

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.

1. Name of Property

Historic name: Waiawa Bridge

Other names/site number: Waiawa Bridge Westbound; 1932 Waiawa Stream Bridge

Name of related multiple property listings: N/A

2. Location

Street & number: Kamehameha Highway westbound and Waiawa Stream

City or Town: Pearl City State: HI County: Honolulu

Not For Publication Vicinity

3. State/Federal Agency Certification

As the designated authority under the National 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 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

Applicable National Register Criteria:

A B C D

<hr/>	
Signature of certifying official/Title:	Date
<hr/>	
State or Federal agency/bureau of Tribal Government	

In my opinion, the property ___meets ___does not meet the National Register criteria.	
<hr/>	
Signature of commenting official:	Date
<hr/>	
Title:	State or Federal agency/bureau of Tribal Government

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4. National Park Service Certification

I hereby certify that this property is:

- entered in the National Register
- determined 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

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Number of resources within Property
(Do not include previously listed sources in this count)

	Contributing	Non-Contributing
Buildings	_____	_____
Sites	_____	_____
Structures	<u>1</u>	_____
Objects	_____	_____
Total	<u>1</u>	_____

Number of contributing resources previously listed in the National Register: N/A

6. Function or Use

Historic Functions

(Enter categories from instructions.)

TRANSPORTATION/road related (vehicular)

Current Functions

(Enter categories from instructions.)

TRANSPORTATION/road related (vehicular)

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7. Description

Architectural Classification

(Enter categories from instructions.)

MODERN MOVEMENT

Materials: (enter categories from instructions.)

Principal exterior materials of property: Concrete

Narrative Description

(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with a **summary paragraph** that briefly describes the general characteristics of the property, such as its locations, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

The Waiawa Bridge exemplifies a multi-span, reinforced-concrete tee-beam bridge constructed in Hawaii during the early 1930s that carries two lanes of westbound Kamehameha Highway traffic over the gulch formed by Waiawa Stream. The length of the bridge is exceptionally long given the relative narrow width of the stream. This is due to the fact that the bridge is built above a stream meander, a bend in the watercourse, resulting in the bridge stretching the length of the meander. The Waiawa Bridge's total length of 332'-0" is divided into six equally spaced spans, each measuring 55'-3" long. The total width of the asphalt-surfaced bridge is 33'-9", including four foot wide shoulders on each side. This bridge has a parapet design featuring narrow arched-top voids and curved end stanchions.

The bridge has high integrity, with the only alterations being the replacement of one end stanchion and guardrails attached to the east stanchions. While the setting has changed somewhat due to increased development, the location, design, materials, workmanship, feeling, and association all retain sufficient integrity.

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Narrative Description

A. TYPE OR FORM

The Waiawa Bridge is a six-span, reinforced concrete tee-beam bridge.

B. SETTING

The Waiawa Bridge is located along a section of Kamehameha Highway about $\frac{5}{8}$ mile east of its junction with Farrington Highway. (Some maps incorrectly label this road segment as part of Farrington Highway.) The bridge is built above a stream meander, a bend in the watercourse, resulting in the bridge stretching the length of the meander. When the new road system was being built, road design took precedent over stream forms, which resulted in this not-ideal bridge placement. The setting around the bridge has changed since its construction, when the surrounding land was almost entirely sugarcane fields (see 1939 aerial photo in this form). However, vegetation in Waiawa gulch screens some of the modern changes from view and provides a rural impression to travelers on the bridge. Without the screening vegetation around the bridge, the urban character of the surrounding area would be evident. South of the bridge and north of the 1950s added lanes for eastbound Kamehameha Highway traffic is the Hawaii Laborers' Training Center. Further south is the H-1 Freeway and Leeward Community College. North and east are large commercial and retail complexes as well as a pair of high-rise residential towers. To the west are the large interchanges of the H-1 and H-2 Freeways plus the Kamehameha Highway, Farrington Highway, and Waipahu Street junctions and crossings.

C. GENERAL CHARACTERISTICS

The Waiawa Bridge is a reinforced-concrete structure carrying two lanes of westbound Kamehameha Highway traffic over the gulch formed by Waiawa Stream. The length of the bridge is exceptionally long given the relative narrow width of the stream. This is due to the fact that the bridge is built above a stream meander, a bend in the watercourse, resulting in the bridge stretching the length of the meander. When the new road system was being built, road design took precedent over stream forms, which resulted in this not-ideal bridge placement. The bridge has six evenly spaced spans, with vertical supports at each bay. Each bay measures approximately 55'-3" each, giving the structure a total length of 332'-0". The width of the asphalt-surfaced bridge is 29'-8" with four foot wide shoulders on each side for a total deck width of 33'-9". The board-formed concrete deck of the Waiawa Bridge is integrated with the four longitudinal girders. The superstructure is supported by a substructure of rectangular, reinforced-concrete bents spaced at 55'-0". The two legs of each bent are cross-shaped in plan (rabbeted corners), with overall dimensions of 3'-10" x 3'-6". The horizontal (top) portion of each bent is a reinforced-concrete beam five feet high with angled corners for support, where it joins the legs. Each bent also has a grade beam with angled corners, tying the bottoms of the two legs together. The

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longitudinal girders are typically about 1'-6" thick and approximately 4'-6" high, but their height is greater at the contact points where they meet the bents; the outboard girders curve slightly at the bents to create spandrels, while the inner girders have angled bracing at the points of support. Joining the girders, above each bent and at two equally spaced planes between bents, are transverse beams with angled-corner connections to the girders. The bridge abutments are board-formed concrete with angled wing walls of varying length, typically between 20' and 30'. Paralleling the highway, there are longer extensions of the wing wall on the south side of the east abutment and on the north side of the west abutment. Projecting six inches outwards from the abutments, at the level where the longitudinal girders attach, is an engaged transverse beam of board-formed concrete. The girders rest on this beam, which is 1'-9" high, not including its beveled bottom surface.

D. SPECIFIC FEATURES

Curved Parapet Design with Arched Voids

The three remaining original concrete end stanchions, set slightly farther apart and at an angle to the roadway, are rectangular in plan and elevation. The concrete parapets between stanchions are three feet high, with a bottom rail measuring nine inches high by 1'-4" wide, and a top rail that is five inches thick and one foot wide. Between these rails are six-inch thick concrete panels perforated with narrow arched openings. These voids are spaced at 1'-1½" on center (o.c.), with each measuring six inches wide and 1'-2" high. This parapet design first appeared on Oahu bridges ca. 1930 and was the standard one during the period between the earlier solid concrete parapets, which were typically in use during the 1920s, and the later parapets with cross-shaped voids that appeared ca. 1936. Along the length of the parapet, at a spacing of 55'-0" o.c., are stanchions that are the height of the parapet and 2'-6" wide. These stanchions each have a plain one inch deep inset panel, which is 1'-10" wide and 1'-2" high. A narrow expansion joint vertically bisects each stanchion.

Six feet from the ends of the parapet, as the bridge approaches, the parapets curve gently away from the edge of the roadway, at an arc of about 25 degrees, before meeting the three extant original end stanchions. These end stanchions are 3'-6" wide, 3'-6" high, and 1'-8" thick, with a nine-inch high base and an 11½" high top cap. A hip-bevel decoration, measuring 3'-0" x 1'-3" and centered on each top cap, rises about 1½" above the cap. Between the base and top cap, the vertical sides of the stanchions are inset about 1½". The three visible sides of the end stanchion (not abutting the parapet) each have an inset panel; the front and back panels are 2'-7" x 1'-2" and the end panel is 10" x 1'-2". The rear and end panels have hip-bevel ornamentation, and the front panel has the name of the bridge or the year of construction inscribed, in 3" high block letters or numbers. The northwest end stanchion is inscribed "WAIAWA". The southwest end stanchion is inscribed "1932" and the northeast end stanchion is inscribed "1933" indicating the construction start and end dates.

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E. IMPORTANT DECORATIVE ELEMENTS & MINOR ALTERATIONS

End Stanchion Replacement & Guardrails

The end stanchion and parapet end of the bridge at the southeast corner is different from the other three and does not appear to be original. This parapet end does not curve away from the roadway. The 3'-0" high concrete end stanchion has a curved shape and measures six feet long and 1'-2" thick. This end stanchion has plain vertical surfaces with no inscription and is a non-contributing element of the bridge. This replacement end stanchion has a steel W-beam guardrail bolted to it. The original end stanchion at the northeast corner also has an attached guardrail. There are steel guardrails to the west of the bridge, but not attached to the end stanchions on that side.

F. INTEGRITY ASSESSMENT

The location of the property has not changed. The Waiawa Bridge is in its original location.

The setting of the property has changed. When the bridge was constructed, the surrounding land was almost entirely in sugarcane cultivation. Currently, vegetation and topography screens much of the nearby urban development to the north and east, along Kamehameha Highway. South of the bridge, the Hawaii Laborers Training Center is visible through the vegetation. Foliage blocks the views of highway development and the H-1 and H-2 Freeway interchanges to the south and west. Integrity of setting is reduced.

