CHAPTER 4: CLOSED CIRCUIT TELEVISION CAMERA (CCTV) AND VARIABLE MESSAGE SIGN (VMS) INSTALLATION ON THE H-1 FREEWAY AT THE KALIHI INTERCHANGE

PROJECT AREA LOCATION AND DESCRIPTION

The locations of the two current undertakings are along the H-1 Freeway in Kalihi and Kapālama Ahupua‘a, Honolulu District (previously Kona District) (Figure 4-1). Both project areas are roughly 2.5 kilometers (km) inland from Ke‘ehi Lagoon. All ground-disturbing activities will occur within the City and County of Honolulu Right-of-Ways. Because roadways are not assigned Tax Map Key (TMK) parcel numbers, the TMKs for adjacent properties were compiled based on proximity to ground-disturbing activities (Table 4-1).

Table 4-1. TMK References for Properties Adjacent to the Project Area.

CCTV Project Area		VMS Project Area	
TMK	**Landowner / Lessee**	**TMK**	**Landowner / Lessee**
(1) 1-3-006:001	City and County of Honolulu	(1) 1-6-003:013	Hawaii Kotohira Jinsha
(1) 1-6-024:003	State of Hawaii	(1) 1-6-003:043	B P Bishop Trust Estate
(1) 1-6-024:004	YMCA of Honolulu	(1) 1-6-003:047	State of Hawaii
(1) 1-6-024:038	State of Hawaii	(1) 1-6-003:048	City and County of Honolulu
		(1) 1-6-003:999	-
		(1) 1-6-021:005	City and County of Honolulu

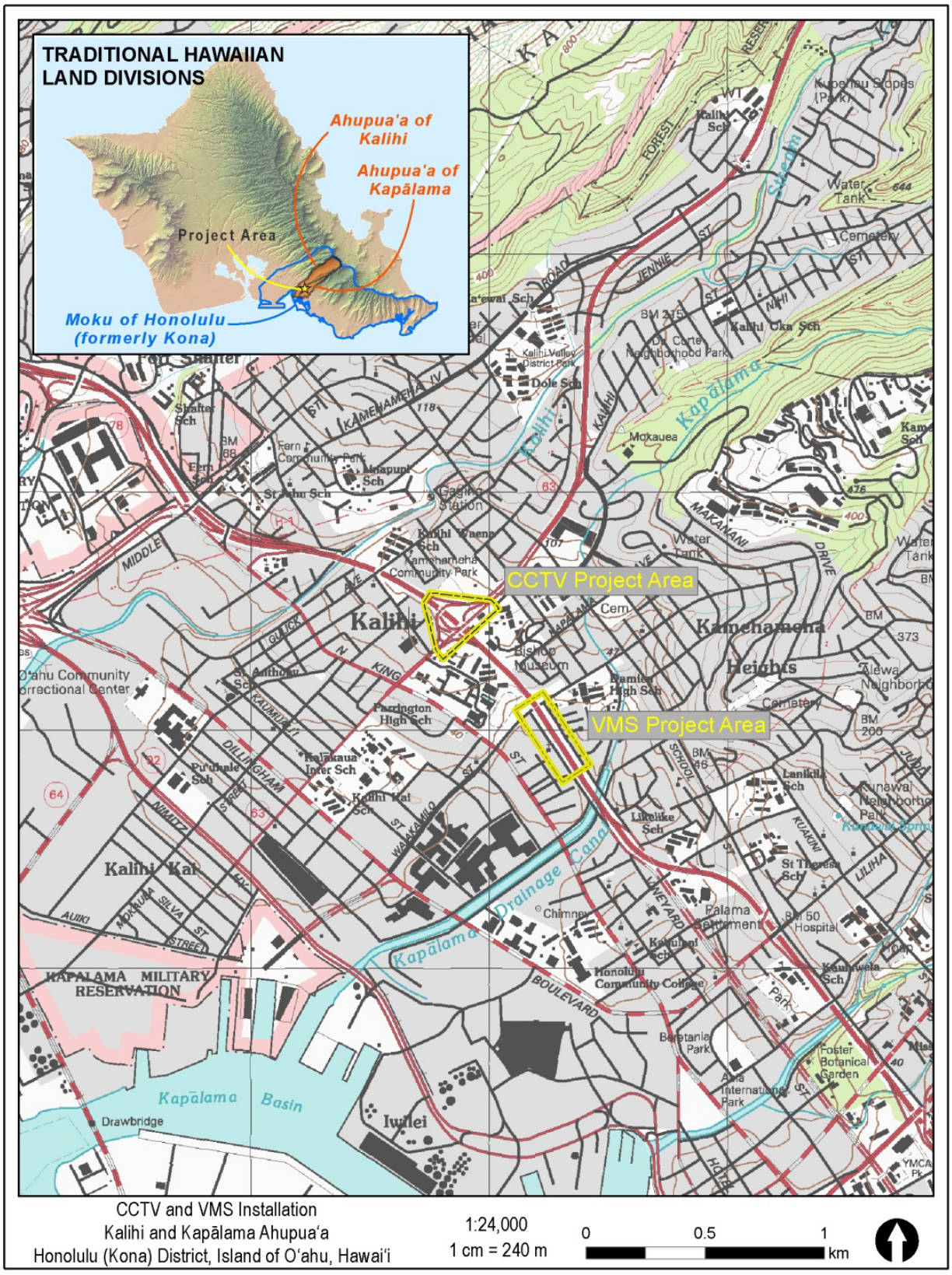

Figure 4-1. Project Area Location on 7.5-Minute Series USGS Honolulu Quadrangle (1998).

The CCTV project area is approximately 12.4 acres. The CCTV will be installed on a stand-alone 50-foot steel tube pole with a footing at grade on the north infield of the Kalihi IC (Figure 4-2). The pole will be anchored to a drilled shaft footing. An existing electrical meter adjacent to the site on the ʻEwa side of Kalihi Street will be used to provide power for the CCTV. A communications link is proposed to the existing Hawaiian Telcom underground service on the Diamond Head side of Kalihi Street fronting the library and YMCA. Conduit trenching will extend for approximately 150 linear meters.

The VMS project area is approximately 11.7 acres. The VMS will be installed approximately 215 meters (m) east of the Houghtailing Street Underpass (Figure 4-3). A butterfly structure is recommended to be located along the southwest side of the freeway. Electrical and communication service will use conduits installed alongside the H-1 Freeway Rehabilitation Project. This will require approximately 25 m of conduit trenching along the grassed median and shoulder parallel to the freeway. The electrical connection will also require trenching across Olomea Street at Houghtailing Street, on the Diamondhead side of the intersection, for approximately 45 m. A fiber optic connection will be made to the existing CCTV cabinet on the southeast corner of Houghtailing Street.

ENVIRONMENTAL BACKGROUND

Kapālama and Kalihi Ahupuaʻa are situated on the leeward side of Oʻahu and extend from the Koʻolau mountain range, through the coastal plain, to the shoreline at Honolulu Harbor. The location of the current undertaking is the *waena* area, or between the upper valleys and the coastal plain.

Kapālama Valley was once watered by the small Kapālama and the Niuhelewai Streams. Kapālama Ahupuaʻa (a traditional Hawaiian land division) is roughly triangular-shaped and rises to approximately 600 m above mean sea level (amsl) on the ridge that separates Nuʻuanu and Kalihi Valleys. To the southwest the land reaches to Kapālama Basin in Honolulu Harbor. Kapālama Canal, located just east of the VMS project area, follows the original lower course of Niuhelewai Stream. It was developed in 1961 and channelized the two lower streams (Stine et al. 2011:4).

Kalihi Ahupuaʻa borders Kapālama on the west. The *ahupuaʻa* consists of an amphitheater-headed valley with Kalihi Steam feeding into Honolulu Harbor. The valley floor has been filled with lava flows of the geologically recent Honolulu Volcanic Series (Macdonald et al.1970; Stine et al 2011:4). Kalihi Stream has two tributaries, Kamanaiki Stream and Kaʻewai Stream.

Topography and Soils

The project areas are situated in a moderately sloping to level area approximately 23 m amsl. At the CCTV project area, soils include Ewa silty clay loam (6-12 percent slopes), Honouliuli clay (0-2 percent slopes), and Kaena clay (2-6 percent slopes) (Figure 4-4).

The Ewa series (EaC) consists of deep, well drained soils that formed in alluvium (Soil Survey Staff 2014). The alluvium washed from the adjacent uplands and is material weathered from basic igneous rocks. Historically the soils were used for irrigated sugarcane and pasture, but today are entirely in urban use. The natural vegetation for this soil type includes fingergrass (*Chloris spp*.), *kiawe* (*Prosopis paffida*), *koa haole* (*Leucaena glauca*), klu (*Acacia farnesiana*), and *ʻuhaloa* (*Waltheria americana*).

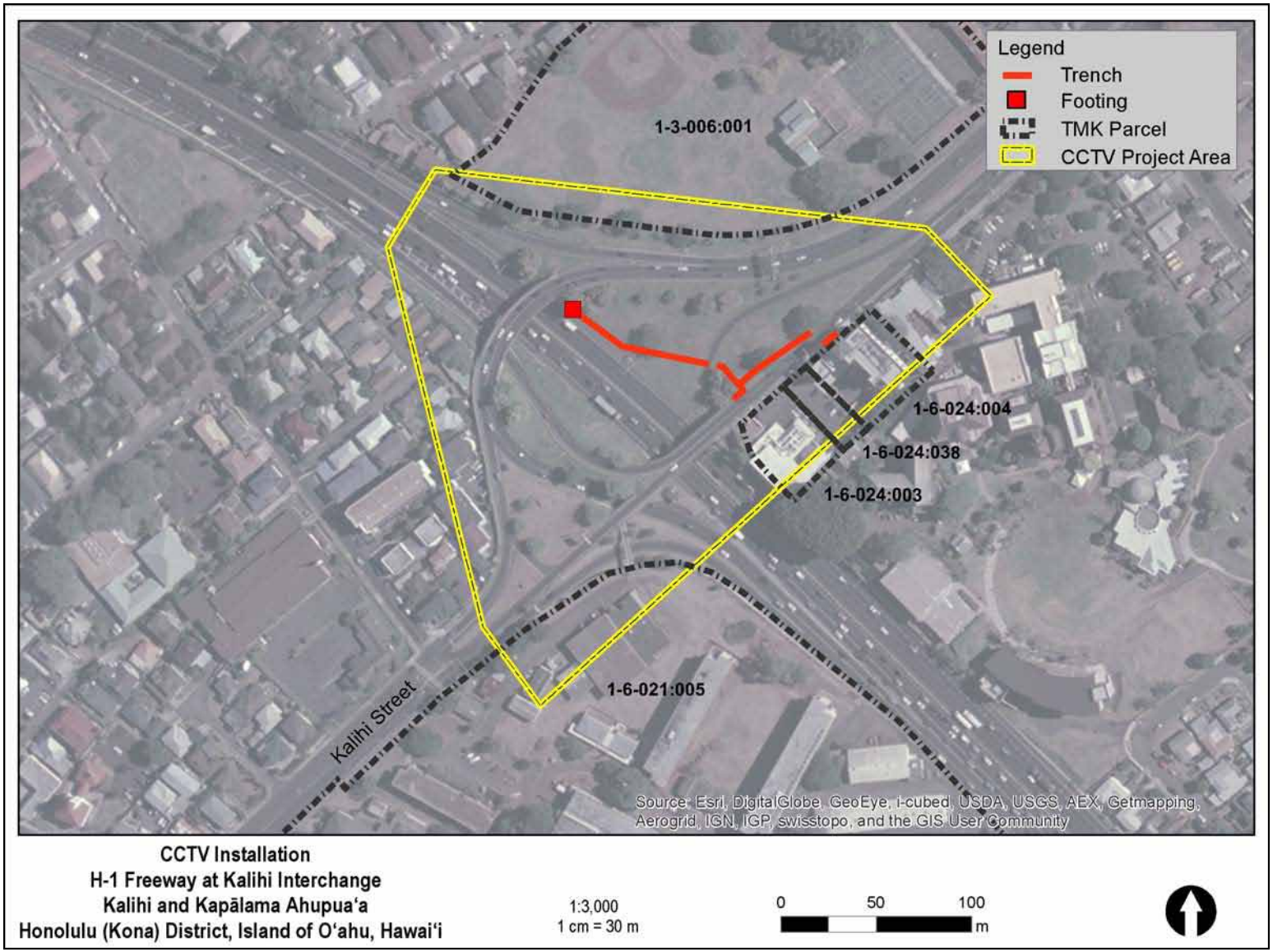

Figure 4-2. CCTV Project Area and Adjacent TMK Parcels.

Figure 4-3. VMS Project Area and Adjacent TMK Parcels.

