HANA BELT ROAD
(Hana Highway)
(State Route 36)
(County Route 31)
Hana Belt Road Documentation Project
Between Haiku and Kaipahulu
Hana vicinity
Maui County
Hawaii

HAER HI-75
*HI-75*

PHOTOGRAPHS

PAPER COPIES OF COLOR TRANSPARENCIES

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

HISTORIC AMERICAN ENGINEERING RECORD

# HANA BELT ROAD
(Hana Highway)
(State Route 36)
(County Route 31)

HAER NO. HI-75

| | |
|---|---|
| LOCATION: | Between Haiku and Kaipahulu, Hana vicinity, Maui County |
| DATES OF CONSTRUCTION: | circa 1908 to 1926, 1937, 1947 |
| DESIGN: | Maui County Engineer's Office: Hugh Howell, Paul Low, A.P. Wong |
| CONTRACTORS: | Wilson and McCandless, Hugh Howell Engineering Company, and Moses Akiona, Ltd. were private contractors. County employees, day laborers, and prison laborers also completed the construction. |
| STRUCTURE TYPES: | Scenic road; masonry bridges, abutments, walls and roadside edging; reinforced concrete arch bridges; reinforced flat slab bridges and culverts; reinforced concrete girder bridges; pipe culverts. |
| OWNER: | State of Hawaii Department of Transportation, County of Maui Department of Public Works and Waste Management. |
| SIGNIFICANCE: | The Hana Belt Road is a remnant of Maui's "belt" (around-the-island) road system. It retains a high level of historic integrity and character. The Hana Belt Road is relatively unaltered in terms of its historic setting and character, which includes the road's location, width, alignment, structures, scenery and vistas. The historic portion of the Hana Belt Road is listed in the National Register of Historic Places. The Hana Belt Road includes the highest concentration of stylistically consistent historic bridges and culverts in the State of Hawaii. |
| HISTORIAN: | Dawn Duensing, summer 2005 |

PROJECT INFORMATION:

Documentation of the Hana Belt Road was conducted in 2005 by the Historic American Engineering Records (HAER), Richard O'Connor, Acting Manager, a division of the National Park Service, Department of the Interior. HAER is a long-range program to document significant engineering, industrial, and maritime works in the United States. This project was funded by the Federal Highways Administration (FHWA), U.S. Department of Transportation, Hawaii Division, Abraham Y. Wong, Division Administrator, and Domingo Galicinao, Structural Engineer. The project was co-sponsored by the Highways Division, Hawaii Department of Transportation (HDOT), Maui District, Ferdinand Cajigal, Engineering Program Manager, and Charlene Shibuya, Design Engineer. The Maui County Department of Public Works and Environmental Management, Milton Arakawa, Director, and Joe Krueger, Project Engineer, provided additional support.

The summer 2005 documentation team worked under the direction of HAER project leader Todd Croteau. The field team consisted of field supervisor and project historian Dawn E. Duensing, architects Maureen Vosmek (University of Maryland) and Elena Molina Cerpa (US/ICOMOS, Peru), and landscape architect Daniel Schaible (University of Oregon). Justine Christianson, HAER Historian, edited the report. Jet Lowe, HAER Photographer, produced the large format photography.

For additional documentation related to the Hana Belt Road, see also:

HAER No. HI-70, Kaukau'ai Bridge (Koukou'ai Bridge)
HAER No. HI-71, Waiohonu Bridge
HAER No. HI-72, Kapi'A Stream Bridge (Kahawaiokapa Bridge)
HAER No. HI-77, Hamakua Ditch (East Maui Irrigation Company)

**TABLE OF CONTENTS**

**PREFACE**

The Historic American Engineering Record (HAER) program of the National Park Service (NPS) has been engaged in a long-term program to document America's national park roads and parkways, as well as other significant American roads. The HAER program has created a detailed visual and textual record of historically significant roads, bridges, ancillary structure, and related landscapes in a broad range of national parks and other locales throughout America. Teams of historians, photographers, architects, and landscape architects have documented existing road and landscape conditions, historic road-building practices, engineering technology, design strategies, and related historical processes.

Many individuals helped make this project a success. The project historian would like to thank Abraham Wong and Domingo Galicinao of the FHWA Honolulu Office for their assistance. Thanks also to Ferdinand Cajigal, Charlene Shibuya, and the able staff at the Maui District Office of the Hawaii Department of Transportation. Milton Arakawa and Joe Krueger of the Maui County Department of Public Works and Waste Management were also of assistance during this project.

This study presents the history of the development and construction of the Hana Belt Road between Huelo and Kalepa Point on the island of Maui, Hawaii. It discusses the predecessor trail to the road as well as early travel along the Maui Coast. The County of Maui planned and built most of the road, with the assistance of the Territory of Hawaii Department of Pubic Works and the Mauna Loa Fund Commission. In addition, local support was crucial in getting the Hana Belt Road built. The thoroughfare was a result of Maui citizens' desire to bring their island to international attention and develop a more profitable tourist industry. For local residents, the opening of the Hana Belt Road provided a direct, overland route to the rest of Maui and ended Hana's centuries-long isolation.

The construction of the Hana Belt Road and its numerous reinforced concrete bridges and other structures demonstrated to the world that Maui was keeping pace with the rest of society in achieving modern public works projects. This report also details later improvements to the road and concludes with a discussion of future plans.

**RAINY LAND, LOW-LYING SKY**

From the Hawaiian language, the name Hana poetically translates as "rainy land, low-lying sky." The name is not restricted only to the small East Maui village and bay, but is also applied to one of four geographic districts on the island of Maui. The Hana District covers nearly half of East Maui, which is comprised of Haleakala, a dormant volcano more than 10,000' in elevation. In ancient times, lava flows poured from rifts in Haleakala to create the jagged northeast coast of Maui. Centuries of stream erosion from the wet, northeasterly tradewinds on Haleakala's windward (northeast) slope helped create a rugged terrain of high sea cliffs and v-shaped valleys. The wet climate resulted in dense forests that, together with the rough terrain, made the Hana District one of Hawaii's most isolated and inaccessible areas.

Despite its isolation, Hana played an important role in Hawaiian legend and history. According to lore, the demigod Maui lived at Ka`uiki at Hana Bay. Maui used his great hook to raise the Hawaiian Islands out of the sea. He also lassoed the sun to slow it down and lengthen the day, which allowed his mother Hina to dry her kapa (barkcloth).

In 1777, Queen Kaahumanu, the favorite wife of King Kamehameha I (the ruler who united the Hawaiian Islands), was born at Ka`uiki. A strong-willed woman, Kaahumanu ruled as regent after Kamehameha's death in 1819 and convinced the king's successor to break the traditional kapu (taboo) system. Her actions inadvertently opened the door to Christian missionaries, who arrived in Hawaii the year after Kamehameha's death in 1820. The establishment of Christian missions and the subsequent American presence in Hawaii changed the course of Hawaiian history.

The Hawaiians' connection to their aina (land) is perhaps the most essential component of their cultural existence. As such, the Hana Coast was and remains culturally significant to Native Hawaiians. Evidence indicates that the numerous deep gulches and streams along the Hana Coast allowed a sizeable Hawaiian population to flourish in ancient times. The wet tradewinds provided the area with ample rain to grow awa, bananas, sweet potatoes, breadfruit, and perhaps most importantly, kalo (taro). The small coastal bays were favorable fishing grounds. Ancient agricultural terraces found in O`opuola, Waikamoi, Puohokamoa, Haipua`ena, and Honomanu Gulches demonstrate that Hawaiians lived throughout the coast, not just in the communities of Keanae, Wailua, Nahiku, Hana, and Kipahulu.

In 1832 American missionaries reported that the Hana District was well populated. They counted 3,816 souls in Hana and 1,553 in nearby Kipahulu. By the end of the 1800s, diseases introduced by the influx of foreigners had drastically reduced the native population. In 1878, only 2,067 people were estimated to reside in the entire Hana District. Despite the decline, the village of Hana seemed to prosper. By 1880 the community boasted a school, courthouse and two stores.

The impact of foreigners on Hawaiian culture is best illustrated in the great changes to agricultural production. Although some Hawaiians continued to live a subsistence lifestyle, by the late 1800s industrial agriculture had been established along the Hana Coast. Sugar plantations became the dominant economic enterprise, but there were also failed attempts in pineapple and rubber. These industrial plantations required more laborers than Hawaiians could supply, so immigrants were employed. To better serve the increasing plantation population, communities in the Hana District supported small general stores, schools, post offices, and churches. Asian influence on the Hana Coast was most apparent in Keanae where more than half of the kalo lo`i (taro fields) were used as rice paddies from the 1880s to the 1930s. Chinese fraternal societies were established in Keanae and Kipahulu in the early 1900s. A Buddhist mission was organized in Hana.

The opening of the Hana Belt Road in 1926 ended Hana's isolation from the rest of Maui and the outside world. Rather than having to take a week-long steamer trip to and from Central Maui, residents could now make day trips between Kahului and Hana. After the road opened, several small hotels were established to accommodate visitors. In 1944 Paul Fagan, a California entrepreneur, purchased the Hana Coast's last remaining sugar plantation, the Ka`eleku Sugar Company. He closed the sugar operation and converted much of the land into ranching. Three years later, Fagan opened Hana's first modern hotel-resort.

The lack of major road improvements since 1926 has not only preserved the historic character of the Hana Belt Road, but has also helped maintain the character of the Hana District itself. The absence of an easily-traveled, high-speed traffic artery has served to impede substantial development, restricting the establishment of fast-food chains, chain stores, strip malls and sprawling subdivisions. Subsequently Hana and other communities in East Maui have remained rural and maintained their Hawaiian lifestyle.

In the early twenty-first century, Hana is renowned as Maui's "last Hawaiian place." Kalo lo`i have been restored throughout the coast, most notably in Keanae, Wailua, and Kipahulu. Thatched hale (houses) scattered around the community stand as evidence of Hawaiian culture. Hawaiian clubs and civic organizations are popular. Residents, especially those in Hana, work together as the bumper sticker claims, to "Keep Hana Hawaiian."

## DESCRIPTION OF CURRENT CONDITIONS

The Hana Belt Road, commonly known as the Hana Highway, traverses approximately 55 miles along Maui's northeast coast from Kahului in central Maui to the remote East Maui community of Hana.[1] After Hana, the road continues south for approximately 16.3 miles along the coast through the small village of Kipahulu and then to Kalepa Gulch. From Kalepa Gulch, the thoroughfare passes 16.3 miles through the leeward (dry) side of East Maui to Ulupalakua. After Ulupalakua, the road travels through Kula to Pukalani and intersects with Haleakala Highway, which takes motorists back to the Hana Highway and Kahului in Central Maui. These road segments circumvented East Maui and were an important link in Maui's "belt" road system around the entire island. Although the road south of Hana is part of the Hana Belt Road, some maps refer to this section of road as Pi`ilani Highway.

The historic portion of the Hana Belt Road, which measures approximately 48 miles, begins .2 miles west of Mile Marker 3 on the Hana Highway, State Route 360, near Huelo and ends at Kalepa Gulch on County Route 31 (Pi`ilani Highway). This portion of Maui's historic belt road system is relatively unaltered and retains significant historic integrity and character. Many sections of Maui's historic belt road system have been replaced or modernized and bear no resemblance to the early belt highways. The Hana Belt Road, however, retains its historic setting, character, alignment, narrow roadbed, bridges, culverts, retaining walls, guardwalls, and other features.

The Hana Belt Road is a narrow, winding thoroughfare that follows East Maui's rugged northeast and southeast coastline. In many locations, the road is nothing more than a narrow bench on the mountainside as it follows Haleakala's coastal contours. The roadway width varies from less than 13' wide along the sea cliffs south of Hana to approximately 22' wide through level topography and residential areas in Keanae and Hana. Along most of the road, there is no shoulder. There are only a few designated areas where motorists may pull off the road to enjoy the views, but there are many informal pullouts alongside the road where space permits. The Hana Belt Road is notable for its breathtaking vistas, with numerous sections of the road clinging to sea cliffs along the scenic East Maui coast. Travelers can enjoy views of the coastline, waterfalls, narrow v-shaped valleys, small villages, and traditional landscapes. Vegetation includes both invasive species (primarily bamboo, ginger, African tulip trees, and vines) and endemic species (including kukui, ferns, pandanus, coconut palms, koas, and mountain apples). Concrete rubble masonry (CRM) guardwalls or w-beam guardwalls protect much of the road. The Hana Belt Road is most renowned for its historic, one-lane bridges, nearly all of which are located on curved alignments. The road includes the highest concentration of stylistically consistent historic bridges in the State of Hawaii. The journey to Hana is slow, and more often than not, it is not the destination but the

[1] The island of Maui is comprised of two shield volcanoes (East and West Maui) that are joined by an isthmus. The larger of the shield volcanoes, the dormant Haleakala, is East Maui, which rises to more than 10,000' in elevation

experience of getting there that is the adventure. Tourists making day trips from resorts in west and south Maui comprise most of the daily traffic.

Motorists usually stop in Hana for a short time to enjoy a swim at Hana Bay or to hike or picnic at Waianapanapa State Park. Some visitors choose to spend more time in Hana, lodging at the Hotel Hana-Maui or at one of the many small guesthouses. The town's facilities include a few restaurants, two general stores, a gas station, several gift shops, a real estate agency, and visitor activities. The community also has churches, a health center, a public school and library, an airport, post office, fire station, and other government services.

After Hana, the narrow road winds nearly 11 miles, more often than not perched on sea cliffs, to the small community of Kipahulu. The Kipahulu section of Haleakala National Park provides a place for visitors to stretch their legs and enjoy the beautiful scenery from the national park visitor center. Many visitors choose to swim in the pools at Oheo Gulch or hike the 4-mile trail through the forest to Waimoku Falls. At Kipahulu, the majority of visitor traffic makes the return trip to Central Maui. Some visitors drive the remaining 6 miles of the Hana Belt Road to Kalepa Gulch, where the road changes into the Pi`ilani Highway, a 20-mile stretch of unimproved road through the dry leeward side of Haleakala. Pi`ilani Highway allows motorists to complete their circular journey around East Maui.

Much more than a scenic drive, the Hana Belt Road is the only direct overland route to Central Maui for residents of the Hana District's coastal communities. Local residents refer to the road as their "lifeline" to the rest of Maui.

The Hana Belt Road between Huelo and Koukou`ai Bridge in Kipahulu was listed on the National Register of Historic Places in 2001. The road is under the jurisdiction of the State of Hawaii Department of Transportation from Kahului to Hana. The Maui County Department of Public Works and Environmental Management is responsible for the section between Hana and Ulupalakua.

Mile Marker (MM) 0 on State Route 360 is located at Kaupakulua Road in the vicinity of Haiku. Route 360 measures 34.93 miles long and ends at Keawa Place in Hana.[2] For the first 2 miles of Route 360, the Hana Belt Road is an improved, modern highway measuring 24' wide with 4' to 6' paved shoulders. The road is quite straight as it proceeds through deep cuts and valleys. At 2.8 miles, the speed limit is reduced to 15 m.p.h., and a road sign cautions motorists about the "narrow winding road next 30 miles" as the road narrows to its historic width and alignment. A short distance beyond is another sign, which notes a 10-ton weight limit for all bridges. The pavement narrows to 20' as the road begins winding its way in and around the lower slopes and ridges of Haleakala. The dense, overgrown vegetation adds to the narrow feeling of the roadway. For the first 10 miles, the thoroughfare runs well inland from the ocean.

[2] For detailed information on the Hana Belt Road's bridges, see Appendix A.

Near MM 4, the pavement narrows to 18'. At MM 4.27 the road passes through pastureland and crosses over a CRM box culvert. Another .3 mile along the road is a one-lane culvert built of dry-laid rock, with w-beam guardrails on both sides of the road above.

Near MM 4.8 at Huelo Lookout is the first of many roadside refreshment stands along the Hana Belt Road. The thoroughfare continues winding around the mountain, traveling over slight grades. At MM 5.09 the Hana Belt Road veers left and crosses the first of its one-lane bridges, Hoalua Bridge. Built in 1929, the structure is a one-span, reinforced concrete T-beam bridge with an open parapet. Just after the bridge is a non-historic lava rock retaining wall and guardwall that nevertheless complements the historic road. There are a few residences in the area, and the landscape is overgrown with invasive species. Road signs remind motorists not to pass.

At MM 5.8, on the makai side (seaside) of the road, is the East Maui Irrigation Company (EMI) (see also HAER No. HI-77) offices and baseyard at Kailua. Just outside the company's gate is a payphone and pullout. Immediately after EMI, the road curves inland (to the right) and comes to Kailua Bridge, built in 1929. A reinforced concrete T-beam structure with open parapets, Kailua Bridge has CRM abutments and guardwalls adjacent to the bridge. Just mauka (mountainside) of the east abutment is a small concrete footing, which may be from an earlier bridge at this site. A house is located on the bluff overlooking the bridge.

After crossing Kailua Bridge, the road climbs out of the valley and narrows to less than two full lanes. There are many areas along the length of the Hana Belt Road where the pavement is less than two-lanes wide. As a result, there are no double, solid yellow lines dividing these stretches of pavement. At some of the narrow locations, yield signs remind motorists to be alert to oncoming traffic.

Motorists pass through a grove of mature eucalyptus trees along the makai side of the road near MM 6. The road then winds around the mountain and descends to Na`ili`iliha`ele Bridge. A three-span structure designed by the County Engineer's Office in 1930, this elegant reinforced concrete T-beam bridge is curved and features an open parapet with balusters and square post caps. The structure's east abutment and wingwalls are built of CRM. The west abutment and piers are reinforced concrete. EMI ditch structures are adjacent to both sides of the bridge. After crossing Na`ili`iliha`ele Bridge, the road climbs and proceeds into a steep, tight, hairpin turn as it travels on a narrow ledge out of the valley. Less than two-lanes wide, a stretch of short CRM guardwall protects this section of road. After climbing out of the valley, the thoroughfare travels through pasture land on the makai side, and motorists catch their first glimpse of one of the most invasive species along the coast, bamboo, which dominates many of the valleys along the Hana Coast.

At MM 7 is a drop culvert built of lava rock and concrete pipe. This area receives a great amount of rainfall, as evidenced in the damp, heavily overgrown forest and moss-covered structures. Trees in this area include the native kukui as well as the exotic eucalyptus. A row of concrete post delineators is located immediately after the drop culvert on both sides of the road. There is also a concrete-slab culvert built of CRM abutments and a solid concrete parapet.

After crossing the culvert, the road is benched in the mountain with a sheer wall 20'-25' high on the mauka side. Staghorn ferns grow on these walls, with kukui and pandanus growing above. Another invasive species, the African tulip tree, is also abundant. W-beam guardrails run along the makai side of the road to protect motorists from steep dropoffs.

The Hana Belt Road continues its meandering path around the mountain contours with only slight grades in this area. Near MM 7.7 is a large turnout and a row of residential mailboxes.

Approaching MM 8, motorists enter a valley and approach O`opuola Bridge, which is situated on a horseshoe bend. This small, one-span structure with cut basalt abutments curves to follow the geometry of the road. The bridge has an open parapet and CRM wingwalls and guardwalls. Asphalt has been used to superelevate the road, resulting in the makai wall becoming shorter than the mauka wall. Numerous mountain apple trees are adjacent to the bridge on the makai side of the road. There is ample pullout space. About .1 mile east of the bridge the road passes through a short cut about 30' high. Winding along the upper part of the valley, the road runs through a blind cut near the approach to Makanali Bridge, which is located at MM 8.2. This 13', one-span, reinforced concrete flat-slab structure has an open parapet and is built on a skew. The abutments are CRM as are the wingwalls. Past Makanali Bridge, the road passes through a blind cut and into a heavily forested area.

The road continues to travel along a bench that follows the contours of the mountain, with w-beam guardrail in many places on the makai side of the road and steep rock cliffs on the mauka side of the road. Proceeding into Ka`aiea Valley, guava and bamboo are the predominant vegetation. The `Aiea (Ka`aiea) Bridge is situated on a horseshoe-shaped curve in the road at the end of the valley at MM 8.57. Adjacent to the bridge is a diversion structure that is part of the EMI irrigation system. `Aiea Bridge is a one-span, reinforced concrete T-beam structure with open parapets of vertical balusters and square post caps.

After Ka`aiea Bridge, the road passes through a deep cut and begins to descend. Just before MM 9 on the mauka side of the road is a row of large piers constructed of lava rock. The pavement continues through a cut and fill before curving along a bench on the mountainside. At approximately MM 9.1, the road passes through a deep blind cut and descends along a bench into the next valley that features kukui, pandanus, bamboo, and a

few coconut palms. At the end of this small valley near MM 9.2 is a flat-slab culvert with CRM abutments and wingwalls. The masonry displays fine workmanship, and the moss and vines on the rock enhance the appearance of the structure. Emerging from this valley, motorists have a view of the Pacific Ocean in the distance.

The road continues on its meandering path, passing the Waikamoi Nature Area, with a hiking trail and picnic area near MM 9.5. Spectacular ocean views may be enjoyed from this hilltop wayside. A small, informal parking area is adjacent to the trailhead on the mauka side of the road. Passing the nature area, the road proceeds around a curve and moves inland along a bench. Bamboo covers the valley slopes, with a few pandanus on the steep cliffs above the road.

Proceeding into Waikamoi Valley, the road narrows to less than two lanes. Jersey barriers and w-beam guardrail are along the pavement's makai edge. The road makes a sharp left turn at MM 9.9 and travels over the 12.9' wide Waikamoi Bridge. This structure is a two-span, reinforced concrete T-beam bridge with a solid concrete parapet, reinforced-concrete abutments and pier, and CRM wingwalls.

From Waikamoi to the Nahiku area, concrete gutters have been installed along the mauka side of the road to help direct water away from the road during rainy weather. Many of the gutters are muddy and mossy, so they are barely noticeable in most areas.

East of Waikamoi, the Hana Belt Road continues its winding path through the rainforest. Ginger is the predominant invasive vegetation.

Near MM 10.5 the road passes through a blind cut, travels slightly uphill and passes the Garden of Eden, a private arboretum open to the public and located on the mauka side of the road. After the arboretum entrance, the road takes a sharp turn inland as it proceeds around and down the mountain contours, curves around a culvert, and descends into Puohokamoa Valley, a popular stop for tourists with a waterfall and place to swim. The road makes a sharp left turn onto Puohokamoa Bridge at MM 11. Puohokamoa Bridge is of reinforced concrete T-beam construction whose concrete abutments are of the same design as those on the bridge at Waikamoi. On the west end of the bridge is a concrete wall and gate built to look like rock. The wall does not complement the historic character of the road and bridge.

On the east side of Puohokamoa Valley is a rockfall structure. A dark-colored mesh screen is anchored to the mountainside to prevent loose rock from falling to the road. Vegetation is regenerating barely a month after the project was completed, so the mesh screen is becoming barely noticeable.[3]

As the road travels out of Puohokamoa Valley, it narrows on its descent on a bench into Haipua`ena Valley. Jersey barriers and w-beam guardrails are along the pavement edge

[3] The rockfall mitigation project was completed in August 2005.

in the narrow spots. At MM 11.4 is Haipua`ena Bridge, a reinforced concrete girder bridge that features the same design as Puohokamoa and Waikamoi. The date of construction, 1911, is inscribed on the makai elevation. Both bridge parapets have collision damage.

The road exits Haipua`ena Valley on a narrow bench and heads back towards the sea. The steep walls along the bench are covered with ferns and other vegetation. Just before MM 12, a lone concrete-post delineator is on the makai side of the road. The road descends and winds through a very heavily forested area with vines covering the trees that extend out over the pavement to form a tunnel. The dark forest is the only view from the road. Near MM 12.1 is Kaumahina State Wayside, which is prominently situated above the road and offers spectacular views of the Pacific Ocean and Keanae Peninsula. It is a fine place to stretch one's legs, take a break from driving, and enjoy the scenic views. The wayside was closed for the construction of a new comfort station in 2005.

Immediately after the wayside, a sign cautions motorists about the approaching rockslide area, located where the Hana Belt Road begins to wind its way down the steep mountainside into the immense Honomanu Gulch. The road travels along the land's contours on a bench situated partway down the mountain, with steep walls above it and a dramatic drop to the ocean hundreds of feet below. In some areas, the cliff above the road is sheer rock; in other locations, ferns and trees cover it. Where trees and vegetation have not grown too high, motorists have a stunning glimpse of the ocean, the Keanae Peninsula, and the road as it rises out of the other side of the valley. Looking down, travelers have views of Honomanu Bay and beach. As the road continues to descend into Honomanu Gulch, it often narrows to less than two lanes wide. Yield signs and the absence of center lines on the pavement mark these areas. W-beam guardrails and short lengths of CRM guardwalls protect nearly the entire distance from the beginning of Honomanu Gulch until Keanae. A significant amount of endemic vegetation, including kukui, pandanus, staghorn fern, and coconut, covers the steep mountainside. A variety of invasive species are also present.

Arriving at the bottom of Honomanu Gulch, motorists make a sharp left turn at MM 13.2 and approach Kolea (Punalau) Bridge, a one-span, reinforced concrete T-beam bridge with CRM abutments and wingwalls, solid concrete parapets, and 1910 inscribed on the exterior elevation of the makai parapet. CRM guardwalls and an assortment of large boulders line the pavement's edge to protect motorists. After Kolea Bridge, the Hana Belt Road travels slightly mauka before proceeding in a relatively straight path through the bottom of the valley floor. The road is well inland from the beach and at an elevation close to sea level. Even near sea level, the road is benched into the side of a hill, with steep walls on the mauka side and guardrails on the makai edge. A dense forest covers the valley floor, with little sunlight penetrating the vegetation. As a result, the area is quite damp, moss-covered and dark. Concrete gutters and grated drop inlets have been built throughout this area. At the other end of the valley, at MM 13.7, is Honomanu Bridge. This bridge has a tangent approach from the west and sharply turns left upon

exiting the structure. Less than 13' wide, the two-span structure is built entirely of reinforced concrete, including the T-beam girders, abutments, parapets, and pier.

Immediately to the east of Honomanu Bridge at MM 13.9 is a dirt road that leads to the beach. The Hana Belt Road then ascends out of Honomanu Valley. Towards the bottom of the valley floor, the road is a full two lanes wide. As motorists ascend, the pavement often narrows to less than two lanes, just as it did on the west side of the gulch.

Approximately .25 mile past Honomanu Bridge, is an area .2 mile in length where the cliffs were cut back from the road for several hundred feet. The cut in the cliff is huge, and the scars from the cut are still quite visible in 2005. Jersey barriers alongside the mauka side of the road serve as a catchment barrier for rocks. On the makai side of the road are w-beam guardrails. As on the west side of the valley, the road rises on a bench cut into the seacliffs high above the ocean. Just after the rockfall mitigation area, a paved pullout on the makai side of the road allows motorists to stop and enjoy the views.

Only .1 mile past the pullouts, the road passes through a blind cut and winds its way around the mountain. This section of the road is quite spectacular, whether from an automobile or from an aircraft. Several hundred feet above the ocean, the Hana Belt Road is perched on the mountainside, traveling around the large mountain mass that separates Honomanu and Nua`ailua valleys.