The design, materials, and workmanship of the property are largely intact. Besides the replacement of one stanchion, the only alteration is the addition of metal guardrails. The historic character of the other three concrete stanchions, the parapets, and the structural framework on the substructure of the bridge is still readily apparent.

The property retains integrity of feeling and association. The bridge expresses the historic sense of the time of its construction. The bridge has sufficient integrity to convey its association with the important highway improvements of that period.

The overall integrity of the property remains high, except for the setting. The few changes (one parapet replaced and two guardrails attached) made to the bridge since construction are minor and do not diminish its integrity.

TERMS	DEFINITION
abutment	A structure built to support the lateral pressure of an arch or span.
bevel	An edge of a structure that is not perpendicular to the faces of the element.
parapet	A low protective wall along the edge of a roof, bridge, or balcony.
stanchion	An upright bar, post, or frame forming a support or barrier.

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8. Statement of Significance

Applicable National Register Criteria

(Mark 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 constructions or represents the work of 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 pre-history or history.

Criteria Considerations

(Mark all the boxes that apply.)

- A. Owned by 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

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Areas of Significance

(Enter categories from instructions.)

Transportation

Period of Significance

1933-1970

Significant Dates

Significant Person

(Complete only if Criterion B is marked above.)

Cultural Affiliation

Architect/Builder

Merritt A. Trease (Design engineer)

J.L. Young Engineering Co. (contractor)

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Previous documentation on file (NPS):

- preliminary determination of individual listings (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 # _____
- Historic American Engineering Record # HI-101
- Historic American Landscape Survey # _____

Primary location of additional data:

- State Historic Preservation Office
- Other State agency
- Federal agency
- Local government
- University
- Other (Name of repository): Hawaii DOT, Highways Div., Design Branch

Historic Resources Survey Number (if assigned): _____

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Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

The Waiawa Bridge is significant at the local level under Criterion A for its association with the Native Hawaiian toponymy of the Waiawa/Wai'awa Ahupua'a as a fertile lowland of wetland farming of Kalo. The area is also known for its cultivation of milkfish in the shoreline loko i'a. The bridge contributed to the modern development in the area that began in the early 1900's and the development of an effective road transportation network on Oahu as part of the Kamehameha Highway segment of Oahu's belt road system. This bridge is the earliest one remaining in the area formerly known as Ewa Junction. This was a significant transportation intersection, where the original government road system had diverging alignments. The main belt road (Kamehameha Highway) led from the junction either east to Honolulu or north to Schofield Barracks then around the North Shore to the windward side. The other section of government road (also called Waipahu and Waianae Roads, then later Farrington Highway) started at the junction and extended west to the southwest plains and then north up western coastline of Oahu.

The Waiawa Bridge is also significant under Criterion C by embodying distinctive characteristics of a type of construction. It is notable for the engineering represented in its individual span lengths of 55' and its overall length of about 330', which place Waiawa Bridge among the longest in Hawaii for tee-beam bridges.

This property's significance in the area of transportation (Kamehameha Highway and Oahu belt road history) for the period from its 1933 construction through 1970 (when the H-1 Freeway became the main road corridor in this vicinity), also links it to the development of the Pearl City area. The narrative about the development history of the bridge includes information on the bridge's designer and contractor. This form provides additional context information on tee-beam bridges in Hawaii as well.

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Narrative Statement of Significance

CRITERION A

The Waiawa Bridge is significant at the local level under Criterion A for its contribution to the development of an effective road transportation network on Oahu, as part of the Kamehameha Highway segment of Oahu's belt road system. This bridge is the earliest one remaining in the area formerly known as Ewa Junction. This was a significant transportation intersection, where the original government road system had diverging alignments. The main belt road (Kamehameha Highway) led from the junction either east to Honolulu or north to Schofield Barracks then around the North Shore to the windward side. The other section of government road (also called Waipahu and Waianae Roads, then later Farrington Highway) started at the junction and extended west to the southwest plains and then north up western coastline of Oahu

Typonymy of Waiawa/Wai'awa Ahupua'a

In Hawaiian custom, places are either named according to their geographical features and water sources. In the case of this ahupua'a (traditional sub-district), water sources are found throughout the land. There are two interpretations of the typonymy of the ahupua'a. Interpreted as Waiawa, it translates as "water [of the] milkfish."¹ Awa are milkfish found in the waters off in Ke-Awa-o-Pu'uloa (Pearl Harbor). Interpreted as Wai'awa (note the 'okina in the word), it translates as "Water [mixed with] the kava plant." The root of the 'awa or kava plant is a traditional narcotic drink and also for medicinal uses. Both interpretations associate with traditional narratives of the ahupua'a. Waiawa/Wai'awa is one of the thirteen sub-districts of the 'Ewa moku (district), situated between two ahupua'a: Mānana to the east and Waipi'o to the west.

Mythology of Waiawa/Wai'awa

A traditional story regarding the ahupua'a is associated with Kamapua'a, a supernatural being in the form a pig. Kamapua'a gained the lands of O'ahu after the death of an O'ahu chief by the name of 'Olopana. Lonoawohi, a kahuna (spiritual expert) who was deposed by 'Olopana from his position, asked the aid of Kamapua'a. After 'Olopana was killed, Lonoawohi asked Kamapua'a for lands of his own. Kamapua'a gave the waterlands of O'ahu to the kahuna. Thus, all lands with the word "wai" in it, including Waiawa/Wai'awa, were that of Lonoawohi and the Lono (deity of agriculture, fertility, and peace) class of kahuna.²

There are two traditional narratives that connect the ahupua'a to the 'awa plant:

¹ Mary Kawena Puku'i, Samuel Elbert, Esther T. Mo'okini, *Place Names of Hawaii*. Honolulu: University of Hawai'i Press, 1974. www.ulukau.org

² Abraham Fornander, "Kaao No Kamapuaa" *Fornander Collection of Hawaiian Antiquities and Folk-Lore Volume 5*. trans. Thomas G. Thrum. Honolulu: Bishop Museum Press, 1918-1919, 316-327.

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'Awa and Kāne

Two of the four paramount deities of Hawaiian mythology, Kāne and his companion Kanaloa, were upon the lands including this noted ahupua'a. Kāne, considered as the ultimate deity of the paramount gods, takes many godly forms such as the deity of procreation, deity of freshwater springs and patron of 'awa.³ While Kāne and Kanaloa were in the ahupua'a, they were invoked by a farmer named Maihea. In his pule (incantation) to the deities, he offered 'awa, kalo (taro), and 'uala (sweet potatoe) to Kāne and Kanaloa in request for guidance and good health.

A Variety of 'Awa

There is a special variety of 'awa that that was not common but found in the uplands of the ahupua'a. This variety was called 'awa popolo or dark kava.⁴

Waiawa/Wai'awa and its Resources

Water was key for life to flourish, thus many of the traditions of Waiawa/Wai'awa are associated with the lowlands of the ahupua'a. The Waiawa Stream was important and well utilized in the lowlands. The stream was imperative for the productive wetland farming such as kalo. The district of 'Ewa, including the ahupua'a of Waiawa/Wai'awa was traditionally known for a variety of kalo called kāī, known for its fragrance when it is cooked or made into poi. Other varieties of kāī includes kāī 'ula'ula (red kāī), kāī koi, kāī kea (fair kāī), kāī ke'oke'o (white kāī), and kāī uliuli (dark kāī). The Waiawa Stream also provided much nutrients for the shoreline fauna. The ahupua'a was also known for its cultivation of awa mo'i or milkfish in the shoreline loko i'a (fishponds). The connection between the ahupua'a tenants of the land and awa is apparent in a poetical phrase noted in in an oli (chant) composed by a chief named Kapa'ahulani⁵ who wished that the new ali'i 'ai moku (paramount island chief), Kualii'i, the nineteenth paramount of O'ahu during the early 1700s, might serve the people well and blessed his army with this phrase in the oli:

"E ku'u kāua i ka loko awa o Waiawa."

Let us cast the net in the awa pond of Waiawa

The meaning of this phrase spoke about the rewards of victory of the battle by Kualii'i that occurred on the Keahumoa plain of Honouliuli ahupua'a. The reward was that the warriors and chief help themselves to the harvest of the sea.

Waiawa/Wai'awa during the Great Māhele

By 1848, during the reign of Kamehameha I's most sacred son, Kauikeaouli Kamehameha [Kamehameha III], the Hawaiian traditions of royal land tenure transformed to a codified western

³ Martha Beckwith, *Hawaiian Mythology* Honolulu: University of Hawai'i Press, 1970, 65.

⁴ Elspeth P. Sterling and Catherine C. Summers, *Sites of Oahu*. Honolulu: Bishop Museum Press, 1978, 43.

⁵ Abraham Fornander, "Ka Pule Ana a Kapaahulani" *Fornander Collection of Hawaiian Antiquities and Folk-Lore Volume 4*. trans. Thomas G. Thrum. Honolulu: Bishop Museum Press, 1918-1919, 400.

