

KAPALAMA CANAL BRIDGE
Dillingham Boulevard and Kapalama Drainage Canal
Honolulu
Honolulu County
Hawaii

HAER No. HI-125

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
U.S. Department of the Interior
National Park Service
Oakland, California

HISTORIC AMERICAN ENGINEERING RECORD

INDEX TO PHOTOGRAPHS

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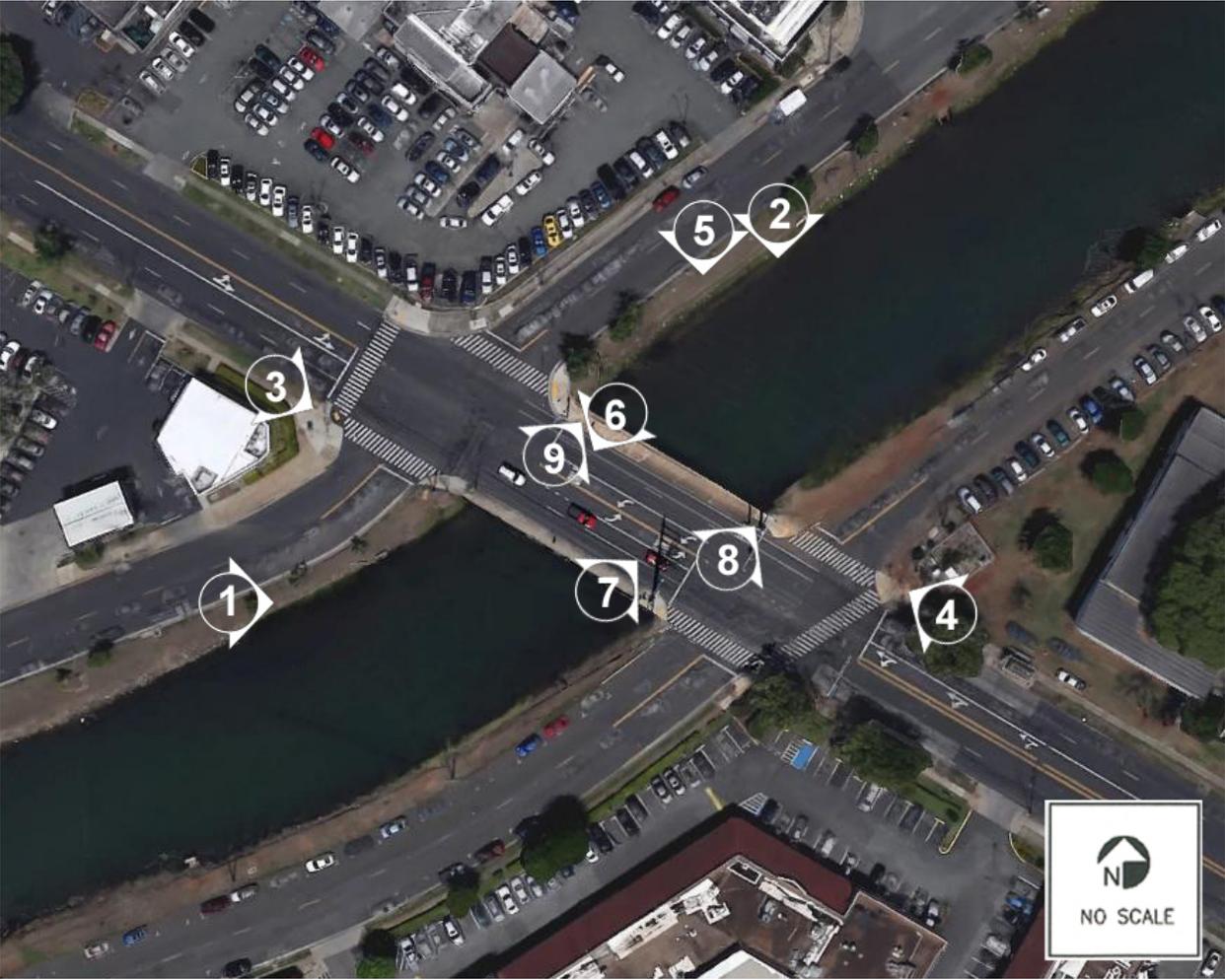
HAER No. HI-125

Silverhouse Photographic, Athens, GA, Photographer

August 2012

- HI-125-1 OVERVIEW OF BRIDGE AND CANAL. VIEW FACING EAST.
- HI-125-2 OVERVIEW OF BRIDGE AND CANAL. VIEW FACING SOUTH.
- HI-125-3 DILLINGHAM BOULEVARD APPROACH TO THE BRIDGE. VIEW FACING
SOUTHEAST.
- HI-125-4 DILLINGHAM BOULEVARD APPROACH TO THE BRIDGE. VIEW FACING
NORTHWEST.
- HI-125-5 DETAIL OF OUTBOARD SIDE OF THE BRIDGE. NOTE THE BEVELED
ENDS OF THE TRANSVERSE BEAMS OF THE SUBSTRUCTURE. VIEW
FACING SOUTH.
- HI-125-6 DETAIL OF THE INBOARD SIDE OF THE PARAPET. VIEW FACING
SOUTHWEST.
- HI-125-7 DETAIL OF THE INBOARD SIDE OF THE PARAPET. VIEW FACING
NORTHEAST.
- HI-125-8 DETAIL OF END STANCHION SHOWING INSCRIPTION "KAPALAMA
CANAL." VIEW FACING NORTHEAST.
- HI-125-9 DETAIL OF END STANCHION SHOWING INSCRIPTION "1930." VIEW
FACING NORTHEAST.

PHOTO KEY



HISTORIC AMERICAN ENGINEERING RECORD

KAPALAMA CANAL BRIDGE

HAER No. HI-125

- Location:** Dillingham Boulevard and Kapalama Drainage Canal
Honolulu
City and County of Honolulu, Hawaii
U.S.G.S. Topographic map, Honolulu Quadrangle 1998 (7.5 minute series)
Universal Transverse Mercator Coordinates NAD 83:
04.616860.2358210
- Present Owner:** State of Hawaii
- Present Use:** Vehicular Bridge
- Significance:** The Kapalama Canal Bridge is significant for its association with the development of an effective road transportation system on Oahu. This bridge was built in 1930 as part of Dillingham Boulevard, an important arterial in Honolulu's urban core. It facilitated passage through Kapalama, and significantly improved access to Pearl Harbor from Honolulu's downtown and port area.
- Historians:** Dee Ruzicka and Polly Tice
Mason Architects, Inc.
119 Merchant Street, Suite 501
Honolulu, HI 96813
- Project Information:** This Historic American Engineering Record (HAER) report is part of the documentation for properties identified as adversely affected by the Honolulu Rail Transit Project (H RTP) in the City and County of Honolulu. This documentation was required under Stipulation V.C. (1, 2) of the Honolulu High-Capacity Transit Corridor Project (HHCTCP) Programmatic Agreement (PA), which was signed by the U.S. Department of Transportation's Federal Transit Administration, the Hawaii State Historic Preservation Officer, the United States Navy, and the Advisory Council on Historic Preservation. After consultation with the City and County of Honolulu, the National Park Service, Pacific West Regional Office, in a letter dated June 29, 2011, stipulated the details of the required documentation efforts, including HAER documentation for this and other bridges affected by the H RTP. Archival photographs were taken in August 2012 by Silverhouse Photographic, Athens, GA. The field work was conducted in November of 2015 and the draft report was prepared in December of 2015.

Part I. Historical Information

A. Physical History:

1. **Date of construction:** 1930
2. **Engineer(s):** Assistant City and County Engineer Daniel Balch and structural engineer George Dawson.¹

Daniel Balch was Assistant to City and County Engineer Louis S. Cain when the bridge was constructed. Balch began his career in 1915 as an engineer for the Territorial Harbor Board,² and ten years later began work for the City and County of Honolulu as Assistant Engineer to Cain. Subsequently, in 1935, Balch followed Cain to the Territorial Department of Public Works as assistant Superintendent when Cain became Superintendent. Balch became Superintendent upon Cain's death in 1940, and retired in 1943.³

George Dawson was a structural engineer for the City and County. Little is known about him. He was engineer for the steel through-deck Karsten Thot Bridge that was built in 1932 over the Wahiawa Reservoir, as well as engineer for the Queen Street Bridge (Nuuanu Stream), built in 1932 in downtown Honolulu.^{4,5}

3. **Builder/ Contractor/ Supplier:** Unknown
4. **Original plans and construction:** Original drawings were prepared by the Office of the City & County Engineer, Honolulu, Hawaii. They are titled, "West Queen Street: King St. to Waiakamilo Road. Kapalama Canal Bridge," and are dated January 29, 1930. The plans were approved by "D.F. Balch" (Daniel Balch), the City & County Engineer. The plans were initialed by engineer and draftsman "G.K.D.," presumably for George K. Dawson.
5. **Alterations and additions:** The bridge is historically intact. The only noticeable alteration is road resurfacing.

