Draft

Archaeological Inventory Survey Report for the Baranof Holdings Honolulu Project, Kakaʻako, Honolulu Ahupuaʻa, Honolulu District, Oʻahu TMKs: [1] 2-1-049:011, 032, and 033

Prepared for
Baranof Holdings

Prepared by
Sara M. Blahut, M.A.,
Michelle Pammer Clark, B.A.
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: KAKAAKO 233)

December 2018

Oʻahu Island	Maui Island	Hawaiʻi Island	Kauaʻi Island
P.O. Box 1114	1860 Main Street	399 Hualani St.	2970 Kele St
Kailua, HI 96734	Wailuku, HI 96793	Suite 124	Suite 114
Ph: (808) 262-9972	Ph: (808) 242-9882	Hilo, HI 96720	Līhuʻe, HI 96766
Fax: (808) 262-4950	Fax: (808) 244-1994	Ph. (866) 956-6478	Ph. (808) 245-9374

Management Summary

Reference	Archaeological Inventory Survey Report for the Baranof Holdings Honolulu Project, Kaka‘ako, Honolulu Ahupua‘a, Honolulu District, O‘ahu TMKs: [1] 2-1-049:011, 032, and 033 (Blahut et al. 2018)
Date	December 2018
Project Number	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: KAKAAKO 233
Investigation Permit Number	CSH conducted the archaeological monitoring fieldwork under archaeological fieldwork permit number 18-15, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-282.
Agencies	SHPD
Project Proponent	Baranof Holdings
Project Funding	Baranof Holdings
Land Jurisdiction	
Project Location	The project area is within a portion of the block bounded by Cooke Street, Kawaiaha‘o Street, Kamani Street, and Queen Street in the Kaka‘ako area of central Honolulu (TMKs: [1] 2-1-049:011, 032, and 033). The project area is plotted on a portion of the 1998 Honolulu U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle.
Project Acreage	The project area comprises approximately 1.03 acres (0.42 hectares).
Project Description	The project is understood to include the demolition of several existing buildings within the project area, grading of the land surface, excavation for foundations and utilities, and the construction of a five-story, ~~125,000-square-foot (sq ft) self-storage facility.~~
AIS Scope	This archaeological inventory survey (AIS) focused on archaeological historic properties and burial sites per the guidelines of HAR §13-276. The identification, documentation, and evaluation of in-use potential architectural historic properties, such as historic buildings and structures, was outside the scope of this AIS. Throughout this report the term “historic properties” is used and should be generally understood to refer to archaeological historic properties, unless otherwise stated.
Area of Potential Effect (APE)	The APE is considered to be the entire 1.03 acre project area
Historic Preservation Regulatory Context	This AIS investigation fulfills the requirements of HAR §13-276 and was conducted to identify, document, and assess significance of any historic properties. This document is intended to support the proposed project’s historic preservation review under Hawai‘i Revised Statutes (HRS) §6E-42 and HAR §13-284, as well as the project’s environmental review under HRS §343. It is also intended to support any project-related historic preservation consultation with stakeholders, such as state

132,619 SF mixed use building, consisting of self storage and ground-floor retail

Borden	and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups. The project was introduced in a Literature Review and Field Inspection (LRFI) document (Farley et al. 2018) as part of a 6E Submittal Request from Agency for Determination Letter per HAR §13-275, submitted to SHPD on 6 June 2018 (LOG: 2018.01354). A meeting regarding the project was held on 7 June 2018 between Dr. Susan Lebo (SHPD), David Shideler (CSH), and Nolan ~~Bordan~~ (Baranof Holdings). SHPD recommended an AIS, and in consultation with SHPD a proposed testing strategy of 8 subsurface test excavations was agreed upon.
Fieldwork Effort	AIS fieldwork was conducted between 14 September 2018 and 04 October 2018 by CSH archaeologists, Sara Blahut, M.A., Jessica Burden, B.A., David Crowell, M.A., Abundanzia Delavega, B.A., Lisa Manirath, M.A., and Laura Vollert, B.A., under the direction of Project Manager, Douglas Borthwick, B.A., Project Director, Michelle Pammer Clark, B.A., and the general supervision of Principal Investigator, Hallett H. Hammatt, Ph.D. This work required approximately 16 person-days to complete.
Historic Properties Identified and Historic Property Significance	One new historic property was identified during AIS testing: State Inventory of Historic Places (SIHP) # 50-XX-XX-XXXX, subsurface structural remnants, is assessed as significant per HAR §13-284 under Criterion d (have yielded, or may be likely to yield, information important for research on prehistory or history).
Effect Recommendation	The proposed project will potentially affect one historic property (SIHP # -XXXX, subsurface structural remnants) identified within the project area. Under Hawai‘i State historic preservation review legislation, the project specific effect recommendation is “effect, with agreed upon mitigation commitments” (in accordance with HAR §13-284-7).
Mitigation Recommendations	In order to mitigate adverse impacts to SIHP # -XXXX, as well as to any additional historic properties that may be present within the project area, it is recommended that project construction proceed under an archaeological monitoring program. This monitoring program will facilitate the identification and proper treatment of any future exposures of SIHP # -XXXX as well as any other historic properties (burial or non-burial) that may be discovered within the project area.

Table of Contents

List of Figures

List of Tables

Section 1 Introduction

1.1 Project Background

At the request of Baranof Holdings, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological inventory survey report (AISR) for the Baranof Holdings Honolulu project, Kaka‘ako, Honolulu Ahupua‘a, Honolulu District, O‘ahu, TMKs: [1] 2-1-049:011, 032, and 033. The project area is within a portion of the block bounded by Cooke Street, Kawaiaha‘o Street, Kamani Street, and Queen Street. The project area is depicted on a portion of the 1998 Honolulu U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2013 aerial photograph (Figure 3).

The project area comprises 45,000 square feet (sq ft) or 1.03 acres (0.42 hectares), including three parcels of the following sizes:

- TMK: [1] 2-1-049:011 (30,000 sq ft)
- TMK: [1] 2-1-049:032 (10,000 sq ft)
- TMK: [1] 2-1-049:033 (5,000 sq ft)

The project will include the demolition of several existing buildings within the project area, grading of the land surface, excavation for foundation and utilities, and the construction of a five-story, 125,000-sq-ft self-storage facility.

1.2 Historic Preservation Regulatory Context and Document Purpose

This archaeological inventory survey (AIS) investigation fulfills the requirements of HAR §13-276 and was conducted to identify, document, and make significance assessments of any historic properties. This document is intended to support the proposed project's historic preservation review under Hawai‘i Revised Statutes (HRS) §6E-42 and Hawai‘i Administrative Rules (HAR) §13-284, as well as the project's environmental review under HRS §343. It is also intended to support any project-related historic preservation consultation with stakeholders such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups.

The area of potential effect (APE) is considered here to be the entirety of the 1.03-acre (0.42-hectare) project area.

The project was introduced in a Literature Review and Field Inspection (LRFI) document (Farley et al. 2018) as part of a 6E Submittal Request from Agency for Determination Letter per HAR §13-275, submitted to SHPD on 6 June 2018 (LOG: 2018.01354). A meeting regarding the project was held on 7 June 2018 between Dr. Susan Lebo (SHPD), David Shideler (CSH), and Nolan Bordan (Baranof Holdings). SHPD recommended an AIS, and in consultation with SHPD a proposed testing strategy of 8 subsurface test excavations was agreed upon.

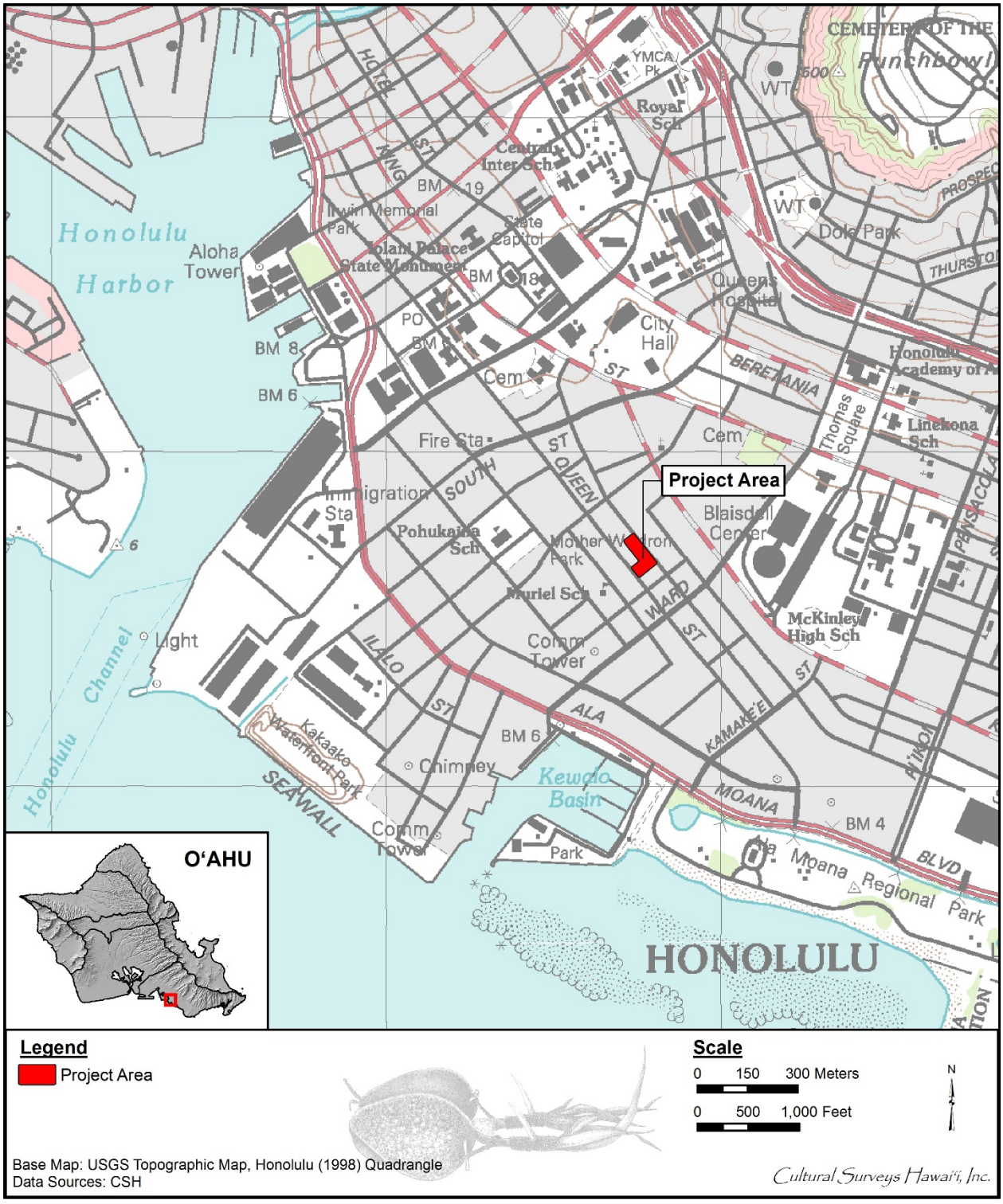

Figure 1. Portion of the 1998 USGS 7.5-minute topographic quadrangle showing the location of the project area

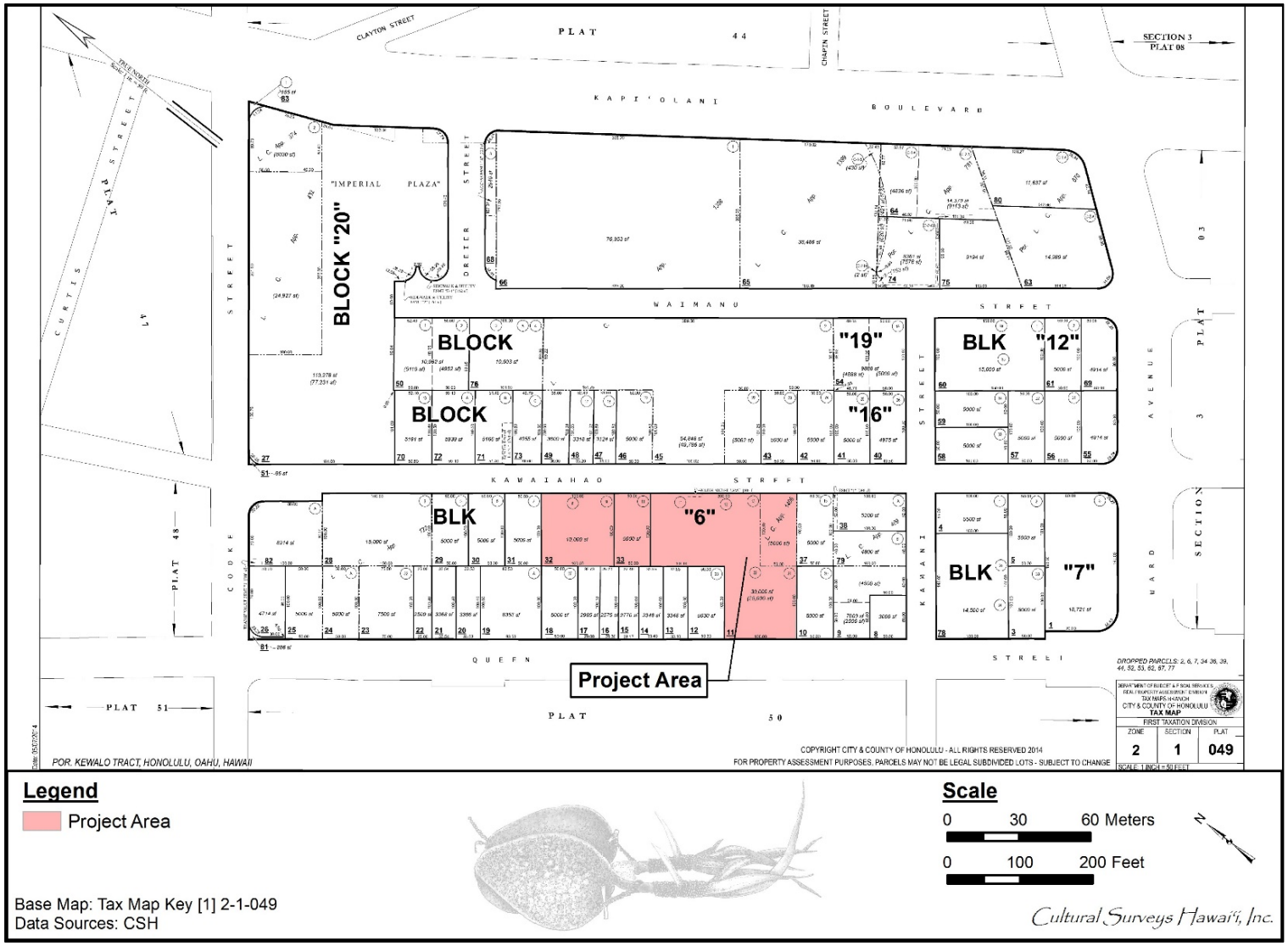

Figure 2. TMK: [1] 2-1-049 showing the project area (Hawai‘i TMK Service 2014)

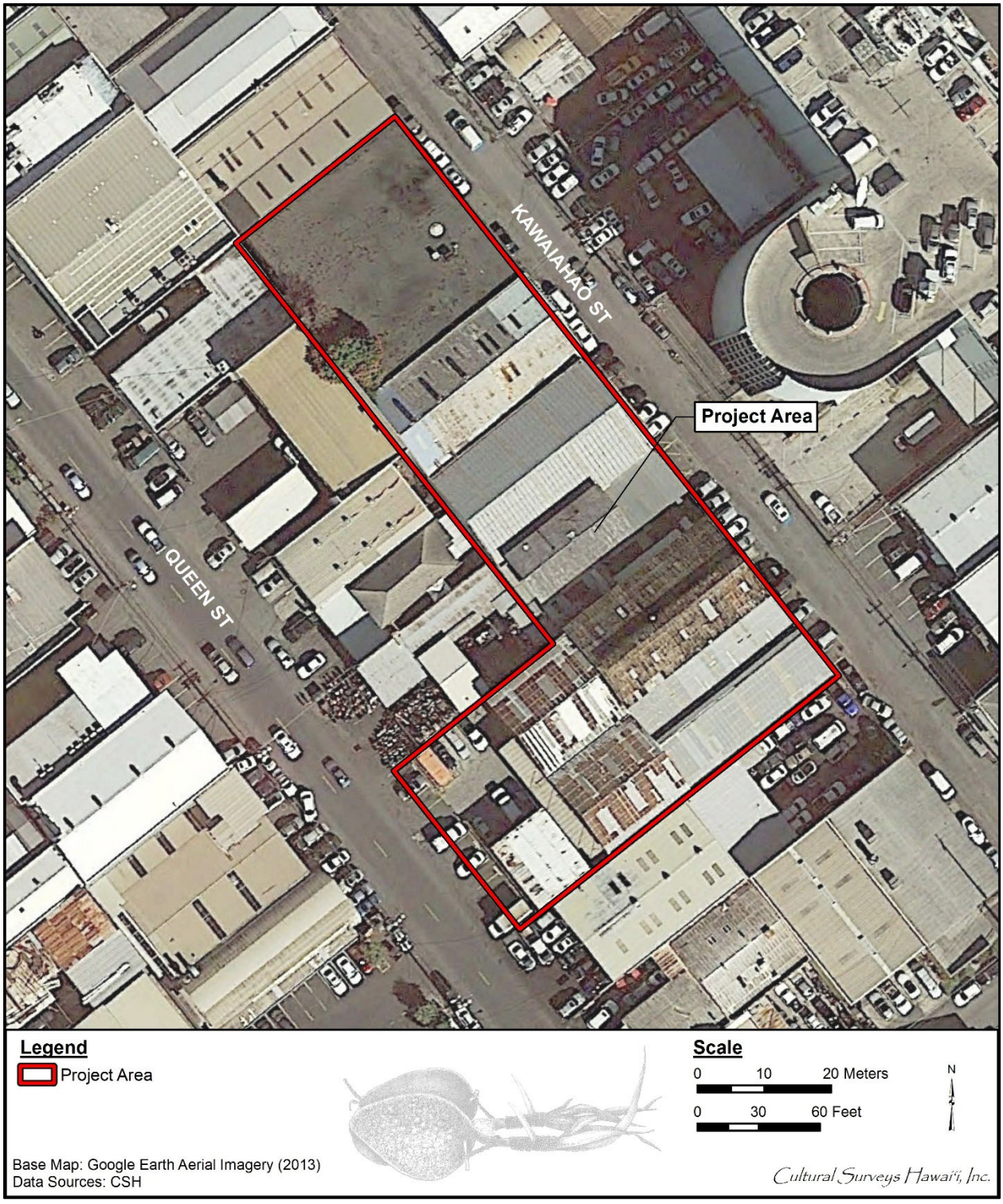

Figure 3. Aerial photograph of the project area (Google Earth Imagery 2013)

1.3 Environmental Setting

1.3.1 Natural Environment

The current project area is within a portion of O‘ahu called the Honolulu Plain, an area generally less than 4.5 m (15 ft) above mean sea level (Davis 1989:5). The Honolulu Plain is stratified with late-Pleistocene coral reef substrate overlaid with calcareous marine sand or terrigenous sediments and stream-fed alluvial deposits (Armstrong 1983:36). The modern Hawaiian shoreline configuration is primarily the result of 1) rising sea level following the end of the Pleistocene (Macdonald et al. 1983; Stearns 1978); 2) the mid- to late- Holocene approximately 1.5-2.0 m highstand of the sea (see summary in Dye and Athens 2000:18–19); and 3) pre-Contact and post-Contact human landscape modifications.

At the end of the Pleistocene, between approximately 20,000 and 5,000–6,000 years ago, water previously locked in glacial ice returned to the world’s oceans, and the sea level rose over 100 m to approximately its current level. In the vicinity of the project area, rising sea levels flooded the previously dry, earlier Pleistocene reef deposits, which had formed hundreds of thousands of years previously when sea level was comparable to modern levels. When sea levels reached approximately modern levels, the now coastal regions became depositional environments, where for tens of thousands of years previously, during the lower sea levels, they had been erosional environments.

A highstand of the sea for the Hawaiian Islands, approximately 1.5 to 2.0 m above present sea level, has been well documented between 4,500 and 2,000 years ago (Fletcher and Jones 1996; Grossman and Fletcher 1998; Grossman et al. 1998; Harney et al. 2000; Stearns 1978). During this highstand, there appears to have been an increase in coral reef production and the production of detrital reef sediments. Littoral environments appear to have been augmented substantially by the deposition of marine sediments. “What this means is that the great shoreline sand berms must have developed around the islands at this time because this was when calcareous sand was being produced and delivered to the shorelines in large quantities” (Dye and Athens 2000:19).

The Honolulu coastline was likely greatly affected by the deposition of marine sediments during this elevated sea level. The subsequent drop in sea level to its present level, ca. 2,000 years ago, most likely created a slightly erosional regime that may have removed sediments deposited during the preceding period of deposition (Dye and Athens 2000:19). However, the net gain in sediments would have been substantial. In 1911, it was estimated that about one-third of the Honolulu Plain was a wetland (Nakamura 1979:65, citing a Hawaiian Territory Sanitary Commission report). Pre-Contact Hawaiians used the lagoonal/estuary environment of the Honolulu plain to construct fishponds. Fishpond walls served as sediment anchors for the accumulation of detrital reef sediments. They also likely affected along-shore sedimentary transport, resulting in new littoral deposition and erosion patterns. In the post-Contact period, when the fishponds were no longer utilized, they became obvious locations for the deposition of fill. These reclaimed areas provided valuable new land for expanding urban development near the heart of growing urban Honolulu.

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area’s soils consist of Fill land, mixed (FL) (Figure 4). FL soils are described as follows:

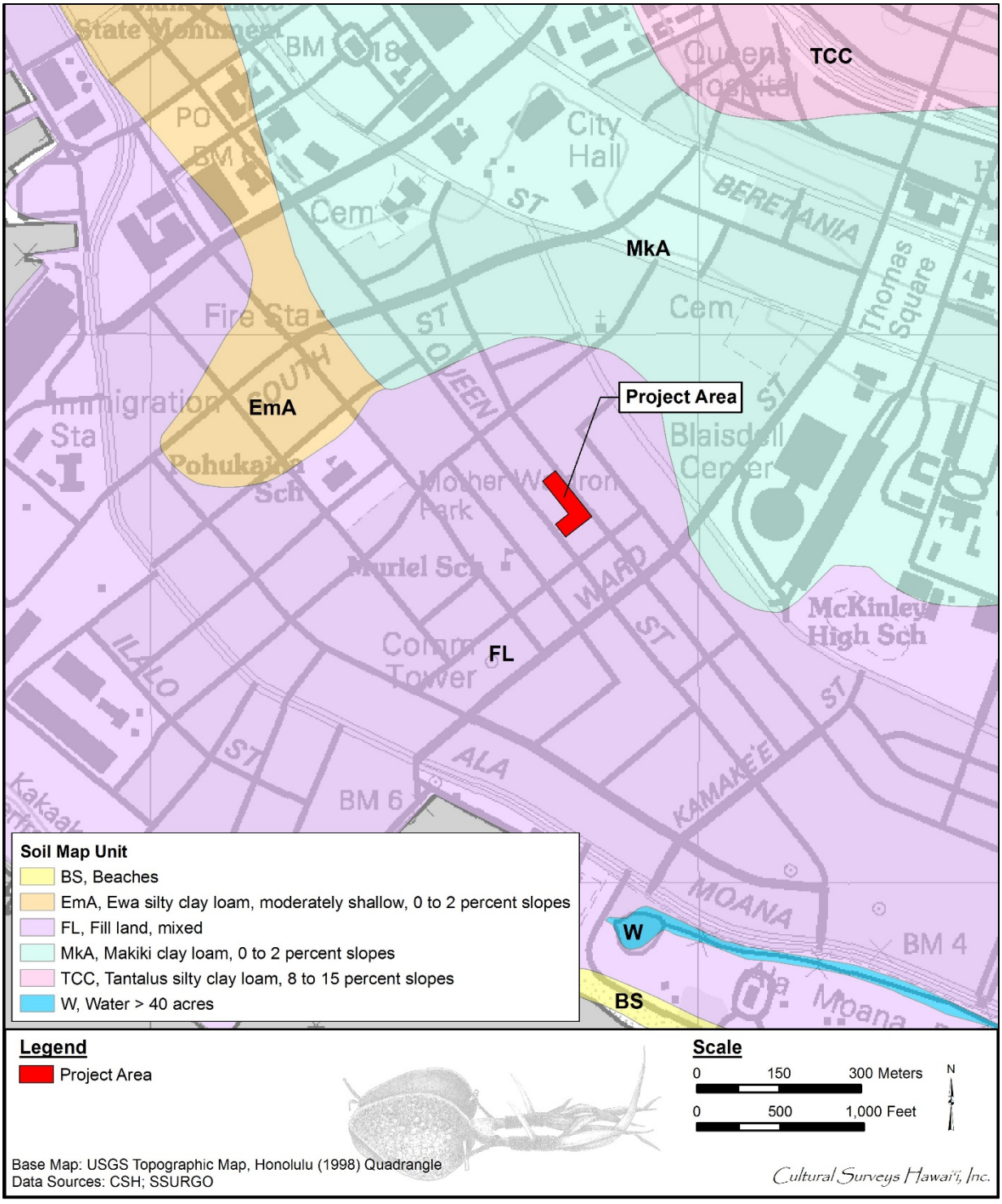

Figure 4. Portion of the 1998 Honolulu USGS 7.5-minute topographic quadrangle with with overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972; USDA SSURGO 2001), indicating soil types within and surrounding the project area

> This land type occurs mostly near Pearl Harbor and in Honolulu, adjacent to the ocean. It consists of areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources. [Foote et al. 1972:31]

The project area is approximately 1,191 m (3,907 ft) inland and is situated between the Nu‘uanu Stream 1,793.5 m (5,884 ft) to the west and the Ala Wai Canal 2,094.5 m (6,871 ft) to the east. The general area has an average temperature of 23.7° C (74.6° F) and receives approximately 691.4 mm (27.2 inches) of rain per year (Giambelluca et al. 2013, 2014). This amount of rainfall would be marginal at best for non-irrigated agriculture.

1.3.1 Built Environment

The project area is within central Honolulu and is surrounded by modern, urban development including warehouses, commercial buildings, parking lots and parking decks, sidewalks, utility infrastructure, and landscaped margins.

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this AIS under archaeological fieldwork permit numbers 18-15, issued by the SHPD pursuant to HAR §13-282. Fieldwork was conducted between 14 September 2018 and 04 October 2018 by CSH archaeologists, Sara Blahut, M.A., Jessica Burden, B.A., David Crowell, M.S., Abundanzia Delavega, B.A., Lisa Manirath, M.A., and Laura Vollert, B.A., under the direction of Project Manager, Douglas Borthwick, B.A., Project Director, Michelle Pammer Clark, B.A., and the general supervision of Principal Investigator, Hallett H. Hammatt, Ph.D. This work required approximately 16 person-days to complete.

In general, fieldwork included 100% pedestrian inspection of the project area, GPS data collection, and subsurface testing.

2.1.1 Pedestrian Survey

A 100%-coverage pedestrian inspection of the project area was undertaken for the purpose of historic property identification and documentation. The pedestrian survey was accomplished through systematic sweeps spaced 5 m apart.

2.1.2 Global Positioning System (GPS) Data Collection

CSH personnel recorded exterior test excavation locations using a Trimble Pro XH (sub-foot horizontal accuracy). Trimble GPS data was post-processed using Trimble's Pathfinder Office 4.2. Project-related GIS work was completed using ESRI's ArcView 10.4.

2.1.3 Subsurface Testing

The subsurface testing program was backhoe assisted and involved 8 test excavations. In general, linear trenches measuring approximately 6 m (20 ft) long and 0.9 m (3 ft) wide were excavated within the project area.

A standard backhoe with a 2-ft-wide bucket assisted with each excavation. At least two archaeologists monitored machine excavation, one positioned at either end of the excavation to monitor both removal of material from the trench and the emptying of the excavator bucket on the adjacent backdirt pile. An archaeologist routinely entered the trenches during excavation to clean the base and sides of the trench manually as excavation progressed

A stratigraphic profile of each test excavation was drawn and photographed. The observed soils and sediments were described using standard USDA soil description observations/terminology. Soil and sediment descriptions included Munsell color; texture; consistence; structure; plasticity; cementation; origin of sediments; descriptions of any inclusions, such as cultural material and/or roots; lower boundary distinctiveness and topography; and other general observations. Where stratigraphic anomalies or potential cultural deposits were exposed, these were carefully represented on test excavation profile maps.

2.1.1 Sampling

Sampling of potential subsurface cultural deposits was carried out when possible to characterize the cultural content and potential time frame or chronology of these layers. In general, sampling

consisted of 1-2 liter bulk samples taken from discrete areas of the test excavation sidewall or excavator bucket, as well as collection of all faunal osseous remains and diagnostic (identifiable or datable) artifacts. These items were collected for further analysis in the CSH laboratory. Very large and/or non-diagnostic artifacts were photographed in the field and not collected.

Bulk samples, faunal remains, and diagnostic (identifiable or datable) artifacts were collected from several test excavations and were analyzed as described below.

2.2 **Laboratory Methods**

Materials collected during AIS fieldwork were identified and catalogued at CSH's laboratory facilities on O‘ahu. Analysis of collected materials was undertaken using standard archaeological laboratory techniques. Materials were washed, sorted, measured, weighed, described, and/or photographed.

2.2.1 Artifact Analysis

Artifact analysis was conducted by Ashley Goodfellow, B.A. In general, artifact analysis focused on establishing, to the greatest extent possible, material type, function, cultural affiliation, and age of manufacture. As applicable, artifacts were washed, sorted, measured, weighed, described, photographed, and catalogued. Diagnostic (dateable or identifiable) attributes of artifacts were researched.

Historic artifacts were identified using standard reference materials (e.g., Elliott and Gould 1988; Fike 1987; Godden 1964; Kovel and Kovel 1986; Lehner 1988; Lindsey 2014; Lister and Lister 1989; Majewski and O‘Brien 1987; Millar 1988; Munsey 1970; Toulouse 1971; and Whitten 2009), as well as resources available on the internet.

2.2.2 Faunal Analysis

Faunal analysis generally focused on species identification and evidence of food consumption. Collected non-human vertebrate skeletal material was identified to the lowest possible taxa and analyzed using an in-house comparative collection and reference texts (e.g., Adams and Crabtree 2008; France 2009) by CSH osteologist, Allison Hummel, M.Sc. with training in faunal analysis. The material was weighed in grams and cataloged according to provenience.

2.2.3 Bulk Sample Analysis

Bulk soil and sediment samples collected from potential cultural strata and/or features were examined within the CSH laboratory to aid in characterizing the cultural content and chronology of these deposits. All samples were labeled with provenience information, and the volume of each sample was recorded so that comparisons could be made between samples. In the lab, bulk samples were screened through 1/16-inch wire mesh. Wet screening of samples was performed as necessary. As applicable, any cultural material was washed, sorted, measured, weighed, described, photographed, identified, and catalogued.

2.3 **Disposition of Materials**

The Hawai‘i State rules governing archaeological inventory surveys and reports (HAR §13-276) state the following regarding archaeological inventory survey collections from private lands:

> Arrangements shall be made with private landowners on the disposition of collections from their lands. If private landowners request archiving of material, then the archive shall be determined in consultation with the SHPD. [HAR §13-276-6]

All materials collected during the current AIS, including samples and artifacts (but excluding human remains and grave goods), are the property of the landowner. Upon conclusion of the AIS, all collected materials (excluding human remains and grave goods), will be temporarily curated at the CSH office in Waimānalo, O‘ahu, Final disposition of the collection will be determined in consultation with the landowner and SHPD, per HAR §13-276-6. All data generated during the course of the archaeological inventory survey will be stored at the CSH offices.

2.4 **Research Methods**

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i at Mānoa, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2000). This research provided the environmental, cultural, historic, and archaeological background for the project area.

Section 3 Background Research

3.1 Traditional and Historical Background

3.1.1 Traditional Hawaiian History and Accounts

The current project area is within the Kaka‘ako Community Development District. However, the boundary of this development district is not the same as the ancient boundary of Kaka‘ako. The development district comprises the *‘ili* (land section) of Kaka‘ako and lands once known as Ka‘ākaukukui, Kukuluāe‘o, and Kewalo, as well as even smaller areas—portions of *‘ili*—called Kawaiaha‘o, Honuakaha, Ka‘ala‘a, ‘Āpua, ‘Auwaiolimu, Pualoalo, Pu‘unui, and Kolowalu. The current project area is within the *‘ili* of Kewalo. Kewalo literally means “the calling,” as in an echo (Pukui et al. 1974:109).

On southeastern O‘ahu, *ahupua‘a* (traditional land division) generally extended from the Ko‘olau mountain range on the *mauka* (inland, toward the mountains) side to the seacoast on the *makai* (toward the ocean) side. However, in the Honolulu/Waikīkī area, land divisions became more complicated. Because of the early development and importance of the coastal areas, several *ahupua‘a* such as Nu‘uanu, Pauoa, Makiki, Mānoa, and Pālolo became “cut off” from the sea. In order to retain access to all of the resources of the land, several *‘ili* (land section smaller than an *ahupua‘a*) had *lele*, or jump lands, which were smaller contiguous or non-contiguous parcels in the uplands, in the river valleys, and along the coast. Kewalo was one of these *lele* lands, which were often independent of the adjacent *ahupua‘a*. Kewalo had a narrow upland section (often called “Kewalo Uka”), a larger lower river valley/plain section, and a small coastal section (called “Kewalo Kai”) joined by a small strip of land.

John Papa ‘Ī‘ī mentions some of these lands while discussing early nineteenth century trails in the Honolulu and Waikīkī area (Figure 5). The fact that a trail traversed this region characterized by ponds, marshlands, and *lo‘i* (irrigated fields) suggests the trail, especially as it neared the coastline at Kālia, must have run on a sand berm raised above surrounding wetlands and coral flats. On this inland trail (probably close to the current alignment of Queen Street and southwest or *makai* of the current project area), walking from Waikīkī to Honolulu, “The trail from Kalia led to Kukuluaeo, then along the graves of those who died in the smallpox epidemic of 1853, and into the center of the coconut grove of Honuakaha” (‘Ī‘ī 1959:89).

The smallpox epidemic graves referred to are within the Honuakaha Cemetery, designated State Inventory of Historic Places (SIHP) # 50-80-14-3712, near the corner of Halekauwila and South streets, *makai* of Kawaiaha‘o Church and well northwest of the current project area. Honuakaha was a settlement generally between Punchbowl and South streets, on the *makai* side of Queen Street.

3.1.1.1 Mythological Accounts

Kaka‘ako is mentioned in Moke Manu’s (1898:230–249) version of the legend of Kū‘ula, the god presiding over the fish, and his son ‘Ai‘ai. ‘Ai‘ai was the first to teach the Hawaiians how to make various fishing lines and nets, the first to set up a *ko‘a kū‘ula*, a rock shrine on which the fishermen would place their first catch as an offering to Kū‘ula, and the first to set up *ko‘a ia*, fishing stations where certain fish were known to gather. Leaving his birthplace in Maui, ‘Ai‘ai

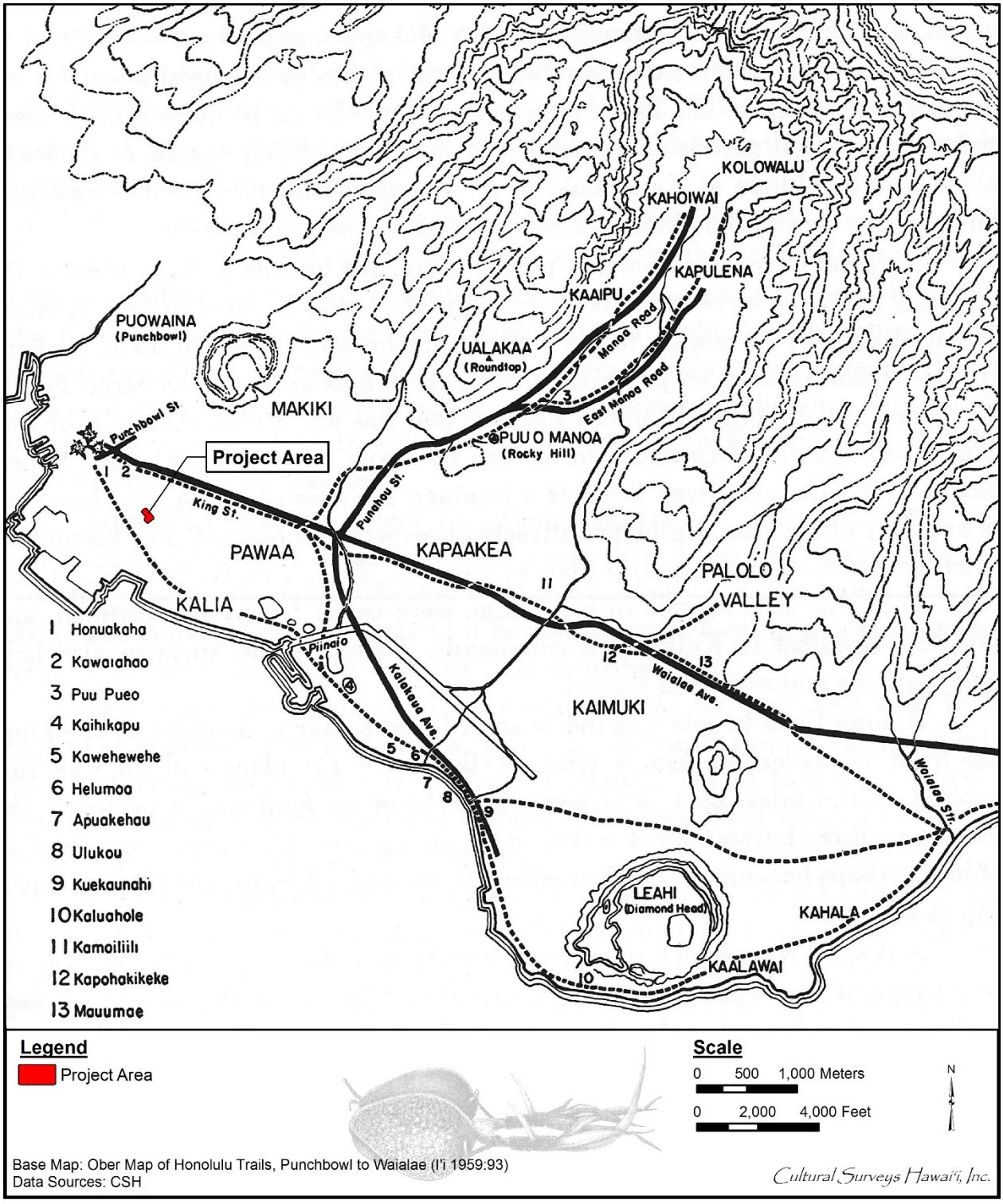

Figure 5. Portion of a map showing early nineteenth century (ca. 1810) trails on the southwest coast of O’ahu with the locations of Honuakaha, Kukuluāe‘o, and Kālia (Ober ca. 1810 in Ī‘ī 1959)

traveled around the islands, establishing *ko‘a kū‘ula* and *ko‘a ia*. On O‘ahu, he landed first at Makapu‘u in Ko‘olaupoko, then traveled clockwise around the island as follows:

> Aiai came to Kalia [Waikīkī] and so on to Kakaako. Here he was befriended by a man named Apua, with whom he remained several days, observing and listening to the murmurs of the chief named Kou. This chief was a skillful aku [*Katsuwonus pelamis*; bonito] fisherman, his grounds being outside of Mamala until you came to Moanalua. There was none so skilled as he, and generous withal, giving akus to the people throughout the district. [Manu 1898:242]

The Kaka‘ako area is briefly mentioned in the legend of Hi‘iaka, who was the beloved sister of the Hawaiian volcano goddess, Pele. Hi‘iaka and her companions had been traveling around O‘ahu on the land trails, but decided to travel from Pu‘uloa (on Pearl Harbor in ‘Ewa) to Waikīkī by canoe. At Pu‘uloa, Hi‘iaka met a party who were planning on traveling to the house of the chiefess Pele‘ula in Waikīkī. Hi‘iaka recited a chant, telling the people that although they were going by land, and she was going by sea, they would meet again in Kou (ancient name of Honolulu). One portion of the chant mentions the place Ka‘ākaukukui, with reference to a pool, possibly a reference to the salt ponds of the area:

A pehea lā au, e Honoka‘upu, ku‘u aloha	And what of me, O Honoka‘upu, my love
I ka welelau nalu kai o Uhi, o ‘Ōa	Upon the crest of the surf at Uhi and ‘Oā
‘O nā makai ke ao (pō) o poina	Eyes in the living realm (night) of oblivion
Ma hea lā wau, e ke aloha lā	Where am I, O my love
‘O Kou ka papa	Kou is the coral flat
‘O Ka‘ākaukukui ka loko	Ka‘ākaukukui is the pool
‘O ka ‘alamihi a‘e nō	Some *‘alamihi* indeed
‘O ka lā a pō iho	Wait all day until night
Hui aku i Kou nā maka.	Friends shall meet in Kou.

[Ho‘oulumāhiehie 2008a:297, 2008b:277]

The exact meaning of the word *alamihi* within this chant is unknown. *‘Alamihi* is the name of a native Hawaiian small black crab (*Metopograpsus thukuhar*), a scavenger often associated in Hawaiian sayings with corpse-eating (Pukui and Elbert 1986:18). *Alamihi* is also used as a place name that can mean “path [of] regret” (Pukui et al. 1974:9).

The chief Huanuikalala‘ila‘i governed Pu‘ukea Heiau in the land section of Kukuluāe‘o in Kaka‘ako, according to Kamakau (1991:24). Pu‘ukea literally means “white hill” (Pukui et al. 1974:199) and is also the name of a small land division within the *‘ili* of Kukuluāe‘o that is mentioned in at least two Land Commission cases, Land Commission Award (LCA) 1502 (not awarded) and LCA 1504. LCA 1504 is near the junction of Halekauwila Street and Cooke Street, two blocks west of the current project area. It is common for a *heiau* (pre-Christian place of worship) to have the same name as the *‘ili* in which it is located, so it is possible Pu‘ukea Heiau was also near the junction of Halekauwila and Cooke streets. Most of the house sites in the mid-nineteenth century in Kaka‘ako were near Halekauwila Street and Queen Street, *mauka* of the low-

lying coastal swamplands on higher, dry ground. It is possible the *heiau* platform or the area that it was built on was one of the few elevated locations in the flat, low-lying swamp that surrounded it, and thus gained the name *pu‘u kea*, or “white hill.”

The present study area is along the western boundary of Kewalo, a region and *‘ili* of Honolulu Ahupua‘a shown on early historical maps. Kewalo once had a freshwater spring in the central portion (current location unknown), as seen in the proverb “*Ka wai huahua‘i o Kewalo*,” which translates as “The bubbling water of Kewalo.” Two springs are mentioned in a traditional story of the Waters of Ha‘o. This legend tells of two children of the chief Ha‘o who ran away from their cruel stepmother. They stayed a time with the caretakers of Kewalo Spring, which may have been close to the trail that connected Waikīkī and Honolulu. The children then left when they heard the chiefess had sent men to look for them. The two children followed the moonlit trail across the plain toward Kou (Honolulu), but finally collapsed from weariness and thirst. In a dream, the boy’s mother told him to pull up a plant close to his feet. When he did, he found a spring under the plant, which was called the Water of Ha‘o, or Kawaiaha‘o. This spring is at the western end of the trail, near Kawaiaha‘o Church in Kaka‘ako (Pukui and Curtis 1988:87–89).

The Kewalo area also once had a famous fishpond, which was used to drown members of a pariah caste (*kauwā*) or *kapu* (taboo) breakers as the first step in a sacrificial ritual known as Kānāwai Kaihehe‘e (Kamakau 1991:6) or Ke-kai-he‘ehe‘e, which translates as “sea sliding along,” suggesting the victims were slid under the sea (Westervelt 1991:63). Sterling and Summers (1978) describe Kewalo as follows:

> A fishpond and surrounding land on the plains below King Street, and beyond Koula. It contains a spring rather famous in the times previous to the conversion to Christianity, as the place where victims designed for the Heiau of Kanelaau on Punchbowl slopes, was first drowned. The priest holding the victim’s head under water would say to her or him on any signs of struggling, ‘Moe malie i ke kai o ko haku.’ ‘Lie still in the waters of your superiors.’ From this it was called Kawailumalumai, ‘Drowning waters.’ [Sterling and Summers 1978:292]

Kewalo is mentioned in a legend as a marsh near the beach, where tall *pili* grass was growing. Kapoi went to this area to get thatching for his house. While there, Kapoi found seven owl eggs and took them home to cook for his supper. An owl perched on the fence surrounding his house and cried out “O Kapoi, give me my eggs!” Kapoi eventually returned the eggs, and the owl became his family god and instructed him to build a *heiau* named Mānoa. Kapoi built the *heiau* and placed some bananas on the altar as a sacrifice. He also set the *kapu* days for its dedication. The king of O‘ahu, Kākuhihewa, who was building his own *heiau* in Waikīkī, had made a law that if any man among his people erected a *heiau* and set the *kapu* before him, that man should die. Kapoi was seized and taken to the *heiau* of Kūpalaha, at Waikīkī. The owl that Kapoi had first met secured the aid of the king of the owls at Owl’s Hill (Pu‘u Pu‘eo) in Mānoa, who gathered all of the owls of the islands; they flew to Kūpalaha and battled the king’s men, who finally surrendered. From this time the owl was considered a powerful *akua* (god). The battle area was known as Kukaeunahio-ka-pueo, which means “the confused noise of owls rising in masses” (Westervelt 1991:135–137; Thrum 1998:200–202).

Kewalo was also the birthplace of the great chief Hua-nui-ka-la-la‘ila‘i, as mentioned in this *mele* (story) chanted by Kamakau (1991:24):

‘O Hua-a-Kamapau ke ‘li‘i	Hua-a-Kamapau the chief
O Honolulu o Waikīkī	O Honolulu, of Waikīkī
I hānau no la i kahua la i Kewalo,	Was born at Kewalo,
‘O Kālia la kahua	Kālia was the place [the site]
O Makiki la ke ēwe,	At Makiki the placenta,
I Kānelā‘au i Kahehuna ke piko,	At Kānelā‘au at Kahehuna the navel cord,
I Kalo i Pauoa ka ‘a‘a;	At Kalo at Pauoa the caul;
I uka i Kaho‘iwai i	Upland at Kaho‘iwai, at
Kanaloaho‘okau . . .	Kanaloaho‘okau. . .

The chief Hua was famous for his love of cultivation and his care for the people. His *heiau* was in Kukuluāe‘o (*‘ili* adjacent to Kewalo) in Honolulu, called Pu‘ukea; it is mentioned in a traditional *wānana* (prophecy) recorded by Kamakau (1991:24–25):

[*Ka makaua ua kahi o ‘Ewa]*	[The increasing “first rain” of ‘Ewa]
Ua puni ka i‘a o Mokumoa,	Overcomes the fish of Mokumoa,
Ua kau i‘a ka nene;	Washes up fish to the nene plants;
Ua ha‘a kalo ha‘a nu;	Lays low the taro as it patters down;
Ha‘a ka i‘a o kewalo,	Lays low the fish of Kewalo,
Ha‘a na ‘ualu o Pahua,	Lays low the sweet potatoes of Pahua,
Ha‘a ka mahiki i Pu‘ukea,	Lays low the mahiki grass at Pu‘ukea,
Ha‘a ka unuunu i Pele‘ula,	Lays low the growing things at Pele‘ula
Ha‘a Makaaho i ke ala.	Lays low Makaaho [Makāho] in its path
E Kū e, ma ke kaha ka ua, e Kū,	O Kū the rain goes along the edge [of the island], O Kū
[I ‘ai ‘na ka i‘a o Maunalua] . . .	[“Eating” the fish of Maunalua] . . .

The chant mentions the *mahiki* grass of Pu‘ukea Heiau. The Hawaiian term *mahiki* means “to peel off” (Andrews 2003:369). The word was also used to describe a rite to exorcise an evil spirit, as the skilled *kahuna* (priest) “peeled” the malicious spirit from the afflicted. Used in the ritual was a shrimp called *mahiki* or a native grass called *mahiki*. *Mahiki*, or *‘aki‘aki*, is a tufted rush (*Sporobolos* sp.) found near the seashore. The ethnologist Mary Kawena Pukui states that even during her youth, parents put “*ti* leaves, or *hala*, or *‘aki‘aki* grass, in a little sea-salt water and [would] have the child drink it” (Pukui et al. 1972:163) to rid them of badly behaving spirits. The use of this grass in a ritual may explain its association with a ceremonial *heiau*, or it may simply be that the Kaka‘ako coast was a good habitat and thus a favored place for healers to collect this type of grass.