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practice of private land ownership⁶ by way of the Organic Acts of 1845 and 1846 that initiated the process of the Māhele and land commission awards (LCA). There are two perspectives regarding the definition of “māhele.” Westerners refer to it as a “division of the communal rights into individual portions.” In 1850, under the Kuleana Act, it allowed maka‘āinana (tenants to the land) to make claim on the lands they had lived and cultivated on.

There is no parcel that is directly related to the area of significance. However, it is noted that there was a parcel situated north of the site. That claimant of LCA 10942:2 belonged to William Wallace.

Context and Development History

Before construction of the 1933 Waiawa Bridge, this part of Kamehameha Highway followed a curving path down into and out of Waiawa gulch. The earlier highway alignment crossed Waiawa Stream on a short bridge that was located to the south of the current one. The surrounding land use, up until World War II, was entirely agricultural, either sugarcane or pineapple plantations. During World War II, the Navy developed lands around this bridge for various uses. Urban land uses, rather than agricultural or military, now are dominant in the area of the bridge.

Starting in the mid-nineteenth century, the successive Kingdom, Provisional Government, Republic, and Territory of Hawaii leaders always had the goal of an improved road system, especially a "belt road" around each island. However, they constantly faced the challenge of building this infrastructure within the financial constraints of their budgets. Once funds from the federal government became available, after 1925, to assist in the financing of Hawaii's roads and bridges, the belt roads on the main islands were completed and further roadway improvements continued.

After Hawaii became a U.S. Territory at the turn of the twentieth century, it expected to become a state eventually, and to share in federal appropriations. However, it took a long time to obtain the funding from Congress to which Hawaii was entitled. There were various reasons for the delay, including the fact that Hawaii had no voting member in either U.S. legislative chamber. The 1925 federal road funds for Hawaii were restricted to construction linking military installations and National Park units to ports.⁷

Mainland states had been receiving Federal highway funds since 1917, while Hawaii received none until 1925. The Federal government provided a portion of those "lost" funds to Hawaii in 1931 with a "special appropriation amounting to \$880,000 ... as the amount of Federal Aid that the Territory would have earned during the period 1917-1925."⁸ The Waiawa Bridge was constructed with these "Emergency Highway" funds; thus, it was designated Federal Aid Project E-9-B, with the E denoting the special

⁶ Lilikalā Kame'eleihiwa, *Native Land and Foreign Desires: Pehea Lā E Pono Ai?*. Honolulu: Bishop Museum Press, 1992, pg. 8.

⁷ Thomas S. MacDonald, "Highway Administration in the United States," *Good Roads*, November 1925. pp. 275-277

⁸ Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1932*. Honolulu: Advertiser Publishing Co., Ltd. 1933. p. 21

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funding (although sometimes the E is dropped from the FAP number).⁹

As noted by the Superintendent of Public Works in his report for 1933, for the "Federal Aid Emergency Projects, all funds ... had to be expended within a certain period."¹⁰ The Waiawa bridge and seven other road projects were accomplished within a year or two (deadline of June 30, 1933 to spend or obligate funds), which was a tremendous burst of transportation improvements for the Territory. Dedicated public employees and contracting firms completed this large amount of work within the deadline.

One of the devoted staffers, Merritt A. Trease was the designer of the bridge. Thompson's inventory of Oahu bridges notes him as the "design engineer" for Waiawa Bridge.¹¹ The city directories of the early 1930s list Trease as a draftsman, rather than as an engineer,¹² but the original drawings for the bridge show his elegantly penned initials, M.A.T., on the "Designed by" line. Trease progressed steadily in his career. Louis S. Cain, Superintendent of Public Works for the Territory of Hawaii, had recruited him from Denver in 1926. By 1964, when Trease retired, he was head planning engineer of the Highways Division for the State of Hawaii, Department of Transportation.¹³

This 1933 bridge was part of a new section of road that re-routed Kamehameha Highway from its earlier alignment, which had curved south into Waiawa gulch. The 1933 Waiawa Bridge and road section eliminated that bend, which had been the most prominent curve in the highway along the stretch between Ewa Junction and Pearl City Junction. That arc in the earlier roadway routing carried the highway down and up the sides of Waiawa gulch, in order to cross Waiawa Stream with a relatively short and inexpensive bridge. By the early 1930s technological developments and federal funding assistance allowed this long (approximately 330') 1933 Waiawa Bridge to cross the gulch in a straighter alignment. The bridge was completed in the first half of 1933, at a cost of \$89,466.02.¹⁴

Another road improvement in the area, made several years later, ca. 1940, was the section of highway constructed just north of this bridge. This section, called the Waiawa Cutoff,¹⁵ branched off Kamehameha Highway just east of the Waiawa Bridge. It curved east and north and rejoined Kamehameha Highway just north of Ewa Junction, thereby allowing traffic between Waiawa and Pearl City to bypass Ewa Junction.

⁹ Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1932*. Honolulu: Advertiser Publishing Co., Ltd., 1933. pp. 26 & 34

¹⁰ *Ibid.*, for the Year Ending June 30, 1933. Honolulu: Advertiser Publishing Co., Ltd. 1934. p. 8.

¹¹ Bethany Thompson, *Historic Bridge Inventory, Island of Oahu* (Prepared for the State of Hawaii, Department of Transportation) 1983. p. VII-129

¹² Polk-Husted Directory Co., *Directory of the City and County of Honolulu and the Territory of Hawaii*, Vols. 1931-32 through 1934-35 (Honolulu: Author) 1931-1934. var. pag

¹³ "Trease: A Roadmap in His Head," *Honolulu Advertiser*, July 12, 1964, article at the University of Hawaii at Manoa Hamilton Library, Honolulu Newspapers Clippings Morgue, on microfiche in Biographical Section under: Trease, Merritt and Esther

¹⁴ Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1933* Honolulu: Advertiser Publishing Co., Ltd., 1934. p. 15.

¹⁵ Territorial Highway Department, *Hawaii Highway Planning Survey, Bridge Inventory for the Island of Oahu* (Prepared in Cooperation with U.S. Department of Commerce, Bureau of Public Roads) September 1950. Bridge Names (second map)

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At the time of the 1933 Waiawa Bridge's construction, it carried Kamehameha Highway traffic in both directions, one lane eastbound (from Ewa Junction) and one lane westbound (to Ewa Junction). This traffic pattern on Waiawa Bridge, with one lane in each direction, lasted until ca. 1953 when another section of highway, with a 1952 bridge, opened, south of the Waiawa Bridge. (The 1952 bridge alignment across Waiawa Gulch is approximately above the location of the pre-1933 bridge, on the curved section of the early twentieth century highway alignment.) When the ca. 1953 project (two-lane bridge and highway section) was finished, it carried Kamehameha Highway's eastbound traffic, while the two lanes of the 1933 Waiawa Bridge carried the westbound traffic. In conjunction with this 1952 eastbound bridge construction, the Territory also built an overpass bridge in 1953, which crosses Kamehameha Highway just east of the Waiawa Bridge. This 1953 overpass allows eastbound traffic from Waiawa Cutoff to merge into Kamehameha Highway without having to stop for an intersection.

The 1933 Waiawa Bridge is the oldest functioning roadway structure in the complex of bridges and overpasses surrounding the formerly simple intersection called Ewa Junction. Traffic in this vicinity increased tremendously during World War II, with the rapid development of numerous Navy installations in the area. In Waiawa and Pearl City, these Navy installations included the Manana storehouses and adjacent Construction Battalion housing area, as well as scattered sections of the Naval Aviation Supply Depot. Other nearby installations were the Naval Supply Depot's Fuel Annexes at Ewa Junction and at Pearl City Peninsula, plus several Navy activities on Waipio Peninsula. In 1970, H-1 Freeway overpasses and ramps added complexity to the road system in this area, which was further complicated when the H-2 Freeway interchange was built later in the 1970s, northwest of this bridge.

Ewa Junction was a point about halfway between the towns of Pearl City and Waipahu, where the main road from Honolulu forked. On nineteenth-century maps, the name of this main route to and from Honolulu generally is "Government Road." On the 1928 U.S. Geological Survey map for Waipahu Quadrangle, the main road from/to Honolulu and the branch leading to the North Shore are both segments of Kamehameha Highway. On that map, the only major road to Ewa (running through Waipahu) has a label of Waianae Road, at a point west of Honouliuli Stream. About 1939, the Territory of Hawaii had Farrington Highway built from Waianae Road (near Honouliuli Stream) to Ewa Junction; this added another road to the Ewa Junction intersection. By then, the name of the Government Road segment leading from Ewa Junction to Honouliuli, past Waipahu Mill, was Waipahu Road. With the addition of Farrington Highway, there were four road branches converging on Ewa Junction. An aerial photo shows that a circle within a triangle of roads existed here by 1943 (National Archives #80-G-410689). An aerial from 1953 (National Archives # 80-G-633618) shows a more complicated intersection superimposed on the earlier pattern, due to the ca. 1953 road sections and bridges discussed above. Development of both the Kamehameha and Farrington Highways into divided thoroughfares plus construction of the H-1 and H-2 interchanges in subsequent decades created the current tangle of roads and overpasses.

