

**FINAL—Archaeological Monitoring Report for Kuahea Street
Interim Improvements, Pālolo Valley, Waikīkī Ahupua‘a,
Kona District, Island of O‘ahu, Hawai‘i**

TMK: (1) 3-4-015 (por.), (1) 3-4-030 (por.), (1) 3-4-030:058, and (1) 3-4-030:059



Prepared For:

City and County of Honolulu
550 South King Street Suite 102
Honolulu, HI 96813



January 2020

Keala Pono 

Keala Pono Archaeological Consulting, LLC • PO Box 1645, Kaneohe, HI 96744 • Phone 808.381.2361

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MANAGEMENT SUMMARY

Archaeological monitoring was conducted for ground disturbing activity associated with Kuahea Street Interim Improvements at TMK: (1) 3-4-015 (por.), (1) 3-4-030 (por.), (1) 3-4-030:058, and (1) 3-4-030:059 in Pālolo Valley, Waikīkī Ahupua‘a, Kona District, on the Island of O‘ahu. No historic properties were encountered during monitoring, and stratigraphy consisted entirely of fill below the asphalt road. Several artifacts were collected; they consist of bottles that date from the 1930s to 1950s, as well as a glass fragment that dates from the early- to mid-20th century.

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INTRODUCTION

At the request of Road and Highway Builders, on behalf of the City and County of Honolulu, Keala Pono Archaeological Consulting conducted archaeological monitoring for Kuahea Street Interim Improvements in Pālolo Valley, Waikīkī Ahupua‘a, Kona District, on the island of O‘ahu. The primary focus of the monitoring was on the identification and appropriate treatment of historic properties that might be affected during ground disturbance.

Archaeological monitoring was conducted in accordance with an archaeological monitoring plan (McElroy and Duhaylonsod 2018) reviewed and accepted by the Hawai‘i State Historic Preservation Division (SHPD). This report meets the requirements and standards of state historic preservation law, specifically Chapter 6e of the Hawai‘i Revised Statutes, and SHPD’s *Rules Governing Standards for Archaeological Monitoring Studies and Reports* (Hawai‘i Administrative Rules §13–279).

The report begins with a description of the project area and a historical overview of land use and archaeology in the area. The next section presents methods used in the fieldwork, followed by the results of the monitoring. Project results are summarized and recommendations are made in the final section. Hawaiian words and technical terms are defined in a glossary at the end of the document.

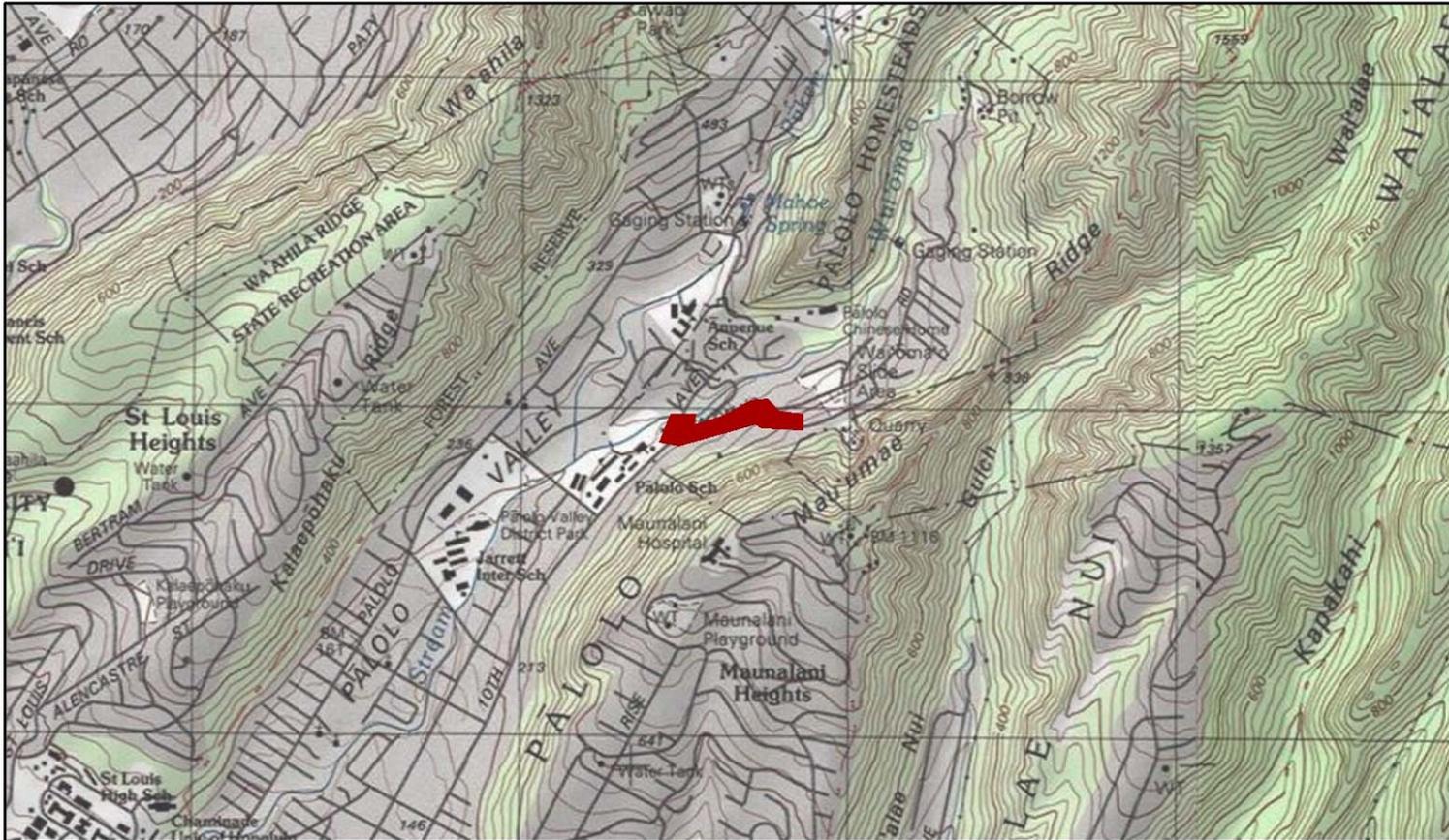
Project Location and Environment

The project area is located in Pālolo Valley, from the intersection of 10th Avenue and Waiōma‘o Road to 2373 Kuahea Street, including the Kuahea Street/Waiōma‘o Road intersection, Helo Place, and Kuahea Place (Figures 1 and 2). Tax Map Key (TMK) locations include TMK: (1) 3-4-030:058 and 059 (Helo Place and Kuahea Place), as well as City and County of Honolulu Right-of-Way street corridors within TMK: (1) 3-4-015 (por.) and 030 (por.) that have no parcel numbers. TMK: (1) 3-4-030:058 is a .035-ha (.087-ac.) parcel with various owners. TMK: (1) 3-4-030:059 is a .041-ha (.101-ac.) parcel, also with various owners. Approximately 2.8 ha (7 ac.) are included within the project area.

The project location is in the ahupua‘a of Waikīkī in the larger district, or moku, of Kona (Kanahale 1995). In modern times, the Kona district of O‘ahu has been renamed the district of Honolulu, and therefore, the project area is also located in Pālolo, Honolulu, O‘ahu. The valley of Pālolo sits on the southern flanks of the Ko‘olau mountain range. To the southwest of Pālolo are Mānoa and Mō‘ili‘ili, and beyond Mō‘ili‘ili, is Waikīkī proper, situated at the coastline. The ridges and gulches of Paliluahine, Wa‘ahila, and Kalaepōhaku separate the valleys of Pālolo and Mānoa. To the south and east of Pālolo is the community of Kaimukī, and to the south is the tuff cone known as Le‘ahi or Diamond Head.

Near the head of Pālolo Valley Ka‘au Crater, was formed when rising lava met groundwater and caused explosions (Macdonald et al. 1983:442). The ash from the explosions washed downslope into Pālolo Valley, causing mudflow deposits as this material moved downstream (Macdonald et al. 1983:442). A thick surface exposure of volcanic dike material also occurs in Pālolo Valley. This has been called a “bud,” and it was once mined at the former Palolo Quarry (Macdonald et al. 1983:142). Soils in Pālolo are of the Rough mountainous land-Kapaa association, described as follows:

Very steep land broken by numerous drainageways and deep, well-drained soils that have a fine textured or moderately fine textured subsoil; in gulches and on narrow ridges. (Foote et al. 1972)



Legend

Project Area



Layer Credits: USGS Topographical Honolulu Quadrangle Map 1998

Figure 1. Project area on a 7.5 minute USGS 1998 Honolulu quadrangle map.

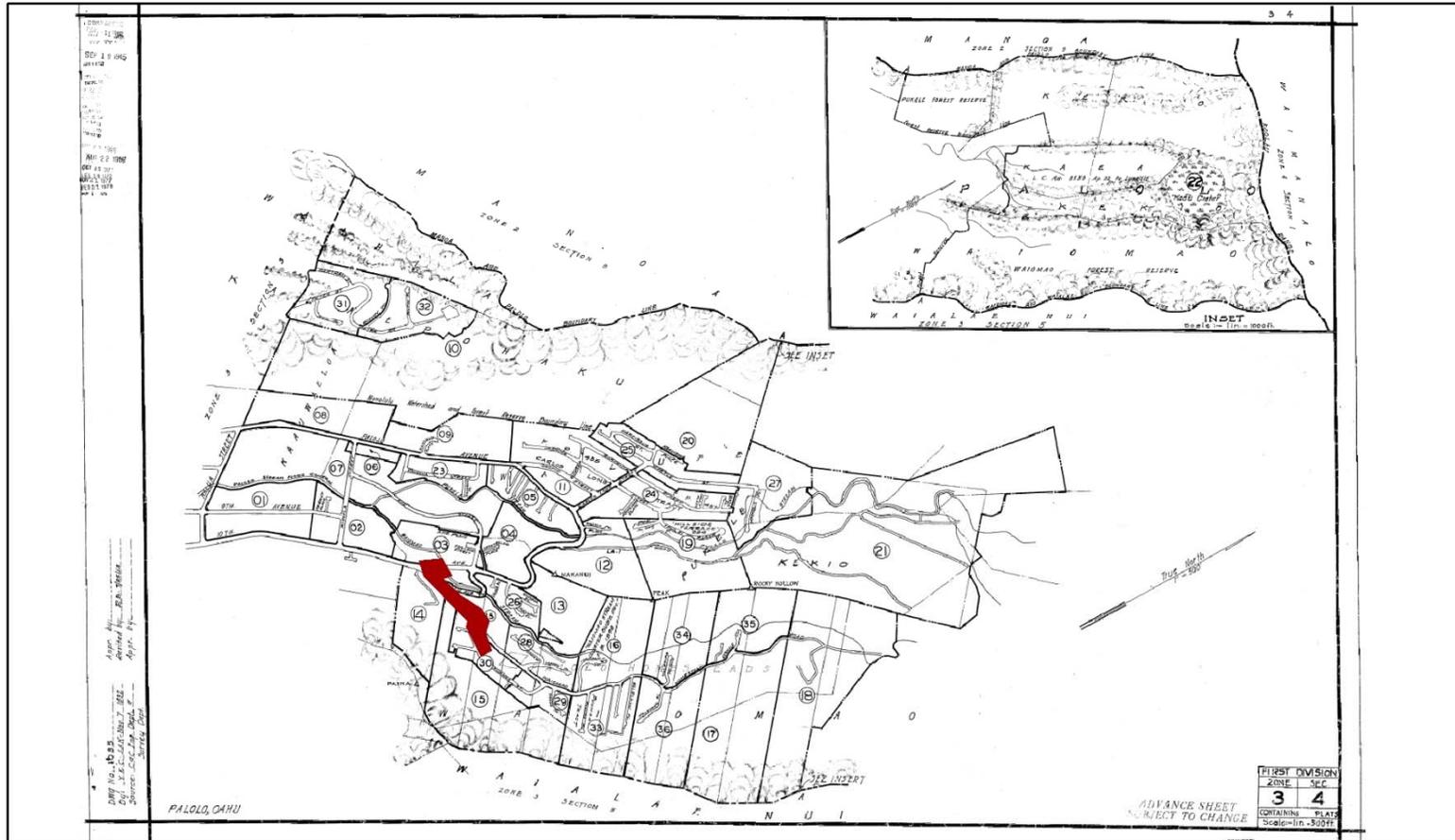


Figure 2. Project area on a TMK map for section (1) 3-4.

