Final Archaeological Monitoring Report for the Kalaniana'ole Improvement Project (Phase I), Waimānalo Ahupua'a, Ko'olaupoko District, Island of O'ahu Por. TMK: [1] 4-1-013: 010, 011, 012, 017; [1] 4-1-008: 059; and [1] 4-2-005: 005

Prepared for
Department of Transportation
Highways Division
and
Kaikor Construction Company, Inc.

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(Job Code: WAIMANALO 4)

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Management Summary

Reference	Draft Archaeological Monitoring Report for the Kalaniana'ole Improvement Project (Phase I), Waimānalo Ahupua'a, Ko'olaupoko District, Island of O'ahu Por. TMK: [1] 4-1-013: 010, 011, 012, 017; [1] 4-1-008: 059; and [1] 4-2-005: 005 (Wilkinson et al. 2010)
Date	June 2010
Project Number (s)	Cultural Surveys Hawai'i Inc. (CSH) Job Code: WAIMANALO 4
Investigation Permit Number	CSH conducted the fieldwork component of the archaeological monitoring program under archaeological permit No. 09-20, which was issued by the Hawai'i State Historic Preservation Division (SHPD) per Hawai'i Administrative Rules (HAR) Chapter 13-282.
Project Location	The project area is located on the windward side of the Island of O'ahu, in the district of Ko'olaupoko within the *ahupua'a* (traditional land division) of Waimānalo. The project area extends from southernmost section of Kahako Place to the east end of Waimānalo Beach Park along the existing Kalaniana'ole Highway (Hwy 72), approximately 3.5 miles. Phase I, reported on in this document, comprises the approximately 0.6 mile-long northern-most section of the project area, between the area west of the southernmost section of Kahako Place and the southern limits of the Olomana Golf Course.
Land Jurisdiction	Hawai'i State Department of Transportation (HDOT) and private
Agencies	HDOT, Hawai'i Department of Land and Natural Resources/State Historic Preservation Division (DLNR/SHPD)
Project Description and Related Ground Disturbance	The project's general proposed improvements to the highway include the construction of left turning lanes and shelter lanes at particular side streets along Kalaniana'ole Highway. Bus pullouts are proposed to alleviate queuing and improve traffic flow, and upgrades will be made to certain sections of roadway and sidewalks in order to comply with the ADA (Americans with Disabilities Act). Remaining areas along Kalaniana'ole Highway that do not have concrete sidewalks will have an asphalt concrete paved shoulder. Also, in locations identified by the community, a shared use grassed path (where available) is proposed to allow equestrian riders to traverse along Kalaniana'ole Highway. This particular phase of work focused on widening and realigning the northernmost section of the project area. Project related ground disturbance included excavation and grading of the existing shoulders and berms along the highway for the installation of the proposed infrastructure.

Historic Preservation Regulatory Context	In consultation with the State of Hawai'i Department of Land and Natural Resources State Historic Preservation Division (DLNR / SHPD), this monitoring report fulfills the requirements of the Draft Hawai'i Administrative Rules Title 13 (DLNR), Sub-Title 13 (SHPD), Chapter 279 (Rules Governing Standards for Archaeological Monitoring and Reports), and is intended for review and approval by the SHPD/DLNR. At the request of the Hawai'i State DOT, CSH prepared a monitoring plan to support these goals (Hammatt et al. 2006) which SHPD reviewed and approved on March 24, 2006 (Log No: 2006.0839, Doc No: 0603CM84; Appendix A). The archaeological monitoring plan described proposed activities, cultural setting, potential historic properties and burials that could be encountered. Project-related archaeological monitoring was carried out per the provisions of the archaeological monitoring plan. This document was prepared to support the project's historic preservation review under Hawai'i Revised Statutes (HRS) Chapter 6E-42 and HAR Chapter 13-284. This report was prepared to document all monitoring results.
Historic Properties Potentially Affected	Though no known State Inventory of Historic Places (SIHP) sites are located within the project area, there is a distinct possibility of uncovering subsurface cultural materials, cultural layers, or human burials during excavation activities.
Fieldwork Effort	CSH archaeologists Douglas Borthwick, B.A., Jeff Fong, M.A., and Nifae Hunkin, B.A., were on site to conduct archaeological monitoring and project documentation. Fieldwork for this monitoring program was completed intermittently between May 26, 2009 and August 20, 2009, requiring approximately 7 person-days of field time to complete. All fieldwork was done under the general supervision of Hallett H. Hammatt, Ph.D. (principal investigator).
Number of Historic Properties Identified	No cultural deposits were identified as a result of the project's monitoring program. The observed stratigraphy indicates extensive earthmoving activity and importation of fill sediments into the project area.

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Section 1 Introduction

1.1 Project Background

At the request Kaikor Construction Company, Inc. and the State of Hawai'i Department of Transportation (HDOT), Cultural Surveys Hawai'i, Inc. (CSH) has prepared this archaeological monitoring report for the Kalaniana'ole Highway Improvements Project. The purpose of the project is to improve traffic operations on an approximately 3.5 mile section of Kalaniana'ole Highway (Hwy 72) in Waimānalo, O'ahu, Hawai'i (Figure 1 through Figure 3). Phase I, reported on in this document, comprises the approximately 0.6 mile-long northern-most section of the project area between the area west of the southernmost section of Kahako Place and the southern limits of the Olomana Golf Course.

The project's archaeological monitoring plan (Hammatt et al. 2006) was reviewed and approved by the SHPD on March 24, 2006 (Log No: 2006.0839, Doc No: 0603CM84; Appendix A). The archaeological monitoring plan described the proposed activities, the cultural setting, and the potential historic properties that could be encountered. Project-related archaeological monitoring was carried out per the provisions of the project's monitoring plan and this monitoring report was prepared to document all monitoring results. This report was prepared per the requirements of Hawai'i Administrative Rules Chapter 13-279 and is intended for review and approval by the SHPD.

The project's general proposed improvements to the highway include the construction of left turning lanes and shelter lanes at particular side streets along Kalaniana'ole Highway. Bus pullouts are proposed to alleviate queuing and improve traffic flow, and upgrades will be made to certain sections of roadway and sidewalks in order to comply with the ADA (Americans with Disabilities Act). Remaining areas along Kalaniana'ole Highway that do not have concrete sidewalks will have an asphalt concrete paved shoulder. Also, in locations identified by the community, a shared use grassed path (where available) is proposed to allow equestrian riders to traverse along Kalaniana'ole Highway. This particular phase of work focused on widening and realigning the northernmost section of the project area. Project related ground disturbance included excavation and grading of the existing shoulders and berms along the highway for the installation of the proposed infrastructure.

1.2 Environmental Setting

1.2.1 Natural Environment

The project area is located on the windward side of the Island of O'ahu, in the district of Ko'olaupoko within the *ahupua'a* (traditional land division) of Waimānalo. Waimānalo is a broad amphitheater-shaped valley with a relatively level floor composed of moderately sloping alluvial fans. It is in the "late mature to old Age" stage of erosional development (MacDonald et al. 1983:217). The Phase I project area is located just north of the Waimānalo Stream, extending

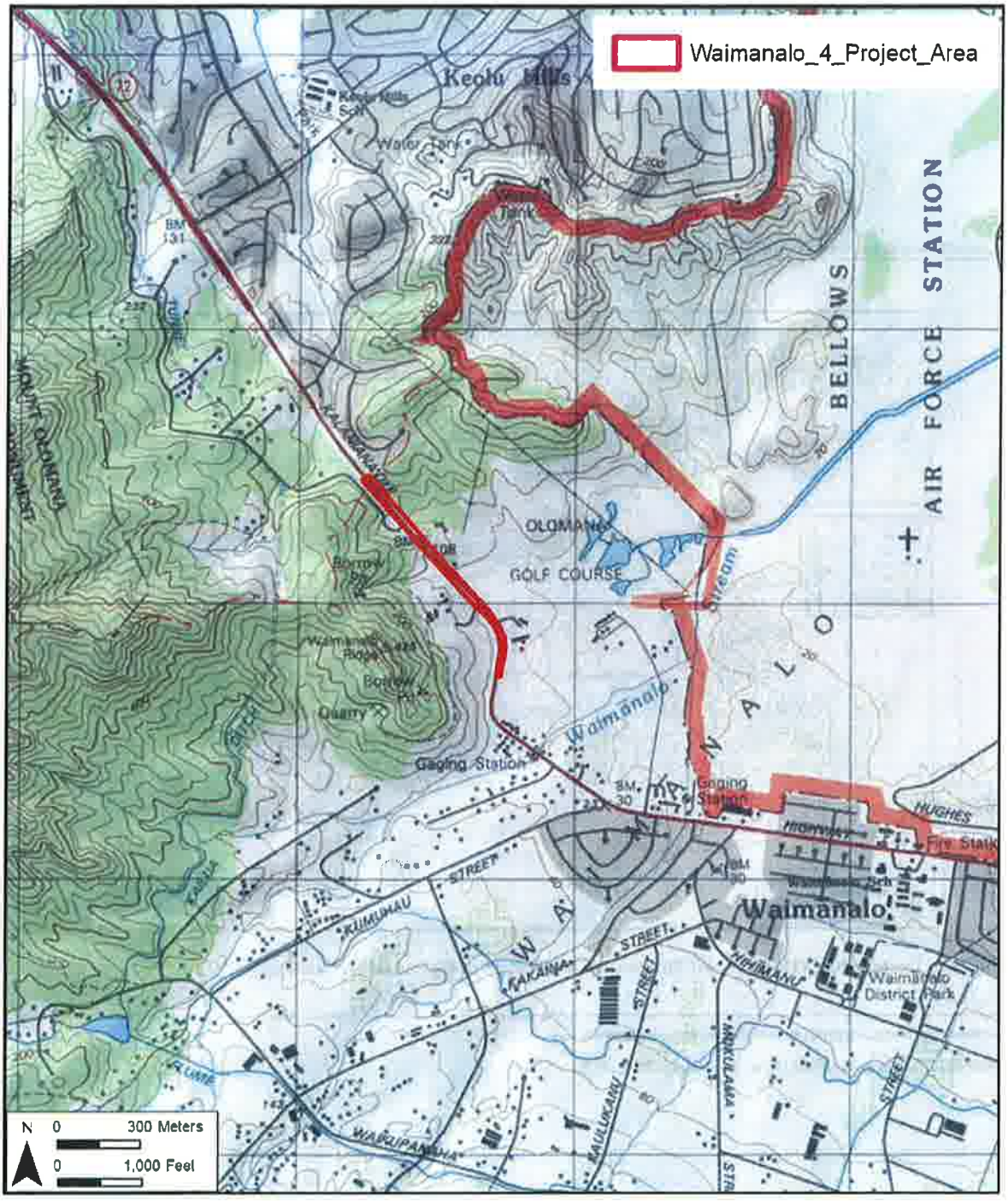

Figure 1. A portion of the U.S. Geological Survey 7.5-Minute Series Topographic Map, Koko Head Quadrangle (1999), showing the location of the Phase I project area

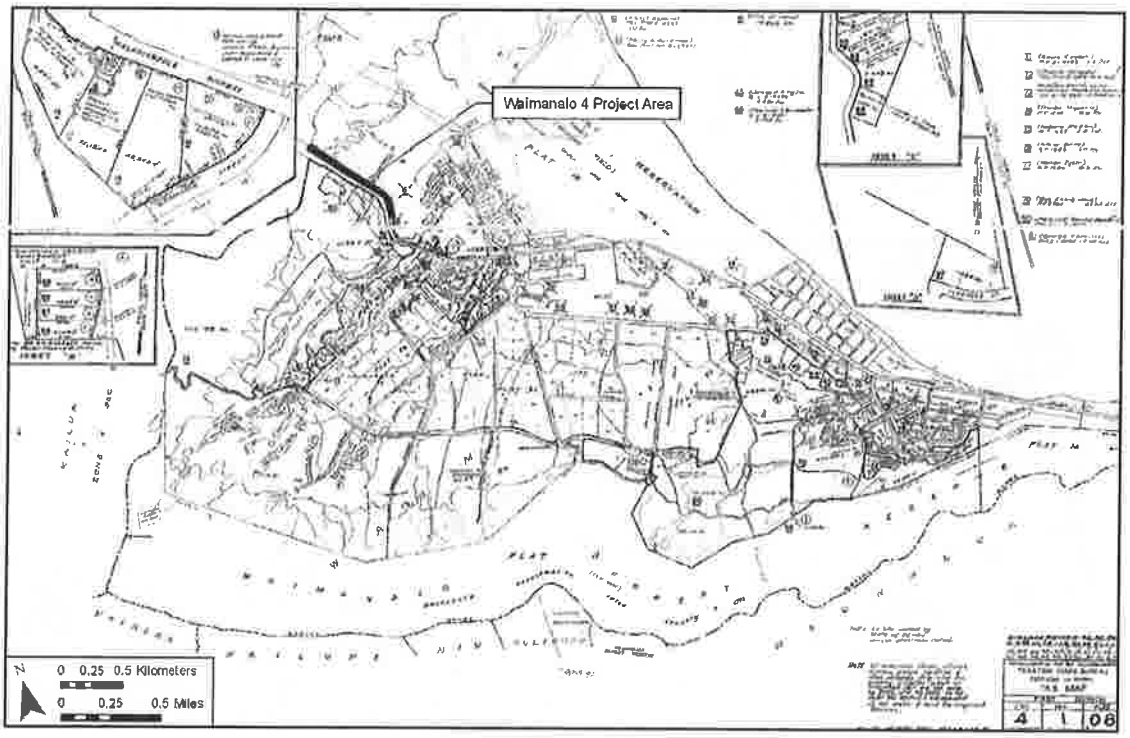

Figure 2. Tax Map Key (TMK) [1] 4-1-08, showing the location of the Phase I project area

