

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: Waikele Canal Bridge and Highway Overpass

Other names/site number: Waikele Stream Bridge and OR&L Bridge; Waikele Stream Bridge easbound span and Bridge over OR&L spur

Name of related multiple property listings: N/A

2. Location

Street & number: Farrington Highway and Waikele Stream

City or Town: Waipahu 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Not For Publication Vicinity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

<p>_____ Signature of certifying official/Title:</p> <p>_____ State or Federal agency/bureau of Tribal Government</p>	<p>_____ Date</p>
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<p>In my opinion, the property ___meets ___does not meet the National Register criteria.</p> <p>_____ Signature of commenting official:</p> <p>_____ Title:</p>	<p>_____ Date</p> <p>_____ State or Federal agency/bureau of Tribal Government</p>
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Waialeale Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

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

Waialeale Canal Bridge and Highway Overpass

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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>2</u>	<u>1</u>
Objects	_____	_____
Total	<u>2</u>	<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)

Waikele Canal Bridge and Highway Overpass

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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

This resource consists of two contributing bridge structures, the Waikele Canal Bridge and the Highway Overpass (OR&L Bridge), with a non-contributing intervening road section. The contributing elements are being submitted conjointly given their close proximity along Farrington Highway, identical architectural features, and the fact that they were constructed simultaneously as part of the Waikele Canal Project.

The 1939 Waikele Canal Bridge is a three-span, reinforced concrete tee-beam bridge that carries the two eastbound lanes of Farrington Highway (Route 93) over the concrete-lined streambed of Waikele Stream. The bridge measures 129'-10" in total length with a total deck width of 32'-2". The bridge deck has four longitudinal beams with partial-arch closed spandrels where the bearing meet the top of the two sets of supporting piers. The bridge has thick concrete parapets with cross-shaped voids and thick curving end stanchions with stepped edges that are typical for the time of its construction in Hawaii.

The 1939 Highway Overpass is a single-span, reinforced concrete tee-beam bridge carrying Farrington Highway's two eastbound lanes over the former Oahu Railway & Land (OR&L) Company's right-of-way. Therefore, the bridge is commonly referred to as the OR&L Bridge, which is the title used throughout the text of this form. The OR&L Bridge is located 128' east of the Waikele Canal Bridge and measures 48'-9" in total length with a total deck width of 32'-2". The OR&L Bridge features the same thick concrete parapets with cross-shaped voids and curving end stanchions with stepped edges as the Waikele Canal Bridge. The superstructure of the OR&L Bridge has four longitudinal tee-beams supported at the flanking abutment walls. Though the substructure and parapet walls are similar to the Waikele Canal Bridge, this overpass does not have the partial arch closed spandrel forms.

Both contributing structures remain in their original locations, have not been altered beyond road resurfacing and guardrail additions, are in good condition, and their materials are intact. The integrity of setting has been diminished by increased development in the area surrounding the structures and the removal of the railroad tracts originally running beneath the OR&L Bridge. The property holds high integrity of design, workmanship, feeling, and association.

Waikele Canal Bridge and Highway Overpass

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Narrative Description—Waikele Canal Bridge

A. TYPE OR FORM

The 1939 Waikele Canal Bridge is a three-span, reinforced concrete tee-beam bridge.

B. SETTING

The 1939 Waikele Canal Bridge is located along an urban section of Farrington Highway about 1/3 mile west of Waipahu Depot Road. The setting has changed since the construction of the bridge. Aerial photos show that, as late as 1951, the area around the bridge had only scattered buildings.¹ From the construction date until that time, the area was on the fringes of the Waipahu community, until the subdivisions of the 1960s and later decades expanded the town.

Immediately to the north of the 1939 Waikele Canal Bridge is a two-lane, reinforced-concrete bridge (built in 1963), that carries the westbound lanes of Farrington Highway across Waikele Canal. It is sited adjacent to the base of the (1939) earthen incline of the eastbound lanes. The northwest end stanchion of this newer bridge is inscribed "William A. Patterson Bridge," named after Waipahu's best-known businessman.² Patterson, 1899- 1980, grew up in Waipahu as the son of an overseer at the Oahu Sugar Company (OSC) plantation; later, he became the first president of United Airlines (from 1934 to 1966).

Further northwest, beyond the William A. Patterson Bridge, are residences along Farrington Highway, then a set of two- and three-story apartment buildings along Aniani Place, whose layout follows the curve of Waikele Stream. North of the 1963 bridge, and north of the narrow strip of residential and commercial development along Farrington Highway, the area occupied by Waipahu Cultural Garden Park and Hawaii's Plantation Village remains mostly open land with scattered buildings, a pattern that recalls the original building density of the immediate area. Residential buildings, a Hawaiian Telcom building, churches, and schools are south of the 1939 Waikele Stream Bridge. To the east is Waipahu's original business district, which started along Waipahu Street and Waipahu Depot Road, and in recent decades has expanded along Farrington Highway to the base of the earthen incline leading to the bridge. West of Waikele Road, Farrington Highway is lined with large commercial developments and a few low- to mid- rise multi-family residential buildings.

¹ Hawaii State Archives, Folder PPA-63-1, photo 1-16, September 6, 1951.

² "Waipahu Honors Its Own: UAL President Patterson," *Honolulu Star Bulletin*, March 29, 1963. p. 21.

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C. GENERAL CHARACTERISTICS

The Waikele Canal Bridge carries the two eastbound lanes of Farrington Highway on an asphalt-surfaced roadway measuring 129'-10" in length with a 26'-2" wide paved asphalt roadway flanked on each side by three foot wide concrete walkways raised six inches above the roadway surface for a total deck width of 32'-2". The deck of the bridge is board-formed concrete, with four longitudinal girders, each supported at two intermediate points. The total distance of the three spans measures 129'-10" between abutments. The center span is 50'-0" and each flanking span is 36'-0". The reinforced-concrete longitudinal girders have an arch closed spandrel form at each support point. Each girder is 1'-6" thick, 3'-0" high at its midpoints between supports, and is six feet high at the spandrels. Transverse beams measuring one foot thick connect the girders at their support points. The supports for the girders are 1'-6" square, reinforced-concrete columns, twenty-eight feet high, which extend down from the spandrel support points to reinforced-concrete piers in the canal bed that are sixteen feet high. These piers consist of four legs, one under each column, joined at their tops by a horizontal three feet square concrete beam. The center two legs of each pier are three feet square and the outer leg of each pier is battered on its upstream- or downstream-facing side, with width ranging from 6'-6" at its base to 5'-0" at its top, where it joins the horizontal beam. In addition, the upstream- and downstream-facing surfaces of the outer legs, which are pointed, help minimize turbulence of the water flow. The abutments of the bridge are board-formed concrete with integral wing walls, extending thirty feet upstream and downstream of each abutment. The abutments are twenty feet high and are set on the top lip of the sloping concrete lining of the canal.

D. SPECIFIC FEATURES

Concrete Parapets with Cross-Shaped Voids

The two concrete parapets are 2'-10" tall measured from the walkway surface, and are 119'-5" long between end stanchions with narrow expansion joints separating the parapets and stanchions. Along the length of each parapet are four expansion joints on a variable spacing of either 24'-5", 24'-0", or 22'-6". The base of each parapet, running its length, is seven inches high measured from the roadway surface and ten inches thick. The parapets have top railings measuring one foot wide and seven inches high with 1" x 1½" stepped corners. Below the railing are a series of vertical concrete balustrades six inches wide and six inches thick spaced at 1'-7" on center. The sections of each parapet between the balustrades are slightly thinner at four inches thick and each section was molded with a cross-shaped void that are typical of concrete bridge design in Hawaii during the 1930s and 1940s and commonly referred to as a Greek-cross shape.³ Each Greek-cross void is 1'-3" high and eight inches wide. There are no intermediate stanchions along the bridge.

³ Heritage Center, School of Architecture, University of Hawaii at Manoa [hereafter, Heritage Center], State of Hawaii Historic Bridge Inventory and Evaluation (Draft prepared for State of Hawaii, Department of Transportation, Highways Division) May 2008. p. I-72

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Curved End Stanchions

The concrete end stanchions are 3'-3" high from the walkway surface, 1'-9" thick, and five feet long. In plan, they form an arc of a circle spanning 45 degrees. The stanchion end facing the parapet abuts it squarely and the stanchion curves out away from the roadway, presenting a curving face to the traffic lanes. Each stanchion has 1½" stepped corners, with a top surface that is 1'-3" wide. Along its outer (road-face) curving surface each measures 5'-5" in length, and along the inner curve, 4'-2" in length.

E. IMPORTANT DECORATIVE ELEMENTS & MINOR ALTERATIONS

End Stanchion Inscriptions & Added Guardrails

Concrete bridges of this type and period, including the Waikele Canal Bridge, typically had date and name inscriptions on the end stanchions. However, non-contributing steel W-beam guardrails were installed in 1989 and extend along the edges of the roadway as the bridge approaches and partially cover the three-inch high block lettering inscriptions that originally read "WAIKELE CANAL 1939" so that only the year, "1939" is still visible on the northeast and southwest stanchions.

Reflector Plates & Added Concrete Paving

At the northeast and southwest ends of each of the two six inch high walkway curbs are eight inch wide phosphor bronze plates set flush with the concrete walkway surface. These plates covered the tops of six inch diameter "bullseye reflectors" that were originally presented to oncoming traffic set into the face of these two curbs.⁴ Added concrete paving covers the face of the curbs, so it is not known if the reflectors are still extant under the plate.

⁴State of Hawaii, Department of Transportation, Highways Division, Design Branch, Project ID No. 7101-001, FAP No. 4C, [Waikele] Canal Bridge, Drawing 4449.27, Sheet 1 of 9, Mar. 1938.

Waikele Canal Bridge and Highway Overpass

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Narrative Description—OR&L Bridge

A. TYPE OR FORM

The 1939 OR&L Bridge is a single-span, reinforced concrete tee-beam bridge.

B. SETTING

The 1939 OR&L Bridge is 128' east of the Waikele Stream Bridge.

C. GENERAL CHARACTERISTICS

The OR&L Bridge carries the same two eastbound lanes of Farrington Highway that pass over the adjacent Waikele Stream Bridge over the former OR&L Company (OR&L Co.) railroad tracks at grade. The bridge measures 48'-10" in total length and features a 26'-2" wide paved asphalt roadway flanked on each side by three foot wide concrete walkways raised six inches above the roadway surface for a total deck width of 32'-2". The deck of the OR&L Bridge is board-formed concrete with four longitudinal girders crossing the single forty-two foot span. Each girder is about 1'-6" thick and three feet high. Smaller transverse beams, which are one foot thick and two feet high, join the girders. One transverse beam joins the three south girders twelve feet from the east abutment, and another transverse beam joins the three north girders twelve feet from the west abutment. The abutments are board-formed concrete, twenty feet high, with wing walls that extend about fifty feet in each direction from under the edges of the bridge.

D. SPECIFIC FEATURES

Concrete Parapets with Cross-Shaped Voids

The parapets of the OR&L Bridge are forty-two feet long between end stanchions. The configuration of the parapets and stanchions of this bridge are identical to the Waikele Canal Bridge, as described in Section D above. The stanchions of the OR&L Bridge have no inscriptions discernible behind the added guardrails.