Specifically, project area soils are Kolekole silty clay loam 6–12% slopes (KaC), Lualualei extremely stony clay 3–35% slopes (LPE), and Kawaihapai stony clay loam 2–6% slopes (Klab) (Figure 3). Kolekole soils are well drained and found in uplands. They are utilized for pasture, as well as sugarcane and pineapple agriculture (Foote et al. 1972:73). Lualualei soils are also well drained, and are found on talus slopes, alluvial fans, and coastal plains. They are used for pasture, sugarcane, truck crops, urban development, military installations, and wildlife habitat (Foote et al. 1972:84). Kawaihapai soils are also well drained and are found in drainageways, on coastal plains, and on alluvial fans. They are utilized for pasture, truck crops, and sugarcane (Foote et al. 1972:64).

The study area lies roughly 4.6 km (2.9 mi.) from the coast at Waikīkī, at an elevation of approximately 150 m (500 ft.). The closest watercourse to the project area is Waiōma‘o Stream, which crosses the western portion of the project at 10th Avenue. This stream, along with Pūkele Stream, combine to form the larger Pālolo Stream, approximately 300 m (984 ft.) southwest of the project area. Mean annual rainfall for the project area is approximately 110 cm (43 in.) (Giambelluca et al. 2013). As the area is completely developed, vegetation consists of non-native plants and grasses.

The Project

The project consists of improvements to the Kuahea Street vicinity in Pālolo. Construction activity focused on the removal and replacement of pavement, which involved excavation to approximately 1.4 m (4.5 ft.) below the pavement surface. Other ground disturbance included adjustment of utility manholes, reconstruction of existing curbs and gutters, relocation of existing water lines and fire hydrants, and installation of new drain lines, drain manholes, outlets, and underdrains. Excavation for these were occasionally very deep, extending to approximately 3 m (9.8 ft.) below surface.

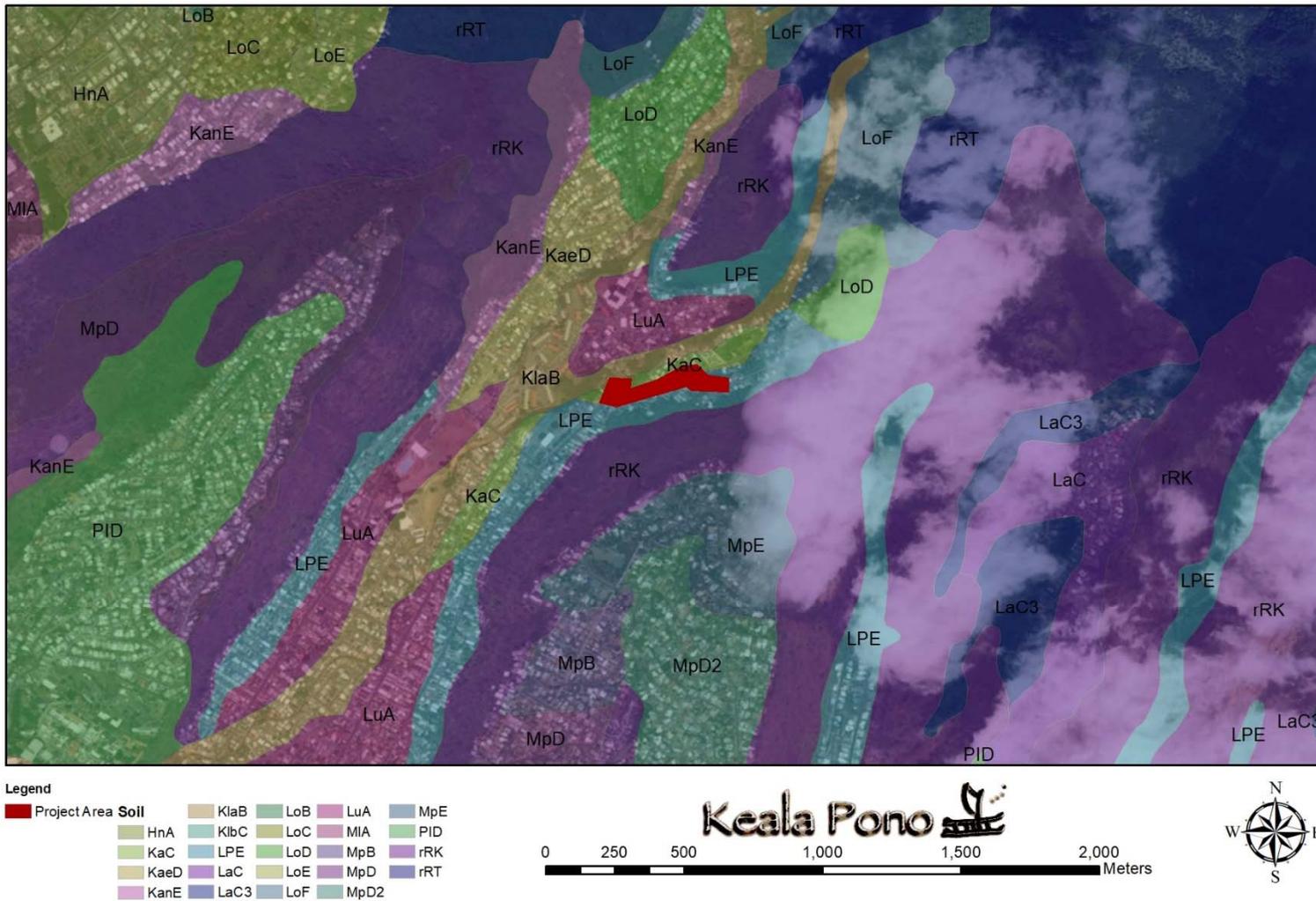


Figure 3. Soils in the vicinity of the project area.

BACKGROUND

A brief historic review of Pālolo is provided below, to offer a better holistic understanding of the use and occupation of the project area. In the attempt to record and preserve both the tangible (i.e., traditional and historic archaeological sites) and intangible (i.e., mo‘olelo) culture, this research assists in the discussion of anticipated finds. Research was conducted at the Hawai‘i State Library, the University of Hawai‘i at Mānoa libraries, the SHPD library, and online on the Office of Hawaiian Affairs and Department of Accounting and General Services websites and the Waihona Aina, Huapala, and Ulukau databases. Archaeological reports and historical reference books were among the materials examined.

Pālolo in the Pre-Contact Era

The history of Pālolo begins with the history of O‘ahu Island:

O‘ahu is also a new name, given in memory of an ancestor of the people of O‘ahu. Lolo-i-mehani, Lalo-waia, and Lalo-oho-aniani were the ancient names of O‘ahu. O‘ahu was the child of Papa and Lua... and because O‘ahu was a good chief and the people lived harmoniously after the time of Wākea *mā*, O‘ahu’s descendants gave the name of their good chief to the island --- O‘ahu-a-Lua. (Kamakau 1991:129)

According to Kanahēle (1995), the first major migrations by Pacific Islanders to O‘ahu probably occurred around AD 300. Although initial settlement of the island was focused on the windward side, by AD 600 permanent settlements appeared on the leeward side of the Ko‘olau Mountains, in the ahupua‘a of Waikīkī, of which Pālolo is a subdivision. While the coastal waters of the ahupua‘a provided an abundance of marine resources, the original inhabitants of Waikīkī Ahupua‘a also depended upon the natural resources harvested from the inland valleys such as Pālolo. These upland resources included pili grass for house thatching; mamaki for clothing; naio for timber; kukui for food, medicine, and lamp oil; lama, ‘ōhi‘a ‘ai and uhiuhi for timber; ‘olonā for cordage; ‘ie‘ie for weaving; and the ‘ōhi‘a lehua for house building and weapon making. In more recent research, Kirch looked at the dating and re-dating of sites in Hawai‘i and elsewhere across the Pacific, and suggested that the earliest settlements in Hawai‘i occurred somewhere around AD 800 to 1000 (Kirch 2010:126–127).

Since Pālolo is not often mentioned in the writings of Hawai‘i’s earliest historians, much of pre-contact Pālolo is inferred by reading the historical records describing Honolulu or Waikīkī. One early Hawaiian historian who did specifically mention Pālolo in his writings, was John Papa ‘Ī‘ī. ‘Ī‘ī illustrated the well-known trails that people used on O‘ahu (Figure 4). His description of the trail that connected Pālolo to the rest of Honolulu was published in the 1800s, but it is safe to assume that such an important and widely used path pre-dated the arrival of the Westerners in the late 1700s. He describes the section leading into Pālolo as follows:

From Paliiki the trail ran up to Kalahu, above Leahi, and on to the place where Waialae stream reached the sand. The trail that ran through Kaluahole went to Kaalawai, up over, and down into Kahala, to meet the other trail at the place where the stream reached the sand. There they met the mauka trail that came from Ululani’s place in Pawaa to Kapaakea, then up to Kamoilili, and to Kapohakikeke, where it left the trail that went to Palolo, and continued on... (‘Ī‘ī 1959:94)

Several place names in Pālolo reference the natural environment of the valley. The name Pālolo can be translated as “clay,” and Kalaepōhaku to “stone promontory” (Pukui et al. 1974:178, 72–73). The

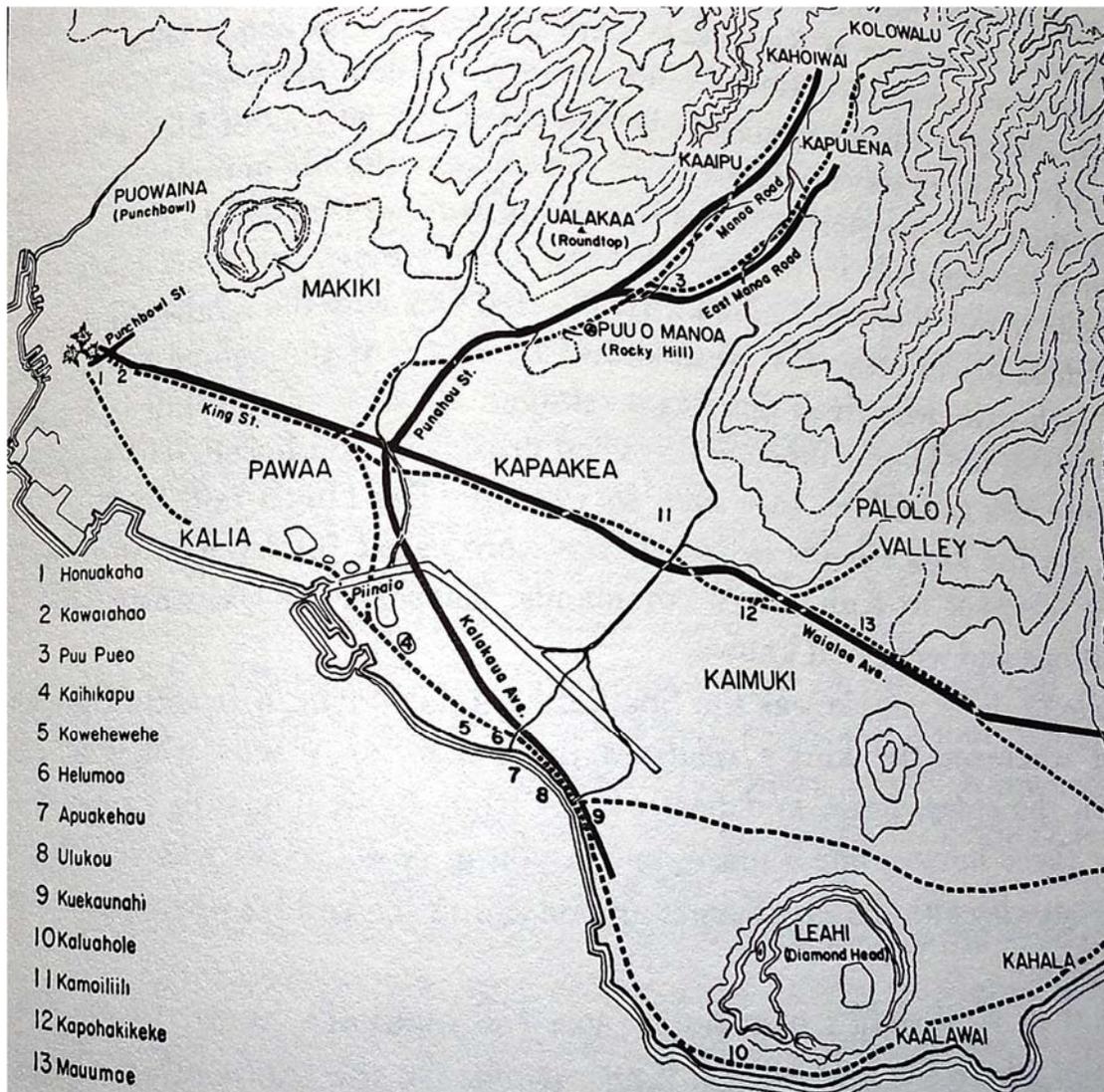


Figure 4. Trails in the vicinity of the project area. Adopted from ‘I‘i (1959:93).

