PRELIMINARY DRAFT REPORT

Archaeological Inventory Survey In Support of the Honolulu Board of Water Supply's Energy Efficiency Program, Honolulu (Waikiki) Ahupuaʻa, Honolulu (Kona) District, Island of Oʻahu, Hawaiʻi

TMKs: (1) 2-1-036: 004 and 005

Prepared for:

NORESCO UTC Building & Industrial Systems
3375 Koapaka Street, Ste. F220
Honolulu, HI 95834

January 2017

PACIFIC CONSULTING SERVICES, INC.

720 Iwilei Road, Suite 424, Honolulu Hawaii 96817

PRELIMINARY DRAFT REPORT

Archaeological Inventory Survey in Support of the Honolulu Board of Water Supply's Energy Efficiency Program on Beretania Street, Honolulu (Waikīkī) Ahupua'a, Honolulu (Kona) District, Island of O'ahu, State of Hawai'i TMK (1) 2-1-036:004 and 005.

Prepared by
Stephan D. Clark, B.S.
Nicole Vernon, M.A.
Dennis Gosser, M.A., R.P.A.

Prepared By:
Pacific Consulting Services, Inc.
720 Iwilei Road, Suite 424
Honolulu, HI 96817

Prepared For:
NORESCO
UTC Building & Industrial Systems
Phoenix, Arizona

January 2017

MANAGEMENT SUMMARY

Document Title:	Archaeological Inventory Survey in Support of the Honolulu Board of Water Supply's Energy Efficiency Project on Beretania Street, Honolulu (Waikīkī) Ahupua'a, Honolulu (Kona) District, Island of O'ahu, State of Hawai'i. TMK (1) 2-1-036:004 and 005.
Date/Revised Date:	Preliminary Draft: January 2017
Archaeological Permit #:	SHPD Permit # 16-13
Project Location:	Board of Water Supply Sites 6 and 7 between Beretania St., Alapai St., Lusitana St., and Lauhala St., Honolulu, O'ahu
Project TMK:	(1) 2-1-036:004 and 005
Land Owner:	City and County of Honolulu
Project Proponents:	Department of Health and Board of Water Supply
Project Overview:	AIS pedestrial survey and excavation of 17 backhoe trenches and 4 hand excavated trenches
Project Acreage:	4.38 ac
Principal Investigator:	Dennis Gosser
Regulatory Oversight:	Hawaii Revised Statutes (HRS), Chapter 6E, Hawaii Administrative Rules (HAR) Chapter 275, and Chapter 276
Project Background:	BWS Site 6 and 7 have been used historically as a residential neighborhood and later as a parking lot and pump station. Although pre-Contact use is likely, no traditional historic properties had been recorded on the site until the current project.
Consultation:	Yes
SIHP #:	50-80-18-XXXX
Findings:	. 62 historic archaeological features: 44 above-ground features and 19 subsurface features; one pre-Contact subsurface feature. 712 artifacts recovered: 269 glass artifacts, 129 ceramic artifacts, 149 metal artifacts, 30 miscellaneous artifacts (primarily shell, bone and, celluloid), and 135 pieces of butchered mammal bone.
Human Skeletal Remains:	Yes: Feature 55, in situ
Recommendations:	50-80-18-XXXX is recommended as significant under criteria d and e of Chapter 6E and under Criterion D of the NRHP. Archaeological Monitoring, preparation of an Archaeological Monitoring Plan, and preparation of a Burial Treatment Plan are recommended

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

At the request of NORESCO UTC Building & Industrial Systems (NORESCO), Pacific Consulting Services, Inc. (PCSI), conducted an archaeological inventory survey (AIS) in support of the proposed construction of photovoltaic arrays for the Honolulu Board of Water Supply's (BWS) Energy Efficiency Program that involves a total of 58 BWS facilities on O'ahu. The AIS work was focused on two of these sites- designated as Site 6 (Beretania Complex) and Site 7 (Water Facilities. The AIS was carried out at two neighboring BWS facilities on Beretania Street in Honolulu: BWS Site 6, Beretania Complex (BWS Site 6) and BWS Site 7, Beretania Water Facilities (BWS Site 7). Both facilities are owned by the City and County of Honolulu. The project proponents are the Department of Health (DOH) and the Board of Water Supply (BWS). The purpose of the AIS was to identify and record any cultural deposits or features within the APE prior to the proposed project. The extent of the undertaking is shown in Figure 1.

The AIS was required by the State Historic Preservation Division (SHPD) (S. Lebo to J. Seto, letter, 18 October 2016; SHPD Log. No: 2016.02181; Doc. No: 1610GC09) in response to the recommendations provided in a draft report that assessed the archaeological potential of 32 of the BWS facilities that are scheduled to involve ground disturbing activities (Vernon et al. 2016). In conjunction with Vernon et al.'s report, Mason Architects, Inc. (MAI) conducted an architectural assessment of the buildings and other structures for the 58 BWS sites that comprise BWS's Energy Efficiency Project. Appendix A provides MAI's assessment of the 58 sites. According to MAI's assessment, the historic BWS buildings on BWS Site's 6 and 7 are eligible for listing on the National Register of Historic Places (NRHP) under Criterion A, for their association with the development of O'ahu's water system), and under Criterion B, for their association with their modern, Hawaii regionalist design by Architect Hart Wood (see Appendix A).

The AIS report has been prepared in compliance with Hawaii Revised Statutes (HRS), Chapter 6E, and the following chapters of Title 13 of the Hawaii Administrative Rules (HAR), Subtitle 13 (State Historic Preservation Division Rules):

- Chapter 275 (Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS).
- Chapter 276 (Rules Governing Standards for Archaeological Inventory Survey and Reports)

PROJECT AREA DESCRIPTION AND AREA OF POTENTIAL EFFECT (APE)

The Tax Map Keys (TMK) for BWS Site 6 and BWS Site 7 facilities are (1) 2-1-036:005 and (1) 2-1-036:004, respectively. The total Area of Potential Effect (APE) is 190,819 square feet (sf) (1.77 hectares [ha]), 4.38 acres [ac]) (see Figure 1), which includes both the BWS Site 6 and 7 facilities. The APE is defined by the area where future construction activities will potentially penetrate below the existing base course. Descriptions of each facility site's APE follows.

The APE for BWS Site 6 facility measures approximately 153,208 sf, of which 46,000 sf is for interior building and roof work. The project ground disturbing activities, shown in Figure 2, total 107,208 sf and will include:

1. Installation of carports and carport-mounted Photo Voltaic system that will entail thirty-five 30-inch concrete piles to a depth of 10 ft to support carport columns, and
2. Trenching for electrical conduits for the carport-mounted PV system that will also connect to Site 7 (Beretania Water Facility).

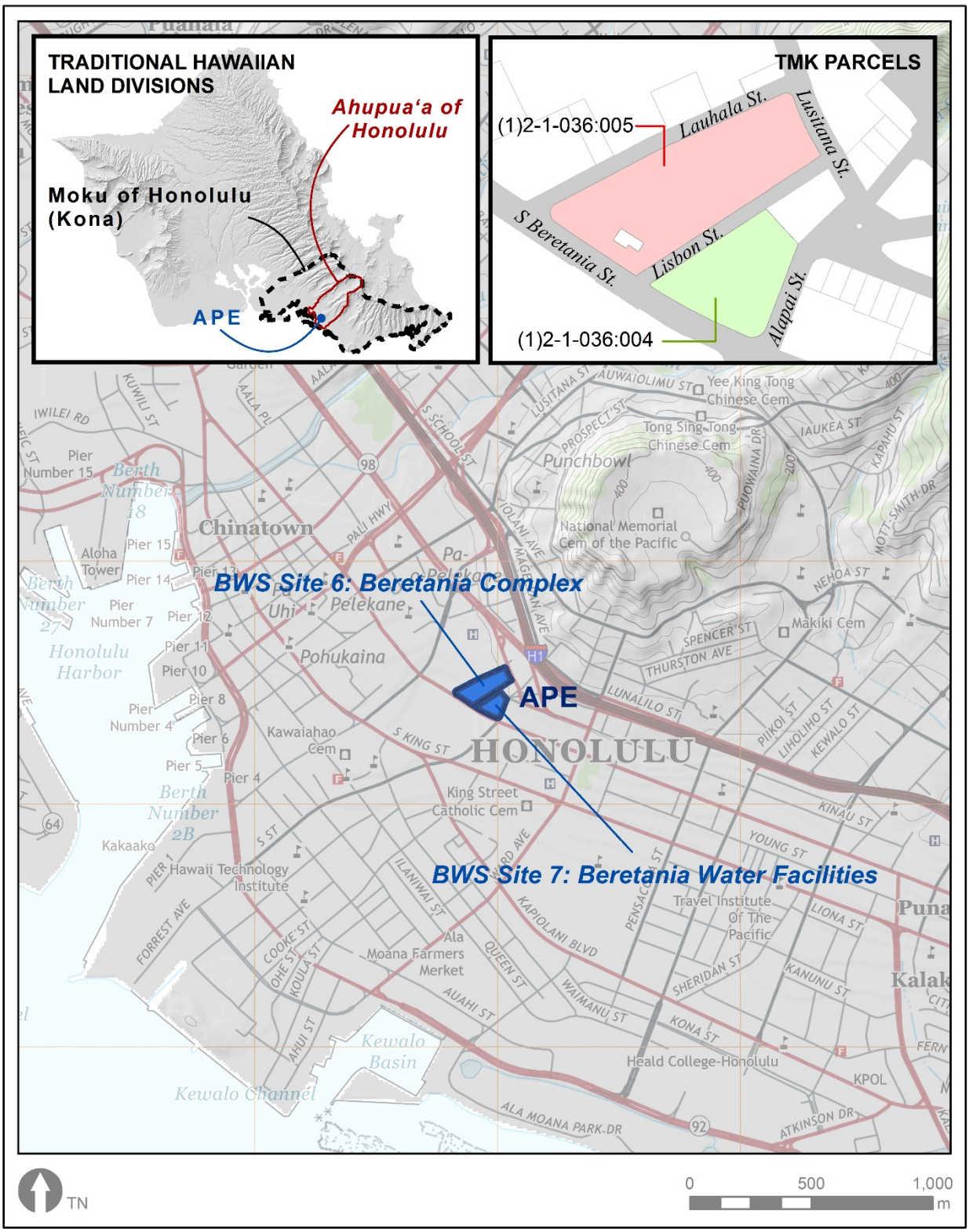


Figure 1. Area of Potential Effect for BWS Site 6 (Beretania Complex) and BWS Site 7 (Beretania Water Facilities) on 7.5-Minute Series USGS Honolulu Topographical Quadrangle (2013).

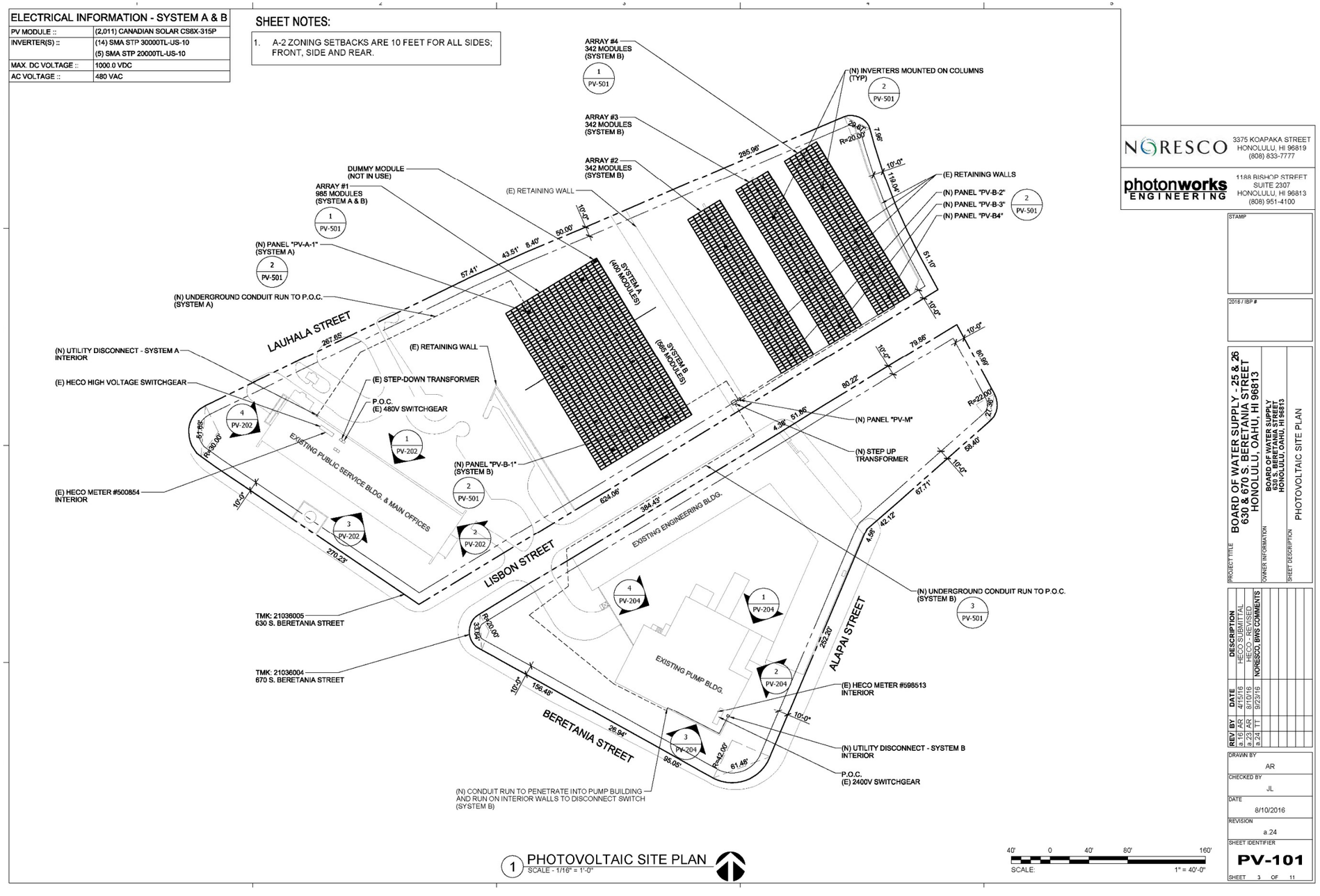


Figure 2. Project Plans for Board of Water Supply Sites 6 and 7.

The APE for BWS Site 7 facility measures approximately 37,611 sf, of which 29,665 is for interior building work. The project ground disturbing activities, shown in Figure 3, total 7,946 sf, and will include trenching for electrical conduits from Site 6 (Beretania Complex) to the point of electrical utility connection of the existing Pump Building.

ENVIRONMENTAL SETTING

Honolulu Ahupuaʻa is located on the leeward side of Oʻahu and extends from the Koʻolau mountain range through the coastal plain to the shoreline. The two BWS facility sites are in an urban environment, roughly 1.1 to 1.3 km inland from Honolulu Harbor.

TOPOGRAPHY AND SOILS

The two BWS facility sites are situated on slightly sloping land approximately 4.0–16.0 m above mean sea level (amsl). Soil units are shown in Figure 4.

Soils consist of Makiki clay loam (MkA) and Tantalus silty clay loams (TCC) with 8 to 15 percent slopes. Soils of the Makiki series are found on alluvial fans and terraces. They are deep, well drained soils that formed in material weathered from alluvium mixed with ash and cinders (Soil Survey Staff 2016). The Tantulus series are well-drained soils on uplands that developed in volcanic ash and material weathered from cinders (Soil Survey Staff 2016).

RAINFALL, VEGETATION, AND BUILT ENVIRONMENT

Annual rainfall at the two BWS facility sites averages from 738.6 millimeters (mm) (29.08 inches [in]) per year, with most rain falling in the winter months between November and March (Giambelluca et al. 2013). Both sites are in developed urban environments with limited landscaping that includes manicured exotic grasses and trees, extant buildings, and paved parking lots.

HISTORICAL BACKGROUND

This section presents the ethnohistorical and archaeological background information for the two BWS facility sites. Data from the background research were compiled to create an overview of traditional Hawaiian and historic-era land use and subsistence practices. Previous archaeological research in the vicinity of the two BWS facility sites is reviewed and anticipated archaeological findings are discussed.

TRADITIONAL HISTORY

The Hawaiian cultural landscape can be described through significant Hawaiian place names, or *wahi pana*, and *moʻōlelo*. *Moʻōlelo* may be myths, legends, proverbs, and events surrounding well-known individuals in Hawaiian history (Pukui and Elbert 1986:254). The following is a discussion of the mythological and traditional accounts associated with the two BWS facility sites.

The two BWS facility sites are located in lands that historical maps identify as ʻAuwaiolimu ʻIli, which was an *ʻili kūpono*. An *ʻIli kūpono* is a land division of an *ahupuaʻa* where tribute was paid to the ruling chief rather than the chief of the *ahupuaʻa* (Handy and Handy 1991:50). Some sources indicate that ʻAuwaiolimu ʻIli was in Pauoa Ahupuaʻa, such as O'Hare et al. 2012, which states the Pauoa was a pre-Contact land division which was later grouped with neighboring *ahupuaʻa* into Honolulu Ahupuaʻa, as Honolulu was once a small village, formerly called Kou, in the *ahupuaʻa* of Pauoa (O'Hare et al. 2012:9). In contrast, the Hawaiian Studies Institute 1987 map titled *Oʻahu: Pre-Mahale Moku and Ahupuaʻa*, which was compiled from early historical maps, does not depict Pauoa as an *ahupuaʻa*. However, pre-

Figure 3. Locations of Proposed Utility Lines at Board of Water Supply Sites 6 and 7.

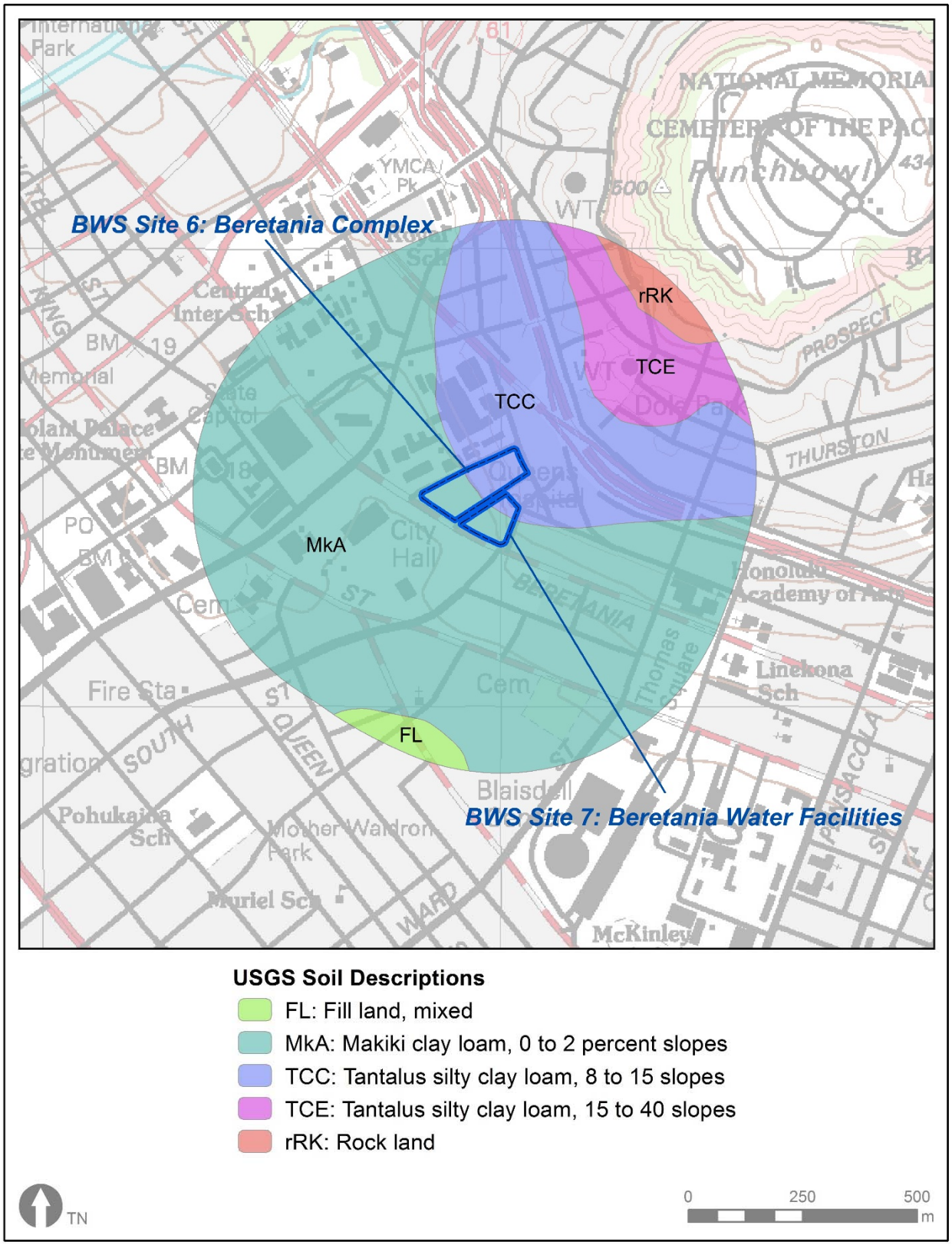


Figure 4. Soil Units Near the Two BWS Facility Sites in Honolulu Ahupua‘a (USDA, NRCS 2016; USGS 2013).

Mahele is not synonymous with pre-Contact, therefore, early maps, such as Kalama's 1838 map of the Hawaiian Islands, may reflect post-Contact changes. For the purposes of this report, background information is specific to ʻAuwaiolimu ʻili and the reader is referred to O'Hare et al. (2012) for an in-depth discussion of the traditional history of Pauoa Valley.

ʻAuwaiolimu ʻIli

ʻAuwaiolimu can be translated as "ditch of moss" (Pukui et al. 1974:14). According to legend, Chiefess Kahalaopuna bathed in the ʻAuwaiolimu Stream. As her hair floated it resembled *limu*, a type of seaweed. The following is a translation of the story from Sterling and Summers (1978:292).

> Chiefess Kahalaopuna went from Waikiki to live at [a place called Auwailimu] on the Punchbowl road. It was her custom to bathe in the stream below there very early in the morning. The mud ran down the stream to the sea. Two men came to the stream to look for her, and one man, Kelumaikai looked in and remarked, "What a lot of limu there is in the stream. The water looks so dark." The second man, named Kailiula looked and said, "There is no limu here where we are standing. That is mud that you are looking at." The other exclaimed and looked closely at the darkened water. Kahalaopuna spoke in a soft, gentle voice, "Can't you see me?" Kelumaikai said, "We did not see you, o chiefess Kahalaopuna." She replied, "Let us go up to the house. Perhaps you want to see me about something." They said that they did. It was through Kahalaopuna that the name Auwai-o-limu was given to the place forever [Desha 1930 translated in Sterling and Summers 1978:292].

Kānelāʻau Heiau

Kānelāʻau Heiau is reported to have been located immediately east of, or possibly within, the BWS Site 7 portion of the APE. Two famous battles are associated with this *heiau* (temple). The first battle occurred in 1783 when the Maui Chief Kahekili invaded Oʻahu at Waikīkī. According to Hawaiian historian Samuel Kamakau:

> In January, 1783, a decisive battle was fought with Kahe-iki as the battlefield. Kahekili's forces were divided into two companies, one under Huʻeu's leadership stationed at Kanelaʻau and Kapapakolea back of Puʻowaina and the other under his own command stationed from above Hekili to Kahehuna and ʻAuwaiolimu. In this battle the waters of the stream of Kahe-iki ran red with blood from the heaps of broken corpses that fell into the water; the stream was dammed back with the corpses of those who died in battle. On the ridge facing Pauoa and from thence down to Kapena another attack was made against the defense station back of the heiau of Kahe-iki. Confusion seized the ranks; the warriors of Kahahana were dispersed [Kamakau 1992:136].

Kānelāʻau Heiau was also significant in the Battle of Nuʻuanu, which followed Kamehameha I's landing at Waikīkī in 1795. Emma Nakuina (1909) described the locations of *heiau* associated with the battle in an early twentieth century newspaper article:

> The battle of Nuuanu commenced at the heiau of Kanelaau just below the old flagstaff station on Punchbowl about where Alapai joins Kinau and Lunalilo Streets and raged along a series of heiaus that formed the guard or outposts of the Puowaina [Punchbowl Crater] sacred heiau. There was one called Mana above the Queen's Hospital, Kahehuna (Royal School site) and one at Kaakopua (Princess Ruth's now the Central Grammar). Here the battle raged the fiercest and the Oahuans were so hard pressed they were divided into two sections, one fleeing Ewa-ward . . . The main portion of the Oahu army retreated fighting up Pauoa way but were met by the Hawaiians under Heulu who had stole a march around Punchbowl and poured down on the retreating defenders by the pass above Punchbowl, Papakolea (Nakuina 1909 in Sterling and Summers 1978:317).

TRADITIONAL LAND USE

During McAllister's archaeological survey of O'ahu in the early 1930s, he was unable to locate many sites in Honolulu that were mentioned in early historical and traditional documentation (McAllister 1933:80–81). *Heiau* sites no longer present during his fieldwork (Thrum 1906; McAllister 1933:81) included Kaahaimauli Heiau, which was previously situated at the location of 'Iolani Palace, and Manua Heiau, previously situated northeast of Queen's Hospital on the side of Pūowaina (Punchbowl Crater). Likewise, Kānelā'au Heiau was also not present.

Based on the lack of fresh water sources in the vicinity of the two BWS facility sites, the land was not likely a place of permanent habitation. However, Handy (1940) noted that the lands to the west were intensively cultivated:

> The flatland in the bottom of Pauoa Valley above Punchbowl was completely developed in terraces. About half of the old terrace area is now covered by streets and school and dwelling houses. Of the upper portion a considerable area is still under cultivation. Below Punchbowl, between Pacific Heights and King Street [where Pauoa Stream runs], there must have been more or less continuous terraces on the ground now covered by the city [Handy 1940:78].

Handy also wrote of sweet potato cultivation on the slopes of Pūowaina:

> Punchbowl Crater (Puowaina), on both the inner and outer slopes, was also famous in ancient times as a sweet potato locality. The planting was especially good on the inland side near the present Hawaiian homestead of Papakolea [Handy 1940:156].

EARLY AND MID-HISTORIC LAND USE

When Rev. Hiram Bingham arrived in Honolulu in 1820, he described the view from "Punchbowl Hill" looking south toward Waikīkī and north into Pauoa Valley:

> 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 1981:92–93].

Jacobus Boelen also visited the island in the 1820s. He describes an area that was a "not greatly cultivated" region of Honolulu, possibly from Pūowaina to Kaka'ako and east to the Kālia portion of Waikīkī (Tulchin and Hammatt 2011:10):

> 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 pronounciations [*sic*] is also written as Honolulu, and on some maps, Honoonoono). The landlocked side on 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].

By the mid-1800s, land use in the Honolulu area shifted from traditional agriculture to maritime trade. Disease, the demands on labor for the sandalwood trade, and other factors decimated the native Hawaiian population in the greater Kou and Wakīkī area (Tulchin and Hammatt 2011:11). Gorham D. Gilman wrote a description of the boundary of Honolulu during the 1840s which illustrates the desolate nature of the area:

> 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 Waikiki side, the barren and dusty plain, and on the Ewa side, the Nuuanu stream. There were few, if any, residences other than the straw houses of the natives mauka of Beretania [Gilman 1903:97].

Traditional land divisions of the fifteenth and sixteenth centuries persisted until the 1848 Mahele, which introduced private property into Hawaiian society (Kamakau 1991:54). During the Mahele, the Land Commission required the Hawaiian chiefs and *konohiki* (land agent for the *ali'i*) to present their claims to the Land Commission. In return they were granted Land Commission Awards (LCAs) for the land quit-claimed to them by Kamehameha III. Land was divided into Crown Lands, Government Lands, and Konohiki Lands. The remaining unclaimed land was then sold publicly, "subject to the rights of the native tenants" (Chinen 1958:29). The Kuleana Act of 1850 allowed *hoa'āina* (common people of the land, native tenants) to make claims to the Land Commission. The new western system of ownership resulted in many losing their land. Often claims would be made for discontiguous cultivated plots with varying crops, but only one parcel would be awarded.

Later, parcels were distributed under Land Patent Grants (Gr.) and Land Court Applications (LCAp). When the monarchy was overthrown in 1893, the Crown Lands became Government Lands, public domain for sale by fee simple (Hammatt 2013:A-5). Patents were the certificates issued for the sale of such lands. Beginning in 1900, when Hawai'i became a U.S. territory, the certificates were called Land Patents, or Land Patent Grants (Hammatt 2013:A-5).

Over the next few decades following the Mahele, Honolulu experienced rapid change. As testament to this, Reverend Sereno Bishop described the transformation of street layout and structures in the city:

> When I returned to Honolulu in 1853, after an absence of thirteen years, I was struck by the many changes. . . . [in 1840] the major portion of the residents of Honolulu still lived in thatched houses. In fact the town was almost entirely composed of this kind of dwellings. . . . when I went away there were only Punchbowl Road, Beretania Street, King Street and Merchant Street. This was the condition of the city in 1840. . . . above Beretania Street, on the slopes and beyond Alapai street, there was hardly a building of any nature whatever [Bishop 1916:58].

During the Mahele, Pauoa Ahupua'a became government land and 'Auwaiolimu 'Ili was awarded to Kaleokekoi; however, Kaleokekoi returned the land as commutation fee for his retained lands and the *'ili* became crown land. According to research conducted by Cultural Survey's Hawai'i (CSH), one LCA was granted in the west portion of the current APE, on the east side of Lauhala Street (O'Hare et al. 2012:19). This parcel, LCA 268, was awarded to John Papa 'Ī'ī and was occupied by 'Ī'ī's servants. The lot contained an adobe wall, two houses, and a well.

At this point in time, Clark (1939) notes that the land east of Punchbowl and north of Beretania, all the way to Punahou, was known as "The Plains." The following is a description of Honolulu's boundaries in 1845:

> Honolulu's city limits, then, in 1845 were: on the makai side, the harbor, the waters of which came up to Queen Street; on the mauka side, Beretania. above which, where the Princess

> Theater is now, there were few if any residences other than the grass houses of Hawaiians; on the Ewa side, Nuuanu Stream; and on the Waikiki side, the swamps below, and the dreary, barren "Plains" above [Clark 1939:10].

Despite most of the "The Plains" remaining unsettled until the 1880s when water was diverted from Makiki (Clark 1939:12), the surveyor Metcalf began laying out a grid of streets in 1846, which was work that continued through the second half of the century. According to Clark (1939:11): "King and Beretania Streets, known as the Lower Road and the Upper Road, already ran a straggling course which changed as often as the dust piled up deep." Figure 5 shows a portion of Metcalf's 1947 map.

A map from 1893, shown in Figure **6** indicates that the APE contained several structures, likely new residences. At the turn of the century, more structures are depicted along with what appear to be walls or fences surrounding small parcels, as shown in Figure **7**. As of 1912, the APE was divided into multiple small, regularly-shaped land grant parcels known as the 'Auwaiolimu Lots, as shown in Figure **8**. The lane that ran partially down the center of the western portion of the APE was called Weaver Lane after Major Gen. Erasmus M. Weaver, a resident of the lane who had served as Chief of the Coast Artillery for several years (Vince 2008). Over the next few decades, private individuals leased or purchased parcels throughout the APE. A topographic map from 1927, shown in Figure **9**, indicates the growth of urban development.

LATE HISTORIC LAND USE

By the end of the 19th century the city water sources were insufficient for the growing Honolulu population (Thrum 1909:166). As a solution, pumping stations and inland reservoirs were planned by the Minister of the Interior to the Monarchy. The reader is referred to O'Hare et al. (2012) for a detailed account of the development of water works in the APE, which are summarized herein.

The first pumping station in the APE was constructed in 1894. The following is a series of accounts from Thrum's Hawaiian Almanac and Annual:

> The desirability of the establishment of a plant for the pumping of artesian water to a storage reservoir on the slope of Punchbowl was mooted in 1892, and led to the erection of the pumping station and sinking of two ten-in wells of two million gallons daily capacity, at the corner of Beretania and Alapai streets [Thrum 1922:53].

> This pumping plant is housed in a substantial and commodious brick structure at the corner of Beretania and Alapai streets, and will connect with the reservoir in course of construction on the slope of Punchbowl [Thrum 1896:143].

> The patience of Honolulans have the promise of reward in an ample water supply for the growing city's needs, as, in addition to the above extension of the Nu'uanu system, steps are taken to augment the artesian supply by sinking two more wells at the Beretania station and installing the high lift pump that has lain idle since its purchase several years ago for want of funds [Thrum 1909:166].

> With the completion of the new and enlarged pumping station, at the corner of Beretania and Alapai streets, a concrete structure, the former brick building, a monument to the efficiency of the late W. E. Rowell as superintendent of Public Works, of the former Interior Department, about 1890, has also had to give way to the march of progress [Thrum 1927:78].

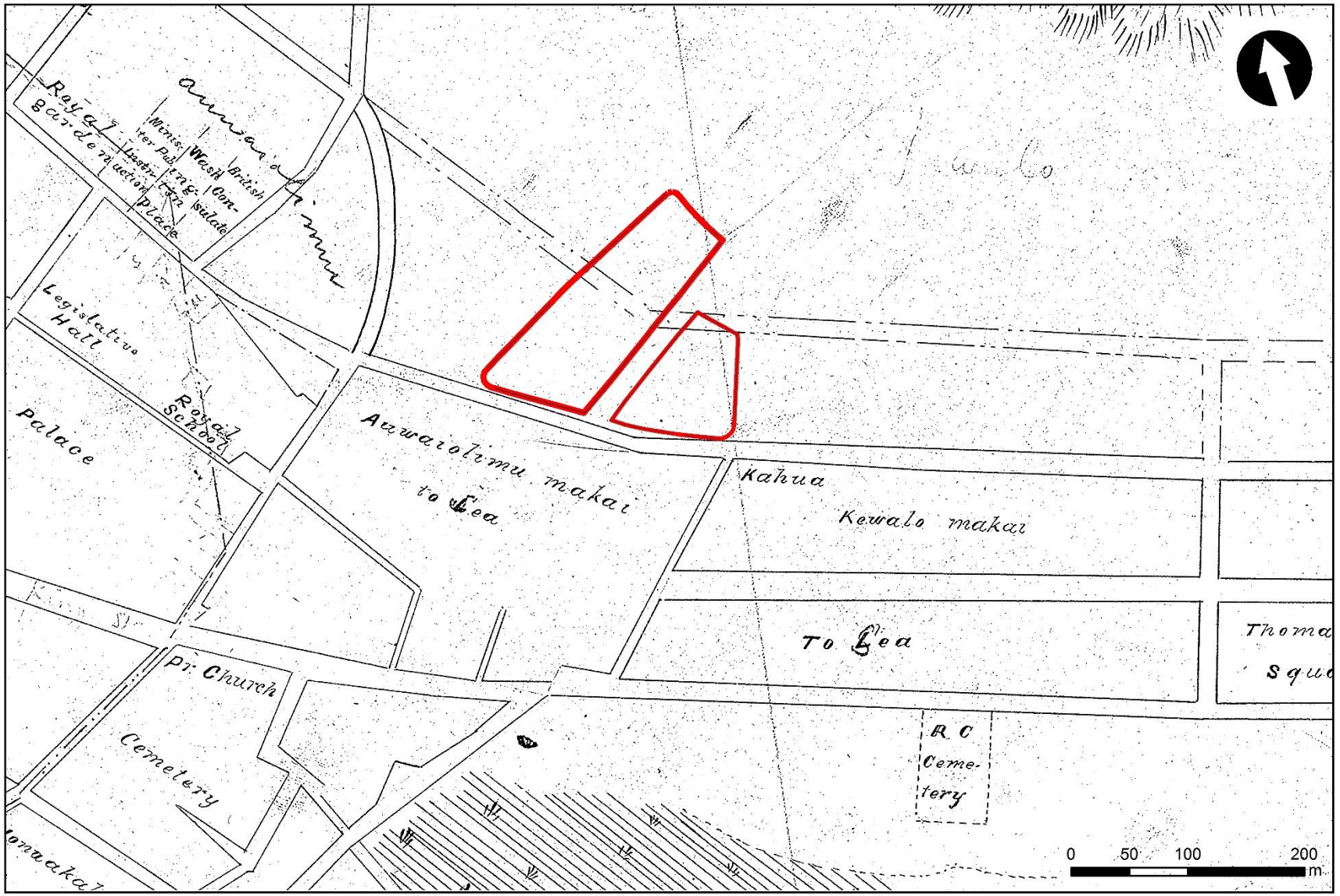


Figure 5. Portion of Metcalf's 1847 map of Honolulu With Area of Potential Effect Superimposed in Red (Metcalf 1847).

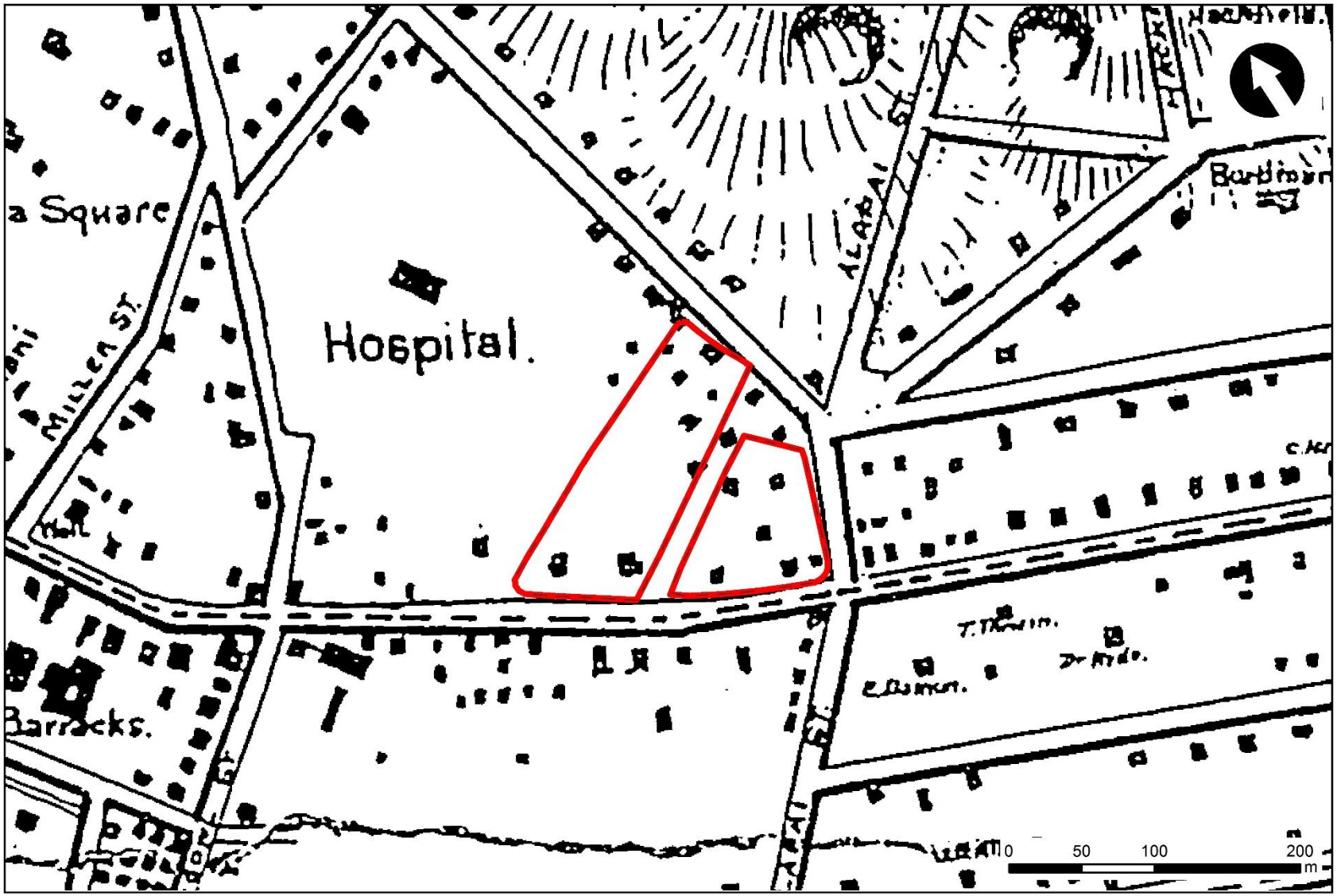


Figure 6. Portion an 1893 Map of Honolulu With Area of Potential Effect Superimposed Showing Locations of Former Residences (Wall 1893).

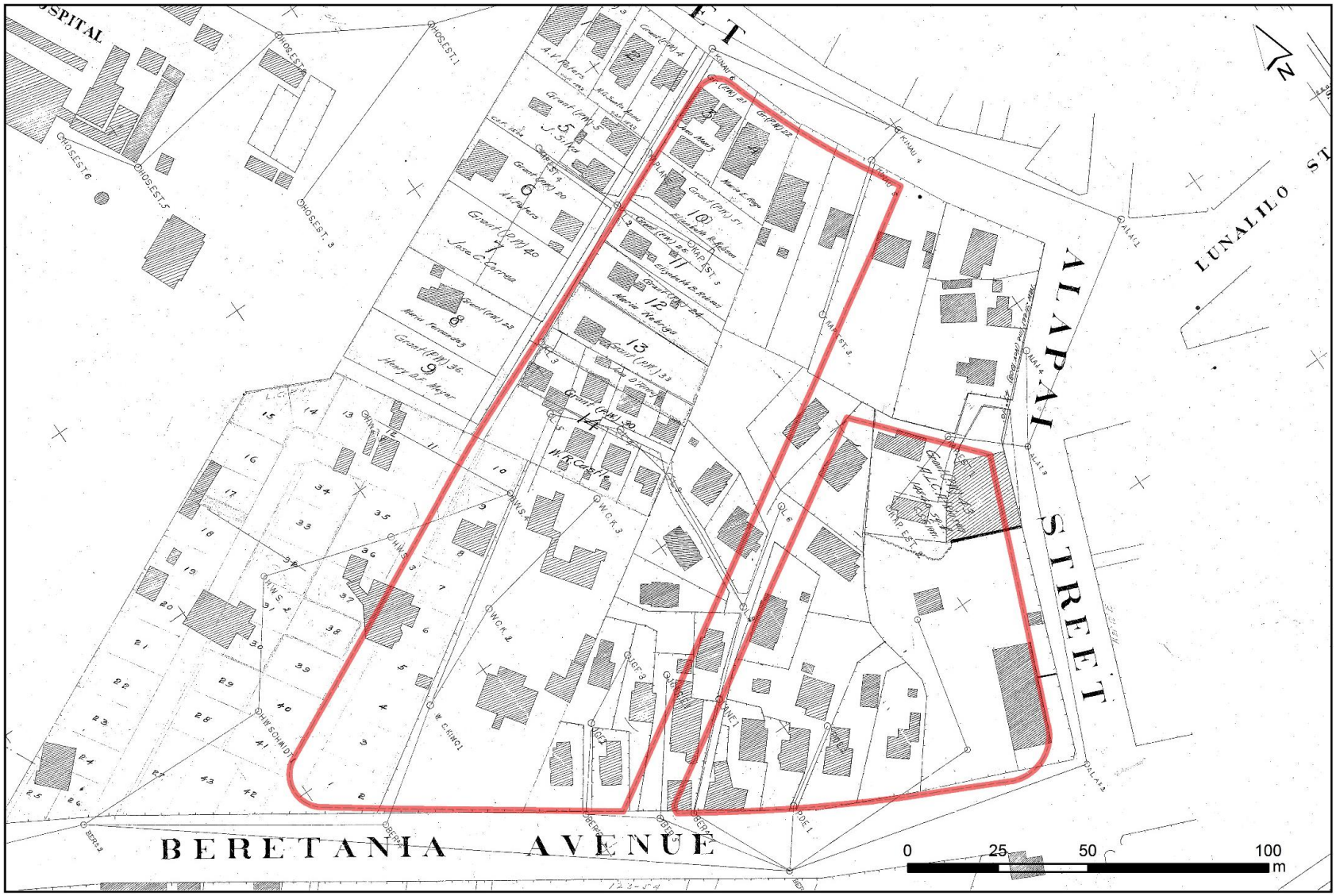


Figure 7. Portion of a 1900 Map of Beretania and Alapai Streets Showing Locations of Former Residences With Area of Potential Effect Superimposed (Lowell 1900).