Near MM 15, the thoroughfare begins its descent into Nua`ailua Valley, which is framed by pandanus, coconut palms, kukui, and African tulip trees. At MM 15.4 is Nua`ailua Bridge, a reinforced concrete T-beam girder bridge widened in 1940. The makai parapet is the original design, open with vertical balusters; the mauka parapet is solid concrete and set back from the road's edge at an angle. From the west, the approach to the bridge is on an easy curve. Crossing the bridge and proceeding east, motorists must navigate a sharp left curve. The road then continues out of the valley, with a few views of the ocean where the vegetation is not so dense.

The road rises from Nua`ailua Valley in much the same manner as it did from Honomanu Valley. Where the vegetation is not too overgrown, motorists can see the road on the other side. In several locations, the roadway narrows to less than two lanes. Near the end of the gulch is another large area of cliff/mountain that has been cut back from the road. There are concrete gutters and a long length of lava rock gabion separates the road from the rockfall area. Weeds cover the rock catchment area behind the gabion. A sign warns motorists not to stop in the rockfall area. The road in this area was reconstructed on a reinforced-concrete cantilever deck. As with the previous rock cut, the scar from construction is still visible years after the construction.

Leaving Nua`ailua Valley, the road parallels the ocean as it travels towards Keanae. Near MM 16.3 on the makai side of the road are the Keanae YMCA camp and the Maui County public works baseyard. After the baseyard, the road makes a hard right turn and

descends into a left curve that passes the Keanae Arboretum at MM 16.5. Parking is available on both sides of the road. The arboretum features a path through native and alien plants.

The Hana Belt Road takes a sharp turn to the right several hundred feet beyond the arboretum. Keanae Homestead Road, which leads to the Keanae Peninsula, is on the left. From the Keanae boat launch on the peninsular are excellent views of the Hana Belt Road as it travels along the cliffs near Honomanu.

Immediately past Keanae Homestead Road is Pi`ina`au Bridge at MM 16.6. The one-span T-beam structure is two-lanes wide with an open baluster parapet. Only .1 mile after Pi`ina`au Bridge is the curved Palauhulu Bridge, another two-lane, reinforced concrete T-beam structure with open parapets. Asphalt was used to superelevate the bridge, which makes the west end of the mauka parapet only 8" high.

The Hana Belt Road proceeds at a fairly level grade as it continues to wind through the Keanae community. Just past MM 17 is a paved pullout area on the makai side that serves as an overlook to view the Keanae Peninsula. The civil defense warning signal is here, which serves as a reminder that the peninsula is in a tidal wave inundation zone. The road then enters the residential area of "upper" Keanae, with its neatly manicured lawns and vernacular, plantation-style architecture. At MM 17.25 is the "Last Stop to Hana" refreshment stand on the mauka side of the road.

One-tenth of a mile after the snack shop is an upside-down U-curve sign to signal a sharp turn ahead. Near the end of this small horseshoe-shaped valley is a sharp left curve, then three culverts, one immediately after the other. The original portions of these structures have fine CRM wingwalls and retaining walls. The makai side of the culverts are flat-slab and were built when the road was widened circa 1937. The agricultural setting includes older homes and kalo lo`i.

MM 18 is located in front of the three-classroom Keanae School, which is listed on the National Register of Historic Places. The road through this residential area is 16' wide with grass shoulders. At MM 18.1 is the two-lane Waiokamilo Bridge and Waiokamilo Culvert. The bridge and culvert are unique, with matching parapets and tangent alignment. Unlike the parapets of most of other bridges on the Hana Belt Road, these two bridges have open parapets with cross-shaped voids and a rectangular railcap. Another snack shop is located on the west end of the bridge on the mauka side of the road. Immediately east of Waiokamilo Culvert is Wailua Homestead Road. After crossing the culvert, the Hana Belt Road curves inland (to the right) and ascends as it heads away from Keanae. The road passes through some blind cuts as it continues its rise to the bench above Wailua. Kalo lo`i are located above the road and are usually draining into the road's culverts. On the left are brief glimpses of the ocean and Wailua village below. Many culverts in this area have CRM walls on top of the road; one has concrete

post delineators. Guardwalls in this area are sometimes built of CRM; often there are no guardrails on the makai side of the road as there are berms left from the cuts in the road.

Approaching MM 19, the Hana Belt Road travels on a bench high above sea level and the village of Wailua. Just after MM 19 on the mauka side of the road is Wailua Valley State Wayside, with a small parking lot. Stairs lead up to a lookout point on a knoll, where visitors can look out over the village of Wailua and the Pacific Ocean. From the parking lot, motorists have a rare view mauka into the immense Wailuanui Valley.

Less than .2 miles east of the wayside is a scenic pullout on the makai side of the road, with a paved parking area and two concrete picnic tables. Small rocks imbedded in the asphalt serve as curbs between the parking area and picnic tables. Most motorists stop here to enjoy the ocean views. The village of Wailua, with its churches and numerous kalo lo`i, is hundreds of feet below. After this stop, the road turns mauka (right) and heads along the road bench into Wailuanui Valley. At this point, the Hana Belt Road travels inland about a mile from the coast.

Proceeding along the bench to the head of Wailuanui ("Big" Wailua) Valley, the road narrows to hardly two lanes. In many places, the road passes through blind cuts with old CRM guardwalls edging the road. On the mauka side of the bench are sheer cliffs several hundred feet above the road. In several places, the rock protrudes over the road. At MM 19.4 the road makes a sharp left on its approach to Waikani Bridge. Even though there is no shoulder and not much space to pullout, many motorists park their car on the road in order to enjoy and photograph Waikani Falls. The 1926 open-spandrel concrete arch Waikani Bridge is one of the most impressive structures along the Hana Belt Road, but overgrown vegetation often obscures it. During dry seasons or after highway maintenance crews trim the vegetation, motorists have fine views of the bridge as they approach it coming into the valley. On the west end of the bridge's makai side is a concrete cantilever deck, installed in early 2001 to repair the undermined road. A large concrete pier was built adjacent to the short CRM wall as an attachment for w-beam guardrail and rubrail. The guardrail and concrete pier are a sharp contrast and visual intrusion to the scenic and historic surroundings. The modern structure further obscures the view of the elegant historic bridge. There are concrete gutters in Wailuanui Valley, and the road east of the bridge is less than two-lanes wide at some points.

Leaving Wailuanui Valley, the road winds in and around the mountain contours as it travels through two densely forested small valleys on its way to Wailuaiki ("Little" Wailua) Valley. The road is still benched into the mountain, with the typical steep walls on the mauka edge of the pavement. Several culverts with masonry guardwalls are in small, v-shaped valleys that separate Wailuanui from Wailuaiki. Located in an extremely rainy locale, some of the masonry walls have openings near the pavement to facilitate drainage off the road. Posted signs warn motorists of the possible dangers from falling rocks. East of Wailuanui Valley, the Hana Belt Road travels through very remote, uninhabited areas.

The road then winds its way into a larger valley named Wailuaiki. This valley is much deeper on the west side than it is on the east. A few sections of the road in this valley are less than two-lanes wide. As motorists approach the head of the v-shaped valley, they have a very dramatic view of the curved, three-span West Wailuaiki Bridge, with a pool above the bridge and a waterfall below. While it is extremely scenic, there are no places for motorists to pull off the road to enjoy the view. Well-built CRM walls and CRM retaining walls are adjacent to the reinforced concrete T-beam bridge with curved open parapets. Although there are a few native hapu`u tree ferns on the cliffs above, most of the vegetation is guava, ginger, and other invasive species. East of the bridge are several large cuts as the road ascends out of the valley.

The road turns sharply to the right as it exits Wailuaiki Valley. Beyond Wailuaiki and stretching to Nahiku are seacliffs like those between Kailua and Honomanu. The Hana Belt Road is not perched on a bench at these cliffs as it was west of Honomanu. Instead, the road runs approximately two-thirds to a mile inland from the sea. This area of the Hana Coast is extremely wet, which requires a variety of small culverts to direct rain away from the road.

Less than half a mile east of West Wailuaiki Bridge, at MM 21.3, motorists cross East Wailuaiki Bridge, a one-span reinforced concrete T-beam bridge with CRM abutments and wingwalls. A heavy layer of asphalt has significantly shortened the height of the bridge parapets.

The Hana Belt Road continues winding around mountain contours and ridges, often narrowing to less than two lanes wide, before crossing Kopili`ula Bridge at MM 21.8. This reinforced concrete T-beam bridge is one of two structures along the road with 2' thick parapets. Since it is located at the end of a narrow, deep valley with waterfalls, there is an irrigation ditch dam beneath the bridge and sluice gate gears on the west end of the mauka wall. Lava rock lines the stream embankments, and a ditch tunnel is adjacent to the bridge.

East of Kopili`ula Bridge, the road travels adjacent to an irrigation ditch for a short distance. Culverts and concrete gutters are in many places along the thoroughfare.

At MM 22.5 is Pua`aka`a (Waiohue) Bridge, a one-span, reinforced concrete T-beam structure with open parapets. The bridge parapets are quite high as compared to other bridges. The road continues on its meandering way around the mountain through heavy vegetation. Vines cover many trees in this part of the rain forest.

Waiohue Bridge, situated at MM 22.3, is a two span, reinforced concrete t-beam structure with solid parapets and a CRM pier. The bridge is adjacent at Pua`aka`a State Wayside, a popular stop for tourists that has a comfort station, parking area, sheltered picnic tables, and a waterfall.

East of the wayside, the road is often less than two-lanes wide. Three short bridges lying within a tenth of a mile of each other are located approximately two-thirds of a mile east of Waiohue Bridge. The alignment of the road and bridges is quite awkward. At MM 22.98 is the first of the bridges, Waiohuolua, a reinforced concrete T-beam structure. The bridge has the original solid parapet on the mauka side, while the makai wall is a w-beam guardrail. "Bridge No. 2" is just beyond Waiohuolua, and Pa`akea Bridge is situated at MM 23.01. A short length of CRM wall separates the second and third bridges. Both bridges are reinforced concrete T-beam with solid concrete parapets with panel details and peaked railcaps, although the detailing is only on the makai parapet of Pa`akea Bridge.

Immediately east of the three short bridges are several culverts. The one immediately after the bridges is unusual as it features a CRM wall that has two concrete posts embedded in it. It is likely that the two posts once marked the culvert, and later a CRM wall was built. About .15 mile after this culvert is a more recent culvert that has short concrete walls angled back from the roadway.

Approximately one-half mile beyond Pa`akea Bridge is Kapa`ula Bridge, a two-span structure that appears to rest on a lava dike in the stream. The bridge is of reinforced concrete, T-beam construction with open parapets. The road winds around the mountain from Kapa`ula Bridge and heads into Hanawi Valley, with the barrel arch Hanawi Bridge located at MM 24. Hanawi Bridge is nearly two lanes wide and features an open parapet design with uniquely shaped post caps. A few native hapu`u tree ferns are in the valley above the bridge. The area is quite overgrown so it is hard to view the concrete bridge from the roadway. Only .2 miles beyond Hanawi Bridge are the East Hanawi Bridge and culvert. East Hanawi Bridge is a concrete T-beam structure with solid parapets. Only a few feet east of the bridge is the East Hanawi Culvert, which also features parapets of solid concrete. The geometry of these structures with the road is almost a tangent.

After East Hanawi Culvert, the road is no longer benched into the mountain. The road is still narrow and winding, with sharp curves, and in many places, pavement less than two lanes wide. For the most part, the road is level or subject to relatively easy grades.

The streams along windward Haleakala are closely spaced, especially in the Nahiku area. Hanawi, Makapipi, and Kuhiwa Streams, for example, enter the ocean within a mile of each other. As a result, from MM 25 near Lower Nahiku Road to MM 30.6 west of Hana are nineteen bridges, including culverts # 5, 6, 7, and 8. All but one of these bridges, Mokulehua, features the Hana Belt Road's typical open parapets. All of the bridges are built of reinforced concrete T-beams, except for Kuhiwa, which is a concrete barrel arch. The four noted culverts are of reinforced concrete flat-slab construction.

Just before MM 25, a vista towards the ocean opens up to motorists. Makapipi Bridge, a two-span bridge, is at that point, set amidst lush vegetation. Lower Nahiku Road is

immediately east of the bridge on the makai side of the road. The road curves to the right after the bridge, and concrete delineators are alongside the pavement.

Approximately .2 miles east of MM 25 are large yellow and black reflective arrows that point out a sharp curve in the road. At MM 25.2 is the barrel arch Kuhiwa Bridge, which features open parapets and square post caps. A thick layer of asphalt on the road deck has substantially shortened Kuhiwa Bridge's parapets. This bridge is adjacent to the Kuhiwa State Forest Reserve, where bamboo harvesting is allowed by permit. On the east side of the makai side of the road is a residence.

The Hana Belt Road continues on its narrow, winding path, often less than two lanes wide, as it descends to Kupukoi Bridge, which is located at MM 25.4. The setting is very rural, with a few scattered residences and lush vegetation. Thick asphalt on the road deck has compromised Kupukoi's open parapets. After the bridge, some portions of the road are relatively straight, although the pavement is quite narrow until it enters residential areas in Nahiku.

Near MM 26, the road curves to the left and approaches the one-span Kahalowaka Bridge, whose deck has also been substantially built up with asphalt so that the open baluster parapet is now quite short. After crossing Kahalowaka, many sections of the road are built on cut and fill. Although the roadway is quite narrow and has dropoffs, there are no guardrails along the edge of the pavement.

At MM 26.5 is the single-span Pupape-Manawaikeae Bridge. One-tenth of a mile east of this structure is the three-span Kahawaihapapa Bridge. Less than .2 miles further along the road is Kea`aiki Bridge, a one-span structure. These bridges are concrete T-beam structures with open baluster parapets. The series is located in the rural residential area of Nahiku, which features neatly landscaped tropical yards. Some of the properties are tropical flower farms.

Immediately east of MM 27 are about a dozen concrete post delineators and West Waioni Bridge. Motorists exit West Waioni Bridge on a curve to the left, pass a stand selling coconuts and a residence, then immediately curve to the right and cross over Waioni's twin structure, East Waioni Bridge. The concrete T-beam bridges have open baluster parapets. Motorists continue to travel on a roadbed that is not wide enough for two full lanes. After East Waioni Bridge, the road travels around a tight, U-shaped curve and meanders through a rural residential neighborhood. The seacliffs along the Hana Coast disappear at Nahiku, the vegetation is not so dense, and motorists have beautiful views of the Pacific Ocean in the distance. The land makai of the road gently descends to the ocean and is a pasture-like setting. Mauka of the road on a clear day, motorists have views up to the summit of Haleakala.

Near MM 27.8 is Lanikele Bridge, a concrete T-beam, two-span structure. The bridge has an open baluster parapet. The abutments are CRM, while the wing walls are dry-laid

rock and the piers are reinforced concrete. An S-curve separates this structure from the next, Helele`ike`oha Bridge, located at MM 27.9. The two-span concrete T-beam bridge has CRM abutments and wingwalls. The parapet has open balusters. A tenth of a mile further along the road is Ula`ino Bridge. This two-span concrete T-beam bridge has abutments and wingwalls of CRM with reinforced concrete piers. There are a variety of "help yourself" stands selling flowers, fruit, coconut candy, banana bread, and various other items on the honor system.

At MM 28.3 is the Hana Belt Road's oldest bridge (according to DOT records), Mokulehua Bridge, built in 1908. Mokulehua is the one bridge between Nahiku and Hana that features solid parapets, which were typical of the road's earliest structures. The three span, concrete T-beam bridge has CRM abutments and wingwalls with a reinforced concrete pier. After crossing the bridge, motorists travel through very dense, jungle-like vegetation where vines cover the trees. The roadway is quite narrow and the heavy vegetation emphasizes this narrow feeling.

Just before MM 29 are a handful of more permanent business establishments. These Nahiku roadside stands cater to tourists and sell coffee, refreshments, and crafts. The Hana Belt Road then travels through a mostly residential neighborhood. The Nahiku setting is that of a lush, tropical rainforest. At MM 29.2 is the one-span Oilowai Bridge, which has modern, thrie-beam guardrails. The one-span, concrete T-beam bridge has open baluster parapets and CRM abutments and wing walls. After crossing the bridge, there are some viewsheds to the ocean and several large banyan trees adjacent to the road. Guardrails were installed to separate the traffic lanes from these large trees. At MM 29.5 is Honoma`ele Bridge, where motorists have pleasant ocean views. The two-span, concrete T-beam bridge has CRM abutments and wing walls and a reinforced concrete pier. The parapets are open baluster. The Hana Airport is visible in the distance.

At MM 29.85, MM 30.1, MM 30.2, and MM 30.6 are flat-slab concrete culverts with open parapets. These small structures have curved approaches. All have been overwhelmed by the installation of thrie-beam guardrails at the ends of the culverts' parapets. Thick layers of asphalt have compromised the parapets, which are unique because the balusters are larger than the other open parapet structures along the Hana Belt Road. The coastal plain widens, and motorists begin to approach the Hana area.

After MM 30, the Hana Belt Road continues its twisting path as it heads into the town of Hana. The road width is quite irregular and quite often takes the shape of an hourglass as it narrows and widens along the way. The narrow, winding road into Hana has the appearance of a minor country road as it passes through pasturelands and residential areas.

Nearing the small community of Hana, the road travels on a relatively straight path. At MM 31, the road intersects with Ula`ino Road, which leads to the National Tropical

Garden of the Pacific. East of this intersection, the Hana Belt Road widens and there are a few passing zones. The speed limit is 30 m.p.h., and the wider, straighter lanes seem to encourage motorists to drive faster. At MM 31.3 a "Welcome to Hana" sign greets motorists. Near MM 31.5 is Alalele Road, which leads to the Hana Airport. A road sign notes that it is 57 miles from this intersection to Wailuku. After Alalele Road, both sides of the Hana Belt Road are heavily overgrown. Among the native vegetation in the area are pandanus trees.

At MM 32 is Honokalani Road, which leads makai from the Hana Belt Road to Waianapanapa State Park, with camping, cabins, and a black sand beach. Just after this intersection, the road travels in a horseshoe curve around a residential lot.

Near MM 32.4 is a 'pedestrian crossing' sign. One-tenth of a mile further is a school speed limit sign with a posted speed limit of 20 miles per hour. Motorists then drive past Hana High and Elementary Schools, which are located on the makai side of the road. East of the school, adjacent to the mauka side of the road, is an asphalt sidewalk that continues to central Hana. A short asphalt curb separates the sidewalk from the roadway.

At approximately MM 33 the Hana Belt Road travels through a residential area. At MM 33.4 is Kawaipapa Bridge, which was built in 1947 and lengthened by the construction of box culverts in 1991. The original portion of the bridge was constructed with concrete girders. Its parapets feature concrete piers and rails, with the construction dates inscribed on the parapets' end piers. The residential area continues on the east side of the bridge. Two-tenths of a mile east of Kawaipapa Bridge is the Hana Community Health Center. After the health center is a Y intersection wit Uakea Road. Motorists continuing straight drive on Uakea Road to Hana Bay, while the Hana Belt Road continues to the right. Maui County's Hana Police Station and county government service center are located at this intersection. Hana ranch lands are located on the mauka side of the road after the Y intersection with Uakea Road.

At MM 33.7 is a flat-slab, one-lane culvert (Culvert #9) with solid concrete parapets and 1915 inscribed on the exterior elevation of the makai parapet. After crossing the culvert, motorists pass the Maui County public works baseyard on the makai side of the road, then the Hana Fire Station. The road is built on fill and has two very narrow lanes. Culvert #10 is a twin culvert to Culvert #9. According to DOT records, it is located at MM 33.9, with MM 34 at the east side of the structure. East of Culvert #10 is Pa`animai Park, which has several parking stalls, picnic tables, and playground equipment. Hana's only subdivision is immediately east of the park on the makai side of the road.

After passing the residential subdivision, motorists travel into the commercial heart of Hana. On the makai side of the road is the Hotel Hana Maui, with parking on the mauka side of the road. A short distance beyond the hotel parking lot is a Catholic church and the intersection with Hau`oli Street, which is on the makai side of the Hana Belt Road. On the southeast corner of the intersection stands the historic Wananalua Church, built in

1838 and listed on the National Register of Historic Places. The Hasegawa General Store, located in the old theater building on the makai side of the road, is after the churches. Across the road on the mauka side are the Hana Ranch Store, the Hana Ranch Restaurant, and a small "shopping center" style building housing a real estate office, gift shop, ad the Hana Post Office. Several other buildings located in this area are associated with the Hana Ranch. After the Ranch businesses is Hana's only gas station.

The Hau`oli Street intersection is the dividing line between the state-maintained section of the Hana Belt Road and the section of road under Maui County's jurisdiction. After Hana, which is Maui's easternmost point, the Hana Belt Road continues in a southerly direction. The county's section of the Hana Belt Road retains more historic integrity and character than the state-maintained areas between Central Maui and Hana, because there are fewer modern intrusions, especially w-beam and thrie-beam guardrail attachments on the bridges. Historic lava rock retaining walls with guardwalls above to protect motorists along the narrow thoroughfare line most of the road. The construction of that section of road between Papa`ahawahawa and Puna`alu`a bridges on benches supported by dry laid lava-rock retaining walls on the mountainside remains a construction achievement.

Leaving Hana's commercial area, the Hana Belt Road passes through a tunnel (approximately .2 miles) of Norfolk Island pine and ironwood trees. The Hana Hongwanji Temple, with its Japanese-style architecture, is located on the makai side of the road, as are several vernacular houses. Heading south from Hana, the speed limit is 35 m.p.h. On both sides of the road is Hana Ranch Company grazing land. Several large-lot private residences are occasionally interspersed between the pastures. Numerous newer residences are on the hills south of Hana.

Mo`omonui Culvert is located just north of MM 51. A flat-slab structure, the culvert features solid concrete walls and the construction date, 1911, inscribed on the exterior elevation of the makai parapet. Pasturelands flank the road. The Hana Ranch Company gate is on the mauka side of the road, with buildings located on the hills above.

South of Hana, the road runs on a straight path along the plain away from the coast. Motorists enjoy pleasant views of Haleakala and the ocean. Haneo`o Beach Road is located near MM 50.3, .7 miles south of Mo`omonui Culvert. The Hana Belt Road curves inland after this intersection and passes over Kaholopo`o (Haneo`o) Bridge at MM 49.8, which is situated on a curve. The reinforced concrete flat slab bridge features lava rock abutments and retaining walls, with w-beam guardrails for parapets. Near MM 49.1 is Hamoa Road.

After MM 49 the Hana Belt Road crosses over Kahawaiokapia (Kapi`a) Bridge (see also HAER No. HI-72), which is located on a slight curve at MM 48.6. Both sides of the stream are heavily overgrown. Old abutments are on the mauka side of the bridge. Kahawaiokapia Bridge is a reinforced concrete T-beam bridge with solid concrete parapets. Leaving the bridge, motorists pass a residential area on the mauka side of the

road, with pastures on the makai side. The Hana Belt Road in this area runs in a straight path until crossing the next one-lane structure, Waiohonu Bridge, at MM 48, which is on a straight alignment with the road. Waiohonu is the road's only five-span structure. It features open parapets, CRM and concrete piers, and fine lava rock abutments and wingwalls. Just south of Waiohonu Bridge, the Hana Belt Road no longer has pavement markings. Without the usual double yellow line down the center of the road, the road has more of a historic appearance that is not much different from its early days as a dirt or macadam strip through the countryside.

Continuing its route through rural residential areas, the Hana Belt Road makes a horseshoe curve around a large hill near MM 47.8. A local road connects the ends of the horseshoe to the Hana Belt Road, providing access to residences and a Catholic church and cemetery. After this curve and hill, the road narrows as it travels along the top of a steep bluff. Along both sides of the road are residential neighborhoods, although on the makai side of the road the land is sometimes too steep to accommodate buildings. The well-manicured landscape is tropical in its appearance, with coconut palms, banana, ti plants, plumeria, and various flowering plants. In most places, traditional lava rock walls separate the residential lots from the roadway, which runs in a fairly straight line through many of these neighborhoods.

Near MM 47.5 the road is built on fill with lava-rock retaining walls. The setting continues to be residential as the road follows the path along the sea cliffs.

At MM 46.4 is Papa`ahawahawa Bridge, which is actually two structures. The earlier bridge was built with reinforced concrete flat-slab construction in 1913; in 1915 a girder bridge lengthened the original structure. The bridge has solid concrete walls, and 1913 is inscribed backwards on the exterior face of the makai (south) parapet. On the makai side of the bridge is the telephone company switching station. After the bridge, the road proceeds along a slight curve. The Hana Belt Road next passes over a cut through hard rock, some of which protrudes over the road, about .2 miles beyond Papa`ahawahawa. Just after this, the road rises and levels out to travel along a bench on the side of the mountain.

After passing MM 46, the road enters a V-shaped valley and travels on a tight curve over Ala`ala`ula Bridge, a single-span, reinforced concrete T-beam structure located at MM 45.79. The exterior face of the makai parapet is inscribed 1915. Exiting the valley, motorists continue their journey through a residential area.

Less than half a mile south of Ala`ala`ula, the road makes a slight jog before crossing Waikakoi Bridge at MM 45.42. This two-span reinforced concrete T-beam structure features a solid concrete wall and is seated on a high, arched pier. After the bridge, the road narrows as it travels along a bench following the contours of the mountain. After Waikakoi, there are only a few residences, and the setting becomes more remote and rugged as it travels on its bench high above the sea.

Approximately .2 miles after Waikakoi, the Hana Belt Road takes a sharp curve to the right and begins to descend around the mountain. The roadbed is only one-lane wide in many places as it descends and travels on an almost straight alignment over Pa`ihi Bridge. This reinforced concrete T-beam structure features solid concrete parapets nearly 2' thick (similar to Kopili`ula Bridge). The north end of the mauka parapet is inscribed 1911. A relatively recent CRM wall covers the "AD" inscribed on the north end of the makai parapet. After crossing the bridge, the road turns left and travels along a bench located high above the sea.

At MM 44.75 the road travels over the 1947 Wailua Bridge, built of reinforced concrete girders and featuring a pier and beam concrete parapet. Kalo lo`i are located on the makai side south of the bridge. Many ulu (breadfruit) trees are also in the area. Curving inland (to the right) the road heads into the other side of Wailua Valley and crosses the South Wailua (Honolewa) Bridge at MM 44.6. The bridge is a favorite stopping place for tourists, who enjoy the high waterfalls. The structure is a reinforced concrete T-beam bridge with solid concrete parapets. Inscribed on the exterior face of the makai parapet is "AD 1911." Its two spans rest on a tall, arched concrete pier. On the south side of the bridge is a parking area shaded by a dense grove of trees. Local craftsmen often sit on the lava rock walls adjacent to the bridge selling hand-woven coconut frond hats or jewelry.

Driving south from the bridge, motorists pass through an arbor of dense trees that allows little sunlight to penetrate. The roadway bench is quite narrow, with ferns and other vegetation covering the walls above the bench in some areas while the walls are bare in others. This extremely narrow section of roadway features a thin lava rock guardwall along the edge of the pavement.