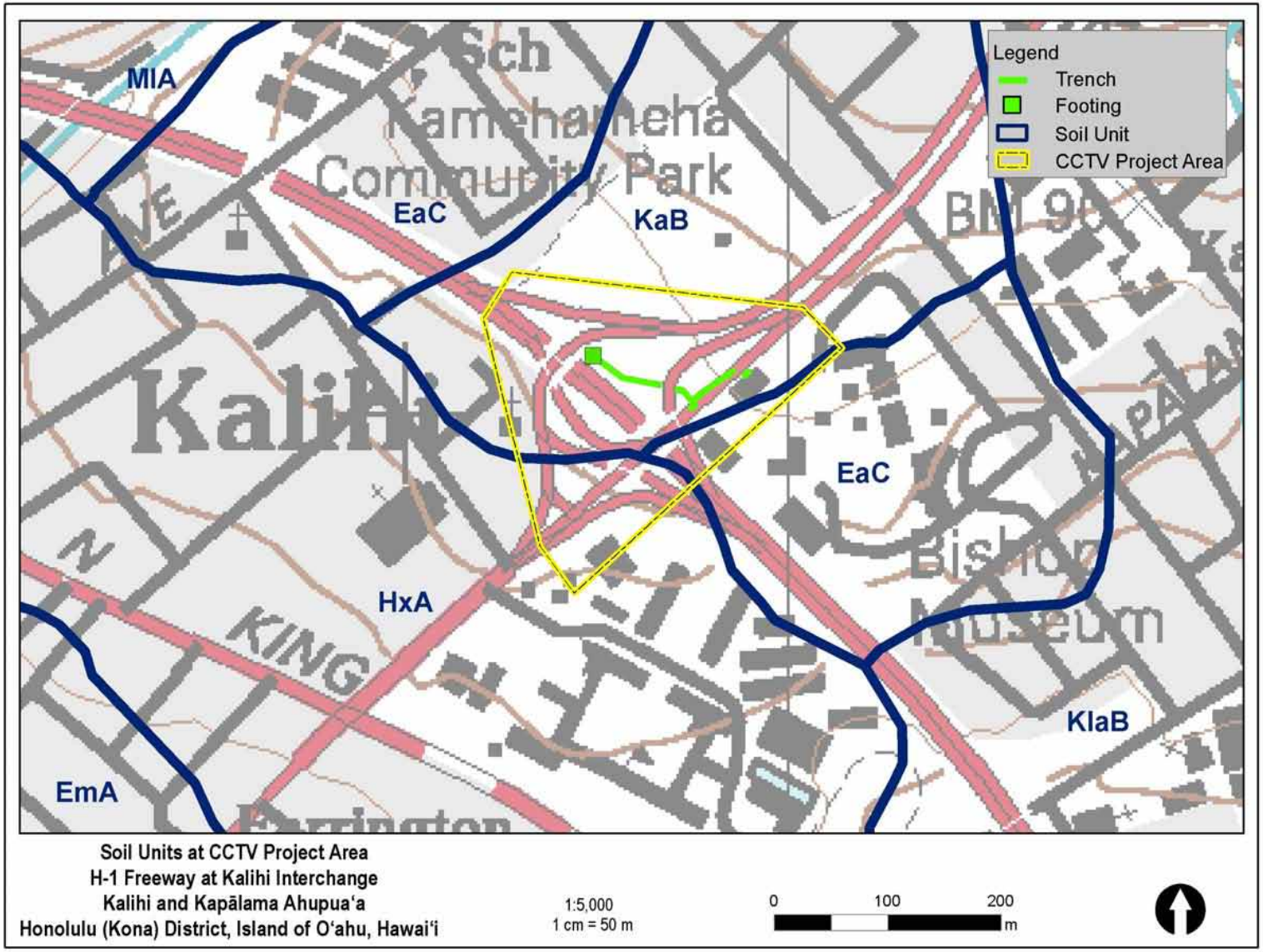

Figure 4-4. Soil Units at the CCTV Area.

The Honouliuli series (HxA) consists of deep, well drained aoils that formed in alluvium weathered from basic igneous rock (Soil Survey Staff 2014). Located on lowlands, these soils can be used for growing irrigated sugarcane, truck crops, orchards, and pasture. The natural vegetation includes *kiawe*, *koa haole*, fingergrass, bristly foxtail (*Setaria verticillata*), and bermudagrass (*Cynodon dactylon*).

The Kaena series (KaB) consists of deep, poorly drained soils that formed in alluvium and colluvium (Soil Survey Staff 2014). Kaena soils are on alluvial fans of steep colluvial slopes. These soils are dark-colored silty clays underlain by alluvium. They must be drained for agriculture because of heavy saturation, but would have been well-suited for traditional *lo'i* (irrigated taro fields) (Shefcheck and Spear 2006:5). The natural vegetation for this soil type includes *kiawe*, klu, lantana (*Lantana spp*.), *koa haole*, and fingergrass.

Soils at the VMS project area include two Ewa series units: Ewa silty clay loam with 6-12 percent slopes and Ewa silty clay loam (EmA) with moderately shallow, 0 to 2 percent slopes; Honouliuli clay (0-2 percent slopes); and Kawaihapai stony clay loam (2-6 percent slopes) (Figure 4-5).

The Kawaihapai series (KlaB) consists of well drained soils that formed in alluvium derived from basic igneous rock in humid uplands (Soil Survey Staff 2014). Kawaihapai soils are in drainageways and on alluvial fans of the coastal plain. Cultivation is hindered by stones. Kawaihapai soils are used for sugarcane, truck crops, and pasture. The natural vegetation for this soil type includes *kiawe*, *koa haole*, lantana, and bermudagrass.

Rainfall and Vegetation

Annual rainfall in this part of leeward O'ahu averages about 957.7 mm (37.7 in) per year, with most rain falling in the winter months between November and March (Giambelluca et al. 2013). The project area is in a developed urban environment with limited landscaping that includes manicured exotic grasses and trees. The modern built environment includes H-1 Freeway, streets, sidewalks, and utility infrastructure, along with commercial, industrial, and residential developments.

HISTORICAL BACKGROUND

This section presents the ethno-historical and archaeological background information of the project area. Data from background research were compiled to create an overview of traditional Hawaiian and historic-era land use and subsistence practices. Previous archaeological research in the study area is reviewed and anticipated archaeological findings are discussed.

Myths and Legends

The Hawaiian cultural landscape can be described through significant Hawaiian place names, or *wahi pana*, and *mo'ōlelo*. *Mo'ōlelo* may be myths, legends, proverbs, and events surrounding well-known individuals in Hawaiian history (Pukui and Elbert 1986:254). The following is a discussion of the mythological and traditional accounts in and around the study area.

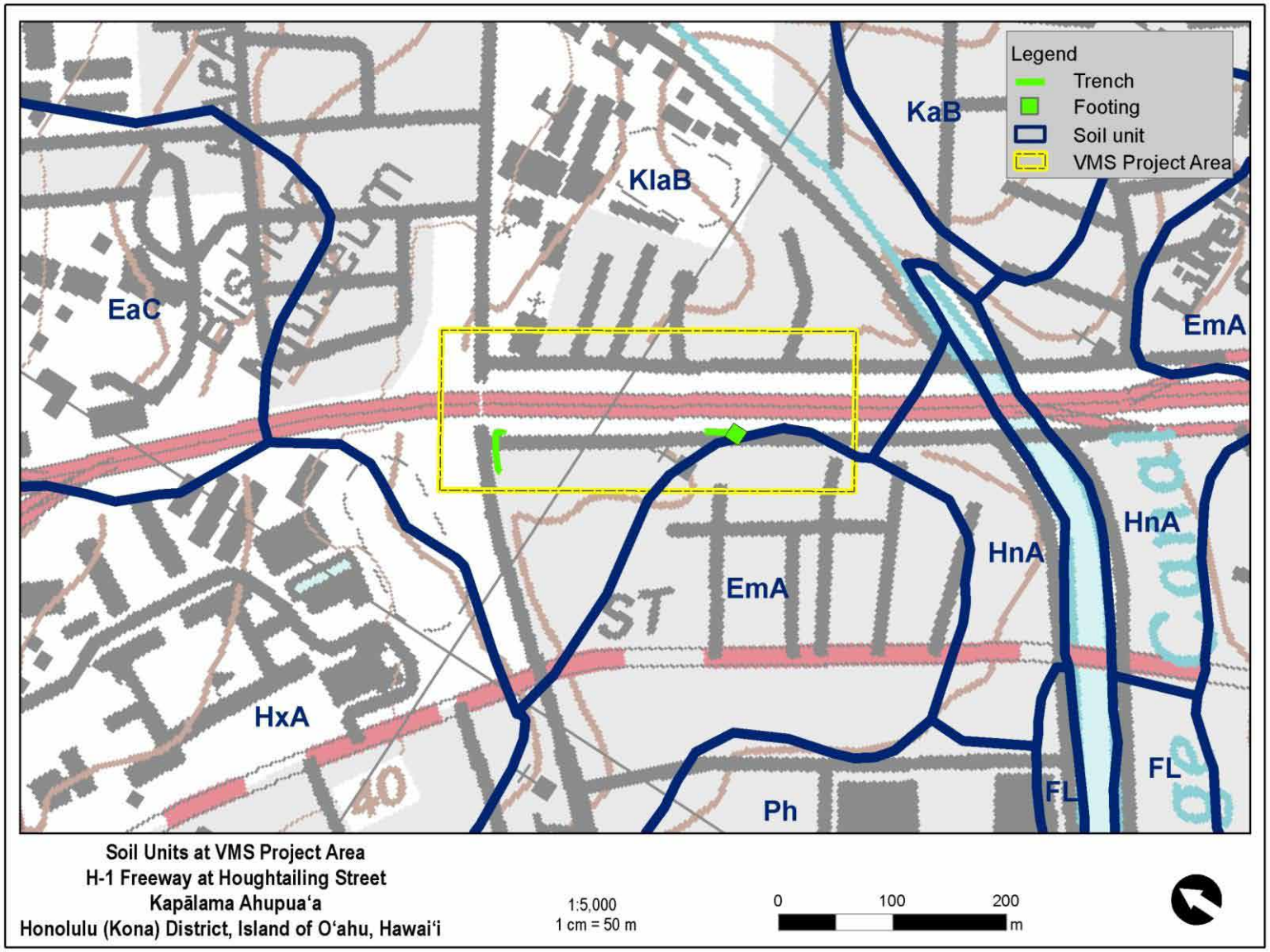

Figure 4-5. Soil Units at the VMS Project Area.

Kapālama

The toponym Kapālama is possibly from the *pā* (an enclosure) of *lama* wood that surrounded a residence of *aliʻi* (chiefs) (Pukui et al. 1974:87). According to McAllister (1933:88): "Kapālama is said to have obtained its name from an establishment in which the young *aliʻi* were kept just before pairing off for offspring." This may have been derived from Nathaniel Emerson. In his translation of David Malo's "Ka Moʻolelo Hawaiʻi," Emerson noted:

> *Hoonoho ia* means put in an establishment, placed under the care of a guardian or duenna [chaperone]. Such an establishment was surrounded by an enclosure, pa, made of the sacred lama . . . Hence this special care or guardianship was called pālama. It is said that an establishment of this kind was anciently placed at that suburb of Honolulu which to this day bears the name of Ka-pa-lama. [Malo 1951:139; note by N. B. Emerson]

According to Westervelt (1923:204-45), Kapālama was a chiefess of Oʻahu who lived in that area. She was the grandmother of Lepeamoa, meaning "cockscomb" (Pukui and Elbert 1986:203). Keāhua, a chief of Kauaʻi, traveled to Oʻahu to take Kapālama's daughter for his wife. Akuapehuale, "God of the swollen billows," was angered and forced the couple to hide in the uplands of the Wailua River valley of Kauaʻi.

The chiefess Kapālama adopted Keāhua's daughter, who was born as an egg, and took her to Kapālama. Lepeamoa hatched from the egg as a bird with rainbow-like feathers. She was able to transform into a beautiful young woman wearing a feather lei. Because of her beauty, a rainbow was always present above her. She was guarded by her ancestress, Keaolewa ("the moving cloud"), who could transform between human and bird. ʻĀlewa Heights, the lower ridge separating Kapālama and Nuʻuanu, may take its name from this ancestress (Hammatt 2013:5).

A famous battle between Kahahawaʻi, the war chief of Kahekili, king of Maui, and the Oʻahu ruling chief Kahahana took place at Niuhelewai Stream (today's Kapālama Canal). Kahahana's reign of Oʻahu began around 1780 and ended with his death after this battle in 1783 (Cordy 2002:19).

> I ka wā e noho ana o Kahekili he ʻlii no Maui, a o Kahahana he ʻlii no Oʻahu nei i*loko* ʻoia kau i halo mai ai o KahaHawaime na koa e kaua ia Oʻahu. Ma kēia kaua ana ua heʻe a ua luku ia nā kānaka Oʻahu, ma Niuhelewai, a ua hoi ka wai i uka o ka muliwai, no ka piha nā kānaka.
>
> When Kahekili was reigning as king of Maui, and Kahahana was king of Oʻahu, it was during this period that KahaHawaiwith a number of warriors came to make war on Oʻahu. In this battle the people of Oʻahu were defeated and slaughtered at Niuhelewai, and the waters of the stream were turned back, the stream being dammed by the corpses of the men [Fomander 1919:498-499].

After Kahahana died in Waikele during the battle in 1783, the chiefs of Maui ruled Oʻahu (Cordy 1981:207). Chiefs from the Oʻahu districts of ʻEwa and Kona, including Kahahana's father, ʻElani, began plot to murder the new rulers (Kamakau 1991:138). When the Maui chiefs became aware of the scheme, the primary instigators, the chiefs of Waipiʻo, convinced Kahekili that the conspiracy originated on Kauaʻi. This is the origin of the phrase, Waipiʻo kīmopō, "Waipiʻo of the secret rebellion" (Pukui 1983:319). Later, the true culprits were revealed, which lead to the following events:

> A no kēia mea, ulu maila ke kaua kūloko o Kona me ʻEwa, nā moku o Oʻahu i luku nui ʻia; ua luku ʻia nā moku o Oʻahu i luku nui ʻia; ua luku ʻia nā kāne, nā wāhine a me nā keiki, a ua pani kūmano ʻia nā kaHawaia me nā muliwai i nā heana o nā kānaka o Kona a me ʻEwa. ʻO nā kaHawaii ʻoi aku ka nui o nā heana, a hoʻi hou ka wai i uka, ʻo ia nō ʻo Makaho a me Niuhelewai ma Kona, a ʻo Kahoʻāʻiaʻi hoʻi ko ʻEwa. He kūmukena ka nui o nā mea he make, ke lilo ka wai i mea ʻawa- ʻawa ke inu aku. Ua ʻōlelo mai hoʻi ka poʻe ʻike maka "O ka lolo ka mea i ʻawa- ʻawa ai ʻo ka wai." [Kamakau 1996:91, Ka Nūpepa Kū ʻoko ʻa, March 30, 1867]
>
> The districts of Kona and ʻEwa were attacked, and men, women, and children were massacred, until the streams of Makaho and Niuhelewai in Kona [in Kapalama] and of Kahoaʻaiʻai in ʻEwa were choked with the bodies of the dead, and their waters became bitter to the taste, as eyewitnesses say, from the brains that turned the water bitter. All the Oʻahu chiefs were killed and the chiefesses tortured [Kamakau 1992:138].

Kalihi

Kalihi translates as "outside edge," or boundary valley (Lyons 1917:178; Pukui et al. 1974). The current study is located in the area historically known are Kalihi-Waena (the area between King Street and School Street). Many of the *moʻolelo* of Kalihi concern Kalihi-Uka, or the *mauka* (toward the mountains) portion of Kalihi to the northeast. The goddess Haumea, who is thought of as the progenitor of the Hawaiian people (Malo 1951:5), is a sister of the gods Kāne and Kanaloa, and the mother of the Hawaiian goddess Pele and her sisters and brothers. She was known for her regeneration abilities and is often considered the goddess of childbirth (Beckwith 1970:283). Papa, the human form of the goddess Haumea, first resided in Kalihi Valley when living on Oʻahu (Beckwith 1970:276).

> In her human body as Papa, Haumea lives on Oahu as the wife of Wakea; in her spirit body as Haumea she returns to the divine land of the gods in Nu'umealani [a legendary place] and changes her form from age to youth and returns to marry with her children and grandchildren. Some place these transformations on Oahu at the *heiau* of Ka-ieie (the pandanus vine) built for her worship in Kalihi valley [Beckwith 1970:278].

