An Archaeological Monitoring Plan for the HDOT Leeward Bikeway Project, Federal Aid Project No. STP-BW-0300(8)

TMKs: (1) 9-4-001:011 and (1) 9-4-011:104

Waikele Ahupua'a
'Ewa District
Island of O'ahu

DRAFT VERSION

Prepared By:

Samuel V. Connell, Ph.D.
and
Robert B. Rechtman, Ph.D.

Prepared For:

Hawaii State Department of Transportation, Highways Division
601 Kamokila Blvd., Rm 609
Kapolei, HI 96707

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ASM affiliates
Archaeology • History • Anthropology • Architectural History
Hilo Office: (808) 969-6066 Fax: (808) 443-0065
507-A E. Lanikaula Street, Hilo, HI 96720
Honolulu Office: (808) 439-8089 Fax: (808) 439-8087
820 Mililani Street, Suite 700, Honolulu, HI 96813

ASM Project Number 33370.00

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1. INTRODUCTION

At the request of the Hawai‘i State Department of Transportation (HDOT) Highways Division, ASM Affiliates has prepared this Archaeological Monitoring Plan (AMP) for ground-disturbing activities across Tax Map Key (TMK) parcels (1) 9-4-001:011 and (1) 9-4-011:104 associated with the implementation of HDOT Leeward Bikeway Project (Federal Aid Project No. STP-BW-0300(8); Figures 1, 2, and 3) in the vicinity of Pouhala Fishpond (State Inventory of Historic Places [SIHP] Site 50-80-09-126, Figure 4). It is possible that the development work may minimally affect several of the TMK parcel that lie adjacent to the bikeway corridor. The Hawai‘i State Historic Preservation Officer (SHPO) concurred (Log No.: 2018.01453, 2018.01758; Doc. No.: 1807SH27) with a Federal Highway Administration (FHWA) commitment to prepare an Archaeological Monitoring Plan, which will be implemented during construction as a precautionary measure, over the Pouhala Fishpond to avoid potential effects to the fishpond.

In 2000, International Archaeological Research Institute, Inc. (IARII) completed an Archaeological Resources Survey of the project area (Dye 2000). The survey identified the Pouhala Fishpond (Site 50-80-09-126) as a known historic site within the vicinity of where the proposed bikeway corridor connects to the already existing Pearl Harbor Bike Path at Waipahu Depot Street and the Kapakahi Stream Bridge. The results of the IARII survey (ibid.) indicated fishpond sediments associated with the former Pouhala Fishpond may exist within the vicinity of the project area, and that construction of the Leeward Bikeway has the potential to impact this historic property.

This AMP contains a description of the project area and the proposed ground-disturbing activities, along with a discussion of the land-use history of the project area. Based on a review of previous archaeological studies conducted in the vicinity of the project area, and in accordance with Hawai‘i Administrative Rules (HAR) §13-279, anticipated historic properties that may be encountered during monitoring are discussed. Finally, the procedures and protocols for the archaeological monitoring and subsequent reporting are provided.

PROJECT AREA DESCRIPTION AND PROPOSED GROUND-DISTURBING ACTIVITIES

On the northwest corner of Waipi‘o Peninsula, the project area is located within the former OR&L railway right-of-way (ROW) in the immediate vicinity of the Pouhala Marsh Wildlife Sanctuary adjacent to the West Loch of the Pearl Harbor Navy Base (see Figure 1). Currently, the ROW is an overgrown single lane dirt track that extends between the Kapakahi Stream Bridge and the Waikele Stream Bridge. The Pouhala Fishpond complex which consists of a wetland marsh area, old rice fields (Figure 5) and possible fishpond walls (see Figure 4) is immediately adjacent on the *makai* side of the ROW (Figure 6). According to the Hawai‘i Soil Atlas, the soil in the direct project area is currently designated as Fill land, mixed (0-3% Slope). “These lands are generally found on coastal, low-lying areas, and were once used for disposal of dredging, garbage, and old sugar mill waste. They are now urban (Hawai‘i Soil Atlas accessed September 2019, https://gis.ctahr.hawaii.edu/SoilAtlas).” However, because this is the delta of the Kapakahi Stream and appears to be an area of lower elevation filled with water, the soil zone designation may include other soil types known to be in the vicinity and found in close proximity. According to Foote et al. (1972), four primary soil associations are found on the *mauka* end of the Waipi‘o Peninsula, including the Lualualei Series, Keaau Series, Honouliuli Series, and Pearl Harbor Series. All of these soil series appear in relatively flat areas (0-3% slope) usually in areas of high amounts of alluvial deposits. The Pearl Harbor Series soil, according to the Hawai‘i Soil Atlas, is a very poorly-drained soil found on the coastal flats of O‘ahu that is well-suited and still cultivated for wetland taro production. The Lualualei Series occurs on alluvial fans, described as having “deep nearly level moderately sloping, well-drained soils that have fine-textured or moderately fine- textured subsoil (Foote et al. 1972:84). Other soils seen in the vicinity of fishponds are the Keaau and Honoulili series clays. These are both characterized as being found on coastal plains and consisting of poorly drained alluvial clays deposited on top of reef limestone and coastal coral sand (Foote et al. 1972:64). The coastal ‘Ewa soils consist of calcareous sediment deposits made up of fossil reef and shellfish limestone interspersed with evidence of alluvial sedimentation. This alternating sequence of marine limestone and terrestrial sediments is derived from fluctuations in sea level during the Pleistocene allowing for the buildup of agriculturally rich volcanic alluvium coming from several rivers flowing into what is today Pearl Harbor (Stearns 1966).

The project area subject to monitoring for the Leeward Bikeway consists of the OR&L ROW extending between the current Kapakahi Stream and Waikele Stream bridges, herein called the study area. Development plans for the Bikeway (Figure 7) indicate that excavation below existing grade will take place, thus there is the potential to encounter historic resources. Archaeological monitoring will be perform during construction to address the potential for inadvertent discovery of historic resources in accordance with applicable provisions of Hawai‘i Administrative Rules (HAR) §13-275-12 and HAR §13-300-40.

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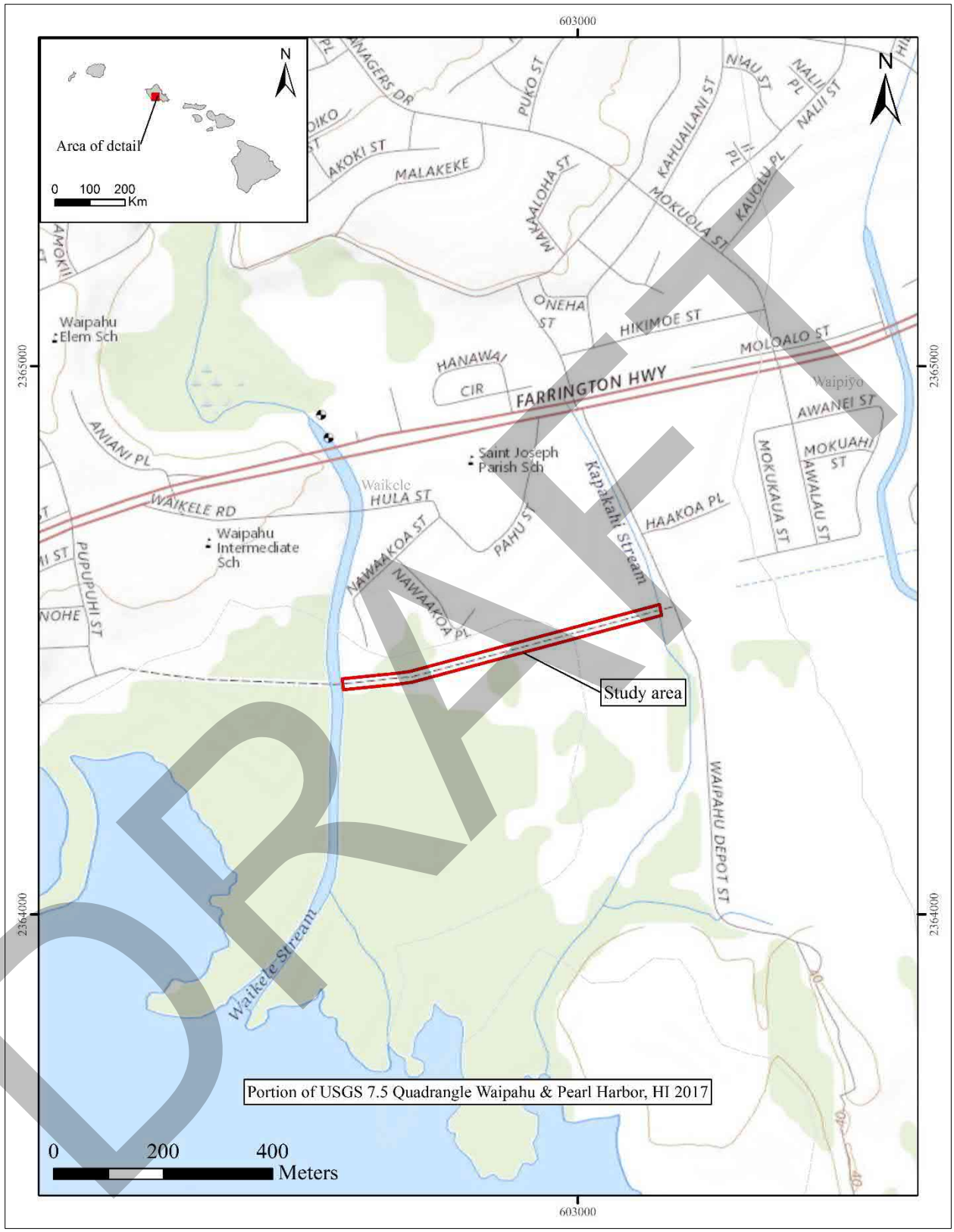