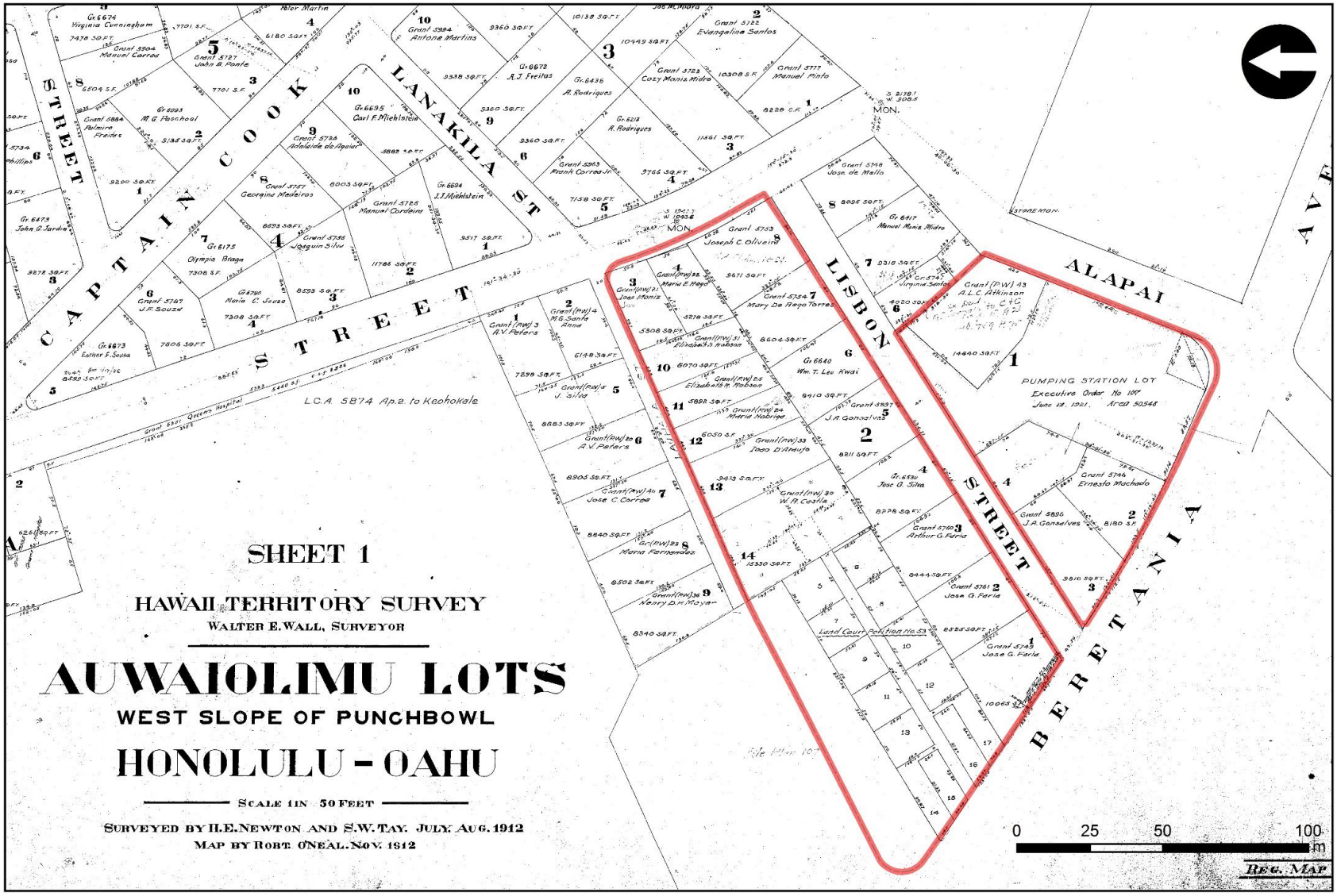


Figure 8. Portion a 1912 Map of Auwaiolimu Lots Showing New Parcel Divisions With Area of Potential Effect Superimposed (O'Neal 1912).

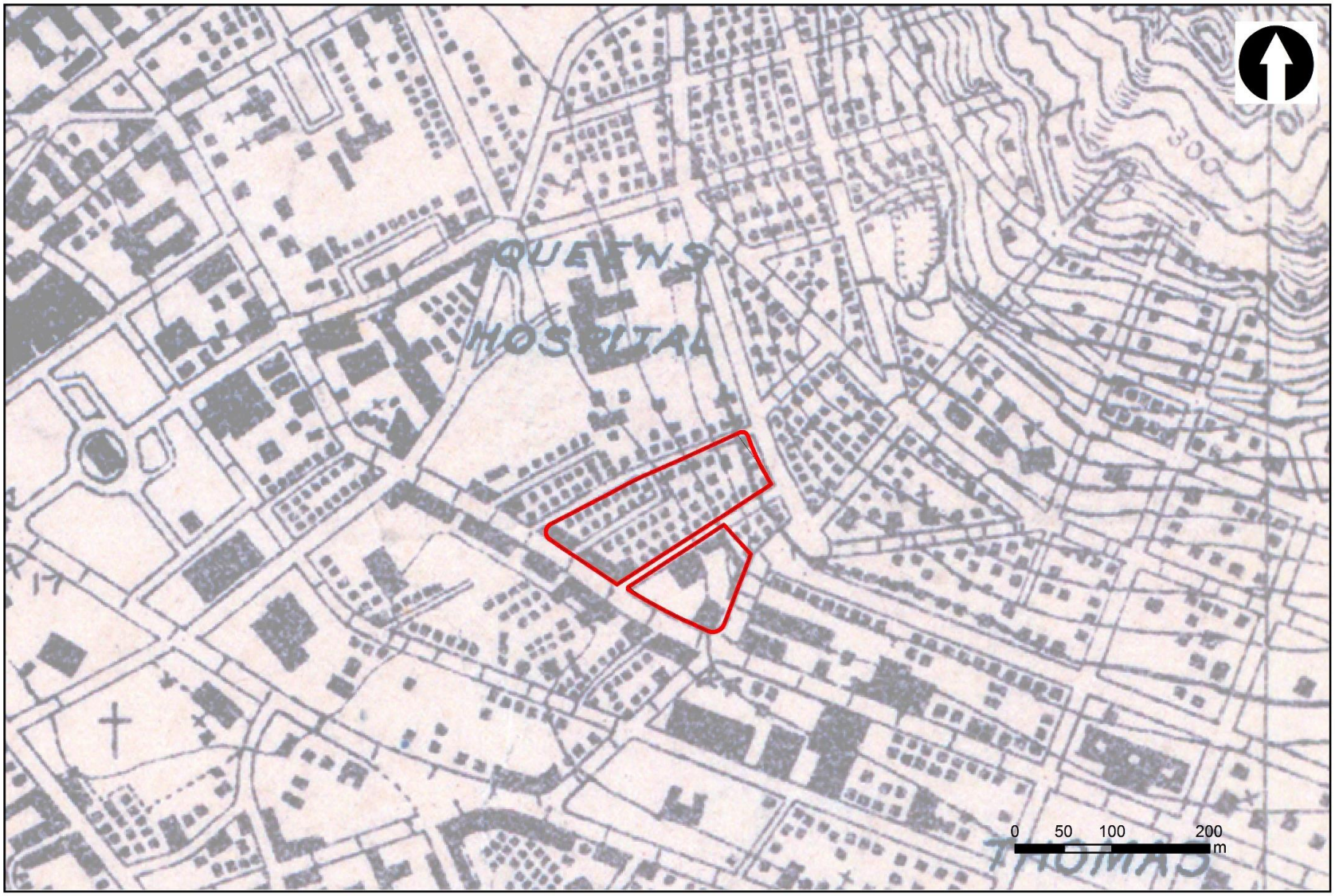


Figure 9. Portion of 1927–1928 Honolulu Quadrangle Showing the Area of Potential Effect (U.S. Geological Survey 1927–1928).

The extant pumping station at BWS Site 7 replaced the original brick structure in 1927. The BWS Public Service Building, situated at BWS Site 6, was constructed in 1958 and designed by the architectural firm of Wood, Weed, and Kubala. Connecting the building to the Engineering Building (constructed in 1939) is an elevated footbridge across Lisbon Street (Hibbard 2011:119; Murai 2000:4–6).

Sanborn Fire insurance maps and aerial photographs show the history of construction in the APE. A 1914 Sanborn Fire Insurance map (see Figure 16 in O'Hare et al. 2012) shows the original brick pumping station at BWS Site 7, along with two drilled wells, businesses, and residence, while the future location of BWS Site 6 was predominantly residential. As of 1927 (see Figure 17 in O'Hare et al. 2012), a new concrete pumping station was under construction and the future location of the Engineering Building contained three concrete slab, which were used for automobile storage, all of which were located in the BWS Site 6 property. By 1950 (see Figure 18 in O'Hare et al. 2012) a majority of the residences at the BWS Site 6 (on the west side of Lisbon Street) had been removed. Similarly, a 1952 aerial photograph, shown in Figure **10**, indicates that parking lots replaced the former houses. By 1959, the entire north portion of the property containing BWS Site 6 had been converted to parking lots, which is shown in Figure **11**. This configuration in the BWS Site 6 property remains today, with the north portion covered in public and employee paved asphalt parking lots, and the south portion containing the Public Service Building (shown under construction in 1958) with an elevated walkway to the Engineering Building, which is situated north of the Beretania Street Pumping Station in the BWS Site 7 property.

CURRENT LAND USE

The current configuration in the BWS Site 6 and 7 properties dates to the mid-20th century. The current building configuration is shown in Figure 2 and the parking lots are shown in Figure 3. At BWS Site 6, the Board of Water Supply Public Service Building (constructed in 1958) is situated on the southern third of the property facing Beretania Street. The building is surrounded by landscaped grasses and trees and has an elevated walkway leading to the Engineering Building on the east side of Lisbon Street. The northern two-thirds of the property are covered in paved parking lots that date to 1959 (see Figure 11). Comparing Figures 10 and 11 with the recent aerial image shown Figure 3, it can be seen that this layout of building and paved parking areas has remained the same since the 1950s.

At the BWS Site 7, the north portion of the property is covered in public and employee paved asphalt parking lots, which is not included in the APE. The south portion of the property contains the A-shaped Engineering Building (constructed in 1939), which is situated north of the Beretania Street Pumping Station (constructed in 1927). The interior space between these buildings is paved, while the area fronting Beretania contains landscaped grasses and trees.

PREVIOUS ARCHAEOLOGY

Numerous archaeological studies have been conducted in the vicinity of the two BWS facility sites. The previous studies are summarized in Table 1 and their locations area illustrated in Figure **12**. A brief summary of several of studies with significant findings follows, which are organized by location. Figure 13 illustrates the locations of previously recorded historic properties near the APE. All site numbers follow State Inventory of Historic Places (SIHP) Site 50-80-14-.

Current Area of Potential Effect

Archaeological literature review and field inspection were conducted within the APE in 2012 by Cultural Surveys Hawai'i (CSH). Historic properties documented were limited to the

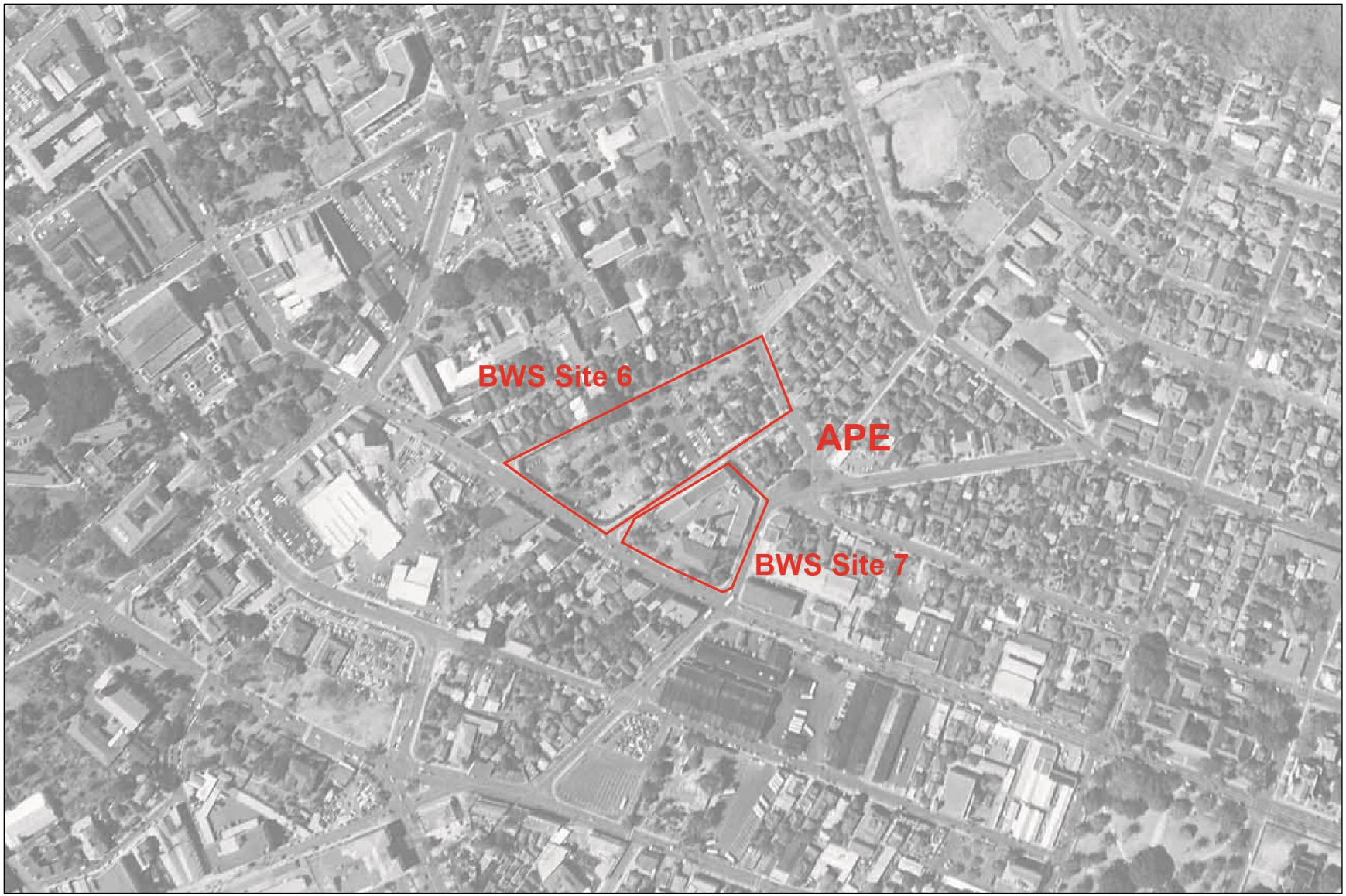


Figure 10. Portion of 1952 Aerial Photograph Showing the Area of Potential Effect (U.S. Geological Survey 1952).

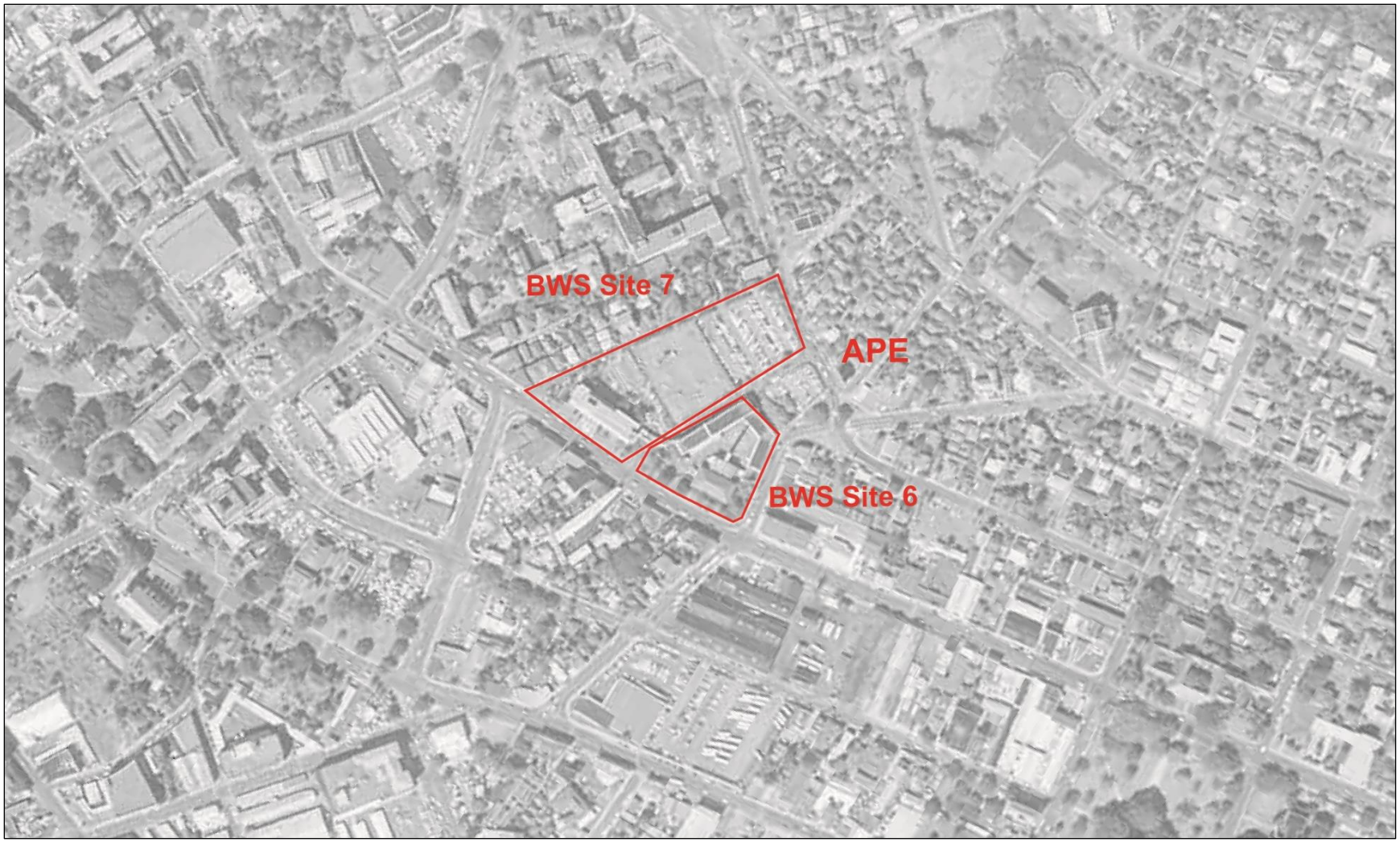


Figure 11. Portion of 1959 Aerial Photograph Showing the Area of Potential Effect (U.S. Geological Survey 1959).

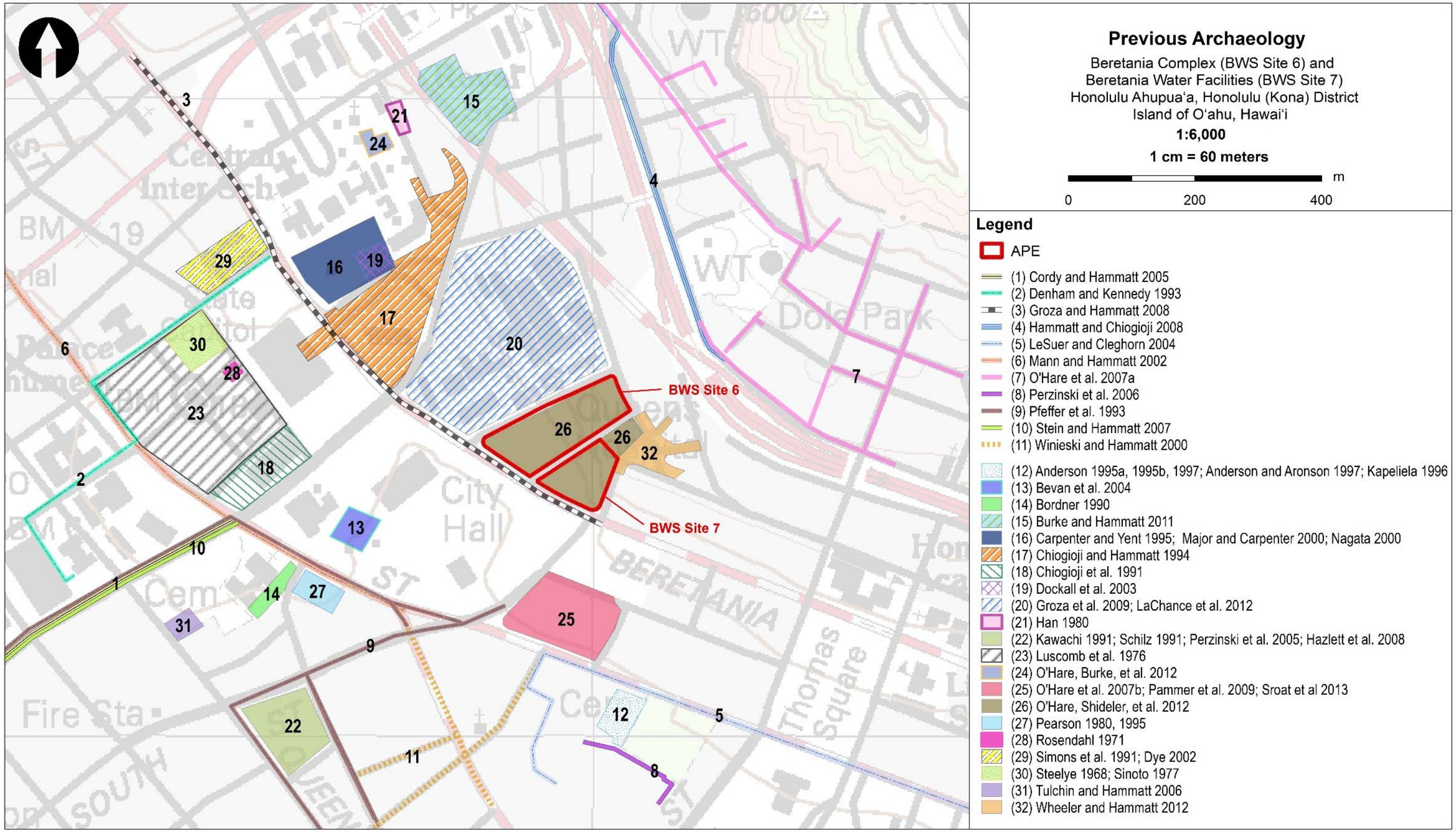


Figure 12. Previous Archaeology Within .5 km of the APE.

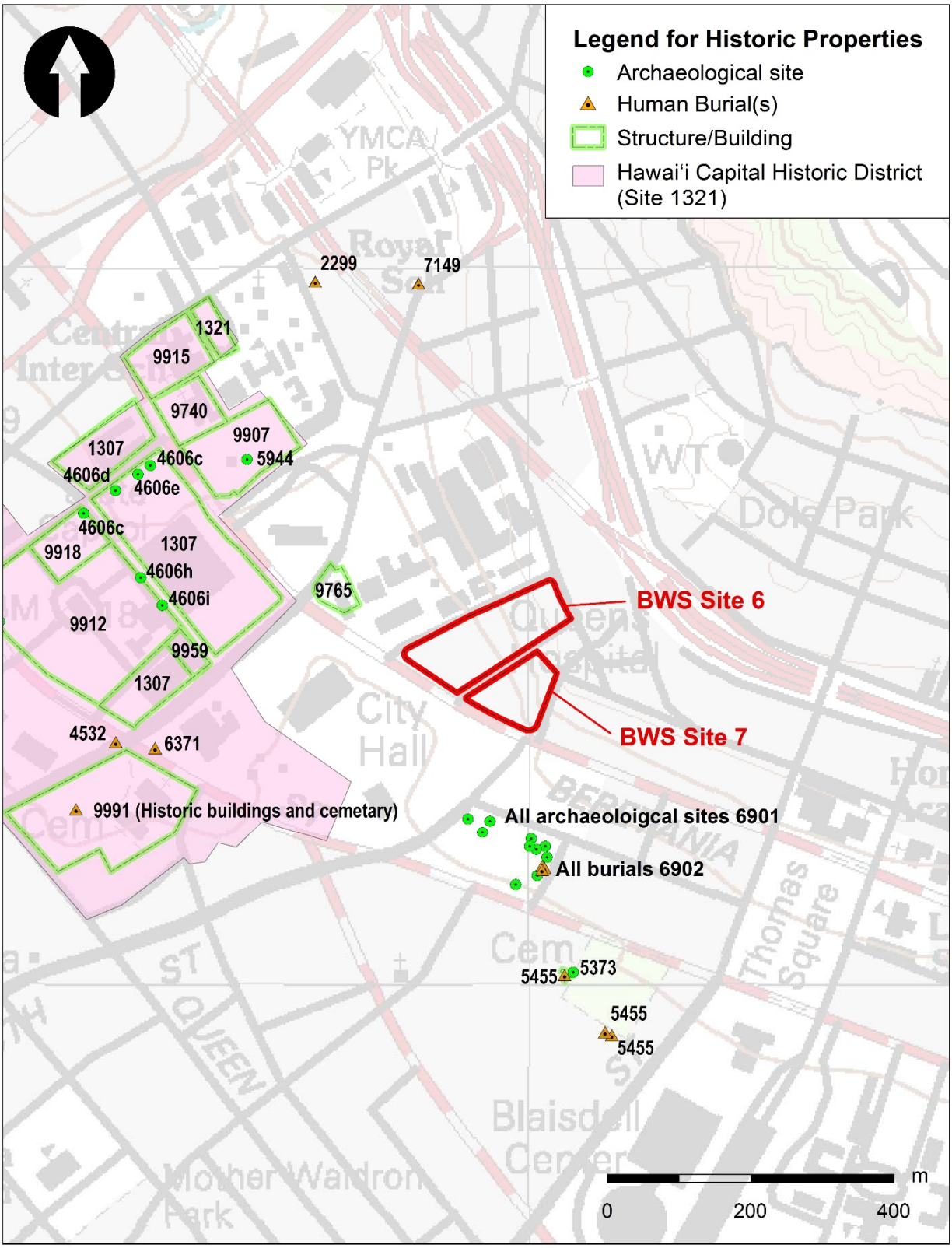


Figure 13. Previously Recorded Sites Within .5 km of the APE. All site numbers follow State Inventory of Historic Places (SIHP) Site 50-80-14-.

Table 1. List of Previous Archaeological Studies within .5 km of the APEs for BWS Site 6 (Beretania Complex) and BWS Site 7 (Beretania Water Facilities).

Author Year	TMK(s) (1)	Nature of Study	SIHP[1] No. 50-80-14	Results
Seelye 1968; Sintoto 1977	2-1-025:002	Archaeological Surveillance and Salvage	-4606	Historic Artifacts.
Rosendahl 1971; Luscomb et al. 1976; Sinoto 1977	2-1-025:002	Archaeological Excavation and Exploration of the Old Carriage Road at ʻIolani Palace	-4606	Historic Artifacts.
Han 1980	2-1-018:042; 1-8-4-002	Inadvertent Discovery of Human Remains	-2299	Two Native Hawaiian burials.
Pearson 1980, 1995	2-1-032:002	Archaeological Excavation	-9991	Kawaiahaʻo Church and Mission grounds. Historic artifacts recovered.
Bordner 1990	2-1-032:017	Excavation & Monitoring	-9991	Kawaiahaʻo Church and Mission grounds. Historic subsurface features and artifacts.
Chiogioji et al. 1991	2-1-025:001	Archaeological Excavation	-9959	No significant findings.
Kawachi 1991	2-1-048:008–019	Inadvertent Discovery of Human Remains	-1604*	Human burial. One human skull and one femur found in the back dirt pile.
Schilz 1991	2-1-048:008–019	Archaeological Assessment	-	Block formerly used for kerosene storage and for tenements (Magoon Block).
Simons et al. 1991	2-1-017:001	Archaeological Monitoring	-1307	Historic artifacts.
Denham and Kennedy 1993	2-1-025:002, 003, & 009-011	Archaeological Monitoring	-4605*	A multi-component subsurface cultural deposit, with a fire pit dated to A.D. 1390–1700, a human burial, and postholes.
			-4606	Nine historic trash pits, one with a drilled marine shell.

Author Year	TMK(s) (1)	Nature of Study	SIHP[1] No. 50-80-14	Results
Pfeffer et al. 1993	2-1-029 to 2-1-032, 2-1-046 to 1-2-048, 2-1-051, 2-1-054, & 2-1-055	Archaeological Monitoring	-3712*	Honuakaha Cemetery, 31 human burials.
			-4532	Isolated human burial.
			-4533*	Isolated human burial.
			-4534*	Cemetery on Queen St, 116 sets of human skeletal remains.
Chiogioji and Hammatt 1994	2-1-18:46 and pors. 1, 11, 16 & 47	Archaeological Assessment	-	No significant findings.
Carpenter and Yent 1995	2-1-018:001	Archaeological Monitoring	-9907	Historic artifacts and two marine shells.
Anderson 1995a	1-2-1:044: 041,042 & 043	Historical Background Research	-	No significant findings.
Anderson 1995b	1-2-1-44:041, 042, & 043	Sub-Surface Inventory	-5373	Historic trash pits.
Kapeliela 1996	2-1-044:041, 042, & 043	Inadvertant Discovery of Human Remains	-5455	A single human burial
Anderson 1997	2-1-044:041, 042, & 043	Subsurface Testing	-5455	Subsurface testing of the proposed reinterment plot; disarticulated human remains encountered.
Anderson and Aronson 1997	2-1-044:041, 042, & 043	Archaeological Monitoring, and Emergency Data Recovery	-5455	30 historic human burials from Roman Catholic Church Cemetery.
Major and Carpenter 2000	2-1-018:001	Archaeological Monitoring	-5944	Possible demolished structure; historic artifacts (glass, metal, ceramic).
Nagata 2000	2-1-018:001	Archaeological Monitoring	-9907	No significant findings.

Author Year	TMK(s) (1)	Nature of Study	SIHP[1] No. 50-80-14	Results
Winieski and Hammatt 2000	2-1-030, 031, 032, 044; 2-1-046:008; 2-1-050:002 & 054	Archaeological Monitoring	-1388*	Mother Waldron Park.
			-4380*	Nine Human burials.
			-5820*	11 human burials (two post-Contact).
Dye 2002	2-1-018:001	Archaeological Monitoring	-9907	Historic artifacts.
Mann and Hammatt 2002	2-1 par. & 1-7 par.	Archaeological Monitoring	-6371	Human burial thought to be Native Hawaiian, possibly post-Contact.
Dockall et al. 2003	2-1-018:001	Archaeological Monitoring	-9907	Historic artifacts.
Bevan et al. 2004	2-1-033:007 (Par.)	Archaeological Monitoring	-1321	Hawaii Capital Historic District No significant findings.
LeSuer and Cleghorn 2004	(included King Street)	Archaeological Assessment	-	No significant findings.
Cordy and Hammatt 2005	2-1-015, 025–027, 029–033	Archaeological Monitoring	-	No significant findings.
Perzinski et al. 2005	2-3-010:048, 050, 052, 053, 054, 055, & 056	Archaeological Inventory Survey	-1604*	Two human skeletal elements.
Perzinski et al. 2006	2-1-048:008	Archaeological Inventory Survey	-5455	Two historic period coffin burials.
Tulchin and Hammatt 2006	2-1-032:016 & 017	Archaeological Subsurface Investigation	-4534*	24 burial pits with coffins were recorded, no burials were disinterred.

Author Year	TMK(s) (1)	Nature of Study	SIHP[1] No. 50-80-14	Results
O'Hare et al. 2007a	2-1-021, 038, and 039; 2-2-002 to -008, -013, -019, 021, 023, 024, 029, 030, 031, 038, 056; 2-4-014 to -017, -029 to -033	Field Inspection and Literature Review	-	No significant findings.
O'Hare et al. 2007b; Pammer et al. 2009	2-1-042:004, 013	Archaeological Inventory Survey and Cultural Impact Evaluation; Addendum	-6901 -6902	Four historic trash pits, dating to between A.D. 1820 and 1920. Three human burials: burial 1 and 2 historic period coffin interments, less information is available regarding Burial 3.
Stein and Hammatt 2007	2-01-017, 024, 025, 026, 030 & 031	Archaeological Monitoring	-	No significant findings.
Groza and Hammatt 2008	Beretania Street (Between North King and Alapa'i)	Archaeological Monitoring	-	No significant findings.
Hammatt and Chiogioji 2008	1-1-6; 1-1-7; 1-2-1; 1-2-2	Archaeological Inventory Survey	-	Masonry arch bridges were noted during a surface survey across Waolani Stream in Nu'uanu and near Pauoa Road in Pauoa.
Hazlett et al. 2008	2-3-010:048, 050, 052, 053, 054, 055, & 056	Archaeological Monitoring	-1604*	Two human skeletal elements.
Groza et al. 2009	2-1-018:048; 2-1-035:001, 003-008, and 010; & 2-1-037:002	Archaeological Monitoring	-	Two historic trash pit features, not significant.

Author Year	TMK(s) (1)	Nature of Study	SIHP[1] No. 50-80-14	Results
Burke and Hammatt 2011	2-1-019:014	Archaeological Monitoring (Inadvertent Discovery of Human Remains)	7149	Native Hawaiian human burial inadvertently discovered prior to monitoring phase.
LaChance et al. 2012	2-1-018:048, 2-1-035:001, 003–008, and 010; 2-1-037:002	Archaeological Monitoring	-	No significant findings.
O'Hare, Burke, et al. 2012	2-1-018:009 & 010	Archaeological Assessment with Subsurface Testing	-	No significant findings.
O'Hare, Shideler, et al. 2012	2-1-036:001, 004, 005, & 006	Archaeological Literature Review and Field Inspection	-	Potential for burials and other cultural deposits.
Wheeler and Hammatt 2012	2-1-036, -037, & -041	Archaeological Monitoring	-	No significant findings.
Sroat et al. 2013		Archaeological Monitoring	6901	Three additional historic trash pit features.

[1] SIHP (State Inventory of Historic Places)

* Denotes archaeological site located more than .5 km from the project area

existing BWS buildings: the Beretania Street Pumping Station, built ca. 1927; the Engineering Building, built 1939; and the Public Service Building, built 1958. These structures are not listed on State or National Register of Historic Places, nor are they within the Hawai‘i Capital Historic District boundary (Site 50-80-14-1321), National Register of Historic Places District; however, the buildings are within the Hawai‘i Capital Special District. The Hawai‘i Capital Special District was established in 1972 to “preserve and enhance the architectural character and park-like setting of our State, and City and County civic center” (Department of Land Utilization 1991:i). Due to these buildings being within this district they are subject to special zoning restrictions for any renovations or new construction.

Alapai Transit Center and Joint Traffic Management Center

Archaeological inventory survey was carried out at an approximately 1.7 ha parcel for the Alapai Transit Center and Joint Traffic Management Center on South King Street at Alapai Street (O’Hare et al. 2007b). During the course of testing, two sites were identified. Site 6901 consists of four historic trash pits dating between A.D. 1820 and 1920. Site 6902 comprises three human burials. Burial 1 and 2 are historic coffin interments, and Burial 3 is undetermined. Subsequent to the discovery of Site 6902, a burial treatment plan was prepared (O’Hare et al. 2008). In 2009, an addendum AIS was conducted because the proposed building plans changed (Pammer et al. 2009). No new sites were identified; only additional historic trash pit features of Site 6901 were recorded. Similarly, during monitoring for construction of the building, three additional historic trash pit features of Site 6901 were recorded (Sroat et al. 2013).

City Hall Annex

In 2003 and 2004, archaeological monitoring was conducted for the City Hall Annex Auditorium Restoration Project (Bevan et. al. 2004). The City Hall Annex Auditorium is part of the Capital Historic District and is listed on the National Register of Historic Places. No significant cultural resources were identified.

Hawaiian Electric Company (HECO) Dispatch Center

In 2004 and 2005, archaeological inventory survey was conducted prior to the development of the proposed HECO Dispatch Center located adjacent to the Catholic cemetery (Perzinski et al. 2006). Two historic coffin burials associated with the Catholic cemetery were recorded and considered additional features of the already designated Site 5455 at One Archer Lane (see discussion below).

‘Iolani Palace and the Hawai‘i State Capitol and Grounds

Multiple archaeological investigations have been carried out at ‘Iolani Palace (Site 9912) and the Hawai‘i State Capitol and grounds (Site 1307). Findings have included historic artifacts (Seelye 1968; Rosendahl 1971; Luscomb et al. 1976; Sinoto 1977), historic trash pits (Site 4606) (Denham and Kennedy 1993), and one multicomponent subsurface cultural deposit (Site 4605) (Denham and Kennedy 1993). At the multicomponent site, a historic trash pit, a ditch, a pit, a firepit (A.D. 1390–1700), six postholes (A.D. 830–1330), and a human burial were documented.

In 1991, archaeological monitoring and data recovery was conducted by Bishop Museum’s Applied Research Group (Simons et al. 1991) during the renovation of the historical Armed Forces Young Men’s Christian Association (YMCA) Building (Site 1307), which is now the Hawai‘i State Art Museum. It is part of the Hawai‘i Capital Historic District and is listed on the National Register of Historic Places. Findings during subsurface testing were limited to artifacts

manufactured in the United States and Europe dating from the late eighteenth to early twentieth centuries (Simons et al. 1991:73).

In 1991, preliminary test excavations and archaeological monitoring were carried out during construction activities at the Hawai‘i State Public Library Addition Site (Site 9959) (Chiogioji et al. 1991). Historic features identified included pits, privies, septic tanks, and a posthole.

Kawaiaha‘o Church Grounds and the Mission House

The Kawaiaha‘o Church was built in 1842 and the surrounding neighborhood was where foreign missionaries first resided after arriving in Hawai‘i in 1820. The church, its two associated cemeteries, and the mission houses are designated Site 9991. Multiple studies have been conducted on the grounds. From 1968 to 1970, archaeological excavations were conducted at the Hawaiian Mission property east of Kawaiaha‘o Church (Pearson 1980, 1995). Only historic debris was encountered. In 1986 and 1987, students from Chaminade University excavated eight test units and trenches on the Kawaiaha‘o Church grounds (Bordner 1990). Finds were limited to historic artifacts. During two subsequent studies numerous human burials were documented on the border of Kawaiaha‘o Cemetery; however, these burials are located over .5 km from the current study area. In 1993, 116 human burials were disinterred from below Queen Street, adjacent Kawaiaha‘o Cemetery (Pfeffer et al. 1993), which were designated Site 4534. Another study was conducted in 2006 and consisted of excavating test trenches along the outside border of Kawaiaha‘o Cemetery (Tulchin and Hammatt 2006). A total of 24 coffin burials (Site 4534) were recorded and left in place.

Keola La‘i Condominiums (Corner of Queen and South Street)

In 1991, archaeological monitoring was conducted for the proposed Queen Emmalani Tower, today’s Keola La‘i Condominiums (Kawachi 1991). A human skull was found in a backdirt pile, followed by additional human remains (Site 1604). An osteological report was prepared by Pietrusewsky and Ikehara (1992). Background research by Schilz (1991) had indicated that the block was formerly used for kerosene storage and tenements beginning in the late 1800s.

In 2005, Perzinski et al. (2005) conducted an archaeological inventory survey and excavated 13 trenches at the location of Keola La‘i Condominium. Two additional human skeletal elements were identified and added to the previously designated Site 1604. Three subsurface features—a garbage pit with historic artifacts, a wall remnant/concrete slab remnant, and a post hole—were also identified and designated Site 6766.

Construction of the Keola La‘i Condominiums was monitored by CSH in the mid-2000s (Hazlett et al. 2008). Late nineteenth and early twentieth century artifacts were recovered during trenching. Two isolated human skeletal remains were discovered in historic fill sediments in a utility trench near Kawaiaha‘o Street. These human remains represented a minimum of four individuals and were considered part of Site 1604.

King Street Rehabilitation Project

In 2001 and 2002, archaeological monitoring was conducted for the King Street Rehabilitation Project (Mann and Hammatt 2002). During the course of monitoring, a historic period trash pit containing butchered faunal bone was recorded at the corner of Richards and South King Streets. No SIHP site number was assigned. Under King Street, in front of Honolulu Hale and east of Punchbowl Street, human skeletal remains of one individual (Site 6371) were

documented at 63 cm below the ground surface. The human remains had been previously disturbed by utility excavations and were poorly preserved.

Miller Street Block

Washington Place (Site 9907) is the official residence for the Governor of Hawai‘i. The 1.2 ha parcel is on the west side of Miller Street, north and inland of the APE. Five archaeological investigations have been carried out on the property: monitoring of kennel construction by State Park archaeologists (Carpenter and Yent 1995); two episodes of monitoring for sidewalk construction by State Park archaeologists (Major and Carpenter 2000; Nagata 2000); archaeological inventory survey of a portion of Washington Place carried out by the Bishop Museum (Dockall et al. 2003); and the monitoring of a trench along Beretania Street adjacent to Washington Place (Dye 2002). These investigations primarily yielded historic artifacts. During the second episode of sidewalk construction monitoring, a high density of historic cultural material and coral cobbles were observed indicating a possible dump or demolished structure. The concentration was designated Site 5944.

One Archer Lane

Archaeological investigations at One Archer Lane have included historic background research (Anderson 1995a), subsurface inventory survey (Anderson 1995b), and archaeological monitoring (Anderson and Aronson 1997). The subsurface testing involved the excavation of eight backhoe trenches. Only historic subsurface features (Site 5373) were encountered. During monitoring in 1996, a single human burial (Site 5455) was inadvertently discovered (Anderson and Aronson 1997; Kapeliela 1996). This was followed by another inadvertent discovery of a concentration of burials representing a minimum of 30 individuals (also designated Site 5455). The burials dated from the mid-1800s to the 1920s, and were likely associated with the adjacent Catholic cemetery (Anderson and Aronson 1997). Subsurface testing at a re-interment location was also completed (Anderson 1997) and archaeological monitoring was conducted for the excavation of an underground storage tank. Disarticulated human remains were encountered at the site of the reinterment plot (Anderson 1997).

Pacific Club

In 2010, prior to implementation of an archaeological monitoring program, an inadvertent burial discovery (Site 7149) occurred during unmonitored construction at The Pacific Club. CSH conducted a preliminary assessment and documentation of the burial (Burke and Hammatt 2011):

> An assessment of the burial determined that the inadvertent discovery was an intact, flexed, primary context, adult burial located 78 cm below the ground surface. The burial was orientated with the head to the northwest, the feet to the southeast, lying on its back in a tightly flexed position. The left arm was placed between the upper and lower legs with the hand across the pelvis, the right arm was lying along the right side of the body, and both legs were flexed and leaning slightly to the left. Large roots growing in the area near the cranium had partially disturbed and crushed it. A basalt boulder was observed lying on top of the left side of the chest. It is unknown if this was deliberately placed on top of the burial or if it naturally came to rest there. Due to disturbance to the pelvis from the air gun and the crushed condition of the cranium, no gender was determined. Based upon the burial context, including the absence of a coffin, modern grave goods, or evidence of other western burial practice, CSH interprets the inadvertently-discovered human remains as likely Native Hawaiian [Burke and Hammatt 2011:45].

A previous burial discovery also occurred at The Pacific Club in 1960:

> The skeleton was completely embedded in a hard clay matrix. The bones were brittle and in a decomposed state. The individual lay about one foot below the surface of the ground. The skeleton was flexed, resting on the right side, and oriented southwest. Small rocks, chunks of coral, a shell, and bits of charcoal were found associated with the burial [Bowen 1961:151 in Burke et al. 2011:41].

Royal Queen Emma Apartments

In 1980, two human burials were inadvertently discovered during bulldozing at the Royal Queen Emma Apartments on Vineyard Avenue and the Pali Highway (Han 1980). One burial was disturbed and the other was in a flexed position. The burials were designated Site 2299.