The *heiau* (traditional Hawaiian ritual structure) where Papa transformed into Haumea was Kaʻieʻie Heiau in Kalihi-Uka (Beckwith (1970:278). She lived there with one of her sons, Kiʻo, who was "named for the deposits (*kiʻo*) of gum on the *kukui* (*Aleurites moluccana*) trees above Kalihi" (Kamakau 1991:134).

In a *moʻolelo* of Kalihi-Kai, there is a shark guardian named Makaliʻi. He was known to visit the waters of Kalihi-Kai, often near Kahakaʻaulana, an islet off Sand Island where he had a cave (Oppenheimer 1976:15). In the 1970s, *kānaka maoli* (Native Hawaiians) of Mokauea recalled that during Makaliʻi's residence in his cave at Kahakaʻaulana, the sand patterns changed above his cave and that fishing was good for the *akule* (bigeye scad, *Trachurops crumenophthalmus*) (Oppenheimer 1976:15).

Traditional Land Use

At the time European explorers arrived to Oʻahu, Kalihi Valley supported a large population with agricultural developments across the floodplains (Kotzebue 1967:339-341). Early accounts of the area document *heiau*, trails connecting Kalihi with various population centers on the island, and *loko* (traditional fishpond) at the intersection of Kalihi Stream and Keʻehi Lagoon. Kapālama, the *ahupuaʻa* immediately east of Kalihi,

contains the minor Kapālama and Niuhelewai Streams, which also would have supported traditional Hawaiian subsistence practices.

The early historical account and map by Otto von Kotzebue's describes the *makai* (seaward) portion of Kalihi circa 1817 (Kotzebue 1817;1967) (Figure 4-6). Along Kalihi Stream there were vast *loʻi* (irrigated taro plot), with a network of *loko* at the mouth, which are labeled on the map in Cyrillic as *Рыбныя Пруды*. Kotzebue did not document any residences near the *loʻi* at the mouth of Kalihi Stream, but four huts where present on Moku Moa, the islet across from the mouth of Kalihi Stream. The following excerpt documents Kotzebue's travel by sea to Pearl Harbor and onward to the mouth of Nu'uanu Stream:

> The way now lies to the west, through a beautifully cultivated valley, which is bounded towards the north by romantic scenery of woody mountains, and on the south by the sea. The artificial taro fields, which may justly be called taro lakes, excited my attention. Each of them forms a regular square of 160 feet, and is enclosed with stone all round like our basins. This field, or rather this pond . . . contains two feet of water. In the spaces between the fields, which are from three to six feet broad, there are very pleasant shady avenues, and on both sides bananas and sugarcane are planted. . . . [T]he fish which are caught in distant streams thrive admirable when put into them. In the same manner as they here keep river-fish, they manage in the sea with sea-fish, where they sometimes take advantage of the outward coral reefs, and draw from them to the shore a wall of coral stone. Such a reservoir costs much labor, but not so much skill as the taro fields, where both are united, I have seen whole mountains covered with such fields, through which the water gradually flowed; each sluice formed a small cascade, which ran through avenues of sugarcane, or banana into the next pond, and afforded an extremely picturesque prospect. Sugar plantations and taro fields alternately varied our way, with scattered habitations, and we had gone unawares five miles to the large village of Mouna Roa [Moana-lua]. . ." [Kotzebue 1967:339-341].

An account of Kalihi Valley and the floodplain is also given by Frederick Debell Bennett from 1834:

> The valley of Kalihi succeeds to that of Anuuana [Nu'uanu], but is less bold and diversified in its scenery. Human dwellings and cultivated lands are here very few, or scattered thinly over a great extent of, probably, the finest soil in the world. The commencement of the valley is a broad pasture-plain, the tall grass waving on every side, and intersected by a foot-path, reminding one forcibly of the rural scenes which precede the hay-harvest in England. Kalihi has a pass to the vale of Kolau similar to the pari [pali] of Anuuana, though more precipitous, and only employed by a few of the islanders who convey fish from Kolau to Honoruru. . . [Bennett 1840:Vol. I: 202].

In the neighboring *ahupuaʻa* of Kapālama the Hawaiian historian John Papa ʻĪʻī, in his writings from the 1860s, describes a trail from Nuʻuanu to Moanalua. In this description, the presence of *loʻi* corresponds to that of Kotzebue:

> When the trail reached a certain bridge, it began going along the banks of taro patches, up to the other side of Kapālama, to the plain of Kaiwiula on to the taro patches, up to the other side of Kapālama, to the plain of Kaiwiula; on into Kahauiki and up to the other side; turned right to the houses of the Portuguese people. . . . [ʻĪʻī 1959:95].

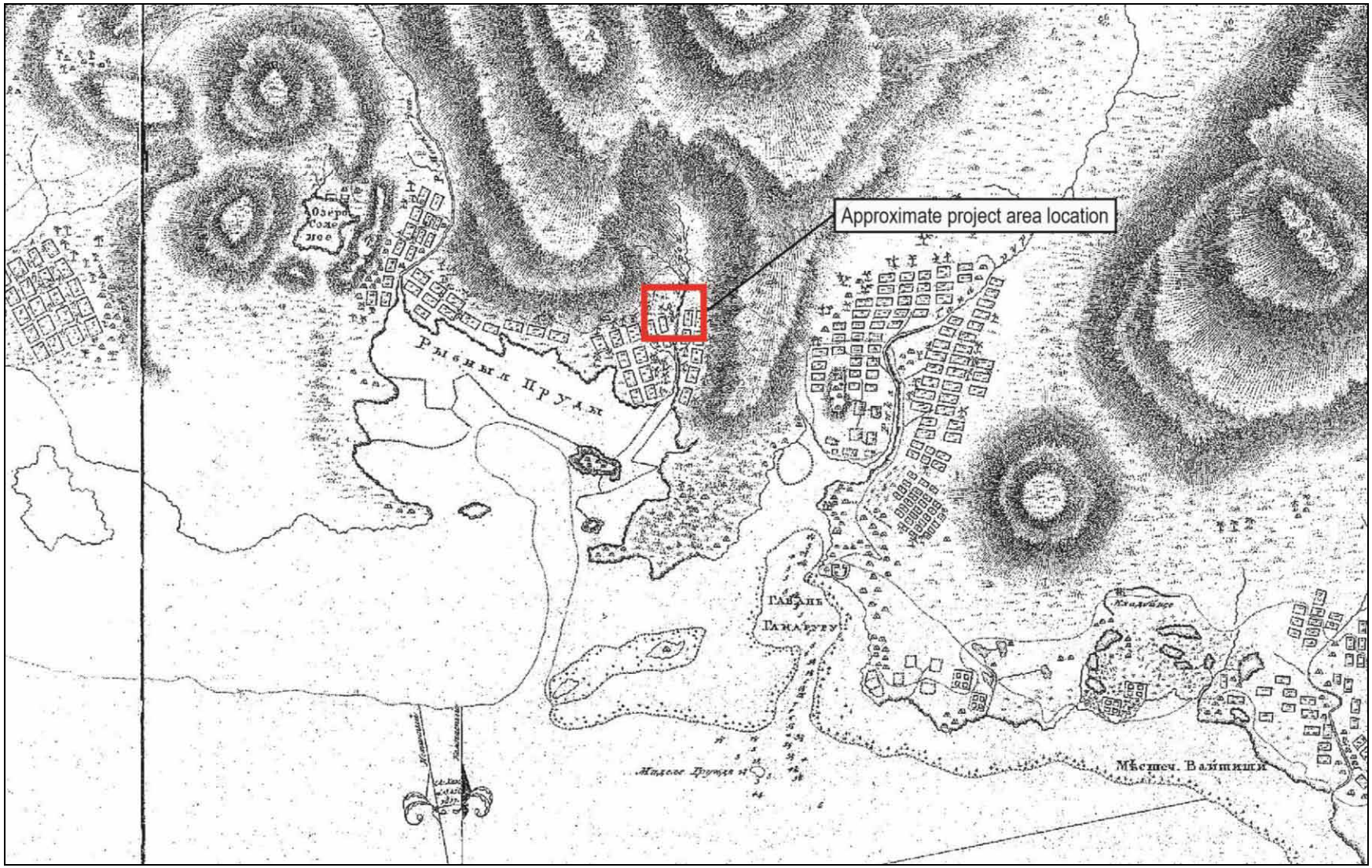

Figure 4-6. South O'ahu Map Dated 1817 by Otto Van Kotzebue (Kotzebue 1817).

Following the severe population decrease caused by the wars of conquest and a circa 1804 epidemic (called *oku'u* or *ahulau*, possibly Asiatic Cholera), Kamehameha I set aside a few large tracts in Kapālama, in addition to others elsewhere, for people to grow crops for subsistence and to trade with visiting ships (Hammatt 2013:32). The Hawaiian historian Samuel Kamakau wrote of this event:

> After the pestilence had subsided the chiefs again took up farming, and Kamehameha cultivated land at Waikiki, Honolulu, and Kapālama, and fed the people [Kamakau 1992:190].

John Papa ʻĪʻī adds:

> He [Kamehameha] also lived in Honolulu, where his farms at Kapālama, Keoneula, and other places became famous. These tasks Kamehameha tended to personally, and he participated in all the projects [ʻĪʻī 1959:69].

Historic Land Use

Traditional land divisions of the fifteenth and sixteenth centuries persisted until the 1848 Māhele, which introduced private property into Hawaiian society (Kamakau 1991:54). During the Māhele, the Land Commission required the Hawaiian chiefs and *konohiki* (land agent for the *aliʻi*) to present their claims to the Land Commission. In return they were granted awards for the land quit-claimed to them by Kamehameha III. The remaining unclaimed land was then sold publicly, "subject to the rights of the native tenants" (Chinen 1958:29). The new western system of ownership resulted in many losing their land. Often claims would be made for discontiguous cultivated plots with varying crops, but only one parcel would be awarded.

Following Kuleana Act of 1850 that granted individual *kuleana* (commoner) lots, records of the Land Commission Awards (LCA) associated with the area indicate that the population was concentrated near Kalihi Stream, between modern Dillingham Boulevard and the Kalihi and Kamanaiki Stream conflux. It is in this zone that both areas for the current project are situated. Typically, a LCA consisted of four to seven *loʻi*, *kula* (dry fields for pastures and dry-land crops), and a house lot (Hammat 2013:26). LCA at or near the current project areas are listed in Table 4-2 and illustrated in Figure 4-7 and Figure 4-8.

Kamehameha "kept of himself" Kapālama Ahupuaʻa during the Māhele (Kameʻeleihiwa 1992:59), and this land remained with the Kamehameha Dynasty through his grandchildren Moses Kekūāiwa, Victoria Kamāmalu, and Lot Kamehameha, until becoming part of the Bernice Pauahi Bishop Estate (Hammatt 2013:33).

A map of Kapālama from this time (Brown 1885) depicts the small *kuleana* LCA parcels across the plain on both sides of Kapālama Stream (see Figure 4-8). These *kuleana* parcels consisted of house sites and *loʻi*. Large rice fields near the central *ʻauwai* (irrigation ditch) inland managed by the *konohiki* (in this case Moses Kekilaiwa) also appear on the map.

Table 4-2. Land Commission Awards (LCAs) in the Vicinity of the Project Area.

LCA No.	Award	Name
553	Nine *loʻi* (1.07acres)	Kuʻula
803	*Loʻi*, pastures (*kula* land), and *loko* (292.41 acres)	Alexander Adams
818	One farm with the fishing grounds called Kaliheawa, situated in Kalihi.	George Beckley
1191	Four *loʻi*, one house, and one *ʻauwai* (irrigation ditch) on the *ʻili** of Kaluaipilau	Kuloa
1229	Eight *loʻi* and one house on the *ʻili* of Kealia	Keliinui
1234	Seven *loʻi*, one house, and one *ʻauwai*	Palau
1242	Two *loʻi* and one house	Pi
1250	Three *loʻi* in the *ʻili* of Kaliawa	Keawe
1741	Two *loʻi*, one *kula*, one bouse on the *ʻauwai ʻili* of Kealia	Kamookahi
1809	One *loʻi*, one house, and two on the *ʻili* of Maliko	Palau
I998	One *loʻi*, one *ʻauwai*	Napaupau
2020	Two *loʻi* in the *ʻili* of Kaluapilau	Pa
2093	Two *loʻi* and one *ʻauwai* in the *ʻili* of Maliko	Keliipaabana
2095	Five *loʻi* ,one bouse, and one *ʻauwai* in the *ʻili* ofKamookahi	Kaioe
2I35	One *loʻi*, one house, and one *ʻauwai* in the *ʻili* of Maliko	Kio
3200	One *loʻi*, one house, and one *kula*	John
4679	Three *loʻi* in the *ʻili* of Kamookahi	Paewahine
6450	*ʻIli* of Mokauea (737.7 6acres). No description of land use in award.	Kaunuohua
7713	No description of land use in award	Kamamalu
7714B	No description of land use in award.	Kekuaiwa
8370	Three *loʻi* in the *ʻili* of Kamookahi	Kahinu