From these legendary accounts it can be seen that Kewalo was traditionally noted for its fishponds and salt pans; for the marshlands where *pili* grass and other plants could be collected;

for ceremonial sites such as the Kewalo spring, the fishpond at which sacrifices were made, and Pu‘ukea Heiau; and for the trails that allowed transport between the more populated areas of Waikīkī and Honolulu. Important chiefs were born in the area and conducted religious rites, and commoners traveled to the area to procure food and other resources; some commoners probably also lived in the area, possibly adjacent to the ponds and trails.

3.1.1.2 Traditional History

Kewalo is between two centers of population, Honolulu and Waikīkī, on the southern shore of pre-Contact O‘ahu. In Waikīkī, a system of irrigated taro *lo‘i* (irrigated pond fields) fed by streams descending from Makiki, Mānoa, and Pālolo valleys blanketed the plain, and networks of fishponds dotted the shoreline. Similarly, Kou—the area of downtown Honolulu surrounding the harbor—possessed shoreward fishponds and irrigated fields watered by ample streams descending from Nu‘uanu and Pauoa valleys. The pre-Contact population and land use patterns of Kewalo may have derived from its relationship to these two densely populated areas, and it may have participated in some of the activities associated with them. Thus, the attempt to reconstruct the Kewalo region (and the present study area) as it existed for the Hawaiians during the centuries before Western Contact and the modern urbanization that reconfigured the landscape must begin with accounts of Kou and Waikīkī.

Waikīkī is the name of a large *ahupua‘a* encompassing lands stretching from Honolulu to Maunalua Bay. Within that *ahupua‘a*, by the time of the arrival of Europeans during the late eighteenth century, the area today known as Waikīkī had long been a center of population and political power on O‘ahu. According to Martha Beckwith (1940:383), by the end of the fourteenth century, Waikīkī had become “the ruling seat of the chiefs of O‘ahu.” The preeminence of Waikīkī continued into the eighteenth century and is confirmed by the decision of Kamehameha, in the midst of unifying the islands, to reside there after winning control of O‘ahu by defeating the island’s chief, Kalanikūpule.

Chiefly residences were only one element of a complex of features sustaining a large population that characterized Waikīkī up through pre-Contact times. Beginning by at least the fifteenth century, a vast system of irrigated taro fields was constructed, extending across the littoral plain from Waikīkī to lower Mānoa and Pālolo valleys. This field system, an impressive engineering design traditionally attributed to the chief Kalamakua, took advantage of streams descending from Makiki, Mānoa, and Pālolo valleys, which also provided ample fresh water for Hawaiians living in the *ahupua‘a*. Water was also available from springs in nearby Mō‘ili‘ili and Punahou. Closer to the Waikīkī shoreline, coconut groves and fishponds dotted the landscape. A continuous zone of population and cultivation from the shoreline of present-day Waikīkī Beach extended north well into Mānoa Valley. The western and eastern bounds of this zone are less clear, and there are no specific references to Waikīkī’s abundance reaching into the Kewalo region.

A basic description of Honolulu and Kou, up to the time of Western Contact, is given by E.S. Craighill and Elizabeth Handy:

> What is now Honolulu was originally that flatland area between the lower ends of Nu‘uanu and Pauoa Valleys and the harbor. [W.D.] Westervelt . . . wrote that ‘Honolulu was probably a name given to a very rich district of farm land near what is now . . . the junction of Liliha and School Streets, because its chief was Honolulu,

> one of the high chiefs at the time of Kakuhihewa'. . . . It is probable that the chief referred to by Westervelt took his name from the harbor and adjoining land. The original name of the land where the town grew when the harbor became a haven for foreign ships was Kou. . .The number of *heiau* in this area indicates that it was a place of first importance before the era of foreign contact. [Handy and Handy 1972:479]

3.1.2 Early Post-Contact to Mid-Nineteenth Century

Rev. Hiram Bingham, arriving in Honolulu in 1820, described a still predominantly Native Hawaiian environment—still a "village"—on the brink of western-induced transformations:

> We can anchor in the roadstead abreast of Honolulu village, on the south side of the island, about 17 miles from the eastern extremity. . . . Passing through the irregular village of some thousands of inhabitants, whose grass thatched habitations were mostly small and mean, while some were more spacious, we walked about a mile northwardly to the opening of the valley of Pauoa, then turning southeasterly, ascending to the top of Punchbowl Hill, an extinguished crater, whose base bounds the northeast part of the village or town. . . . Below us, on the south and west, spread the plain of Honolulu, having its fishponds and salt making pools along the seashore, the village and fort between us and the harbor, and the valley stretching a few miles north into the interior, which presented its scattered habitations and numerous beds of kalo (arum esculentum) in its various stages of growth, with its large green leaves, beautifully embossed on the silvery water, in which it flourishes. [Bingham 1847:92–93]

The Kewalo region would have been in Bingham's view as he stood atop "Punchbowl Hill" looking toward Waikīkī to the south; it would have comprised part of the area he describes as the "plain of Honolulu" with its "fishponds and salt making pools along the seashore."

Another visitor to Honolulu in the 1820s, Captain Jacobus Boelen, hints at the possible pre-Contact character of Honolulu and its environs, including the Kewalo area:

> It would be difficult to say much about Honoruru. On its southern side is the harbor or the basin of that name (which as a result of variations in pronunciation [*sic*] is also written as Honolulu, and on some maps, Honoonoono). The landlocked side in the northwest consists mostly of tarro fields. More to the north there are some sugar plantations and a sugar mill, worked by a team of mules. From the north toward the east, where the beach forms the bight of Whytetee, the soil around the village is less fertile, or at least not greatly cultivated. [Boelen 1988:62]

Boelen's description implies the Kewalo region and the present project area are within a "not greatly cultivated" region of Honolulu, perhaps extending from Pūowaina (Punchbowl Crater) at the north through Kaka‘ako to the Kālia portion of Waikīkī in the east.

An 1817 map of the south coast of O‘ahu drawn by Otto Von Kotzebue, a lieutenant aboard the Russian naval ship *Rurick*, indicates the project area was within a region originally composed of coastal marsh (Figure 6). The map shows fishponds and taro *lo‘i* (shown as rectangles) surrounding the project area, massed around the streams descending from Nu‘uanu and Mānoa valleys. Few habitations are indicated. Kotzebue notes of the region:

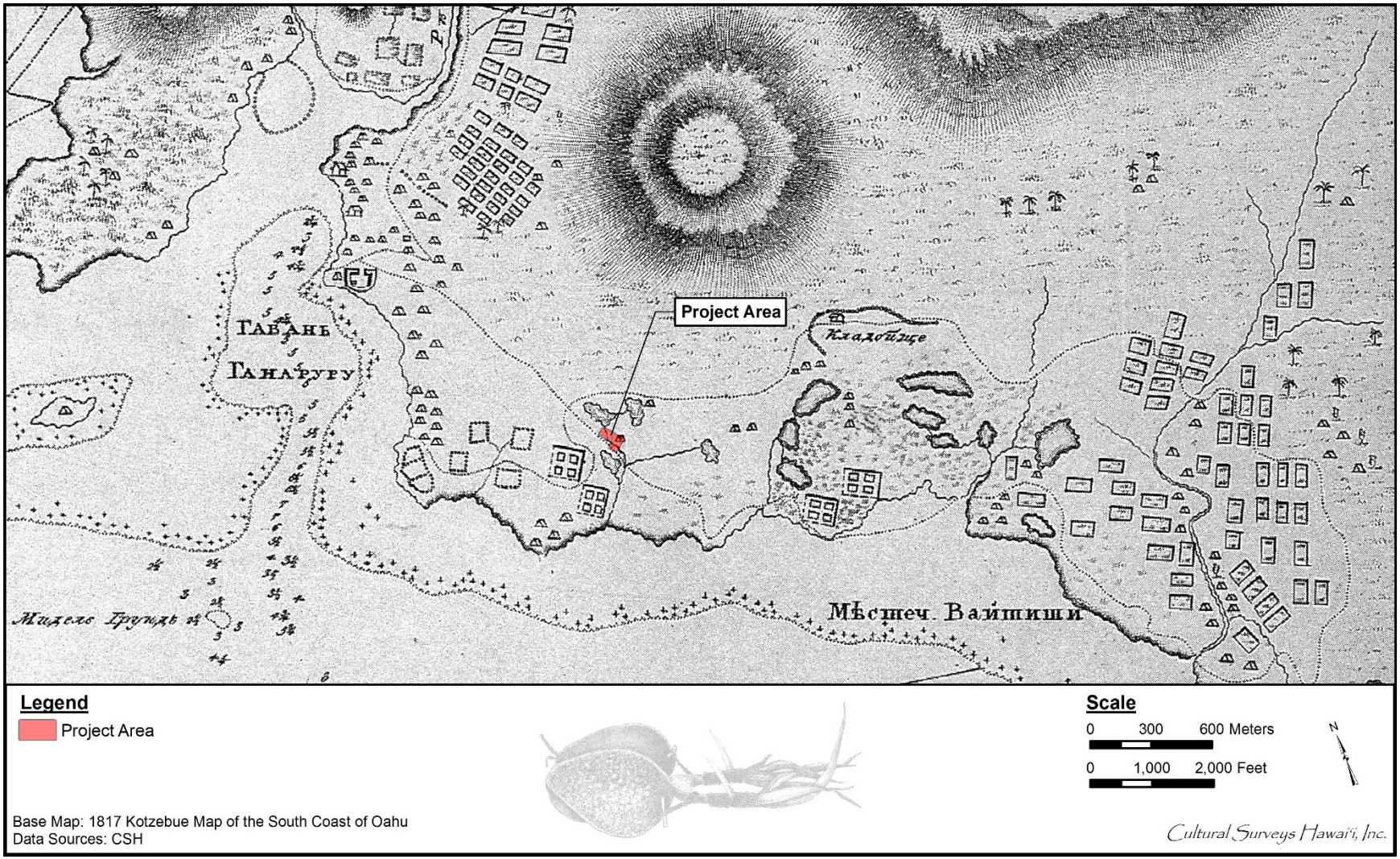

Figure 6. Portion of the 1817 map of the south coast of O‘ahu by Kotzebue, showing the project area between fishponds

> The cultivation of the valleys behind Hanarura is remarkable. Artificial ponds support, even on the mountains, the taro plantations, which are at the same time fish-ponds; and all kinds of useful plants are cultivated on the intervening dams. [Kotzbue 1821:240]

The 1825 Malden map (Figure 7) shows much the same scene of a relatively flat featureless landscape south of Punchbowl with the prevalence of fishponds attesting to the high water table.

The shift in population and habitation concentration along the south coast in the early post-Contact period, along with the resultant development of the surrounding built environment, reflects the post-Contact movement of Hawaiians to the area around Honolulu harbor—the only sheltered landing on O‘ahu and the center of increasing trade with visiting foreign vessels. Kamehameha had moved from Waikīkī to Honolulu in 1809.

A clearer picture of Kewalo and the present project area develops with accounts of Honolulu by other visitors and settlers during the first half of the nineteenth century. Gorman D. Gilman, who arrived in Honolulu in 1841, recalled in a memoir the limits of Honolulu during the early 1840s:

> The boundaries of the old town may be said to have been, on the *makai* side, the waters of the harbor; on the *mauka* side, Beretania street; on the Waikīkī side [i.e., the area just beyond Punchbowl Street], the barren and dusty plain, and on the Ewa [west] side, the Nuuanu Stream. [Gilman 1903:97]

Gilman further describes the “barren and dusty plain” beyond (i.e., east of) Punchbowl Street:

> The next and last street running parallel [he had been describing the streets running *mauka-makai*, or from the mountains to the shore] was that known as Punchbowl Street. There was on the entire length of this street, from the *makai* side to the slopes of Punchbowl, but one residence, the two-story house of Mr. Henry Diamond, *mauka* of King Street. Beyond the street was the old Kawaiahao church and burying ground. A more forsaken, desolate looking place than the latter can scarcely be imagined. One, to see it in its present attractiveness of fences, trees and shrubbery, can hardly believe its former desolation, when without enclosure, horses and cattle had free access to the whole place. [Gilman 1903:89]

American missionary C.S. Stewart further confirmed in his memoirs the “forsaken” and “desolate looking” environs of the missionary enclave and of Kawaiaha‘o Church during the period of initial mission settlement in the 1820s. Stewart arrived on Maui after living at the mission and declared Lahaina to be “like the delights of an Eden” after having spent “four weeks residence on the dreary plain of Honoruru” (Stewart 1970:177). The preceding descriptions of the Honolulu plain most likely include—at least for western sensibilities—the Kewalo region.

The barrenness of the Kewalo area is illustrated in a sketch made in 1853 showing Kawaiaha‘o Church as the large coral stone structure with a steeple that remains a landmark to this day (Figure 8). Between Kawaiaha‘o Church and the sea are only a few scattered huts along the shore and aligned along the inland trail (now covered by King Street). The project area would be *makai* and south of the church near the shore. The missionary families grazed their cows in the lands *makai* of the mission houses, possibly on lands near the project area (*Paradise of the Pacific* 1950:21).

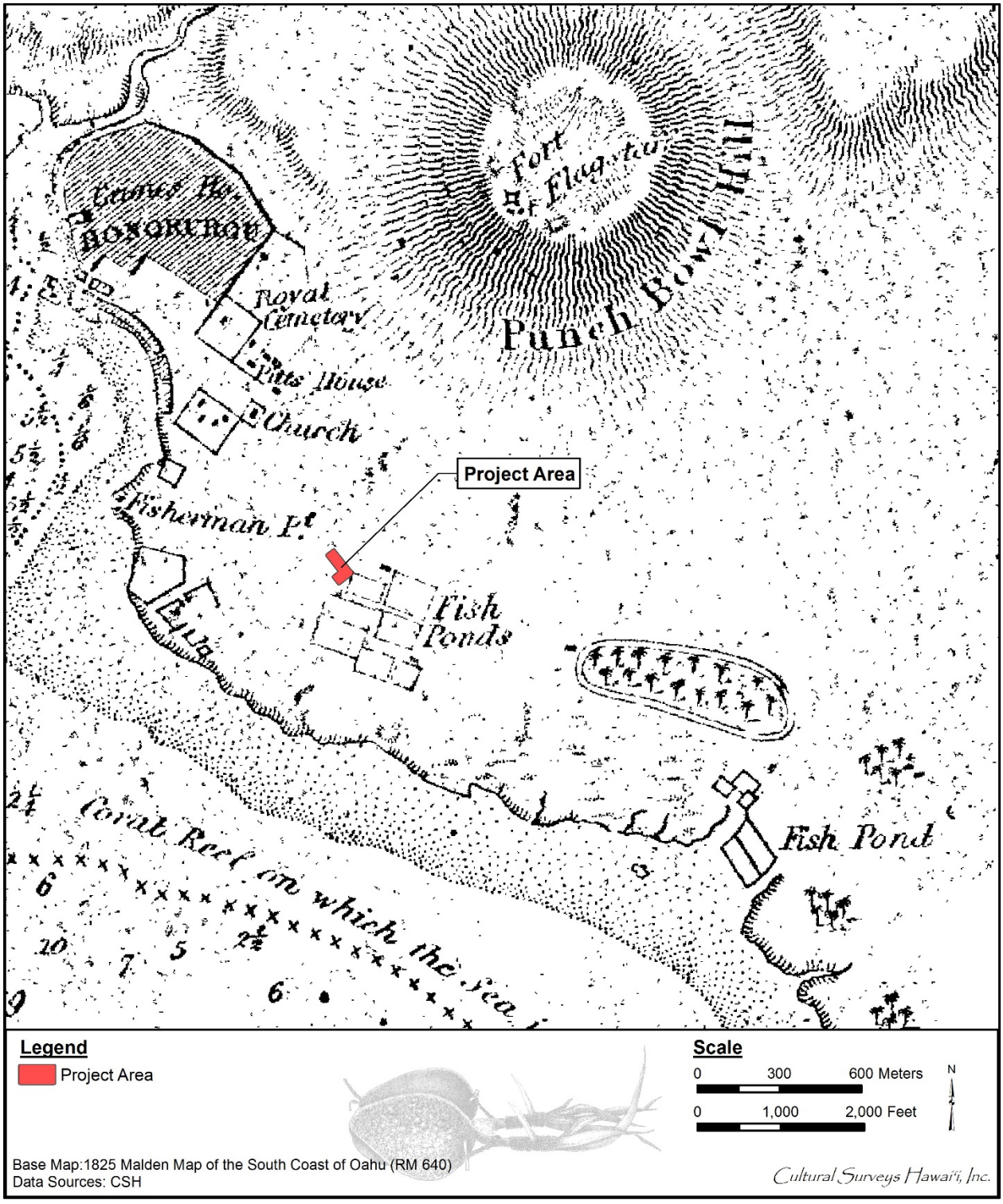

Figure 7. Portion of the 1825 Malden map of the South Coast of Oahu showing the project area

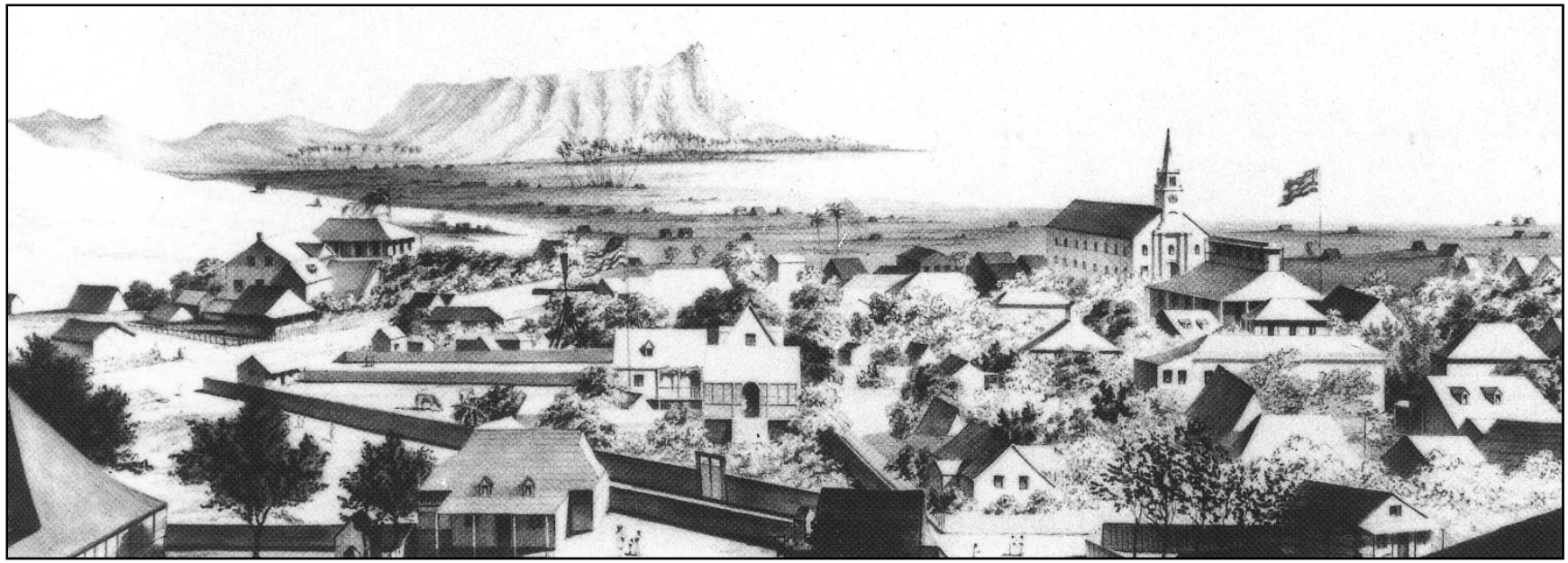

Figure 8. “View of Honolulu from the Catholic Church No. 2,” central panel of sketch by Paul Emmert ca. 1853; the project area is on the barren landscape south (back) of the coral-block Kawaiaha‘o Church (structure with steeple completed in 1842) (original sketch at Hawaiian Historical Society; reprinted in Grant 2000:5). The greater Kaka‘ako plain is relatively unpopulated.

An 1855 LaPasse map shows the project area surrounded by ponds or wetlands labeled as "Pecheries," denoting fishponds Figure 9).

3.1.2.1 The Māhele and the Kuleana Act

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 among the king of Hawai‘i, the *ali‘i* (chiefs), and the common people, which introduced the concept of private property into Hawaiian society. In 1848, Kamehameha III divided the land into four divisions: Crown Lands to be reserved for himself and the royal house; Government Lands set aside to generate revenue for the government; Konohiki Lands claimed by *ali‘i* and their *konohiki* (supervisors); and *kuleana*, habitation and agricultural plots claimed by the common people (Chinen 1958:8–15). In 1851, Government Lands became available for purchase "in lots of from one to fifty acres in fee simple, to residents only, at a minimum price of fifty cents per acre" (Alexander 1886:119). It is through records for Land Commission Awards generated during the Māhele that the first specific documentation of life in Kewalo and Kukuluāe‘o as it had evolved up to the mid-nineteenth century comes to light.

The LCA records indicate the traditional Hawaiian usage of the region and its environs may have been confined to salt making and farming of fishponds, with some wetland agriculture in those areas *mauka* or toward Waikīkī at the very limits of the field system descending from Makiki and Mānoa valleys. It seems probable that traditional salt making greatly increased in scale to meet foreign demand; Figure 10 and Figure 11 show huge salt works seaward of the project area. However, the testimonies indicate the area was lived on and shaped by Hawaiians before the nineteenth century. The LCA records also reveal that, midway through the nineteenth century, taro cultivation, traditional salt making, and fishpond farming activities continued within the Kewalo/Kukuluāe‘o area (see Figure 11). These activities and the land features that supported them would be eliminated or buried during the remainder of the nineteenth century by the urbanization of Honolulu.

The project area is in something of a bare spot with seemingly no *kuleana* LCAs within 100 m (see Figure 11). There were house lots to the west (LCAs 1503:2 and 1504) and fishponds to the southwest, southeast, east, and northeast, but not much enterprise at the immediate project vicinity; this suggests it was marshy but without significant natural pools. The general alignment of present day Queen Street is suggested on the 1883 (see Figure 10) and 1884 (see Figure 11) maps but appears to have not been expanded to *makai* of the project area until after 1887 (Figure 12).

3.1.3 Mid-Nineteenth Century to Early Twentieth Century

3.1.3.1 Kaka‘ako Salt Works and the Salt Pans of Kewalo and Kukuluāe‘o

Many of the coastal lands in Kewalo and Kukuluāe‘o (including an extensive area just *makai* of the project area; see Figure 10 and Figure 11) were used to produce salt. The Hawaiians used *pa‘akai* (salt) for a variety of purposes including to flavor food, to preserve fish by salting, for medicines, and for ceremonial purposes. David Malo described the traditional method as follows:

> *O ka paakai kekahi mea e pono ai, he mea e ono ai, ka ia, a me ke koekoe o ka paina ana, he mea hana ia ka paakai, ma kekahi aina, aole i hana a ma kekahi*

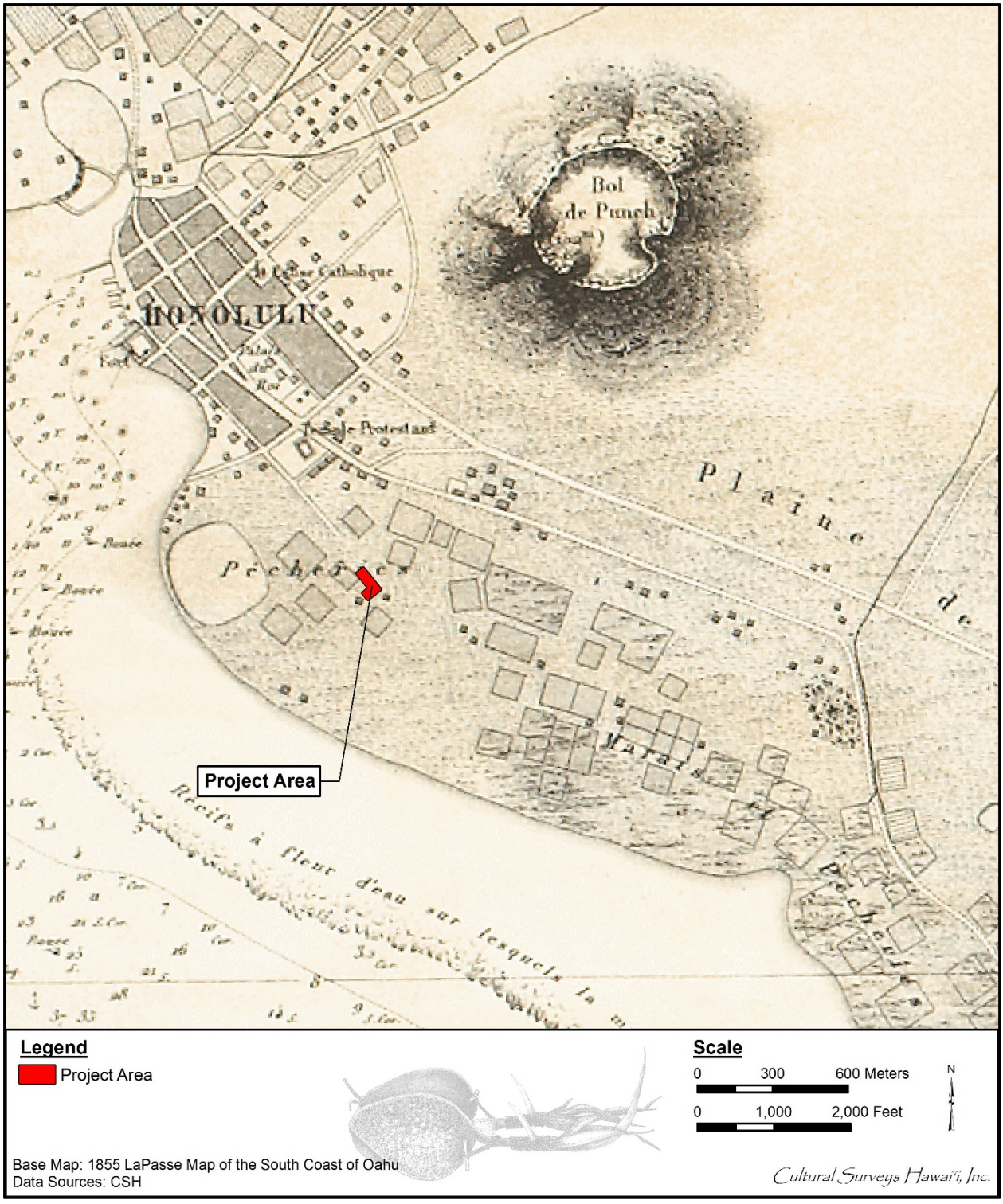

Figure 9. Portion of the 1855 LaPasse map of O‘ahu’s south coast and approximate location of the project area

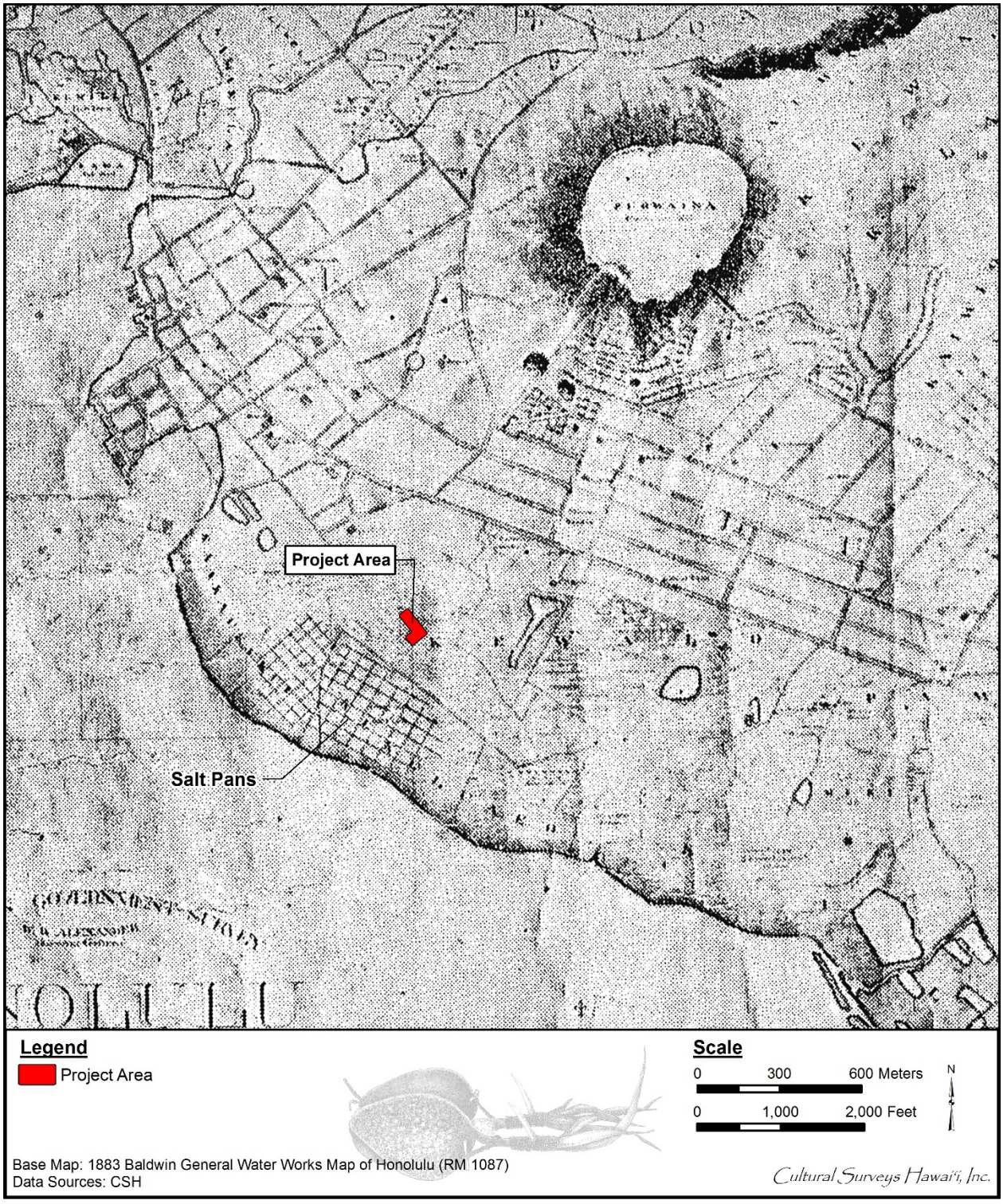

Figure 10. Portion of the 1883 Baldwin General Waterworks map of Honolulu showing the project area

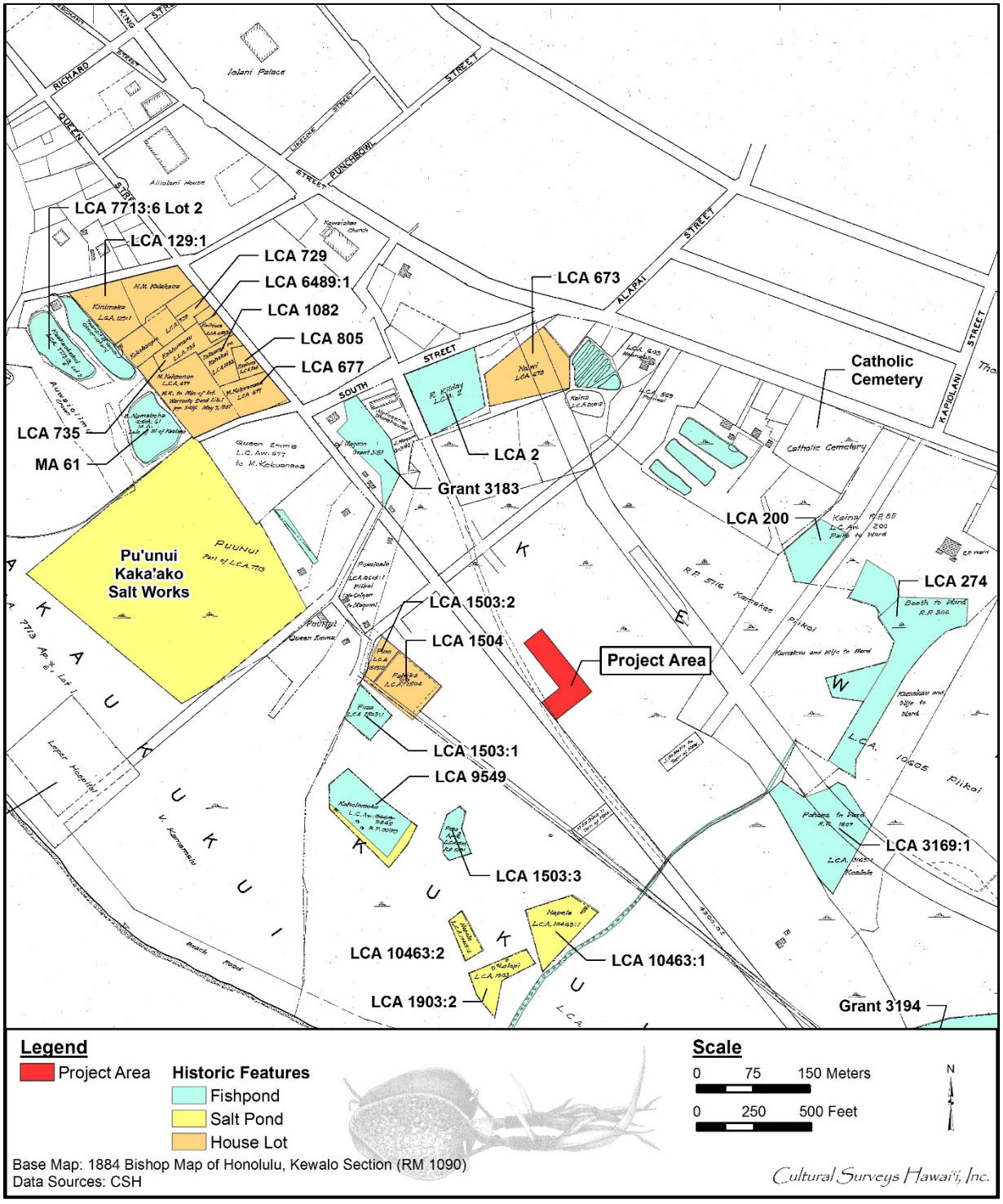

Figure 11. Portion of the 1884 map of Honolulu, Kewalo Section by S.E. Bishop with highlighted LCAs indicating house lots, fishponds, and salt ponds claimed in Land Court testimonies; the project area is in Kewalo ‘Ili awarded to Kamake‘e Pi‘ikoi (LCA 10605: ‘Āpana [lot] 7)

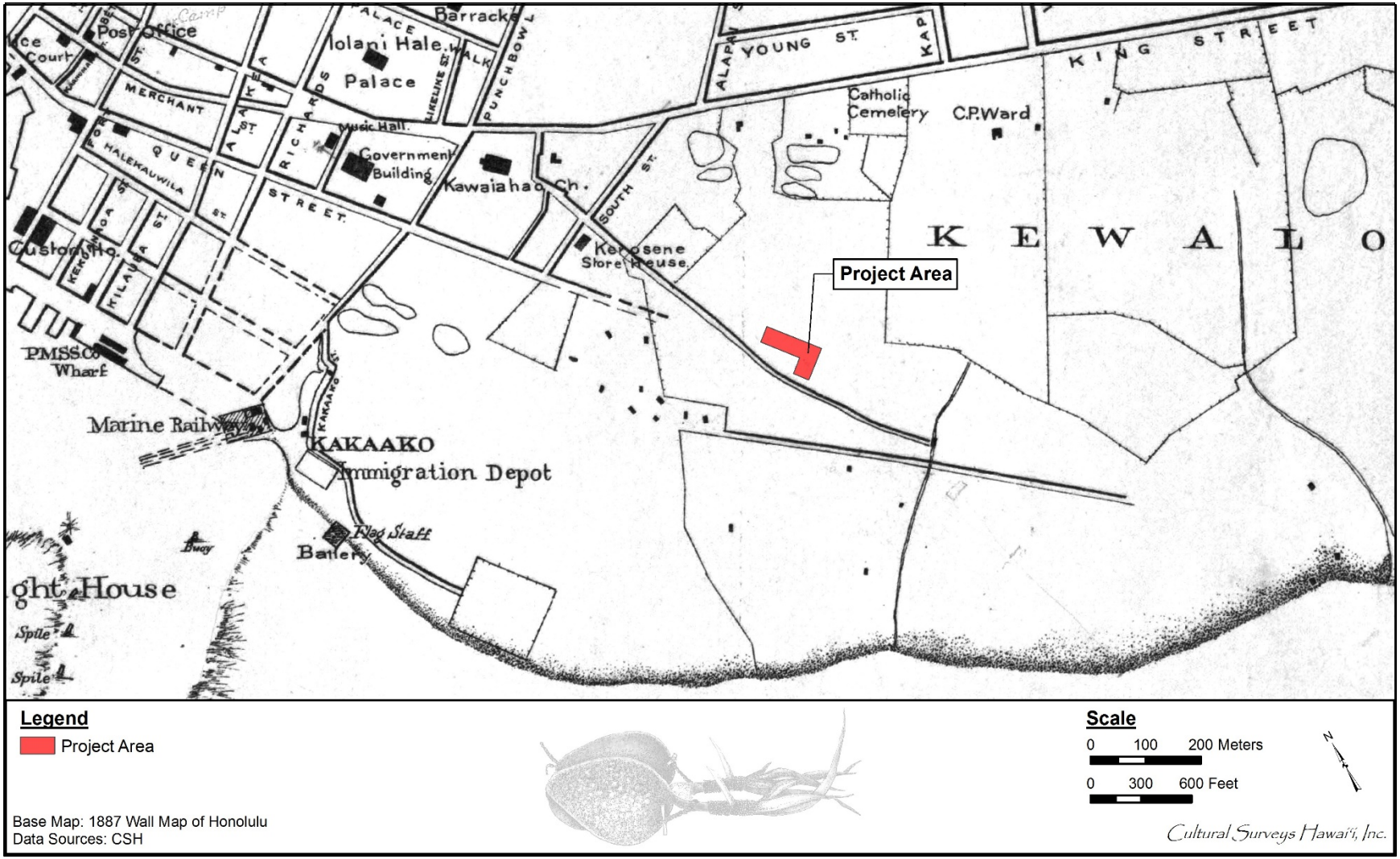

Figure 12. Portion of the 1887 Wall map of Honolulu showing the project area

> *aina, o ke kai makai, e kii aku no ka wahine, a lawe mai ma ke poi, a ke kai hooholo ia mai kekahi ma kauwahi mai.*
>
> *E waiho kela kai ma kekahi poho paha, he ekaha paha, he kahe ka paha, a liu malaila, alaila lawe ana kauwahi e, a paakai iho la no ia, o ka papa laau ka mea kui poi.* [Malo 2006:73]
>
> Translation
>
> Pa‘akai (salt) is another beneficial item. It is used to make fish delicious and tasteless foods edible. Pa‘akai is made at a particular place, [but] it [salt] is not actually made from this spot, rather it [salt water] came from the sea. A woman went to get some when the sea crashed [upon the rocks] and she ran back [the salt water] to this particular spot.
>
> That salt water (*kai*) is placed in, perhaps, a depression (*poho*) or a ‘Bird’s nest’ (*ēkeha*) or rock basin (*kāheka*) and allowed to evaporate (*liu*). Then it is taken to another spot and is formed into *pa‘akai*. [Malo 2006:95]

Captain Cook was the first to note the method of making salt in prepared “saltpans”:

> Amongst their arts, we must not forget that of making salt, with which we were amply supplied, during our stay at these islands, and which was perfectly good of its kind. Their saltpans are made of earth, lined with clay; being generally six or eight feet square, and about eight inches deep. They are raised upon a bank of stones near the high-water mark, from whence the salt water is conducted to the foot of them, in small trenches, out of which they are filled, and the sun quickly performs the necessary process of evaporation. . . . Besides the quantity we used in salting pork, we filled all our empty casks, amounting to sixteen puncheons, in the Resolution only. [Cook 1784:151]

In an article on Hawaiian salt works, Thomas Thrum discusses the large salt works at Ālia Pa‘akai (Salt Lake in Moanalua) and at Pu‘uloa on the western loch of Pearl Harbor. Kamakau (1961:409) reported, “The king and Isaac of Pu‘uloa are getting rich by running the salt water into patches and trading salt with other islands.” The salt was sent to Russian settlements in the Pacific Northwest, where it was used to pack salmon (Calnitsky 2018).

Thrum also mentions a salt works in Kaka‘ako:

> Honolulu had another salt-making section in early days, known as the Kakaako salt works, the property of Kamehameha IV, but leased to and conducted by E.O. Hall, and subsequently E.O. Hall & Son, until comparatively recent years. This enterprise was carried on very much after the ancient method of earth saltpans as described by Cook and Ellis. [Thrum 1924:116]

The export of salt declined in the late nineteenth century. Thrum (1924:116) states the apex of the trade was in 1870, but by 1883, he noted that “pulu, salt and oil have disappeared entirely” from the list of yearly exports (Thrum 1884:68). By 1916, only one salt works, the Honolulu Salt Company, was still in operation. Salt continued to be manufactured for local use; the Kaka‘ako Salt Works appears on maps as late as 1891, and a page in Victoria Wards’s ledger for 1883 notes a yearly income of $651.50 received from her “Salt Lands” in Kukuluāe‘o (Hustace 2000:50).

By 1901, most of the fishponds and salt pans *makai* of the Ward "Old Plantation" area were reported as abandoned. In that year, the Hawaii First Legislative Assembly (Hawaii Legislature 1901:185) proposed to build a ditch to drain away the "foul and filthy water that overflows that district at the present time."

> The district makai of King St. and the Catholic Cemetery, Ewa of Mrs. Ward's (the Old Plantation), mauka of Clayton St., and Waikiki of the land from King St., leading to the Hoomananaauao Church, consists of six large abandoned fish ponds and a large number of smaller ones, all in filthy condition, fed by springs and flowing into Peck's ditches. Just makai of these ponds, at the end of Clayton street, next to Mr. Ward's, is Peck's place. An artesian well flushing the wash houses flows into two foul ditches, thence to the big pond which is Waikiki of what used to be Cyclomere and next to Mrs. Ward's line [ditch] extending down to Waimanu St.
>
> The rear portion of Mrs. Ward's property down to Waimanu St. used to be fish ponds all connecting to the sea by a ditch which is fed by an artesian well. These ponds, with the exception of three, are abandoned. [Hawaii Legislature 1901:185]

3.1.3.2 Kaka‘ako Use as a Quarantine Area

Kaka‘ako, outside the eastern edge of Honolulu town, was used as a quarantine area throughout the nineteenth and early twentieth centuries. The most serious was the smallpox epidemic of 1853, discussed in detail in the following section. In 1881, Kaka‘ako was used for the quarantine of leprosy patients at the Kaka‘ako Receiving Station (Griffin et al. 1987:55; Hanley and Bushnell 1979:112). In 1884, Mother Marianne built a home at Kaka‘ako for the non-leprous daughters for the patients of Kaka‘ako and for the exiled lepers of Moloka‘i. The girl's home was named after Queen Kapi‘olani, who supported the plan by raising funds. A two-story dormitory for the girls was built near the sister's chapel (Hanley and Bushnell 1980:222). In 1888, the Hawaii Board of Health decided to close the Kaka‘ako branch, moving the receiving station back to Kalihi, and determined that "[t]he buildings at Kakaako should be entirely removed" (Hanley and Bushnell 1980:275). In 1889, the Kapiolani School for Girls and the Franciscan Sisters moved to Kalihi to a new Leper Receiving Station (Hanley and Bushnell 1980:326). The buildings of the Kapiolani Home were torn down, and the new immigration station was built on the former grounds.

The Immigration Station was established in 1893 on Allen Street near downtown Honolulu. Newly arrived sugarcane workers from China and Japan were quarantined and processed through this building. In 1897, a new station was built on Fisherman's Point at Kaka‘ako. After the occupation of the Islands, the United States took over immigration matters and built a new structure at the site. On 3 July 1905, this new Immigration Station, designed by the Hawai‘i architect Oliver G. Traphagen, was opened on the freshly filled lands within a boundary seawall. This 1905 station was set on wooden pilings and was connected across the mudflats to the shoreline by two causeways (Melichar 1978: 17–18). The four-remaining buildings of the Immigration Station were placed on the National Register of Historic Places (NRHP) in 1973 and designated SIHP # 50-80-14-9964. The main offices of the U.S. Immigration and Naturalization Department moved to the Waterfront Plaza office complex in 2009.

In 1899, the first case of bubonic plague was identified in Hawai‘i, and spread rapidly through the crowded tenements of Chinatown. The government decided the best way to eradicate the

disease was through “controlled burning” of the wooden buildings. Infected patients were moved to a quarantine camp at Kaka‘ako (Iwamoto 1969:122–124, 130–131).

3.1.3.3 Smallpox Epidemic of 1853

To prevent the spread of smallpox, a law was passed in 1836 that pilots could not board foreign ships until it was first confirmed that all persons on board were free of diseases, especially smallpox. This precaution was not successful, as smallpox was introduced to the Islands in 1853, probably from a ship out of Boston, the *Charles Mallory*. This epidemic resulted in 9,082 cases and 5,748 deaths in a population of about 70,000 in the Hawaiian archipelago, about 20,000 of whom were on O‘ahu (Arnold 1956:313). In the 1854 census for the First District (south O‘ahu, from Maunalua to Moanalua), 3,759 deaths were reported in a population of about 10,000 people; 2,800 of these deaths were attributed to smallpox. Nearly all of the deaths were of Native Hawaiians (Greer 1969:75). The total number of smallpox cases for O’ahu is estimated at 11,081 with 5,947 deaths (Greer 1965:261).

During this crisis, doctors recommended the establishment of a pest house and quarantine ground. A 2-acre (0.80-ha) lot, already enclosed with a board fence, was selected. This lot is the same as the Honuakaha award to Mataio Kekūanao‘a, LCA 677, about 500 m northwest of the present project area (see Figure 11). Not all of the dead on O‘ahu were interred in cemeteries, and clusters of historic burials and isolated burials have been found throughout Kaka‘ako. Many of these burials seem to date to the mid-nineteenth century, as families did not always bury their relatives in the approved cemetery areas:

> Others were buried where they lay, without coffins, in graves so shallow that wandering pigs and dogs could unearth them. Some native families nursed their sick at home, devotedly and uselessly, and carefully laid the dead under the dirt floors of their thatch huts or in their house yards, following their old burial practices and condemning themselves to follow the dead into the grave. [Daws 1968:140]

3.1.3.4 Trash Burning and the Kaka‘ako and Kewalo Incinerators

In the early years of garbage disposal, all trash was dumped into low-lying ground or landfills, or burned in the open area. To reduce the volume of waste, plans were made to build incinerators, where “putrescible” (mainly animal and fish waste) trash could be burned, while non-animal material, called “combustible” waste, was still disposed of in the earlier method (Young 2005). Thomas Thrum reported on the first incinerator in the Kaka‘ako area in 1905:

> Early in the year was completed the long projected garbage crematory for the disposal, daily, of the city's refuse by a patent and sanitary process. It is located on the shore of Kakaako, adjoining the sewer pumping station; is two stories in height and built of brick. [Thrum 1906:177]

> The dredging of Honolulu harbor and its channel is completed as far as planned for the present, and excavations for the *Alakea* and *Kinau* slips finished, the material there from being used to fill in a large area of Kakaako and the flats in the vicinity of the sewer pumping station and garbage crematory. The amount of material removed by the Federal dredging was a million and a half cubic yards. [Thrum 1907:148–149]

For the incinerator, Thrum noted the following:

> The new station is built on piles on reclaimed land that is being filled in from the coral dredgings that is going on, and is gradually taking on a tropical appearance . . . . Adjoining its premises on the mauka side is the new building designed for the Planters's Association for their labor bureau. [Thrum 1907:148–149]

In the early 1920s, trash was burned in the open at the Ala Moana Dump (landfill area *makai* of Ala Moana Boulevard). The Hawaii Public Works recommended that an incinerator should be built for the burning of "putrescible" waste. The Kewalo Incinerator (Incinerator Number 1) was built in the Italianate-style at the intersection of Ahui and Olomehana streets in 1930 by the City and County of Honolulu. The facility was built to dispose of waste from the Ala Moana dump, and the resulting ash was used to fill the seawall in Ka‘ākaukukui in the late 1940s and to create 29 additional acres of land adjacent to Fort Armstrong. It ceased operations in 1945 when a new incinerator was built on Ohe Street. The second incinerator, built in 1946–1948 was used for waste burning until 1997 (Mason Architects 2002).