E. IMPORTANT DECORATIVE ELEMENTS & MINOR ALTERATIONS

Reflector Plates & Added Concrete Paving

The OR&L Bridge has phosphor bronze plates remaining in the curbs near the northeast and southwest stanchions, like the Waikele Canal Bridge. These plates covered the tops of six-inch diameter "bullseye reflectors" that were originally presented to oncoming traffic by being set into the face of those curbs. Added concrete paving covers the face of the southwest curb, so it is not known if the reflector is still extant under the plate. A gap in the added paving at the northeast curb reveals the top of the reflector cavity with no reflector present.

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Integrity Assessment—Waikele Canal And Or&L Bridges

The location of the property has not changed. The Waikele Canal Bridge and OR&L Bridge are in their original location.

The setting of the property has changed. When the bridges were constructed, there were only scattered buildings in the vicinity. The increased development around the bridges and the removal of the tracks under the OR&L Bridge has greatly reduced the integrity of setting.

The design, materials, and workmanship of the property are elements of integrity that are largely retained. Besides road resurfacing, the only alteration is the addition of metal guardrails. These have covered the bridge's inscriptions, but the historic character of the stanchions is still readily apparent and reflected in their arc plan design.

The feeling and association of the property are retained. The bridges express the historic sense of the time of their construction. The bridges have sufficient integrity to convey their association with the important highway improvements of that period.

The overall integrity of the property remains high. The few changes made to the bridges since construction are minor and do not diminish their 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

1939

Significant Dates

Significant Person

(Complete only if Criterion B is marked above.)

Cultural Affiliation

Architect/Builder

William R. Bartels (Design engineer)

E. E. Black (contractor)

Waikele Canal Bridge and Highway Overpass

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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-100
- 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 1939 Waikele Canal and OR&L Bridges are eligible under the local level under Criterion A as they reflect the political, economic, and social events impacting the area as Hawaii transitioned from an isolated independent kingdom to a modern society. The waters of the Waikele Stream irrigated the shore of Apoka'a where numerous loko i'a (enclosed fishponds) were located. The Waikele ahupua'a was known for productive wetland farming and oyster cultivation. The structures were also associated with the plantation industry—namely the Oahu Sugar Company. They were the last major re-accommodation bridges built by the FHWA for the OL&R railroad before it went out of business. They are also eligible under Criterion C for their association with early developments in concrete bridge construction in Hawaii featuring parapet design with cross-shaped voids and a curved-plan end stanchion configuration. The bridges are good examples of 1930's reinforced concrete bridges in their use of materials, method of construction, craftsmanship, and overall design.

The period of significance for both the 1939 Waikele Canal and OR&L Bridges lasted from 1939 to 1969, during which time the bridges facilitated passage along Farrington Highway, speeding travel by providing more efficient routes as alternatives to Waipahu Road, whose alignment follows the sinuous route of the nineteenth-century Government Road. After 1969, the H-1 Freeway became the main highway to bypass downtown Waipahu. This property's significance in the Farrington Highway and Oahu belt road history links it to the development of Waipahu, which is related to the OR&L Co. railway line, and to the Waikele Canal flood control project.

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CRITERION A

The 1939 Waikele Canal and OR&L Bridges are eligible under the local level under Criterion A for their association with the plantation industry—namely the Oahu Sugar Company. They were the last major re-accommodation bridges built by the FHWA for the railroad before it went out of business.

Hawaiian Typonymy of Waikele Ahupua‘a

In Hawaiian custom, places are named according to their geographical features and water sources. In the case of Waikele ahupua‘a (traditional sub-district), commonly known as Waipahu, water sources are found throughout the land. Waikele translates as “muddy water.”⁵ Waikele ahupua‘a is one of thirteen land divisions in the district of ‘Ewa. The boundaries of the ahupua‘a comprises the western half of the Waipi‘o peninsula and extends up through the Leilehua Plateau (Central O‘ahu Plateau) to its upper boundary with Wahiwā in the district of Wai‘anae Uka and the Waipi‘o ahupua‘a. Hanohano Gulch extends from the central plateau to the opening to the lowlands of the ‘ili of Waipahu. Waikele Stream is the perennial waterway that runs from where it converges with Waikakalaua Stream in the upper part of the ahupua‘a down to its outlet at the sea Apoka‘a (West Loch). Along the shore of Apoka‘a were numerous loko i‘a (enclosed shoreline fishpond) such as Ka‘auku‘u and Pouhala. Once adjoined, the size of the loko i‘a was 63 acres.⁶ Within the ahupua‘a are thirteen recorded ‘ili or sub-divisions including: Kahaku‘ōhi‘a, Waikele, Pāiwa, Kahaupu‘upu‘u, Waipahu, Ulumalu, Aui‘ole, Kanupo‘o, Ulemoku, Kaohai, ‘Ōni‘o, Waikakalaua, and Pouhala. The area of significance is situated in the ‘ili of Pouhala.

Mythology of Waikele

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 named ‘Olopana. Lonoawohi, a kahuna (spiritual expert) who was deposed by ‘Olopana, asked for the aid of Kamapua‘a. After ‘Olopana was killed, Lonoawohi asked Kamapua‘a for lands of his own. Kamapua‘a gave the wetlands of O‘ahu to the kahuna. Thus, all lands with the word “wai” in it, including Waikele, were that of Lonoawohi and the Lono (deity of agriculture, fertility, and peace) class of kahuna.⁷

Waikele and its Resources

Water was essential for pre-contact life to flourish, thus many of the traditions of Waikele are associated with the lowlands of the ahupua‘a that were well irrigated by the Waikele Stream. The stream was imperative for the productive wetland farming such as kalo. The district of ‘Ewa, including the ahupua‘a of Waikele, was traditionally known for a variety of kalo (taro) called kāī, known for its

⁶ “Land Award-Kaawa,” Office of Hawaiian Affairs Kipuka Database <http://kipukadatabase.com/kipuka/LandAwards.aspx?o=9861&s=0&t=0&a=1> (accessed July 15, 2008).

⁷ 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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fragrance when cooked or made into poi. Other varieties of k̄ai includes k̄ai 'ula'ula (red k̄ai), k̄ai koi, k̄ai kea (fair k̄ai), k̄ai ke'oke'o (white k̄ai), and k̄ai uliuli (dark k̄ai). The Waikele Stream also provided nutrients for the shoreline fauna. The ahupua'a of Waikele was also known for its i'a hāmau leo (pearl oyster). The connection between Waikele inhabitants and i'a hāmau leo is apparent in a poetical phrase noted in many meles (songs). In the mele "Kue Hao o ka Lanakila," Waikele and the pearl oyster are mentioned in the description of the area visited while traveling on the locomotive train called *Lanakila*.⁸

"Hanohano Waikele i ka ulu niu, I ke kai o ka i'a hāmauleo."

Waikele is magnificent in the coconut groves as well as the sea of pearl oysters.

As one of the fishing traditions of Waikele, the people where forbidden to talk while harvesting oysters along the shores of Apoka'a due to the traditional laws placed upon in terms of restricted harvesting to only a certain time of the year.

Waikele during the Great Māhele

By 1848, during the reign of Kamehameha I's most sacred son, Kamehameha III, the Hawaiian traditions of royal land tenure transformed to a codified western practice of private land ownership⁹ 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 were many claims within the 'ili of Pouhala, particularly in the area of significance were lands designated as k̄uleana or lands that were previous inhabited by maka'āinana before the shift of land tenure. One such claimant was by Palaualelo, a maka'āinana that is identified as Land Commission Award (LCA) 1018 located on the west end of the Waikele Canal Bridge. In a Foreign Testimony documented in the Māhele 'Āina Index, Palaualelo stated:

Transcription

Owau o Palaualelo, ke hai aku nei au i kou mau kuleana, kuleana mooaina akahi, kuleana pahale alua.
Nau na Palaualelo

Translation

*I am Palaualelo, I am telling you my kuleana lands, first is the small parcel, second is the house lot.
Belonging to Palaualelo*

⁸ S. Pinao, *Buke Mele Lahui*, trans. Ikaika Bantolina (Honolulu: Halepai Makaainana, 1895), 98.

⁹ Lilikalā Kame'eiehiwa, *Native Land and Foreign Desires: Pehea Lā E Pono Ai?* (Honolulu: Bishop Museum Press, 1992), pg. 8.

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By 1889, Palaualelo gave his claim to Ka'awa and was the last claimant before it was condemned for the construction of roadways during the late 1920s.

Context and Development History

During the Republic of Hawaii period (1894-1898), and especially after annexation of Hawaii by the United States in 1898, political and business leaders recognized that the creation of improved belt roads with modern bridges around the perimeter of each island was of great importance to linking each island's communities, and to their economic growth.¹⁰ Funding the needed highway and bridge construction was always a challenge in each period of Hawaii's history. Before, and for decades after annexation, there was no federal funding for roads. Starting in 1925, after Congress passed the Hawaii Bill of Rights, the Territory of Hawaii was able to obtain Federal highway funds to assist with the goal of completing and improving the islands' belt roads.

Planning for the Territorial Highway Department's new section of Farrington Highway included the Waikele Canal Bridge. It was built in 1938-39 under Federal Aid Project (FAP) No. 4-C, which was subtitled "Waipahu Cutoff." The OR&L Bridge was also in this new section of highway and built at the same time, but with different funding, as discussed below. Before this project the only road through the area, between Ewa Junction in the east and Waianae Road in the west, was Waipahu Road. This Kingdom-era roadway, originally called "Government Road," linked Waianae Road with Kamehameha Highway (the main belt road) at Ewa Junction. Waipahu Road (now Waipahu Street) follows a winding route through the former sugar plantation village of Waipahu; it runs generally east-west, except where it was realigned to curve south of the now-demolished OSC mill and where it makes a sinuous Z-turn to follow the land contour and to cross the Waikele Stream gulch at the 1905 bridge.

The 1939 Waipahu Cutoff highway alignment was a new road segment, an extension of Waianae Road eastward to the Ewa Junction. In the area near the mill, the 1939 highway ran $\frac{1}{4}$ to $\frac{1}{2}$ mile *makai* (common Hawaiian term denoting: toward the sea) of Waipahu Road. This then-new roadway, named Farrington Highway, provided a more direct east-west route across the Hoaeae, Waikele and Waipio *ahupuaa* (common Hawaiian term for land divisions that typically extend from the mountains to the sea), eliminating the need to travel along Waipahu Road's twisting and more hilly course through the built-up village of Waipahu. Farrington Highway created a bypass around Waipahu and greatly improved Oahu's belt road system in this part of the island.

In 1935, several years before the Waikele Canal Bridge and the OR&L Bridge were built, the City and County of Honolulu proposed a resolution to name the section of belt road that traversed Waipahu, Ewa, Waianae, Mokuleia, and Waialua, to the Haleiwa-Waialua junction, as Farrington Highway. (The portion of the belt road around Kaena Point, which would have connected the Waianae and Mokuleia ends of Farrington Highway, was never built.) The name of the road, which included both new and

¹⁰ Heritage Center, State of Hawaii Historic Bridge Inventory and Evaluation, Draft, May 2008. pp. I-27 to I-29.