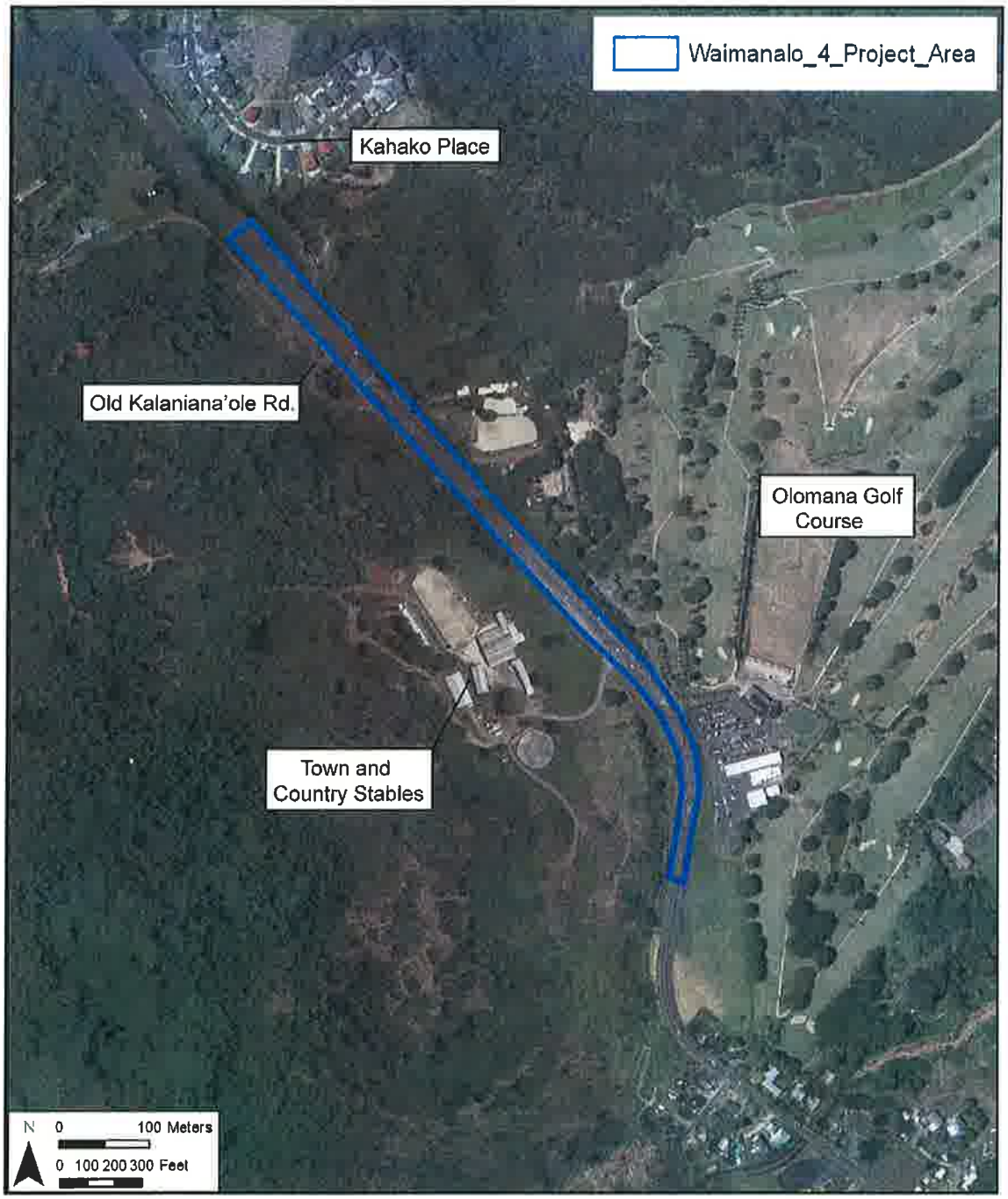

Figure 3. Aerial photograph (source: U.S. Geological Survey Orthoimagery 2005), showing the location of the Phase I project area and other significant places

up out of the Waimānalo Plain into the Keolu Hills (see Figure 1 through Figure 3). Elevations within the Phase I project area range from approximately 30 feet average mean sea level (AMSL) at the southern boundary to 150 feet at the north. Annual rainfall averages between 1000 and 1500 mm (40 to 60 inches) per year (Giambelluca et al. 1986:73).

There are four soil types of varying properties within the Phase I project area (Figure 4). Kokokahi clay 6-12% slopes, Alaeloa silty clay 15-35% slopes, Papaa clay 6-20 % slopes, and Papaa clay 35-70% slopes (Foote et al. 1972).

Vegetation in the lower elevations of Waimānalo is overwhelmingly exotic (introduced), including *koa haole*, Christmas-berry, lantana, guava, and a variety of exotic weeds, but landscape plantings predominate in this area.

1.2.2 Built Environment

The project area associated with the Phase I construction activities runs along Kalaniana'ole Highway between the southernmost section of Kahako Place and the southern limits of the Olomana Golf Course (see Figure 1 through Figure 3). The built environment includes the existing highway, cross streets and related landscaping and signage/infrastructure.

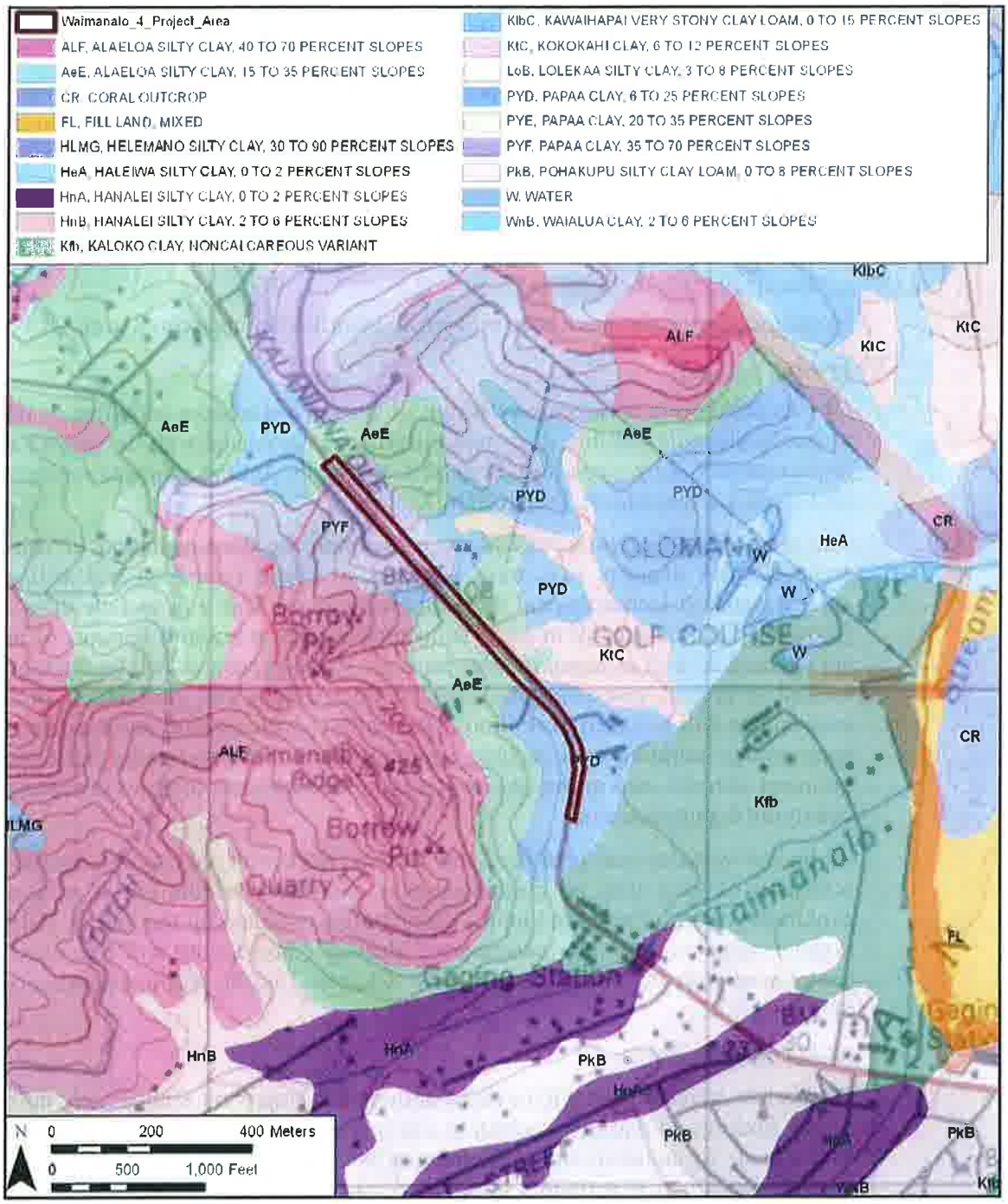

Figure 4. A portion of the U.S. Geological Survey 7.5-Minute Series Topographic Map, Koko Head Quadrangle (1999) with overlay of soil survey data (Foote et al. 1972), showing the location of the Phase I project area

Section 2 Archaeological Monitoring Provisions

All excavation activities and monitoring practices during this project abided by the following monitoring provisions, which were designed in accord with State Historic Preservation Division rules governing standards for archaeological monitoring and reports (HAR 13-13-279):

1. Anticipated Historic Properties:

   The project area has the potential for pre-contact and historic cultural deposits.

2. Locations of Historic Properties:

   No historic properties have been previously identified on the school grounds.

3. Fieldwork:

   On-site monitoring is recommended for all ground disturbance activities. A qualified archaeologist will monitor all ground disturbance associated with the project's sewer improvements. Any departure from this will only follow consultation with, and written concurrence from, DLNR/SHPD.

   The monitoring fieldwork will likely encompass the documentation of subsurface archaeological deposits (e.g, trash pits and structural remnants) and will employ current standard archaeological recording techniques. This will include drawing and recording the stratigraphy of excavation profiles where cultural features or artifacts are exposed as well as representative profiles. These exposures will be photographed, located on project area maps, and sampled. Photographs and stratigraphic profiles of excavations will be taken even if no historically-significant sites are documented. As appropriate, sampling will include the collection of representative artifacts, bulk sediment samples, and/or the on-site screening of measured volumes of feature fill to determine feature contents.

   If human remains are identified, no further work will take place, including no screening of back dirt, no cleaning and/or excavation of the burial area, and no exploratory work of any kind unless specifically requested by the SHPD. All human skeletal remains that are encountered during construction will be handled in compliance with HRS 6E-43.6 and HAR Chapter 13-300, and in consultation with SHPD/DLNR.

4. Archaeologist's Role:

   The on-site archaeologist will have the authority to stop work immediately in the area of any findings so that documentation can proceed and appropriate treatment can be determined. In addition, the archaeologist will have the authority to slow and/or suspend construction activities in order to insure that the necessary archaeological sampling and recording can take place.

5. Coordination Meeting:

   Before work commences on the project, the on-site archaeologist shall hold a coordination meeting to orient the construction crew to the requirements of the archaeological monitoring program. At this meeting the monitor will emphasize his or her authority to temporarily halt construction and that all historic finds, including objects such as bottles, are the property of the landowner and may not be removed from the construction site. At this time it will be made clear that the archaeologist must be on site during all subsurface excavations.

6. Laboratory work:

   Laboratory analysis of non-burial related finds will include standard artifact and midden recording, as follows: Artifacts will be documented as to provenience, weight, length, width, type of material, and presumed function. Bone and shell midden materials will be sorted down to species, when possible, then tabulated by provenience, and presented in table form.

7. Report Preparation:

   One of the primary objectives of the report will be to present a stratigraphic overview of the project area which will allow for predictive assessments of adjacent properties, which may be the subject of future development. The report will contain a section on stratigraphy, description of archaeological findings, monitoring methods, and results of laboratory analyses. The report will address the requirements of a monitoring report (HAR section 13-279-5). Photographs of excavations will be included in the monitoring report even if no historically-significant sites are documented. Should burial treatment be completed as part of the monitoring effort, a summary of this treatment will be included in the monitoring report. Should burials and/or human remains be identified, then other letters, memos, and/or reports may be requested by the Burial Sites Program.

8. Archiving Materials:

   All burial materials will be given to SHPD/DLNR for storage. Materials not associated with burials will be temporarily stored at the contracted archaeologist's facilities until an appropriate curation facility is selected, in consultation with the landowner and SHPD.

Section 3 Methods

3.1 Field Methods

Following monitoring provisions set forth in the monitoring plan (Hammatt et al. 2006) for this project, an archaeological monitor was present for initial ground disturbing activities. After these initial activities demonstrated predominately shallow excavations through fill sediments, archaeological monitoring was adjusted to an on-call program supplemented by intermittent "spot-checks," during which the archaeologist would assess the progression of the ground disturbing activities and record the exposed stratigraphy.

CSH archaeologists Douglas Borthwick, B.A., B.A., Jeff Fong, M.A., and Nifae Hunkin, B.A., were on site to conduct archaeological monitoring and project documentation. Fieldwork for this monitoring program was completed intermittently between May 26, 2009 and August 20, 2009, requiring approximately 7 person-days of field time to complete. All fieldwork was done under the general supervision of Hallett H. Hammatt, Ph.D. (principal investigator). The archaeological monitoring fieldwork associated with the project was completed under archaeological permit No. 09-20, which was issued by the Hawai'i State Historic Preservation Division (SHPD) per Hawai'i Administrative Rules (HAR) Chapter 13-282.