3.1.4 Turn of the Century Land Reclamation Projects

3.1.4.1 Kaka‘ako Reclamation

The first efforts to deepen Honolulu Harbor were made in the 1840s. The idea of using this dredged material, composed of sand and crushed coral, to fill in low-lying lands was quickly adopted. Between 1857 and 1870, the "Esplanade" between Fort and Alakea streets was created on 22 acres of filled-in former reef and tideland. By 1874, Sand (Quarantine) Island, site of the first immigration station, had been created over "reclaimed" land on reefs.

By the 1880s, filling-in of the mud flats, marshes, and salt ponds in the Kaka‘ako and Kewalo area had begun. This filling was pushed by three separate but overlapping improvement justifications. The first directive or justification was construction of new roads and the improvement of older roads by raising the grade so flooding during heavy rains would not wash the improvements away.

The justification for infilling of low-lying areas most frequently cited was public health and sanitation, the desire to clean up rivers and ponds that were reservoirs for diseases such as cholera and acted as breeding places for rats and mosquitoes. Thus, as early as 1902 (Hawaii Board of Health 1902), the following was reported:

> The Board has paid a great deal of attention to low-lying stagnant ponds in different parts of the city, and has condemned a number of them. The Superintendent of Public Works has given great assistance to seeing that the ponds condemned by the Board are filled. In September a pond on South Street was condemned as deleterious to the public health. [Hawaii Board of Health 1902:80]

The referenced pond may allude to Namekeha's pond on South Street, west of the current project area.

The first areas to be filled were those closest to Honolulu, then moving outward to Kaka‘ako (Griffin et al. 1987:13). The first fill material may have been set down in 1881 for the Kaka‘ako Leper Branch Hospital, which had been built on a salt marsh. Laborers were hired to "haul in wagonloads of rubble and earth to fill up that end of the marsh" (Hanley and Bushnell 1980:113).

In 1903, five more lots in Kewalo, on Ilaniwai, Queen, and Cooke streets, were condemned and ordered to be filled (Hawaii Board of Health 1903:6).

The 1893 Wall map (Figure 13) shows a very large portion of Kewalo as hatched to indicate "swamp" (or perhaps more accurately "marsh," as there are believed to have been few trees). These swamp or marsh lands were regarded as appropriate for reclamation fill activities. Although public health and safety were prominently cited, according to Nakamura (1979:113), the main desire (and third justification) to fill in Honolulu, Kewalo, and then Waikīkī lands was to provide more room for residential subdivisions, industrial areas, and finally tourist resorts. By the twentieth century, Kaka‘ako was becoming a prime spot for large industrial complexes such as iron works, lumber yards, and draying companies, which needed large spaces for their stables, feed lots, and wagon sheds.

The previously extant expanse of marshy ground of Kewalo inhibited the development of Honolulu eastwards. Following reclamation fill episodes, it was possible to quickly push development eastward along such corridors as the new Waimano Street, Kawaiaha‘o Street, Queen Street, and Laniwai Street (modern Halekauwila Street). This eastward expansion of streets is striking in a comparison of the 1893 (see Figure 13) and 1897 (Figure 14) maps.

In 1904, the area around South Street from King to Queen streets was filled in. The Hawaii Department of Public Works (1904:117) reported "considerable filling [was] required" for the extension of Queen Street from South Street to Ward Avenue, which would "greatly relieve the district of Kewalo in the wet season."

3.1.4.2 Kewalo Reclamation Project

Although the Board of Health could condemn a property, and the Department of Public Works could then fill in the land, the process was rather arbitrary and piecemeal. In 1910, after an epidemic of bubonic plague, the Board of Health condemned a large section of Kewalo consisting of 140 land parcels, including areas once known as Kukuluāe‘o and Ka‘ākaukukui, which had numerous ponds (Hawaii Department of Public Works 1914:196).

In 1914, the following occurred:

> . . . locality bounded by King street, Ward avenue, Ala Moana and South street, comprising a total area of about two hundred acres, had been found by the board of health of the Territory to be deleterious to the public health in consequence of being low and below 'the established grades of the street nearest thereto' and at times covered or partly covered by water and improperly drained and incapable by reasonable expenditure of effectual drainage, and that said lands were in an insanitary and dangerous condition. [Hawaii Reports 1915:329]

The first land to be filled in was the portion of the Ward Estate Kukuluāe‘o property west of Ward Avenue, completely filled in by June 1913. By August, the rest of the Ward Kukuluāe‘o lands west of Ward Avenue had been completely filled and by February 1914, all of the land from South Street to Ward Avenue and from Ala Moana to Queen Street had been filled.

These newly reclaimed lands were ripe for the development of standardized streets and standard sized lots as befitted the new territory of the U.S. An undated (ca. 1900) "Map of Kewalo Tract" (Figure 15) shows the project area within a layout of standardized lots. A 1906 fire insurance map

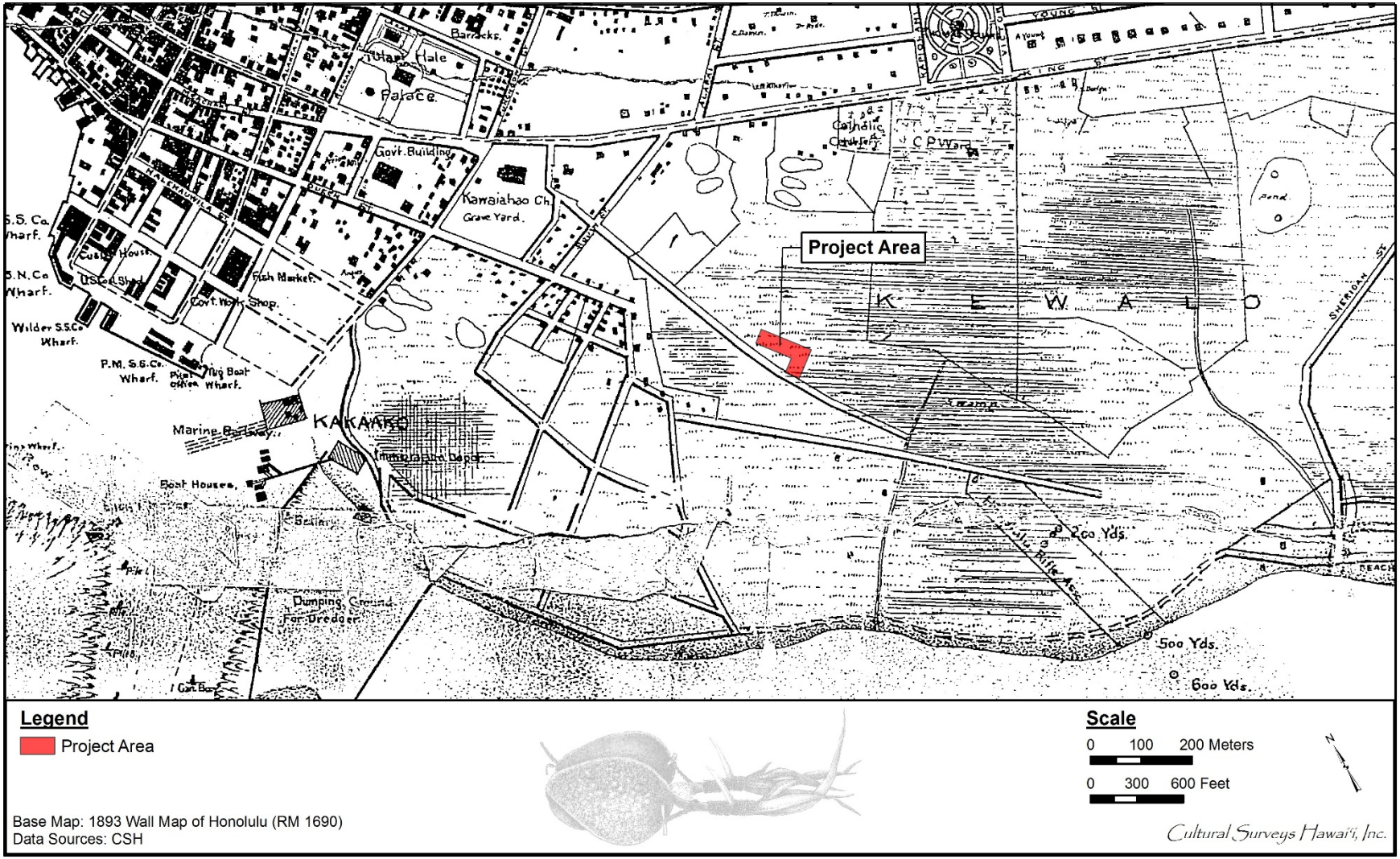

Figure 13. Portion of the 1893 Wall map showing the project area within marshland

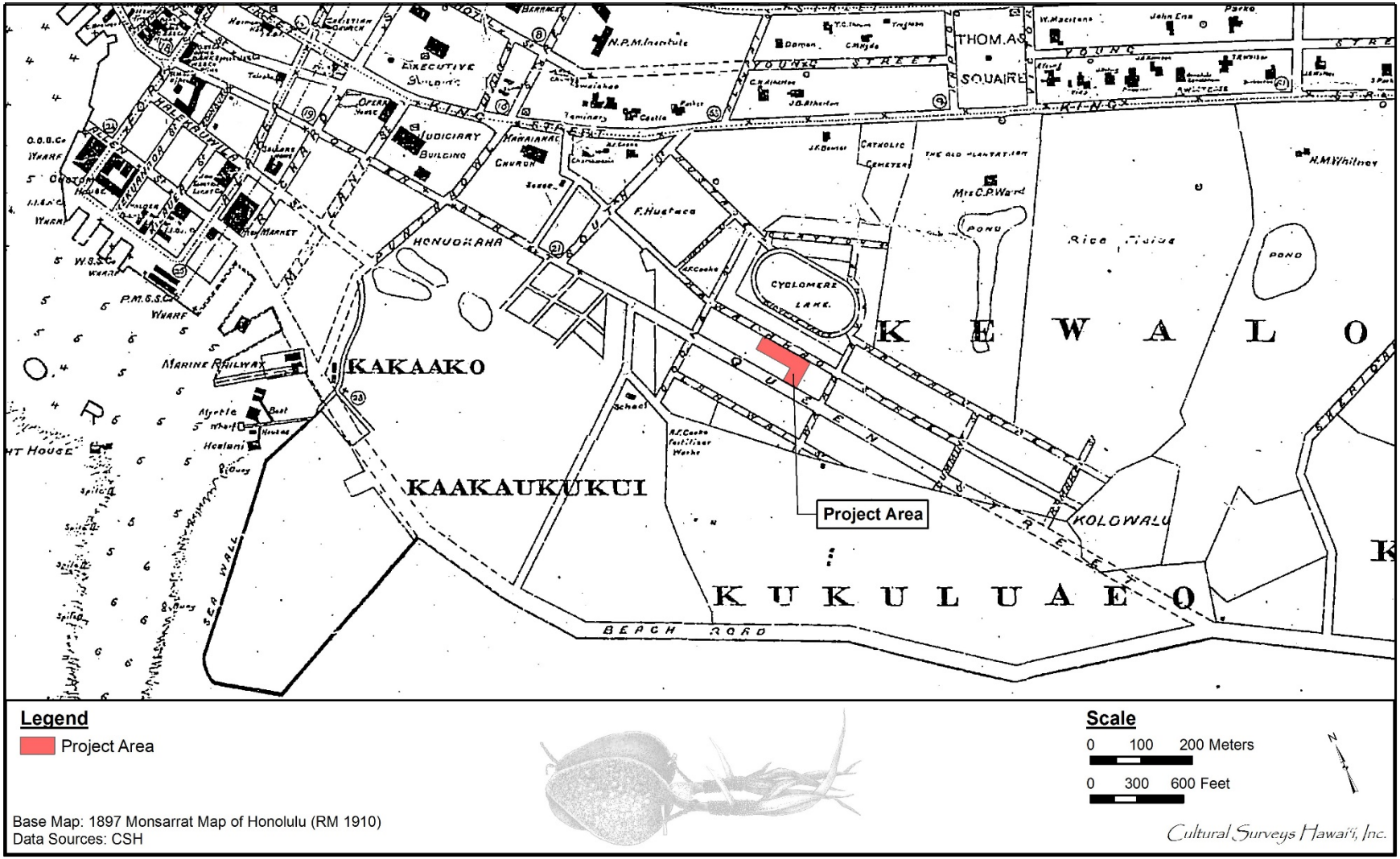

Figure 14. 1897 Monsarrat map showing new named roads (Queen, Cooke and Laniwai streets) in vicinity of project area (vacant)

Figure 15. Map of Kewalo Tract (no date, ca. 1900), with the project area designated parcels 8 through 14, 21, and 22

(Figure 16) indicates that in addition to the standardization of streets and lot size, the home construction in the present project area and vicinity was also largely standardized; nine lots with ten dwellings in the project area are indicated.

Legal proceedings in 1914 managed to shut down operations planned for the area from Ward Street to Waikīkī, but infilling was eventually completed (Thrum 1916:159–160). A 1914 Department of Public Works Map of Kewalo Reclamation Progress (Figure 17) indicates the lands of the project area had been subject to "reclamation." A 1914 Sanborn Map Company fire insurance map (Figure 18) shows the development of single-family dwellings; ten lots with ten dwellings are indicated. This land was mainly owned by the Bishop Estate, who had leased the land to small farmers growing taro and rice and raising ducks in the ponds; however, developing house lots was more lucrative. In 1916, the Bishop Estate announced that as soon as their present tenant leases expired, they planned to fill the remaining lands and divide them into residence and business lots (Larrison 1917:148–149). In 1919, a portion of the coastal section of the Bishop Estate lands was secured by the government to expand the Kewalo Basin (Thrum 1920:148). A 1919 U.S. Army War Department map (Figure 19) shows the rapid development of streets and houses in the Kaka‘ako area.

3.1.4.3 Kewalo Basin Dredging

In 1919, the Hawaii Government appropriated $130,000 to improve the small harbor of Kewalo for the aim of "harbor extension in that it will be made to serve the fishing and other small craft, to the relief of Honolulu harbor proper" (Thrum 1920:147). As the area chosen for the harbor was adjacent to several lumber yards, including the Lewers & Cooke yards, the basin was initially made to provide docking for lumber schooners; however, by the time the wharf was completed in 1926, this import business had faded, and the harbor was used mainly by commercial fishermen. The dredged material from the basin was used to fill a portion of the Bishop Estate on the western edge of Waikīkī and some of the Ward Estate in the coastal area east of Ward Avenue (U.S. Department of the Interior 1920:52). In 1941, the basin was dredged and expanded to its current 55 acres. In 1955, dredged material was placed along the *makai* side to form an 8-acre land section protected by a revetment.

3.1.4.4 Waikīkī Reclamation Project

It was during the 1920s that southeast O'ahu was transformed when construction of the Ala Wai Drainage Canal—begun in 1921 and completed eight years later—resulted in the draining and filling in of the remaining ponds and irrigated fields of Honolulu and Waikīkī. The canal was one element of a plan to urbanize Waikīkī and the surrounding districts, first conceived in 1906. The final result was a "canal three miles long, with an average depth of twenty-five feet and a breadth of two hundred fifty feet" (*Honolulu Advertiser*, 17 October 1928:2:16).

The first action was to dig a canal parallel to the coast along Waikīkī Beach. The dredged material was placed on adjacent properties from McCully Street to Kapi‘olani Park. This action affected several private landowners, including the Bishop Estate and the Booth Estate. The second action was to dredge a canal from the beach toward the reef. The dredged material was pumped to the new McKinley High School site, an area of former large ponds adjacent to the eastern boundary of the *mauka* portion of the Ward Estate (Hawaii Governor 1922:49–50). Additional dredged material was used to fill the area *makai* of the school grounds in 1930 (Hawaii Governor 1930:74).

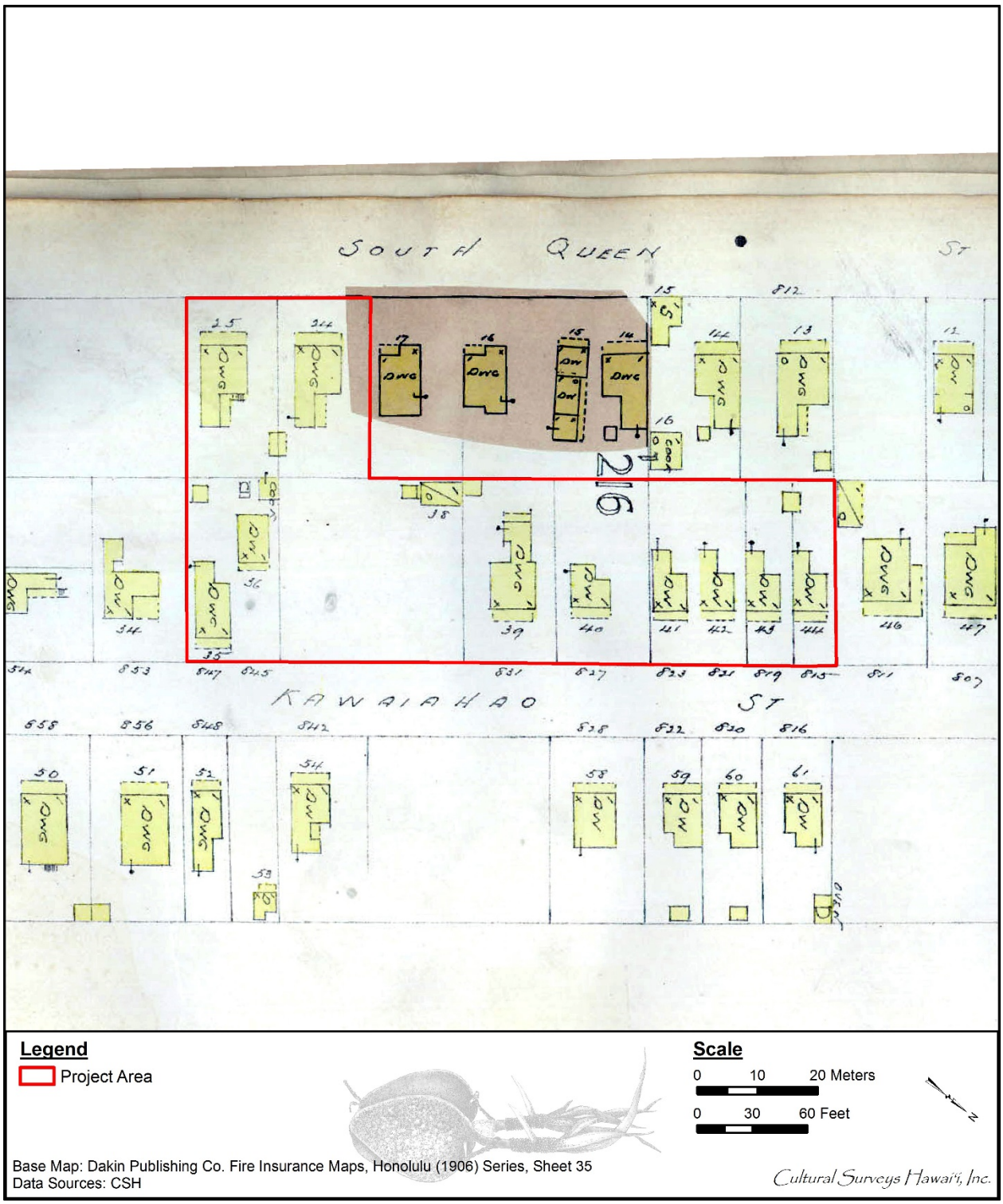

Figure 16. Portion of the 1906 Dakin Publishing Company fire insurance maps, showing the project area

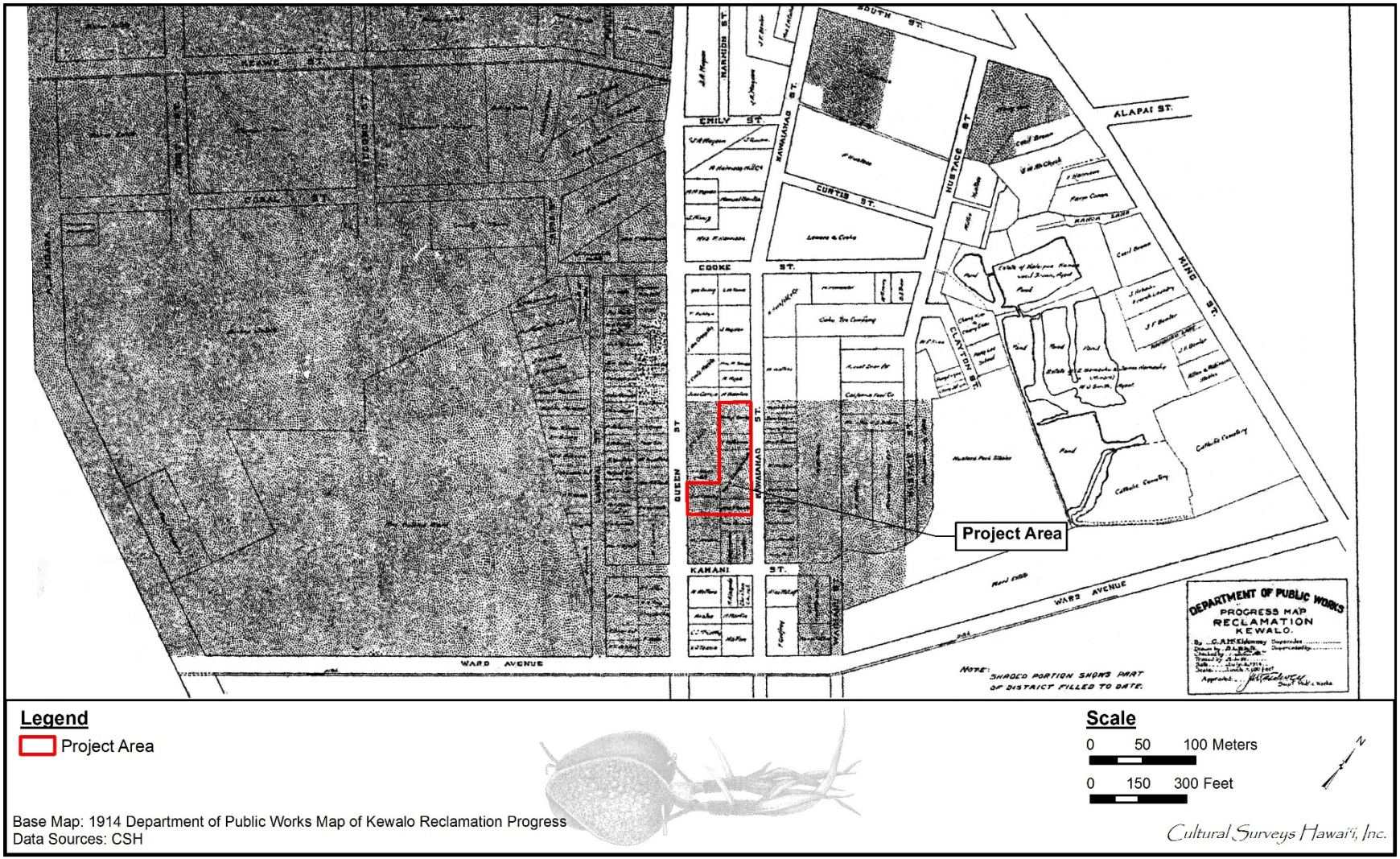

Figure 17. 1914 Hawaii Department of Public Works map of Kewalo reclamation progress showing the project area

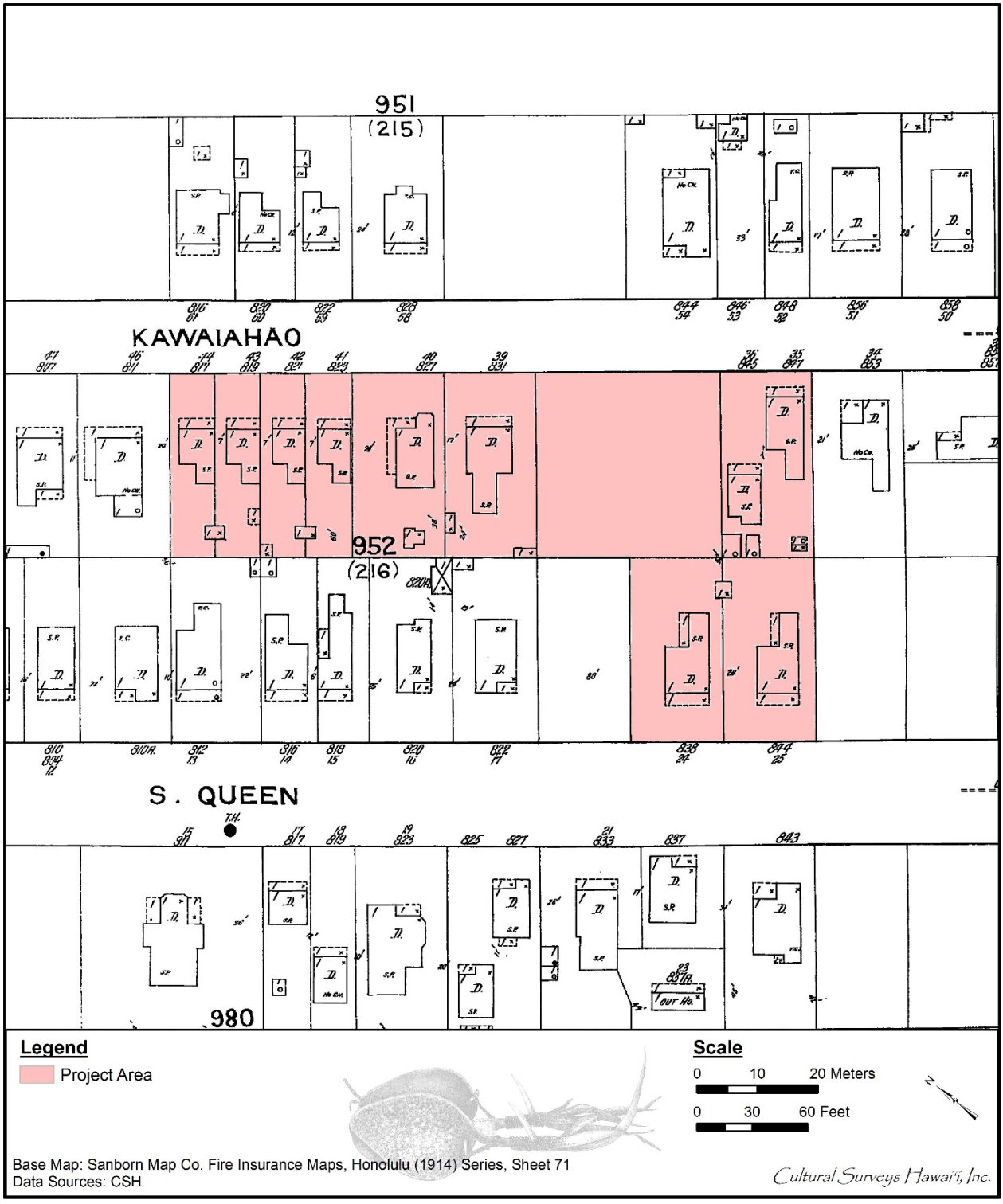

Figure 18. Portion of the 1914 Sanborn Map Company fire insurance map, showing dwellings and a vacant warehouse in the project area

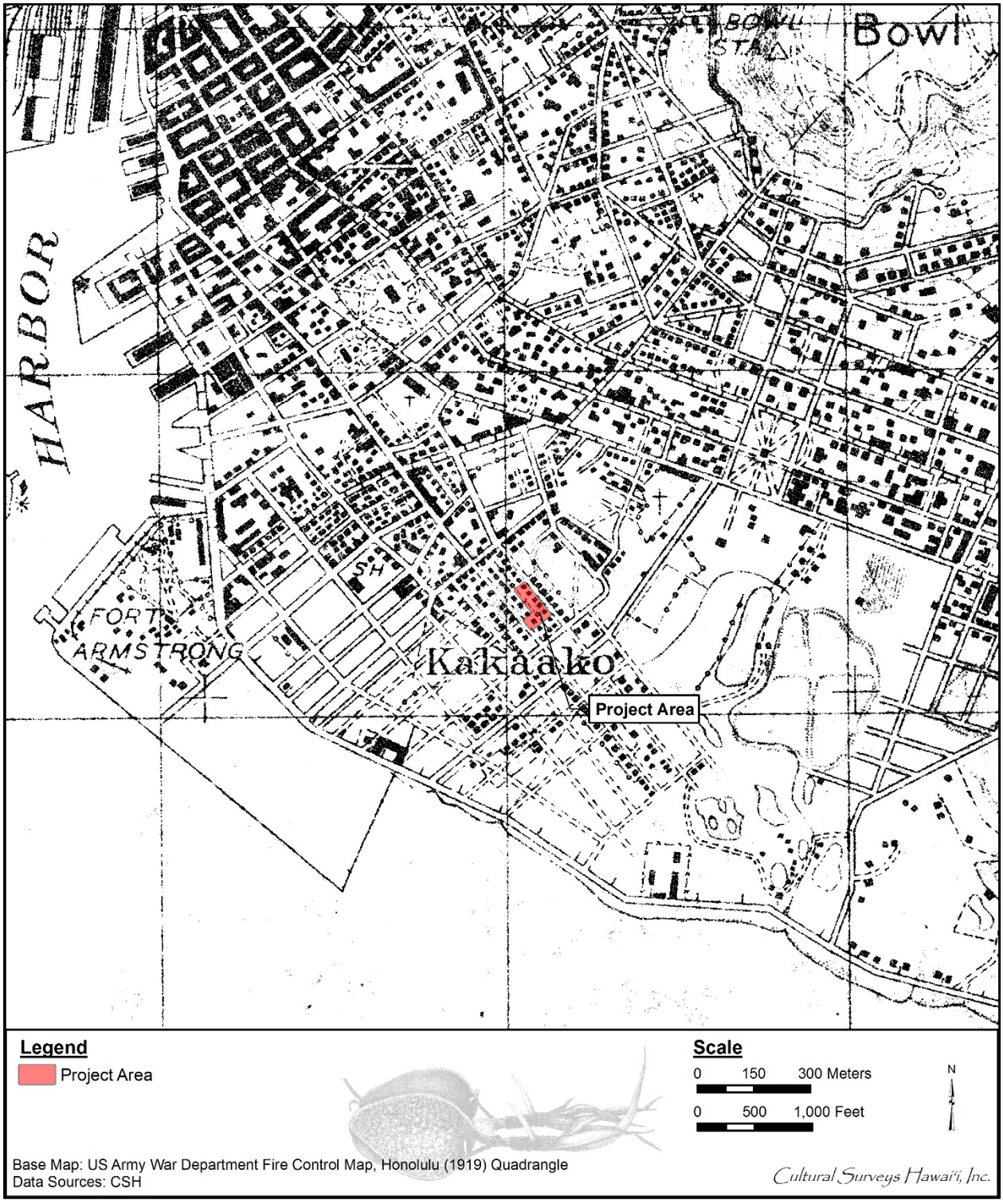

Figure 19. Portion of the 1919 U.S. Army War Department map, Honolulu Quadrangle, showing the project area

Several claims were made against the dredging company, including compensation for destroyed crops and livestock by farmers. For instance, a Chinese tenant farmer named Chang Fow, leasing lands in Waikīkī from the Bishop Trust Company, wrote a letter of complaint indicating the salt water that leached into his lands as a result of the dredging of the canal had devastated his fishponds and stocks of ducks and chickens (letter from Chang Fow to the Bishop Trust Company, 23 May 1922 in Nakamura 1979:100–101). His claims, along with those of other residents of the area, give an impression of the continuing agricultural subsistence base in Waikīkī that lasted into the 1920s before rapidly becoming a thing of the past.

The 1927 Sanborn Map Company fire insurance map (Figure 20) and 1927 aerial photograph (Figure 21) continue to show the same urban residential pattern with ten lots and ten dwellings but with a large central storage ("stge") or warehouse facility. Development proceeded slowly across Ward Avenue to the east in the 1920s and 1930s (Figure 21 and Figure 22). The development of McKinley High School, which moved to its present location 200 m east of the project area in 1923 (see Figure 22), was a major change in the landscape.

In the 1940s and 1950s, the character of Kaka‘ako changed from residential to light industrial, with more warehouses and shops (Figure 23 through Figure 25). The 1950 Sanborn Map Company fire insurance map (Figure 24) still shows many dwellings but also shows storage, a machine shop, offices, and a laundry/dry cleaning enterprise. Sometimes prior laundry/dry cleaning enterprises are associated with soil contamination. The 1953 map (Figure 26) is notable for showing four schools within 500 m at the end of Kaka‘ako's residential period. By 1970 (Figure 27), the project area appears to be entirely within warehouse or light industrial buildings, a pattern that continued to the end of the twentieth century (Figure 28).

Figure 20. Portion of the 1927 Sanborn Map Company fire insurance map, showing dwellings in the project area

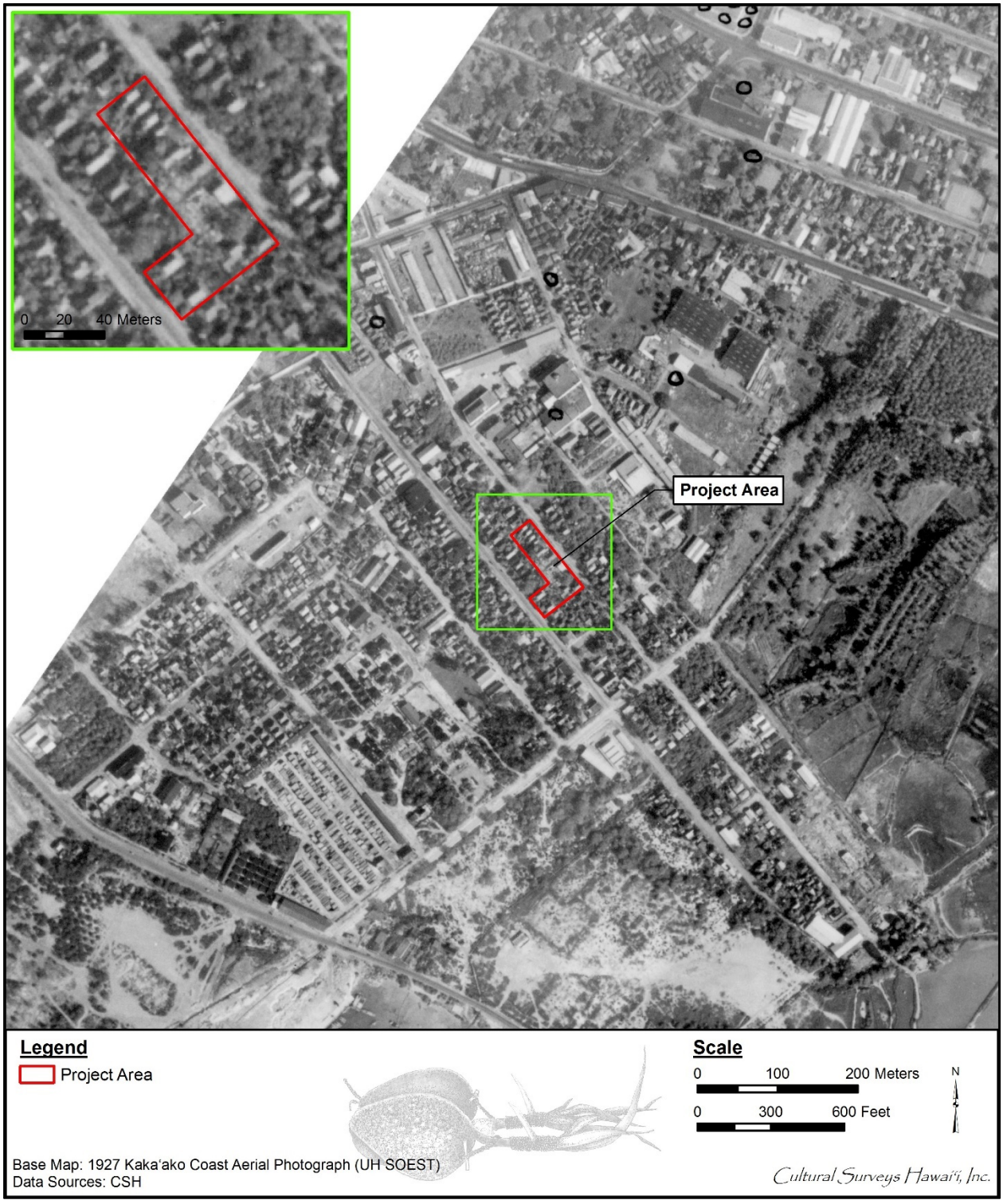

Figure 21. 1927 Kaka‘ako Coast aerial photograph (UH SOEST) showing the project area

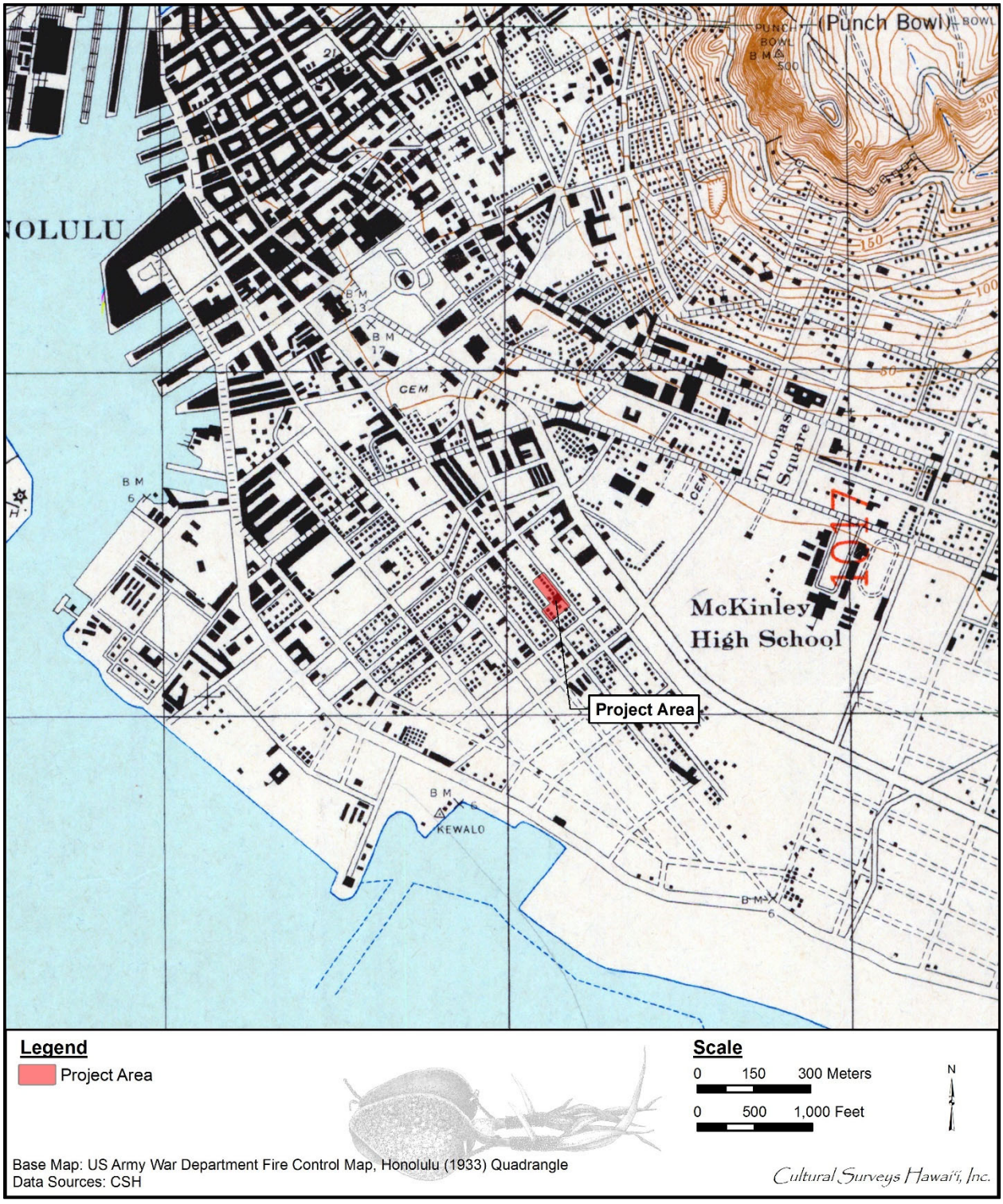

Figure 22. Portion of the 1933 U.S. Army War Department fire control map, Honolulu quadrangle, showing the project area

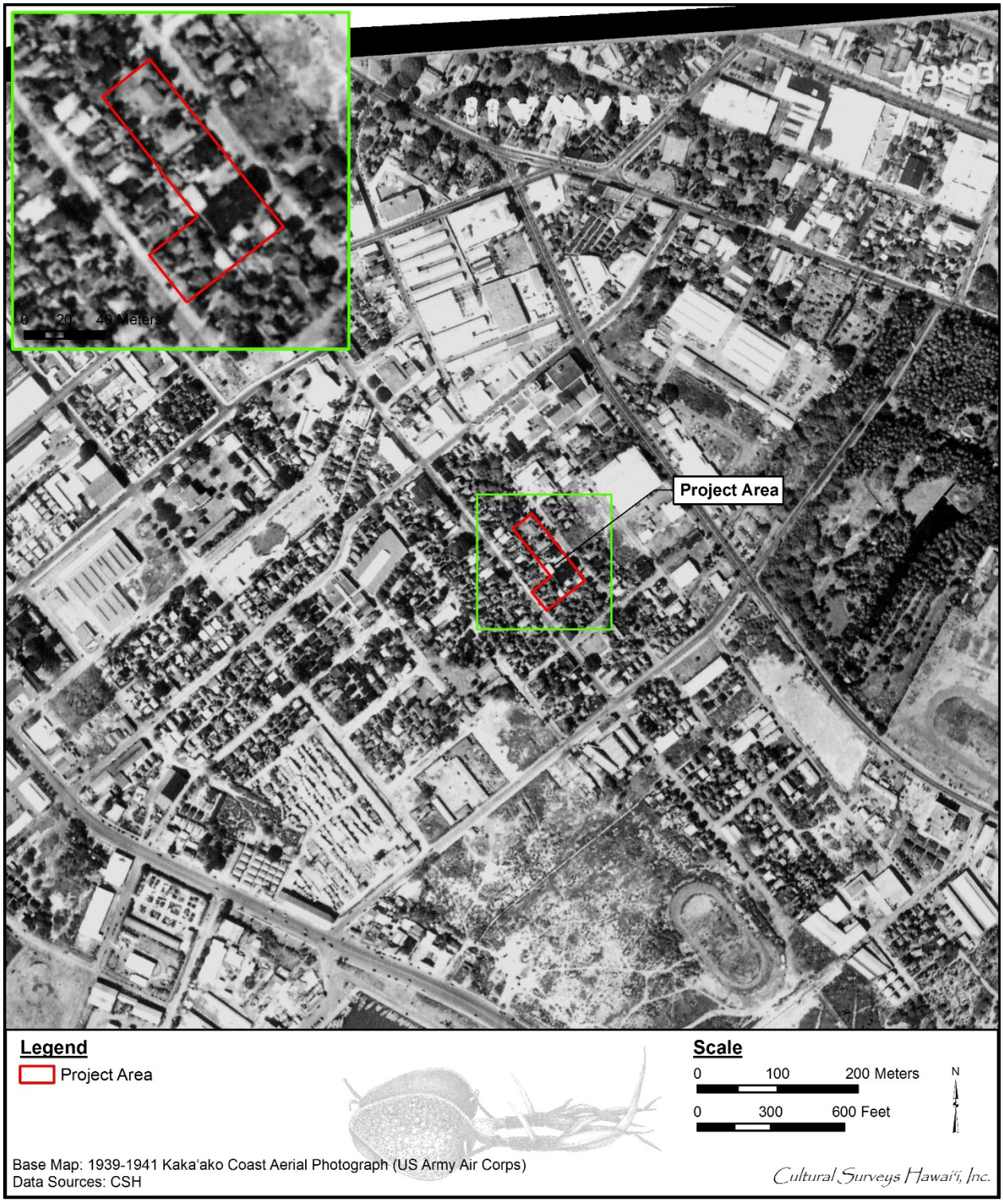

Figure 23. 1939-1941 Kaka‘ako Coast aerial photograph showing the project area (U.S. Army Air Corps)

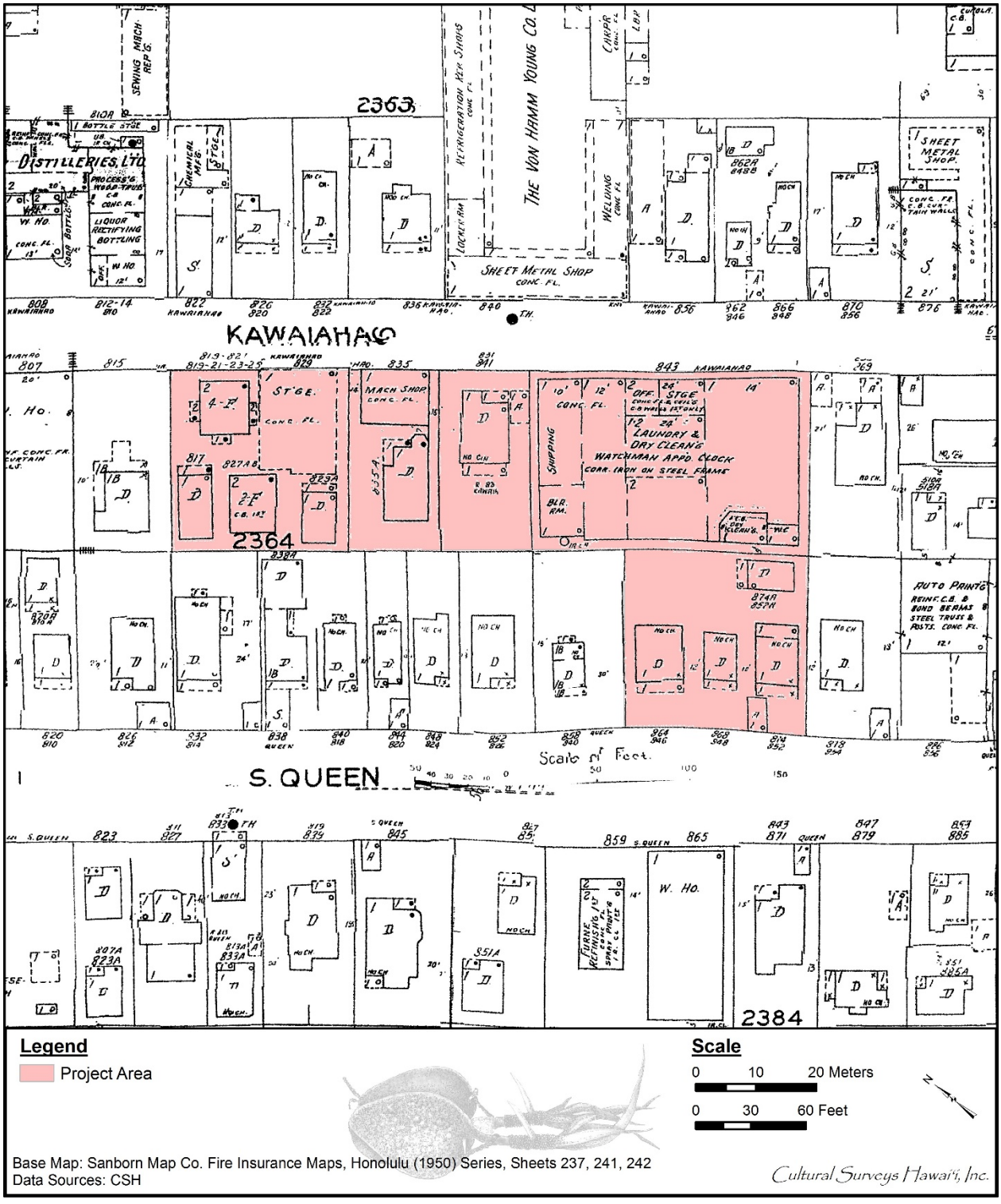

Figure 24. Portion of the 1950 Sanborn Map Company fire insurance map, showing dwellings and commercial buildings in project area