Figure 1. Portion of 2017 U.S.G.S. 7.5 quadrangle showing the study area location within the northwest corner of Waipi‘o Peninsula.

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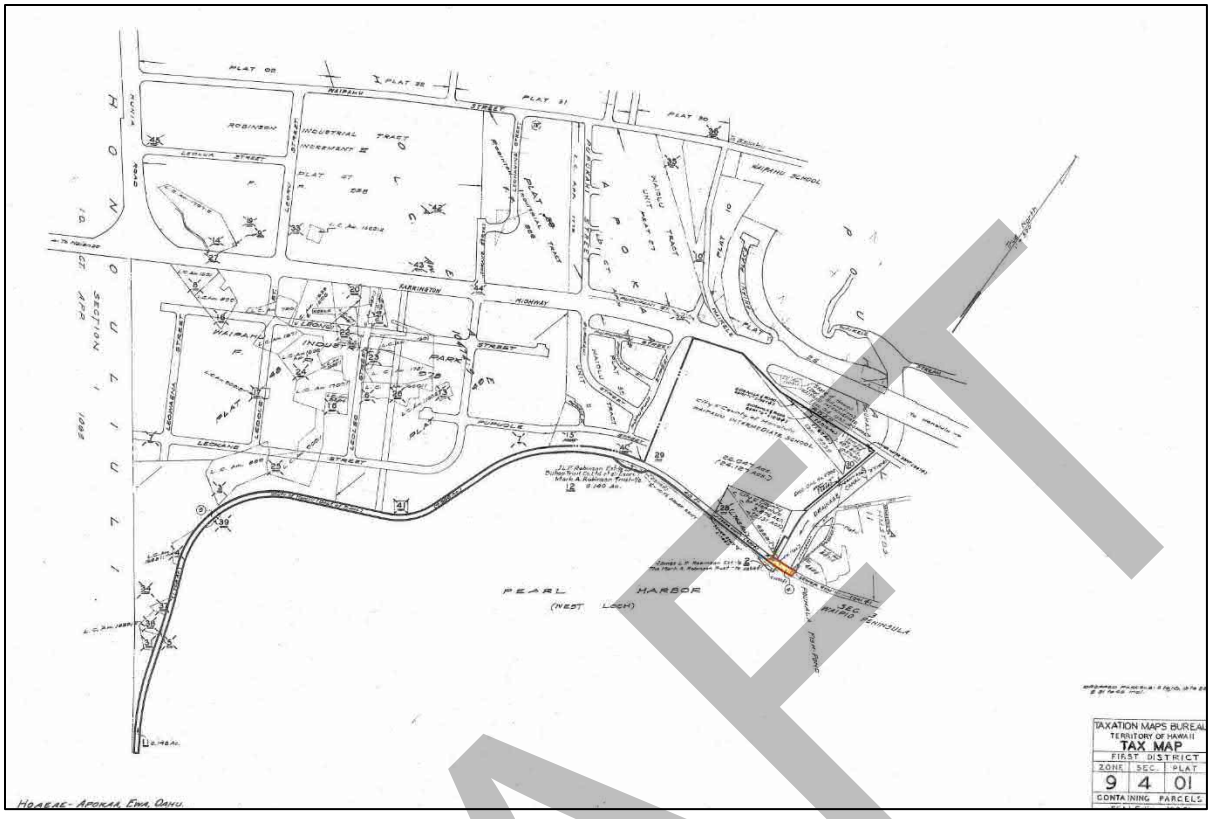

Figure 2. Tax Map Key (TMK: (1) 9-4-001 showing portion of Parcel 011 that will be subject to monitoring.

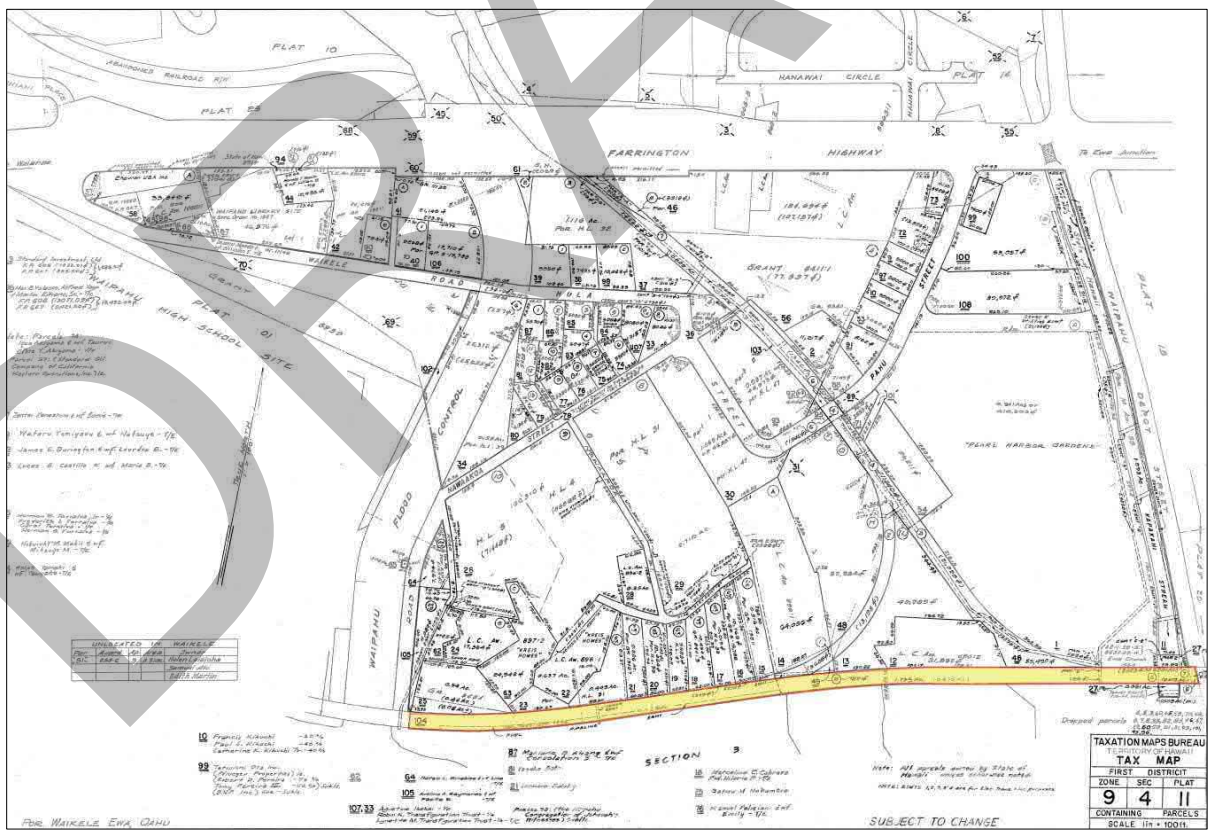

Figure 3. Tax Map Key (TMK): (1) 9-4-011 showing Parcel 104 that will be subject to monitoring.