streams in the valley also speak of their natural characteristics: Waiōma‘o translates to “green water,” and Pūkele to “muddy” (Pukui et al. 1974:193, 227). A white clay was named palolo, and it was associated with the first humans, although it is not clear if this is how Pālolo got its name:

The head of the first kanaka was created from a whitish clay (palolo), which was brought by Lono from the four ends of the world—from “Kai Koolau, Kai Kona, Kahiki-ku, Kahiki-moe”—north, south, east, west. The clay from the north and east forming the right side, and the clay from the south and west forming the left. (Fornander 1919 Vol. 6:267)

Subsistence and Traditional Land Use

Pālolo was at the easternmost edge of the wet valleys on the leeward side of O‘ahu. An area of drought existed from Pālolo to Haha‘ione, although Pālolo is still listed as a valley that supported wet taro (Handy et al. 1991:275, 483). Handy et al. (1991:483) describe Pālolo further:

The stream was large and capable of irrigating terraces along its course on both sides and below the end of the valley on land now covered by houses. There were terraces, some on steep slopes, all along Waiomao and Pukele Streams, which join to form Palolo Stream. Far back in these little valleys wild taro was found in abundance in 1935.

There are two heiau noted for Pālolo Valley. Maumae Heiau is on the south side of Pālolo at the valley's entrance (Fornander in Sterling and Summers 1978:277). It was "A medium-sized heiau of Pookanaka class, credited to the time of Olopana. Foundations only remain" (Thrum in McAllister 1933:196). This site was not found in a survey by J.G. McAllister (1933). It is described in further detail:

There were also advisors and counselors in the affairs of the kingdom. There were four of them: Kai, Kapalaoa, Kaaloo and Kauakahiakaola. With these people Kamehameha carried out all of his works and through them important laws were made, which carried great influence upon the people, such as the Mamalahoa⁴¹ and the Maumae,⁴² "that the old and the infirm might lie down in the road and not be molested."

⁴²Maumae was also the name of a heiau that stood on the right hand, or southern, side of Palolo hill at entrance of the valley. (Fornander 1919 Vol. 5:478)

Mauoki Heiau was located at the foot of the slope that divides Mānoa and Pālolo. It was described as follows:

It is said to have been of traditional Menehune construction with stones brought one by one from Kawiwi, Waianae. It was a heiau of good size, walled on three sides and open to the west...It was torn down...in 1883 and its stones used for street work. (Thrum in McAllister 1933:78)

Mo'olelo

Hawaiian place names were connected to traditional stories through which the history of the places was preserved. These stories were referred to as "mo'olelo, a term embracing many kinds of recounted knowledge, including history, legend, and myth. It included stories of every kind, whether factual or fabulous, lyrical or prosaic. Mo'olelo were repositories of cultural insight and a foundation for understanding history and origins, often presented as allegories to interpret or illuminate contemporary life... Certainly many such [oral] accounts were lost in the sweep of time, especially with the decline of the Hawaiian population and native language" (Nogelmeier 2006:429, 430). Still, a number of traditional stories managed to be recorded as Hawaiian society transitioned from an oral culture to a written one, and among these were several stories connected to the Pālolo area.

Among the most celebrated mo'olelo is the epic saga of Hi'iakaikapoliopole, in which Hi'iaka journeys from Hawai'i Island to Kaua'i. Upon stopping on O'ahu, Pālolo and its winds are mentioned:

It is thou, o Pahoā
And the woman, Makahuna who lives in the light rain of Palolo.
Hearken to the voice
To the cry of the traveler.
Travelling on this hot scorching day from Waikiki,
How warm it is. (*Ka Na 'i Aupuni* in Sterling and Summers 1978:277)

The leaves of the banana tree sway up and down,
Set a-sway by the wind.
The leaves of the taro toss to and fro,
Stirred by the wind,
The wind that blows from below...(*Ka Na 'i Aupuni* in Handy et al. 1991:483)

It is said that two mo‘owahine resided in Pālolo (Davis in Sterling and Summers 1978). Their names were Awapuhi-melemele and Awapuhi-ke‘oke‘o (yellow ginger and white ginger). After fighting over a man, one turned the other to stone, and this stone, which resembles a woman’s torso and legs, is located in the middle of Pālolo Stream, approximately half a mile below the “first bridge” (Davis in Sterling and Summers 1978:277).

A supernatural rooster, Kaau-helu-moa, is also associated with Pālolo (*Na Anoai o Oahu Nei* in Sterling and Summers 1978). The rooster grew up in Pālolo, raised by his grandmother. Kamapua‘a, a kino lau distinguished for his hog body form, wanted to kill and eat the rooster. When Kamapua‘a went to bite Kaau-helu-moa, the rooster flew onto his back and kicked and pecked at him. Kamapua‘a rolled on the ground, and the rooster began to run away. Kamapua‘a chased him, and the rooster kicked back at him but fell into a spring and died. The spring took the name of the rooster, and it is said to have water that appears reddened with blood. However, if you take the water from the spring, it appears the clear color of normal water (*Na Anoai o Oahu Nei* in Sterling and Summers 1978:277).

Another mo‘olelo speaks of a father and son who were robbers that lived in Pālolo (Henriques Coll. in Sterling and Summers 1978). The pair lived at the base of the mountains, that are known to house many burial caves. The robbers would use a fishing net to entangle people on the trail so they could steal from them. They would then kill their victims and dispose of their remains in the burial caves. The father became seriously ill and required the son to catch three men in order to save his life. The son waited by the trail as three men returned from the uplands with a load of ‘iliahi. The son cast his net, but for the first time he failed to capture his would-be victims. Although one man was killed, the other two escaped. That night, armed men came upon the robbers to exact justice. The robbers claimed that they were in a place of refuge and could not be punished, but this claim was refuted by the valley’s chief priest. With his last remaining strength, the father threw his net all the way to Wai‘alae Bay. The next day, after the robbers were killed, the net was found, stuck on a sharply pointed rock. It is said that the mesh imprint of the net still remains on that rock (Henriques Coll. in Sterling and Summers 1978:280).

Another mo‘olelo notes that Ka‘au Crater was formed by the celebrated hero Maui (Emerson in Sterling and Summers 1978). Maui wanted to rearrange the islands and combine them into a solid mass. He stood at Ka‘ena Point on O‘ahu and threw his magic fishing hook far into the sea to anchor itself into the island of Kaua‘i. He tugged at the line, but a huge boulder dislodged and fell at his feet. The hook careened toward O‘ahu and landed at Pālolo, where Ka‘au Crater was formed by the force of its landing (Emerson in Sterling and Summers 1978:277).

Pālolo in the Historic Era

When the first Westerners arrived in the Hawaiian archipelago in 1778, the islands were not yet united under one sovereign. At that time, Pālolo and the entire island of O‘ahu were under the rule of Chief Kahahana. In 1783, Chief Kahahana’s reign was ended with the invasion and victory of Chief Kahekili of Maui. This would forever be the end of O‘ahu’s independence as a separate island kingdom. When Chief Kahekili died in 1794, control of O‘ahu went to his son Kalanikūpule. The following year, Chief Kamehameha of Hawai‘i Island invaded O‘ahu to engage Kalanikūpule in battle. Kamehameha overwhelmed Kalanikūpule’s warriors, effectively gaining control of all the islands from Hawai‘i to O‘ahu. Eventually, Kamehameha would make a peaceful agreement with Chief Kaumuali‘i of Kaua‘i, bringing that island and Ni‘ihau into the fold and thereby uniting the Hawaiian archipelago under one rule (Kamakau 1996, Kanahahele 1995).

Pālolo and the Changes in Land Tenure

It was during the reign of Kamehameha III, in the mid-1800s, as the Hawaiian kingdom became increasingly exposed to outside influences, that the Hawaiian monarchy faced a crossroads of major change. Dr. David Keanu Sai describes the predicament that King Kamehameha III faced:

Kamehameha III's government stood upon the crumbling foundations of a feudal autocracy that could no longer handle the weight of geo-political and economic forces sweeping across the islands. Uniformity of law across the realm and the centralization of authority had become a necessity. Foreigners were the source of many of these difficulties. (Sai 2008:62)

“Several legislative acts during the period 1845–1855 codified a sweeping transformation from the centuries-old Hawaiian traditions of royal land tenure to the western practice of private land ownership” (Moffat and Fitzpatrick 1995). Most prominent of these enactments was the Māhele of 1848 which was immediately followed by the Kuleana Act of 1850.

The Mahele was an instrument that began to settle the undefined rights of three groups with vested rights in the dominion of the Kingdom --- the government, the chiefs, and the *hoā'āina*. These needed to be settled because it had been codified in law through the Declaration of Rights and laws of 1839 and the Constitution of 1840, that the lands of the Kingdom were owned by these three groups... Following the Mahele, the only group with an undefined interest in all the lands of the Kingdom were the native tenants, and this would be later addressed in the Kuleana Act of 1850. (Beamer 2008:194, 195)

Although the Māhele had specifically set aside lands for the King, the government, and the chiefs, this did not necessarily alienate the *maka'āinana* from their land. On the contrary, access to the land was fostered through the reciprocal relationships which continued to exist between the commoners and the chiefs. Perhaps the chiefs were expected to better care for the commoners' rights than the commoners themselves who arguably might have been less familiar with foreign land tenure systems. Indeed, the *ahupua'a* rights of the *maka'āinana* were not extinguished with the advent of the Māhele, and Beamer points out that there are “numerous examples of *hoā'āina* living on Government and Crown Lands Post-Mahele which indicate the government recognized their rights to do so” (Beamer 2008:274).

Hoā'āina who chose not to acquire allodial lands through the Kuleana Act continued to live on Government and Crown Lands as they had been doing as a class previously for generations. Since all titles were awarded, “subject to the rights of native tenants.” The *hoā'āina* possessed habitation and use rights over their lands. (Beamer 2008:274)

For those commoners who did seek their individual land titles, the process that they needed to follow consisted of filing a claim with the Land Commission; having their land claim surveyed; testifying in person on behalf of their claim; and submitting their final Land Commission Award (LCA) to get a binding royal patent. However, in actuality, the vast majority of the native population never received any LCAs recognizing their land holdings due to several reasons such as their unfamiliarity with the process, their distrust of the process, and/or their desire to cling to their traditional way of land tenure regardless of how they felt about the new system. In 1850, the king passed another law, this one allowing foreigners to buy land. This further hindered the process of natives securing lands for their families.

According to the Waihoa Aina database, 14 LCAs were claimed for the 'ili of Waiōma'ō in Pālolo, where the project area is located (Table 1). Of the 14 LCA claims, only half were awarded. Three LCA parcels were awarded within or very close to the current project area. These are LCA 8287, awarded to Kawainui; 10622:2, awarded to Pa; and 8290, awarded to Kinoua. LCA 8287 lies within

the western portion of the project area, while LCA 10622:2 is situated to the north of the western side of the project (Figure 5). LCA 8287 is to the north of the eastern side of the project. Māhele testimony does not provide much information for any of the parcels. For LCA 8287, the testimony notes that the parcel is within the smaller land section (mo‘o‘āina) of Kamakaha, and the plot borders land belonging to the konohiki (Figure 6). For LCA 10622:2, the testimony mentions that the mo‘o‘āina is Kahalii, and the parcel is bounded by land belonging to Kaahui, Kalama, and the konohiki (Figure 7). Note that in both instances it is unclear if the testimony refers to the konohiki of the area or a person named Konohiki. No information could be found for LCA 8290. The LCA awards are also shown on two historic maps of Pālolo (Figures 8 and 9). Note the depiction of kula and taro lands around the project area on Figure 9.