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Pearl City Area

Pearl City was Oahu's first planned suburban development,¹⁶ initiated by Benjamin F. Dillingham in 1890. Dillingham started the Oahu Railway & Land Company railroad line the year before, and created Pearl City by subdividing his land on the (Pearl City) peninsula and further *mauka* (common Hawaiian term meaning: toward the mountains), in the area of Pearl City Junction, where Lehua Avenue (the subdivision's main access road) intersected the Government Road (future Kamehameha Highway). The railway link from Pearl City to Honolulu was a selling point for the development. Prices for subdivided lots sold at auction in November 1890 began at \$44 per lot.¹⁷ Sales and population growth in the early decades were slow; in 1892, there were about 550 unsold lots remaining, out of 800.¹⁸

Up until 1920, the area was still a small settlement, despite the "City" in its name. Starting in the 1910s, some military families joined the peninsula's original residents.¹⁹ The area was popular due to availability of inexpensive rentals, which appealed especially to non-commissioned officers, and because of its convenient location. Navy personnel (military or civilian) used small boats or ferry services, commuting by water to Ford Island and the main base at Pearl Harbor. Most of the Hawaiian, Chinese, and Japanese families in Pearl City worked small farming operations in taro, rice, bananas, and watercress. Another typical occupation for these families was as domestic help for their wealthier neighbors.²⁰ Affluent families, usually Caucasian, purchased most of the waterfront lots on Pearl City Peninsula and eventually put up weekend homes there, while maintaining primary residences in Honolulu.

During the 1920s and 1930s as automobiles became more common and roads were improved, the Pearl City area grew in population with residents who commuted to work in Honolulu. During World War II, the Navy gained control of all the Pearl City Peninsula land and developed it with a variety of facilities, few of which remain. The Navy condemned the Pearl City Peninsula land after the war and redeveloped it, mostly with military housing.²¹ The growth trend in adjacent parts of Pearl City, next to and *mauka* of the peninsula, also continued, with housing "sprout[ing] in former agricultural areas" and displacing much of the small farm parcels and sugarcane land.²² Along with this increase in housing, the establishment of businesses along Kamehameha Highway encouraged additional community growth.

¹⁶ Jim Chiddix and MacKinnon Simpson, *Next Stop Honolulu, Oahu Railway & Land Company 1889-1971*. Honolulu: Sugar Cane Press, 2004. p. 38.

¹⁷ Pearl City Library, *Pearl City: A Look at the Past: an oral history project*. Wahiawa: Wonder View Press, 1992. p. 70.

¹⁸ Jim Chiddix and MacKinnon Simpson, *Next Stop Honolulu, Oahu Railway & Land Company 1889-1971*, 2004. p. 42.

¹⁹ Ann Yoklavich, *Historic American Buildings Survey* (HABS), U.S. Naval Base, Pearl Harbor, Pearl City Peninsula, HABS No. HI-393 Prepared for Commander Navy Region Hawaii, 2004. p. 3.

²⁰ Joyce Chinen, "The Suburbanization of Pearl City," *The Pearl City Local History Project* (Pearl City: Cultural Heritage Learning Center) 1994. p. 10.

²¹ Ann Yoklavich, U.S. Naval Base, Pearl Harbor, Pearl City Peninsula, HABS No. HI-393, 2004. pp. 5-9.

²² Joyce Chinen, "The Suburbanization of Pearl City," *The Pearl City Local History Project*, 1994. p. 11.

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By the late 1950s, Pearl City's growth mirrored national patterns of suburban development that were differentiated by a suburb's "age, socioeconomic status, activities, racial and ethnic composition, household composition, and relationship to central cities;" however, it was also "very unique" because the period of martial law during the war had a "profound impact on the transformation of the Pearl City area." This was due to the confiscation of land and other property that affected Japanese farmers in the area, divesting them of their homes and sources of income. This re-apportionment of Pearl City land, along with "the influx of new populations from the mainland, active duty and civilian defense workers, meant new residents and new services for the area, and set the stage for the post war development that followed." The end of many farming operations and the displacement of former residents "created somewhat of a social vacuum in the area" and allowed much of the post-war development, including several subdivisions built *mauka* of Kamehameha Highway. The fee simple titles that were available for these lots were a powerful motivator for families looking to own a home in the 1950s. This, combined with the demolition and redevelopment of low and moderate income neighborhoods in and adjacent to downtown Honolulu in the late 1950s and early 1960s helped to redistribute housing to areas further from downtown Honolulu, including Pearl City where the new residents were typically younger working-class families. Shopping centers and other facilities (both private and public) opened to serve the emerging community.

The construction of the H-1 Freeway in the late 1960s increased the opportunity for commuters, and created a surge in demand for housing that stimulated another phase of development. This included high-density housing and franchise retailing operations. In the same period, this development extended eastward along Kamehameha Highway into the adjacent Waiau and Waimalu areas.²³

CRITERION C

The bridge is further eligible under Criterion C as an example of concrete tee-beam bridge design that significantly increased structural load-bearing capacity and thus represents an important step in the evolution of bridge technology. It is notable for the engineering represented in its individual span lengths of 55' and its overall length of about 330', which place Waiawa Bridge among the longest in Hawaii for tee-beam bridges.

Engineering & Design

James L. Young, the engineer and contractor who built the Waiawa Bridge, also contributed to the success of the project. He had a long history of achievement in Hawaii, following his 1905 arrival here while in civil service with the U.S. Army Engineers and Quartermaster Department. He was born in Kentucky, educated there and in Ohio as both an architect and engineer. He worked on the mainland

²³ Joyce Chinen, "The Suburbanization of Pearl City," *The Pearl City Local History Project*, 1994. p. 13

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and in Cuba before coming to Hawaii. His first five years in Hawaii involved building Fort Shafter and inaugurating construction at Fort Ruger, Fort Kamehameha, and Schofield Barracks; in 1910 he started the Lord-Young Engineering Co., which later became J.L. Young Engineering Co.²⁴ He practiced in Hawaii for at least twenty-five years as a general contractor and consulting engineer. His extensive list of projects included: ordnance buildings on Magazine Island (now Kuahua Peninsula at Pearl Harbor), hangars on Ford Island, University of Hawaii (at Manoa) library and administration building (George Hall), five structures at Palama Settlement, Honolulu Star-Bulletin Building, Hawaii State Library, Pantheon Block, and Bishop Museum laboratory (Konia Hall).²⁵

Tee-Beam Bridges

Concrete tee-beam bridges are the most common type of extant pre-World War II bridges in the State of Hawai'i.²⁶ They are a part of the evolution of reinforced-concrete deck bridge technology in Hawai'i that began with the first slab bridges around 1908. Often county designed, these early slab bridges frequently consisted of concrete decks that replaced older bridges featuring original lava rock or mortar abutments. The design of reinforced-concrete deck bridges progressed rapidly during the first decades of the 20th century.²⁷ The strength and low cost of concrete girder and tee-beam types led to their use in locations with short spans, rather than concrete-arched types.

Although the earliest tee-beam bridges in Hawai'i date from about 1912, after 1925 they became the preferred bridge type of the Territorial Highway Department until the 1950s. The pattern of reinforcing steel within girders distinguishes the tee-beam type from other concrete girder bridges and serves to structurally join the girders and the deck, allowing the two components to work together and carry a greater load. This relatively small change over standard girder construction provided an increased carrying capacity.

Tee-beam bridges in Hawai'i generally have parapets with voids capped by a reinforced-concrete rail. Several standard rail patterns were used by the Territorial Highway Department including the "Greek Cross", arched, and simple rectangular voids."²⁸ Earlier lava rock or concrete masonry bridges typically had solid railings.

The individual span length of about 55' for the Waiawa Bridge is notable for tee-beam bridges, and among the longest span length on the island for this type, with only three other Oahu tee-beam bridges having longer maximum spans. Due to this bridge's six spans, it has an overall length of approximately 330' that is also distinctive for tee-beam bridges. Comparing overall dimensions, this is the third longest tee-beam bridge on Oahu.

²⁴ George F. Nellist, *The Story of Hawaii and Its Builders*. Honolulu: Honolulu Star-Bulletin, Ltd., 1925. p. 911.

²⁵ George F. Nellist, *Men of Hawaii, Volume IV* Honolulu: Honolulu Star-Bulletin, Ltd., 1930. pp. 591-593

²⁶ Heritage Center, School of Architecture, UH Manoa, State of Hawaii, Historic Bridge Inventory and Evaluation (Draft prepared for the State of Hawaii, Department of Transportation, Highways Division) 2008. P. I-72.

²⁷ Parsons Brinckerhoff and Engineering and Industrial Heritage, A Context for Historic Bridge Types, NCHRP Project 25-25, Task 5, Prepared for the National Cooperative Highway Research Project, October 2005. Pp. 2-26.

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Conclusion

The Waiawa Bridge is significant at the local level under Criterion A for its contribution to the development of an effective road transportation network on Oahu, as part of the Kamehameha Highway segment of Oahu's belt road system. This bridge is the earliest one remaining in the area formerly known as Ewa Junction. This was a significant transportation intersection, where the original government road system had diverging alignments. The main belt road (Kamehameha Highway) led from the junction either east to Honolulu or north to Schofield Barracks then around the North Shore to the windward side. The other section of government road (also called Waipahu and Waianae Roads, then later Farrington Highway) started at the junction and extended west to the southwest plains and then north up western coastline of Oahu.