Near MM 44.5 the Hana Belt Road bears around the mountain in a tight, horseshoe shaped curve. The road moves away from the edge of the cliff and travels through an area of dense vegetation. The only view is straight ahead as the road continues to wind its way around the mountain. Approximately .2 miles further, the road is protected by w-beam guardrails, although many sections of the road edge have dry-laid lava rock guardwalls. Dry-laid rock retaining walls usually extend beneath the guardwalls; most of these are not visible as they are covered by vegetation.

Near MM 44 are fine views of the ocean and gulch south of Wailua. Much of the area appears to be overgrown with a type of sugarcane grass, perhaps leftover from the days of the Kipahulu Sugar Plantation in the early 1900s. The road then veers inland to the right, and travels on a narrow path through tall grass and trees. Some of the rock walls in the area have been hit and reduced to piles of rubble. At MM 43.86 is Pu`uhaoa Bridge, a reinforced concrete T-beam structure. The parapets are unique, featuring diamond-patterned openings. The abutments are reinforced concrete while the dry-laid lava rock wingwalls are battered.

At MM 43.6 is the first of two masonry arch bridges. Waiele (Paehala) Bridge is built on a curve, and there are a few adjacent residences. The single-span bridge has solid concrete walls and a masonry arch of cut basalt. Solid concrete parapets line both sides, and AD 1910 has been inscribed on the exterior face of the makai parapet. After the bridge, the road continues its meandering path around the mountainside, with heavy vegetation dominating the setting. Some concrete post delineators are located approximately two-tenths of a mile beyond the bridge. Immediately after, the road passes over Mahalawe (Kakiweka) Bridge, at MM 43.29. Kakiweka Bridge is a reinforced concrete, flat-slab structure with solid concrete parapets and dry-laid rock wingwalls that display fine workmanship.

About .1 mile beyond Kakiweka, the Hana Belt Road travels along a bench cut into rock as it descends and heads into Hahalawe Valley. Dry-laid rock walls line the edge of the road. Located at MM 43, Hahalawe Bridge is the historic road's second masonry arch bridge. It features solid concrete parapets, with 1910 inscribed on the exterior face of the makai wall. A concrete mile marker, number 64, stands adjacent to the bridge on the south side of the makai parapet. The beautiful landscape features ferns, palm trees, and pandanus.

South of Hahalawe Valley, the road is often no more than a lane and a half wide as it travels along the bench. In many places, traffic must pull over at the numerous informal pullouts to allow oncoming traffic to pass. Dry-laid rockwalls are located along most of the road, which further adds to the narrow effect of the pavement.

At MM 42.9 is the 1910 Maluhiana`iwi Culvert, a reinforced concrete flat slab structure. Thick asphalt on the road deck has reduced the parapet height to 6" and on the north end of the mauka parapet, it is as high as the railcap.

Continuing along the bench on the mountain, the Hana Belt Road curves to the left before passing over Pua`alu`u Bridge, located at MM 42.5. This two-span reinforced concrete flat slab structure straddles a waterfall and is quite picturesque. The bridge has solid concrete parapets, with 1910 inscribed on the exterior face of the makai parapet. After the bridge, the road curves to the right and travels through a more open setting, with views to the ocean in several locations. The rock walls along the edge of the road are often covered in vegetation so that they appear to be berms rather than rock walls.

Two-tenths of a mile beyond Pua`alu`u Bridge, the road travels through a wooded area, then enters the Kipahulu District of Haleakala National Park. After a slight jog in the road, motorists pass over Oheo Bridge at MM 42.1. The barrel arch bridge is unique on the Hana Highway. Its open parapets feature diamond-patterned voids and solid walls that angle back from the parapets' ends, and 1916 and "20 tons" are inscribed on the inside faces of the end walls. Makai of the bridge are abutments from the previous wood structure that stood at this location.

After crossing Oheo Bridge, the road curves to the right, then the left as it travels .1 mile to the Haleakala National Park parking area and visitor facilities. At the sharp curve just north of the parking lot, motorists are asked to "blow horn" to warn oncoming traffic of their approach. Park facilities include a campground, visitor center, restrooms, and hiking trails. Many travelers spend time swimming in the pools at Oheo Gulch, which have lovely views of the ocean below and the Oheo Bridge and Haleakala above. More energetic travelers may choose to hike the 4 miles to Waimoku Falls. For most tourists, the national park is the end of their day's journey along the Hana Belt Road. After relaxing in the Kipahulu section of Haleakala National Park, most travelers return to Central Maui by the Hana Belt Road. A small number of motorists choose to complete a loop trip by driving the remaining 6 miles of the Hana Belt Road to Kalepa Gulch, where the road becomes the Pi`ilani Highway, an unimproved road through the dry leeward side of Haleakala that allows motorists to complete their circular journey around East Maui.

Heading south from the visitor parking lot at the national park, motorists travel in a straight path that goes over a short, steep hill with limited sight distance. After the hill on the makai side of the road is the park service maintenance facility. The narrow, two-lane road here is merely a strip of asphalt through the countryside. The road rises and falls with the contours of the land and proceeds in an almost-straight path through private lands bordered by rock walls. In most areas, the vegetation is quite overgrown and there are only views of the road straight ahead. The area is now rural residential and there is occasionally a refreshment stand.

Near MM 41 is the small St. Paul Catholic Church on the mauka side of the road. About .1 mile further is a road that leads makai from the Hana Belt Road to Palapala Ho`omau Church on the cliffs above the ocean. This side trip is popular with tourists since it is where aviator Charles Lindbergh is buried. On the mauka side of the Hana Belt Road from this small side road is the ruins and smokestack of the Kipahulu Sugar Mill.

At MM 40.7 is Kalena Culvert, a flat-slab structure with solid concrete walls. The open-air Kipahulu Community Center is located on the mauka side of the road south of the culvert.

At MM 40.6 is the final bridge within the Hana Belt Road Historic District. Koukou`ai Bridge (see also HAER No. HI-70) is an open-spandrel, concrete arch structure with three arch ribs and solid concrete parapets. Inscribed on the exterior face of the makai parapet is the date 1911. Residential lots are adjacent to Koukou`ai. A stand selling organic refreshments is on the mauka side north of the bridge.

After Koukou`ai, the Hana Belt Road continues on its narrow path through the trees. The road is simply a ribbon of pavement passing through rural scenery. The road descends as it approaches MM 39.5, where it crosses Kukui`ula Bridge. This simple girder bridge sits on CRM abutments. Its parapets are w-beam guardrails between piers on both ends

of the structure. On the inside face of two diagonally opposite piers 1969 has been inscribed.

After crossing Kukui`ila Bridge, the road curves to the right, and motorists have a dramatic view of the coastline, with the road bench clinging to the cliff above the sea as it descends to sea level. The road here is of tremendous scenic value as motorists see the extreme contrast between the windward area of Maui they have been traveling and the dry leeward area they are now approaching.

After reaching sea level, the road curves to the left and crosses Ka`apahu Bridge at MM 39.1. Built in 1983, this bridge is built on concrete abutments with prestressed reinforced concrete I-beams with cross struts. The solid concrete parapets have iron railings and are inscribed with Kaapahu Bridge 1983.

After crossing the bridge, the roadway travels in a straight path along the rocky beach for a short distance before climbing a narrow bench up and around the next mountain. These sections of road hang on the mountain and are not for 'weak-at-heart' motorists, because beneath the road is a sheer drop to the ocean. Lava rock retaining walls support the bench, and there are few guardrails. Once around the mountain, there is also a short section of road that travels along the base of the mountain just yards above the ocean, with W-beam guardrails protecting this section. The motorist experience of rugged oceanside path is unforgettable.

At MM 38.7 is Alelele Bridge, an I-beam bridge, also built in 1983 in a design similar to Ka`apahu Bridge. A sign at this bridge notes the end of the Hana Belt Road and the beginning of the Pi`ilani Highway.

## EARLY TRAVEL ALONG THE HANA COAST

The Hana Belt Road traverses through some of Hawaii's most rugged terrain and rainiest climate. East Maui, where the Hana Belt Road is located, is comprised of the immense dormant volcano, Haleakala, which rises to over 10,000' above sea level. Ancient lava flows pouring into the ocean created the jagged coast along which the Hana Belt Road is aligned. The wet, tradewind climate produced centuries of stream erosion that helped cut a rugged terrain of great sea cliffs and v-shaped valleys. The wet climate encouraged the growth of dense forests throughout this rugged region, making the Hana Coast one of Hawaii's most isolated and inaccessible areas.

Early Hawaiians had no means of overland travel except by foot. Most Hawaiians prior to Western contact (1775) lived along the coast and infrequently traveled into the island interiors. Travel by canoe, whether to nearby coastal communities or to the other side of

the island, was more convenient.[4] Overland travel between Hana and the rest of Maui was especially difficult. Consequently Hana was politically tied to the more accessible communities on the island of Hawaii across the Alenuihaha Channel. Maui's geographic situation resulted in the island being divided into two separate kingdoms in ancient times, one with a court at Lahaina, and the other with a court in Hana.

In the sixteenth century, Maui's King Pi`ilani conquered East Maui and drew Hana into his political sphere. Pi`ilani was notable for his public works projects, particularly the Alaloa, the "long road," which began in West Maui.[5] The road had no bridges, and beaches were often used to cross gulches. Hawaiian travelers reportedly swung themselves over East Maui's rushing streams with ropes made of vines. Rather than travel over rough footpaths, they probably swam around points that jutted out into the ocean.[6]

The Hana Belt Road's predecessor trail, the King's Highway, was an extension of Pi`ilani's Alaloa. Pi`ilani's son, Kihapi`ilani, extended the Alaloa into the Hana District during the sixteenth century. When completed, the road was 4' to 6' wide, 138 miles long, and paved with hand-fitted basalt (lava) rocks. Moses Manu's 1848 account noted, "This road was treacherous and difficult for the stranger, but when it was paved by Kihapi`ilani this road became a fine thing." The King's Highway encircled the entire island of Maui. With the completion of Kihapi`ilani's trail, Maui became the only island in the Hawaiian chain to have a "belt" road system that completely encircled it.[7] In 1828, missionaries noted that more than 30 miles of "paved" trail still existed and were useful for overland travel. Missionaries, like the early Hawaiians, often used canoes, but where necessary, had to travel by foot. The missionaries reported that the king's trail was a great help in ascending and descending the steep mountains and cliffs along the Hana Coast. The King's Highway switchbacks over the steep mountains near Honomanu were still visible in the 1940s.[8] Intact portions of the King's Highway remained in 2005, although most of this highway has been obliterated by agriculture or paved over by modern roadways, including the Hana Belt Road.

Horses were introduced to the islands in 1803 and imported in great numbers during the 1820s and 1830s.[9] By the late 1800s, perhaps as early as the 1870s, a government "road" was in use near Keanae. This "road" was perched along a narrow ledge on the cliffs high

---

[4] Ralph S. Kuykendall, *Hawaiian Kingdom: Twenty Critical Years, 1854-1874*, Vol. 3 (Honolulu: University of Hawaii Press, 1995), 23; E.S. Craighill Handy and Elizabeth G. Handy, *Native Planters in Old Hawaii, Their Life, Lore and Environment* (Honolulu: Bishop Museum Press, 1972), 491.

[5] Gail Bartholomew, *Maui Remembers: A Local History* (Honolulu: Mutual Publishing, 1994), 2.

[6] Handy and Handy, 489. The Handys' account cites Martha Foss Fleming, who wrote about Maui's Alaloa, but cited no primary sources.

[7] Bartholomew, *Maui Remembers*, 2; Trust for Public Land and Bay Pacific Consulting, "East Maui Resource Inventory," Prepared for the Rivers, Trails and Conservation Assistance Program, National Park Service, U.S. Department of the Interior (Honolulu: 1998), 9.

[8] E.E. Pleasant, "Maui 100 Years Ago: The Old Trail to Hana," *The Maui News*, June 13, 1942.

[9] Kuykendall, *Hawaiian Kingdom*.

above the settlement and was only useful as a horsetrail. A good carriage road had yet to be built.[10]

During the 1870s, 15 miles of unpaved road was built from central Maui into East Maui's rain forest to facilitate the construction of the Hamakua Ditch, which was completed in 1878. The ditch was an engineering marvel built to ensure the economic success of the sugar industry by transporting water from rainy East Maui to central Maui's arid plantations.[11] The continuing prosperity of the sugar industry, coupled with the later development of the pineapple industry, would require a good road in East Maui, thus ensuring the eventual development of a modern road along the Hana Coast.

After the completion of the Hamakua Ditch, the trail adjacent to the waterway, which had facilitated its construction and maintenance, became useful as a horse trail for residents traveling along the coast. What came to be called the "Ditch Trail" was also popular with tourists. While Haleakala Crater was a "must see" for most tourists visiting Hawaii, by the end of the nineteenth century, a typical journey also included the beautiful Hana Coast as seen along the "Ditch Trail." Guided tours on horseback traveled to the summit of Haleakala, through the volcano's massive crater, and down via Kaupo Gap to the small community of Kaupo near sea level. From Kaupo, travelers continued on a rough trail to Kipahulu, on to Hana and Nahiku, and then followed the Ditch Trail through the rain forest back to Kailua. While traveler George Bowser commented that East Maui was a "perfect paradise" and "just the country to delight the tourist," the one exception to his pleasure was the roads. Bowser observed that a good strong mule would go a long way in dealing with the poor road conditions. He cautioned that tourists needed to become accustomed to the road and be prepared for "floundering and creeping along at anything but a lively pace."[12]

## EARLY ROAD AND BRIDGE CONSTRUCTION IN THE HANA DISTRICT

The Department of Public Works, headed by the Superintendent of Public Works (SPW), was responsible for internal improvements for the Territory of Hawaii.[13] In 1899 the SPW authorized an expenditure of $594 to improve Hana's "government road." J. R. Higby was contracted to build two new sections of horse trail between Hanawi and Keanae. A 14,700' section was built at the Keanae end, and 13,200' of road was constructed on the Hanawi end. These new sections of horse trail left a gap in the road that measured 19,460' (3.68 miles). To mitigate this, the SPW ordered a temporary trail cut from the end of the Hanawi section to another old road. Despite the gap and temporary trail, the SPW considered this work to be an improvement over the old

---

[10] Photograph of "Government Road Near Keanae," ca. 1880, in Bartholomew, *Maui Remembers*.

[11] Spencer Mason Architects, *State of Hawaii Historic Bridge Inventory and Evaluation*, Draft, (Honolulu: State of Hawaii, Department of Transportation, Highways Division, 1996), IV-12.

[12] George Bowser, "Touring the Valley Isle Nearly Fifty Years Ago," *The Maui News*, December 4, 1926, 7.

[13] In 1898, Hawaii was annexed as a territory of the United States. Statehood was granted in 1959.

thoroughfare. In addition to the trail improvements, $2,021 was appropriated for bridge materials in the project area.[14]

In 1900, the Department of Public Works built bridges costing $380 at Ula`ino and Kawaiokapia. Considerable road repairs were also completed, which cost the territory $13,759. In July 1902, P.E. Lamar & Company completed a new Kailua Bridge for $993.[15] The SPW explained that the work required in the Hana District was quite extensive due to heavy rainstorms and freshets. At times, flooding during the winter rainy season made it impossible to travel on the Hana road. In 1902, mail carriers were unable to complete their rounds, so the SPW ordered footbridges built over deep gulches.[16] Travelers were stuck with difficult overland travel on horseback or by steamers, which used what one resident called the "most impracticable landings."[17]

The pace of transportation improvements along the Hana Coast seemed to accelerate after the County Act went into effect in July 1905. The County Act established county governments throughout Hawaii and transferred the responsibility for road construction and maintenance from the SPW to the County Board of Supervisors. The SPW retained the authority to approve all new projects. To fund public works projects, loans were authorized.[18] The Maui County Board of Supervisors demonstrated its serious intentions for capital improvement projects when it voted to appoint a county engineer to oversee such projects.[19] The first Maui County Engineer, Hugh Howell, prepared a series of reports that illustrated how professional expertise was applied in directing the new county's transportation projects.

Howell's communications to the Maui County Board of Supervisors indicated that early wood structures along the Hana Coast were built using truss systems. Howell's program from 1906 to circa 1909 was to replace these failing structures with bridges built on concrete or rock piers, which eliminated the need for high-maintenance trusses. In constructing wood bridges with concrete foundations, Howell was following the advice of SPW C. S. Holloway, who strongly recommended that concrete or wood bridges, rather than steel, be built wherever possible. Holloway further emphasized that particular attention should be paid to the structures' foundations and piers, so that the structures would be of a more permanent nature.[20] Howell's reports on Hana's bridge projects demonstrated his efforts to follow Holloway's instructions, as well as his desire to build practical, more permanent public improvements.

---

[14] *Annual Report of the Superintendent of Public Works*, 1900, 227, available at the Archives of Hawaii. The annual reports will hereafter be cited SPW Report.
[15] SPW Report, 1900, 45; 1902, 39, 47.
[16] SPW Report, 1902, 33, 55.
[17] "Raymond Adds Ginger to Loan Fund Meeting," *The Maui News*, May 23, 1914.
[18] SPW Report, 1906, 4-5; SPW Report, 1904, 40.
[19] "Board of Supervisors Hold Meeting," *The Maui News*, January 6, 1906, 1.
[20] SPW Report, 1904, 4-5.

Within a few months of being appointed county engineer, Howell had determined a new course of action for bridges in the Hana District. The first project he reported on was the bridge at Oheo Gulch, which had been replaced with a 70' span built on new piers that required more than 100 cubic yards of concrete. Waiohonu Bridge (see also HAER No. HI-71), which had two spans of 40' and 60', was also rebuilt with a new superstructure that did not use trusses. The rebuilt superstructure spanned over three new concrete piers and existing piers.[21]

Over the course of the next few years, Howell's reports to the Board of Supervisors related how numerous new bridges were required on the Hana road, while also explaining the difficulties of bridge and road maintenance in East Maui. He demonstrated that the county engineer's office had a professional staff that was creative, willing, and able to take on the challenges presented by East Maui's harsh elements.

Howell's reports explained that repairing and replacing bridges was the most important and expensive work in the Hana District. Many of the bridges had deteriorated from rot and had trusses that were considered dangerous. Trusses were essential on longer spans, but according to Howell, these structures required a great deal of maintenance. Rather than continue to repair or replace failing truss members, Howell decided to replace the bridges with superstructures of a simpler design that were be built on concrete or rock piers. Kahawaipapa Bridge was replaced with a new structure built on two concrete piers at a cost of about $800. Howell noted that it was an economical reconstruction, as it reduced the necessary maintenance from $50 to $5 per year. The reduced maintenance costs were a result of Howell's decision to coat all new timber with a mixture of equal parts crude oil and carbolineum. Pieces less than 30' in length were soaked for an hour, which allowed the solution to penetrate the lumber as deep as 1/2 inch. Howell believed that this inexpensive treatment was the best wood preservative available, with the exception of the much more expensive creosote. He planned to use these techniques on all new bridge work in the Hana District.[22] Similar replacement projects were conducted at Na`ili`ilihaele, Kea`aiki, Oiliwai, Manawaikeae, and Kuhiwa. Much to Howell's dismay, Kailua Bridge, which had been built by the territory in 1902, was already decayed beyond repair in 1906. Although the structure was a wagon bridge, Howell decided to replace it with a 8' to 10'-wide horse bridge since there would be no use for a wagon bridge in the near future. Other work done in conjunction with replacement bridges included road realignment. In several projects, the road and bridge approaches were realigned to eliminate grades of up to 20 percent.[23]

**DEMANDS FOR A BELT ROAD TO HANA**

The belt road system was a significant achievement in Maui's transportation history. Maui's road-building program was concurrent with the strategy of all the major Hawaiian Islands to develop belt road systems. By 1900, Mauians were considering the need for a

---

21 "Much Business of Interest Done by Board of Supervisors," *The Maui News*, March 10, 1906, 2.
22 "Supervisors Authorize Improvements," *The Maui News*, April 7, 1906, 1.
23 "Supervisors Authorize," 1; "Report of County Engineer," *The Maui News*, September 1, 1906, 3.

Hana section of the belt road and were calling for a good wagon road to connect central Maui and Hana. Three reasons were presented in Maui's requests for funding to construct the Hana Belt Road. In the early years, a road along the Hana Coast was believed necessary to open up land for development, which would be economically advantageous to the entire island. Later demands for the road argued that a thoroughfare through the tropical wilderness would help develop Maui by drawing tourists to the island. Finally, the road would end Hana's centuries of isolation and connect the community to the rest of Maui.

Although the calls for an improved belt road along the Hana Coast probably dated to the mid 1890s, the first written evidence of such demands were probably *Maui News* editorials in 1900. A writer opined that there was a serious need for a good wagon road not just to Hana, but through to Kipahulu. He argued that a decent wagon road would increase property values in East Maui by making it possible for hundreds of small farms to be established and grow marketable crops. Another editorial that year called for a 16'-wide road and suggested that revenues from government leases of the East Maui watershed could be used to pay for the project. The writer believed that the ditch trail could easily be converted into a government belt road "without the outlay of one cent of money."[24] Newspaper editorials continued to emphasize the importance of a road to Hana. "What the Central Pacific was to California, and what the Panama Canal would be to the Islands," *The Maui News* emphasized in 1903, was "relatively what a good road all the way from Paia to Hana would mean to Maui." Another editorial claimed that good wagon roads were as essential to the island as arteries were to the human body. A road to Hana, it seemed, was absolutely necessary for the economic development of East Maui and its success in sugar, minor industries, and small-scale farming.[25]

## PIECEMEAL CONSTRUCTION OF A ROAD TO HANA

Perhaps as a result of Maui's lobbying efforts, the territory appropriated $50,000 for belt road construction between Nahiku and Keanae in 1903. Several months later, the appropriation was reduced by $10,000, which *The Maui News* deemed unfortunate but probably necessary. An editorial emphasized that this was the most "badly needed" road in Hawaii because steamer service was uncertain, and Maui was missing out on the benefits associated with development in East Maui, including increased population, tax revenues, and production.[26] The extension of the belt road between Keanae and Nahiku was nearly completed in 1905. Road construction in East Maui was neither an easy proposition, nor an inexpensive one. The Superintendent of Public Works explained that the road in East Maui traversed through very rough country so it had been built "as

---

[24] Editorial, *The Maui News*, June 28, 1902, 2; Editorial, *The Maui News,* November 15, 1902, 2.
[25] Editorial, *The Maui News*, March 7, 1903; Editorial, *The Maui News*, April 25, 1903.
[26] "What Maui Gets," *The Maui News*, May 23, 1903, 3; Editorial, *The Maui News*, July 4, 1903, 2.

narrow as possible in order to construct, with the money available, the maximum length of road." The project cost $39,838.[27]

In late 1909, the chairman of the Maui Board of Supervisors, William Pogue, tried to jump-start the completion of Maui's belt road with a letter to the editor that was published on the front page of *The Maui News*. Pogue pointed out that Maui's belt road was barely halfway around the island and that Maui was ten years behind the other Hawaiian Islands in finishing its belt road system. Pogue urged Mauians to unite, as they had done on other public works projects, in lobbying the legislature and board of supervisors to support completion of the belt road. He argued that parceling out money each year for certain sections of road was not getting the belt road built. Pogue believed if the Maui Board of Supervisors continued its present policy of piecemeal funding, it would take up to fifteen years to complete the road, that is *if* they continued to fund it, which was not guaranteed. Pogue thought it would be wiser for Maui to ask the legislature and the governor to issue territorial bonds for belt road construction. He estimated that the belt road could then be finished within four years. Another benefit to securing this financing was that the belt road would not be subject to future changes of policy by the County Board of Supervisors.[28]

Although Pogue hoped to convince his fellow citizens, the board of supervisors, and the territorial legislature to complete the belt road within four years, his letter did not achieve the desired results. While Maui's plans to complete its belt road did not move forward as quickly as Pogue hoped, progress was being made. From 1908 to 1913, twenty concrete bridges were built on the East Maui government trail in anticipation of road improvements. It is unclear what prompted Maui's leaders to order the construction of a concrete rather than wood bridge over Mokulehua Stream in 1908. What is certain, however, is that by 1911, the Territorial Legislature had authorized a loan fund commission for each county. These loan fund commissions decided which public works projects should go forward for each county. They approved projects, which could then be paid for with bonds authorized by the territorial legislature and approved by the governor.[29] The creation of the Maui Loan Fund Commission and the availability of funding most likely prompted the construction program for concrete bridges along the Hana Coast.

By July 1911 the Maui Loan Fund Commission (MLFC) was in operation, with Hugh Howell as its secretary and engineer. With the governor's approval of bonds, the MLFC was ready to move ahead with permanent capital improvements, not bridges built of wood. In July 1911, the MLFC published a notice to accept sealed tenders for the construction of nine reinforced concrete bridges in the Hana District. The 1911 bridges were Waikamoi, Kolea, Honomanu, Nua`ailua, Mo`omonui, Waikakoi, Pa`ihi, South

---

27 SPW Report, 1904, 6-7, 40.
28 "Advocates Belt Road," *The Maui News*, November 6, 1909, 1.
29 Spencer Mason Architects, IV-12.

Wailua (Honolewa), and Koukou`ai.[30] W. R. Patterson of Wailuku was the lowest bidder for each of the bridges.[31]

In addition to the bridge projects, road improvements continued. The unfinished stretch of belt road between Nahiku and Keanae, which had been lengthened by a territorial contract in 1903, was funded for additional work in 1912. All three of the contractors interested in the project bid higher than the $77,000 authorized by Governor Pinkham. John H. Wilson of Honolulu submitted the lowest bid at $84,000. Wilson was well known in Hawaii as the builder of the serpentine Pali Road through the Ko`olau Mountains on Oahu. Hugh Howell, who was then working on his own, bid more than $117,000 for the project. The Lord-Young Engineering Company presented a bid for $90,000. On the same day that the contract bids were announced, *The Maui News* printed "special correspondence" from Hana detailing its residents' complaints about the steamer service, which seemed to inconvenience everyone who relied on it. The writer noted that that the work on the belt road could not come soon enough.[32] Less than a month later, another communication from Hana repeated complaints about the unreliable steamer service, which seemed to show up whenever it pleased rather than on its published schedule.[33]

While Wilson was working on his Keanae-Nahiku extension, the MLFC authorized additional bridges for construction. In 1912, concrete bridges were built at Puohokamoa and Haipua`ena. Howell had been appointed county engineer for the second time in 1912. He designed Haipua`ena Bridge and likely also designed Puohokamoa Bridge, which was nearly identical. In 1913, concrete structures were built at Papahawahawa, and in 1914 at Olowai and Ula`ino.[34]

Wilson's work on the Keanae-Nahiku project was not yet completed when Mauians again received disappointing news about the belt road's chances for completion. In 1914, several months before Wilson was scheduled to finish his project, which had been plagued by wet weather, Governor Pinkham visited Maui. Pinkham refused to indicate whether he would approve necessary funding for the final stretch of road that would bridge the gap and take the thoroughfare into the Keanae Valley. The MLFC had already decided that $135,000 should be spent to extend Wilson's road a few more miles into Keanae. Even as the Board of Supervisors assured Pinkham that this was the most

---

[30] Maui Loan Fund Commission, Request for Sealed Tenders, *The Maui News*, July 15, 1911, 3. Bridge dates, unless otherwise noted, are from bridge inspection reports on file at the Hawaii Department of Transportation and the Maui County Department of Public Works and Environmental Management.