Table 1. LCA Claims in the ‘Ili of Waiōma‘o, Pālolo

LCA	Claimant	Awarded
1651	Kolohe	No
1876	Kapapoko	No
1898	Opunui	Yes
3412B	Kaniho	No
3415B	Kaahui	Yes
3742B	Opunui	No
3743B	Kaalu	No
3744B	Wainui	No
8287	Kawainui	Yes
8288	Kanewahie	No
8290	Kinoua	Yes
8291	Kaalu	Yes
10622	Pa	Yes
10623	Pakui	Yes

Pālolo in the Late-1800s

An 1880 tourist guide for O‘ahu described Pālolo Valley and its bountiful produce:

...No tourist should fail to spend a day hunting for ferns, and for the picturesque in one or the other of the deep gulches in this neighborhood, Manoa, Palolo or Waialae. These valleys follow one another in the order just named, whilst they are full of verdure and of a profusion of vegetation, such as can only be found in such favored spots. The land nearer the sea is of little value, and is, in many places, covered with boulders. As in the ravines on the northeastern coast, and almost everywhere else throughout the Island, these are full of fruit-bearing trees, mingled with the native trees. Limes, oranges, bananas and guavas are to be had in plenty for the picking. (Bowser 1880:498)

The 19th century ended with the overthrow of the Hawaiian monarchy and the subsequent annexation of the Hawaiian Islands by the United States of America. Thus, Pālolo saw great changes within that century. Its population was transformed from a native Hawaiian society under a monarchy to an increasingly multiethnic populace as a territory of the United States government.

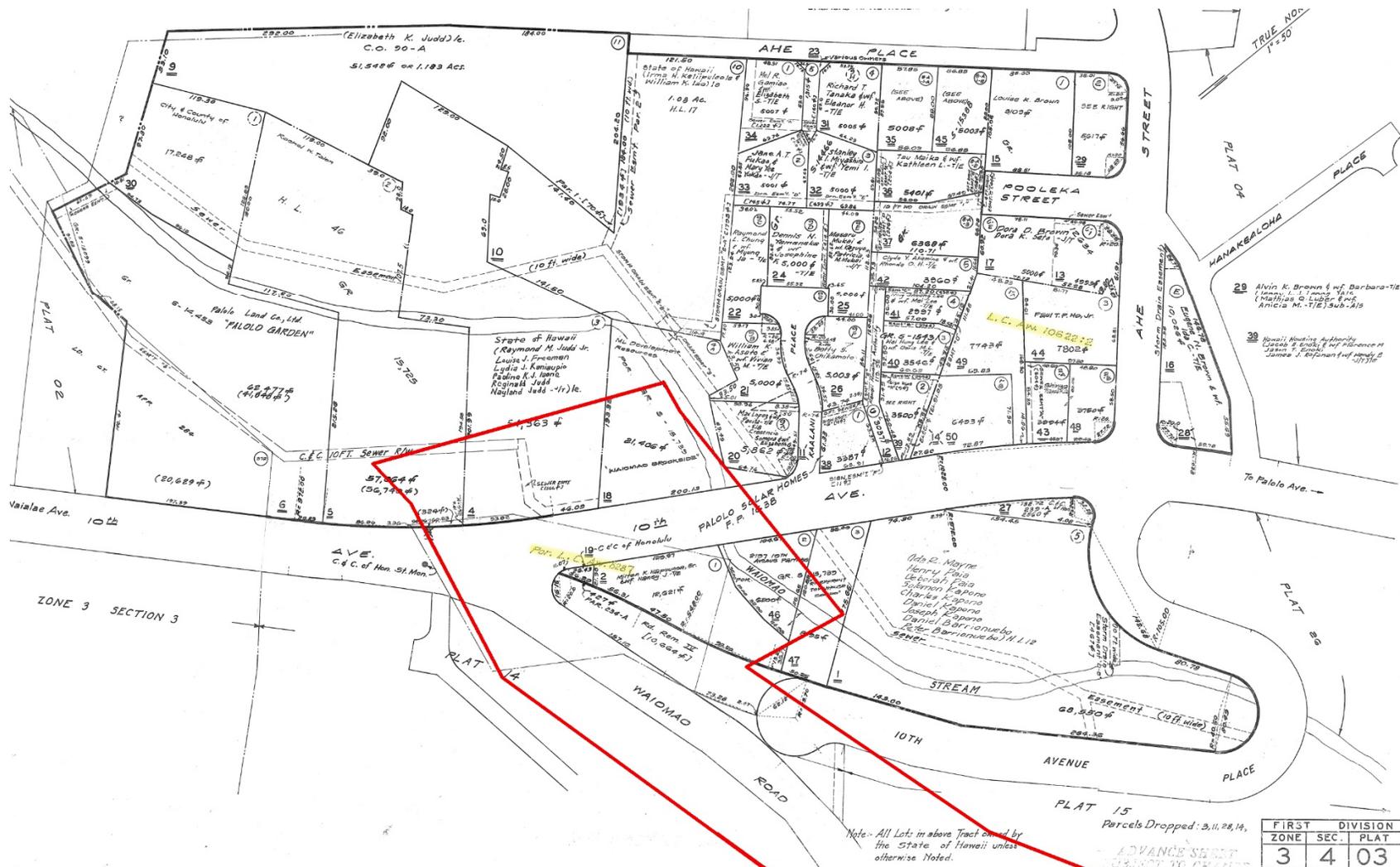


Figure 5. LCA Awards (highlighted in yellow) in relation to the western end of the project area (outlined in red) on a portion of a 1933 TMK map.

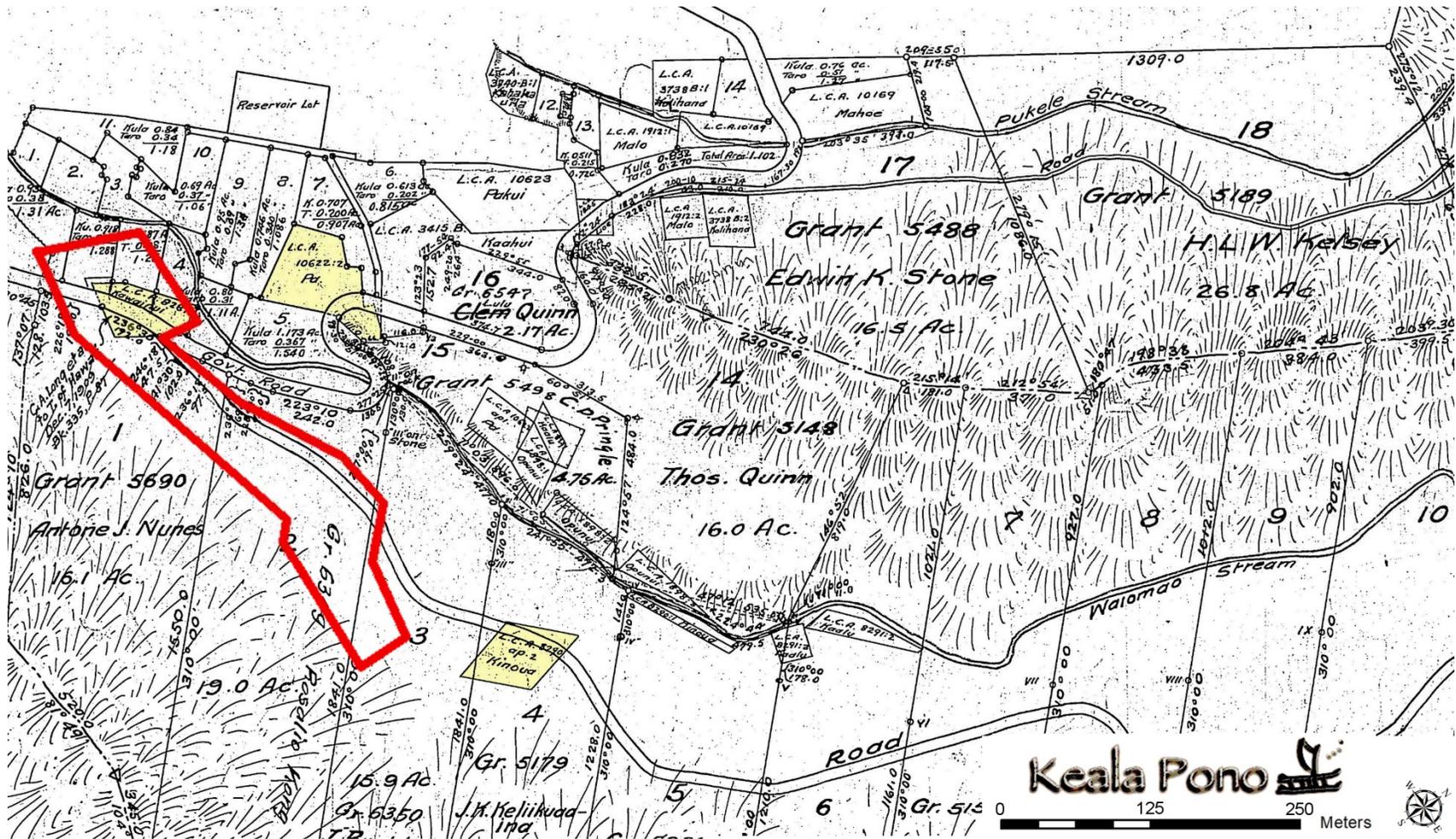


Figure 9. Portion of a map of Pālolo Valley showing LCA awards in the project area (Iao 1914). The LCAs of Pa, Kawainui, and Kinoua are highlighted in yellow and the project area is outlined in red.

The 20th Century

Altizer et al. (2009:24) comment on the historical development of the region, with Pālolo being among the later areas to be urbanized:

During the early 1900s, the first detailed maps of the vicinity were produced by land companies that wished to develop the land for housing subdivisions. Other areas such as Nu‘uanu, Pauoa, Makiki, and Manoa were developed first. Much of the land in Palolo was too swampy, too steep, or too remote. The first sections to be developed were the McCully and Kaimuki areas. In 1908, a mule-drawn trolley car service was built along Wai‘alaie Road, linking the people of Palolo to the urban center at Honolulu.

Pālolo Elementary was the first school in the valley, opening in 1921. Early businesses in Pālolo included two dairies, a golf course, and a rock quarry that was operated by Hawaiian Construction and Dredging Company. The golf course opened in 1931 next to the elementary school, and remained in operation until 1955 (Figure 10). There was also an airstrip positioned in the valley during World War II. Also during the war, evacuation camps were established in Pālolo, where people could shelter in the event of another Japanese attack. The rock quarry remained open until 1951, when it was replaced by housing developments. The 1950s also saw improvements to the canals in the valley:

Flood control became an issue in Honolulu after flooding caused by a February 1935 storm claimed the lives of nine people, leading to the channelizing of a number of streams in town during the late 1930s. The Kapalama and Manoa-Palolo canals were constructed.... During the 1950s Palolo and Manoa streams were lined with concrete walls and beds, as a new drainage section was established within the City and County’s Bureau of Plans, thanks to congressionally authorized obligation bonds for flood control. (HHF 2011)

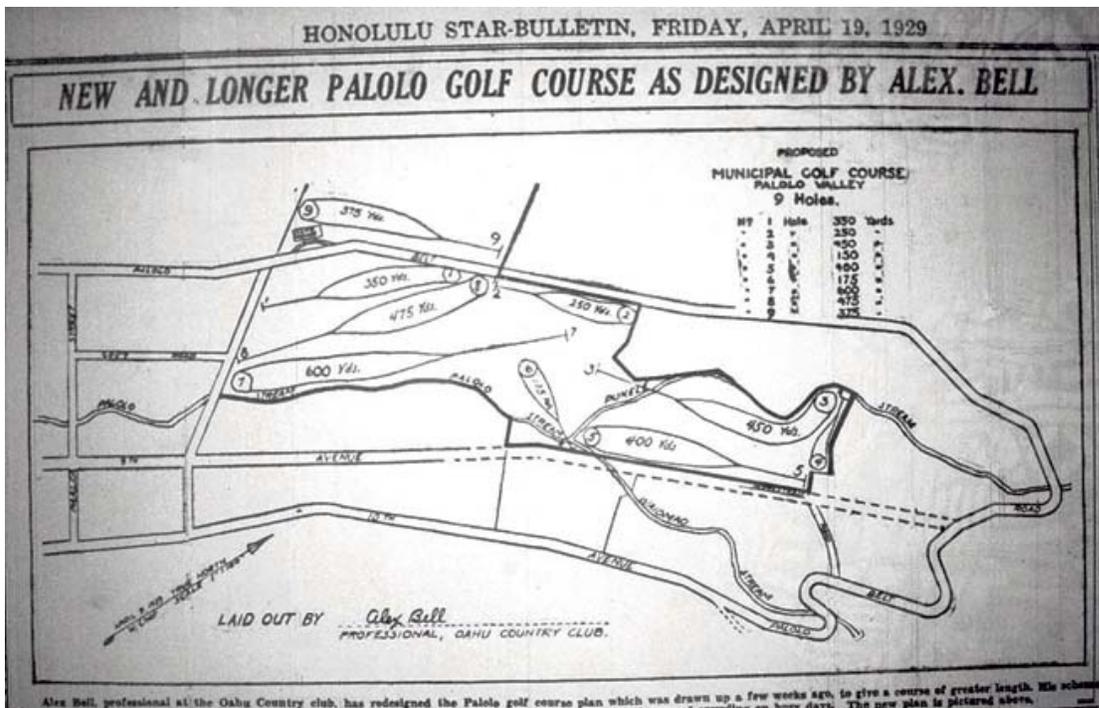


Figure 10. Pālolo Golf Course, ca. 1931–1955 (*Honolulu Star Bulletin* 1929).