* `*ili* is a land division within an *ahupua`a*

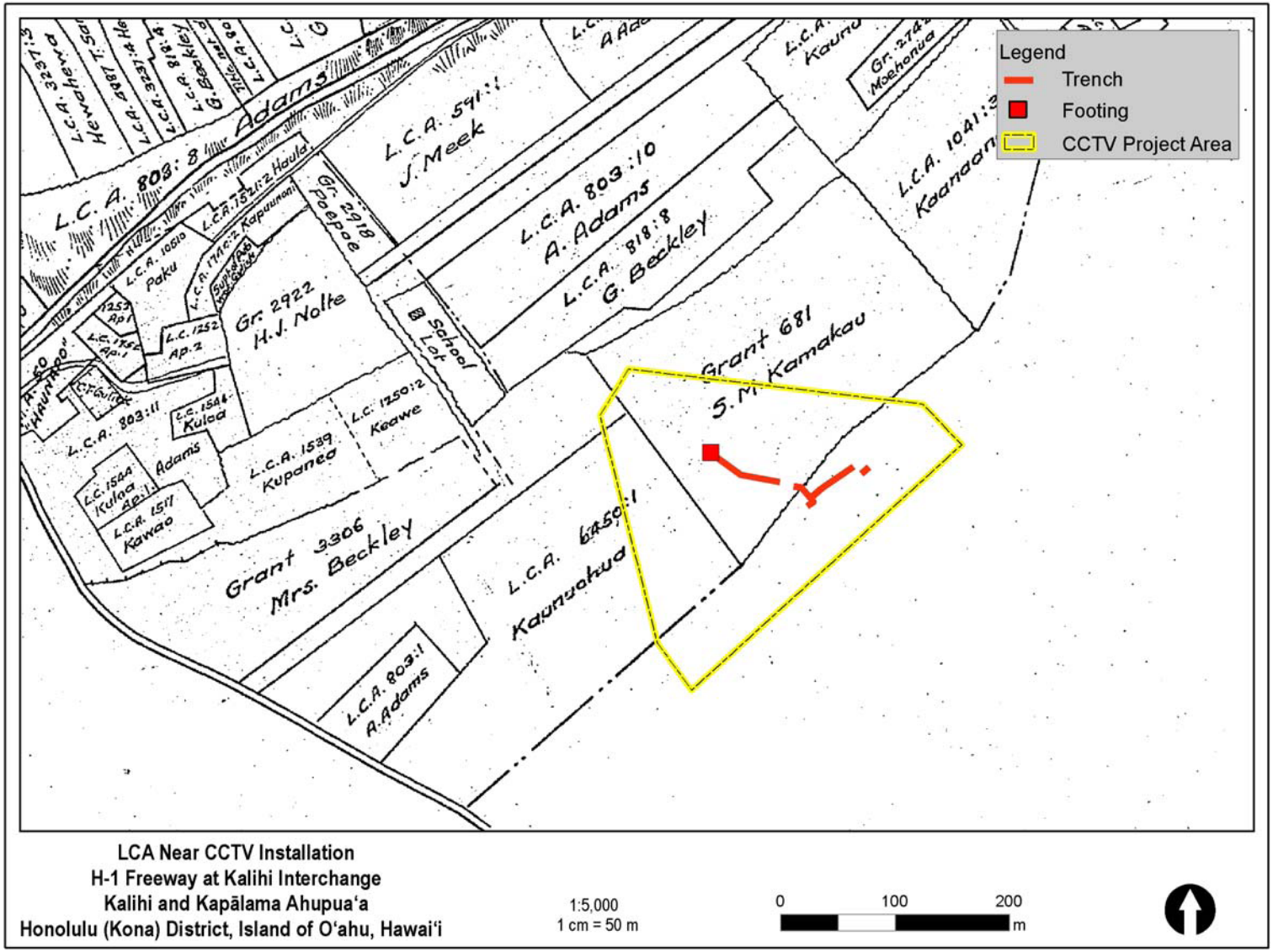

Figure 4-7. Kalihi Map Dated 1883 by J.F. Brown (Brown 1883, Hawaii Land Survey Division).

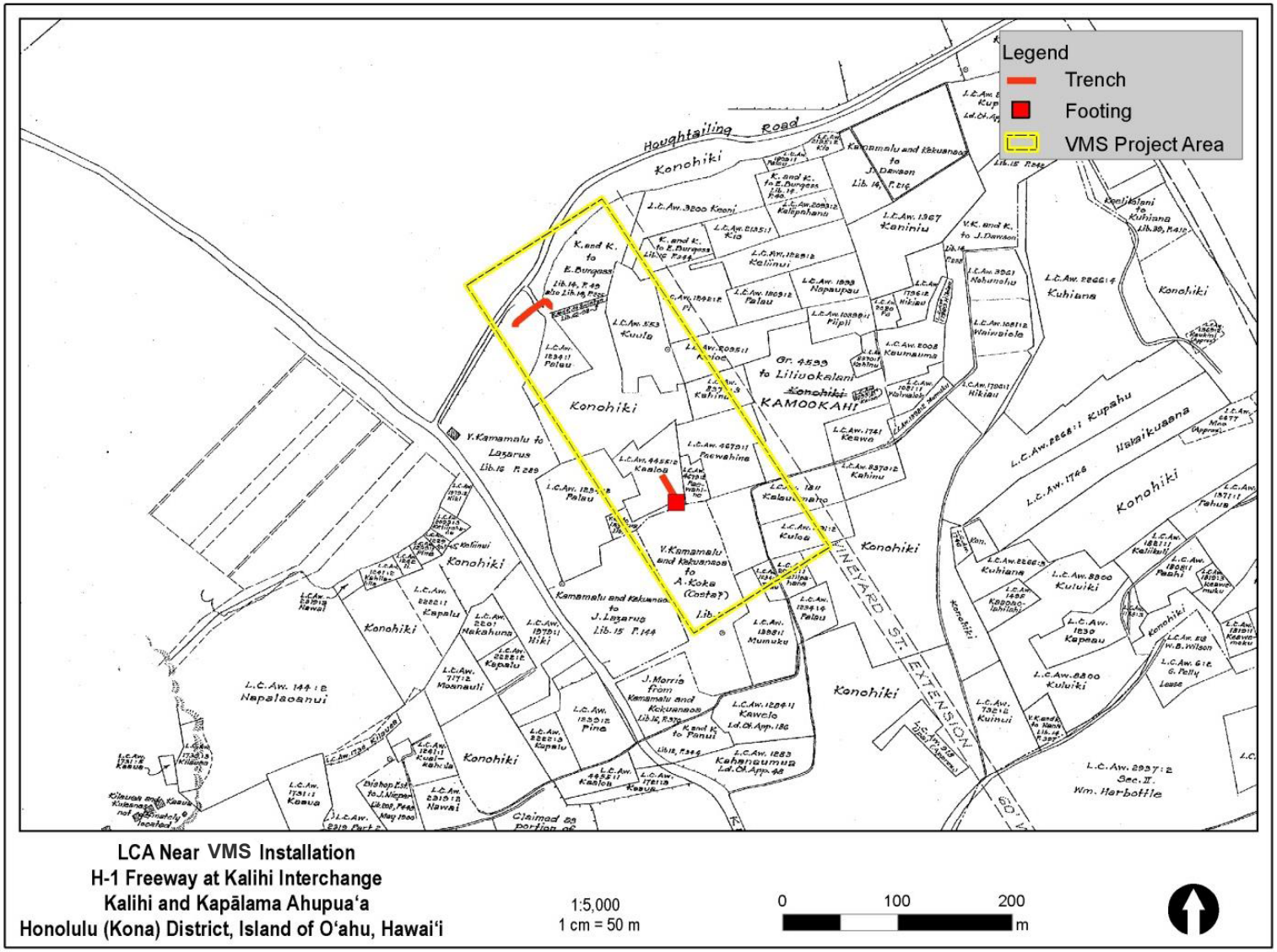

Figure 4-8. Kapalama Map Dated 1885 by J.F. Brown (Brown 1885, Hawaii Land Survey Division).

In 1853, an epidemic of smallpox broke out in Honolulu. As graveyards were crowding, it was decided that the dead should be buried in areas of low population. The plains of Kaiwi‘ula in early historic accounts, which was in the vicinity of today’s Bishop Museum (Pukui et al. 1974:71), was one of these areas:

> When the graveyard in Honuakaha was filled, Keone' ula was taken for a burial ground and the plains of Kaiwi‘ula and the rocky lands of Mau‘oki and Laepohaku [Kamakau 1992:417].

During the Māhele, many *lo‘i* were claimed along the Kalihi and Niuhelewai Streams. E. Craighill Handy recorded *lo‘i* in the 1930s, most likely those located in Kalihi-Kai and Kalihi-Waena (Hammatt 2013:21):

> Extensive terraces covered all the flatland in lower Kalihi Valley for approximately 1.25 miles on both sides of the stream. Above this the valley is too narrow for terraces for a mile or more; but in upper Kalihi there are numerous small areas that were developed in terraces [Handy 1940:79].

Similarly, E. S. Craighill Handy, reported the following on Kapālama:

> Kapālama had two streams watering its terrace area [for taro], which was almost continuous from Iwilei up to the foothills above School Street, an area measuring about three quarters of a mile both in depth inland and in breadth [Handy 1940:79].

On an 1881 map of O‘ahu produced by the Hawaiian Government Survey that includes Kalihi and Kapālama Ahupua‘a, only one road appears in the area (Figure 4-9). This road would later become King Street, running parallel to the coast. Also, an “insane asylum” was located just east of the VMS project area, on the eastern boundary of Kapālama.

The 1897 map of Honolulu by M. D. Monsarrat (1897) illustrates King Street running east-west south of the project area, with the Oahu Railway and Land Company railroad tracks parallel (Figure 4-10). The land is predominantly rural, mainly under cultivation for pineapple and taro.

Near the VMS project area, “truck gardens” and “taro patches” are illustrated on maps from the 1920s (Figure 4-11 and 4-12). The stream and bridge that appear in the map remained present in the area until at least 1937. In another historic map of the area, the proximity of Kamahameha School (the future site of Farrington High School) to both the CCTV and VMS areas can be seen (Figure 4-13).

Looking at the greater Kalihi and Kapālama Ahupua‘a area, topographic maps from 1917, 1927-28, and 1933 show the transformation from rural suburb into an urban grid of roads and structures (Figure 4-14). This expansion of development continued into the mid-twentieth century (Figure 4-15 and 4-16), leading to today’s urban environment. A 1943 War Department map illustrates the density of residences in Kalihi and Kapālama (Figure 4-17). Farrington High School replaced Kamehameha Schools near the current study area. In Kalihi-Kai, two of the five *loko* have been filled and the salt beds at the mouth of Kalihi Stream are no longer present. Ten years later many new schools and churches appear in the area (Figure 4-18). In Kalihi-Kai, all five *loko* have been filled and replaced by the Kapālama Military Reservation.

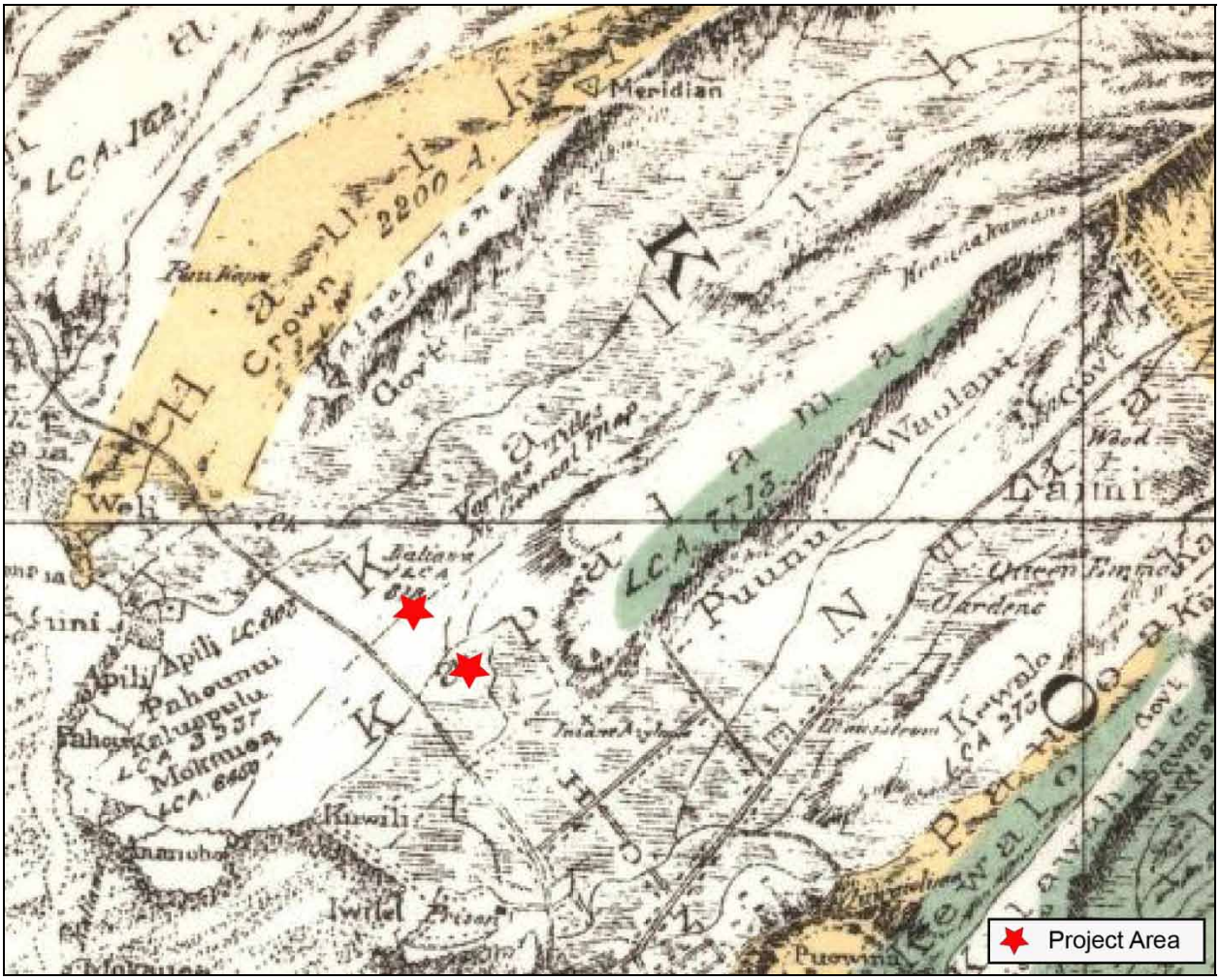

Figure 4-9. O‘ahu Map Dated 1881 by the Hawaiian Government Survey (Covington 1881, Hawaii Land Survey Division).