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existing segments, honored former Territorial Governor Wallace R. Farrington (in office 1921-1929), who was "instrumental" in developing plans to complete the belt road on Oahu.¹¹

The OR&L Bridge, although a segment of Farrington Highway, was not a part of FAP 4-C. Original drawings show that it was located within the 1.1 miles of the highway that were funded through Federal Aid Grade Hazard (FAGH) Project 4-C, instead of FAP 4-C. FAGH projects were for the "elimination of hazards to life at railroad grade crossings" and funds were available for bridges over railroad crossings within the Federal highway system.¹² Such FAGH projects did not require any matching funds from the Territorial government.¹³

Several sources noted different costs for the highway work in this area. Newspaper articles stated the expected cost of the Waipahu Cutoff project as \$250,000 in 1937.¹⁴ This total was partly funded by Territorial appropriation and with a larger amount of Federal funds, since the cost of railroad grade crossing elimination was an "outright grant" from the Federal government and did not have to be matched by the Territory.¹⁵ The articles also noted: "All curves in the road between [Ewa and Waianae Junctions] will be eliminated;"¹⁶ and that "motorists will miss Waipahu entirely when using the cutoff and traffic will be speeded up by elimination of travel through the narrow and winding streets of that community."¹⁷ Before the bids were due from contractors, a newspaper article reported the expected cost of the project (including the amount for the flood control canal that rerouted Waikele Stream) at \$399,700, with work expected to begin in July 1938.¹⁸ The Superintendent of Public Works 1940 report noted the total cost of the FAP and FAGH 4-C projects, plus the related Kunia Road project (FAP 16-B) at the western end of Waipahu Road, was \$381,238.18.¹⁹ The amounts for the Waikele Canal Bridge and OR&L Bridge were not broken out in any cost estimates or final figures for highway and bridge construction in the Waipahu area, although a 1938 news article noted an estimate, for the canal only, as \$65,000.²⁰

The contractor E. E. Black completed all the highway and bridge construction for FAP and FAGH 4-C in 1939. E.E. Black was a well-connected Hawaii businessman, who was also Honolulu Gas Company's president, a director of Castle & Cooke, and on the board of Hawaiian Gas Products, Inc., as well as owner of the contracting company.²¹ E.E. Black, Ltd. continued to be an important construction firm in

¹¹ "Farrington Highway to be New Belt Road Name," *Honolulu Star Bulletin*, February 11, 1935. p. 1.

¹² Federal Works Agency, "Title 23, Chapter 1 – Public Roads Administration" *1939 Supplement to the Code of Federal Regulations of the United State of America* (Washington DC: Government Printing Office) 1940. p. 1335

¹³ "Cain Outlines Territory–U.S. Highway Plan," *Honolulu Star Bulletin*, June 29, 1937. p. 1.

¹⁴ *Ibid.*, and "New Highways Will Be Built," *Honolulu Star Bulletin*, December 18, 1937. p. 3.

¹⁵ "U.S. Earmarks \$975,000 for Hawaii Roads," *Honolulu Star Bulletin*, December 31, 1937. p. 1.

¹⁶ "New Highways Will Be Built," *Honolulu Star Bulletin*, December 18, 1937. p. 3.

¹⁷ "Waipahu Road Job Bids Are Due June 9th," *Honolulu Star Bulletin*, May 25, 1938. p. 1.

¹⁸ *Ibid.*

¹⁹ Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii, for the year ending June 30, 1940* (Honolulu: Pacific Herald Publishing Co.) 1940. p. 22.

²⁰ "Waipahu Road Job Bids Are Due June 9th," *Honolulu Star Bulletin*, May 25, 1938. p. 1.

²¹ Michael T. Holmes, *The Specter of Communism in Hawaii* (Honolulu: University of Hawaii Press) 1994.

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Hawaii for most of the twentieth century. In the mid-1990s, a California-based corporation purchased the firm, and a few years later transferred its focus of operations to Guam.²²

The O'ahu Sugar Company (OSC) plantation and mill began in Waipahu as a development project of Benjamin F. Dillingham, who had leased land from James Campbell, prompting noted historian Muricio Michael's observation: "The town of Waipahu is a child of Oahu Sugar [Company]."²³

Dillingham partnered with J. Hackfeld and Company (Paul Isenberg) and Mark Robinson (who provided land for the mill site) to form the company, which was incorporated in March 1897. OSC was one of several sugar companies that were formed immediately prior to annexation. In late 1897, the first OSC manager, August Ahrens, utilized a land exchange to re-rout the original "Government Road" traversing Waipahu, creating the new Waipahu Road (now Waipahu Street) that ran south of the mill to avoid interference with the plantation's rail lines.²⁴ OSC's first harvest was in 1900 and yielded 7,900 tons of raw sugar. The population of Waipahu grew as the plantation increased production and required more field and mill laborers, tradesmen, supervisors, and engineers.. By the late 1920s, Waipahu extended southward along Waipahu Road with a business district centered at Waipahu Depot Street, while residential areas were located both north of the mill and to the east along Waipahu Road. By the 1930s, Waipahu "included second and third generations" that "had grown up on the plantation and considered Waipahu their home".²⁵ In 1940, Waipahu had a population of 6,900.

The 1939 Waipahu Cutoff created an alternate road (Farrington Highway) bypassing Waipahu and provided expanded opportunity for a new business district. Expansion of commercial activities into the space along the road was slow; despite the ca. 1939 flood control project initiated by the City that diverted Waikele Stream directly into Pearl Harbor via a dredged canal to eliminate the flooding that occurred during heavy rains near Waipahu Depot Street at the convergence of Waikele and Kapakahi Streams.

The population of Waipahu expanded from 8,353 to 22,798 between 1960 and 1970. This period saw a corresponding increase in building along Farrington Highway. In 1966, the section of the H-1 Freeway between Kunia Road and Makakilo, running north of Waipahu, was opened, providing another bypass around the town. This 1966 date of the construction of the H-1 Freeway represents the end of the period of significance for the Honouliuli Bridge. Waipahu continued to grow and the population in 1980 was over 29,000.

²² Ronna Bolante, "Can Locals Compete?" *Hawaii Business*, on website <http://www.hawaiibusiness.com/Hawaii-Business/July-2002>, (accessed February 20, 2013).

²³ Michael Mauricio, *Waipahu, Its People and Heritage* (Waipahu, HI: Waipahu Community Foundation) 1997. p. 59.

²⁴ Spencer Mason Architects, "Waipahu Street Widening Project and Potential Historic Properties". Prepared for Austin, Tsutsumi & Associates, Inc.) 1990. p. 1-3.

²⁵ Nedbalek, p. 27.

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Oahu Railway & Land Company

The OR&L Co. was a business combining a narrow-gauge railway system and land development, established in 1889 by Benjamin F. Dillingham. The trains primarily hauled supplies to, and raw sugar from, his and others' sugar plantations, but also carried passengers. The railroad system reached from the base yard in Honolulu to Ewa Station by May 1890. The Waipahu Station was located along the main route, where Waipahu Depot Road crossed the OR&L Co. tracks, about ½ mile south of the OSC mill. This station was about ½ mile southeast of the site of the future Waikele Canal Bridge. In the last decade of the nineteenth century, OR&L Co. laid additional stretches of track from Ewa around Kaena Point, and along the north shore to Kahuku; in 1906, the company extended a branch line from Waipahu to Wahiawa. In 1921, a second set of tracks expanded the line from Honolulu to Waipahu.²⁶

The branch line to Wahiawa extended northwest from the OR&L Co. main line, at a point just west of the Waipahu Station. This branch line ran about ½ mile before crossing a bridge over the Waikele Stream. This section of the branch line to Wahiawa was the portion spanned by the 1939 OR&L Bridge that carried Farrington Highway over the railroad tracks. This branch line consisted of two tracks at the point where the OR&L Bridge crosses it.

OR&L Co. railroad operations remained a principal mode of travel and transport across Oahu thru the 1920s. During the 1930s pineapple and sugar freight before World War II consistently provided good income for the company. Passenger traffic on the OR&L Co. lines diminished through the depression years of the 1930s, and passenger trains ran less frequently. The company ordered its last steam locomotives in 1926.²⁷

Private ownership of automobiles and territorial roadway improvements further contributed to the decline in OR&L Co.'s passenger service. Previously busy railway stations became "whistle stops", and OR&L Co. converted many of its passenger cars into freight cars. Even with declining passenger numbers and service cuts during the 1930s, OR&L Co. maintained some passenger service; they offered special charters (such as photography excursions around Kaena Point), and operated a fleet of gasoline-powered passenger motorcars with daily service on the mainline, which was cheaper to operate than a steam locomotive.

World War II reversed this decline, as OR&L Co. "went into a heightened schedule of moving men and material. Trains ran 24 hours a day, sometimes with five-minute headways. Many old passenger cars which – in the late '30s – had had the seats ripped out...were soon reconfigured with crude benches to carry people again."²⁸

²⁶ Lani Nedbalek, *Waipahu, A Brief History* (Mililani, HI: Wonder View Press) 1984. p. 39

²⁷ *Ibid.*, p. 185.

²⁸ *Ibid.*, p. 199.

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After the war, OR&L Co.'s freight and passenger business once again dropped when automobiles and trucks began to supply Oahu's transportation needs more frequently. A tsunami struck Hawaii on April 1, 1946; on Oahu, it damaged OR&L Co.'s mainline, forcing plantations on the north shore to use trucks for deliveries into Honolulu. When these and other plantations realized that truck shipping was efficient, it became the preferred method of delivery. OR&L Co.'s freight tonnage decreased even further. Operations of the common carrier service on the OR&L Co. mainline ceased on December 31, 1947, and the railway company removed most of its mainline track. For a few decades longer, the Navy assumed control of the OR&L Co. tracks between Pearl Harbor and (Naval Magazine) Lualualei. The OR&L Co. maintained a small rail line at the Honolulu waterfront that served pineapple canneries, a meat packing plant, and the wharfs. In 1962, the packing plant started using trucks for transportation, and subsequently about 8¾ miles of track were abandoned. The pineapple canneries remained connected to the wharfs by rail lines until 1971, when OR&L Co. operations ended.

Waikele Canal

The Waikele Canal was a City and County of Honolulu project, built in conjunction with the construction of the Waikele Canal Bridge and the OR&L Bridge, which were Territorial projects. The city built the canal to stop the flooding of businesses that frequently occurred during heavy rains near Waipahu Depot Road, about ¼ mile east of the bridge. In this area, Waikele Stream, which drains a very large area *mauka* of Waipahu, formerly emptied into Kapakahi Stream at a sharp bend that turned the water south toward Pearl Harbor. Waipahu community leaders and the Honolulu Board of Supervisors recognized the need for flood control in this area in 1937. At that time, the Supervisors recommended that any funds left over from the Kapalama flood control project be set aside for the Waipahu project and for a project in Waialua.²⁹ The Waikele Canal alignment ran south to Pearl Harbor, starting from a point in Waikele Stream about ¼ mile upstream from this flood point. The canal ran near (west of) the existing OR&L Co.'s Wahiawa branch line for a short distance. The Waikele Canal Bridge was built to span this canal and the OR&L Bridge was built to span the OR&L Co.'s tracks.