B. Historical Context:

History of the Kapalama Area

The Kapalama Canal Bridge is located within the Kapalama *ahupuaa* (a common Hawaiian term for a geographical area that typically extends from the mountains to the sea). In the Hawaiian language, Kapalama means "the enclosure of lama." This refers to a compound, enclosed by sacred lama wood, where young *alii* (common Hawaiian term denoting a person of royal lineage and rank) were domiciled just before being married to produce offspring. By legend, such an enclosure was located there, hence the name.⁶

At the time of the *Mahele* (the transformation of Hawaiian traditions of royal land tenure to the codified western practice of private land ownership) ca. 1850, the terraced area of Kapalama that extended from the edge of the sea to the foothills (above what would become School

¹ Bethany Thompson, Historic Bridge Inventory, Island Of Oahu. Honolulu: State of Hawaii Department of Transportation, Highways Division. June 1983. pp. VII-13.

² "Daniel Balch New Chief of Public Works," *Honolulu Star Bulletin*, September 17, 1940.

³ "D.F. Balch," obituary, December 19, 1961.

⁴ 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. V-43.

⁵ Ruzicka, Dee. Pre-Draft National Register Nomination Form for Kapalama Canal Bridge. April 16, 2013.

⁶ Sterling, Elspeth P. and Catherine C. Summers, *Sites of Oahu* (Honolulu: Bishop Museum Press) 1978. p. 319.

Street) was planted in taro.⁷ Two streams, Niuhelewai Stream and Kapalama Stream drained this area. Kapalama Stream extended *mauka* (common Hawaiian term meaning "in the direction of the mountains") on a route running just east of Waiakamilo Road / Houghtailing Street before crossing west near H1 Freeway to extend up Kalihi Valley east of Kalihi Street. Niuhelewai Stream was about ½ mile east of Kapalama Stream, extending up to a spring located just *makai* (common Hawaiian term meaning "in the direction of the sea") of (future) School Street. This spring was west of (present) Lanakila Street and just across School Street from the former Insane Asylum (now the site of Hawaii Public Housing Authority). Near (former) Vineyard Boulevard (now Halona Street / H1 Freeway), a branch of Niuhelewai Stream extended northwest, crossing School Street near Houghtailing and meandering *mauka*. Niuhelewai is described in *Place Names of Hawaii* as "Old part of Honolulu, site of a battle in which Ka-hekili of Maui defeated Ka-hahana of O'ahu; a stream here was choked with corpses."⁸

By the late 1800s, rice was planted in the area of Kapalama surrounding the site of the future bridge.⁹ Pineapples were planted farther west, near what would become Kalihi Street. To the east, the area of Iwilei was an industrial site near the edge of downtown Honolulu that contained a fertilizer works, a slaughterhouse, and a prison. King Street was the only east-west road through Kapalama and the Oahu Railway & Land Co. (OR&L) main line was constructed just *makai* of King Street. By 1912, School Street was built westward through Kapalama to Kalihi Street, and the former OR&L line *makai* of King was now the Kalihi Line. A new main line extended *makai* from the downtown depot before intersecting the Kalihi Line just west of Middle Street. The Kalihi line was apparently abandoned in the late 1920s.

The area of Kapalama had begun to urbanize with the 1901 establishment of the Kapiolani Tract subdivision by developer William C. Achi. This subdivision was laid out in a grid pattern with about 1200 lots in two north-south rows of blocks. The subdivision extended *makai* from King Street between Kalihi Street and Puuhale Road. Further urbanization occurred by 1912, with the platting of the Bishop Estate Tract that extended east of the Kapiolani Tract to Waiakamilo Road. Queen Street extended west-east through both subdivisions, terminating at Waiakamilo Road. The area of Kapalama between the two OR&L lines and between Waiakamilo Road and Iwilei was planted in sugarcane.¹⁰

West Queen Street Extension (Dillingham Boulevard) and the Kapalama Canal Bridge

By 1922 the City and County of Honolulu had plans to fill this vacant area with a grid of streets, centered around the extension of Queen Street from Waiakamilo Road, to an intersection with King Street at Liliha Street. This was referred to as the West Queen Street Extension¹¹ and would eventually become Dillingham Boulevard. By the end of the 1920s, the City and County had laid down a solid roadbed of fill along this route and installed sewer lines. An article in the *Honolulu Star Bulletin* reported that in February of 1930, the City and County of Honolulu was still waiting for this fill to settle before surfacing the roadway and installing its curbs, walkways,

⁷ Sterling and Summers, *Sites*, p. 320.

⁸ Mary Kawena Pukui and Samuel H. Elbert and Esther T. Mookini, *Place Names of Hawaii* (Honolulu: University of Hawaii Press) 1974. p. 166.

⁹ Monsarrat, M.D. map "Honolulu, Hawaiian Islands," 1897.

¹⁰ "Cost of Big Drain Project is Set High," *Honolulu Advertiser*, November 14, 1924. p. 1.

¹¹ City Planning Commission, City and County of Honolulu, map "Proposed Street Plan Kapalama Section," December 1922.

and lighting.¹² This additional work (for 4300' of roadway) was anticipated to be contracted in the summer of 1930, and was estimated to cost \$180,000.

The *Honolulu Star Bulletin* reported in 1930 that the City and County planned a canal (Kapalama Drainage Canal) to join the area's two streams (Kapalama Stream and Niuhelewai Stream) at a cost of about \$750,000, "fill[ing] the same purpose as the Ala Wai."^{13,14} Earth from the dredged canal was to be used to fill nearby low lying land. The 110'-long Kapalama Canal Bridge was planned to span the (anticipated) Kapalama Drainage Canal at a cost of about \$35,000. However, the bridge was completed years before the canal was even begun. When built, the bridge spanned Niuhelewai Stream and perhaps some portion of adjoining wetlands until the canal was dredged.

The engineers for the bridge were Daniel Balch and George K. Dawson.¹⁵ At the time of the bridge's construction, Daniel Balch was Assistant to City and County Engineer Louis S. Cain, and George Dawson was a structural engineer for the City and County. Balch began his career in 1915 as an engineer for the Territorial Harbor Board.¹⁶ In 1925 he began work for the City and County of Honolulu as assistant engineer to Louis Cain. (Balch followed Cain to the Territorial Department of Public Works as assistant Superintendent in 1935 when Cain became Superintendent. Balch became Superintendent upon Cain's death in 1940 and retired in 1943.¹⁷) Little is known about George Dawson, except that he was engineer for the 1932 steel through-deck Karsten Thot Bridge over the Wahiawa Reservoir,¹⁸ as well as the 1932 Queen Street Bridge (Nuuanu Stream) in downtown Honolulu. Unfortunately, the contractor for the Kapalama Canal Bridge is not known.

In early October 1930, the City and County Board of Supervisors named the new West Queen Street Extension "Dillingham Boulevard," in honor of Benjamin F. Dillingham (1844-1918).¹⁹ Dillingham had built Oahu's first railroad, was responsible for the formation of Ewa and Oahu Sugar Plantations, and was associated with the construction of Pearl Harbor Naval Base. In 1931 Dillingham Boulevard was extended west of Puuhale Road to Pearl Harbor. The full length of Dillingham Boulevard from Honolulu to Pearl Harbor was in place by late October 1931 when it was called "one of Oahu's finest highways."²⁰

Another road running in a roughly east-west direction towards Pearl Harbor was the next logical development. The eight-lane Honolulu to Pearl Harbor road (later named Nimitz Highway), which began at Waiakamilo Road and terminated at Pearl Harbor, was soon built further *makai* of Dillingham Boulevard. Construction of the highway began in July 1941, but it took years to complete. Delays were due, in part, to the fact that during World War II, a rail line located along this corridor was in heavy use. After the war was over a preference for trucking led to the closure of Dillingham's railroad. Following the war, the necessary lots along the corridor were acquired, and construction on the road resumed. Nimitz Highway was finally completed in

¹² "Contract for Queen Street Work Will Be Let This Summer," *Honolulu Star Bulletin*, February 1, 1930. Sec. 2, p. 1.

¹³ *Ibid.*

¹⁴ The Ala Wai was a dredged canal that drained the low lying land at Waikiki.

¹⁵ Thompson, *Historic Bridge Inventory Oahu*, VII-13.

¹⁶ "Daniel Balch New Chief of Public Works," *Honolulu Star Bulletin*, September 17, 1940.

¹⁷ "D.F. Balch," obituary, December 19, 1961.

¹⁸ 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. V-43.

¹⁹ "Memory of B.F. Dillingham Honored By Supervisors In Naming New Boulevard," *Honolulu Advertiser*, October 8, 1930, 1.

²⁰ "Dillingham Boulevard Is One Of Oahu's Finest Highways," *Honolulu Star Bulletin*, October 31, 1931. Sec. 3, p. 1.

1949 and "cost the federal government \$1,388,000, with lesser funding amounts provided by the Territory of Hawaii and the City & County of Honolulu."²¹ Once complete, it replaced Dillingham Boulevard as the main corridor in this vicinity.