Standard archaeological monitoring practices were employed. The archaeologist watched as the machine excavated at a normal pace and inspected the sediment as it was removed from a trench and dumped into a backfill pile adjacent to the trench or into a dump truck. All excavation activity, particularly through the undisturbed sediment was closely monitored.

Documentation included scale section profiles, sediment descriptions, and photographs of exposed trench sections. Trench profile photographs included a photo scale indicating the excavated trench depths. Sediment descriptions included Munsell color designations, texture and sediment size, compactness, structure, inclusions and cultural material present, and lower boundary attributes.

3.2 Laboratory Methods

No cultural materials were observed or collected during this project, therefore laboratory studies were unnecessary.

3.3 Document Review

Background research included a review of historical documents and maps at the Hawai'i State Archives, Hawai'i State Survey Office, State Historic Preservation Division library and files, and the Cultural Surveys Hawai'i library. This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected type and location of sub-surface pre- and post-contact historic properties in the project area.

Section 4 Background Research

4.1 Traditional and Historical Background

4.1.1 Mo'olelo Hawai'i

Mo'olelo Hawai'i (Hawaiian legend/history) of Waimānalo infer some generally recurring themes, including the scarcity of water except for small springs and Waimānalo Stream, the abundance of food crops along Waimānalo Stream, the good fishing resources and broad reef of the ocean fronting Waimānalo, and the somewhat isolated nature of Waimānalo, especially in terms of land routes, but with the sandy beach frontage allowing easy access by sea. An example of the mythological references to Waimānalo, occurs in the Pele and Hi'iaka epic. During her travels to locations throughout the Hawaiian Islands, Hi'iaka arrived on O'ahu at Makapu'u, in southeastern Waimānalo Ahupua'a:

> As they [Hi'iaka and her companion Malei] traveled on, Makapu'u and its neighbor hills passed out of sight. Arriving at Ka-ala-pueo, they caught view of the desolate hill Pohaku-loa, faint, famished, forlorn…'It [southeastern Waimānalo] is indeed a barren land. Fish is the only food it produces. Our vegetables come from Waimanalo. When the people of that district bring down bundles of food we barter for it our fish" [Emerson 1915:89].

Another theme associated with Hi'iaka's traverse of Waimānalo, is her interactions with the local beauty, 'Āpuakea. Fornander (1919:Vol. VI:343) relates: "At Kapua in Koolau Muliwaiolena and her daughter Apuakea were killed because the latter compared herself to Hiiaka in beauty." A more comprehensive account is given in a rendition of the story of Hi'iaka-i-ka-poli-o-Pele in the Hawaiian language newspaper *Ka Leo o Ka Lāhui*:

> They traveled past Kuhui (Kukui?) and Pahonu where the people shouted at the beauty of Hiiaka. The news reached the ears of Apuakea and she said to her mother, Muliwaiolena, "Oh, Muliwaiolena, go and take a look at the women whose beauty the people are shouting about and see if they are as beautiful as I am." Muliwaiolena came out and looked. Never had she seen anything on O'ahu to equal the beauty of these women. Turning to Apuakea she said, "Daughter, your beauty does not compare with their great beauty. You are like the soles of their feet." Hearing this the expression on Apuakea's face changed and she fainted away.
>
> Hi'iaka overheard the words of the woman to her daughter and she uttered this chant:
>
> O Apuakea-nui, you beautiful woman,
>
> Comparisons have been made of your charms,

> You are beautiful, beautiful indeed.
>
> Muliwaiolena then called out to Hi'iaka and her friend, "Come in, eat and drink and when you are full then continue on your long journey." But the travelers did not accept as they did not like the embarrassing comparison that had been made between themselves and the young girl, Apuakea.
>
> As the travelers went off Muliwaiolena suddenly fell dead. Shortly afterwards Apuakea died... [*Ka Leo o Ka Lāhui* March 14, 15 1893, cited in Sterling and Summers 1978:248-249].

It is said the coastal area of central Waimānalo, *makai* (seaward) of the current project area, was named 'Āpuakea, or Fair 'Āpua, for the maiden "whose skin was very fair and whose behavior was so loveable that the people named the place for her and for her fair skin" (Alona 1939, cited in Sterling and Summers 1978:245). The ancient village of Kapu'a, the setting of the 'Āpuakea story, was also said to have been the location of the legendary Muliwai'ōlena stream:

> When Kauholokahiki, sister of Kanehunamoku, came ashore from Ulukaa she landed at Ulupau in Mōkapu. There she built a shrine on which to lay her offerings, and there she was found by some women who went to gather sea weeds on the shore and made friends with her. The native women admired the beauty of the stranger who was covered only by a skirt of green pahapaha sea weeds. One of the women removed her own body covering and draped it around the hips of the stranger and invited her to her home. Her beauty glowed like a light in the house and many people came with gifts of taps, skirts, dogs, hogs and poi. One day the chief Ilauhoe took Kauholokahiki, the stranger, to be his wife. She was so beautiful that even the palms of her hands were lovely. When the chief Ilauhoe married her, the chief wanted her to go bathing with him but she answered, "I am kapu and can bathe in no other water unless you go yourself and fetch my bathing water from Muliwaiolena." The husband said, "It may be in Kahiki and is too far. We do not know where this water is." She replied, "If you love me, O Chief, go yourself for my bathing water that I mentioned. It is in Waimanalo, at Kapua, a village belonging to the chief Lupe. It is the stream with the yellow water that runs quietly. That is the one. "The chief ran at once with a container and in no time he dipped up the water and returned. It was indeed yellowish color and that was the first time that it was known that this was Muliwaiolena. It is there to this day... [Uaua 1870, cited in Sterling and Summers 1978:248].

An additional locality of coastal Waimānalo mentioned in the Hi'iaka story is Pāhonu:

> There was once a chief who was so fond of turtle meat that he ordered a sea wall built to keep captured turtles from escaping. Every turtle caught by a fisherman was put into this enclosure. No one else was allowed to partake of turtle meat under penalty of death. No one dared to eat turtle as long as the old chief lived [Alona 1939, cited in Sterling and Summers 1978:249].

In the mid-valley area of Waimānalo, *mauka* (inland) of Muliwai'ōlena, was a low hill known as Pu'u o Moloka'i:

> Long ago a Molokai man came here and went to live on a low hill not far from Muliwai-olena. The reason for his coming from Molokai to Oahu was forgotten long ago but others followed and dwelt with him. This hill was called Puu-o-Molokai or Molokai's-hill. The newcomers made their homes on the hill itself and kept very much to themselves. When a boy married one of the girls of Waimanalo, he had to leave his own people to dwell with his wife's. If a girl married a Waimanalo man she too left her own people. Gradually the Molokai people were absorbed by those of Waimanalo [Alona 1939, cited in Sterling and Summers 1978:247].

There are also traditional accounts of two springs in Waimānalo Valley:

> The one called Kupunakane is away up in the mountains. The spring called Kupunawahine is a spring way down on the level land. The strange, strange thing about these ponds was that on calm, sunny days they begin to cry out to each other. Their voices were soft and sounded very much like a woman mourning her husband. On days that were over cast with clouds in the sky, then the water of the mountain spring changed. The water of the mountain spring came warm and when you drank the water in the lowland spring it was cool, according to their legend [*Hoku o Hawaii*, Mar. 11, 1930, cited in Sterling and Summers 1978:247].

4.1.2 Early Historic Period

Waimānalo was a frequent point of arrival to and departure from O'ahu in late pre-contact and early post-contact times, as in the following account of the loss of O'ahu sovereignty:

> When King Kahekili of Maui heard of the death of the priest, Kaopulupulu, by Kahahana (a chief appointed by Kahekili to govern Oahu), he sent some of his men thither by canoe, who landed at Waimanalo, Koolau, where as spies, they learned from the people respecting Kaopulupulu and his death, with that of his son; therefore they returned and told the King the truth of these reports, at which the affection of Kahekili welled up for the dead priest, and he condemned the King he had established. Coming with an army from Maui, he landed at Waikiki without meeting Kahahana, and took back the government of Oahu under his own kingship. The chiefs and people of Oahu all joined under Kahekili for Kahahana had been a chief of wrong-doing… [Thrum 1907:212-3].

Samuel Kamakau, in 1875, related: "The ahupua'a of Waimanalo, including the fish pond at Maunalua and the traveling uhu of Makapu'u belonged to Maui-mua (First Maui)" (*Kuokoa* Nov. 27, 1875; in Sterling and Summers 1978:244).

During Kamehameha's conquest of O'ahu, part of his fleet landed near Makapu'u and then joined with Kamehameha's other forces, finally conquering O'ahu. Prior to the invasion, Kamehameha sent a messenger to Kahekili:

> Ki-kane, Kamehameha's messenger to Kahekili, threw down two *maika* stones, a black one and a white one. Ka-hekili said when he saw these stones, "This stone (the white) brings life through farming and fishing, rearing men, and providing them with food; this other stone (the black) brings war." Let the reader ponder the meaning of this answer. Kahekili asked, "Is Kamehameha coming to Oahu to fight?" "Yes," answered Ki-hane. "What harbor will he choose?" "It was Kiko'o's counsel to make Waimanalo the harbor and battle site. "It is too low there to cast sling stones to reach the heights. It is good only for food and fish. If stones are thrown from above nothing can save the battlefield..." [Kamakau 1961:150].

After Kamehameha's conquest of O'ahu and his division of the island among his chiefs, Waimānalo was apparently retained as Kamehameha's personal property. This seems to be the case as, in 1845, when Kamehameha III, Kauikeaouli, who had "inherited" the land as a son of Kamehameha I, claimed the *ahupua'a* of Waimānalo "to be the private lands of his Majesty Kamehameha III, to have and to hold to himself, his heirs and successors, forever; and said lands shall be regulated and disposed of according to his Royal will and pleasure, subject only to the rights of tenants" (Commissioner of Public Lands 1929:28).

Two early foreign visitors, both missionaries, visited Waimānalo. In 1828, Levi Chamberlain commented on Waimānalo as being a "considerable settlement." While there, Chamberlain stayed in a native house, which he described as "a miserable place for the abode of human beings and presented a motley group of children and women, dogs, hogs and fowls." Chamberlain also noted "though there are a good many inhabitants in the settlement, yet but very few seemed to give any attention to instruction (Chamberlain 1956:30). In 1838, Edwin Hall wrote:

> We could not however, but notice, that most of the inhabitants on the eastern end of the island were much more degraded, and exhibited far less evidence of improvement than any we saw on other parts of the island; a fact calling for our sympathy and pity, and for our endeavors to enlighten and elevate them [Hall 1939:111].

4.1.3 Land Commission Award Documentation

In 1845, the Board of Commissioners to Quiet Land Titles, also called the Land Commission, was established "for the investigation and final ascertainment or rejection of all claims of private individuals, whether natives or foreigners, to any landed property" (Chinen 1958:8). This led to the Māhele, the division of lands between the king of Hawaii, the *ali'i* (chiefs), and the common people, which introduced the concept of private property into the Hawaiian society. In 1848, Kamehameha III divided the land into four categories: certain lands to be reserved for himself and the royal house were known as Crown Lands; lands set aside to generate revenue for the government were known as Government Lands; lands claimed by *ali'i* and their *konohiki*

(supervisors) were called Konohiki Lands; and habitation and agricultural plots claimed by the common people were called *kuleana* (Chinen 1958:8-15). Ralph Kuykendall notes the concept of private land ownership was a radical departure from the local traditional land tenure system:

> The old feudal arrangement of joint and undivided ownership had given place to the system of individual allodial tenures, and aliens had been admitted to the enjoyment of the same rights as Hawaiian subjects in the ownership and use of land [Kuykendall 1967: 298].

The *ahupua'a* of Waimānalo was awarded to Victoria Kamāmalu, subject to the *kuleana* claims of the commoners. She received the third largest share of lands among the *ali'i nui* (high chiefs) of the Kingdom of Hawai'i, including 47 *ahupua'a*-sized parcels in addition to Waimānalo (Tulchin et al. 2010). Approximately 113 *kuleana* land claims were awarded in Waimānalo. Nearly all of these Land Commission Awards (LCA) were located along Waimānalo Stream, or its upper tributaries, in the northwestern portion of the *ahupua'a* (Figure 5). While the Hawaiian population of Waimānalo was likely much larger and more dispersed in pre-contact times, it nevertheless appears that the traditional Hawaiian population of Waimānalo was always clustered along Waimānalo Stream and its upper tributaries, focused on wetland taro and sweet potato cultivation. Additional *kuleana* LCAs, primarily consisting of house lots, were scattered along the coastal areas of central and southeastern Waimānalo, likely focused on the procurement of marine resources. The current project area lies directly to the north of this cluster.

Land Commission Award data indicated that it was common for *kuleana* awards to have a parcel along the coast, as well as a parcel in the upland area. The following account describes the traditional utilization of both land and sea:

> A spring called Wai-kupanaha was pointed out to us, (in valley mauka of Mill), surrounded by tall taro plants, banana trees and fragrant white gingers. According to Mr. Alona, the Wai-kupanaha on the west side of Mr. Castle's place was a lele, or a part of this kuleana, so both were given the same name. The upland piece was for taro growing and the piece near the sea was for fishing. The former owners of Wai-kupanaha went inland to raise taro and then to their land by the shore to fish. Both places had water but today only the upland Wai-kupanaha has water [Alona 1939, cited in Sterling and Summers 1978:246].

