

HANEOO BRIDGE
(Kaholopo Bridge)
Hana Belt Road
Piilani Highway at Haneo Stream
Hana
Maui County
Hawaii

HAER HI-98
HAER HI-98

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
1111 Jackson Street, Suite 700
Oakland, CA 94607

HISTORIC AMERICAN ENGINEERING RECORD

HANEOO BRIDGE (Kaholopo Bridge)

HAER No. HI-98

Location: Piilani Highway at Haneoo Stream
Hana
Maui County, Hawaii

U.S.G.S. Hana Quadrangle, Hawaii,
7.5 Minute Series (Topographic) (Scale – 1:24,000) NAD 83
Universal Transverse Mercator Coordinates:
04.813180.2295190

Construction Date: 1900 - abutments and center pier; 1917 - concrete flat slab deck.

Designer: 1900 - unknown, 1917 – Apau Paul Low, Assistant Maui County Engineer

Builder: Unknown

Owner: County of Maui, Department of Public Works

Present Use: Vehicular bridge

Significance: The Haneoo Bridge is significant for its association with the transportation and commerce history of Maui, the social history of East Maui, and as an example of bridge engineering in Hawaii. It is a part of the Hana Belt Road system, completed in 1927, which advanced settlement, agriculture, and tourism in East Maui. The bridge is a contributing resource to the Hana Belt Road Historic District, a major engineering achievement that is listed on the State and National Registers of Historic Places.

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Date of Report: February 2012

DESCRIPTION:

The Haneoo Bridge is located about 1¾ miles south of Hana, Maui on the Piilani Highway, a section of County Road that extends from Hana around the south side of East Maui. It is at mile marker 49.84¹ on the Hana Belt Road section of the belt highway that circles East Maui,² and it carries a single lane of traffic over Haneoo Stream. It lies in a rural setting with no buildings in the immediate vicinity. The streambed was dry at the time of the site visit.

The Haneoo Bridge includes two spans, with an overall length of 21'-4" and a total width of 17'-0". It is constructed of a flat concrete slab on basalt rubble and cement mortar abutments and center pier. The roadway is asphalt paved and the historic guardrails have been removed. An added, non-historic, W-beam guardrail on 4½" steel pipe posts set into the concrete deck is on the *mauka*³ edge of the bridge while the *makai*⁴ edge has no guardrail, only the remnant of vertical steel I-beam posts that once supported one.

The bridge's concrete slab deck is 1'-4" thick on the *makai* edge. On the *mauka* edge the slab thickness tapers, from 1'-8" on the north (Hana) side to 2'-3" on the south side. On the *mauka* side, the height from the stream bed (mid-stream) to the top surface of the slab is about 8' and on the *makai* side this height is about 10'. At its mid-point, the slab rests on a 1'-4" wide concrete cap of the basalt rubble and cement mortar center pier. Each span of the slab, from each abutment to the center pier is 10'-0". The center pier runs the width of the slab and is battered, tapering (on the *makai* side) from 1'-9" on top to 3'-6" at its base.

At the *mauka* side, the center pier has a rounded nose projecting upstream which serves to divide the flow of water during flood conditions. The basalt rubble and cement mortar construction of the rounded nose is 5'-6" high from the stream bed. It is topped by the 1'-4" wide concrete cap that carries the deck slab. The nose projects about 5' upstream from the edge of the bridge, rounding smoothly downward until it reaches a level about 3' above the stream bed, where the profile drops vertically to the stream bed. The rounded portion of the nose is capped with concrete, the vertical surface has no concrete covering, is lava rock and concrete mortar. The nose is about 2' wide at its top and about 3' wide at its base.

The abutments of the bridge have a very slight batter and are constructed of lava rock laid in rough courses with cement mortar. They are topped with a concrete cap 3" to 4" high that supports the deck slab.

The underside of the deck slab is supported by temporary framing of aluminum I-beams and screw-adjusted shores that rest on the streambed. This shoring is a recent addition during the last few years and it almost fills the two channels under the bridge. The underside of the deck slab that is visible through the framing shows a board formed concrete surface. Areas of concrete spall were observed. The reinforcing steel revealed by the spalling includes flat bars, about 2" wide that run longitudinally and round rods, about ½" in diameter that run transversely. It appears that the flat bars are the underside of old railroad track.