The bridge is further eligible under Criterion C as an example of concrete tee-beam bridge design that significantly increased structural load-bearing capacity and thus represents an important step in the evolution of bridge technology. It is notable for the engineering represented in its individual span lengths of 55' and its overall length of about 330', which places Waiawa Bridge among the longest in Hawaii for tee-beam bridges.

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9. Bibliography

Architectural Drawings, Maps, and Aerial Photos

Original drawings of the Waiawa Bridge are electronic files (scans) located in the database at the Hawaii, Department of Transportation, Highways Division, Design Branch: FAP No. E-9-B, Kamehameha Highway. Revised 9/9/1932.

No early photographs of the bridge were located.

Historic maps and aerial photos are located in the collections of the Hawaii State Archives. National Archives II, in College Park, Maryland, also has historic aerial photos of this area.

Current Aerial Photo from Google Earth 6.1. Pearl City vicinity. Approximate elevation 3000', Borders and Labels data layer. Available from server kh.google.com, accessed February 13, 2013.

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Yoklavich, Ann. *Historic American Buildings Survey (HABS), U.S. Naval Base, Pearl Harbor, Pearl City Peninsula, HABS No. HI-393*. Prepared for Commander Navy Region Hawaii. 2004.

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10. Geographical Data

Acreeage of Property Less than one acre

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates (decimal degrees)

Datum if other than WGS84: _____

(enter coordinates to 6 decimal places)

- | | | |
|----|-----------------|------------------|
| 1. | Latitude: _____ | Longitude: _____ |
| 2. | Latitude: _____ | Longitude: _____ |
| 3. | Latitude: _____ | Longitude: _____ |
| 4. | Latitude: _____ | Longitude: _____ |

Or

UTM References

Datum (indicated on USGS map):

NAD 1927 NAD 1983

- | | | |
|--------------------|------------------------|--------------------------|
| 1. Zone: <u>04</u> | Easting: <u>605720</u> | Northing: <u>2366360</u> |
| 2. Zone: _____ | Easting: _____ | Northing: _____ |
| 3. Zone: _____ | Easting: _____ | Northing: _____ |
| 4. Zone: _____ | Easting: _____ | Northing: _____ |

Verbal Boundary Description (Describe the boundaries of the property.)

The boundary of tWaiawa Bridge is defined by the limits of the bridge itself, enclosed by a parallelogram measuring approximately 350' x 60' that includes the bridge superstructure and abutments.

Boundary Justification (Explain why the boundaries were selected.)

The boundary includes all historic features of both bridge.

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11. Form Prepared By

name/title Dee Ruzicka
organization Mason Architects, Inc.
street & number 119 Merchant Street, Suite 501
city or town Honolulu state HI zip code 96813
e-mail dr@masonarch.com
telephone 808-536-0556
date February 26, 2013

name/title Lorraine Minatoishi
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street & number 1429 Makiki St. Suite 2-211
city or town Honolulu state HI zip code 96814
e-mail lm@mahawaii.com
telephone 808-285-1184
date July 16, 2014

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)

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Index of Figures

Name of Property: Waiawa Bridge
City or Vicinity: Pearl City
County: Honolulu
State: Hawai'i
Location of Original Digital Files: 1429 Makiki St., Honolulu, HI

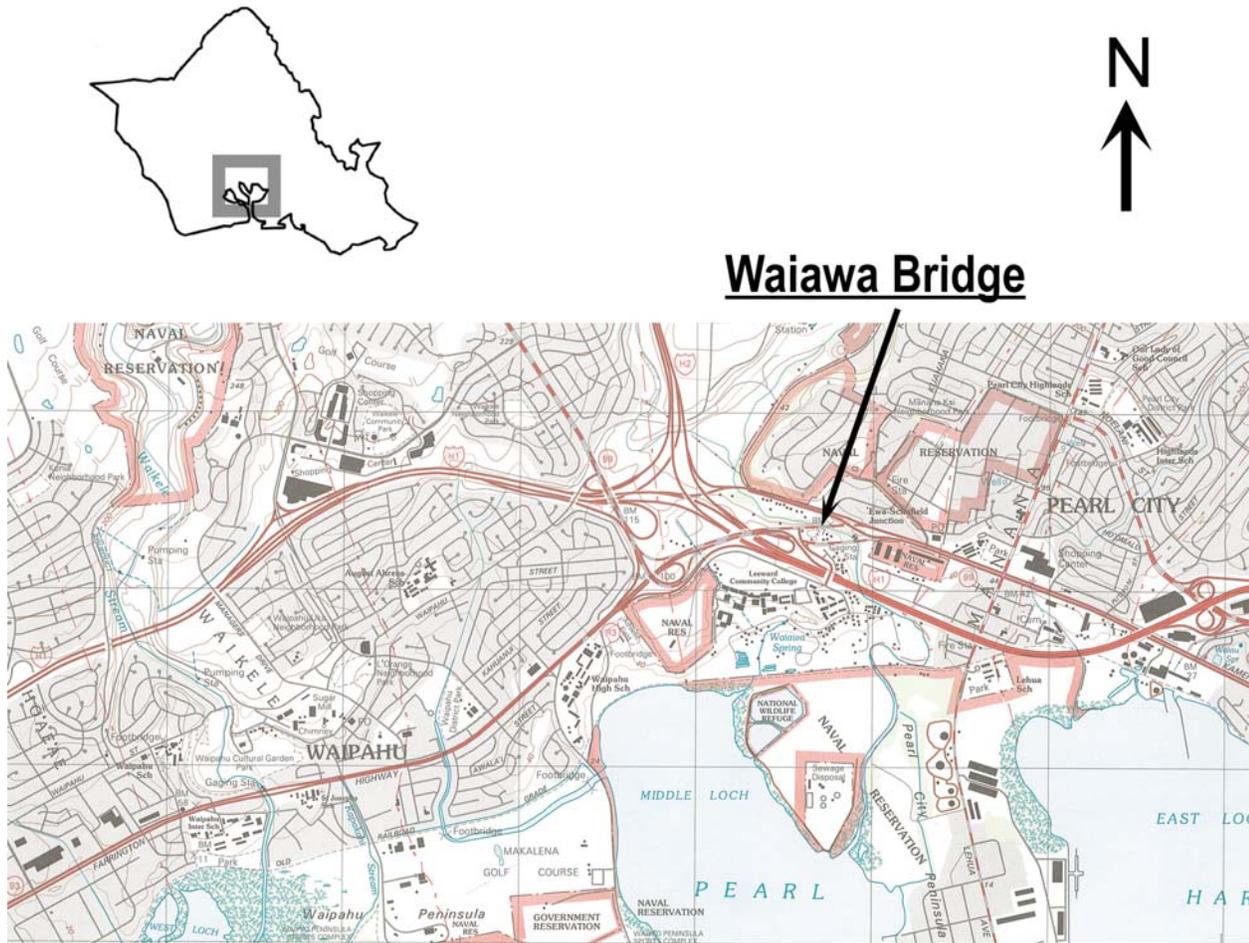
Figure #: File Name	Description
Figure 1: HI_Honolulu_WaikeleCanalBridge_Fig0001	USGS Map
Figure 2: HI_Honolulu_WaikeleCanalBridge_Fig0002	GoogleEarth Map
Figure 3: HI_Honolulu_WaikeleCanalBridge_Fig0003	Topographic Map 1927
Figure 4: HI_Honolulu_WaikeleCanalBridge_Fig0004	Aerial Photograph 1939
Figure 5: HI_Honolulu_WaikeleCanalBridge_Fig0005	Topographic Map 1943
Figure 6: HI_Honolulu_WaikeleCanalBridge_Fig0006	Topographic Map 1954
Figure 7: HI_Honolulu_WaikeleCanalBridge_Fig0007	Original Drawing of Bridge

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Figure 1: HI_Honolulu_WaikeleCanalBridge_Fig0001