4.1.4 Ranching in Waimānalo

In 1828, Englishman Thomas Cummins arrived in Hawai'i. Soon after, he married the High Chiefess Kaumakaokane, a relative of Kamehameha I, who provided Cummins with connections to the throne. Cummins received a Royal Patent to an estate of crown lands in Waimānalo in 1842, and in 1850, Kamehameha III leased 6,970 acres of land in Waimānalo to Cummins for a period of 50 years at $350.00 per annum (Dorrance 1998). Thomas Cummins and his son John A. Cummins then proceeded to turn Waimānalo into a large cattle and horse ranch. The Cummins Estate, known as "Mauna Rose," became famous for its lavish parties, commonly hosting the Kamehamehas, King Kalākaua, Queen Lili'uokalani, and American, British, and

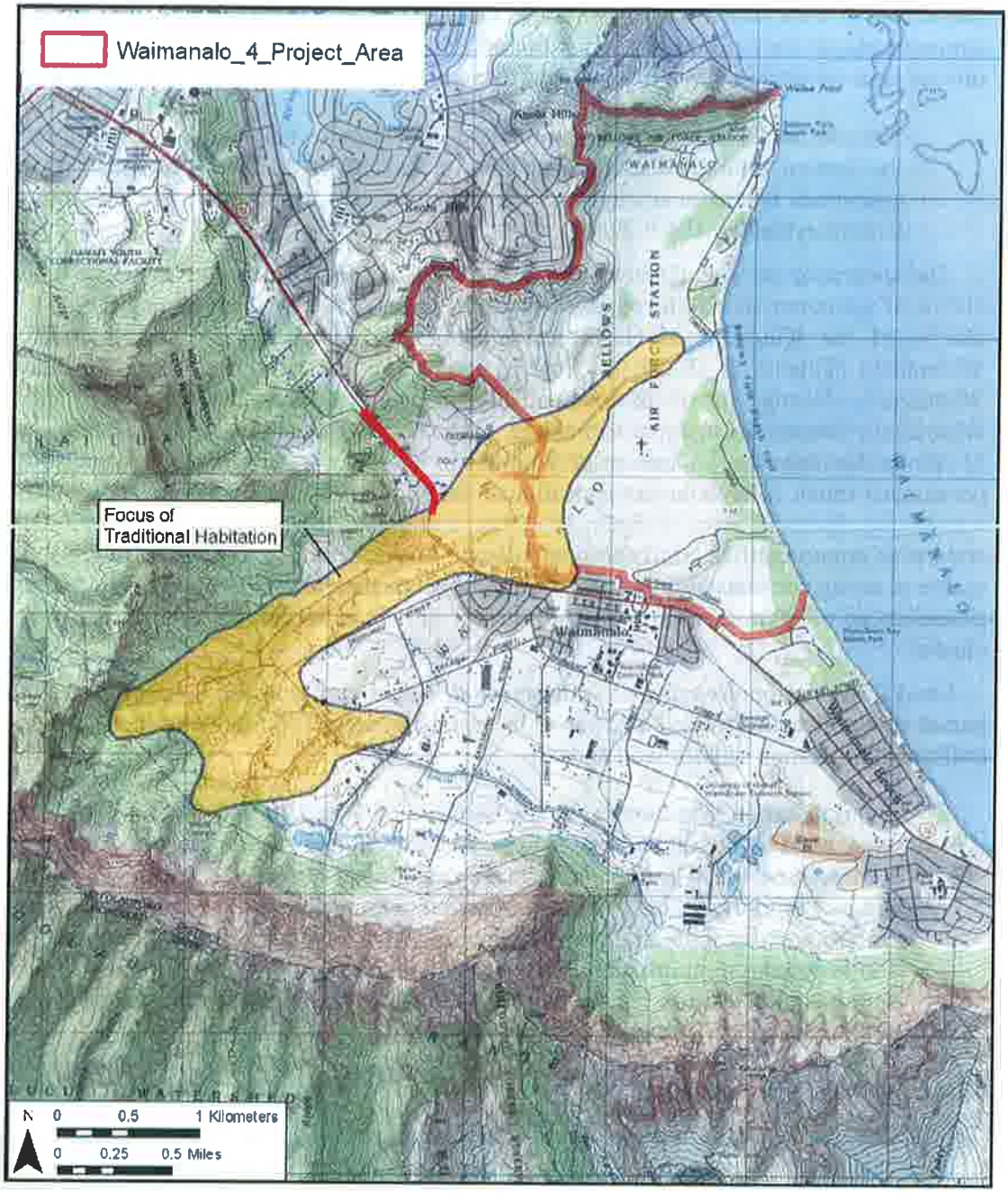

Figure 5. U.S. Geological Survey 7.5-Minute Series Topographic Map, Koko Head Quadrangle (1999), showing the focus of traditional Hawaiian habitation along Waimānalo Stream and its tributaries (based on Land Commission Award data), in relation to the Phase I project area

Russian naval officers visiting O'ahu (Star Bulletin 6/22/1935:9, cited in Silva 1981:A-22). Cummins constructed a landing at Waimānalo Bay, as access to Waimānalo prior to the construction of the Nuuanu Pali road was primarily by sea (Condé and Best 1973:364). A railroad line was also constructed to connect the landing to the Cummins Estate:

> Kamehameha V often visited the [Cummins'] plantation. When he grew too heavy to make the trip over the Pali on horseback, he is said to have acquired a small steamboat to transport him around the southern tip of Oahu to Waimanalo. A railroad track was laid to carry the rotund monarch from the landing to the Cummins home [Thomas 1983: 77].

In general, the introduction of livestock to Hawai'i had an exceedingly negative impact on the natural environment, and contributed to the demise of traditional Hawaiian life. Lacking walls and fences to contain the vast herds of cattle, sheep, and horses, the animals trampled the small scattered homesteads and stripped the land of native vegetation. The relationship between cattle and the natural environment of Hawai'i has been described by William A. Bryan:

> Since the coming of the whites there have been many causes…that have been at work bringing about a change in the natural conditions. Chief among the disturbing elements, however, have been the cattle. As early as 1815 they were recognized as a serious menace to the native forests. Roaming at will through the forests they and other animals, as goats and pigs, have done untold damage, and brought about conditions that have been most serious in many places [Bryan 1915:226-227].

The following account describing Waimānalo circa 1847 illustrates the damage to the natural landscape caused by the development of the Cummins Ranch:

> At that time, it seemed that the valley was filled with breadfruit, mountain apples, kukui [candlenut] and coconut trees. There were taro patches, with banks covered with ti and wauke [paper mulberry] plants. Grass houses occupied the dry lands, a hundred of them here and sweet potatoes and sugar cane were much grown. It was a great help toward their livelihood…The whole ahupuaa of Waimanalo was leased to white men except the native kuleanas and because the cattle wandered over them, they were compelled to build fences for protection. The taro patches that were neatly built in the time when chiefs ruled over the people and the land, were broken up. The sugar cane, ti and wauke plants were destroyed. The big trees that grew in those days, died because the roots could not get moisture. The valley became a place for animals. [*Kuokoa*, Oct. 26, 1906, cited in Sterling and Summers 1978:244].

The Cummins family eventually began to buy up the *kuleana* of the native farmers, gaining some 200 acres in fee. By the early 1870s, Chinese rice farmers were using some of these lands under agreement with John A. Cummins (Tulchin et al. 2010).

4.1.5 The Waimānalo Sugar Company

In 1876, the Hawaiian Kingdom entered into a Reciprocity Treaty with the United States. This allowed the growing Hawaiian sugar industry a free market and the potential for great profits. One of the Chinese rice farmers, Tai Lee, began sugar cultivation on Cummins' Waimānalo lands. Eventually Tai Lee and other Chinese farmers cultivated up to 1,200 acres of cane in Waimānalo (Advertiser 11/8/1931:1, cited in Silva 1981:A-22).

John A. Cummins saw the potential of sugar production at Waimānalo. He organized the Waimanalo Sugar Company and began construction of a sugar mill in 1880. In 1890, J. A. Cummins renegotiated his father's original lease on the Waimānalo lands for an additional 30 years, and sublet the lands to the Waimanalo Sugar Company. The Waimanalo Sugar Company continued to buy sugar from the Chinese farmers until circa 1900, when the plantation began to do most of its own cultivation (Tulchin et al. 2010).

During this time, sugar and most other goods were transported between Honolulu and Waimānalo by steamer, via the Waimānalo Landing. The Cummins Estate was still renowned for its extravagant hospitality. Lavish weeklong *luaus* (Hawaiian feasts) were given for Hawaiian royalty. In 1883, King Kalākaua visited Waimānalo for John Cummins' birthday celebration:

> After landing from the ss *Waimanalo*, a train of six cars was waiting to convey the party to Waimanalo proper. The spectacle was a magnificent one. The wharf was lined with evergreens; the locomotive and cars were ornamented with flags and banners, the Royal cars being commodiously fitted up with sofa, arm chairs and a canopy. When it was reported "All Aboard," away we went, booming along thru' the cane fields, towards the mill. On arrival at Mr. Cummins' house, hundreds of natives flocked to welcome His Majesty. A noticeable feature was the respectful manner in which the Chinese laborers uncovered their heads as the train went by them in the cane fields [Advertiser 1883, cited in Condé and Best 1973:365].

The Waimanalo Sugar Company continued to grow, with increasing lands being put under cultivation. As the plantation grew, former ranch lands were converted to cane fields. New irrigation ditches and railroad lines were constructed, and improvements were made to the mill and Waimanalo Landing. A 1916 map of Waimānalo (Figure 6), compiled from surveys in 1880 and 1884, shows the extent of plantation development in Waimānalo. The map also shows Waimānalo Landing, the plantation railroad connecting the landing to the mill, and the coastal government road called the "Proposed Kamehameha Highway," which would become the present Kalaniana'ole Highway. Also shown on the 1916 map are the coastal settlement area and the Pāhonu fishpond (see Section 4.1.1) southeast of the current project area.

In 1885, W.G. Irwin & Company (which later merged with C. Brewer & Company) became agents for the Waimanalo Sugar Company, with John Cummins remaining manager. John Cummins died in 1913 and his estate sold the remaining fee simple lands and the unexpired lease of Waimānalo lands to the Waimanalo Sugar Company. A 1922 map of the Waimanalo Sugar Company's fields (Figure 7) shows the extent of plantation development in the early 1920s. The plantation cane fields stretch across the floor of Waimānalo Valley to the base of the Ko'olau

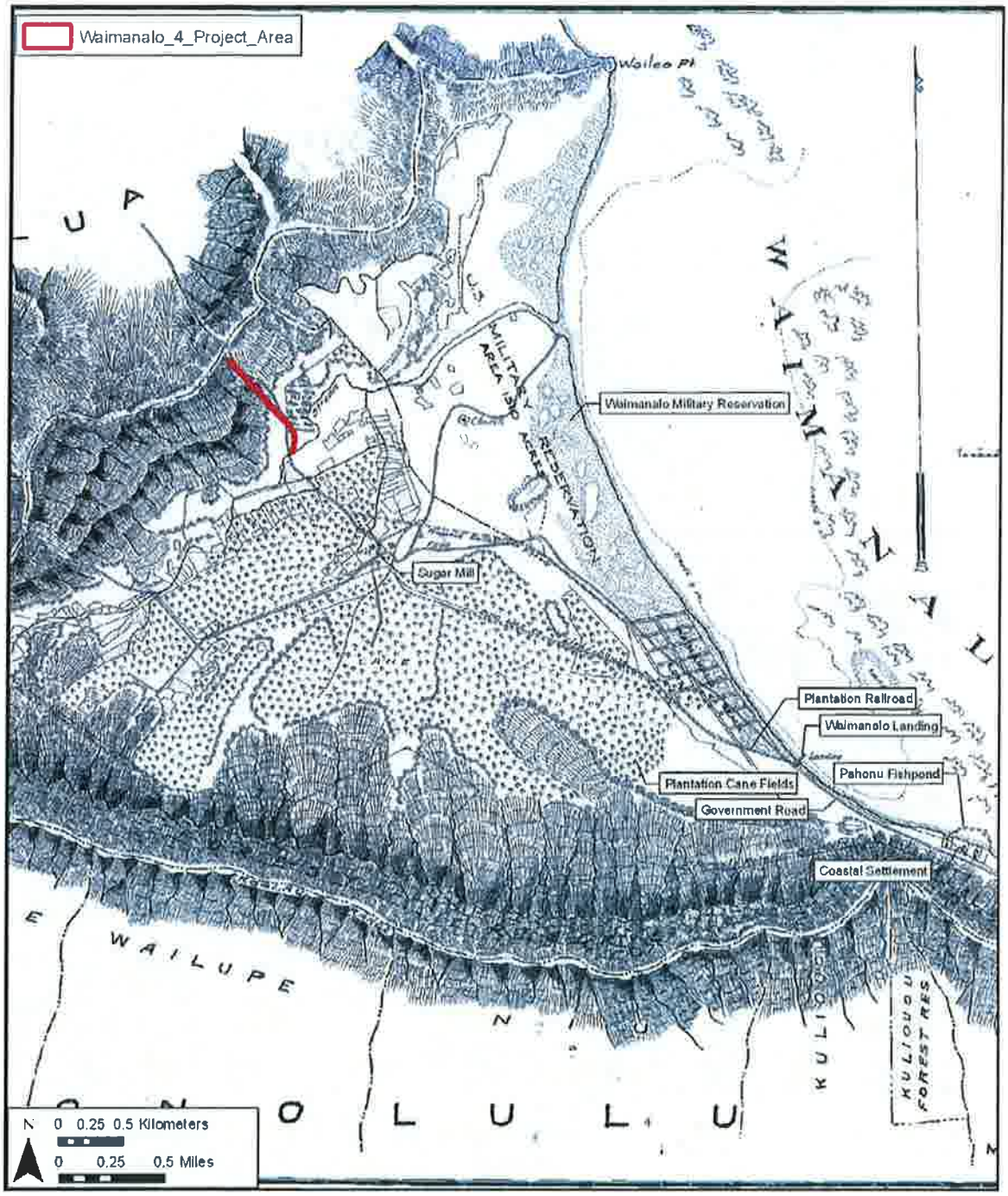

Figure 6. A 1916 survey map of Waimānalo by Walter E. Wall, showing the location of the Phase I project area and features discussed in the text