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Figure 4. Google Earth™ satellite image showing current study area between Kapakahi and Waikele Streams, adjacent to Pouhala Fishpond complex. Possible fishpond walls and rice fields are visible in the areas *makai* of Bikeway corridor.

Figure 5. Pouhala Fishpond complex and rice cultivation area in the background. Photograph taken facing west standing 30 meters south of bike path on the west side of Kapakahi Stream.

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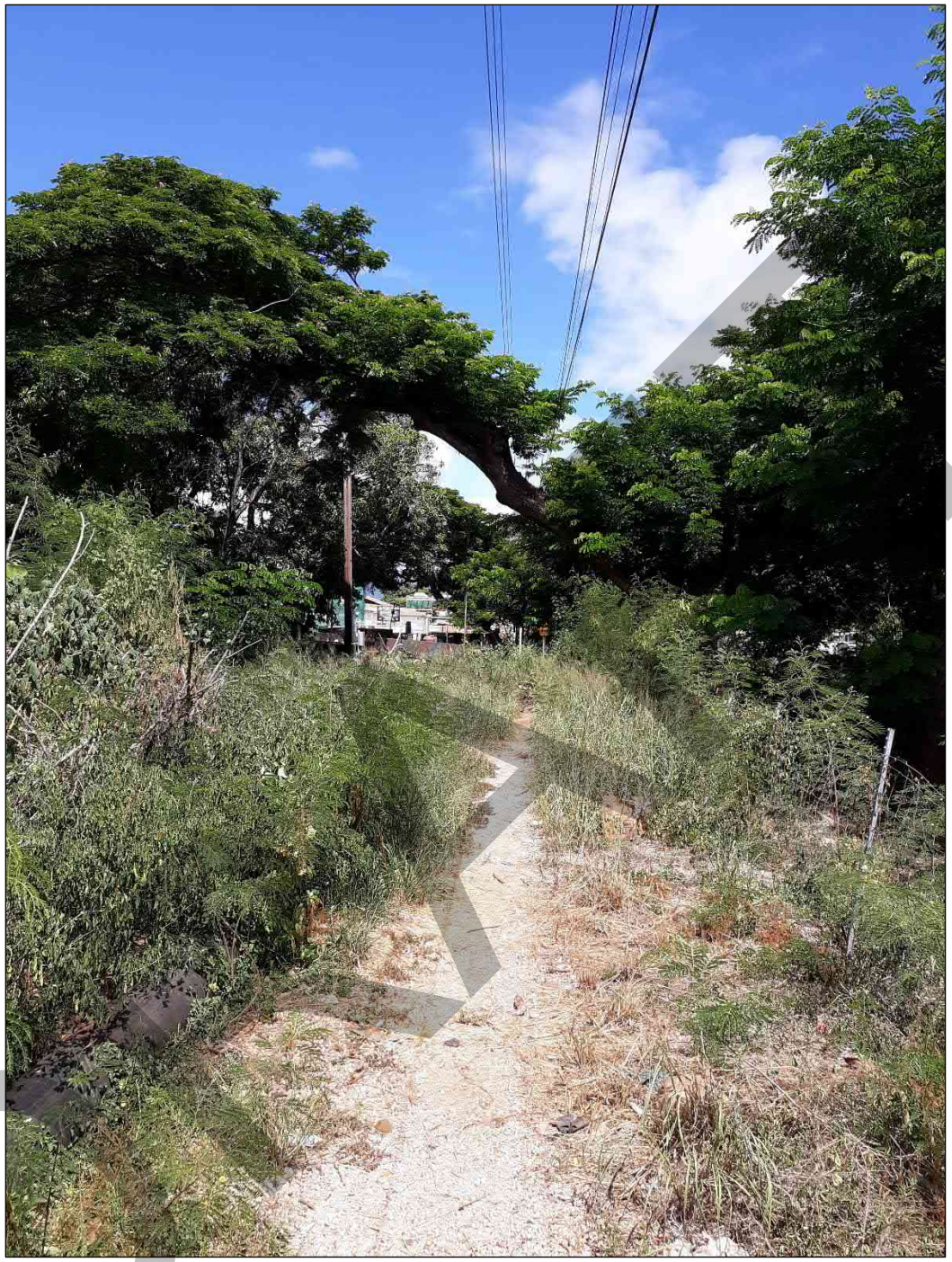

Figure 6. Eastern end of proposed Leeward Bikeway study area. Photograph taken standing approximately 100 feet west of the Kapakahi Stream Bridge.

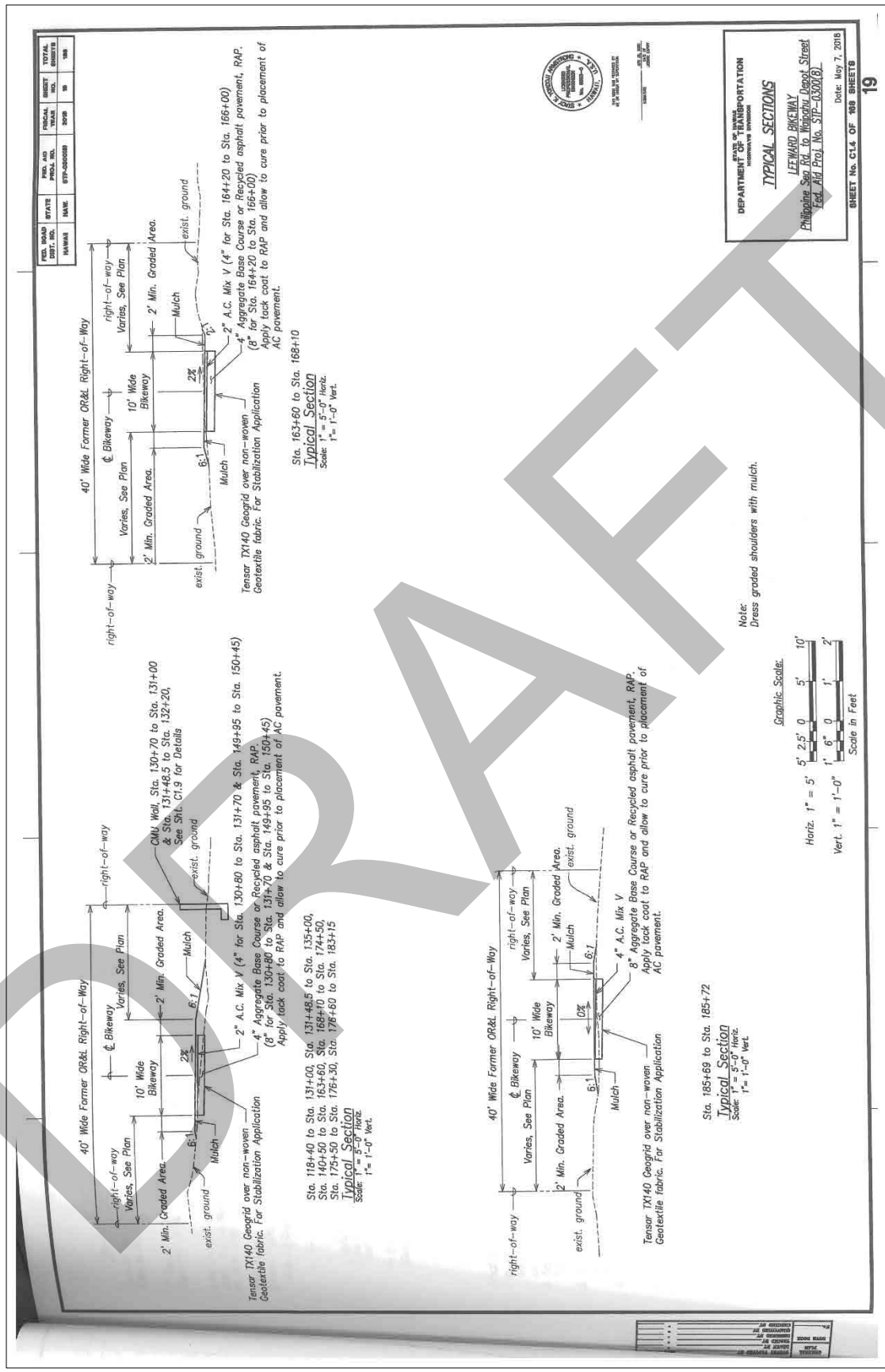

Figure 7. Bikeway plans showing typical cross-sections of the construction.