[31] "Disgruntled Contractors," *The Maui News*, August 12, 1911, 1.

[32] "Belt Road Bids Opened," *The Maui News*, October 5, 1912, 1; "Hana Is Mad Re Claudine," *The Maui News*, October 5, 1912, 5.

[33] "Hana Is Mad Right Along," *The Maui News*, November 9, 1912, 1.

[34] Haipua`ena Bridge drawing at the Hawaii Department of Transportation. Dates noted from bridge inspection reports.

important project in Maui's proposed bond issue, he would not commit to the project.[35] After several months of attempting to convince the governor that the new section of road between Keanae and Nahiku would be useless without the additional funding needed to carry the road into Keanae, Pinkham announced that he would not approve the project. He reportedly expressed "ardent disapproval" for a road between Keanae and Hana. Although the newspaper hinted that the governor was treating Maui harshly, he had pledged to cut the cost of government in general and was probably not targeting Maui projects.[36]

The Wilson and McCandless firm completed several miles of road in November 1914. The work was a "fine piece of road" that cost about $85,000, but benefited no one since it ended miles from any habitation at the bottom of a gulch in the Ko`olau Forest Reserve. *The Maui News* noted that the roadway ran through some of Hawaii's most spectacular scenery as it traversed along the mountainside a few thousand feet above sea level and close below the ditch trail. The section of "useless" road included a fine bridge at the West Kopili`ula gulch. Once again, *The Maui News* reminded readers that the legislature had authorized an additional $135,000 to finish the road into Keanae, but the governor had failed to approve the expenditure. Wilson's firm most likely built Kopili`ula Bridge.[37]

The MLFC continued to build bridges in the Hana District, with at least five bridges constructed in 1915 and three in 1916.[38] One of the 1915 bridge projects was Waiohonu, which likely used the existing concrete piers built in 1906 and the rock pier that predated the concrete piers. In August 1916, E. C. Mellor, a new contractor, was awarded the contract to replace the 1906 wood bridge at Oheo Gulch with a new concrete arch bridge. Mellor's low bid proposed to built the barrel-arch structure in seventy-five days for $6,000. The Hugh Howell Engineering Company bid to build the bridge in seventy days at a cost of $6580; J. C. Foss, Jr., (Mellor's former associate) bid ninety days for $7673; and Harry Sands proposed to build the structure in eighty-five days for $7887.[39]

---

[35] "Raymond Adds," 1; "Belt Road Or Nothing Says Board," *The Maui News*, June 20, 1914, 1; "Let's Have the Belt Road Money," *The Maui News*, June 20, 1914, 2.

[36] "No Keanae Highway Says Governor," *The Maui News*, July 18, 1914, 6.

[37] "Road Pau on Nahiku Part Belt Road," *The Maui News*, November 14, 1914, 8; "Fine Bridge On Useless Road," *The Maui News*, July 25, 1914, 6. It is not clear which bridge *The Maui News* referred to as being built in the "West" Kopili`ula Gulch. The bridge inspection report stated that Kopili`ula Bridge was built in 1926, and none of the bridges in the vicinity were built in 1914 or were 70' in length. It is possible that the date for Kopili`ula Bridge from the bridge inspection report is incorrect, especially considering that the bridge's design is very similar to Pa`ihi Bridge, which was built in 1911. It seems unusual that Kopili`ula's similar, bulky design would have been built in 1926, when most of the bridges of that era featured open parapets. From the newspaper's statement that the bridge was about 70', and the fact that the design similar to Pa`ihi, which was definitely built in 1911, it is likely that Kopili`ula Bridge was the structure built by Wilson in 1914.

[38] According to DOT records, these bridges were: Ala`ala`ula, Kahawaiokapia, Waiohonu, and two culverts in Hana, #9 and #10. In 1916, Palauhulu, Pi`ina`au, and Oheo Bridge were erected.

[39] "New Contractor Lands Oheo Bridge Contract," *The Maui News*, August 25, 1916, 6.

It seemed that Pogue's prediction that the belt road would take years to complete without a substantial government commitment and appropriation was coming true. In 1920, Mauians learned that no money would be appropriated for the belt road for another two years. By that time, the focus of belt road work had shifted to the need for macadamizing the section that ran through the pineapple district west of Kailua towards Central Maui. Being prime pineapple country, the industry had complained for decades that muddy roads during the wet season had periodically shut down pineapple harvesting. Governor McCarthy vetoed funding for the macadamizing project, noting that Mauians had not demonstrated to him that the work was important.[40]

While the focus seemed to have shifted to the section of belt road nearer Central Maui, legislator John Fassoth had not lost his focus on the need to complete the belt road. Fassoth, apparently a Hana resident, had written several letters to *The Maui News* to express his wish that the belt road be finished, even if it had to be built around the other side of Haleakala (not via Keanae). In early 1921, he reminded readers that Maui was the only island without a complete belt road. While he emphasized that Hana was as isolated as if it were on its own island, he also argued that the entire county lost by not having a finished belt road. He stressed that businessmen lost time and money because travel between Central Maui and Hana was slow and expensive. Maui County also lost because taxes were not realized when land was not fully developed. He emphasized that revenue from tourism was not being collected either, noting that this road would be a "tremendous asset in attracting tourists." Fassoth stated that Maui should get its loan fund, but also believed that funding should come from the federal government since the territory paid a lot in federal taxes, but got nothing in return.[41] *A Maui News* editorial followed up on Fassoth's opinions, agreeing with him on all points, especially in noting that it was unfair to keep Hana Coast residents in a state of isolation.[42]

Although no progress was made on completing the belt road to Hana, work on the bridges along the Hana Coast continued, both west and south of Hana. Records indicate that two bridges were built in 1917, five in 1920, two in 1921, and one in 1922.[43]

## REALIZING MAUI'S DREAM OF A HANA BELT ROAD

In early 1923 Maui's civic and business leaders resurrected their interest in completing a belt road through to Hana. Together with a new Hawaii governor, Wallace Farrington, Mauians were finally able to make their dream of a road to Hana a reality.

---

40 "No Money For Belt Road For Two Years," *The Maui News*, May 7, 1920, 1.
41 "Roads First Need View Of Fassoth," *The Maui News*, February 2, 1921, 1.
42 "Connect Maui Up," Editorial, *The Maui News*, February 11, 1921, 4.
43 Bridge Inspection Reports; see also Appendix.

**Surveying**

In January 1923, County Engineer Paul Low prepared estimates for completing the Hana Belt Road for the County Board of Supervisors. Low compiled his data based on previous surveys calculated by Maui Loan Fund Commission engineers, including Howell. Other engineers who had worked on surveys for the MLFC were Harvey, Brune, Foss, and Cox. Low reviewed their work, which detailed the alignment, cuts, fills, bridges, and other work. He noted that their estimates, which were probably at least fifteen years old, were useless. For reasons that were not specified, Low divided the project into two sections. The first section was between Kailua and Keanae, a distance of 11.67 miles, and the second from Keanae to Wailuaiki, a distance of 5.66 miles. His estimated cost for the first segment was $422,750, and for the other $206,000. He added $63,250 to the total project costs for overhead and other expenses.[44]

To make his estimates, Low planned for a 16' bench and a 12' wide light, macadam road. For the 11.67 miles between Kailua and Keanae, 273,200 cubic yards of earth would need to be excavated at a cost of $.75 per cubic yard, which totaled $204,500. One thousand cubic yards of borrowed fill was needed, which would cost $500. He calculated $7,500 for parapet walls, $4,300 for culverts, $40,000 for bridges, and $145,000 for macadam pavement. In order to accommodate the road, Low estimated that there would be an additional expense of $1,345 to relocate the irrigation ditch using 1,345' of tunnels. The estimated cost to build retaining walls was $7,500.[45]

Similar work was planned for the shorter (5.67 miles) section between Keanae and Wailuaiki. Low calculated that excavating 128,100 cubic yards of earth would cost $96,000. He calculated $12,500 for walls, which were likely retaining walls. Culverts would cost $2,500 and bridges, $25,000. To macadamize the roadway, he figured a cost of $70,000. Altogether, with engineering, overhead, and contingencies, Low estimated that a $692,000 appropriation would be required to complete the Hana Belt Road.[46]

**Financing**

With Low's estimates in hand, the Board of Supervisors began gathering support for the project. Their first order of business was to present Low's plan to the Maui Chamber of Commerce, which had a Belt Road Committee chaired by William Pogue. In February 1923, the Board of Supervisors, under the direction of Chairman Sam Kalama, met with the Maui Chamber of Commerce. Pogue's committee supported Low's plan and the authorization of $300,000 worth of bonds for the project. Pogue also recommended a special tax to help finance the project. In addition, he told the supervisors that not all chamber members supported the Hana Coast route. A. F. Tavares, who had interest in

---

44 "Estimate Made Belt Road Cost By Way Kailua," *The Maui News*, January 13, 1923, 1.
45 "Itemized Coasts Proposed Belt Road Presented," *The Maui News*, January 19, 1923, 1.
46 "Itemized Coasts," 1.

pineapple production in the Hana area, wanted the road to be built via Kaupo, which would benefit his company and, according to him, be a less expensive project.[47]

Chairman Kalama agreed with Pogue's proposal for a tax increase, but he felt it should be less than half of Pogue's proposed sum. Pogue raised concerns similar to those he had in 1909, noting that if the total sum required to build the road was not appropriated at one time, the project would be ongoing and subject to dismissal should a new Board of Supervisors not want the road. Pogue also suggested that a special committee be designated to visit the governor and convince him of the project's worthiness. Finally, he urged supervisors to settle on the road's alignment, believing that a determined route would bolster support for the road. The committee of chamber and supervisor members agreed that loan funds together with a special tax would be an appropriate way to finance the road. They also decided that the best means to complete the project would be to build the road first, and then spend the special tax to surface the road.[48]

Within several days, the Chamber of Commerce and Board of Supervisors announced that Kalama would work with the chamber's special committee, which would meet with the governor, should he not support an authorization of $300,000 for the Hana Belt Road. To reduce construction costs, the Board of Supervisors also decided to ask the governor for a workforce of fifty prison laborers dedicated to the belt road project. Finally, the Board of Supervisors decided on an alignment that would complete the belt road sections near Keanae, rather than reroute the road via Kaupo. The supervisors did want the Kaupo route as part of their overall goal to eventually complete Maui's belt road system.[49]

Maui's leaders seemed anxious not to repeat the mistake of 1920 when Governor McCarthy did not approve loan fund requests due to the apparent lack of citizen interest in their projects. One month after the joint meetings with the Chamber of Commerce, the Board of Supervisors voted to purchase a steam shovel and employ twenty men on road work near Keanae. Low selected a site east of Kailua for a prison labor camp. The supervisors notified Governor Farrington that they intended to request his approval for bonds in the amount of $300,000. *The Maui News* wrote, "There has never been such a concerted and systematic demand for the road in all the more than 20 years it has been under consideration." The supervisors decided that work should get underway from both ends of the project. The only thing remaining was for the supervisors and business leaders to agree on how the remaining money would be secured. Businessmen were concerned with the possibilities of tax increases and government spending.[50]

By May, plans for the next segment of the Hana Belt Road were in full swing. The Board of Supervisors ordered Low to prepare the final survey and construction

---

47 "Supervisors and Committee Agree As To Belt Road," *The Maui News*, February 8, 1923, 1.
48 "Supervisors and Committee Agree," 1.
49 "Belt Road Plans Further Advanced," *The Maui News*, February 10, 1923, 1.
50 "Belt Road Work Will Be Started By Maui County," *The Maui News*, March 10, 1923, 1.

specifications. Kalama, together with the county attorney and Low, arranged to meet with the governor, superintendent of public works and other territorial officials in Honolulu. County officials, in ranking their public works projects, planned to tell the governor that the belt road was considered most important. The prison labor camp had been built east of Kailua, and the county planned to purchase another steam shovel and drill. The county estimated that with three work crews, the road to Hana could be opened by 1925.[51]

## BUILDING THE ROAD: KAILUA TO KEANAE, 1923 - 1925

No documentation has been located indicating when Governor Farrington approved Maui's request for bonds to pay for the belt road construction. Superintendent of Public Works Lyman Bigelow visited Maui and probably approved of Low's plans for construction sometime prior to August 1923. The governor would have approved Maui's request after Bigelow's visit. The Board of Supervisors approved Low's plans and specifications for the Kailua to Keanae road in August 1923. The prison labor camp was ready. Bids were solicited to build what was being called the Kailua to Keanae section of the belt road.[52]

Little was noted in *The Maui News* or in government documents about the progress of belt road construction until February 1925, when a short *Maui News* article reported that the two steam shovels, one working from Keanae and the other from Kailua, were 3 miles apart. Grading and clearing gangs generally worked immediately ahead of the steam shovels. Hired workers were used from the Keanae end and were located about 1,300' from Haipua`ena Bay. The prison laborers were reported to be about 250' from the `Aiea tunnel, where they were may have been redirecting a portion of the ditch. The county spent about $12,745 during January for the project, which was delayed due to rain, washouts, and cave-ins.[53]

In May 1925, two county supervisors, Antonino Garcia and Frank Summerfeld, along with two other government officials, drove out towards Keanae to check on the construction progress. Although the men intended to park their car near the end of the construction zone and then walk out to view the other end of the project, by the time they arrived, workers were about to "break through" and connect the two pieces of road. Too excited to miss the opportunity, they waited until the workers (or steamshovels) met, then drove in their car to the end of the new road. The Chevrolet lost its muffler and was covered with mud from the trip over the rough, unfinished road, which took about forty-five minutes each way. Garcia reported that the thoroughfare would be one of the islands' most scenic driveways when it was completed and opened for traffic. In response to Garcia's joy ride, the county engineer's department replied that the work was

---

51 "Belt Road Project Is To Go Forward At Once," *The Maui News*, May 25, 1923, 1.
52 "Bids for Belt Road Work Asked," *The Maui News*, August 14, 1923, 1.
53 "Progress Of Belt Road Work Reported," *The Maui News*, February 14, 1925, 1.

only completed after months of difficult labor. In order to better convey how difficult the job was, the engineers observed that it was only 4 miles between beginning and end as the crow flies, but 12 miles of winding up and down, in and around the mountains by road. Now that the work gangs had connected the two sections of road, the county expected work to proceed rapidly.[54]

New bridges were also built as part of the new road to Keanae, including Honoma`ele Bridge in 1924, and `O`opuola Bridge in 1925.[55]

## CELEBRATING IN KEANAE, JULY 11, 1925

*Maui News* coverage on the opening of the scenic belt road to Keanae sheds additional light on the reasons for building the belt road through to Hana. First, the newspaper credited William Pogue and Sam Kalama with the idea for building a road from Kailua to Keanae and on to Hana. In May 1895, the men visited Keanae and after a rough trip over the government trail, discussed the idea of building a belt road. Thirty years later, on June 11, 1925, both men rode over the new road to Keanae with Governor Farrington and SPW Bigelow to attend the celebration of its opening. The official automobile led a procession of more than one hundred cars.[56]

Governor Farrington believed that the new road marked the beginning of a new era in Maui's history. He realized the road would be a "tourist paradise" that would open a new industry on the island. In describing his journey over the new road, he noted that the scenery was a "gorgeous spectacle [with] the blue sea in many places hundreds of feet below you, the white surf beating against the shore line and these wonderful green hills, the many gulches and every playing light, shade and color on the sides of beautiful and majestic Haleakala." The road was an exciting journey for most Maui residents, many of whom had never viewed the scenery near Keanae.[57] The new road drew attention from the mainland U.S. as well, with a Los Angeles-based writer marveling at the landscape features, which included bamboo thickets, mountain apple, and kukui trees.[58]

*The Maui News* noted that the road, in addition to its value as a scenic route, was a fine piece of engineering. There was nothing in the Territory of Hawaii or perhaps in the world quite like the new road to Keanae, with the section through Honomanu Gulch being the climax of the journey. The serpentine roadway wound its way up, down, and around numerous gulches as it headed to Keanae, each one of them opening up a wonderful panorama. An editorial noted that the road was still rough in many places, unsurfaced, and in need of widening so that cars could pass each other at any point.

---

54 "First Car Runs Over Belt Road Kailua-Keanae," *The Maui News*, May 23, 1925, 1.
55 Bridge Inspection Reports.
56 "Hundreds Motor to Keanae," *The Maui News*, June 13, 1925, 1.
57 "Hundreds Motor," 1.
58 "Wonder And Charm Of Maui Scenery To Be Pictured And Told Hundreds Of Thousands Readers On Mainland," *The Maui News*, August 15, 1925, 1.

These minor discomforts were considered trivial in comparison to the tremendous beauty that the road offered.[59]

As far as Maui's leaders were concerned, perhaps the best news they heard on opening day was Governor Farrington's encouraging remarks that more funding for Maui's belt road was likely forthcoming.[60]

## BUILDING THE ROAD: KEANAE TO WAILUAIKI, 1925 - 1926

After the Keanae celebration, little time was wasted beginning work on the final link of the Hana Belt Road. A month after the new road to Keanae opened, Maui's road program received a substantial boost when President Calvin Coolidge approved a bond issue for the Territory of Hawaii that included $150,000 to continue construction of the Hana Belt Road.[61] *Maui News* articles between August 1925 and December 1926 provided updates on the construction progress for the final 3.5 miles of belt road to Hana.

Assistant County Engineer A. H. Wong and three others from the county engineer's office were dispatched into the field for additional survey work in August 1925. Wong led the team in inspecting wood bridges between Kopili`ula Gulch and Hana and in assessing which should be replaced.[62] No information was located as to how many bridges needed replacement or how many new stream crossings would require bridges. Numerous bridges were built as part of the final phase of Hana Belt Road construction. Bridge inspection reports from the Hawaii Department of Transportation indicate that fourteen bridges were built in 1926 and two each in 1928 and 1929.

The final 3.5 miles of construction on the Hana Belt Road proved to be some of the most difficult. In November 1925, construction came to a sudden stop when a 20-ton steam shovel slipped off the road and "turned turtle" into the gulch below. Sam Kalama had apparently made a habit of going out to inspect the progress on his "pet" project. He was particularly interested in hurrying work along, so he ordered the workers to move the shovel to Wailua. The big machine had pulled over to the side of the narrow bridge to allow oncoming traffic to cross. While waiting on the side of the road, the embankment gave way. The steam shovel fell into the gulch, coming to a rest on its smokestack. Workers estimated that it would take two weeks to get the machine back in service, if no serious damage had occurred. In order to get the machine back up and running, workers had to disassemble and reassemble it piece by piece.[63] The steam shovel's boom was

---

[59] "Hundreds Motor," 1; "Maui's New Road," Editorial, *The Maui News*, June 17, 1925, 4.
[60] "Maui Will Share New Loan Fund Governor Thinks," *The Maui News*, June 13, 1925, 1.
[61] "Coolidge Approves Proposed $2,590,000 Hawaii Bond Issue," *The Maui News*, August 22, 1925, 1.
[62] "Do Field Surveys in Hana District," *The Maui News*, August 5, 1925. One of the 1926 bridges is Kopili`ula, which as previously indicated, may have been built in 1911.
[63] "Embankment Cave In, Steam Shovel Turns Turtle Into Gulch," *The Maui News*, November 25, 1925, 1.

damaged and had to be repaired in Kahului. The machine was not back in service until January 1926.[64]

In March, Low reported that little progress had been made with the steam shovels. Shortly after the Keanae machine had fallen into the gulch, the Hana machine had a broken gear. Even if the machines had not experienced problems, Low expected work to proceed at a slow pace since solid rock awaited the road crews entering West Wailuaiki. Even though the machinery problems slowed construction, Low was pleased that the manual labor was going smoothly. He complimented the prison laborers, who were doing excellent finishing work near Keanae, including top-dressing the road. Other work included finishing culverts and improving bridge approaches at Haipua`ena and Pu`a`alu`u. Stone masons worked in Honomanu.[65]

A month later, Low informed the Board of Supervisors that both steam shovels were again in service. He expected the Hana shovel to reach and cross West Wailuaiki Stream soon, and noted that the Keanae gang was working against solid rock, which required considerable blasting and work by hand. The Hana gang had been divided into three sections, with each group strategically placed so that blasting could be done. In order to accomplish the work, men tied thick ropes around their waists, were lowered over the steep cliffs, dug a footing in the rock, set their drills, bore holes in the rock, and set the powder and fuses that would blast the new roadbed. Only after blasting the rock did the steam shovel begin its work. Stonemasons continued working on wing and retaining walls in Honomanu as well as the new section of road near the village of Wailua, which probably required retaining walls. Payroll, materials, and supplies for the month totaled $16,072.[66]

Low provided an enthusiastic and optimistic update to the Maui Board of Supervisors in May 1925, estimating that the road might be ready in fall. He explained that only 1.5 miles of one of the "prettiest and most scenic roads in the entire territory" was needed to connect Hana with the rest of Maui. Two groups of workers, eighty in all and none of them prisoners, were blasting their way through solid rock. The work was especially difficult from the Keanae side, where laborers were dynamiting their way "slowly but surely" through the mountains. He expected the benching and grading to be done by October. Contrary to his plans of January 1923, Low reported that the roadway would eventually be 20' wide, but for this project, only 16' was being benched into the mountains. He noted that some of the rock being blasted from the right-of-way would be used later as a top dressing for the road.[67]

---

[64] "Steam Shovel Back and Working Again," *The Maui News*, January 9, 1926, 1.
[65] "Kailua-Kopiliula Road Work Making Headway, Says Low," *The Maui News*, March 13, 1926, 1.
[66] "Builders Progress In Construction of Belt Road Project," *The Maui News*, April 17, 1926, 7; "Beautiful Scenery Unfolds," *The Maui News*, December 22, 1926, 8.
[67] "Keanae-Wailua Link Belt Road Ready In Fall," *The Maui News*, May 8, 1926, 1.

Supervisors asked Low how the scenery along the new stretch of road compared with the section that had opened in 1925. Low believed that there was no comparison. In his opinion, the truly beautiful portion of the Hana Belt Road was the part under construction in Wailuanui Valley. Low explained how the road wound along the mountain on a ledge and for almost a mile provided a huge panoramic view, with the taro patches and rice paddies of quaint Wailua below. He noted that the 3.5-mile final phase of the Hana Belt Road project was about 60 percent completed.[68]

One week after Low's report to the supervisors, he escorted them on a tour of the project site near Wailua. Supervisors visited the entrance to Wailuanui Valley, where there was a solid wall of rock about 110' long. In order to build the road, workers tunneled into the rock in ten locations and placed large charges of dynamite therein to blast out the rock. A nearby ditch watering the Akiona family's taro patches and rice paddies complicated the work. In order to keep the water flowing, workers had to dig a temporary ditch before the rock was blasted. The road gang's progress pleased Low, and he noted that he expected to have the steam shovels moving along the newly blasted bench soon. SPW Bigelow sent more good news when he notified the Mauians that he had approved the plans for the Wailuanui (Waikani) Bridge. County costs for belt road work during April 1926 were $10,696.[69]

Workers continued to make excellent progress in May 1926, especially on the West Wailuaiki Bridge, where District overseer Charles Bailey was in charge of construction. Sand and gravel had been delivered to the site, and crews were working on the structure's piers and abutments. Steam shovel crews were also making headway. The Hana shovel had moved about 1900' during the month and was exiting West Wailuaiki Valley, its clearing and grading gang preparing way for the machine. The Keanae shovel was in the midst of the high cuts and rocky stretch on the west side of Wailuanui Valley. Prison laborers were still working on the finishing touches on the road that had opened in June 1925. Their jobs involved widening and top dressing the roadway and removing overhanging boulders from the cliffs in the Puohokamoa and Haipua`ena areas. The county planned to advertise for bids for the Wailuanui (Waikani) Bridge within a few weeks. The total costs for work completed in May 1925 was $12,018.[70]

Work came to a grinding halt early one morning in July, when a landslide in the Waikani area sent tons of rock and dirt into the gulch and trapped the steam shovel. *The Maui News* reported that Kalama, not Low, had been "jolted" out of bed early that morning by a phone call notifying him that his "pet project" was in trouble. Rather than attend the supervisors' meeting that day, Kalama jumped into his car and drove to the construction site. When he had to return to town, he instructed the project manager to telephone him when the steam shovel was extracted from the mess. Kalama was relieved when the good

---

68 "Keanae-Wailua Link Belt Road," 1.
69 "Workers Blast Tons Of Rock On Belt Road," *The Maui News*, May 15, 1926, 1.
70 "Substantial Gain Made On Belt Road During Past Month," *The Maui News*, June 12, 1926, 1.

news came later that night that the shovel would be back to work soon. Another small slide happened the next day.[71]

After a year of digging through the mountains and blasting through solid rock from both ends of the project, the steam shovels finally met at the foot of Waikani Falls in Wailuanui Valley. Low was confident that the new road would be open in November, pointing out that the difficult work had been finished, and the remaining tasks would be the minor work of leveling and finishing touches. The steam shovels would now be backtracking, widening portions of the roadbed as they went. One major component of the project remained, the erection of Wailuanui (Waikani) Bridge. That project had been delayed until the road was cleared through to the worksite so that materials could be delivered.[72]

Having noted the significant progress being made on construction, *The Maui News* lavished praise on both Low and Kalama for their success, noting that Low had supervised one of the finest and most difficult road engineering projects on Maui. Even though the project was not yet completed, the newspaper credited the young engineer with finishing it well within budget. Kalama, however, was recognized as the person who made the belt road a reality. The road to Hana had been his dream for more than a quarter century, and the article reminded readers that Kalama had stayed in office so that he could push the project through.[73]

In August 1926, Akiona's crews began building the framework for Wailuanui Bridge. The original bridge plans, together with *Maui News* articles, referred to the bridge as "Wailuanui," which corresponded to the place name of the stream and valley where the structure was located. Naming structures for the streams crossed was the custom for all the bridges along the road. It is unclear when the bridge became commonly known as "Waikani," as it was in 2005. The adjacent waterfalls were also called "Waikani." Wailuanui Bridge is a concrete-arch structure 130' long and 90' high, designed by architect William D'Esmond in partnership with Low. The open-spandrel bridge features two rib arches and dramatically crosses a deep gorge at the head of Wailuanui Valley. The bridge is located at the end of the mile-long ledge over Wailua, which Low had described in May 1926 as "without comparison."[74]

Wailuanui Bridge was the major piece of construction remaining to be completed before the Hana Belt Road could be opened to traffic. Kalama emphasized that the county was cooperating with the contractor to hasten completion of the structure. Some Mauians were excited about the prospects of driving the new thoroughfare and could not wait for it to open. Even though there was a locked gate at the end of the road, thirty motorists

---

71 "Land Slide Halts Progress of Work On Maui Belt Road," *The Maui News*, July 10, 1926, 1.

72 "Steam Shovels Meet Next Week," *The Maui News*, July 31, 1926, 1; "Shovels Finish Belt Road Work," *The Maui News*, August 11, 1926, 1.