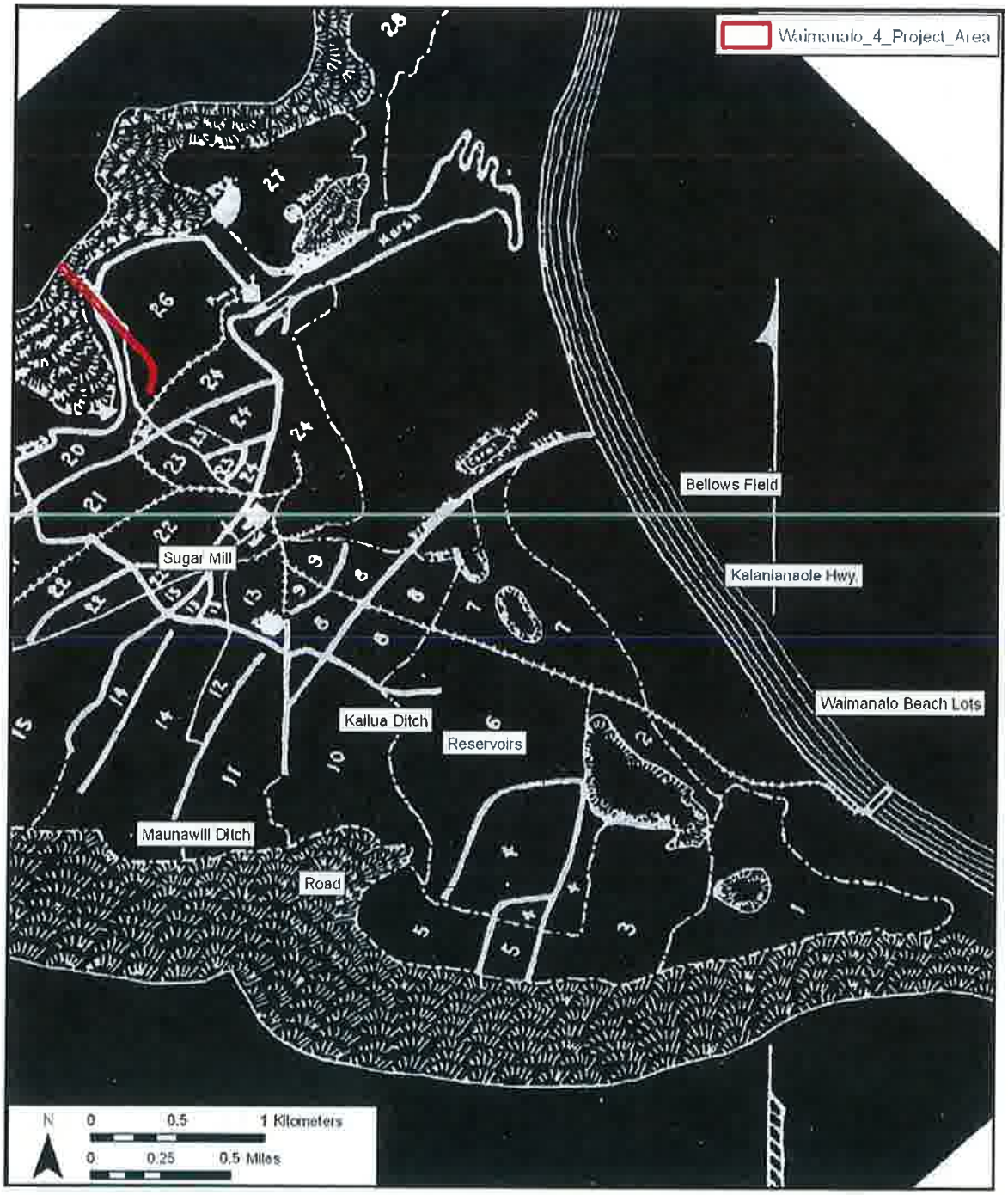

Figure 7. 1922 map of the fields of Waimanalo Sugar Company by Y.K., showing the location of the Phase I project area

Range. The southern half of the current project area is indicated to have been cultivated in cane; previously, this particular area was used for rice cultivation (see Figure 6).

Water was a continuous problem for most sugar companies, including the Waimanalo Sugar Company. Irrigation for the Waimānalo cane lands was developed from three sources: springs and water tunnels in neighboring Maunawili Valley; Kawainui Swamp in Kailua; and a swampy area near the mouth of Waimānalo Stream, known as the Waimānalo Lagoon (Bartholomew and Associates 1959:17). Water from these sources was transported to the Waimānalo cane lands via the Kailua Ditch, Maunawili Ditch, and the Pump Ditch, respectively. Portions of the Pump Ditch, also known as the Tai-Lee Ditch, were originally constructed during the Chinese sugar cane growing period of 1876-1900, and later modified by the Waimanalo Sugar Company.

Carol Wilcox summarizes the company's irrigation system:

> Kailua Ditch, the earliest of Waimanalo Sugar's three ditches, diverted water from upper Kailua springs in the Waimanalo basin and emptied into the Waimanalo Reservoir. A second ditch, built in 1924, had its source in the Kawainui Swamp. Two pumps lifted water from that swamp and took it to the head of a 10,000-foot system of small tunnels, mostly through stone or hard earth, into a reservoir. This ditch cost $220,000.
>
> The ditch most associated with the Waimanalo Sugar Company is the Maunawili Ditch. Its source is high-level tunnels, springs, and streams in Maunawili and Waimanalo Valley. The dirt- and cement-lined ditch includes about twenty flumes, many measuring no more than a foot and a half each way, before it crosses through the Olomana Tunnel to Waimanalo. During dry seasons this ditch delivered less than 2 mgd [million gallons per day]. Waimanalo Sugar eventually had 99 percent of its sugar under irrigation – and nearly 25 percent of that came from surface water sources [Wilcox 1996:111].

The Maunawili Ditch, Kailua Ditch, and Pump Ditch transported irrigation water across Waimānalo Valley, generally from northwest to southeast, along high-, mid-, and low-level elevation contours. A 1938 U.S. Geological Survey topographic map (Figure 8) shows the three ditch systems, along with additional plantation infrastructure associated with the Waimanalo Sugar Company throughout Waimānalo Valley. The high-level Maunawili Ditch is shown crossing through the *mauka* portion of the current project area, and continuing to the west beyond the project area. The mid-level Kailua Ditch is shown to cross through the central portion of the current project area. Two plantation reservoirs are also indicated in the *makai* portion of the project area.

Reconstruction of the Waimanalo Sugar Company's irrigation system was undertaken in the 1930s, under the management of George Bennett:

Figure 8. A portion of the 1938 U.S. Geological Survey Topographic Map of the Island of Oahu, showing the location of the Phase I project area and features discussed in the text

> During the last five years Mr. Bennett has rebuilt all the old flumes which bring the Maunawili water to the fields using redwood, good for 15 years or more; concreted the open ditches; and has replaced the old wooden pipes with concrete siphons [Honolulu Advertiser 3/31/1940, cited in Condé and Best 1973:367].

The rebuilding of the water system was part of a general modernization of the plantation. Other facets of modernization included mechanized land clearing and the opening of the Nu'uanu Pali Road and the Koko Head to Waimānalo Road. The mechanized land preparation enabled more land to be cleared in a shorter amount of time, and the paved roads to Honolulu ended the need to ship sugar products to the Honolulu Plantation Refinery by steamer.

The Waimanalo Sugar Company continued operations into the 1940s. However, facing rising operational costs and diminishing returns, the Waimanalo Sugar Company ceased operations in 1947. Following the closure of the Waimanalo Sugar Company, the plantation's water license and irrigation ditch system reverted to the Territory of Hawai'i. Wilcox noted of the Maunawili Ditch System:

> Visually, this was a gem of a system up until recent times. Although small, it had all the components of a typical ditch system: flumes, ditches, tunnel. Its particular charm was its redwood flumes, which were in remarkably good condition in 1984. These have since been abandoned in favor of PVC pipe [Wilcox 1996:113].

4.1.6 Diversified Agriculture in Waimānalo

The Waimanalo Sugar Company sold its fee-simple land holdings and the remaining years of its lease of government-owned lands to the Waimanalo Agricultural Development Company (Bartholomew and Associates 1959:17). The Waimanalo Agricultural Development Company then sub-let one to twenty-acre farm lots and up to 150-acre pastoral lots to individual farmers in Waimānalo Valley for diversified agriculture. Following the expiration of the agricultural leases in 1953, the Territorial Government began selling approximately 9-acre agricultural parcels in the central valley, known as the Waimanalo Farm Lots subdivision. Seven chicken farms, one dairy, and one piggery, as well as papaya and flower farms, were established in the Farm Lots area (Bartholomew and Associates 1959:17). Portions of the former plantation irrigation system, with some modifications, continued to be used to provide water to the Farm Lots. A 1977-1978 U.S. Geological Survey aerial photograph (Figure 9) shows the Waimanalo Farm Lots Subdivision south of the current project area.

Circa 1950, the University of Hawai'i established an approximately 30-acre agricultural research farm, known as the Waimanalo Agricultural Experiment Station, in the central valley, immediately *makai* of the Waimanalo Farm Lots subdivision (Figure 10). Research conducted at the experiment station provided local farmers with scientific knowledge about crops and agricultural practices to improve agricultural production in Hawai'i. The Waimanalo Agricultural Experiment Station was later expanded to approximately 130 acres.

In 1967, the L.W. Campos Ranch relocated from Kailua to Waimānalo, establishing an approximately 200-acre dairy farm within the current project area (http://hawaii.gov/dlnr/boc). Campos Ranch was purchased by Foremost Dairies in 1969, which expanded the dairy by

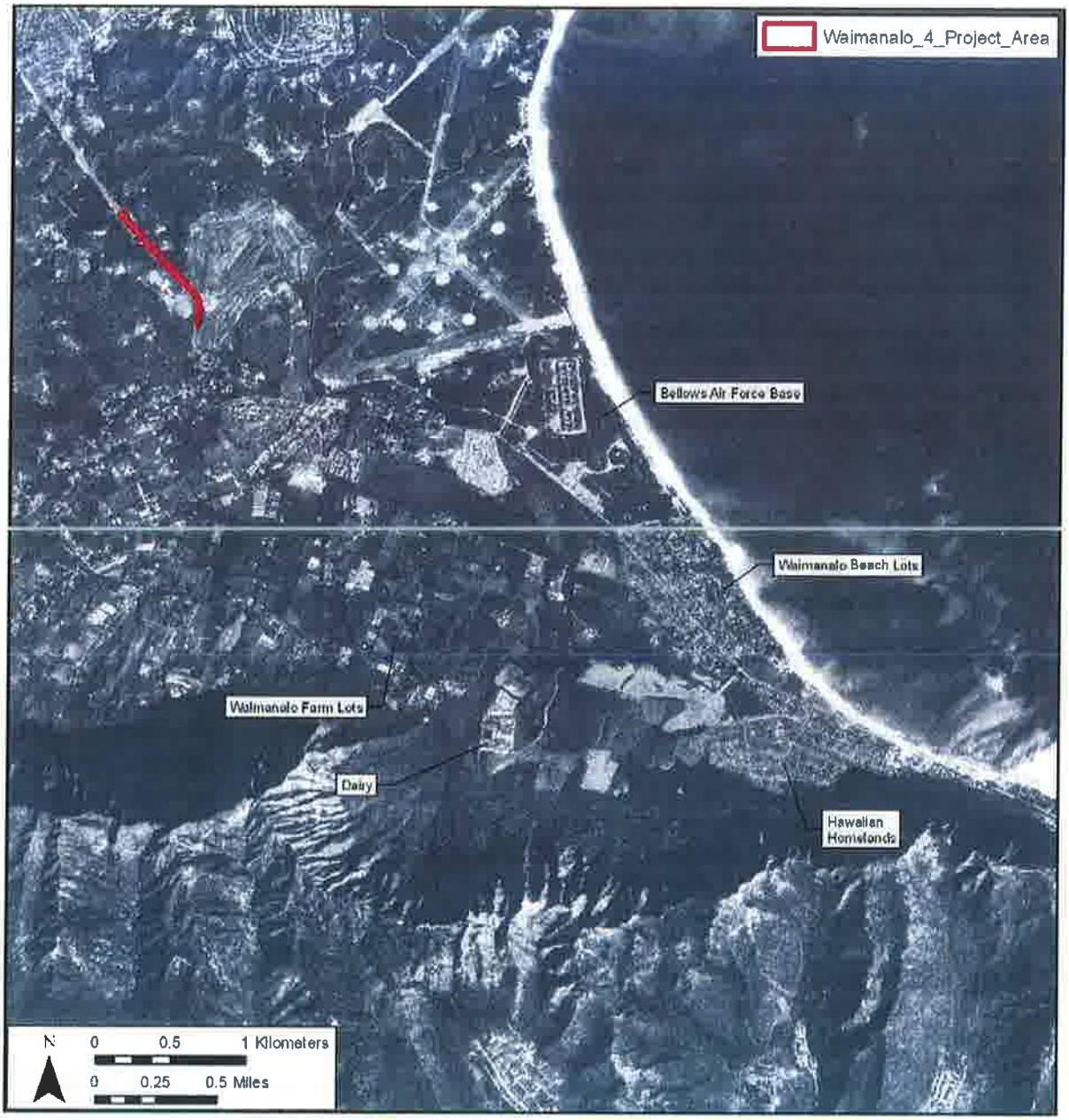

Figure 9. 1977-78 U.S. Geological Survey Orthophotograph, Koko Head Quadrangle, showing the location of the Phase I project area and features discussed in the text