Dredge material from the canal was used to build the incline that carries Farrington Highway up to the OR&L Bridge and the Waikele Canal Bridge. FAGH 4-C funding covered the construction of the incline, as well as the OR&L Bridge. The dredged canal diverted Waikele Stream directly into Pearl Harbor, eliminating the flooding that had periodically occurred at the Waipahu Depot Road area.

After dredging the canal and diverting Waikele Stream into it, the segment of the stream that formerly ran to Kapakahi Stream at Waipahu Depot Road went dry. This left the canal as the only outlet of Waikele Stream to Pearl Harbor, so a recent topographic map labels it as Waikele Stream.

The Waikele Canal was opened in October 1939 and quickly proved its worth, diverting water coming down Waikele Stream and preventing flooding of the business district. On the 21st and 22nd of that

²⁹ Heritage Center, State of Hawaii Historic Bridge Inventory and Evaluation, Draft, May 2008. p. I-30.

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month it "withstood the acid test when 11.07 inches of rain fell in Waipahu." At the official dedication, held on October 29, 1939, acting Mayor David Y. K. Akana presented the flood control canal to the community in a ceremony conducted on the Waikele Canal Bridge.

CRITERION C

The Waikele Canal and OR&L Bridges are eligible under Criterion C for their association with early developments in concrete bridge construction in Hawaii featuring parapet design with cross-shaped voids and a curved-plan end stanchion configuration. The bridges are good examples of 1930's reinforced concrete bridges in their use of materials, method of construction, craftsmanship, and overall design.

Engineering & Design

William R. Bartels, bridge engineer for the Hawaii Territorial Highway Department, designed the Waikele Canal Bridge. Bartels received his education and training in Germany and immigrated to Hawaii in 1932 when he commenced working with the Highway Department; he continued his career there until his retirement in 1958.³⁰ During that period, he was a prolific and versatile designer, responsible for large and sophisticated bridge construction projects in Hawaii, including many tee-beam and rigid-frame concrete bridges. He also designed other bridge types, for instance, the 1945 bridges along the Waimalu-Aiea stretch of Kamehameha Highway (Waimalu, Kalauao Springs, and Kalauao Stream Bridges). Bartels' name appears on original drawings of the Waikele Canal Bridge as the designer. He designed and checked the drawings, dated March 1938, with the aid of several different drafters. Louis S. Cain, the Territorial Highway Engineer at the time, approved the drawings.

During the research for this nomination form, the only drawing found of the OR&L Bridge is an unsigned civil engineering drawing showing the grade contours and a section profile at the site. Therefore, the designer of the OR&L Bridge is unknown. The parapet and stanchion design of the OR&L Bridge is identical to the Waikele Canal Bridge and other contemporary Territorial bridges. This suggests that either the OR&L Bridge was designed by the Territorial Highway Department, or engineers from either the Territorial or federal highways departments did the drawings.

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.³¹ 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

³⁰ "TH Honors 4 Veteran Employees," *Honolulu Advertiser*, July 1, 1958. Article at the University of Hawaii at Manoa, Hamilton Library, Honolulu Newspapers Clippings Morgue, on microfiche in Biography section under: Bartels.

³¹ 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.

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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.³² 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."³³ Earlier lava rock or concrete masonry bridges typically had solid railings.

Conclusion

The 1939 Waikele Canal and OR&L Bridges are eligible under the local level under Criterion A for their association with the OR&L Railway and the plantation industry—namely the Oahu Sugar Company. They were the last major re-accommodation bridges built by the FHWA for the railroad before it went out of business. They are also eligible under Criterion C for their association with early developments in concrete bridge construction in Hawaii featuring parapet design with cross-shaped voids and a curved-plan end stanchion configuration and as examples of concrete tee-beam bridge designs that significantly increased structural load-bearing capacity and thus collectively represent an important step in the evolution of bridge technology.

³² 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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9. Bibliography

Architectural Drawings, Early Views, and Aerial Photography

Original drawings of the Waikele Canal Bridge are electronic files (scans) located in the database at the Hawaii Department of Transportation, Highways Division, Design Branch: FAP No. 4-C, Waianae Road (Farrington Highway) Waipahu Cutoff. Project ID No. 7101-001, Project File O-10-12, dated 06/09/1938.

No detailed drawings of the OR&L Bridge could be located for this form. This bridge appears on roadway profile drawings in the above Waikele Canal Bridge files.

Some early photographs of the bridges and of canal dredging are located at the Hawaii State Archives in annual *Report to the Governor, Territory of Hawaii*, by the Superintendent of Public Works, for years ending 1938 and 1940.

Historic aerial photographs of area around bridges are located at the Hawaii State Archives in folders PPA-39-2 and PPA-63. Current aerial photo from Google Earth 6.1. Waipahu vicinity. Approximate elevation 3000', Borders and Labels data layer. Available from server kh.google.com. accessed February 13, 2013.

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"Cain Outlines Territory-U.S. Highway Plan," June 29, 1937. p. 1.

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"New Highways Will Be Built," December 18, 1937.

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"Three Major Improvements Dedicated at Waipahu," October 30, 1939. p. 16. "New 5½-Mile Section of H-1 Open Wednesday," Nov. 27, 1966. p. A1B.

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Waikele Canal Bridge and Highway Overpass

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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>602560</u> | Northing: <u>2364830</u> |
| 2. Zone: <u>04</u> | Easting: <u>602600</u> | Northing: <u>2364840</u> |
| 3. Zone: _____ | Easting: _____ | Northing: _____ |
| 4. Zone: _____ | Easting: _____ | Northing: _____ |

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

The boundary of the property is defined by the limits of the Waikele Canal Bridge and the Highway Overpass (OR&L Bridge), including their superstructures and abutments, with the segment of Farrington Highway between them considered non-contributing.

Boundary Justification (Explain why the boundaries were selected.)

The boundary includes all historic features of both bridges.

Waialeale Canal Bridge and Highway Overpass

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11. Form Prepared By

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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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Name of Property: Waikele Canal Bridge and Highway Overpass
City or Vicinity: Waipahu
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	Federal Aid Project Map
Figure 4: HI_Honolulu_WaikeleCanalBridge_Fig0004	1954 Map
Figure 5: HI_Honolulu_WaikeleCanalBridge_Fig0005	Original drawing of bridge (Image 1)
Figure 6: HI_Honolulu_WaikeleCanalBridge_Fig0006	Original drawing of bridge (Image 2)
Figure 7: HI_Honolulu_WaikeleCanalBridge_Fig0007	Original drawing of bridge (Image 3)

Waikele Canal Bridge and Highway Overpass

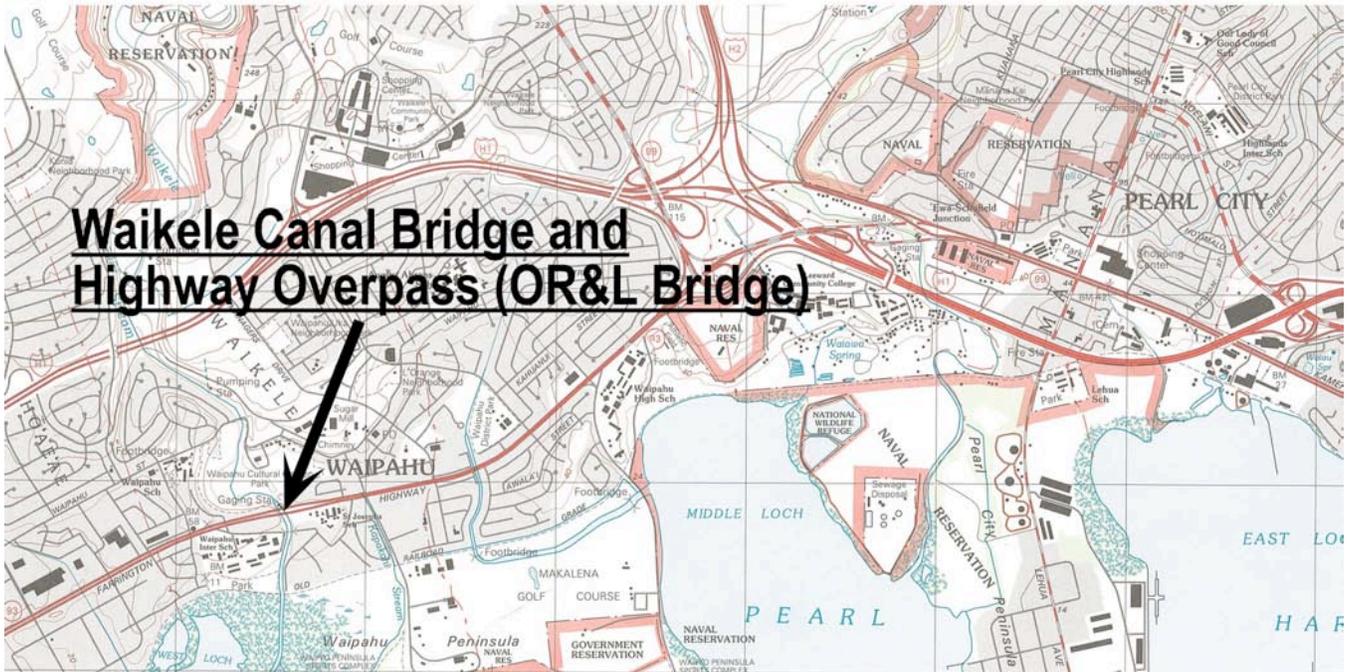
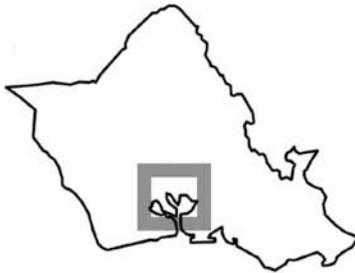
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Figure 1: HI_Honolulu_WaikeleCanalBridge_Fig0001

Location map for Waikele Canal Bridge and Highway Overpass (OR&L Bridge). *U.S. Geological Survey, Waipahu Quadrangle, 1:24,000, 1998.*