Previous Archaeology

Numerous archaeological studies have been conducted in Pālolo. The following discussion provides information on archaeological investigations that have been carried out within approximately 1 km of the project area, based on reports found in the SHPD library in Kapolei, Hawai'i (Figure 11, Table 2). Projects are presented chronologically, and State Inventory of Historic Places (SIHP) numbers are prefaced by 50-80-14.

In 1984, an archaeological reconnaissance survey was conducted at a Pālolo Valley parcel located at TMK: (1) 3-4-020:003 (Kennedy 1984). No surface archaeological properties were identified in the project area, and no subsurface features were expected due to the area's sloped talus topography.

A 1987 archaeological reconnaissance survey at Wa'ahila Ridge led to the inadvertent discovery of a burial cave, SIHP 3733, and a rock wall, SIHP 3734 (Kennedy 1987). A subsequent report documented the presence of at least five adult burials in the cave, in addition to the presence of animal remains (Pietrusewsky 1987).

A 1989 burial report documented human remains inadvertently discovered in Pālolo along 10th Avenue (Kawachi 1989). They were designated as SIHP 4156.

In 1992, an archaeological inventory survey was conducted for the Pālolo Waterline Replacement Project at the corridors for Segments A and B (Sinoto and Pantaleo 1992). No archaeological or cultural sites or features were identified.

In 1994, a burial cave with human remains was inadvertently discovered along the slopes of Pālolo Valley (Jourdane 1994). The human remains were designated SIHP 4842.

A 1996 archaeological inventory survey was conducted for the Kamoku-Pukele 138-kV Transmission Line Alignments project (Wolforth et al. 1996). Two archaeological sites were identified in the Pālolo area: SIHP 5463, a wall complex constructed of stones; and SIHP 1726, the remnants of the Old Kawao Community Park.

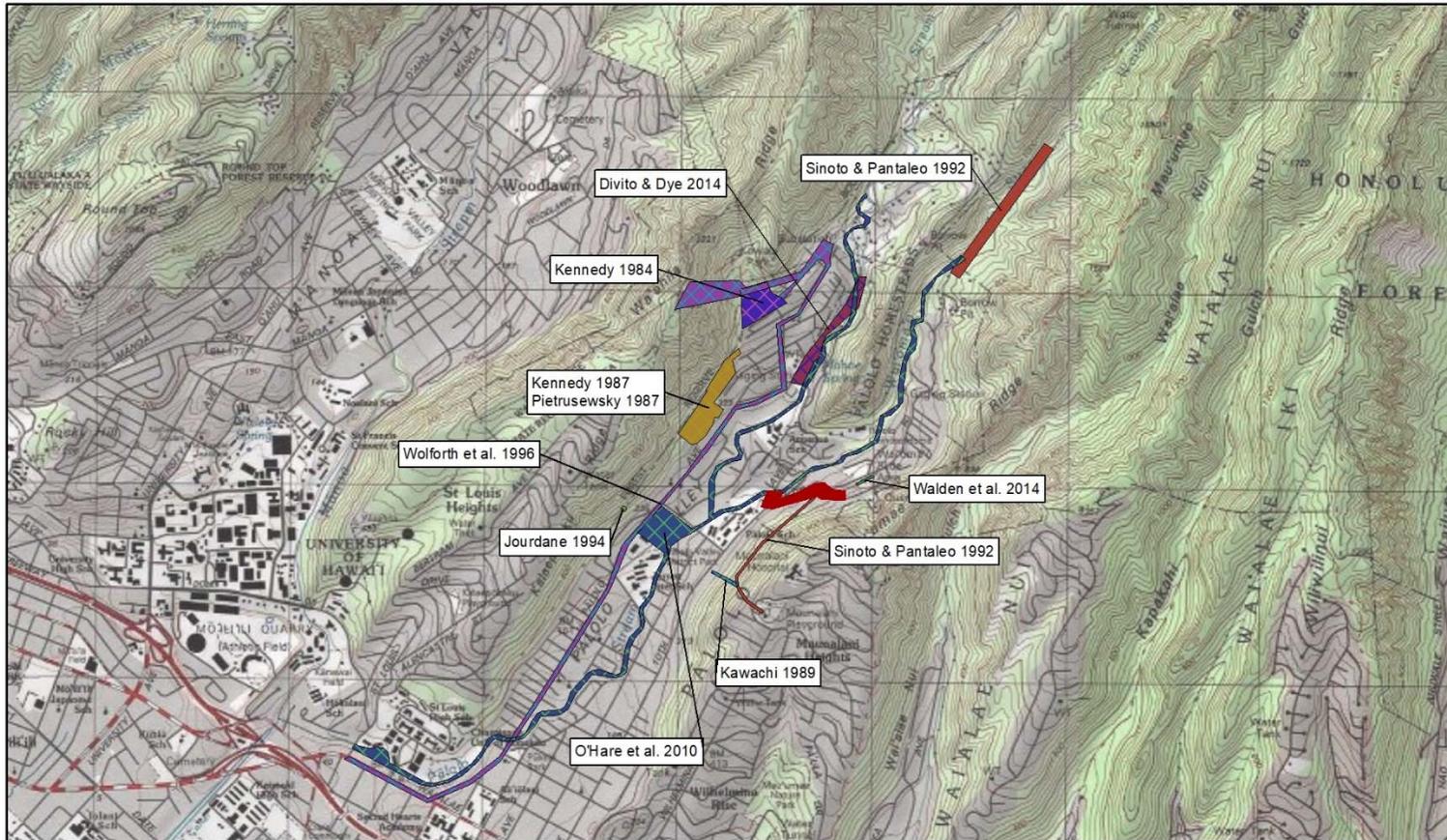
In 2010, a cultural resources and ethnographic study were conducted for the Ala Wai Watershed Project which included lands in Pālolo (O'Hare et al. 2010). Two terrace complexes were identified in the valley and designated as SIHP 6749 and 6750.

In 2014, archaeological monitoring was conducted along Pūkele Stream for the Pālolo Sewer Rehabilitation project (Divito and Dye 2014). No archaeological or cultural properties were identified.

Also in 2014, archaeological monitoring was conducted in Pālolo Valley for the Kuahea Street Interim Repair Project (Walden et al. 2014). Only one archaeological property was identified, a post-contact retaining wall made of concrete. It was designated as SIHP 7654. Under Criterion "D," the wall was determined to be significant due to its potential to yield important information.

Summary and Settlement Patterns

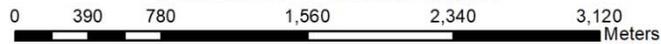
Archaeological evidence and traditional sources advance the theory that the district of Waikīkī, of which Pālolo is a part of, was one of the first places that Polynesians settled on O'ahu after the initial occupation of the Ko'olaupoko area. The first arrivals to Hawai'i probably came around AD 300,



Legend

- Project Area
- Previous Archaeology

Keala Pono



Layer Credits: USGS Topographical Honolulu Quadrangle Map 1998

Figure 11. Location of previous archaeological studies in the vicinity of the project area.

Table 2. Previous Archaeology in Pālolo

Author	Year	Location	Work Completed	Findings
Kennedy	1984	Northwestern Portion of Pālolo Valley	Archaeological Reconnaissance	No archaeological or cultural sites or features were identified.
Kennedy	1987	West Side of Pālolo Valley	Archaeological Reconnaissance	Survey resulted in the discovery of a burial cave, SIHP 3733, and a rock wall, SIHP 3734.
Pietrusewsky	1987	West Side of Pālolo Valley	Burial Report	Five adult burials were discovered in a cave and animal remains were present; these were designated as SIHP 3733.
Kawachi	1989	10 th Ave., Palolo Hillside	Burial Report	Human remains were discovered along 10 th Ave; they were designated as SIHP 4156.
Sinoto and Pantaleo	1992	South of Kuahea St.	Archaeological Inventory Survey	No archaeological or cultural sites or features were identified.
Jourdane	1994	West Side of Pālolo Valley	Burial Report	Human remains were discovered in a cave along the slopes of Pālolo Valley and were designated as SIHP 4842.
Wolforth et al.	1996	Throughout Pālolo Valley	Archaeological Inventory Survey	Two archaeological sites were identified in the Pālolo area: SIHP 5463, a wall complex constructed of stones; and SIHP 1726, the remnants of the Old Kawao Community Park.
O'Hare et al.	2010	Throughout Pālolo Valley	Cultural Resources and Ethnographic Study	Two terrace complexes were identified in the valley and designated as SIHP 6749 and 6750.
Divito and Dye	2014	Pūkele Stream Sewer	Archaeological Monitoring	No archaeological or cultural sites or features were identified.
Walden et al.	2014	Kuahea St.	Archaeological Monitoring	Identified a post-contact retaining wall made of concrete, designated as SIHP 7654.

and the settlement of Waikīkī likely occurred around AD 600 (Kanahele 1995). The healthy population of the district was sustained by an abundance of marine resources off its shore, well-stocked fishponds along its coast, and well-irrigated wetlands where taro was bountifully harvested. The inland valleys and ridges of Pālolo and other areas provided further natural resources for additional food, clothing, housing, cordage, and other necessities. Pālolo was a prominent area of Waikīkī, as evidenced in the many mo'olelo that mention this place. Pālolo was noted in the Hi'ikaikapoliopele saga, as well as in a story of the hero Maui, and in tales of mo'owahine, a supernatural rooster, and robbers that resided in the valley.

The Hawaiian Islands consisted of several sovereign island kingdoms independent of each other for almost 1,000 years. During this time, different islands were consolidated under one ruler, and at other times, the chiefdoms consisting of several islands were splintered, all this fluidity due to inter-island wars and alliances. For much of this portion of Hawaiian history, the ahupua'a of Waikīkī not only remained part of the O'ahu kingdom, it was the very seat of power for the O'ahu king. Toward the end of the 18th century when O'ahu was first conquered by Maui, and about a decade later when O'ahu was conquered by Hawai'i Island, Waikīkī remained the seat of political power. The unified Hawaiian Islands continued to be ruled out of Waikīkī under King Kamehameha the Great until he moved his seat of government to Honolulu. Throughout it all, Waikīkī was still a place reserved for Hawaiian royalty to live, worship, and play, although this likely did not extend into Pālolo Valley. King Kamehameha III's sweeping enactment of the Māhele of 1848, which allowed for private ownership of land, showed that Hawaiians were very much interested in Pālolo Valley lands, particularly in areas along the streams. One LCA was awarded within the project area, and another two were awarded nearby, all within the 'ili of Waiōma'o.