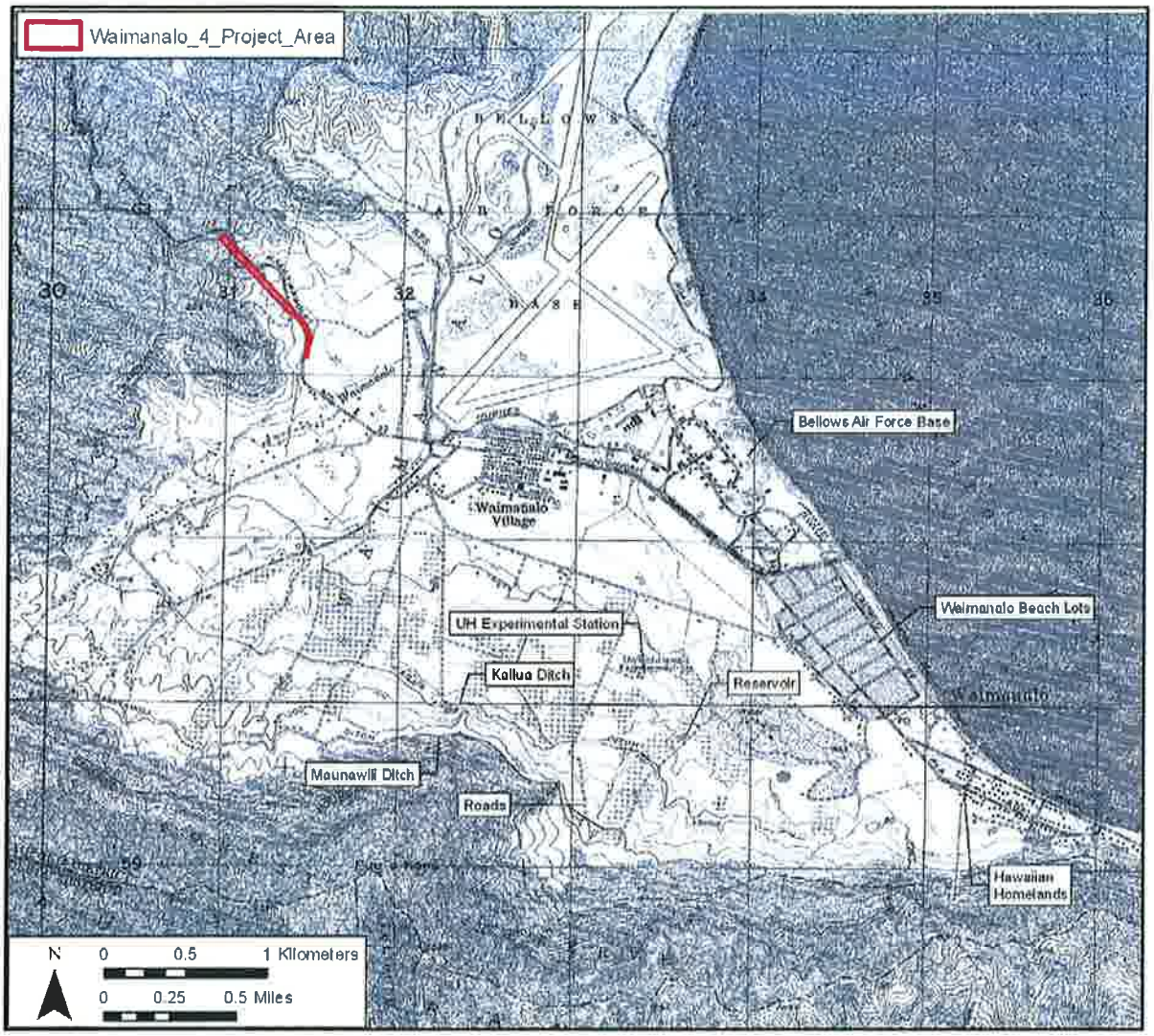

Figure 10. 1954 Army Map Service Topographic Map, Koko Head Quadrangle, showing the location of the Phase I project area and features discussed in the text

acquiring an additional approximately 140 acres for pasture. In 1984, the dairy sub-leased an approximately 21-acre parcel to Universal Synergetics (Unisyn). Unisyn was established to research and develop a commercial anaerobic digestion technology for manure and organic waste conversion into agricultural products or other products to be used by farmers. Unisyn developed a full-scale facility and began converting biomass such as trees, grasses, agricultural wastes, animal manures, ocean plants, garbage, and other wet organic wastes into renewable resources, such as soil amendments, irrigation water, heat, steam, electricity, or liquid or gas fuels for transportation (e.g. ethanol) (Hammatt et al. 1999:10-11).

In 1997, the dairy was acquired by Meadow Gold Dairies. Citing the high costs of feed and low milk prices, the Meadow Gold Dairy in Waimānalo ceased operations circa 2002. The 1977-1978 U.S. Geological Survey aerial photograph (see Figure 9) shows the dairy infrastructure.

4.1.7 Military Development in Waimānalo

The Waimānalo Military Reservation, including approximately 1,500 acres along the northern, coastal portion of Waimānalo, was established in 1917 (see Figure 6). Limited development and little activity occurred on the military reservation through the 1920s. In 1933, Waimānalo Military Reservation was renamed Bellows Field. Bellows Field then consisted of an infantry and artillery training area, also including a runway for the Air Corps. With the onset of World War II, accelerated development occurred at Bellows Field, which became a permanent military post in 1941 (www.bellowsafs.com). A 1943 War Department Map (Figure 11) shows the additional roads, structures, and runways constructed at Bellows Field.

Following World War II, activity at Bellows Field declined, with much of the area only being used for military recreational purposes and as an emergency landing field. Bellows Field was subsequently renamed Bellows Air Force Base, and later, Bellows Air Force Station. In 1956, an Air Force communications facility was constructed, with extensive antennae installations. A 1954 Army Map Service map shows the increased coastal development at the Bellows Air Force Base (see Figure 10) Bellows Air Force Station continues to be used for military training and recreational purposes (www.bellowsafs.com).

4.1.8 Residential Development in Waimānalo

The primary residential area in Waimānalo in the early 1900s was located in the vicinity of the Waimānalo Sugar Company's sugar mill. Waimānalo Village was established as housing for plantation workers and their families. In 1925, the first large-scale sale of Waimānalo lands to the public occurred with the establishment of the Waimānalo Beach Lots subdivision. The subdivision, located just south of the Waimānalo Military Reservation, included 266 lots on 90 acres of land (Bartholomew and Associates 1959:16). A 1938 U.S. Geological Survey map (see Figure 8) shows the road grid of the Waimānalo Beach Lots subdivision, with a few homes constructed. Also shown on the map is Kalaniana'ole Highway, which opened in 1924 and greatly improved transportation to Waimānalo.

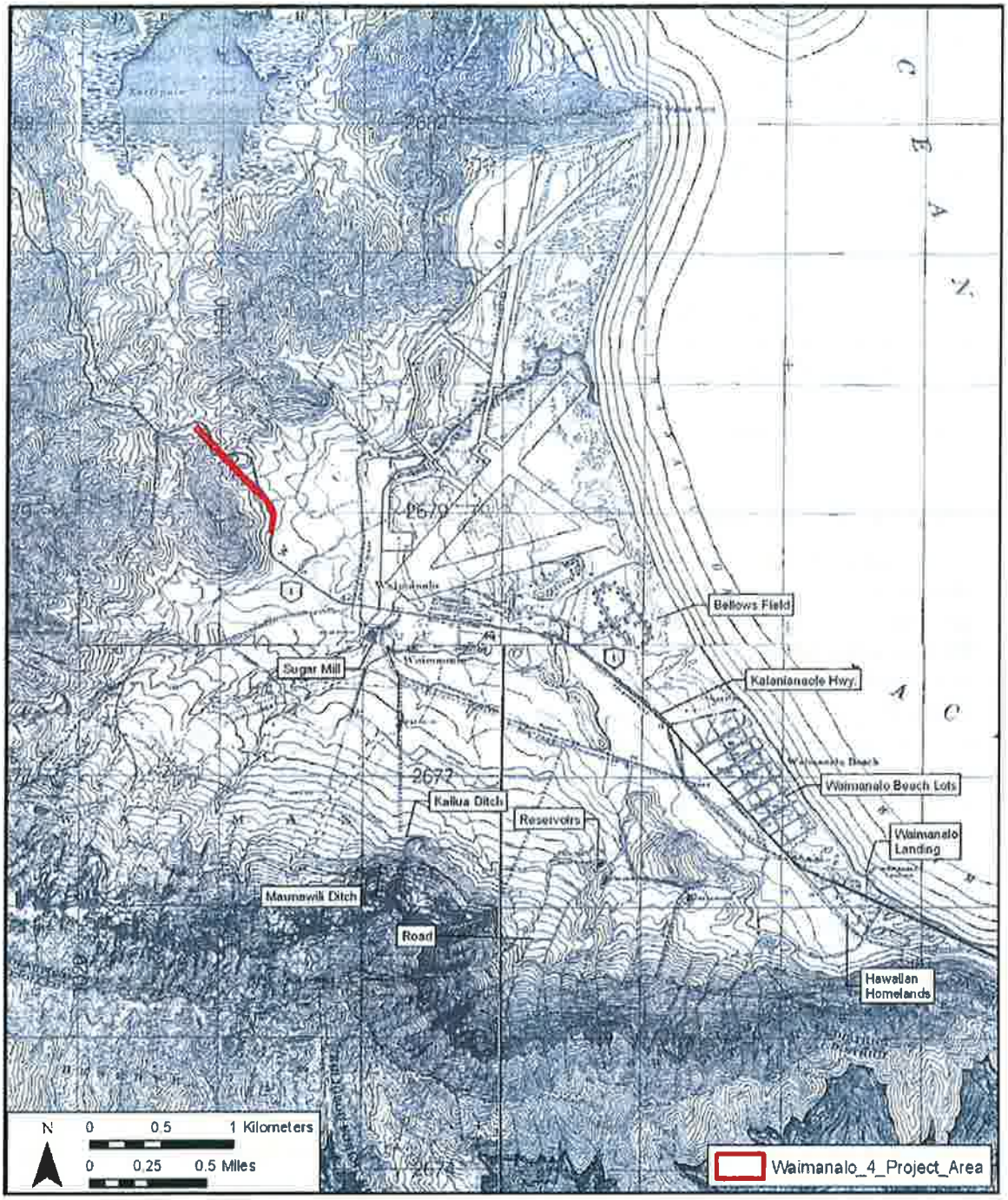

Figure 11. A portion of the 1943 War Department Topographic Map, Kailua, Makapuu, and Diamond Head Quadrangles, showing the location of the Phase I project area and features discussed in the text

Additional residential development occurred in the coastal portion of central Waimānalo with the establishment of Waimānalo Homestead by the Hawaiian Homes Commission in 1925. Qualified homesteaders, with 50% or more Hawaiian blood, were awarded residential lots located inland of Kalaniana'ole Highway, in the vicinity of Waimanalo Landing (Tulchin et al. 2010; see Figure 11). In modern times, additional residential development has occurred in the Waimānalo Village, Waimānalo Beach Lots, and Waimānalo Hawaiian Homelands subdivisions (see Figure 9).

4.2 Previous Archaeological Research

There have been approximately 100 archaeological studies in Waimānalo Ahupua'a. This previous archaeological research section is meant to serve as an overview, and is not an exhaustive review of all previous archaeology in Waimānalo Ahupua'a. General overviews of previous archaeological research in the coastal and inland portions of Waimānalo are presented, with detailed summaries of previous archaeological research in the vicinity of the current project area.

4.2.1 Coastal Waimānalo

The major focus of archaeological research in Waimānalo has been the Bellows Air Force Station area, and to a much lesser extent the Waimānalo State Recreation Area. Waimānalo, in general, is distinguished as being the place of one of the earliest archaeological investigations in the Hawaiian Islands. In 1879, Mr. Otto Finsch reported on human burials in sand deposits and associated artifacts in an area which is now Bellows Air Force Station (Finsch 1879). Beginning in the 1960s, approximately 70 separate archaeological reconnaissance, inventory survey, data recovery (excavation), and monitoring projects have taken place at Bellows Air Force Station, with most of the studies made in conjunction with construction activity. Human burials, lithic scatters, soil features and/or occupation layers have been found almost everywhere archaeological investigation has taken place. Possibly the most important finds were discovered in dune deposits adjacent to the mouth of Waimānalo Stream. Radiocarbon dates on charcoal from cultural layers within the dune, which placed the earliest occupation to around A.D. 300-400 (Tuggle et al. 1978), have been much disputed, but these deposits are still considered to be among the oldest in Hawai'i (Pearson et al. 1971; Cordy and Tuggle 1976; and Kirch 1985). Much of the research since this discovery of early Bellows Dune occupation has focused on attempting to connect other archaeological finds in more inland areas of Bellows to this early Polynesian settlement. The Bellows Air Force Station remains a focus of continuing archaeological research.