The Queen's Medical Center

During excavations in 1971 for a new Community Mental Center at the site of today's Queen's Medical Center, a construction crew encountered over 100 artifacts, including many "caches" of bottles, and the human remains of five individuals at a depth of 1.8 m (Groza et al. 2009:22). Rev. Abraham Akaka of Kawaiaha‘o Church was called to bless the site and the medical examiner was notified. A Hawaiian minister noted that at least some of the burials were Native Hawaiian based on their "position." This, along with the absence of coffins or associated artifacts, suggests the burials were possibly Native Hawaiian; however, no further explanation was provided by the minister and no formal records of the discovery exist.

Archaeological monitoring was carried out for construction at Queen's Medical Center in 2008 (Groza et al. 2009). Findings were limited to four trash pits containing historic glass bottles and ceramic fragments, a few pieces of metal, butcher-cut faunal bone, sea urchin, and *‘opihi* (limpet, *Cellana Sp.*). All features were determined to date to the historic period, no SIHP site number was assigned.

CULTURAL CONSULTATION

(THIS SECTION WILL CHANGE DEPENDING ON RESULTS OF JAN 25 MEETING WITH K. KALEIKINI) The PCSI Project Manager for the AIS for BWS Sites 6 and 7, Mr. Steve Clark, contacted Ms. Ka‘anohi Kaleikini and asked if she was available to participate in AIS consultation for the BWS AIS. Ms. Kaleikini is a SHPD-recognized cultural descendent to native Hawaiian burials in Waikīkī Ahupua‘a, and agreed to consult with PCSI for this project. He provided her with a copy of the Draft AIS Work Plan via email and arranged to meet. Mr. Clark met with Ms. Ka‘anohi Kaleikini on Wednesday, November 9, 2016 in the parking lots of BWS Site 6 after a human burial was found during AIS testing. Ms. Kaleikini expressed concern about the possibility of native Hawaiian burials being found because of the burials found around the corner at the Alapai Transit Center. Mr. Clark agreed that this was also PCSI's concern, and mentioned that a number of burials were found in the black cinder sands located further upslope near Round Top Drive.

Ms. Ka‘anohi did not have information regarding archaeological sites, traditional cultural practices, or traditional cultural places (TCP) associated with the BWS APE. Consultation with Ms. Kaleikini continued throughout fieldwork, and included consultation regarding the disposition of the human burial found during AIS testing. She requested that, should we find anything significant, to please let her know.

ANTICIPATED FINDINGS

Anticipated findings were based on the results of land use history, historical maps, and results of previous archaeological studies in the vicinity of the APE. There was potential for

encountering human burials in the APE, in addition to historic period trash deposits similar to those found at the nearby Alapai Transit Center parcel.

Background research and previous archaeological investigations indicated that the APE was not the location of pre-Contact habitation or agriculture. Settlement began in the area in the late nineteenth century when the pumping station was built in the current APE. At that time property in the area was owned by high *ali‘i* such as Ane Keohokālole, Caesar Kapa‘akea, and John Papa ‘Ī‘ī, along with *haole* (foreign-born residents) who established residence in this new suburb of Honolulu south of Pūowaina. Consequently, there was potential for encountering cultural deposits, artifacts, and human burials associated with these historic period residences.

Cultural resources that have been identified in the vicinity of the APE included historic period human burials and cultural deposits (O'Hare et al. 2007a,b; Pammer et al. 2009; Sroat et al. 2013). Numerous burials were previously identified on the south side of South King Street, west of Ward Avenue, both within and on the outside west and south borders of the Catholic cemetery (Anderson 1997; Anderson and Aronson 1997; Perzinski et al. 2006). Based on proximity of the APE to the Alapai Transits Center property human burials, and the unpredictable locations of these burial finds, there was potential for human burials being encountered.

Previous archaeological investigations in the vicinity also suggested potential for encountering subsurface historic properties. Deposits associated with post-Contact land use were anticipated, possibly consisting of cultural layers and/or structural remnants, including trash pits, privies, and building foundations that are buried by modern and/or historic fill layers. Anticipated evidence of pre-Contact land use was limited to isolated artifact finds. Probability for encountering pre-Contact native Hawaiian burials was also considered low.

METHODS AND PROCEDURES

A pedestrian surface survey was conducted for the two parcels. A series of retaining and free-standing walls were identified along the boundaries of the two parking lots, as well within the parking lots. The features identified were documented, photographed, and described during the surface survey. GPS points were taken at key locations. The identified surface features were assigned a temporary feature number (PCSI1-36; PCSI1.1-1.8) in the field.

A subsurface testing program, guided by an AIS Work Plan (Gosser and Clark 2016), was also conducted. Initially, the AIS Work Plan proposed excavation of a series of backhoe trenches in order to characterize subsurface proveniences in the two parking lots as well as in proposed conduit trench locations within and outside the parking lots. One archaeologist monitored the excavation of the backhoe trenches, and two archaeologists documented the stratigraphic sequences and subsurface features encountered within the backhoe trenches. Artifacts and faunal materials observed during excavations were collected. Subsurface features were assigned a temporary feature number (SF1-19) in the field. After fieldwork was completed, all surface and subsurface features were assigned consecutive permanent feature numbers (Fe1-55). Eight identified features associated with one of the boundary walls (Fe 33) were assigned feature numbers Fe33.1 through 33.8.

After soils and sediments were removed, trench faces were examined for archaeological materials and subsurface features. All excavations were subject to documenting the stratigraphic sequence within the trench, drawing to-scale profiles, taking photographs, and preparing soil descriptions.

Roman numerals were assigned to each in situ (naturally occurring) stratigraphic layer (e.g., Layer I; with Layer I being the uppermost layer). Stratigraphic layers determined to be fill

deposits were assigned alphabetic designations (e.g., Fill A, Fill B). Numerals were added to the alphabetic designations for fills when different fills were noted in the same stratigraphic position (e.g., Fill A, Fill A1).

Stratigraphic layers were described according to United States Department of Agriculture, Soil Conservation Service standards, and with the aid of a field manual for soil descriptions (Schoeneberger et al. 1998). Soil characteristics described include soil color (Munsell 2000), texture, consistence, estimated percentage of rock inclusions, root information (size and type), lower boundary topography, and the presence of archaeological materials and/or subsurface features. When historic artifacts were encountered during monitoring, both diagnostic and non-diagnostic artifacts were collected.

Amended AIS Work Plan

After a human burial was found in TR15, toward the end of the testing, a site visit was conducted on November 9, 2016, to determine how best to proceed. The site visit was attended by Dr. Susan Lebo and Ms. Kimi Matsushima (representing SHPD), Ms. Paulette (Ka‘anohi) Kaleikini (an SHPD-recognized cultural descendent to burials in Kaka‘ako and Waikiki), Mr. Alani Apio and Mr. Marc Chun (representing the BWS), Mr. Jim Flynn and Mr. Rick Ellis (representing NORESCO), and Mr. Steve Clark and Mr. Dennis Gosser (representing PCSI). During this site visit, it was agreed to amend the AIS Work Plan as follows:

- The back dirt pile from Trench 15 (where the burial was found) would be screened to determine if additional human skeletal remains are present in the back dirt;
- The wooden box covering the burial would be rebuilt with clean, new wood. A steel plate would be placed over Trench 15 for more permanent protection. Tarps would be placed over the steel plate, and the edges of the steel plate would be covered with a suitable material for waterproofing (cold asphalt).
- The remaining four (4) unexcavated trenches (TR12, 13, 16, and 17) would not be excavated by backhoe in their originally proposed locations. Instead, PCSI would identify the four nearest column locations (for proposed carports) to the TR15 burial find in the CV Parking Lot and excavate smaller (1.5 by 1.5 m; or 5 feet by 5 feet) test units by hand in these locales.
- For the last four excavations, the asphalt and base course of coral cobbles (Fill A) would be removed by mechanical means. If Layer I (brown silty sand) was found underlying Fill A, excavation of Layer I deposits would proceed by hand (with shovels, trowels and whisk brooms). The Layer I matrix would be screened through a 1/8-inch screen and any archaeological materials would be collected. Excavations would continue into the underlying non-cultural cinders (Layer II) until PCSI’s archaeologists were satisfied that sediments from intrusive features (e.g., burials or historic trash pits) were not present;
- The hand excavations would not start until the amended AIS Work Plan was approved by SHPD.

Constraints on Fieldwork

Because testing was conducted in active parking lots, the original placement of backhoe trenches, as presented in the AIS Work Plan (Gosser and Clark 2016:Figure 2) was altered at the request of NORESCO and the Honolulu BWS. Most of the backhoe trenches were therefore excavated within (and parallel to) parking lot stalls. This minimized impact to the use of parking lot stalls.

LABORATORY METHODS

Cultural materials encountered during excavations were collected and transported to the PCSI Archaeology Laboratory in Honolulu for further analysis. A master inventory catalog was compiled, and relevant attributes were identified and recorded, for instance, manufacture method and diagnostic decorations were recorded for historic glass and ceramic artifacts. Faunal specimens (bone and shell) were identified to the lowest possible taxonomic order (e.g., Genus and Species), where possible. Baseline analysis was conducted on these materials, the results of which are presented in the "Results of Laboratory Analysis" section.

CURATION

All field records, photographs, maps, and related documents are being temporarily curated at the PCSI Archaeology Laboratory in Honolulu. These records and documents will be returned to the landowner for final disposition after completion of the project.

FIELD RESULTS

The AIS field activities conducted within the project APE (BWS Site 6 and BWS Site 7) consisted of a pedestrian survey and subsurface testing program (see Figure 14). Sixty-three archaeological features were identified during the AIS, including 44 above-ground features and 19 subsurface features identified within 21 test excavations. The site complex has been designated as SIHP Site 50-80-18-xxxx.

The boundaries of SIHP xxxx include the Employee Parking Lot (EPL), the Company Vehicle Parking Lot (CVPL), and the Visitor's Parking Lot (VPL) within BWS Site 6 and a small portion of the southwest corner of BWS Site 7 across Lisbon St. from the VPL (Figure 14). Figures 15, 16, and 17 present overview photographs of the site area.

The archaeological surface features include historic walls, terraces, and curbs. The walls that confine the EPL and CVPL have height on both sides-a characteristic of free-standing walls. The heights of these boundary walls, however, are generally greater on the downslope side (in the parking lot interior) than upslope side (exterior side), and therefore are designated as retaining walls.

Terraces are defined as raised level areas bound on two or three sides, and typically integrated into a natural slope or built feature on the other sides (REFS). Terraces are usually faced by a retaining wall and the retained material is either soil, rock, or a mixed fill.

The six primary terraces within the APE that comprise the EPL and CVPL are likely cut-and-fill modifications to the natural slope between Lusitana Street. (upslope) and Beretania Street. (downslope). Four of the terrace surfaces are asphalt paved and soil filled, and are retained by vertical basalt and mortar walls capped with mortar. Two of the terraces are unpaved, soil filled and faced with vertical basalt and mortar walls as well as stacked construction materials such as concrete slabs and parking stall bumpers (the unpaved terraces have been assigned multiple feature designations based on facing type).

Additional features (curbing and planting areas) have been constructed on the terraces. Although the parking lots were constructed between 1952 and 1962, the additional features and the paved surfaces have likely been added or modified since the original construction.

The subsurface features identified during AIS testing included pits, post molds, as well as concentrations of cobbles/pebbles and rusted metal. Pits are generally defined as intentional excavations with widths greater than depths. Pits are characterized depending on the contents of their fill (e.g., trash pits, hearths, human burials, etc.). Post molds are defined as excavated holes or shafts with depths greater than width, and were excavated for structural support posts.

Figure 14. Map Showing Boundaries of Site T-1, Locations of Excavation Trenches, and Locations of Features 1 through 63.

Figure 15. Overview Photographs of the Employee Parking Lot (EPL). Top: View to West with the Company Vehicle Parking Lot (CVPL) in the Background. Bottom: View to North.

Figure 16. Overview Photographs of the Company Vehicle Parking Lot (CVPL). Top: View to West. Bottom: View to Northeast.

Figure 17. Overview Photographs of Visitor's Parking Lot. Top: View to Northwest. Bottom: View to Southeast.

The Site T-1 features are summarized in Table 2 and reflect three separate land uses with three time periods, two of which overlap. From the most recent to the latest time period, these uses include:

- Current BWS parking lot: 1952 to present
- Residential use: late 1800s to circa 1958
- Human burial: Possibly late pre-Contact period

SITE 50-80-18-XXXX, FEATURES 1-32, BWS PARKING LOTS-1952-PRESENT

The BWS parking lots were constructed between 1952 and 1962 (see Figures 10 and 11) and are currently in use; some alterations to the lots may have occurred after 1962. Features 1 through 32 (see Table 2 and Figure 14) comprise the BWS parking lot period and include:

- Four basalt and mortar retaining wall segments parallel to Lisbon Street (Features 1-4), and five basalt and mortar wall segments parallel to Lauhala Street along the northern parcel boundary (Features 5-9);
- Three soil terraces with three types of retaining elements at the eastern end of the APE near Lusitana Street (Features 10, 22, and 23);
- Four asphalt-paved parking lot terraces defined by basalt and mortar retaining walls, including three stepped levels in the EPL (Features 11, 13, and 14), and one level in the CVPL (Feature 15); Feature 12 is a double curb configuration that divides the Feature 13 terrace into two parking areas;
- Three soil terraces with three types of retaining elements located at the eastern end of the CVPL (Features 16-18);
- A series of six narrow, roughly linear terraces abutting Features 5-9 along the northern boundary of both the EPL and the CVPL (parallel to Lauhala Street) defined by low concrete walls and curbs used to retain soil for planting(Features 19-21 and Features 24-26); and
- A series of six low rectangular and irregular-shaped terraces along the southern boundary of the EPL defined by low concrete curbs (one with cut coral block curbs) that retain soil for planting (Features 27-32).

- **Features 1-9: Retaining Walls**

Features 1-9 include nine retaining walls along the southern (Fe. 1-4) and northern (Fe. 5-9) boundaries of the EPL and CVPL measuring in length from 5.8 m to 38.6 m (see Figure 14); the wall lengths are a function of the parking lot entrance/exit gates, including two entrance gates and four exit gates in the EPL, and one entrance gate and two exit gates in the CVPL. The walls are narrow, ranging in width from .30 m to .45 m. Wall heights vary considerably with upslope (exterior) heights ranging from .10 m to .80 m and downslope (interior) heights from .20 m to .97 m (see Table 2).

Table 2. Summary of Archaeological Surface and Subsurface Features of Site T-1 at Honolulu Board of Water Supply's Site 6 (Parking Lot Parcels)						
Feature No (Fe)	**Feature Type/Description**	**Feature Function**	**Length (m)**	**Width (m)**	**Height (cm) for surface features; Depth (cmbs) for Subsurface features**	**Location in APE (See Figure x)**
Site T-1 Parking Lot Era (1952-present)						
Fe1	Free-standing wall segment along southern boundary; oriented approximately 228 degrees MN; 1-2 courses of gray, dense small basalt boulders and large cobbles; wall capped with flat, smooth concrete surface; not similar in construction style to wall Features 33-35.	Boundary	11.6	0.30	15-25 exterior 12-30 interior	Along Lisbon St. near intersection with Lusitana.Street west of Entrance 1 to EPL; west of Feature 34 wall
Fe2	Boundary wall segment along southern boundary; oriented approximately 228 degrees MN; 1-2 courses of gray dense small basalt boulders and large cobbles; wall capped with flat, smooth concrete surface; connects to Feature 13 retaining wall.	Boundary	10.8	0.30	5-6 exterior 30-40 interior	Along Lisbon St., west of Feature 1, between Entance 2 and Exit 2 of EPL
Fe3	Boundary wall segment along southern boundary; oriented approximately 228 degrees MN; very low in height with 1-2 courses of gray, dense basalt boulders and large cobbles; capped with flat, smooth concrete surface.	Boundary	5.8	0.40	1-5 exterior 2-10 interior	Along Lisbon St., west of Feature 2; west of Exit 2 of EPL
Fe4	Boundary wall segment along southern boundary; oriented approximately 228 degrees MN; 3-5 courses of gray and reddish brown vesicular basalt boulders and cobbles; no mortar in faces of walls but mortar is visible on the inside of the wall; capped with flat, smooth concrete surface.	Boundary	35.3	0.30-0.40	55-80 exterior 55-97 interior	Along Lisbon Street west of Feature 35 boundary wall, within CVPL
Fe5	Boundary wall segment along northern boundary; oriented approximately 228 degrees MN; 3-5 courses of reddish brown and gray basalt boulders and cobbles; little to no mortar visible in wall faces; capped with flat, smooth concrete surface.	Boundary	16.7	0.45	45-75 exterior 90-95 interior	Starts at intersection of Lusitana and Lauhala Sts; extends west to Exit 3 of EPL
Fe6	Boundary wall segment along northern boundary; oriented approximately 228 degrees MN; 4-5 courses of reddish brown and gray basalt boulders and cobbles; mortar visible between rocks but is not flush with rocks on wall faces; capped with flat, smooth concrete surface.	Boundary	27.9	0.35	35-47 exterior 85-90 interior	Along Lauhala St. Exits 3 and 4 of EPL; west of Feature 5
Fe7	Boundary wall segment along northern boundary; oriented approximately 228 degrees MN; 4-5 courses of reddish brown and gray boulders and cobbles; mortar visible between rocks but is not flush with rocks on wall faces; capped with flat, smooth concrete surface.	Boundary	38.6	0.35	20-30 exterior 50-60 interior	Along Lauhala St., between Exit 4 of EPL and Exit 2 of CVPL; west of Feature 6
Fe8	Boundary wall segment along northern boundary; oriented approximately 228 degrees MN; 3-4 courses of reddish brown and gray vesicular basalt boulders and cobbles; capped with flat, smooth concrete surface.	Boundary	21.9	0.35	40-50 excterior 60-78 interior	Along Lauhala St., between Exit 2 and Exit 3 of CVPL
Fe9	Boundary wall segment along northern boundary; oriented approximately 228 degrees MN; 2-3 courses of reddish brown and gray vesicular and dense small basalt boulders and large cobbles.	Boundary	10.3	0.35	35-45 upslope 41-50 downslope	Along Lauhala St., west of Exit 3 of CVPL; west of Feature 8

Table 2. Summary of Archaeological Surface and Subsurface Features of Site T-1 at Honolulu Board of Water Supply's Site 6 (Parking Lot Parcels)						
Feature No (Fe)	**Feature Type/Description**	**Feature Function**	**Length (m)**	**Width (m)**	**Height (cm) for surface features; Depth (cmbs) for Subsurface features**	**Location in APE (See Figure x)**
Fe10	Terrace with retaining wall oriented approximately 310 degrees MN; doesn't extend all the way across EPL; 3-4 courses of gray vesicular and dense basalt boulders and cobbles with mortar flush to rocks in wall face; capped with flat, smooth concrete surface.	Planting Area	20.2	1.3-1.6	3-27 upslope 5-80 downslope	Situated in southeast corner of EPL, west of Feature 33 wall
Fe11	Terrace with retaining wall oriented approximately 310 degrees MN; 3-5 courses of mostly gray vesicular and dense basalt; smooth concrete cap on top of wall; concrete curb abuts north end of retaining wall.	Terrace wall retains eastern (upper-most) asphalted terrace of EPL	55.9	14.5-17.2	17-20 upslope 60-110 downslope	Immediately west of Features 10, 22, and 23 in EPL; extends from Entrance 1 to Exit 3 in EPL
Fe12	Two parallel concrete curbs oriented approximately 310 degrees MN; curbs are about 31 cm apart; south end nearly abuts Feature 29 terrace/planter.	Divides Feature 13 parking lot terrace	56.0	.60 (exterior)	11-15 cm upslope 15-17 downslope	In center of Feature 13 parking lot terrace in EPL
Fe13	Terrace with retaining wall oriented approximately 315 degrees MN; 3-5 courses of mostly gray vesicular and dense basalt small boulders and large cobbles; mortar visible between rocks; top of wall capped with flat, smooth concrete surface; concrete curb abuts north end of retaining wall.	Terrace wall retains central asphalted terrace of EPL	65.0	33.8-34.2	18 upslope 73-120 downslope	Immediately west of Feature 11 in In EPL; extends from Exit 1 and Entrance 2 to Exit 4 in EPL
Fe14	Terrace with retaining wall oriented approximately 315 degrees MN; 3-5 courses of mostly gray vesicular and dense basalt small boulders and large cobbles; mortar visible between rocks; top of wall capped with flat, smooth concrete surface.	Terrace wall retains western (lowest) asphalted terrace of EPL	72.1	15.3-16.8	56 upslope 65-75 downslope	Retaining wall marks west boundary of EPL; extends north from Exit 2 of EPL
Fe15	Terrace with retaining wall oriented approximately 322 degrees MN; 5-6 courses of mostly gray vesicular small basalt boulders and medium cobbles; no mortar visible on wall faces; top of wall is capped with flat, smooth concrete surface; vehicle ramp present in central portions of wall.	Terrace wall retains asphalted terrace of CVPL	72.4	57.8-58.5	25-45 upslope 80-100 downslope	Retaining wall marks west boundary of CVPL
Fe16	Terrace with retaining wall made 3-4 courses of old concrete curbs; level soil area within curbs; oriented north/south; eucalyptus trees and aloe plants on terrace.	Planting area	7.7	2.5	51-74 (downslope)	In soil area near central portions along western end of CVPL
Fe17	Terrace with retaining wall made of 1-2 courses of cut, rectangular basalt blocks; level soil area behind wall; eucalyptus and plumeria trees on terrace.	Planting area	8.6	3.2	23-54 (downslope)	In soil area along western end of CVPL; adjacent to (north) Feature 16
Fe18	Terrace with retaining wall constructed of old concrete curbs, red bricks, decorative blocks, a metal bed frame and old bath tub; level to sloping soil surface behind retaining elements.	Planting area	18.1	3.5	80-100 (downslope)	In soil area at northeast corner of of CVPL; adjacent to (north) Feature 17

Table 2. Summary of Archaeological Surface and Subsurface Features of Site T-1 at Honolulu Board of Water Supply's Site 6 (Parking Lot Parcels)						
Feature No (Fe)	**Feature Type/Description**	**Feature Function**	**Length (m)**	**Width (m)**	**Height (cm) for surface features; Depth (cmbs) for Subsurface features**	**Location in APE (See Figure x)**
Fe19	Terrace delineated by concrete curbs; oriented east/west; roughly rectangular, level soil interior with lilies, crotan (sp?) and hibiscus.	Planting area	14	1.25	16	Parallel to Lauhala St. in northeast corner of CVPL; west of Exit 2 of CVPL
Fe20	Terrace delineated by concrete curbs; oriented east/west; roughly rectangular, level soil interior with hibiscus.	Planting area	27	1.25	16	Parallel to Lauhala St., in north/central portion of CVPL; west of Feature 19; between Exits 2 and 3 in CVPL
Fe21	Terrace delineated by concrete curbs; oriented east/west; roughly rectangular, level soil interior with lilies.	Planting area	8.6	1.25	16	Parallel to Lauhala St., in northwest corner of CVPL; west of Feature 20
Fe22	Terrace with retaining elements consisting of old concrete curbs; level soil area behind retaining wall; two tiers of curbs; coconut palms, bougainvillea, Norfolk pine	Planting area	25	0.91	0-5 upslope 15-33 downslope	Central portios of soil area at eastern end of EPL; north of Feature 10 in EPL
Fe23	Terrace with curved retaining wall of cut basalt blocks and concrete slabs, with plastic barrel in wall; soil mound about 65-75 cm high on terrace; ends about 2.5 m from north side of EPL	Planting area	10	5-6	30-65	In northeast corner of EPL; north of Feature 22
Fe24	Terrace oriented east/west; delineated by concrete curb; roughly rectangular, level soil interior; bougainvillea and other exotic plants.	Planting area	5.9	1.1	10-27 interior	Parallel to Lauhala St., in northeast corner of EPL; on west side of Exit 3 in EPL
Fe25	Terrace delineated by low concrete wall; rectangular, level soil interior with bougainvillea, spanish needle.	Planting area	29.0	1.1	20-86 interior	Parallel to Lauhala St. in between Exits 3 and 4 in EPL; west of Feature 24
Fe26	Terrace delineated by low concrete wall; rectangular, level soil interior with bougainvillea.	Planting area	22.7	1.85	16-60 interior	Along Lauhala St., west of Exit 4 in EPL; west of Feature 25
Fe27	Terrace delineated by low concrete curbs; level soil interior; triangular shape; 2 coconut trees inside.	Planting area	5.8	5.1 x 3.1	20	West of southwest corner of EPL by Lisbon St.; west of Entrance 1 of EPL
Fe28	Terrace delineated by low concrete curbs; level soil interior; triangular shape; grasses and weeds inside.	Planting area	5.8	5.2 x 3.0	23	West of Feature 27 by Lisbon St.; on west side of Exit 1 in EPL
Fe29	Terrace delineated by low concrete curbs; irregular-shaped, level soil interior (west side is rectangular-shaped with east side flaring to a triangular shape; grasses and weeds inside.	Planting area	11.7	.9-2.7	26	Between Exit 1 and Entrance 2 of EPL by Lisbon St.; west of Feature 28

Table 2. Summary of Archaeological Surface and Subsurface Features of Site T-1 at Honolulu Board of Water Supply's Site 6 (Parking Lot Parcels)						
Feature No (Fe)	**Feature Type/Description**	**Feature Function**	**Length (m)**	**Width (m)**	**Height (cm) for surface features; Depth (cmbs) for Subsurface features**	**Location in APE (See Figure x)**
Fe30	Terrace delineated by concrete curbs; rectangular, level soil interior; pink hibiscus inside.	Planting area	5.5	1.2	22	On west side of Entrance 2 in EPL by Lisbon St.; west of Feature 29
Fe31	Terrace delineated by cut coralline limestone curbs; level soil interior; roughly triangular-shaped; weeds inside.	Planting area	4.8	4.6 x 4.5	13	On east side of Exit 2 of EPL by Lisbon St.; west of Feature 30
Fe32	Terrace delineated by cut coralline limestone curbs; level soil interior; roughly triangular-shaped; weeds inside; brown bottle glass fragments and a white button on surface.	Planting area	7.5	5.2 x 4.9	13-15	On west side of Exit 2 of EPL by Lisbon St.; west of Featue 31
Site T-1 Residential Use Era (Late 1800s to 1958)						
Fe33	Boundary wall along east boundary of APE-oriented 315 degrees MN; multiple-stacked construction with 4-5 courses of reddish brown to gray vesicular basalt small boulders and large cobbles, with mortar flush between rocks on wall faces; top of wall on south end (by Lisbon St.) is capped with boulders 0.35 to 0.65 m wide and 20-35 cm thick with little to no mortar visible; north end is similar construction as south end; capped with basalt boulders with visible mortar	Boundary	60.32	0.35-0.55	30-50 upslope 60-110 downslope	Parallel to Lusitana St.; marks east end of APE
Fe33.1	Sealed gate in Feature 33 wall; gate was built between two basalt rock pillars; gate sealed by four courses of basalt boulders with mortar; tops of pillars are capped with small basalt boulders (similar to capping of south side of Feature 33 wall.	Pedestrian access	NA	1.4 between rock pillars	40 upslope 110 downslope	Incorporated into Feature 33 wall near it's southern end; east end of APE
Fe33.2	Sealed gate in Feature 33 wall; gate was built between two basalt rock pillars; gate sealed by four courses of basalt boulders with mortar; tops of pillars are capped by small basalt boulders similar to Feature 33.1 pillars.	Pedestrian access	NA	1.2 between rock pillars	55 upslope 110 downslope	Incorporated into Feature 33 wall north of Feature 33.1 at east end of APE
Fe33.3	Basalt rock pillar in central portion of Feature 33 wall, and on south side of concrete wall segment (Feature 33.4); pillar has been impacted (missing rocks) on north side probably from construction of concrete wall segment; pillar is 0.45 x 0.45 m and is 30 cm higher than adjacent Feature 33 wall on south side of pillar.	Pedestrian access	NA	0.45	58 upslope 125 downslope	Incorporated into Feature 33 wall north of Feature 33.2 at east end of APE
Fe33.4	Concrete retaining wall segment within Feature 33 wall; built on narrow concrete curb base; has three concrete pillars including two that define a sealed gate (Feature 33.5) and a third pillar (Feature 33.6) at the north end of the concrete wall segment.	Boundary	11.0	0.18	48 upslope 110 downslope	In central portions of Feature 33 boundary wall at east end of APE
Fe33.5	Sealed concrete gate in concrete wall segment about 5.2 m north of south end of concrete wall section (Feature 33.4); two concrete pillars define gate width.	Pedestrian access	NA	1.0 (between pillars)	57 upslope 110 downslope	About 5.2 m north of south end of concrete wall section in mauka boundary wall (PCSI-1)
Fe33.6	Concrete pillar at N end of concrete wall (PCSI 1.4); square in cross-section; immediately adjacent to (south of) Feature 33.7 basalt rock pillar.	Wall stabilization?	NA	0.22	73 upslope 125 downslope	Within concrete wall (PCSI-1.4)
Fe33.7	Basalt rock pillar adjacent to north end of concrete wall segment (Feature 33.4); pillar is intact and connects to Feature 33 wall; top of pillar is capped with small basalt boulders.	Pedestrian access	NA	0.45-0.48	108 upslope 160 downslope	Within PCSI-1 wall along mauka boundary

Table 2. Summary of Archaeological Surface and Subsurface Features of Site T-1 at Honolulu Board of Water Supply's Site 6 (Parking Lot Parcels)						
Feature No (Fe)	**Feature Type/Description**	**Feature Function**	**Length (m)**	**Width (m)**	**Height (cm) for surface features; Depth (cmbs) for Subsurface features**	**Location in APE (See Figure x)**
Fe33.8	Repaired section of PCSI-1 wall consists of 4-5 courses of small vesicular basalt boulders and large cobbles; repaired section supported by concrete.	Wall repair	1.2	1.1	NA	Near north end of Feature 33 at east end of APE
Fe34	Boundary wall segment along southern boundary; oriented approximately 228 degrees MN; 1-3 courses of reddish brown and gray small vesicular basalt boulders and large cobbles; has mortar flush to rocks in wall faces; top of wall is capped with boulders similar to Feature 33 wall.	Boundary	13.0	0.50	40-60 upslope 35-65 downslope	Starts near southeast corner of APE, and extends along Lisbon St. from Entrance 1 to Exit 1 of EPL
Fe35	Boundary wall segment along southern boundary; oriented approximately 230 degrees MN; similar construction to Features 33 and 34; 3-4 courses of reddish brown and gray vesicular, small boulders and large cobbles; boulders mortared to top of wall like southern segment of Feature 33; mortar is visible.	Boundary	14.8	0.40	60-80 upslope 80-95 downslope	Along Lisbon St., starts adjacent to PCSI-18
Fe36	Terrace with retaining wall oriented approximately 320 degrees MN; resembles construction style of Feature 33 wall; constructed with 3-5 courses of reddish brown and gray dense basalt boulders and cobbles; mortar on wall is flush with rocks in wall face; at north end wall curves up to within 1.0 meter of Feature 14 wall; at north end, cut coralline limestone blocks are visible in wall at ground surface; north end of wall is visibly impacted (broken). Rectangular, level soil area has eucalyptus trees.	Residential foundation	44.2	4.4-5.7	0 upslope 70-125 downslope	In soil area at eastern end of CVPL (southeast corner)
Fe37	Pit	Unknown	NA	0.85-1.1	11-23 (top) 45-50 (base)	Trench 9, south face
Fe38	Post mold	Structural support	NA	0.10	25 (top) 48 (base)	Trench 9, south face
Fe39	Concentration of rusted metal (iron?)	Unknown	NA	0.26	35 (top) 55 (base)	Trench 10, north face
Fe40	Post mold	Structural support	NA	0.20-0.25	35 (top) 100 (base)	Trench 5, North face
Fe41	Possible pit	Unknown	NA	0.20-0.40	47 (top) 85 (base)	Trench 6, South face
Fe42	Possible pit	Unknown	NA	0.95-1.35	25 (top) 170 (base)	Trench 2, west face
Fe43	Possible pit	Unknown	NA	0.45-0.90	35 (top) 65 (base)	Trench 2, south face
Fe44	Two connecting pits	Trash disposal?	NA	1.70	15 (top) 55 (base)	Trench 7, north face

Table 2. Summary of Archaeological Surface and Subsurface Features of Site T-1 at Honolulu Board of Water Supply's Site 6 (Parking Lot Parcels)						
Feature No (Fe)	**Feature Type/Description**	**Feature Function**	**Length (m)**	**Width (m)**	**Height (cm) for surface features; Depth (cmbs) for Subsurface features**	**Location in APE (See Figure x)**
Fe45	Possible post mold; partly exposed	Structural support	NA	0.20+	18 (top) 90 (base)	Trench 7 north face
Fe46	Pit	Trash pit	NA	1.50-1.85	35 (top) 140 (base)	Trench 14, north face
Fe47	Pit	Trash pit	NA	0.55-1.60	20 (top) 70 (base)	Trench 14, south face
Fe48	Pit	Trash pit	NA	0.75-2.50	18 (top) 80 (base)	Trench 14, north face
Fe49	Pit	Trash pit?	NA	0.50-0.70	16 (top) 60 (base)	Trench 15, north face
Fe50	Pit	Trash	NA	0.35-0.58	18 (top) 63 (base)	Trench 15, north face
Fe51	Pit	Trash	NA	55-1.30	25 (top) 70 (base)	Trench 15, north face
Fe52	Pit	Unknown	NA	0.36-0.78	18 (top) 68 (base)	Trench13, southwest face
Fe53	Post mold	Structural support	NA	0.16	16 (top) 48 (base)	Trench 16, southwest face
Fe54	Concentration of basalt cobbles/pebbles (designated in field as SF-9 but SF-9 used in TR7-re-designated as SF-19 by SDC).	Road bed?	NA	3.15	30 (top) 50 (base)	Trench 19, west face
Late Pre-Contact Period						
Fe55	Pit	Burial	NA	0.70-0.90	20 (top) 82 (base)	Trench 15, north face
EPL = Employee Parking Lot; CVPL = Company Vehicle Parking Lot; VPL Visitor's Parking Lot m = meters cm = centimeters cmbs = centimeters below surface						

Figure 18 presents photographs of portions of the Feature 1 and Feature 3 walls showing the interior/exterior height differences. Portions of the Feature 3 wall appear to consist of only foundation rocks with the concrete cap situated almost flush to the ground surface (see Figure 18).

Features 1-9 are multiple-stacked with one to five courses of small, angular basalt boulders and large cobbles (lower portions of Feature 2 and 3 walls have only one to two courses of rock). Mortar is used in the interior portions of wall construction, and is often not visible in the wall faces. Where it is visible, the mortar is inset (crude tuckpointing) from the wall faces. The upper horizontal surfaces of Features 1 through 9 are capped with flat, smooth concrete. Figure 19 presents photographs of Feature 4 (southern boundary) and Feature 5 (northeast corner). Little to no mortar is visible on the faces of these two walls.

Generally, a higher percentage of dense, gray to dark gray basalt boulders and cobbles were used in the construction of the Feature 1-9 walls than were used in the construction of older residential boundary walls of this site, which are composed of predominantly reddish-brown vesicular basalt (see Figures 18 and 19). Chain-link fences have been erected on the tops of Features 4, 5, 6, 7, 8, 9, and 15 (see Figures 18 and 19). Figure 20 presents photographs of Features 6, 7, and 8 along Lauhala St. showing automobile exit gates, primarily dark gray basalt rocks in the walls, concrete caps, and chain-link fences (on top of walls) with posts penetrating the concrete caps.

The Feature 9 retaining wall extends along the northern boundary of the CVPL and ends in the northwest corner of the CVPL. Here Feature 9 connects to the Feature 14 retaining wall at the west end of the CVPL. Figure 21 presents photographs of the Feature 9 retaining wall, as well as the north end of the retaining wall of Feature 15 parking lot terrace.

Features 10, 22, and 23: Soil Terraces in the Employee Parking Lot

Features 10, 22, and 23 are soil terraces located at the eastern end of the EPL, north of the upper-most asphalt parking lot area (see Table 2; see Figure 14).

Feature 10 is a soil terrace on the northeastern end of the APE, located just east (*makai*; seaward) of a wall (Feature 33) associated with the earlier residential use the parcel. The Feature 10 terrace is approximately 20 m in length and has a basalt retaining wall oriented at approximately 310 degrees for approximately 15 m that then curving to the west where the south end abuts the Feature 33 wall. The north end of the terrace is defined by a concrete curb imbedded in the ground perpendicular to the terrace's long axis.

Figure 22 presents photographs of the Feature 10 terrace and retaining wall. After curving to the west, the wall decreases in height from north to south. The upslope height of the retaining wall ranges from .30 m to .27 m and the downslope height ranges from .50 m to .80 m (see Table 2). The soil terrace ranges from 1.3 m to 1.6 m wide.

The Feature 10 retaining wall is multiple-stacked with three to four courses of small, angular basalt boulders and large cobbles and mortar. The mortar has been applied flush to the wall faces similar to Feature 33. Feature 10 is capped with thin, leveled (flat) concrete. As with the Feature 1-9 walls, a greater percentage of dark gray basalt boulders and cobbles were used in the construction of Feature 10 than was used to construct Feature 33 (see Figure 22).

Figure 18. Photographs of Site T-1, Feature 1 and 3 Retaining Walls in EPL. Top: View to South with Feature 29 to West. Bottom: Portion of Feature 3 Showing Concrete Cap Nearly Flush to Ground.

Figure 19. Photographs of Site T-1, Feature 4 and 5, Retaining Walls. Top: Feature 4 in CVPL; View to South. Bottom: Feature 5 (foreground) and Feature 6 (background); View to West.

Figure 20. Photographs of Site T-1, Features 6, 7, and 8, Retaining Walls. Top: Features 6 (foreground) and 7 (background); View to South. Bottom: Feature 8 on North Side of CVPL; View to Southwest.

Figure 21. Photographs of Site T-1, Features 9 and 15, Retaining Walls. Top: Feature 9, View to South. Bottom: West End of Feature 9 (left) and South End of Feature 15; View to South.

Figure 22. Photographs of Site T-1, Feature 10, Terrace. Top: Feature 10 Terrace with Concrete-capped Retaining wall; Feature 33 in the Background; View to South. Bottom: Feature 10 Soil Terrace Showing Curbing on Surface that Defines North End of Terrace; Feature 33 Wall on Left; View to South.

To the west of Feature 10, Feature 22 is a soil terrace expediently faced with stacked concrete parking stall bumpers and wasted concrete fragments (one to two courses high). The terrace is bound on the north by Feature 33 (see Figure 14; see Table 2). Feature 22 is approximately 25 m in length.

Figure 23 presents a photograph of Feature 22. The upslope height of this retaining face is approximately .05 m and the downslope height ranges from approximately .30 m to .40 m. (see Table 2). The soil terrace ranges from 5 m to 6 m wide, and slopes up to the northeast to Feature 33. The disturbed surface includes several large boulders and is planted with coconut palms, bougainvillea, and Norfolk pines.

To the west of Feature 22, Feature 23 is a mounded soil terrace in the northwest corner of the APE (see Figure 14; see Table 2). Feature 23 is approximately 10 m in length, and is expediently faced with cut basalt blocks, concrete slabs, and other materials.

Figure 23 presents a photograph of Feature 23. The upslope height of the basalt block/concrete slab retaining wall ranges from .20 m to .30 m and the downslope height ranges from .30 m to .65 m. (see Table 2). The terrace ranges from 7 to 8 m wide, and contains a large, disturbed, soil mound. The terrace slopes up to the east to Feature 33. Sparse grass is growing on the mound's surface.

Features 11-15: Asphalt Parking Lot Terraces and Double Curb

Features 11, 13, 14, and 15 consist of broad, asphalt-paved terraces (used as parking lots) defined on the downslope side by vertical basalt boulder and cobble retaining walls. Feature 12 includes two low, parallel, curbs that divide the Feature 13 terrace into two parking areas. From west to east, Features 11, 13, and 14 comprise the stepped EPL (see Figure 14 and Table 2).

Feature 11 is the uppermost terraced parking area in the EPL (see Figure 14). Figure 24 presents a photograph of Feature 11. The mortared retaining wall is stacked with three to five courses of dark gray vesicular and dense basalt boulders and large cobbles. The mortar is flush with the rock face, and the upper horizontal surface is capped with flat, smooth, concrete. The Feature 11 retaining wall is approximately 55.9 m in length. The terrace (including the wall) ranges from 14.5 m to 17.2 m wide.

Feature 13 is the central parking area in the EPL (see Figure 14). Figure 24 presents a photograph of a portion of Feature 13. The mortared retaining wall is stacked with three to five courses of dark gray vesicular and dense basalt boulders and large cobbles. The mortar is flush with the rock face, and the upper horizontal surface is capped with flat, smooth, concrete. The Feature 13 retaining wall is approximately 65 m in length. The terrace (including the wall) ranges from 33.8 m to 34.2 m wide.

Feature 13 is bisected northwest to southeast by a .15 m to .17 m high concrete block double curb designated as Feature 12 (see Figure 14; see Table 2). The two curbs are approximately 56 m in length and abut a low terrace (Feature 29) at the south end. The parallel curbs are approximately .30 m apart (Figure 24; see Table 2). The curbs are comprised of joined individual concrete blocks measuring approximately 1.8 m long, .15 m wide, and .15 m high.

Figure 23. Photographs of Site T-1, Features 22 and 23, Terraces. Top: Feature 22, View to Southeast. Bottom: Feature 23, View to Northeast.

Figure 24. Site T-1, Features 11 and 13, Parking Lot Terraces, and Feature 12, Double Concrete Curb. Top: Feature 11 (background) and Feature 13 (foreground); View to Southwest. Bottom: Feature 11 (background) and Feature 12 (foreground); View to Southwest.

At the north end of the Feature 11 and 13 retaining walls are concrete block curbs that abut the walls at an acute angle. These curbs, about 3.8 m in length, mark the end of the northern-most parking stalls for these two parking lot terraces. Figure 25 presents photographs of these concrete curbs. The curbs are comprised of joined individual concrete blocks measuring approximately .45 m long, .15 m wide, and from .10 m to .26 m high.

Feature 14 is the western-most and lowest stepped terrace parking area in the EPL (see Figure 14). Figure 26 presents photographs of the Feature 14 retaining wall. The mortared retaining wall is stacked with three to five courses of dark gray vesicular and dense basalt boulders and large cobbles. The mortar is inset (crude tuckpointing) from the rock face, and the upper horizontal surface is capped with flat, smooth, concrete. The Feature 14 retaining wall is approximately 72.1 m in length. The terrace (including the wall) ranges from 15.3 m to 16.8 m wide.

At the north end of the Feature 14 retaining wall, two .30 m diameter pipes have been incorporated into the wall's construction to facilitate water drainage from the EPL into the CVPL (Feature 15; see Figure 26). The two pipes empty into a shallow concrete culvert between the Feature 18 terrace and the Feature 24 terraced planter in the CVPL (see the Feature 24 description below).

The Feature 15 parking lot terrace comprises the entire CVPL (see Figure 14 and Table 2). Figure 27 presents photographs of portions of the Feature 15 retaining wall (see also Figures 16 and 21). This wall is constructed primarily of dark gray vesicular and dense basalt boulders and large cobbles with mortar. The upper horizontal surface of the wall is capped with smooth concrete; there is little mortar visible in the wall faces.

In the approximate center of the Feature 15 retaining wall is a one-lane, vehicle access ramp leading from the CVPL down into the VPL (see Figure 27). It was not assigned a feature number, and it is not certain when this ramp was constructed.

Features 16-18: Soil Terraces in the Company Vehicle Parking Lot (CVPL)

Features 16 through 18 are three soil terraces in the northwest corner of the CVPL (see Figure 14 and Table 2). These terraces contain different types of retaining elements and abut Feature 14 in the EPL.

Feature 16 is a soil terrace at the eastern end of the CVPL, north of Feature 36 (see Figure 14). The terrace is approximately 7.7 m long, 2.5 m wide, and has retaining elements consisting of three to four courses of stacked concrete parking stall bumpers. The downslope height of the retaining wall ranges from .51 m to .74 m (see Table 2). Figure 28 presents a photograph of Feature 16. The level soil terrace appears to be disturbed (mixed), and has been planted with Eucalyptus trees and aloe plants.