The wingwalls of the bridge are constructed of basalt rubble and cement mortar. On the *mauka* side, the north wingwall is about 9' high from the streambed and extends roughly perpendicular to the bridge for about 52'. The south wingwall, about 4' high, extends perpendicularly for 13'

¹ Dawn Duensing, "Hana Belt Road, HAER HI-75," (Washington D.C.: National Park Service, 2005). P. 87.

² Dawn Duensing, *Hana Belt Road Historic District, National Register of Historic Places Reg. Form*, (Washington D.C.: National Park Service, 2001). P. 10.

³ Hawaiian term meaning "toward the mountains."

⁴ Hawaiian term meaning "toward the sea."

and then curves outward to widen the channel to over 32'. The makai-side wing walls generally follow the curve of the roadway. On the north side, the wingwall extends north-northeast about 80'. On the south side, the wingwall curves sharply makai, extending about 24' from the bridge.

On the north (Hana-side) approach to the bridge, along the *makai* side of the roadway are seven rectangular bollards built of basalt rubble and cement mortar. Each is typically 2'-8" high, with a footprint of 1'-8" x 2'-6". They are spaced about 10' apart and are joined by six sections of 2½" diameter steel pipe. Inscriptions in the concrete cap of two of the bollards indicated they were built in June 2004. An additional single bollard is located on the south approach, *makai* side of the roadway.

HISTORIC CONTEXT:

For Additional information, see Hana Belt Road Historic District, National Register of Historic Places Registration Form, 2001 and HAER HI-75, Hana Belt Road, 2005.

Hana Belt Road

The Hana Belt Road was built in incremental sections. In 1877 a fifteen-mile section of unpaved road was built from central Maui to Kailua to serve the construction of the Haiku irrigation ditch. In 1899, a rubber plantation, Haiku Rubber Co., provided the impetus to add another section near Nahiku.

In 1902, the *Maui News* recognized that a "good wagon road" from Huelo to Kipahulu would open up the lands to small farmers.⁵ Apparently, much of this wagon road was in place and only a section between Huelo and Nahiku needed to be built to complete the circuit.⁶ The point was further emphasized later that year as the *Maui News* editorialized that a wagon road from Hana to Kahului would enable "the finest bananas produced in the islands" to be shipped via sugar steamer from Kahului to the west coast.⁷ Homesteads and farming lands were expected to be opened by the completion of the road. Construction and improvements to the wagon road occurred piecemeal as the County could provide funds. In 1914, the *Maui News* noted that the scenery along the route would put the area "on the tourist map."⁸

In 1914 a paved portion of the road near Nahiku was built and additional funding proposed by the County for extending the road to the west. This funding, authorized by the legislature, was vetoed by territorial Governor Lucius Pinkham who did not agree on the tourism potential of the road. This lack of Territorial-level executive support for the Hana Road continued through the administration of Governor Charles McCarthy (1918-1921). Although roadwork halted, concrete bridges continued to be built and improved through the 1920s. Maui finally got territorial cooperation to secure funding, and between 1923 and 1926 a section of the road was built that included the difficult stretch along the cliffs above Keanae and Wailua. The Hana Belt Road officially opened on December 18, 1926.

The belt road around East Maui is about 88 miles long. It consists of an approximate 51-mile long section of road, the Hana Highway, that extends from Kahului to Hana. The belt road continues past Hana as the Piilani Highway, an approximate 37-mile section that traverses the south coast of the island. The Hana Belt Road Historic District extends about 42 miles, from Huelo to just past Kipahulu and includes the portion of Piilani Highway at the Haneoo Bridge.

Haneoo Bridge

⁵ "One of the most serious needs..." editorial, *Maui News*, June 28, 1902. P.2.

⁶ Ibid, and "Central Maui and East Maui..." editorial, *Maui News*. December 27, 1902. P. 2

⁷ "It is difficult..." editorial, *Maui News*. November 15, 1902. P. 2.

⁸ "The key to progress..." editorial, *Maui News*. May 16, 1914. P. 2.