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2. BACKGROUND

In order to provide an understanding of the archaeological resources known to exist within the vicinity of the project area and of any additional resources that may be encountered during the monitoring effort, a brief culture-historical background is presented. This is followed by a summary of prior archaeological studies that have been conducted in the project area vicinity.

A BRIEF HISTORY OF THE CURRENT STUDY AREA VICINITY

This brief history of the current project area vicinity borrows heavily and builds upon a previous report by Davis and Rechtman (2019). The project area is located within the *moku* (district) of ʻEwa, which translates literally as "crooked" (Pukui et al. 1974:28). ʻEwa extends eastward from Honouliuli Ahupuaʻa to Hālawa Ahupuaʻa and encompasses the estuary of Pearl Harbor, known to the ancient Hawaiians as "Ke-awa-lua- o-Puʻuloa, The- many (*lau*)-harbors (*awa*)-of Puʻuloa" (Handy and Handy 1991:469). Much of ʻEwa is watered by streams that flow from the Koʻolau Range, although the western plains are arid. The subject *ahupuaʻa* of Waikele translates literally as "muddy water" (Pukui et al. 1974:223), is likely a reference to its namesake Waikele Stream, which still flows to the west of the project area (see Figure 1). Associated *ahupuaʻa* also have toponyms tied to the significance of water, including Waipiʻo translated literally as "curved water" or waterfall, and Waiawa translated literally as "milkfish water" (ibid.).

The early inhabitants of Precontact Oʻahu settled along the shores of Puʻuloa where they engaged in traditional agricultural and aquacultural techniques —eloquently summed up by Handy and Handy as follows:

> The salient feature of ʻEwa, and perhaps its most notable point of difference, is its spacious coastal plain, surrounding the deep bays ("lochs") of Pearl harbor, which are actually the drowned seaward valleys of ʻEwa's main streams, Waikele and Waipiʻo. . .
>
> These bays offered the most favorable locality in all the Hawaiian Islands for the building of fishponds and fish traps into which deep-sea fish came on the inflow of tidal waters.
>
> The lowlands, bisected by ample streams, were ideal terrain for the cultivation of irrigated taro. The hinterland consisted of deep valleys running far back into the Koʻolau range. Between the valleys were ridges, with steep sides, but a very gradual increase of altitude. The lower parts of the valley sides were excellent for the culture of yams and bananas. (1991:469).

Waikele along with neighboring Waipiʻo and Hōʻaeʻae *ahupuaʻa* to the east and west, respectively, comprise the region of Waipahu which translates as "bursting water" (Pukui et al. 1974:227), yet another reference to the many freshwater springs in the area. Handy and Handy further discuss ancient land use in Waikele and Waipahu as follows:

> The area between the West Loch of Pearl harbor and Loko Eo (the fishpond at the north end of Waipiʻo peninsula) was terraced throughout, continuing for more than a mile up into Waikele Stream. The lower terraces were watered from the great spring at Waipahu. . . (1991:472).

In another volume, Handy provided the following descriptions:

> **Waikele.** In the flatland, where the Kamehameha Highway crosses the lower valley of Waikele Stream, there are the remains of terraces on both sides of the road, now planted to bananas, beans, cane, and small gardens. For at least 2 miles upstream there were small terrace areas. (Handy 1940:82)

A vivid description of Pouhala, linking the fishpond to the railway used for this bikeway project, is found in Sterling and Summers (1978:29) who cite Mary Kawena Pukui's story of the place (Pukui 1939:1258):

> After resting, we decided to go down to Lahilahi's (Webb) old house near Pouhala, an important fish pond in the olden days. . . . The railroad crosses the pond, cutting it in two, but [at] the old opening for the sluice gate that occupied the space in ancient times, there is now an ordinary wire screen held in a wooden frame. The water is no longer as clean as it was and long yellow mosses sway to and fro. Lahihali pointed out the lands that were once a series of small taro patches. One has some thrifty taro growing, another is only a small pond but the rest hold only tall green grasses that swayed to and fro in the wind. The taro patch was called Kapalaha. What a wonderful place it must have been with a fish pond and the sea in front and taro patches at the back door. "A fine place for crabbing," said Lahilahi, "and when it was the season for oama, plenty! Sometimes we would take our cooked ka-i taro down to the shore and eat them, with shell fish as we caught them. Delicious, Oh!"

The area around Pearl Harbor and the Waipiʻo Peninsula was known to be a prominent settlement for Precontact Oʻahu *aliʻi* [royalty] (McAllister 1933:106). The high concentration of productive agriculture and aquaculture in the

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form of fishponds was an important factor. "The primary reason for 'Ewa's prominence in history and as an ali'i stronghold was undoubtedly the existence of the great number of fishponds at different points around Pearl Harbor, which was 'Ewa territory. Two of the largest were on the peninsula, and another was ***at its northwest corner*** [emphasis ours]" (Handy and Handy 1991:470).

The Pouhala Fishpond complex, referenced above as the fishpond in the northwest corner of Waipi'o Peninsula, is depicted on several historical maps: Hawai'i Registered Map 120 (Figure 8), Hawai'i Registered Map No. 1498 (RM 1498, Figure 9) and Hawai'i Registered Map 2578 (Figure 10). The 1875 map show several fishpond in the Pouhala vicinity, whose names on later maps were dropped or misspelled (e.g., Mokuula becoming Mokuola). The 1889 map clearly shows the fishpond complex extending further north than is visible today (see Figure 9), and the later 1915 map clearly shows the OR&L railway crossing 'Pouhala' Fishpond (see Figure 10). In fact, on the *mauka* side of the railway near the label 'Pouhala Fish Pond' is the label 'Old Fish Pond' (see Figure 10), confirming the above statement made to Mary Pukui by Lahilahi that the train split the fishpond in two. This is important because the project area is on top of the old railway ROW.

The attribution of fishponds to landed boundaries, in this case *'ili*, can be found on Registered Maps. During the early Historic Period, after he conquered O'ahu in 1795, Kamehameha divided the large *ahupua'a* on O'ahu into smaller *'ili 'āina* ('Ī'ī 1959), which had an impact on the soon to come *Māhele 'Āina* of 1848. The *ahupua'a* of Waikele appears to have been subdivided into *'ili* and awarded as such. The project vicinity falls within an area of the *'ili* Ohua and it appears to have included a smaller fishpond identified as Mokuola fishpond (see Figure 9). It should be noted that according to the directory of Hawaiian Place Names found at Ulukau: The Hawaiian Electronic Library, the 'Mokuola Fishpond' found referenced on RM 1498 (see Figure 9) is mislabeled (c.f., see Figure 8). The name of the fishpond should be written as 'Mokuula', referenced as "an unclaimed pond bounding Loko Kuhewa on the north and the kula of Moolea on the south. Boundary of the *'ili* Ohua adjoins "ka loko i kapaia o Mokuula" (BCT). LCAw 890:2 to Kuhano is bounded on the south by "Loko o Mokuula". Written "Loko Mokuola" on RM 1498, TMK 9301:13x. (Ulukau.org accessed 9/16/19 [http://www.ulukau.org/cgi-bin/hpn?e=q-0mahele--00-0-0--010---4----dtx--0-0l--1en-Zz-1---20-about-Mokuula--00031-000-10escapewin-00&a=d&c=mahele&cl=search&d=HASH01528e58f310d9e885da28b6]). It is of historical interest that the fishponds in this area were used as part of boundary designations, in this case the borders of the *'ili* Ohua.