Feature 17 is immediately north of Feature 16 in the northeastern corner of the CVPL (see Figure 14 and Table 2). The terrace is approximately 8.6 m long, 3.2 m wide, and has retaining elements consisting of two courses of cut basalt blocks (Figure 28). The downslope height of the basalt block retaining wall ranges from .23 m to .54 m. The disturbed level soil area has been planted with Eucalyptus and Plumeria trees.

Figure 25. Photographs of Site T-1, North End of Features 11 and 13 Parking Lot Terrace Retaining Walls. Top: North end of Feature 11; View to South. Bottom: North end of Feature 13, View to South.

Figure 26. Photographs of Site T-1, Feature 14, Parking Lot Terrace. Top: Feature 14, View to North. Bottom: Feature 14 Showing Two Drainage Pipes, View to Northwest.

Figure 27. Photographs of Site T-1, Feature 15, Parking Lot Terrace. Top: Feature 15 Retaining Wall, View to South. Bottom: Vehicle Ramp Incorporated into Feature 15, View to Northwest.

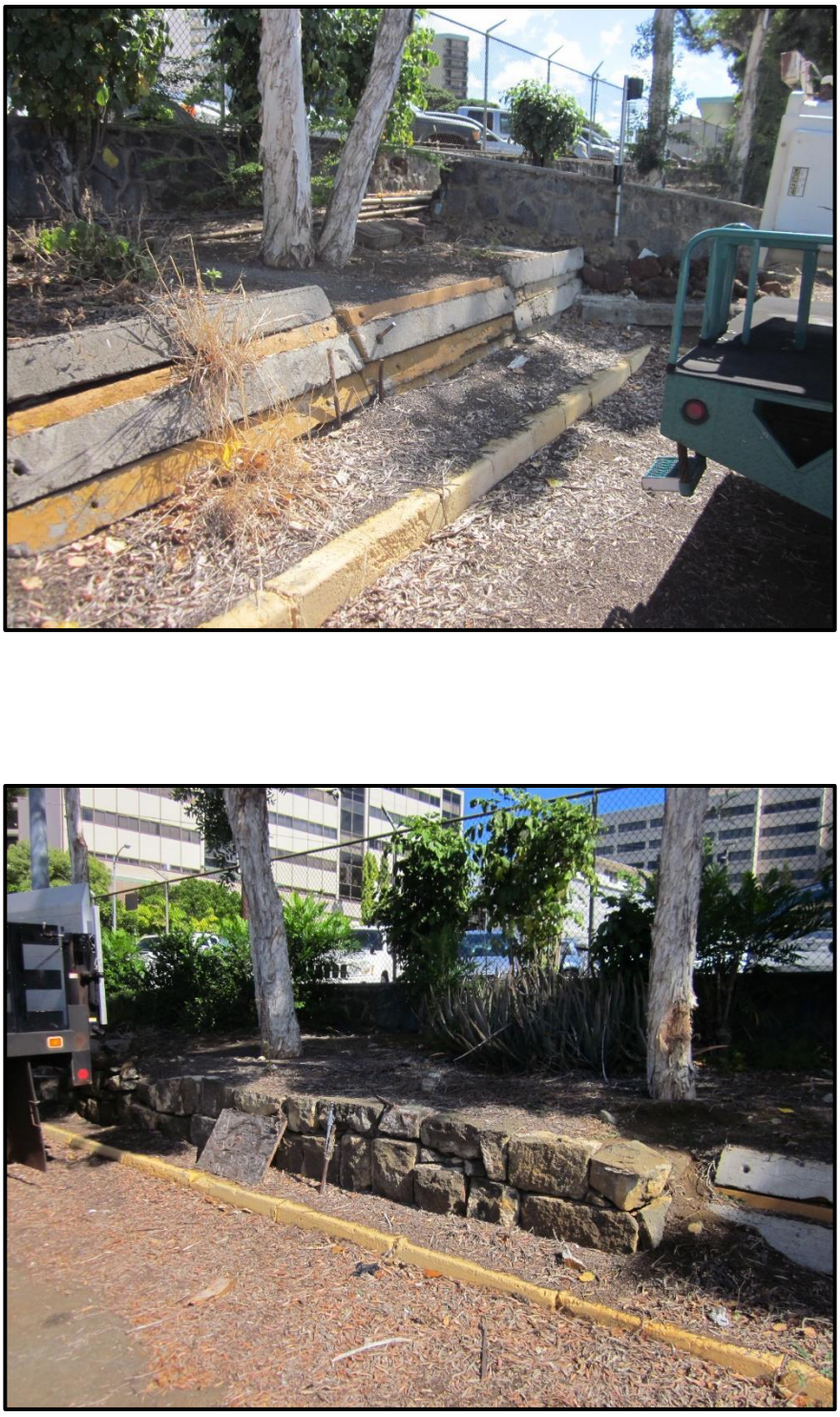


Figure 28. Photographs of Site T-1, Features 16 and 17, Terraces. Top: Feature 16, View to Southeast. Bottom: Feature 17, View to Northeast.

Feature 18 is a soil terrace immediately north of Feature 17 in the northeastern corner of the CVPL (see Figure 14 and Table 2). The terrace is approximately 18.1 m long, 3.5 m wide, and has retaining elements consisting of concrete slabs, parking stall bumpers, red bricks, decorative concrete blocks, concrete chunks, an iron bed frame, and an old bathtub (Figure 29). The downslope height of the retaining wall ranges from .80 m to 1.0 m. (see Table 2). The disturbed soil terrace has been planted with Eucalyptus trees.

Located between Feature 18 and Feature 19 (terraced planter) is a shallow concrete drainage culvert adjacent to the pipes incorporated into the Feature 15 retaining wall above Feature 18 (see description for Feature 19 below).

Features 19-21 and 24-26: Terraces (Planters)

Features 19-21 and 24-26 are a series of six narrow, roughly linear terraces along the northern boundary of both the EPL and CVPL (see Figure 14 and Table 2). These terraces are defined by low concrete walls and curbs on the south and by Features 5-9 on the north. The terraces are being used as garden planters for flowering shrubs.

Feature 19 is a terrace located in the northwest corner of the CVPL, northwest of Feature 18 and immediately adjacent to a concrete drainage culvert between Features 19 and 18. Feature 19 is 14 m long, approximately 1.25 m wide, and is retained by a .16 m high concrete curb on the south and Feature 7 on the north. The soil terrace is planted with lilies, hibiscus, and other plants (Figure 30)

A concrete drainage culvert defines part of the southern boundary of Feature 19. The drainage measures 3.8 m long and .64 m wide. Curbing on the culvert measures .10 m wide and .26 m high. The two pipes incorporated into the Feature 14 retaining wall facilitate water drainage into the culvert (see Figure 30).

Feature 20 is a terrace west of Feature 19 in the north-central portion of the CVPL (see Figure 14 and Table 2). The terrace is 12.2 m long, 1.25 m wide, and is retained by a .16 m high concrete curb on the south and Feature 8 on the north. The soil terrace is planted with hibiscus (Figure 31).

Feature 21 is a terrace west of Feature 20 in the northwest corner of the CVPL (see Figure 14 and Table 2). The terrace is 6.6 m long, 1.25 m wide, and is retained by a .16 m high concrete curb on the south and Feature 9 on the north. The soil terrace is planted with hibiscus (Figure 31).

Feature 24 is a terrace in the northeast corner of the EPL (see Figure 14 and Table 2). The terrace is approximately 5.9 m long, 1.1 m wide, and is retained by a .10 m to .27 m concrete wall on the south and Feature 5 on the north. The soil terrace is planted with bougainvillea and other exotic plants (Figure 32).

Feature 25 is a terrace in the north-central portion of the EPL (see Figure 14 and Table 2). The terrace is approximately 29 m long, 1.1 m wide, and is retained by a .20 m to .86 m concrete wall on the south and Feature 6 on the north. The soil terrace is planted with bougainvillea and other exotic plants (Figure 32).

Feature 26 is a terrace in the northwest corner of the EPL (see Figure 14 and Table 2). The terrace is approximately 22.7 m long, 1.9 m wide, and is retained by a .16 m to .60 m high wall on the south and Feature 7 on the north. The soil terrace is planted with bougainvillea and exotic grasses (Figure 33).

Figure 29. Photographs of Site T-1, Feature 18, Terrace. Top: Feature 18, View to East. Bottom: Feature 18, View to Southeast.

Figure 30. Photographs of Site T-1, Feature 19, Terrace. Top: Feature 19, View to West. Bottom: Feature 19 Terrace (left), North End of Feature 18 (right), View to West.

Figure 31. Photographs of Site T-1, Features 20 and 21, Terraces. Top: Feature 20, View to West. Bottom Feature 21, View to East.

Figure 32. Photographs of Site T-1, Features 24 and 25, Terraces. Top: Feature 24, View to Northeast. Bottom: Feature 25, View to Northeast.

Figure 33. Photographs of Site T-1, Feature 26, Terrace. Top: Feature 26, View to Southwest. Bottom: Feature 26, View to Northeast (after landscape maintenance).

Features 27-32: Terraces

Features 27 through 32 are a series of six low rectangular to irregular-shaped terraces along the southern boundary of the EPL. These terraces are defined by low curbs fashioned from concrete and cut coral block curbs, and function as planting areas and control traffic (see Figure 14 and Table 2).

Feature 27 is a terrace in the southeast corner of the EPL (see Figure 14 and Table 2). The terrace is triangular shaped and measures approximately 5.8 m by 5.1 m by 3.1 m, and is retained by a .20 m high concrete curb on the north, by Feature 11 on the west, and by Feature 34 on the south. Two coconut trees are growing in the level soil area (Figure 34).

Feature 28 is a terrace in the southeast corner of the EPL, immediately west of Feature 27 (see Figure 14 and Table 2). The terrace triangular-shaped and measures approximately 5.8 m by 5.2 m by 3.0 m, and is retained by a .23 m high concrete curb. The level soil area is planted with exotic weeds and grasses (Figure 34).

Feature 29 is a terrace in the south-central portion of the EPL, southwest of Feature 28 (see Figure 14 and Table 2). The terrace is roughly rectangular-shaped approximately 11.7 m long, .9 m to 2.7 m wide, and is retained by a .26 m high concrete curb. The level soil area is planted with exotic weeds and grasses (Figure 35).

Feature 30 is a terrace in the south-central portion of the EPL (see Figure 14 and Table 2). The terrace is rectangular-shaped approximately 5.5 m long, 1.2 m wide, and is retained by a .22 m high concrete curb. The level soil area is planted with hibiscus (Figure 35).

Feature 31 is a terrace west of Feature 30 in the southwest corner of the EPL (see Figure 14 and Table 2). The terrace is roughly triangular-shaped, measures approximately 4.8 m by 4.6 m by 4.5 m, and is retained by a .13 m high cut coral block curb (Figure 36).

Feature 32 is a terrace in the southwest corner of the EPL (see Figure 14 and Table 2). The terrace is a roughly triangular-shaped, measures approximately 7.5 m by 5.2 m by 4.9 m, and is retained by a .13 m to .15 m cut coral block curb (Figure 36). A white porcelain button was recorded on the surface of Feature 32 (not collected) (Figure 37).

SITE T-1, FEATURES 33-54, RESIDENTIAL ERA- LATE 1800S TO 1958

The Late Historic Land Use section indicates that the APE contained several structures by 1893 that may have been residences. Figures 6 through 9 show the growth of urban/residential use in the APE between the late 1800s and the late 1920s. Based on Figure 11, the residential structures were gone by 1958.

The pedestrian survey of BWS Site 6 identified three basalt walls and a terrace that appear to be older than the basalt rock walls associated with the construction of the EPL and CVPL. These features, designated Features 33 through 36 comprise the surface features associated with the Residential period of Site T-1 (see Figure 14 and Table 2). These include:

- Feature 33: A retaining wall parallel to Lusitana Street. This wall has eight subfeatures, designated Features 33.1 through 33.8;
- Feature 34: A segment of a retaining wall near the corner of Lisbon and Lusitana Streets;
- Feature 35: A segment of a retaining wall at the southeast corner of the CVPL; and
- Feature 36: A rock faced terrace in the southeast corner of the CVPL.

Figure 34. Photographs of Site t-1, Features 27 and 28, Terraces. Top: Feature 27 Abutting Feature 34 (left) and Top of Feature 11 Wall, View to South. Bottom: Feature 28 Abutting Feature 34 (right) With Feature 11 Wall and Feature 27 in background, View to Northeast.

Figure 35. Photographs of Site T-1, Features 29 and 30, Terraces. Top: Feature 29, View to East. Bottom: Feature 30, View to Northwest.

Figure 36. Photographs of Site T-1, Features 31 and 32, Terraces. Top: Feature 31, View to South. Bottom: Feature 32, View to West.

Figure 37. Photographs of Feature 32, Cut Coral Curb and Surface Artifact. Top: Feature 32 Cut Coral Blocks, View to West. Bottom: Button Recorded on the Surface of Feature 32, View to West.

In addition, 18 subsurface features recorded during backhoe and hand excavations in the EPL, CVPL, and Visitor's Parking Lot, are associated with the Residential period of the site. These features, designated as Features 37 through 54, will be presented at the end of this section, and further discussed in the sections titled "Stratigraphy in the APE" and "Excavation Results."

Feature 33: Retaining Wall and Features 33.1 through 33.8

Feature 33 is a multiple stacked, four to five courses high basalt retaining wall extending from Lauhala Street on the north to Lisbon Street on the south along the eastern boundary of the BWS Site 6 parcel (see Figure 14 and Table 2). The wall is 60.3 m long and from .35 m to .55 m in wide, with upslope (exterior) height ranges from .30 m to .50 m and downslope height ranges from .60 m to 1.1 m.

The Feature 33 wall construction style differs from north to south. South of Feature 33.4, a broad intentional gap in the wall (sealed with concrete), construction materials include mostly reddish brown (with some gray), small vesicular basalt boulders and large cobbles. The wall is capped with small, flat, overhanging, basalt boulders rather than with a thin layer of concrete typical elsewhere in the project area (Figures 38 and 39). Mortar in this segment of the wall is flush with the rock faces.

North of Feature 33.7, construction materials include primarily gray basalt boulders. The mortar is inset and not typically visible on the wall faces. In addition, the top of the wall lacks uniform capping but is well faced with basalt (Figure 40). In some areas, mortar is present on the top of the wall and is grooved (combed) (Figure 41).

There are eight component features of the Feature 33 wall, designated as Features 33.1 through 33.8, which may be indicative of residential use. The wall has undergone repairs and renovations over time.

Features 33.1 and 33.2 have been identified as entry ways built into the wall, likely for pedestrian access (see Figure 14 and Table 2). Basalt rock piers border the entry ways (Figure 42). The openings between the rock piers of Features 33.1 and 33.2 measure 1.45 m and 1.20 m, respectively.

As can be seen in Figure 42, the openings were sealed at some point after the original construction with four to five courses of mortared small basalt boulders and large cobbles. The mortar is flush with the rocks in the sealed portion. The rock and mortar "seals" within the openings are supported by concrete slabs (1.55 m long and .16 m thick), which originally likely served as threshholds.

The rock piers are similar in construction to the Feature 33 wall, and were constructed using four to five courses of mortared, reddish brown, small basalt boulders and large cobbles. They are roughly square in cross-section, measuring .45 m wide on a side and 1.10 m high. Each pier is capped with small basalt boulders that are mortared in place (see Figure 41).

The upper courses of rock that comprise the sealed portion of Feature 33.1 appear to have been removed, while the upper portion of the sealed portion of Feature 33.2 is flush with the top of the rock piers (see Figure 42).

Figure 38. Photographs of Site T-1, Southern Portion of Feature 33, Retaining Wall. Top: Feature 33 (background) Showing Boulder Cap and Feature 10 (foreground); View to North. Bottom: Feature 33 Boulder Cap; View to Northeast.

Figure 39. Photograph of Site T-1, Feature 33, Top of Retaining Wall Showing Boulder Cap, View to South.

Figure 40. Photographs of Site T-1, Northern Portions of Feature 33 Retaining Wall. Top: Feature 33 North End Exterior Abutting Feature 5 Wall with Chain-link Fence, View to South. Bottom: Feature 33 North End Interior Abutting Feature 5 Wall with Chain-link Fence, View to West.

Figure 41. Photographs of the Top of Feature 33 Retaining Wall and Feature 33.1 Entry Pier. Top: North End of Feature 33 Showing Grooved Mortar, View to East. Bottom: Feature 33.1 Top of North Entry Pier Showing Mortar and Concrete Boulder Cap, View to South.

Figure 42. Photographs of Site T-1, Features 33.1 and 33.2, Sealed Entry Gates. Top: Feature 33.1, Sealed Entry with Basalt Entry Piers and Concrete Threshold, View to East. Bottom: Feature 33.2 Sealed Entry with Rock Piers, View to West.

Features 33.3 and 33.7 are single basalt piers located on either end of a concrete retaining wall segment (Feature 33.4) (see Figure 14). These piers are similar in construction and size to the piers bordering Features 33.1 and 33.2, exhibiting rock and mortar construction with boulder caps (see Table 2). Feature 33.7 is the tallest pier (1.6 m downslope height) present in the Feature 33 wall (Figure 43).

Feature 33.4 is a concrete wall segment located between Feature 33.3 to the south and Feature 33.7 to the north. The concrete wall is 11.0 m long, .18 m wide, and 1.10 m high (Figure 44). As can be seen in Figure 44, Feature 33.4 is leaning inward toward the west (downslope).

Feature 33.4 also has a sealed gate (Feature 33.5) with concrete pillars, and an additional concrete pillar (Feature 33.6) on the north end of the concrete wall, adjacent to the Feature 33.7 rock pillar (see Figure 43). Figure 45 presents a photograph of Feature 33.5 sealed concrete gate. This feature has two concrete pillars on either side of the sealed gate. The sealed gate measures 1.0 m wide and 110 cm in height. The sealed portion consists of a series of concrete 9-10 layers of concrete slabs with two concrete blocks at the base.

Feature 33.6, is a concrete pillar located adjacent to Feature 33.7 basalt rock pillar (see Figure 14). This concrete pillar is square in cross-section (.22 m on a side) and measures 125 cm in height on the downslope side (see Table 2; see Figure 43).

Feature 33.8 appears to be a repaired section of the northern portion of the Feature 33 retaining wall located approximately 5.0 m north of the Feature 33.7 basalt rock pillar (see Table 2; see Figure 14). The repaired section consists of four to five courses of small vesicular basalt boulders and large cobbles, and measures approximately 1.10 m by 1.10 m (see Figure 45).

Features 34 and 35 Residential Boundary Walls and Feature 36 Terrace

Feature 34 is a retaining wall located between Entrance 1 and Exit 1 of the EPL (see Table 2; see Figure 14). This wall, which was built parallel to Lisbon Street, exhibits the same construction technique and materials as the Feature 33 retaining wall. Figure 46 presents photographs of the Feature 34 wall. This wall measures 13 m in length and .50 in width. The upslope (exterior) height ranges from 40 to 60 cm; downslope height ranges from 35 to 65 cm.

The Feature 34 wall was constructed with two to three courses of mostly reddish brown (with some gray), small vesicular basalt boulders and large cobbles. Mortar was used in the construction and is flush with the rocks in the wall's faces. Like the Feature 33 wall, the top of the Feature 34 wall is capped with basalt boulders mortared in place.

Feature 35 is a retaining wall built parallel to Lisbon Street that extends from the Feature retaining wall to Entrance 1 of the CVPL (see Table 2; see Figure 14). Like Feature 34, this wall exhibits the same construction technique and materials as the Feature 33 wall. Figure 47 presents photographs of the Feature 35 wall. This wall measures 14.8 m in length and .4 0 in width. The upslope (exterior) height ranges from 60 to 80 cm; downslope height ranges from 80 to 95 cm.

The Feature 35 wall was constructed with one to three courses of mostly reddish brown (with some gray), small vesicular basalt boulders and large cobbles. Mortar was used in the construction and is flush with the rocks in the wall's faces. Like the Feature 33 and 34 walls, the

Figure 43. Photographs of Site T-1, Features 33.3 and 33.7, Rock Piers in Feature 33. Top: Feature 33.3, View to North. Bottom: Feature 33.7, View to Northwest.

Figure 44. Photographs of Site T-1, Feature 33.4 Concrete Wall Segment. Top: Feature 33.4 (Concrete Retaining Wall) and Feature 33.5 (Sealed Entry), View to East. Bottom: Feature 33.4, View to North.

Figure 45. Photographs of Feature 33.5 Sealed Concrete Gate and Feature 33.8 Repaired Section of Feature 33 Retaining Wall. Top: Feature 33.5, View to East. Bottom: Feature 33.8, View to East.

Figure 46. Photographs of Site T-1, Feature 34, Retaining Wall. Top: Feature 34, View to West. Bottom: Feature 34 Showing Top of Wall Capped with Boulders, View to East.

Figure 47. Photographs of Site T-1, Feature 35 Retaining Wall. Feature 35 (interior), View to Southeast. Bottom: Feature 35 (exterior), View to North.

top of the Feature 35 wall is capped with basalt boulders mortared in place (see Figure 47). A chain-link fence has been erected on top of the Feature 35 wall.

Feature 36 is a large terrace located in the southeast corner of the CVPL (see Table 2; see Figure 14). The central and southern portions of this terrace's retaining wall exhibits similarities in construction and materials to the Feature 33, 34, and 35 walls. Three to five courses of reddish brown and gray basalt boulders and cobbles with mortar applied flush to the rocks in the retaining wall's face. Figure 48 presents photographs of Feature 36. This terrace measures 44.2 m in length and ranges from 70 to 125 cm in downslope height.

The terrace wall retains a level soil area that ranges from 4.4 to 5.7 m in width. The soil is flush with the top of the wall. Glass, ceramic, and metal artifacts were observed on the soil surface but not collected.

The north end of the retaining wall curves upslope to the west and ends approximately 1.0 m south of the Feature 14 retaining wall. Figure 49 presents photographs of the northern portion of the Feature 36 retaining wall. The curved portion of the wall is constructed with 2-3 courses of medium, dense basalt boulders and is capped with a flat, smooth concrete surface. The retaining wall at the north end measures 70-75 cm in downslope height. At the base of the wall's north end, are cut coralline limestone blocks (see Figure 49).

Features 37 through 54, Subsurface Features

Features 37 through 54 are subsurface components of Site T-1's Residential Era. These features were encountered during subsurface testing within the EPL, CVPL, and VPL, and are believed to be associated with former residential structures within the APE as seen on old maps (see Figures 6-11). Table 3 presents a summary of these features, and includes feature type and function, metric data, base morphology, layer of origin, and descriptions of feature fills. Figure 14 shows the location of these features within the APE.

The 18 subsurface features include nine pits (Features 37, 44, and 46-52), three possible pits (Features 41-43), three post molds (Features 38, 40, and 53), one possible post mold (Feature 45), one rusted metal concentration (Feature 39) and one cobble/pebble concentration (Feature 54).

Functional determinations of subsurface features were based primarily on feature morphology and feature contents. Twelve of the 18 subsurface features were designated as pits and possible pits. Pits are defined here as excavations of various sizes and purposes that extend at least 5.0 cm into the underlying stratum (depth parameter based on Rieth and Duarte: 2015: 121). Pits whose depth is greater than two times the width (ratio based on Rieth and Duarte: 2015:121), with straight sides and varied base topography (round, pointed, subrounded, flat) were assigned a "post mold" as a feature form with a "structural support" function. There were no fire pits or fire features encountered.

Of the 18 subsurface features, 11 contained archaeological materials (see Table 3). These include Features 37 (pit), 39 (concentration of rusted metal), 40 (post mold), 41 (possible pit), 44 (two connecting pits), 46 (pit), 47 (pit), 49 (pit), 50 (pit), 51 (pit), and 53 (post mold). The remaining seven subsurface features did not contain archaeological materials in collected samples, nor were there any materials visible in the profiles within excavated trenches.

With the exception of Features 42 (possible pit), 43 (possible pit), and 54 (cobble/pebble concentration), all subsurface features originate within Layer I (see Table 3). Features 42 and 43, identified in TR2, appear to be associated with Fill B deposits (Layer I is not present in TR2). The fills for these two features, however, resemble fills of features associated with Layer I.

Figure 48. Photographs of Site T-1, Southern and Central Portions of Feature 36, Terrace. Top: Feature 36 South End (on basalt bedrock), View to Southeast. Bottom: Feature 36, View to North.

Figure 49. Site T-1, North End of Feature 36, Terrace. Top: Feature 36, North End Showing Curve in Wall, View to Northeast. Bottom: North End of Feature 36 Showing Coralline Limestone at Base of wall, View to East.

Table 3. Summary of Subsurface Features from the Residential Era Identified During Excavations at BWS Parking Lots.								
Permanent Subsurface Feature No.	**Feature Type**	**Feature Function**	**Width (cm) in Cross-Section**	**Depth (cmbs)**	**Base Morphology**	**Layer of Origin**	**Location**	**Description of Feature Fill**
Fe37	Pit	Unknown	80-103	11-50	Roughly flat	Layer I	Trench 9, south face	Black to very dark brown (10YR 2/1.5, moist) silty sand; loose, friable, nonsticky, nonplastic; few, fine, interstitial roots; abrupt, smooth lower boundary; contains glass, ceramic, and cut bone artifacts and vertebrate faunal remains (medium and large mammal).
Fe38	Post mold	Structural support	10	25-48	Flat	Layer I	Trench 9, south face	Very dark gray (10YR 3/1, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; no archaeological materials recovered.
Fe39	Concentration of rusted metal (iron?)	Trash pit	26	35-55	Roughly flat	Layer I/II mixed	Trench 10, north face	Mixed very dark brown (10YR 2/2, moist) silty sand and black (10YR 2/1, moist) cinder sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains rusted metal fragments.
Fe40	Post mold	Structural support	20-25	35-100	Flat	Layer I	Trench 5, north face	Very dark brown (10YR 2/2, moist) silt loam; loose, friable, slightly sticky, slightly plastic; no roots; abrupt, smooth lower boundary; contains ceramic artifacts.
Fe41	Possible pit	Unknown	18-35	47-85	Roughly flat	Layer I	Trench 6, south face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains metal artifacts.
Fe42	Possible pit	Unknown	95-135	25-170	Flat	Fill B	Trench 2, north face	Mixed black (10YR 2/1, moist) cinder sands and white (2.5YR 8/1, moist) coral sands; loose, friable, nonsticky, nonplastic; violently effervescent; no roots; abrupt, smooth lower boundary; no archaeological materials recovered.
Fe43	Possible pit	Unknown	45-90	35-65	Rounded	Fill B	Trench 2, south face	Very dark brown (10YR 2/2, moist) sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; no archaeological materials recovered.
Fe44	Two connecting pits	Trash disposal?	170	15-55	Flat	Layer I	Trench 7, north face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains vertebrate faunal remains (fish and unidentified medium vertebrates).
Fe45	Post mold; partly exposed	Structural support	20+	18-90	Flat	Layer I	Trench 7 north face	Black to very dark brown (10YR 2/1.5, moist) sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; no archaeological materials recovered.
Fe46	Pit	Trash pit	150-185	35-140	Roughly flat	Layer I	Trench 14, north face	Black to very dark brown (10YR 2/1.5, moist) silty sand; loose, friable, nonsticky, nonplastic; few, fine, interstitial roots; abrupt, smooth lower boundary; contains artifacts of glass, ceramic, metal, shell, celluloid and cut bone artifacts and vertebrate faunal remains (unidentified medium, medium to large and large mammal, and pig.
Fe47	Pit	Trash pit	55-160	20-70	Rounded	Layer I	Trench 14, south face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains glass, ceramic, metal, and bone artifacts and vertebrate faunal remains (unidentified medium vertebrates, unidentified medium and large mammals).
Fe48	Pit	Trash pit	75-250	18-80	Roughly rounded	Layer I	Trench 14, north face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; no archaeological materials recovered.
Fe49	Pit	Trash pit?	50-70	16-60	Roughly rounded	Layer I	Trench 15, north face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains glass and rusted metal artifacts (not collected).

Table 3. Summary of Subsurface Features from the Residential Era Identified During Excavations at BWS Parking Lots.								
Permanent Subsurface Feature No.	**Feature Type**	**Feature Function**	**Width (cm) in Cross-Section**	**Depth (cmbs)**	**Base Morphology**	**Layer of Origin**	**Location**	**Description of Feature Fill**
Fe50	Pit	Trash	35-58	18-63	Roughly rounded	Layer I	Trench 15, north face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains glass and rusted metal artifacts and unidentified large mammal bone (not collected).
Fe51	Pit	Trash	128	25-70	Roughly rounded	Layer I	Trench 15, north face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains rusted metal artifacts and pieces of unidentified large mammal bone (not collected).
Fe52	Pit	Unknown	36-78	28-50	Flat	Layer I	Trench13, southwest face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; no archaeological materials recovered.
Fe53	Post mold	Structural support	16	16-48		Layer I	Trench 16, southwest face	Very dark brown (10YR 2/2, moist) silty sand; loose, friable, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; contains concrete fragments (not collected).?
Fe54	Cobble/pebble concentration	Road bed?	315	10-23		Fill B2	Trench 19, west face.	Dark reddish gray (5YR 4/2, moist) very cobbly, pebbly, sandy clay; hard, firm, slightly sticky, slightly plastic; no roots; abrupt, smooth lower boundary; no archaeological materials recovered.

Feature 54, a cobble/pebble concentration interpreted as a possible buried road bed, is associated with Fill B2.

There are variations in the color and texture of subsurface feature fills. The colors are generally dark in color, with colors including black, very dark gray, very dark brown, and dark reddish gray. Textural variations include sandy silt, silty sand, silt loam, and sand. Feature 54 fill is a very cobbly, pebbly, sandy clay.

Subsurface features are further discussed in the section below titled "Excavation Results."

SITE 50-18-T-1, FEATURE 55, LATE PRE-CONTACT USE ERA-1952-PRESENT

The late pre-Contact Era of Site T-1 is represented by one subsurface feature, designated as Feature 55. This feature, a human burial, was encountered during backhoe excavation of TR15 in central portion of the CVPL (see Figure 14).

Observations of the north face of TR15 indicated that upper portions of Layer I had been mixed and disturbed, and it was noted that upper portions of the Feature 55 burial pit had been truncated. The portion of the pit remaining ranged in width from .70 m to .90 m, and in depth from approximately .25 m to .83 m (see Table 2). Three other pit features were documented in TR15. Two of these, Features 50 and 51, are present on either side of the Feature 55 burial.

Based on consultation with SHPD, the Honolulu BWS, NORESCO, and a recognized cultural descendent to burials in Waikiki Ahupua`a, PCSI archaeologists screened the back dirt pile to search for additional skeletal components of this burial. In addition, interim protective measures were implemented to protect the burial until determinations were made regarding the preservation of the burial and long-term protective measures. Interim protective measures included:

1. wrapping the skeletal remains in linen and placing them in a brown paper bag,
2. building a wooden box to protect the remains still present in the north face of TR15,
3. placing the linen-wrapped bones under the wooden box
4. placing a steel plate over TR15, and
5. covering the steel plate and back dirt piles with plastic tarps to keep the area dry.

In addition, safety barricades were placed around the location of Feature 55. Figure 50 presents photographs of the wooden box before the steel plate was placed for TR15 and the protective covering and safety barricades.

EXCAVATION RESULTS

Excavation of 21 trenches were conducted as part of the AIS for this project. This included excavation of 17 backhoe trenches and four hand-excavated trenches. Figure 14 shows the location of the 21 excavations within the project APE. This section presents the stratigraphy documented in the APE and a brief description of the excavation units.

Stratigraphy

A total of nine (9) stratigraphic layers were identified during archaeological subsurface testing at the Honolulu BWS APE. These layers include seven (7) fill deposits, designated as Fills A, A1, B, B1, B2, C, and D, and two *in situ* stratigraphic layers, designated as Layers I and II.

Table 4 provides detailed descriptions of stratigraphic layers along with interpretations and information regarding where the layers were encountered during subsurface testing. An

Figure 50. Photographs of Site T-1, Protective Measures for Feature 55 Human Burial. Top: TR15 post excavation with Wooden Protective Box over Feature 55, View to Southwest. Bottom: Feature 55 Showing Tarps Covering TR15 and Backdirt Piles, View to North.

Table 4. Summary of Stratigraphic Layers Identified in BWS APE.

Layer	Interpretation	Description	Distribution
Fill A	Marine sediments; cultural fill; base course for asphalt pavement	3-20 cm thick; white to (10YR 8/1, moist), small coral cobbles and pebbles in a fine to coarse coral sand matrix; hard, firm, nonsticky, nonplastic; strongly effervescent; no roots; abrupt, smooth, lower boundary; no archaeological materials observed.	TR1-20
Fill A1	Terrigenous sediments; cultural fill; base course for asphalt	15-24 cm thick; grayish brown (10YR 5/2, moist) small basalt cobbles and pebbles in a fine to coarse basalt sand matrix; hard, firm, nonsticky, nonplastic; no roots; abrupt, smooth lower boundary; no archaeological materials observed	TR21
Fill B	Terrigenous and marine sediments; cultural fill	5-35 cm thick; dark brown (7.5YR 3/4, moist) cobbly, pebbly silty clay loam with approximately 10-15%, by volume, subrounded coral cobbles and pebbles; hard, firm, slightly sticky, very slightly plastic; few, fine, interstitial roots; abrupt, wavy lower boundary; contains historic artifacts (glass, ceramic and metal) in TR11 and non-cultural in TR1-3.	TRs 1, 2, 3, 11
Fill B1	Terrigenous and marine sediments; historic fill deposit	4-20 cm thick; dark reddish brown (10YR 8/1, moist) clay; contains less than 5%, by volume, basalt and coral pebbles; hard, very firm, sticky, plastic; few, fine interstitial roots; abrupt, smooth, lower boundary; one piece of non-diagnostic bottle glass observed in TR20.	TR20, 21
Fill B2	Terrigenous and marine sediments; historic fill deposit	9-30 cm thick; reddish brown (5YR 4/3,moist) very cobbly, pebbly clay with approximately 25%, by volume, angular to subangular basalt and coral cobbles and pebbles; hard, very firm, sticky, plastic; few, fine interstitial and tubular roots; abrupt, smooth boundary; contains possible buried road feature (SF-19) in TR19.	TR19
Fill C	Terrigenous sediments; historic fill deposit	2-25 cm thick; dark brown to dark grayish brown (10YR 3/2.5, moist), silty clay loam; hard, firm, slightly sticky, slightly plastic; few, very fine, interstitial roots; abrupt, smooth, lower boundary; no archaeological materials observed.	TR20
Fill D	Terrigenous and marine sediments; historic fill deposit	10-18+ cm thick; grayish brown (10YR 5/2, moist) basalt and coral sands with medium to coarse grains; loose, friable, nonsticky, nonplastic; violently effervescent; no roots; lower boundary not reached; non-cultural.	TR11
I	Terrigenous sediments	2-75 cm thick; very dark grayish brown (10YR 3/2, moist) silty sand; slightly hard, friable, nonsticky, nonplastic; contains approximately 10%, by volume, fine to coarse cinder sands; few to common, fine to medium, interstitial and	TRs 4-21

Table 4. Summary of Stratigraphic Layers Identified in BWS APE.			
Layer	**Interpretation**	**Description**	**Distribution**
		tubular roots; abrupt, smooth to wavy lower boundary; contains historic artifacts (glass, ceramic, metal, bone) and subsurface features.	
II	Terrigenous cinder sediments	10-140+ cm thick; black (10YR 2/1, moist), fine to coarse sands; hard, firm, nonsticky, nonplastic; no roots; lower boundary not reached in all but TRs 13 and 18; directly overlies basalt bedrock in TRs 13 and18 and Layer III in TR11; non-cultural in most trenches; disturbed Layer III deposits in TR11 contains historic artifacts (glass, ceramics) and UI large mammal bone.	TR1-21

asphalt layer, which directly overlies the stratigraphic layers, is present across the entire APE, and was not assigned a layer designation. The thickness of the asphalt, however, was documented in profile drawings.

Fill Deposits

Seven of the nine stratigraphic layers have been identified as fill deposits, and designated as Fills A, A1, B, B1, B2, C, and D. These are briefly discussed below.

Fill A

Fill A is a white (10YR 8/1, m.) coral fill consisting of small coral cobbles and pebbles in a fine to coarse coral sand matrix (see Table 4). A minor color variation of very pale brown (10YR 8/2, m.), was observed in Fill A deposits in a number of backhoe trenches. Fill A was present in all trenches excavated in the BWS parking lots; it was not present in TR21, excavated in the short segment of asphalt access road leading into the BWS pump house building. Fill A was found directly underlying the asphalt and directly overlying Fill B, Fill B1, as well as Layers I, II, and III. Based on its stratigraphic position (directly underlying the asphalt), it is interpreted as the base course for the asphalt pavement in the parking lots. One partial bottle, one ceramic bowl fragment, and one piece of cut mammal bone were recovered in Fill A deposits in TR8. No archaeological materials were encountered in Fill A deposits in other trenches.

Fill A1

Fill A1 is a dark grayish brown fill consisting of small basalt cobbles and pebbles in a fine to coarse basalt sand matrix. It was found only in TR21, excavated in the short segment of asphalt access road leading into the BWS pump house building. It was found directly underlying the asphalt pavement and directly overlying Fill B1 deposits. Based on its stratigraphic position (directly underlying the asphalt), it is interpreted as the base course for the asphalt pavement in this portion of the APE. No archaeological materials were found in Fill A1 deposits.

Fill B

Fill B is a dark yellowish brown (7.5YR 3/4, m.) cobbly, pebbly silty clay loam with approximately 10-15%, by volume, subrounded coral cobbles and pebbles. In TRs1-3, Fill B was found directly underlying Fill A and directly overlying Layer II cinder deposits. Fill B deposits

in TRs1-3 are found in the same stratigraphic position where Layer I deposits were normally found. No archaeological materials or features were encountered in Fill B deposits in TRs1-3.

In TR11, Fill B also consisted of dark yellowish brown (7.5YR 4/4, m.) silty clay loam sediments, but contained more coral in these terrigenous sediments, and eventually these sediments mostly pinched out and were replaced with coral pebbles and small cobbles in a coral sand matrix. In this trench, Fill B was found directly underlying disturbed Layer I deposits and directly overlying Layer II cinders. Fill B deposits in TR11 also appear to be disturbed, and contained historic artifacts fashioned from glass (bottles and bottle fragments) ceramics (bowl fragments, bottle fragments, doll arm, door knob, insulator fragment, marble, and unidentified fragments), bone (cut bone), and vertebrate faunal remains (fish bone).

Fill B1

Fill B1 is a dark reddish brown clay with less than 5%, by volume, basalt and coral pebbles; this fill was found only in TR20 and TR21 (see Table 4). In TR20, Fill B1 was found directly underlying both Fill A and a small deposit of Fill C, and directly overlying Fill C. In TR21, Fill B1 was found directly underlying Fill A1 and directly overlying Layer I. One piece of non-diagnostic clear bottle glass was observed (but not collected) in Fill B1 deposits in TR20. No archaeological materials were observed in Fill B1 deposits in TR21.

Fill B2

Fill B2 is a reddish brown, very cobbly, pebbly clay deposit with approximately 25%, by volume, angular to subangular basalt and coral cobbles and pebbles. Fill B2 was found only in TR19 (see Table 4), and was found directly underlying Fill A and directly overlying both a possible buried road feature, designated as Feature 54, and Layer I. No artifacts were encountered in Fill B2. The buried road feature, Feature 54, is situated within Fill B2 deposits.

Fill C

Fill C is a dark brown to dark grayish brown silty clay loam found only in TR20. It was found directly underlying Fill B2 and directly overlying Layer I. It ranged in thickness from 2.0 to 25.0 cm with thinner portions present on the western portion of TR20. No archaeological materials were encountered in Fill C.

Fill D

Fill D deposits consist primarily of grayish brown, medium to coarse basalt (cinder) and coral sands, and were found only in TR11. These sands gave the appearance of decomposing basalt bedrock, but when examined under a microscope, they proved to be a mixture of cinder and coral sands. When the sands were tested with 1.0 molar HCl, they violently effervesced, indicated that calcium carbonates (e.g., coral sand) were present. They were found directly underlying Layer II cinder sands. No archaeological materials were identified in Fill D deposits in TR11.

In Situ Stratigraphic Layers

Layer I

With the exception of TR21, Layer I throughout the APE was consistently a very dark grayish brown (10YR 3/2, m.) silty sand consisting of cinder sands mixed with silts. Layer I is the cultural layer in Site T-1. It was found in TRs 4-21. Where Layer I was encountered, it was found directly underlying Fill A, Fill B1 (TR21), Fill B2 (TR19), Fill C (TR20). In TRs 19 and 20, Layer I deposits were found in what appear to be tree root molds (see section titled Backhoe Trenches; TRs 19 and 20).

Layer I is absent in TRs1-3, and is discontinuously present in TRs 7, 12, 13, 15, and 18. In TRs15, it was observed that upper portions of Layer I were disturbed (mixed with Layer II cinders) and removed. In TR10, no intact Layer I deposits were observed. It appeared that Layer I was mixed with Layer II cinders throughout this trench.

Layer I deposits across Site T-1 (in non-subsurface feature proveniences), contains historic artifacts fashioned from glass (whole and partial bottles, bottle fragments, whole jars, jar fragment, cut glass, unidentified glass), ceramics (plate fragment, bowl fragment, cup fragment, flower pot, unidentified fragments), metal (whole wire nails, cut wire nails, light bulb bases, forged welded fragment, bullet casings), shell (button), and bone (cut mammal bone), as well as invertebrate faunal remains (marine shell, sea urchin), and vertebrate faunal remains (large and medium mammal, fish, and bird). Layer I also is the layer of origin for a majority of the subsurface features, including a burial, post molds and a variety of pits.

In TR21, Layer I color and textural variations were observed. In this trench, Layer I is a reddish brown (5YR 4/3, m.) silt loam and contained historic artifacts fashioned from glass (whole bottles and bottle fragments), metal (lamp post sections), and cut mammal bone. In addition to these recovered artifacts, pieces of wire, bricks, and unidentified metal objects were not collected from Layer I.

Layer II

Layer II deposits consists primarily of black volcanic cinder sands. These cinder sands exhibited marbled areas, and lenses, of olive (5Y 4/4, m.) to pale olive (5Y 6/4, m.) cinder sands. Layer II cinder sands were primarily found directly underlying Layer I. Where Layer I was absent, Layer II cinder sands were found directly underlying Fill A (TRs12, 18), and Fill B (TRs1-3, 11). In most of the excavations, the lower boundary of Layer II was not reached. In TRs13 and 18, Layer II cinder sands were found directly overlying shallow basalt bedrock. In TR11, disturbed Layer II deposits were found directly overlying Fill D basalt and coral sands.

Where intact Layer II cinders were encountered, they were non-cultural throughout the APE. In TR11, however, historic artifacts were found in Layer II cinders, indicating that Layer II in the vicinity of TR11 is disturbed. The artifacts include items fashioned from glass (whole and partial bottles and bottle fragments), ceramic (insulator fragment, pitcher fragment, chamber pot fragment), metal (pencil ferrule, a bell, wire nails, silver plated headland reflector) and cut mammal bone, as well as invertebrate faunal remains (marine shell) and vertebrate faunal remains (mammal), indicating that Layer II in the vicinity of TR11 is disturbed.

BACKHOE AND HAND EXCAVATED TRENCHES

The excavation results for the 17 backhoe trenches (TR1-TR11, TR14, 15, and TR18-21), and four hand-excavated units (TR12, 13, 16, and 17) are presented in this section. Trenches excavated by backhoe measured 6.0 by 1.0 m in size while trenches excavated by hand measured 1.5 by 1.5 m in size. For the hand excavated trenches, a mud shovel was used to remove the asphalt and compact Fill A deposits. After these were removed, trowels, small hand picks, and whisk brooms were used to excavate Layer I deposits.

Trenches 1 through 11 (TR1-11) were excavated in the EPL; TR12-18 were excavated in the CVPL, TR19 and 20 were excavated in the VPL, and TR21 was excavated in the access road to the BWS Engineering Building and Pump Station (BWS Site 7). Figure 14 shows the location of the 21 excavations within the project APE. Table 5 summarizes metric and non-metric data for the excavations. Excavation results are presented below by trench. Stratigraphic layer descriptions for these excavations are present in Table 4 above.