Kapalama Drainage Canal

The potential commercial value of the low-lying land of the Kapalama area *makai* of King Street was understood since at least the early 1920s. In 1923-24 the Territorial Board of Health condemned as unsanitary almost 58 acres in this area. The board ordered the land filled, and by June 30, 1924 had built up about 11 acres with spoil from the dredging of the harbor slip between Piers 16 and 17. An additional 11 acres was contracted to be developed by the Hawaiian Dredging Co and paid for with Territorial sanitation funds. The 1924 Annual Report of the [Territorial] Department of Public Works stated, "these filling operations have converted practically worthless swamp lands into property selling as high as \$30,000 per acre."²² During 1924-25, little developable land was added to the condemned area because of the unavailability of fill material within pumping distance of the project. However, when Kapalama Basin in Honolulu Harbor was dredged (1925-1926), spoil from the project was used to raise the remaining acreage to grade level. In mid-1926 the "entire district [was] being gradually converted into an industrial center of considerable magnitude."²³

The City and County began planning a drainage system to prevent heavy flooding. In August 1924, city planning engineer Capt. Charles Welsh submitted a drainage plan to the City Planning Commission for what would become the Kapalama Drainage Canal.²⁴ Welsh's plan called for an open canal, 5' deep and 100' wide extending about 4000' *mauka* from Kapalama Basin slightly west of Niuhelewai Stream. At the *mauka* point (near the *mauka* side of Vineyard Street extension) the original plan intended that the canal curved to the northwest before branching into two open drains. One branch extended northwest to Houghtailing Road and then near School Street and Kapalama Avenue, and the other ran northeast to School Street and into a (closed) box drain extending along Houghtailing Street to Konia Street. This initial plan contained the basis for the final design of the Kapalama Drainage Canal system in that it "combine[d] the two streams which now meander across Palama district into one channel through the lowest section of that area. The combination of these two streams into a single channel also permit[ted] the full development of the maximum amount of land in that portion of the city. It also provide[d] a minimum amount of drainage sewers to be maintained from public funds."²⁵

In November 1924, the City and County altered Welsh's original plan by adding an extension to the area of the insane asylum at School and Liliha Streets, and a line to Kamehameha School (present Bishop Museum).²⁶ The depth of the large canal at the lower section was increased to about 9', and the projected cost of the project was \$837,000. Although Welsh's original plan in August pointed out the development potential of draining this area, an additional road across the Palama area was needed to alleviate the congestion on King St. This additional road was

²¹ Mason Architects, Inc, Nimitz Highway Improvements Project Historic Resources Survey Phase II (Prepared for Parsons Brinckerhoff, Inc.) 2005. p. 16.

²² Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1924* (Honolulu: Honolulu Star Bulletin) 1925. p. 10-11.

²³ Superintendent of Public Works, *Report to the Governor of the Territory of Hawaii for the Year Ending June 30, 1926* (Honolulu: Honolulu Star Bulletin) 1927. p. 6.

²⁴ "Captain Charles R. Welsh Submits First Report To City Planning Commission On Drainage Plan For Kapalama District," *Honolulu Advertiser*, August 10, 1924, p. 12.

²⁵ "Capt. Welsh Submits Report," *Honolulu Advertiser*, August 10, 1924, p. 12.

²⁶ "Proposed Kapalama Plan Discussed at Meetings of Planners and Public," *Honolulu Advertiser*, November 16, 1924, p. 14.

the West Queen Street Extension (later Dillingham Boulevard), but "it would be useless to build a new street on fresh fill across this land unless the flood waters coming down from the mountains were taken care of first."²⁷

Although the *Honolulu Advertiser* asserted in November 1924 that the Queen Street extension "[could] not be done until a drainage canal is constructed"²⁸ the City and County had different ideas; the Kapalama Canal Bridge and the West Queen Street Extension/Dillingham Boulevard were completed in 1930-31, at least six years before the Kapalama Drainage Canal was even begun.

The canal got underway sometime in late 1937 to early 1938. A Works Progress Administration grant of \$310,000 partly funded the \$670,000 project; the remaining money came from bond sales of \$300,000 and funds from the city's flood control fund.²⁹

The Hawaiian Contracting Company of Honolulu completed the Kapalama Drainage Canal in February 1939 in just under a year. The shape and configuration of the final drainage system included a canal extending *mauka* from Kapalama Basin along the approximate contour of Niuhelewai Stream, to about Vineyard Street where narrower branch channels extend to School Street and Kapalama Avenue, School and Houghtailing Streets, and School and Liliha Streets. When completed, the system contained 2.6 miles of canal and other drainage structures, and drained an area of 1,145 acres.³⁰

Tee-Beam Bridges On Oahu

Concrete tee-beam bridges are the most common type of remaining pre-World War II bridges in the state of Hawaii.³¹ They are a part of the evolution of reinforced-concrete deck bridge technology in Hawaii that began with the first slab bridges around 1908. Often county-designed, these early slab bridges frequently consisted of concrete decks that replaced older type superstructures that were built on their original abutments, which were often lava rock and mortar.

Design of reinforced-concrete bridges progressed rapidly during the first decades of the 20th century.³² The strength of concrete girder and tee-beam types, and their lower cost, led to their use in locations with short spans, rather than the concrete arched types.

Although the earliest tee-beam bridges in Hawaii date from about 1912, after about 1925 this bridge type became the preferred choice for bridge construction by the Territorial Highway Department. The pattern of reinforcing steel within their girders is the feature that most distinguished the tee-beam type from other concrete girder bridges. Changing the arrangement of the reinforcing steel in the girders and deck, from the configuration used in earlier concrete girder bridges, served to structurally join the two³³ and allowed the two components to work together; thus tee-beam bridges could efficiently carry a greater load. This relatively small change over standard concrete girder construction provided an increased carrying capacity, and the tee-beam type quickly came into wide use, with examples constructed into the 1950s.

²⁷ "Proposed Kapalama Plan Discussed at Meetings of Planners and Public," *Honolulu Advertiser*, November 16, 1924, p. 14.

²⁸ *Ibid.*

²⁹ "Start Canal at Kapalama in December," and "Kapalama Flood Control Bonds May Be Sold In Issue," *Honolulu Advertiser*, October 1, 1937, p. 1, p. 4. "Delay Seen On Flood Project," *Honolulu Star Bulletin*, October 1, 1937, p. 3.

³⁰ "Another Step Forward in Flood Control," *Honolulu Star Bulletin*, February 25, 1939, p. 12.

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.

³² Parsons Brinckerhoff and Engineering and Industrial Heritage, A Context for Historic Bridge Types, NCHRP Project 25-25, Task 15 (Prepared for the National Cooperative Highway Research Project) October 2005. pp. 2-26.

³³ *Ibid.* p. 3-88.

Tee-beam bridges in Hawaii generally had parapets with voids, beneath a reinforced-concrete rail cap. "Several standard rail patterns [were] used by the Territorial Highway Department, either "Greek-cross", arched, or simple rectangular voids."³⁴ Earlier masonry (lava rock or concrete) bridges typically had solid railings.

Part II. Structural/Design Information

A. General Statement:

1. **Character:** The Kapalama Canal Bridge exemplifies a multi-span, reinforced-concrete tee-beam bridge constructed in Hawaii during the early 1930s.³⁵ The bridge carries Dillingham Boulevard over the tidally-influenced Kapalama Drainage Canal. This five-span bridge has a parapet design that features narrow round arched-top voids. The typical individual span length of approximately 21'-9" is among the shorter span lengths in the state of Hawaii for standard tee-beam bridges. Its overall length of approximately 108' is standard for this bridge type. (Four other tee-beam bridges on Oahu exist with longer overall spans.)
2. **Condition of Fabric:** Fair. The concrete at many areas of both parapets is crazed, with numerous spalling sections where rusted steel rebar is exposed. The bridge has moderately high integrity. The setting has changed since the bridge was built.

B. Description:

1. **Dimensions:** The Kapalama Canal Bridge measures 108'-0" in length and 80'-0" wide. This overall width includes a deck that is 76'-0" wide between two parapets that are 2'-0" wide.
2. **Materials:** The bridge is constructed of reinforced concrete, with asphalt paving on a concrete deck. Abutments are concrete. The wing walls are coursed, quarry-faced basalt lava rock set in concrete mortar.
3. **Parapet and Stanchions:** The concrete parapets of the bridge are about 3'-1" high with a bottom rail measuring 9" high by 1'-6" wide, and a top rail that is 6" high and 1'-0" wide. The upper surface of the top rail is slightly peaked. Between these rails are 6" thick 1'-10" high concrete panels that are perforated with narrow round arched openings. These openings are spaced at 1'-0" on center (o.c.), with each measuring 6½" wide and 1'-2" high. Along the length of the parapet are four rectangular stanchions which are 2'-9" wide, 2'-0" thick, and about 3'-3" high. These stanchions have an 8" high cap with a hip-bevel decoration raised about 1½" above the cap. The inboard and outboard faces of the stanchions have 1'-4" x 1'-2" inset panels with a hip-bevel decoration.

At the ends of the parapets are concrete stanchions, which are rectangular in plan and elevation. The stanchions are 4'-6" wide, 2' thick, and 3'-4" high with a 9" high base and an 8" high cap. On the top of the cap, set about 2" in from the edge is a low-sloped hip, about 1½" high at its highest point, or "ridge". Between the base and top cap, the vertical sides of the stanchions are inset about 3". The three sides of the end stanchions not facing the parapet each have inset panels, the front and back panels are

³⁴ 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.