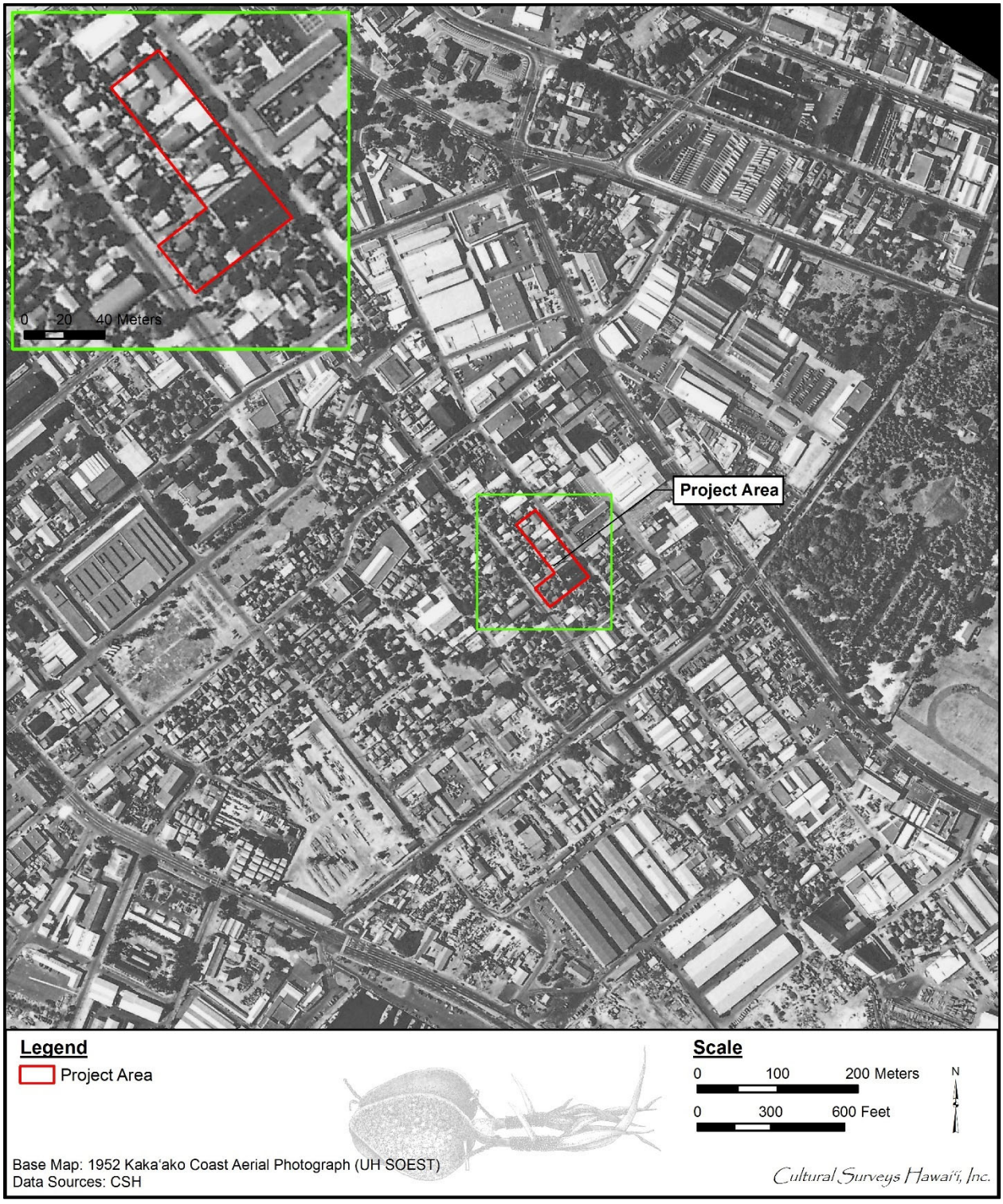

Figure 25. 1952 Kaka‘ako Coast aerial photograph (UH SOEST) showing the project area

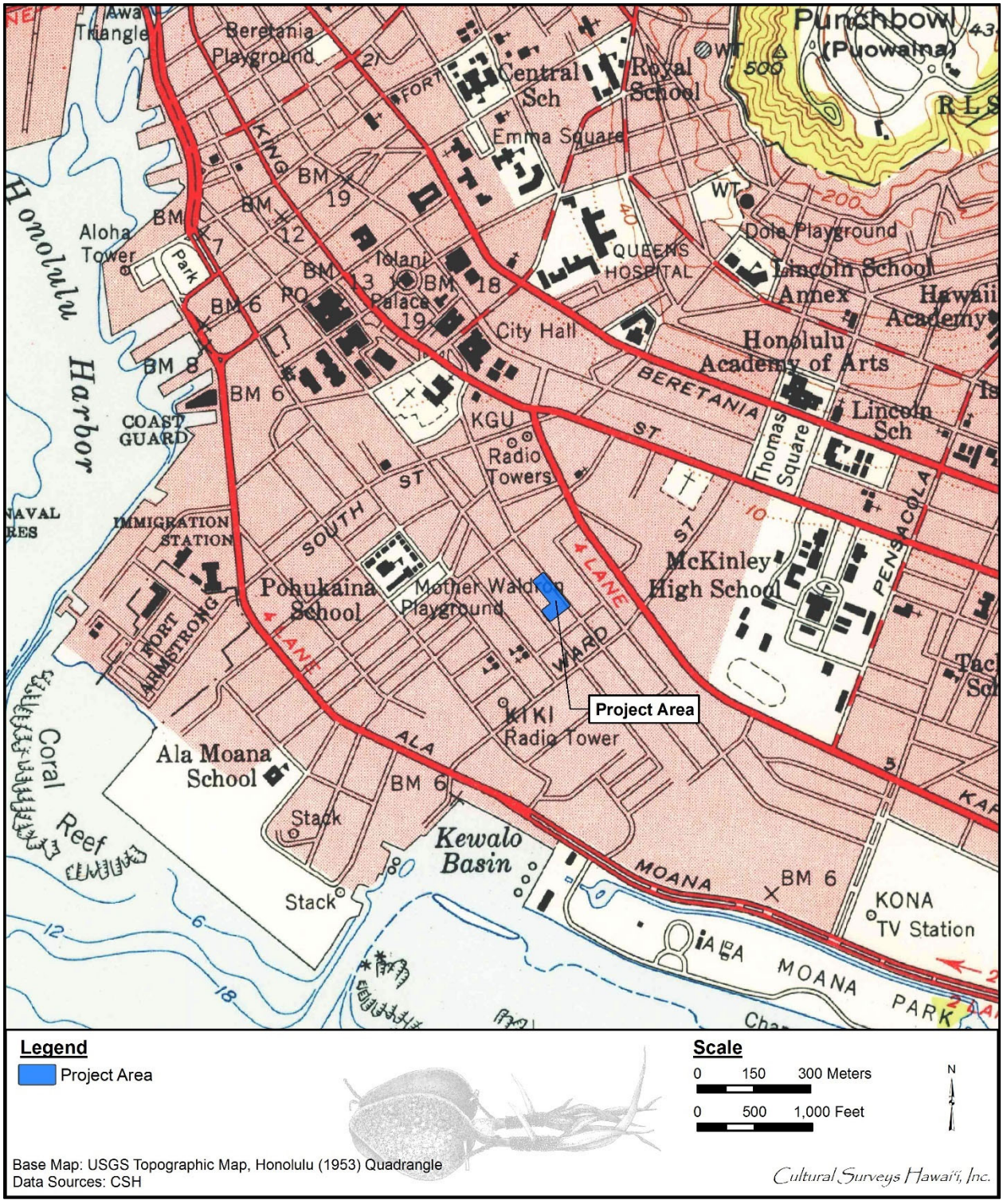

Figure 26. Portion of the 1953 Honolulu USGS topographic quadrangle showing the project area

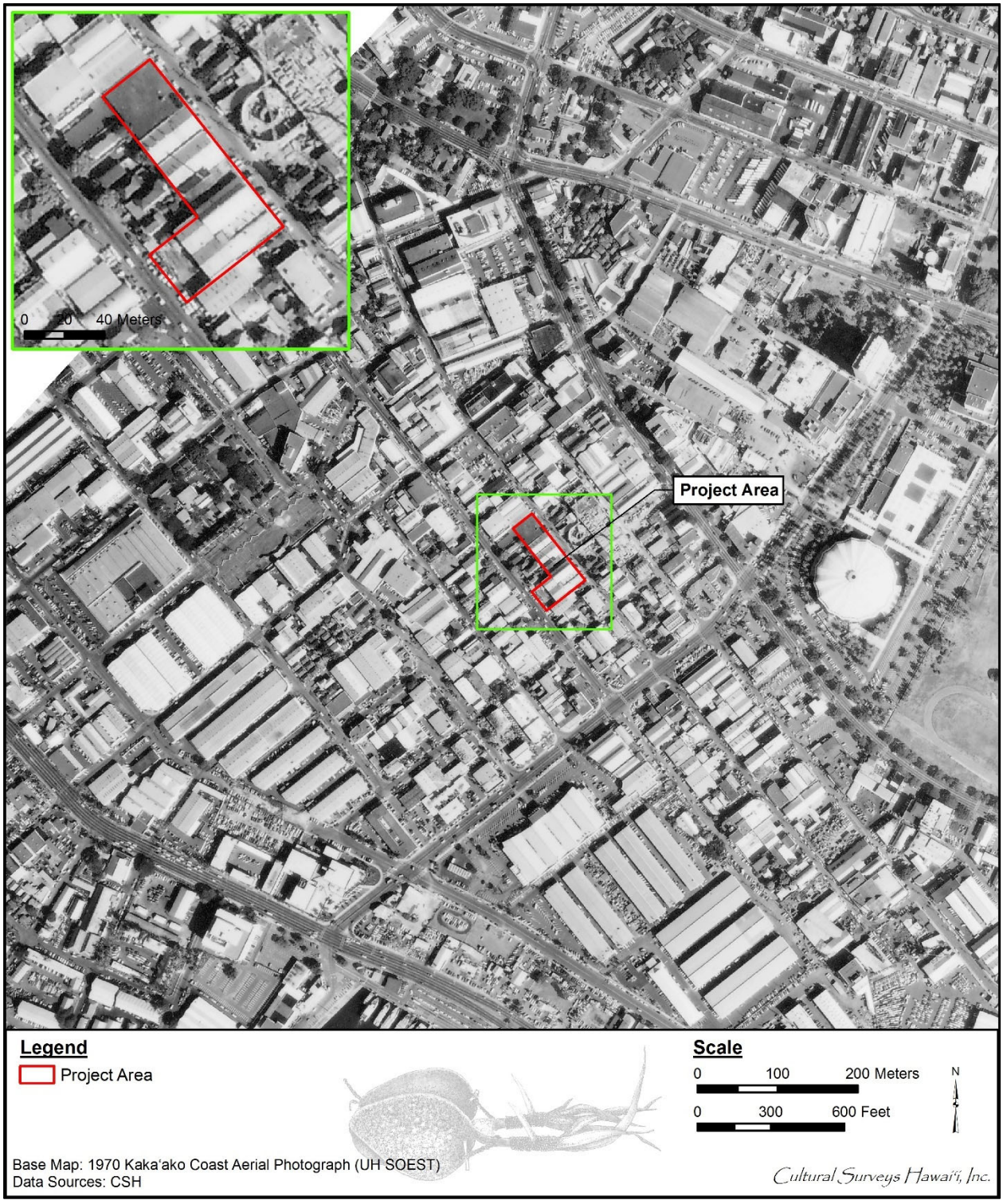

Figure 27. 1970 Kaka‘ako Coast aerial photograph (UH SOEST) showing the project area

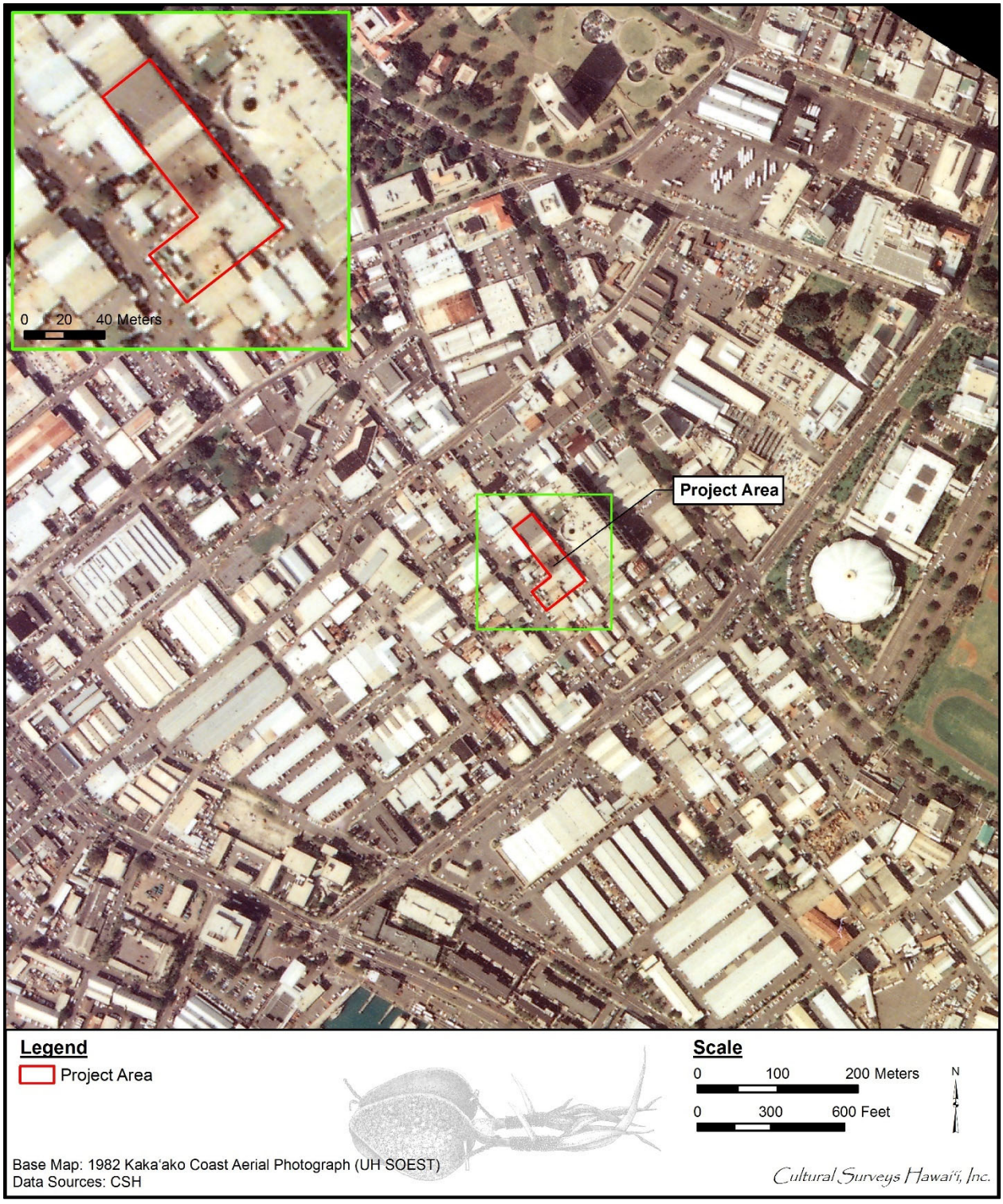

Figure 28. 1982 Kaka‘ako Coast aerial photograph (UH SOEST) showing the project area

3.2 Previous Archaeological Research

Most traditional Hawaiian surface structures had been demolished in the Kaka‘ako area by the time of the first scientific archaeological surveys (i.e., Griffin et al. 1987). In his report on the survey of O‘ahu sites conducted in 1930, McAllister (1933:80) says of Honolulu, “Information regarding former sites within the present limits of Honolulu must come entirely from literary sources.” He mentions Pākākā Heiau, once the main royal temple in Honolulu, which would have been around the foot (i.e., *makai* end) of Fort Street. He does not list Pu‘ukea Heiau (discussed in Section 3.1.1), which Kamakau (1991:24–25) placed in Kukuluāe‘o, but he does note that Peter Corney (1896:101), a visitor to the island in 1819, saw several *heiau* (*morai*) along the Honolulu shore.

No previous archaeological investigations have been conducted within or immediately adjacent to the current project area. Archaeological studies conducted in the vicinity are illustrated in Figure 29 and summarized in Table 1. Historic properties in the vicinity are illustrated in Figure 30 and summarized in Table 2. The following is a summary of the archaeological studies.

3.2.1 Keola La‘i Condominium Project (Schilz 1991; Kawachi 1991; Perzinski et al. 2005, and Hazlett et al. 2008)

In 1991, a literature review (Schilz 1991) recommended monitoring and test excavations for a property bounded by Kawaiaha‘o Street (north), South Street (west), Queen Street (south), and Emily Street (east) during construction of the then proposed Queen Emmalani Tower (TMKs: [1] 2-1-048:008–019). During monitoring, a human skull was found in the backdirt pile. Carol Kawachi (1991) from the SHPD went to the site to monitor the remediation of the remaining dirt piles. One additional bone, a humerus, was found. The burial remains were designated SIHP # 50-80-14-1604. The human remains were examined by osteologists from the University of Hawai‘i at Mānoa (Pietrusewsky et al. 1989). Historic artifacts related to residential use of the buildings in the Magoon Block were also found in the backdirt piles.

In 2005, Perzinski et al. (2005) conducted an archaeological inventory survey (AIS) in the same area, excavating 13 trenches. Perzinski et al (2005) discovered two additional human skeletal elements, which were considered part of SIHP # -1604. Three subsurface features comprising a garbage pit with abundant historic artifacts (dating to the decades around the turn of the century), a wall remnant/concrete slab remnant, and a posthole were considered residential/industrial remains of the late nineteenth/twentieth century occupation and use of the block; these features were designated SIHP # -6766.

CSH (Hazlett et al. 2008) subsequently monitored construction at the Queen Emmalani site (now called the Keola La‘i Condominium). Historic artifacts dating to the decades around the turn of the twentieth century were found in several trenches. Two isolated human skeletal remains in historic fill sediments were discovered in a utility trench near and parallel to Kawaiaha‘o Street. These human remains were considered part of SIHP # -1604. In all, the scattered human remains are from at least four different individuals.

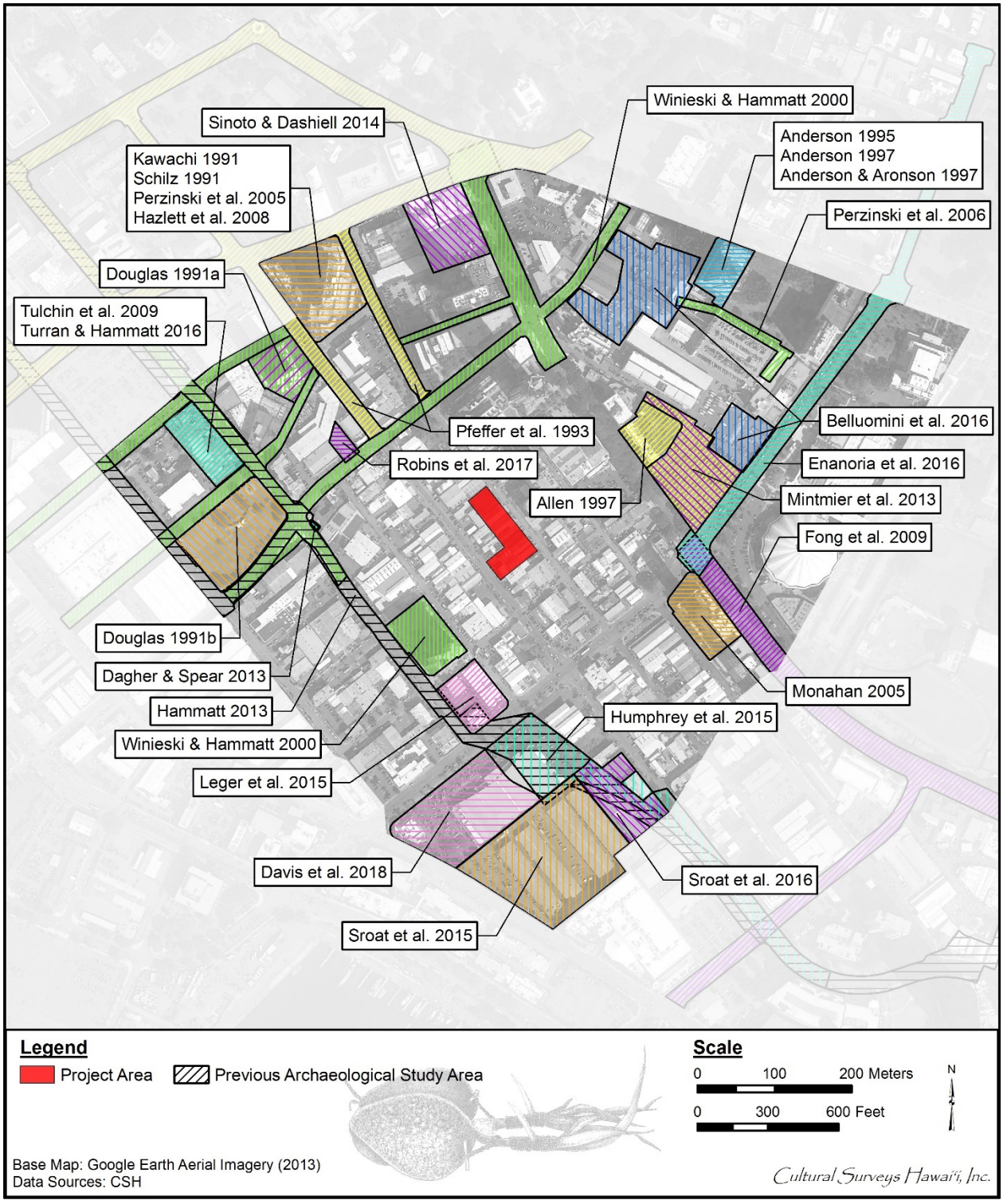

Figure 29. Previous archaeological studies in the vicinity of the project area; figure is bounded by South Street on the northeast, Pohukaina Street on the southwest, and Kawaiaha‘o Street on the northwest (Base map: Google Earth 2013)

Table 1. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results (SIHP # 50-80-14)
Douglas 1991a	Burial report	Coral and Queen St	Six burials reported (SIHP # -4380)
Douglas 1991b	Burial report	Mother Waldron Park	Burials identified during construction of water line across park; no locations provided and assigned SIHP # -4380
Kawachi 1991	Archaeological monitoring	Queen Emmalani Tower/Keola La‘i Condominium; TMKs: [1] 2-1-048:008, 009	Single human humerus and cranium identified (no SIHP number assigned)
Schilz 1991	Literature review	Queen Emmalani Tower/Keola La‘i Condominium; TMKs: [1] 2-1-048:008, 009	Concluded project area had low potential for subsurface cultural deposits; recommended monitoring during below grade excavations
Pfeffer et al. 1993	Archaeological monitoring	South St and Quinn Ln	Identified 116 burials associated with original extent of Kawaiaha‘o Cemetery (SIHP # -4534); 31 burials associated with historic Honuakaha smallpox cemetery (SIHP # -3712) and two other isolated burial sites (SIHP #s -4532 and - 4533); because these historic properties were well northwest of the present project area, they are not depicted on Figure 30
Anderson 1995	Archaeological inventory survey	One Archer Lane; TMKs: [1] 2-1-044:041–043	One historic property identified: SIHP # -5373, post-Contact trash pit with bottles, ceramics, and metal fragments
Allen 1997	Paleoenvironmental investigation	Symphony Park	Sedimentary, pollen, and radiocarbon analyses indicate area was wetland or marsh prior to Hawaiian settlement; wetland later designated SIHP # -6636
Anderson 1997	Archaeological monitoring	One Archer Lane; TMKs: [1] 2-1-044:041–043	One historic property identified: SIHP # -5455, post-Contact burial associated with Roman Catholic Cemetery

Reference	Type of Study	Location	Results (SIHP # 50-80-14)
Anderson and Aronson 1997	Archaeological monitoring and data recovery	One Archer Lane; TMKs: [1] 2-1-044:041–043	Identified 29 additional post-Contact burials (SIHP # -5455) associated with Roman Catholic Cemetery
Winieski and Hammatt 2000	Archaeological monitoring	Kaka‘ako Improvement District 3 project	Identified 11 burials designated SIHP #-5820; many had been disturbed by construction work; those found in situ or partially in situ were in traditional Hawaiian flexed position within buried A horizon or natural sand deposits
		Pohulani Elderly Rental Housing project	Identified nine burials in extended and flexed burial positions, designated SIHP # -4380
		Kauhale Kaka‘ako project	Documented buried A horizon and natural sand deposits underlying fill layers (Trenches 1–4) and one area (Trench 5) of previous pond sediments; no SIHP numbers assigned
Monahan 2005	Archaeological inventory survey	Three parcels bounded by Ward Ave, Kapi‘olani Blvd, and Waimanu St	No historic properties observed
Perzinski et al. 2005	Archaeological inventory survey	Queen Emmalani Tower/Keola La‘i Condominium; TMKs: [1] 2-1-048:008, 009	Two isolated human skeletal remains (SIHP # -1604) and evidence of historic occupation (SIHP # -6766)
Perzinski at al. 2006	Archaeological inventory survey	Kewalo HECO Dispatch center	One previously identified historic property (SIHP # -5455; see also Anderson 1997 and Anderson and Aronson 1997) consisting of two burials associated with Roman Catholic King St Cemetery
Hazlett et al. 2008	Archaeological monitoring	Queen Emmalani Tower/Keola La‘i Condominium; TMKs: [1] 2-1-048:008, 009	Isolated human remains associated with SIHP # -1604 (see also Perzinski et al. 2005)

Reference	Type of Study	Location	Results (SIHP # 50-80-14)
Fong et al. 2009	Archaeological monitoring	Kapi‘olani Blvd	No historic properties identified
Tulchin et al. 2009	Archaeological inventory survey	Halekauwila Place-Pohukaina School	Historic artifacts such as bottles and ceramics found, dating to late 19th/early 20th century; no SIHP number assigned
Dagher and Spear 2013	Burial site component of data recovery plan	Intersection of Halekauwila and Cooke St; TMK: [1] 2-1-050:004	One inadvertent burial identified during construction activities (SIHP # -7276)
Hammatt 2013	Archaeological inventory survey	Honolulu High-Capacity Transit Corridor–City Center (Section 4)	Three historic properties documented in vicinity of current project area: SIHP # -5820, two cultural deposits (a culturally enriched, sandy loam A horizon and a historic fill deposit utilized as a living surface) with 42 associated features including 12 human burials; SIHP # -7189, burned trash fill deposit; and SIHP # -7429, culturally enriched A horizon with pit features overlying Jaucas sand, included an isolated human skeletal element
Mintmier et al. 2013	Archaeological inventory survey	Symphony Honolulu project	One new historic property, SIHP # -7565, consisting of five subsurface features likely associated with utility infrastructure and associated commercial business; one previously recorded historic property, SIHP # -6636, consisting of Kewalo Wetland
Sinoto and Dashiell 2014	Archaeological inventory survey	801 South St Bldg B Development Area (Honolulu Advertiser Bldg); TMK: [1] 2-1-047:004	Concluded wetland deposit exposed in *mauka*/Diamond Head portion of parcel was natural wetland, not a fishpond or *lo‘i*; two ditches, SIHP # -7687 Features A and B likely constructed in late 1800s and do not represent modified traditional Hawaiian *‘auwai* (water channel)

Reference	Type of Study	Location	Results (SIHP # 50-80-14)
Humphrey et al. 2015	Supplemental archaeological inventory survey	Honolulu High-Capacity Transit Corridor–City Center (Section 4)	15 test excavations identified additional components of SIHP # -7429, including three pit features and a human burial
Leger et al. 2015	Archaeological inventory survey	Ward Block O	27 test excavations identified one historic property: SIHP # -7717, pre- to post-Contact subsurface residential and commercial surfaces; project area contained fill layers overlying two sequences of natural layers: loamy sand A horizon, Jaucas sand, and natural wetland or marine deposits; and wetland A horizon over natural wetland or marine deposits
Sroat et al. 2015	Archaeological inventory survey	Ward Block I	88 test excavations identified three historic properties: SIHP #s -7429, subsurface cultural deposits comprising culturally enriched historic fill layers and a sand A horizon with 60 associated features, including human burials; -7655, subsurface historic salt pan remnants and associated cultural deposits, including a human burial; and -7659, Ward Estate water channel (*‘auwai*)
Belluomini et al. 2016	Archaeological inventory survey	HECO Ward facility	Documented SIHP # -6636, Kewalo wetland
Enanoria et al. 2016	Archaeological monitoring	Ward Ave, between Kīnau St and Kapi‘olani Blvd	No historic properties identified
Sroat et al. 2016	Archaeological inventory survey	Ward Block N East	Identified two historic properties: SIHP #s -7429, pre- and post-Contact cultural deposits with associated features, including human burials; and -7686, subsurface historic infrastructure remnants

Reference	Type of Study	Location	Results (SIHP # 50-80-14)
Turran and Hammatt 2016	Archaeological monitoring	Block bounded by Halekauwila St, Keawe St., Pohukaina St, and Mother Waldron Park; TMKs: [1] 2-1-051:042–044	Identified two historic properties: SIHP #s -7189, historic trash layer suspected to be from open air burning of urban refuse during early 1900s; and -7577, an inadvertently discovered disarticulated human rib fragment located in northwest portion of project area
Robins et al. 2017	Archaeological inventory survey	Nohona Hale project at 630 Cooke St; TMK: [1] 2-1-051:014	Documented SIHP # -7942, historic burnt trash fill layer (Feature 1) and historic structural remains (Feature 2)
Davis et al. 2018	Archaeological inventory survey	Ward Block H	Documented three previously identified historic properties: SIHP #s -7429, subsurface cultural deposits; -7686, subsurface historic infrastructure remnants; and -7655, historic salt pan remnants

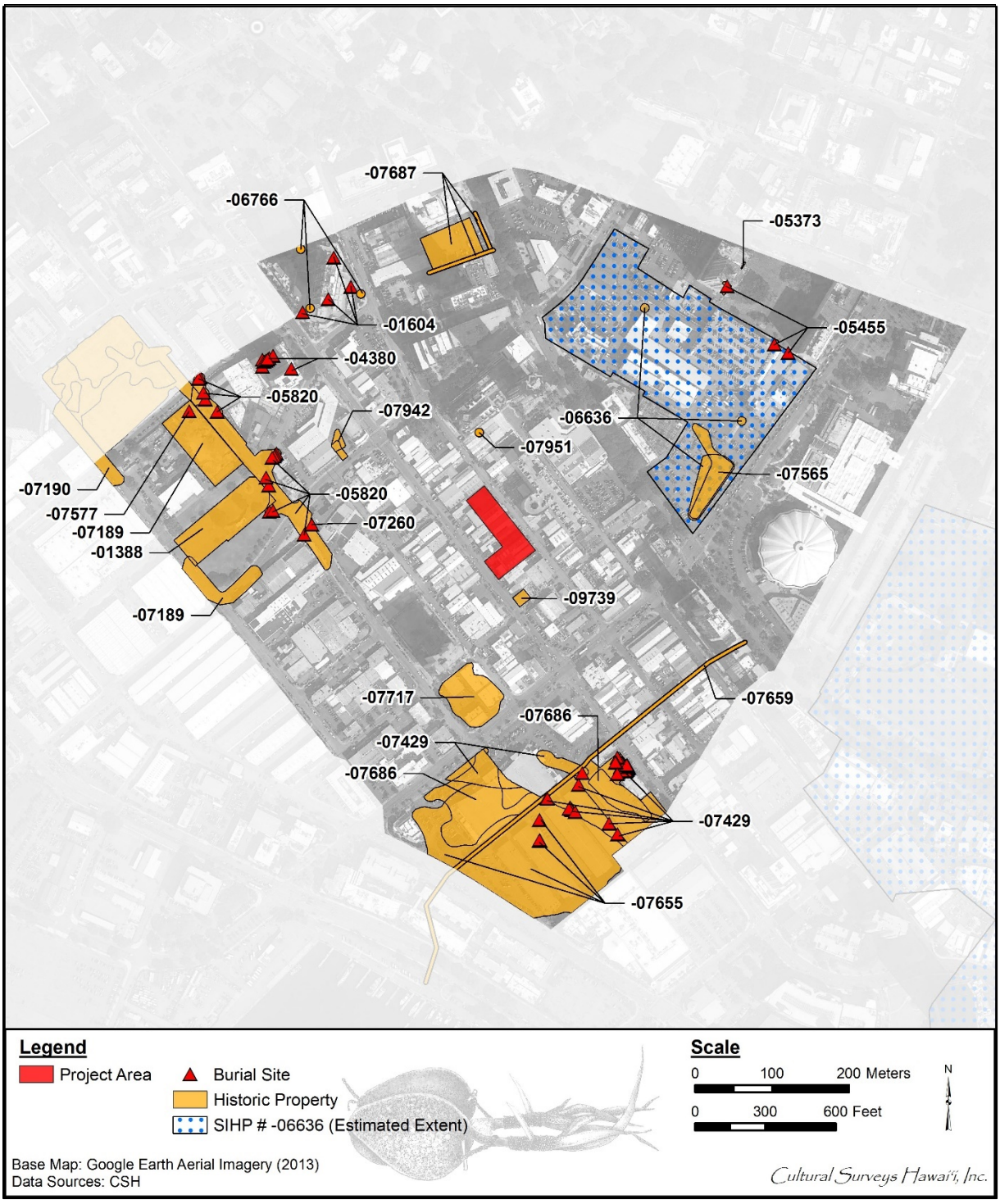

Figure 30. Historic properties in the vicinity of project area (while the Pfeffer et al. [1993] study extended into the vicinity of the present project area, all of the historic properties identified were well northwest and are not depicted in this figure) (Base map: Google Earth 2013)

Table 2. Historic properties in the vicinity of the project area

SIHP # 50-80-14	Formal Type/ Name	Description	Reference
-1388	Mother Waldron Park	Constructed in 1937	Hawai‘i Register
-1604	Human remains	Isolated remains	Perzinski et al. 2005; Hazlett et al. 2008
-4380	Human remains	Six human burials	Douglas 1991a, b; Winieski and Hammatt 2000
-5373	Historic trash pit	Post-Contact trash pit with bottles, ceramics, and metal fragments	Anderson 1995
-5455	Roman Catholic King Street Cemetery	Associated with post-Contact human burials	Anderson 1997; Anderson and Aronson 1997; Perzinski et al. 2006
-5820	Human remains	11 human burials	Winieski and Hammatt 2000
-6636	Kewalo Wetlands	–	Allen 1997; Mintmier et al. 2013
-6766	Subsurface cultural features	Post-Contact	Perzinski et al. 2005
-7189	Burned trash fill deposit	Post-Contact	Hammatt 2013
-7190	Salt pan remnants	Pre- and post-Contact	Pammer et al. 2011
-7260	Human remains	A partial set of displaced in situ human skeletal remains (30%) was recovered from the backdirt in association with traditional Hawaiian cultural material, including volcanic glass artifacts and faunal midden.	Dagher and Spear2013
-7429	Subsurface cultural deposit with human remains	with pit features overlying Jaucas sand; included an isolated human skeletal element within the A horizon	Hammatt 2013; Humphrey et al. 2015; Sroat et al. 2015; Sroat et al. 2016
-7565	Subsurface structural remnants	Likely associated with utility infrastructure and associated commercial business	Mintmier et al. 2013
-7577	Human remains	One burial	Turran and Hammatt 2016
-7655	Salt pan remnants	Includes man-made berm, fire features, and human remains	Sroat et al. 2015

SIHP # 50-80-14	Formal Type/ Name	Description	Reference
-7659	Ward Ditch (*‘auwai*)	Post-Contact	Pammer et al. 2014
-7686	Subsurface infrastructure remnants	Post-Contact; associated with commercial development	Sroat et al. 2016
-7687	Subsurface cultural deposit	Features A and B are post-Contact ditches	Sinoto and Dashiell 2014
-7717	Subsurface cultural deposit	Pre- and post-Contact	Leger et al. 2015
-7942	Historic burnt trash fill layer (Feature 1) and structural remains (Feature 2)	Feature 1 likely associated with open air burning of urban refuse in the early 1900s, associated with in-filling of the marshlands; Feature 2 represents probable building foundations and a floor associated with early and mid-twentieth century settlement and commercial development	Robins et al. 2017
-7951	Historic trash pit	Post-Contact	Davis et al. 2016
-9739	Yee/Kobayashi Store	Post-Contact	Hawai‘i Register

3.2.2 Kaka‘ako Improvement District 1 (Pfeffer et al. 1993)

From April 1986 through August 1988, CSH (Pfeffer et al. 1993) conducted monitoring, data recovery, and excavation services within the Hawaii Community Development Authority's Kaka‘ako Improvement District 1 (ID-1), which was bounded by Punchbowl Street (west), South Street (east), King Street (north), and Ala Moana Boulevard (south) with easterly extensions on Kawaiaha‘o Lane, Auahi Street, and Queen Street. Four burial site areas comprising 149 burial sets were encountered in the Kaka‘ako ID-1 project area; two burial areas were associated with cemeteries, and two were isolated burials. The Pfeffer et al. (1993) study identified 116 burials associated with the original extent of Kawaiaha‘o Cemetery (SIHP # -4534), 31 burials associated with the historic Honuakaha smallpox cemetery (SIHP # -3712), an isolated burial on Punchbowl Street (SIHP # -4532), and an isolated burial on Halekauwila Street (SIHP # -4533). None of the burials and none of the historic properties were identified in the Queen Street section closest to the current project area, and thus they are not depicted on Figure 30.

A variety of other archaeological features were noted, excavated, and recorded during monitoring. These include historic trash layers, cultural features, and fill layers associated with the urbanization of Kaka‘ako.

3.2.3 Kaka‘ako Improvement District 3 and Pohulani Elderly Housing (Douglas 1991a, b; Winieski and Hammatt 2000)

In November 1990, during construction of an elderly housing project at the southwest corner of Coral and Queen streets, human bones were uncovered and reported to the SHPD (Douglas 1991a). Disinterment for the burials was recommended, and CSH (Winieski and Hammatt 2000) conducted excavations the same month. Eight burials were identified on the east side of the property; only five were removed. A glass bead was found with one burial, suggesting a post-Contact date. One burial also exhibited a pre-mortem loss of the mandibular incisors, which suggests deliberate tooth evulsion. This procedure was known to have been practiced by Hawaiians in the pre-Contact and early post-Contact periods. The author concluded the burials were probably of Hawaiian ethnicity, perhaps representing a nuclear family. This burial area was later designated SIHP # -4380. This project area is within the boundary of LCA 2045 to Kauwahi, who received the parcel in the time of Kamehameha I, indicating this was a Hawaiian habitation area as early as the beginning of the nineteenth century.

In March 1991, during excavation of a water line trench between Coral and Queen streets across Mother Waldron Park, human skeletal remains were discovered and disinterred (Douglas 1991b). The remains were determined to be of Hawaiian ancestry, with a pig burial possibly associated with the burial. These burials were considered part of SIHP # -4380.

Between November 1990 and September 1992, CSH (Winieski and Hammatt 2000) monitored construction at the Kaka‘ako Improvement District 3 area, the Pohulani Elderly Rental Housing project area, and the Kauhale Kaka‘ako project area (TMKs: [1] 2-1-030–032, 044, 046–048, 050–052, and 054). Kaka‘ako Improvement District 3 was bounded by Kapi‘olani Boulevard and King Street (north), the northern end of Cooke Street (east), Halekauwila Street (south), and South Street (west). It includes extensions of Keawe and Cooke streets to the south.

The monitoring of subsurface excavations revealed that although the area had been previously disturbed, a cultural layer and in situ Jaucas sand and volcanic cinder deposits were still intact

below fill layers. The cultural layer contained historic artifacts mixed with scant traditional Hawaiian cultural materials. Twenty human burials were discovered during these projects—nine at the Pohulani Elderly Rental Housing project (SIHP # -4380) and 11 (SIHP # -5820) in and around Mother Waldron Park (SIHP # -1388). Five burials were in an extended position, and seven were flexed. The position of eight could not be determined. One burial was in a coffin, and one contained a glass trade bead, suggesting the burials were of post-Contact age. The 17 burials recovered were reinterred in the northeast corner of Mother Waldron Park. Three were left in place beneath the Pohulani Elderly Rental Housing Facility. These scattered burials are all clustered around the location of LCA 982 to Kukao and the Pu‘unui parcel to Queen Emma, an area with a cluster of Hawaiian house lots shown on several late nineteenth century maps.

3.2.4 One Archer Lane (Anderson 1995; Anderson 1997; Anderson and Aronson 1997)

In 1995, Ogden Environmental and Energy Services Company, Inc., conducted an AIS of One Archer Lane, an area adjacent to the western boundary of the historic Roman Catholic Cemetery (Anderson 1995). One historic property was identified: SIHP # -5373, a post-Contact trash pit containing bottles, ceramics, and metal fragments. Of note was the presence of a basalt adze fragment determined to be associated with the historic trash pit; however, pre-Contact land use within the study area could not be ruled out.

During archaeological monitoring and data recovery of a tank installation at One Archer Lane, a post-Contact human burial (SIHP # -5455) was inadvertently encountered (Anderson 1997). Following the discovery of the human burial, it was believed that any further work would not intrude into the cemetery boundary. As a result, in consultation with the SHPD, monitoring was halted for the remainder of the project.

In August 1997, two months after monitoring was halted, a concentration of burials (SIHP # -5455) was inadvertently encountered during construction activities at One Archer Lane. In all, a minimum of 29 individuals were encountered. Analysis of the burials showed that “the burials dated from the mid-1800s to the 1920s” (Anderson and Aronson 1997), suggesting the burials were associated with the historic Roman Catholic Cemetery.

3.2.5 Symphony Park (Allen 1997; Mintmier et al. 2013)

In 1995, Ogden Environmental and Energy Services conducted geoarchaeological coring at the construction site of Symphony Park (Allen 1997). The project area is bounded by the Hawaiian Electric Company Archer Substation and the Ward Complex on the northeast and northwest, Kapi‘olani Boulevard on the southwest, and Ward Avenue on the southeast. Testing revealed that a bay was in the area cored by ca. 2500 BCE or earlier. The area then transitioned from lagoonal to marsh by AD 300-800, following a lowering of sea level to an elevation near today’s. After the area transitioned into marshland, grasses and sedges increased. No historic properties were identified by Allen (1997) within the wetland deposit.

In 2013, Pacific Consulting Services, Inc., conducted an AIS for the Symphony Honolulu project (Mintmier et al. 2013). Twelve trenches were excavated. One new historic property, SIHP # -7565, and one previously recorded historic property, SIHP # -6636 (Kewalo wetland), were recorded during the survey. SIHP # -7565 consists of five subsurface features likely associated with utility infrastructure and associated commercial structures. No cultural features were identified by Mintmier et al. (2013) within the wetland deposit (SIHP # -6636).

3.2.6 Three Parcels at Kapi‘olani Boulevard and Waimanu Street (Monahan 2005)

In 2005, Scientific Consultant Services (SCS) conducted an AIS, reported as an archaeological assessment, for three parcels bounded by Ward Avenue, Kapi‘olani Boulevard, and Waimanu Street (Monahan 2005). Nine backhoe-assisted trenches were excavated to an average depth of 103 cm below ground surface. No artifacts or features were observed; however, archaeological monitoring was recommended for all areas.

3.2.7 HECO Ward Facility (Perzinski et al. 2006, Belluomini et al. 2016)

In 2005, CSH completed an AIS with subsurface testing for an approximately 1-acre parcel of land for a new HECO controlling station, adjacent to the historic Roman Catholic Cemetery. One previously identified historic property, SIHP # -5455, was documented within the study area. The two historic coffin burials, believed to be associated with the Roman Catholic Cemetery, were outside the presently delineated cemetery property, suggesting the cemetery once extended beyond the current delineated area (Perzinski et al. 2006).

In 2016, CSH (Belluomini et al. 2016) reported on an AIS for the Ward Avenue HECO facility lighting improvements and an electric vehicle charging station project (TMKs: [1] 2-1-044:003, 039, and 044). The project included the installation of 21 avian friendly solar powered lights on newly installed poles and excavations for three bollards within existing parking lots. A total of 24 test unit excavations were conducted and primarily contained historic and modern fill deposits. SIHP # -6636, subsurface Kewalo wetland remnants, was documented.

3.2.8 Kapi‘olani Boulevard Improvements (Fong et al. 2009)

In 2008, CSH completed archaeological monitoring for the construction and upgrading of existing drainage, water, and sewer systems within Kapi‘olani Boulevard. No historic properties were identified. Observed stratigraphic layers included clay and gley deposits that may be indicative of the wetland agriculture surface that existed until the early twentieth century. Layers of both disturbed and clean Jaucas sand were also excavated and predicated by fill material. Several historic items (stoneware vessel, shell button, wire fragments, undescribed bottle glass and ceramic fragments, square nails, wire nails, a shotgun cartridge, and numerous wood planks) were encountered, all post-dating 1890, which is indicative of the conversion of this area from agriculture land to residential suburbs. Fill material was also found at various locations in the project area that had been deposited during reclamation activities that occurred in the 1920s and 1930s.

3.2.9 Halekauwila Place – Pohukaina School (Tulchin et al. 2009)

In 2009, CSH archaeologists excavated 16 trenches in the Halekauwila Place property, once the grounds of Pohukaina School (Tulchin et al. 2009). Subsurface testing revealed several historic and modern fill layers overlying the natural sediments. The natural sandy clay sediments were typical of a wet, marsh-type environment. Fill layers included a layer of ash and burnt garbage, interpreted to be fill material generated by the city’s municipal garbage incinerator, and layers of sandy clay, interpreted to be fill material generated by the dredging of Honolulu Harbor and other coastal areas in the vicinity. The presence of the dredged fill material and incinerator fill material is consistent with background research of Kaka‘ako land reclamation projects in the late 1800s and early 1900s. The upper terrigenous fill layers included construction debris and abandoned utilities, evidence of the former Pohukaina School. Numerous historic artifacts, mainly glass

bottles and ceramics, were recovered from the fill layers; most were dated to the late nineteenth to early twentieth century. No pre-Contact cultural layers or burials were found.

3.2.10 Honolulu High-Capacity Transit Corridor Project (HHCTCP) (Hammatt 2013 and Humphrey et al. 2015)

Between November 2011 and February 2013, CSH conducted an AIS of the Honolulu High-Capacity Transit Corridor Project (HHCTCP) (City Center), which extended from Kalihi Stream in the west to the Ala Moana Center in the east (Hammatt 2013). The 250 AIS test excavations documented 19 historic properties along the length of the project corridor. Of these, only one historic property (SIHP # -5820, human burials) previously identified by Winieski and Hammatt (2000) was documented in the vicinity of the current project area. In addition to the previously identified burials, Hammatt et al. (2013) recorded SIHP # -7429, two cultural layers: a historic A horizon consisting of reworked/redeposited natural loamy sand with eight associated pit features, including a possible post mold and two dog burials; and a lower, in situ, culturally enriched, loamy sand A horizon containing 19 associated pit features and cultural material such as a marine shell midden, a shell fishhook, historic artifacts, faunal remains, charcoal, a basalt tool, and a modified human tibia fragment. Additional pit features including a horse burial were identified in association with a disturbed layer, and an in situ human burial was identified within Jaucas sand.

In 2014, a supplemental investigation was conducted for the City Center project area due to modifications to the Kaka‘ako Station footprint and rail corridor alignment in the immediate vicinity (from Ward Avenue to just east of Kamake‘e Street) (Humphrey et al. 2015). Humphrey et al. (2015) further documented SIHP # -7429, cultural deposits. These two cultural deposits are designated Component 1 (culturally enriched historic fill) and Component 2 (culturally enriched natural sand deposits). Four additional features of SIHP # -7429 were identified, including a fire pit feature within Component 2 and a flexed human burial within Jaucas sand.

3.2.11 Inadvertent Burial at Halekauwila and Cooke (Dagher and Spear 2013)

SCS conducted data recovery of an inadvertent burial, SIHP # -7260, uncovered during construction of an above-ground transformer box at the intersection of Halekauwila and Cooke streets (TMK: [1] 2-1-050:004) (Dagher and Spear 2013). A partial set of displaced, in situ human skeletal remains was recovered from the backdirt in association with traditional Hawaiian cultural material, including volcanic glass artifacts and faunal midden. The remains appeared to be of Native Hawaiian ancestry.

3.2.12 Honolulu Advertiser Building (Sinoto and Dashiell 2014)

Aki Sinoto Consulting (Sinoto and Dashiell 2014) reported on an AIS at the 801 South Street Building B Development Area (Honolulu Advertiser Building or Hawaii Newspaper Agency Building or News Building) (TMK: [1] 2-1-047:004). The testing concluded the wetland deposit exposed in the *mauka*/Diamond Head portion of the parcel was a natural wetland, not a fishpond or *lo‘i*. Furthermore, Sinoto and Dashiell (2014) concluded two ditches, SIHP # -7687 Features A and B, likely were constructed in the late 1800s and do not represent modified traditional Hawaiian *‘auwai*.

3.2.13 Ward Neighborhood Block O Project (Leger et al. 2015)

Between 14 April 2013 and 16 October 2014, CSH conducted an AIS of the Block O project area at the intersection of Ward Avenue and Halekauwila Street (Leger et al. 2015). Twenty-seven test excavations were documented, and one historic property was identified: SIHP # -7717, consisting of subsurface pre- to post-Contact residential and commercial surfaces. In general, the stratigraphy within Block O consists of the modern surface, overlying modern and historic fill deposits, including Kaka‘ako reclamation fill deposits of crushed coral and dredged marine clay, overlying in situ sand deposits. Localized wetland deposits were also encountered within two discrete areas in the *makai* portion of the parcel.