The project area may also be associated with early rice field agriculture as evidenced by the aerial imagery (see Figure 4). After the *Māhele*, during the late 1800s, Waikele and neighboring Waipi'o were the site of the most productive rice fields in the Hawaiian Islands; "with the benefit of freshwater springs and the mountain waters of Waikele and Kipapa Streams, which merged to create the Kapakai Stream, wet crops and taro were easily cultivated" (Chong 1998:1). Chinese planters leased abandoned *lo'i* and unused *kuleana* lands from Hawaiian families located in Waikele and Waipi'o, taking advantage of the many artesian wells in 'Ewa district that were located between the coast and the inland plains. In 1892, 333 acres in Waikele and Waipi'o were dedicated to rice production:

> . . . most of it was worked by two dozen or so major rice cooperative companies and the balance cultivated by approximately three dozen smaller group or family operations. Many of these smaller operations combined their efforts during the planting and harvesting seasons and bonded socially through traditional arranged marriages between their children. (ibid.:16).

The Chinese rice planters irrigated their rice fields by channeling the waters of Waikele Stream, which was also referred to as Kapakai Creek and Kapakahi River; a waterway that was sometimes "a source of great woe and destruction" for "during floods the stream would change its course, overflow its banks and inundate the rice paddies while destroying homes and claiming lives in its rampant race for the sea" (Chong 1998:16). Chong reports that in 1890 "more than ten million pounds of rice were exported, raised on sixteen thousand acres of rice paddies" (ibid.:15), which marked the peak of Hawaiian rice production and ranked Hawai'i as the third largest U.S. rice producer behind Louisiana and South Carolina.

In addition to large-scale Chinese rice farming pursuits during the late 1800s and early 1900s, the landscape and demography of 'Ewa and much of O'ahu underwent further lasting changes as a result of the rise and fall of the commercial sugarcane industry and the development of Pearl Harbor as a naval stronghold. In 1884, King David Kalakaua and President Grover Cleveland of the U.S. negotiated a treaty (referred to as the Pearl Harbor Treaty) through which the U.S. acquired Pearl Harbor. According to a newspaper article titled "Honolulu and Pearl Harbor Vital Centers of America's Power in Pacific," beginning in the 1840s, members of the U.S. Government made it clear to all European countries who showed any interest in occupying the Hawaiian Islands that the U.S. would not allow it (The Evening Bulletin 1908:1). Then, as countries in Asia began to show interest, the U.S. shifted their focus to the east. As the Spanish-American war unfolded, the U.S. found it necessary "to acquire the sovereignty of the Hawaiian

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Islands, both for the protection of the [U.S.] Pacific coast and in order to make it possible to maintain any naval base in the Far East" (ibid.). The same article states that Pearl Harbor was a position that offered "strategically and otherwise, the finest site for a naval and coaling station to be found in the whole Pacific" (ibid.). To that end, more than 600 acres had been acquired for the construction of a naval station and that almost 10 years had passed since the annexation of Hawai'i in 1898 without breaking ground. In 1908, an appropriation of $3,000,000.00 was made by Congress to straighten the channel and establish the extant Naval Base at Pearl Harbor (ibid.).

In 1888, a few years after the Pearl Harbor Treaty a developer named B.F. Dillingham promised investors that he would connect Honolulu with Pearl Harbor by means of a steam railroad. Thus, the Oahu Railway and Land Company or OR&L was born. Although railroads, largely associated with the sugar industry, were already in operation around Hawai'i Island, O'ahu was undeveloped in comparison and the Pearl Harbor region was not yet known as a sugar production area (Yardley 1981). According to Dillingham biographer Paul T. Yardley, "the great dry plains of Ewa produced nothing but cattle and firewood" (ibid.:130). The main landholders of 'Ewa, such as James Campbell, were all amenable to the planned railroad and the promise of increasing the value of their holdings. On March 8, 1889, the formal groundbreaking for the railway took place at Moanalua near the intersection of Middle Street and Kamehameha Highway.

By July 1, 1890, the railroad reached Hō'ae'ae (Yardley 1981:158), to the west of the direct APE. Later that same year, Dillingham shifted his focus to developing portions of Campbell's 60,000 acres in 'Ewa into sugar plantations and constructing a wharf in Honolulu Harbor that could accommodate ships loaded with sugar for export, as well as imports for transport by rail. Dillingham began by renting out portions of his acreage for other uses, which resulted in the establishment of Ewa Plantation Company in 1890, which included portions of Waikele.

According to the Hawaiian Sugar Planter's Association (HSPA) Archive Register of the Ewa Plantation Company (Campbell 1994), by 1910 "the Ewa Plantation Company community of 2,500 people contained several camps, the plantation store, kindergarten, clubhouse, hospital and dispensary, and several outlying camps" and "by 1923 Ewa Plantation was the first sugar company in the world to raise ten tons of sugar per acre and, by 1933, the plantation produced over 61,000 tons of sugar a year" (Campbell 1994:1). Ewa Plantation had 69 artesian wells and 5 surface wells in operation by 1933 and their harvesting operation had become fully mechanized by 1936 (ibid.).

Regarding the Waikele rice fields, during the decades leading up to World War II, rice production suffered a steady decline due to increasing rental costs, blight, insect infestations, and less demand for rice locally exacerbated by cheaper rice production on the mainland. First generation farmers encouraged their offspring to pursue business endeavors rather than continue rice farming; by 1942, only scant traces of the rice farming industry were evident in Waikele (Chong 1998).

When the U.S. entered World War II, "the Army took possession of over 500,000 acres of Ewa Plantation land" (Campbell 1994:2). The OR&L continued to flourish through the end of World War II and provided transport for millions of passengers and freight during the war, proving itself indispensable to the U.S. Army and Navy. However, after the war as infrastructure improvements to O'ahu roadways were implemented and a shift to automobiles, trucks, and buses for the transport of people and goods was underway, the OR&L could not compete (Yardley 1981). The year 1947 marked the close of the main line while limited operations between the docks and pineapple canneries continued before complete abandonment of the railway a few years later.

In contrast, "a good sugar crop and substantial investment in new equipment and development" were able to mitigate the effects of World War II on the sugar industry, 10 years after the attack on Pearl Harbor (Campbell 1994). Castle and Cooke Ltd. became the majority shareholder of Ewa Plantation Company stock in 1962. In 1970, Ewa Plantation was unable to renew its lease for the Campbell Estate lands and was forced to merge with Oahu Sugar Company (OSC), which had been acquired by AMFAC, Inc. roughly a decade prior to the merger (Yardley 1981). Because of the merger, OSC became "the second largest sugar plantation in Hawaii and the third largest in the U.S." (Yamamoto et al. 2005:43). By 1982, OSC covered 55 square miles of land with 15,488 cultivated acreage (ibid.). OSC continued to produce high yields well into the 1980s.

Land modifications associated with the development of the OR&L railway, the commercial cultivation of sugar as Ewa Plantation and later OSC, and the development of Pearl Harbor by the U.S. as a military stronghold have had a lasting impact on the landscape and demographics of the direct APE vicinity. More recently, as commercial sugar cultivation fell by the wayside, ongoing residential and commercial development associated with the population influx of military personnel and their families took hold. Such development is evidenced by the density of residential properties surrounding the project area.