³⁵ National Bridge Inventory Database, Kapalama Canal Bridge, on website nationalbridges.com, accessed November 10, 2015.

3'-5" x 1'-3" and the side panel is 1'-0" x 1'-2". The same low-sloped hip shape found on the top of the caps is also inset within the rear and side panels. Typically, concrete bridges of this type and period have date and name inscriptions on the stanchions at the ends of their parapets. Here, "Kapalama Canal" is on the front panels of the northeast and southwest stanchions. On the front panels of the northwest and southeast stanchions is the date "1930." The incised block letters of the inscriptions are about 3" high.

The top of the cap of each stanchion at the parapet ends has been partially re-surfaced with concrete. The southeast stanchion has a portion of this concrete spalled away to reveal that a steel pipe with an inside diameter of about 2" is imbedded vertically in the center of the stanchion.

4. **Superstructure:** The bridge deck has an asphalt surfaced roadway that is 56'-0" wide that carries two lanes of traffic in each direction over the Kapalama Drainage Canal. At both sides of the roadway are 9'-10" wide concrete walkways set 5" higher than the roadway, which form curbs.
5. **Substructure:** The substructure of the Kapalama Canal Bridge consists of concrete abutments and masonry wing walls with coursed, quarry-faced-basalt lava rock set in concrete mortar. At some sections of the wing walls, such as at the southwest, the mortar joints are raised in a v-profile. The four bents of the bridge are concrete transverse beams with beveled ends. The bents divide the 108'-0" total length of the bridge into five spans of 21'-6" each. At each bent, the transverse beam is supported by about fourteen pre-cast concrete, square-section piles that are driven into the stream bed. The transverse beams in turn support the longitudinal concrete beams of the bridge superstructure. The underside of the longitudinal beams is typically about 4' to 5' above the surface of the canal, depending on the tide.

C. Site Information:

The Kapalama Canal Bridge is located along a well-traveled commercial section of Dillingham Boulevard. East of the bridge is the campus of Honolulu Community College. A strip mall lies to the south, and a used car lot to the north. Kapalama Shopping Center is located about one block northwest of the bridge. The setting around the bridge has changed greatly since its construction. At that time, the area around it was vacant; the land fronting Dillingham Boulevard between Waiakamilo Road and what would become Alakawa Street was undeveloped.

Part III. Sources of Information

A. Primary Sources:

Architectural Drawings and Early Views

Original drawings were prepared by the Office of the City & County Engineer, Honolulu, Hawaii, and are titled, "West Queen Street: King St. to Waiakamilo Road. Kapalama Canal Bridge." The drawing set is dated January 29, 1930, and includes the following sheets: Kapalama Canal Bridge (sheet 1 of 4); Details of Decks 1 & 5 (sheet 2 of 4); Detail of Decks 2, 3, & 4 (sheet 3 of 4); and Details of Pile Bents (sheet 4 of 4). Another drawing that appears to be part of the

same set, but without a sheet number is "West Queen Street, King Street to Waiakamilo Road, Name Plate for Bridge Over Kapalama Canal" also dated January 29, 1930.

Historic aerial photographs of the area around the bridge are located at the Hawaii State Archives in folders PPA-48-3, PPA-49-4, and PPA-58-2. A ca. 1930 aerial photomosaic of the area is in folder PPO-42. This aerial was taken by the U.S. Army Air Corps, 11th Photo District and is considered in the public domain.

B. Secondary Sources:

City Planning Commission, City and County of Honolulu, map "Proposed Street Plan Kapalama Section," December 1922.

Heritage Center, School of Architecture, University of Hawaii at Manoa. State of Hawaii, Historic Bridge Inventory and Evaluation. Draft prepared for the State of Hawaii, Department of Transportation, Highways Division. May 2008.

Honolulu Advertiser

"Captain Charles R. Welsh Submits First Report To City Planning Commission On Drainage Plan for Kapalama District." August 10, 1924. p. 12.

"Kapalama Plan." August 15, 1924. p. 11.

"Cost Of Big Drain Project Is Set High." November 14, 1924. p. 1.

"Proposed Kapalama Plan Discussed At Meeting Of Planners and Public." November 16, 1924. p. 14.

"Memory of B.F. Dillingham Honored By Superv. In Naming New Boulevard." October 8, 1930. p. 1.

"Early Start Is Assured on Puuloa Road." March 31, 1931. p. 11.

"Pearl Harbor Traffic Will Get A Break." July 21, 1931. p. 1.

"New Bids For Puuloa Project." September 18, 1931. p. 12.

"Start Canal At Kapalama In December." October 1, 1937. p. 1.

"Kapalama Flood Control Bonds May Be Sold In Issue." October 1, 1937. p. 4.

"Rush Urges Filling Land." December 3, 1939. p. 1.

Dillingham Blvd. to Open Tuesday." Feb 25, 1940. p. 1.

"Complaint – dirt road ewa of Kapalama Canal." February 6, 1948. Editorial Page.

Honolulu Star Bulletin

"Contract for Queen Street Work Will Be Let This Summer." February 1, 1930. Sec 3, 1.

"Dillingham Boulevard Is One Of Oahu's Finest Highways." October 31, 1931. Sec. 3, 1.

"Appropriation Is Urged For Flood Control Program." September 28, 1937. p. 12.

"Delay Seen On Flood Project." October 1, 1937. p. 3.

"Another Step Forward in Flood Control." February 25, 1939. p. 12.

Mason Architects, Inc. Nimitz Highway Improvements Project Historic Resources Survey Phase II. Prepared for Parsons Brinckerhoff, Inc. 2005.

National Bridge Inventory Database. On website nationalbridges.com, accessed November 10, 2015.

Pukui, Mary Kawena, Samuel H. Elbert and Esther T. Mookini. *Place Names of Hawaii*. Honolulu, Hawaii: University of Hawaii Press. 1974.

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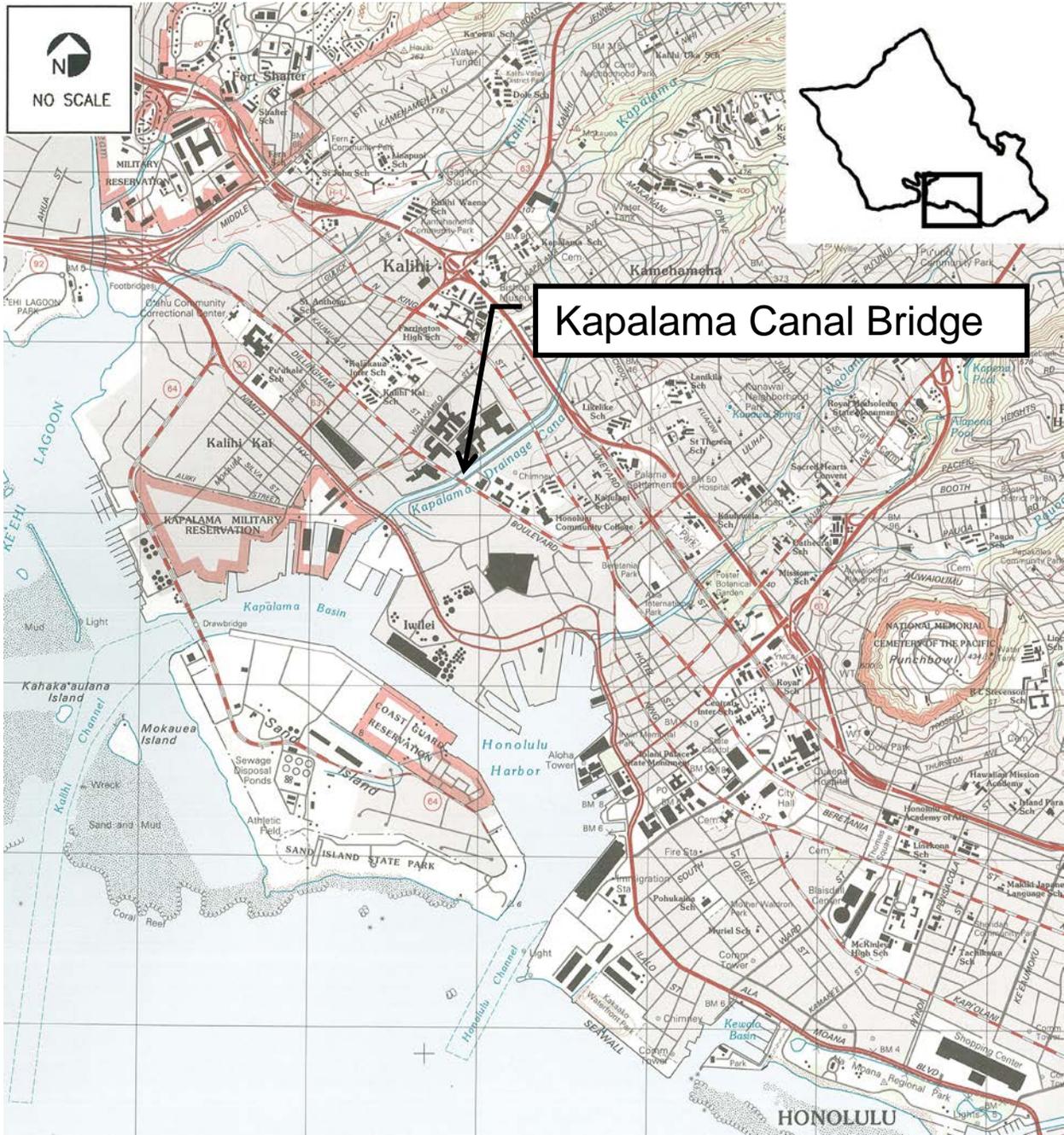
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Location Map