SIHP # -7717 was documented within the majority of the project area. SIHP # -7717 is composed of multiple pre- to post-Contact buried residential and commercial surfaces and features. These buried surfaces and associated features evidence residential (i.e., living) and commercial land use within Block O over an extended period of time. The buried surfaces consist of 25 buried living/residential and/or commercial surfaces and ten associated historic features (SIHP # -7717 Features 1–9). The buried surfaces consist of in situ, natural land surfaces; historic fill deposits utilized as living surfaces; and twentieth century commercial surfaces and infrastructure remnants.

In situ living surfaces consist of portions of the natural sand A horizon and the underlying Jaucas sand. These in situ living surfaces contain historic artifacts, faunal material, charcoal, marine shell midden, and/or historic features such as a milled wood post and associated pit. One traditional type Hawaiian artifact was encountered within the Jaucas sand, consisting of a grooved basalt sinker stone or canoe anchor. Historic living surfaces consist of four fill deposits that contain historic features and one trash layer. In addition, two historic pit features of indeterminate provenience were identified. These historic deposits and features contain faunal material, historic artifacts, charcoal, and two dog burials. Historic commercial surfaces and infrastructure remnants consist of concrete slabs (n=10), oiled road surfaces (n=8), asphalt (n=3), and concrete infrastructure remnants (n=2). These buried commercial surfaces indicate a change in land use from residential to commercial sometime in the mid-twentieth century.

3.2.14 Block I (Sroat et al. 2015)

CSH (Sroat et al. 2015) reported on an AIS for the Block I project, which is a discrete project within the larger Ward Neighborhood Land Block 1 area, within Ward Industrial Center. The parcel is bounded by Auahi Street (southwest), Ward Entertainment Center (southeast), and Ward Gateway Center (northwest) (TMK: [1] 2-3-002:001 por.). Three historic properties were identified within the Block I study area:

1. SIHP # -7655 consists of subsurface historic salt pan remnants, documented as man-made berms constructed around laminated salt pan beds, and associated cultural activity within the upper portion of the salt pan berms, including fire features and human interment. SIHP # -7655 salt pan remnants were previously documented within the Block B East and Block C West project areas, just makai of Block I (see Pammer et al. 2014; Sroat et al. 2014). Within Block I, the boundary of the historic salt pan remnants was extended approximately 160 m mauka, and evidence of cultural use of the constructed salt pan berms was documented in the form of pit features and a human burial site.
2. SIHP # -7429 consists of pre- and post-Contact cultural deposits with associated features, including human burials. SIHP # -7429 was previously documented by Hammatt (2013)

and Hawkins et al. (2015), to the north and south of Block I, as consisting of a culturally enriched historic fill layer with associated features, including post molds and water channel features, overlying a natural loamy sand A horizon cultural deposit with associated traditional type pit features and an isolated human skeletal element. The Block I AIS documented the central portion of this historic property and similarly identified both pre- and post-Contact cultural deposits with associated features. Features included traditional type pit features, fire features, post molds, isolated human skeletal elements within disturbed local sediments, and in situ human burials.

3. SIHP # -7659 consists of the concretized Ward Estate *‘auwai*. SIHP # -7659 was previously identified with the Block B East project area, *makai* of Block I (see Pammer et al. 2014). During a pedestrian survey of the Block I study area, this concretized channel was observed to extend along the length of the northwestern boundary of the study area and to continue *mauka* in the direction of the Neal Blaisdell Center.

3.2.15 Enanoria et al. 2016

CSH (Enanoria et al. 2016) conducted archaeological monitoring for a Board of Water Supply water main replacement project along Ward Avenue, between Kīnau Street and Kapi‘olani Boulevard. The documented stratigraphy consisted of imported fill associated with the construction of the existing asphalt surface and subsurface utilities, overlying redeposited natural alluvium associated with subsurface utility installation. Naturally deposited alluvium and volcanic cinder were also encountered in areas with less disturbance. No historic properties were identified.

3.2.16 Block N East Project (Sroat et al. 2016)

CSH (Sroat et al. 2016) reported on an AIS for the Block N East Project (TMKs: [1] 2-3-002:001 [por.], 067, 086, and 087). This was a discrete project within the larger Ward Neighborhood Land Block 1 area, within Ward Industrial Center, along the *makai* (seaward) side of Queen Street between Ward Avenue and Kamake‘e Street.

Two historic properties were documented within the Block N East project area:

1. SIHP # -7429 consists of pre- and post-Contact cultural deposits with associated features, including human burials. SIHP # -7429 was previously documented by Hammatt (2013), Hawkins et al. (2015), Humphrey et al. (2015), and Sroat et al. (2015) within adjacent project areas. Within Block N East, SIHP # -7429 consists of culturally enriched natural sand deposits, including an associated human burial ground, and culturally enriched fill deposits utilized as historic living surfaces.
2. 2. SIHP # -7686 consists of subsurface historic infrastructure remnants. SIHP # -7686 was previously identified by Hawkins et al. (2015) within the adjacent Block M project area as consisting of warehouse building remnants and asphalt road surfaces associated with twentieth century commercial development. Within Block N East, SIHP # -7686 consists of buried asphalt and oil-rolled surfaces.

3.2.17 Nohona Hale Project at 630 Cooke Street (Robins et al. 2017)

CSH (Robins et al. 2017) reported on an AIS for a Nohona Hale project at 630 Cooke Street (TMK: [1] 2-1-051:014). One historic property was identified: SIHP # -7942, consisting of a historic burnt trash fill layer (Feature 1) and historic structural remains (Feature 2). The burnt trash fill (Feature 1) was likely associated with open air burning of urban refuse during the early 1900s and use of the processed fill in unwanted marshlands within the area. The historic structural

remains (Feature 2) represent probable building foundations and a floor associated with early and mid-twentieth century settlement and commercial development.

3.2.18 Davis et al. 2018

CSH (Davis et al. 2018) reported on an AIS at Block H, which is a discrete project within the larger Ward Neighborhood Master Plan and is part of the current Ward Gateway Center. Three previously identified historic properties were further documented by Davis et al. (2018): SIHP #s -7429, pre- and post-Contact cultural deposits with associated features; -7686, subsurface historic infrastructure remnants; and -7655, historic salt pan remnants. Only sparse cultural material was observed within SIHP # -7429, consisting mainly of post-Contact material and four associated pit features, including one post hole.

The SIHP # -7686 salt pan berms evidenced wide variability and included an area of high, steep berms in the *makai* portion of the Block H project area along Auahi Street. The salt pan beds were most distinguishable in the *mauka* portion of the Block H project area. Within the remaining areas, the salt pan beds were distinguished by the presence of associated salt pan berms and/or their presence directly atop the coral shelf (i.e., the natural soils had been entirely scraped away). A possible *‘auwai* was identified within the south corner of the Block H project area. It consisted of a narrow channel defined by square-cut embankments. The channel sediment contained a dense deposit of brackish water snails and peat.

SIHP # -7686 was documented throughout the Block H project area and consisted of buried asphalt surfaces, an oil-rolled surface, two buried wall remnants, two localized demolition deposits, and a large trash pit. Only one structural remnant pre-dated the early twentieth century Kaka‘ako land reclamation.

3.3 Background Summary and Predictive Model

From the pre-Contact period into the early 1900s, Kaka‘ako was considered separate from the two main population centers of the region, Honolulu and Waikīkī. It was sparsely populated and characterized by a relatively barren plain dotted with fishponds and saltpans. In general, Kaka‘ako was not a favored location of permanent habitation or traditional agricultural activities.

Previous archaeology indicates many of the sediments in the area are fills, some of which extend to the water table. Subsurface cultural deposits identified in the vicinity of the project area consist of post-Contact deposits associated with salt production, trash disposal, and urban/industrial development. Elsewhere, some natural soils/sediments remain intact below the fill layers, including sections with calcareous or marine sands; this is important since sand dunes or berms were favored locations for traditional Hawaiian burials. Small clusters of traditional Hawaiian burials have been recorded west/northwest and south of the project area, although not within ca. 100 m. However, the lack of burials and other historic properties in the immediate vicinity is likely a result of the lack of prior archaeological studies adjacent to the current study area, rather than an indication that such properties do not exist.

The current project area is situated within former marshland along the western boundary of Kewalo Ili, *mauka* of the pre-1850 coastline. Mid-1800s Māhele documents indicate the property was marshland when awarded to Kamake‘e Pi‘ikoi (LCA 10605; ‘Āpana 7), wife of Jonah Pi‘ikoi, an *ali‘i* and retainer of Kauikeaouli (Kamehameha III), who held several government posts.

Archival maps suggest the project area remained undeveloped until the early twentieth century, when the marsh was in-filled. After 1914, the project area and surrounding Kaka‘ako region was intensively developed with the construction of a road grid, residential units, and industrial/commercial buildings.

Although no pre-Contact cultural deposits are expected in the former marsh, traditional Hawaiian burials might be present in elevated sand berms (Jaucas sand), as documented elsewhere in the former tidal flats or marshland.

Section 4 Results of Fieldwork

CSH completed the fieldwork component of this AIS under archaeological fieldwork permit numbers 18-15, issued by the SHPD pursuant to HAR §13-282. Fieldwork was conducted between 14 September 2018 and 04 October 2018 by CSH archaeologists, Sara Blahut, M.A., Jessica Burden, B.A., David Crowell, M.S., Abundanzia Delavega, B.A., Lisa Manirath, M.A., and Laura Vollert, B.A., under the direction of Project Manager, Douglas Borthwick, B.A., Project Director, Michelle Pammer Clark, B.A., and the general supervision of Principal Investigator, Hallett H. Hammatt, Ph.D. This work required approximately 16 person-days to complete.

Fieldwork consisted of an initial 100% coverage pedestrian inspection within the study area in order to locate any surface historic properties. The pedestrian survey was accomplished through systematic sweeps spaced 5 m apart. No surface archaeological historic properties were observed and therefore historic property identification efforts focused on the identification of subsurface cultural deposits through a subsurface testing program.

Eight test trenches were excavated, documented, sampled, and subsequently backfilled. The distribution of these test excavations is shown on Figure 31. These 8 test excavations were placed to target a potential dryland berm associated with the Queen Street alignment and historic properties shown on twentieth century Sanborn Fire Insurance Maps (Figure 32 and Figure 33). One new historic property was identified during archaeological inventory survey testing: CSH 1, subsurface structural remnants.

The following paragraphs provide an overview and summary of the backhoe testing results. For detailed information regarding each of the test excavations, please refer to the excavation profiles, stratigraphic descriptions, and photographs that follow this more general summary discussion.

4.1 Stratigraphic Summary

Stratigraphic documentation for excavations included the production of detailed stratigraphic profile maps, the completion of USDA soil description observations for each stratum, and the sequential designation of each stratum using roman numerals (i.e., Strata I, II, III, etc.) with sub-designations (i.e., Strata Ia, Ib, Ic, etc.) used for sequential deposits, primarily in reference to successive fill layers.

In general, the observed stratigraphy consisted of imported fill deposits overlying natural low-lying deposits. These observations are consistent with the USDA soil data for the project area and its vicinity which indicates the project area to be within “Fill Land.” Fill layers were designated Stratum I or Stratum II and subdivided into sub-strata based on differences in matrix, soil color, and texture. Fill deposits generally extended 1.00–1.50 mbs. Natural deposits were designated Stratum III. The coral shelf was reached at the base of excavation (BOE) within all 8 test excavations. The coral shelf was observed originating from 2.20–2.45 mbs with the water table observed just above.

Background research indicates the project area to be former marshland until the end of the nineteenth century when it was filled and developed. An 1883 Baldwin map and 1893 Wall map (see Figure 12 and Figure 13) show the project area as undeveloped marshland. By 1897 (see Figure 14) Queen Street and Kawaiahao Street alignments are in place and by ca. 1900 (see Figure

15) the project area has been subdivided into parcels. A 1914 Public Works map (see Figure 17) indicates the project area to have been infilled, although much of the surrounding land *mauka* of Queen Street had not. A 1906 Dakin fire insurance map (see Figure 16) depicts dwellings and small outbuildings covering the project area. The project area appears to remain largely residential until the mid-twentieth century when commercial properties begin to take the place of the dwellings (see Figure 20, Figure 24, Figure 32, and Figure 33).

The imported fill deposits associated with Stratum I generally consisted of the current concrete slab surface with associated base course, as well as various imported deposits (i.e., loamy sand, sandy loam, sandy clay loam, crushed coral and/or hydraulic pumped fill) used to raise and level the surface for urban development during the early twentieth century. Stratum I deposits were observed across the entire project area.

The fill deposits associated with Stratum II generally consisted of dark sandy loam, sandy clay loam, or sandy clay deposits mixed with or overlying imported volcanic cinder. Though the exact composition of Stratum II varied between test excavations, it was observed consistently across the entire project area. Forty-three of 46 collected artifacts originated within Stratum II and a number of non-diagnostic artifacts including decomposing ferrous metal and wood were observed within Stratum II during testing. Datable artifacts provide a date range from the late nineteenth to early twentieth century.

The natural deposits associated with Stratum III generally consisted of gleyed sandy clay, silty clay, and sand. Stratum III corresponds to the natural marshlands covering the project area prior to infilling at the turn of the nineteenth century. These deposits are collectively termed “low-lying deposits” throughout this document. No evidence of sand berms or high ground were identified. A number of bulk samples were collected from Stratum III in order to identify and characterize any cultural content that may have been present. Wet-screening of these samples in the CSH laboratory identified no cultural content and little to no organic or other noteworthy material.

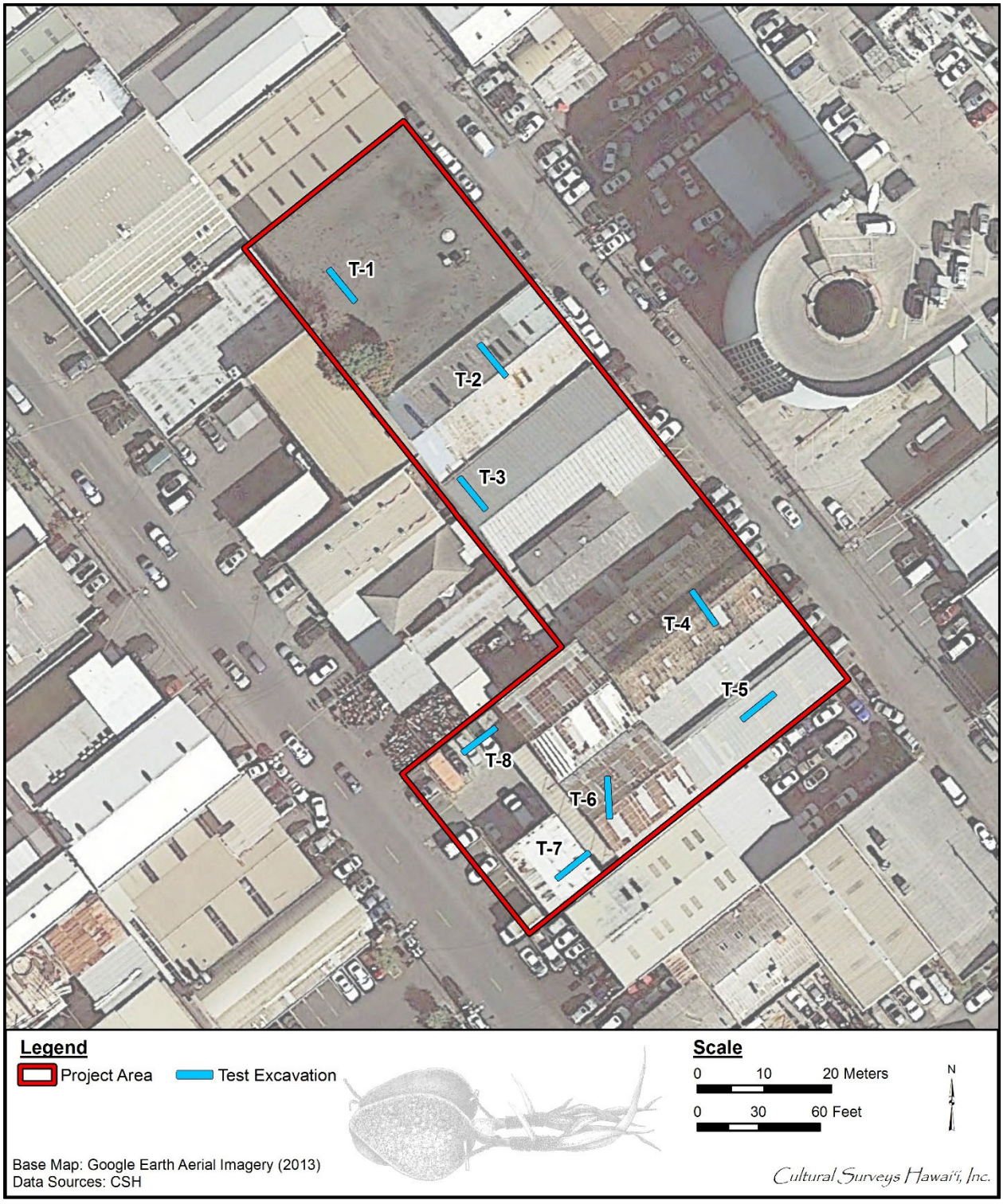

Figure 31. Aerial photograph showing the locations of test excavations within the project area (Google Earth 2013)

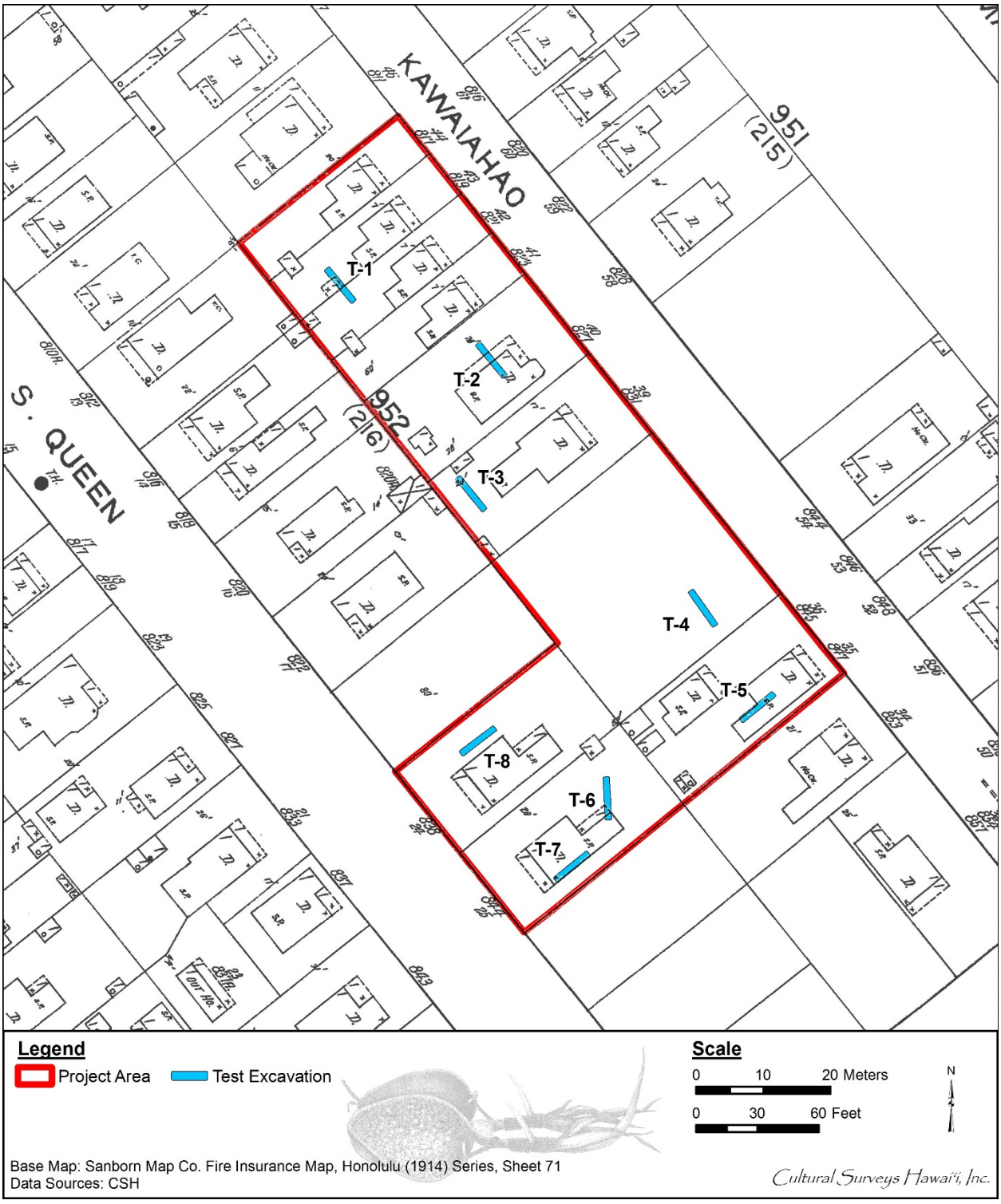

Figure 32. 1914 Sanborn Fire Insurance Map showing testing locations

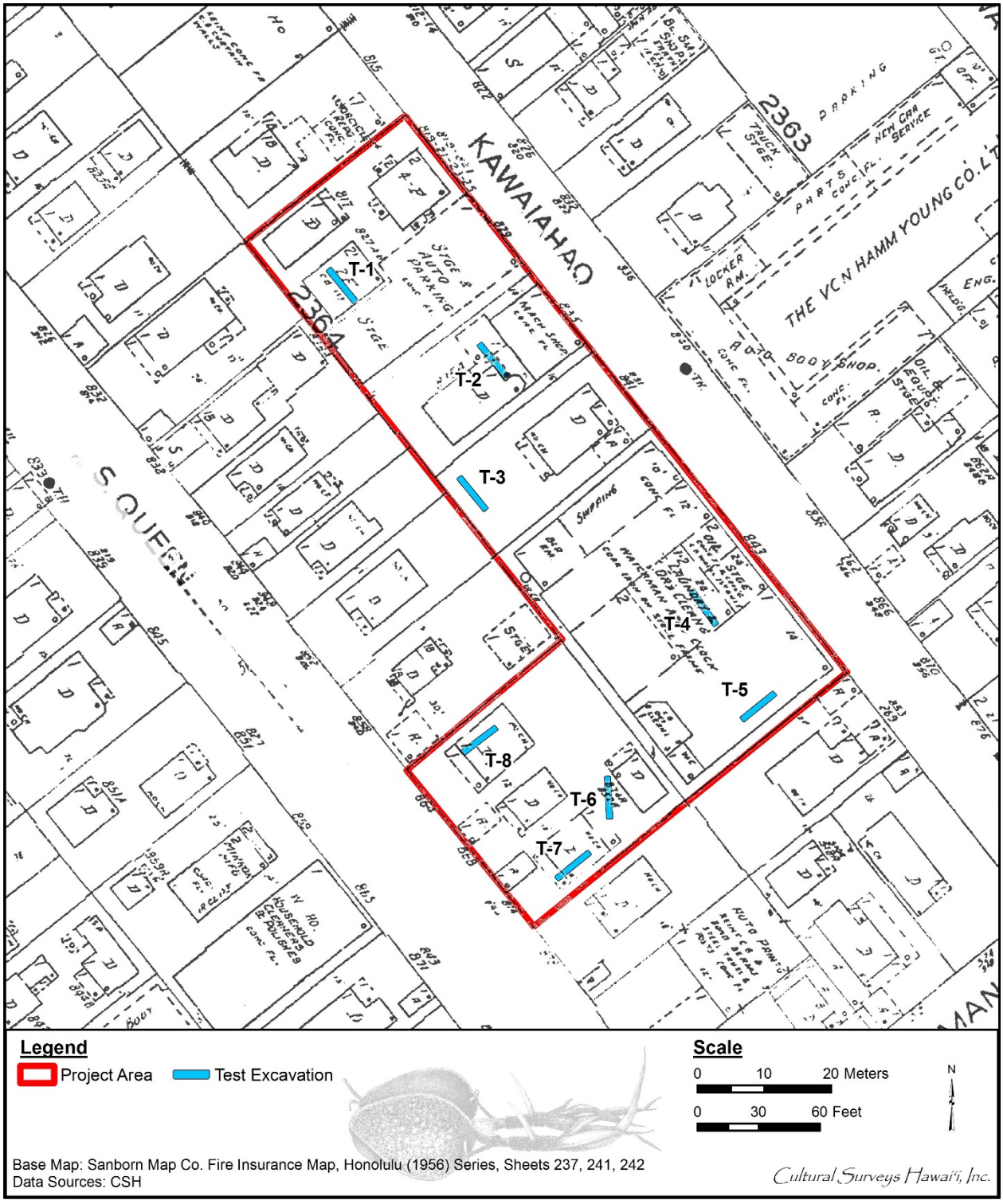

Figure 33. 1956 Sanborn Fire Insurance Map showing testing locations

4.2 Subsurface Testing Results

4.2.1 Test Excavation 1 (T-1)

Test Excavation 1 (T-1) is located in the northwest portion of the project area, oriented in a northwest/southeast direction (see Figure 31). T-1 measures 6.15 long by 0.90 m wide with a maximum depth of 2.45 mbs. The excavation was placed to target a dwelling and subsequent flat as shown on 1914 and 1956 Sanborn Fire Insurance Maps, respectively (see Figure 32 and Figure 33). The southeast end of the excavation was characterized by a hard, compacted area at 32 cmbs and was benched.

Stratigraphy observed within T-1 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), sandy loam basalt gravel basecourse (Stratum Ib), sandy loam fill (Stratum Ic), sandy clay loam fill (Stratum Id), cobbly sand crushed coral fill (Stratum Ie), sandy clay fill (Stratum IIa), and sandy loam fill (Stratum IIb). Fill deposits are overlying natural low-lying deposits consisting of natural silty clay (Stratum IIIa) and natural sandy clay (Stratum IIIb). The water table was observed at 2.40 mbs and the coral shelf was encountered at 2.45 mbs (BOE) (Figure 34 through Figure 36 and Table 3).

A concrete and hollow tile foundation remnant was observed crossing the center of the excavation, oriented in a northeast/southwest direction. This remnant has been designated CSH 1, Feature 1. The foundation remnant was observed at 0.40–0.70 mbs originating within sandy clay loam fill (Stratum Id) and extending into crushed coral fill (Stratum Ie) (Figure 36). Feature 1 consists of a single course of concrete hollow tiles measuring 40 cm by 20 cm by 20 cm overlying a concrete footer. The location of Feature 1 corresponds to a building labeled as a two story flat on a 1956 Sanborn Fire Insurance Map (see Figure 33).

Historic artifacts and faunal osseous remains and were observed within Strata Id and IIb Diagnostic artifacts were collected (Acc. #s 13–20), large or non-diagnostic artifacts were photographed in the field. Bulk samples were collected from the backpile for Strata IVa and IVb. Wet-screening of these samples in the CSH laboratory produced no cultural material or other notable inclusions.

Figure 34. Photograph of T-1, southwest wall, southeast end, view to west

Figure 35. Photograph of T-1, southwest wall, northwest end, view to south

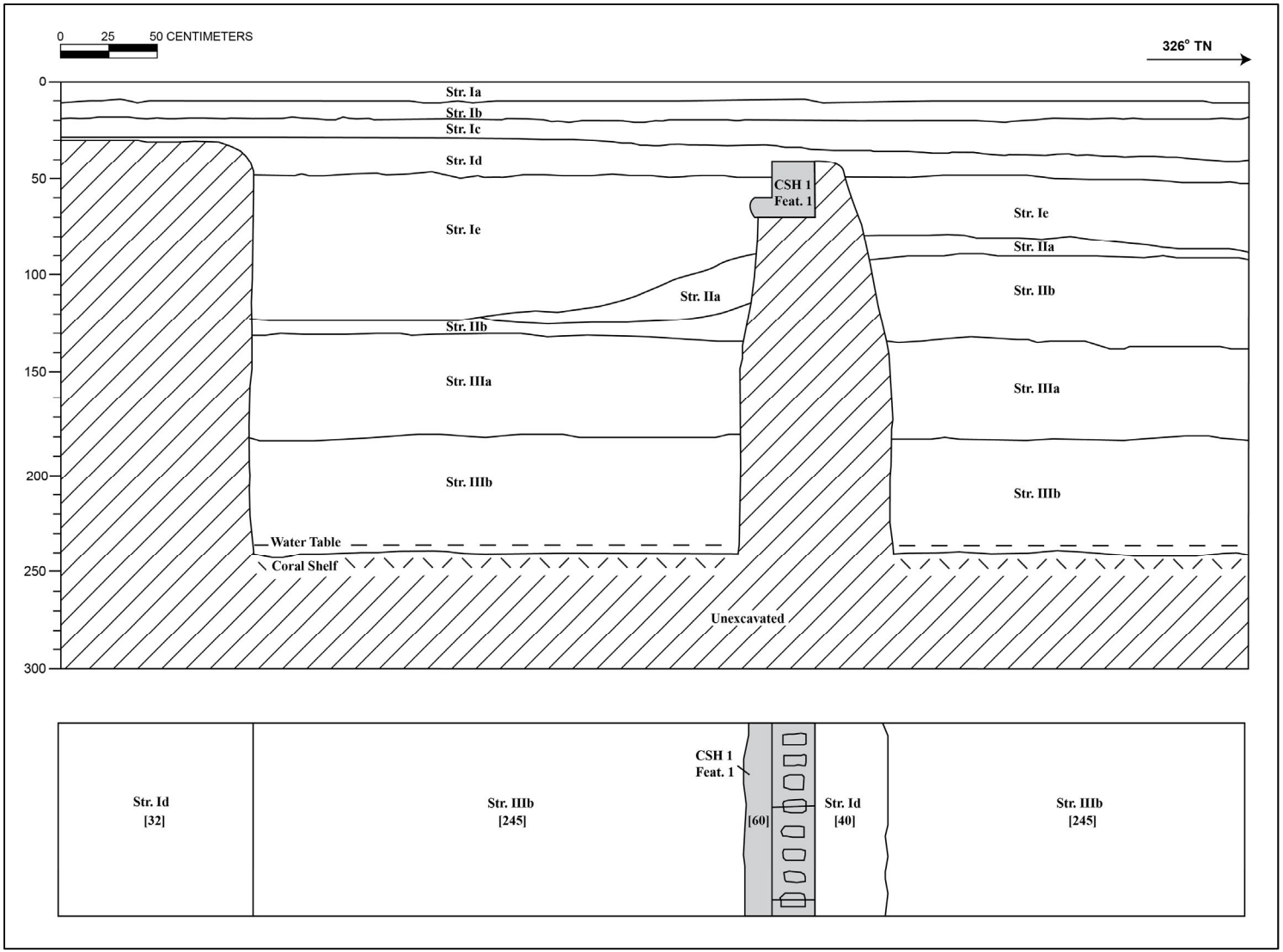

Figure 36. Profile and plan view of T-1, southwest wall

Table 3. Stratigraphic description of T-1

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–11	Concrete
Ib	11–20	Fill; 7.5YR 4/4, brown; extremely gravelly sandy loam; weak, fine, granular structure; dry, loose consistence; no cementation; non-plastic; mixed origin; clear, smooth lower boundary; no roots observed; basalt gravel basecourse
Ic	20–40	Fill; 7.5YR 5/2, brown; gravelly sandy loam; weak, medium, granular structure; moist, loose consistence; no cementation; non-plastic; mixed origin; abrupt, smooth lower boundary; no roots observed
Id	28–52	Fill; 7.5YR 4/2, brown; sandy clay loam; weak, fine, granular structure; moist, friable consistence; no cementation; slightly plastic; marine origin; clear, smooth lower boundary; no roots observed
Ie	48–125	Fill; 7.5YR 6/2, pinkish gray; cobbly sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; marine origin; abrupt, smooth lower boundary; no roots observed; crushed coral fill
IIa	80–125	Fill; 7.5YR 4/2, brown; sandy clay; moderate, fine, blocky structure; wet, slightly sticky consistence; no cementation; slightly plastic; mixed origin; clear, smooth lower boundary; no roots observed
IIb	80–130	Fill; 10YR 2/1, black; sandy loam; weak, medium, granular structure; moist, friable consistence; no cementation; non-plastic; terrigenous origin; abrupt, smooth lower boundary, no roots observed
IIIa	130–185	Natural; GLEY 10G 5/1, greenish gray; silty clay; weak, fine, blocky structure; wet, slightly-sticky consistence; no cementation; plastic; marine origin; clear, smooth lower boundary; no roots observed
IIIb	185–245 (BOE)	Natural; GLEY 10B 6/1, bluish gray; sandy clay; weak, fine, granular structure; wet, slightly-sticky consistence; no cementation; slightly plastic; marine origin; clear, smooth lower boundary; no roots observed

4.2.2 Test Excavation 2 (T-2)

Test Excavation 2 (T-2) is in the north/central portion of the project area, oriented in a northwest/southeast direction (see Figure 31). T-2 measures 6.2 m long by 1.0 m wide with a maximum depth of 2.45 mbs. The excavation was placed to target a dwelling and machine shop as shown on 1914 and 1956 Sanborn Fire Insurance Maps (see Figure 32 and Figure 33). The southeast half of the trench was characterized by a concrete jacket with water valve at 24 cmbs. The excavation was benched to avoid this potentially active utility.

Stratigraphy observed within T-2 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), sandy loam fill (Stratum Ib), cobbly sandy loam demolition fill (Stratum IIa, CSH 1 Feature 2), and sandy loam fill (Stratum IIb). Fill deposits are overlying natural low-lying deposits consisting of sandy clay (Stratum IIIa), silty clay loam (Stratum IIIb), and marine sand (Stratum IIIc). The water table was observed at 2.40 mbs and the coral shelf was encountered at 2.45 mbs (BOE) (Figure 37, Figure 38, and Table 4).

Stratum IIa consists of a demolition fill deposit observed in the southeast half of T-2. This deposit has been designated CSH 1, Feature 2. Feature 2 was observed at 0.32–0.97 mbs below a sandy loam fill (Stratum Ib) and above a sandy loam fill (Stratum IIb) (Figure 38). Feature 2 consists of 7.5YR 3/4 dark brown cobbly sandy loam with layers of 10YR 7/1 light gray sand and 10YR 2/1 black volcanic cinder and contains historic artifacts, bricks, and basalt cobbles throughout. Brick portions with makers marks were identified from the Carnegie Brick and Pottery company (United States), the Gartcraig Fireclay Company (Scotland), and the Ferguslie Fireclay Works (Scotland) dating from the late 1800s to early 1900s. Feature 2 likely corresponds to the demolition of the dwelling or machine shop shown at this location on Sanborn Fire Insurance Maps (see Figure 32 and Figure 33).

In addition to Stratum IIa, Stratum IIb also contained historic artifacts including a number of intact glass bottles. A sample of diagnostic artifacts were collected (Acc. #s 29, 31–46), large or non-diagnostic artifacts were photographed in the field. Bulk samples were collected from the backpile for Strata IIIa–IIIc. Wet-screening of these samples in the CSH laboratory produced no cultural material or other notable inclusions.

Figure 37. Photograph of T-2, northeast wall, view to east

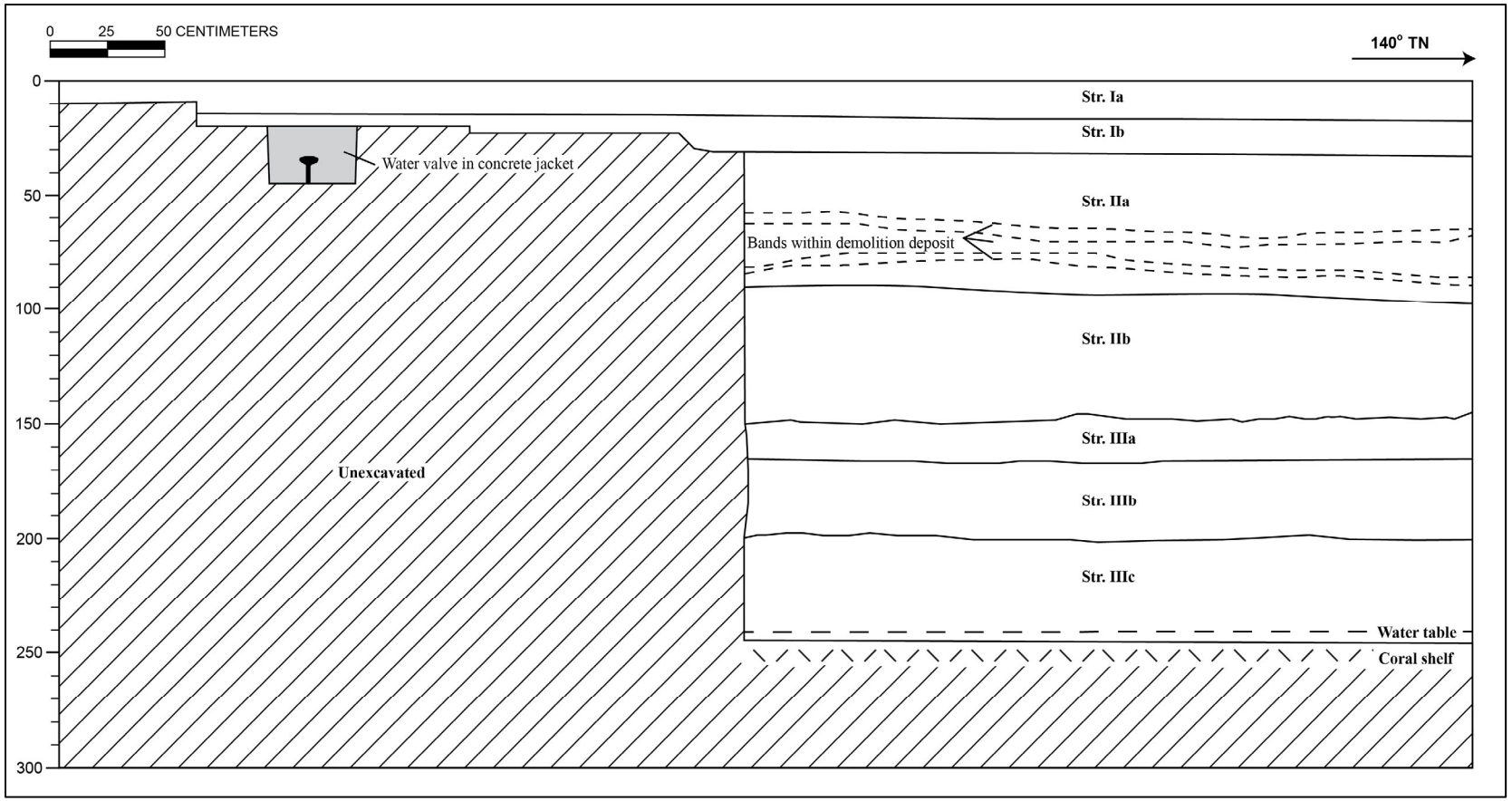

Figure 38. Profile of T-2, northeast wall

Table 4. Stratigraphic description of T-2

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–15	Concrete
Ib	15–36	Fill; 7.5YR 3/4, dark brown; sandy loam; moderate, fine, granular structure; moist, friable consistence; no cementation; slightly plastic; mixed origin, clear, smooth lower boundary; no roots observed
IIa	32–97	Fill; 7.5YR 3/4, dark brown; cobbly sandy loam; weak, medium, granular structure; moist, friable consistence; no cementation; non-plastic; mixed origin; clear, smooth lower boundary; no roots observed; demolition layer containing bricks and basalt cobbles; striated layers including 10YR 7/1 light gray sand and 2.5Y black volcanic cinder
IIb	89–150	Fill; 10YR 3/1, very dark gray; sandy loam; weak, medium, granular structure; moist, friable consistence; no cementation; slightly plastic; mixed origin; abrupt, smooth lower boundary; no roots observed; contains historic artifacts (glass bottles, ceramic bottles, ceramics)
IIIa	145–165	Natural; 10YR 5/2, grayish brown; sandy clay; moderate, fine, blocky structure; moist, firm consistence; no cementation; plastic; marine origin; clear, smooth lower boundary; no roots observed
IIIb	165–200	Natural; 10YR 3/2, very dark grayish brown; silty clay loam; moderate; medium, blocky structure; moist; firm consistence; no cementation; very plastic; marine origin; clear, smooth lower boundary, no roots observed
IIIc	199–250 (BOE)	Natural; 10YR 5/1, gray; sand; structureless (single-grain); wet, non-sticky consistence; no cementation; non-plastic; marine origin; clear, smooth lower boundary; no roots observed

4.2.3 Test Excavation 3 (T-3)

Test Excavation 3 (T-3) is along the southwest boundary of the central project area, oriented in a northwest/southeast direction (Figure 31). T-3 measures 6.2 m long by 0.90 m wide with a maximum depth of 2.35 mbs. The excavation was placed to provide general stratigraphy and aid in overall distribution. No utilities or other complications were encountered within this excavation.

Stratigraphy observed within T-3 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), clay loam utilized as basecourse (Stratum Ib), mixed loamy sand fill (Stratum Ic), sandy clay hydraulic fill (Stratum Id), and sandy clay loam fill (Stratum II). Fill deposits are overlying natural low-lying deposits consisting of mottled sandy clay (Stratum IIIa), clay (Stratum IIIb), and sandy clay (Stratum IIIc). The water table was observed at 2.30 mbs and the coral shelf was encountered at 2.35 mbs (BOE) (Figure 39, Figure 40, and Table 5).

No historic properties were observed within T-3. Historic artifacts and faunal remains were observed within Stratum II. Diagnostic artifacts were collected (Acc. # 24), and large or non-diagnostic artifacts were photographed in the field. No bulk samples were collected from this excavation.

Figure 39. Photograph of T-3, southwest wall, view to south

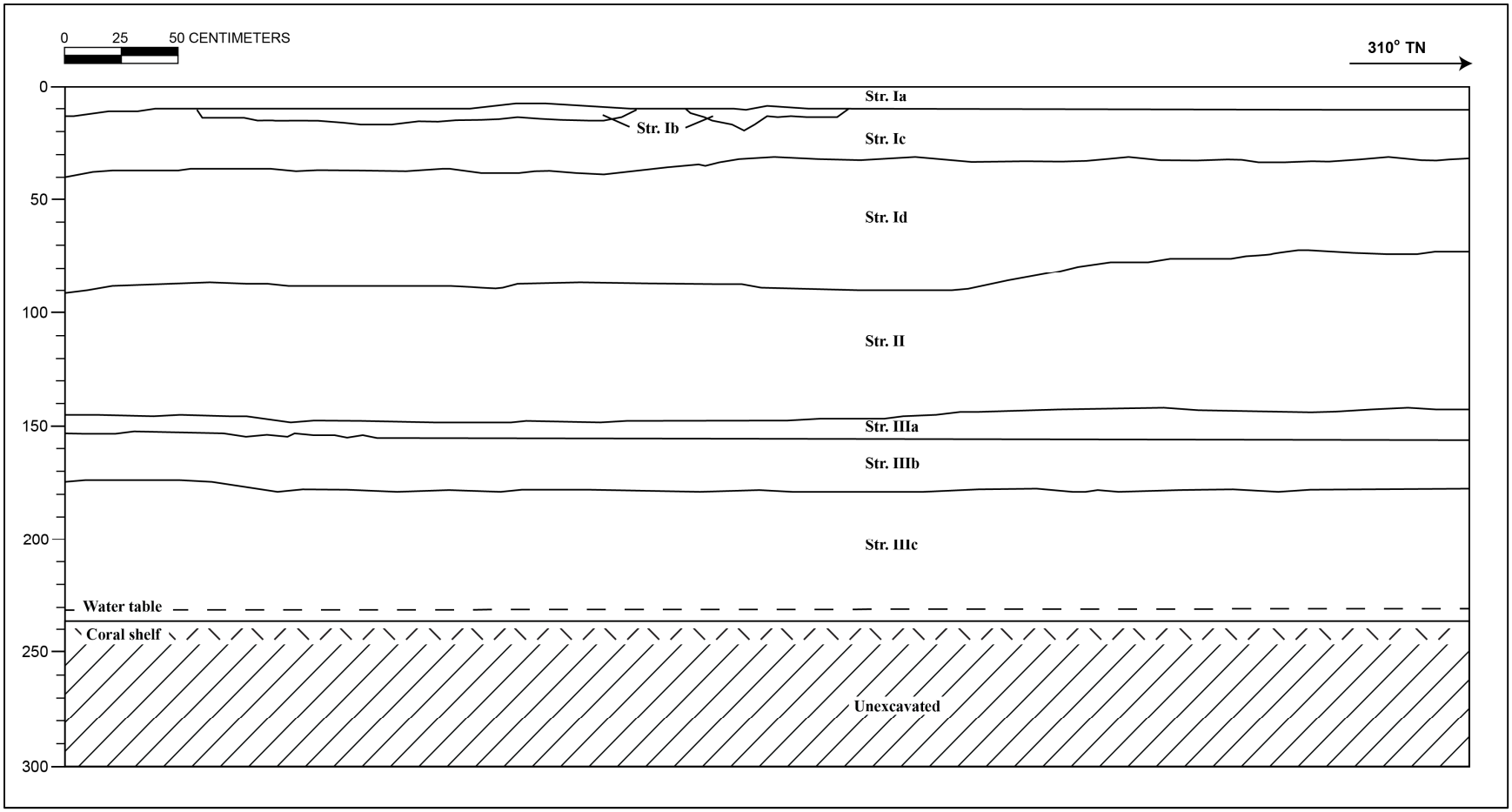

Figure 40. Profile of T-3, southwest wall

Table 5. Stratigraphic description of T-3

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–13	Concrete
Ib	9–19	Fill; 10YR 2/2, very dark brown; clay loam; moderate, fine, granular structure; moist, firm, consistence; no cementation; slightly plastic; terrigenous origin; clear, discontinuous lower boundary; no roots observed
Ic	10–34	Fill; 10YR 5/2, grayish brown; gravelly loamy sand; weak, fine, granular structure; moist, friable consistence; no cementation; non-plastic; mixed origin; diffuse, smooth lower boundary; no roots observed
Id	31–90	Fill; 10YR 7/4, very pale brown; sandy clay; weak, fine, granular structure; moist, friable consistence; no cementation; slightly plastic; marine origin; abrupt, smooth lower boundary; no roots observed; hydraulic pumped fill
II	73–149	Fill; 10YR 2/1, black; gravelly sandy clay loam; moderate, medium, granular structure; moist, friable consistence; no cementation; slightly plastic; mixed origin; clear, smooth lower boundary; no roots observed; contains volcanic cinder; contains historic artifacts (bricks, glass, metal)
IIIa	144–155	Natural; GLEY 10B 5/1, bluish gray; sandy clay; moderate, medium, granular structure; moist, friable consistence; no cementation; slightly plastic; marine origin; clear, smooth lower boundary; no roots observed
IIIb	153–177	Natural; GLEY 10BG 3/1, very dark greenish gray; clay; moderate, medium, blocky structure; moist, firm consistence; no cementation; very plastic; marine origin; clear, smooth lower boundary; no roots observed
IIIc	173–235 (BOE)	Natural; GLEY 10B 5/1, bluish gray; sandy clay; weak, coarse, granular structure; wet, slightly sticky consistence; no cementation; slightly plastic; clear, smooth lower boundary; no roots observed

4.2.4 Test Excavation 4 (T-4)

Test Excavation 4 (T-4) is in the east corner of the project area, oriented in a northwest/southeast direction (see Figure 31). T-4 measures 6.2 m long by 1.0 m wide with a maximum depth of 2.40 mbs. The excavation was placed to target the laundry and dry-cleaning building as shown on a 1956 Sanborn Fire Insurance Map (see Figure 33). The laundry and dry-cleaning building first appears on the 1950 Sanborn map (see Figure 24) and may have been incorporated in full or in part into the extant structure. Two concrete footings were observed in the northeast wall which appear to be associated with the current building.

Stratigraphy observed with T-4 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), volcanic cinder sand utilized as basecourse (Stratum Ib), loamy sand fill (Stratum Ic), sand fill (Stratum Id), loamy sand hydraulic fill (Stratum Ie), gleyed silty clay hydraulic fill (Stratum If), and extremely gravelly sandy clay loam fill (Stratum II). Fill deposits are overlying natural low-lying deposits consisting of silty clay loam (Stratum IIIa) and sandy clay (Stratum IIIb). The water table was observed at 2.35 mbs and the coral shelf was encountered at 2.40 mbs (BOE) (Figure 41, Figure 42, and Table 6).

No evidence of the targeted historic structure was observed. A bottle neck was observed and collected from Stratum Id (Acc. # 30). No other cultural material was observed, and no bulk samples were taken.