The 19th century closed with the overthrow of the Hawaiian monarchy by foreigners backed by the United States and the move to incorporate Hawai'i as an American territory. As the U.S. military and other planners drained and filled Waikīkī's wetlands and developed it into an area of prime real estate, the uplands, including Pālolo, were also being converted from agricultural to residential purposes. By the mid-20th century, Pālolo was clearly a post-territorial multiethnic community, with early establishments including an elementary school, two dairies, a golf course, and a rock quarry. Residential development has continued to grow throughout the decades making Pālolo blend into the cityscape of modern Honolulu.

METHODS

Archaeological monitoring was carried out between February 12, 2018 and July 2, 2018, with a total of 55 work days completed during this time. Archaeological monitors included Anthony Alvarez, MA, Megan Edwards, MA, Jeffrey Lapinad, Robin Keli‘i, BA, Max Pinsonneault, BA, Lisa, Rey, BA, and Danielle Shemesh, BA. The archaeological monitor was on site full time for all excavation. Windy McElroy, PhD served as Principal Investigator, overseeing all aspects of the project.

Archaeological monitoring was guided by a SHPD-approved archaeological monitoring plan, and there were no deviations from the plan (McElroy and Duhaylonsod 2018). On the first day of work, the archaeological monitor spoke with the construction team to ensure that they understood the purpose of the monitoring and that the monitor has the authority to halt construction activity. Excavation was conducted with a backhoe, excavator, mini excavator, bobcats, and by hand with shovels (Figure 12).

Representative profiles were drawn and photographed. Profile locations were recorded with a 3 m-accurate Garmin 62st GPS unit. Digital photos were taken of various stages of the work and also where profiles were drawn. Sediments were described using Munsell Soil Color Charts, a sediment texture flow chart (Thien 1979), and the U.S. Department of Agriculture soil manual. The scale in all field photographs is marked in 10 cm increments. The north arrow on all maps points to magnetic north. Throughout this report rock sizes follow the conventions outlined in *Field Book for Describing and Sampling Soils*: Gravel <7 cm; Cobble 7–25 cm; Stone 25–60 cm; Boulder >60 cm (Schoeneberger et al. 2002:2-35). Collected material is being temporarily curated at the Keala Pono office in Kapolei, Hawai‘i until it can be turned over to the landowner.



Figure 12. Excavation with a mini excavator and shovels.

RESULTS

Archaeological monitoring was conducted in Pālolo Valley, from the intersection of 10th Avenue and Waiōma‘o Road to 2373 Kuahea Street, including the Kuahea Street/Waiōma‘o Road intersection, Helo Place, and Kuahea Place (Figure 13). A wider view of the project location can be seen in Figure 1. Two profiles are presented here, representative of stratigraphy throughout the project area. Stratigraphy consisted of the asphalt road with various layers of fill below (Table 3). No historic properties or cultural deposits were encountered. Six glass bottles and one bottle fragment were collected from three contexts. These were grouped together as artifact sets, based on context (see Figure 13).

Stratigraphy

Profiles were taken at various points along the project corridor, and two representative profiles are presented here. Some of the excavations were relatively deep, typically from 1.5 to 3 m in depth. Stratigraphy consisted of asphalt over previously excavated fill; no natural stratigraphic layers were encountered (see Table 3). In total, seven historic glass objects were recovered from the lower levels of the secondary fill (see Laboratory Analysis). No historic properties or cultural deposits were encountered.

Profile 1 was recorded approximately at the base of the driveway of 2237 Waiōma‘o Road (see Figure 13). The excavation extended to as deep as 2.9 m below surface. Five layers were encountered, consisting of an asphalt layer (I) over four layers of secondary fill (II, III, IVa, and IVb) (Figure 14).

Profile 2 was recorded in the center of Kuahea Street, immediately southeast of Waiōma‘o Street’s southwestern intersection with Kuahea Street (see Figure 13). This area is sloping down to the west. The excavation extended to 2.1 m below the surface. Four layers were encountered, consisting of an asphalt layer (I) over three layers of secondary fill (II, III, and IV) (Figure 15).

Laboratory Analysis

During the archaeological monitoring of the Kuahea Street Improvements in Pālolo there were three separate discoveries of historic bottles recovered along Waiōma‘o Road. In total seven artifacts were recovered, one pair of bottles produced in 1954 and 1955 respectively, a lone bottle produced in 1934, and a set of three bottles produced in 1952 along with an unidentified glass fragment that dated to the 19th or 20th century. All bottles are machine made and were recovered in proximity to abandoned pipes buried between 1 and 2.1 m below the road surface.

Method of Analysis

Bottles were analyzed according to the Society for Historical Archaeology (SHA) Historic Glass Bottle Identification & Information Website published and maintained by Bill Lindsey, formerly of the Bureau of Land Management (Lindsey 2018). All six bottles were identified by researching the manufacturer logos upon the base of bottles, along with the date stamp and year of manufacture printed on the right and left respectively. The single glass fragment was dated according to Edwards’ (2017) unpublished bottle manufacturing timeline, and confirmed through the SHA bottle identification website (Lindsey 2018).

Results

Artifacts were grouped into three sets based on context. They are described below.

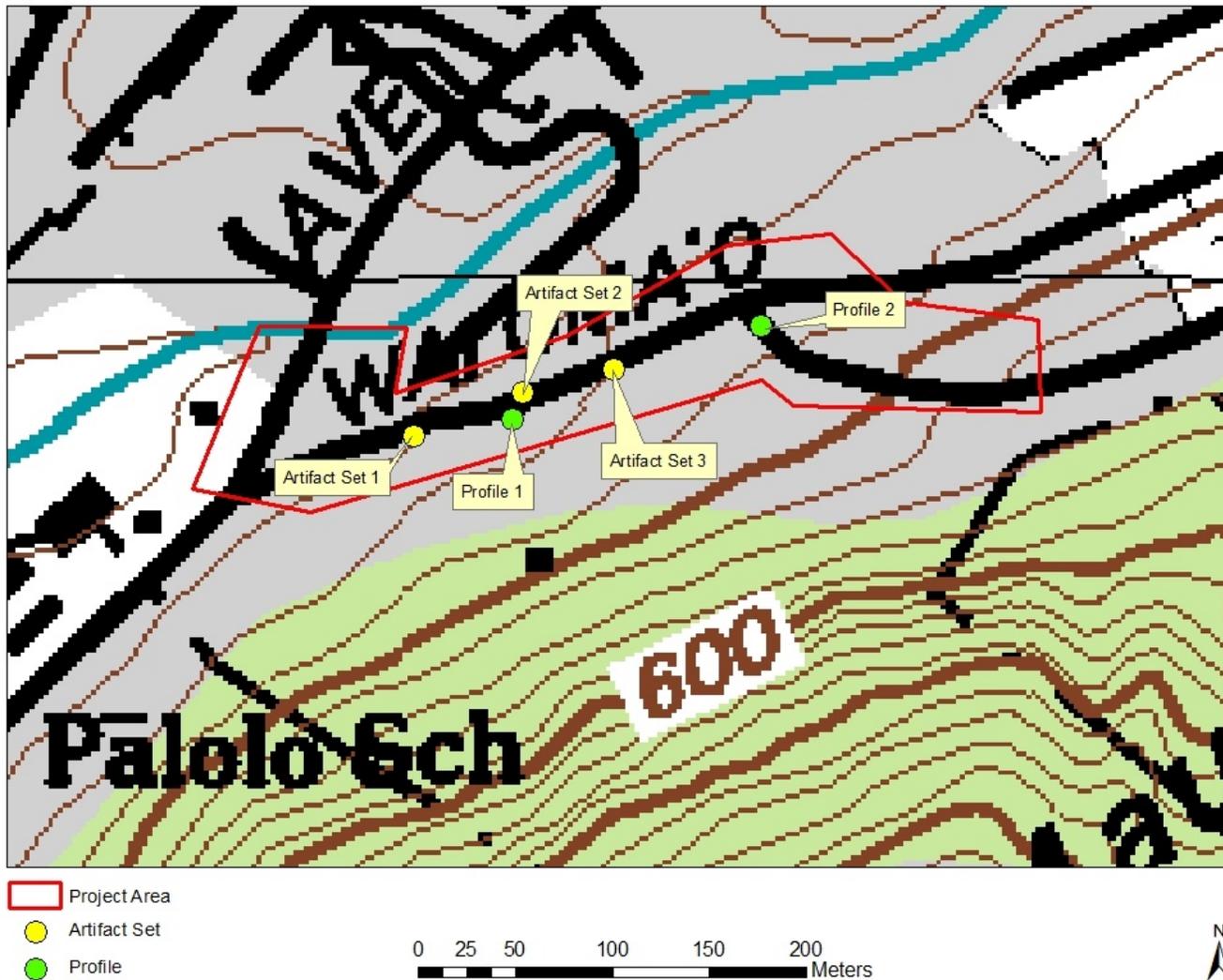


Figure 13. The project area on 1998 USGS quadrangle, showing locations of artifact sets and profiles.

Table 3. Sediment Descriptions

Location	Layer	Depth (cmbs)	Color	Description	Interpretation
Profile 1- Waiōma'ō Rd.	I	0–22	N/A	Asphalt; smooth, very abrupt boundary.	Modern Road
	II	22–46	7.5YR 5/4	Clay; 1% roots, 25% rocks; smooth, very abrupt boundary.	Fill
	III	46–82	10YR 2/1	Sandy clay with rubble inclusions; 25% rocks; wavy, very abrupt boundary.	Fill
	IVa	82–168	10YR 4/3	Sandy clay with rubble inclusions; 25% rocks; wavy, abrupt boundary.	Fill
	IVb	168–290+	10YR 4/3	Sandy clay with rubble inclusions; 75% rocks; base of excavation.	Fill
Profile 2- west end of Kuahea St.	I	0–20	N/A	Asphalt; smooth, very abrupt boundary.	Modern Road
	II	20–45	5Y 3/2	Sandy clay; no rocks; smooth, clear boundary.	Fill
	III	45–150	10R 3/4	Sandy clay with rubble inclusions; 70% rocks; wavy, clear boundary.	Fill
	IV	150–210+	5YR 7/2	Gravel; 99% rocks; base of excavation.	Fill

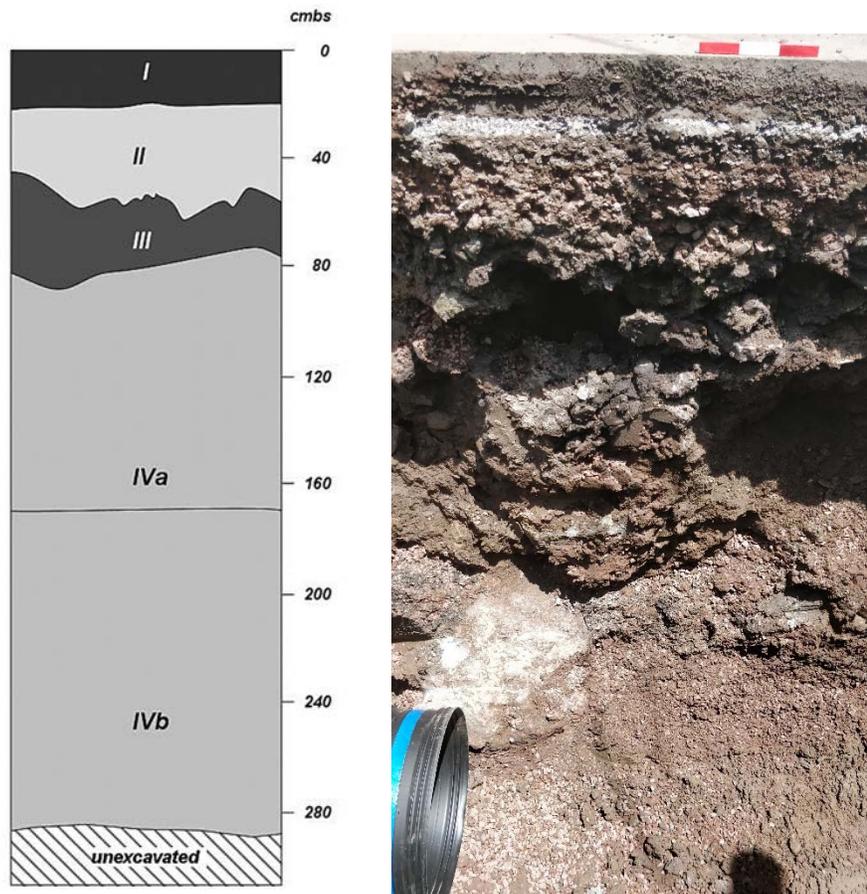


Figure 14. Profile 1, northwest face drawing and photo.