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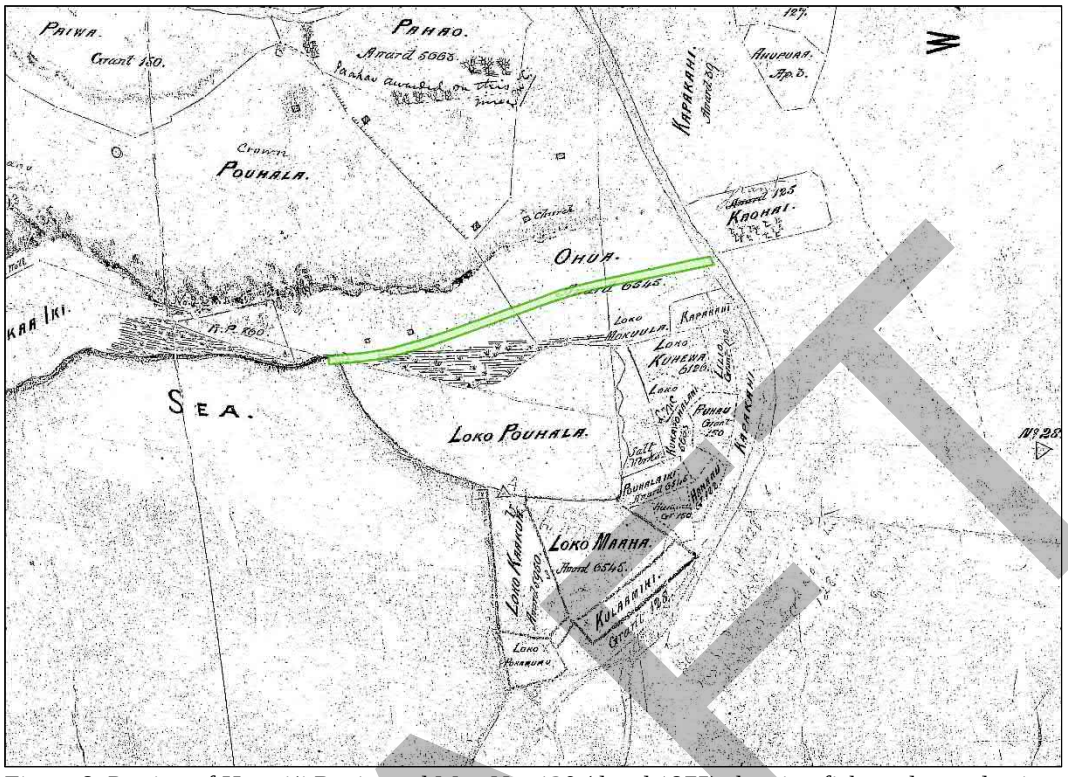

Figure 8. Portion of Hawai‘i Registered Map No. 120 (dated 1875) showing fishpond complex in the vicinity of Pouhala Fishpond.

Figure 9. Hawai‘i Registered Map 1498 (dated 1889) showing Pouhala Fishpond, note the other fishpond Loko Mokuola [Mokuula], which is also adjacent to the current study area.

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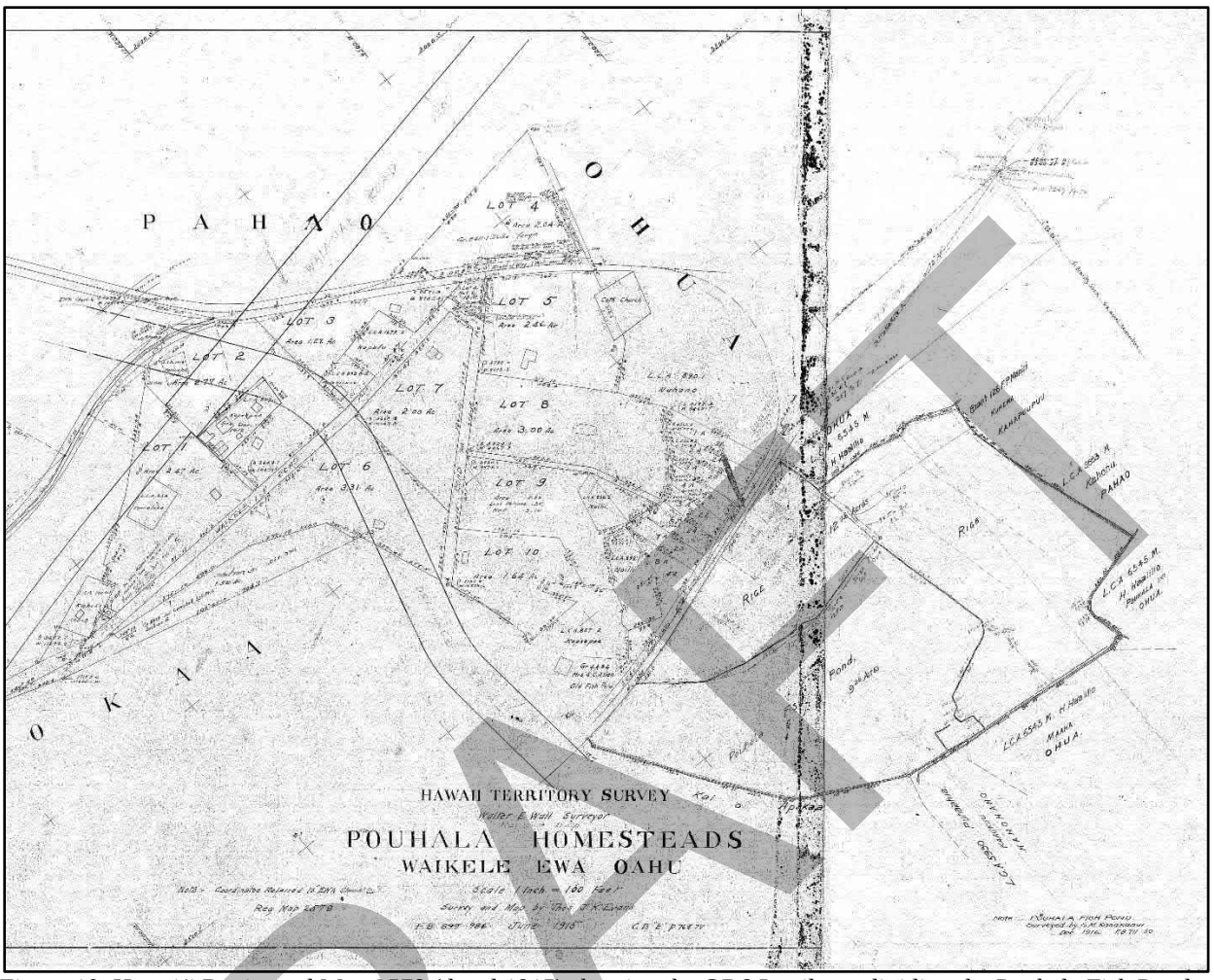

Figure 10. Hawai‘i Registered Map 2578 (dated 1915) showing the OR&L railway dividing the Pouhala Fish Pond (labeled as such). The label of “Old Fish Pond” can be seen on the *mauka* side of the railway to the right of the drainage canal which is the Waikele Stream. North is toward the upper left of the map.

PRIOR ARCHAEOLOGICAL STUDIES

An understanding of fishponds and the importance of aquaculture has been slow to develop in archaeology, as measurements of subsistence complexity and intensive food production have primarily focused on terrestrial-based agricultural productivity. The invention of fishponds was, according to Kirch (1985), a unique achievement among the Hawaiians. The artificial ecosystems maintained within complex arrangements of fishponds were highly productive. Waikele Ahupua’a with its several streams and fresh water sources flowing into a zone of shallow reefs provided an excellent ecosystem for a complex of several significant *loko* (fishponds). Pearl Harbor is a noted location of important Native Hawaiian fishponds, to include Loko Eo, Loko Hanaloa, Loko Puohala and Loko Ulumoku, among others (Kirch 1985; McAllister 1933). It has been estimated that the total amount of fish produced per year by Hawaiian fishponds weighed more than two million pounds (Kikuchi 1973). The most common form of fishpond is the *loko kuapā*, which is constructed using basalt and coral blocks that are formed into walls extending into the ocean to create a pool. Sluice gates are often built into the walls to control fish access but allow the tides to flow in and out. The two species of fish commonly raised in fishponds are *awa* or milkfish (*Chanos chanos*) and *‘ama‘ama* or mullet (*Mugil cephalis*), both of which do very well in brackish water (Kirch 1985). It is noted that Hawaiian fishponds were symbols of power, and all such resources may have been owned by chiefs and served their extensive households. “Fishponds became symbols of the chiefly right to conspicuous consumption and to ownership of the land and its resources. They were manifestations of the chief’s political power and his ability to control and tap his resources” (Kikuchi 1976:295).