Figure 41. Photograph of T-4, northeast wall, view to east

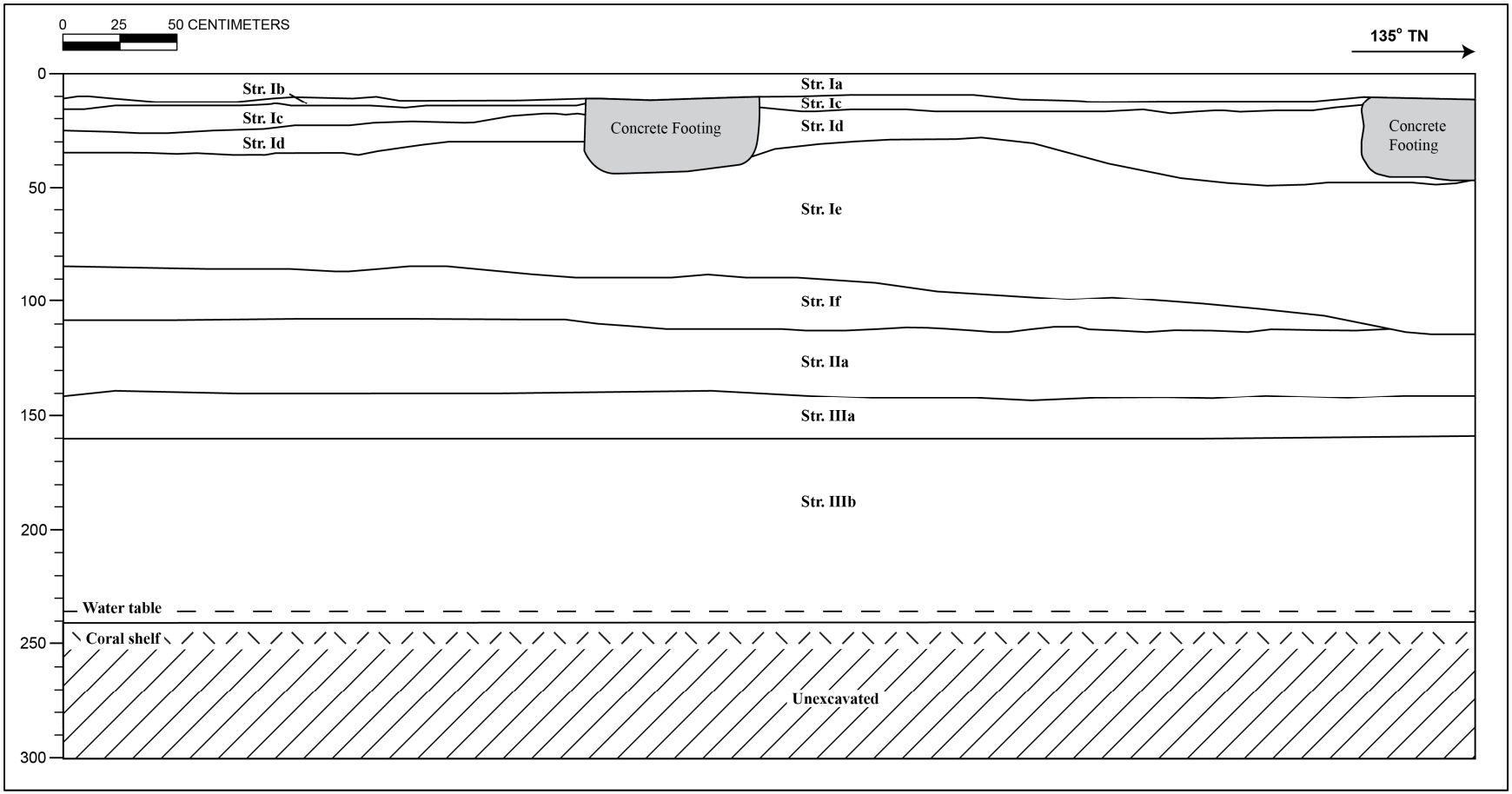

Figure 42. Profile of T-4, northeast wall

Table 6. Stratigraphic description of T-4

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–13	Concrete
Ib	11–15	Fill; 10YR 3/1, very dark gray; sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; terrigenous origin; clear, smooth, lower boundary; no roots observed; volcanic cinder
Ic	13–25	Fill; 10YR 6/4, light yellowish brown; loamy sand; weak, very fine, granular structure; moist, friable consistence; no cementation; non-plastic; mixed origin; clear, smooth lower boundary; no roots observed
Id	18–50	Fill; 10YR 5/2, grayish brown; sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; marine origin; clear, smooth lower boundary; no roots observed
Ie	30–115	Fill; 10YR 7/4, very pale brown; loamy sand; weak, very fine granular structure; moist, friable consistence; no cementation; slightly plastic; marine origin; clear, smooth lower boundary; no roots observed; hydraulic pumped fill
If	85–112	Fill; GLEY 10B 6/1, bluish gray; silty clay; weak, fine, blocky structure; moist, friable consistence; no cementation; plastic; marine origin; clear, smooth, lower boundary; no roots observed; hydraulic pumped fill
II	108–142	Fill; 10YR 3/1, very dark gray; extremely gravelly loamy sand; moderate, fine, granular structure; moist, friable consistence; no cementation; non-plastic; mixed origin; clear, smooth lower boundary; no roots observed
IIIa	140–160	Natural; 10YR 4/1, dark gray; very gravelly silty clay loam; moderate, coarse, granular structure; moist, friable consistence; no cementation; slightly plastic; marine origin; clear, smooth lower boundary; no roots observed
IIIb	160–240 (BOE)	Natural; GLEY 10B 6/1, bluish gray; sandy clay; moderate, medium, blocky structure; moist, firm consistence; no cementation; plastic; marine origin; clear, smooth, lower boundary; no roots observed

4.2.5 Test Excavation 5 (T-5)

Test Excavation 5 (T-5) is in the east corner of the project area, oriented in a northeast/southwest direction (see Figure 31). T-5 measures 6.0 m long by 0.90 m wide with a maximum depth of 2.23 mbs. This excavation was placed to target a dwelling and a laundry and dry-cleaning building as shown on 1914 and 1956 Sanborn Fire Insurance maps respectively (see Figure 32 and Figure 33). The laundry and dry-cleaning building first appears on the 1950 Sanborn map (see Figure 24) and may have been incorporated in full or in part into the extant structure. No utilities or other complications were encountered within this excavation.

Stratigraphy observed within T-5 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), loamy sand utilized as basecourse (Stratum Ib), mixed sandy loam fill (Stratum Ic), loamy sand hydraulic fill (Stratum Id), and extremely gravelly sandy clay fill (Stratum II). Fill deposits are overlying natural low-lying deposits consisting of mottled clay loam (Stratum IIIa) and sandy clay (Stratum IIIb). The water table was observed at 2.20 mbs and the coral shelf was encountered at 2.23 mbs (BOE) (Figure 43, Figure 44, and Table 7).

No evidence of the targeted historic structures was observed. Historic artifacts were observed within Strata Id and II. Diagnostic artifacts were collected (Acc. #s 21–23, 26, 27), and large or non-diagnostic artifacts were photographed in the field. Bulk samples from Strata II–IIIb were collected. Wet-screening of these samples in the CSH laboratory produced no cultural material or other notable inclusions.

Figure 43. Photograph of T-5, northwest wall, view to west

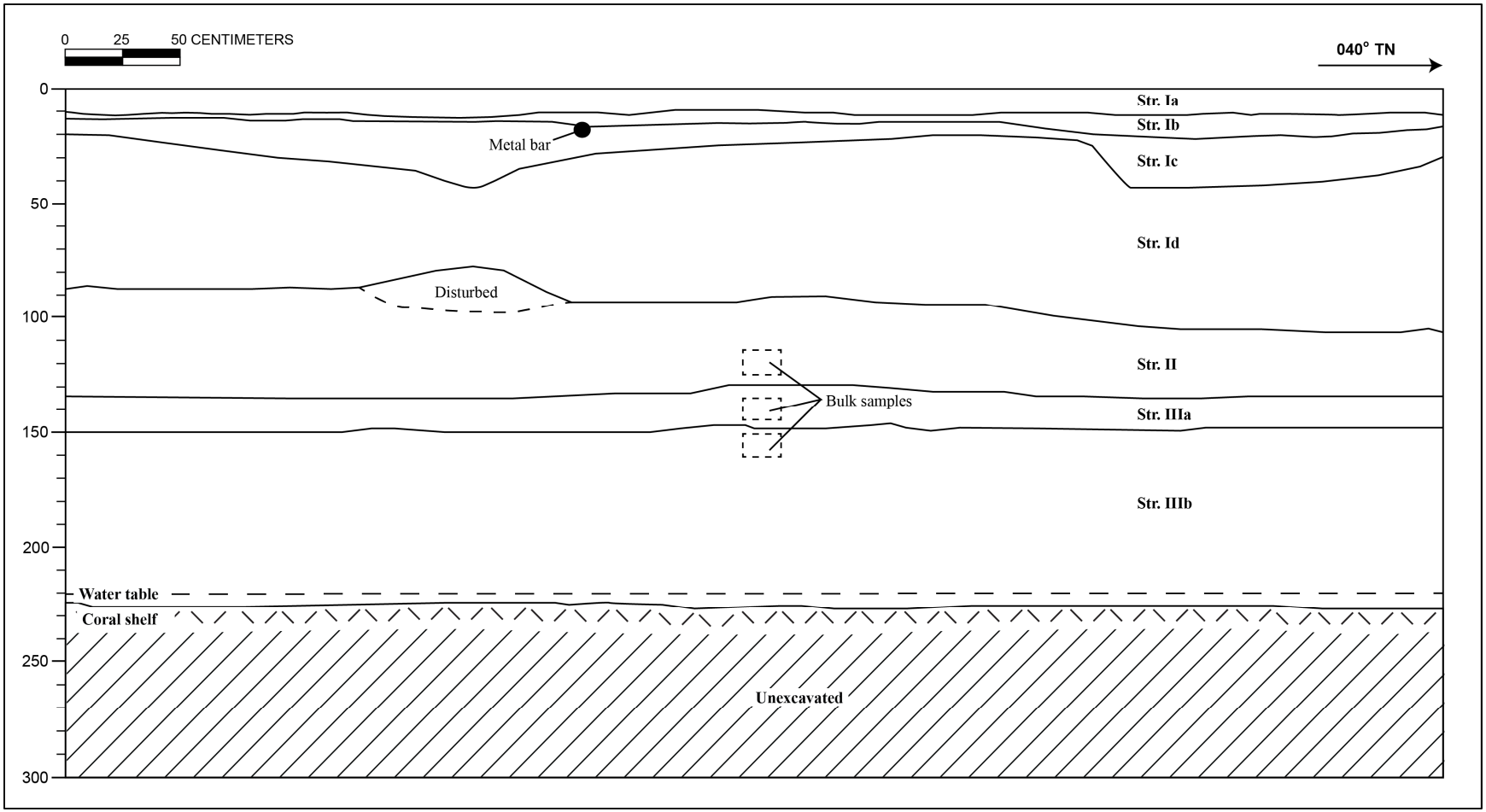

Figure 44. Profile of T-5, northwest wall

Table 7. Stratigraphic description of T-5

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–13	Concrete
Ib	11–23	Fill; 10YR 6/4, light yellowish brown; loamy sand; weak, very fine, granular structure; moist; friable consistence; no cementation; non-plastic; mixed origin; clear, smooth lower boundary; no roots observed
Ic	14–45	Fill; 10YR 5/1, gray; gravelly sandy loam; moderate, fine, granular structure; moist, friable consistence; no cementation; slightly plastic; mixed origin; clear, wavy, lower boundary; no roots observed
Id	20–106	Fill; 10YR 7/4, very pale brown; loamy sand; weak, fine; granular structure; moist, friable consistence; no cementation; non-plastic; marine origin; clear, smooth lower boundary; no roots observed; hydraulic pumped fill
II	76–135	Fill; 10YR 3/1, very dark gray; extremely gravelly sandy clay loam; moderate, medium, granular structure; moist, friable consistence; no cementation; plastic; mixed origin; clear, smooth lower boundary; no roots observed; contains historic artifacts (glass, wood, metal) and volcanic cinder
IIIa	130–150	Natural; 10YR 4/1, dark gray; clay loam; moderate; fine; blocky structure; moist; friable consistence; no cementation; plastic; mixed origin; clear, smooth lower boundary; no roots observed
IIIb	147–223 (BOE)	Natural; GLEY 10B 6/1, bluish gray; sandy clay; moderate, fine, blocky structure; wet, slightly sticky consistence; no cementation; plastic; marine origin; clear, smooth lower boundary; no roots observed

4.2.6 Test Excavation 6 (T-6)

Test Excavation 6 (T-6) is located along the southeast side of the project area, oriented in a north/south direction (see Figure 31). T-6 measures 6.0 m long by 0.95 m wide with a maximum depth of 2.38 mbs. This excavation was placed to target dwellings shown on 1914 and 1956 Sanborn Fire Insurance Maps (see Figure 32 and Figure 33). No utilities or other complications were encountered within this excavation.

Stratigraphy observed within T-6 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), clay loam utilized as basecourse (Stratum Ib), mixed loamy sand fill (Stratum Ic), sandy clay hydraulic fill (Stratum Id), sandy clay loam fill (Stratum IIa), and volcanic cinder sand fill (Stratum IIb). Fill deposits area overlying natural low-lying deposits consisting of mottled sandy clay (Stratum IIIa), silty clay (Stratum IIIb), and marine sand (Stratum IIIc). The water table was observed at 2.20 mbs and the coral shelf was encountered at 2.38 mbs (BOE) (Figure 45, Figure 46, and Table 8).

No evidence of the targeted historic structures was observed. A bottle (Acc. # 28) was observed and collected from Stratum Id and a cat humerus was observed and collected from Stratum IIa. A bulk sample from Stratum IIIb. Wet-screening of this sample in the CSH laboratory produced no cultural material or other notable inclusions.

Figure 45. Photograph of T-6, west wall, view to southwest

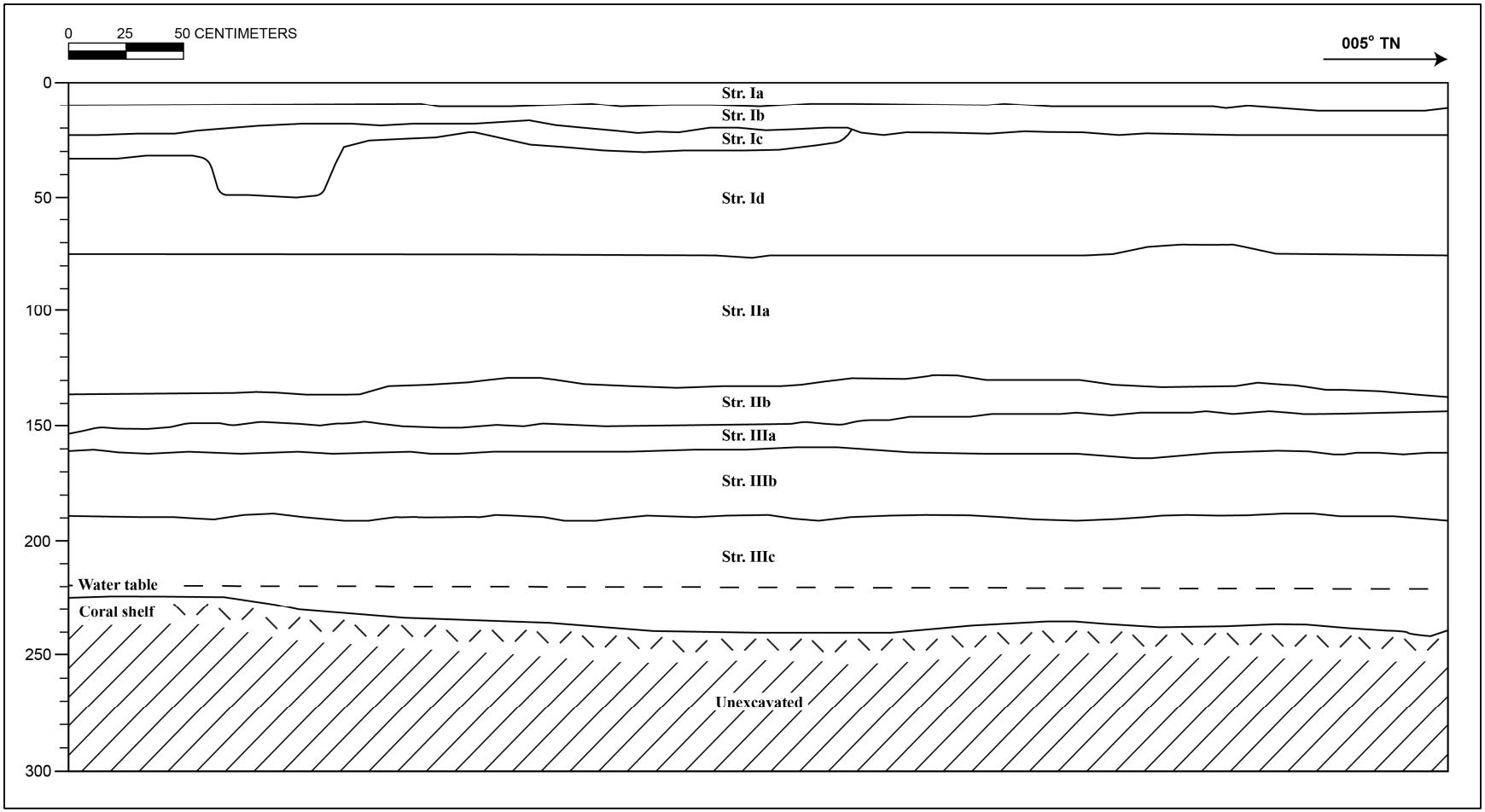

Figure 46. Profile of T-6, west wall

Table 8. Stratigraphic description of T-6

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–11	Concrete
Ib	10–27	Fill; 10YR 2/2, very dark brown; gravelly clay loam; moderate, fine blocky structure; moist, firm consistence; no cementation; plastic; terrigenous origin; abrupt, smooth, lower boundary; no roots observed
Ic	16–50	Fill; 10YR 4/2, dark grayish brown; loamy sand; weak, fine, granular structure; moist, friable structure; no cementation; non-plastic; mixed origin; clear, discontinuous lower boundary; no roots observed
Id	22–75	Fill; 10YR 7/4, very pale brown; gravelly sandy clay; moderate, medium granular structure; moist, firm consistence; no cementation; plastic; marine origin; clear, smooth lower boundary; no roots observed; hydraulic pumped fill
IIa	70–138	Fill; 10YR 3/3, dark brown; sandy clay loam; weak, coarse, granular structure; moist, friable consistence; no cementation; slightly plastic; mixed origin; clear, smooth lower boundary; contains volcanic cinder; contains historic debris (brick, glass, wood)
IIb	130–152	Fill; 10YR 2/1; black; sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; terrigenous origin; abrupt, smooth lower boundary; no roots observed; volcanic cinder fill
IIIa	140–162	Natural; GLEY 10Y 4/1, dark greenish gray; sandy clay; weak, fine, granular structure; wet, non-sticky consistence; no cementation; slightly plastic; mixed origin; clear, smooth lower boundary; no roots observed
IIIb	160–190	Natural; GLEY 10Y 4/1, dark greenish gray; silty clay loam; weak, medium, blocky structure; wet, slightly-sticky consistence; no cementation; plastic; mixed origin; clear, smooth lower boundary; no roots observed
IIIc	190–238 (BOE)	Natural; GLEY N 6/1, gray; sand; structureless (single-grain); wet, non-sticky consistence; no cementation; non-plastic; marine origin; clear, smooth lower boundary; no roots observed

4.2.7 Test Excavation 7 (T-7)

Test Excavation 7 (T-7) is in the south corner of the project area, oriented in a northeast/southwest direction (see Figure 31). T-7 measures 6.0 m long by 0.90 m wide with a maximum depth of 2.20 mbs. The excavation was placed to target a dwelling as shown on 1914 and 1956 Sanborn Fire Insurance Maps (see Figure 32 and Figure 33). T-7 was also placed to target any potential dryland berm associated with the Queen Street alignment. No utilities or other complications were encountered within this excavation.

Stratigraphy observed within T-7 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), sandy clay loam utilized as basecourse (Stratum Ib), crushed coral sand fill (Stratum Ic), sand hydraulic fill (Stratum Id), sandy clay loam fill (Stratum IIa), and volcanic cinder sand fill (Stratum IIb). Fill deposits are overlying natural low-lying deposits consisting of mottled clay loam (Stratum IIIa), clay (Stratum IIIb), and marine sand (Stratum IIIc). The water table was observed at 2.15 mbs and the coral shelf was encountered at 2.20 mbs (BOE) (Figure 47, Figure 48, and Table 9).

No evidence of the targeted historic structure or the potential dryland berm were observed. Historic artifacts were observed within Strata Ib, Ic, and IIa. Diagnostic artifacts were collected (Acc. # 25), and large or non-diagnostic artifacts were photographed in the field. Bulk samples were collected from Strata IIIa and IIIb. Wet-screening of these samples in the CSH laboratory produced no cultural material or other notable inclusions.

Figure 47. Photograph of T-7, southeast wall, view to east

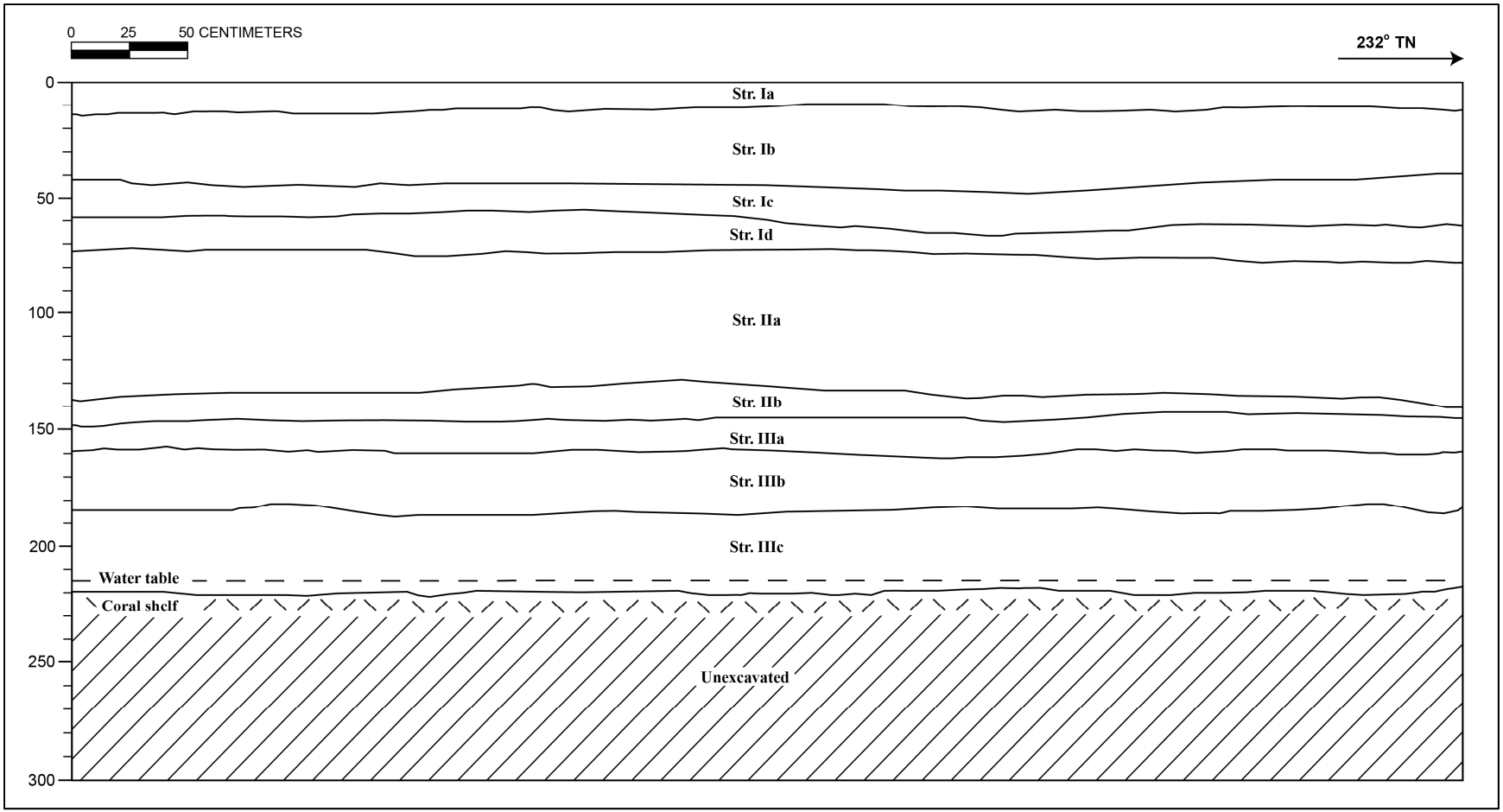

Figure 48. Profile of T-7, southeast wall

Table 9. Stratigraphic description of T-7

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–14	Concrete
Ib	12–47	Fill; 7.5YR 2.5/3, very dark brown; sandy clay loam; weak, fine, granular structure; moist, friable consistence; no cementation; slightly plastic; terrigenous origin; abrupt, smooth lower boundary; no roots observed;
Ic	40–66	Fill; 10YR 6/4, light yellowish brown; sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; mixed origin; abrupt, smooth lower boundary; no roots observed; crushed coral fill with thin bands of different colors (10YR 4/4, dark yellowish brown; 10YR 2/2, very dark brown)
Id	56–78	Fill; 2.5Y 6/4, light yellowish brown; sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; marine origin; abrupt, smooth lower boundary; no roots observed; hydraulic pumped fill
IIa	74–140	Fill; 10YR 2/2, very dark brown; cobbly sandy clay loam; weak, medium, granular structure; moist, friable consistence; no cementation; slightly plastic; terrigenous origin; abrupt, smooth lower boundary; no roots observed; contains angular basalt cobbles; few historic artifacts (ceramics, bottle)
IIb	130–148	Fill; 10YR 2/1, black; sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; terrigenous origin; abrupt smooth lower boundary; no roots observed; volcanic cinder fill
IIIa	143–160	Natural; GLEY 10Y 4/1, dark greenish gray; clay loam; moderate, coarse, blocky structure; moist; firm consistence; no cementation; very plastic; mixed origin; clear, smooth lower boundary; no roots observed
IIIb	160–185	Natural; GLEY 10Y 5/1, greenish gray; clay; moderate, coarse blocky structure; moist, firm consistence; no cementation; very plastic; marine origin; clear, smooth lower boundary; no roots observed
IIIc	185–220 (BOE)	Natural; GLEY 5G 7/1, light greenish gray; sand; structureless (single-grain); wet, non-sticky consistence; no cementation; non-plastic; marine origin; abrupt, smooth lower boundary; no roots observed

4.2.8 Test Excavation 8 (T-8)

Test Excavation 8 (T-8) is in the south portion of the project area, oriented in a northeast/southwest direction (see Figure 31). T-8 measures 5.10 m long by 0.90 m wide with a maximum depth of 2.25 mbs. This excavation was placed to target a dwelling as shown on 1914 and 1956 Sanborn Fire Insurance Maps (see Figure 32 and Figure 33). T-8 was also placed to target any potential dryland berm associated with the Queen Street alignment. T-8 was shortened slightly (from the standard 6.0 m) to avoid potentially active utilities identified during toning. Additionally, during excavation it became clear (overwhelming odor) that the lower strata had been contaminated with petroleum byproducts and the excavation was partially abandoned due to safety concerns.

Stratigraphy observed within T-8 includes imported fill deposits (Strata I–II), overlying natural low-lying deposits (Stratum III), and the coral shelf. Imported fill deposits consist of the current concrete slab surface (Stratum Ia), sandy clay loam utilized as basecourse (Stratum Ib), crushed coral sand fill (Stratum Ic), sandy clay loam fill (Stratum IIa), and volcanic cinder sand fill (Stratum IIb). Fill deposits are overlying natural low-lying deposits consisting of mottled sandy clay (Stratum IIIa), clay loam (Stratum IIIb), and marine sand (Stratum IIIc). The water table was observed at 2.20 mbs and the coral shelf was encountered at 2.25 mbs (BOE) (Figure 49, Figure 50, and Table 10).

No evidence of the targeted historic structure or the potential dryland berm were observed. Stratum Ic exhibits a large trench cutting down into Stratum IIa, likely related to a utility associated with earlier development of the project area. No cultural material was observed within T-8 and no samples were collected.

Figure 49. Photograph of T-8, southeast wall, view to east

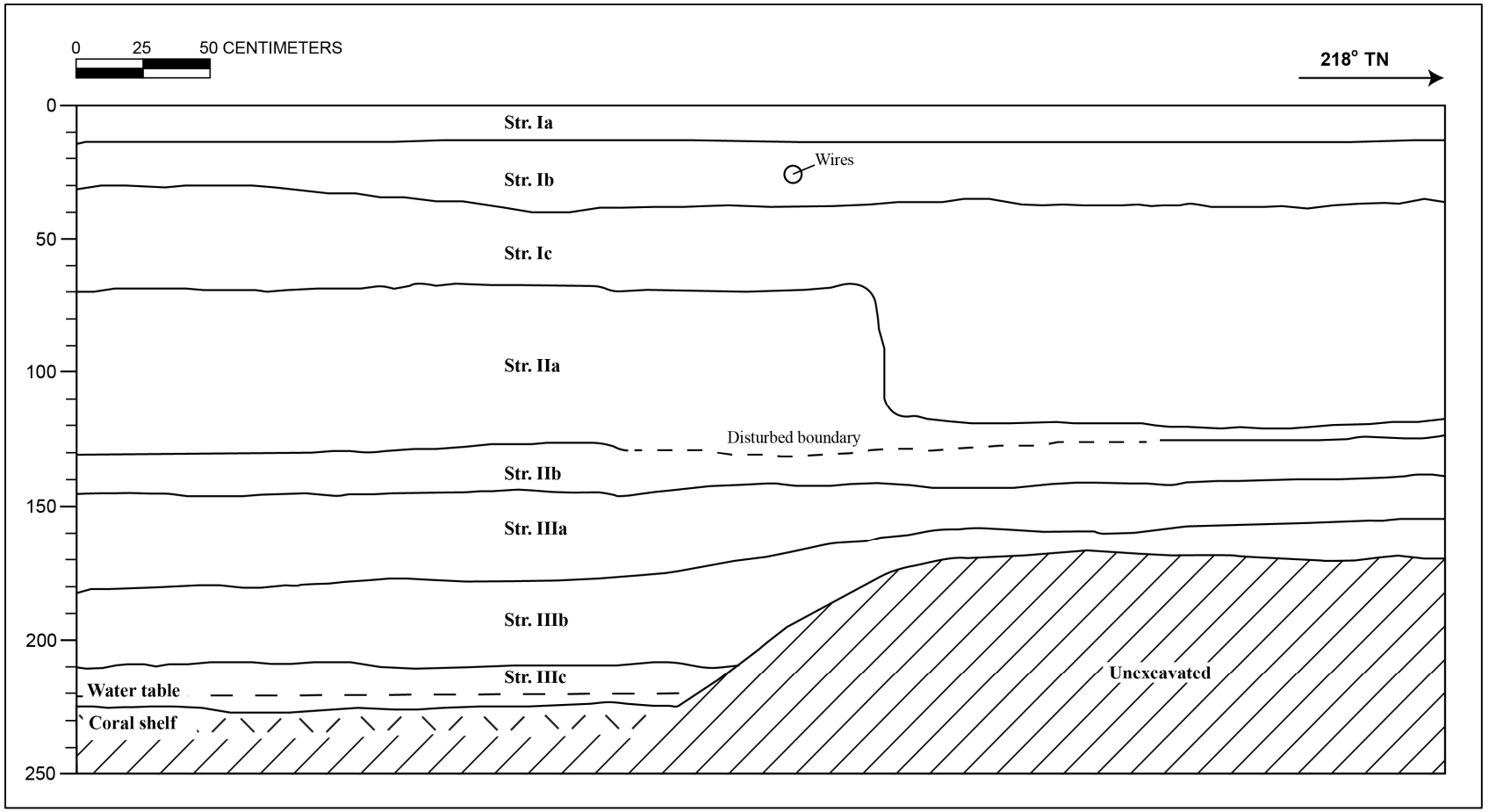

Figure 50. Profile of T-8, southeast wall

Table 10. Stratigraphic description of T-8

Stratum	Depth (cmbs)	Description of Sediment
Ia	0–14	Concrete
Ib	14–38	Fill; 10YR 3/3, dark brown; sandy clay loam; weak, fine, granular structure; moist, friable consistence; no cementation; slightly plastic; terrigenous origin; abrupt smooth lower boundary; no roots observed
Ic	30–120	Fill; 10YR 7/3, very pale brown; very gravelly sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; marine origin; abrupt wavy lower boundary; no roots observed; crushed coral and hydraulic pumped fill
IIa	70–130	Fill; 10YR 3/4, dark yellowish brown; cobbly sandy clay loam; weak, fine, granular structure; moist, friable consistence; no cementation; slightly plastic; terrigenous origin; clear, smooth lower boundary; no roots observed; contains basalt cobbles and volcanic cinder
IIb	125–145	Fill; 10YR 2/1, black; sand; structureless (single-grain); moist, loose consistence; no cementation; non-plastic; terrigenous origin; abrupt, smooth lower boundary; no roots observed; volcanic cinder fill
IIIa	140–180	Natural; GLEY 10GY 4/1, dark greenish gray; sandy clay; weak, fine, blocky structure; moist, friable consistence; no cementation; slightly plastic; mixed origin; clear, smooth lower boundary; no roots observed; contaminated with petroleum by-products
IIIb	155–217	Natural; GLEY 5GY 6/1, greenish gray; clay loam; moderate, medium blocky structure; moist, firm consistence; no cementation; very plastic; marine origin; clear, smooth lower boundary; no roots observed; contaminated with petroleum by-products
IIIc	217–225 (BOE)	Natural; GLEY 10GY 5/1, greenish gray; sand; structureless (single-grain); wet, non-sticky consistence; no cementation; non-plastic; marine origin; abrupt smooth lower boundary; no roots observed

Section 5 Results of Laboratory Analysis

Materials collected during the Baranof Holdings Honolulu Project inventory survey fieldwork were identified and catalogued at CSH's laboratory facilities on O‘ahu. Analysis of collected materials was undertaken using standard archaeological laboratory techniques. The results are presented below.

5.1 Bulk Sample Analysis

Eleven bulk samples were collected during the project. All samples were wet-screened for content at the CSH laboratory. Screening results are presented in Table 11 below. With the exception of a single sample from Stratum II, all samples were collected from Stratum III, natural deposits, in order to identify any potential cultural content. No cultural material was identified within the Stratum III samples. The Stratum II sample contained cultural material consistent with a historic fill deposit.

Table 11. Bulk sample analysis

Provenience	Depth (cmbs)	Sample volume (L)	Contents
T-1, Str. IIIa	130–185	1	Marine gravels
T-1, Str. IIIb	185–245	1	Marine shell and gravels
T-2, Str. IIIa	145–165	1.5	Snail shells, marine shell and gravels
T-2, Str. IIIb	165–200	1.5	Marine shell and gravels
T-2, Str. IIIc	200–248	1.5	Marine shell and gravels
T-5, Str. II	115–125	1	Slag, volcanic cinder, charcoal, burnt faunal bone, gravels
T-5, Str. IIIa	134–144	1	Marine shell and gravels
T-5, Str. IIIb	150–160	1	Marine gravels
T-6, Str. IIIb	160–190	1	Marine shell and gravels
T-7, Str. IIIa	143–160	1	Snail shells and gravel
T-7, Str. IIIb	160–185	1	Marine shell and gravels

5.2 Artifact Analysis

There were 46 historic artifacts collected during the project. The term "historic" is defined as artifacts made by westerners using non-traditional Hawaiian methods; these artifacts date to the post-Contact period (post-1778). The collection includes 35 glass bottle or bottle fragments, one ceramic bottle, and 10 brick fragments. The artifacts are described in Table 12.

5.2.1 Glass Artifacts

The terminology used to describe bottle traits and dating information is based on information from the U.S. Department of the Interior, Bureau of Land Management (BLM) Society of Historic Archaeology (SHA) "Historic Glass Bottle Identification and Information Website" (BLM/SHA

Table 12. Summary of Artifacts

Acc. #	Provenience	Material	Type	Description	Origin	Age
1	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless glass liquor (possibly brandy) bottle, complete, two-piece cup-bottom mold, slight push-up base, tooled strait brandy finish, no embossing or maker's marks	Unknown	Late 1890s-mid 1910s
2	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Aqua Perry Davis & Son medicinal bottle, complete, two-piece cup-bottom mold, tooled double ring finish, embossed "DAVIS" on front panel, "PAIN KILLER" on side panel, "VEGETABLE" on other side panel, and "35" on base	United States	1878-ca. 1915
3	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless Vaseline bottle, complete, mold blown, two-piece cup-bottom mold, round base, tooled one-part (patent) finish, cork closure, embossed "CHESEBROUGH MFG CO" (arched) on body / "VASELINE" on heel, made in Perth Amboy, New Jersey, USA	United States	Ca. 1880s/1890s
4	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Greenish aqua druggist bottle, complete, “strait neck panel” body style, two-piece cup-bottom mold, tooled prescription finish, embossed "38 F" on base	United States	Post-1850, 1880-1910s
5	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless medicinal bottle, complete, "strait neck panel" body style, two-piece cup-bottom mold, tooled patent finish, embossed on base with Obear-Nester Glass Co. maker's mark, made in Illinois, USA	United States	1895-mid 1920s
6	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless square druggist bottle, complete, two-piece cup-bottom mold, tooled prescription finish, no embossing	Unknown	Ca. 1870s-1920s

Acc. #	Provenience	Material	Type	Description	Origin	Age
7	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless 10 oz. capacity soda bottle, complete, four-piece cup-bottom mold, round, flat base, tooled crown finish, embossed "THIS BOTTLE / IS THE PROPERTY OF / CONSOLIDATED / SODA WATER WORKS CO / LTD. / HONOLULU, T.H. / NEVER SOLD" on body and "C" on base, bottled in Honolulu, T.H.	United States	Ca. 1912
8	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Greenish aqua club style sauce bottle, complete, two-piece cup-bottom mold, tooled three-part club sauce finish, contained sauce intended for meats, base embossed "476 / H"	United States	1870s-ca. 1910s
9	T-2; Stratum IIb; 98-150 cmbs	Ceramic	Bottle	Stoneware ale or "ginger beer" bottle, complete, "champagne" shape, double ring finish, cream-colored paste, coated in colorless glaze, "Bristol glaze" on the upper half of the bottle from just below the shoulder to the finish	Glasgow, Scotland or Liverpool, England	Ca. nineteenth century
10	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Aqua Hawaiian Soda Works bottle, complete, two-piece mold, tooled “laid-on-ring” finish, Hutchinson stopper, embossed "HAWAIIAN / SODA / WORKS / HONOLULU / T. H." on body and "pHw" on base	United States	Ca. 1907
11	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless household bottle, complete, square body style with beveled corners, machine-made, small mouth external thread	Unknown	Post-1908
12	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless olive bottle, complete, tall and narrow body style two-piece cup-bottom mold, tooled one part "flared" finish, no embossing or label	United States	Late 1890s-early 1930s

Acc. #	Provenience	Material	Type	Description	Origin	Age
13	T-1; Stratum IIb	Glass	Bottle	Amber beverage bottle, one base to body and one body to shoulder fragment, two-piece cup-bottom mold, embossed "S F & P G W" on base, manufactured by San Francisco & Pacific Glass Works in San Francisco, California	United States	1876-1902
14	T-1; Stratum IIb	Glass	Bottle	Amber beverage bottle, base to body fragment, unknown method of manufacture	Unknown	Unknown
15	T-1; Stratum IIb	Glass	Bottle	Olive green wine or liquor bottle, base to body fragment, turn mold, round, push-up base	Unknown	1870-1920
16	T-1; Stratum IIb	Glass	Bottle	Colorless beverage bottle, body fragment, unknown method of manufacture	Unknown	Unknown
17	T-1; Stratum IIb	Glass	Bottle	Amber liquor bottle, complete, tall, moderately slender body with bulged neck (also called cylinder bottle), one-piece dip mold, applied oil finish, no seams or embossing	United States	1800-1870
18	T-1; Stratum IIb	Glass	Bottle	Amber liquor bottle, complete, tall, moderately slender body with bulged neck (also called cylinder bottle), one-piece dip mold, applied oil finish, no seams or embossing	United States	1800-1870
19	T-1; Stratum IIb	Glass	Bottle	Medium blueish aqua Hollister & Co soda bottle, complete, two-piece mold, semi-round base, tooled Hutchinson finish, embossed "HOLLISTER & Co / HONOLULU" vertically on body	United States	Ca. 1893
20	T-1; Stratum IIb	Glass	Bottle	Medium blue-green aqua soda bottle, body to neck fragment, four-piece mold, unknown manufacturer, most likely bottled in Hawaii, embossed "…TER" horizontally on body	United States	Early 1880s-mid 1910s

Acc. #	Provenience	Material	Type	Description	Origin	Age
21	T-5; Stratum II; 76-135 cmbs	Glass	Bottle	Aqua "export" style beer bottle, complete, quart size, machine-made, crown finish, heel embossed "R 106"	United States	Post-1908
22	T-5; Stratum II; 76-135 cmbs	Glass	Bottle	Aqua medicinal "strait neck panel" bottle, rectangular shape with indented panels on all four sides, perhaps held a cure, remedy, or related product, complete with fragments missing from heel and shoulder, two-piece cup-bottom mold, tooled patent finish, embossed "88" on base	United States	Post-1850, 1880-1910s
23	T-5; Stratum II; 76-135 cmbs	Glass	Bottle	Colorless, pressed, tableware body fragment	United States	Post-1870-ca. 1920s
24	T-3; Stratum II; 73-149 cmbs	Glass	Bottle	Medium blueish aqua Hollister & Co soda bottle, base to body fragment, two-piece mold, semi-round base, embossed "[HOLL]ISTER & Co / [HO]NOLULU" vertically on body (rectangular O's and wide N in "HONOLULU")	United States	Ca. 1900
25	T-7; Stratum IIa; 74-140 cmbs	Glass	Bottle	Dark olive green "export" style beer bottle, complete, turn mold, applied two-part mineral finish, slight push-up base	United States	Mid-1870s-1885
26	T-5; Stratum Id; 20-106 cmbs	Glass	Bottle	Aqua beverage bottle, base to shoulder fragment, machine-made, valve/ejection mark on base, base embossed "P [C G] W", maker's mark for Pacific Coast Glass Works in San Francisco, California (ca. 1902-1924)	United States	1912-1924

Acc. #	Provenience	Material	Type	Description	Origin	Age
27	T-5; Stratum Id; 20-106 cmbs	Glass	Bottle	Colorless liquor bottle or flask, base to body fragment, machine-made, valve/ejection mark on base, manufactured by Owens-Illinois Glass Co at the Streator, Illinois plant (1930-present), Diamond-OI logo embossed on base with "D9 / 56-8" and "M…"	United States	1938
28	T-6; Stratum IIa; 70-138 cmbs	Glass	Bottle	Cobalt blue bottle, complete, two-piece cup-bottom mold, tooled oil finish, embossed "728" on base	Unknown	1880-1915
29	T-2; Stratum IIa; 32-97 cmbs	Glass	Bottle	Colorless "ball neck panel" or "ball neck extract" (rectangular shape with four indented panels) bottle, complete, two-piece cup-bottom mold, molded ring on lower neck with tooled patent finish, no embossing	United States	Mid to late 1860s-ca. 1910s
30	T-4; Stratum Id; 18-50 cmbs	Glass	Bottle	Colorless glass bottle, neck to finish fragment, machine-made, small bore, non-threaded metal cap closure (used on fruit or canning jars, food bottles, ointment jars, snuff bottles, and medicines)	Unknown	Post-1908
31	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless barrel mustard bottle, two-piece cup-bottom mold, tooled one-part finish	United States	1850s-1920s
32	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless, complete, two-piece cup-bottom mold, tooled one-part (patent) finish, embossed “PACIFIC / VINEGAR AND PICKLE WORKS / S.F.” on body	United States	1860-1912
33	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless square druggist bottle, complete, two-piece cup-bottom mold, tooled prescription finish, no embossing	Unknown	Mid-1870s-early 1920s
34	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless square glass bottle with beveled corners, machine-made, small mouth external thread finish, no embossing	Unknown	Post-1908

Acc. #	Provenience	Material	Type	Description	Origin	Age
35	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless perfume bottle, base to neck fragment, two-piece cup-bottom mold, embossed "MOUILLERON / NEVEU / PARIS" on body, imported from Paris to New York by F. Paturel & Co.	France	1819-1935
36	T-2; Stratum IIb; 98-150 cmbs	Glass	Bottle	Colorless square possible druggist or medicinal bottle, complete, machine-made, valve mark on base, prescription finish, embossed "2" on base	Unknown	Post-1908
37	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Carnegie brick fragment, clay bar made with extruded, stiff-mud process and sent through Raymond and Berg cutting machine, brick made with patent pressed brick machine, impressed mark "CAR[NEGIE]" on face, no frog	United States	1903-1932
38	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Carnegie brick fragment, clay bar made with extruded, stiff-mud process and sent through Raymond and Berg cutting machine, brick made with patent pressed brick machine, impressed mark "[C]ARNE[GIE]" on face, no frog	United States	1903-1932
39	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Gartcraig firebrick fragment, machine-made, impressed “[GA]RTCR[AIG]” inside rectangular frog on face, lime mortar on one side	Scotland	1872-1921
40	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Gartcraig firebrick fragment, machine-made, impressed “[G]ARTC[RAIG]” inside rectangular frog on face	Scotland	1872-1921
41	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Gartcraig firebrick fragment, machine-made, impressed “[GARTC]RAIG” inside rectangular frog on face, lime mortar on one side	Scotland	1872-1921
42	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Gartcraig firebrick fragment, machine-made, impressed “[GAR]TCR[AIG]” inside rectangular frog on face, lime mortar on one side	Scotland	1872-1921

Acc. #	Provenience	Material	Type	Description	Origin	Age
43	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Gartcraig firebrick fragment, machine-made, impressed “[GARTCR]AIG” inside rectangular frog on face, lime mortar on one side	Scotland	1872-1921
44	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Firebrick fragment, Ferguslie Fireclay Works, Paisley, Scotland, "[PA]TENT / [R. BROW]N & SO[N / PAIS]LEY" impressed on face in octagonal-shaped frog	Scotland	1850-1934
45	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Firebrick fragment, Ferguslie Fireclay Works, Paisley, Scotland, "PAT[ENT / R]. BROWN [& SON] / PAIS[LEY]" impressed on face in octagonal-shaped frog	Scotland	1850-1934
46	T-2; Stratum IIa; 32-97 cmbs	Ceramic	Brick	Firebrick fragment, Ferguslie Fireclay Works, Paisley, Scotland, "PAT[ENT] / R. BROW[N & SON] / PA[ISLEY]" impressed on face in octagonal-shaped frog	Scotland	1850-1934

2018), unless otherwise noted. Bottle research is focused on function and date of manufacture, using reference texts and online resources to identify maker's marks and company histories.

5.2.1.1 Mold-blown bottles (1800-mid twentieth century)

Around ca. 1800, glassworkers began to blow bottles in molds. Most molds were made from metal, but wood, ceramic, fired clay, clay lined wood, soapstone, and other materials were sometimes used. Types of bottle molds include one-piece dip mold, three-piece dip mold, four-piece mold, two-piece mold, and turn mold. The body features left by these different molds provide information about the age of the artifact.

The final step in the production of a mold-blown bottle is adding the finish or "lip". The method used to finish the bottle is useful in artifact dating. Applied finishes were used from 1840 to 1885. Glass was applied to the bottle neck and the finish was shaped with a specialized lipping tool. Diagnostic features of an applied finish include side mold seams that end abruptly on the neck at the bottom of the finish, excess glass slopping over onto the upper neck below the finish, and a horizontal ridge inside the neck of the bottle that can be felt by inserting a finger into the bottle bore (BLM/SHA 2018).

Tooled finishes were used as early as the 1860s on smaller bottles, but it did not become the dominant finishing method until 1890. The full date range for a tooled finish is 1870-1920. The upper part of the bottle was re-fired and some of the glass from the neck was formed into the finish with a lipping tool. Diagnostic features of a tooled finish include side mold seams that fade out on the neck of the bottle below the finish, concentric horizontal tooling marks present on the finish and upper neck, an absence of glass flopping over onto the upper neck, and an absence of the interior ridge in the bore (BLM/SHA 2018).

5.2.1.1.1 One-piece dip mold (1800-1870)

One of the first types of molds was the one-piece dip mold, which dates from 1800 to 1870. Bottles made with this type of mold do not have seams or embossing.

Acc. #s 17 and 18 were blown in a dip mold and have applied oil finishes (Figure 51). The shape of the bottles (tall, moderately slender body with a bulging necks) is commonly used for spirits, ale/porter, and wine. After the 1870s, black glass was replaced with lighter green, olive green, amber, and colorless glass. Acc. #s 17 and 18 date ca. 1870.