Portion of an aerial photo mosaic (ca. 1930) showing the area of Kapalama where Dillingham Boulevard and the Kapalama Canal would be constructed. Highlighting and labeling added by author shows the future approximate locations of both. Their intersection would be the site of the Kapalama Canal Bridge. This photo from the Hawaii State Archives was taken by the U.S. Army Air Corps 11th Photo Section and is in the public domain. *U.S. Army Air Corps, 11th Photo Section, Hawaii State Archives, folder PPO-42, photo "Mosaic of the City of Honolulu." Ca. 1930.*



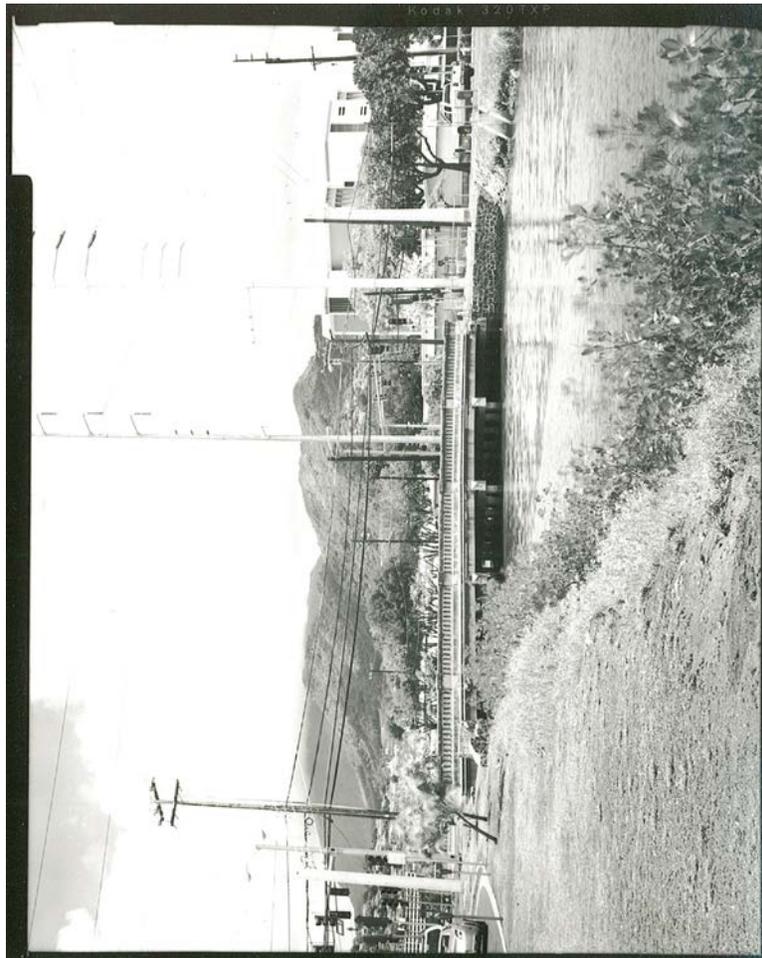
KAPALAMA CANAL BRIDGE
HAER No. HI-125
(Page 13)

Portion of an aerial photo ca. 1939-41 showing the Kapalama Canal Bridge at upper center. This photo was taken by the U.S. Army Air Corps and is in the public domain. *Hawaii State Archives, folder PPA-58-4, photo M-57.62. Ca. 1939-41.*



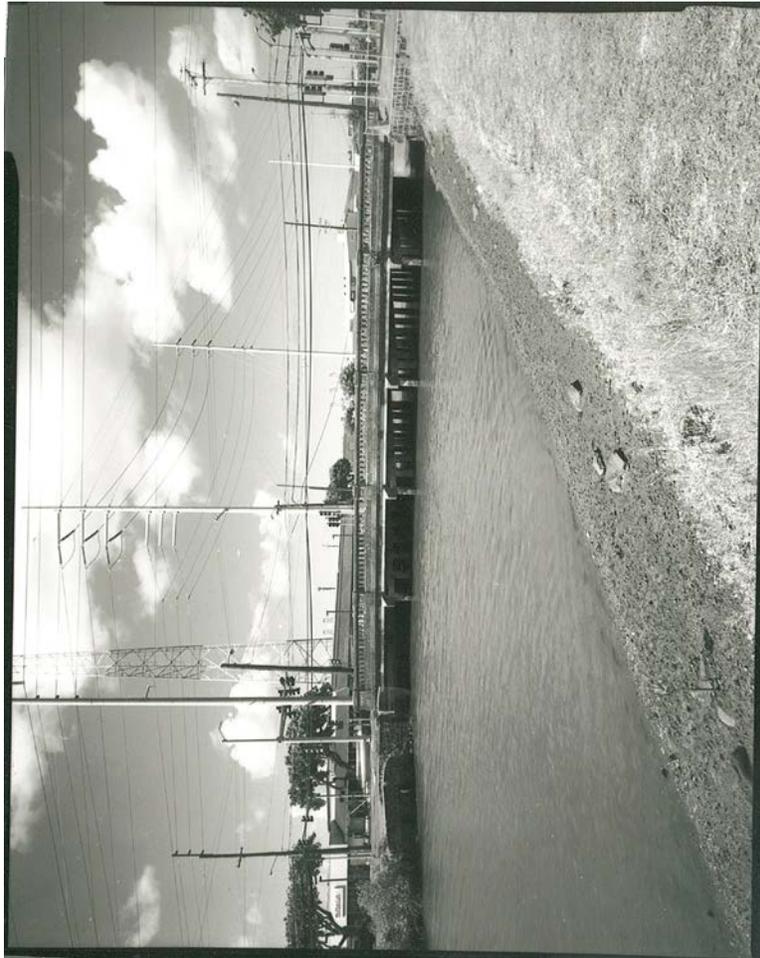
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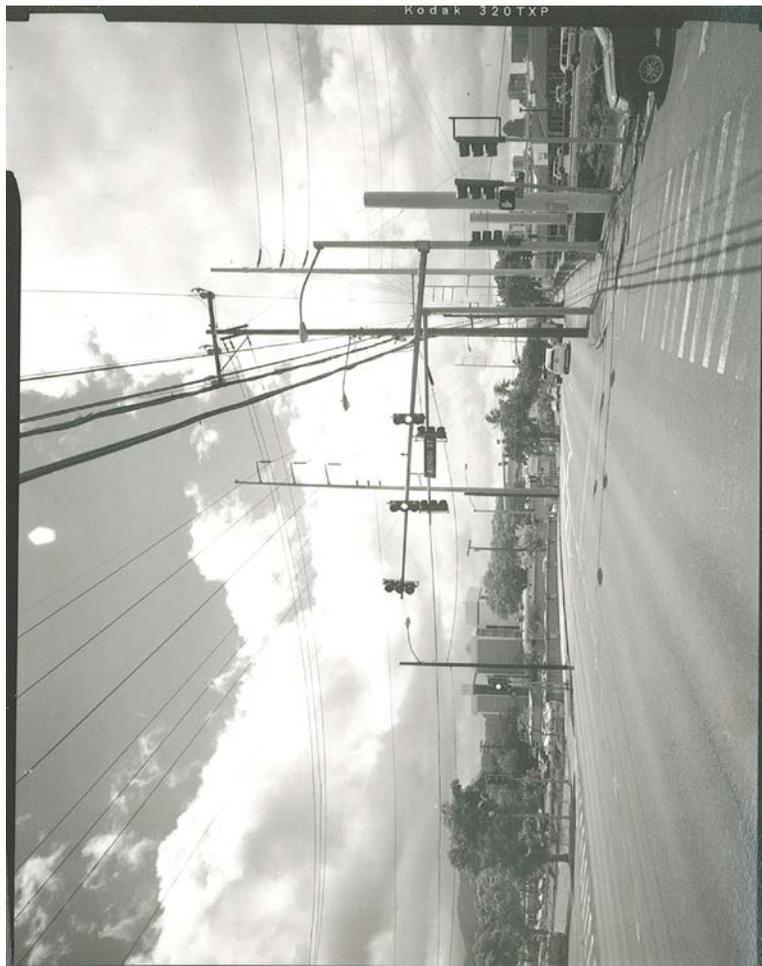
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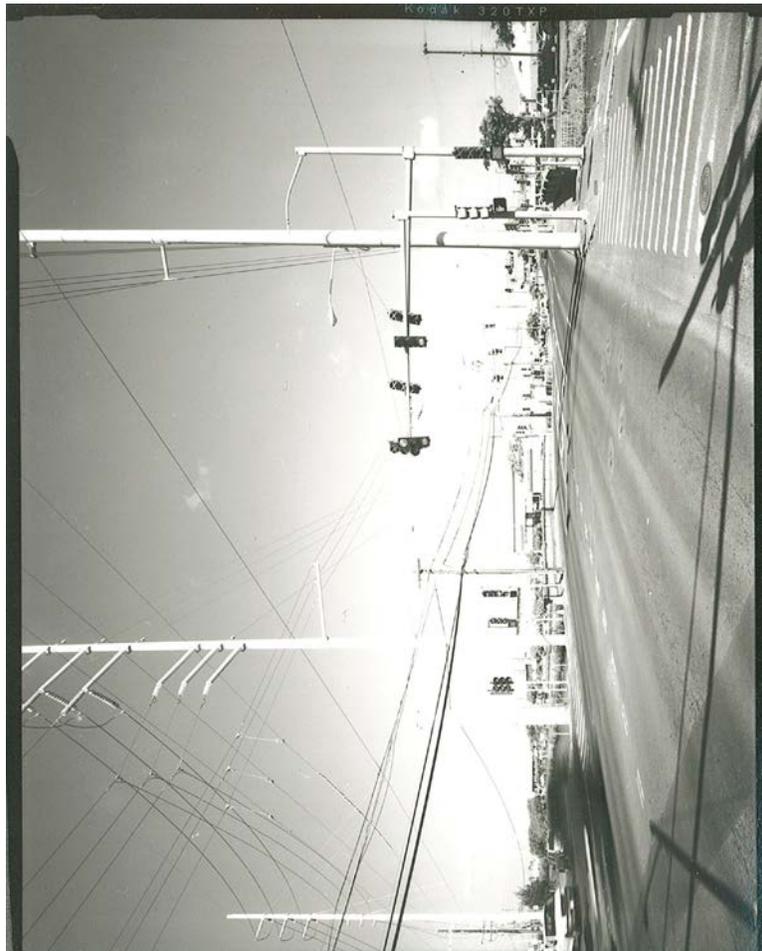
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HAER No. HI-125-3