Table 5. Summary of Excavations within the Honolulu Board of Water Supply's Sites 6 and 7.							
Excavation No.	**Excavation Type**	**Size (m)**	**Orientation (degrees MN)**	**General Location**	**Layers Present**	**Depth at BOE (cmbs)**	**Archaeological Materials/ Subsurface Features Present**
TR1	Backhoe	6 x 1	250	EPL	Fill A, Fill B, II	60-65	No archaeological materials present
TR2	Backhoe	6 x 1	260	EPL	Fill A, Fill B, II	40-170	Features 42 (pit) & 43 (post mold); no archaeological materials present
TR3	Backhoe	6 x 1	260	EPL	Fill A, Fill B, II	40-55	No archaeological materials present
TR4	Backhoe	6 x 1	260	EPL	Fill A, I, II	65-80	No archaeological materials present
TR5	Backhoe	6 x 1	250	EPL	Fill A, I, II	50-105	Feature 40 (post mold); ceramic artifacts in Feature 40
TR6	Backhoe	6 x 1	250	EPL	Fill A, I, II	65-105	Glass, ceramic, metal, and bone artifacts and vertebrate faunal remains in Layer I (not collected); Feature 41 (possible pit); metal artifacts in Feature 41
TR7	Backhoe	6 x 1	250	EPL	Fill A, I, II	35-100	Features 44 (two connecting pits) & 45 (post mold); vertebrate faunal remains in Feature 44; no archaeological materials in Feature 45
TR8	Backhoe	6 x 1	258	EPL	Fill A, I, II	65-68	Glass, ceramic, and cut bone artifacts in Fill A
TR9	Backhoe	6 x 1	258	EPL	Fill A, I, II	48-54	Features 37 (pit) & 38 (post mold); glass, ceramic, and cut bone artifacts and vertebrate faunal remains in Feature 37; no archaeological materials in Feature 38
TR10	Backhoe	6 x 1	258	EPL	Fill A, I/II mixed	60-65	Glass, ceramic, and cut bone artifacts in Layer I/II mixed deposits; Feature 39 (metal concentration); rusted metal fragments in Feature 39

Table 5. Summary of Excavations within the Honolulu Board of Water Supply's Sites 6 and 7.							
Excavation No.	**Excavation Type**	**Size (m)**	**Orientation (degrees MN)**	**General Location**	**Layers Present**	**Depth at BOE (cmbs)**	**Archaeological Materials/ Subsurface Features Present**
TR11	Backhoe	6 x 1	230	EPL	Fill A, Fill B, I, II, III	105-130	Glass, ceramic, and cut bone artifacts in Fill B; glass and ceramic artifacts in Layer I; glass, ceramic, metal and cut bone artifacts and invertebrate and vertebrate faunal remains in Layer II
TR12	Hand excavated	1.5 x 1.5	245	CVPL	Fill A, I, II	33-35	Vertebrate faunal remains in Layer I
TR13	Hand excavated	1.5 x 1.5	245	CVPL	Fill A, I, II, bedrock	16-72	Ceramic artifact and inverte rate and vertebrate faunal remains in Layer I; Feature 52 (pit); no archaeological materials in Feature 52
TR14	Backhoe	6 x 1	250	CVPL	Fill A, I, II	54-140	Layer I contained non-diagnostic glass and metal artifacts (not collected); Features 46 (pit), 47 (pit) & 48 (pit); Feature 46 contained glass, ceramic, metal, cut bone, shell, and celluloid artifacts and vertebrate faunal remains; Feature 47 contained glass, ceramic, metal, cut bone and bone artifacts and vertebrate faunal remains; no archaeological materials in Feature 48
TR15	Backhoe	6 x 1	210	CVPL	Fill A, I, II	60-85	Layer I contained glass, ceramic, metal and celluloid artifacts and vertebrate faunal remains; back dirt pile sediments (Layer I and feature fills) contained glass, ceramic, metal, bone, shell, cut bone, celluloid artifacts and vertebrate faunal remains;

Trench 1

Trench 1 (TR1) was excavated by backhoe in the southeast corner of the Feature 13 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR1 ranged from 60 to 65 cmbs.

Three stratigraphic layers, designated as Fill A, Fill B, and Layer II, were identified in TR1. Fill B was found in the second stratigraphic position, directly underlying Fill A, and directly overlying Layer II cinders. Layer I, the cultural layer that is predominantly found in the second stratigraphic position in the EPL, was not present in TR1. Layer II, the non-cultural, black cinder sand layer, was the only in situ layer found. Figure 51 presents the stratigraphic profile drawing of the north face of TR1, with a photograph. No archaeological materials or features were encountered during excavations in TR1.

Trench 2

Trench 2 (TR2) was excavated by backhoe near the southeast corner of the Feature 13 parking lot terrace in the EPL (see Figure 14. The base of excavation in TR2 ranged from 35 to 170 cmbs, with deeper portions excavated by hand to expose the base of Feature 42, a deep pit. Three stratigraphic layers, designated as Fill A, Fill B, and Layer II, and two subsurface features, designated as Features 42 and 43, were identified in TR2. As in TR1, Fill B in TR2 was found in the second stratigraphic position, directly underlying Fill A, and directly overlying Layer II cinders. Layer I, the cultural layer, was not present in TR2. Layer II, the black cinder sand layer, was the only in situ (non-cultural and naturally occurring) layer found in TR2. Figure 52 presents a stratigraphic profile drawing of the south face and a section of the north face of TR2, with photographs showing pit Features 42 and 43.

Feature 42 is a deep pit with nearly vertical sides and a roughly flat base (see Figure 52). The pit fill consisted of a mixture of black cinder sands and white coral sands. Feature 42 ranged in width from approximately 1.35 m (top) to 1.0 m (base) and ranged in depth from 25 (top) to 170 (base) cmbs. No archaeological materials were found in samples of Feature 42.

Feature 43 is a shallow pit with one steeply sloped side, one gently sloped side, and a roughly rounded base (see Figure 52). The pit, whose fill consisted of very dark brown sand, has a maximum width of 0.9 m, and ranges in depth from 35 (top) to 65 (base) cmbs. No archaeological materials were encountered in Feature 43.

Trench 3

Trench 3 (TR3) was excavated by backhoe in eastern portions of the Feature 13 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR3 ranged from 40 to 55 cmbs.

Three stratigraphic layers, designated as Fill A, Fill B, and Layer II, were identified in TR3. As in TRs 1 and 2, Fill B in TR3 was found in the second stratigraphic position, directly underlying Fill A, and directly overlying Layer II cinders. Layer I, the cultural layer, was not present in TR3. Layer II, the black cinder sand layer, was the only in situ layer found. Figure 53 presents the stratigraphic profile drawing of the north face of TR3, with a photograph. No archaeological materials or features were encountered during excavations in TR3.

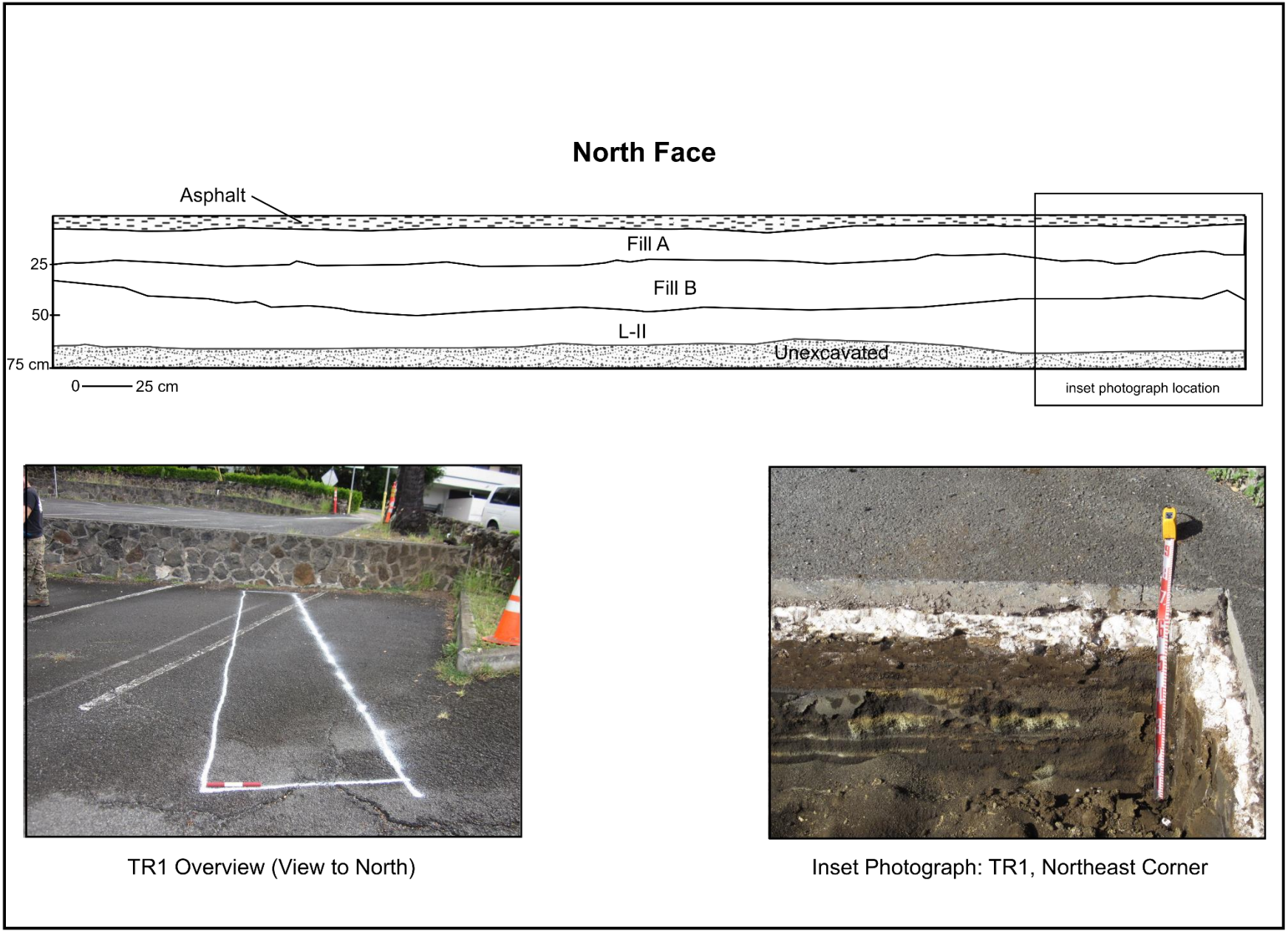


Figure 51. Trench 1 (TR1) North Face Profile and Photographs.

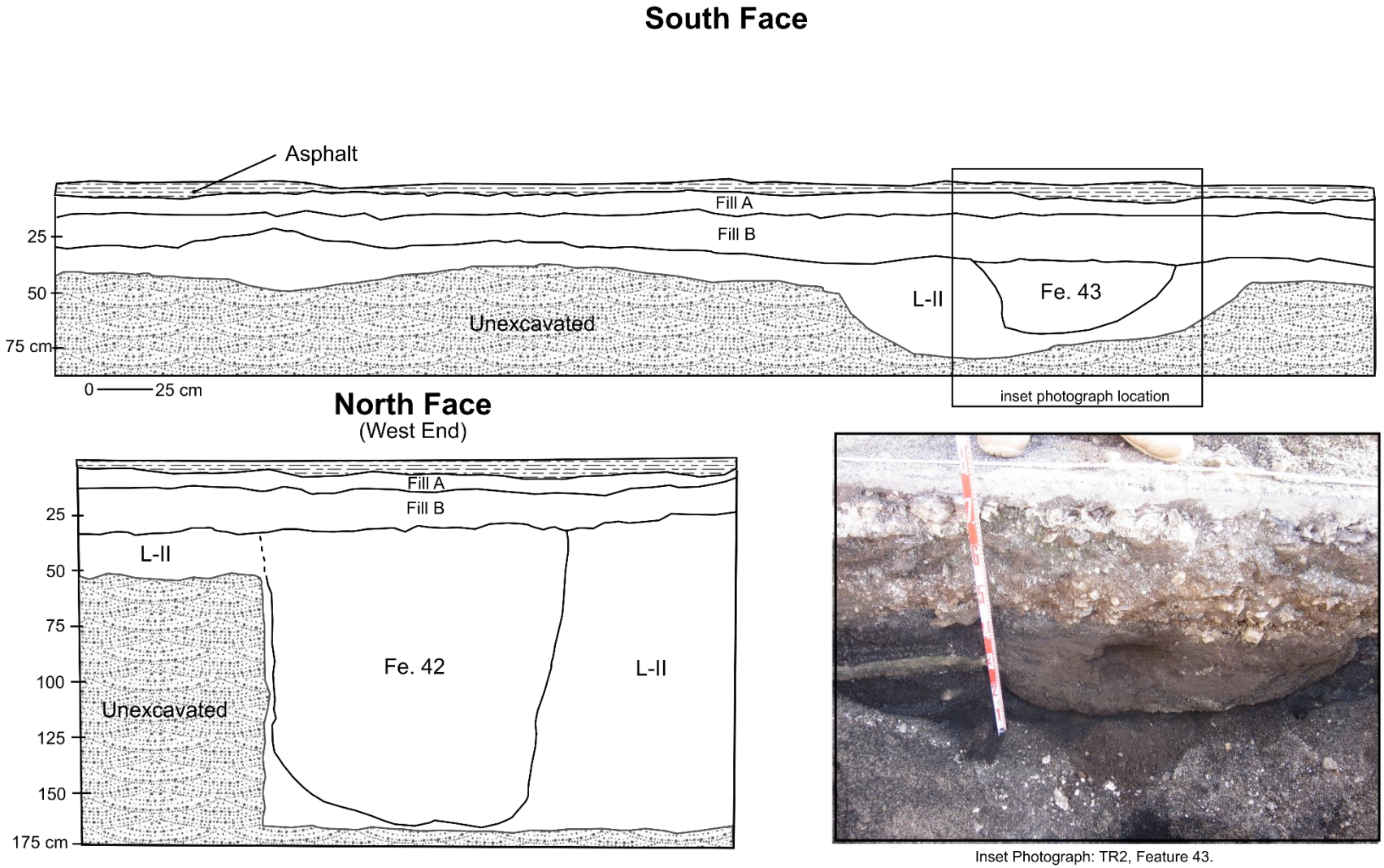


Figure 52. Trench 2 (TR-2) South Face and North Face (portion) Profile with Feature 43 Photograph.

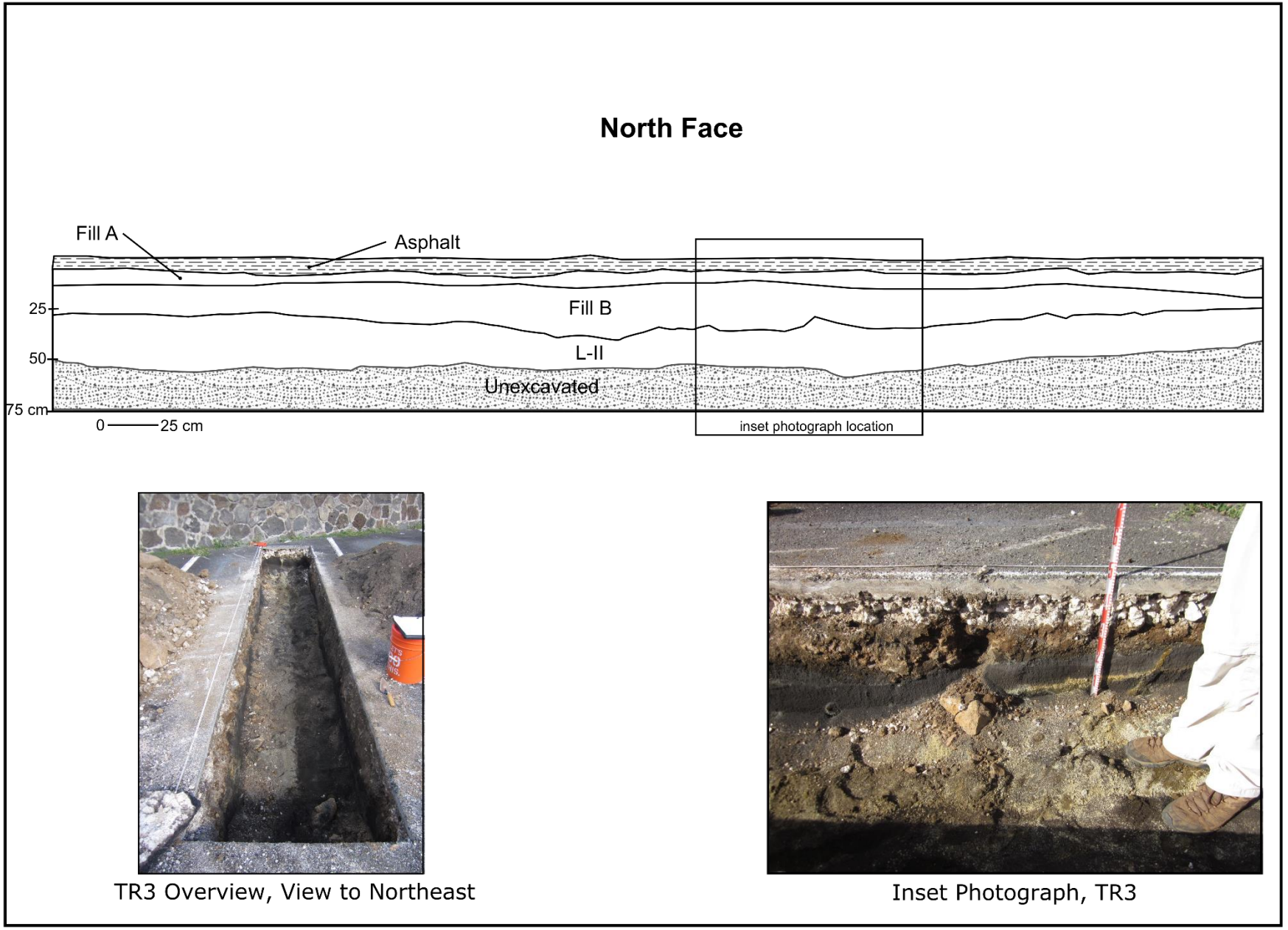


Figure 53. Trench 3 (TR3) North Face Profile and Photographs.

Trench 4

Trench 4 (TR4) was excavated by backhoe in northeast corner of the Feature 13 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR4 ranged from 65 to 80 cmbs.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, were identified in TR3. Layer I, a very dark grayish brown silty sand found in the second stratigraphic position, directly underlying Fill A. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 54 presents the stratigraphic profile drawing of the north face of TR4, with a photograph. Although Layer I contains archaeological materials and features in other trench locales, no materials or features were encountered during excavations in TR4.

Trench 5

Trench 5 (TR5) was excavated by backhoe in the central/east portion of the Feature 13 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR5 ranged from 50 to 105 cmbs, with deeper portions excavated by hand to expose the base of Feature 40, a possible post mold pit.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, as well as one subsurface pit feature, designated as Feature 40, were identified in TR5. Layer I, the cultural layer, was found in the second stratigraphic position, directly underlying Fill A. No archaeological materials were recovered from Layer I. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 55 presents a stratigraphic profile drawing of the north face of TR5, with photographs showing Feature 40.

Feature 40 is a post mold with vertical sides and a flat base. The feature fill consisted of a very dark brown silt loam. The width of this possible post mold ranges from 0.20 to 0.25 m; it ranges in depth from 35 (top) to 100 (base) cmbs. Two ceramic bowl fragments were recovered from a sample of the Feature 40 fill.

Trench 6

Trench 6 (TR6) was excavated by backhoe in the central portion of the Feature 13 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR6 ranged from 65 to 105 cmbs, with deeper portions excavated by hand to expose the base of Feature 41, a pit feature.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, as well as one possible pit feature, designated as Feature 41, were identified in TR6. Layer I, the cultural layer, was found in the second stratigraphic position, directly underlying Fill A. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 56 presents a stratigraphic profile drawing of the north face of TR6, with a photograph showing Feature 41.

Feature 41 is a possible pit with nearly vertical sides and a roughly flat and narrow base. The feature fill consisted of a very dark brown silty sand. The width of this pit ranges from 0.20 to 0.40 m; it ranges in depth from 47 (top) to 85 (base) cmbs. Archaeological materials recovered from samples of Feature 41 include six wire nails.

Archaeological materials recovered from Layer I in TR6 include items fashioned from glass (one bottle fragment, one whole jar, one jar fragment), ceramics (one unidentified ceramic fragment), metal (fork, cake server fragment, a handle, and iron hames) and bone (cut mammal bone).

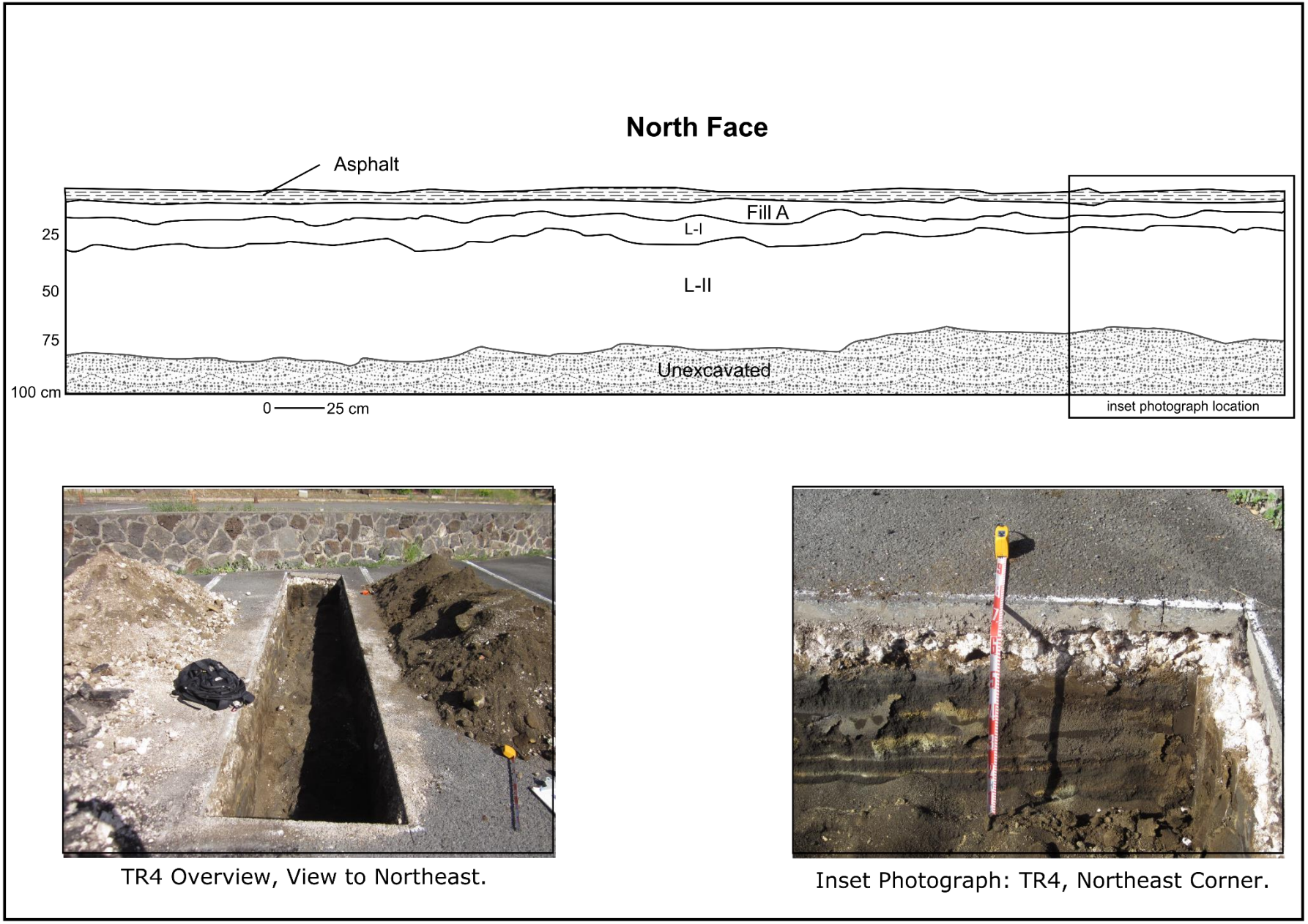
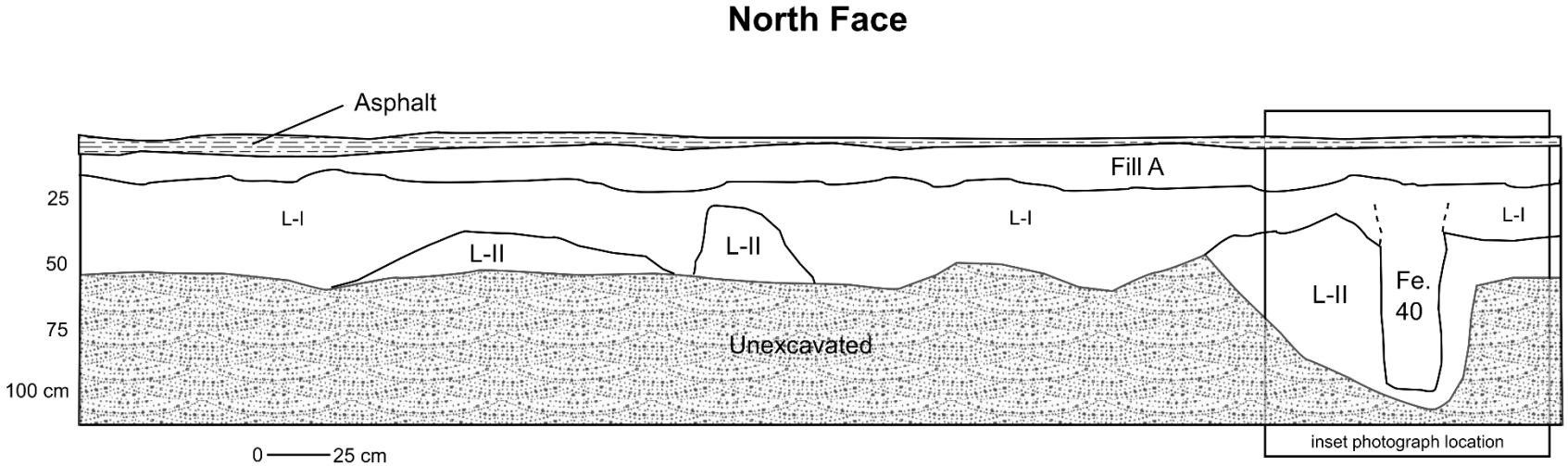


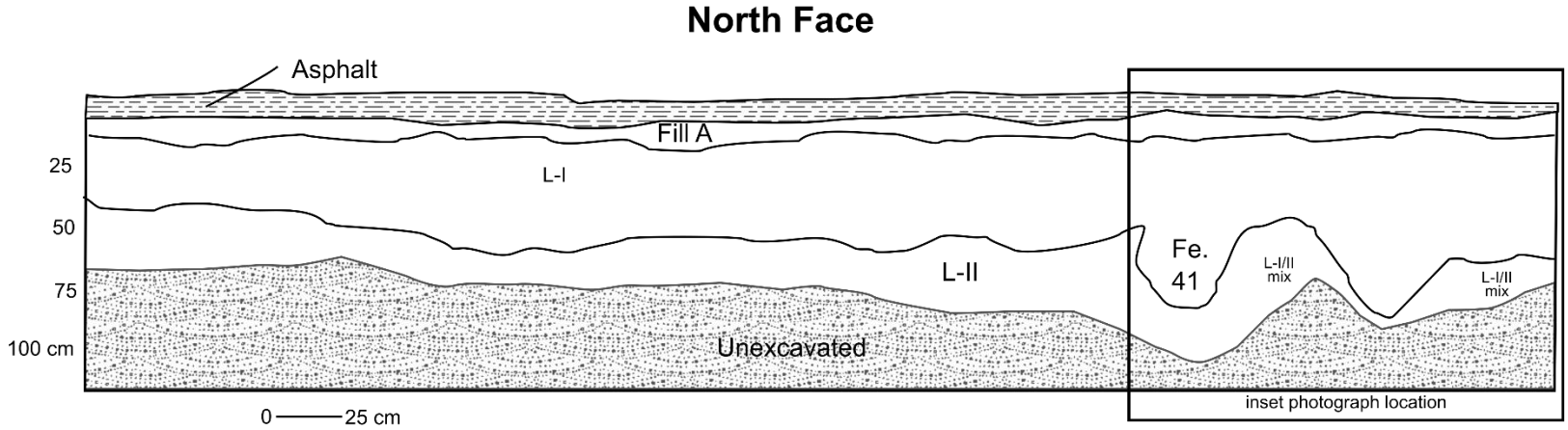
Figure 54. Trench 4 (TR4) North Face Profile and Photographs.



TR5 Overview, View to North

Inset Photograph: TR5 Feature 40

Figure 55. Trench 5 (TR5) North Face Profile, Overview Photograph, and Photograph of Feature 40.



TR6 Overview, View to North

Inset Photograph: TR6, Feature 41.

Figure 56. Trench 6 (TR6) North Face Profile, Overview Photograph, and Photograph of Feature 41.

Trench 7

Trench 7 (TR7) was excavated by backhoe in the central/south portion of the Feature 13 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR7 ranged from 35 to 100 cmbs, with deeper portions excavated by hand to expose the base of Feature 45, a possible post mold.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, as well as two subsurface features, designated as Features 44 and 45, were identified in TR7. Layer I, the cultural layer, was found in the second stratigraphic position, directly underlying Fill A. It was noted that Layer I was absent in the eastern portion of TR7; no archaeological materials were encountered in Layer I deposits in TR7. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 57 presents a stratigraphic profile drawing of the north face of TR7, with photographs showing Features 44 and 45.

Feature 44 is a pair of connected (adjacent) shallow pits; both have sloping sides and rounded bases. The feature fill of both pits consisted of a very dark brown silty sand. The width of Feature 44's western-most pit ranges from 0.30 to 0.75 m; it ranges in depth from 30 (top) to 50 (base) cmbs. The eastern-most pit ranges from approximately 0.40 to 1.0 m; it ranges in depth from 15 (top) to 55 (base) cmbs. Archaeological materials recovered from samples of Feature 44 included vertebrate faunal remains of fish.

Feature 45 was found at the east end of TR7 and is only partly exposed. It appears to be a possible post mold with one vertical side exposed and a flat base. The feature fill consisted of a black to very dark brown sand. The exposed width of Feature 45 ranges from 0.1 to 0.2 m; it ranges in depth from 18 (top) to 90 (base) cmbs. No archaeological materials were encountered from Feature 45.

Trench 8

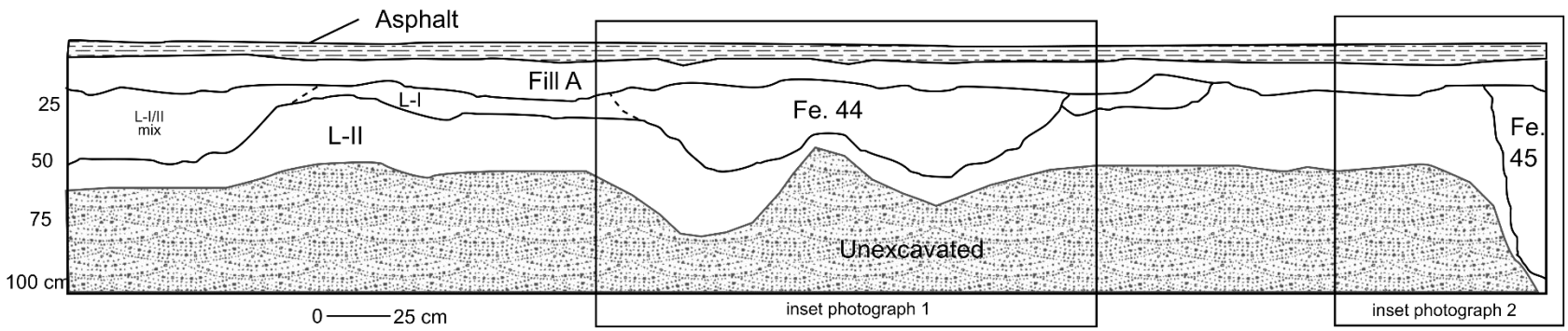
Trench 8 (TR8) was excavated by backhoe in the eastern portion of the Feature 14 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR8 ranged from 65 to 68 cmbs.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, were identified in TR8. A partial glass bottle, a ceramic bowl fragment, and a piece of cut mammal bone were recovered from Fill A deposits in this trench. Layer I, the cultural layer, was found in the second stratigraphic position, directly underlying Fill A. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 58 presents a stratigraphic profile drawing of the south face of TR8, with a photograph. No archaeological materials were recovered from Layer I in TR8.

Trench 9

Trench 9 (TR9) was excavated by backhoe in the central portions of the Feature 14 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR9 ranged from 48 to 54 cmbs.

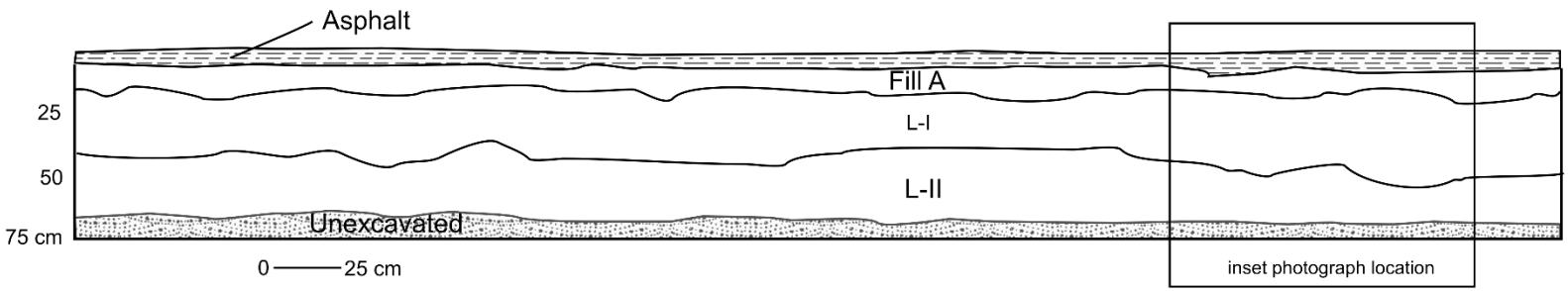
Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, as well as two subsurface features, designated as Features 37 and 38, were identified in TR9. Layer I, the cultural layer, was found in the second stratigraphic position, directly underlying Fill A. The thickness range of Layer I, 2 to 15 cm, and the fact that the west side of Feature 37 ends at the base of Fill A, suggests upper portions of Layer I were removed prior to the deposition of Fill A. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 59 presents a stratigraphic profile drawing of the south face of TR9, with photographs showing Features 37 and 38.



Inset Photograph 1: TR7, Feature 44

Inset Photograph 2: TR7, Feature 45

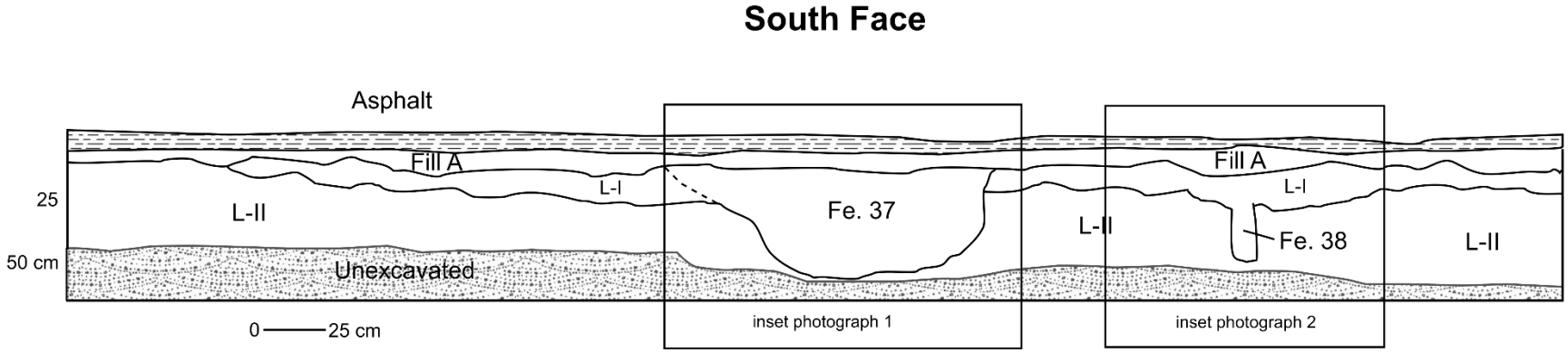
Figure 57. Trench 7 (TR7) North Face Profile and Photographs.



TR8 Overview, View to Northeast.

Inset Photograph: TR8, North Face.

Figure 58. Trench 8 (TR8) North Face Profile and Photographs.



Inset Photograph 1: TR9, Feature 37.

Inset Photograph 2: TR9, Feature 38.

Figure 59. Trench 9 (TR9) South Face Profile and Photographs of Features 37 and 38.

Feature 37 is a shallow pit with a one nearly vertical side extending to the base of Fill A, one gently sloping side, and a roughly flat base. The feature fill of this pit consisted of a black to very dark brown silty sand. The width of Feature 37 ranges from 0.85 to 1.10 m; it ranges in depth from 11-23 (top) to 45-50 (base) cmbs.

Feature 38 is a post mold with vertical sides and a flat base found near the east end of TR9. The feature fill consisted of a black to very dark brown sand. The width of Feature 38 is 0.1 m; it ranges in depth from 25 (top) to 48 (base) cmbs.

Archaeological materials recovered from Trench 9 include glass, ceramics, and faunal material from Feature 37.

Trench 10

Trench 10 (TR10) was excavated by backhoe in the northeast portion of the Feature 14 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR10 ranged from 60 to 65 cmbs.

Two stratigraphic layers, designated as Fill A, Layer I/II mixed, as well as one subsurface feature, designated as Feature 39, were identified in TR10. Underlying Fill A, a mixture of what were likely Layer I and II sediments was observed. No intact sediments of Layers I or II were observed. Figure 60 presents a stratigraphic profile drawing of the north face of TR10, with a photograph showing Feature 39.

Feature 39 is a rusted metal (iron?) concentration in Layer I/II mixed deposits; no pit outlines were visible. The feature fill consisted of very dark brown silty sands. The width of this concentration is 0.25 m; it ranges in depth from 35 (top) to 55 (base) cmbs.

Archaeological materials found in Trench 10 include glass, ceramics, and faunal bone from Layer I.

Trench 11

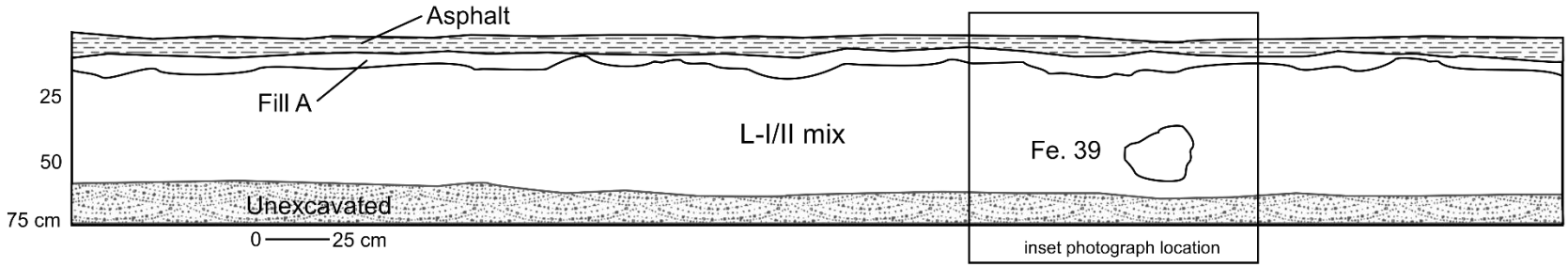
Trench 11 (TR11) was excavated by backhoe in the southwest portion of the Feature 14 parking lot terrace in the EPL (see Figure 14). The base of excavation in TR11 ranged from 105 to 130 cmbs. This trench was the first excavated trench, and it was noted after TRs1-10 were excavated that stratigraphic Layers I and II in TR11 were disturbed.

Five stratigraphic layers, designated as Fill A, Fill B, Fill D, Layer I and Layer II, were identified in TR11. Layer I, the cultural layer, was found directly underlying Fill A. Fill B deposits, found directly underlying Layer I, transition from the dark brown, cobbly, pebbly silty clay loam deposits with coral cobbles and pebbles (in west and central portions of TR11) to a thin layer of coral cobbles and pebbles (in the east portion of TR11). Layer II black cinder sand deposits were considered to be disturbed because they contained historic artifacts (see below). Fill D deposits, found only in the eastern portion of TR11 near the base of excavation, consisted of a grayish brown cinder and coral sands. Figure 61 presents a stratigraphic profile drawing of the south face of TR11, with a photograph.

Archaeological materials recovered from Trench 11 include glass, ceramics, metal, and faunal bone from Layer I and Fill B.

Trench 12

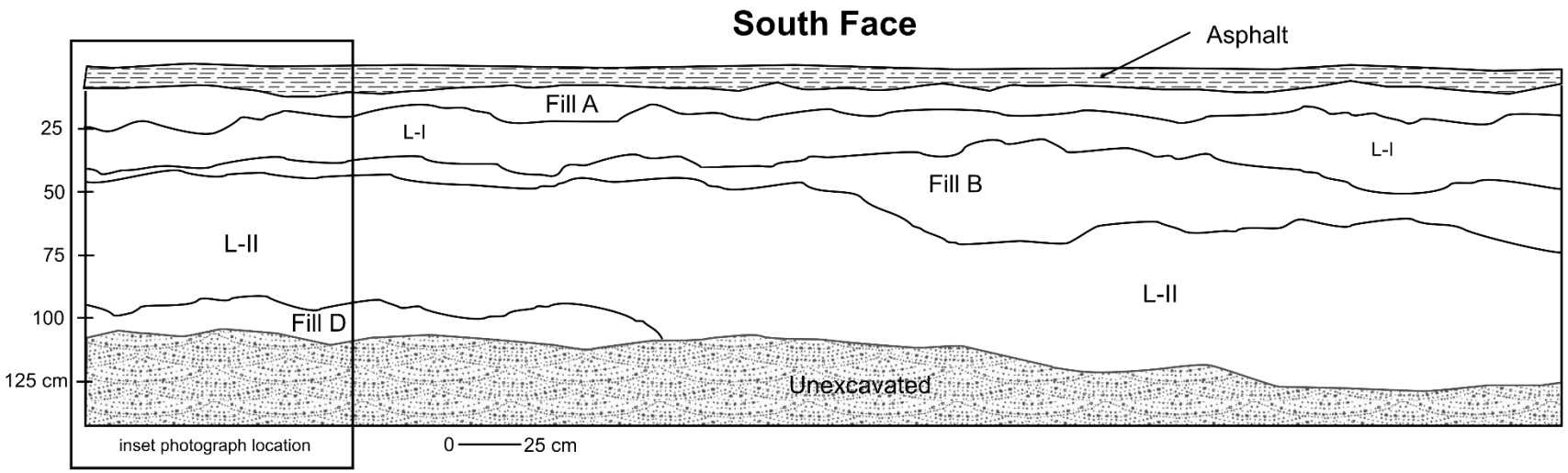
Trench 12 (TR12) was excavated by hand in the southwest quadrant of the Feature 15 parking lot terrace in the CVPL (see Figure 14). The base of excavation in TR12 ranged from 33 to 35 cmbs.



TR10 Overview, View to Northeast

Inset Photograph: TR10, Feature 39

Figure 60. Trench 10 (TR10) South Face Profile and Photograph of Feature 39.



TR11 Overview, View to South

TR11 South Wall, SE Corner

Figure 61. Trench 11 (TR11) South Face Profile and Photographs.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, were identified in TR12. Layer I, the cultural layer, was present in the second stratigraphic position, but this layer was thin (3-5 cm thick), and discontinuously present, suggesting that upper portions of Layer I were removed before the deposition of Fill A. Figure 62 presents a stratigraphic profile drawings of the northwest, northeast, and southwest faces of TR12, with photographs.