Waikele Canal Bridge and Highway Overpass

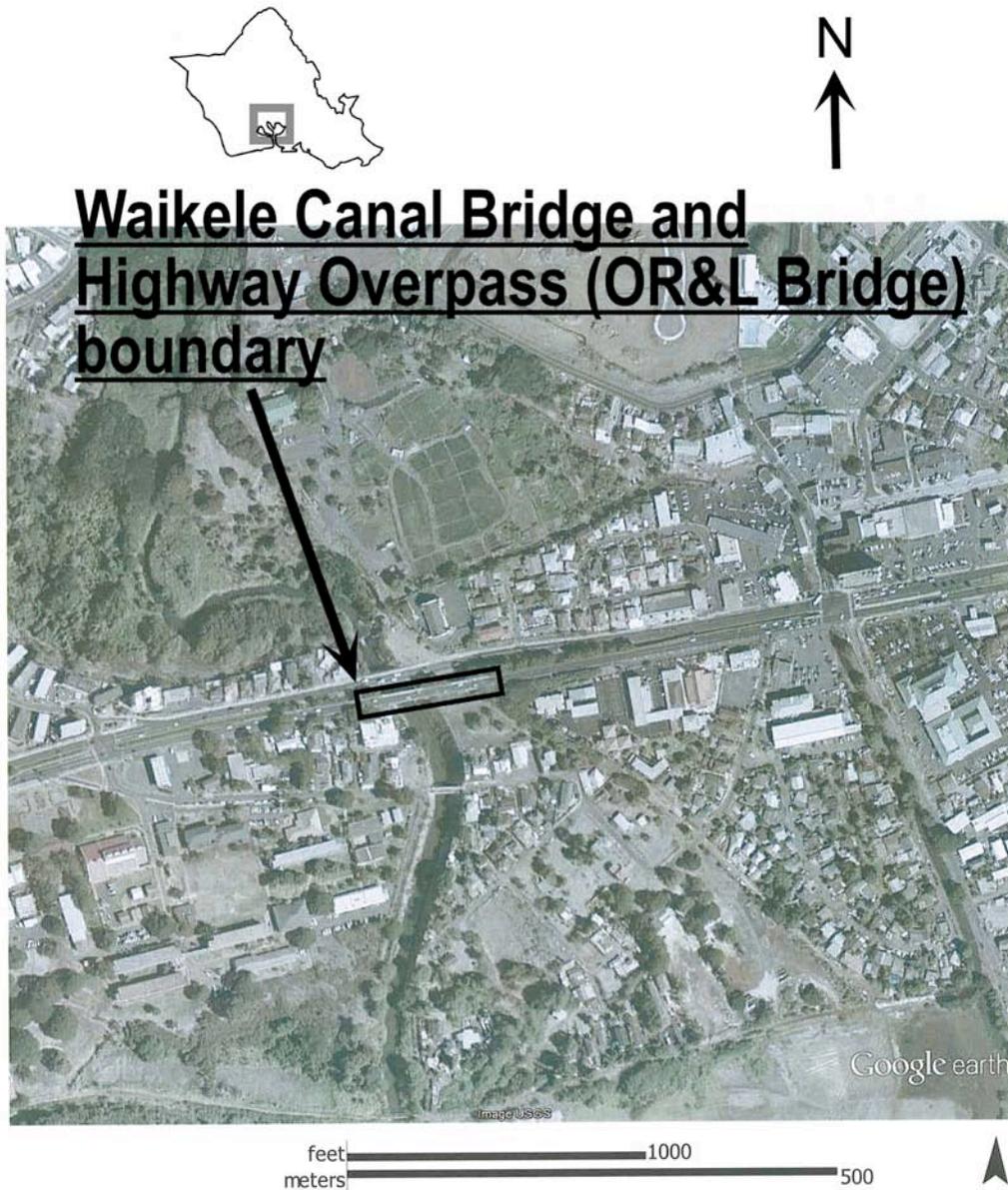
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Figure 2: HI_Honolulu_WaikeleCanalBridge_Fig0002

Boundary Map for Waikile Canal Bridge and Highway Overpass (OR&L Bridge). *GoogleEarth, 2013.*



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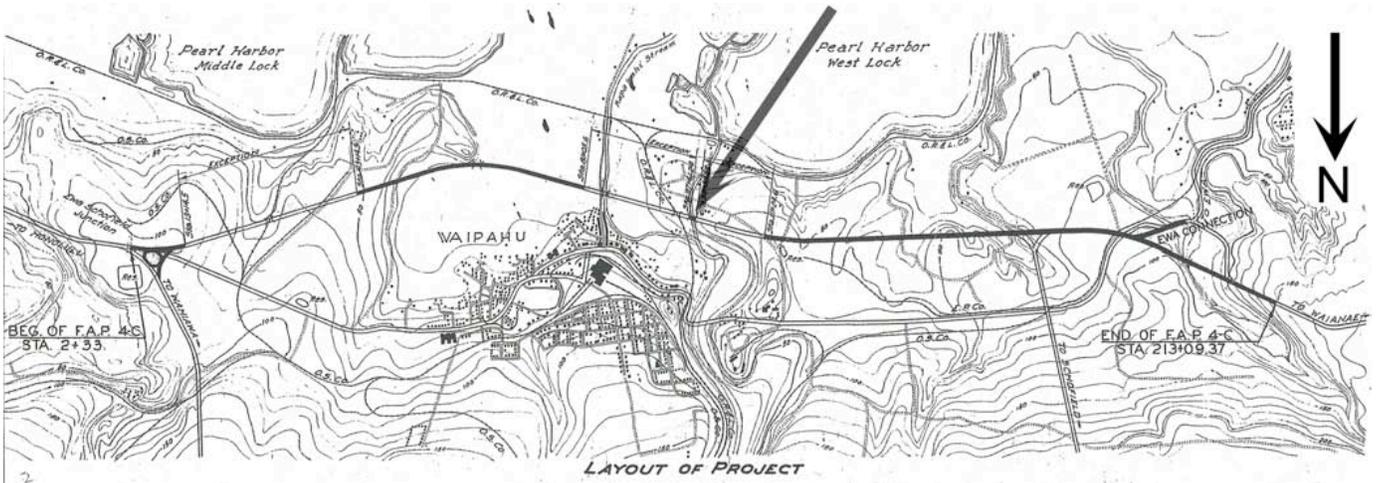
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Figure 3: HI_Honolulu_WaikeleCanalBridge_Fig0003

Portion of the project map for Federal Aid Project 4-C, Waipahu Cutoff. The location of the two bridges is shown by the added arrow. No scale. *State of Hawaii, Department of Transportation, Highways Division, Design Branch, Project ID No. 7101-001, 06/09/1938.*



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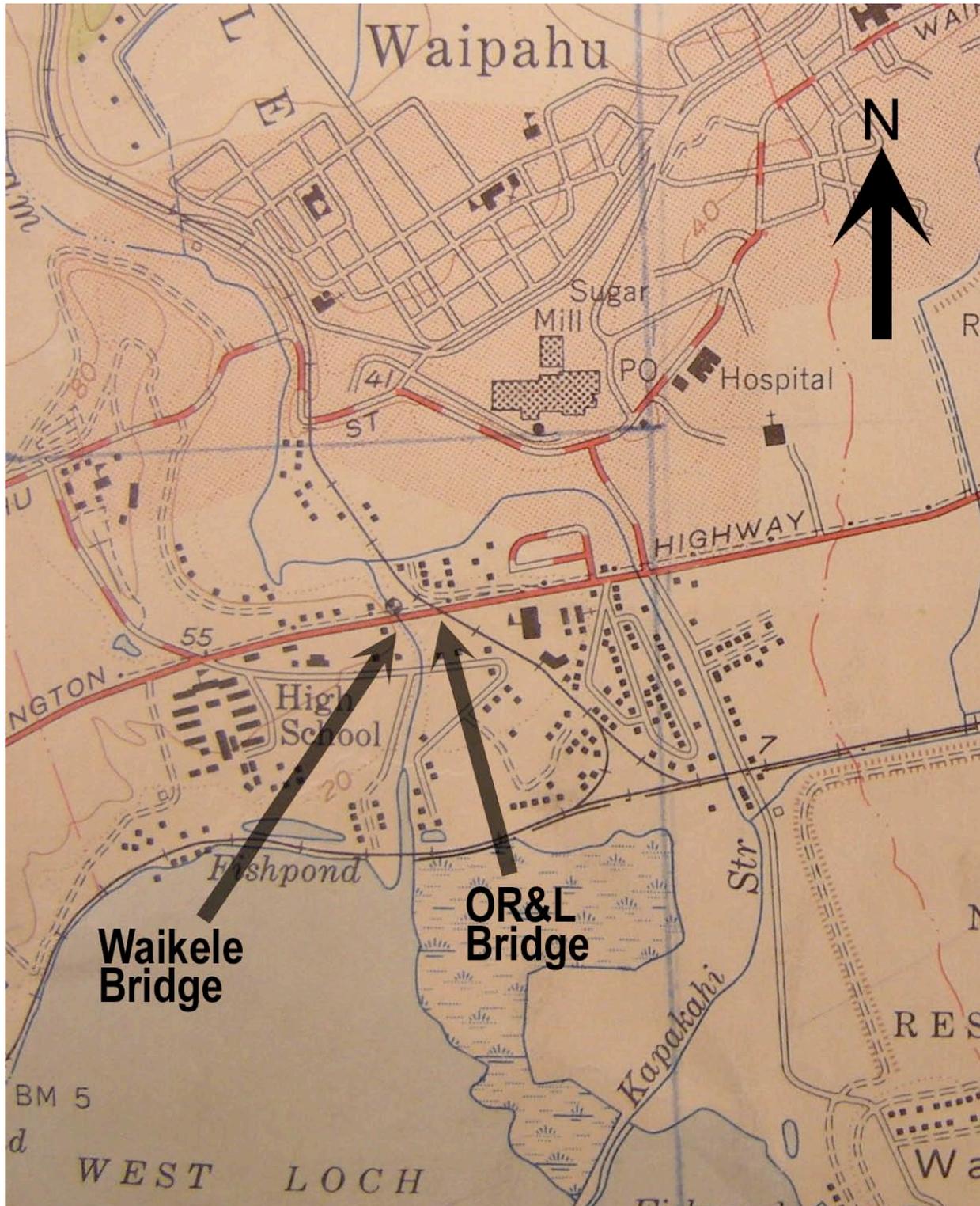
Name of Property

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Figure 4: HI_Honolulu_WaikeleCanalBridge_Fig0004

Portion of 1954 topographic map showing the two bridges (added arrows and labeling). No scale.
U.S. Geological Survey, Waipahu quadrangle, 1954.