The basalt rubble-constructed abutments and center pier of the Haneoo Bridge were built in 1900. In 1917 the bridge was altered.⁹ This consisted of removing the original deck and replacing it with the existing concrete slab. It is likely that the original deck and railings of the bridge were timber construction. The 1917 concrete deck was set across the tops of the 1900 abutments and center pier. The roadway bed along the approaches is level with the tops of the abutments and the center pier, making it unlikely that an arched construction was removed in the 1917 rebuilding. The materials and construction of the post-1917 bridge railings are unknown. It is possible that they remained timber construction after the concrete flat slab was added. During the field work for this report, no impressions in the concrete deck slab were found to indicate the construction or the material of any former guardrail.

A 1990 photograph in the *Historic Bridge Inventory and Evaluation, Island of Maui* shows the makai guardrail that year was constructed of 4½" steel pipe, a single horizontal length with its ends bent down and buried at the approaches, supported on three vertical pipe posts.¹⁰ The photo shows the mauka side had the existing W-Beam guardrail. The bridge was resurfaced in 1992,¹¹ and by 1995 both guardrails were constructed of W-beams.¹²

Upstream of the bridge is a former railroad grade that passes close to the road at this point. The railroad that ran on this line was part of the Hana Plantation Company at the time of the bridge's original construction. At that time, the new bridge would have been an important part of the transportation system for the plantation, as well as a component of the belt highway. The Hana Plantation Company became the Kaeleku Plantation Company in 1905, and in 1907 the original (1883) 20" gauge railway was upgraded to 36" gauge. By 1925, the plantation railroad extended from a point south of the bridge near (present day) Kakio, about 2½ miles south of Hana, to the mill, about 2½ miles northwest of Hana. The bridge would have been important to the continuity of the vehicular roadway, running adjacent to the railroad down the length of the plantation. In conjunction with the railroad, it would have been vital to move plantation equipment, supplies, and workers. The railway was dismantled sometime after 1944, when the plantation went out of business.

Although the 1900 and 1917 construction dates for the Haneoo Bridge indicate that the road in this area had been built at that time, it is not certain when the remainder of the belt road extending south of Hana to past Kipahulu was completed.¹³ A USGS topographic map of the area, surveyed in 1924 and 1925 shows that the belt road south of Hana was a "hard, imperviously surfaced road."¹⁴ The surfaced roadway shown on this map ended at Kukuiula Gulch, about 2 miles past Kipahulu. This is consistent with the travel log of William Pogue, co-chair of the Maui County Board of Supervisors, who visited the area on January 12, 1927, several weeks after the official opening of the Hana Belt Road. Pogue toured the road and noted that it ended at the bank of a creek that was 9 minutes driving time from Kipahulu.¹⁵

The engineer of the 1917 alteration of the bridge was likely Apau Paul (A.P.) Low, who was employed by Maui County as the Assistant County Engineer from 1916 to 1918. He became

⁹ Duensing, *Hana Belt Road Historic District*, 30.

¹⁰ Hawaii Heritage Center, *Historic Bridge Inventory and Evaluation, Islands of Maui and Molokai*, (Honolulu: Dept. of Transportation, State of Hawaii, 1990). P. 193.

¹¹ GMP Associates Inc., "Final Environmental Assessment for Kaholopo Bridge Replacement," (Wailuku, Maui: Dept of Public Works and Waste Mgmt, County of Maui, 1995). Appendix C, p. 2.

¹² GMP Assoc., "Final EA for Kaholopo Bridge Repl. P. 20.

¹³ Duensing, "Hana Belt Road, HAER HI-75," 2005. P. 49-50.

¹⁴ USGS, Topographic map "Haleakala Quadrangle, Edition of 1928, Surveyed in 1924-1925."