73 "Steam Shovels Meet Next Week," 1.

74 "Shovels Finish Belt Road Work," 1; Wailuanui Bridge Plans, 1926, Hawaii Department of Transportation.

decided to go around the gate and take a Sunday drive over the new road. Kalama was concerned about public safety, pointing out that frequent rainfall made the unfinished roadway susceptible to landslides.[75]

Low reported on Akiona's progress on Wailuanui Bridge in mid November. Crews had poured the arch ribs and built the forms for the central portion of the superstructure. The bulkhead walls and both end spans were in the process of being completed. Low was pleased with the progress, but in order to give Akiona's crew more time to finish the bridge, he pushed back the official opening of the road by one week. The county planned to open the road the Saturday before Christmas, on December 18. A Hana luau of up to 3000 people was planned to celebrate the event. The entire community of Hana was expected to greet visitors as they arrived over the new road that connected East and Central Maui.[76]

Despite the best efforts of all involved, weather made the timely completion of Wailuanui Bridge and the Hana Belt Road difficult. The same day that *The Maui News* announced the date of the official opening, heavy rains washed out the bridge's formwork and scaffolding. Approximately 600 bags of cement for the project were washed away, and landslides covered the road near the structure with loose earth. Low visited the work site and determined that the damage was not serious. One major problem was the formwork for the center arch, which had washed away. The concrete had been setting for nearly a month, and the formwork had been scheduled for removal in a few days. Other damage included the formwork on the Keanae end of the bridge, which was carried away in the landslide. After assessing the damage, Low opined that it would cause only a few days delay. The major loss was the large amount of concrete that had slid from a storage shed into the stream below. County officials were confident that work could still be completed in time for the road's opening date.[77]

Within three weeks of the Wailuanui flood, Akiona's team had completed the superstructure and was putting the finishing touches on the bridge railings. All of the formwork was to be removed prior to the opening on December 18. Other work being completed prior to the scheduled opening included roadbed widening and preparation of an upper Keanae lookout.[78] Presumably, the bridge was ready for opening day as no mention was made otherwise in the news reports of the opening festivities.

## PREPARING TO INTRODUCE THE WORLD TO HANA

---

[75] "Shovels Finish Belt Road Work," 1.

[76] "Road Linking Hana With Rest Of Maui Will Be Opened Officially December 18, With Celebration," *The Maui News*, November 13, 1926, 1.

[77] "Flood Threatens Belt Road Bridge," *The Maui News*, November 17, 1926, 1.

[78] "Final Touches Given Program For Opening of Hana Belt Road," *The Maui News*, December 11, 1926, 1.

The level of excitement rose as the date for the Hana Belt Road opening approached. The committee in charge of festivities, chaired by Supervisor H. A. Drummond, viewed the opening of the road as a milestone in Maui's history. Mauians remained confident that more money would be appropriated so that the belt road around Maui would continue to be built step by step until it was completed. Perhaps more importantly, the committee realized that their celebration of the Hana Belt Road's completion was an opportunity to showcase Hana, which was expected to begin attracting tourists from around the world.[79]

In early December, committee members traveled to Hana to meet with their counterparts in that community and finalize plans for the celebration. Governor Farrington, who was by then Hawaii's delegate-elect to the U. S. Congress, was expected to attend the opening celebration, as were other government dignitaries and tourist bureau officials from Honolulu. The Board of Supervisors and a group of Hana citizens each pledged $500 to pay for the affair. A special invitation was extended to William Pogue, who was no longer on the Board of Supervisors but still considered a "champion of the belt road." Pogue, Farrington, Kalama, Low, and Bailey were designated to ride in the official car. Some discussion centered around who would drive the vehicle, with Kalama wanting the privilege as he had also driven the official car when the previous section of belt road to Keanae had opened. A compromise was decided whereby Kalama would drive to Keanae, and Low would take the wheel from that point to Hana. Kalama's role beyond Keanae was to serve as a tour guide pointing out the scenic spots and informing the passengers about the engineering problems that had been encountered along the way.[80]

Other activities planned for the opening day celebration were a musical program, entertainment, and a parade featuring Hana's children. By December, the committee had increased its expected guest list to 5,000, rather than the previously anticipated 3,000. A fishing excursion was planned for Governor Farrington, who had reminisced about the fishing trip he took after the road opening in Keanae. Hana's new hotel, built by J. A. Medeiros, was scheduled to open for the occasion in order to accommodate those wishing to spend the night in Hana.[81]

Last but not least, the Maui sheriff's department was involved with preparations for opening festivities. Under the direction of Sheriff Clem Crowell, a schedule was arranged as to when and in which direction automobiles would be permitted to travel the new road. The Hana Belt Road was to close in mid afternoon to allow Hana traffic to return to Central Maui. The sheriff's office also established traffic regulations and emphasized that motorists should be certain that their tires and automobiles were in road-worthy condition. Crowell worried that a breakdown would delay the entire procession

---

[79] "Houston and Farrington Will Be Here," *The Maui News*, December 4, 1926, 1; "Hana Prepares For Reception Of Farrington," *The Maui News*, December 8, 1926, 1.

[80] "Houston and Farrington Will Be Here," 1; "Hana Prepares For Reception," 1.

[81] "Final Touches Given Program," 1; "Governor Looks Forward To His Drive To Hana," *The Maui News*, December 15, 1926, 1.

to Hana, thus ruining the schedule for the luau and other activities at the end of the road.[82]

## ENDING HANA'S CENTURIES OF ISOLATION

The Hana Belt Road opened to the public as scheduled on December 18, 1926. *Honiron*, a publication of Honolulu Iron Works, described the road as "spectacularly chiseled out of abrupt cliffs and precipitous valleys." It noted that miles of the roadway were nothing more than a 16'-wide shelf cut into the mountainside, with towering masses of rock above and sheer drops measuring hundreds of feet to the ocean below.[83]

*The Maui News* published extensive coverage on the opening of the road, Maui's "newest scenic asset." With its typical use of superlatives, the newspaper's writers and editor praised the newly completed Hana Belt Road as the "great road making achievement in the Islands, fraught with tremendous difficulties in engineering and construction work" and completed by "dare-devil exploits." The paper claimed the road was the most scenic driveway in the world, with vistas of lofty mountains, the Pacific Ocean, wild canyons, cataracts, waterfalls, and luxurious tropical vegetation.[84]

*Maui News* articles recapped the history of belt road construction and credited Maui's determined leaders with ensuring the completion of the project. The paper noted that Pogue, Kalama, Low, Drummond, and Fleming (also a supervisor) had accomplished a coup d'état in the annals of road-building history. Over a period of sixteen years, the men, who worked together in various combinations, had secured more than 1.5 million dollars in funding to build the road. Equally as impressive was the story of how they had overcome Maui's difficult terrain and climate to build a narrow shelf of road around and over mountains and through the rain forest. Pogue was singled out as the man who got the project off to a fine start in 1909 when the first appropriations were granted for the Hana District's concrete bridges.[85] The newspaper did not mention, as it had in its coverage of the Keanae road opening, that Pogue and Kalama had discussed the idea for a road through to Hana thirty-one years earlier in 1895.[86]

The island of Maui enjoyed a holiday when the road opened on December 18. The day of festivities was likely the biggest event Hana had ever witnessed, and the small community pulled it off with great flair. Citizens had decorated many of the buildings,

---

82 "Governor Looks Forward," 1.

83 "Honiron Tells Of Maui Road To Hana," *The Maui News*, March 5, 1927, 6.

84 "Magnificent Scenery Unfolds Before Eyes of Travelers On Motor Trip Over New Road Leading To Hana," *The Maui News*, December 22, 1926, 1,8.

85 "Farrington Will Open Road Today, Marks Epoch in Progress Of Maui County," *The Maui News*, December 18, 1926, 1; "Maui Takes Day Off For Road Opening," *The Maui News,* December 22, 1926, 1. *The Maui News* stated that the first concrete bridge dated to 1910; DOT records indicate that Mokulehua was built in 1908.

86 "Hundreds Motor to Keanae," 1.

and flags were hung throughout the village. Banners expressing "welcome" and "aloha" were posted in various locations. In typical Hana style, the day's activities reflected the generosity and spirit of the community. The luau featured kalua pig, freshly pounded poi, laulau, and other traditional Hawaiian fare. The villagers served approximately 3,500 guests in the only building large enough to hold such a crowd, the pineapple cannery. The Kaahumanu Society, a Hawaiian women's civic club, held a bazaar that featured Hawaiian crafts, including quilts and feather lei. *The Maui News* noted that the entire town pitched in to make the day a success, including children in scouting programs. The event was a multi-cultural affair, with Hawaiians, Filipinos, and Japanese contributing their time and talents.[87] The guests that day surely equaled or exceeded Hana's population. Census statistics indicated that the entire Hana *District* had 3,100 residents in 1920 and 2,436 in 1930.[88]

A grand procession of 200 automobiles traveled over the Hana Belt Road on opening day without incident. Police were posted at locations along the entire route to direct traffic and assist motorists. Signs marked "bad turn" and "go slow" were installed to mark dangerous curves and other points in the road. Scouts were available to assist in the event of a flat tire or car trouble. Although Low's 1923 estimates to complete the road to Hana included pavement, the road was not paved when it was opened in 1926.[89] The work along the new Hana Belt Road would continue. The challenges faced during construction would also remain. Rains on the night the road opened caused a small landslide, which closed the road to traffic for a few hours the next morning.[90]

The completion of the Hana Belt Road increased the length of Maui's belt road system to 125 miles. Forty-four miles were needed to complete the system, including 38 miles to carry the thoroughfare beyond Hana and around Haleakala to Kihei. In addition, there remained a gap of about 6 miles in the West Maui belt between Honolua and Kahakuloa.[91]

## OTHER WORK TO BE DONE

Although the Hana Belt Road's most noticeable missing feature was macadam pavement, other work remained to be done. While many bridges were built in 1926, not all were ready when the road opened, such as the Kuhiwa Bridge whose plans and DOT records indicate the date of construction was 1926. A *Maui News* article, on the other hand,

---

87 "Hana Prepares For Biggest Day," *The Maui News*, December 22, 1926, 1.

88 Robert C. Schmitt, *Historical Statistics of Hawaii* (Honolulu: The University Press of Hawaii, 1977), 13-14.

89 "Farrington Will Open Road Today," 1; "Celebration Typical Of Maui," Editorial, *The Maui News*, December 22, 1926, 3.

90 "Magnificent Scenery Unfolds Before Eyes," 1, 8.

91 "Farrington Will Open Road Today," 1.

reported that bids for the bridge were not opened until March 1927 and that the structure was completed in November 1927.[92]

The newspaper article noted that all the proposals for the Kuhiwa Arch Bridge were higher than the Low's estimate. Moses Akiona proposed to erect the structure for $7,800 in eighty days; Robert O. Sano proposed $7,875 for seventy days work; George Yamayoshi bid $9,904 for a timetable of sixty-five days, and N. K. Sniffen bid $10,500 to build the bridge in ninety days. The Board of Supervisors rejected all the bids and decided that county workers would build the structure.[93]

Fleming analyzed the bid situation and pointed out that the Hana District overseer, Charles Bailey, was one of the best bridge builders in the Territory of Hawaii. Fleming also realized that if the project were awarded to a private contractor, employees of the Maui engineer's office would likely be laid off work. Supervisor Drummond asked Low whether he had accurately estimated the bridge costs. Low replied that he had been generous in figuring what the structure would cost and was confident that the county could build the bridge for less money. As such, the county engineer's office was instructed to build the Kuhiwa Arch Bridge.[94]

In reporting the project costs to the Board of Supervisors, Low provided a list of all labor expenses, which included a temporary bridge, falsework, excavation, picking up and hauling materials, mixing and laying concrete, bending and placing steel, and other miscellaneous tasks. Low also listed material costs, which included cement, steel, form lumber, hardware, freight, truck rental, and miscellaneous incidentals. In analyzing his costs, Low figured that some of the materials, such as lumber for formwork, were salvaged from other county projects and would be reused again. He noted that some of the jobs associated with the bridge would be done while county workers were doing other county roadwork. In his opinion, many of the values placed on the tasks and materials offset one another. Taking all of this into account, Low concluded that the bridge cost the county only $500 to build.[95]

Other bridges built after the completion of the belt road were Makanali and Ka`aiea in 1928, and Holua and Kailua in 1929. DOT records state that the Hanawi Bridge, which is a twin bridge of Kuhiwa, was also built in 1926. The SPW Report, however, noted that Hanawi Bridge and its approach were built for $7,600 in 1929. The SPW Report recorded the bridges that were built by the county, and as per the law, checked and approved by the SPW.[96] Also built by the County Engineer's Office after the road opened was Na`ili`iliha`ele Bridge in 1930.[97] The new concrete girder bridge probably replaced the wood bridge built by Howell in 1906.

---

92 "County Builds Kuhiwa Bridge at Lower Cost," *The Maui News*, November 12, 1927, 1.
93 "County Builds Kuhiwa Bridge at Lower Cost," 1.
94 "County Builds Kuhiwa Bridge at Lower Cost," 1.
95 "County Builds Kuhiwa Bridge at Lower Cost," 1.
96 SPW Report, 1929, 16-17.
97 Na`ili`iliha`ele Bridge Plans, November 1929, County Engineer's Office.

During the 1930s additional improvements may have been made along the Hana Belt Road in the Keanae area, where the road was apparently widened. Bridge plans indicate that Waiokamilo Bridge was widened to 34'-0" in 1937, and Nua`ailua Bridge to 24'-0" in 1939 - 1940. Physical inspections of Culverts #2, #3, and #4 showed that each of these structures were two different culverts. The culverts on the makai side were older and constructed of concrete rubble masonry. The mauka sides of the structures were built of reinforced concrete abutments and flat slabs. With Nua`ailua Bridge on the west end of Keanae and Waiokamilo on the east end, the culverts may have been widened as part of a 1930s road widening project. Nua`ailua Bridge was an unusual project. Plans indicated that the new wall on the widened structure was to match the original makai wall. When the bridge was widened, a solid concrete parapet was built.[98] In addition to road widening, the Works Progress Administration completed some paving in the Wailua area in 1936. Although paving was included as part of Low's 1923 estimates, the road was not entirely paved until the 1960s.[99]

The last two bridges to be built on the Hana Belt Road were Wailua and Kawaipapa in 1947. Bids for both structures and another bridge near Kaupo, Manawainui, were opened in March 1947. Henry Fong was the low bidder at $122,934, with Kawaipapa costing $42,645. The other bidder on the project was A. L. Ho, who proposed to erect the three structures for $161,309.[100] Robert Belt, the SPW, inspected and approved the bridges in June 1948.[101]

## BUILDING THE ROAD BEYOND HANA

Despite *The Maui News*' extensive coverage of building the Hana Belt Road to Hana, as well as its articles regarding other Maui road-building projects, no information could be found indicating when or how the Hana Belt Road was built between Hana and Kipahulu. As the Territory of Hawaii had little to do with the construction of the Hana Belt Road other than review and approve plans, records of the Superintendent of Public Works also have no information on the project.

An article in the *Honolulu Advertiser* in 1925 noted that the road south of Hana continued "but a few miles" to Kipahulu.[102] In January 1927, just weeks after the opening of the Hana Belt Road, William Pogue celebrated his seventy-first birthday by

---

98 Waiokamilo Bridges 1 & 2 Plans, November 1937, D. K. Kapohakimohewa, Designer; Joseph Matson, County Engineer; Nua`ailua Bridge Plans, 1939-1940.

99 "County Asks WPA To Take Over 127 Workers As Sum In Road Fund Is Depleted," *The Maui News*, November 7, 1936, 1; Leonard Lueras and R. Youngblood, *On the Hana Coast: Being an Accounting of Adventures, Past and Present, in a Land Where the Hand of Man Seems to Rest Lightly* (Honolulu: Emphasis International, 1983), 17.

100 "Fong Bids Low on Hana Bridges," *Honolulu Advertiser*, March 9, 1947, 5.

101 "Three New Bridges on Maui Finished," *Honolulu Star Bulletin*, June 6, 1948, 6.

102 "Fleet Edition," *Honolulu Advertiser*, April 30, 1925, 6.

driving the entire distance of Maui's belt road. His log reported that he drove 11.2 miles to Kipahulu from Hana, then drove to the end of the road, which was located at a stream 75.4 miles from Wailuku. He did not specify at which stream the road ended, nor did the description of his journey indicate whether the road traveling to Kipahulu was a trail or a roadway meant for automobiles.[103] In 1929, an *Advertiser* article in the automobile section noted that the road went 15 miles beyond Hana and ended in the Kipahulu District.[104] *The Maui News* detailed road projects being done by the Work Progress Administration during the Great Depression. Part of the work included widening the "trail" as far as Kalepa so that cars could drive over it. The project was done in conjunction with improvements between Kipahulu and Kaupo.[105]

## STRUCTURES ON THE HANA BELT ROAD

The Hana Belt Road between Huelo and Kalepa has seventy-seven bridges (including some called "culverts") constructed between 1908 and 1947.[106] Twenty-two of these structures are located on the Hana Belt Road south of Hana, while the remainder are located on the road west of Hana towards Central Maui. The majority of the narrow bridges are single lane, between 12'-6" wide and 16'-0". A handful of the structures near Keanae are two-lanes wide, including Nua`ailua and Waiokamilo bridges. More than half of the bridges along the road are single span. Nearly all the bridges on the road were simple in design, yet highly functional for the era.

### Masonry Arch Bridges

Two masonry arch structures south of Hana, Hahalawe Bridge and Wai`ele Bridge, may be the oldest surviving structures along the road. Although the solid concrete parapets were inscribed "1910," the masonry arches may date to the late 1800s when such structures were commonly built. Both bridges utilized cut basalt blocks to build the abutments and arch rings. The bridges retain their historic integrity and feature fine craftsmanship and local materials.

### Concrete Bridges

With only a few exceptions, the bridges (including flat-slab culverts) along the Hana Belt Road were built of reinforced cast-in-place concrete between 1908 and 1930. County and territorial engineers utilized structural systems typical for the early twentieth century,

---

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

104 "Wailuku to Hana Considered Maui's Most Beautiful Drive," *Honolulu Advertiser*, September 28, 1929, Auto Supplement, 1.

105 "Road Work is Moving Ahead," *The Maui News*, November 7, 1936, 1, 5. Kalepa Stream is the end of the Hana Belt Road.

106 See Appendix A for an inventory of bridges in the historic district.

including concrete arch, flat slab, girder, and simple tee-beam spans. Concrete deck girder (mostly tee-beams) and flat-slab structures were the most common types of bridge built along the Hana Belt Road. Territorial and county engineers realized that these structures were both economical and strong over short spans.

The majority of bridges featured two styles of parapet construction. Earlier structures built between 1908 and 1915 used a solid-paneled, reinforced concrete parapet that often featured a peaked concrete rail cap. After 1916 bridges were built with a reinforced-concrete parapet of simple, vertical concrete balusters and a rectangular concrete rail cap. A handful of structures, including Pu`uhaoa Bridge, built in 1910, and Waiokamilo Bridge and Culvert, built in 1921, featured a more ornate open-rail parapet. Two bridges constructed in 1947, Kawaipapa and Wailua, are unique designs, with two concrete railings that connect concrete piers on the parapet ends and centers. Some of the bridges have construction dates inscribed on the parapets.

Many of the bridges along the Hana Belt Road, although built of the most modern technology, showed uniquely local qualities through vernacular materials and building methods. Many of the bridges featured lava rock (basalt) abutments, piers, and wingwalls. The masonry work associated with these bridges highlighted the fine local craftsmanship involved with dry-laid rock masonry, concrete rubble masonry, and in a few cases, cut-block masonry.

**Concrete Arch Bridges**

After 1904, concrete arch bridges were built in Hawaii, often using standardized plans. Two types of concrete arch bridges were constructed on the Hana Belt Road: barrel arch and rib arch. The barrel arch bridges included Hanawi and Kuhiwa bridges, built in 1927 and 1929 respectively, and Oheo Gulch Bridge in 1916. The Oheo Bridge featured a unique, open parapet design (similar to Pu`uhaoa) and also had wingwalls at the end of the parapets. The arched structure was suitably located over the scenic Oheo Gulch in what became the Kipahulu District of Haleakala National Park.

The rib arch bridges demonstrated sophisticated engineering for their day and marked the evolution of concrete technology toward lighter structures. Koukou`ai Bridge was the first open-spandrel arch bridge on Maui and is an excellent example of early twentieth century bridge construction in the Hawaiian Islands. Built in 1911, the arched structure features high columns and spans a deep gorge just south of Haleakala National Park. The other rib arch bridge was Wailuanui (Waikani) Bridge, which the Akiona Contracting Company built in 1926. Designed by local architect William D'Esmond and County Engineer Low, the bridge dramatically crosses a deep gorge at the end of a long valley. The diaphragms on the rib arches below the road deck exhibit fine details. The five concrete arch bridges showed that the island of Maui, despite its geographic isolation, was not behind the rest of the United States in terms of its use of sophisticated, modern technology.

**Culverts**

Honolulu Iron Work's publication *Honiron* reported that numerous culverts along the Hana Belt Road were necessary due to the to the road's demanding topography and wet climate. During the 1920s, Calco Corrugated Culverts manufactured from Armco Ingot Iron were used in road construction.[107] Numerous culverts were also constructed of basalt, and often featured lava rock walls on the road. Dense vegetation covers many of the Hana Belt Road culverts so they are not visible from the road.

A number of culverts were built using concrete abutments, slabs, and parapets. Example of this type of structure include: Culvert #1 between Na`ili`iliha`ele Bridge and `O`opuola Bridge; Culverts #9 and #10 located in the village of Hana near the Hana Fire Station; and Kalena Culvert north of Koukou`ai Bridge.

Four distinctive culverts (Culverts #5, #6, #7, and #8), constructed of concrete abutments, concrete slabs, and open parapets with simple vertical concrete balusters and concrete rail caps, were located west of Hana and east of Honoma`ele Bridge. These structures vary in span length from 5'-5" to 14'-7". Waiokamilo Culvert, built to match Waiokamilo Bridge, is another distinctive culvert located adjacent to (east of) Waiokamilo Bridge. It spanned the Hana Highway at the "Y" intersection with Wailua Road. Two culverts with concrete abutments, concrete slabs, and solid concrete parapets are Mo`omonui Culvert and Maluhiana`iwi Culvert, which were built in 1910, as indicated on the parapet walls. Most of the construction dates for the culverts are unknown because the DOT maintained no records on these structures.

## HANA BELT ROAD ALTERATIONS 1990-2005

In 1969, the State of Hawaii transferred jurisdiction over the portion of the Hana Belt Road between Hana and Kipahulu to the County of Maui Department of Public Works. The historic portion of the Hana Belt Road between Huelo and Hana remained under the jurisdiction of the State of Hawaii Department of Transportation. The two government agencies maintain and preserve the road in significantly different manners.

The Hana Highway existed relatively undisturbed and until the 1980s. The road had been virtually unmaintained since it was first paved in 1962. Heavy rains and traffic had taken their toll, and the road "became a 55-mile nightmare of potholes and nonexistent shoulders . . . subjecting a vehicle to suspension destroying conditions."[108]

---

[107] "Honiron Tells Of Maui Road," 6.

[108] Ron Youngblood, *On the Hana Coast* (Honolulu: Emphasis International Ltd. and Carl Lindquist, 1983), 81.

Although the state's portion of the Hana Belt Road retains its historic character and integrity, there have been numerous alterations along the roadway. The most noticeable change along the road have been various types of guardrail systems. It is unknown when the first guardrails systems would have been installed on the Hana Belt Road. Early safety devices included concrete posts that served to delineate the edge of the road. Other concrete posts, which still remained along the roadbed, were apparently used in post-and-wire safety systems.

Efforts to bring the road up to more current safety standards were implemented in the 1980s. Bridge inspection reports and photographs indicated that lava-rock guardwalls, road striping, and reflector posts were installed circa 1983.[109] Lava-rock guardwalls were also built in various areas along the edge of the road. These walls complement the road's historic integrity. Many of the lava-rock guardwalls continued to be built in more recent years.

The most noticeable change to the state section of the road was the addition of w-beam and thrie-beam steel guardrails. Many of the weathered w-beam guardrails appear to have been along the road for a number of years. More noticeable, however, were the thrie-beam transitions between w-beam guardrails and the ends of bridge parapets. In many cases, the thrie-beam attachment is larger than the original bridge parapet, with the thrie-beam rail overwhelming many of the parapets.

Another change over the years has been road widening. There are still many segments of the road that are close to the original 16' width or narrower, especially on the cliffs near Keanae and east of Pua`aka`a State Wayside. These sections are too narrow for cars to pass each other without yielding. The road, however, has been widened in many areas. In a few places where the topography is more level, such as through villages and near the beginning of the road in the Huelo vicinity, the pavement has been widened. Another noticeable change from road repaving projects has been the superelevation of curves. In several locations, the Department of Transportation has used the new layers of asphalt to super-elevate curves, particularly in the area east of Wailua. The superelevation is particularly noticeable on bridges, where added layers of asphalt have significantly shortened the height of the bridge parapet and often fill part of the openings between parapet balusters. Other changes along the road include the painting of some bridges and lava rock walls white to increase nighttime visibility and the installation of numerous cautionary signs ("one-lane bridge," "narrow road"), reflector signs, and reflectors in the pavement. There have been a few jersey barriers added to the road, usually in places where the roadbed is being undermined alongside a steep cliff.

In the mid 1990s, several major projects were implemented in Honomanu Gulch. The road west of Keanae that traverses the steep mountainside on the east side of Honomanu Bridge was widened. Work included blasting and removing a large portion of the

---

[109] See bridge inspection reports for 1984, which include photographs showing the guardwalls and other safety features.

mountainside near the road's summit to relocate the damaged road, which had been collapsing into the ocean. A gabion built of lava rocks, which does not match the character of the traditional lava-rock guardwalls, was built as a rock catchment between the mountain and the road. Concrete gutters were installed and wide shoulders were added. A similar project was completed during the 1990s. Another section of mountain west of Keanae was removed, the road was widened, and jersey barriers were installed between the mountain and the road to catch rocks. The Department of Transportation also installed concrete gutters and new culverts in other locations along the road, especially in the area between Wailua and Nahiku, in an effort to control runoff during rainstorms.

The bridges along the Hana Belt Road retain their historic character. In 1991, a Kawaipapa Bridge was lengthened by means of a double box culvert. The bridge parapets were constructed to match those on the original 1947 structures.

The County of Maui section of the Hana Belt Road south of Hana has been subjected to fewer changes than the state-maintained portion of the belt road. The county has widened the road in a few locations, but for the most part, the pavement is no wider than 18'-0" and often averages 15' to 16' wide. Some guardrails have been added, but not to the same extent as the state-maintained section of the Hana Belt Road.