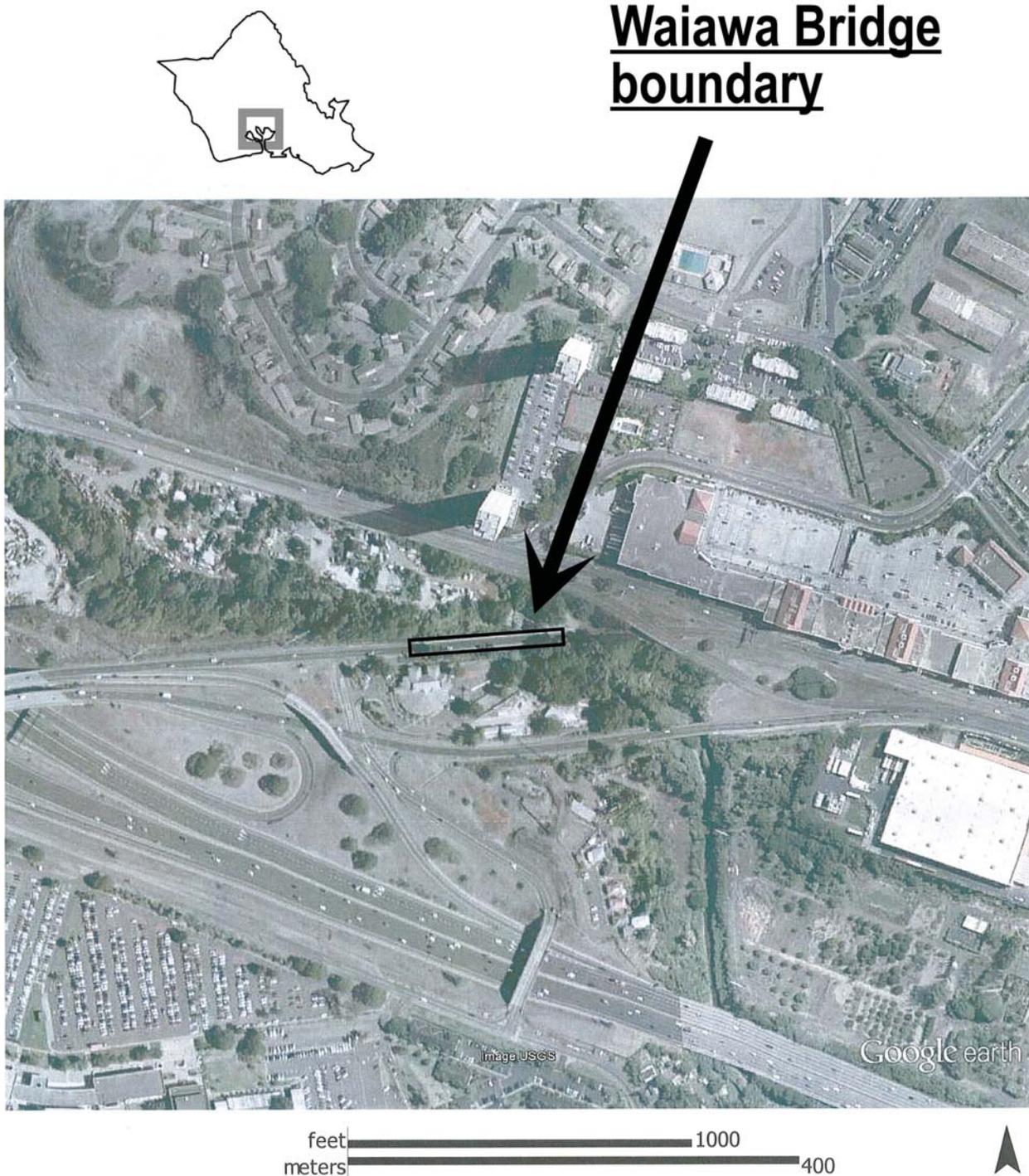
Location map for Waiawa Bridge. *U.S. Geological Survey, Waipahu Quadrangle, 1:24,000, 1998.*



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Figure 2: HI_Honolulu_WaikeleCanalBridge_Fig0002
Boundary Map for Waiawa Bridge. *Google Earth, 2013.*



Waiawa Bridge

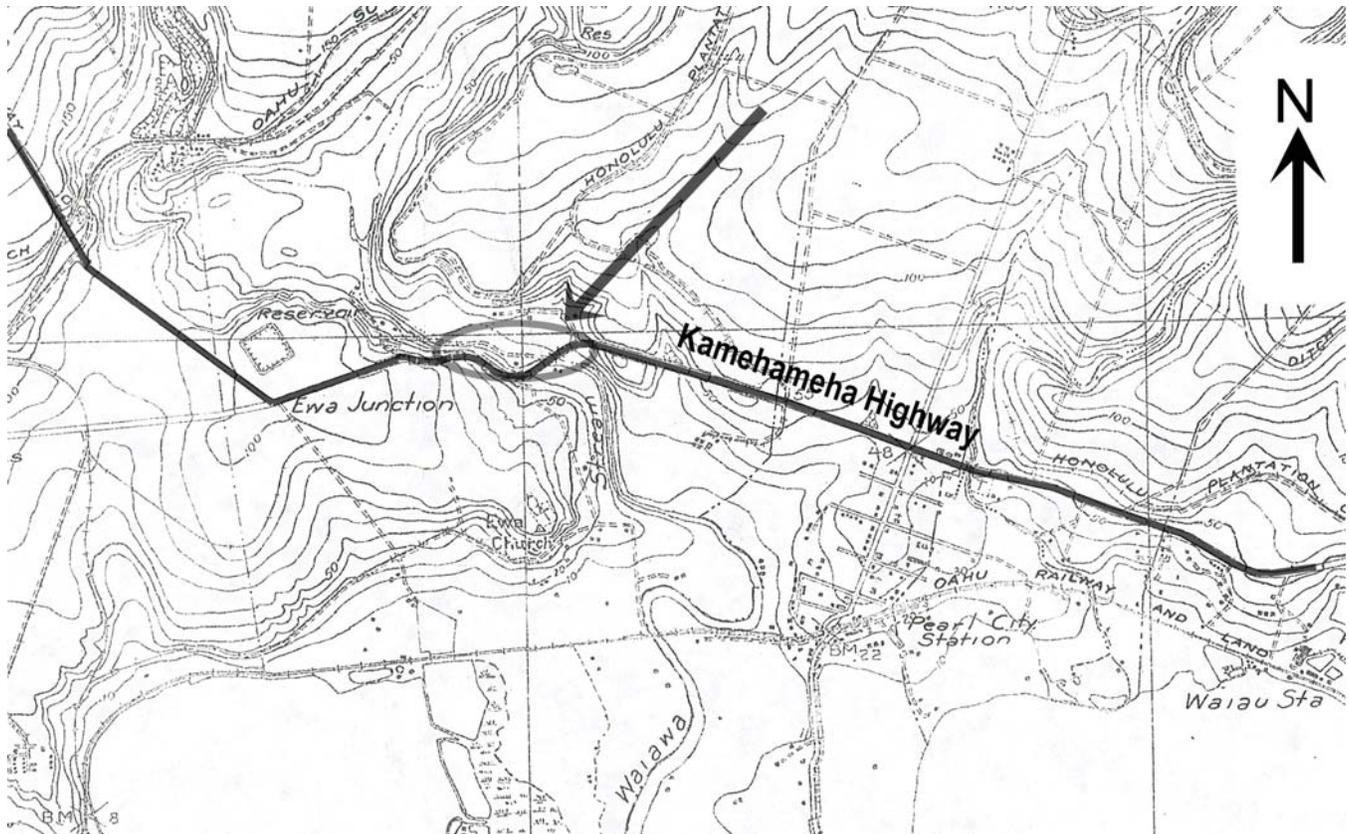
Name of Property

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Figure 3: HI_Honolulu_WaikeleCanalBridge_Fig0003

Portion of topographic map from 1927 showing the future location of the Waiawa Bridge (added arrow, labeling, and oval highlight). U.S. Geological Survey, Waipahu Quadrangle, 1:20,000, 1927.