5.2.1.1.2 Two-piece mold (1880-1915)

The most common type of mold is the two-piece mold, which dates from 1850 to 1920 but is most common from 1880 to 1915. There are four variations of the two-piece mold: hinge, key, post-bottom, and cup-bottom. The two-piece cup-bottom mold dates post-1850, with peak use from 1880 through the 1910s. This mold leaves a horizontal seam around the heel of the bottle and two side seams extending from the heel seam up the bottle body and neck. There are 14 bottles with a two-piece cup-bottom mold in the collection (Acc. #s 1-3, 4-6, 8, 10, 12, 19, 22, 28, 29, and 35).

Acc. #s 19 and 24 are medium blueish aqua Hollister & Co. soda bottles with two-piece molds and semi-round bases. Acc. # 19 has a tooled Hutchinson finish (Figure 52). H.R. Hollister and Hyland formed the first soda water company in Hawaii in 1863. In 1868, Hollister opened Hollister Soda Works on Ford and Merchant Streets. In 1894, Hollister Soda Works, Tahiti Lemonade

Figure 51. 1) Acc. # 17 and 2) Acc. # 18, dip mold bottle, applied oil finish, tall, moderately slender body with bulging neck, contained spirits, ale/porter, or wine, date ca. 1870s

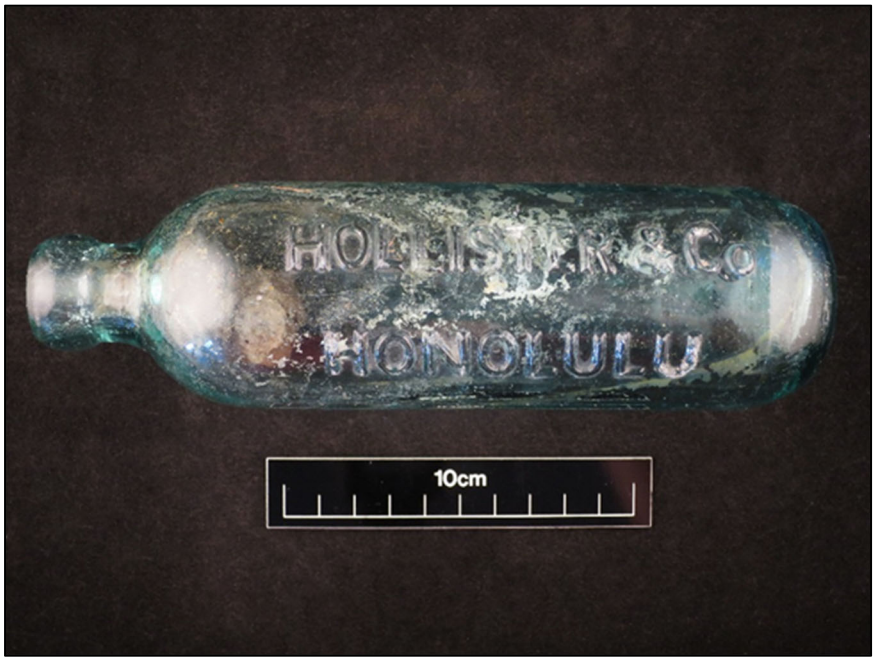

Figure 52. Acc. # 19, medium blueish aqua Hollister & Co soda bottle, complete, two-piece mold, semi-round base, tooled Hutchinson finish, embossed "HOLLISTER & Co / HONOLULU" vertically on body, United States, ca. 1893

Works, and Crystal merged into Consolidated Soda Water Works, Ltd (Sabey 2007). Based on bottle embossing, Acc. # 19 dates ca. 1893 and Acc. # 24 dates ca. 1900 (Elliott and Gould 1988: 112).

Acc. # 10 is a complete aqua Hawaiian Soda Works bottle with a two-piece mold, tooled “laid-on-ring” finish, and Hutchinson wire stopper closure (Figure 53). The Hutchinson wire stopper was invented in 1879 by Charles G. Hutchinson. It is a rubber piece held between two metal plates attached to a looped spring wire stem. The top of the wire extended above the bottle mouth and the rubber piece was positioned below the neck (Elliott and Gould 1988:34). The bottle was sealed by pulling the stopper until the rubber piece met the inside of the bottle’s shoulder and the carbonation held the Hutchinson in place (Elliott and Gould 1988:39). Acc. # 10 has a classic “ginger ale” bottle shape with a semi-round base that does not require a special holding device to stand upright. It would have contained 10 ounces of ginger ale. To open the bottle, the Hutchinson stopper was pushed down forcefully to release the carbonation (Elliott and Gould 1988: 40). Production of the Hutchinson stopper was over by 1920 (Elliott and Gould 1988:42). Acc. # 10 is embossed "HAWAIIAN / SODA / WORKS / HONOLULU / T. H." on the body and “pHw” on the base. The Hawaiian Islands became a territory of the United States in 1900. Afterwards, “T. H.” (Territory of Hawaii) was embossed on the bottles (Elliott and Gould 1988:1). Acc. # 10 dates ca. 1907 (Elliott and Gould 1988:100).

Acc. # 1 is a complete colorless brandy bottle with a two-piece cup-bottom mold and tooled strait brandy finish (Figure 54). The shape of the bottle (tall, moderately slender body with a strait neck) was common during the decade just prior to National Prohibition. There is no embossing or maker’s mark on the bottle, but it most likely dates from the late 1890s-mid 1910s (BLM/SHA 2018).

Acc. # 13 is a base to shoulder fragment of an amber beverage bottle with a two-piece cup-bottom mold. It is embossed “S F & P G W” on the base (Figure 55). This is the maker’s mark for San Francisco & Pacific Glass Works. In 1876, Pacific Glass Works was purchased by Carlton Newman who owned the rival company San Francisco Glass Works. He merged the firms under a new name, San Francisco and Pacific Glass Works. Acc. # 13 dates from 1876-1902.

Acc. # 29 is a complete, colorless, two-piece cup-bottom mold “ball neck panel” or “ball neck extract” bottle with a tooled patent finish (Figure 56). It has a rectangular shape with four indented panels and a molded ring on the lower neck. It could have contained flavoring extract, medicine, hair dye, furniture polish, or cologne. This bottle style was used from the mid to late 1860s to ca. 1950s, but Acc. # 29 dates before ca. 1910s.

Acc. #s 4, 5, and 22 are complete two-piece cup-bottom mold bottles with tooled finishes (Acc. # 4 prescription and Acc. #s 5 and 22 patent) and “strait neck panel” body styles (Figure 57). This body style is also called “panels” or “short neck panels” because of the rectangular bottle shape and two to four indented panels. Acc. #s 5 and 22 are most likely medicinal bottles, but patent finishes were also used on liquor bottles, hair tonics, and inks. Acc. # 4 is most likely a druggist bottle based on the prescription finish. Acc. #s 4 and 22 are embossed “38F” and “88” on the base, respectively, but no information could be found about the manufacturers. Acc. # 5 is embossed “N” in an oval on the base. This is the maker’s mark of Obear-Nester Glass Co. of St. Louis, Illinois. Obear-Nester Glass Co. was created when Joseph, Fred, and Michael Nester bought into

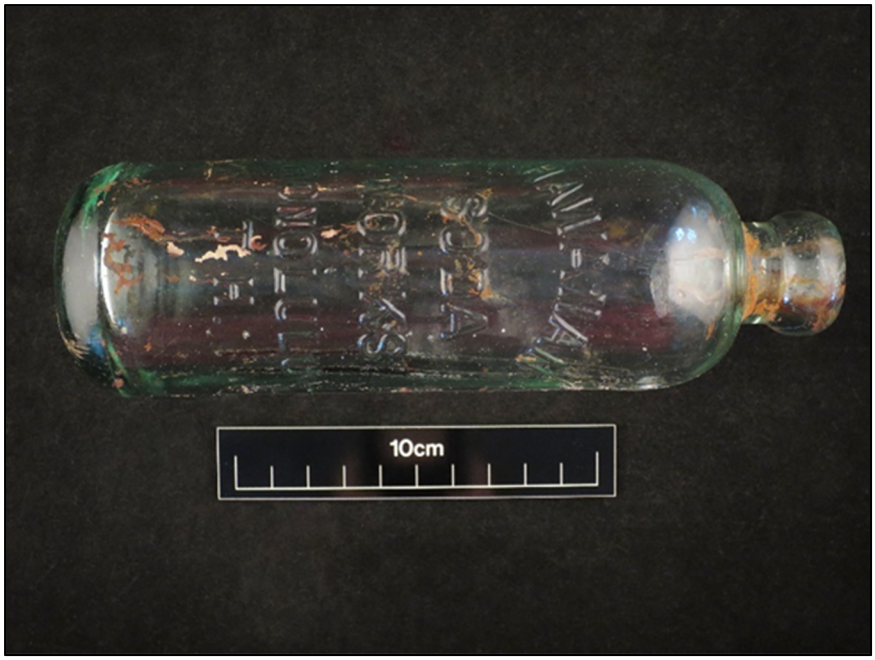

Figure 53. Acc. # 10, aqua Hawaiian Soda Works bottle, complete, two-piece mold, tooled “laid-on-ring” finish, Hutchinson stopper, embossed "HAWAIIAN / SODA / WORKS / HONOLULU / T. H." on body and "pHw" on base, United States, ca. 1907

Figure 54. Acc. # 1, colorless glass liquor (possibly brandy) bottle, complete, two-piece cup-bottom mold, slight push-up base, tooled strait brandy finish, no embossing or maker's marks, late 1890s-mid 1910s

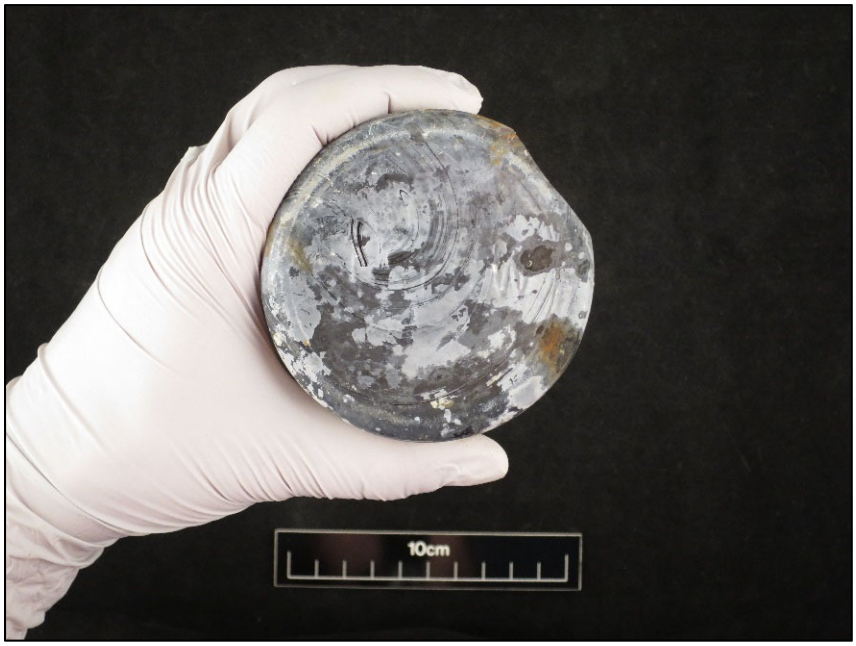

Figure 55. Acc. # 13, amber beverage bottle, one base to body and one body to shoulder fragment, two-piece cup-bottom mold, embossed "S F & P G W" on base, manufactured by San Francisco & Pacific Glass Works in San Francisco, California, United States, 1876-1902

Figure 56. Acc. # 29, colorless "ball neck panel" or "ball neck extract" (rectangular shape with four indented panels) bottle, complete, two-piece cup-bottom mold, molded ring on lower neck with tooled patent finish, no embossing, United States, mid to late 1860s-ca. 1910s

Figure 57. 1) Acc. # 4, 2) Acc. # 5, and 3) Acc. # 22, two-piece cup-bottom mold bottles with tooled finishes and “strait neck panel” body styles

Thomas J. Obear’s glass business, previously Allison-Obear Glass Co. and then Obear Glass Works. The artifact dates from 1895-mid 1920s (Lockhart et al. 2018).

Acc. #s 6 and 33 are complete colorless square bottles with two-piece cup-bottom molds and tooled prescription finishes (Figure 58). This shape was common on mouth-blown bottles from the 1870s to 1920s (BLM/SHA 2018). There is no proprietary embossing on the bottles that could be used for dating. The prescription finish is the most common finish on druggist, drug store, and prescription bottles. However, it was also used on medicinal, poison, bitters, ink, perfume, cologne, toiletry, liquor, food, and sauce bottles (BLM/SHA 2018 Prescription).

Acc. # 2 is a complete aqua two-piece cup-bottom mold Davis Pain Killer medicinal bottle with a tooled double ring finish (Figure 59). Perry Davis became very sick in 1840 and created a pain killer from vegetable extracts, camphor, ethyl alcohol, and opiates. He started selling the product in 1843 and had it patented in 1845 (Tamburello 2008). Perry Davis’ Pain Killer soon became very popular around the country. It is thought to be the first remedy made for pain rather than a specific ailment. Before his death in 1862, he associated the firm with his son, Edmund Davis, by re-naming the company Perry Davis & Sons (Findlay Antique Bottle Club 2014). The trademark “Davis Pain Killer” was applied for on March 6, 1878 and registration remained current until January 1, 1960. The factory was in Providence, Rhode Island (Tamburello 2008).

Acc. # 8 is a complete greenish aqua club sauce style sauce bottle with a two-piece cup-bottom mold and tooled three-part club sauce finish (Figure 60). This bottle would have held sauce intended for meats (BLM/SHA 2018). The base is embossed “476 / H”, but no information could be found about the manufacturer. It dates from the 1870s to the end of the mold-blown era (ca. 1910s).

Acc. # 12 is a complete colorless two-piece cup-bottom mold olive bottle with a tooled one part “flared” finish (Figure 61). The tall, narrow body style originated in the late 1890s and remained popular until the early 1930s. It was called the “New York Style Olive”, “Chicago Cylinder Olive”, or “Footed Cylinder Olive” by bottle makers.

Acc. # 31 is a colorless, mold-blown barrel mustard bottle with a tooled one-part finish (Figure 62). Barrel mustard bottles have a wide bore, cylindrical shape with bulging body (diameter of heel and neck smaller than body), and three molded bands above and below the central labeling area. This style mustard jar was used from the 1850s to 1920s. Mustard was used to improve bland dishes and hide the flavor of foods before refrigeration and preservation techniques improved. For a time, it was also thought mustard could cure various ailments such as congestion, hysteria, snakebite, and bubonic plague. This style barrel bottle might also have been used for spices and other condiments like horseradish (BLM/SHA Food Bottles 2018).

Acc. # 32 is a Pacific Vinegar and Pickle Works bottle (Figure 63). It was made with a two-piece cup-bottom mold and tooled one-part (patent) finish. The body is embossed “PACIFIC / VINEGAR AND PICKLE WORKS / S.F”. Joseph Pohley and John Ludwig Koster opened the business in San Francisco, California in 1860 under the name Pacific Vinegar Works. They were in operation until 1912.

Figure 58. 1) Acc. # 6 and 2) Acc. # 33, colorless square bottles with two-piece cup-bottom molds and tooled prescription finishes, ca. 1870s-1920s

Figure 59. Acc. # 2, aqua Perry Davis & Son medicinal bottle, complete, two-piece cup-bottom mold, tooled double ring finish, embossed "DAVIS" on front panel, "PAIN KILLER" on side panel, "VEGETABLE" on other side panel, and "35" on base, United States, 1878-ca. 1915

Figure 60. Acc. # 8, greenish aqua club style sauce bottle, complete, two-piece cup-bottom mold, tooled three-part club sauce finish, contained sauce intended for meats, base embossed "476 / H", United States, 1870s-ca. 1910s

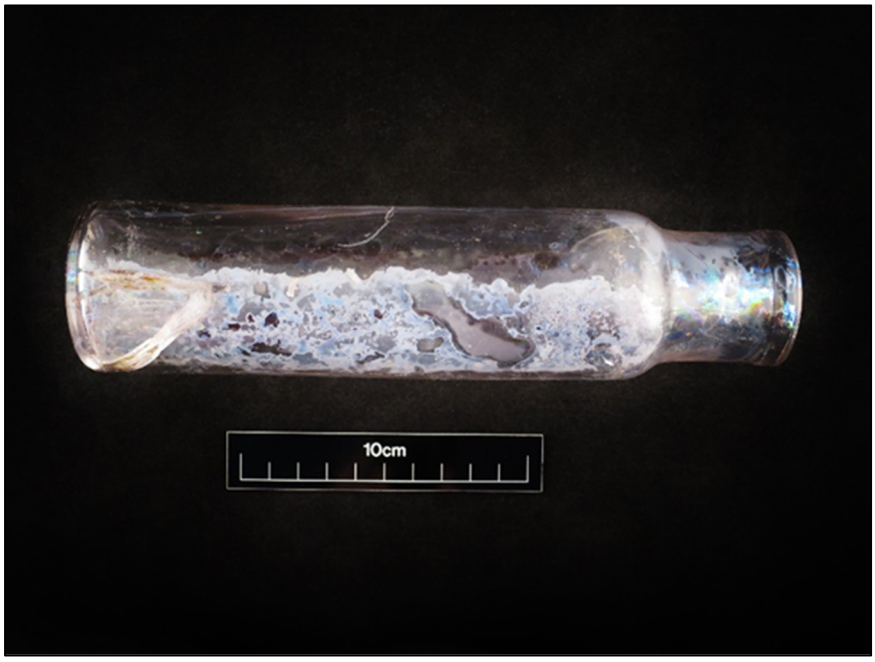

Figure 61. Acc. # 12, colorless olive bottle, complete, tall and narrow body style two-piece cup-bottom mold, tooled one part "flared" finish, no embossing or label, United States, late 1890s-early 1930s

Figure 62. Acc. # 31, colorless barrel mustard bottle, two-piece cup-bottom mold, tooled one-part finish, 1850s-1920s

Figure 63. Acc. # 32, colorless, complete, two-piece cup-bottom mold, tooled one-part (patent) finish, embossed “PACIFIC / VINEGAR AND PICKLE WORKS / S.F.” on body, 1860-1912

Acc. # 3 is a complete colorless two-piece cup-bottom mold Vaseline bottle with a tooled patent finish and cork closure (Figure 64). The artifact is embossed “CHESEBROUGH MFG. CO.” in an arch on the body above “VASELINE” on the heel. Robert Chesebrough patented Vaseline in 1872 and established Chesebrough Manufacturing Company in 1880 to sell his product (Lockhart 2015:2; Whitten 2016). Early versions of the jar dating to ca. 1880s/1890s are embossed like Acc. # 2, while later machine-made versions include some variation of “TRADE MARK/ VASELINE” CHESEBROUGH/ NEW-YORK” (Whitten 2016). The company was bought by Unilever in 1987 (Whitten 2016).

Acc. # 35 is a perfume bottle embossed “MOUILLERON / NEVEU / PARIS" on the body (Figure 65). Mouilleron was established in 1819 and acquired by Cottan in 1935. The bottles were being imported from Paris to New York by F. Paturel & Co. ca. 1866.

5.2.1.1.3 Four-piece mold (early 1880s-mid 1910s)

Another type of mold-blown bottle in the collection was made using a four-piece mold. A four-piece mold has four main body parts, two for the body and two for the shoulder/neck. This type of mold has a horizontal seam on or just below the shoulder and two side mold seams running vertically from the heel, up the body, to the neck of the bottle. Four-piece molds also have a fifth part, the base plate, that can be either “post-bottom” or “cup-bottom”. Four-piece molds have been called “sectional plate molds” because the parts can be changed to add or remove embossing without creating a new mold. Four-piece molds were commonly used for liquor, beer, and soda bottles between the early 1880s and mid 1910s (BLM/SHA 2018). There are two bottles with a four-piece cup-bottom mold in the collection (Acc. #s 7 and 20).

Acc. # 7 is a colorless 10-ounce capacity soda bottle with a four-piece cup-bottom mold and tooled crown top finish (Figure 66). It is embossed “THIS BOTTLE / IS THE PROPERTY OF / CONSOLIDATED / SODA WATER WORKS CO / LTD. / HONOLULU, T.H. / NEVER SOLD” on the body and “C” on the base. Hollister & Co. and Tahiti Lemonade Works Company combined in 1894 to form Consolidated Soda Water Works (Elliott and Gould 1988:26). In 1898, Consolidated Soda Water Works switched from marble to crown top sodas (Elliott and Gould 1988:30). Acc. # 7 dates circa 1912 (Elliott and Gould 1988:81).

Acc. # 20 is a medium blue-green aqua soda bottle with a four-piece mold. The manufacturer is unknown, but it was most likely bottled in Hawaii. It has “…TER” embossed horizontally on the body, possibly for Enterprise Soda Works.

5.2.1.1.4 Turn mold (1870-1920)

Turn mold bottles date from 1870 to 1920. They were made by turning the bottles inside the mold, which left the body of the bottles seamless and shiny. Unlike free-blown bottles, turn mold bottles are symmetrical and evenly proportioned. They can be identified by faint concentric rings around the heel and body of the bottle. Most do not have marking or embossing. Turn molded bottles are often used for wine or liquor. There are two turn mold bottles in the collection (Acc. #s 15 and 25).

Acc. # 25 is a complete, turn-molded dark olive green “export” style beer bottle with an applied two-part mineral finish (Figure 67). Export style beer bottles date from the mid-1870s to present. They have a slightly bulged neck and body length that is greater than or equal to the height of the shoulder, neck, and finish. Most contained lager beers, but microbreweries also used this style of

Figure 64. Acc. # 3, colorless Vaseline bottle, complete, mold blown, two-piece cup-bottom mold, round base, tooled one-part (patent) finish, cork closure, embossed "CHESEBROUGH MFG CO" (arched) on body / "VASELINE" on heel, made in Perth Amboy, New Jersey, USA, ca. 1880s/1890s

Figure 65. Acc. # 35, colorless perfume bottle, base to neck fragment, two-piece cup-bottom mold, embossed "MOUILLERON / NEVEU / PARIS" on body, imported from Paris to New York by F. Paturel & Co., 1819-1935

Figure 66. Acc. # 7, colorless 10 oz. capacity soda bottle, complete, four-piece cup-bottom mold, round, flat base, tooled crown finish, embossed "THIS BOTTLE / IS THE PROPERTY OF / CONSOLIDATED / SODA WATER WORKS CO / LTD. / HONOLULU, T.H. / NEVER SOLD" on body and "C" on base, bottled in Honolulu, T.H., ca. 1912

Figure 67. Acc. # 25, dark olive green "export" style beer bottle, complete, turn mold, applied two-part mineral finish, slight push-up base, mid 1870s-1885

bottle for porter, ale, stout, and Weiss. Two-part mineral finishes, as seen on Acc. # 25, were most common from the mid-1870s to early 1890s.

5.2.1.2 Machine-made bottles (post-1905)

Semi-automatic machines were introduced in the 1890s and were mostly used to make wide-mouth bottles/jars. The glass had to be manually fed into the machines by glass workers. In 1903, Michael Owens invented a machine that took the place of the skilled glass workers. The machine could blow wide-mouth bottles as early as 1905 and narrow-necked bottles (such as beverage bottles) as early as 1908. The Automatic Bottle Machine (ABM) blew a bottle from base to lip, usually with a two-piece cup-bottom mold. The two side seams extend to and over the lip of the bottle, or to a horizontal seam at the bottom of the bottle finish. The base of a bottle made in the early Owens ABM machines often had a round scar with feathered edges. There are few ways, other than the presence of the Owens suction scar on the base, to distinguish a bottle made by a semi versus fully automatic machine, so both types of bottles are described in this report as “machine made” (BLM/SHA 2018). There are seven machine-made bottles or jars in the collection (Acc. # 11, 21, 26, 27, 30, 34, and 36).

Acc. # 21 is a complete, machine-made, aqua “export” style beer bottle with a crown finish (Figure 68). The method of manufacture shifted from mold-blown to machine made in the twentieth century. Crown finishes grew in popularity during the late 1890s and were dominant by the mid-1910s. Acc. # 21 dates post-1908.

Acc. # 26 is a machine-made aqua beverage bottle with “P [C G] W” embossed on the base. George H. Newman established Pacific Coast Glass Works with his nephew Carlton Newman Davis in 1903 (Toulouse 1971: 384). Operations were by hand until the directory listed “hand and machine” in 1912 (Toulouse 1971:416). Acc. # 26 dates between 1912 and 1925 when the name changed to Pacific Coast Glass Company and the trademark became “PCGCo” or “PC” (Toulouse 1971:416).

Acc. # 27 is a colorless liquor bottle or flask base to body fragment manufactured by Owens-Illinois Glass Company (Figure 69). Owens-Illinois Glass Company was created through the merger of Owens Glass Co. and Illinois Glass Co. in 1929. The company was formally incorporated as Owens-Illinois Glass Co., Ltd. in 1931 (Lockhart and Hoenig 2015; Paquett 1994). It was one of the largest glass bottle manufacturers in the world with plants located across the country. Since the company’s incorporation, three maker’s marks have been used. The first maker’s mark combined the logos of both companies. It was a diamond around an “O” containing an “I”, called the Diamond-OI logo. It was used from 1929 to 1954, but some manufacturing plants continued to use the mark until 1966 (Lockhart and Hoenig 2015). This is the maker’s mark on the base of Acc. # 27. After 1934, glass manufacturers wanting to make liquor bottles or flasks had to conform to federal regulations that called for specific code sequences on the base of the bottle. The first line is a distiller number (beginning with D), rectifier number (beginning with R), or import number (beginning with I). The second line is a federally-assigned glass house number, dash or manufacturer’s mark, and date code. Two-digit date codes started being used in the 1940s (Lockhart and Hoenig 2018:310-311). Acc. # 27 is embossed “D-9 / 56-8” on the base. Distiller number “9” is for the plant in Streator, Illinois which has operated from 1930 to the present. The number “56” is the liquor permit number and “8” represents a 1938 date.

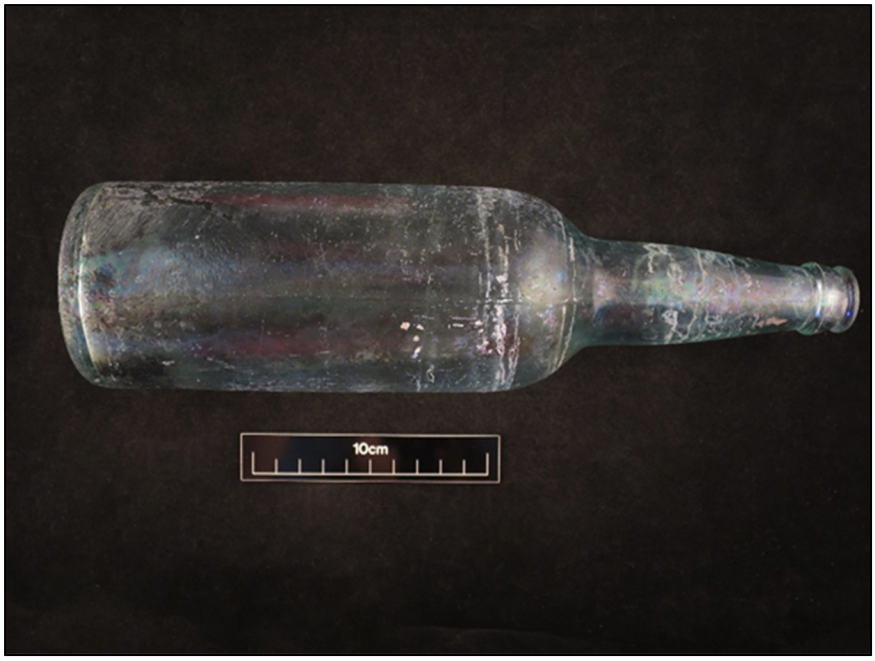

Figure 68. Acc. # 21, aqua "export" style beer bottle, complete, quart size, machine-made, crown finish, heel embossed "R 106", post-1908

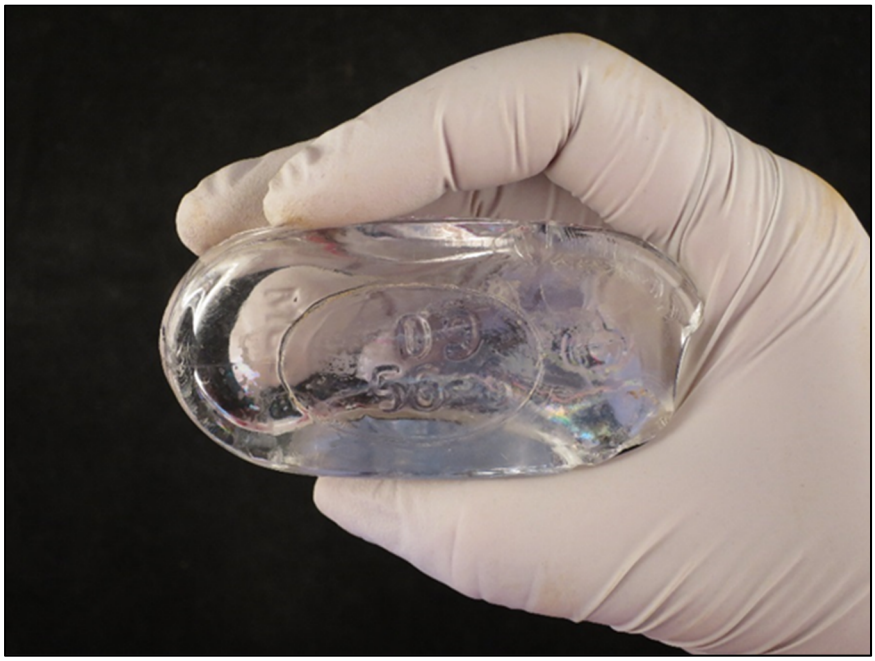

Figure 69. Acc. # 27, colorless liquor bottle or flask, base to body fragment, machine-made, valve/ejection mark on base, manufactured by Owens-Illinois Glass Co at the Streator, Illinois plant (1930-present), Diamond-OI logo embossed on base with "D9 / 56-8" and "M…", United States, 1938

Acc. # 30 is a colorless neck to finish fragment of a machine-made bottle with a non-threaded metal cap closure (Figure 70). This type of closure was used on fruit or canning jars, food bottles, ointment jars, snuff bottles, and medicines. It was held in place by friction and did not provide an airtight seal. Metal cap closures were used for a long time and are not a good indicator of an artifact's age.

5.2.1.3 Other Bottles

Acc. # 23 is colorless pressed glass tableware fragment (Figure 71). To make pressed glass, molten glass is poured into a mold and "pressed" with a plunger. Pressed glass tableware was produced beginning in 1825. Early pressed glass was ornate to hide manufacturing flaws (Welker and Welker 1985). By 1865, pressed glass technology had advanced and it became more functional and affordable. True colorless pressed glass dates post-1870 (BLM/SHA 2018). Popularity of pressed glass tapered out in the 1920s due to rising interest in crystal tableware (Welker and Welker 1985).

The manufacturing techniques to make two of the bottles are unknown (Acc. #s 14 and 16). These bottle fragments did not have diagnostic physical features such as pontil marks, mold seams, suctions scars, valve marks, etc. necessary to determine the method of manufacture.

5.2.2 Ceramic Artifacts

Ceramic is a term used to describe artifacts made from fired clay. The ceramics in the collection include one bottle (Acc. # 9) and ten brick fragments (Acc. #s 37-46). The bottle (Acc. # 9) was analyzed for paste, shape, color, decoration, and origin. The Florida Museum of Natural History (2018) ceramic identification site divides paste type into "earthenwares," "stonewares," and "porcelains." Shapes are designated as "flatware" for artifacts like plates and shallow saucers, "hollowware" for artifacts like bowls and cups, or "tableware" when the fragments are too small to determine general shape.

The bricks (Acc. #s 37-46) were analyzed for portion, method of manufacture, manufacturer marks, and origin.

5.2.2.1 Bottles

Stoneware ale bottles are made from semivitreous ceramic material and cream-colored paste. They were coated in colorless glaze. The upper half of some bottles has a light brown glaze. This is known as "Bristol glaze" named after inventor William Powell of Bristol, England. Stoneware ale bottles can be square-bodied or have a "champagne" shape (which closely resembles the form of a traditional beer or liquor bottle) with brandy, double ring, or oil finishes. Acc. # 9 has a "champagne" shape and double ring finish (Figure 72). The upper half of the bottle (just below the shoulder to the finish) has a light brown "Bristol glaze". Stoneware ale bottles contained ale or ginger beer. Most were produced around Glasgow, Scotland or Liverpool, England. Some were made in the Northeast and Midwest United States, but these were regionally distributed and not found out west. The bottles date ca. nineteenth century (Baxter 2013:303-304).

5.2.2.2 Bricks

The first brick building in Hawaii was the King Kamehameha I palace built in Lahaina, Maui in 1802. By 1820, bricks associated with the Calvinist mission appear in Hawaii from Boston. Local brick making began on O‘ahu in 1839 and the first structure was built in Honolulu in 1847.

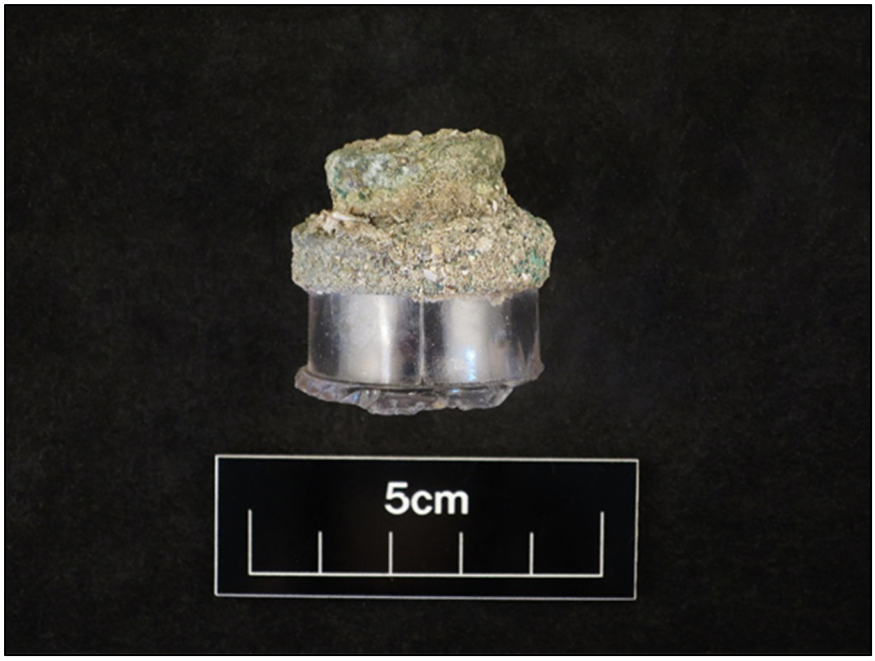

Figure 70. Acc. # 30, colorless glass bottle, neck to finish fragment, machine-made, small bore, non-threaded metal cap closure (used on fruit or canning jars, food bottles, ointment jars, snuff bottles, and medicines), post-1908

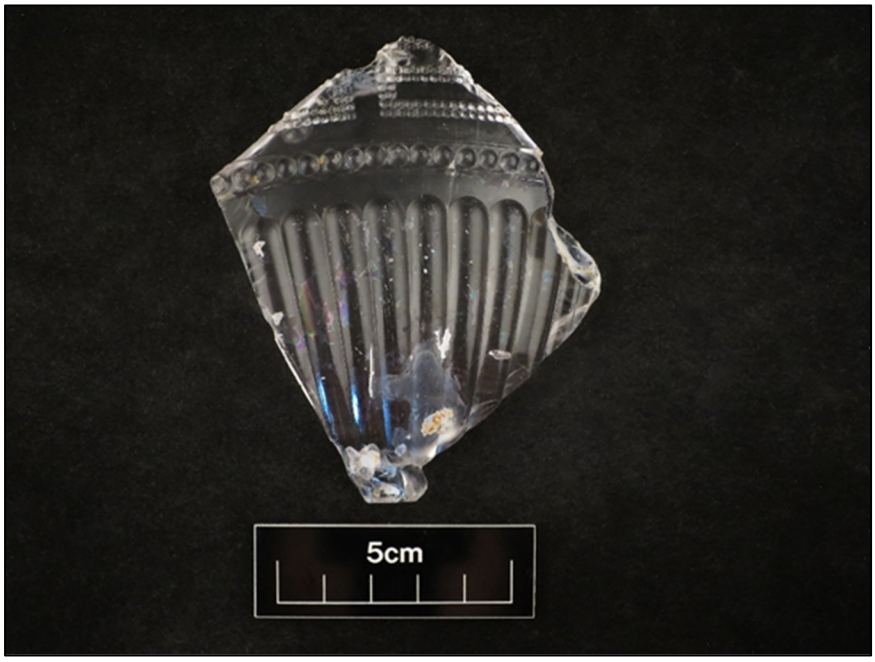

Figure 71. Acc. # 23, colorless, pressed, tableware body fragment, post 1870-ca. 1920s

Figure 72. Acc. # 9, stoneware ale or "ginger beer" bottle, complete, "champagne" shape, double ring finish, cream-colored paste, coated in colorless glaze, "Bristol glaze" on the upper half of the bottle from just below the shoulder to the finish, Scotland or England, ca. nineteenth century

In the 1860s, bricks started being imported from Japan (Lebo 1997:107). There are 10 brick fragments in the collection. Family names, company initials, place names, trade names, or a combination of symbols/logo designs with letters are often impressed into bricks (Meide 1994:16).

Acc. #s 37-38 are Carnegie bricks (Figure 73). In 1903, the Carnegie Brick and Pottery Company was incorporated under directors James H. Swift, Charles A. Gray, O.K. McMurray, M.B. Maynard, C. Bosse, M.A. Murphy, and W.C. Gregg. The clay bars were produced using a stiff-mud extruding process and sent through Raymond and Berg cutting machines. The bricks were made with the latest patent pressed brick machines, which could produce 20,000 bricks per day. “CARNEGIE” was impressed onto the face of the bricks with or without a frog. Then, the bricks were dried in kilns. Oil burners provided heat and the air was drawn through the drying tunnels with an exhaust fan. The kilns could dry 110,000 bricks in 10 hours. The plant made face, pressed, paving, fire, and enamel bricks. Other products included locomotive fire blocks, arch bricks, decorative bricks, split pavers, architectural terra cotta, drain tiles, chimney flutes, electrical conduits, sewer-pipes, pottery, and artistic sculptures. The plant was closed in 1911 following a flood. The undamaged property was purchased by Stockton Fire and Enamel Brick Company and shipped to their plant in Stockton, California where they continued to produce Carnegie bricks until 1932. In 1930, another plant was built in Pittsburg, California. This plant was purchased by Gladding, McBean and Company in 1943. Carnegie firebrick continued to be made at this plant until 1958. The firebrick made at the Pittsburg plant is recognizable by its yellow color, quartz grog, oblong shaped outline of the name plate, and lower case “n” in “CARnEGIE” (Mosier 2006).

Acc. #s 39-43 are Gartcraig bricks (Figure 74). The company was started near Millerston in Glasgow, Scotland by Andrew Yeats and Dr. Willis in 1862. It was originally called Andrew Yeats and Company. The name was changed to Gartcraig Coal & Fireclay Company Ltd in 1872 and then Gartcraig Fireclay Co Ltd in 1877. Bricks were made until 1921 when the plant was closed (Cranston 2015).

Acc. #s 44-46 are firebricks made by R. Brown of Ferguslie Fireclay Works (Figure 75). The company was founded by Robert Brown in Paisley, Glasgow, Scotland in 1850. He died ca. 1900 and was succeeded by his son. In 1902, the company was incorporated. Business was bad from 1914-1918 during the war and the company continued to struggle until it was liquidated in 1934 (Cranston 2014).

5.2.3 Summary of Historic Artifacts

Artifacts were collected from T-1 through T-7. All the artifacts came from fill contexts. Artifacts recovered from the project area include glass and ceramic artifacts predominately dating from the nineteenth to early twentieth centuries. The glass artifacts in the collection consist mainly of mold-blown and machine-made beverage, medicinal/druggist, and household bottles. The molds and finish types provide a possible manufacture date range of ca. 1870s to 1910s for the mold-blown bottles and 1908-1938 for machine-made bottles.

The ceramic collection consists of a stoneware ale bottle from Glasgow, Scotland or Liverpool, England and bricks from Scotland and the United States. The ceramic artifacts date from the nineteenth century to 1934.

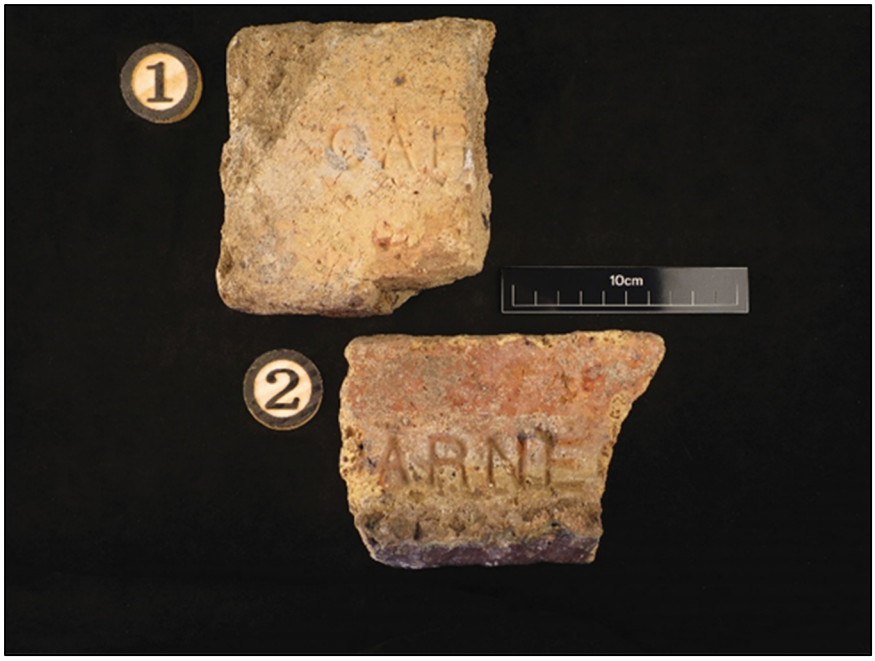

Figure 73. 1) Acc. # 37 and 2) Acc. # 38, Carnegie brick fragment, clay bar made with extruded, stiff-mud process and sent through Raymond and Berg cutting machine, brick made with patent pressed brick machine, impressed mark "CARNEGIE" on face, no frog, United States, 1903-1932

Figure 74. 1) Acc. # 39, 2) Acc. # 40, 3) Acc. # 41, 4) Acc. # 42, and 5) Acc. # 43, Gartcraig firebrick fragment, machine-made, impressed “GARTCRAIG” inside rectangular frog on face, Scotland, 1872-1921

Figure 75. 1) Acc. # 44, 2) Acc. # 45, and 3) Acc. # 46, firebrick fragments, Ferguslie Fireclay Works, Paisley, Scotland, "PATENT / R. BROWN & SON / PAISLEY" impressed on face in octagonal-shaped frog, 1850-1934

5.3 **Faunal Analysis**

CSH archaeologists collected faunal osseous remains from four of the eight test excavations (T-1 through 3, and T-6). The remains were recovered from Strata Id-IIb (historic fill layers) and include cat (*Felis catus*), cow (*Bos taurus*), goat (*Capra hircus*), and pig (*Sus scrofa*), as shown in Table 13. The majority of these remains are considered to be food refuse. Most show evidence of post-Contact butchering, identified by striations found on the cortical bone caused by saw-cutting.

Table 13. Results of Vertebrate Faunal Analysis

Test Excav.	Stratum/ SIHP #	Species; Mass	Description
1	Str. Id	Pig (*S. scrofa*); 11.4 g	Rib fragments; saw-cut
	Str. IIb	Pig (*S. scrofa*); 28.2 g	Rib section, long bone fragments, trabecular fragments; most saw-cut
2	Str. IIa	Cow (*B. taurus*); 26.6 g	Subadult femoral head portion; saw-cut. Rib fragment
	Str. IIb	Cow (*B. taurus*); 59.1 g	Talus
3	Str. II	Goat (*C. hircus*); 19.9 g	Distal radius portion; saw-cut
6	Str. IIa	Cat (*F. catus*); 3.4 g	Subadult humerus

Section 6 Historic Property Description

One historic property was identified within the current project area during the archaeological inventory survey (CSH 1, subsurface structural remnants). The historic property is detailed below and the distribution is depicted on The distribution of CSH 1 is depicted on a portion of the 1998 U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 76), a 2013 aerial photograph (Figure 77), and a 1950 Sanborn Fire Insurance map (Figure 78).

6.1 CSH 1

FORMAL TYPE:	Subsurface structural remnants
FUNCTION:	Twentieth century residential and commercial development
NUMBER OF FEATURES:	2
AGE:	Post-contact (early to mid-twentieth century)
LOCATION:	T-1, T-2
TAX MAP KEY:	TMKs: [1] 2-1-049:011, 032, and 033
LAND JURISDICTION:	Baranof Holdings
PREVIOUS DOCUMENTATION	N/A

CSH 1 is a newly identified historic property consisting of subsurface structural remnants associated with early to mid-twentieth century residential and commercial development. During archaeological inventory survey testing structural remnants were observed, documented, and designated CSH 1 Features 1 and 2. These remnants consist of a concrete and hollow tile foundation and a demolition fill deposit. The two observed features of CSH 1 are described below.

6.1.1 Feature 1

CSH 1 Feature 1 consists of a concrete and hollow tile foundation remnant (Figure 79). Feature 1 was observed crossing the center of T-1, oriented in a northeast/southwest direction. The entire horizontal extent is unknown as Feature 1 extends into the northeast and southwest walls. The foundation remnant was observed at 0.40–0.70 mbs originating within sandy clay loam fill (Stratum Id) and extending into crushed coral fill (Stratum Ie) (see Figure 36). Feature 1 consists of a single course of concrete hollow tiles measuring 40 cm by 20 cm by 20 cm overlying a concrete footer. The location of Feature 1 corresponds to a building labeled as a two story flat on a 1950 Sanborn Fire Insurance Map (see Figure 78). The Sanborn Map also notes the building to have concrete block construction of the first floor.