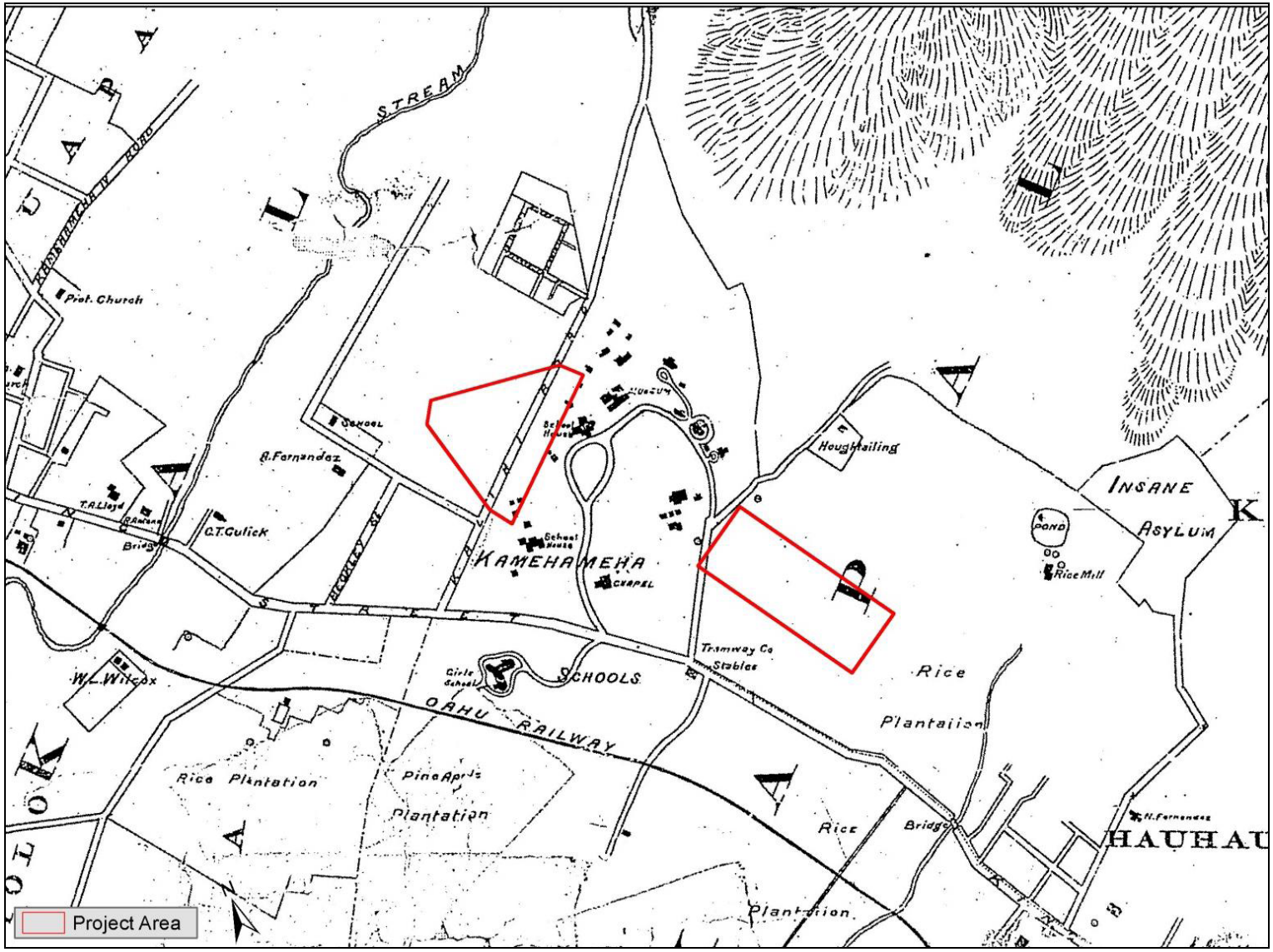

Figure 4-10. Portion of *Map of Honolulu* Map Dated 1897 by M.D. Monsarrat (Monsarrat 1897, Hawaii Land Survey Division).

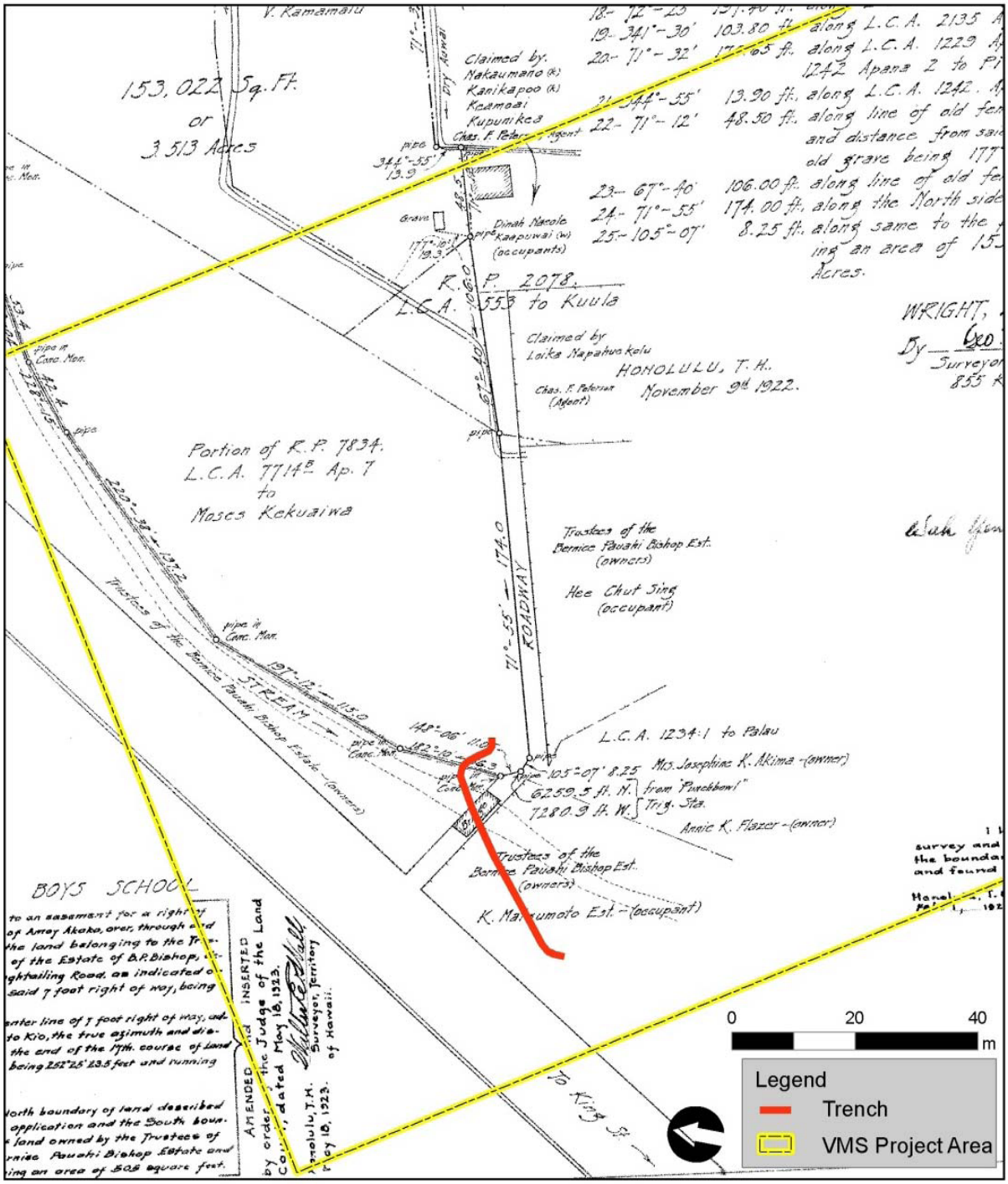

Figure 4-11. Land Court Application No. 544 Map Dated 1922 by G.F. Wright (Wright 1922, Hawaii Land Survey Division).

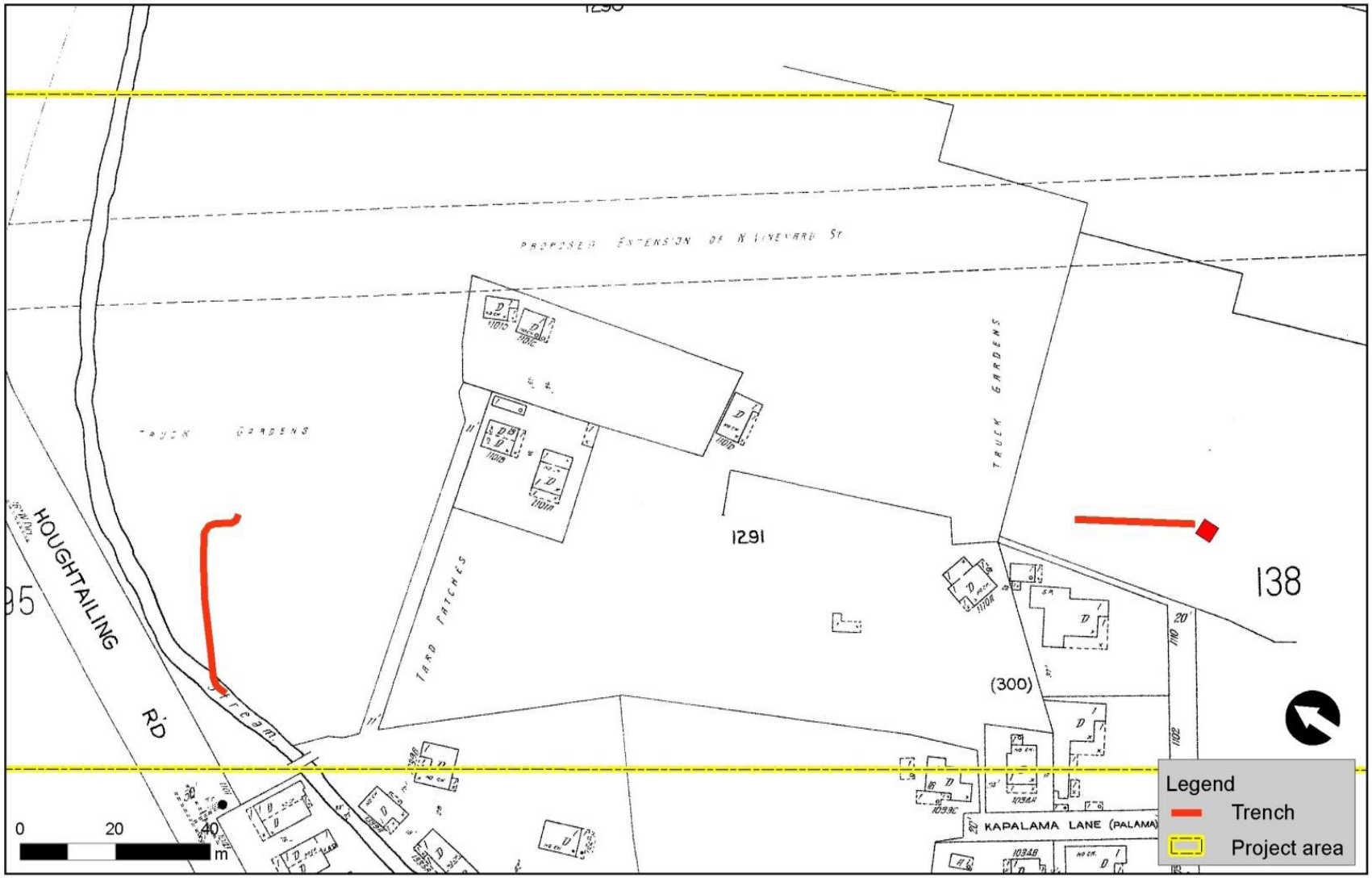

Figure 4-12. Honolulu Map Dated 1927 by the Sanborn Map Company (Sandborn 1927a, Hawaii Land Survey Division).

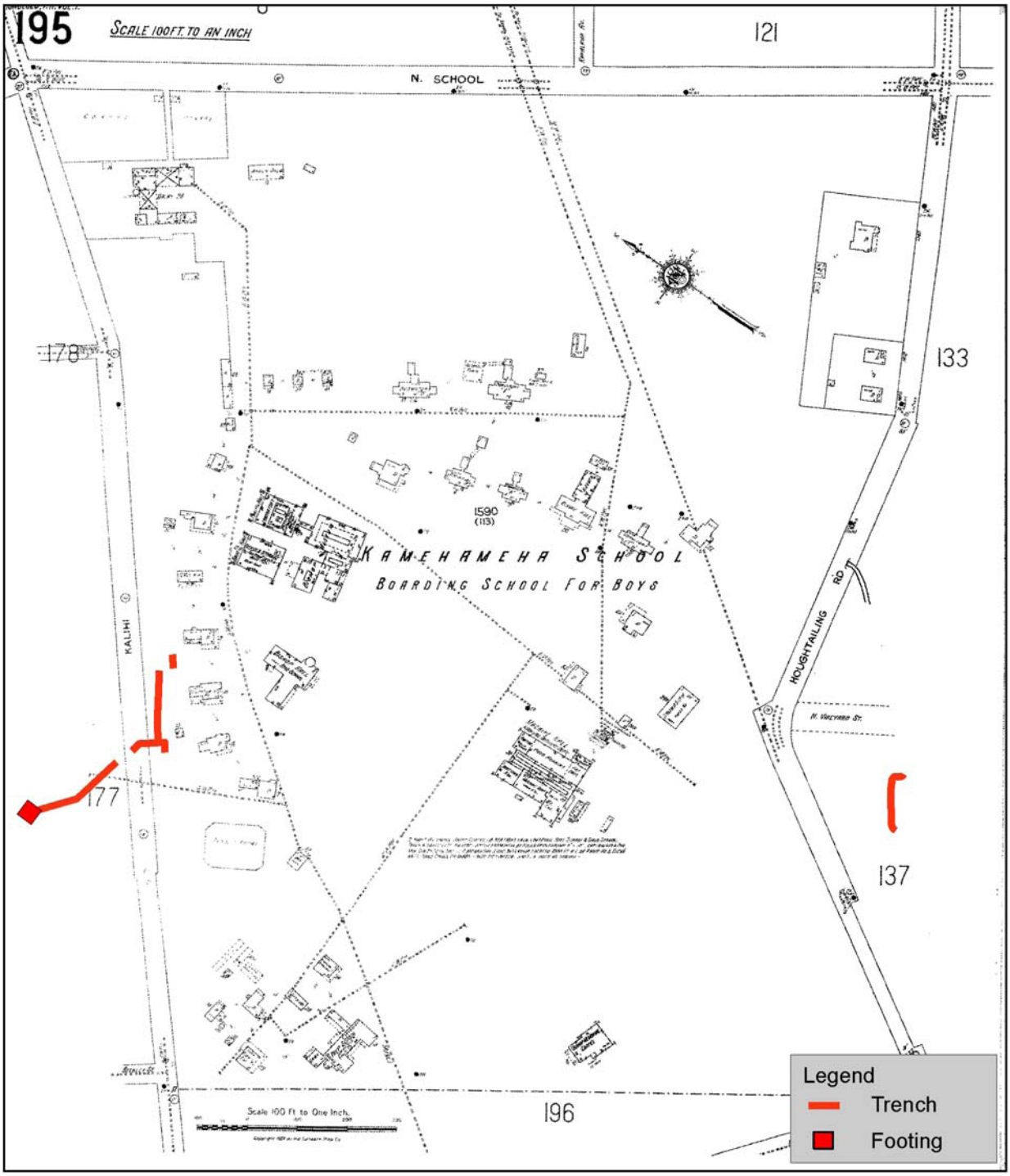

Figure 4-13. Honolulu Map Dated 1927 by the Sanborn Map Company (Sanborn 1927b, Hawaii Land Survey Division).