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Despite their significance, scant research has been done on the Pearl Harbor fishponds and little archaeological work has been done on the Waipi‘o Peninsula in the vicinity of the project area. Prior to this bikeway project, there were three archaeology projects of note conducted in the area (Table 1). (1) A reconnaissance survey and monitoring was done at the 7.93 acre Pupu‘ole Park (TMK: (1) 9-4-01) by Nagaoka and Davis (1989) in which no sites were recorded. Pupu‘ole Mini Park, as it is called today, lies 900 meters west of the current project area on the ‘Ewa side of the Waikele Stream along the bikeway route. (2) A significant survey and testing project by Pacific Legacy, Inc. (Goodman and Cleghorn 1998) was conducted as part of the construction of a sports complex east of Pouhala Marsh Wildlife Sanctuary and south of the Pearl Harbor bikeway. It was determined the area was covered by more than 3 meters of fill. (3) Survey of Waipio Peninsula for the Makalena Golf Course by Athens (1999), who conducted subsurface testing at Site 50-80-09-123 (Loko Eo). Paleoenvironmental coring at the pond found intact sediments at depths beginning at seven meters below the ground surface, a depth corresponding to 2,500 years ago, which is well before the islands were settled. A determination was made that there were no intact sediments associated with the use of Loko Eo as a fishpond.

In all three instances the assessment was that the area has been buried by several meters of fill hindering the possibility for discovery of potentially significant subsurface deposits. Nevertheless, the specific location of the current project area alongside the Kapahaki Stream next to Puohala Fishpond complex and historic rice fields and other potential walls is in our opinion indicative of a much higher potential for recovery of subsurface deposits. This is supported by the report submitted to the SHPO in 2000 by IARII (Dye 2000), which conducted an Archaeological Resources Survey as part of the Leeward Bikeway Environmental Assessment on behalf of HDOT. They determined that intact sediments may be recovered along the *mauka* edge of the abandoned Pouhala fishpond within the current project area.

The IARII survey notes, “Site 50-80-09-126, Puohala and Ulumoku (or Kaaukuu) fishponds, are located in the Waikele *ahupua‘a*. In 1900, the two ponds were divided into a number of smaller ponds, some of which were used for rice cultivation (McAllister 1933:106). Today, the area around the Pouhala pond is a low-lying wetland with poorly drained soils, portions of which are still used for small-scale agriculture. Ulumoku fishpond, south of the proposed bikeway route, has been deeply filled with urban waste. Fishpond sediments, if present today in the wetland, would be significant for the information of Hawaiian history and prehistory that they are likely to yield.” (Dye 2000:2). The determination of significance in reference to the Pouhala fishpond in the area of proposed monitoring is important.

Table 1. Archaeological studies conducted in the vicinity of the current project area.

Author(s)/Date	*Location*	*Nature of Work*	*Findings*
IARII 2000	Leeward Bikeway	Literature review	Puohala Fishpond
Athens 1999	Makalena Golf Course	Survey and cores samples	Loko Eo disturbed
Goodman and Cleghorn 1998	Waipi‘o Soccer Complex	Survey and testing	No remains encountered
Nagaoka and Davis 1989	Pupu‘ole Mini Park	Recon. and monitoring	No sites recorded

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3. ANTICIPATED REMAINS

Based on the findings of previous archaeological work in the general vicinity of the Area of Potential Effect (APE) (Athens 1999; Dye 2000; Goodman and Cleghorn 1998; Nagaoka and Davis 1989), the likelihood of discovering any Precontact or Historic Period subsurface cultural deposits is low. In all three instances the assessment was that the area has been buried by several meters of fill, hindering the possibility for discovery of potentially significant subsurface deposits. Nevertheless, the specific location of the current study area between Waikele Stream and Kapahaki Stream, in the vicinity of Loko Puohala, Loko Mokuula, and Historic rice fields may be indicative of a higher potential for encountering subsurface deposits.

While the IARII survey report (Dye 2000) focused on Pouhala Fishpond, our research indicates that Mokuula Fishpond, identified on Hawai‘i Registered Maps (see Figures 8 and 9), may also be of relevance to this project. Satellite imagery depicts several possible rock alignment features extending into extending into the wetland areas in the immediate vicinity of the current study area (see Figure 4). Evidence associated with historic rice cultivation, although not explicitly identified as a potentially significant for the study area, seems to also be visible in the satellite imagery in the vicinity of the current study area (see Figure 4). These Historic Period agricultural practices were often undertaken in areas of earlier traditional taro farming (see discussion above and Handy and Handy 1991).

Project monitoring will pay paramount attention, therefore, to evidence which would indicate behaviors associated with the construction and use of a fishpond. Foremost would be evidence of historic fishpond seawalls (*kuapā)* constructed using basalt rocks and coral. Basal dimensions of walls more than two meters thick are the norm for fishponds. Fishponds can also have internal wall features designed to create a series of smaller ponds with graded percentages of salt water versus fresh water. Water would have flowed directly into the fishpond from Kapakahi Stream which has since been diverted via culvert. In addition, there can be associated structures to include fisherman’s huts, guard houses, and small ritual fishing shrines (*ko‘a*). Less common would be fisherman’s *heiau* on the edge of fishponds and fishtraps as well as *ahu* (cairns) associated with these features (see Greene 1993 for a thorough description of Kaloko Fishpond in the Kona District on the island of Hawai‘i). Additionally, Kirch (1985) notes that fishponds can have associated onsite activities such as processing and cooking fish and shellfish, and repairing fishing gear. Artifacts or features evidencing such activities have the potential to be identified within the current study area.

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4. THE MONITORING EFFORT

Prior to the commencing any ground-disturbing activities, the project's Principal Archaeologist and archaeological monitor will meet with the prime contractor and construction crew to review procedures for archaeological monitoring. It will be explained that the monitoring archaeologist has the authority to halt ground-disturbing activities in the event that cultural resources are encountered. If cultural resources identified during monitoring are deemed significant, the SHPD will be notified and consultation will be coordinated as appropriate with interested parties and/or organizations. Scaled representative stratigraphic profiles will be prepared. Even in the absence of identified cultural deposits or features, at least one profile will be included in the Archaeological Monitoring Report for reference. Additionally, the SHPD will be notified upon the onset and completion of the monitoring activities, along with any change in status of the monitoring (i.e., a shift from on-site to on-call will only occur with the prior written approval from SHPD).

FIELD METHODS

A qualified archaeological monitor will be present on-site to observe all subsurface ground-disturbing activities until bedrock is reached or until excavation ceases, whichever occurs first. When on site, the monitor will keep a daily log of project activities performed and any discoveries made. The monitor will inspect all exposed soil, and the stratigraphic profiles of any deep cuts will be examined; stratigraphic profile drawings will be prepared showing representative soil profiles whether or not they contain cultural deposits. This practice will be followed in an effort to identify previously undiscovered and undisturbed cultural deposits, features, artifacts, and human skeletal material. If any such resources are encountered the following procedures will be initiated:

Cultural Deposits

If non-burial historic properties are identified by the monitor, the HDOT will notify the SHPD. All cultural deposits and sequences (including representative natural sequences) identified during the monitoring effort will be mapped, representative scaled profile drawings and plan views will be prepared, photographs will be taken, and the soils will be described in detail (using standard USDA soil descriptions and Munsell colors). Furthermore, their locations will be recorded with a GPS set to sub-1m accuracy, and the locations of these points will be recorded on a map and/or table and presented in the Archaeological Monitoring Report. If intact cultural deposits are discovered during monitoring, an assessment will be made as to their integrity and significance using the criteria enumerated in HAR §13-284-6(b). If the deposit is deemed significant and is likely to be further impacted by construction activities, work in the affected area will be curtailed, and the HDOT will develop an appropriate mitigation strategy in consultation with the SHPD.