Waikele Canal Bridge and Highway Overpass

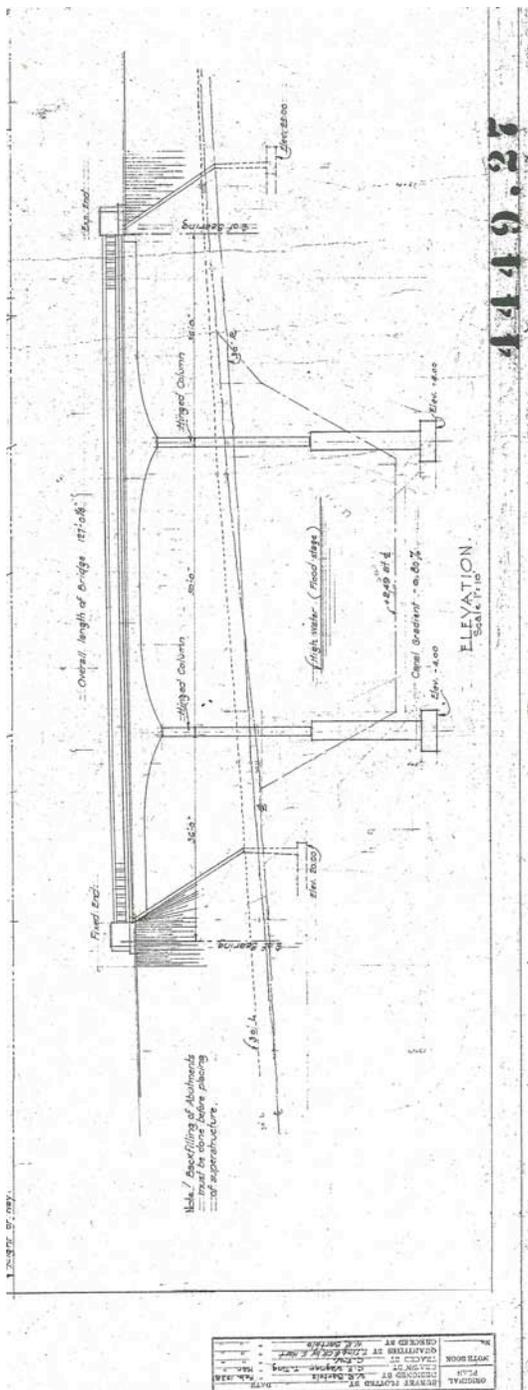
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Figure 5: HI_Honolulu_WaikeleCanalBridge_Fig0005

Portion of original drawing of the Waikele Canal Bridge showing an elevation of the bridge. Note the boxed information that indicates the designer as W.R. Bartels. "Canal Bridge, FAP 4-C, Mar. 1938." State of Hawaii, Department of Transportation, Highways Division, Design Branch, Project ID No. 7101-001, drawing 4449.27.



Waikele Canal Bridge and Highway Overpass

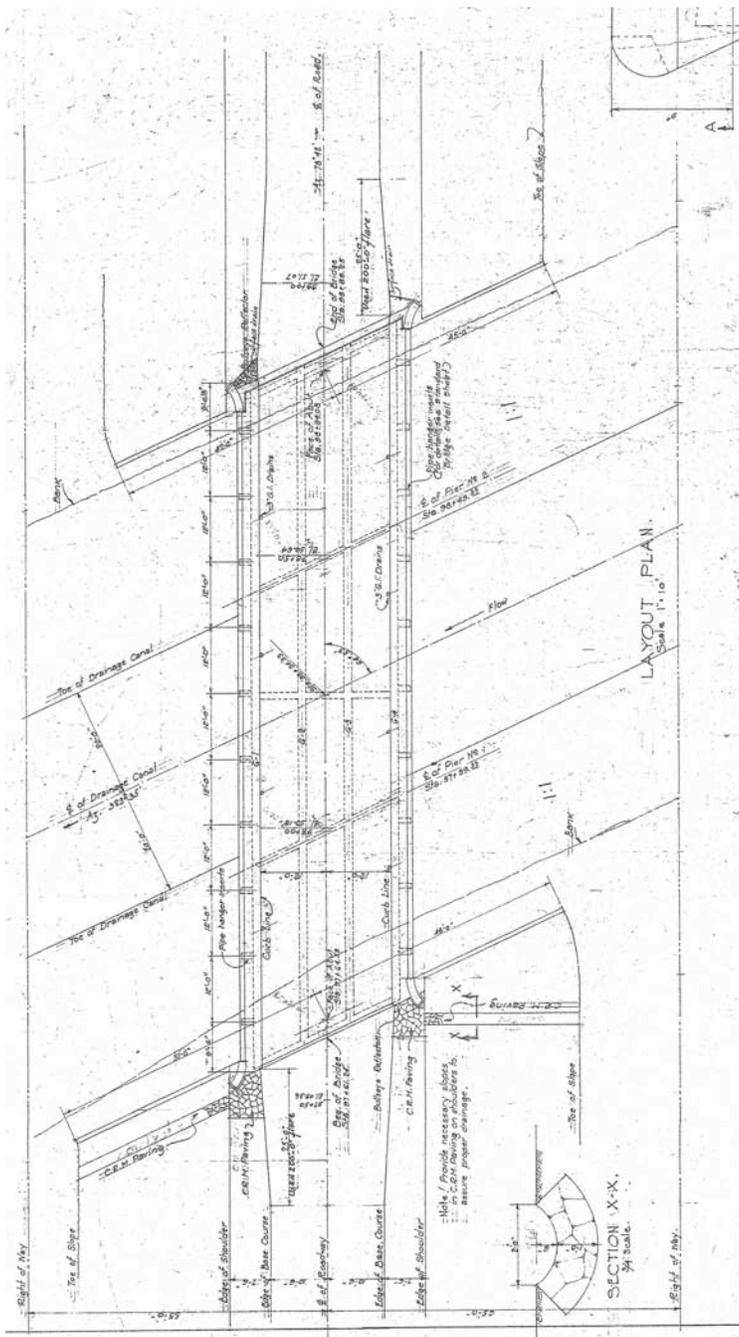
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Figure 6: HI_Honolulu_WaikeleCanalBridge_Fig0006

Portion of original drawing of the Waikele Canal Bridge showing the plan of the bridge. "Canal Bridge, FAP 4-C, Mar. 1938." State of Hawaii, Department of Transportation, Highways Division, Design Branch, Project ID No. 7101-001, drawing 4449.27.



Waikele Canal Bridge and Highway Overpass

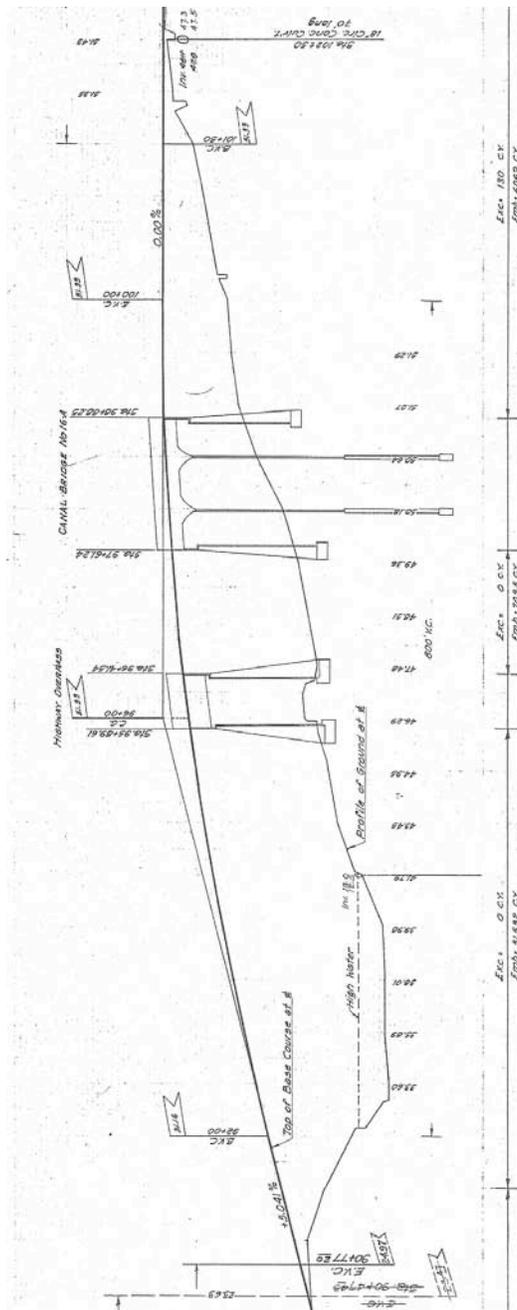
Name of Property

Honolulu, Hawai'i

County and State

Figure 7: HI_Honolulu_WaikeleCanalBridge_Fig0007

Portion of original drawing of the Waikele Canal Bridge and Highway Overpass (OR&L Bridge) showing a section through the Farrington Highway roadway. Note the level of the built-up incline above the profile of the original grade (ground). *Untitled drawing for FAGH 4-C, Revised June 19, 1939. State of Hawaii, Department of Transportation, Highways Division, Design Branch, Project ID 7101-001, drawing 4449.8.*



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

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PHOTO LOG

Historic Photos

Name of Property: Waikele Canal Bridge and Highway Overpass
City or Vicinity: Waipahu
County: Honolulu
State: Hawai'i
Location of Original Digital Files: 1429 Makiki St., Honolulu, HI

Photo #: Photo Name	Description
Photo 1: HI_HonoluluCounty_WaikeleCanalBridge_H0001	Aerial photo 1939-1941
Photo 2: HI_HonoluluCounty_WaikeleCanalBridge_H0002	Dredging of Canal ca. 1937
Photo 3: HI_HonoluluCounty_WaikeleCanalBridge_H0003	Canal ca. 1940
Photo 4: HI_HonoluluCounty_WaikeleCanalBridge_H0004	OR&L Bridge under construction 1938