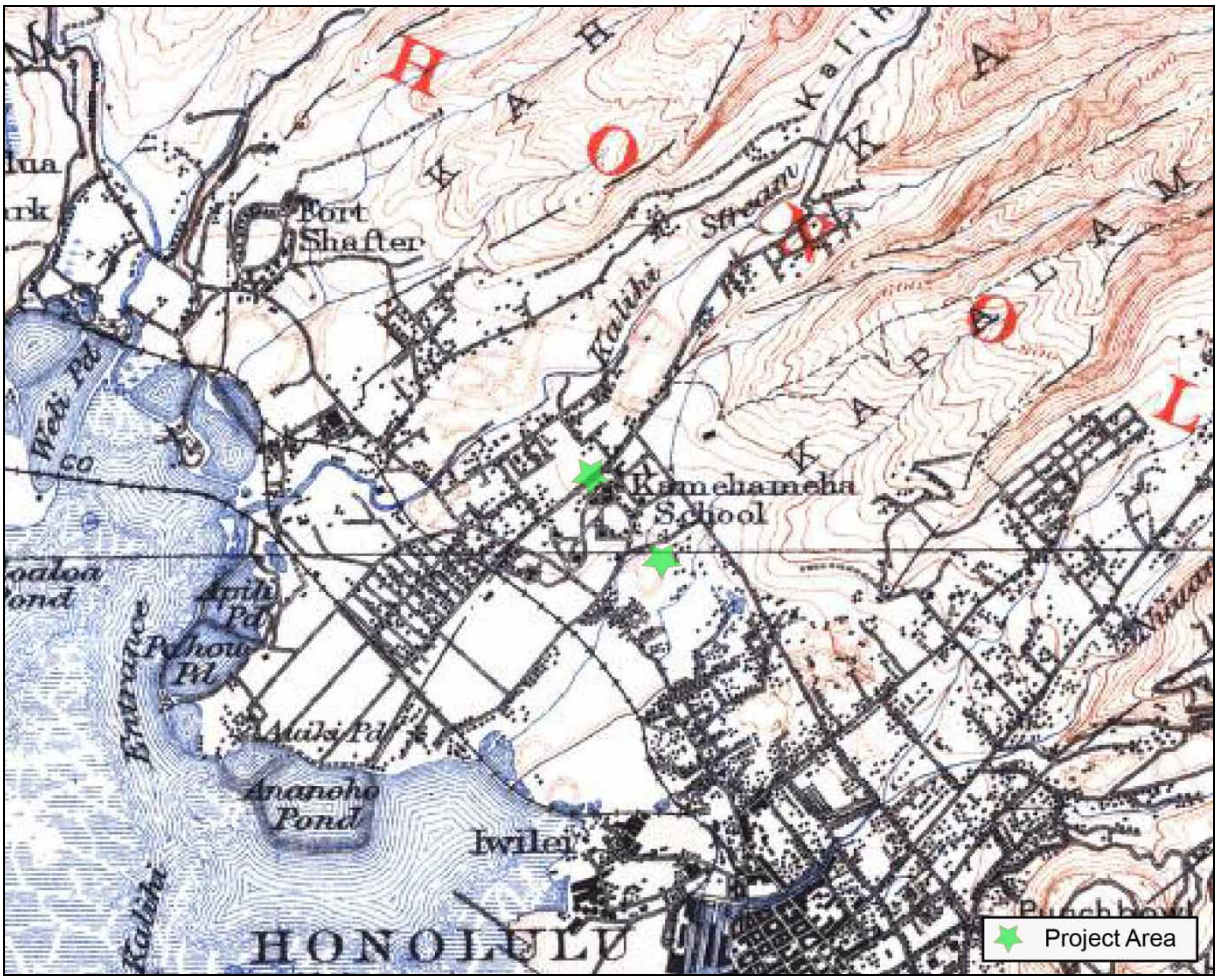

Figure 4-14. Topographic Map of the Island of Oahu Dated 1917 by the U.S. Department of the Interior (U.S. Department of the Interior, 1917).

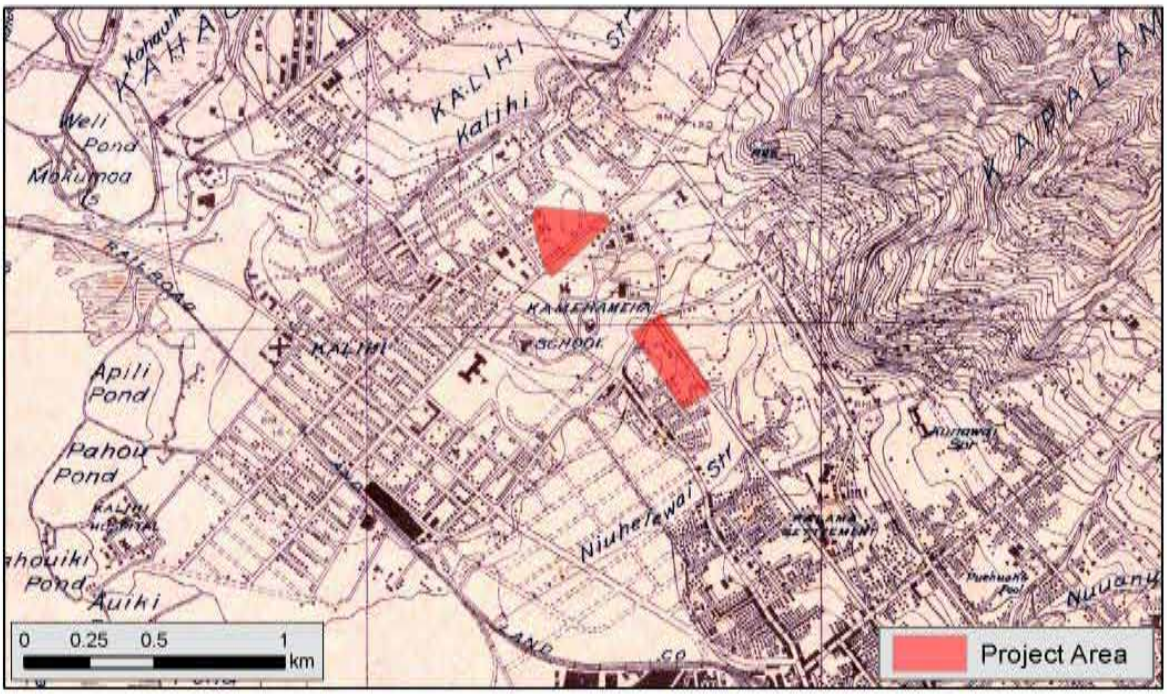

Figure 4-15. Topographic Map Dated 1927-28 by the U.S. Geological Survey (U.S. Geological Survey 1927-1928).

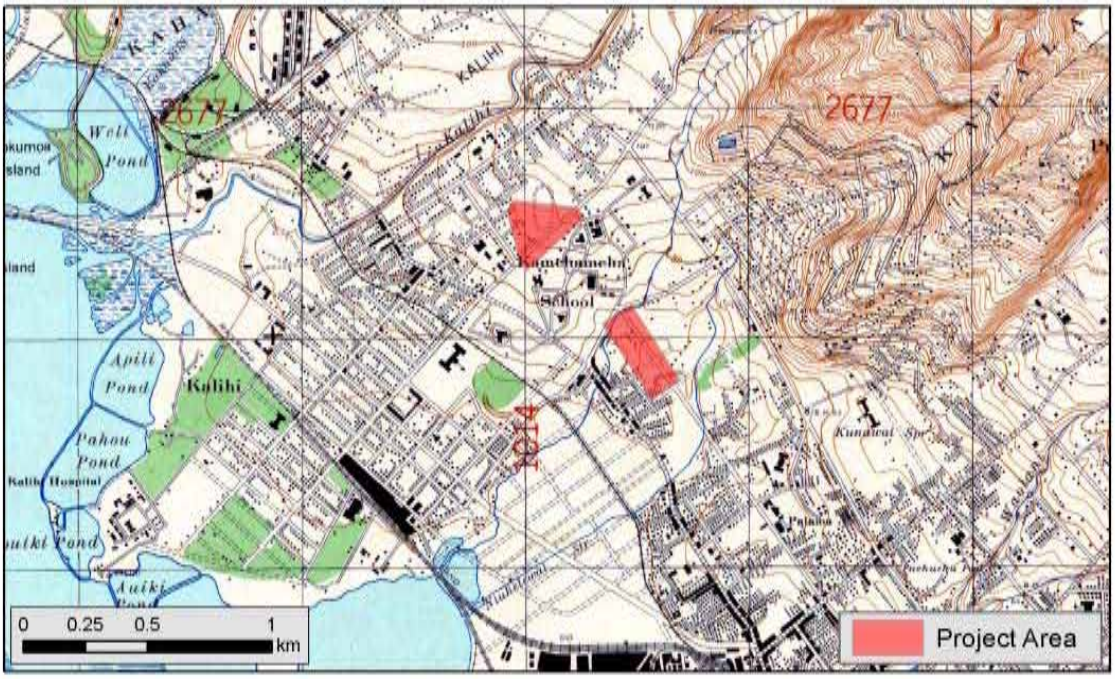

Figure 4-16. Fire Control Map Dated 1933 by the U.S. War Department (U.S. War Department 1933).

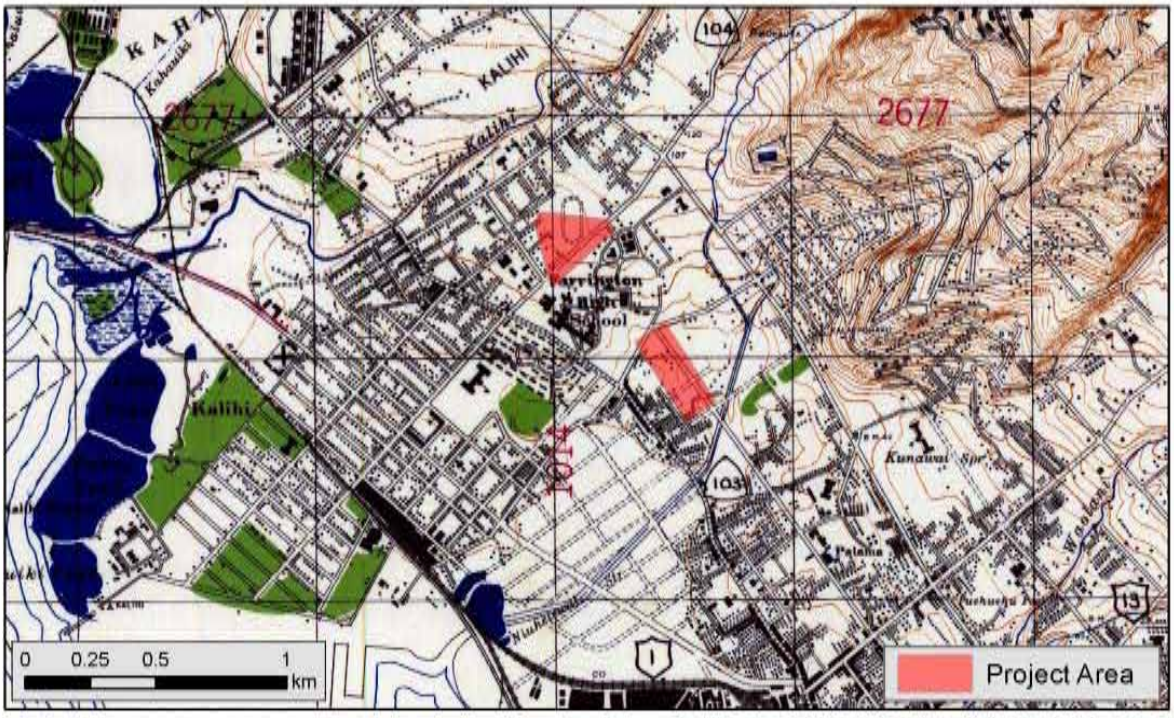

Figure 4-17. U.S. War Department Map Dated 1943 by the U.S. War Department (U.S. War Department 1943).

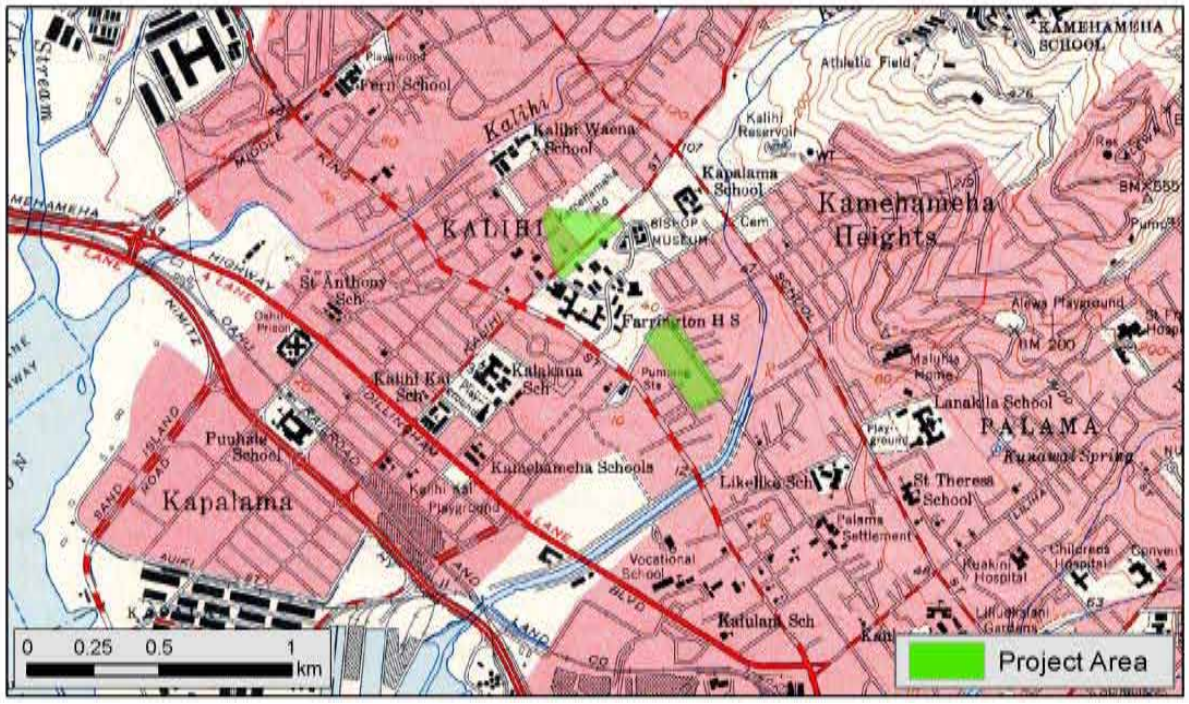

Figure 4-18. Topographic Map Dated 1953 by the U.S. Army Mapping Service (U.S. War Department 1953).