Approximately a dozen archaeological studies were carried out at the Waimānalo State Recreation Area, just south of Bellows Air Force Station, mostly between 1976 and 1980. There was hope that the occupation layers documented just to the north might be present in the State Recreation Area. However, little findings were observed.

Several archaeological studies have been conducted in recent years in coastal Waimānalo. The remains of Waimānalo Landing were located within the near-shore waters of Waimānalo Beach Park (UH Marine Option Program 1999). Subsurface cultural deposits and human burials were

identified during construction activities at Kaiona Beach Park (Jones and Hammatt 2005). A subsurface cultural deposit was identified at Waimānalo Beach Park (Simonson et al. 2008). In addition to formal archaeological studies, several inadvertent burial discoveries have been also been reported in coastal Waimānalo, in the vicinity of the Waimānalo Beach Lots subdivision (McMahon et al. 1990) and Kaiona Beach Park (Medical Examiner 1988).

4.2.2 Inland Waimānalo

Relatively few archaeological studies have been conducted in Waimānalo Ahupua'a inland of Kalaniana'ole Highway, and none have been conducted directly adjacent to the current project area. The locations of previous archaeological studies in the vicinity of the current project area are indicated on Figure 12.

CSH conducted an archaeological inventory survey of the U.S. Department of Agriculture (USDA) Fruit Fly Production Facility, within the University of Hawai'i Agricultural Experiment Station (Hammatt et al. 2002; see Figure 12). The study area was formerly under sugar cane cultivation. No historic properties were identified within the study area. However, a plantation-era irrigation ditch, known as the Tai-Lee Ditch (SIHP # 50-80-15-6427) was observed along the *makai* edge of the study area. CSH subsequently conducted an addendum to the inventory survey of the USDA Fruit Fly Production Facility, for a planned expansion of the facility (Hammatt et al. 2003). No historic properties were identified in the addendum study area.

CSH conducted an archaeological inventory survey of the former Unisyn Biowaste Technology Facility, within the current project area parcel *makai* of Waikupanaha Street (Hammatt et al. 1999; see Figure 12). The study area was formerly under sugar cane cultivation, and was heavily modified by the development of the Unisyn facility. No historic properties were identified in the study area

Aki Sinoto Consulting (ASC) conducted an archaeological inventory survey of the Board of Water Supply (BWS) Waimānalo Well III, including the well site and a corridor for a pipeline between the well site and Hihiwai Street (Drolet and Sinoto 2001; see Figure 12). The well site is located in the *mauka* portion of the current project area, with the pipeline route traversing the central portion of the project area, and continuing *makai* along Waikupanaha Street. The Kailua Ditch, a component of the former Waimanalo Sugar Company's irrigation system (SIHP # 50-80-15-4042) was documented in the study area. The ditch construction was observed to include un-lined earthen channels and stone and mortar lined channels. Modern modifications to the ditch were also observed, including cement pipe culverts at road crossings, and portions of the ditch were converted to PVC pipes. A remnant railroad berm, consisting of a 2.5 m wide by 1.5 to 3.0 m high earthern berm, was observed in the study area. The berm was not assigned an SIHP number. Two stacked stone features (SIHP # 50-80-15-5876) were also observed in the *mauka* portion of the study area, in the vicinity of the well site. Feature 1 was described as "a low-lying, faced stone platform" (Drolet and Sinoto 2001:23). Feature 2 was described as a "rectangular, faced stone platform" (Drolet and Sinoto 2001:23). Feature 2 was noted to be located in an area of uniform plantings of mango trees, with possible planting furrows. No artifacts or midden were observed in the vicinity of the features. The stacked-stone features were preliminarily interpreted to be historic clearing mounds associated with agricultural pursuits of plantation workers.

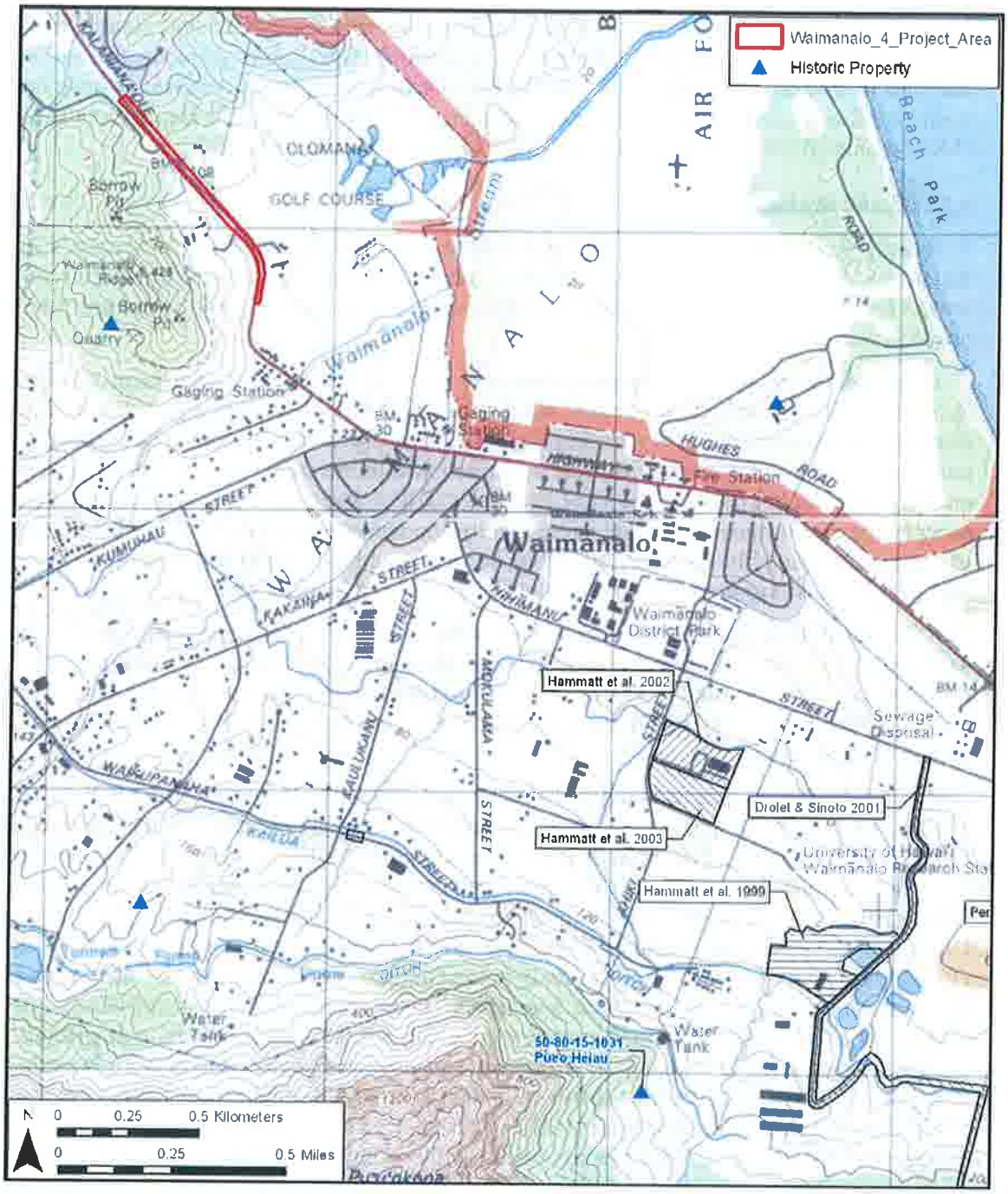

Figure 12. A portion of the U.S. Geological Survey 7.5-Minute Series Topographic Map, Koko Head Quadrangle (1999), showing the locations of previous archaeological studies in the vicinity of the Phase I project area

4.3 Background Summary and Predictive Model

Pre-contact Waimānalo was able to sustain a sizable native population, with abundant resources, including well-watered lands along Waimānalo Stream and the broad reef and good fishing resources along the coast. The traditional Hawaiian population of Waimānalo appears to have been clustered along Waimānalo Stream and its upper tributaries, focused on wetland taro and sweet potato cultivation. Through the Māhele, the *ahupua'a* of Waimānalo was awarded to Victoria Kamāmalu, with *kuleana* Land Commission Awards clustered along Waimānalo Stream and its upper tributaries, as well as along the coast.

In historic times, land use in Waimānalo became dominated by ranching and sugar plantation activities inland, and military activities along the coast. In 1850, much of Waimānalo was leased to the Cummins family, who established a large horse and cattle ranch. Traditional land uses were replaced by pasture for grazing livestock and rice fields. The Cummins Estate became famous for its lavish parties, commonly hosting the Hawaiian royalty and American, British, and Russian naval officers visiting O'ahu. By the late 1870s, Chinese rice farmers began cultivating sugar cane in Waimānalo, followed by the establishment of the Waimānalo Sugar Company by Cummins in 1880. In the early 1900s, sugar cane was cultivated throughout Waimānalo, including portions of the current project area, with an extensive irrigation system to transport water from neighboring Maunawili Valley and Kawainui Marsh in Kailua to the plantation's cane fields.

Facing rising operational costs and diminishing returns, the Waimanalo Sugar Company ceased operations in 1947. Much of the Waimānalo lands were then converted to diversified agricultural uses, including chicken and pig farms, ranches, and truck farms. Portions of the former plantation irrigation system, with some modifications, continued to be used to provide water to the agricultural lands.

No previous archaeological studies have been conducted within the current Phase I project area. Previous archaeological research in the vicinity of the current project area indicates heavy land disturbance, and a lack of pre-contact archaeological features in areas formerly under sugar cane cultivation. The southern half of the current project area was formerly cultivated in both rice and cane.

Though extensive land disturbance, including the initial construction and maintenance of Kalaniana'ole Highway, has probably obliterated any traditional surface remains within the Phase I project area, the presence of subsurface cultural deposits is still a distinct possibility. This possibility is based on the close proximity of the project area to the focus of traditional Hawaiian habitation within Waimānalo Valley. Historic subsurface deposits may also be encountered, which would provide important information about early industry in the valley.

Section 5 Results of Fieldwork

Fieldwork was accomplished by CSH archaeologists intermittently between May 26, 2009 and August 20, 2009, requiring approximately 7 person-days to complete.

General contractor Kaikor Construction Company, Inc. oversaw all excavations within the Phase I project area. The current phase of construction activity was confined to an approximately 0.6 mile-long section of Kalaniana'ole Highway, which lies between the area west of the southernmost section of Kahako Place and the southern limits of the Olomana Golf Course (see Figure 1 through Figure 3). Ground disturbance associated with this phase included excavation related to the project area's development, such as trenching for utilities installation, and grading of shoulder areas for road widening and realignment. Archaeological monitoring for this project included monitoring of this ground disturbance as part of an on-call program supplemented by intermittent "spot-checks," during which the archaeologist would assess the progression of the ground disturbing activities and record the exposed stratigraphy. No artifacts, features, human remains, or significant historic properties were observed during monitoring of ground disturbing activities.

5.1 Stratigraphy

Excavations observed throughout the project tended to be shallow (less than two meters in depth), though excavation into some road berms reached somewhat greater depths (see Section 5.1.4 below). Sediments observed included fill layers associated with landscaping and previous construction activities, and natural clay. No artifacts, features, human remains, or significant historic properties were encountered during the remainder of ground disturbing activities associated with this project.

Four representative profiles are provided below documenting the observed stratigraphy exposed during excavations associated with the project. These profiles were taken intermittantly along Kalaniana'ole Highway, at excavation trenches for utilities installation and at an excavation trench for a new drainage culvert. and The locations of these profiles are shown on Figure 13. Detailed information regarding each of the representative profiles, including trench profiles, sediment descriptions, and photographs, are provided below.

5.1.1 Profile #1

Profile #1 was documented along the *makai* shoulder of Kalaniana'ole Highway, west of the southernmost extent of Kahako Place (see Figure 13). Ground disturbance in this area consisted of an excavation trench for utilities installation, measuring approximately 0.4 meters wide and up to 1.2 meters deep. The stratigraphic sequence observed in this area of excavation is characterized by concrete and fill layers associated with the construction of the existing road.