**HISTORIC AMERICAN ENGINEERING RECORD
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HAER No. HI-125-4



**HISTORIC AMERICAN ENGINEERING RECORD
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HAER No. HI-125-5



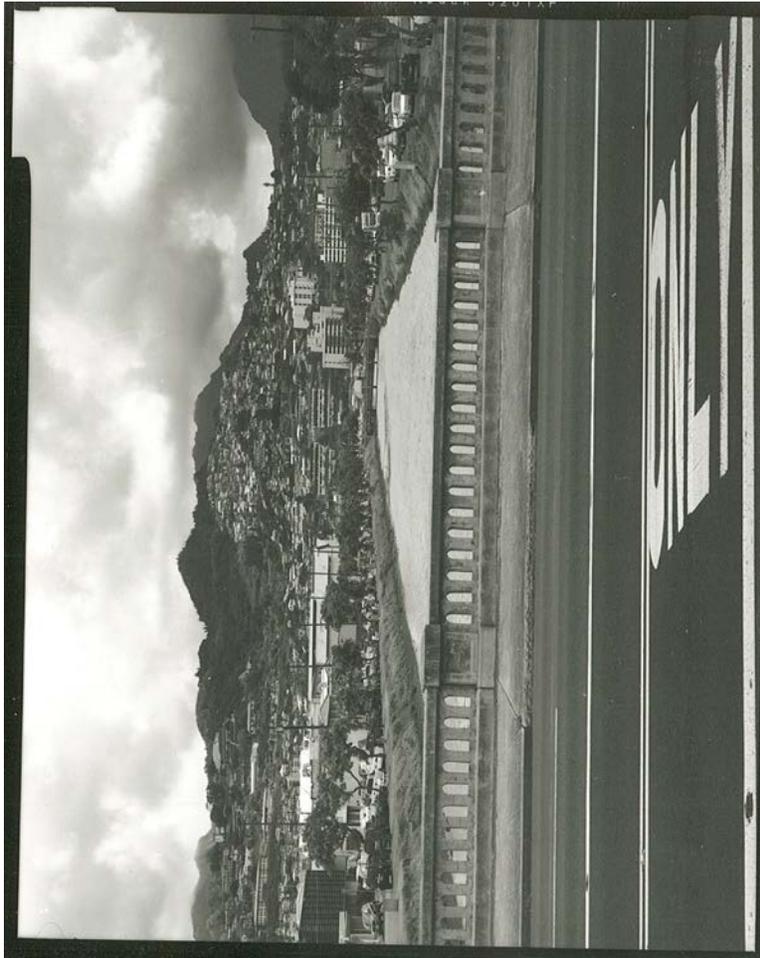
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SEE INDEX TO PHOTOGRAPHS FOR CAPTIONS**

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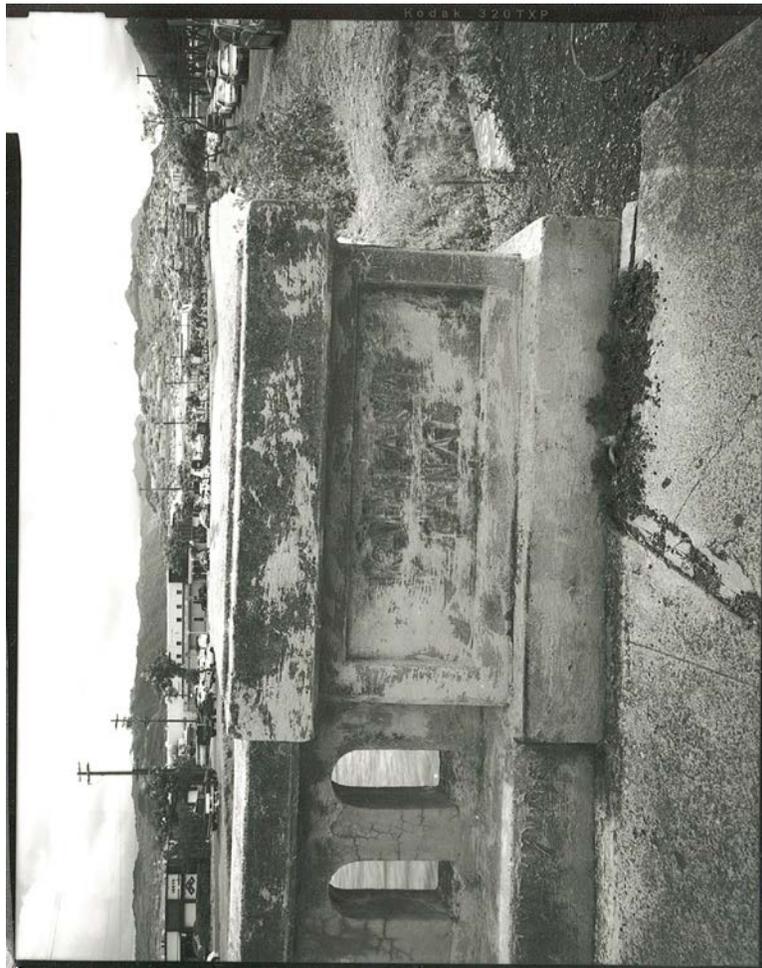
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SEE INDEX TO PHOTOGRAPHS FOR CAPTIONS**

HAER No. HI-125-7



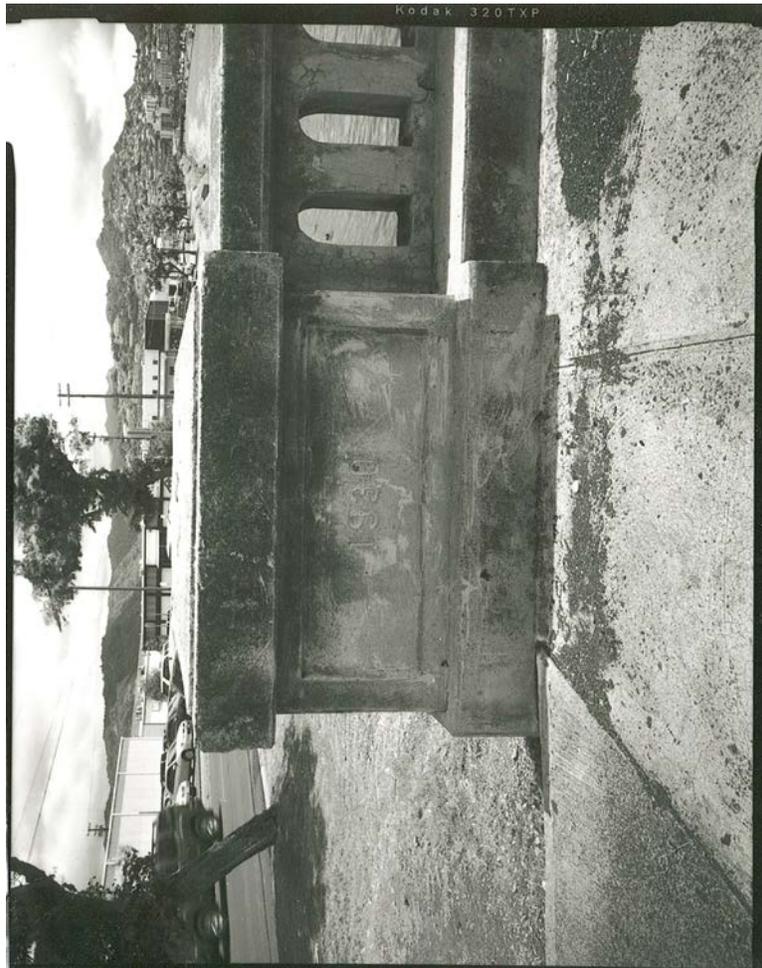
**HISTORIC AMERICAN ENGINEERING RECORD
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HAER No. HI-125-8