¹⁵ "Maui Belt Road Circled," *Maui News*, January 15, 1927. P. 1.

the Maui County Engineer in 1918, holding that position until 1928. Low was born in Honolulu in 1891 and received a degree in civil engineering from Stanford University in 1914. Low "appears to have been influential in developing the Hana Belt Road and bridges during the 1920s."¹⁶ Another person associated with the improvement of bridges on the Hana Belt Road was Hugh Howell, Maui County Engineer from 1906 until ca. 1912. During his tenure, Howell "concentrated on replacing failing, high maintenance truss bridges with simpler, more cost-effective structures built on durable concrete or rock masonry piers. East Maui had forty-seven bridges in 1908 and documents show that the wood structures demanded constant attention."¹⁷

Although the Territory of Hawaii reviewed and approved project and funding plans for the construction of the Hana Belt Road, the County of Maui was responsible for most of the work. This included arranging financing, design and engineering, and building. Prison work gangs were part of the labor force building the road.¹⁸ The road represents a "substantial public works achievement for the County of Maui during an era when Maui, especially Hana, was quite isolated from the rest of the world."¹⁹

Jurisdiction of this section of Hana Belt Road (between Hana and Kipahulu) was transferred from the State of Hawaii to the County of Maui in 1969²⁰. This section of road is known as the Piilani Highway. It has received fewer alterations, upgrades, or changes than the portion of the Hana Belt Road from Hana to Huelo that was retained under State jurisdiction.

Kaholopo as Alternate Name

The origin of the use of the name "Kaholopo" as an alternate name for this bridge is unclear. The 1990 *Historic Bridge Inventory and Evaluation for the Islands of Maui and Molokai* uses it as an alternate name,²¹ and this is repeated in the 2001 *National Register of Historic Places Registration Form for the Hana Belt Road* and the 2001 *Preservation Plan for County of Maui Bridges Within the Hana Highway Historic District*. "Kaholopoo" is the name of a small gulch, upland about ¾ mile west of the Haneoo Bridge. The gulch is about ¾ mile long, extending northwest from Haneoo Gulch. The Kaholopoo Gulch is named on current (1992) USGS topographic maps and on the 1957 USGS topographic map of the area, but is not named on the 1925 USGS topographic map. The 2005 HAER report *Hana Belt Road, HAER HI-75*, uses Kaholopoo as an alternate name for the Bridge.²²

¹⁶ Hawaii Heritage Center, *Historic Bridge Inventory Maui*, 1990. P. 6.

¹⁷ Dawn Duensing, "The Hana Belt Road: Paving the Way for Tourism," *Hawaiian Journal of History*, Vol. 41. 2007. P. 126.

¹⁸ "Road Committee Urges Support," *Maui News*, Feb 5, 1927. P. 2.

¹⁹ Duensing, "Hana Belt Road, HAER HI-75," 2005. P. 55.

²⁰ Duensing, "Hana Belt Road, HAER HI-75," 2005. P. 52.

²¹ Hawaii Heritage Center, *Historic Bridge Inventory Maui*, 1990. P. 192-93.

²² Duensing, "Hana Belt Road, HAER HI-75," 2005. P. 87.

Sources

A. Architectural Drawings:

No early drawings for the Haneoo Bridge were located for this report. A set of four drawings prepared by Maui County Department of Public Works for an inspection report of the bridge (Inspection date August 18, 1993) are available in Appendix C of "Final Environmental Assessment and Negative Declaration for Kaholopo Bridge Replacement," Job 94-40, Department of Public Works and Waste Management, County of Maui. August 1995. Prepared by GMP Associates.

B. Early Views:

No historic photos of the Haneoo Bridge were located for this report. Aerial photos from 1951 and later showing the area of the bridge are available in the Aerial Photo collection of the Hawaii State Archives.

Historic topographic and other maps showing the area are available at the Hawaii State Archives.

C. Bibliography:

Duensing, Dawn E. *Hana Belt Road, National Register of Historic Places Registration Form*. Washington D.C.: Department of the Interior, National Park Service. 2001.

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Maui News.

"One of the most serious needs..." Editorial. June 28, 1902. P.2

"It is difficult..." Editorial. November 15, 1902. P. 2.

"Central Maui and East Maui..." Editorial. December 27, 1902. P. 2

"The key to progress..." Editorial. May 16, 1914. P. 2.