Trench 13

Trench 13 (TR13) was excavated by hand in the southwest quadrant of the Feature 15 parking lot terrace in the CVPL (see Figure 14). The base of excavation in TR13 ranged from 16 to 72 cmbs, with deeper portions in the vicinity of Feature 52, a pit.

Excavations in TR13 exposed relatively shallow basalt bedrock. Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, and a pit feature, designated as Feature 52, were identified in TR13. Fill A was found directly overlying both Layer I and basalt bedrock. Layer I was present in the second stratigraphic position, but was discontinuously present. Layer II was found directly underlying Layer I and Fill A, and directly overlying bedrock. Figure 63 presents stratigraphic profile drawings of the southwest and northwest faces of TR13, with a photograph showing Feature 52

Feature 52 is a pit with nearly vertical sides and a flat base directly overlying basalt bedrock (see Figure 63). The feature fill of this pit consisted of very dark brown silty sands. The width of Feature 52 ranges from 0.36 to 0.78 m; it ranges in depth from 18 (top) to 68 (base) cmbs.

Archaeological materials present in TR13 includes ceramics.

Trench 14

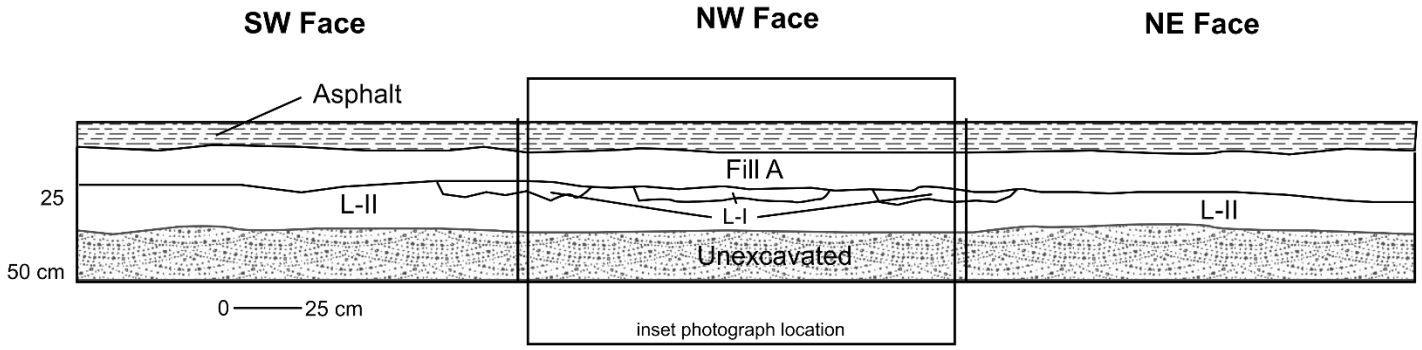
Trench 14 (TR14) was excavated by backhoe in the south central portion of the Feature 15 parking lot terrace in the CVPL (see Figure 14). The base of excavation in TR14 ranged from 54 to 140 cmbs, with deeper portions excavated by hand to expose the bases of three subsurface features.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, and three subsurface features, designated as Features 46, 47, and 48, were identified in TR14. Layer I, the cultural layer, was directly underlying Fill A. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 64 presents a stratigraphic profile drawing of the north face and a section of the south face of TR14, with photographs showing pit Features 46, 47, and 48.

Feature 46 was encountered at the west end of TR14, and only partly exposed. This appears to be a deep pit with one vertical side and a roughly flat base (see Figure 64). The pit fill consisted of black to very dark brown silty sand. The exposed portion of Feature 46 ranged in width from approximately 1.50 to 1.85 m. and ranged in depth from 35 (top) to 140 (base) cmbs. Archaeological materials found in Feature 46 include glass, ceramic, metal, and faunal bone.

Feature 47 is a pit with a roughly rounded base, one nearly vertical side, and one sloping side (see Figure 64). The pit, whose fill consisted of very dark brown silty sand, ranges in width from 0.55 to 1.60 m, and ranges in depth from 20 (top) to 70 (base) cmbs. Archaeological materials found in Feature 47 include glass, ceramic, metal, and faunal bone.

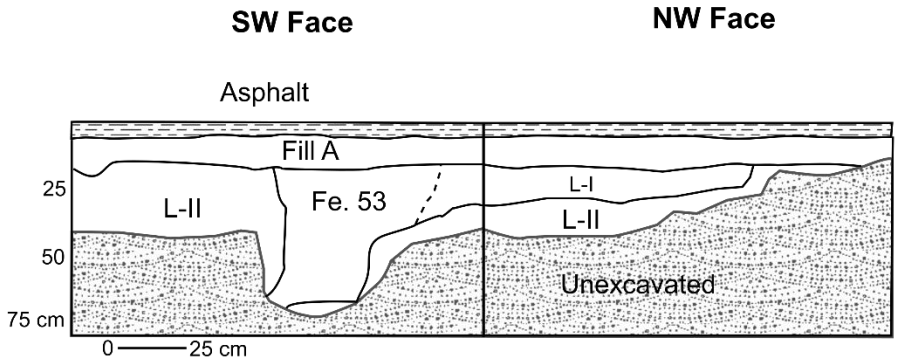
Feature 48 is a pit with a roughly rounded base, one steeply sloping side, and one gently sloping side similar to Feature 46 (see Figure 64). The pit fill consisted of very dark brown silty sand. Feature 48 ranged in width from approximately 0.75 (base) (top) to 2.5 m (top) and ranged in depth from 18 (top) to 80 (base) cmbs.



TR12 Overview, View to West

Inset Photograph: TR12 NW Face

Figure 62. Trench 12 (TR12) SW Face, NW Face, and NE Face Profile and Photographs.



TR13 Overview, View to West

TR13 Feature 53

Figure 63. Trench 13 (TR13) SW Face and NW Face Profiles and Photographs.

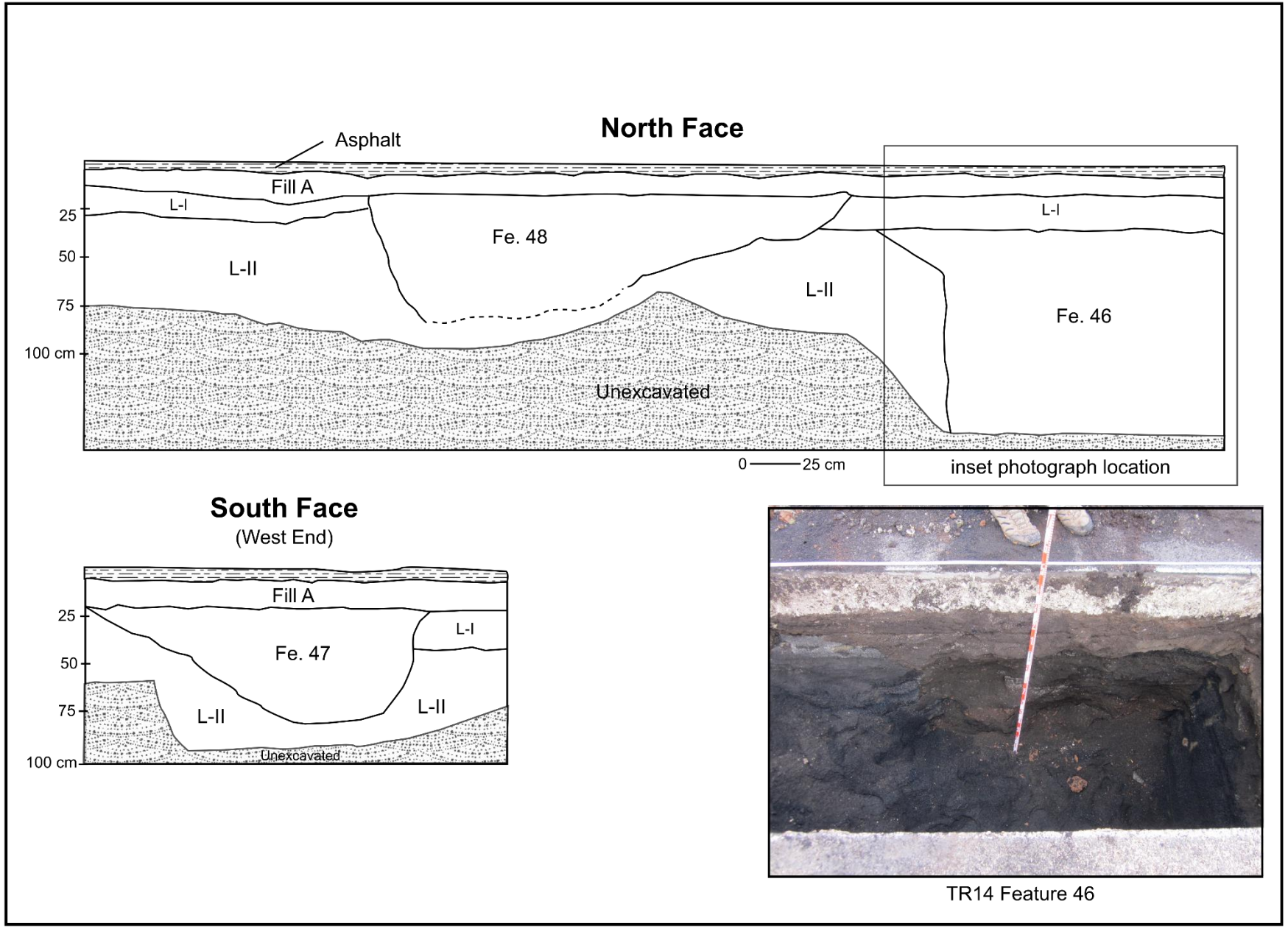


Figure 64. Trench 14 (TR14) North Face and South Face (Partial) Profile and Photograph of Feature 46.

Trench 15

Trench 15 (TR15) was excavated by backhoe in the central portion of the Feature 15 parking lot terrace in the CVPL (see Figure 14). The base of excavation in TR15 ranged from 60 to 85 cmbs, with deeper portions excavated by hand to expose the bases of three of the four subsurface features encountered in this trench.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, and four subsurface features, designated as Features 49, 50, and 51, and 55, were identified in TR15. Layer I, the cultural layer, was directly underlying Fill A. It was apparent that upper portions of Layer I had been removed, based on the fact that pit Features 49-51 and 55 extend to the base of Fill A. It is likely that Layer I was thicker prior to the cultural deposition of Fill A. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 65 presents a stratigraphic profile drawing of the north face of TR15, with photographs showing pit Features 49, 50 and 51.

Feature 49 was encountered at the west end of TR15. This is a pit with one steeply sloping side, one side with an irregular topography, and a roughly rounded base (see Figure 65). The pit fill consisted of very dark brown silty sand. Feature 49 ranged in width from approximately 0.50 to 0.70 m, and ranged in depth from 16 (top) to 60 (base) cmbs.

Feature 50 was encountered in central portions of TR15 and is located adjacent to (west) of the Feature 55 burial. This is a pit with one nearly vertical side, one gently sloping side, and a roughly rounded base (see Figure 65). Feature 50, whose fill consisted of very dark brown silty sand, ranges in width from 0.35 to 0.58 m, and ranges in depth from 18 (top) to 63 (base) cmbs.

Feature 51 was encountered at the east end of TR15, and most but not all of this feature was exposed. This is a pit with one nearly vertical side, one gently sloping side, and a roughly rounded base (see Figure 65). The pit fill consisted of very dark brown silty sand. Feature 51 ranged in exposed width from approximately 0.55 (base) (top) to 1.3 m (top) and ranged in depth from 25 (top) to 70 (base) cmbs.

Feature 55 is a burial feature found in central/east portions of TR15. This is a pit with steeply sloping sides and a rounded base (see Figure 65). The pit fill consisted of very dark brown silty sand. Feature 55 ranged in width from approximately 0.70 to 0.90 m and ranged in depth from 20 (top) to 82 (base) cmbs.

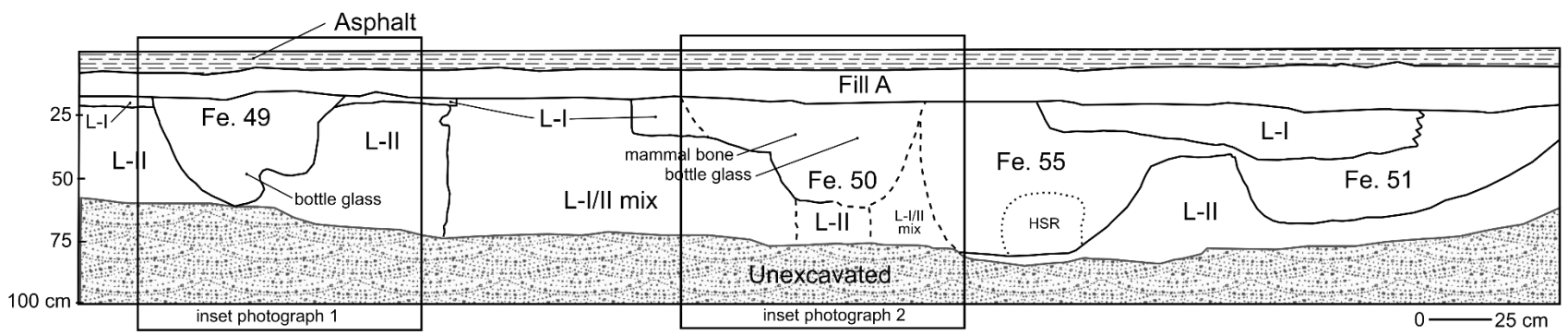
Archaeological materials were recovered from Trench 15 include glass, ceramic, metal, and faunal bone.

Trench 16

Trench 16 (TR16) was excavated by hand in central west portions of the Feature 15 parking lot terrace in the CVPL (see Figure 14). The base of excavation in TR16 ranged from 80 to 82 cmbs.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, and a post mold feature, designated as Feature 53, were identified in TR16. Layer I, the cultural layer, was present in the second stratigraphic position, directly underlying Fill A. Layer II cinder sands were directly underlying Layer I. Figure 66 presents stratigraphic profile drawings of the southeast, southwest, and northwest faces of TR16, with a photograph showing Feature 53

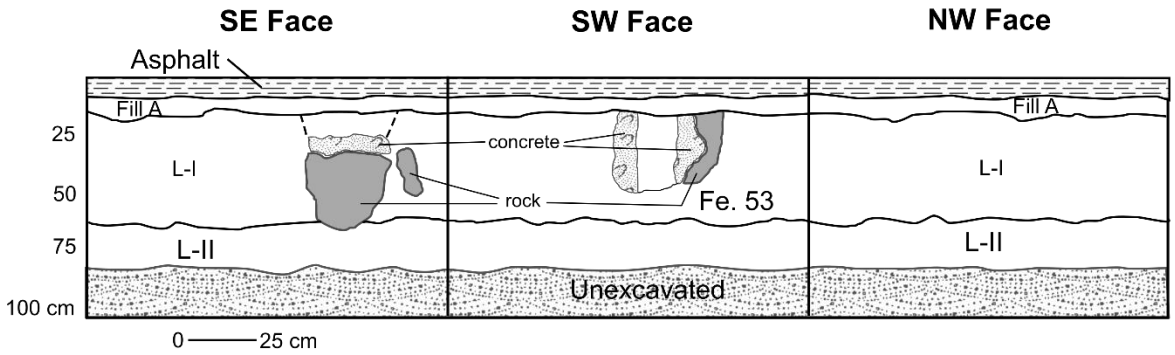
Feature 53 is a post mold surrounded by a piece of concrete. It has vertical sides and a roughly flat base (see Figure 66). The feature fill of this pit consisted of very dark brown silty sands. The width of Feature 53 is 0.16 m; it ranges in depth from 16 (top) to 48 (base) cmbs.



Inset Photograph 1: TR15 Feature 49

Inset Photograph 1: TR15 Feature 50

Figure 65. Trench 15 (TR15) North Face Profile and Photographs of Features 49 and 50.



TR16 Overview, View to West

TR16 Feature 53

Figure 66. Trench 16 (TR16) SE, SW Face, and NW Face Profiles and Photographs.

Archaeological materials recovered from Trench 16 include glass, ceramic, metal, and faunal bone.

Trench 17

Trench 17 (TR17) was excavated by hand in central west portions of the Feature 15 parking lot terrace in the CVPL (see Figure 14). The base of excavation in TR17 ranged from 55 to 60 cmbs.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, were identified in TR17. Layer I, the cultural layer, was present in the second stratigraphic position, directly underlying Fill A. Layer II cinder sands were directly underlying Layer I. Figure 67 presents stratigraphic profile drawings of the southeast, southwest, and northwest faces of TR17, with a photograph.

Archaeological materials recovered from Trench 17 include ceramic, metal, a shell button, and faunal bone.

Trench 18

Trench 18 (TR18) was excavated by backhoe in the southwest corner of the Feature 15 parking lot terrace in the CVPL, adjacent to the CVPL's Entrance 1 (see Figure 14). The base of excavation in TR18 ranged from 15 to 44 cmbs.

Three stratigraphic layers, designated as Fill A, Layer I, and Layer II, were identified in TR18. Excavation of TR18 exposed very shallow basalt bedrock across the trench. Fill A was present across the trench and was found directly overlying Layer I, Layer II, and basalt bedrock. Layer I, the cultural layer, was directly underlying Fill A, but absent in the southwest end of TR18. Where Layer I was present, it was found directly overlying basalt bedrock. Only a small deposit of Layer II black cinder sands was found in the southwest end of the trench. Figure 68 presents a stratigraphic profile drawing of the east face of TR18, with a photograph.

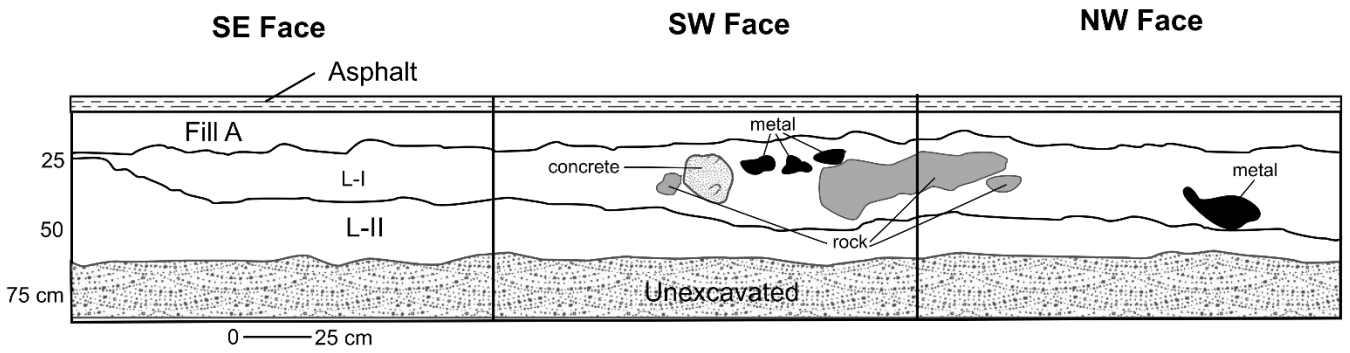
Trench 19

Trench 19 (TR19) was excavated by backhoe at the north end of the VPL (see Figure 14). The base of excavation in TR19 ranged from 95 to 133 cmbs.

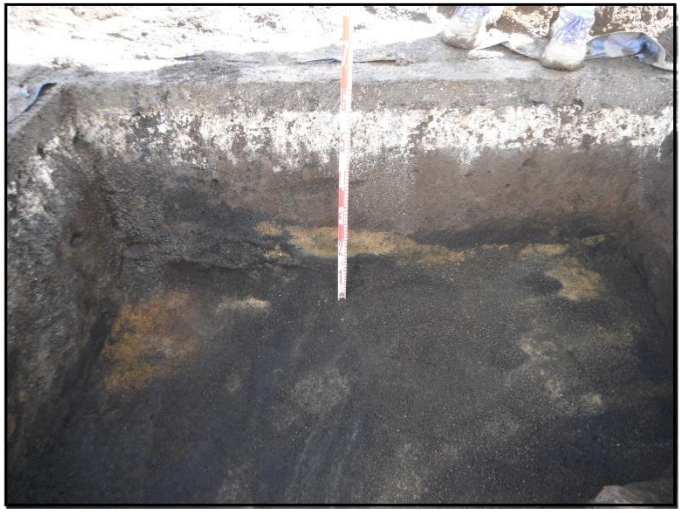
Four stratigraphic layers, designated as Fill A, Fill B2, Layer I, and Layer II, and one subsurface feature, designated as Feature 54, were identified in TR19. Fill B2, a reddish brown very cobbly, pebbly clay deposit was found only in TR19 (see Table 4). It directly overlies Feature 54. Layer I, the cultural layer, was found directly underlying Fill B2 and Feature 54. After excavation of TR19 was originally completed, a series of downward extensions of Layer I was observed. These downward extensions initially looked like post molds. It was decided to continue excavation of this trench. After TR19 was excavated deeper, it was concluded that the downward extensions were probably tree root molds, based on their unusual configurations. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 69 presents a stratigraphic profile drawing of the north face of TR19, with photographs showing Feature 54 and the tree root molds extending below the base of Layer I.

Feature 54 was encountered in central portions of TR19. This is a cobble/pebble concentration with a roughly flat base (see Figure 69). The fill of this feature consisted of dark reddish gray, very cobbly, pebbly, sandy clay. Feature 54 measures 3.15 m in width, and ranged in depth from 30 (top) to 50 (base) cmbs.

Archaeological materials recovered from Trench 19 include brick fragments.

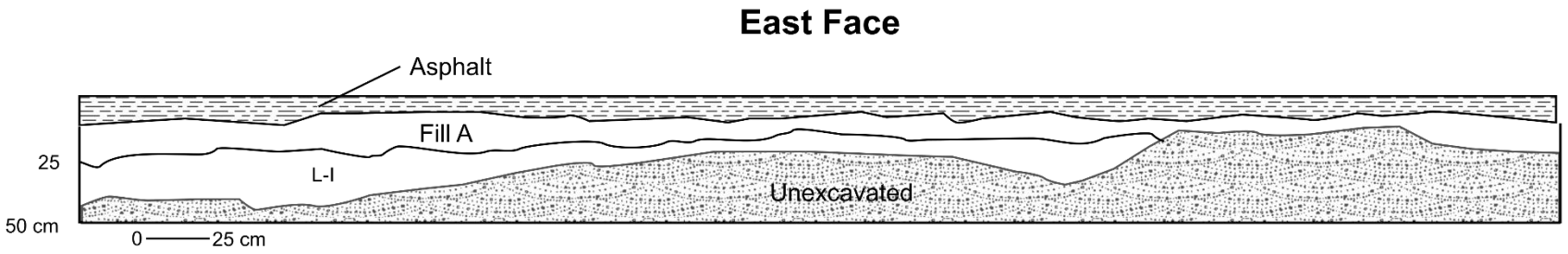


TR17 Overview, View to North



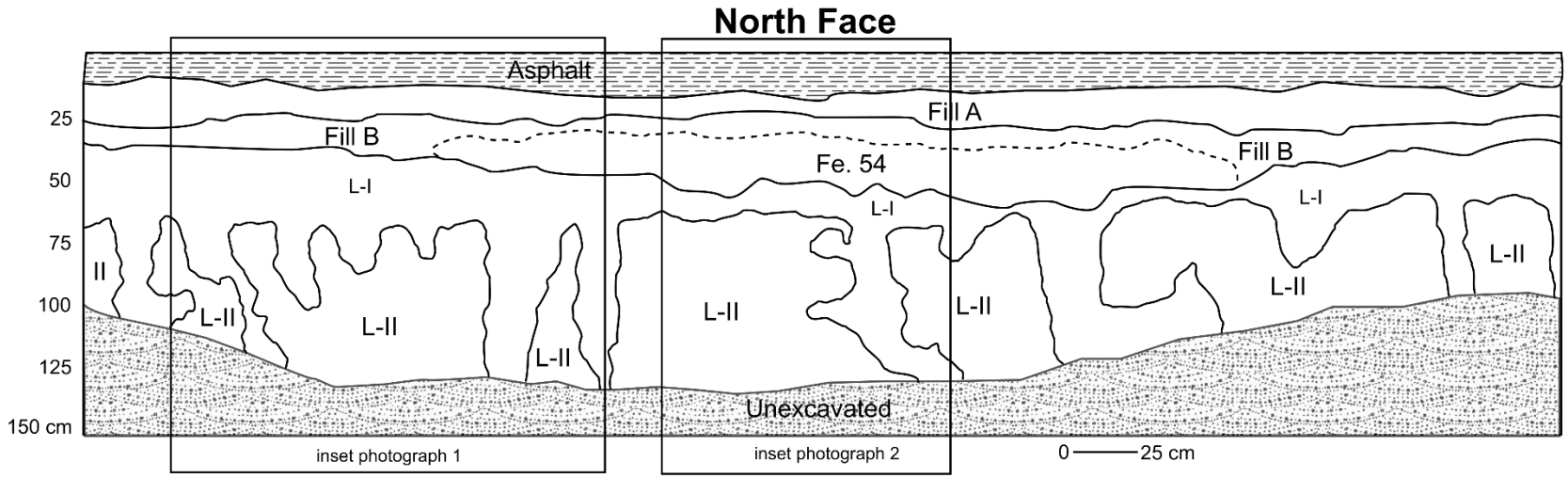
TR17 Southeast Face

Figure 67. Trench 17 (TR17) SE Face, SW Face, and NW Face Profiles and Photographs.



TR18 Overview, View to South

Figure 68. Trench 18 (TR18) East Face Profile and Photographs.



Inset Photograph 1: TR19 North Face

Inset Photograph 2: TR19 Feature 54

Figure 69. Trench 19 (TR19) North Face Profile and Photographs.

Trench 20

Trench 20 (TR20) was excavated by backhoe at the north end of the VPL, just west of TR19 (see Figure 14). The base of excavation in TR20 ranged from 85 to 108 cmbs.

Five stratigraphic layers, designated as Fill A, Fill B1, Fill C, Layer I, and Layer II, were identified in TR20. Fill B1, a dark reddish brown clay deposit was found only in TR20 and TR21 (see Table 4). It directly underlies Fill A. Layer I, the cultural layer, was found directly underlying Fill B1, and also exhibited downward extensions identified as tree root molds. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 70 presents a stratigraphic profile drawing of the south face of TR20, with a photograph.

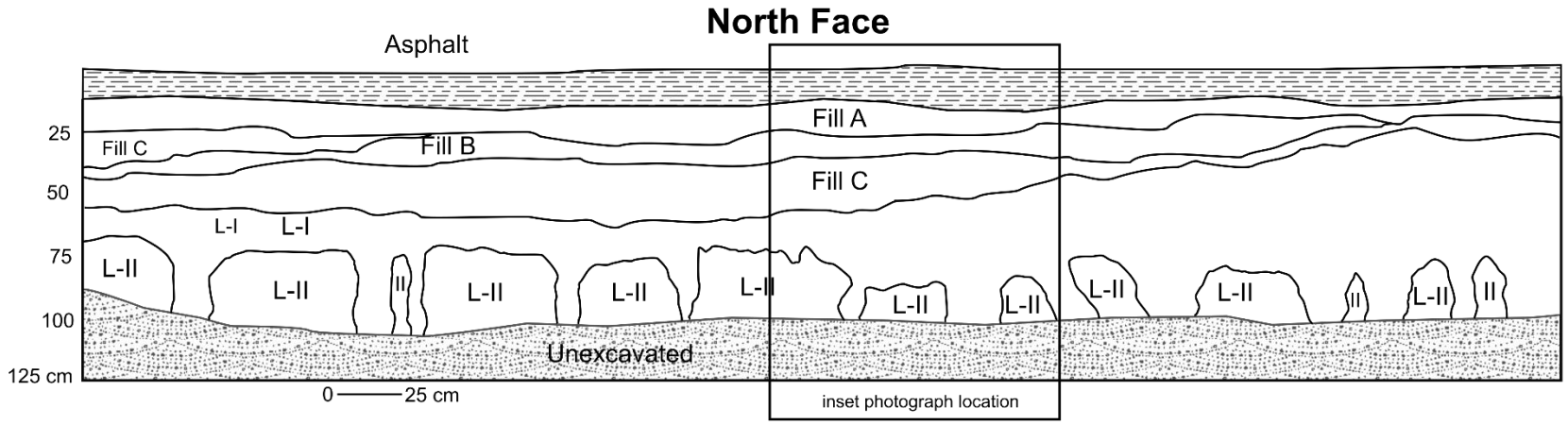
Trench 21

Trench 21 (TR21) was excavated by backhoe along the west side of the asphalt access road leading to the Engineering Building and Pump Station in the BWS Site 7 parcel, situated south of the VPL (see Figure 14). Figure 71 presents photographs showing the location of TR21. The base of excavation in TR21 ranged from 77 to 175 cmbs.

Four stratigraphic layers, designated as Fill A1, Fill B1, Layer I, and Layer II, were identified in TR21. Fill A, the coral base course for the asphalt pavement in the EPL, CVPL, and VPL, was not present in TR21. TR21 is the only excavation where Fill A1 was present. This fill is a grayish brown deposit of small basalt cobbles and pebbles in a fine to coarse basalt sand matrix, and was found directly underlying the asphalt. Fill B1, the dark reddish brown clay deposit first identified in TR20, was also identified in TR21 and directly underlies Fill A1 and overlies Layer I.

Layer I, the cultural layer, exhibited color and texture variations in TR21 that were not observed in TR1-20 in the EPL, CVPL, and VPL. In TR21, Layer I in TR21 is a reddish brown (5YR 4/3, m.) silt loam that was disturbed (mixed). During excavations in Layer I, four sections of old metal lamp posts were exposed; two were removed while other sections extended into the faces of TR21. Figure 72 presents photographs of the two sections that were removed and two sections still in situ. Layer II, the black cinder sand layer, was found directly underlying Layer I. Figure 73 presents a stratigraphic profile drawing of the east face of TR21, with a photograph.

Archaeological materials recovered from Trench 21 include glass, ceramic, metal, and faunal bone.



TR20 Overview, View to West

Inset Photograph: TR20, East Face

Figure 70. Trench 20 (TR20) North Face Profile and Photographs.

Figure 71. Photographs of TR21 in Paved Access Road leading to the Engineering Building in BWS Site 7. Top: TR21 Post Excavation, View to East. Bottom: TR21 Removal of Asphalt, View to West.

Figure 72. Photographs of Lamp Post Recovered in Trench 21. Top: TR21 Post Excavation Showing In Situ Lamp Post Sections within Layer I, View to East. Bottom: Lamp Post Removed from TR21; View to East.

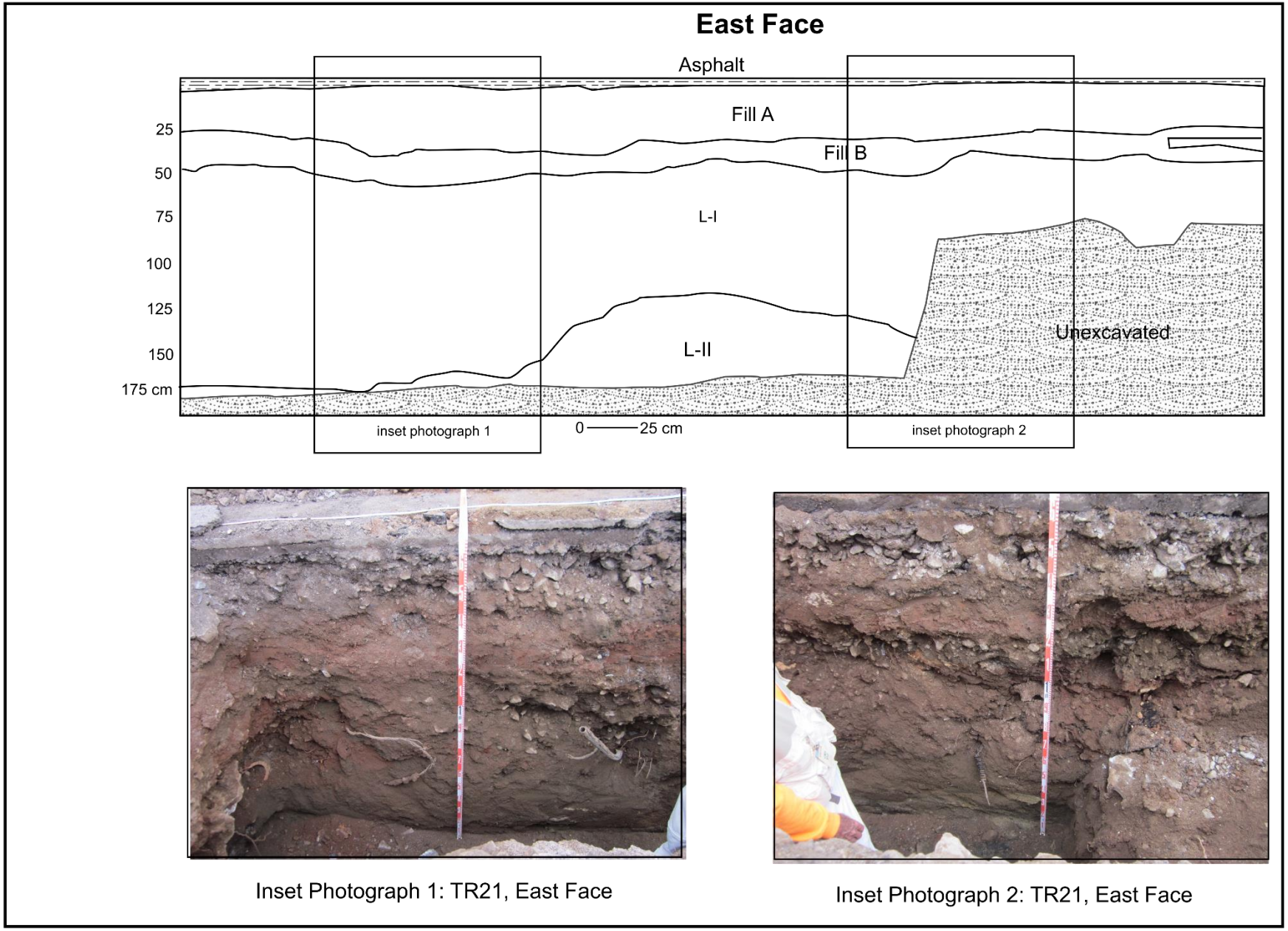


Figure 73. Trench 21 (TR21) North Face Profile and Photographs.

LABORATORY RESULTS

This section presents the results of analyses of historic artifacts and faunal remains recovered during excavations. Methodologies used in the analysis of artifacts are presented first followed by the results of the artifact analyses. The results of invertebrate and vertebrate faunal analyses concludes this section.

METHODOLOGY

Methods used to analyze, date, and describe the various historic items (glass, ceramic, metal, shell, celluloid and other materials) in the Site T-1 historic artifact assemblage are presented below by material and artifact types.

Glass Bottles

The glass bottle analysis provides several categories of information: a date range for the manufacture of the bottle; a description of the contents; and the manufacturing origin of the bottle. The diagnostic attributes that are assessed in the analysis include method of manufacture as determined by mold seams, the shape or form of the bottle, the color of the glass, labels or embossed lettering identifying the product, and embossed lettering or designs identifying the bottle maker. Elements of the bottle analysis including discussion of the temporal implications of mold seams are taken from Munsey (1970),and Toulouse (1969); bottle terminology from Berge (1980); description of bottle finishes and bottle shape by Fike (1987); the dating of bottle maker marks by Toulouse (1971) and a number of specialized discussions of liquor bottles (Wilson and Wilson 1968), medicine bottles (Fike 1987), condiment bottles (Zumwalt 1980), and bottles used by Hawaii merchants (Elliot and Gould 1988). In addition to these and other authors, the Bureau of Land Management and the Society for Historic Archaeology maintain a continually updated site called “Historic Glass Bottle Identification & Information Website. Date ranges assigned to bottles and bottle fragments in the current analysis are based one or more attributes including maker marks, embossed labeling, mold seams, glass color, bottle shape or form, and bottle closure or finish techniques.”

Mold Seams

Mold seams provide evidence of method of manufacture. Bottles can be placed in two general temporal categories (pre ca 1900 and post ca 1920) based on method of manufacture. Prior to around 1900 all bottles were fashioned by hand, either free blown or hand blown into a mold. The mold may consist of a single part tapering cylinder, a dip mold, which shapes the body of the bottle up to the shoulder, or a two or three part hinged mold that forms all of the bottle except for the closure which is then finished by hand (Berge 1980:61-66)(Munsey 1970:38-50), (Toulouse 1969). These handmade bottles carry distinctive, diagnostic mold seams and finish attributes. The attributes imparted by specific mold types and bottle finishing techniques are provided in the artifact descriptions in the following sections. Between ca 1900 and ca 1920 hand-made technologies were replaced by semi-automated and then fully automated bottle manufacture techniques. During this period of transition, between ca 1900 and ca 1920, some bottles continued to be made by hand, but many bottles - particularly wide-mouth containers - were made by automatic bottle machines (ABM). By ca 1920, most bottles were produced by ABMs (Munsey 1970:32-33, Berge 1980). Bottles manufactured by ABMs also carry distinctive, temporally diagnostic mold seams.

Maker Marks and Product Labeling

In many cases, both hand-made and machine-made bottles carry the name or mark of the bottle maker on the base or heel of the bottle. These marks provide a specific date range

for the manufacture of the bottle. Toulouse (1970) presents an extensive analysis of most American and some European maker marks. In addition to maker marks, many bottles have information related to the product, company or bottler embossed on the body of the bottle which provides a specific temporal range. In more recent times (ca post ca 1920's) embossing was replaced by painted or printed labels. In the present analysis specific temporal parameters based on embossed labeling, are derived from a number of authors including, Fike (1987) for medicines, Wilson and Wilson (1968) liquor and spirits, Zumwalt's (1980) analysis of condiment bottles, and Elliot and Gould's (1988) analysis of Hawaiian soda bottles among others.

Bottle Form and Finishes

In addition to the specific temporal information that is derived from mold seams, maker marks and product labeling, general temporal ranges can be determined by bottle form and finish attributes. Historically, many bottled products can be identified by the shape of the bottle and the nature of the bottle closure. For example milk bottles are recognizable by the form of the bottle and the distinctive cap-seat closure. Beer and soda bottles can be assigned temporal ranges based the type of closure (Berge 1980), (Munsey 1970). The content and temporal attributes of liquor battles may be determined by the form and method of closure (Berge 1980), Munsey 1970). Content and date ranges can be assigned to medicinal bottles based on form and closure type (Fike 1987). The same indicators are true for condiments (Zumwalt 1980), and ink bottles (Covill 1971).

Ceramics

The ceramic assemblage consists primarily of fragments of tableware and several fragments of other vessels including chamber pots, ceramic bottles and storage vessels. The analysis and catalogue are developed through the following categories: vessel form; ware type; paste attributes; body glaze; decorative elements; and maker marks. In many cases a vessel form, plate, bowl, cup etc. can be determined from a fragment. The ceramic analysis provides several categories of information. Vessel form provides insights into the activities and in some cases the economic status of the user. A general date range based on ware types and decorative techniques has been put forth by Majewski and O'brien (1987) and summarized by Lebo (1996: Appendix G, Part I:3-7) Some fragments carry temporally diagnostic back marks or maker marks. These marks may also identify the manufacturing origin and maker of the vessel. Geoffrey Godden (1963, 1964, 1966, 2004) provides an analysis of the dates associated with these pottery marks. All of the vessel fragments in the assemblage which carry maker marks are of British origin and based on ware types and techniques of decoration, most of the general assemblage is of British origin and from the latter half of the 19th century. Selected elements of the ceramic assemblage are described below.

Ware Type and Paste

Paste refers to the clay fabric from which the vessel is formed. The present analysis recognizes three general ware type categories based on paste variations: earthenware; stoneware and porcelain. A fourth category, porcelaneous stoneware has been suggested and incorporated by some researchers (Worthy 1982:337) (Lebo 1996 Appendix G, Part I:13). Porcelaneous stoneware is a useful, but in some cases misleading, descriptive modifier particularly suited to some highly vitrified non-translucent white-bodied ceramics such as and particularly Chinese rice bowls. The term must be separated from the coarse fabric of stone utility vessels and viewed as a variable along the continuum of the degree of vitrification within the larger framework of white bodied wares (Majewski and O'Brien 1987:106), is not used in the present analysis which does not seek to elaborate on the degrees of vitrification within the

category of white bodied wares. Additionally, there are no semi-porcelaneous rice bowls represented in the present assemblage.

Earthenware is pottery with a permeable body which must be covered by a glaze to be impervious to liquids (Worthy 1982:334). Unrefined earthenware or terra cotta is usually a red-brown coarse, porous, soft paste with no glaze or clear glaze. Common vessel forms are flower pots, crocks or other utility wares. Refined earthenware or white bodied earthenware includes creamware, pearlware, whiteware, and most varieties of Ironstone (Lebo 1986 Appendix G, Part I:3). Paste is usually white or off-white, fine, porous and soft. Refined earthenware or white bodied wares are commonly covered with a clear, alkaline glaze. A variety of decorative techniques may be employed including molded-relief, transfer printing, handpainting, annular banding decal, gilding, and others. Common vessel forms include tableware chamber pots, and other toiletry vessels.

Stoneware is a vitrified pottery which is impervious to liquids, although glazes are commonly added (Worthy 1982:335). Stoneware paste is usually grey or buff, coarse, non-porous and hard. Common surface treatments include salt glaze, slip/trailing, dark brown "Albany" slip, and thick dark brown glazes. Common vessel forms include mineral water jugs, ink bottles, crockery, pickle jars and ginger beer jars.

Porcelain is a white, vitrified, translucent pottery (Worthy 1982:337). Paste is white, fine, translucent, non-porous and hard. The kaolin body is fired from 1300 to 1450 degrees centigrade which eliminates the boundary between the body and the glaze. Surface treatments include clear glaze, molded-relief, decal, gilding and handpainted floral designs. Vessel forms include tableware, tea cups, rice bowls and spoons.

Glazes

Glazes are a glassy vitreous coating usually prepared from silicate mixtures which bonds to the ceramic surface at temperatures which vary according to the ingredients (Parmalee 1973, Rado 1969 in IMACS). Glazes vary in color and texture according to their chemical constituents and required maturing temperatures. The most common nineteenth-century glazes were alkaline, feldspathic, and raw lead glazes. Alkaline glazes consist primarily of silicates of potash and soda. Some glazes are indicative of manufacturing origin and general time frames. Stoneware bottles were produced almost exclusively in England with a grey salt glaze, a white Bristol glaze, or a white Bristol and a brown ferruginous glaze (Munsey 1970:135). Salt glaze, used on high-fired utilitarian stoneware, usually ale and ginger beer bottles, was obtained by throwing salt into the kiln when the fire reached its greatest heat. This process results in a thin, hard coating of a silicate of soda and alumina. Salt glazing however covers only the exterior and the interior must be covered with a slip glaze such as Albany or left unglazed. Salt glazed stoneware bottles were commonly imported to the Hawaiian Islands. Celadon, a green or blue green translucent glaze used on Chinese porcelain may be a universal marker for late 19th to early 20th century Overseas Chinese sites (Chase 1975, Sando and Fenton1984).

Decorative Techniques

Decorative techniques can be divided into two major categories: Modified surface decoration, called relief molding, and color added decoration such as transfer printing or handpainted decoration. Various decorative techniques have enjoyed periods of relative popularity and can be used to suggest general, probable date ranges. These general ranges of greatest popularity have been described by Majewski and O'brien (1978:131-165) and summarized by Lebo (1996 Appendix G, Part I:7).

Molded relief is a raised decoration which is an integral part of a vessel mold or form. These molded decorations may form geometric or floral patterns on otherwise undecorated white vessels. This form of decoration was particularly popular on clear glazed white ironstone vessels during the second half of the 19th century (Lebo 1996 Appendix G:7, Wetherbee 1974) IMAX.