**HISTORIC AMERICAN ENGINEERING RECORD
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HAER No. HI-125-9



FIELD NOTES

Kapalama Canal Bridge

HAER No. HI-125

Honolulu, HI

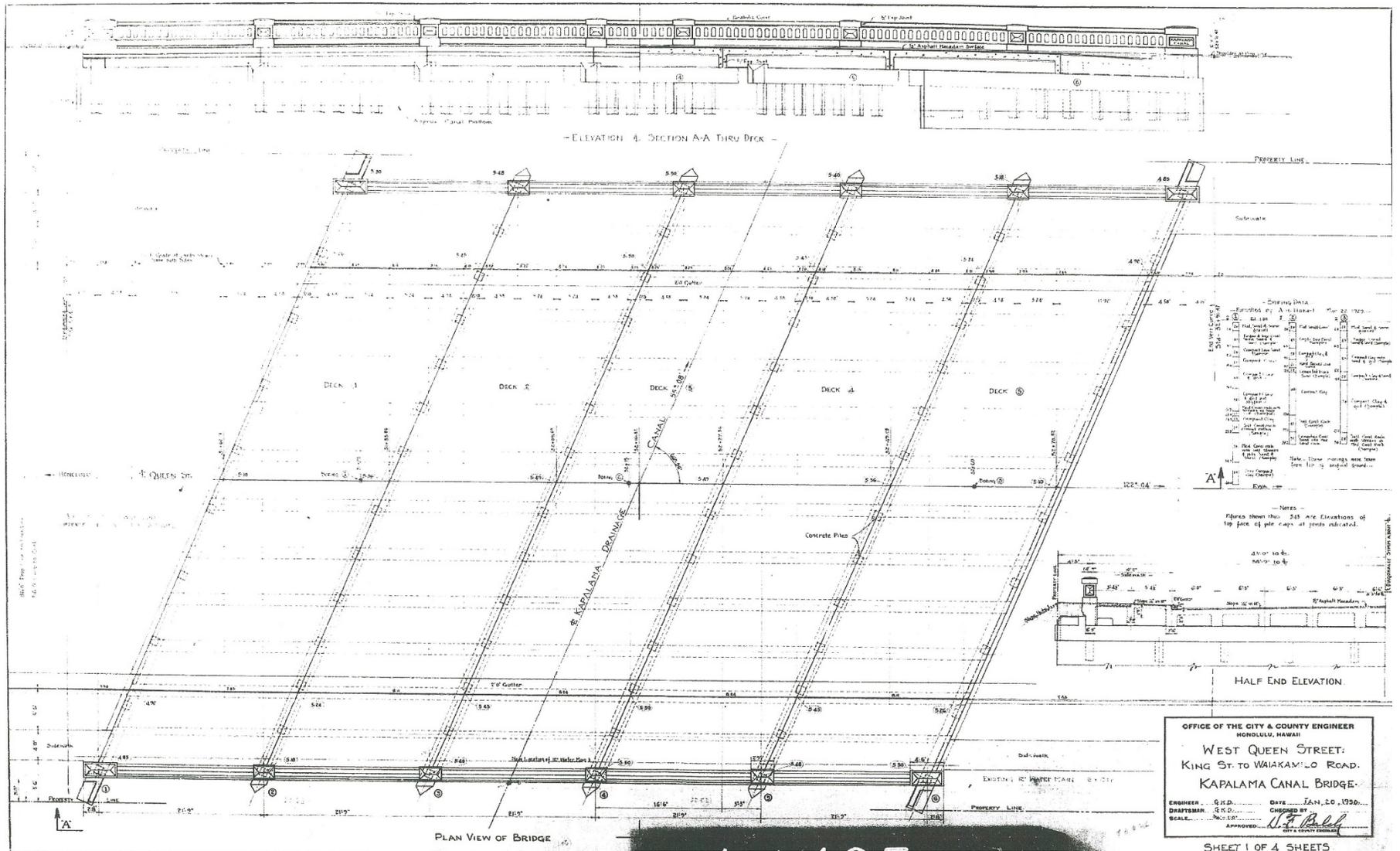


Figure 1: Original drawing prepared by the Office of the City & County Engineer, Honolulu, Hawaii titled, "West Queen Street: King St. to Waiakamilo Road. Kapalama Canal Bridge. (sheet 1 of 4)." Dated January 29, 1930. HAER No. HI-125.

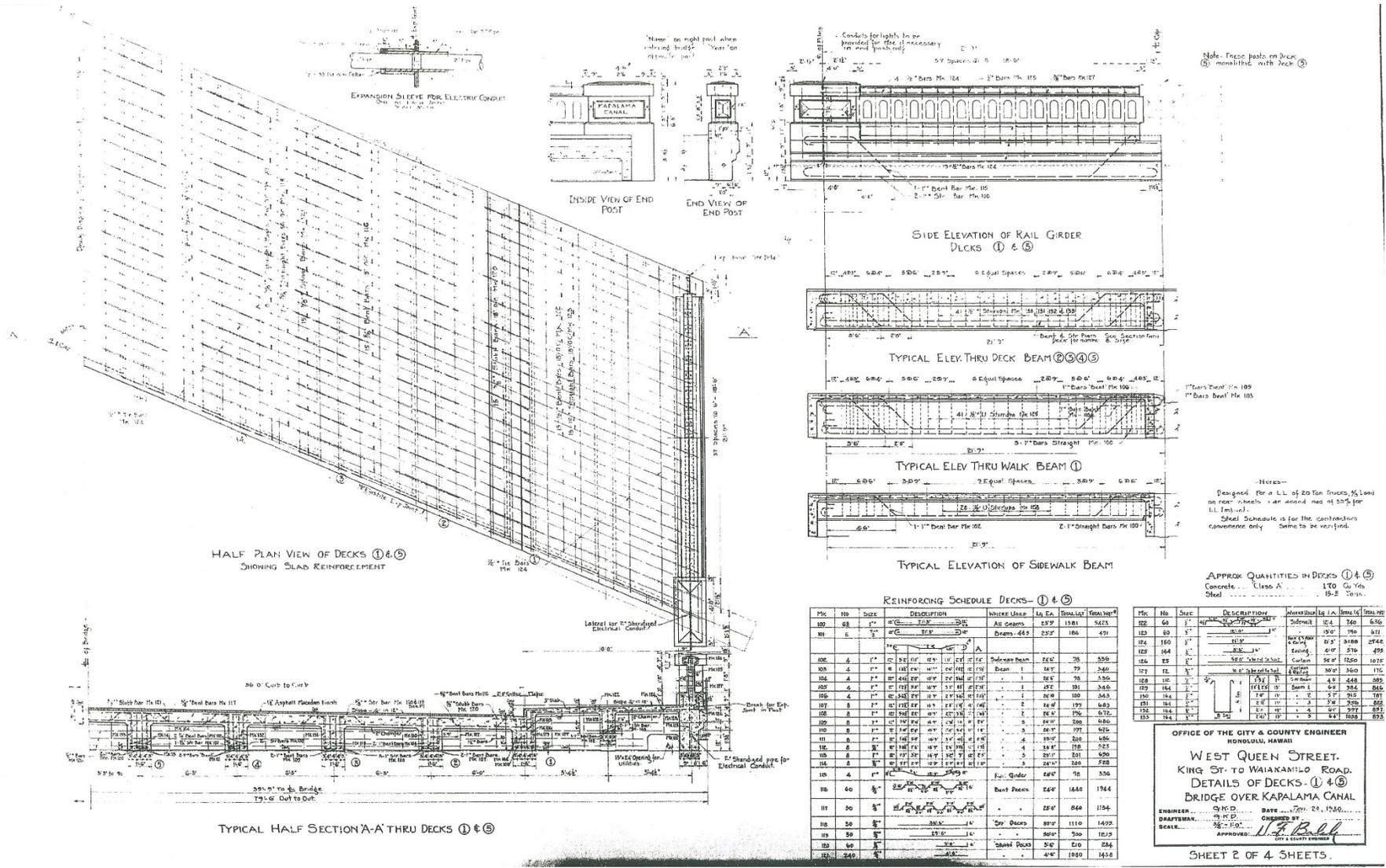


Figure 2: Original drawing prepared by the Office of the City & County Engineer, Honolulu, Hawaii titled, "West Queen Street: King St. to Waiakamilo Road. Details of Decks 1 & 5 (sheet 2 of 4)." Dated January 29, 1930. HAER No. HI-125.