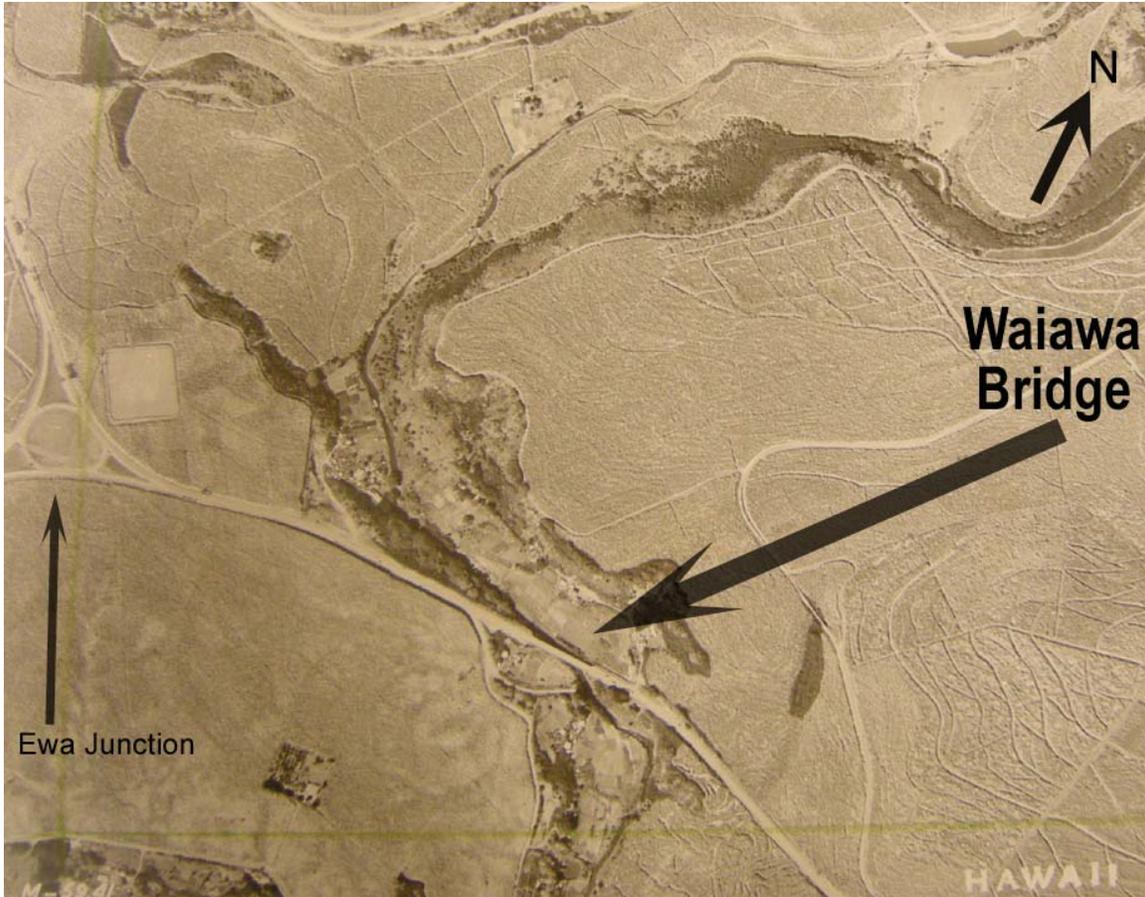


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Figure 4: HI_Honolulu_WaikeleCanalBridge_Fig0004

Portion of aerial photo ca. 1939 showing the Waiawa Bridge on Kamehameha Highway east of Ewa Junction (added arrows and lettering). Note the curve of the former highway alignment south of the bridge and the circle at Ewa Junction. *Hawaii State Archives, Folder PPA-59-2, photo M-58.41, U.S. Army Air Corps, 1939-41.*

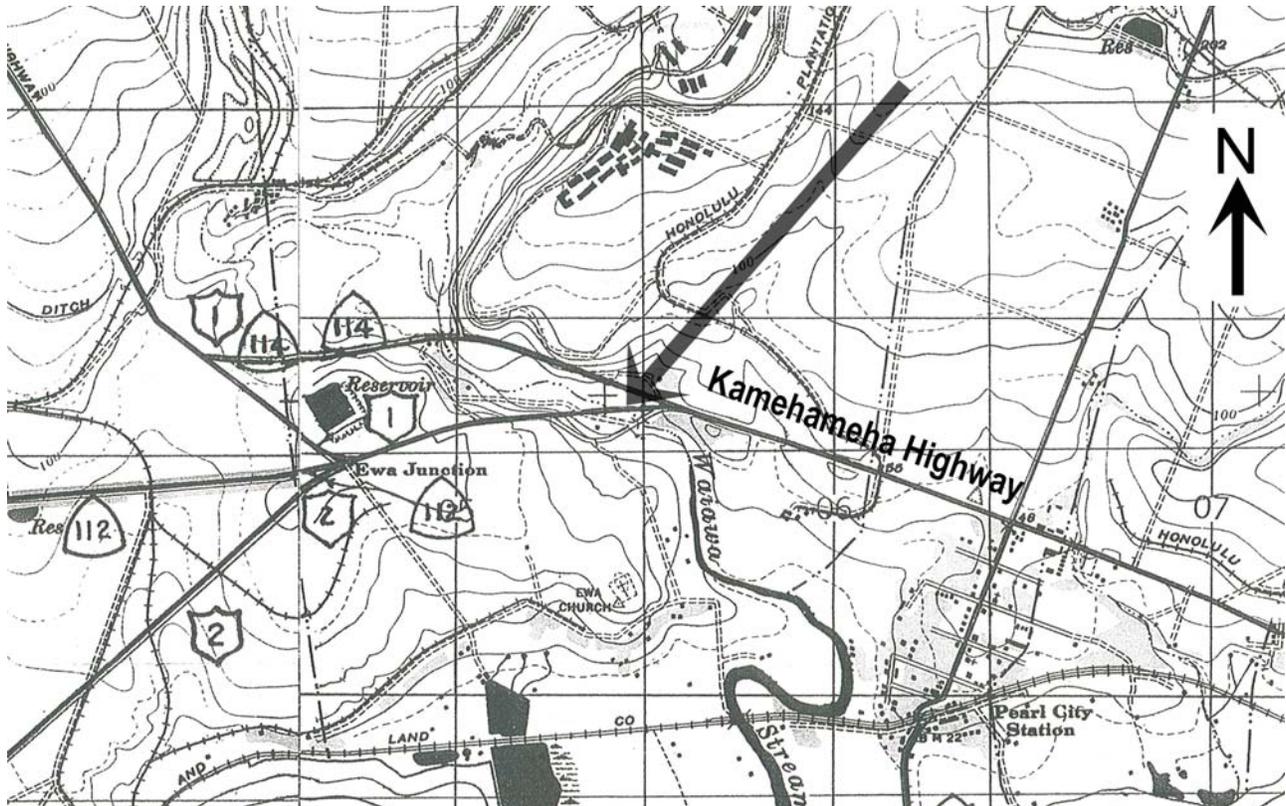


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Figure 5: HI_Honolulu_WaiakeleCanalBridge_Fig0005

Portion of 1943 topographic map showing the location of the Waiawa Bridge (added arrow and "Kamehameha Highway" label). Note the straightening of the highway at the 1933 bridge and the 1940 Waiawa Cutoff road to the north that allowed some traffic to bypass Ewa Junction. Also, note that the map does not show Ewa Junction as a circle. *U.S. Army Corps of Engineers, Waipahu Quadrangle, 1:20,000, 1943.*



Waiawa Bridge

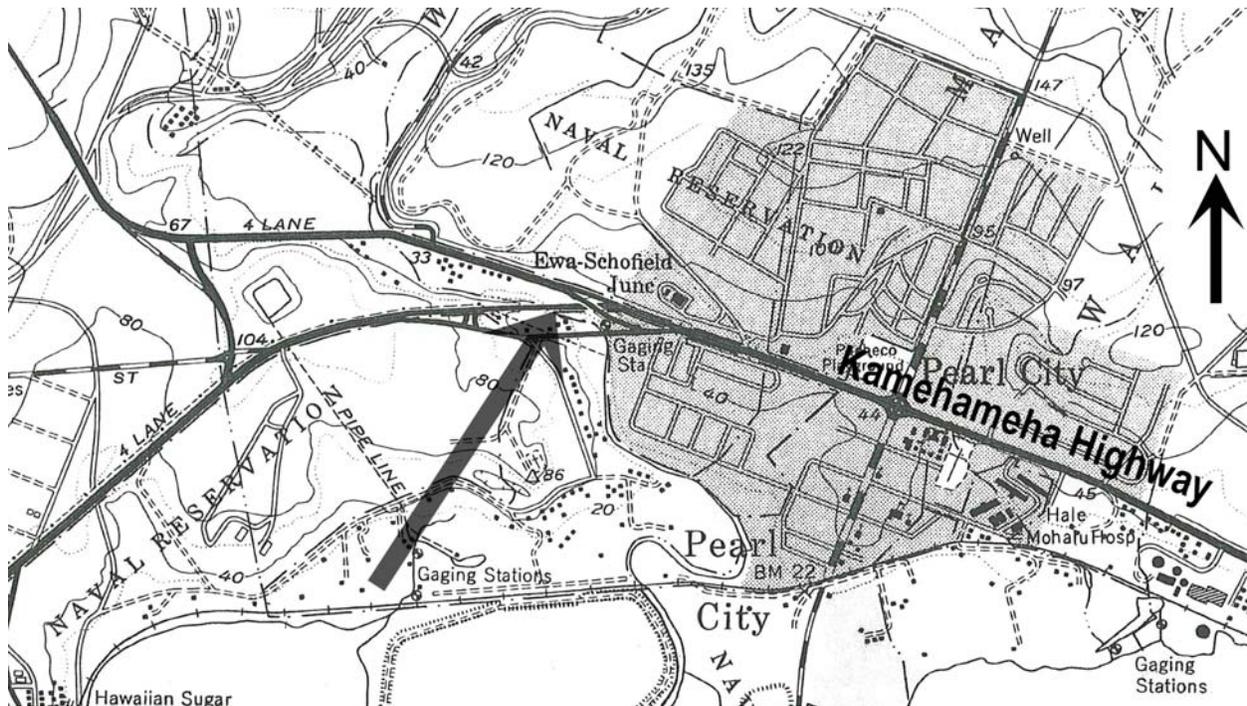
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Figure 6: HI_Honolulu_WaikeleCanalBridge_Fig0006

Portion of 1954 topographic map showing the Waiawa Bridge (added arrow and "Kamehameha Highway" label). Note the highway construction to the south of the bridge that provided separate lanes for eastbound traffic, and the overpass just east of the bridge that allowed eastbound Waiawa Cutoff traffic to travel onto Kamehameha Highway without an intersection. *U.S. Geological Survey, Waipahu Quadrangle, 1:24,000, 1954.*