Although the Hana Belt Road has been improved over the years, many of the bridges along the road have suffered from a lack of maintenance. Most of the bridge walls originally averaged 34" high. The walls are now shorter due to repeated layers of asphalt. In many cases, the additional asphalt may have been as much as 12" high, which also added a tremendous amount of additional dead weight to the bridges. The lack of maintenance along the Hana Belt Road is also evidenced in the weeds and vegetation that grow in the concrete joints between the road decks, parapets, and abutments. A few bridge walls have been damaged by accidents. In earlier years, many of the damaged walls were repaired to match the original design, although in a few cases, damage was not repaired neatly or was repaired with a non-matching element. An example of a repaired bridge wall is the Waikani Bridge balustrades, which were severely damaged on the west end. Rather than restoring the end of the bridge wall, the repair consisted of building a rock wall in place of the balustrades. Another example of a bridge alteration that does not match the original is the Holua Bridge parapet, where a solid piece of concrete was placed on the end of the damaged wall.

## FUTURE PLANS

In the early 1990s, the Maui County Department of Public Works declared that many of the Hana bridges within the county's jurisdiction were so badly deteriorated that some would have to be replaced. In consultation with community preservationists, a "preservation plan" for the bridges in the "Hana Highway Historic Bridge District" was

completed in 2000.[110] The preservation plan did not aim to preserve the bridges, but instead called for the preserving the *character* of the Hana Belt Road. As such, the county planned for the replacement bridges to be 16' wide, rather than the 32' width required by the Federal Highway Administration (FHWA). Because the county was seeking to use federal funding to replace the bridges, FHWA standards had to be followed. In late 2001, the FHWA granted Maui County an exemption from the 32' width and agreed to fund the 16' wide bridges. The exemption was granted on a case-by-case basis and was not automatic for any bridge the county planned to replace. As of 2005, the Maui Department of Public Works planned to replace four bridges: Kaholopo`o, Papahawahawa, Waiohonu, and Pa`ihi. Plans for 16' wide bridges at Kaholopo`o and Papahawahawa were completed, and the county was working on specifications for Waiohonu and Pa`ihi Bridges. In summer 2005, the county decided that it would rehabilitate Koukou`ai Bridge and was undertaking a structural analysis of the bridge in order to plan its rehabilitation. The county decided to rehabilitate rather than replace Koukou`ai because the concrete arch structure was considered one of the most significant individual bridges on the Hana Belt Road.

## THE HANA BELT ROAD: A CREDIT TO THE COMMUNITY

The Hana Belt Road was 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. Building the road and bridges involved a substantial commitment of money, engineering expertise, and public involvement. Records indicate that the local Maui county government did most of the planning, financing, and constructing. Although the Territorial Superintendent of Public Works reviewed and approved project plans, the county initiated and completed the work. The SPW had so little involvement in this Maui public works project that its annual report for 1926, the year the Hana Belt Road opened to the public, noted that there was practically no work on Maui that year.[111]

The completion of the road was a testament to Maui's civic pride during the early twentieth century. At a time when Maui's population was about 38,000, most of which was agricultural labor, a $692,000 road through an uninhabited rainforest was a substantial financial commitment and engineering achievement. Unlike late twentieth-century road and bridge projects, Mauians could not count on government aid and federal cost sharing, but instead had to rely on loans approved by the territorial government. Completion of the Hana Belt Road also involved the expertise of highly trained and experienced engineers and designers. County leaders relied on local engineering and design talent in the County Engineer's Office to complete the Hana Belt Road. Although

---

[110] Wilson Okamoto & Associates, Inc., *Preservation Plan for Bridges Under the Jurisdiction of the County of Maui Within the Hana Highway Historic District*, Prepared for the County of Maui Department of Public Works, (Honolulu: Wilson Okamoto and Associates, 2000).

[111] SPW Report, 1926, 16.

some of the construction was contracted out, county employees did nearly all the design and engineering work.

**Community Leaders**

Although many civic-minded individuals contributed to the Hana Belt Road's completion, William Pogue and Samuel Kalama were the driving forces behind the project. Both men were well-known public figures in the Maui community. Between them, the two men chaired the Maui County Board of Supervisors for nearly the entire time that Mauians worked to get funding and build their road. Pogue chaired both the Maui County Board of Supervisors from 1908 until 1912, and for several years after 1911, the Maui Loan Fund Commission, which funded the Hana bridges and road. He also had experience in the territorial legislature.[112] Sam Kalama served on the Board of Supervisors from 1912 to 1932, chairing the board his entire tenure. Kalama also had ten years experience in the territorial legislature, and served in numerous other government posts.[113] Both Pogue and Kalama were public servants when Maui County government was in its infancy, which was a busy era with numerous public works projects. Under their leadership, Maui found the means by which to build its road, whether it was purchasing steam shovels to get the project started before loans were available, or securing prison labor to save on expenditures. Both men also relied on the involvement of the Maui Chamber of Commerce to help lobby for the road.

**Engineers, Architects, and Builders**

The Hana Belt Road and its concrete bridges were a remarkable engineering feat for the early twentieth century, especially in the small, isolated community of Maui. As the SPW acknowledged in 1905, road construction in the Hana District was through "very rough country."[114] The road was a challenging proposition for engineers, who had to determine a workable alignment through difficult terrain and climate. Miles of road had to be blasted out of the mountainsides and numerous bridges were required to carry the road across streams and gulches. Heavy vegetation, torrential rains, and landslides complicated construction and later maintenance of the road.

A number of talented engineers contributed to the success of the Hana Belt Road project. The County Engineer's Office completed nearly all the engineering and design work. Hugh Howell, who was appointed Maui's first County Engineer in 1906, served again in 1914, and also worked as a secretary/engineer with the Maui Loan Fund Commission. Howell was educated at the University of California and came to Hawaii in 1894 to work as a hydraulic engineer. Together with other Loan Fund Commission engineers who were less well known, Howell completed the early survey work for the Hana Belt Road. As the county engineer, he also designed several bridges, including Waikamoi and

---

112 George F. Nellist, ed., *Men of Hawaii* (Honolulu: Honolulu Star-Bulletin, Ltd., 1925), 703-704.
113 "Samuel E. Kalama Answers Call," *The Maui News*, February 28, 1933, 1, 4.
114 SPW Report, 1904, 6-7, 40.

Haipua`ena. Howell later began his own engineering company. In the 1930s he conducted federal water surveys and planned irrigation projects on Molokai. Howell was also appointed as civil engineer for the Hawaiian Homes Commission. He, like Pogue and Kalama, was involved with numerous civic clubs.[115]

Hawaii-born engineers played an important role in the development of the Hana Belt Road. Paul Low, who was born in Honolulu and received a B.S. in Civil Engineering from Stanford, also did post graduate work at the University of Illinois. As Maui County Engineer from 1918 until 1928, Low prepared the project specifications and managed the two major phases of Hana Belt Road construction between 1923 and 1926. His name appears on many of the Hana Belt Road bridge plans. During his tenure as county engineer, Low supervised a number of Maui's other public works projects, including the County Office Building in 1924. He was elected to the Territorial Senate in 1928.[116]

A. H. Wong succeeded Low as county engineer in 1928. Wong was born in Honolulu and received a degree in civil engineering from Purdue University. Wong had been Low's assistant engineer while the Hana Belt Road was under construction. He designed the West Wailuaiki Bridge, and his name also appears on the plans for Kuhiwa Bridge. Wong later worked on the construction of Haleakala Highway and became an engineering supervisor of the Works Progress Administration project that built Maui Airport during the 1930s.[117]

Charles Bailey was born in Vermont and earned a civil engineering degree at the University of Vermont. Bailey went to Hana in 1912 to supervise the first macadamizing project in the Hana District. He also worked on Maui's Lahaina Pali. Kalama praised Bailey as the county's best bridge and road builder, which was why he was chosen to manage the county team that built Kuhiwa Bridge. After serving as an engineer with the county, Bailey was appointed to the Territory of Hawaii Commission on Public Lands.[118]

Two notable local contractors, John Wilson and Moses Akiona, completed projects on the Hana Belt Road. Wilson was born in Honolulu and educated at Stanford University. He made a name for himself as the builder of the serpentine Pali Road on Oahu and worked on many other engineering projects. He became the Superintendent of Highways on Maui in 1907 and Honolulu City Engineer in 1919. Wilson was well known for his

---

[115] George F. M. Nellist, ed., *Pan Pacific Who's Who, An International Reference Work* (Honolulu: Honolulu Star Bulletin, Ltd., 1941), 329; "Hugh Howell Passes Away On Molokai," *The Maui News*, March 20, 1946, 1.

[116] L. C. Newton, ed., *Who's Who in the Counties of Maui and Kauai, Territory of Hawaii*, vol. 1 (Wailuku, Hawaii: Maui Publishing Company, Ltd., 1931), 65.

[117] George F. Nellist, ed., *Men of Hawaii*, Volume IV Revised (Honolulu: Honolulu Star Bulletin, Ltd., 1930), 571; Dawn Duensing, National Register of Historic Places Nomination Form, Hana Belt Road, 36.

[118] Nellist, *Men of Hawaii*, 1925, 242-243; "Charles Bailey Dies Suddenly Hana Hospital," *The Maui News*, March 14, 1931, 1.

years as the mayor of Honolulu.[119] Moses Akiona was born in Keanae and established his contracting firm, Moses Akiona, Ltd., in 1920. In addition to Waikani bridge, Akiona's firm worked on other Maui projects, including Malulani Hospital, Kula Sanitarium, and the Lahaina Courthouse. His business eventually grew to become one of the largest contracting firms in the territory. In the 1960s, Akiona and his sons built a section of the H-1 freeway on Oahu.[120]

One notable architect/civil engineer who also made an important civic contribution to the Hana Belt Road was William D'Esmond. With Wong, D'Esmond designed Wailuanui (Waikani) Bridge. D'Esmond was educated at the British Army Engineering School and the University of Maine. He came to Hawaii with the U.S. Army in 1912 and relocated to Wailuku in 1920, where he established a successful architectural practice. D'Esmond designed Maui's County Office Building in 1927; Paia School, 1926; St. Anthony's School, 1925; and numerous residences on Maui.[121]

## THE HANA BELT ROAD'S IMPACT ON MAUI

The Hana Belt Road has served as one of Maui's premier scenic roads for nearly eighty years. Built to connect Hana to Central Maui and provide access to some of the island's most beautiful scenery, the Hana Belt Road continues to serve its original function. In 2005, the road and its one-lane bridges were one of Maui's most popular visitor attractions, transporting motorists through much of the same scenery as existed when the road opened in 1926: a spectacular thoroughfare chiseled out of cliffs, passing through huge gulches and past waterfalls, with beautiful views of the Pacific Ocean and East Maui's natural features. Small communities such as Keanae and Wailua were still dotted with karo lo`i, country churches, and a three-room school. Along the way were the historic irrigation ditches, dams, and weirs still used for Central Maui's sugar industry.

The Hana Belt Road was the major factor that allowed the development of the Hana Coast in East Maui. The extent of economic development predicted by *Maui News* writers never happened, although many homes and small farms were built along the road as land became accessible. Agriculture remained important, although tourism, as predicted, also developed into a major industry.

Through the decades, alterations to the Hana Belt Road have been limited. In 2005, the Hana Belt Road and its one-lane bridges were the most significant collection of stylistically consistent, historic bridges in the state of Hawaii. The major changes to the road were CRM guardwalls built at the ends of bridge parapets in the 1980s. CRM

---

[119] Nellist, ed., *Pan Pacific Who's Who,* 1941; Perry Edward Hilleary, ed., *Pan Pacific Who's Who, An International Reference Work* (Honolulu: Honolulu Star Bulletin, Ltd., 1954), 708.
[120] Spencer Mason Architects, *State of Hawaii Historic Bridge Inventory and Evaluation*, VI 191, V 14.
[121] Dawn Duensing, National Register of Historic Places Nomination Form, Hana Belt Road, 36; Nellist, *Men of Hawaii,* 1930, 398.

guardwalls, as well as W-beam and thrie-beam steel guardrails, were also added in an effort to conform to more modern safety standards. The road's historic integrity has been maintained with its original alignment, structures, and materials. For the most part, the road retains the character that Low intended and admired: it is still benched into a dramatic ledge above the quaint village of Wailua, taking advantage of endless panoramic opportunities.

The lack of road improvements over the past seventy years has not only preserved the historic character of the Hana Belt Road, but has also helped to maintain the rural character of the Hana District. The lack of an easily-traveled, high-speed traffic artery has served to impede substantial development, which has subsequently allowed Hana and other East Maui communities to remain rural. There are no fast food chain restaurants, chain stores, strip malls or sprawling subdivisions along the Hana Belt Road. Travelers along the Hana Coast are served by the occasional roadside stand and must drive all the way to Hana for limited conveniences such as groceries, gas, and restaurants. With a sizable population of residents of Hawaiian ancestry, Hana is often cited as Maui's "most Hawaiian community." The Hana community has worked together to "Keep Hana Hawaiian," as a bumper sticker urges, and preserve its rural lifestyle and values. In the 1990s, residents rallied against the approval of major developments such as a golf course and an adjacent residential community. Many Hana residents believe that the narrow, winding, and slow Hana Belt Road is a means to "Keep Hana Hawaiian."

## APPENDIX A: Hana Belt Road Historic District Bridge Descriptions

Bridge descriptions were based on fieldwork completed in July 2005 by project historian Dawn E. Duensing. Additional data, including construction dates, was collected from bridge drawings and bridge inspection reports at the Hawaii Department of Transportation (HDOT) and the Maui County Department of Public Works and Environmental Management (DPWEM). Measurements for structures under the state's jurisdiction were noted according to DOT records, which were calculated in feet and tenths of a foot, i.e. 16.1' = sixteen and one-tenth feet. DPWEM records were calculated from metric measurements in most cases. Bridge widths are roadway, curb-to-curb measurements.

Mile markers (MM) were used to provide bridge and culvert locations. Mile marker 0 is situated at the intersection of the Hana Highway and Kaupakulua Road. The Hana Highway Historic District, as noted in the National Register Nomination, begins at approximately MM 3.1. The road under the county's jurisdiction, that is the distance between Hana and Kalepa, is measured from the opposite direction, MM 0 being located at the junction of route 37 and 377 near Pukalani (locally known as "Five Trees").

Bridges and culverts are listed in geographical order east from Mile Marker 0 in Huelo.

**Holua Bridge**

| | |
|---|---|
| Location: | MM 5.09 |
| Year Built: | 1929 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open parapet with balusters, railcap, square post caps |
| Abutments: | reinforced concrete |
| Number of Spans: | one 48.0' span |
| Piers: | n/a |
| Bridge roadway width: | 16.5' |
| Structure Length: | 49'-0" |
| Approach road width: | 20.0' |
| Height above stream: | 28.0' |
| Alignment: | on curve |
| Setting: | rural area |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls adjacent to bridge. Repair on east end of mauka parapet is not "in-kind." |

**Kailua Bridge**

| | |
|---|---|
| Location: | MM 5.87 |
| Year Built: | 1929 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open parapet with balusters, square post caps |
| Abutments: | CRM with concrete seat, CRM wingwalls |
| Piers: | n/a |
| Number of Spans: | one 39.0' span |
| Structure Length: | 40.0' |
| Bridge roadway width: | 20.5' |
| Approach road width: | 24.0' |
| Height above stream: | 18.0' |
| Alignment: | on curve |
| Setting: | rural, house on bluff above bridge |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls adjacent to bridge. Small concrete footing mauka of east abutment may be from an earlier bridge. |

**Na'ili'iliha'ele Bridge**

| | |
|---|---|
| Location: | MM 6.22 |
| Year Built: | 1930 |
| Type: | concrete T-beam |
| Designer/Builder: | County Engineer's Office |
| Parapet: | curved, open parapet with balusters, square post caps |
| Abutments: | reinforced concrete (west), CRM (east), CRM wingwalls |
| Number of Spans: | three spans, maximum span length 21.5' |
| Piers: | reinforced concrete |
| Bridge roadway width: | 19.0' |
| Bridge deck width: | 23.0' |
| Structure Length: | 64.0' |
| Approach road width: | 24.0' |
| Height above stream: | 20.0' |
| Alignment: | on curve |
| Setting: | rural |
| Condition: | appears to be in good condition |
| Other: | Bridge is curved, design similar to West Wailuaiki Bridge. CRM guardwalls. Bridge and walls painted white. Old abutments on mauka side. |

**Culvert #1**

| | |
|---|---|
| Location: | MM 7.05 |
| Year Built: | unknown |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid concrete parapet |
| Abutments: | CRM |
| Number of Spans: | one span |
| Piers: | n/a |
| Structure Length: | approximately 9'-0" |
| Alignment: | curve |
| Setting: | rural area |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. Painted white. Heavy vegetation. |

**'O'opuola Bridge**

| | |
|---|---|
| Location: | MM 7.95 |
| Year Built: | 1925, altered 1931 |
| Type: | concrete T-beam |
| Designer/Builder: | County Engineer's Office |
| Parapet: | curved, open parapet with balusters, square post caps |
| Abutments: | cut basalt with CRM wingwalls |
| Number of Spans: | one 27.0' span |
| Piers: | n/a |
| Bridge roadway width: | 20.4' |
| Bridge deck width: | 21.8' |
| Structure Length: | 29.4' |
| Approach road width: | 24.0' |
| Height above stream: | 20.0' |
| Alignment: | on curve |
| Setting: | rural, rather remote; lush vegetation includes mountain apple and kukui trees |
| Condition: | appears to be in good condition |
| Other: | Bridge is curved. CRM guardwalls. Asphalt has been used to super elevate, resulting in makai wall being shorter than mauka wall. |

**Makanali Bridge**

| | |
|---|---|
| Location: | MM 8.22 |
| Year Built: | 1928 |
| Type: | reinforced concrete slab |
| Designer/Builder: | Department of Public Works |
| Parapet: | open parapet with balusters, square post caps |
| Abutments: | CRM with CRM wingwalls |
| Number of Spans: | one 13.0'span |
| Piers: | n/a |
| Bridge roadway width: | 16.5' |
| Bridge deck width: | 17.8' |
| Structure Length: | 18.0' |
| Approach road width: | 18.0' |
| Height above stream: | 15.0' |
| Alignment: | on curve |
| Setting: | rural area |
| Condition: | appears to be in good condition; guava tree growing beneath bridge |
| Other: | CRM guardwalls; skew angle is 20°-00'-00". |

**Ka'aiea ('Aiea) Bridge**

| | |
|---|---|
| Location: | MM 8.57 |
| Year Built: | 1928 |
| Type: | concrete T-beam |
| Designer/Builder: | Department of Public Works |
| Parapet: | open parapet with balusters, square post caps |
| Abutments: | CRM with concrete seat, CRM wingwalls |
| Number of Spans: | one 18.0' span |
| Piers: | n/a |
| Bridge roadway width: | 15.0' |
| Structure Length: | 22.0' |
| Approach road width: | 22.0' |
| Height above stream: | 12.5' |
| Alignment: | on curve |
| Setting: | remote area at the end of a horseshoe-shaped valley, adjacent to irrigation works |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. Repair on east end of mauka parapet was not an "in-kind" repair: does not match original design. |

**Waikamoi Bridge**

| | |
|---|---|
| Location: | MM 9.88 |
| Year Built: | 1911 |
| Type: | reinforced concrete girders |
| Designer/Builder: | Hugh Howell, Sr. Engineer, County Engineer Office |
| Parapet: | solid concrete parapet with peaked railcap |
| Abutments: | reinforced concrete, CRM wingwalls |
| Number of Spans: | two spans, maximum length 16.0' |
| Piers: | reinforced concrete pier is arched, pier nose curved on upstream side |
| Bridge roadway width: | 12.9' |
| Bridge deck width: | 14.4' |
| Structure Length: | 41.0' |
| Approach road width: | 17.0' |
| Height above stream: | 19.0' |
| Alignment: | on curve |
| Setting: | remote, end of a v-shaped valley, adjacent to irrigation works. |
| Condition: | fair to good condition. Collision damage both parapets, repair on makai wall does not match original design. |
| Other: | CRM guardwalls. Asphalt shortens parapet height to as little as 28". Design is same as Haipua'ena Bridge. |

**Puohokamoa Bridge**

| | |
|---|---|
| Location: | MM 11 |
| Year Built: | 1912 |
| Type: | reinforced concrete T-beam |
| Parapet: | solid concrete parapets |
| Abutments: | reinforced concrete abutments with CRM wingwalls; abutment is wider than bridge deck on mauka side |
| Number of Spans: | two spans, 29.1' and 19.6' |
| Piers: | concrete pier on CRM pier |
| Bridge roadway width: | 15.4' |
| Bridge deck width: | 16.9' |
| Structure Length: | 55.2' |
| Approach road width: | 18.0' |
| Height above stream: | 15.0' |
| Alignment: | on curve |
| Setting: | at the end of a v-shaped valley, stream is a popular swimming hole; adjacent to arboretum. |
| Condition: | Appears to be in good condition. |
| Other: | CRM guardwalls. Adjacent property owner has built inappropriate concrete wall and gate at west end of bridge that do not complement road's historic character. |

**Haipua'ena Bridge**

| | |
|---|---|
| Location: | MM 11.44 |
| Year Built: | 1912 |
| Type: | reinforced concrete girder |
| Designer/Builder: | Hugh Howell, Sr. Engineer, County Engineer's Office |
| Parapet: | solid concrete parapets with peaked railcap, 1911 inscribed on makai elevation |
| Abutments: | CRM with CRM wingwalls |
| Number of Spans: | two, maximum span length 14.0' |
| Piers: | reinforced concrete pier is arched, pier nose curved on upstream side |
| Bridge roadway width: | 12.8' |
| Structure Length: | 34.0' |
| Approach road width: | 17.0' |
| Height above stream: | 11.0' |
| Alignment: | on curve |
| Setting: | remote area. |
| Condition: | fair to good condition; cracks in parapets |
| Other: | CRM guardwalls. Design is the same as Waikamoi Bridge. |

**Kolea (Punalau) Bridge**

| | |
|---|---|
| Location: | MM 13.16 |
| Year Built: | 1911 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | Hugh Howell, Sr. Engineer, County Engineer's Office |
| Parapet: | solid concrete parapets, 1911 inscribed on makai elevation |
| Abutments: | reinforced concrete, CRM wingwalls |
| Number of Spans: | one 30.0' span |
| Piers: | n/a |
| Bridge roadway width: | 12.8' |
| Bridge deck width: | 14.1' |
| Structure Length: | 33.6' |
| Approach road width: | 17.0' |
| Height above stream: | 13.0' |
| Alignment: | on curve |
| Setting: | Honomanu Valley, heavy vegetation |
| Condition: | appears to be in good condition; west end of makai wall is damaged. |
| Other: | CRM guardwalls; large boulder on west makai end appears to have been placed as a 'guardrail.' Some retaining walls are tiered, covered with shotcrete and vines. |

**Honomanu Bridge**

| | |
|---|---|
| Location: | MM 13.71 |
| Year Built: | 1911 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | Hugh Howell, Sr. Engineer, County Engineer's Office |
| Parapet: | solid concrete |
| Abutments: | reinforced concrete, CRM wingwalls |
| Number of Spans: | two, maximum span length 23.9' |
| Piers: | reinforced concrete pier |
| Bridge roadway width: | 12.7' |
| Structure Length: | 48.0' |
| Approach road width: | 17.0' |
| Height above stream: | 15.0' |
| Alignment: | on curve |
| Setting: | lush vegetation, at base of Honomanu Valley |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls adjacent to bridge. |

**Nua'ailua Bridge**

| | |
|---|---|
| Location: | MM 15.38 |
| Year Built: | 1911 |
| Date Altered: | widened in 1940 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | Joseph Matson, Sr. Engineer, County Engineer's Office |
| Parapet: | original parapet (makai) is open balustrade, mauka parapet is solid concrete |
| Abutments: | reinforced concrete, CRM wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Bridge roadway width: | 24.0' |
| Bridge deck width: | 27.5' |
| Structure Length: | 34.5' |
| Approach road width: | 31.0' |
| Height above stream: | 17.0' |
| Alignment: | on curve |
| Setting: | Honomanu Valley, remote, grassy shoulder area |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. |

**Pi`ina`au Bridge**

| | |
|---|---|
| Location: | MM 16.6 |
| Year Built: | 1916 |
| Date Altered: | late 1930s or early 1940s |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open parapet with balusters, railcap |
| Abutments: | reinforced concrete on bedrock |
| Number of Spans: | one |
| Piers: | n/a |
| Bridge roadway width: | 19.3’ |
| Bridge deck width: | 20.5 |
| Structure Length: | 28.4’ |
| Approach road width: | 20.5’ |
| Height above stream: | 20.0’ |
| Alignment: | tangent |
| Setting: | rural residential, Y intersection with Lower Keanae Road |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. |

**Palauhulu Bridge**

| | |
|---|---|
| Location: | MM 16.77 |
| Year Built: | 1916 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | curved, open parapet with balusters |
| Abutments: | reinforced concrete abutments on bedrock, CRM wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Bridge roadway width: | 20.4’ |
| Bridge deck width: | 21.6’ |
| Structure Length: | 31.0’ |
| Approach road width: | 25.0’ |
| Height above stream: | 20.5’ |
| Alignment: | on curve |
| Setting: | rural residential, popular swimming hole below bridge, old abutments on makai side of structure |
| Condition: | appears to be in good condition, thick layer of asphalt |
| Other: | CRM guardwalls. Asphalt used to super-elevate the curves; west end of mauka wall is about 8” high. |

**Culvert #2**

| | |
|---|---|
| Location: | MM 17.48 |
| Year Built: | unknown |
| Date Altered: | circa 1937-1940 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid parapet on makai side; CRM wall on mauka side |
| Abutments: | concrete (makai side), CRM (mauka side), battered CRM wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 10' |
| Alignment: | on curve |
| Setting: | rural residential, agricultural, taro lo'i nearby |
| Condition: | good condition |
| Other: | Similar to Culverts #3 and 4; all three structures in close proximity. Culvert #2 is a pair of culverts: new culvert was built makai of original when the road was widened, circa 1937-1940 (date estimated Nu`uailua and Waiokamilo Bridge drawings). CRM guardwalls on makai side of culvert. |

**Culvert #3**

| | |
|---|---|
| Location: | MM 17.53 |
| Year Built: | unknown |
| Date Altered: | circa 1937-1940 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid parapet on makai side; CRM wall on mauka side |
| Abutments: | concrete (makai), CRM (mauka), CRM wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 15' |
| Alignment: | on curve |
| Setting: | rural residential, agricultural, taro lo'i nearby |
| Condition: | good condition |
| Other: | Similar to Culverts #2 and 4; all three culverts in close proximity. Structure is a pair of culverts: new culvert was built makai of the original when the road was widened, circa 1937-1940 (estimated from Nu`uailua and Waiokamilo Bridge drawings). CRM guardwalls on makai side of culvert. |

**Culvert #4**

| | |
|---|---|
| Location: | MM 17.55 |
| Year Built: | unknown |
| Date Altered: | circa 1937-1940 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid concrete parapets |
| Abutments: | concrete (makai), CRM (mauka), CRM wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 13' |
| Alignment: | on curve |
| Setting: | rural residential, agricultural, taro lo'i nearby |
| Condition: | good condition |
| Other: | CRM guardwalls. This structure is a pair of culverts. New culvert built makai of the original when the road was widened, circa 1937-1940 (estimated from comparison with Nu`uailua and Waiokamilo Bridge drawings). |