Waikele Canal Bridge and Highway Overpass

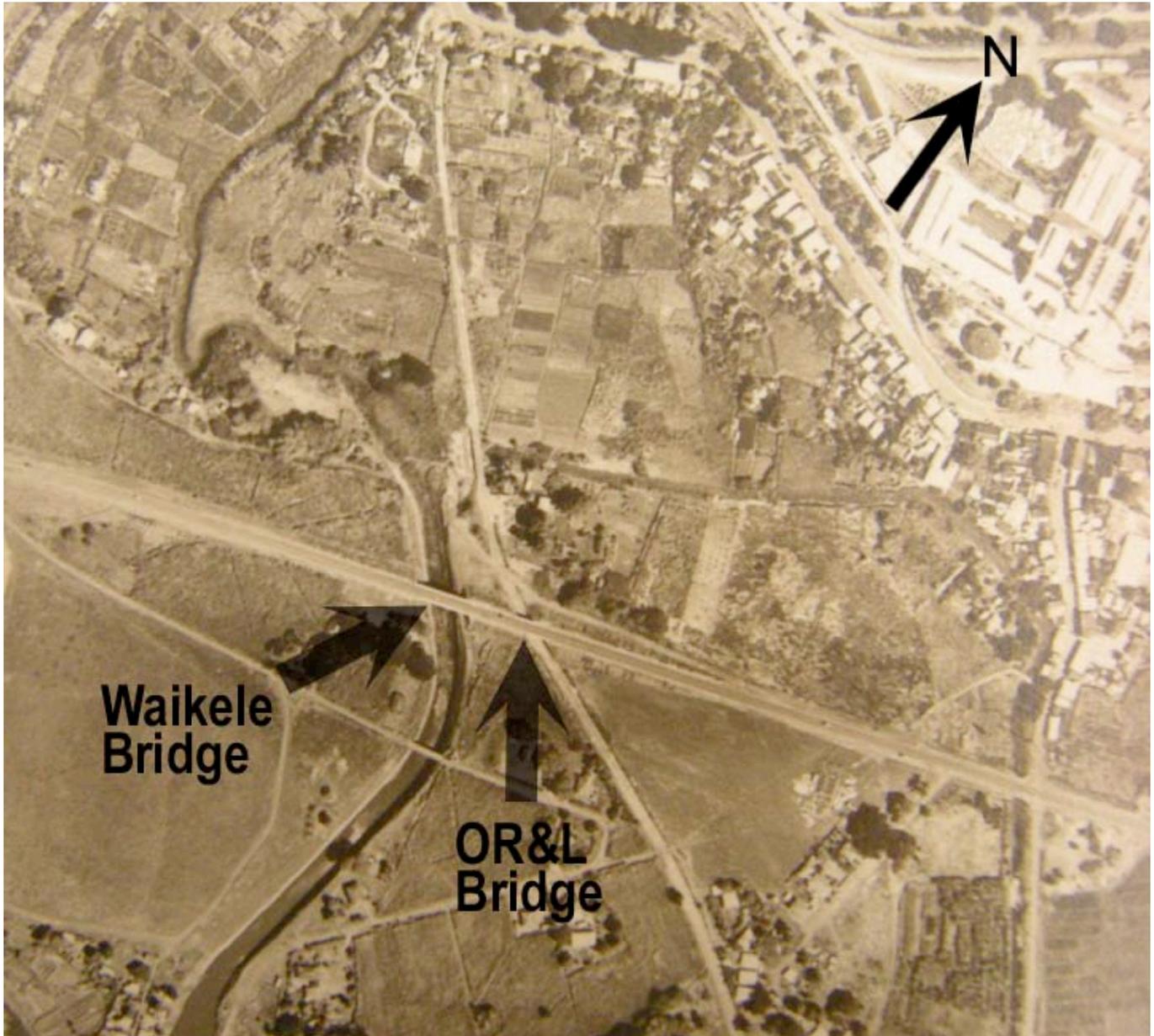
Name of Property

Honolulu, Hawai'i

County and State

Photo 1: HI_HonoluluCounty_WaikeleCanalBridge_H0001

Portion of aerial photo dated 1939-1941 showing the two bridges shortly after construction (added arrows and labeling). No scale. *Hawai'i State Archives, Folder PPA-39-2, photo M-4.30*



Waikele Canal Bridge and Highway Overpass

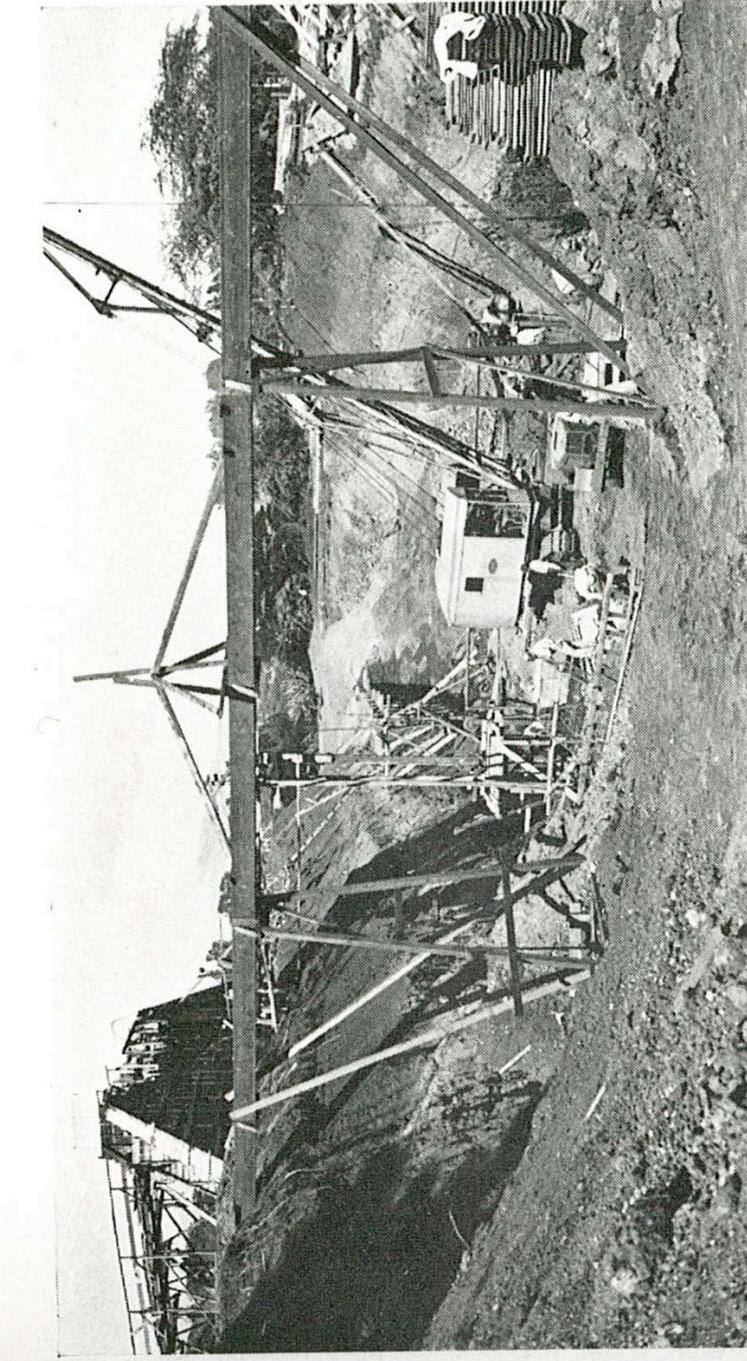
Name of Property

Honolulu, Hawai'i

County and State

Photo 2: HI_HonoluluCounty_WaikeleCanalBridge_H0002

Historic photograph (ca. 1937) showing dredging of the flood control canal. *Superintendent of Public Works*, Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1938, between pages 18 and 19.



Flood control canal, 36 feet deep, being constructed in connection with FAP 4-C to relieve Waipahu and vicinity from danger of future floods. This project is being constructed jointly by the City and County of Honolulu and the Territorial Highway Department.

Waikele Canal Bridge and Highway Overpass

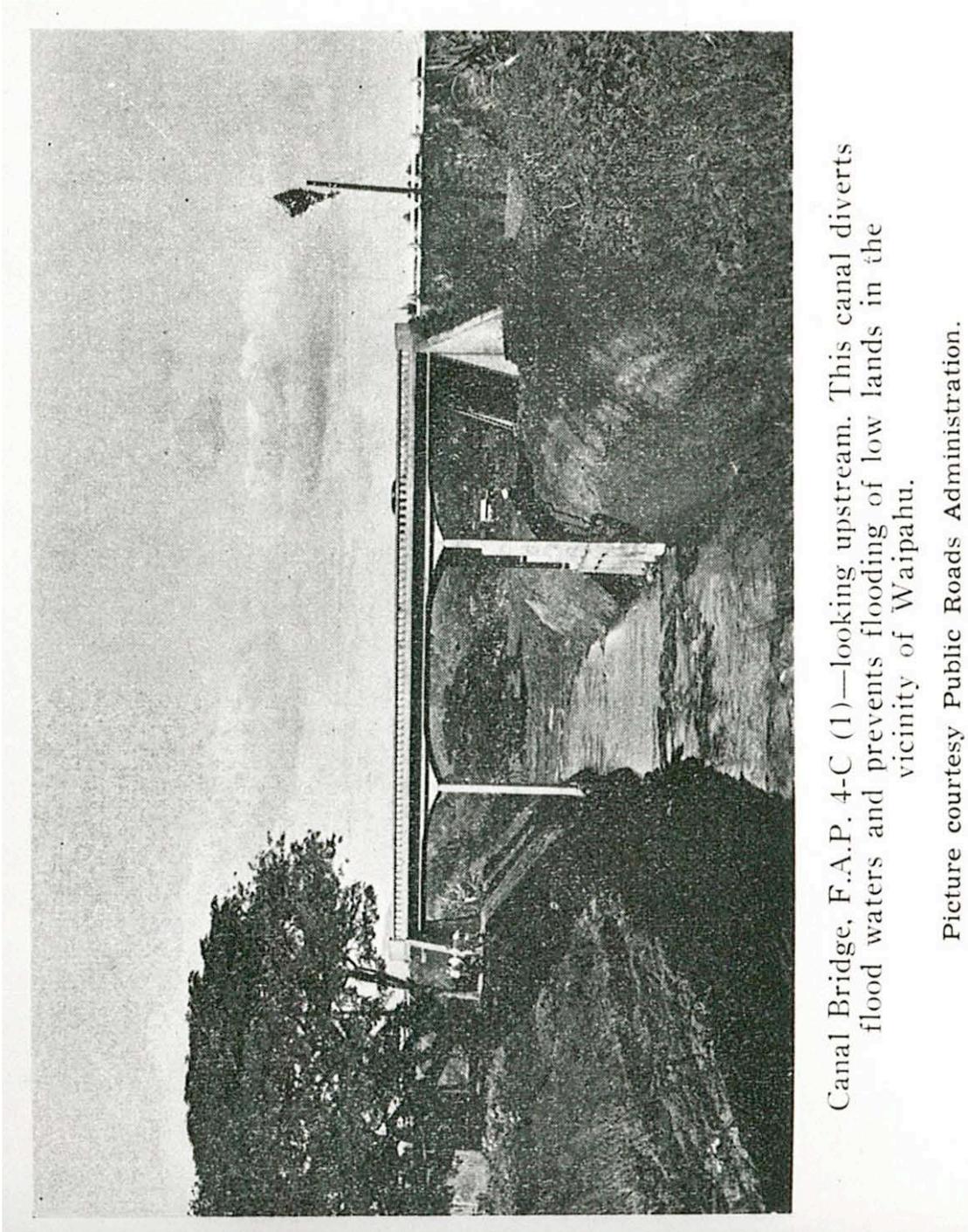
Name of Property

Honolulu, Hawai'i

County and State

Photo 3: HI_HonoluluCounty_WaikeleCanalBridge_H0003

Historic photograph showing the Waikele Canal Bridge. *Superintendent of Public Works, Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1940, between pages 26 and 27.*