6.1.2 Feature 2

CSH 1 Feature 2 consists of a demolition fill deposit (Stratum IIa) (Figure 80). Feature 2 was observed in the southeast half of T-2. The entire horizontal extent is unknown as Feature 2 extends into the northeast, southeast, and southwest walls. Feature 2 was observed at 0.32–0.97 mbs below a sandy loam fill (Stratum Ib) and above a sandy loam fill (Stratum IIb) (see Figure 38). Feature 2 consists of 7.5YR 3/4 dark brown cobbly sandy loam with layers of 10YR 7/1 light gray sand and

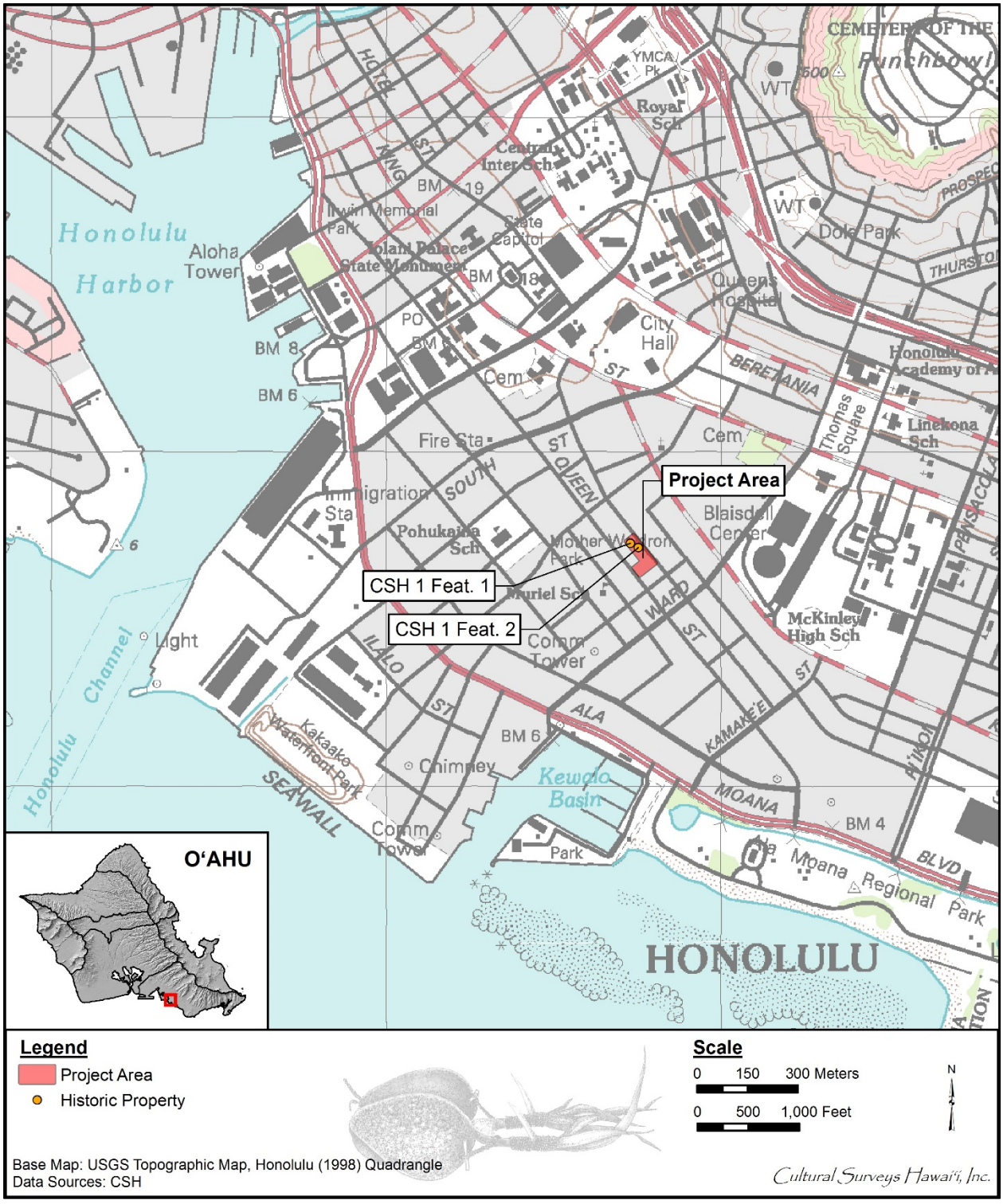

Figure 76. Portion of a 1998 Honolulu USGS topographic quadrangle showing the location of historic properties within the project area

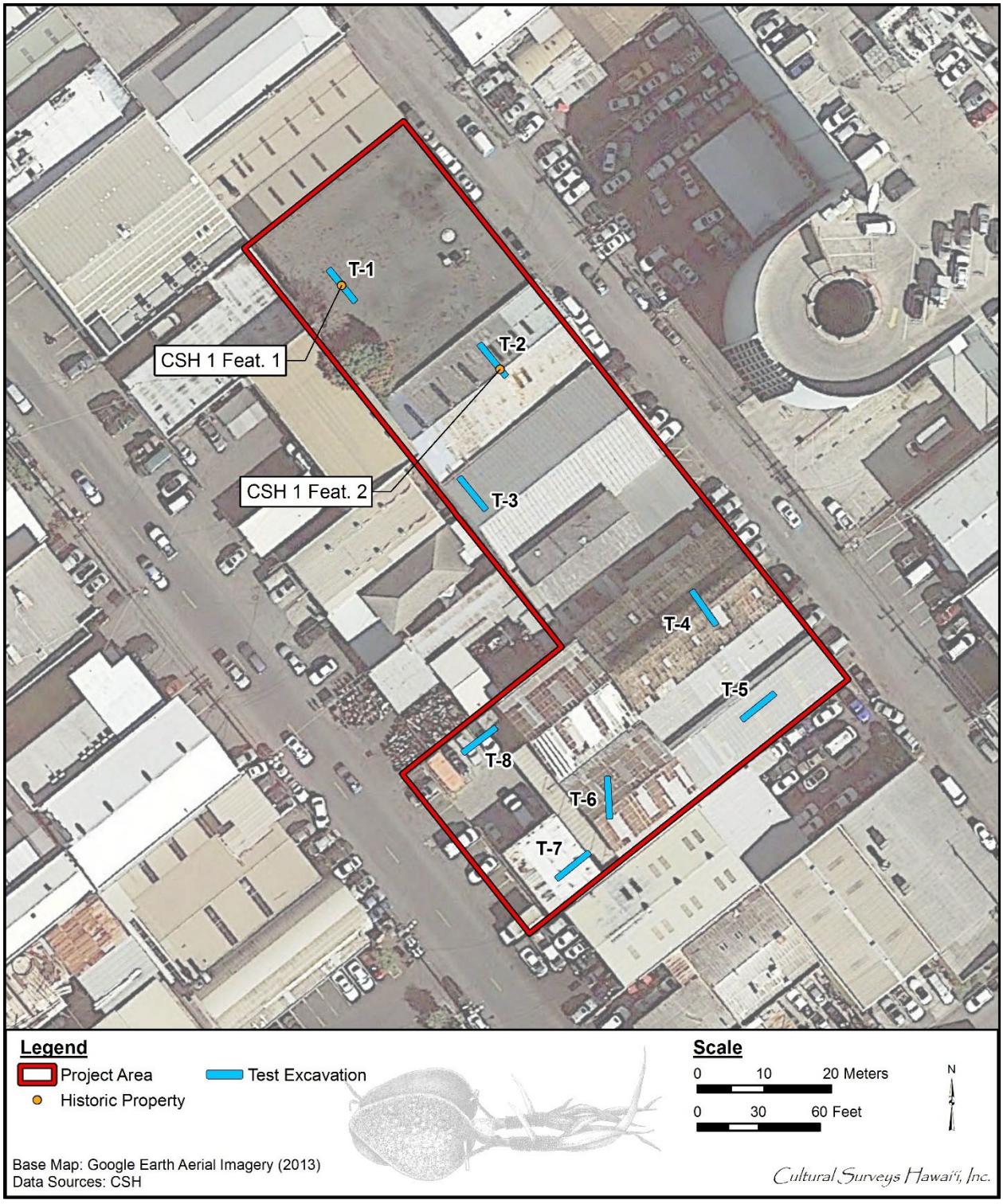

Figure 77. 2013 Google Earth Aerial photograph showing the location of CSH 1 within the project area

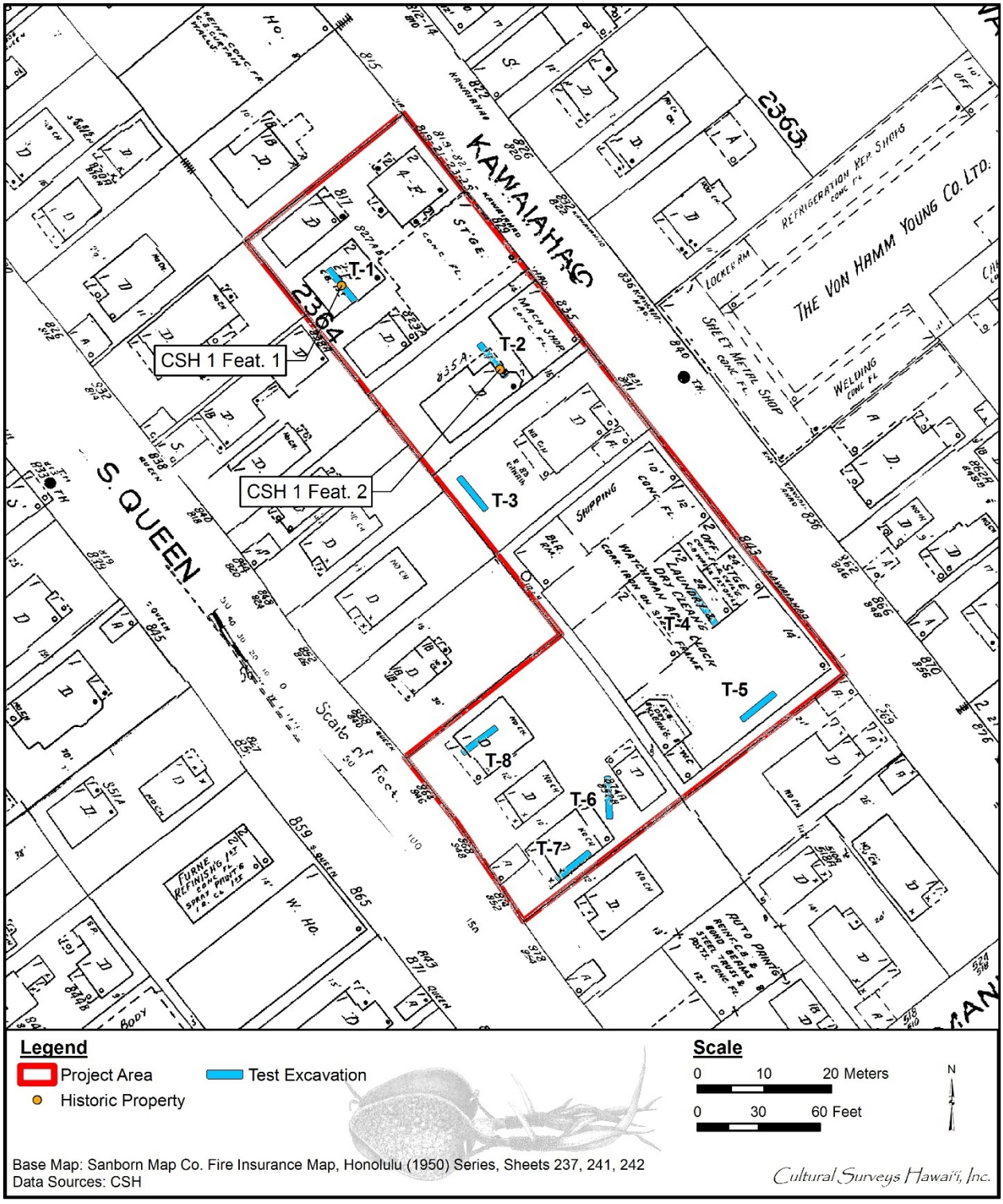

Figure 78. A 1950 Sanborn Fire Insurance Map showing the location of CSH 1 within the project area

Figure 79. Photograph of CSH 1 Feature 1, hollow tile footing, view to northwest

Figure 80. Photograph of CSH 1 Feature 2, demolition fill deposit, view to northwest

10YR 2/1 black volcanic cinder and contains historic artifacts, bricks, and basalt cobbles throughout. A sample of diagnostic artifacts were collected for further analysis in the lab. Brick portions with makers marks were identified from the Carnegie Brick and Pottery company (United States), the Gartcraig Fireclay Company (Scotland), and the Ferguslie Fireclay Works (Scotland) dating from the late 1800s to early 1900s. Feature 2 likely corresponds to the demolition of the dwelling or machine shop shown at this location on a 1950 Sanborn Fire Insurance Map (see Figure 78).

6.1.3 Site Summary

CSH 1 consists of buried structural remnants associated with early to mid-twentieth century residential and commercial development. CSH 1 has been assessed as significant under Criterion d (have yielded, or may be likely to yield, information important for research on prehistory or history) pursuant to HAR §13-284-6. This historic property retains integrity of location and materials. CSH 1 can potentially provide additional information on twentieth century residential and commercial development and infrastructure within the Kaka‘ako area.

Section 7 Summary and Interpretation

At the request of Baranof Holdings, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological inventory survey report (AISR) for the Baranof Holdings Honolulu project, Kaka‘ako, Honolulu Ahupua‘a, Honolulu District, O‘ahu, TMKs: [1] 2-1-049:011, 032, and 033. The project area is within a portion of the block bounded by Cooke Street, Kawaiaha‘o Street, Kamani Street, and Queen Street.

The project will include the demolition of several existing buildings within the project area, grading of the land surface, excavation for foundation and utilities, and the construction of a five-story, ~~125,000-sq-ft self-storage facility~~. 132,619 SF mixed use building, consisting of self storage and ground-floor retail

The current project area is situated within former marshland along the western boundary of Kewalo Ili, *mauka* of the pre-1850 coastline. Mid-1800s Māhele documents indicate the property was marshland when awarded to Kamake‘e Pi‘ikoi (LCA 10605; ‘Āpana 7), wife of Jonah Pi‘ikoi, an *ali‘i* and retainer of Kauikeaouli (Kamehameha III), who held several government posts. Archival maps suggest the project area remained undeveloped until the early twentieth century, when the marsh was in-filled. After 1914, the project area and surrounding Kaka‘ako region was intensively developed with the construction of a road grid, residential units, and industrial/commercial buildings.

In general, the observed stratigraphy consisted of imported fill deposits overlying natural low-lying deposits. These observations are consistent with the USDA soil data for the project area and its vicinity which indicates the project area to be within “Fill Land.” Fill layers were designated Stratum I or Stratum II and subdivided into sub-strata based on differences in matrix, soil color, and texture. Fill deposits generally extended 1.00–1.50 mbs. Natural deposits were designated Stratum III. The coral shelf was reached at the base of excavation (BOE) within all 8 test excavations. The coral shelf was observed originating from 2.20–2.45 mbs with the water table observed just above.

The imported fill deposits associated with Stratum I generally consisted of the current concrete slab surface with associated base course, as well as various imported deposits (i.e., loamy sand, sandy loam, sandy clay loam, crushed coral and/or hydraulic pumped fill) used to raise and level the surface for urban development during the early twentieth century. Stratum I deposits were observed across the entire project area.

The fill deposits associated with Stratum II generally consisted of dark sandy loam, sandy clay loam, or sandy clay deposits mixed with or overlying imported volcanic cinder. Though the exact composition of Stratum II varied between test excavations, it was observed consistently across the entire project area. Forty-three of 46 collected artifacts originated within Stratum II and a number of non-diagnostic artifacts including decomposing ferrous metal and wood were observed within Stratum II during testing. Datable artifacts provide a date range from the late nineteenth to early twentieth century.

The natural deposits associated with Stratum III generally consisted of gleyed sandy clay, silty clay, and sand. Stratum III corresponds to the natural marshlands covering the project area prior to infilling at the turn of the nineteenth century. These deposits are collectively termed “low-lying deposits” throughout this document. No evidence of sand berms or high ground were identified. A

number of bulk samples were collected from Stratum III in order to identify and characterize any cultural content that may have been present. Wet-screening of these samples in the CSH laboratory identified no cultural content and little to no organic or other noteworthy material.

One historic property was identified during archaeological inventory survey testing: CSH 1, subsurface structural remnants. CSH 1 is a newly identified historic property consisting of subsurface structural remnants associated with early to mid-twentieth century residential and commercial development. During archaeological inventory survey testing structural remnants were observed, documented, and designated CSH 1 Features 1 and 2. These remnants consist of a concrete and hollow tile foundation and a demolition fill deposit.

Section 8 Significance Assessments

Historic property significance is evaluated and assessed based on the five State of Hawai‘i historic property significance criteria. To be considered significant, a historic property should possess integrity of location, design, setting, materials, workmanship, feeling, and/or association and meet one or more of the following criterion (in accordance with HAR §13-284-6):

a. Be associated with events that have made an important contribution to the broad patterns of our history;
b. Be associated with the lives of persons important in our past;
c. Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;
d. Have yielded, or is likely to yield, information important for research on prehistory or history; or
e. Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity.

One historic property was identified within the current project area. Table 14 lists the historic property along with the significance/eligibility assessments and mitigation recommendations. These significance recommendations are included in this AMR for the review and concurrence of the SHPD.

CSH 1 consists of buried structural remnants associated with early to mid-twentieth century residential and commercial development. CSH 1 has been assessed as significant under Criterion d (have yielded, or may be likely to yield, information important for research on prehistory or history) pursuant to HAR §13-284-6. This historic property retains integrity of location and materials. CSH 1 can potentially provide additional information on twentieth century residential and commercial development and infrastructure within the Kaka‘ako area

Table 14. Archaeological historic property integrity, significance, and mitigation recommendations

SIHP #	Name (Formal Type)	Integrity							Significance	Mitigation Recommendation
		Location	Design	Setting	Materials	Workmanship	Feeling	Association		
CSH 1	Subsurface structural remnants	Y	N	N	Y	N	N	N	d	Archaeological monitoring

Section 9 Project Effect and Mitigation Recommendations

9.1 Project Effect

The proposed project will potentially affect one historic property (SIHP # -XXXX, subsurface structural remnants) identified within the project area. Under Hawai‘i State historic preservation review legislation, the project specific effect recommendation is “effect, with agreed upon mitigation commitments” (in accordance with HAR §13-284-7). The recommended mitigation measures will reduce the project’s potential effect on significant historic properties.

9.2 Mitigation Recommendations

This AIS represents a good faith effort to identify and document the historic properties located within the project area. Due to the inherent limitations of any sampling strategy, however, it is likely additional features associated with the historic properties identified during this inventory survey, potentially including human burials, will be uncovered during the project’s construction.

In order to mitigate adverse impacts to SIHP # -XXXX, as well as to any additional historic properties that may be present within the project area, it is recommended that project construction proceed under an archaeological monitoring program. This monitoring program will facilitate the identification and proper treatment of any future exposures of SIHP # -XXXX as well as any other historic properties (burial or non-burial) that may be discovered within the project area. Due to the potential to encounter additional components of SIHP # -XXXX, CSH recommends on-site archaeological monitoring for all ground-disturbing activities within the project area.

Section 10 References Cited

Adams, Bradley and Pam Crabtree
2011 *Comparative Osteology.* Academic Press, Reed Elsevier, New York.

Alexander, W.D.
1886 A Brief History of Land Titles in the Hawaiian Kingdom. *Hawaiian Almanac and Annual for 1887*. Thomas G. Thrum, Honolulu.

Allen, Jane
1997 *Paleo-Environmental Investigations in the Kewalo Wetland: Geoarchaeological Coring at Symphony Park, Waikiki, Honolulu District, O‘ahu.* Ogden Environmental and Energy Services, Inc., Honolulu.

Anderson, Lisa
1995 *Archaeological Subsurface Inventory Survey of the King Street Place Property, Honolulu Hawai‘i 96813 (TMK No. 1-2-1-044: 041, 042, and 043).* Ogden Environmental and Energy Services, Inc., Honolulu.

1997 *Monitoring and Archaeological Testing Plan for the Proposed KITV4 Underground Storage Tank Placement at One Archer Lane, Honolulu, Hawai‘i (TMK No. 1-2-1-044: 041, 042, and 043).* Ogden Environmental and Energy Services, Inc., Honolulu.

Anderson, Lisa and K. Aronson
1997 *Archaeological Monitoring and Emergency Data Recovery of One Archer Lane, Honolulu, Hawai‘i (TMK: No. 1-2-1-44:041, 042, and 043).* Ogden Environmental and Energy Services, Inc., Honolulu.

Andrews, Lorrin
2003 *A Dictionary of the Hawaiian Language*. Island Heritage, Waipahu, Hawai‘i.

Armstrong, R.W.
1983 *Atlas of Hawaii*. Second edition. University of Hawaii, Honolulu.

Arnold, Harry L.
1956 Hawaii Medical Association, 1856-1956. *Hawaii Medical Journal* 15(4):313–324.

Baldwin, E.D.
1883 Honolulu Water Works System. Registered Map 1087. Hawaii Land Survey Division, Department of Accounting and General Services, Honolulu.

Baxter, R. Scott
2013 Stoneware Ale Bottles. In *Ceramic Identification in Historical Archaeology: The View from California, 1822-1940*, edited by Rebecca Allen, Julia E. Huddleson, Kimberly J. Wooten, and Glenn J. Farris, pp. 303-313. Society for Historical Archaeology. Special Publication Series No. 11. Germantown, MD, USA.

Beckwith, Martha
1940 *Hawaiian Mythology*. Yale University Press, New Haven, Connecticut.

Belluomini, Scott A., Trevor M. Yucha, and Hallett H. Hammatt
2016 *Archaeological Inventory Survey Report for the Ward Avenue HECO Facility Lighting Improvements and Electric Vehicle Charging Station Project Honolulu Ahupua‘a, Honolulu (Kona) District, O‘ahu TMK: [1] 2- 1-044:003, 039, and 044*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Bingham, Hiram
1847 *A Residence of Twenty-One Years in the Sandwich Islands*. Convers, New York.

Bishop, S.E.
1884 Honolulu, Kewalo Section. Map by S.E. Bishop, Registered Map 1090. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

BLM/SHA (Bureau of Land Management/Society for Historical Archaeology)
2018 Historic Glass Bottle Identification & Information Website. Electronic document, www.sha.org/bottle/index.htm.

Boelen, Jacobus
1988 *A Merchant’s Perspective: Captain Jacobus Boelen’s Narrative of his Visit to Hawai‘i in 1828*. Hawaiian Historical Society, Honolulu.

Calnitsky, Naomi
2018 *How Indigenous Hawaiians Helped Build the Pacific Northwest Economy.* Electronic document, http://edgeeffects.net/hawaiian-labor-migrations/ (accessed 11 May 2018).

Chinen, Jon J.
1958 *The Great Mahele, Hawaii’s Land Division of 1848*. University of Hawaii Press, Honolulu.

Cook, James P.
1784 *A Voyage to the Pacific Ocean 1776, 1777, 1779, and 1780*. Vol. 2 and 3. G. Nichol and T. Cadell, London.

Corney, Peter
1896 *Voyages in the Northern Pacific. Narrative of Several Trading Voyages From 1813 1818, Between the Northwest Coast of America, the Hawaiian Islands and China, with a Description of the Russian Establishments on the Northwest Coast*. Thos. G. Thrum, Honolulu.

Cranston, Mark
2015 Gartcraig Fire Clay Co, Millerston, Glasgow – History. Electronic document, https://www.scottishbrickhistory.co.uk/gartcraig-fire-clay-co-millerston-glasgow-history/, accessed November 19, 2018.

2014 Ferguslie Fireclay Works, Paisley – Robert Brown & Son – History. Electronic document, https://www.scottishbrickhistory.co.uk/ferguslie-fireclay-works-paisley-robert-brown-son-history/, accessed November 19, 2018.

Dagher, Cathleen and Robert Spear
2013 *A Burial Site Component of a Data Recovery Plan for State Site 50-80-14-7260 Kaka‘ako Area, Honolulu Ahupua‘a, Honolulu District (Kona), O‘ahu Island, Hawai‘i (TMK [1] 2-1-050:004)*. Scientific Consultant Services, Inc., Honolulu.

Dakin Publishing Company

1906 Fire Insurance Map of Honolulu, Hawaiian Islands for 1906. Available at the Hamilton Library, University of Hawai‘i at Mānoa, Honolulu.

Davis, Jesse O., Ena M. Sroat, and Matthew McDermott

2018 *Archaeological Inventory Survey Report for the Block H Project, Kakaako Honolulu Ahupuaa, Honolulu (Kona) District, O‘ahu, TMKs: [1] 2-3-002:002 and 059 (por.).* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Daws, Gavan

1968 *Shoal of Time.* Macmillan, New York.

Douglas, Michele Toomay

1991a Report on a Single Human Skeleton Recovered from Mother Waldron Park, Kaka‘ako, O‘ahu, Hawai‘i, Honolulu, Hawai‘i. Appendix A: *An Archaeological Monitoring Report for Kaka‘ako Improvement District 3 Pohulani Elderly Rental Housing and Kauhale Kaka‘ako, Honolulu, O‘ahu, Hawai‘i (TMK 2-1-30, 31, 32, 44, 46, 47, 48, 50, 51, 52, 54),* by John Winieski and Hallett H. Hammatt. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

1991b *Report on Six Human Skeletons from Coral Street and Queen Street, Kaka‘ako, O‘ahu, Honolulu.* Manuscript on file at Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawai‘i.

Dye, Tom and J. Stephen Athens

2000 Part A: Introduction. In *Ancient Hawaiian Fishponds of Pearl Harbor: Archaeological Studies on U.S. Navy Lands, Hawai‘i,* edited by J. Stephen Athens. International Archaeological Research Institute, Inc., Honolulu.

Elliott, Rex R. and Stephen C. Gould

1988 *Hawaiian Bottles of Long Ago*. Revised edition. Hawaiian Service, Inc., Honolulu.

Emmert, Paul

1853 View of Honolulu from Catholic Church No. 2. [Sketch, central panel]. Hawaiian Historical Society, Honolulu.

Enanoria, Brittany, Ellena de Leeuw, and Hallett H. Hammatt

2016 *Archaeological Monitoring Report for the BWS Water Main Replacement Project at Ward Avenue, Honolulu Ahupuaa, Honolulu District, Oahu TMKs: [1] 2-1-040:001; 2-1-041:024, 026, 028; 2-1-042:018, 024; 2-1-044:001, 003, 005, 032, 033; 2-1-049:080; 2-3-003:001; 2-3-008:001, 002; 2-4-001:001; 2-4-014:021 and 024.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Fike, R.E.

1987 *The Bottle Book: A Comprehensive Guide to Historic, Embossed Medicine Bottles.* Peregrine Smith Books, Salt Land City, Idaho.

Fitzpatrick, Gary

1986 *The Early Mapping of Hawai‘i*. Editions Limited, Honolulu.

Fletcher, Charles H. III and Anthony T. Jones

1996 Sea-level highstand recorded in Holocene shoreline deposits on O‘ahu, Hawaii. *Journal of Sedimentary Research* 66(3):632–641.

Fong, Jeffery, Douglas Borthwick, and Hallett Hammatt

2009 *Archaeological Monitoring Report for Rehabilitation of Streets: Unit 9 Phase 1 Kapi‘olani Boulevard from Kalākaua Avenue to Ward Avenue, Kamake‘e Street from Kapi‘olani Boulevard to Auahi Street and Atkinson Drive from Kapi‘olani Boulevard to Ala Moana Boulevard (TMK: [1] 2-1-044, 049, [1] 2-3-001-005, 007, 008, 010, 015, 016, 021, 022, 032, 034-036, 038-041).* Cultural Surveys Hawai‘i, Inc, Kailua, Hawai‘i.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens

1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawai‘i Agricultural Experiment Station. U.S. Government Printing Office, Washington, D.C.

France, Diane L.

2009 *Human and Nonhuman Bone Identification: A Color Atlas.* Taylor & Francis Group, Boca Raton, Florida.

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delparte

2013 Online Rainfall Atlas of Hawai‘i. *Bulletin of the American Meteorological Society volume 94, pp. 313-316, doi: 10.1175/BAMS-D-11-00228.1.* University of Hawai‘i at Mānoa, Honolulu. Electronic resource, http://rainfall.geography.hawaii.edu (accessed 26 April 2018).

Giambelluca, T.W., X. Shuai, M.L. Barnes, R.J. Alliss, R.J. Longman, T. Miura, Q. Chen, A.G. Frazier, R.G. Mudd, L. Cuo, and A.D. Businger

2014 *Evapotranspiration of Hawai‘i.* Final report submitted to the U.S. Army Corps of Engineers—Honolulu District, and the Commission on Water Resource Management, State of Hawai‘i. University of Hawai‘i at Mānoa, Honolulu. Electronic resource, http://climate.geography.hawaii.edu/ (accessed 26 April 2018).

Gilman, Gorman D.

1903 Streets of Honolulu in the Early Forties. Thomas G. Thrum, editor. *Hawaiian Almanac and Annual for 1904*. Thos. G. Thrum, Honolulu.

Godden, Geoffrey A.

1964 *Encyclopaedia of British Pottery and Porcelain Marks*. Herbert Jenkins, London.

Google Earth

2013 Aerial image. Electronic document, http://www.google.com (accessed November 2014).

Grant, Glen

2000 *Hawai‘i Looking Back: An Illustrated History of the Islands.* With Bennett Hymer and the Bishop Museum Archives. Mutual Publishing, Honolulu.

Greer, Richard A.

1965 Oahu’s Ordeal—The Smallpox Epidemic of 1853. *Hawaii Historical Review* Vol. II October 1965.

1969 The Founding of The Queen’s Hospital. *Hawaiian Journal of History*, Volume 3:110–145.

Griffin, P. Bion, D.T.P. Keene, and Joseph Kennedy

1987 *Kaka‘ako: Prediction of Sub-Surface Archaeological Resources, Kaka‘ako Community Development District, Archaeological Reconnaissance Survey*. University of Hawai‘i at Mānoa, Honolulu.

Grossman, E.E. and C.H. Fletcher

1998 Sea level higher than present 3500 years ago on the northern main Hawaiian Islands. *Geology* 26(4):363–366.

Grossman, E.E., C.H. Fletcher, and B.M. Richmond

1998 The Holocene sea-level highstand in the equatorial Pacific: analysis of the insular paleosea-level database. *Coral Reefs* 17:309–327.

Hammatt, Hallett H.

2013 *Archaeological Inventory Survey Report for City Center (Section 4) of the Honolulu High-Capacity Transit Corridor Project, Kalihi, Kapālama, Honolulu, and Waikīkī Ahupua‘a, Honolulu (Kona) District, Island of O‘ahu TMK [1] 1-2, 1-5, 1-7, 2-1, 2-3*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Handy, E.S. Craighill and Elizabeth G. Handy

1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment.* Bishop Museum Bulletin 23. Bernice Pauahi Bishop Museum, Honolulu.

Hanley, Sister Mary Laurence and O.A. Bushnell

1980 *A Song of Pilgrimage and Exile: The Life and Spirit of Mother Marianne of Molokai.* Franciscan Herald Press, Chicago.

Harney, J.N., E.E. Grossman, B.M. Richmond, and C.H. Fletcher III.

2000 Age and composition of carbonate shoreface sediments, Kailua Bay, Hawaii. *Coral Reefs* 19:141–154.

Hawaii Board of Health

1902 *Report of the President of the Board of Health of the Territory of Hawaii.* Bulletin Publishing Company, Honolulu.

1903 *Annual Report of the Board of Health of the Territory of Hawaii.* Bulletin Publishing Company, Honolulu.

Hawaii Department of Public Works

1904 *Annual Report of the Superintendent of Public Works to the Governor of the territory of Hawaii*. Bulletin Publishing Company, Honolulu.

1914 *Annual Report of the Superintendent of Public Works to the Governor of the territory of Hawaii*. Bulletin Publishing Company, Honolulu.

Hawaii Governor

1922 *Report of the Governor of the Territory of Hawaii to the Secretary of the Interior.* Government Printing Office, Washington, D.C.

1930 *Annual Report of the Governor of the Territory of Hawaii to the Secretary of the Interior.* Government Printing Office, Washington, D.C.

Hawaii Legislature
1901 *First Legislative Assembly of the Territory of Hawaii, 1901, Extra Session*. Grieve Publishing Company, Honolulu.

Hawaii Reports
1915 *Cases Decided in the Supreme Court of the Territory of Hawaii*. Honolulu Star-Bulletin, Honolulu.

Hawai‘i TMK Service
2014 Tax Map Key [1] 2-1-049. Hawai‘i TMK Service, Honolulu.

Hazlett, Alexander, Mary Carney, and Hallett H. Hammatt
2008 *Archaeological Monitoring Report for the Honolulu Design Center Phase III Project, Waikiki Ahupua‘a, ‘Ili of Kewalo, Honolulu (Kona) District, O‘ahu Island TMK: [1] 2-3-010:048, 050, 052, 053, 054, 055, 056*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Honolulu Advertiser
1928 Building a Greater Waikiki. *Honolulu Advertiser*, 17 October:2, 16.

Ho‘oulumāhiehie
2008a *Ka Mo‘olelo O Hi‘iakaikapoliopele*. Awaiaulu Press, Honolulu.
2008b *The Epic Tale Of Hi‘iakaikapoliopele*. Puakea Nogelmeier, translator. Awaiaulu Press, Honolulu.

Humphrey, Lisa, Kelly Burke, Jessica Leger, Michelle Pammer, Ena Sroat, and Matt McDermott
2015 *Supplemental Archaeological Inventory Survey Report for the City Center (Section 4) of the Honolulu Rapid Transit Project, Kalihi, Kapālama, Honolulu, and Waikīkī Ahupua‘a, Honolulu (Kona District), O‘ahu, Addressing Changes from the Vicinity of Ward Avenue and Halekauwila Street to the Vicinity of Queen and Kamake‘e Streets TMK: [1] 2-3:002, 003, and 004 (Various Parcels).* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Hustace, Frank Ward, III
2000 *Victoria Ward and Her Family: Memories of Old Plantation*. Victoria Ward, Ltd., Honolulu.

‘Ī‘ī John Papa
1959 *Fragments of Hawaiian History as Recorded by John Papa ‘I‘i*. Bishop Museum Press, Honolulu.

Iwamoto, Lana
1969 The Plague and Fire of 1899-1900 in Honolulu. In *Hawaii Historical Review Selected Readings*. Hawaiian Historical Society, Honolulu.

Kamakau, Samuel M.
1961 *Ruling Chiefs of Hawaii.* Kamehameha Schools Press, Honolulu.
1991 *Tales and Traditions of the People of Old: Nā Mo‘olelo a ka Po‘e Kahiko.* Bishop Museum Press, Honolulu.

Kawachi, Carol T.
1991 *Queen Emmalani Tower Project Monitoring, Kaka‘ako, Kona, O‘ahu, TMK [1] 2-1-48: 8-19*. State Historic Preservation Division, Kapolei, Hawai‘i.

Kotzebue, Otto V.
1817 South O‘ahu. Map by Otto von Kotzebue. In *The Early Mapping of Hawai‘i*, by Gary L. Fitzpatrick 1986, pp. 48–49. Editions Limited, Honolulu.

1821 *A Voyage of Discovery, into the South Sea and Bering Straits, for the Purpose of Exploring a North-east Passage Undertaken in the Years 1815-1818.* Longman, Hurst, Rees, Orme, and Brown, London.

Kovel, Ralph and Terry Kovel
1986 *Kovels' New Dictionary of Marks: Pottery & Porcelain 1850 to the Present*. Crown Publishers, Inc., New York.

LaPasse, Lt. Joseph de
1855 Plan du Mouillage [Anchorages] d'Honolulu. Map by Lt. Joseph de LaPasse. In *The Early Mapping of Hawai‘i* by Gary L. Fitzpatrick, 1986, pp. 82–83. Editions Limited, Honolulu.

Larrison, G.
1917 Honolulu's Future Water Supply. In *Hawaiian Almanac and Annual for 1917*. Thomas G. Thrum, Honolulu.

Lebo, Susan A.
1997 Native Hawaiian and Euro-American Culture Change in Early Honolulu, Archaeological Data Recovery, Harbor Court Property, Site No. 50-80-14-2456, Honolulu, Hawai‘i. With contributions by P. Christiaan Klieger, Stephan D. Clark, Leslie L. Hartzell, Heidi A. Lennstrom, Boyd Dixon, Mary F. Riford, and Tracy Tam Sing. Anthropology Department, Bernice Pauahi Bishop Museum, Honolulu.

Leger, Jessica, Ena Sroat, Josephine M. Yucha, and Matt McDermott
2015 *Archaeological Inventory Survey Report for the Block O Project, Kaka‘ako, Honolulu Ahupua‘a, Honolulu (Kona) District, O‘ahu, TMK: [1] 2-1-050:001, 061, and 062.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Lehner, Lois
1988 *Lehner's Encyclopedia of U.S. Marks on Pottery, Porcelain & Clay.* Collector Books, Paducah, Kentucky.

Lindsey, Bill
2017 Historic Glass Bottle Identification & Information Website. Accessed at http://www.sha.org/bottle.

Lockhart, Bill
2015 A Tour Through Time in Vaseline Jars. Electronic document, https://sha.org/bottle/pdffiles/Vaseline2015.pdf, accessed November 14, 2018.

Lockhart, Bill and Russ Hoenig
2018 The Bewildering Array of Owens-Illinois Glass Co. Logos and Codes. Electronic document, https://sha.org/bottle/pdffiles/OwensIllinois2018Part2.pdf.

2015 The Dating Game. Bottles and Extras. The Illinois Glass Company. Electronic document, www.sha.org/bottlesandmore.htm.

Lockhart, Bill, Beau Schriever, Bill Lindsey, and Carol Serr
2018 Obear-Nester Glass Co. Online document, https://sha.org/bottle/pdffiles/Obear-Nester.pdf, accessed November 12, 2018.

Macdonald, Gordon A., Agatin T. Abbott, and Frank L. Peterson
1983 *Volcanoes in the Sea: The Geology of Hawaii*. University of Hawai‘i Press, Honolulu.

Malden, Lieutenant Charles R.
1825 South Coast of Oahu. Registered Map 640. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

Malo, David
2006 *Ka Mo‘olelo Hawai‘i. Hawaiian Traditions.* Translated by Malcolm Nāea Chun. First People’s Productions, Honolulu.

Manu, Moke
1898 Aiai, Son of Ku‘ula: Part II of the Legend of Ku‘ula, the Fish God of Hawaii. Translated from Moke Manu by M.K. Nakuina. In *Hawaiian Folk Tales: A Collection of Native Legends*, compiled by Thomas G. Thrum. Mutual Publishing, Honolulu.

Mason Architects, Inc.
2002 *Incinerator Number One (Old Kewalo Incinerator). HAER No. HI-64*. Historic American Buildings Survey (HAER), Pacific Great Basin System Support Office, National Park Service, Oakland, California.

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

Meide, Chuck
1994 Bricks: An Overview of Function, Form, and Historical Types. The Florida State University.

Melichar, Ronald Lee
1978 *C.W. Dickey‘s Immigration Station: A History of its Site, a Proposal for its Future.* Ronald Lee Melichar.

Millar, Jim
1988 *The Handbook of Hawaiian Machine Made Soda Bottles.* Soda Mart, Goodletsville, Tennessee.

Mintmier, Melanie A., Paul Titchenal, Katherine A. Shiroma, and Stephan D. Clark
2013 *Archaeological Inventory Survey in Support of the Proposed Symphony Honolulu Project at the Corner of Kapiolani Boulevard and Ward Avenue, Honolulu (Waikīkī) Ahupua‘a, Honolulu (Kona) District, O‘ahu Island, State of Hawai‘i. TMK: (1) 2-1-044: 001, 032, 047, 048.* Pacific Consulting Services, Inc., Honolulu.

Monahan, Christopher M.
2005 *Archaeological Assessment Report of Three Parcels Measuring Approximately 1.35 Acres in Waikiki Ahupua‘a, ‘Ili of Kewalo, Kona (Honolulu) District, Island of O‘ahu, Hawai‘i [TMK:(1) 2-3-003:73 and 96].* Scientific Consulting Services, Honolulu.

Monsarrat, M.D.
1897 Honolulu, Hawaiian Islands, map by M.D. Monsarrat. Registered Map 1910. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

Mosier, Dan
2006 California Bricks: Carnegie Brick and Pottery Company. Electronic document, https://calbricks.netfirms.com/brick.carnegiebp.html, accessed November 19, 2018.

Munsey, Cecil
1970 *Illustrated Guide to Collecting Bottles.* Hawthorn Books, Inc., New York.

Nakamura, Barry
1979 The Story of Waikiki and the Reclamation Project. M.A. thesis, University of Hawaii, Honolulu.

Ober, Gerald
1810 Map of Honolulu trails ca. 1810, as described by ‘Ī‘ī. In *Fragments of Hawaiian History as Recorded by John Papa ‘Ī‘ī,* by John Papa ‘Ī‘ī, 1959, Bishop Museum Press, Honolulu.

Paquette, Jack K.
1994 The Glassmakers: A History of Owens-Illinois, Incorporated. Trumpeting Angel Press, Toledo.

Paradise of the Pacific
1950 Kakaako, A Growing Business District. *Paradise of the Pacific* November:21.

Perzinski, David, David Shideler, and Hallett Hammatt
2006 *Archaeological Inventory Survey of the Kewalo HECO Dispatch Center, Honolulu Ahupua‘a, Kona District, O‘ahu Island.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Perzinski, David, Todd Tulchin, and Hallett H. Hammatt
2005 *Archaeological Inventory Survey of a 2.7-Acre Parcel at the Intersection of Queen and South Streets, Honolulu, HI, (TMK 2-1-48:8)*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Pfeffer, Michael, Douglas F. Borthwick, and Hallett H. Hammatt
1993 *An Archaeological Summary of the Kaka‘ako Improvement District 1 Monitoring, Kaka‘ako, O‘ahu, Hawai‘i (TMKs 2-1-29 to 2-1-32, 2-1-46 to 1-2-48, 2-1-51, 2-1-54, and 2-1-55), for Hawaii Community Development Authority*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Pietrusewsky, Michael, Michele T. Douglas, and Rona Ikehara
1989 *An Osteological Study of Human Remains Recovered from South Street and Quinn Lane, Kaka‘ako, O‘ahu, Hawai‘i*. University of Hawai‘i, Honolulu.

Pukui, Mary Kawena and Caroline Curtis
1988 *Tales of the Menehune.* Collected or suggested by Mary Kawena Pukui; retold by Caroline Curtis. Kamehameha Schools Press, Honolulu.

Pukui, Mary Kawena, and Samual H. Elbert
1986 *Hawaiian Dictionary.* Second edition. University of Hawaii Press, Honolulu.

Pukui, Mary Kawena, E.W. Haertig, and Catherine A Lee
1972 *Nānā I Ke Kumu (Look to the Source)*. Hui Hānai, Honolulu.

Pukui, Mary Kawena, Samuel H. Elbert, and Esther T. Mookini
1974 *Place Names of Hawaii*. University of Hawaii Press, Honolulu.

Robins, Jennifer, Brittany Enanoria, and Hallett H. Hammatt
2017 *Archaeological Inventory Survey Report for the Nohona Hale Project, Kaka‘ako, Honolulu Ahupua‘a, Honolulu (Kona) District, O‘ahu, TMK: [1] 2-1-051:014*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Sabey, Chris
2007 *Holister Soda Works*: Electronic document, http://www.fohbc.org/PDF_Files/HollisterSodaWorks_Sept2007.pdf

Sanborn Fire Insurance Company
1914 Sanborn Fire Insurance Map for 1914. Sanborn Map Company, New York. Available at the Hamilton Library, University of Hawai‘i at Mānoa, Honolulu.

1927 Sanborn Fire Insurance Map for 1927. Sanborn Map Company, New York. Available at the Hamilton Library, University of Hawai‘i at Mānoa, Honolulu.

1950 Sanborn Fire Insurance Map for 1950. Sanborn Map Company, New York. Available at the Hamilton Library, University of Hawai‘i at Mānoa, Honolulu.

Schilz, Allan J.
1991 *An Evaluation of the Archaeological Resources at the Proposed Site of Queen Emmalani Tower, Kaka‘ako, Honolulu, Hawai‘i, TMK [1] 2-1-48:8-19*. Environmental and Energy Services, Honolulu.

Sinoto, Akihiko and Eugene Dashiell
2014 *Archaeological Inventory Survey: 801 South Street Building B Development Area Honolulu Ahupuaa, Kona, Island of 0ahu TMK: (1) 2-1-047:004*. Aki Sinoto Consulting, Honolulu.

Sroat, Ena, Megan Hawkins, Kelly Burke, Michelle Pammer, Constance O’Hare, and Matt McDermott
2015 *Archaeological Inventory Survey Report for Block I, Kaka‘ako, Honolulu Ahupua‘a, Honolulu (Kona) District, O‘ahu, TMK: [1] 2-3-002:001 (por.), Volumes I–III*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Sroat, Ena, Kelly L. Burke, Megan T. Hawkins, and Matt McDermott
2016 *Archaeological Inventory Survey Report for the Block N East Project, Kaka‘ako, Honolulu Ahupua‘a, Honolulu (Kona) District, O‘ahu, TMKs: [1] 2-3-002:001 (por.), 067, 086, 087.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Stearns, H.T.
1978 *Quaternary Shorelines in the Hawaiian Islands*. Bishop Museum Bulletin 237. Bishop Museum Press, Honolulu.

Sterling, Elspeth and Catherine C. Summers
1978 *Sites of Oahu*. Departments of Anthropology and Education, Bernice Pauahi Bishop Museum, Honolulu.

Stewart, C.S.
1970 *Journal of a Residence in the Sandwich Islands, During the Years 1823, 1824, and 1825*. University of Hawaii Press for the Friends of the Library of Hawaii, Honolulu.

Tamburello, Paul
2008 Perry Davis: Westport’s own ‘pain killer’. Electronic document, https://ptatlarge.typepad.com/ptatlarge/2008/09/perry-davis.html, accessed November 14, 2018.

Toulouse, Julian Harrison
1971 Bottle Makers and their Marks. Thomas Nelson Inc., Camden, New Jersey.

Thrum, Thomas G.
1884 Retrospect of the Year 1883. *Hawaiian Almanac and Annual for 1884*. Thomas G. Thrum, Honolulu.

1906 Retrospect for 1905. *Hawaiian Almanac and Annual for 1906*. Thomas G. Thrum, Honolulu.

1907 Retrospect for 1906. *Hawaiian Almanac and Annual for 1907*. Thomas G. Thrum, Honolulu.

1916 Retrospect for 1915. *Hawaiian Almanac and Annual for 1916*. Thos. G. Thrum, Honolulu.

1920 Retrospect for 1919. *Hawaiian Almanac and Annual for 1920*. Thomas G. Thrum, Honolulu.

1924 Hawaiian Salt Making. *Hawaiian Almanac and Annual for 1924*. Thomas G. Thrum, Honolulu.

1998 *Hawaiian Folk Tales: A Collection of Native Legends*. Compiled by Thomas G. Thrum. Mutual Publishing, Honolulu.

Tulchin, Todd, Kendy Altizer, Douglas Borthwick, and Hallett H. Hammatt
2009 *Archaeological Assessment of the Proposed Halekauwila Place Project, Kaka‘ako, Honolulu District, O‘ahu Island, TMK: [1] 2-1-051:009 por.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Turran, Tyler and Hallett H. Hammatt
2016 *Archaeological Monitoring Report for the Halekauwila Place Project, Honolulu Ahupuaa, Honolulu (Kona) District, Oahu TMKs: [1] 2-1-051:042, 043, and 044.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

UH SOEST
1927 UH SOEST Aerial Photograph, Kaka‘ako Coast. University of Hawai‘i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/.

1952 UH SOEST Aerial Photograph, Kaka‘ako Coast. University of Hawai‘i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/.

1970 UH SOEST Aerial Photograph, Kaka‘ako Coast. University of Hawai‘i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/.

1982 UH SOEST Aerial Photograph, Kaka‘ako Coast. University of Hawai‘i at Mānoa School of Ocean and Earth Science and Technology–Coastal Geology Group. Online at http://soest.hawaii.edu/coastal/webftp/Oahu/mosaics/.

U.S. Army Air Corps
1939–1941 High-altitude aerial photographic series for O‘ahu, 1939–1941, M [Mission] 56.57 and M. 56.59. Aerial Photographs, File PPA 44 1.001 and 1.006, Copies available at the Hawai‘i State Archives, Honolulu.

U.S. Army War Department
1919 U.S. War Department Fire Control map, Honolulu Quadrangle. USGS Information Services, Denver, Colorado.

1933 U.S. War Department Fire Control map, Honolulu Quadrangle. USGS Information Services, Denver, Colorado.

USDA (U.S. Department of Agriculture)
2001 Soil Survey Geographic (SSURGO) database. U.S. Department of Agriculture, Natural Resources Conservation Service. Fort Worth, Texas. http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/.

U.S. Department of the Interior
1920 *Reports of the Department of the Interior for the Fiscal Year Ended June 30 1920*. Government Printing Office, Washington D. C.

USGS (U.S. Geological Survey)
1953 Honolulu USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

1998 Honolulu USGS 7.5-minute topographic quadrangle. USGS Information Services, Denver, Colorado.

Waihona ‘Aina
2000 *The Māhele Database.* Electronic document, http://waihona.com

Wall, W.A.

1887 Map of Honolulu and Vicinity, Oahu Island, Kona District. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

1893 Map of Honolulu and Vicinity, by W. A. Wall, Surveyor. Registered Map 1690. Hawai‘i Land Survey Division, Department of Accounting and General Services, Honolulu.

Welker, John, and Elizabeth Welker

1985 History of Pressed Glass (Ch. 1, pp. 1-12); Factory History (Ch. 2, pp. 13-118); Glassmen & Their Organization (Ch. 5, pp. 177-200). Excerpts from *Pressed Glass in America: Encyclopedia of the First Hundred Years, 1825-1925*. Antique Acres Press, Ivyland, PA.

Westervelt, W.D.

1991 *Hawaiian Legends of Old Honolulu.* Collected and translated from the Hawaiian by W.D. Westervelt. Charles E. Tuttle Company, Rutland, Vermont.

Whitten, David

2009 *Glass Factory Marks on Bottles.* Electronic document, http://www.myinsulators.om/glass-factories/bottlemarks.html

2016 Chesebrough Manuf’g Co / Vaseline Jars. Electronic document, https://www.glassbottlemarks.com/chesebrough-manufg-co-vaseline-jars/, accessed November 14, 2018.

Winieski, John P. and Hallett H. Hammatt

2000 *An Archaeological Monitoring Report for Kākā‘āko Improvement District 3 Pohulani Elderly Rental Housing and Kauhale Kākā‘āko, Honolulu, O‘ahu, Hawai‘i (TMK 2-1-30, 31, 32, 44, 46, 47, 48, 50, 51, 52, 54)*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Young, Robert

2005 Garbage in Paradise: A History of Honolulu’s Refuse Division. Unpaginated and unpublished report. City and County of Honolulu Department of Environmental Services, Division of Refuse Collection and Disposal.