Transfer printing is a common decorative technique present in 19th century Hawaiian assemblages. The process spans the period between the 1780'2 and the 20th century but probably suggests a date range from between ca 1830 and 1900 for Hawaiian assemblages. Transfer printing is the process of decorating pottery from paper impressions taken off inked copperplate engravings. Transfer printing is an English invention dating from the Buttersea enamel-works (1753-1756) (Norman-Wilcox 1965 in IMAX). Blue transfer printed designs in oriental motifs are common to 19th century English pottery. The design is made of small colored dots that are always applied in an underglaze.

Decal decoration or decalcomania is a multiple color decoration introduced around 1860. Decal decorations appear in slight relief when viewed in reflected light. Decal decorations, often floral patterns, are composed of many colored dots which are usually applied in an overglaze (Berge 1980 in IMAX). Early decal decorated vessels in the United States date to the 1880's and gained in popularity after 1900(Lebo 1996 Appendix G Part I:7, Majewski and O'Brien 1987)

Handpainting encompasses a number of techniques applied by hand with a brush or fingers. The methods include hand painted floral designs, designs applied with a cut sponge, annular or banded designs applied with a brush and combinations these techniques. Various hand painted techniques were popular at differing times from the 1780's through the 20th century (Lebo 1996 Appendix G, Part I:7).

Gilding involves the application of liquid gold dissolved in sulphurous oils or burnished gold, a thin paste of gold chloride, bismuth oxide, borax, and gum water. Gilding was often applied as an edge band or to accent floral designs. Gilding was used most frequently on 19th century refined earthenwares (Majewski and O'Brien 1987:153).

Maker Marks

Among the tools of ceramic analysis, back marks, maker marks, patents and other devices that are printed or impressed on ceramic vessels, are usually the most specific dating indicators. These marks may also identify the maker company along with the location of manufacture. Sources for the identification of ceramic maker marks include Geoffrey Godden (1963,1964,1966, 2004), Ralph and Terri Kovel (1986), and John Patrick Cushion (1959). A number of general rules for interpreting Euro-American maker's marks are derived from Godden's *Illustrated Encyclopedia of British Potter and Porcelain Marks* (1963) and Wetherbee's *White Ironstone* (1974):

- Any printed mark incorporating the name of the pattern may be regarded as having been made after 1810.
- The use of the word "Royal" suggests a date after the mid-19th century
- The garter-shaped mark was used from 1840 onward.
- The Staffordshire knot occurs from about 1845.
- The Royal Arms was used from the early part of the 19th century, but the quartered shield without a central escutcheon was used after 1837.

- By law, the word “England” has to be affixed to English goods imported to the U.S. after 1891.
- “Made in England” is a 20th century mark.
- Ltd., “Limited” reveals a date after 1860 but was not generally used in ceramics marks before 1880.
- “Trade Mark” had to be subsequent to the Trade Mark Act of 1862 but normally denotes a date after 1875.

Metal

A range of research sources were applied to the analysis of the metal artifact assemblage. Nails which represent the greatest number of metal artifacts were assessed through research provided by Fontana and Greenleaf (1962 IMAX) and Buckles et al. (1978:403-404 IMAX). Information relative to several artifacts including batteries, light bulbs, and insignia were gathered from internet sources. Cartridges were in some cases found in Barnes (1972). A number of artifacts including horse and buggy tack, tools, clothing accessories such a suspender parts and corset hooks, and buttons were located in the 1897 Sears Roebuck Catalogue (Lyons 2007).

Miscellaneous Artifacts

The miscellaneous catalogue includes butchered bone, shell, bone, and celluloid buttons, a bone toothbrush, a hard rubber pipe and fitting from a ladies hygiene syringe, and several zinc carbon battery fragments. Some of the miscellaneous artifacts including toiletry items such as the bone toothbrush, hard rubber syringe parts, and buttons were found in the 1897 Sears Roebuck Catalogue (Lyons 2007). Some dates for celluloid and glass buttons were derived from Fink and Pitzler (1993). Information related to shell, bone, and celluloid buttons was also taken from Luscomb (1967) IMAX.

HISTORIC ARTIFACT ANALYSIS

Archaeological Inventory Survey investigations at BWS Sites 6 and 7 yielded a total of 712 artifacts. Table 6 presents a summary of the artifacts by provenience, including layers and subsurface features within excavated trenches where artifacts were recovered. Major material classes include glass (n=269), ceramic (n=129), metal (n=149), butchered bone (n=135), and various miscellaneous artifacts (n=30). The results of the artifact analyses are presented in Appendix B, including Table B1 (Glass Artifacts), Table B2 (Ceramic Artifacts), Table B3 (Metal Artifacts), and Table B4 (Miscellaneous Artifacts). Artifact types include complete (n=16), partial (n=5), and fragmentary (n=48), examples of hand-made, mold-blown, bottles and complete (n=14), partial (n=6), and fragmentary (n=29), examples of bottles manufactured by automatic bottle machine (ABM). Glass artifacts also include a glass insulator, a glass marble, fragments of window glass, light bulb fragments, light globe fragments, two glass applicators, and a glass button. The ceramic assemblage is dominated by fragments, and one complete example, of refined earthenware (n=93), also present are fragments and one complete example, of stoneware vessels (n=6), examples of porcelain (n=13), include tableware (n=5), porcelain insulators (n=4), porcelain doll parts (n=3), and a porcelain door knob (n=1) Also present in the ceramic assemblage are ceramic marbles (n=6) and fragments of terra cotta (n=6). Metal

Table 6. Summary of Artifacts from Site T-1 by Provenience.

Description	TR5/Fe40	TR6/I	TR6/Fe41	TR8/Fill A	TR9/Fe37	TR10/I	TR11/I	TR11/Fill B	TR11/II	TR11/ back dirt pile	TR13/I/2	TR14/Fe46	TR14/Fe47	TR15/I	TR15/ back dirt pile	TR16/I/1	TR16/I/3	TR16/I/4	TR16/I/5	TR17/I/2	TR17/I/3	TR19/I	TR21/I	TR21/ back dirt pile	Total
Glass Artifacts																									
Bottle, whole								6	2			4	8	3	4								1	1	**29**
Bottle, partial				1	3				1				2	3											**10**
Bottle, fragment		3				1	1	9	14	3		7	15	3	8	3							3	5	**75**
Jar, whole		1																							**1**
Jar, partial		1																							**1**
Jar, fragment															7										**7**
Insulator, fragment																								1	**1**
Insulator, partial												2													**2**
Light bulb														1											**1**
Fruit bowl, fragment												3													**3**
Globe lamp, fragment												7													**7**
Vial														1											**1**
Cut glass													1				1								**2**
Unidentified glass																	1								**1**
Window pane fragment												119													**119**
Applicator, fragment															2										**2**
Cup, partial														1											**1**
Cup, fragment															2										**2**
Marble															1										**1**
Button															1										**1**
Stemware															1										**1**
Glass, fragments															1										**1**
Total Glass artifacts	**0**	**5**	**0**	**1**	**3**	**1**	**1**	**15**	**17**	**3**	**0**	**142**	**26**	**12**	**27**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**4**	**7**	**269**
Ceramic Artifacts																									
Plate, fragment					1							1	3	4	4					1				4	**18**
Bowl, fragment	2			1	4	1		8			1	10	7											1	**35**
Bottle, fragment								1		1														1	**3**
Brick, fragment																						2			**2**
Tea cup													1												**1**
Tea cup, fragment							1																		**1**
Wine cup, fragement															1										**1**
Cup, fragment													4	2	1	1									**8**
Doll arm								1					1												**2**
Doll, fragment												1													**1**
Door knob								1																	**1**
Insulator, fragment								1	1					1											**3**
Lid, fragment												5													**5**
Pitcher, fragment									1				2												**3**
Chamber pot, fragment									1			5													**6**
Flower pot																1									**1**
Saucer, fragment													1												**1**
Pipe, fragment																	1							1	**2**

Table 6. Summary of Artifacts from Site T-1 by Provenience.

Description	TR5/Fe40	TR6/I	TR6/Fe41	TR8/Fill A	TR9/Fe37	TR10/I	TR11/I	TR11/Fill B	TR11/II	TR11/ back dirt pile	TR13/ I/2	TR14/Fe46	TR14/Fe47	TR15/I	TR15/ back dirt pile	TR16/ I/1	TR16/ I/3	TR16/ I/4	TR16/ I/5	TR17/ I/2	TR17/ I/3	TR19/I	TR21/I	TR21/ back dirt pile	Total
Marble								1							4	1		1							**7**
Light post, fragment																								2	**2**
Ceramic, fragment		1						2				8	3	2	2	1				4				3	**26**
Total Ceramic Artifacts	**2**	**1**	**0**	**1**	**5**	**1**	**1**	**15**	**3**	**1**	**1**	**30**	**22**	**9**	**12**	**4**	**1**	**1**	**0**	**5**	**0**	**2**	**0**	**12**	**129**
Metal Artifacts																									
Ax, fragment													1												**1**
Pencil ferrule									1						4										**5**
Bell									1																**1**
Chain, fragment													1												**1**
Bucket, fragment										1															**1**
Nail, wire			6						4			3													**13**
Nail, wire, fragment																13				7					**20**
Nail, cut																	12								**12**
Nail, cut fragment												1	2			17				17					**37**
Cork screw, fragment										1															**1**
Decorative Wrought Iron										1															**1**
Fork		1																							**1**
Cake server, fragment		1																							**1**
Light Bulb Screw Base														2	4										**6**
Handle		1																							**1**
Needle												1													**1**
Iron Hames		1																							**1**
Wrought Iron Bar With Forged Eyelet, fragment													1												**1**
Wrought Iron Bar With Forged Welded Piece, fragment														1											**1**
Copper wire, fragment													2												**2**
Iron Pipe, fragment													1												**1**
Penny															1										**1**
Rivet															1										**1**
Suspender Loops															1										**1**
Tag															2										**2**
Button															4										**4**
Bullet casing															1		1			2					**4**
Silver Plate Tube, fragment													1												**1**
Washer															1										**1**
Silver plated headland Reflector									1																**1**
Monkey wrench, fragment															1										**1**
Safety pin, fragment															2										**2**
Harmonica, fragment															2										**2**
Clip, whole															2										**2**
Suspender Fastener, fragment												3													**3**
Clasp Suspender, fragment															2										**2**

Table 6. Summary of Artifacts from Site T-1 by Provenience.

Description	TR5/Fe40	TR6/I	TR6/Fe41	TR8/Fill A	TR9/Fe37	TR10/I	TR11/I	TR11/Fill B	TR11/II	TR11/ back dirt pile	TR13/ I/2	TR14/Fe46	TR14/Fe47	TR15/I	TR15/ back dirt pile	TR16/ I/1	TR16/ I/3	TR16/ I/4	TR16/ I/5	TR17/ I/2	TR17/ I/3	TR19/I	TR21/I	TR21/ back dirt pile	Total
Pin, whole															2										**2**
Corset Hooks															1										**1**
Battery Terminal For Zinc-Carbon Dry Cell, fragment																								1	**1**
Horse shoe, whole																	1								**1**
Plate, partial																				1					**1**
Metal, fragments												2			3										**5**
Bronze Wheel, fragment																				1					**1**
Total Metal Artifacts	**0**	**4**	**6**	**0**	**0**	**0**	**0**	**0**	**7**	**3**	**0**	**10**	**9**	**3**	**34**	**30**	**14**	**0**	**0**	**28**	**0**	**0**	**0**	**1**	**149**
Miscellaneous Artifacts																									
Cut mammal bone		2		1	11	5		3	5	4		23	3		27		16		20	6	5		3	1	**135**
Button, shell												1			7					1					**9**
Button, shell fragment												1			1										**2**
Button, bone													1												**1**
Button, bone partial															1										**1**
Button, Celluloid														1	6										**7**
Button, Celluloid fragment												1		1											**2**
Battery, zinc-carbon cell fragment														1										2	**3**
Syringe, hard rubber															2										**2**
Light post, concrete																								1	**1**
Toothbrush, bone															2										**2**
Total Miscellaneous Artifacts	**0**	**2**	**0**	**1**	**11**	**5**	**0**	**3**	**5**	**4**	**0**	**26**	**4**	**3**	**46**	**0**	**16**	**0**	**20**	**7**	**5**	**0**	**3**	**4**	**165**
Grand Total Artifacts	**2**	**12**	**6**	**3**	**19**	**7**	**2**	**33**	**32**	**11**	**1**	**208**	**61**	**27**	**119**	**37**	**33**	**1**	**20**	**40**	**5**	**2**	**7**	**24**	**712**

artifacts (n=149), include a 1915 penny, cut (n=49) and wire (n=33) nails, spikes, horse and buggy harness tack, clothing accessories, emblems and insignia, automobile parts, cartridges and button fragments. Miscellaneous artifacts (n=165), include butchered bone, bone, shell, and celluloid buttons, a bone toothbrush, hard rubber syringe parts and fragments of several carbon core batteries.

As can be seen in Table 6, greater numbers of artifacts were recovered from trenches excavated in the CVPL, including TR14 (combined total is 269 and includes Features 46 [n=208] and 47 [n=61]), TR15 (n=146 for Layer I and the back dirt pile), and TR16 (n=91), and TR17 (n=45). With the exception of TR11, generally fewer artifacts were recovered in excavations in the EPL, including TR9, Feature 37 (n=19), TR6, Layer I and Fe41 (n=18), TR10, Layer I (n=7), TR5, Feature 40 (n=2). TR11 in the EPL is an exception (n=78 for all proveniences). As will be discussed later in the report, the differential number of artifacts recovered in the CVPL versus the EPL is likely a result of the discontinuous nature of Layer I, the cultural layer, in both of these parking lots.

The age of the artifacts, as provided in Tables B1 through B4 in Appendix B provides a fairly tight chronological framework for the activities represented by the Residential Era of Site T-1. A majority of the glass bottles have an age range that begins in the late 1800s to the early 1900s and ends in the 1920s to the 1930s-40s. None of the bottles recovered in excavations were manufactured after 1935 (see Table B1). The dates of ceramic, metal, and shell artifacts provided in Tables B2-B4 also suggest a time period ranging from the late nineteenth to the early twentieth centuries.

The remainder of this section presents the analysis of glass, ceramic, metal, and miscellaneous artifacts by material types. The analysis of recovered faunal materials concludes the laboratory results section.

Glass Artifacts

The 269 glass artifacts represent approximately 38% of the artifact assemblage. The glass bottle assemblage includes 16 complete examples, 5 partial examples, and 48 fragmentary examples of mold-blown glass bottles (see Table B1 in Appendix B). These bottles were individually hand blown into a mold and the bottle closure finished by hand, usually with a lipping tool (Munsey 1970:32-36). All of the mold-blown bottles and bottle fragments in the assemblage carry temporally diagnostic mold seams or finish characteristics. On mold-blown bottles, the mold seam disappears on the shoulder or neck of the bottle where the neck and finish have been hand tooled (Munsey 1970:38-40). Some of the mold-blown bottles and fragments in the assemblage also carry temporally diagnostic embossed lettering identifying the product or the bottle manufacturer. Prior to the turn of the century, all glass bottles were fashioned in this manner by hand.

A total of 14 complete examples, 6 partial examples, and 29 fragmentary examples of bottles produced by automatic bottle machines (ABMs), are represented in the assemblage (see Table B1 in Appendix B). Nine (9) bottle fragments included in this glass bottle assemblage could not be assigned a method of manufacture. Two bottle fragments are from a large, free blown, demijohn bottle. In depth discussions of the temporally diagnostic characteristics of these manufacturing technologies are provided by Berge (1980), Fike (1987), Munsey (1970) and Toulouse (1969). No glass bottles were manufactured in Hawai'i; however, this bottle assemblage provides an overview of mold blown and ABM bottle types imported to the Hawaiian Islands between ca 1880 and ca 1930. Selected elements of the glass assemblage are described below. For a complete catalogue of the glass assemblage see Table B1 in Appendix B).

Handmade Mold Blown Bottles ca 1880-ca 1915

Alcoholic Beverage Bottles

Several complete or nearly complete mold blown bottles, which contained alcoholic beverages, are represented in the assemblage. Artifact 2.25 is a dark olive green bottle that was blown into a one-part, shoulder height, turn mold (Figure 74). The bottle exhibits a blurred mold seam around the shoulder. The body of the bottle exhibits parallel groves caused by slight imperfections in the mold that were scratched into the surface as the bottle was turned in the mold. This mold is associated primarily with the manufacture of wine bottles during the period from ca1800-1910 (Munsey 1970:40). The closure or finish is a hand-tooled collar know as a packer finish (Fike1987:8). The bottle was sealed with a cork which was tied down with a wire fastener. This particular bottle probably contained wine or brandy.

Artifact 29.1 is an aqua glass bottle which was blown into a post-bottom mold. The heavy mold seam forms a circle on the bottle base with two seams extending across the edge of the base and up the sides to about 3cm below the finish (see Figure 74). The finish is a hand-tooled crown cap which was fashioned with a lipping tool. This mold form was popular throughout the nineteenth century (Munsey 1970:39). This particular bottle contained beer. The base of the bottle is embossed with “I. P. G. Co.”, which is the maker’s mark of the Illinois Pacific Glass Co. of San Francisco which was in use between 1902 and 1925 (Toulouse 1971:269).

Artifact 2.26 is an amber bottle which was blown into a cup-bottom mold (see Figure 74). This mold produces a circular seam around the heel of the bottle with two seams extending up the sides to just above the shoulder (Munsey 1970:44). The bottle exhibits a hand tooled Packer finish (Fike 1987:8). The base of the bottle carries the maker mark “R. & Co.” which is the mark of Roth and Co. of San Francisco which was in use between 1880 and 1900 (Toulouse 1971:438). The bottle was sealed with a cork, probably tied down with wire, and contained an alcoholic beverage.

Soda Bottles

Among the handmade, mold blown bottles in the assemblage are fragments of three soda bottles. Artifact 28.2 is an aqua glass bottle blown into a cup-bottom mold. This mold produces seams around the outside of the base and up the sides of the bottle (Munsey 1970:39). Although the neck and finish are missing, it is known that this bottle had a hand tooled, globular finish which accommodated a Hutchinson stopper. The body of the bottle carries the embossed “PROPERTY OF HAWAIIAN SODA WORKS/ HONOLULU T.H./ THIS BOTTLE NOT SOLD” (Figure 75). This bottle was in use around 1910 (Elliot and Gould 1988:100 #155).

Artifact 25.2 is an aqua bottle which was blown into a hinged, cup-bottom mold. This bottle exhibits mold seams that extend up the sides and shoulder to below the finish (Munsey 1970:44). The bottle finish is a hand tooled blob top which accommodated a Hutchinson stopper which is still present in the closure (see Figure 75). “STAR SODA WATER WORKS HONOLULU” is embossed on the body of the bottle. This bottle was in use around 1900 (Elliot and Gould 1988:119 #265).

Artifact 6.1 is an aqua glass bottle blown into a cup-bottom mold producing seams around the heel and up the sides of the bottle. This distinctive octagonal bottle is known to have utilized a Hutchinson stopper (see Figure 75). “ARTIC SODA WORKS HONOLULU” is embossed vertically on the body of the bottle. This bottle was in use between 1902 and 1903 (Elliot and Gould 1988:77).

Figure 74. Photograph of Mold-Blown Alcoholic Beverage Bottles, Artifact 2.25 (left), Artifact 29.1 (center) and Artifact 2.26 (right).

Figure 75. Photograph of Mold Blown Soda Bottles, Artifact 28.2 (left), Artifact 25.2 (center), Artifact 6.1 (right).

Medicine Bottles

Artifact 25.3 is an aqua glass medicine bottle with an oval base which was blown into a cup bottom mold. This mold produces seams around the heel, up both sides, and across the shoulder of the bottle (Munsey 1970:44). The bottle is finished with a hand tooled, "extract" finish which was closed with a cork stopper (Fike 1987:8). Embossed vertically on the body of the bottle is "POND'S EXTRACT," and the date "1846" is embossed on the bottle base (Figure 76). Theron Pond, of Clinton, Connecticut, formulated this preparation of witch hazel in 1846 (Fike 1987:120) and claimed it would cure numerous illnesses. The embossed bottle was introduced ca 1882 (Wilson and Wilson 1971:72 and 133).

Artifact 29.3 is a small, rectangular medicine bottle fashioned from clear glass with a slight amethyst tint (Figure 77). The bottle originally had a paper label. This bottle was blown into a cup bottom mold and exhibits mold seams around the heel and up both sides of the bottle (Munsey 1970:44). The bottle closure is a "Reinforced Extract/Patent" medicine finish and was sealed with a cork stopper (Fike 1987:8). This bottle was in use between around 1900 and 1915 and contained medicine.

Artifact 21.1 is a rectangular bottle fashioned from clear glass. This bottle carried a paper label. This bottle was blown into a cup-bottom mold producing seams around the heel and up both sides of the bottle to just below the finish (see Figure 77). The bottle has a hand tooled "prescription" finish (Fike 1987:8). This bottle contained a proprietary medicine, and was sealed with a cork. Similar bottles were commonly sold in bulk to merchants who applied their own labels. This bottle was probably in use between around 1900 and 1920 (Fike 1987:15).

Artifact 25.6 is a rectangular bottle fashioned from clear glass with a slight amethyst tint. The bottle was blown into a cup-bottom mold. Mold seams encircle the heel of the bottle and extend up both sides, across the shoulder to just below the finish (see Figure 77). This bottle carried a paper label. The finish is a tooled "Prescription" closure that was sealed with a cork (Fike 1987:8). This bottle contained medicine and was in use between around 1880 and 1910.

Artifact 25.4 is the body of a rectangular bottle fashioned from aqua glass. The neck and finish are missing. The bottle was blown into a post bottom mold. Mold seams extend from the circular post to the corners of the bottle base and up two sides and across the shoulder. Three sides of this rectangular bottle are recessed panels. Embossed in the recessed panels are "Dr. KENNEDY'S/ MEDICAL DISCOVERY/ ROXBURY MASS" (Figure 78). This bottle was in use around 1885 (Wilson and Wilson 1971:50).

Condiment Bottles

Generic condiment bottles, very common between ca1880 to around 1920, are recognizable by their form and construction (Zumwalt 1980). These bottles carried paper labels. Artifact 25.5 is a cylindrical bottle fashioned from aqua glass. This bottle was blown into a cup-bottom mold and has seams encircling the heel and extending up two sides, disappearing above the shoulder (Figure 79). The closure is a tooled "Packer" finish (Fike 1987:8). This bottle probably contained a viscous sauce.

Artifact 28.1 is also a generic condiment bottle which had a paper label. This cylindrical bottle was blown into a cup-bottom mold and exhibits seams around the heel and up two sides to just below the finish (see Figure 79). The "Packer" finish is an applied collar of glass (Fike 1987:8). Similar bottles contained preserved olives, fruit, or pickles (Zumwalt 1980:206).

Artifact 22.2 is a rectangular bottle fashion from aqua glass. This bottle was blown into a full-height cup bottom mold. The crude thread closure is formed in the mold (see Figure 79). Mold seams extent around the heel, up two corners of the body and through the threaded

Figure 76. Photograph of Mold Blown Medicine Bottle, Artifact 25.3.

Figure 77. Photograph of Mold Blown Medicine Bottles, Artifact 29.3 (left), Artifact 21.1 (center), Artifact 25.6 (right).

Figure 78. Photographs of Mold Blown Medicine Bottle, Artifact 25.4 (three sides).

Figure 79. Photograph of Mold Blown Condiment Bottles, Artifact 25.5 (left), Artifact 28.1 (center) and Artifact 22.2 (right).

closure. The bottle carried a paper label and probably contained a viscous sauce (Zumwalt 1980;291).

Makers Marks

Seven of the mold blown bottle base fragments in the assemblage carry the manufactures maker mark. Examples of these marks include artifact 33.2 which is the base of an amber bottle which was blown into a post-bottom mold. This bottle contained an alcoholic beverage. The bottle base carries the mark "I G Co."(Figure 80), which is the mark of the Illinois Glass Co. of Alton Illinois which was in use between ca1880 and 1900 (Toulouse 1971:264). Artifact 2.9 is an amber bottle which was blown into a post-bottom mold. This bottle contained an alcoholic beverage. The base of the bottle carries the mark "A B Co" (see Figure 80). This is the mark of the American Bottle Co. of Chicago Illinois which was in use from 1905 until 1916 (Toulouse 1971:30). Artifact 3.11 is the base of an aqua bottle which was blown into a cup-bottom mold. The bottle base carries the mark "R & CO" (see Figure 80). This is the mark of Roth and Co. of San Francisco which was in use between around 1880 and 1910 (Toulouse 1971:438). Artifact 37.2 is a bottle base fashioned from thick, dark olive-green glass. This bottle was blown into a dip mold and has no seams around the base. "WOOD PORTOBELLO" are embossed into a push-up on the bottle base (see Figure 80). This is the mark of Wood's Bottle Works of Portobello Scotland and spans the period between 1868 and 1920 (Toulouse 1971:524-525).

Other Mold Blown Bottles

Several small, mold blown specialty bottles are present in the assemblage. Artifact 21.1 is a cylindrical ink bottle fashioned from clear glass (Figure 81). This bottle was blown into a cup bottom mold. This bottle has a tooled bead finish (Fike 1987:8). Similar bottles were common from the late 1800's up to recent times (Covill 1971:53). The construction of this bottle suggests the period between ca 1900 and 1920.

Artifact 40.2 is a small, mold blown perfume bottle. This bottle is fashioned from clear glass, blown into a cup bottom mold (see Figure 81). This bottle has a tooled bead finish (Fike 1987:8). The body of the bottle is embossed with "ED PINAUD PARIS". An internet search revealed that this bottle was probably in use between ca1900 and 1910.

Artifact 40.1 is a small, square bodied, bottle that appears to have been made completely by hand without the use of a mold. The sides are slightly concave and the finish is a hand tooled "Prescription" (Fike 1987:8). This bottle may have contained medicine or perfume and probably dates to around 1900 (see Figure 81).

Artifact 39.3 is a small, oval bodied, bottle that was blown into a cup-bottom mold. The bottle is made of clear glass and exhibits a threaded closure that was part of the mold. The bottle retains a threaded metal cap (see Figure 81). Similar bottles are offered for sale, in bulk, in the 1897 Sears Roebuck catalogue (Lyons 2007:43) and contained tablets of various description.

Machine-Made Bottles ca 1910-1930s

A variety of bottles (and jars), produced by Automatic Bottle Machines (ABMs), are represented in the assemblage, spanning the period between ca 1915 and ca 1930s. It is noteworthy that no bottles specifically attributable, or representative of, the period after ca 1935 are present in the assemblage. Bottles manufactured by ABMs exhibit mold seams that extend around the bottle base, with two seams extending up the sides of the bottle and continuing through the finish and across the top of the bottle finish (Munsey 1970:45). Early machine made

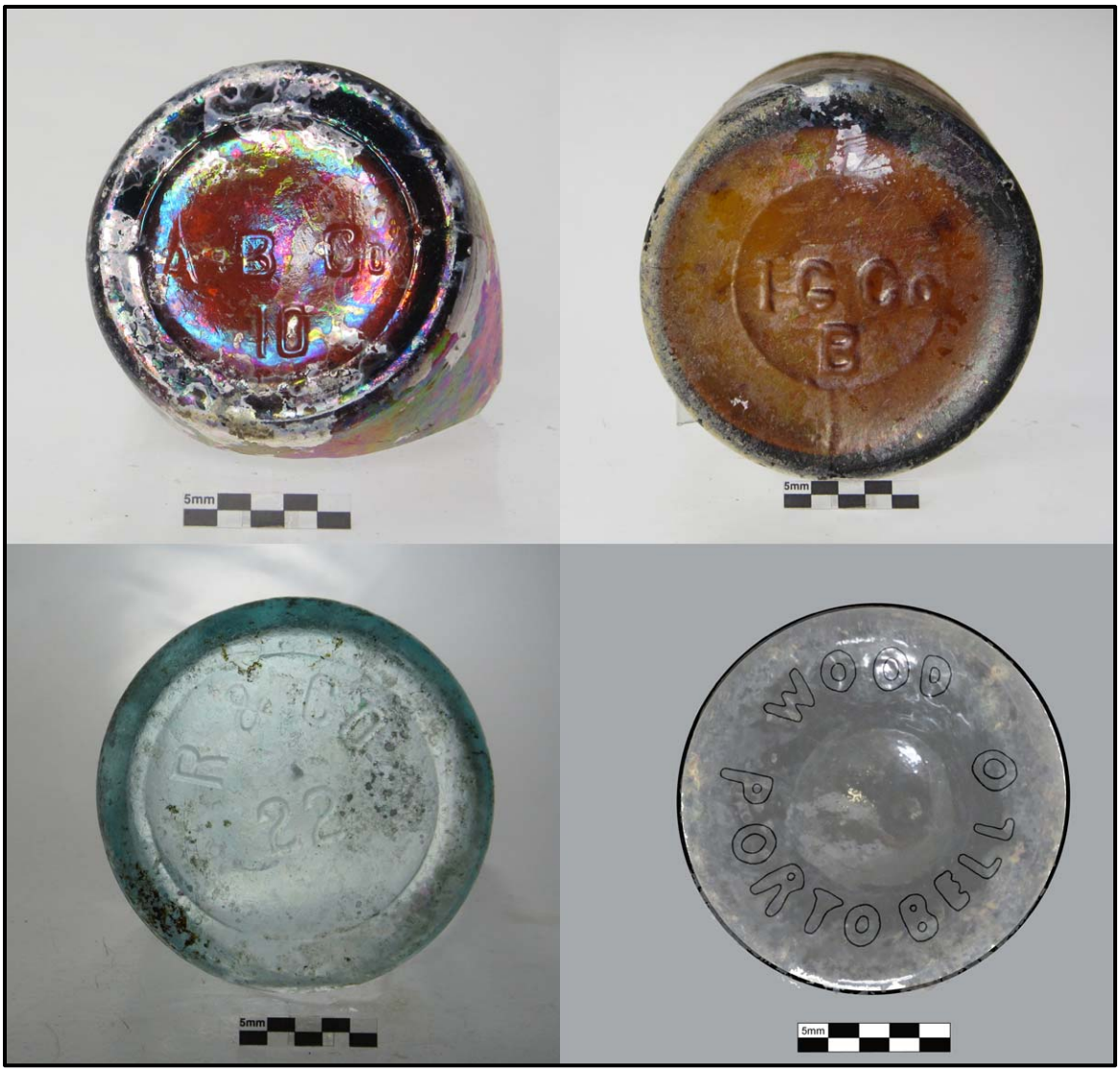


Figure 80. Photographs of Makers Marks on Mold Blown Bottles, Artifact 33.2 (upper left), Artifact 2.9 (upper right), Artifact 3.11 (lower left) and Artifact 37.2 (lower right).

Figure 81. Photograph of Other Mold Blown Bottles, Artifact 21.2, Artifact 40.2, Artifact 40.1 and Artifact 39.3 (left to right).

bottles produced between ca 1920 and ca 1930, which included wide mouth containers such as milk bottles, continued to be thick walled and heavier than mold blown bottles (Berge 1980). Machine made bottle types present in the assemblage include beer and wine bottles, milk bottles, soda bottles, cosmetic bottles, and medicine bottles.

Alcoholic Beverage Bottles

Artifact 29.2 is an example of very early Automatic Bottle Machine technology. This bottle is fashioned from olive green glass. This bottle is heavy, thick walled and exhibits a crown cap closure (Figure 82). The mold seams continue around the base of the crown cap and through the finish and across the top of the closure. The heel of the bottle is embossed with "B.C. BREWERIES LTD. VANCOUVER B.C.". A web search revealed that B.C. Breweries LTD. was in business only between 1911 and 1916.

Artifact 2.19 is a cylindrical aqua glass bottle produced by an automatic bottle machine. The bottle has a "lightning" type closure with mold seams running through and across the closure top (see Figure 82). The base of this bottle exhibits irregular circular marks that are suction machine cutoff scars made by the Owens automatic bottle-making machine which was first used in 1904 (Munsey 1970:40). This bottle was probably made in Japan between ca 1910 and 1930.

Artifact 3.1 is an early ABM bottle fashioned from amber glass. The closure is a crown cap with mold seams continuing across the top of the closure (see Figure 82). The glass is thick and heavy and typical of early ABM bottles (Berge 1980). This bottle contained beer and was probably manufactured between ca1910 and 1930.

Milk Bottles

Artifact 2.18 is a clear, heavy- walled, ABM milk bottle. "PROPERTY OF ALOHA DAIRY/ONE PINT/WASH AND RETURN BOTTLES DAILY" is embossed on the body of the bottle (Figure 83). Embossed on the heel of the bottle is "I.P.G." in a triangle. This is the maker mark of Illinois Pacific Glass Co. of San Francisco which was in use from 1902 to 1925 (Toulouse 1971:268).

Artifact 32.1 is a clear, heavy-walled, ABM milk bottle. "HALF PINT/PROPERTY OF RAWLEY'S ICE CREAM AND DAIRY PRODUCTS CO. LTD" is embossed on the body of the bottle (see Figure 83). "I.P.G." in a triangle is embossed on the heel of the bottle. This is the mark of the Illinois Pacific Glass Co. of San Francisco which was in use between 1902 and 1925 (Toulouse 1971:268).

Extract Bottle

Artifact 39.1 is a rectangular, aqua glass extract bottle manufactured by an automatic bottle machine. This bottle has the general appearance of a hand-made bottle but close examination reveals mold seams continuing across the top of the finish. This bottle has a "Patent" finish and was sealed with a cork (Fike 1987:8). Three sides of this bottle have recessed panels. These panels are embossed with "BURNETT/ BURNETT'S STANDARD FLAVORING EXTRACT/ BOSTON" (Figure 84). The base of the bottle carries the suction scar of the Owens automatic bottle machine and the maker mark of the Illinois Glass Co. of Alton Illinois which was in use between 1916 and 1929 (Toulouse 1971:264).

Figure 82. Photograph of Machine Made Alcoholic Beverage Bottles, Artifact 29.2 (left), Artifact 2.19 (center) and Artifact 3.1 (right).

Figure 83. Photograph of Machine Made Milk Bottles, Artifact 2.18 (left) and Artifact 32.1 (right).

Figure 84. Photograph of Machine Made Extract Bottle, Artifact 39.1.

Figure 85. Photograph of Other Machine Made Bottles, Artifact 22.1 (left), Artifact 28.5 (center back), Artifact 28.3 (right) and Artifact 10.3 (center front).

Other Machine Made Bottles

Examples of several other types of machine made bottles are present in the assemblage. Among these is Artifact 22.1, a square bodied, clear glass bottle with a threaded closure (Figure 85). Mold seams are present through the threads and across the top of the finish. The heel of the bottle is embossed with "I.P.G. Co.". This is the mark of the Illinois Pacific Glass Co. of San Francisco which was in use from 1902 until 1925 (Toulouse 1971:268). Similar bottles commonly contained tablets or salts (Fike 1987:15).

Artifact 28.5 is a squat, cylindrical bottle made from a light aqua glass. This bottle has a "Bead" finish (Fike 1987:8). Mold seams are present through the neck and across the finish of the bottle (see Figure 85). Embossed on the shoulder of the bottle is "WHITTEMORE'S POLISH". A web search revealed that this bottle was in use between ca 1910 and 1920.

Artifact 28.3 is a squat, machine made, clear glass bottle. This bottle has a ring where the neck and shoulder join (see Figure 85). The finish is a "Bead" type (Fike 1987:8). This bottle type was nearly exclusively used for creams and pomades (Fike 1987:15). This bottle is rather crudely formed and most probably represents the period between ca 1910 and 1920.

Artifact 10.3 is a fragment of a clear glass bottle which may have contained soda. This artifact s noteworthy in that it is the only example of a bottle from the assemblage that clearly postdates ca 1934. This fragment exhibits a portion of a painted label (see Figure 85). The Bureau of Land Management and the Society for Historic Archaeology maintain a continually updated site called "Historic Glass Bottle Identification & Information Website. A review of the relevant portions of this site indicates that painted labels such as this were not in use prior to 1934. Other indicators of the post ca 1935 period are conspicuously absent in the assemblage. For example the phrase "Federal Law Prohibits Sale or Reuse of This Bottle" which by law had to appear on liquor bottles sold between 1933 and 1964 (Ferraro and Ferraro 1966:56-60), is absent in the assemblage. Also absent is the "No Deposit- No Return" which is a post 1940 feature. Perhaps the most common maker mark of the period between 1930 and 1954, the Owens Illinois mark (1929-1954) (Toulouse1971:403) is also conspicuously absent in the assemblage.

Miscellaneous Glass Artifacts

Other glass artifacts recovered during the course if the inventory survey included fragments of window glass, Artifacts 43.6 and 23.11; fragments of cut glass tableware Artifacts 40.13, 21.12, and 43.5; fragments of a lamp globe used with ornate oil lamps similar to those advertised in the 1897 Sears Roebuck catalogue (Lyons 2007:624); and two glass applicators similar to those found in mercurochrome bottles (see Table B1 in Appendix B). Also present in assemblage are fragments of two glass insulators, Artifact 22.4 and Artifact 41.4, of the type used for telephone and telegraph lines from the 1890's to the 1950's (Figure 86).

Additional glass artifacts include a light bulb, Artifact 29.12. A web search suggests this is an early light bulb type in use from around 1904 to 1908 (Figure 87). A glass marble was recovered, Artifact 40.20; the automatic glass marble machine was introduced in the U.S. in 1901, and by 1910 glass marbles were readily available (Garskadden and Gartley 1990:58; (see web, ceramic marbles Maryand). Glass marbles used for Cod Stopper soda bottles were molded and have a distinctive mold seam. A single glass button (see Figure 87), of the type popular from between ca1860 to 1900 (Fink and Pitzler 1993:34), and a small glass vial, artifact 31.1 (Figure 87) are among the miscellaneous glass artifacts. Similar vials containing medicines are advertised in the 1897 Sears Roebuck catalogue (Lyons 2007:30).

Figure 86. Photograph of Miscellaneous Glass Artifacts, Artifact 22.4 (left) and Artifact 41.4 (right).

Figure 87. Photograph of Miscellaneous Glass Artifacts, Artifact 20.12, Artifact 40.20, Artifact 40.28 and Artifact 31.1 (left to right).

Ceramic Artifacts

The ceramic assemblage is comprised of 129 artifacts, representing 18.1% of the total artifact assemblage (see Table B2 in Appendix B). The assemblage is dominated by 93 fragments of refined white earthenware. Most of the white earthenware fragments are tableware, (plates, bowls and cups) with a few examples of toilet ware (chamber pots). All of the refined white earthenware fragments that can be assigned a manufacturing local are of English origin. English maker marks or partial maker marks are present on nine artifacts. Porcelain tableware of Chinese origin is represented by two bowl fragments, one complete tea cup, one base fragment of a tea cup, and a base fragment of one wine cup (see Table B2 in Appendix B). Fragments of three stoneware bottles and a stoneware jar are among the ceramic artifacts.

Other ceramic artifacts include parts of three porcelain dolls, fragments of four porcelain electrical insulators, and a porcelain door knob. Also present in the assemblage are seven ceramic marbles, fragments of two terra cotta flower pots, two brick fragments, and two fragments of ceramic utility pipe (see Table B2 in Appendix B).

Ceramic vessels are classified in terms of the hardness of the "body," or "paste," from which the item was fashioned: earthenware pottery is permeable and must be covered by a glaze to be impervious to liquids; stoneware is a vitrified pottery that is impervious to liquids, although glazes are commonly applied; porcelaneous stoneware is naturally white bodied, highly vitrified, and opaque; porcelain is pottery that is white, vitrified, and translucent (Worthy 1982: 134-137). Ceramic artifacts are also described and identified using form, function, and decorative techniques. Selected ceramic artifacts are discussed below. For a complete catalogue of the ceramic artifacts see Table B2 in Appendix B.

Ceramic Tableware

Refined White Earthenware (Whiteware)

Of the 93 fragments of refined white earthenware, 40 tableware vessels (plates, bowls, and cups), and two toiletry vessels (chamber pots) are represented in the assemblage. The whiteware is constructed of a white or off-white, fine porous, soft paste. Surface treatments include a clear glaze with a variety of decorative techniques including: transfer printing, molded-relief, flow blue, hand painting, engine turned annular banding, decal, and gilding. Although these whitewares in Hawaii generally span the period from around 1830 until recent times, general periods of popularity for the various decorative techniques provide a probable temporal framework (Lebo 1997 Appendix G, Part I:7). Additionally maker's marks present on fragments of nine whiteware vessels provide some specific temporal information.

Maker Marks

Artifact 6.2 consists of two fragments of a plain, undecorated whiteware bowl. The bottom of the bowl carries a black, transfer printed maker mark. The mark includes "ROYAL IRONSTONE CHINA" a depiction of the Royal Arms: a shield flanked by a lion and a unicorn, and "BAKER & Co LTD ENGLAND" (Figure 88). Baker and Co. was a North Staffordshire pottery which was in operation between 1839 and 1932. The word "England" was added to the mark after 1891 and "LTD" was added to Baker ware in 1893. This mark was used by the Baker Co. from 1893 until 1928 (Cushion 1959:135, Godden 1963, 1964, 1972, 2004 etc).

Figure 88. Photograph of Maker Mark of "Baker & Co LTD England", Artifact 6.2.

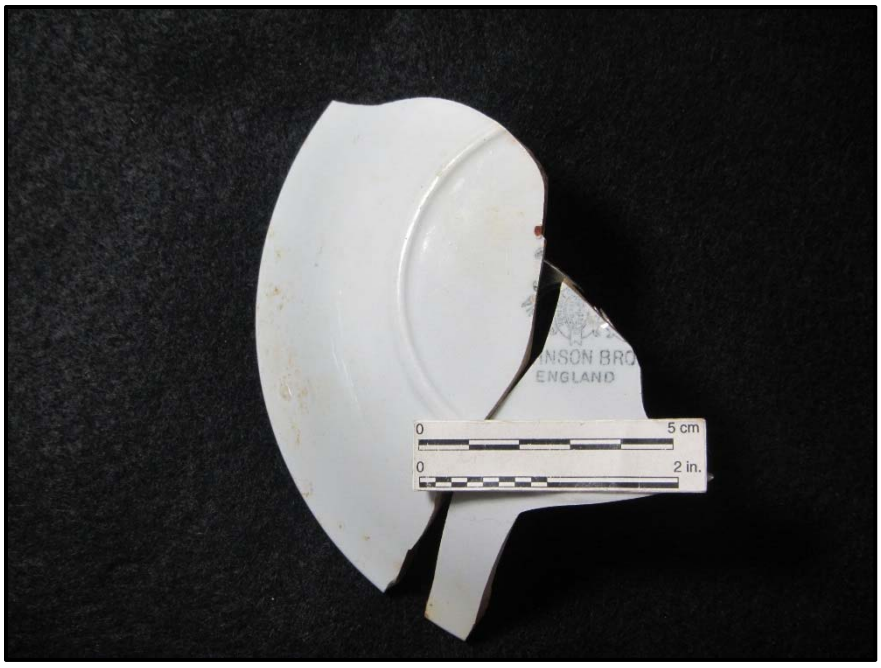


Figure 89. Photograph of Maker Mark of "Johnson Bros England", Artifact 8.1.

Artifact 8.1 is two fragments of a plain whiteware bowl which on the bottom carries the partial, black transfer printed maker mark of "JOHNSON BROS ENGLAND" (Figure 89). The Johnson Bros pottery was located at Hanley, North Staffordshire, England, from 1883 to 2004.

This complete maker mark Included "ROYAL IRONSTONE CHINA" the Royal Arms, and "JOHNSON BROS ENGLAND". This mark was in use by the Johnson Bros Co. from 1883 to 1913 (Godden 1963, 1964 1972 , Kovel and Kovel 1986:12).

Artifact 30.1 is a fragment of a whiteware plate which carries a partial, black transfer printed maker mark of "GEORGE JONES & SONS ENGLAND". Above the Royal Arms was "ROYAL PATENT IRONSTONE". This mark is also partially present on Artifact 22.6 (Figure 90). George Jones and Sons pottery operated in Stoke-Upon-Trent, Staffordshire, England from 1861 through 1951. This mark was in use between ca 1891 and 1907 (Godden 1964, 2004 etc)

Artifact 37.7 is a whiteware plate fragment which carries a partial maker mark in black transfer print. This mark exhibits the Royal Arms, and below "TRADE MARK" and a banner with "ENGLAND" (Figure 91). "Trade Mark" had to be subsequent to the Trade Mark Act of 1862 and normally denotes a date after 1875. By law, the word "England" had to affixed to English goods imported to the U.S. after 1891. Some British potters however used the word "England" as early as 1869 (Godden 1963, Wetherbee 1974).