**Waiokamilo Bridge**

| | |
|---|---|
| Location: | MM 18 |
| Year Built: | 1921 |
| Date Altered: | 1937 |
| Type: | concrete T-beam |
| Designer/Builder: | D.K. Kapohakimohewa, County Engineer's Office |
| Parapet: | open parapet, cross-shaped voids rectangular railcap |
| Abutments: | reinforced concrete, CRM wingwalls |
| Number of Spans: | one 20.0' span |
| Piers: | n/a |
| Bridge roadway width: | 34.0', two lanes |
| Bridge deck width: | 36.0' |
| Structure Length: | 24.0' |
| Approach road width: | 27.0' |
| Height above stream: | 11.0' |
| Alignment: | on tangent |
| Setting: | rural residential, snack shops adjacent to bridge |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. Bridge is painted white. Waiokamilo Culvert, which features the same parapet design, is immediately east of this bridge. |

**Waiokamilo Culvert**

| | |
|---|---|
| Location: | MM 18 |
| Year Built: | unknown |
| Date Altered: | unknown |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | open parapet, cross-shaped voids, railcap |
| Abutments: | reinforced concrete |
| Number of Spans: | one |
| Piers: | n/a |
| Bridge roadway width: | 34'-0" |
| Structure Length: | 24'-0" |
| Approach road width: | 27'-0" |
| Height above stream: | approximately 11' |
| Alignment: | tangent |
| Setting: | adjacent to Y intersection with Lower Wailua Road, rural residential, snack shops nearby |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. Culvert is painted white. Waiokamilo Bridge, which features the same parapet design, is west of this culvert. |

**Waikani Bridge**

| | |
|---|---|
| Location: | MM 19.39 |
| Year Built: | 1926 |
| Type: | concrete arch |
| Designer/Builder: | William D'Esmond and A. H. Wong, designers; Moses Akiona Company, builder |
| Parapet: | open baluster, pyramid-shaped post caps |
| Abutments: | reinforced concrete |
| Number of Spans: | one span, 83.0' |
| Piers: | n/a |
| Bridge roadway width: | 17.0' |
| Bridge deck width: | 20.0' |
| Structure Length: | 108.0' |
| Approach road width: | 27.0' |
| Height above stream: | 36.0' |
| Alignment: | on curve |
| Setting: | remote, rural, spans deep gorge, waterfall upstream |
| Condition: | Superstructure in good condition, parts of mauka parapet and columns missing, replaced by CRM walls. |
| Other: | CRM guardwalls. See original drawings for parapet design. |

**West Wailuaiki Bridge**

| | |
|---|---|
| Location: | MM 20.83 |
| Year Built: | 1926 |
| Date Altered: | 1937 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | A. H. Wong, County Engineer's Office |
| Parapet: | curved, open parapet with balusters, railcap |
| Abutments: | reinforced concrete |
| Number of Spans: | three |
| Piers: | reinforced concrete |
| Bridge roadway width: | 22.0' |
| Bridge deck width: | 22.0' |
| Structure Length: | 71.6' |
| Approach road width: | 21.0' |
| Height above stream: | 15.0' |
| Alignment: | on curve |
| Setting: | remote rural location, bridge spans a deep valley, small waterfall upstream, waterfall below bridge |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls adjacent to bridge. Alterations dated 1937 are not obvious. |

**East Wailuaiki Bridge**

| | |
|---|---|
| Location: | MM 21.27 |
| Year Built: | 1926 |
| Date Altered: | |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | A. P. Low, County Engineer |
| Parapet: | open parapet with balusters, railcap |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one 30.0' span |
| Piers: | n/a |
| Bridge roadway width: | 18.4' |
| Bridge deck width: | 20.4' |
| Structure Length: | 34.0' |
| Approach road width: | 20.0' |
| Height above stream: | 16.0' |
| Alignment: | on curve |
| Setting: | remote rural location at the end of a v-shaped valley |
| Other: | CRM guardwalls; painted white; thick layer of asphalt on bridge deck. |

**Kopili`ula Bridge**

| | |
|---|---|
| Location: | MM 21.81 |
| Year Built: | 1926 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | 2'-thick, solid concrete parapets, peaked railcap |
| Abutments: | reinforced concrete, CRM wingwalls |
| Number of Spans: | two, maximum span length 38.5' |
| Piers: | two reinforced concrete columns, notched at connection with girders, pier nose curved on upstream side |
| Bridge roadway width: | 14.3' |
| Bridge deck width: | 17.7' |
| Structure Length: | 77.0' |
| Approach road width: | 23.0' |
| Height above stream: | 11.0' |
| Alignment: | on curve |
| Setting: | remote, rural, adjacent to irrigation works, concrete dam |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. Ditch dam and sluice gate are underneath bridge; sluice gate gears on mauka wall; ditch tunnel on mauka, west side of bridge. |

**Pua`aka`a (Waiohue) Bridge**

| | |
|---|---|
| Location: | MM 22.31 |
| Year Built: | 1926 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster parapet, rectangular railcap, square post cap |
| Abutments: | reinforced concrete with CRM wingwalls |
| Number of Spans: | one 19.5' span |
| Piers: | n/a |
| Bridge roadway width: | 22.4' |
| Bridge deck width: | 24.2' |
| Structure Length: | 20.2' |
| Approach road width: | 20.0' |
| Height above stream: | 9.0' |
| Alignment: | on curve |
| Setting: | remote area just west of Pua`aka`a State Wayside, lush vegetation |
| Condition: | appears to be in good condition, weeds growing between parapet and road deck. |
| Other: | CRM guardwalls; CRM wingwalls are covered with shotcrete. |

**Waiohue Bridge**

| | |
|---|---|
| Location: | MM 22.47 |
| Year Built: | 1926 |
| Date Altered: | 1937 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete with peaked railcap, 'panel' design on mauka parapet |
| Abutments: | CRM, with CRM wingwalls |
| Number of Spans: | two, maximum span length is 16.0' |
| Piers: | CRM pier on solid rock |
| Bridge roadway width: | 13.3' |
| Bridge deck width: | 14.8 |
| Structure Length: | 40.0' |
| Approach road width: | 20.0' |
| Height above stream: | 8.0' |
| Alignment: | on curve |
| Setting: | remote area at Pua'aka'a State Wayside with parking area, comfort station, picnic tables/shelters, waterfall and pool, lush vegetation |
| Condition: | good condition, recent repairs evident on girders, ferns growing along parapet/road deck joints. |
| Other: | CRM guardwalls. Pipe railings along parking area adjacent to bridge. |

**Waiohuolua Bridge**

| | |
|---|---|
| Location: | MM 22.98 |
| Year Built: | circa 1920 |
| Date Altered: | circa 1984 (based on DOT bridgeinspection photos) |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete mauka wall; w-beam guardrail for makai wall |
| Abutments: | CRM |
| Number of Spans: | one 15.0' span |
| Piers: | n/a |
| Bridge roadway width: | 12.4' |
| Bridge deck width: | 13.8' |
| Structure Length: | 18.2' |
| Approach road width: | 16.0 |
| Height above stream: | 8.0' |
| Alignment: | on curve |
| Setting: | remote, heavy vegetation; spans a narrow gorge; bridge |

| | |
|---|---|
| | immediately west of Bridge #2 and Pa'akea Bridge. |
| Condition: | poor condition; remaining bridge parapet has horizontal crack at mid-height that runs almost entire length of parapet. |
| Other: | Waiohuolua, Bridge #2, and Pa'akea bridges are close together, which presents a challenging alignment for modern motor vehicle traffic. It appears that W-beam guardrails attached to mauka wall were stronger than concrete parapet, because when impacted, the parapet cracked. Skew angle 5°-00'-00". |

**Bridge #2**

| | |
|---|---|
| Location: | MM 23 |
| Year Built: | circa 1920 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete with panel design and peaked railcap |
| Abutments: | reinforced concrete on CRM |
| Number of Spans: | one 16.4' span |
| Piers: | n/a |
| Bridge roadway width: | 12.5' |
| Bridge deck width: | 13.9 |
| Structure Length: | 20.5' |
| Approach road width: | 16.0' |
| Height above stream: | 7.0' |
| Alignment: | on curve |
| Setting: | remote area, heavy vegetation; bridge is immediately west of Pa'akea Bridge; CRM wall separates the bridges. |
| Condition: | appears to be in good condition |
| Other: | Waiohuolua, Bridge #2, and Pa'akea bridges are situated close together and present a challenging alignment for modern motor vehicle traffic. CRM guardwalls. CRM walls between Bridge #2 and Pa'akea Bridge built in April 1985. |

**Pa`akea Bridge**

| | |
|---|---|
| Location: | MM 23.01 |
| Year Built: | circa 1920 |
| Date Altered: | 1937 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, peaked railcap and panel detail on makai parapet |
| Abutments: | CRM and cut basalt, CRM wingwalls |

| | |
|---|---|
| Number of Spans: | one |
| Piers: | n/a |
| Bridge roadway width: | 12.6’ |
| Bridge deck width: | 14.0’ |
| Structure Length: | 19.3’ |
| Approach road width: | 18.0’ |
| Height above stream: | 7.0’ |
| Alignment: | on curve |
| Setting: | remote area; adjacent to Pa‘akea Bridge, bridges separated by CRM wall. Waiohuolua Bridge immediately to west. |
| Condition: | appears to be in good condition |
| Other: | Waiohuolua, Bridge #2, and Pa`akea bridges are situated close together and present a challenging alignment for modern motor vehicle traffic. CRM guardwalls. CRM walls between Bridge #2 and Pa‘akea Bridge built in April 1985. The original mauka wall is in the streambed below; 1937 alteration was probably a new solid-concrete parapet. |

**Kapa`ula Bridge**

| | |
|---|---|
| Location: | MM 23.37 |
| Year Built: | 1926 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster with railcap, square post caps |
| Abutments: | concrete, CRM wingwalls |
| Number of Spans: | two, maximum span length is 21.0’ |
| Piers: | reinforced concrete on lava dike |
| Bridge roadway width: | 16.3’ |
| Bridge deck width: | 18.0’ |
| Structure Length: | 49.0’ |
| Approach road width: | 17.0’ |
| Height above stream: | 41.0’ west span, 12.0’ east span |
| Alignment: | on tangent |
| Setting: | remote, bridge spans a narrow gorge, heavily overgrown, lava dike in streambed. |
| Condition: | good condition, thick asphalt as high as bottom of balusters |
| Other: | CRM guardwalls. |

**Hanawi Bridge**

| | |
|---|---|
| Location: | MM 23.99 |
| Year Built: | 1926 |
| Type: | concrete barrel arch |
| Designer/Builder: | County Engineer’s Office |
| Parapet: | open baluster, some square post caps, parapets curved, |

| | |
|---|---|
| | some posts and caps shaped to follow curve |
| Abutments: | reinforced concrete, battered CRM wingwalls |
| Number of Spans: | one 36.0' span |
| Piers: | n/a |
| Bridge roadway width: | 20.5' |
| Bridge deck width: | 23.5' |
| Structure Length: | 60.0' |
| Approach road width: | 20.0' |
| Height above stream: | 19.4' |
| Alignment: | on curve |
| Setting: | Situated at end of a v-shaped valley in a remote, area with lush vegetation. Small building on west end. Upstream are pool, a small waterfall, and a rocky gorge. |
| Condition: | appears in good condition |
| Other: | Rough finish on concrete face below road deck/above arch. Bridge is wider than average. Design is identical to Kuhiwa Bridge. CRM guardwalls. |

**East Hanawi Bridge**

| | |
|---|---|
| Location: | MM 24.2 |
| Year Built: | 1926 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one 18.4' span |
| Piers: | n/a |
| Bridge roadway width: | 16.2' |
| Bridge deck width: | 18.1' |
| Structure Length: | 23.0' |
| Approach road width: | 16.2' |
| Height above stream: | 15.0' |
| Alignment: | on tangent |
| Setting: | remote location, bridge spans a small stream |
| Condition: | appears to be in good condition, thick asphalt on road deck |
| Other: | Moss on parapets. CRM guardwalls. |

**East Hanawi Culvert**

| | |
|---|---|
| Location: | MM 24.2 |
| Year Built: | unknown |
| Type: | flat slab? |
| Parapet: | solid concrete with railcap |
| Abutments: | reinforced concrete with CRM wingwalls |
| Number of Spans: | one |

| | |
|---|---|
| Piers: | n/a |
| Structure Length: | approximately 11'-8" |
| Approach road width: | 16.2' |
| Alignment: | on tangent |
| Setting: | remote, immediately east of East Hanawi Bridge |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. |

**Makapipi Bridge**

| | |
|---|---|
| Location: | MM 24.98 |
| Year Built: | 1926 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster, square railcaps |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | two |
| Piers: | reinforced concrete |
| Bridge roadway width: | 16'-0" |
| Structure Length: | 40.0' |
| Approach road width: | 16.0' |
| Height above stream: | 12.0' |
| Alignment: | on curve |
| Setting: | heavy vegetation, rural area, at Lower Nahiku Road intersection |
| Condition: | appears to be in good condition, potholes in pavement. |
| Other: | CRM guardwalls, CRM walls also alongside the road west of bridge. |

**Kuhiwa Bridge**

| | |
|---|---|
| Location: | MM 25.2 |
| Year Built: | 1926 |
| Type: | concrete barrel arch |
| Designer/Builder: | A. H. Wong, County Engineer's Office |
| Parapet: | open baluster, square post caps |
| Abutments: | reinforced concrete |
| Number of Spans: | one 36.5'span |
| Piers: | n/a |
| Bridge roadway width: | 16.5' |
| Bridge deck width: | 18.3' |
| Structure Length: | 60.0' |
| Approach road width: | 19.0' |
| Height above stream: | 37.0' |
| Alignment: | on curve |
| Setting: | remote area adjacent to Kuhiwa State Forest Reserve |

| | |
|---|---|
| Condition: | mauka parapet has been hit, west end leans away from road, mauka side of wingwall is cracked on west end. 1992 bridge inspection report noted that damaged mauka railing was "practically useless." Thick asphalt and low parapets. |
| Other: | CRM guardwalls. Hanawi and Kuhiwa are identical structures, except that the rough-textured finish on fascia was not applied to Kuhiwa. |

**Kupukoi Bridge**

| | |
|---|---|
| Location: | MM 25.42 |
| Year Built: | 1926 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster with square caps |
| Abutments: | CRM abutments and wingwalls, abutments on bedrock |
| Number of Spans: | one 21.4' span |
| Piers: | n/a |
| Bridge roadway width: | 16.0' |
| Structure Length: | 24.5' |
| Approach road width: | 17.0' |
| Height above stream: | 15.0' |
| Alignment: | on tangent |
| Setting: | spans a narrow gorge, road width in the area is less than two lanes; rural with a few residences; lush vegetation |
| Condition: | moss covered, appears to be in good condition |
| Other: | CRM guardwalls. |

**Kahalaowaka Bridge**

| | |
|---|---|
| Location: | MM 25.95 |
| Year Built: | 1926 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster |
| Abutments: | CRM with CRM wingwalls |
| Number of Spans: | one 22.0' span |
| Piers: | n/a |
| Bridge roadway width: | 16.0' |
| Structure Length: | 24.0' |
| Approach road width: | 16.5' |
| Height above stream: | 9.0' |
| Alignment: | on curve |
| Setting: | remote, heavily overgrown area |
| Condition: | appears to be in good condition, thick layer of asphalt, dirt |

| | |
|---|---|
| | on road deck is as high as bottom of balusters, weeds growing on bridge obscure view |
| Other: | Moss covered, CRM guardwalls. |

**Pupape-Manawaikeae Bridge**

| | |
|---|---|
| Location: | MM 26.48 |
| Year Built: | 1926 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster, square post caps |
| Abutments: | west is reinforced concrete, east is CRM abutment with concrete seat, CRM wingwalls |
| Number of Spans: | one 20.7' span |
| Piers: | n/a |
| Bridge roadway width: | 16.3' |
| Structure Length: | 24.3' |
| Approach road width: | 17.0' |
| Height above stream: | 16.0' |
| Alignment: | on curve |
| Setting: | lush vegetation, residence on west/mauka side of bridge |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls. |

**Kahawaihapapa Bridge**

| | |
|---|---|
| Location: | MM 26.6 |
| Year Built: | 1922 or 25? |
| Type: | concrete T-beam |
| Designer/Builder: | built by County Engineer's Office |
| Parapet: | open baluster |
| Abutments: | CRM with CRM wingwalls |
| Number of Spans: | three |
| Piers: | one concrete pier; one CRM pier, which may date to 1906 |
| Bridge roadway width: | 16.4' |
| Structure Length: | 60.0' |
| Approach road width: | 18.0' |
| Height above stream: | 15.0' |
| Alignment: | on curve |
| Setting: | nearby residential |
| Condition: | good condition; east end of mauka wall is damaged |
| Other: | CRM guardwalls adjacent to bridge. |

**Kea`aiki Bridge**

| | |
|---|---|
| Location: | MM 26.77 |
| Year Built: | 1921 or 1925 |
| Type: | concrete T-beam |
| Designer/Builder: | built by County Engineer's Office |
| Parapet: | open baluster |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one 19.1' span |
| Piers: | n/a |
| Bridge roadway width: | 16.5' |
| Structure Length: | 22.8' |
| Approach road width: | 19.0' |
| Height above stream: | 27.0' |
| Alignment: | on curve |
| Setting: | rural residential area with tropical flower farms |
| Condition: | appears to be in good condition, weeds on bridge are so high that parapets are hidden from view |
| Other: | moss-covered parapets and CRM guardwalls |

**West Waioni Bridge**

| | |
|---|---|
| Location: | MM 26.94 |
| Year Built: | 1920 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one 24.4' span |
| Piers: | n/a |
| Bridge roadway width: | 16.6' |
| Bridge deck width: | 18.3' |
| Structure Length: | 29.0' |
| Approach road width: | 18.0' |
| Height above stream: | 15.0' |
| Alignment: | on curve |
| Setting: | rural residential, coconut stand nearby |
| Condition: | Good condition, parapets in good condition |
| Other: | CRM guardwalls. Bridge is painted white. Bridge is a twin<br><br>of Waioni, which is .1 mile to the east. |

**Waioni Bridge**

| | |
|---|---|
| Location: | MM 27.01 |
| Year Built: | 1920 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one 20.6' span |
| Piers: | n/a |
| Bridge roadway width: | 16.2' |
| Bridge deck width: | 18.0' |
| Structure Length: | 24.0' |
| Approach road width: | 18.0' |
| Height above stream: | 11.0' |
| Alignment: | on curve |
| Setting: | rural residential; coconut stand |
| Condition: | good condition |
| Other: | Bridge is a twin of West Waioni, which is .1 mile to the west. CRM guardwalls; painted white. |

**Lanikele Bridge**

| | |
|---|---|
| Location: | MM 27.76 |
| Year Built: | 1917 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster |
| Abutments: | CRM, dry-laid rock wingwalls |
| Number of Spans: | two, maximum span length 22.0' |
| Piers: | reinforced concrete |
| Bridge roadway width: | 16.1' |
| Structure Length: | 51.0' |
| Approach road width: | 16.0' |
| Height above stream: | 17.0' |
| Alignment: | on tangent |
| Setting: | rural residential |
| Condition: | appears to be in good condition; recent maintenance and repairs evident on pier |
| Other: | CRM guardwalls; moss-covered parapets; painted white. |

**Helele`ike`oha Bridge**

| | |
|---|---|
| Location: | MM 27.86 |
| Year Built: | 1917 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |

| | |
|---|---|
| Parapet: | open baluster |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Bridge roadway width: | 16.2’ |
| Structure Length: | 28.0’ |
| Approach road width: | 16.0’ |
| Height above stream: | 12.0’ |
| Alignment: | on curve |
| Setting: | rural residential |
| Condition: | appears to be in good condition, |
| Other: | CRM guardwalls; moss-covered parapets. |

**`Ula`ino Bridge**

| | |
|---|---|
| Location: | MM 27.98 |
| Year Built: | 1914 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | open baluster |
| Abutments: | CRM abutments with concrete seat, CRM wingwalls |
| Number of Spans: | two, maximum span length 18.8’ |
| Piers: | reinforced concrete |
| Bridge roadway width: | 16.4’ |
| Bridge deck width: | 18.0’ |
| Structure Length: | 39.6’ |
| Approach road width: | 18.0’ |
| Height above stream: | 12.0’ |
| Alignment: | on curve |
| Setting: | spans a beautiful lava rock stream; rural residential neighborhood |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls; moss-covered parapets. |

**Mokulehua Bridge**

| | |
|---|---|
| Location: | MM 28.31 |
| Year Built: | 1908 |
| Type: | concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete; may have had a peaked railcap--part of one remains on the makai parapet |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | three |
| Piers: | reinforced concrete; pier nose is curved on upstream side |
| Bridge roadway width: | 13.9’ |

| | |
|---|---|
| Bridge deck width: | 15.2' |
| Structure Length: | 48.2' |
| Approach road width: | 16.0' |
| Height above stream: | 21.0' |
| Alignment: | on curve |
| Setting: | rural residential; waterfall below bridge |
| Condition: | good condition; bridge and walls were repaired after flooding in late 200? |
| Other: | CRM guardwalls. If DOT records are accurate, this bridge is the oldest bridge on the Hana Belt Road. |

**Oilowai Bridge**

| | |
|---|---|
| Location: | MM 29.18 |
| Year Built: | 1914 |
| Type: | concrete T-beam |
| Designer/Builder: | built by Wilson & McCandless |
| Parapet: | open baluster |
| Abutments: | CRM abutments with concrete seats, CRM wingwalls |
| Number of Spans: | one 20.6' span |
| Piers: | n/a |
| Bridge roadway width: | 16.0' |
| Bridge deck width: | 18.0' |
| Structure Length: | 22.8' |
| Approach road width: | 17.0' |
| Height above stream: | 22.0' |
| Alignment: | on curve |
| Setting: | bridge spans deep gully; trees and heavy vegetation |
| Condition: | appears to be in good condition |
| Other: | moss covered; concrete piers at ends of parapets with thrie-beam and W-beam guardrail attached, thrie-beam overwhelms parapets. |

**Honoma`ele Bridge**

| | |
|---|---|
| Location: | MM 29.54 |
| Year Built: | 1924 |
| Type: | concrete T-beam |
| Designer/Builder: | built by County Engineer's Office |
| Parapet: | open baluster |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | two, east span 17.5', west 15.5' |
| Piers: | reinforced concrete |
| Bridge roadway width: | 16.0' |
| Structure Length: | 38.8' |
| Approach road width: | 17.0' |

| | |
|---|---|
| Height above stream: | 4.0’ |
| Alignment: | on curve |
| Setting: | rural setting with pastoral fields on mauka side of road |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls on three ends; west end of mauka parapet has a concrete structure with thrie-beam and W-beam guardrail attached. |

**Culvert #5**

| | |
|---|---|
| Location: | MM 29.85 |
| Year Built: | unknown |
| Type: | concrete slab |
| Designer/Builder: | unknown |
| Parapet: | open baluster; high, wide end posts |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 18’ |
| Alignment: | on curve |
| Setting: | mauka of road is heavily forested; makai of road is open pastoral land |
| Condition: | appears to be in good condition, thick asphalt, weeds growing on both sides of parapets |
| Other: and | concrete structures adjacent to parapets with thrie-beam<br><br>W-beam guardrails attached; thrie-beam overwhelms original parapets |

**Culvert #6**

| | |
|---|---|
| Location:` | MM 30.09 |
| Year Built: | unknown |
| Type: | concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | open baluster with high endposts |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 12’ |
| Alignment: | on curve |
| Setting: | rural residential, pastoral setting |
| Condition: | appears in fair/good condition, thick layers of asphalt cover bottom of balusters; some collision damage; weeds growing along road deck/parapet joints |

| | |
|---|---|
| Other: | concrete structures at ends of parapets with thrie-beam and W-beam guardrails attached; thrie-beam overwhelms original parapets. |

**Culvert #7**

| | |
|---|---|
| Location: | MM 30.20 |
| Year Built: | unknown |
| Type: | concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | open baluster with high endposts |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 6’ |
| Alignment: | on curve |
| Setting: | rural, pastoral setting |
| Condition: | appears to be in good condition, thick layer of asphalt; heavy moss; weeds in road deck/parapet joints |
| Other: | concrete piers at ends of parapets with thrie-beam and W-beam guardrails attached; thrie-beam overwhelms original parapets. |

**Culvert #8**

| | |
|---|---|
| Location: | MM 30.57 |
| Year Built: | unknown |
| Type: | concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | open baluster |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 13’ |
| Alignment: | on curve |
| Setting: | rural residential, thick vegetation |
| Condition: | appears in fair/good condition; thick layers of asphalt cover the bottom of balusters; some collision damage |
| Other: | concrete piers at ends of parapets with thrie-beam and W-beam guardrails attached; thrie-beam overwhelms original parapets. |

**Kawaipapa Bridge**

| | |
|---|---|
| Location: | MM 33.44 |
| Year Built: | 1947 |
| Date Altered: | 1991 |
| Type: | concrete girder; concrete box culvert |
| Designer/Builder: | unknown |
| Parapet: | concrete posts and rail, dates inscribed at ends of parapets |
| Abutments: | concrete with concrete wingwalls |
| Number of Spans: | two, maximum length 33.0' |
| Piers: | concrete |
| Bridge roadway width: | 26.0' |
| Bridge deck width: | 31.4' |
| Structure Length: | 72.7', original bridge |
| Approach road width: | 28.0' |
| Height above stream: | 11' |
| Alignment: | tangent |
| Setting: | in Hana town, adjacent to Hana Health Center |
| Condition: | good condition |
| Other: | rubrails attached to parapets. Bridge extension using a box culvert was built in 1991 at west end of original bridge; matches parapet design of original structure. |

**Culvert #9**

| | |
|---|---|
| Location: | MM 33.74 |
| Year Built: | 1915 |
| Type: | concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid wall with peaked railcap, 1915 inscribed on makai parapet |
| Abutments: | concrete with CRM wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 15' |
| Approach road width: | 16.0' |
| Alignment: | almost tangent |
| Setting: | adjacent to county office and police station, public works baseyard, fire station; pasture is on the mauka side of road |
| Condition: | appears to be in good condition |
| Other: | rock wingwalls extend downstream from the culvert; W-beam guardrails at both ends of makai parapet |

**Culvert #10**

| | |
|---|---|
| Location: | MM 34 |
| Year Built: | 1915 |
| Type: | concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid wall with peaked railcap, 1915 inscribed on makai parapet |
| Abutments: | concrete with CRM wingwalls, concrete abutment rests on CRM on west side |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 14.0’ |
| Approach road width: | 16.0’ |
| Alignment: | almost tangent |
| Setting: | east of the fire station; pasture on the mauka side of road |
| Condition: | appears in good/fair condition; so many weeds growing on the bridge it is difficult to see parapets; mauka parapet has damaged railcap and exposed rebar |
| Other: | MM 34 on south end of culvert. |