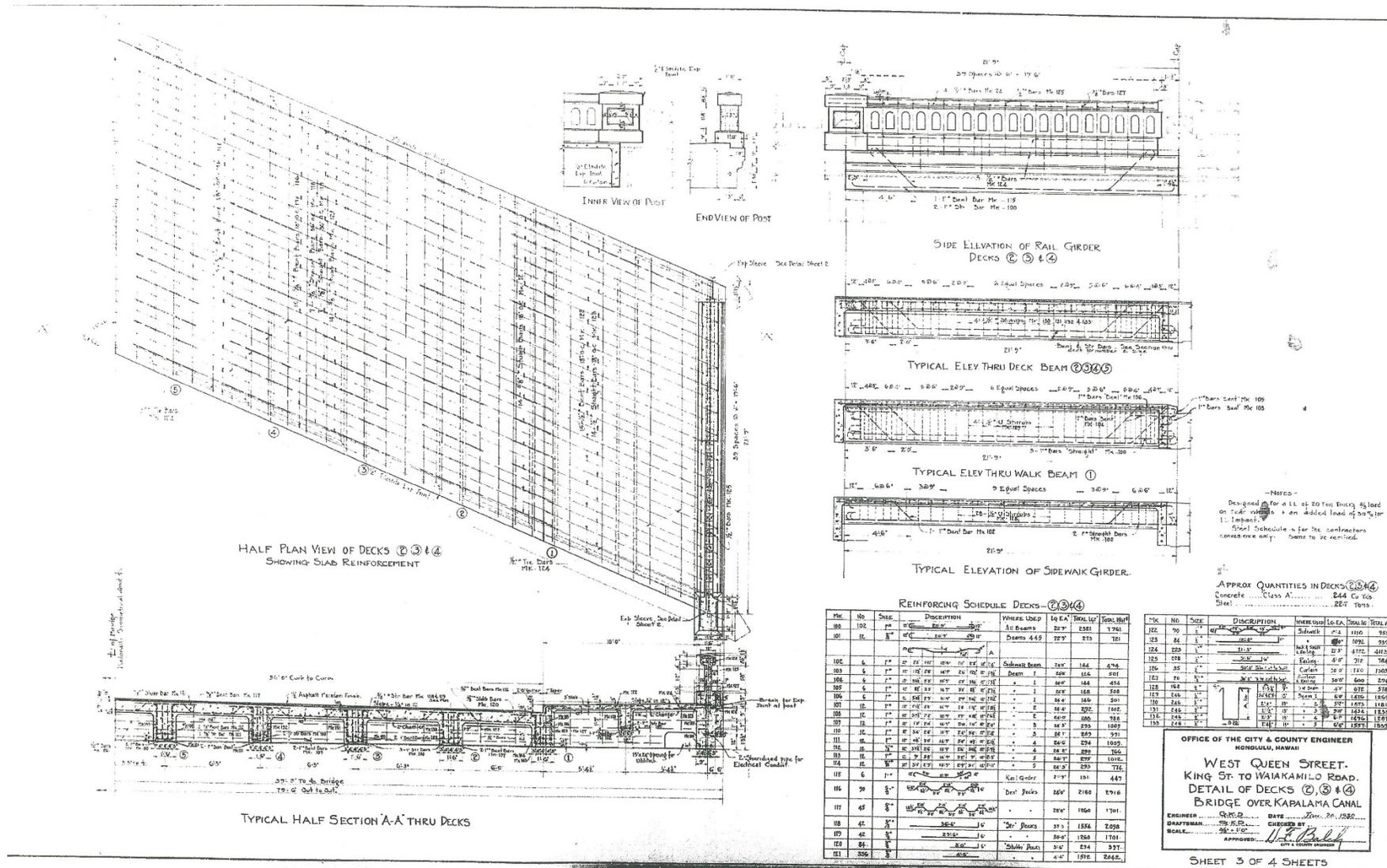


Figure 3: Original drawing prepared by the Office of the City & County Engineer, Honolulu, Hawaii titled, "West Queen Street: King St. to Waiakamilo Road. Detail of Decks 2, 3, & 4 (sheet 3 of 4)." Dated January 29, 1930. HAER No. HI-125.

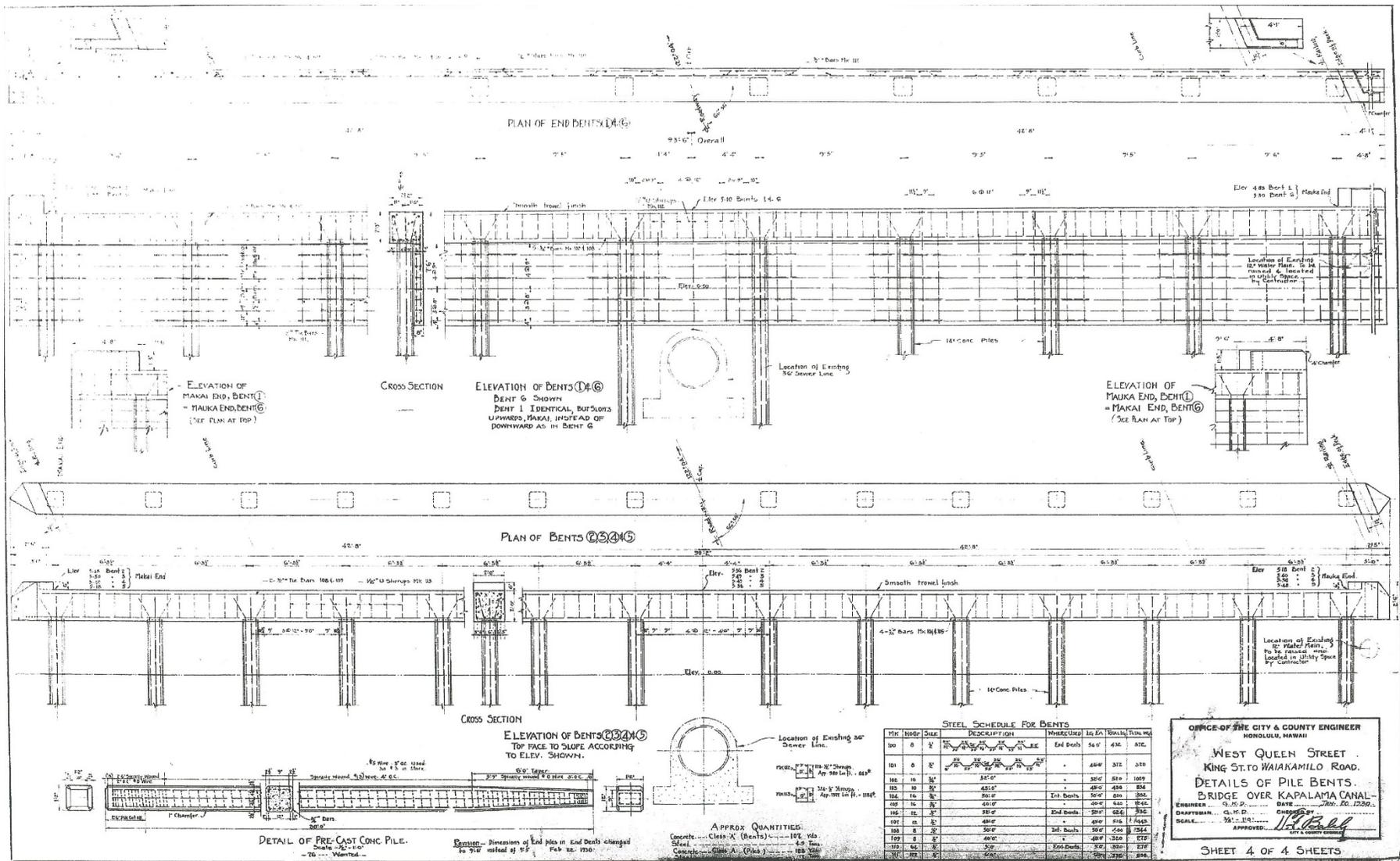


Figure 4: Original drawing prepared by the Office of the City & County Engineer, Honolulu, Hawaii titled, "West Queen Street: King St. to Waiakamilo Road. Details of Pile Bents (sheet 4 of 4)." Dated January 29, 1930. HAER No. HI-125.

KAPALAMA

CANAL

1930

OFFICE OF THE CITY & COUNTY ENGINEER HONOLULU, HAWAII	
WEST QUEEN STREET KING ST. TO WAIKAMILLO ROAD	
NAME PLATE FOR BRIDGE OVER KAPALAMA CANAL	
ENGINEER G. M. D.	DATE JAN. 29, 1930
DRAWN BY D. A. S.	CHECKED BY
APPROVED	

Tracing Filed in 48-E-1

Figure 5: Original drawing prepared by the Office of the City & County Engineer, Honolulu, Hawaii titled, "West Queen Street: King St. to Waiakamilo Road. Name Plate for Bridge Over Kapalama Canal (no sheet number)." Dated January 29, 1930. HAER No. HI-125.