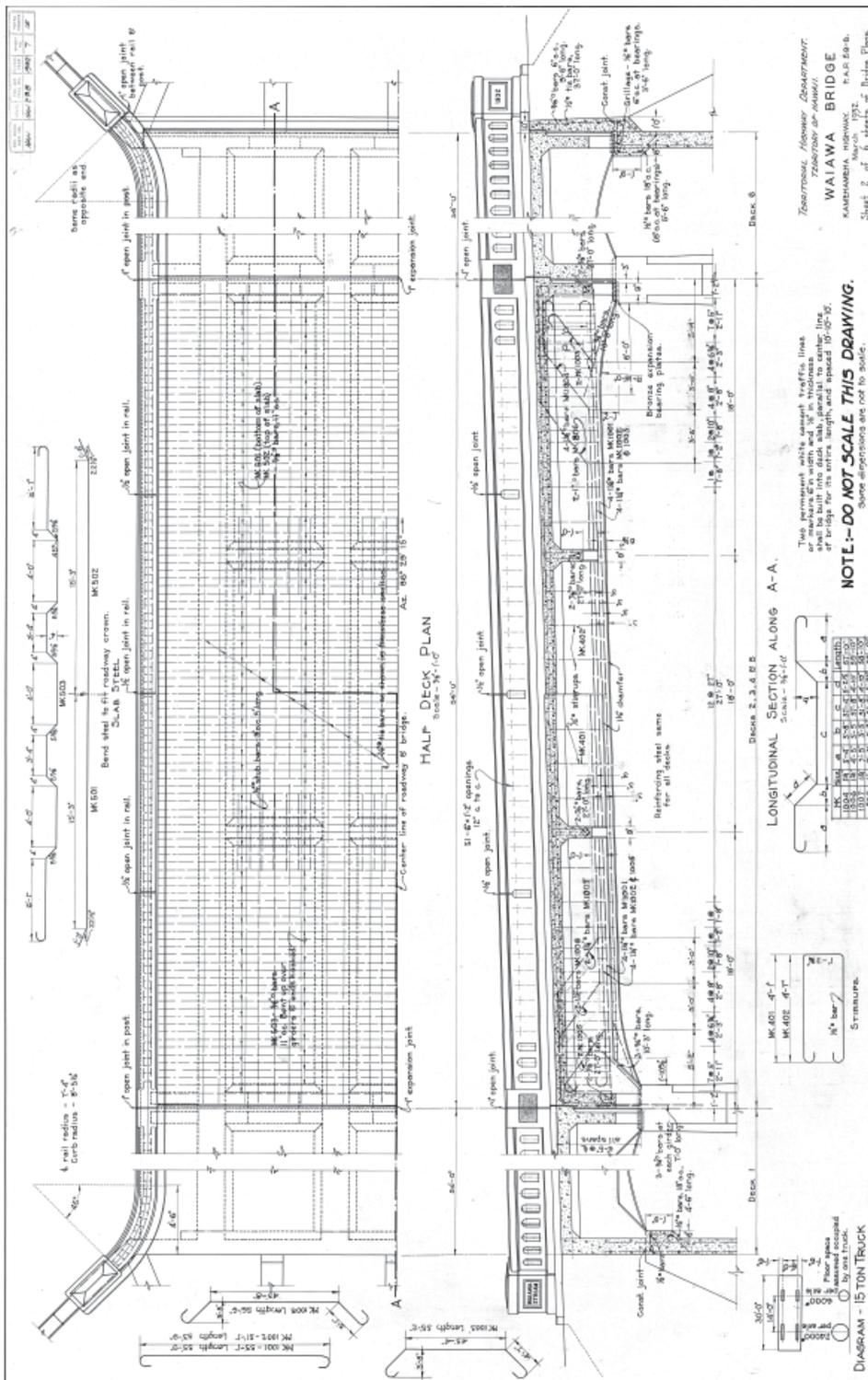


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Figure 7: HI_Honolulu_WaikeleCanalBridge_Fig0007

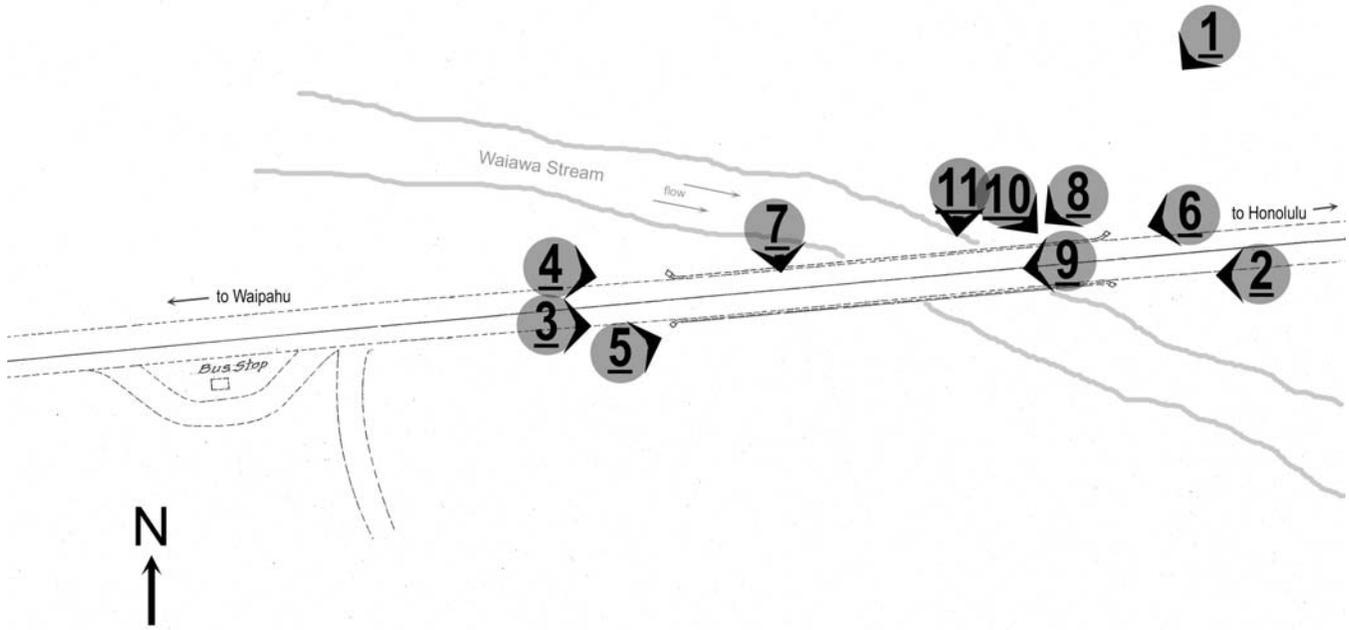
Original drawing of the Waiawa Bridge, showing half deck plan and longitudinal section. *FAP No. E-9-B. State of Hawaii, Department of Transportation, Highways Division, Design Branch, drawing 4256.7 (Revised 9-9-32).*



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Photo Key



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PHOTO LOG

Current Photos

Name of Property: Waiawa Bridge
City or Vicinity: Pearl City
County: Honolulu State: HI
Photographer: Dee Ruzicka
Date Photographed: May 14, 2012
Location of Original Digital Files: Mason Architects, Inc. 119 Merchant Street, Suite 501
Honolulu, HI 96813 Job #1110

Photo #1 (HI_HonoluluCounty_WaiawaBridge_0001)

Overview of bridge, camera facing southwest.

Photo #2 (HI_HonoluluCounty_WaiawaBridge_0002)

Bridge approach, camera facing west.

Photo #3 (HI_HonoluluCounty_WaiawaBridge_0003)

Overview of bridge, camera facing east.

Photo #4 (HI_HonoluluCounty_WaiawaBridge_0004)

Overview of bridge, camera facing southeast.

Photo #5 (HI_HonoluluCounty_WaiawaBridge_0005)

Detail of typical end stanchion, with scale device (one-foot increments), and view of outboard side of downstream parapet, camera facing northeast.

Photo #6 (HI_HonoluluCounty_WaiawaBridge_0006)

Detail of 1933 stanchion, camera facing southwest.

Photo #7 (HI_HonoluluCounty_WaiawaBridge_0007)

Detail of typical stanchion showing narrow expansion joint, with scale device (one-foot increments), camera facing south.

Photo #8 (HI_HonoluluCounty_WaiawaBridge_0008)

Oblique view of the underside of Waiawa Bridge, camera facing southwest.

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Photo #9 (HI_HonoluluCounty_WaiawaBridge_0009)

Detail of typical supporting bent, camera facing west.

Photo #10 (HI_HonoluluCounty_WaiawaBridge_0010)

Oblique view of the east abutment, camera facing southeast.

Photo #11 (HI_HonoluluCounty_WaiawaBridge_0011)

Oblique view of supporting bent, camera facing south.

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HI_HonoluluCounty_WaiawaBridge_0003



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HI_HonoluluCounty_WaiawaBridge_0011