Recent Land Use

Today the project area includes a portion of the H-1 Freeway that traverses a mixed residential and commercial zone. Construction for the H-1 Freeway through Kalihi and Kapālama Ahupua‘a began in 1960. Prior to 1960, the H-1 Freeway was named the Lunalilo Freeway. It was at this time that federal money was used for the freeway system in Hawaii (Stine et al. 2011:30).

PREVIOUS ARCHAEOLOGICAL RESEARCH

Numerous archaeological investigations have been conducted in the vicinity of the CCTV and VMS areas, along with one archaeological monitoring project that traversed the VMS project area. Previous work has included archaeological literature review and field inspection, archaeological inventory survey, archaeological subsurface testing, and archaeological monitoring. Several instances of the inadvertent discovery human remains have also occurred.

The following section focuses on projects conducted within approximately 1 km of the current study parcel in order to compare previous findings of land use (Figure 4-19 and Table 4-3).

In 1980, SHPD conducted a site visit for excavations at Pālama Fire Station (550 m south of the VMS project area) that revealed a large charcoal deposit in a trench sidewall, along with several basalt cobbles (Neller 1980 cited in Hammatt 2013:129-130). Prior to SHPD’s return to document the feature, the trench was backfilled and no determination could be made as to whether the deposit represented a historic feature or a traditional *imu* pit (traditional earth oven) (Hammatt 2013:130).

During excavation for a water line on Austin Lane (550 m south of the VMS project area) there was an inadvertent discovery of human skeletal remains (Jourdane 1994). SHPD determined the remains to represent a single individual from a previously disturbed burial. No ethnicity determination was possible. Historic material in the soil matrix indicated that the burial was likely historic (Hammatt 2013:130).

Fragmented human skeletal remains were observed during excavation at the Pālama Chevron Station at 80 cm below surface, 105 cm below surface, and 120 cm below surface (Dunn et al. 1991:1, 4 cited in Hammatt 2013:130). The Minimum Number of Individuals (MNI) was tentatively determined to be five. Sources reported to PHRI field personnel that the area was once a cemetery (Dunn et al. 1991:10 cited in Hammatt 2013:130).

Archaeological monitoring was conducted immediately east of the CCTV project area at the Bishop Museum (Steiner-Horton 1993). No evidence of pre-Contact deposits was encountered. Some historic artifacts were recovered from a fill layer possibly dating to the Kamehameha Schools period (Bishop Museum Site No. 50-0a-A6-26).

The Bernice P. Bishop Museum (Nakamura et al. 1994) conducted an archaeological assessment immediately south of the VMS project area on the corner of North King and Houghtailing Streets (TMK 1-6-003:043). No significant cultural resources were identified.

Cultural Surveys Hawai‘i, Inc. (CSH) (Borthwick et al.1995) conducted an archaeological inventory survey of the Kamehameha Homes Project in Kapālama located 250 m south of the VMS project area. No significant cultural resources were identified.

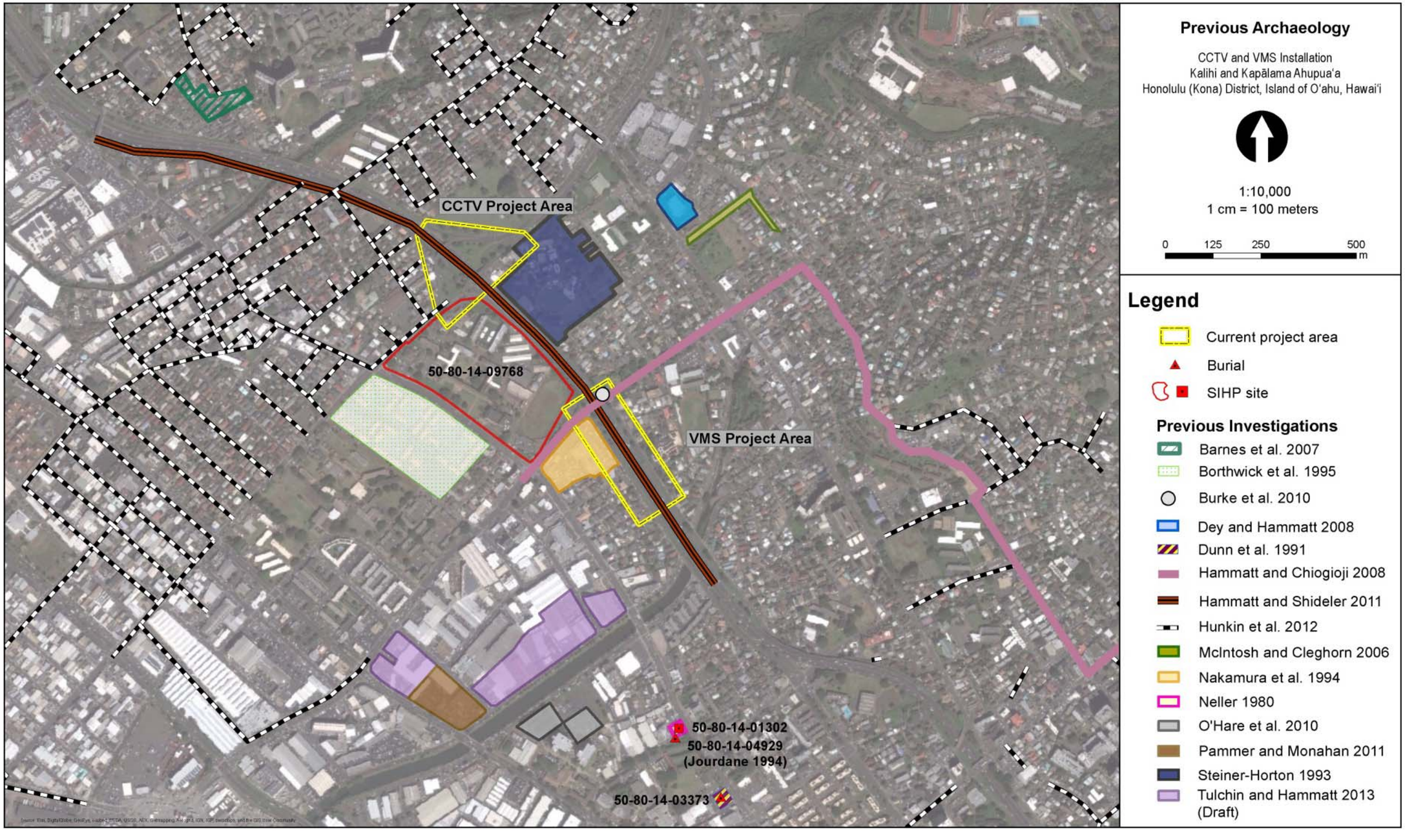

Figure 4-19. Locations of Archaeological Sites and Previous Studies in the Vicinity of the Current Project Area.

Table 4-3. List of Previous Archaeological Studies and Burial Finds in the Vicinity of the Project Area.

Author Year	TMK(s)	Nature of Study	SIHP* No.	Results
Neller 1980	1-5-005:014	Inadvertent discovery	50-80-14-01302	A large charcoal deposit with basalt cobbles observed in trench wall.
Dunn et al. 1991	1-5-08:017, 018, 023	Inadvertent discovery	50-80-14-03373	Fragmentary skeletal remains; likely post-Contact (MNI = 5(?)); possible former cemetery.
Steiner-Horton 1993	1-6-024:001	Archaeological monitoring	(Bishop Museum Site 50-0a-A6-26)	Historic artifacts possibly dating to the Kamehameha Schools period
Nakamura et al. 1994	1-1-003:042, 043	Archaeological assessment	-	No significant finds.
Jourdane 1994	(Austin Lane)	Inadvertent discovery	50-80-14-04929	Human skeletal remains.
Borthwick et al. 1995	1-5-001:001	Archaeological inventory survey	-	No significant finds.
Mcintosh and Cleghorn 2006	1-6-015:018, 042, 070-72, 092-3, 102-3	Preliminary testing	-	No significant finds.
Barnes et al. 2007	1-3-009:029	Archaeological literature review and field inspection	-	No significant finds.
Dey and Hammatt 2008	1-6-027:076	Archaeological monitoring	-	No significant finds.
Hammatt and Chiogioji 2008	1-6, 1-7-, 2-1, & 2-2 (various parcels)	Archaeological inventory survey	-	No significant finds.

Table 4-3. List of Previous Archaeological Studies and Burial Finds in the Vicinity of the Project Area.

Author Year	TMK(s)	Nature of Study	SIHP* No.	Results
Burke 2010	1-6-023-066	Archaeological monitoring	-	No significant finds.
O'Hare et al. 2010	1-5-018:001 & 002	Archaeological literature review and field inspection	-	No significant finds.
Hammatt and Shideler 2011	(Ola Lane Overpass to the Vineyard Boulevard off-ramp)	Archaeological monitoring	-	Potential impacts to historic properties.
Pammer and Monahan 2011	1-5-002:001 & 002	Subsurface testing	-	No significant finds.
Hunkin et al. 2012	(58 streets)	Archaeological monitoring	-	Isolated human remains in fill layer.
Tulchin, J. and Hammatt 2013	1-5-003, -019, -022, -030, -031, -033: Various Parcels	Preliminary testing	-	No significant finds.

*SIHP = Statewide Inventory of Historic Places

In 2006, pre-construction testing was conducted prior to improvements to the Kamehameha Heights water system along the Puea and Ka'ahumanu Cemeteries 0.5 km northeast of the CCTV project area (McIntosh and Cleghorn 2006 in Stine et al. 2011:34). No cultural deposits or human remains were encountered in the ten test trenches along the north and east streets bounding the cemeteries.

CSH conducted archaeological literature review and field inspection 0.75 km east of the CCTV project area at Coombs Lane and Hiu Street in Kalihi (Barnes et al. 2007). A Catholic Church appears on the parcel according to historic maps as early as 1897. The associated cemetery was in use until at least 1927. Research and a field inspection indicated that the church lot and cemetery boundary are identical to those that exist today.

In 2008, archaeological monitoring was conducted for a Walgreens development 0.5 km northeast of the CCTV project area (Dey and Hammatt 2008). No significant cultural resources were identified.

CSH (Hammatt and Chiogioji 2008) conducted an AIS for the Proposed Board of Water Supply Kalihi Beretania 24-Inch Water Main Project, Nu'uanu and Kapalama. The

project traversed a portion of the VMS project area near Olomea Street. No significant cultural resources were identified.

In 2010, archaeological monitoring was carried out for the Traffic Management System PH 1 Project immediately north of the VMS project area (Burke et al. 2010). Background research indicated potential for early historic remains. No significant cultural resources were identified.

CSH (O'Hare et al. 2010) carried out an archaeological literature review and field inspection for the Honolulu Community College Advanced Technology Training Center Project, located on the northwest side of the HCC campus approximately 0.6 km south of the VMS project area. Extensive land modification was documented and no cultural resources were identified. However, background research indicated that pre-Contact and early post-Contact cultural deposits associated with traditional Hawaiian habitation, agriculture, and burials may be present beneath fill layers in the vicinity, along with post-Contact cultural deposits associated with western settlement and residential development from the nineteenth and twentieth centuries (Hammatt 2013:129).

In 2011, CSH conducted a literature review and field inspection for the H-1 Highway Widening Project between the Ola Lane Overpass and the Vineyard Boulevard off-ramp in Kalihi and Kapālama (Hammatt and Shideler 2011). Results indicate potential impact to the H-1 freeway (a possible historic property), the Kalihi and Kapālama Stream channelization walls (possible historic properties), and the original ground surface below fill layers at bridge footings, piers, and stream retaining walls (O'Hare et al. 2013:72).

In 2011, CSH (Pammer and Monahan 2011) conducted limited subsurface testing 0.7 km south of the VMS project area at one Kamehameha School parcel for the Kapalama Shopping Center Redevelopment Project. Five test trenches were excavated below the asphalt in the parking lots. Only modern and historical fill layers were encountered.

CSH conducted extensive monitoring for the Kalihi-Nu'uanu Sewer project (Hunkin et al. 2012). The project covered 58 streets between Middle Street in Kalihi and Pi'ikoi Street in Makiki. One isolated human femur fragment was recovered from fill material in one of the western Punchbowl slope areas. No cultural deposits were identified during the course of monitoring.

CSH conducted test excavations in the *makai* portion of Kapālama for Kamehameha Schools (Tulchin and Hammatt 2013). Multiple parcels were investigated, the closest being 200 m south of the VMS project area. No significant cultural resources were identified.

The historic property Farrington High School (Site 50-80-14-09768) is located adjacent to the project areas. Wallace Rider Farrington High School was established in 1940 at the former site of Kamehameha Preparatory School. Farrington High School (TMK 1-6-021:005) was placed on the Hawai'i Register of Historic Places in 1993 as SIHP No. 50-80-14-09768. Wallace Rider Farrington (1871-1933), served as the sixth governor of the Territory of Hawai'i from 1921 to 1929. The school was designed by the Hawai'i architect Charles W. Dickey (1871 -1942). Formerly the 26-acre parcel was used by the U.S. Army as a hospital during World War II (Stine et al. 2011:27). Archaeological monitoring was recently carried out for electrical upgrades at the school. Results of this work are pending.

GEOTECHNICAL STUDIES IN THE PROJECT AREA

Geolabs, Inc. recently explored subsurface conditions at the CCTV and VMS areas by conducting geotechnical coring and sampling boring (Mimura and Berut 2014). Results were as follows:

> The boring drilled near the Kalihi CCTV generally encountered fill consisting of medium dense clayey gravel about 3.5 feet in thickness. The clayey gravel was underlain by medium hard, closely to moderately fractured basalt rock extending to the maximum depth explored of about 16 feet below the existing ground surface [Mimura and Berut 2014:3].
>
> The boring drilled near the Kalihi VMS generally encountered very stiff to hard clayey fill extending to a depth of about 13.5 feet below the existing ground surface. The fill was underlain by river deposits consisting of very dense gravelly sand and very stiff silty clay. We encountered groundwater at a depth of about 12.6 feet below the existing ground surface at the time of our field exploration [Mimura and Berut 2014:5].