**Mo`omonui Culvert**

| | |
|---|---|
| Location: | MM |
| Year Built: | 1911 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid concrete with 1911 inscribed on makai parapet, peaked railcaps |
| Abutments: | concrete and CRM, CRM wingwalls are tiered |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 9’ |
| Alignment: | tangent |
| Setting: | near town of Hana, residential, ranch land |
| Condition: | appears in fair condition; exposed rebar on underside of slab |
| Other: | CRM guardwalls with iron rails; W-beam guardrail attached to north end of makai wall. |

**Kaholopo`o (Haneo`o) Bridge**

| | |
|---|---|
| Location: | MM 49.84 |
| Year Built: | 1910 |
| Date Altered: | 1917 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |

| | |
|---|---|
| Parapet: | W-beam guardrails |
| Abutments: | CRM and CRM wingwalls |
| Number of Spans: | two |
| Piers: | CRM |
| Bridge roadway width: | 15.1’ |
| Bridge deck width: | 17.0’ |
| Structure Length: | 23.0’ |
| Approach road width: | 22.0’ |
| Height above stream: | 8’ |
| Alignment: | on curve |
| Setting: | Hana Ranch Co. pasture land; an abutment from a railroad trestle is upstream |
| Condition: | exposed reinforcement bars on bottom of slab |
| Other: | CRM walls built upstream from bridge RO channel stream; flat slab is reinforced with railroad rails. Maui County plans to demolish and replace this structure. |

**Kahawaiokapia (Kapi`a)Bridge**

| | |
|---|---|
| Location: | MM 48.64 |
| Year Built: | 1915 |
| Date Altered: | 1931 |
| Type: | concrete T-beam |
| Designer/Builder: | built by Wilson and McCandless |
| Parapet: | different solid concrete parapets; AD 1915 inscribed on inside of mauka parapet, both parapets have peaked railcaps; makai wall has small buttresses at each end. |
| Abutments: | CRM abutments with concrete seat, CRM wingwalls |
| Number of Spans: | three, maximum span 17.1’ |
| Piers: | reinforced concrete |
| Bridge roadway width: | 15.4’ |
| Bridge deck width: | 15.7’ |
| Structure Length: | 59.0’ |
| Approach road width: | 20.0’ |
| Height above stream: | 17.0’ |
| Alignment: | tangent |
| Setting: | rural, heavy vegetation |
| Condition: | fair/good condition; spalling concrete and exposed rebar |
| Other: | Appears that 1931 alteration was a new makai parapet different from the 1915 parapet. North abutment is quite wide on the mauka side, may have been also been railroad abutment.<br>See also HAER No. HI-72. |

**Waiohonu Bridge**

| | |
|---|---|
| Location: | MM 48.03 |
| Year Built: | 1915 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | built by Wilson and McCandless |
| Parapet: | open balusters with square railcaps, peaked post caps |
| Abutments: | CRM abutments with concrete seat, CRM wingwalls |
| Number of Spans: | five, maximum span length 20.0' |
| Piers: | one CRM, three reinforced concrete |
| Bridge roadway width: | 15.4' |
| Bridge deck width: | 16.7' |
| Structure Length: | 97.1' |
| Approach road width: | 16.0' |
| Height above stream: | 14.5' |
| Alignment: | on tangent |
| Setting: | rural residential neighborhood |
| Condition: | spalling on girders, corroding reinforcement bars, minor parapet damage |
| Other: | CRM wingwalls show fine craftsmanship of early twentieth century. Maui County plans to demolish and replace this bridge. CRM pier may date to an earlier bridge that was replaced in 1906; concrete piers may date to 1906. See also HAER No. HI-71. |

**Papa`ahawahawa Bridge**

| | |
|---|---|
| Location: | MM 46.36 |
| Year Built: | 1913 |
| Date Altered: | 1915 |
| Type: | reinforced concrete flat slab; reinforced concrete T-beam |
| Designer/Builder: | built by County Engineer's Office |
| Parapet: | solid concrete with rectangular railcap; 1913 inscribed backwards on exterior face of makai parapet |
| Abutments: | 1913 CRM abutments and wingwalls; 1915 extension reinforced concrete |
| Number of Spans: | one 11.0' flat slab span; one 22.0' girder span |
| Piers: | CRM and reinforced concrete |
| Bridge roadway width: | 14.4' |
| Bridge deck width: | 16.1' |
| Structure Length: | 41.0' |
| Approach road width: | 17.1' |
| Height above stream: | 9' |
| Alignment: | tangent |
| Setting: | rural residential |
| Condition: | fair condition, spalling concrete and corroded |

| | |
|---|---|
| | reinforcement bars |
| Other: | This bridge is two structures, the girder bridge was built to extend the 1913 flat-slab structure after the streambed changed course and widened. Maui County plans to demolish and replace the structure. There is some debate over the name of this structure. While many on Maui refer to it as Papa`ahawahawa, the more likely spelling is Papahawahawa, which translates as "dirty flat." (See Pukui and Elbert, *Place Names of Hawaii*, page 179 and James A. Bier's *Map of Maui*. See also HAER No. HI-34 for additional information.) |

**Ala`ala`ula Bridge**

| | |
|---|---|
| Location: | MM 45.79 |
| Year Built: | 1915 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, peaked railcaps, slightly wider than average solid parapet, 1915 inscribed on exterior face of makai parapet; makai parapet is angled to follow the curve of the road |
| Abutments: | reinforced concrete |
| Number of Spans: | one 30.0' span |
| Piers: | n/a |
| Bridge roadway width: | 12.5' |
| Bridge deck width: | 14.4' |
| Structure Length: | 54.0' |
| Approach road width: | 18.0' |
| Height above stream: | 22.0' |
| Alignment: | on curve |
| Setting: | end of v-shaped valley, waterfall upstream, lush vegetation |
| Condition: | fair/ good condition; some spalling and exposed reinforcement bars |
| Other: | This design is unique. CRM guardwalls. |

**Waikakoi Bridge**

| | |
|---|---|
| Location: | MM 45.42 |
| Year Built: | 1911 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete with peaked railcap, most of railcap is missing on mauka parapet |
| Abutments: | south abutment is reinforced concrete, north is CRM |
| Number of Spans: | two, maximum span length is 14.0' |

| | |
|---|---|
| Piers: | reinforced concrete pier is arched with columns; lower portions of columns rounded on upstream side |
| Bridge roadway width: | 15.1' |
| Bridge deck width: | 16.7' |
| Structure Length: | 33.0' |
| Approach road width: | 18.0' |
| Height above stream: | 21.0' |
| Alignment: | tangent |
| Setting: | rural residential |
| Condition: | appears to be in good condition |
| Other: | CRM guardwalls adjacent to bridge. |

**Pa`ihi Bridge**

| | |
|---|---|
| Location: | MM 44.94 |
| Year Built: | 1911 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | 2'-thick, solid concrete parapets, peaked railcap, AD is inscribed on north end of the makai parapet, 1911 on north end of mauka parapet |
| Abutments: | reinforced concrete |
| Number of Spans: | one 36' span |
| Piers: | n/a |
| Bridge roadway width: | 13.8' |
| Bridge deck width: | 17.7' |
| Structure Length: | 42.0' |
| Approach road width: | 18.0' |
| Height above stream: | 10' |
| Alignment: | on curve |
| Setting: | remote area; narrow road and bridge on a high cliff; waterfall |
| Condition: | fair: spalling on slab and girders; exposed and corroded rebar |
| Other: | CRM guardwall installed on north end of makai parapet in late 1990s covered "AD" inscription. Maui County plans to replace structure. |

**Wailua Bridge**

| | |
|---|---|
| Location: | MM 44.75 |
| Year Built: | 1947 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | concrete "posts" with concrete beam, Wailua inscribed on |

| | |
|---|---|
| | south end of mauka parapet and north end of makai parapet; 1947 inscribed on opposite ends |
| Abutments: | concrete with concrete wingwalls |
| Number of Spans: | one 60.0' span |
| Piers: | n/a |
| Bridge roadway width: | 14.0' |
| Bridge deck width: | 19.0' |
| Structure Length: | 66.0' |
| Approach road width: | 16.0' |
| Height above stream: | 17.0' |
| Alignment: | on curve |
| Setting: | remote, fruit stand and *taro lo'i* adjacent to bridge |
| Condition: | good condition |
| Other: | massive abutments compared to other structures; bridge is curved and on a skew. W-beam guardrails on old concrete posts. |

**South Wailua (Honolewa) Bridge**

| | |
|---|---|
| Location: | MM 44.64 |
| Year Built: | 1911 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | solid concrete with peaked railcap; AD 1911 inscribed on exterior face of makai wall; panel details |
| Abutments: | reinforced concrete |
| Number of Spans: | two, maximum span length 25.0' |
| Piers: | reinforced concrete pier is arched with columns; lower portion of columns are rounded |
| Bridge roadway width: | 15.1' |
| Bridge deck width: | 16.7' |
| Structure Length: | 57.0' |
| Approach road width: | 16.0' |
| Height above stream: | 27.0' |
| Alignment: | on curve |
| Setting: | parking area south of bridge; high waterfall above bridge |
| Condition: | appears good, some damage on north end of makai parapet |
| Other: | popular stop for motorists; frequently a traffic bottleneck |

**Pu`uhaoa Bridge**

| | |
|---|---|
| Location: | MM 43.86 |
| Year Built: | 1910 |
| Type: | reinforced concrete T-beam |
| Designer/Builder: | unknown |
| Parapet: | unique, diamond-patterned openings, rectangular railcaps, square end-post and caps. AD 1910 inscribed vertically on opposite pairs of endposts; other endposts vertical inscription is "20 tons" |
| Abutments: | reinforced concrete, dry-laid lava rock wingwalls are battered |
| Number of Spans: | one 20.0' span |
| Piers: | n/a |
| Bridge roadway width: | 14.4' |
| Bridge deck width: | 16.4' |
| Structure Length: | 23.0' |
| Approach road width: | 16.0' |
| Height above stream: | 13' |
| Alignment: | tangent |
| Setting: | undeveloped, remote area |
| Condition: | appears to be in good condition |
| Other: | old abutments are upstream, dry-laid rock work shows workmanship of early twentieth century; parapet style similar to Oheo Bridge |

**Waiele (Paehala) Bridge**

| | |
|---|---|
| Location: | MM 43.58 |
| Year Built: | 1910 |
| Type: | masonry arch of cut basalt |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, AD 1910 on exterior of mauka wall, makai parapet has rectangular railcap; mauka parapet and road deck are not straight over the arch, but skewed |
| Abutments: | CRM |
| Number of Spans: | one 19.0' span |
| Piers: | n/a |
| Bridge roadway width: | 12.5' |
| Bridge deck width: | 13.8' |
| Structure Length: | 25.0' |
| Approach road width: | 14.0' |
| Height above stream: | 7.0' |
| Alignment: | on curve |
| Setting: | rural residential area |
| Condition: | appears to be in good condition, some damage on makai |

| | |
|---|---|
| | parapet |
| Other: | very few bridges of this type remain in Hawaii; common bridge type in late 1800s. Twin bridge to Hahalawe Bridge, see below. |

**Mahalawe (Kakiweka) Bridge**

| | |
|---|---|
| Location: | MM 43.29 |
| Year Built: | 1910 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, rectangular railcap |
| Abutments: | reinforced concrete, dry-laid rock wingwalls |
| Number of Spans: | one 28.9' span |
| Piers: | n/a |
| Bridge roadway width: | 13.8' |
| Bridge deck width: | 15.4' |
| Structure Length: | 30.8' |
| Approach road width: | 14.0' |
| Height above stream: | 16.0' |
| Alignment: | on curve |
| Setting: | rural residential area |
| Condition: | appears to be in good condition, some damage to north end of makai parapet, thick asphalt shortens parapets to as low as 17" |
| Other: | CRM guardwalls. |

**Hahalawe Bridge**

| | |
|---|---|
| Location: | MM 43.04 |
| Year Built: | 1910 |
| Type: | masonry arch of cut basalt |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, AD 1910 on exterior of mauka wall, makai parapet has rectangular railcap |
| Abutments: | CRM |
| Number of Spans: | one 20.0' span |
| Piers: | n/a |
| Bridge roadway width: | 14.4' |
| Bridge deck width: | 16.1' |
| Structure Length: | 25.0' |
| Approach road width: | 15.0' |
| Height above stream: | 10' |
| Alignment: | on curve |
| Setting: | situated at end of v-shaped valley, remote, lush vegetation |
| Condition: | good condition, heavy layer of asphalt |

| | |
|---|---|
| Other: | very few bridges of this type remain in Hawaii; common structure in late 1800s. Wai'ele Bridge is nearly identical, see above. |

**Maluhiana`iwi Culvert**

| | |
|---|---|
| Location: | MM 42.9 |
| Year Built: | 1910 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, peaked railcap; AD1910 on exterior face of makai parapet |
| Abutments: | reinforced concrete with dry-laid rock wingwalls |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 14.0' |
| Alignment: | on curve |
| Setting: | rural residential |
| Condition: | good condition; thick asphalt reduces parapet height to as low as 6"; on north end of mauka parapet, asphalt is as high as the railcap |
| Other: | CRM guardwalls adjacent to bridge are also very short due to thick asphalt. |

**Pua`alu`u Bridge**

| | |
|---|---|
| Location: | MM 42.5 |
| Year Built: | 1910 |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, rectangular railcap, 1910 on exterior face of makai parapet |
| Abutments: | CRM abutments and wingwalls |
| Number of Spans: | two, maximum span length 15.0' |
| Piers: | reinforced concrete; upstream nose of pier is rounded |
| Bridge roadway width: | 14.4' |
| Bridge deck width: | 16.4' |
| Structure Length: | 33.0' |
| Approach road width: | 15.0' |
| Height above stream: | 10' |
| Alignment: | on curve |
| Setting: | remote area, waterfall below bridge |
| Condition: | appears to be in good condition, thick layer of asphalt reduces wall height to about 12" |
| Other: | CRM guardwalls. |

**Oheo Bridge**

| | |
|---|---|
| Location: | MM 42.1 |
| Year Built: | 1916 |
| Type: | concrete barrel arch |
| Designer/Builder: | built by E. C. Mellor |
| Parapet: | unique, diamond-patterned openings, rectangular railcaps; AD 1916 is inscribed on south end of mauka parapet, north end of makai parapet; "20 tons" inscribed opposite of date |
| Abutments: | reinforced concrete |
| Number of Spans: | one 58' span |
| Piers: | n/a |
| Bridge roadway width: | 14.4' |
| Bridge deck width: | 16.4' |
| Structure Length: | 63.0' |
| Approach road width: | 16.0' |
| Height above stream: | 44.0' |
| Alignment: | on curve |
| Setting: | spans at deep gorge at the Kipahulu section of Haleakala National Park; below bridge are waterfalls and pools |
| Condition: | good condition; thick asphalt reduces height of the bridge walls |
| Other: | Oheo Bridge has an excellent end treatment: concrete walls angled away from bridge parapets. |

**Kalena Culvert**

| | |
|---|---|
| Location: | MM 40.7 |
| Year Built: | unknown |
| Type: | reinforced concrete flat slab |
| Designer/Builder: | unknown |
| Parapet: | solid concrete |
| Abutments: | reinforced concrete; CRM wingwalls that extend upstream |
| Number of Spans: | one |
| Piers: | n/a |
| Structure Length: | approximately 14.0' |
| Alignment: | on curve |
| Setting: | very rural area, residences nearby, adjacent to Kipahulu Community Center |
| Condition: | appears to be in good condition |
| Other: | W-beam guardrails on approaches. |

**Koukou`ai (Kaukau`ai) Bridge**

| | |
|---|---|
| Location: | MM 40.58 |
| Year Built: | 1911 |
| Type: | open spandrel concrete arch, three arch ribs |
| Designer/Builder: | unknown |
| Parapet: | solid concrete, peaked railcaps, panel details on exterior face of makai wall, with "AD 1911" |
| Abutments: | reinforced concrete |
| Number of Spans: | one 32.2' span |
| Piers: | n/a |
| Bridge roadway width: | 15.1' |
| Bridge deck width: | 16.7' |
| Structure Length: | 58.0' |
| Approach road width: | 16.0 |
| Height above stream: | 34' |
| Alignment: | on curve |
| Setting: | rural residential area, Kipahulu Community Center nearby |
| Condition: | fair condition |
| Other: | Maui County hired a consultant in August 2005 to prepare a structural analysis. The county plans to rehabilitate the structure.<br>See also HAER No. HI-70. |

## SOURCES CONSULTED

### Government Documents

*Annual Report of the Superintendent of Public Works*, 1900 - 1959. Available at the Archives of Hawaii.

Hawaii Department of Transportation. Bridge Inspection Reports, various dates.

Maui County Department of Public Works. County Bridges, September 30, 1979. Map at the Department of Public Works and Environmental Management office.

Maui County Department of Public Works and Environmental Management. Bridge Inspection Reports, various dates.

County Engineer's Office. Bridge Plans: Makapipi, Kuhiwa, `O`opuola, Hanawi, Honomanu, Haipua`ena, Kahalaowaka, Na`ili`iliha`ele, Wailuanui (Waikani), Waikamoi, Waiohue, Puakea, East Wailuaiki, West Wailuaiki, Waiokamilo, and Nua`ailua. Located at the Hawaii Department of Transportation, Maui District Office.

### Books

Bartholomew, Gail. *Maui Remembers: A Local History.* Honolulu: Mutual Publishing, 1994.

Handy, E. S. Craighill, and Elizabeth G. Handy. *Native Planters in Old Hawaii, Their Life, Lore, and Environment*, Honolulu: Bishop Museum Press, 1972.

Hilleary, Perry Edward, ed. *Pan Pacific Who's Who, An International Reference Work.* Honolulu: Honolulu Star Bulletin, Ltd., 1954.

Kuykendall, Ralph S. *Hawaiian Kingdom: Twenty Critical Years, 1854 - 1874*, V. 3, Honolulu: University of Hawaii Press, 1995.

Lueras, Leonard, and R. Youngblood. *On the Hana Coast: Being an Accounting of Adventures, Past and Present, in a Land Where the Hand of Man Seems to Rest Lightly.* Honolulu: Emphasis International, 1983.

Nellist, George F., ed. *Men of Hawaii.* Honolulu: Honolulu Star-Bulletin, Ltd., 1925.

_____. *Men of Hawaii.* Volume IV Revised, Honolulu: Honolulu Star Bulletin, Ltd., 1930.

_____. *Pan Pacific Who's Who, An International Reference Work.* Honolulu: Honolulu Star Bulletin, Ltd., 1941.

Newton, L. C. ed. *Who's Who in the Counties of Maui and Kauai, Territory of Hawaii.* Vol. 1, Wailuku, Hawaii: Maui Publishing Company, Ltd., 1931.

Pukui, Mary Kawena and Samuel H. Elbert. *Hawaiian Dictionary.* Honolulu: University of Hawaii Press, 1986.

Pukui, Mary Kawena, Samuel H. Elbert, and Esther T. Mookini. *Place Names of Hawaii.* 2d ed., rev. and enl. Honolulu: University Press of Hawaii, 1974.

Schmitt, Robert C. *Historical Statistics of Hawaii.* Honolulu: The University Press of Hawaii, 1977.

Youngblood, Ron. *On the Hana Coast.* Honolulu: Emphasis International Ltd and Carl Lindquist, 1983.

**Map**

Bier, James A. *Map of Maui, The Valley Isle.* Sixth edition. Honolulu: University of Hawaii Press, 1997.

**Reports**

Duensing, Dawn. National Register of Historic Places Nomination Form for the Hana Belt Road. Prepared January 13, 2001.

Spencer Mason Architects. *State of Hawaii Historic Bridge Inventory and Evaluation.* Draft. Honolulu: State of Hawaii, Department of Transportation, Highways Division, 1996.

Trust for Public Land and Bay Pacific Consulting, "East Maui Resource Inventory." Prepared for the Rivers, Trails, and Conservation Assistance Program, National Park Service, U.S. Department of the Interior. Honolulu: Trust for Public Land and Bay Pacific Consulting, 1998.

Wilson Okamoto & Associates, Inc. *Preservation Plan for Bridges Under the Jurisdiction of the County of Maui Within the Hana Highway Historic District.*

Prepared for the County of Maui Department of Public Works. Honolulu: Wilson Okamoto and Associates, 2000.

**Newspaper Articles**

"Advocates Belt Road," *The Maui News*, November 6, 1909.

"Beautiful Scenery Unfolds," *The Maui News*, December 22, 1926.

"Belt Road Bids Opened," *The Maui News*, October 5, 1912.

"Belt Road Or Nothing Says Board," *The Maui News*, June 20, 1914.

"Belt Road Plans Further Advanced," *The Maui News*, February 10, 1923.

"Belt Road Project Is To Go Forward At Once," *The Maui News*, May 25, 1923.

"Belt Road Work Will Be Started By Maui County," *The Maui News*, March 10, 1923.

"Bids for Belt Road Work Asked," *The Maui News*, August 14, 1923.

"Board of Supervisors Hold Meeting," *The Maui News*, January 6, 1906.

Bowser, George. "Touring the Valley Isle Nearly Fifty Years Ago," *The Maui News*, December 4, 1926.

"Builders Progress In Construction of Belt Road Project," *The Maui News*, April 17, 1926.

"Celebration Typical Of Maui," Editorial, *The Maui News*, December 22, 1926.

"Charles Bailey Dies Suddenly Hana Hospital," *The Maui News*, March 14, 1931.

"Connect Maui Up," Editorial, *The Maui News*, February 11, 1921.

"Coolidge Approves Proposed $2,590,000 Hawaii Bond Issue," *The Maui News*, August 22, 1925.

"County Asks WPA To Take Over 127 Workers As Sum In Road Fund Is Depleted," *The Maui News*, November 7, 1936.

"County Builds Kuhiwa Bridge at Lower Cost," *The Maui News*, November 12, 1927.

"Disgruntled Contractors," *The Maui News*, August 12, 1911.

"Do Field Surveys in Hana District," *The Maui News*, August 5, 1925.

Editorial, *The Maui News*, February 17, 1900.

Editorial, *The Maui News*, June 28, 1902.

Editorial, *The Maui News*, November 15, 1902.

Editorial, *The Maui News*, March 7, 1903.

Editorial, *The Maui News*, April 25, 1903.

Editorial, *The Maui News*, July 4, 1903.

"Embankment Cave In, Steam Shovel Turns Turtle Into Gulch," *The Maui News*, November 25, 1925.

"Estimate Made Belt Road Cost By Way Kailua," *The Maui News*, January 13, 1923.

"Farrington Will Open Road Today, Marks Epoch in Progress Of Maui County," *The Maui News*, December 18, 1926.

"Final Touches Given Program For Opening of Hana Belt Road," *The Maui News*, December 11, 1926.

"Fine Bridge On Useless Road," *The Maui News*, July 25, 1914.

"First Car Runs Over Belt Road Kailua-Keanae," *The Maui News*, May 23, 1925.

"Fleet Edition," *Honolulu Advertiser*, April 30, 1925, section 5.

"Flood Threatens Belt Road Bridge," *The Maui News*, November 17, 1926.

"Fong Bids Low on Hana Bridges," *Honolulu Advertiser*, March 9, 1947.

"Governor Looks Forward To His Drive To Hana," *The Maui News*, December 15, 1926.

"Hana Is Mad Re Claudine," *The Maui News*, October 5, 1912.

"Hana Is Mad Right Along," *The Maui News*, November 9, 1912.

"Hana Prepares For Biggest Day," *The Maui News*, December 22, 1926.

"Hana Prepares For Reception Of Farrington," *The Maui News*, December 8, 1926.

"Honiron Tells Of Maui Road To Hana," *The Maui News*, March 5, 1927.

"Houston and Farrington Will Be Here," *The Maui News*, December 4, 1926.

"Hugh Howell Passes Away On Molokai," *The Maui News*, March 20, 1946.

"Hundreds Motor to Keanae," *The Maui News*, June 13, 1925.

"Itemized Coasts Proposed Belt Road Presented," *The Maui News*, January 19, 1923.

"Kailua-Kopiliula Road Work Making Headway, Says Low," *The Maui News*, March 13, 1926.

"Keanae-Wailua Link Belt Road Ready In Fall," *The Maui News*, May 8, 1926.

"Land Slide Halts Progress of Work On Maui Belt Road," *The Maui News*, July 10, 1926.

"Let's Have the Belt Road Money," *The Maui News*, June 20, 1914.

"Magnificent Scenery Unfolds Before Eyes of Travelers On Motor Trip Over New Road Leading To Hana," *The Maui News*, December 22, 1926.

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

Maui Loan Fund Commission, Request for sealed tenders, *The Maui News*, July 15, 1911.

"Maui Takes Day Off For Road Opening," *The Maui News,* December 22, 1926.

"Maui Will Share New Loan Fund Governor Thinks," *The Maui News*, June 13, 1925.

"Maui's New Road," *The Maui News*, editorial, June 17, 1925.

"Much Business of Interest done by Board of Supervisors," *The Maui News*, March 10, 1906.

"New Contractor Lands Oheo Bridge Contract," *The Maui News*, August 25, 1916.

"No Keanae Highway Says Governor," *The Maui News*, July 18, 1914.

"No Money For Belt Road For Two Years," *The Maui News*, May 7, 1920.

Pleasant, E. E. "Maui 100 Years Ago: The Old Trail to Hana." *The Maui News*, June 13, 1942.

"Progress Of Belt Road Work Reported," *The Maui News*, February 14, 1925.

"Raymond Adds Ginger To Loan Fund Meeting," *The Maui News*, May 23, 1914.

"Report of County Engineer," *The Maui News*, September 1, 1906.

"Road Linking Hana With Rest Of Maui Will Be Opened Officially December 18, With Celebration," *The Maui News*, November 13, 1926.

"Road Pau on Nahiku Part Belt Road," *The Maui News*, November 14, 1914.

"Road Work is Moving Ahead," *The Maui News*, November 7, 1936.

"Roads First Need View Of Fassoth," *The Maui News*, February 2, 1921.

"Samuel E. Kalama Answers Call," *The Maui News*, February 28, 1933.

"Shovels Finish Belt Road Work," *The Maui News*, August 11, 1926.

"Steam Shovel Back and Working Again," *The Maui News*, January 9, 1926.

"Steam Shovels Meet Next Week," *The Maui News*, July 31, 1926.

"Substantial Gain Made On Belt Road During Past Month," *The Maui News*, June 12, 1926.

"Supervisors and Committee Agree As To Belt Road," *The Maui News*, February 8, 1923.

"Supervisors Authorize Improvements," *The Maui News*, April 7, 1906.

"Three New Bridges on Maui Finished," *Honolulu Star Bulletin*, June 6, 1948.

"Wailuku to Hana Considered Maui's Most Beautiful Drive," *Honolulu Advertiser*, Auto Supplement, September 28, 1929.

"What Maui Gets," *The Maui News*, May 23, 1903.

"Wonder And Charm Of Maui Scenery To Be Pictured And Told Hundreds Of Thousands Readers On Mainland," *The Maui News*, August 15, 1925.

"Workers Blast Tons Of Rock On Belt Road," *The Maui News*, May 15, 1926.