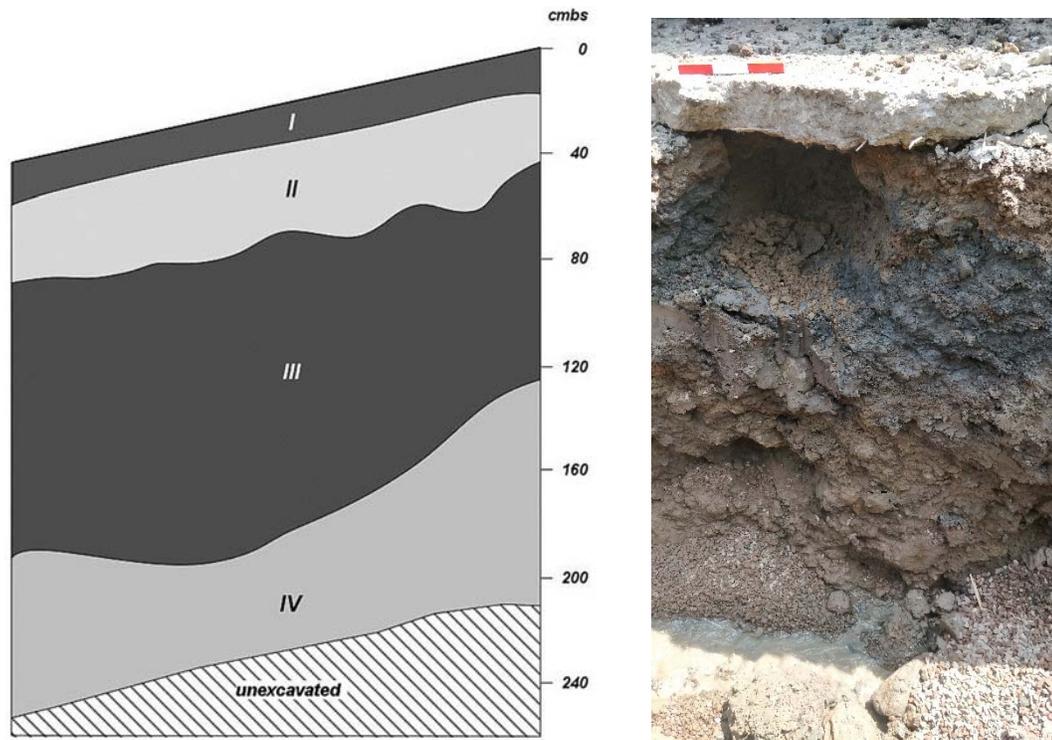


Figure 15. Profile 2, north face drawing and photo.

Artifact Set 1

This artifact set consists of a pair of brown beer bottles discovered 2.1 m below the surface immediately underneath a cement waterline.

Bottle 1 produced in 1954:

The bottle was produced by the Owens Illinois Glass Company. The logo appearing on the base with an I inside of the O, first appeared in 1954. when combined with the single-year digit 4 printed to the right of the logo, the bottle can be dated to either 1954 or 1964. This can be narrowed down specifically to 1954 by the Duraglas stamp appearing directly beneath the logo which only appeared on Owens Illinois bottles during the 1940s and 1950s, negating the possibility of production in the 1960s. With the production date of 1954 established, the “20” printed to the left of the logo indicates that the bottle was produced in Oakland, California (Lockhart and Hoenig 2015).

Bottle 2 produced in 1955:

The bottle was produced by the Owens Illinois Glass Company. The logo appearing on the base with an I inside of the O, first appeared in 1954. When combined with the single-year digit 5 printed to the right of the logo, the bottle can be dated as early as 1955 or 1965. This can be narrowed down specifically to 1955 by the Duraglas stamp appearing directly beneath the logo which only appeared on Owens Illinois bottles during the 1940s and 1950s, negating the possibility of production in the 1960s. With the production date of 1955 established, the “20” printed to the left of the logo indicates that the bottle was produced in Oakland, California (Lockhart and Hoenig 2015).

Artifact Set 2

This artifact set consists of a lone brown beer bottle recovered from fill associated with the removal of an abandoned waterline 2.5 m below the surface.

Bottle 3 produced in 1934:

The bottle was produced by the Owens Illinois Bottling Company. The logo appearing on the base with an I inside of an O inside of diamond was in use from 1924 through 1960. The date code is a 4 without a period, which in conjunction with the logo is indicative of production in 1934. This is further confirmed by the “24” opposite the date stamp which indicates that the bottle was produced in the Los Angeles, California factory between 1932 and 1937 (Lockhart and Hoenig 2015).

Artifact Set 3

This artifact set consists of three brown beer bottles and one glass fragment recovered 1 m below the surface, directly over an old waterline.

Bottle 4 produced in 1952 or 1957:

The bottle was produced by the Thatcher Glass Manufacturing Company in Streator, Illinois. The logo appearing on the base with an M and a C underneath a larger T was utilized between 1944 and 1985. This bottle has an unusual date code with both a 52 and a 57 printed independently to the left of the TMC logo. This likely indicates a date of either 1952 or 1957. Unfortunately this cannot be narrowed down further by the “S” plant code for the Streator, Illinois factory, which was active between 1924 and 1963, leaving the dates for this bottle at either 1952 or 1957 (Lockhart et al. 2007).

Bottle 5 produced in 1952:

The bottle was produced by the Thatcher Glass Manufacturing Company in Streator, Illinois. The logo appearing on the base with an M and a C underneath a larger T was utilized between 1944 and 1985. The date code “52” appearing to the left of the logo indicates production in 1952. The “S” plant code for the Streator, Illinois factory further confirms this, as the factory was active between 1924 and 1963 (Lockhart et al. 2007).

Bottle 6 produced in 1952:

The bottle was produced by the Brockway Glass Company. The logo appearing on the base with an encircled B was in use between 1933 and 1980. The date code “52” printed to the right of the logo, indicates a manufacture date of 1952. The “4” printed opposite to the left of the logo indicates that the bottle was manufactured at the Lapel, Indiana plant in operation between 1951 and 1988, further confirming that the bottle was produced in 1952 (Lockhart et al. 2013).

Glass Fragment, 1864–present:

The glass itself is colorless and is likely the neck of a decanter, vase, or growler. It has two embossed stamps one of which says “LOG”, the second of which says “conte”, and there are no visible seams on the fragment. The presence of embossing and the colorless manufacture of the glass indicate that the fragment has a soda-lime composition. This process was invented in 1864 (Edwards 2017, Jones and Sullivan 1989).

Summary of Laboratory Analysis

Five of the six bottles can be clearly dated to the early to mid-1950s, and the sixth bottle was produced several years earlier in 1934. All six of the bottles are likely beer bottles, evidenced by their brown coloring and shape. Additionally, they were all produced in North America. All of the bottles' proximity to now-abandoned waterlines, is highly indicative of trash left behind by the work crews that initially installed these waterlines in the mid- to late-1950s. Additionally, the one glass fragment is likely from the early- to mid-20th century.

Summary of Results

In sum, excavations were monitored along Waiōma‘o Road from 10th Avenue to 2373 Kuahea Street, including the Kuahea Street/Waiōma‘o Road intersection, Helo Place, and Kuahea Place. No historic properties or cultural deposits were encountered. Stratigraphy consisted of a secondary fill below the asphalt road. The six historic glass bottles recovered from the secondary fill date from the 1930s through the 1950s. An additional glass fragment likely dates from the early- to mid-20th century. The bottles were located near old waterlines and were likely deposited when these waterlines were installed.

Table 4. Artifact Data

Acc. No.	Contents	Company	Origin	Date	Glass Color	Glass Type	Height (cm)	Diameter (cm)	Description
1	Beer	Owens Illinois Bottling Company	Oakland, California	1954	Amber	Container	20	22	Whole amber glass beer bottle with a horizontal seam between the heel and the body, and a vertical seam bisecting the bottle from the heel to the bore. Embossed on the shoulder: "NOT TO BE REFILLED" and "NO DEPOSIT * NO RETURN". Embossed on the base: An I within and O, with the factory code "20" to the left and the date code "5" to the right. Below this a large "I*N" above "Duraglas" embossed in cursive over top of "I-WAY", which is further above the code "7-C3".
2	Beer	Owens Illinois Bottling Company	Oakland, California	1955	Amber	Container	20	22	Whole amber glass beer bottle with a horizontal seam between the heel and the body, and a vertical seam bisecting the bottle from the heel to the bore. Embossed on the shoulder: "NOT TO BE REFILLED" and "NO DEPOSIT * NO RETURN". Embossed on the base: An I within and O, with the factory code "20" to the left and the date code "5" to the right. Below this, in the center of the base "5*G" over "Duraglas" written in cursive, above "I-WAY", further above the code "7-GB".
3	Beer	Owens Illinois Bottling Company	Los Angeles, California	1934	Amber	Container	24	22	Whole amber glass beer bottle. Horizontal seam between heel and body and vertical seam bisecting the bottle from the heel to the bore. On the base there is a maker's mark of an I within an O within a Diamond flanked by a "24" embossed to the left and a "4" embossed to the right.
4	Beer	Thatcher Glass Manufacturing Company	Streator, Illinois	1952 or 1957	Amber	Container	20	22	Whole amber glass beer bottle with a horizontal seam between the heel and the body, and a vertical seam bisecting the bottle from the heel to the bore. Embossed on the shoulder: "NOT TO BE REFILLED" and "NO DEPOSIT * NO RETURN". Embossed on the base: an M and a C intertwined with a T, factory designation "S", possible year codes "52" and "57", and separate from the rest "2481".

Table 4. (Continued)

Acc. No.	Contents	Company	Origin	Date	Glass Color	Glass Type	Height (cm)	Diameter (cm)	Description
5	Beer	Thatcher Glass Manufacturing Company	Streator, Illinois	1952	Amber	Container	20	22	Whole amber glass beer bottle with a horizontal seam between the heel and the body, and a vertical seam bisecting the bottle from the heel to the bore. The bottle has been deformed by high pressure. Embossed on the shoulder: "NOT TO BE REFILLED" and "NO DEPOSIT * NO RETURN". Embossed on the base: an M and a C intertwined with a T, factory designation "S", possible year codes "52" and another "52", and separate from the rest "2481".
6	Beer	Brockway Glass Company	Lapel, Indiana	1952	Amber	Container	Unknown	22	Amber glass beer bottle that has been broken into two pieces with a horizontal seam between the heel and the body, and a vertical seam bisecting the bottle from the heel to the bore. Embossed on the shoulder: "NOT TO BE REFILLED" and "NO DEPOSIT * NO RETURN". Embossed on the base: An encircled "B", flanked by the factory code to the left "4", and the date code to the right "52". Embossed above the logo is the word "EMPERGLA", and below the logo is "I-WAY".
7	Unknown	Unknown	Unknown	1864–Present	Colorless	Container	Unknown	Unknown	A colorless glass fragment. Likely the shoulder of a vase or decanter. Several embossings are present on the bottle, two of which are readable. The first says "ley" and second says "conte".

SUMMARY AND RECOMMENDATIONS

Archaeological monitoring was conducted for ground disturbing activity associated with road improvements on TMK: (1) 3-4-015 (por.), (1) 3-4-030 (por.), (1) 3-4-030:058, and (1) 3-4-030:059 in Pālolo Valley, Waikīkī Ahupua‘a, Kona District, on the island of O‘ahu. No historic properties or cultural deposits were encountered. Stratigraphy consisted of secondary fill below the asphalt road. Six historic glass bottles recovered from the secondary fill date from the 1930s through 1950s. An additional glass fragment likely dates from the early- to mid-20th century. These items were located near old waterlines and were likely deposited when the waterlines were installed. Because of the potential for archaeological resources including human burials to occur in the area, it is recommended that archaeological monitoring is conducted for any future work in the vicinity, even though no significant archaeological resources were found during this project.