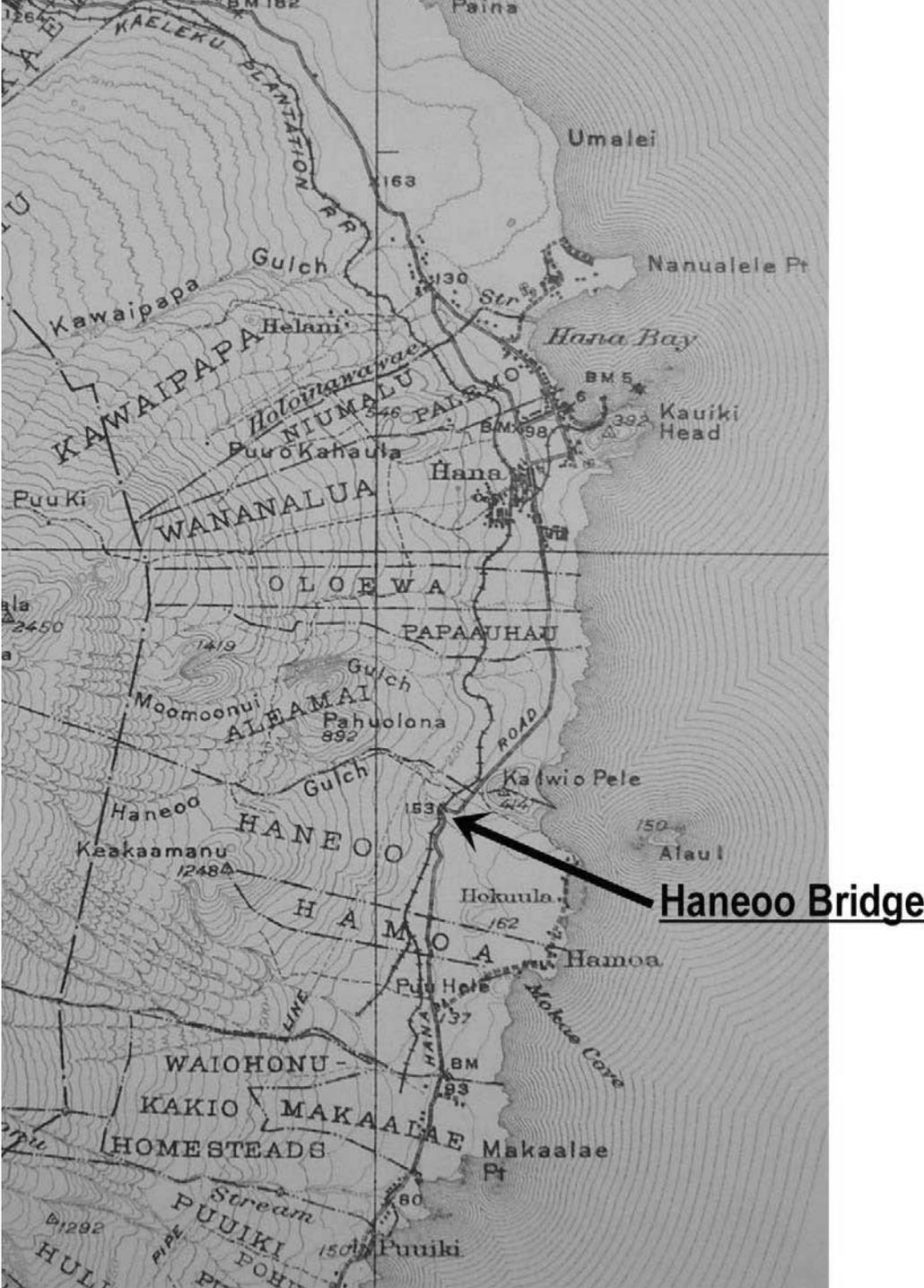
"Supervisors and Committee Agree as to Belt Road." February 8, 1923. P. 1.

"Maui Takes Day Off For Road Opening." December 22, 1926. P. 1.

"Maui Belt Road Circled." January 15, 1927. P. 1.

"Road Committee Urges Support." February 5, 1927. P. 2.

Portion of 1925 USGS topographic map showing the area near the Haneoo Bridge (lettering and arrow added). North at top. *US Geological Survey, Topographic map of the Island of Maui, 1930.*



Portion of 1925 USGS topographic map showing the end of the Hana Belt Road (added arrow) about 2 miles west of Kipahulu. Note that the symbol used for the Hana Belt Road indicates that it is "Hard, imperviously surfaced road." North at top. *US Geological Survey, Topographic map of Haleakala Quadrangle, Island of Maui, 1925.*