Waikele Canal Bridge and Highway Overpass

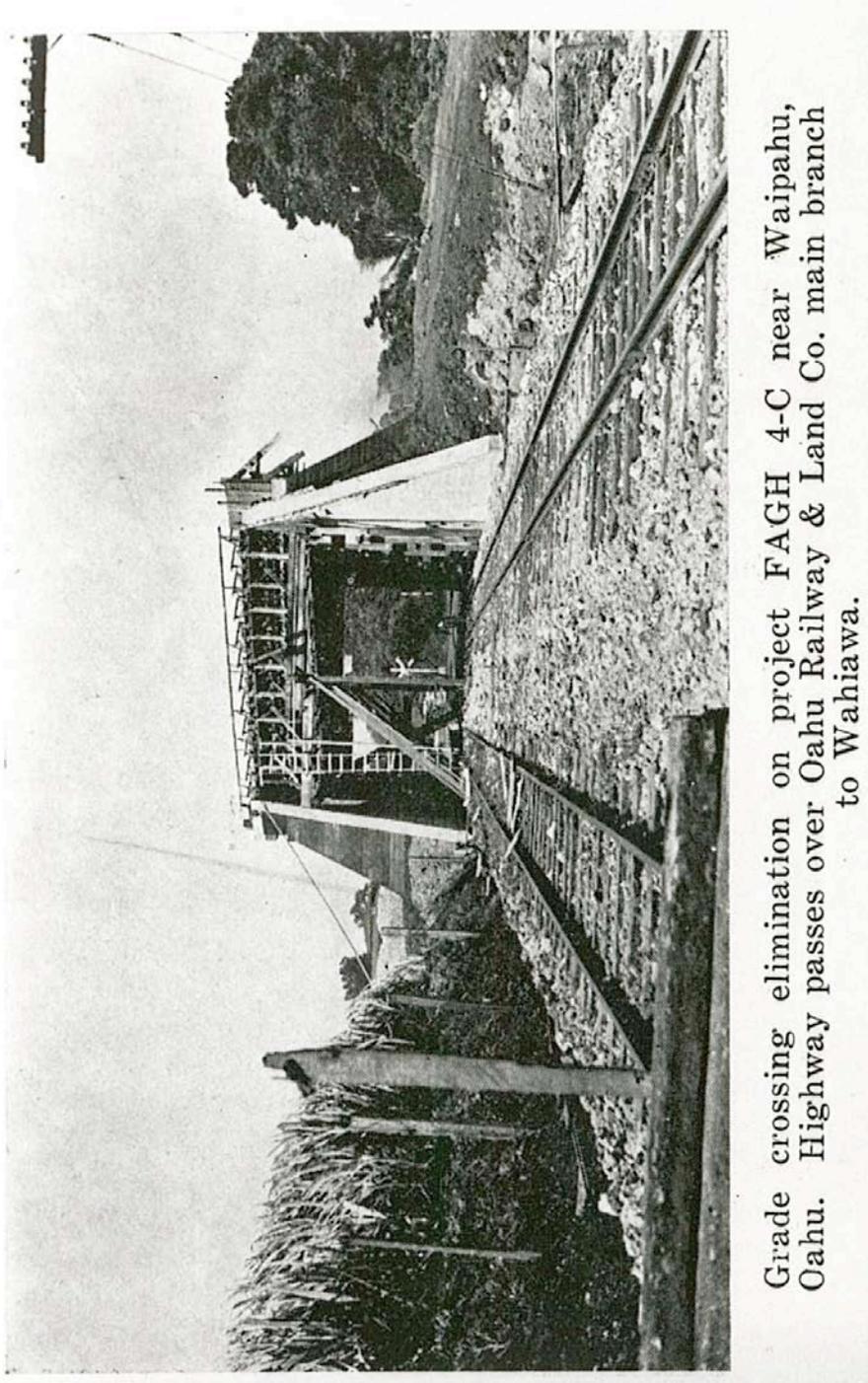
Name of Property

Honolulu, Hawai'i

County and State

Photo 4: HI_HonoluluCounty_WaikeleCanalBridge_H0004

Historic photograph showing OR&L Bridge under construction. *Superintendent of Public Works, Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1938, between pages 18 and 19.*



Waikele Canal Bridge and Highway Overpass

Honolulu, Hawai'i

Name of Property

County and State

Current Photos

Name of Property: Waikele Canal Bridge and Highway Overpass
City or Vicinity: Waipahu
County: Honolulu
State: Hawai'i
Location of Original Digital Files: 1429 Makiki St., Honolulu, HI

Photo #: (Photo Name)

Description

Photo #1 (HI_HonoluluCounty_WaikeleCanalBridge_0001)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing east-southeast.

Photo #2 (HI_HonoluluCounty_WaikeleCanalBridge_0002)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing west-southwest.

Photo #3 (HI_HonoluluCounty_WaikeleCanalBridge_0003)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing west.

Photo #4 (HI_HonoluluCounty_WaikeleCanalBridge_0004)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing west.

Photo #5 (HI_HonoluluCounty_WaikeleCanalBridge_0005)

Overview of Waikele Canal Bridge, camera facing north.

Photo #6 (HI_HonoluluCounty_WaikeleCanalBridge_0006)

Detail of end stanchion, Waikele Canal Bridge, with scale device (one-foot increments), camera facing south.

Photo #7 (HI_HonoluluCounty_WaikeleCanalBridge_0007)

Supports of Waikele Canal Bridge, camera facing west.

Photo #8 (HI_HonoluluCounty_WaikeleCanalBridge_0008)

East abutment of Waikele Canal Bridge, camera facing east.

Photo #9 (HI_HonoluluCounty_WaikeleCanalBridge_0009)

Detail of west support columns and pier of Waikele Canal Bridge, camera facing south

Photo #10 (HI_HonoluluCounty_WaikeleCanalBridge_0010)

Detail of Waikele Canal Bridge four-legged concrete pier in the streambed, camera facing

Photo #11 (HI_HonoluluCounty_WaikeleCanalBridge_0011) Detail of Waikele Canal Bridge spandrel, camera facing south.

Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

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Photo #12 (HI_HonoluluCounty_WaikeleCanalBridge_0012)

Abutments and deck of Highway Overpass (OR&L Bridge), camera facing southeast.

Photo #13 (HI_HonoluluCounty_WaikeleCanalBridge_0013)

Abutments and deck of Highway Overpass (OR&L Bridge), camera facing northwest.

Photo #14 (HI_HonoluluCounty_WaikeleCanalBridge_0014)

Detail of west abutment of Highway Overpass (OR&L Bridge), camera facing west.

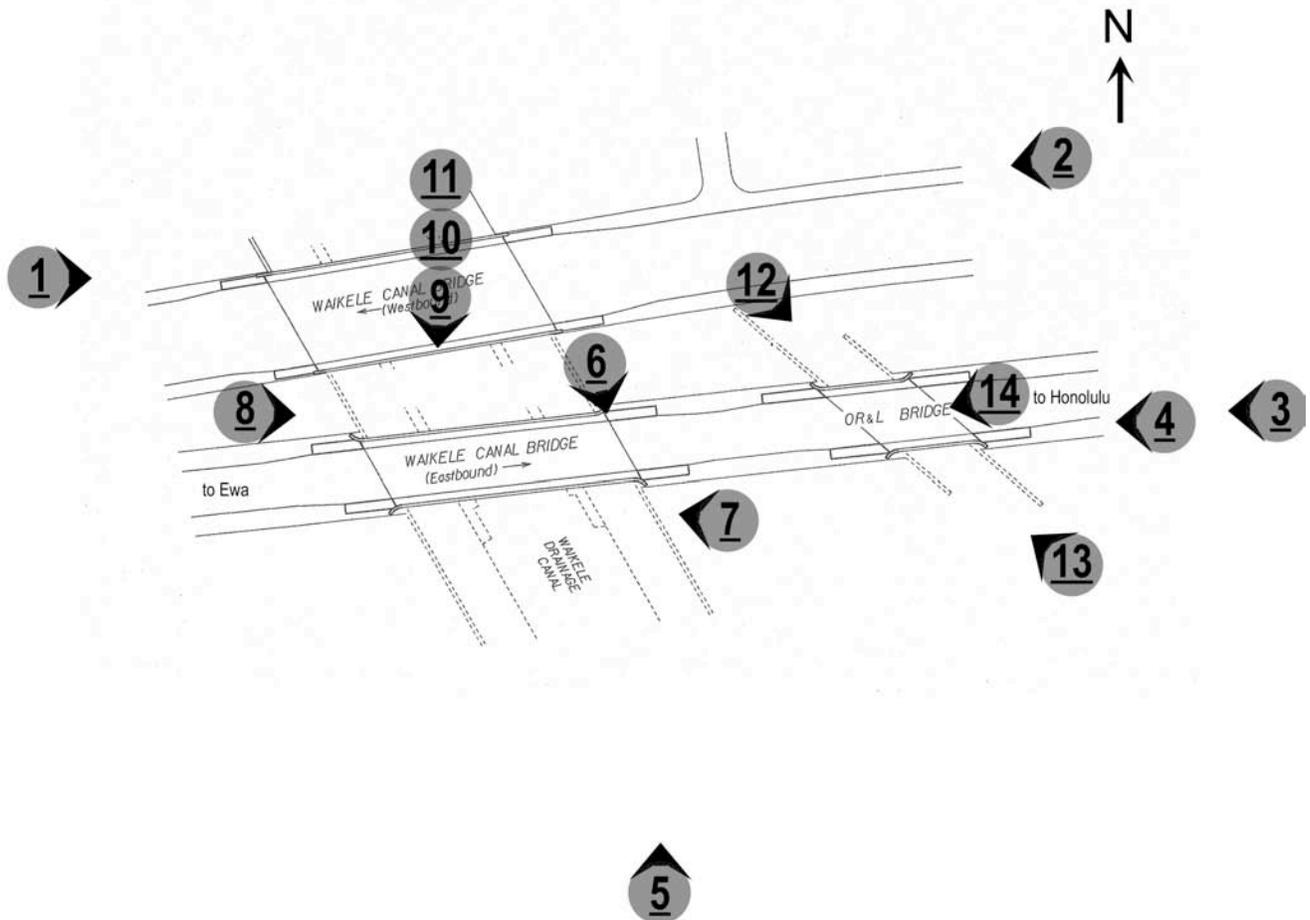
Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo Key



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #1 (HI_HonoluluCounty_WaikeleCanalBridge_0001)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing east-southeast.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #2 (HI_HonoluluCounty_WaikeleCanalBridge_0002)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing west-southwest.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #3 (HI_HonoluluCounty_WaikeleCanalBridge_0003)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing west.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #4 (HI_HonoluluCounty_WaikeleCanalBridge_0004)

Overview of Waikele Canal Bridge and Highway Overpass (OR&L Bridge), camera facing west.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #5 (HI_HonoluluCounty_WaikeleCanalBridge_0005) Overview of Waikele Canal Bridge, camera facing north.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #6 (HI_HonoluluCounty_WaikeleCanalBridge_0006)

Detail of end stanchion, Waikele Canal Bridge, with scale device (one-foot increments), camera facing south.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #7 (HI_HonoluluCounty_WaikeleCanalBridge_0007) Supports of Waikele Canal Bridge, camera facing west.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #8 (HI_HonoluluCounty_WaikeleCanalBridge_0008) East abutment of Waikele Canal Bridge, camera facing east.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #9 (HI_HonoluluCounty_WaikeleCanalBridge_0009)

Detail of west support columns and pier of Waikele Canal Bridge, camera facing south.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #10 (HI_HonoluluCounty_WaikeleCanalBridge_0010)

Detail of Waikele Canal Bridge four-legged concrete pier in the streambed, camera facing south.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #11 (HI_HonoluluCounty_WaikeleCanalBridge_0011) Detail of Waikele Canal Bridge spandrel, camera facing south.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #12 (HI_HonoluluCounty_WaikeleCanalBridge_0012)

Abutments and deck of Highway Overpass (OR&L Bridge), camera facing southeast.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #13 (HI_HonoluluCounty_WaikeleCanalBridge_0013)

Abutments and deck of Highway Overpass (OR&L Bridge), camera facing northwest.



Waikele Canal Bridge and Highway Overpass

Name of Property

Honolulu, Hawai'i

County and State

Photo #14 (HI_HonoluluCounty_WaikeleCanalBridge_0014)
Detail of west abutment of Highway Overpass (OR&L Bridge), camera facing west.