ANTICIPATED FINDS

Previous archaeological investigations and historical records indicate that traditional Hawaiian settlement and intensive agriculture in Kalihi and Kapālama Ahupuaʻa occured along the well-watered streams dissecting the coastal floodplain. The Kalihi CCTV and VMS areas are situated east of the Moanalua Stream and west the Kalihi Stream, in the *waena* portion, or between the upper valley and the coastal plain. Previous studies of settlement patterns on Oʻahu suggest that:

> The greatest percentages of each community's agricultural lands on Oʻahu were generally on coastal plains and in lower valleys. Upper valley agricultural fields generally covered smaller areas and were not large inland systems [Cordy 2002:46].

Kuleana land claims in the vicinity of the project area were clustered adjacent to the fresh water sources at Kalihi and Niuhelewai Streams. These mainly consisted of loʻi, interspersed with houses and *kula* lands. By the mid-twentieth century these lands had developed into the suburbs of Honolulu (Stine et al. 2011:35). In the vicinity of the current undertaking, impacts from urbanizations have included the construction of the H-1 Freeway, widening and realignment of Houghtailing Street, and the construction of Olomea Street.

In addition to Farrington High School (SIHP No. 50-80-14-9768), historic properties in the vicinity include post-Contact subsurface fill material and related artifacts probably associated with the early Kamehameha School period of occupation on Bishop Museum property (Bishop Museum No. 50-0aA6-26) (Steiner-Horton 1993). The rapid nineteenth century residential and industrial expansion of Honolulu suggests a high probability of encountering historic archaeological deposits (Shefcheck and Spear 2006:11). Historic burials have been recorded in a 1 km vicinity of the project area (Dunn et al. 1991; Jourdane 1994), which indicates a possibility for inadvertent discovery of human remains. Furthermore, the project area surrounds the area traditionally known as Kaiwiʻula, where according to Kamakau (1992), the dead were buried circa 1853 during the smallpox epidemic.

EXTENT OF ARCHAEOLOGICAL MONITORING

All archaeological monitoring will be closely coordinated with construction crews. The archaeologist(s) will conduct on-site or on-call monitoring of all ground-disturbing activities below existing base course, which is defined as the compacted construction fill directly underlying existing asphalt and/or concrete surfaces. Table 4 presents a list of ground-disturbing activities and estimated excavation depths in meters (m) and feet (ft) at the CCTV and VMS project areas. Figures 4-20 through 4-22 show the locations of the ground-disturbing activities for each project area on modified design plans.

Table 4-4. Proposed Ground-disturbing Activities.

Proposes Ground-disturbing Activities	Estimated Excavation Depth	On-Call/On-Site Monitoring Necessary
CCTV Pole Footing	3.0-4.6 m (10-15ft)	Yes; On-site
VMS Pole Footing	6.1-12.2 m (20-40ft)	Yes; On-site
Conduit Trenching*	1.2-1.8 m (4-6ft)	Yes; On-site
Pull Boxes	0.9-1.8 m (3-4ft)	Yes; On-site
CCTV Cabinet	0.6 m (2ft)	Yes; On-call

* Conduit trench excavations may exceed estimated depth where conduits conflict with existing utility lines and may be excavated up to 4.3 m (12.0-14.0ft) below ground surface.

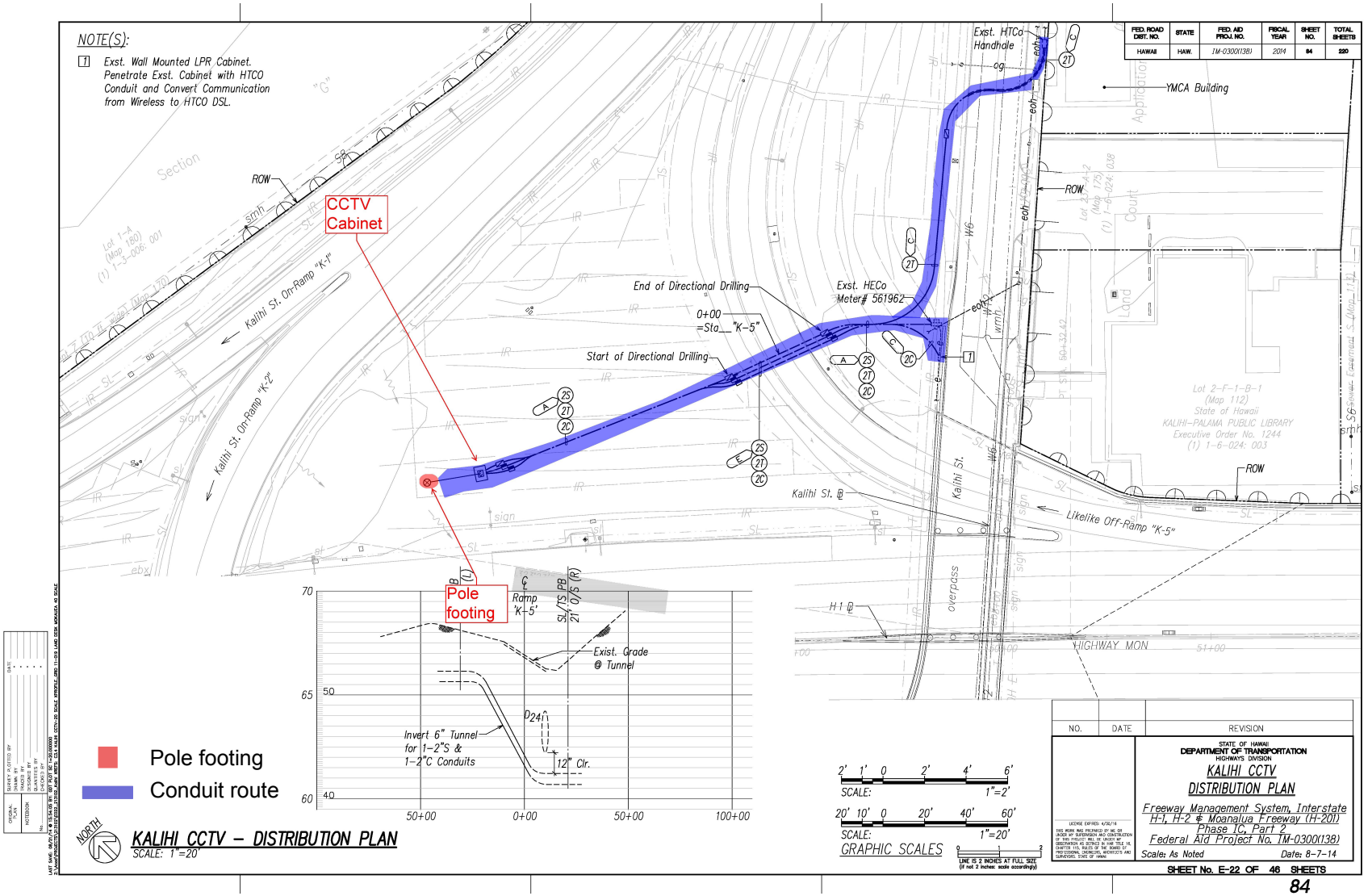

Figure 4-20. Design Plan for CCTV Installation.

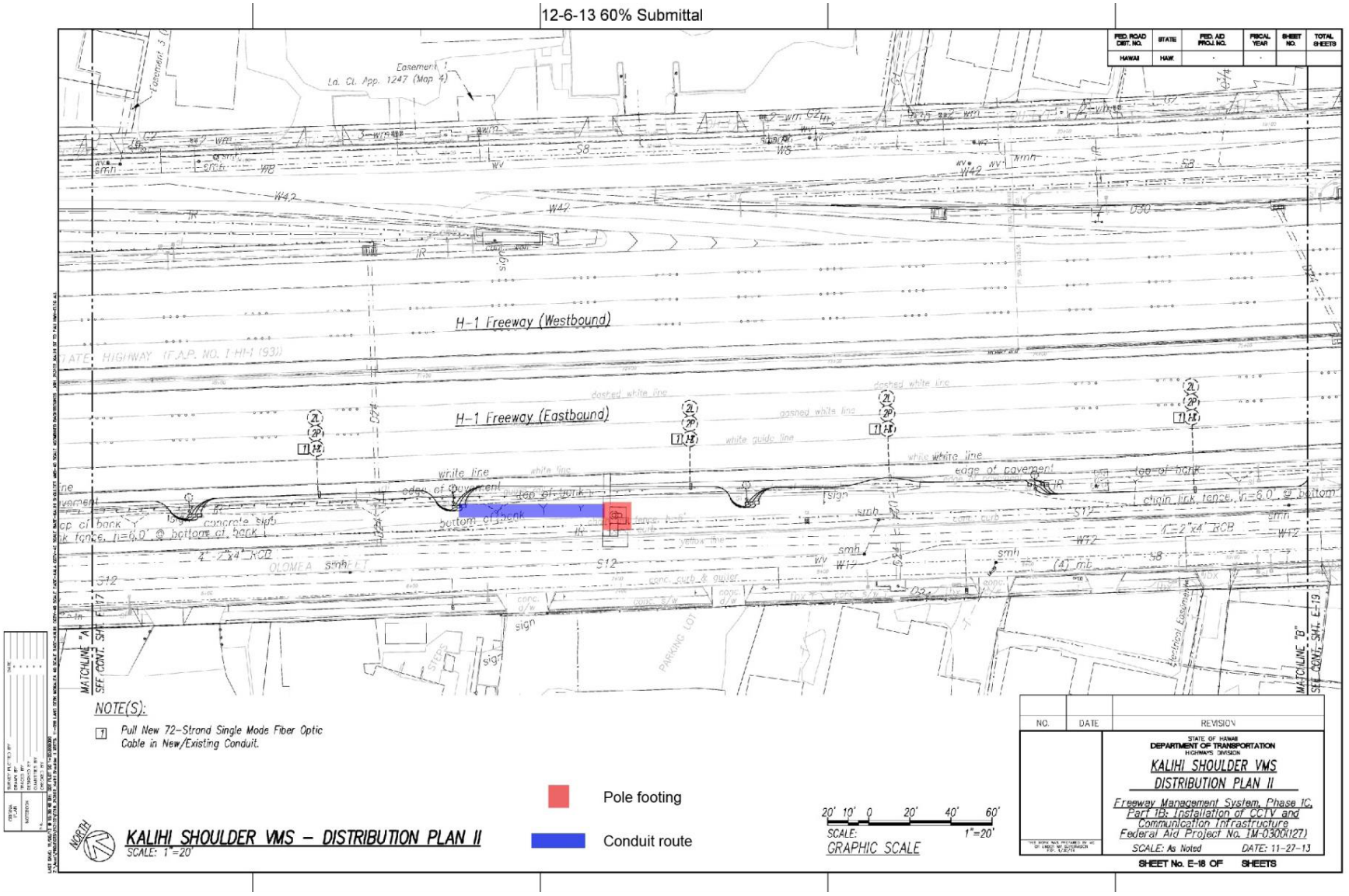

Figure 4-21. Design Plan for VMS Installation.

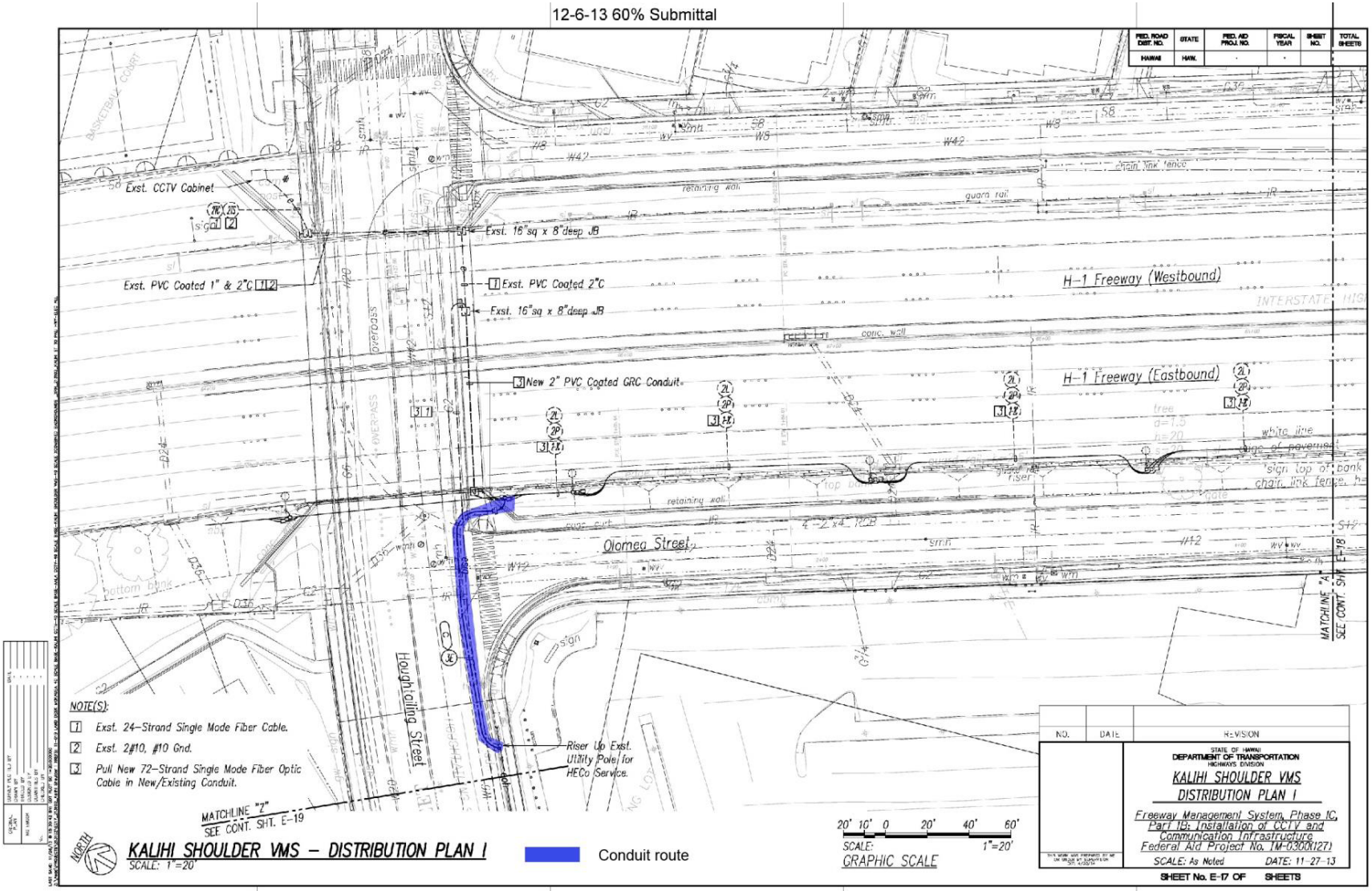

Figure 4-22. Design Plan for Electrical Connection to Support VMS.

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