The stratigraphic sequence of a section of the northeast wall (Figure 14 and Figure 15) of the utilities excavation trench consisted of:

Figure 13. Aerial photograph (source: U.S. Geological Survey Orthoimagery 2005), showing the locations of the project area, the profiled areas described in this report, and other significant places

Figure 14. Photo of the profiled section of the northeast wall of the utilities excavation trench on the *makai* shoulder of Kalaniana'ole Highway

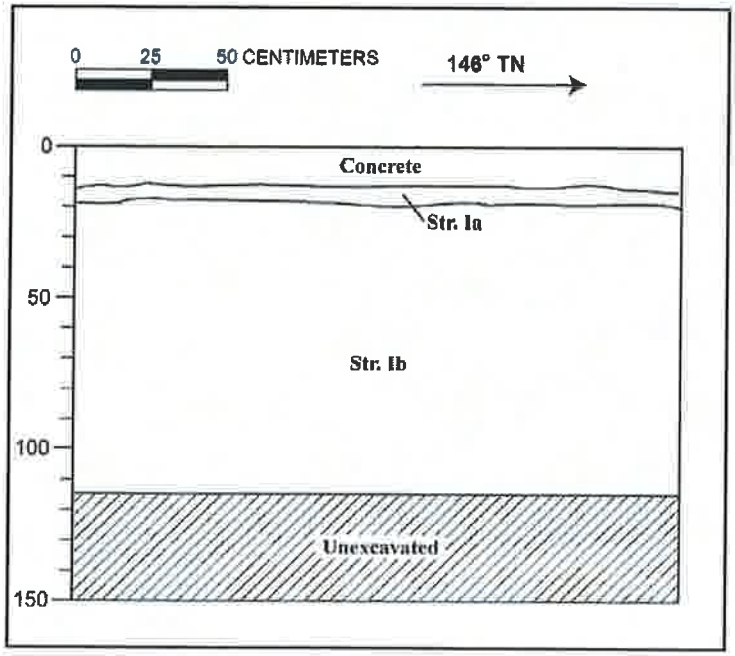

Figure 15. Profile #1; a section of the northeast wall of the utilities excavation trench on the *makai* shoulder of Kalaniana'ole Highway

Stratum I: 15-20 cmbs*	Fill; 10YR 3/2 (very dark grayish brown); gravelly silt loam; weak, fine, crumb structure; dry, weakly coherent consistency; non plastic; no cementation; terrestrial sediment; abrupt, smooth lower boundary; includes roots and rootlets; no cultural materials present; fill layer associated with previous construction activities
	*cmbs = centimeters below surface
Stratum II: 20-115 cmbs	Fill; 10YR 6/3 (pale brown); silty sandy crushed coral; moderate, fine, granular structure; dry, hard consistency; non plastic; no cementation; mixed sediment; includes roots; no cultural materials present; fill layer associated with previous construction activities

5.1.2 Profile #2

Profile #2 was documented along the *mauka* shoulder of Kalaniana'ole Highway, just north of the turn-off for Old Kalaniana'ole Road and south of Profile #1 (see Figure 13). Gound disturbance at this area consisted of an excavation trench for utilities installaion, measuring approximately 0.4 meters wide and up to 1.2 meters deep. The stratigraphic sequence observed in this area of excavation is characterized by concrete and fill layers associated with the construction of the existing road.

The stratigraphic sequence of a section of the northeast wall (Figure 16 and Figure 17) of the utilities excavation trench consisted of:

Stratum I: 20-80 cmbs	Fill; 10YR 7/4 (very pale brown); loamy sandy crushed coral; moderate, medium to large, granular sturcture; dry, hard consistency; non plastic; weak cementation; mixed sediment; very abrupt, smooth lower boundary; mottled with 10% silt loam; no cultural materials present; fill layer associated with previous construction activities
Stratum II: 80-120 cmbs	Fill; 10YR 4/1 (dark gray); extremely stony silt; structurless; dry, loose consistency; non plastic; no cementation; terrestrial sediment; inlcudes 90% basalt gravel, cobbles and boulders; no cultural materials present; fill layer associated with previous construction activities

Figure 16. Photo of the profiled section of the northeast wall of the utilities excavation trench on the *mauka* shoulder of Kalaniana'ole Highway

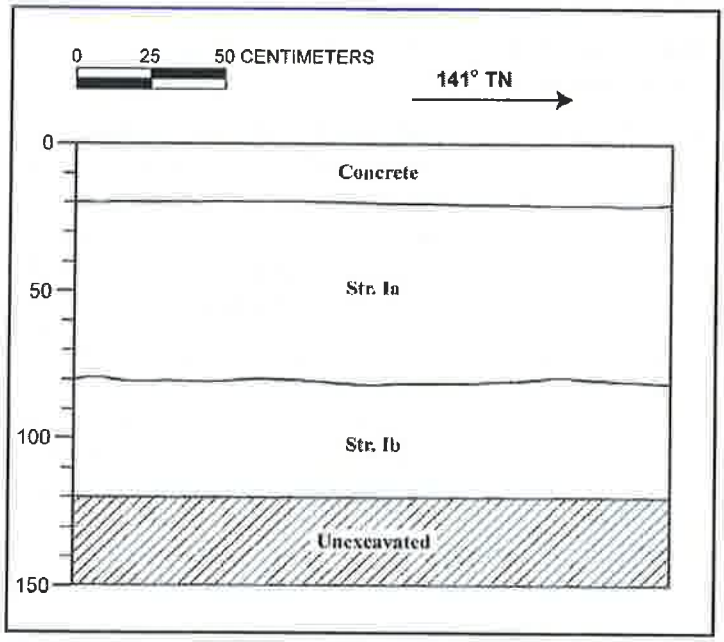

Figure 17. Profile #2; a section of the northeast wall of the utilities excavation trench on the *mauka* shoulder of Kalaniana'ole Highway

5.1.3 Profile #3

Profile #3 was documented along the *mauka* shoulder of the Kalaniana'ole Highway median, between Town and Country Stables and the Olomana Golf Course (see Figure 13). Ground disturbance at this area consisted of excavation pits for light post installations and an excavation trench for utilities installation. The stratigraphic sequence observed in this area of excavation is characterized by asphalt and fill layers associated with the construction of the existing road.

The stratigraphic sequence of a section of the southwest wall (Figure 18 and Figure 19) of the utilities excavation trench consisted of:

Stratum I: 15-40 cmbs	Fill; 10YR 5/6 (yellowish brown); loamy sandy crushed coral; moderate, medium, granular structure; dry, hard consistency; non plastic; no cementation; mixed sediment; very abrupt, smooth lower boundary; includes 10% basalt gravel; no cultural materials present; fill layer associated with previous construction activities
Stratum II: 40-115 cmbs	Fill; 10YR 3/4 (dark yellowish brown); stony clay loam; moderate, medium, crumb structure; dry, hard consistency; slightly plastic; no cementation; terrestrial sediment; includes 20% basalt gravel and cobbles; no cultural materials present; fill layer associated with previous construction activities

5.1.4 Profile #4

Profile #4 was documented along the *mauka* shoulder of the Kalaniana'ole Highway, approximately 30 feet from the highway and adjacent to the northern side of the Town and Country Stables driveway (see Figure 13). Ground disturbance at this area consisted of grading for highway widening and excavation for a new drainage culvert. The stratigraphic sequence observed in this area of excavation is characterized by a landscaping fill layer over natural clay.

The stratigraphic sequence of the east wall (Figure 20 and Figure 21) of the drainage culvert excavation trench consisted of:

Stratum I: 10-110 cmbs	Fill; 5YR 3/2 (dark reddish brown); silty clay loam; moderate, fine, granular structure; dry, loose and moist, very friable consistencies; slightly plastic; no cementation; terrestrial sediment; abrupt, smooth lower boundary; includes roots and rootlets; includes 10% basalt gravel and cobbles; no cultural materials present; landscaping fill layer supporting lawn growth
Stratum II: 95-296 cmbs	B Horizon; 5YR 4/6 (yellowish red); clay; moderate, fine, granular structure; dry, slightly hard and moist, firm consistencies; plastic; no cementation; terrestrial sediment; no cultural materials present

Figure 18. Photo of the profiled section of the southwest wall of the utilities excavation trench on the *mauka* side of the Kalaniana'ole Highway median

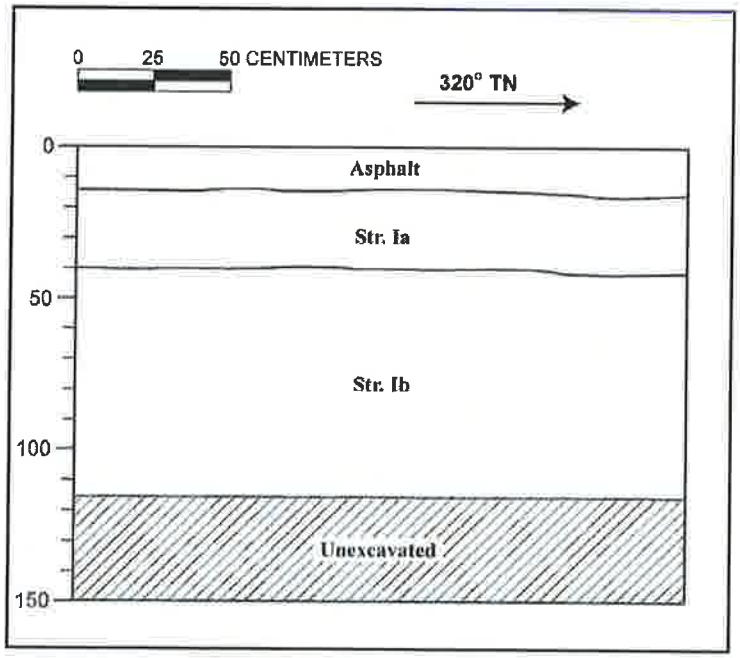

Figure 19. Profile #3; a section of the southwest wall of the utilities excavation trench on the *mauka* side of the Kalaniana'ole Highway median

Figure 20. Photo of the east wall of the drainage culvert excavation trench

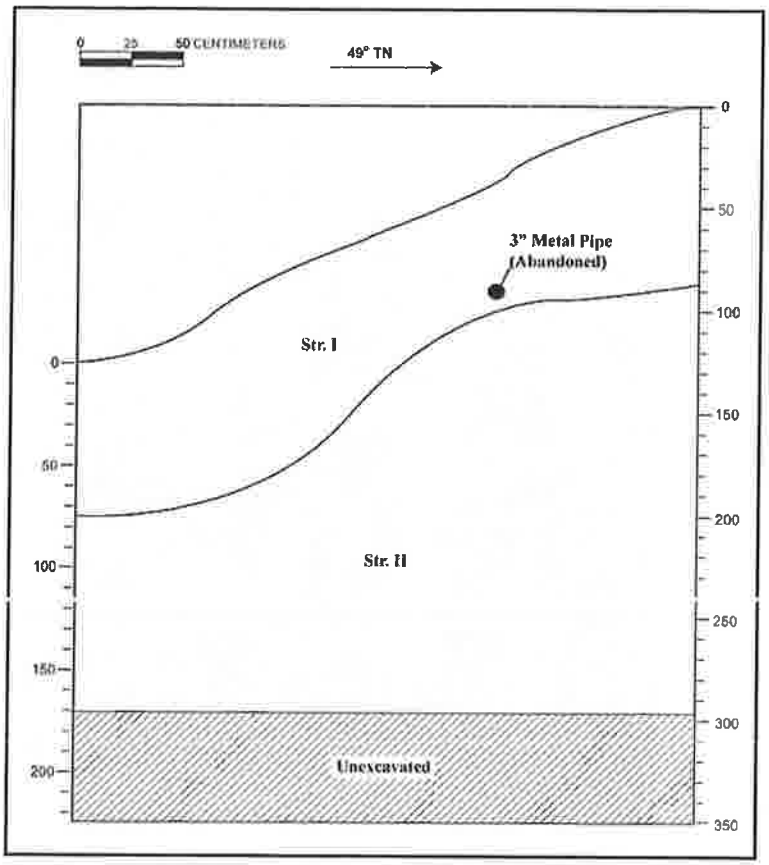

Figure 21. Profile #4; the east wall of the drainage culvert excavation trench

Section 6 Summary and Recommendation

In compliance with and to fulfill applicable Hawai'i state historic preservation legislation, CSH conducted archaeological monitoring of the project area for Phase I of the Kalaniana'ole Improvement Project. Fieldwork for this monitoring program was completed intermittently between May 26, 2009 and August 20, 2009. Associated ground disturbance included excavation related to the project area's development, such as trenching for utilities installation, and grading of shoulder areas for road widening and realignment.

The observed and documented stratigraphy included fill layers associated with landscaping and previous construction activities, and natural clay. Extensive earthmoving activity and importation of fill sediments into the project area is apparent. No artifacts, features, human remains, or significant historic properties were observed during monitoring of ground disturbing activities.

Background research and previous archaeological studies conducted within Waimānalo Valley indicate that this general area was a locus of traditional Hawaiian activity. Much of the land along the project area has been subjected to post-contact and modern development activities involving extensive ground disturbance, including the development of the highway itself. While it is likely that evidence of pre- and post-contact land use that may have been present in the project area has been destroyed, it is still possible that such remains might be encountered, particularly during subsurface excavation. This possibility is based on the close proximity of the project area to the focus of traditional Hawaiian habitation within Waimānalo Valley. Historic subsurface deposits may also be encountered, which would provide important information about early industry in the valley. It is thus recommended that the State Historic Preservation Division be consulted during any future planning of subsurface excavations to determine appropriate mitigation measures, including the need for an archaeological monitor during ground disturbing activities.

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Appendix A SHPD Acceptance of the Archaeological Monitoring Plan

LINDA LINGLE
GOVERNOR OF HAWAII

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
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KAPOLEI, HAWAII 96707

March 24, 2006

Dr. H.H. Hammatt
Cultural Surveys Hawaii, Inc.
P.O. Box 1114
Kailua, Hawai'i 96734

LOG NO: 2006.0839
DOC NO: 0603CM84
Archaeology

Dear Dr. Hammatt:

SUBJECT: **Chapter 6E-8 Historic Preservation Review (State DOT) –**
Revised Archaeological Monitoring Plan
Proposed Kalaniana'ole Highway Improvements Project
Waimānalo Ahupua'a, Ko'olaupoko District, Island of O'ahu
TMK: (1) 4-1-various plats and parcels

Thank you for the opportunity to review the aforementioned revised report by Hammatt *et al.* (2006), which we received on March 23, 2006. In a letter (LOG NO: 2006.0701, DOC NO: 0603CM52) dated March 15, 2006, we requested three minor additions to the monitoring provisions, which you have revised to our satisfaction.

The monitoring plan is accepted in fulfillment of the requirements of Hawai'i Administrative Rules (HAR) Chapter 13-279.

Please contact Chris Monahan at 808-692-8015, if you have questions about this letter.

Aloha,

Melanie Chinen, Administrator
State Historic Preservation Division

CM