Cultural Features

Subsurface cultural features observed will be fully described, drawn, and photographed. Provenience information will also be recorded and related to an established project datum ensuring accurate horizontal and vertical placement. The limits of the feature will be defined, if possible without further excavation, and any natural or cultural associations (including surrounding soil) will be noted. Locations of subsurface cultural features will be recorded with a GPS set to sub-1m accuracy and recorded on a map and/or table, and will be presented in the Archaeological Monitoring Report. Where appropriate, samples for further analyses will be recovered and processed.

Artifacts

Artifacts observed from disturbed soils will be collected and their general provenience recorded. All traditional Hawaiian artifacts and diagnostic Postcontact artifacts will be subjected to laboratory analysis. The precise locations of any *in situ* artifacts will be recorded and the items photographed and collected for laboratory analysis. The precise locations of any items found *in situ* will be recorded and the items photographed and recovered for subsequent laboratory analysis, and their locations recorded with a GPS set to sub-1m accuracy. The locations of these points will be recorded on a map and/or table and will be presented in the Archaeological Monitoring Report. Any observed associations will also be documented, and the surrounding soil will be fully described using standard USDA soil descriptions and Munsell colors.

Human Skeletal Remains

If human skeletal remains are encountered during the monitoring effort, the on-site monitor will halt all ground-disturbing activity in the immediate area of the discovery, stabilize the remains, and HDOT will contact the appropriate authorities, including staff from the Archaeology Branch and from the History and Culture Branch of the SHPD, the

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appropriate on-site construction personnel, and the Police and Medical Examiner. If the skeletal material is determined to be Historic or Precontact (as opposed to recent), the HDOT will consult with and get direction from the SHPD on how to proceed with the discovery, and the human skeletal remains will be handled in compliance with HRS §6E-43, HAR §13-300, and SHPD directives. If the remains are determined to be of recent origin, the Honolulu Police Department will take jurisdiction.

TREATMENT OF COLLECTED REMAINS

All collected material will be temporarily stored within a secure location approved by the SHPD. The collected items will be recorded in a field catalog. Upon completion of the monitoring fieldwork, the disposition of the items will be as follows:

Cultural Material

All cultural material collected during monitoring will be analyzed (cleaned, weighed, measured, photographed, and illustrated if appropriate), and cataloged. Analysis will also include formal description and functional interpretation. The identification of artifacts, vertebrate faunal remains, and invertebrate faunal remains will include comparison with reference collections and materials, as needed.

Collected Samples

All collected samples will be initially processed by a qualified archaeologist before being submitted to the appropriate institutions for detailed analysis.

Human Skeletal Remains

If the SHPD determines that the removal of buried human skeletal remains is an appropriate course of action, then a Burial Site Component of a Data Recovery Plan will be developed in consultation with the SHPD as appropriate in accordance with Hawai‘i State law as outlined in HAR §13-300-40.

REPORTING

Following completion of archaeological monitoring, a draft monitoring report will be prepared and submitted to the SHPD for review and acceptance. This report will follow the specifications contained in HAR 13§13-279-5. If human remains are recovered as part of the monitoring project they will be summarized in the final monitoring report following procedures contained in HAR §13-300. A final monitoring report will be submitted to SHPD for review and acceptance within 180 days of completion of the monitoring fieldwork.

CURATION OF RECOVERED ITEMS

Any material collected during the monitoring effort will be curated by the archaeological consultant for a period of no more than one year following submission of the final monitoring report, during which time arrangements will be made for permanent curation in consultation with the landowner and the SHPD. It will be the landowner’s responsibility to secure permanent curation in an acceptable facility; included in this responsibility are the costs associated with long-term curation.

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REFERENCES CITED

Athens, S.
1999 Ancient Hawaiian Fishponds of Pearl Harbor: Archaeological and Historical Studies on U.S. Navy Lands. International Archaeological Research Institute, Inc., Honolulu. Prepared for the State Historic Preservation Division, Department of Land and Natural Resources.

Campbell, S.
1994 Hawaiian Sugar Planter's Association Plantation Archives Register of the Ewa Plantation Company Ewa, Oahu 1891-1960.

Chong, D.
1998 *Ancestral Reflection: Hawaii's Early Chinese of Waipahu, an Ethnic Community Experience, 1885-1935*. Tsoong Nyee Society, Waipahu.

Davis, S., and R. Rechtman
2019 Historic Properties Review and Assessment to Accompany FCC Wireless Telecommunications Bureau Collocation Submission Packet (FCC Form 621) for the Proposed T-Mobile Waipahu/HI01120B Modifications Project, Waikele Ahupuaʻa, ʻEwa District, Island of Oʻahu, TMK: (1) 9-4-010:038. ASM Affiliates ASM Report Number 32180.05. Prepared for EnviroWest LLC on behalf of T-Mobile West, LLC.

Dye, T.
2000 Archaeological Resources Survey, Leeward Bikeway Environmental Assessment, Hawaii Department of Transportation, Highway Division. International Archaeological Research Institute, Inc (IARII). Prepared for Earth Tech, Inc.

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, in conjunction with the University of Hawaii Agricultural Extension. U.S. Government Printing Office, Washington, D.C.

Goodman, W., and P. Cleghorn
1998 Archaeological Inventory Survey for the Proposed Waipio Sports Complex, Waikele and Waipio Ahupuaʻa, Waipio Peninsula, ʻEwa, Oʻahu. Pacific Legacy, Inc. Prepared for Belt Collins Hawaii.

Greene, L.
1993 A Cultural History of Three Traditional Hawaiian Sites on the West Coast of Hawaiʻi Island. United States Department of the Interior, National Park Service, Denver Service Center.

Handy, E. S. C.
1940 The Hawaiian Planter. *B.P. Bishop Museum Bulletin No. 126*. Bishop Museum Press, Honolulu.

Handy, E. S. C., and E. G. Handy
1991 Native Planters in Old Hawaii: Their Life, Lore, and Environment. *Bernice P. Bishop Museum Bulletin 233*. With the collaboration of Mary Kawena Pukui. Bishop Museum Press, Honolulu.

ʻĪʻī, J. P.
1959 Fragment of Hawaiian History. *B.P. Bishop Museum Special Publication 70*. Bishop Museum Press, Honolulu.

Kikuchi, W.
1973 Hawaiian aquacultural system. Ph. D. dissertation, University of Arizona, Tucson, AZ.

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Kikuchi, W.
1976 Prehistoric Hawaiian fishponds. *Science* 193: 295–299.

Kirch, P.
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

McAllister, J.
1933 Archaeology of Oahu. *Bernice P. Bishop Museum Bulletin 104*. Bishop Museum Press, Honolulu.

Nagaoka, L., and B. Davis
1989 Archaeology Subsurface Survey and Monitoring of the Proposed Pupu‘ole Park, Waipahu, Ewa, Oahu. Prepared by International Archaeological Research Institute Inc., Honolulu, Hawai‘i. Prepared for AM Partners, Hawai‘i.

Pukui, M.
1939 Waikele, Ewa 1939. *Hawaiian Ethnological Notes* 1.

Pukui, M. K., S. H. Elbert, and E. Mo‘okini
1974 *Place Names of Hawaii*. Revised and Expanded Edition. University of Hawaii Press, Honolulu.

Stearns, H.
1966 *Geology of the State of Hawai’i*. Pacific Book Publishers.

Sterling, E., and C. Summers
1978 *Sites of Oahu*. Bishop Museum Press, Honolulu.

The Evening Bulletin
1908 Honolulu and Pearl Harbor Vital Centers of America’s Power in Pacific. *The Evening Bulletin*, July 16, 1908.

Yamamoto, M., N. Silva, and K. Yamamoto
2005 *Waipahu. . . Recollections from a Sugar Plantation Community in Hawaii.* Privately published.

Yardley, P.
1981 *Millstones and Milestones: The Career of B.F. Dillingham, 1844-1918*. University of Hawai‘i Press, Honolulu.

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