GLOSSARY

ahupua‘a	Traditional Hawaiian land division usually extending from the uplands to the sea.
‘āpana	Piece, slice, section, part, land segment, lot, district.
‘awa	The shrub <i>Piper methysticum</i> , or <i>kava</i> , the root of which was used as a ceremonial drink throughout the Pacific.
boulder	Rock 60 cm and greater.
cobble	Rock fragment ranging from 7 cm to less than 25 cm.
gravel	Rock fragment less than 7 cm.
hau	The indigenous tree <i>Hibiscus tiliaceus</i> , which had many uses in traditional Hawai‘i. Sandals were fashioned from the bark and cordage was made from fibers. Wood was shaped into net floats, canoe booms, and various sports equipment and flowers were used medicinally.
heiau	Place of worship and ritual in traditional Hawai‘i.
hoa‘āina	Native tenants that worked the land.
hōlua	Traditional Hawaiian sled used on grassy slopes.
‘ie‘ie	The vine <i>Freycinetia arborea</i> , an endemic, woody branching climber that grows at altitudes of 300–600 m. In ancient Hawai‘i, vines were considered sacred and used in basketry and for ceremonial purposes.
‘ili	Traditional land division, usually a subdivision of an ahupua‘a.
‘iliahi	<i>Santalum</i> spp., refers to all types of Hawaiian sandalwood.
iwi	Bone.
kalo	The Polynesian-introduced <i>Colocasia esculenta</i> , or taro, the staple of the traditional Hawaiian diet.
kino lau	The different forms that a supernatural being may take.
konohiki	The overseer of an ahupua‘a ranked below a chief; land or fishing rights under control of the konohiki; such rights are sometimes called konohiki rights.
kukui	The candlenut tree, or <i>Aleurites moluccana</i> , the nuts of which were eaten as a relish and used for lamp fuel in traditional times.
kula	Plain, field, open country, pasture, land with no water rights.
lama	The native tree, <i>Diospyros sandwicensis</i> , that had many uses in traditional Hawai‘i. Fruit was eaten, wood was fashioned into fish traps and sacred structures within heiau. Lama wood was also crushed and used for medicinal purposes.
lo‘i, lo‘i kalo	An irrigated terrace or set of terraces for the cultivation of taro.
Māhele	The 1848 division of land.
maka‘āinana	Common people, or populace; translates to “people that attend the land.”
māmaki	<i>Piptarus</i> spp., a small native tree. Fiber from its bark was used to make a kind of coarse tapa. Sometimes spelled mamake in old texts.
menehune	Small people of legend who worked at night to build structures such as fishponds, roads, and heiau.

moku	District, island.
mo‘o	Lizard, dragon, water spirit.
mo‘o‘āina	A parcel of land.
mo‘o wahine	Female water guardian.
mo‘olelo	A story, myth, history, tradition, legend, or record.
‘ōhi‘a ‘ai	The mountain apple tree, <i>Eugenia malaccensis</i> , a forest tree that grows to 50 ft. high.
‘ōhi‘a lehua	The native tree <i>Metrosideros polymorpha</i> , the wood of which was utilized for carving images, as temple posts and palisades, for canoe spreaders and gunwales, and in musical instruments.
olonā	The native plant <i>Touchardia latifolia</i> , traditionally used for making cordage.
pili	A native grass, <i>Heteropogon contortus</i> .
stone	Rock fragment ranging from 25 cm to less than 60 cm.
uhiuhi	The endemic tree <i>Mezoneuron kauaiense</i> , a legume with pink or red flowers and winged pods. It produces a hard, heavy wood that was used for hōlua sleds, spears, digging sticks, and house posts in ancient times.

REFERENCES

- Altizer, K., D. Shideler, and H.H. Hammatt
2009 *Archaeological Inventory Survey Report for the Proposed Chaminade-Saint Louis School Campus Project, Palolo Ahupua`a, Honolulu (Kona) District, O`ahu Island*. TMK: (1) 3-3-001: por. 001 & por. 006. Cultural Surveys Hawai`i, Inc., Kailua, Hawai`i.
- Beamer, B.
2008 *Na wai ka mana? `Ōiwi Agency and European Imperialism in the Hawaiian Kingdom*. Diss. University of Hawai`i, Honolulu.
- Bowser, G.
1880 *Hawaiian kingdom statistical and commercial directory and tourists` guide, 1880/1881*. George Bowser & Co., Honolulu, San Francisco.
- Divito, N.J. and T.S. Dye
2014 *Archaeological Monitoring Report for the Pālolo Sewer Rehabilitation, Pūkele Stream Sewer, Land of Pālolo, Kona, O`ahu (TMK: (1) 3-4-12:various, TMK (1) 3-4-19:various, and TMK: (1) 3-4-27:various)*. T.S. Dye & Colleagues, Archaeologists, Inc., Honolulu.
- Edwards, M.
2017 Bottle Manufacturing Timeline. Unpublished teaching reference. University of Hawai`i at Mānoa, Honolulu.
- Foote, D., E. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. United States Department of Agriculture, Soil Conservation Service. Published in cooperation with the University of Hawaii Agricultural Experiment Station, Washington, D.C.
- Fornander, A.
1919 *Fornander Collection of Hawaiian Antiquities and Folk-Lore, Vols. 5 and 6*. Bishop Museum Press, Honolulu.
- Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte
2013 Online Rainfall Atlas of Hawai`i. Bull. Amer. Meteor. Soc. 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.
- Handy, E.S., E.G. Handy, and M.K. Pukui
1991 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Revised Edition. Bernice P. Bishop Museum Bulletin 23, Bishop Museum Press, Honolulu.
- HHF (Historic Hawai`i Foundation)
2011 Hawaii Modernism Context Study. Chapter 4 Modern Resources. Historic Hawai`i Foundation, Honolulu.
- Honolulu Star Bulletin*
1929 "New and Longer Golf Course as Designed by Alex Bell." Friday, April 19, 1929.

- Iao, J.
1914 *Palolo Homesteads Pukele and Waiomao Palolo Valley Honolulu Oahu*. Scale 1 in. = 400 ft. Hawaii Territory Survey Plat Map 2018.
- ‘Ī‘Ī, J.P.
1959 *Fragments of Hawaiian History*, translated by Mary Kawena Pukui. Bishop Museum Press, Honolulu.
- Jones, O. and C. Sullivan
1989 *The Parks Canada Glass Glossary for the description of containers, tableware, flat glass, and closures*. Revised Edition. Canadian Government Publishing Centre, Canadian Park Service, Quebec.
- Jourdane, E.
1994 *Inadvertent Discovery of Human Remains at Palolo, Kona, O‘ahu, State Site No. 50-80-14-4842, SHPD #683*. State Historic Preservation Division, Department of Land and Natural Resources, Honolulu.
- Kamakau, S.M.
1991 *Tales and Traditions of the People of Old: Na Mo‘olelo a ka Po‘e Kahiko*. Translated by Mary Kawena Pukui. Ed. by Dorothy B. Barrere. Bishop Museum Press, Honolulu.

1996 *Ke Kumu Aupuni*. ‘Ahahui ‘Ōlelo Hawai‘i, Honolulu.
- Kanahele, G.S.
1995 *Waikiki 100 B.C. To 1900 A.D.: An Untold Story*. The Queen Emma Foundation, Honolulu.
- Kawachi, C.
1989 *Pālolo Hillside Burials, 2035 10th Avenue, Honolulu, O‘ahu*. State Historic Preservation Division, Department of Land and Natural Resources, Honolulu.
- Kennedy, J.
1984 *An Archaeological Walk-Through Reconnaissance in Pālolo Valley, Island of O‘ahu, TMK: 3-4-20:03*. Archaeological Consultants of Hawaii, Inc., Haleiwa, Hawai‘i.

1987 *Archaeological Investigations at TMK 3-4-09:1; 3-4-11:135*. Archaeological Consultants of Hawaii, Inc., Haleiwa, Hawai‘i.
- Kirch, P.V.
2010 *How Chiefs Became Kings: Divine Kingship And The Rise Of Archaic States In Ancient Hawai‘i*. University of California Press, Berkeley and Los Angeles.
- Lindsey, B.
2018 Bottle Glossary Page. Retrieved July 3, 2018
<<https://sha.org/bottle/glossary.htm#Duraglas>>
- Lockhart, B. and R. Hoenig
2015 *The Bewildering Array of Owens-Illinois Glass Co. Logos and Codes*, 24.
- Lockhart, B., P. Schulz, B. Schriever, C. Serr, and B. Lindsey
2013 *Brockway Machine Bottle Co. and Brockway Glass Co.*, 28.

- Lockhart, B., P. Schulz, C. Serr, and B. Lindsey
2007 *The Dating Game: Thatcher Glass Mfg. Co.*, 13.
- Macdonald, G.A., A.T. Abbott, and F.L. Peterson
1983 *Volcanoes in the Sea*. Second edition. University of Hawai‘i Press, Honolulu.
- McAllister, J.G.
1933 *Archaeology of Oahu*. Bernice P. Bishop Museum Bulletin 104. Bernice P. Bishop Museum, Honolulu.
- McElroy, W.K. and D. Duhaylonsod
2018 *Archaeological Monitoring Plan for Kuaheha Street Interim Improvements, Pālolo Valley, Waikīkī Ahupua‘a, Kona District, Island of O‘ahu*, Hawai‘i. Keala Pono Archaeological Consulting, Kāne‘ohe, Hawai‘i.
- Moffat, R.M. and G.L. Fitzpatrick
1995 *Palapala‘āina: Surveying the Mahele*. Editions Limited, Honolulu.
- Monsarrat, M.D.
1881 *Palolo Valley Kona Oahu*. Scale 1 in. = 5,000 ft. Hawaii Territory Survey Register Map 908.
- Nogelmeier, M.P.
2006 “Commentary.” *The Epic Tale of Hi‘iakaikapoliopele*. Awaiaulu: Hawaiian Literature Project, Honolulu.
- O‘Hare, C.R., K. Vogeler, C.M. Monahan, D.W. Shideler, and H.H. Hammatt
2010 *Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Mānoa and Pālolo Ahupua‘a, Honolulu District, O‘ahu Island, TMK [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3 and 3-4, Volume I, II, III: Cultural Resources of the Makiki, Mānoa and Pālolo Ahupua‘a*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.
- Pietruszewsky, M.
1987 *Human Skeletal Remains from Wa‘ahila Ridge, Palolo, Oahu*. In *Archaeological Investigations at TMK: 3-4-09:1; 3-4-11:135, Pālolo, Island of O‘ahu* by J. Kennedy. Archaeological Consultants of Hawaii, Inc., Haleiwa, Hawai‘i.
- Pukui, M.K., S.H. Elbert, and E.T. Mookini.
1974 *Place Names of Hawaii*. University Press of Hawaii, Honolulu.
- Sai, D.
2008 *The American Occupation of the Hawaiian Kingdom: Beginning the Transition from Occupied to Restored State*. Diss. University of Hawai‘i, Honolulu.
- Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson (editors)
2002 *Field Book for Describing and Sampling Soils, Version 2.0*. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.
- Sinoto, A. and J. Pantaleo
1992 *Archaeological Inventory Survey of Segments A and B Corridors for the Proposed Palolo Waterline Replacement Project, Palolo, Kona, O‘ahu*. Aki Sinoto Consulting, Honolulu.

Sterling, E.P. and C.C. Summers

1978 *Sites of Oahu*. Bishop Museum Press, Honolulu.

Thien, S.

1979 A Flow Diagram for Teaching Texture-By-Feel Analysis. *Journal of Agronomic Education* 8:54-55.

Walden, J., M.A. Mintmier, and S.D. Clark

2014 *Archaeological Monitoring Report in Support of the Kuahea Street Interim Repair Project, Waikīkī (formerly Pālolo) Ahupua 'a, Honolulu (formerly Kona) District, Island of O'ahu, State of Hawai 'i, TMKs: (1) 3-4-030: portions of 015, and 023-034*. Pacific Consulting Services, Inc., Honolulu.

Wolforth, T.R., A.E. Haun, and K. Maly

1996 *Archaeological Inventory Survey for the Kamoku-Pukele 138-kV Transmission Line Alignments, Lands of Mānoa, Pālolo, and Waikīkī, Honolulu District, Island of O'ahu (TMK 2-7, 2-8, 2-9, 3-2, 3-3, 3-4)*. Paul H. Rosendahl, Inc., Hilo, Hawai 'i.