Decorative Techniques

A variety of decorative techniques occur on the whiteware fragments in the assemblage. These include transfer printing, hand painting, which includes sponge applications and annular banding, molded relief, flow blue, decal, and gilding. Examples and descriptions of these techniques are provided below.

Transfer Printing

Transfer printing is the process of decorating pottery from paper impressions taken off inked copperplate engravings. These inked impressions are applied to the bisque surface leaving a print of the engraved design. The process was invented by Englishmen John Sadler and Guy Green around 1752 at the Buttersea enamel works (Berge1980, Norman-Wilcox 1965). The designs, usually floral or landscapes, are composed of many small colored dots applied in an underglaze. Blue is the most common color but varied themes in blue, red, green and brown are also common. Artifact 21.9 is a fragment of a whiteware ceramic lid with a brown floral pattern (Figure 92). Transfer printing in general ranges from ca 1780 through the 20th century. Brown floral designs similar to Artifact 21.9 are common in late 19th through the 20th Century (Lebo 1996 Appendix G, Part I:7 Table G.4).

Flow Blue

Flow blue is a form of transfer printing in which the design is softened or blurred by adding a volatizing mixture during the glaze firing. Artifact 28.8 is a fragment of a whiteware saucer with edge molded decoration and Flow Blue floral designs (see Figure 92). Flow blue also occurs in other colors including green, brown, and red. This decorative technique was popular between the 1840's and early 1900"s (Lebo 1996 Appendix G:7).

Handpainting

Handpainted designs are applied by hand with a brush or fingers. These techniques include hand painted floral motifs, sponge stamped geometric and floral designs, and banded

Figure 90. Photograph of Maker Mark of "George Jones & Sons England", Artifact 30.1 and Artifact 22.6 (left to tight).

Figure 91. Photograph of Maker Mark with "Trade Mark England", Artifact 37.7.

Figure 92. Photograph of Transfer Printed and Flow Blue Ceramics, Artifact 21.9 (left) and Artifact 28.8 (right).

Figure 93. Photograph of Handpainted Floral, Sponge, and Banded ceramics, Artifact 2.2 (left), Artifact 6.4 (center) and Artifact 33.4 (right).

designs applied with a brush onto a vessel positioned on a turning wheel. Artifact 2.2 is a fragment of a whiteware bowl with a brush applied floral leaf and a red rim band (Figure 93). This pattern, known as "Loke lani Ware" was manufactured in England and imported to Hawaii by W.W. Dimond & Co. LTD. Of Honolulu from around 1850 through the 20th century (Leidman 1987 in Clark 1987:68). Handpainted whitewares with floral paterns reached a height of popularity between ca1840 and 1860 (Lebo 1996 Appendix G:7)

Artifact 6.4 is a fragment of a whiteware plate decorated with a sponge stampled floral design and brush applied bands (see Figure 93). Sponge applied motifs were popular from around 1845 through the 20th century (Lebo 1996 Appendix G:7). Artifact 33.4 is an example of whiteware decorated with a wheel turned, brush applied banding (see Figure 93). Annular designs occur from the 1780's through the 20th century reaching a peak of popularity between 1830 and 1860 (Lebo 1996 Appendix G:7).

Decalcomania

Decalcomania is a method of multiple color decoration which was introduced around 1860. Decal colors appear in slight relief when light is reflected off the vessel surface (Berge 1980). The design is composed of many raised dots, similar to transfer prints, but applied as an overglaze. Artifact 27.4 is a fragment of a whiteware pitcher which is is decorated with a multi-color floral design (Figure 94). Polychrome floral decorations such as this were popular from the 1880's through the 1950's (Lebo 1996 Appendix G:7).

Gilding

Gilding is the process of applying a gold decoration over the body glaze. Two types of applications are used: the liquid gold method, and the burnished gold method. The liquid gold method is not wear resistant while the burnished gold method is. Artifact 45.2 is a fragment of a whiteware bowl with a scalloped rim. A gold band has been applied to the interior rim (see Figure 94). The use of gilding as a decorative technique peaked between 1860 and the 20th century (Lebo 1996 Appendix G:7)

Chinese Porcelain Tableware

Chinese porcelain vessels are fashioned from a pure white to blue-white, fine translucent non-porous hard paste. Common surface treatments include blue-tinted clear glaze, blue-green celadon glaze, handpainted overglaze floral "Four seasons" designs and handpainted underglaze "Double happiness" or "Swatow" designs. Common vessel forms include tea cups, wine cups, rice bowls and spoons.

Artifact 24.1 is a porcelain tea cup with handpainted floral overglaze designs and some gilded highlights. The tea cup is footed and the bottom edge of the foot remains unglazed (Figure 95). Artifact 39.17. Artifact 39.17 is a basal fragment of a small, footed, porcelain wine cup. The exterior of the cup is decorated with a blue floral underglaze design and four Chinese characters on the base (see Figure 95).

Artifact 22.8 is a fragment a shallow, footed, porcelain bowl. The interior of the bowl is decorated with an elaborate, blue, transfer printed floral and bird underglaze design. The overglaze is clear with a slight bluish tint (Figure 96). The exterior of the bowl is undecorated and the base of the foot is unglazed. Artifact 22.9 consists of several (4) fragments of a shallow porcelain bowl decorated with a delicate, blue, underglaze floral transfer print design (see Figure 96). The body overglaze has a slight bluish tint. Similar assemblages of Overseas Chinese ceramics which include porcelain tea cups, wine cups, and bowls, are described from the Ventura Mission Project in contexts dating to around 1907 (Chase1976:512-514).

Figure 94. Photograph of Decal Decorated and Gilded Ceramics, Artifact 27.4 (left) and Artifact 45.2 (right).

Figure 95. Photograph of Chinese Porcelain Tea Cup and Wine Cup, Artifact 24.1 (left) and Artifact 39.17 (right).

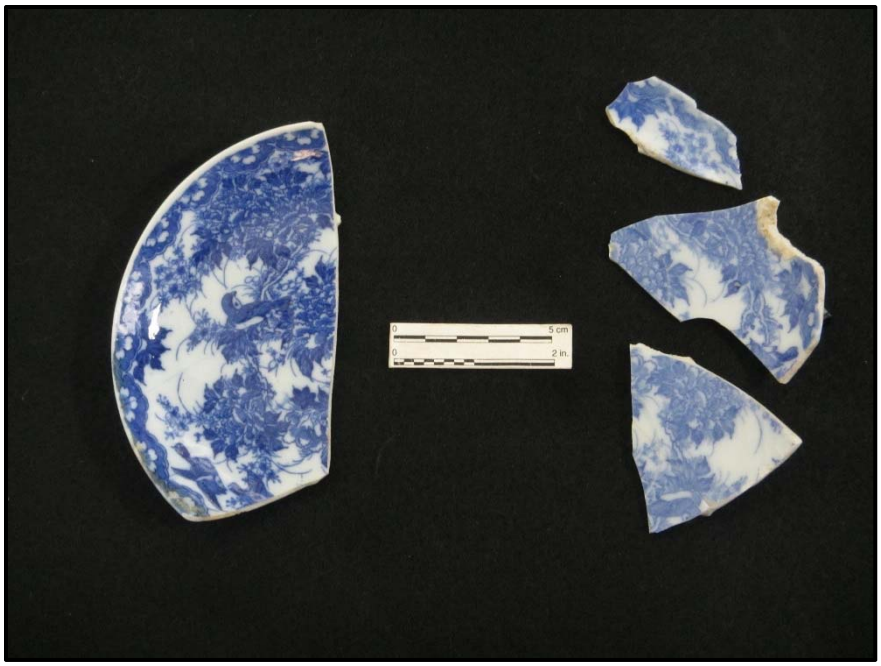


Figure 96. Photograph of Chinese Porcelain Bowl, Artifact 22.8 (left) and Artifact 22.9 (right).

Figure 97. Photograph of Stoneware Bottle Fragments, Artifact 37.5 (left) and Artifact 4.4 (right).

Utility Stoneware Bottles and Jars

The paste or fabric from which utility stoneware vessels are formed is usually grey or buff, coarse, non-porous, and hard. Common surface treatments include salt glaze, slip /trailing, dark brown "Albany" slip, Bristol two tone cream and brown exteriors, and incised lettering. Vessel forms include mineral water jugs, ink bottles, crockery pickle jars, rundlets, and ginger beer jars. Fragments of three stoneware bottles and one stoneware jar are present in the assemblage.

Artifact 37.5 is a fragment of a stoneware bottle. The bottle is formed from a buff paste. The exterior is salt glazed and the interior remains unglazed. Relatively sharp concentric ridges on the interior walls suggest this bottle was formed by an extruder rather than wheel-thrown which results in smoother less regular interior ridges (Figure 97). This bottle may have contained rum or mineral water and probably dates to ca 1880-1900 (Munsey 1970:139, Wilson and Wlson1968:167).

Artifact 4.4 is a fragment of a stoneware bottle including a portion of the base and part of the body. The bottle is formed from a buff colored paste. The exterior exhibits a salt glaze finish and the interior is covered with a reddish-tan slip glaze (see Figure 97). This bottle was wheel-thrown. Similar bottles contained mineral water or rum and date to the period between around 1880 and 1900 r (Munsey 1970:139, Wilson and Wlson1968:167).

Artifact 2.27 is the base and lower body of a very heavy, thick- walled stoneware bottle. The bottle was formed from a light tan paste. The roughly formed base and thick walls with pronounced interior ridges suggest this bottle form by an extruder (Figure 98). The exterior of the bottle has a clear salt glaze and the interior is unglazed. Similar bottles contained mineral water or rum and are attributed to the period between ca 1880 and 19001900 (Munsey 1970:139, Wilson and Wlson1968:167).

Artifact 40.18 is a fragment from the shoulder of a large stoneware jar. The jar was fashioned from a coarse grey paste. The exterior of the fragment is glazed with a mustard-brown colored glaze and the interior is a cream color. These are known as a "Bristol" glaze. This jar was hand thrown on a wheel. The shoulder fragment is stamped or impressed with a portion of the label which identified the merchant and the product (Figure 99). A portion of four lines of lettering are present on the fragment; -MOR-, -sion Mer-, -109 Lea-, -OND-. From this partial label and the described elements of the stoneware jar, a web search was undertaken resulting in the identification the artifact and the merchant. The complete artifact would have been a large cylindrical, round shouldered, wide mouth, jar decorated in a two tone cream and mustard-brown "Bristol" glaze. Stamped on the shoulder is "J.T. MORTON/ Provision Merchant/ 107, 108, & 109 Leadenhall St/ LONDON

Figure 100 provides a photograph of a similar jar (http://www.ebay.ie/itm/-/121708644678**).** This is known as an "advertising jar" and dates to the 1870's through the 1880's. It advertises the merchant shippers, J.T. Morton, Provision Merchants, originally of Aberdeen in Scotland in 1849, and from 1872, in London located at 107, 108,& 109 Leadenhall Street just across the street from where Lloyds of London is now located in the heart of the financial district. Morton is listed initially as traders in flour, corn, and corks but their principal output was an exceptionally wide range of bottled, canned and preserved foods: fruits, pickles, salad oil sauces, castor oil and, their best known product, jam.

Figure 98. Photograph of Stoneware Bottle Fragment, Artifact 2.27.

Figure 99. Photograph of Stoneware Bottle Fragment, Artifact 40.18.

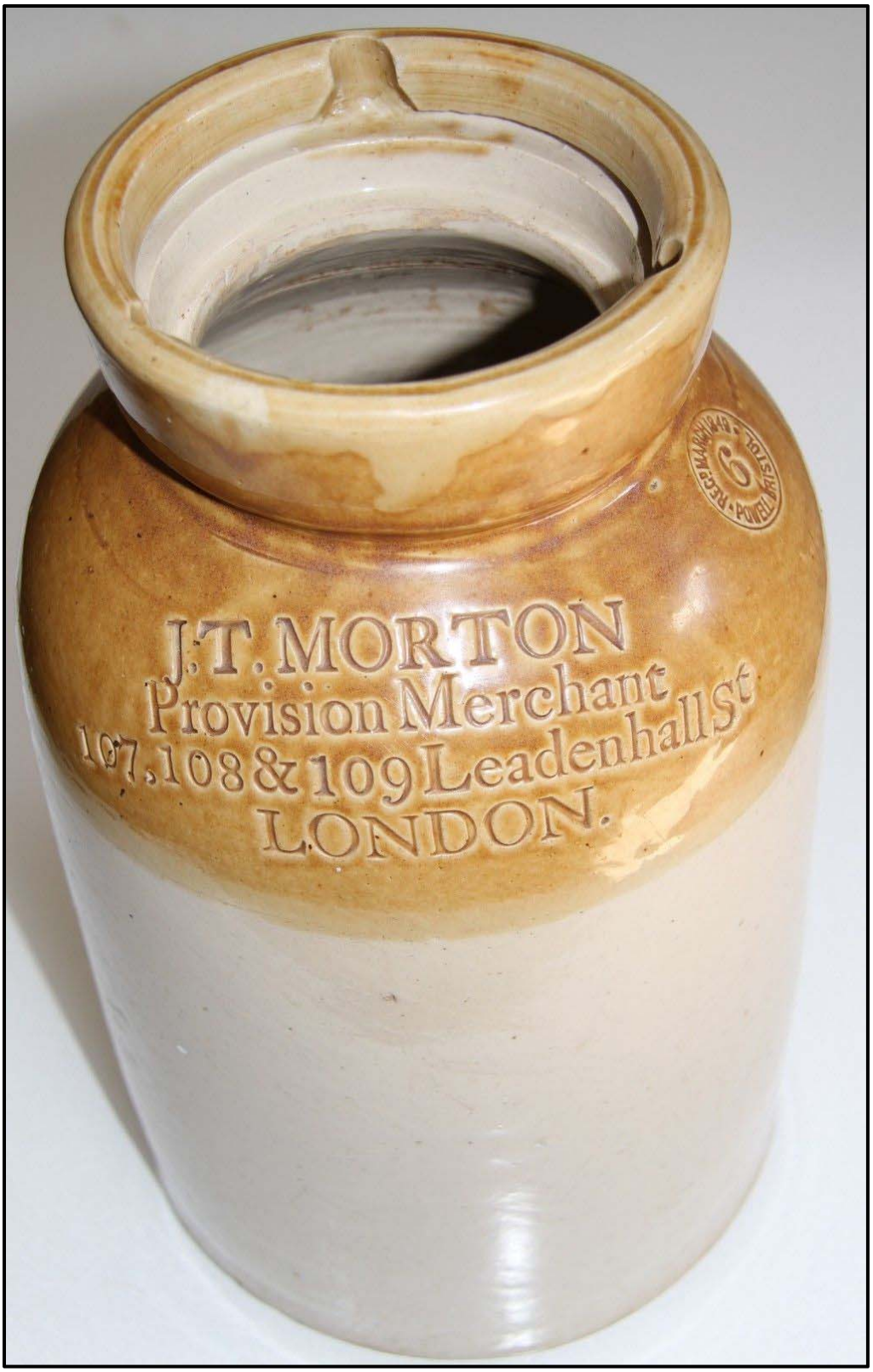


Figure 100. Photograph of J.T. Morton Stoneware Jar From ebay Account itardis (http://www.ebay.ie/itm/-/121708644678).

Other Ceramic Artifacts

Porceclain Dolls

Portions of three porcelain dolls are present in the assemblage. Artifact 21.8 is the body and legs of a small seated figure. The head and portions of both arms are missing. The doll is formed from molded porcelain. The paste is a fine, white, and translucent. The body has been covered with a mat, pink glaze (Figure 101). This small seated figure would have been about 5cm in height with the head which may have been a separate part. Similar dolls, in collections dating from ca 1900 through ca 1920, are referred to as miniature, doll house dolls and are constructed from German bisque porcelain (web search- porcelain doll ca 1900).

Artifact 25.1 is an unbroken porcelain arm about 4 cm in length. This movable arm was attached to the body with a twist pin joint (see Figure 101). This artifact is similar to other German bisque porcelain dolls from collections from the early decades of the 1900's (web).

Artifact 2.1 is an unbroken, lower arm from a doll which may have been constructed of other materials except for the head and extremities (see Figure 101). This arm segment is also similar to those in German bisque porcelain doll collections from the early decades of the 1900's (web).

Electrical Insulators

Although the following electrical insulators are described in advertisements as porcelain, the paste from which they are fashion may be more accurately described as porcelaneous: a material less translucent than true porcelain. Artifact 2.4 is known as a knob tube insulator. This unglazed white tube is one of the first insulators introduced when electrical wiring was installed in residential structures in the early 1900's (Web).Tube insulators were inserted into holes drilled into joists and studs. The wires, a hot and a cold were fed through the center of the tube (Figure 102). Artifact 32.5 is a cylindrical porcelaneous insulator covered with a clear glaze (see Figure 102). Similar insulators are associated with residential wiring from the 1920's and 1930's (web).

Artifacts 41.2 and 41.3 are fragments of two large industrial porcelaneous electrical insulators that were recovered in association with a light pole fixture (Feature # ?). Artifact 41.2 is a fragment of a heavy porcelaneous insulator which is partially covered in a thick, shiny, dark brown, "Albany slip" glaze (Figure 103). Artifact 41.3 is a fragment of a large, heavy, unglazed insulator (see Figure 103).

Ceramic Marbles

Ceramic marbles can be divided into three categories based on the material they are manufactured from; earthenware, stoneware, and porcelain. The assemblage includes four earthenware marbles, two stoneware marbles, and one porcelain marble. Unglazed earthenware marbles, are common in the U.S. from the Colonial Period up until WWI (Gartley and Garskadden 1998:52 from web, ceramic marbles Maryland). Porcelain marbles were produced between ca 1850 and 1910 (Garskadden and Gartley 1990:67 web). The automatic glass marble machine was introduced in the U.S. in 1901 and by 1910 glass marbles were readily available. (Garskadden and Gartley 1990:58). Artifact 39.2a is an unglazed earthenware marble, 1.5 cm in diameter, constructed of a light reddish-tan paste (Figure 104). Artifact 39.2b is and unglazed earthenware marble constructed of dark brown paste (see Figure 104). Artifact 39.2c is an unglazed earthenware marble made of a light grey paste (see Figure 104). Artifact 2.23 is an unglazed earthenware marble constructed of light grey paste (Figure 104). Artifact 47.4 is an earthenware marble made of a tan paste which appears to have been painted red

Figure 101. Photograph of Porcelain Doll Fragments, Artifact 21.8 (left), Artifact 25.1 (center) and Artifact 2.1 (right).

Figure 102. Photograph of Porcelaneous Electrical Insulators, Artifact 2.4 (left) and Artifact 32.5 (right).

Figure 103. Photograph of Fragments of Porcelaneous Electrical Insulators, Artifact 41.2 (left) and Artifact 41.3 (right).

Figure 104. Photograph of Ceramic Marbles, Artifact 39.2a, Artifact 39.2b, Artifact 39.2c, Artifact 2.23, Artifact 47.4, Artifact 40.23 and Artifact 42.1 (left to right, top to bottom).

(see Figure 104). Artifact 40.23 is an unglazed earthenware marble constructed of tan paste which may have been painted red (see Figure 104). Artifact 42.1 is an unglazed porcelain marble which is 2cm in diameter (see Figure 104).

Ceramic Door Knob

Artifact 2.14 is an opaque porcelaneous door knob cover in s shiny clear glaze (Figure 105). The door knob is mushroom-shaped with an iron shank, and is 5.8cm across. Similar fixtures appear to span the period from the early 1900's to the present.

Metal Artifacts

The metal assemblage includes a total of 149 artifacts, representing 21% of the total artifact assemblage (see Table B3 in Appendix B). Of this number, cut and wire nails account for 82 artifacts with the remaining 67 artifacts distributed among a number of categories including tableware; electrical fixtures and batteries: a variety of clothing accessories including buttons pins and emblems: equestrian accouterments: school or office supplies including pencil parts and paper clips: cartridges: a harmonica fragment: and a 1915 penny. Selected elements of the metal artifact assemblage are described below. For a complete catalogue of the metal artifacts see Table B3 in Appendix B.

Nails

Nails are the most frequently occurring metal artifact in the assemblage. The collected nails are all severely deteriorated by rust. Of the 82 nails recovered, 49 are cut nails (including fragments and whole examples), and 33 are wire nails (including fragments and whole examples) (see Table B3 in Appendix B).

Prior to around 1800, nails were handmade, wrought nails, universally characterized by uneven rectangular shanks that taper on all four sides to a point. Machine cut nails were introduced between ca 1790 and 1810. The nail plate is turned between alternated blows of the cutter. Between ca1810 and 1830 machines were invented which obviated the necessity of having to turn the nail plate. Around 1855, machines were invented in France to make complete wire nails automatically. A few were exported to the United States, soon to be replaced by machines of American manufacture. By around 1890 the sale of wire nails outnumbered cut nails (Fontana and Greenleaf 1962:54-55 in IMAX).

Tableware

Artifact 45 is an enameled stamped sheet metal plate. Thin, stamped sheet metal coated with a thin, white, enamel surface (Figure 106). Enameled kitchenware was introduced in the U.S. in the 1850,s. In 1876 patents were filled in the U.S. for making stamped sheet metal enameled kitchenware. By around 1930 enamelware experienced a decline in popularity (web search).

Artifact 10.7 in a plated metal fork embossed with "Niagara Silver Plate" (Figure 107). This cutlery was introduce as the Glendale Pattern around 1930 (web search). Artifact 10.8 is the blade of a stainless steel cake server (see Figure 107). The cake server is stamped "Stainless Steel Made in U.S,A., Patented 1912". Artifact 4.7 is fragment of a cork screw (see Figure 107).

Figure 105. Photograph of Ceramic Door Knob, Artifact 2.14.

Figure X. Photograph of Enamelware Plate, Artifact 45.

Figure 107. Photograph of Tableware, Artifact 10.7 (left), Artifact 10.8 (center) and Artifact 4.7 (right).

Figure 108. Photograph of Insignia, Emblem, and Buttons, Artifact 40.34 (top left), Artifact 40.35 (top right), Artifact 39.9 (bottom left) and Artifact 39.11 (bottom right).

Electrical Fixtures and Batteries

Electrical fixtures include six light bulb fragments with threaded screw metal bases (see Table B3 in Appendix B). These screw base light bulbs were introduced around 1908 and similar designs have been produced until recent times (Web search). Artifact 3.21 is a silver plated automobile headlamp reflector. Similar headlamp reflectors were in use from ca1908 until around 1940 (web). Artifacts 30.8 and 37.4 are fragments of zinc-carbon cell batteries. The function of these batteries which were about 15cm in length and about 6cm in diameter remains uncertain.

Clothing Accessories, Emblems, Pins, and Buttons

Artifact 40.34 is a complete U.S. Artillery pin (Figure 108). This pin was probably a hat insignia of the type used between 1872 and 1895 (web). Artifact 40.35 is an emblem shield which was probably affixed to a garment (see Figure 108). Similar shield pins are advertised in the 1897 Sears Roebuck Catalogue (Lyons 2007:427).

Artifacts 39.9 and 39.11 are two piece metal buttons (see Figure 108). These two piece coat buttons are known as the "Sander's" type and have been in use from ca1830 to the present (Olsen 1963 in IMAX).

Tools

The metal artifact assemblage include two tools that are severely deteriorated by rust. Artifact 35 is a heavy single blade ax head (Figure 109). Artifact 39.28 is described as a knife handle, screw, monkey wrench (see Figure 109). Both tools are described and pictured in the 1897 Sears Roebuck Catalogue (Lyons 2007:91-92).

Equestrian Accoutrements

Several metal artifacts in the assemblage are associated with horses and buggies. Artifact 9.1 is a portion of an iron Hames. This is a portion the tack used to harness a horse to a wagon. Similar fittings are advertised in the 1897 Sears Roebuck Catalogue (Lyons 2007:685). Artifact 43.1 is a complete, rusted, horse shoe (Figure 110). Artifact 3.20 is a jingle bell of the type used on horse and buggy harnesses (Figure 110).

Other Metal Artifacts

Other metal artifacts in the assemblage include three brass cartridges. Artifact 53.6 includes two .22 caliber short cartridges. These short cartridges are referenced as BB caps or CB caps and date from 1845 to ca 1942 (Barnes 19--). Artifact 39.7 is a .45 caliber centerfire cartridge. Similar cartridges are advertised in the 1897 Sears Roebuck Catalogue (Lyons 2007:542-543). Artifact 39.5 is a 1915 Lincoln penny. Artifact 40.19 is a fragment of a harmonica.

Miscellaneous Artifacts

The miscellaneous artifact assemblage includes a total of 165 artifacts, representing approximately 23.2% of the total artifact assemblage. Within the group of miscellaneous artifacts several material categories are represented, these include bone (including saw cut, butchered bone), shell, celluloid and rubber artifacts. Significant elements of the miscellaneous assemblage are described below. A complete catalogue of the miscellaneous artifact is provided in Table B4 in Appendix B.

Figure 109. Photograph of Tools, Artifact 35 (top) and Artifact 39.28 (bottom).

Figure 110. Photograph of Horse Shoe (Artifact 3.20) and Harness Bell (Artifact 43.1).

Artifact 40.17 is an ivory toothbrush which is in two fragments. The toothbrush was 16.5cm in length (Figure 111). This brush has four rows of bristles and the handle exhibits a faint engraving which could not be deciphered. The 1897 Sears Roebuck Catalogue pictures several similar toothbrushes (Lyons 2007:340).

Artifact 39.16 includes two elements of a hard rubber syringe pipe (see Figure 111). These syringes are pictured and described in the 1897 Sears Roebuck Catalogue (Lyons 2007:341). The syringes were sold in a kit which includes a bulb, a tube, and several fittings described as pipes. These kits are designed to inject fluids.

The present assemblage includes a number of buttons. A glass button is described in the Glass Artifacts section and metal buttons are described in the Metal Artifacts section. The present assemblage also includes nine shell buttons, two bone buttons, and eleven celluloid buttons. Selected examples of these are described below. Several styles of shell buttons are present. All types of holes, shanks, shapes decorations and sizes are used for shell buttons (Luscomb 1967:177-180 in IMAX). Commercially-made shell buttons were introduced into the United States from France in 1855 (Fontana and Greenleaf 1962:98 inIMAX). Artifact 40.29 is a shell button or cuff fastener with a metal shank,

Artifact 51.1 is a very small four-hole button, Artifact 23.2 is a single hole button (Figure 112). Disks cut from animal bones have been made in a variety of sizes from prehistoric times. Artifact 28.12 is a four-hole bone button, Artifact 38.2 is a fragment of what was probably a four hole bone button (see Figure 112). Celluloid is an ivory-like material that was developed 1869. When celluloid is heated it produces a carbolic or menthol odor. Artifact 40.31 is a single hole blue tinted celluloid button, Artifact 34.4 is a shank celluloid color or cuff fastener, Artifact 30.7 is a single hole celluloid disk which may have been a two-part button (see Figure 112). Celluloid buttons reached their height of popularity between the 1870's and the 1930's (Fink and Pitzler 1993:61)

All the cut bone artifacts are culturally modified-that is, they have been cut with a saw. This is based on striations visible along the cut surfaces of the bone fragments. Several of the bones also have linear cuts, indicating that they have also been cut with a knife or cleaver. During laboratory analyses of the cut bone, it was determined that they the bones are from unidentified large mammals, medium to large mammals, and medium mammals. This assemblage is further discussed in the Faunal Analysis section below.

FAUNAL ANALYSIS

The results of analyses of recovered faunal materials from excavations from Site T-1 are presented in this section. In the assemblage of recovered faunal materials, both marine invertebrate remains as well as vertebrate remains are represented. These materials were recovered from excavated samples taken from Layer I. Invertebrate remains were not recovered from subsurface features. Invertebrate remains are presented first followed by vertebrate remains.

Invertebrate Remains

A total of 36.4 g of marine invertebrate remains were recovered from excavated samples of Layer I. In the marine invertebrate assemblage, sparse marine mollusks, including gastropods and bivalves, and sea urchin remains are represented. Table 7 summarizes the invertebrate faunal materials by provenience recovered from excavations at Site T-1, and provides identifications of recovered invertebrate species and gram (g) weights of the materials.

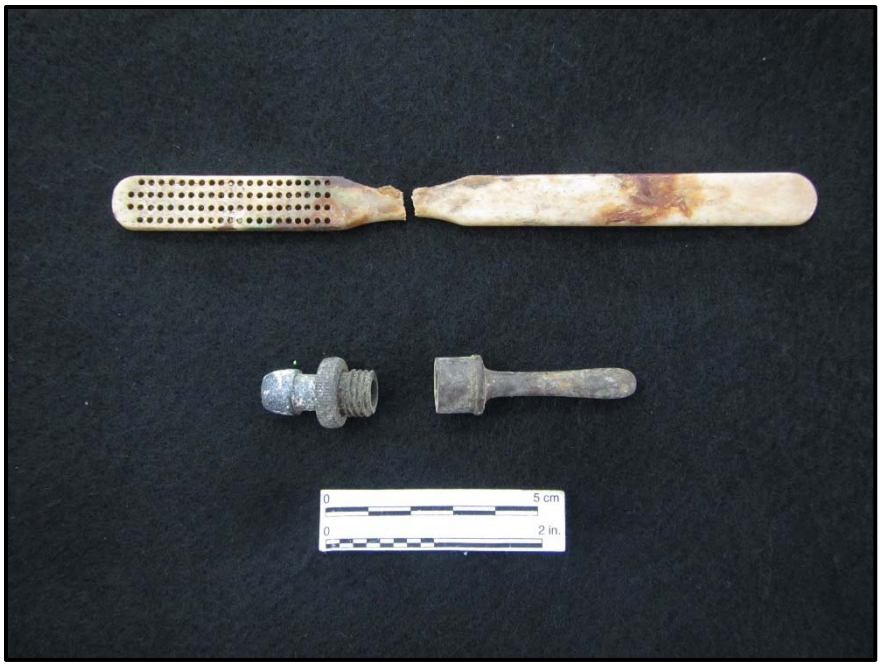


Figure 111. Photograph of Toothbrush and Syringe, Artifact 40.17 (top) and Artifact 39.16 (bottom).

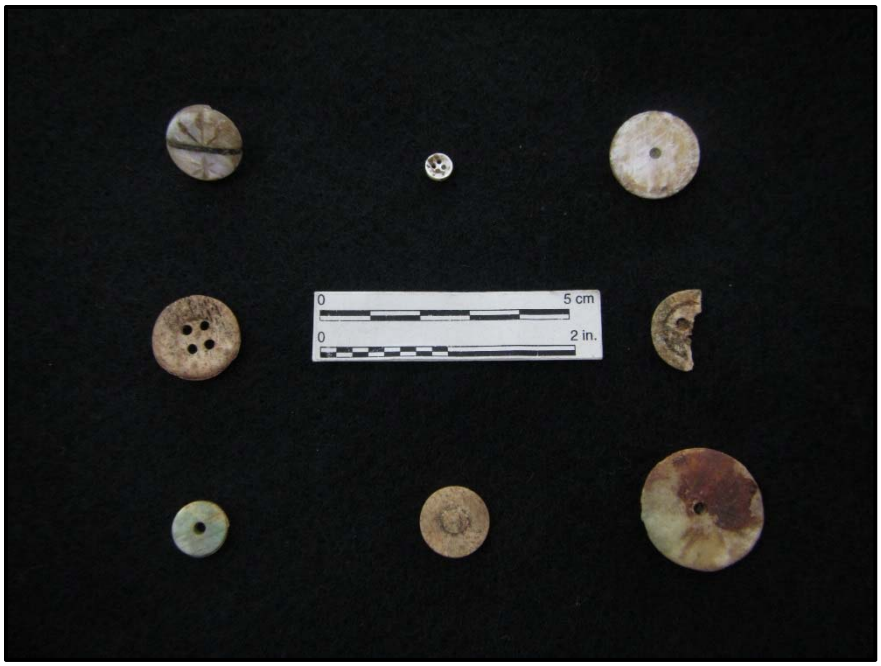


Figure 112. Photograph of Shell, Bone, and Celluloid Buttons, Shell Artifact 40.29 (top left), Artifact 51.1 (top center), Artifact 23.2 (top right), Bone Artifact 28.12 (middle left), Artifact 38.2 (middle right), Celluloid Artifact 40.31 (bottom left), Artifact 23.4 (bottom center) and Artifact 30.7 (bottom right).

Table 7. Summary of Invertebrate Remains from Excavations.								
Provenience	**TR11/II**	**TR13/I**	**TR16/ I/3**	**TR16/ I/5**	**TR17/ I/2**	**TR17/ I/3**	**TR17/ I/4**	**TOTAL**
Weight in grams (g)	**g**	**g**	**g**	**g**	**g**	**g**	**g**	**g**
Invertebrate Fauna								
Gastropods								
Nerita picea			2.5	4.9	4.9	2.5	0.4	15.2
Turbo sandwicensis	16.0							16
Unidentified gastropod							0.7	0.7
Total Gastropods	**16.0**	**0.0**	**2.5**	**4.9**	**4.9**	**2.5**	**1.1**	**31.9**
Bivalves								
Brachidontes crebristriatus		0.5		0.3				0.8
Tellina palatum							0.7	0.7
Unidentified bivalves						2.1		2.1
Total Bivalves	**0**	**0.5**	**0**	**0.3**	**0**	**2.1**	**0.7**	**3.6**
Echinoderms (Sea Urchins)								
Echinothrix diadema			0.7	0.2				0.9
Total Echinoderms	**0**	**0**	**0.7**	**0.2**	**0**	**0**	**0**	**0.9**
Total Invertebrate Fauna	**16.0**	**0.5**	**3.2**	**5.4**	**4.9**	**4.6**	**1.8**	**36.4**

Of In the 36.4 g of invertebrate remains recovered from Layer I samples, 97.6% (35.5 g) were identified as marine mollusks (gastropods and bivalves) and 2.4% (0.9 g) were echinoderm (sea urchin) remains. Of the 35.5 g of marine mollusk remains, 31.9 g, or 89.9%, were gastropods, and 3.6 g, or 10.1%, were bivalves.

Two families of gastropods (univalves) are represented (see Table 7). These include Neritidae and Turbinidae. In these families, two genera and two species were identified, including *Nerita picea*, and *Turbo sandwicensis.* The gastropod *Turbo sandwicensis* (*ʻālīlea*) is represented by a single large shell weighing 16.0 g. This shell is broken and weathered (white and powdery). *Nerita picea* (*pipipi*) inhabit shorelines and are abundant on all rocky substrates from the splash zone to high-water mark (Kay 1979:63), while *Turbo sandwicensis* are found under rocks in shallow waters shoreward of fringing reefs and the outer edges of reefs (Kay 1979:59).

Both of these species are frequently found in traditional Hawaiian midden deposits in Hawaiian archaeological sites, and often pipipi is a predominant species in these middens. According to Titcomb (1978:344), *pipipi* were enjoyed as a food item by Hawaiians. Children snacked on them as they were collected, using a needle to pry the meat out from the shell. A broth was sometimes made with *pipipi* using the shells to add flavor (Titcomb 1978; 344). ʻAlīlea were also eaten by native Hawaiians (Titcomb 1978;345).

Two families of bivalves are also represented in the faunal assemblage (see Table 7). These include Mytilidae and Tellinidae. Two genera and two species were identified, including *Brachidontes crebristriatus* and *Tellina palatam*. The 26.2 g of the bivalve *Brachidontes crebristriatus* dominates the invertebrate assemblage by weight (see Table 12). *Tellina palatam* remains totaled 5.9 g.

Brachidontes crebristriatus, mussels, are extremely abundant on limestone shorelines, and less abundant on basalt shorelines in Hawaiʻi (Kay 1979:511). *Tellina palatam* primarily silty sands on fringing reefs and at depths of 2.0 to 3.0 m (Kay 1979:563). Both of these species are relatively common in midden deposits of traditional Hawaiian archaeological sites. Both are edible (Titcomb 1978: in both shallow and relatively deep water habitats (Kay 1979). It is likely these remains represent food refuse.

Vertebrate Remains

A total of 676 pieces of unmodified vertebrate faunal remains were recovered from the AIS excavations. The NISP breakdown by zoological class is presented below in Table 8. Table 9 presents a summary of the total Number of Identified Specimens (NISP) of vertebrate faunal remains. This number includes unmodified vertebrates; it does not include the 135 cut bone artifacts (butchered bone).

Table 8. Breakdown of Unmodified Vertebrate Remains by Zoological Class.

Unidentified Vertebrate	Bony Fishes	Bird	Mammal
13 (2%)	71 (10.5%)	59 (8.7%)	533 (78.8%)

Table 9. Summary of Unmodified Vertebrate Faunal Remains from Site T-1.													
Provenience	**TR6/I**	**TR7/ Fe44**	**TR9/Fe37**	**TR11/ Fill B**	**TR11/II**	**TR12/I**	**TR13/I**	**TR14/ Fe46**	**TR14/ Fe47**	**TR15/ Backdirt pile**	**TR16/I**	**TR17/I**	**TOTAL**
NISP	#	#	#	#	#	#	#	#	#	#	#	#	#
Mammals													
Unidentified medium mammals			8					22	2	137	243	6	418
Unidentified medium to large mammals	5					28		19		8	12	11	83
Unidentified large mammals			5		2			4	6	9		1	27
Bos taurus					1								1
Sus scrofa								2			1	1	4
Total Mammals	**5**	**0**	**13**	**0**	**3**	**28**	**0**	**47**	**8**	**154**	**256**	**19**	**533**
Fish													
Unidentified bony fishes		1								15	47	8	71
Total Fish	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**47**	**8**	**71**
Birds													
Unidentified small birds												2	2
Unidentified medium birds							1			18	13		32
Unidentified medium Passeriforms								1					1
Gallus gallus	1			3						19		1	24
Total Birds	**1**	**0**	**0**	**3**	**0**	**0**	**1**	**1**	**0**	**37**	**13**	**3**	**59**
Unidentified medium vertebrates		2		1					10				**13**
Total Vertebrate Fauna	**6**	**3**	**13**	**4**	**3**	**28**	**1**	**48**	**18**	**206**	**316**	**30**	**676**

A further breakdown of the NISP by all taxa, in ascending taxonomic order, is shown in Table 10 below.

Table 10. Breakdown of Unmodified Vertebrate Remains by Taxon.

Taxon	NISP
Medium vertebrate	13
Bony Fishes	71
Small Bird	2
Medium Bird	32
Gallus gallus	24
Medium Passeriform	1
Medium Mammal	418
Medium-Large Mammal	83
Large Mammal	27
Cf. *Sus scrofa*	4
Cf. *Bos Taurus*	1
Total	676

The taxonomic categories used are further defined as follows:

Medium Vertebrate: Faunal remains consisting of highly fragmented bone material representing member(s) of indeterminate class, order, and family, but with an estimated head-and-body length of from about 0.3 m to, roughly, 2.0 m.

Bony Fishes: Faunal remains of indeterminate class and family, although essentially bony fishes rather than shark or ray.

Small Bird: Faunal remains of indeterminate order and family up through the general size of storm-petrel, quail, plover, sparrow, myna, thrush, and so on; in Hawai‘i probably a large amount of the material represents passeriforms but smaller species of 3 or 4 other orders could well be included as well.

Medium Bird: Faunal remains deriving from member(s) of indeterminate order and family in the general size range of shearwater and petrel, tropicbird, night-heron, duck, hawk, junglefowl (= chicken), moorhen and coot, curlew, gull, owl, crow, and so on; in Hawai`i, probably no passeriform other than *Corvus hawaiiensis* (Hawaiian Crow) would be included but a number of native or historically introduced species of up to a half-dozen orders could potentially be.

Gallus gallus (Red Junglefowl [=Chicken]): Faunal remains derived from an individual of this introduced species. Note that in almost all cases, fragmentary material representing pre-Contact Polynesian junglefowl would not be distinguishable from that of historically introduced chicken breeds of this same species.

Medium Passeriform: Faunal remains of member(s) of this order in the general size range of myna and robin to larger jays; among native Hawaiian passeriform species, apparently only the now-extinct *Chaetoptila* sp. (family Meliphagidae) and, possibly, a very few of the larger prehistorically extinct species of Hawaiian Honeycreepers or Finches (subfamily Drepanidinae of the family Fringillidae; see Olson and James 1982:39-42)--as well as a few of the historically introduced species of various families--would be of this size.

Unidentified Medium Mammal: Faunal remains of member(s) of indeterminate order and family in the general size range of an adult dog or juvenile pig or goat/sheep; in Hawai‘i, native or introduced species of at least three orders could potentially be included.

Unidentified Medium-Large Mammal: Faunal remains of member(s) of an indeterminate mammalian order and family in the general size range of human, porpoise, seal, pig, deer, and goat/sheep; in Hawai‘i, native or introduced species of at least four orders could potentially be included.

Unidentified Large Mammal: Faunal remains of member(s) of an indeterminate mammalian order and family in the size range of medium and large whales, horse/mule/donkey, and cattle; native or historically introduced species of up to four orders could potentially be included.

Cf. *Sus scrofa* (Pig): Faunal material presumably representing this species although the usually fragmentary remains probably could not be safely distinguished from remains of other suids such as *Sus barbatus* (Bearded Pig) and *Babyrousa babyrussa* (Babirusa) of further southwest in the Pacific or pig breeds introduced historically to Hawai‘i. Thus, the scientific name is preceded with "cf.".

Cf. *Bos taurus* (Domestic Cattle): Faunal material presumably representing this species member(s) of the family Bovidae in the cattle size range. Though all such material has been referred to this species (introduced to the Hawaiian Islands in 1793), in reality, other large bovids in Hawai‘i such as *Bubalus bubalis* (Water Buffalo; introduced about 1881?) and *Bison bison* (North American Bison; introduced in 1968) could not be distinguished from it on the basis of most fragmentary material.

Although the recovered faunal samples were highly fragmented and thus not amenable to further statistical analyses such as calculation of the Minimum Number of Individuals (MNI), a few observations are possible.

- None of the taxa listed above is unusual for an urban archaeological deposit in Hawai‘i. All of these taxa are found routinely in similar excavations. In the case of the subject project area, most of the identifiable vertebrate faunal remains appear to be derived from midden deposits and as such represent food remains, probably from historic, post-contact activities. Primary evidence for this comes from the 135 bone fragments that show evidence (striations on cut surfaces) of sawing or cutting with a metal blade (see Table B4). Fewer faunal specimens have undergone thermal alteration (charring or calcination), most likely through cooking methods.

- The fish remains consisted of non-diagnostic portions such as vertebral and cranial bone fragments.

- Of the recovered bird remains, about 40% (24/59) are Chicken. It is possible that the unidentified Medium Bird remains are also Chicken but they are too fragmentary to identify further.

- Of the recovered mammalian remains, about 0.18% (1/533) could be identified as Domestic Cattle and about 0.75 (4/533) could be identified as Pig. It is likely that at least some of the Large Mammal remains are derived from Domestic Cattle just as at least some of the Medium Mammal and Medium-Large Mammal bones are Pig.

- With regard to the Passeriform bones found, it is not clear that they represent food remains.

SUMMARY DISCUSSION AND INTERPRETATIONS

At the request of NORESCO, PCSI conducted an archaeological inventory survey in support of the proposed construction of photovoltaic arrays for the Honolulu BWS's Energy Efficiency Project that involves a total of 58 BWS facilities on O‘ahu. The AIS work focused on Site 6 (Beretania Complex) and Site 7 (Water Facilities) on Beretania Street in Honolulu, in lands that historical maps identify as ‘Auwaiolimu ‘Ili, in Honolulu Ahupua‘a, Honolulu (Kona) District. The purpose of the AIS was to identify and record any cultural deposits or features within the APE prior to the proposed project (see Figure 1)

The total APE measures 190,819 square feet (sf) (1.77 hectares [ha]), 4.38 acres [ac]) (see Figure 1), which includes both the BWS Site 6 and 7 facilities. The APE is defined by the area where future construction activities will potentially penetrate below the existing base course.

These two BWS facilities are situated on sloping land approximately 4.0–16.0 m above mean sea level (amsl). Soils consist of Makiki clay loam (MkA) and Tantalus silty clay loams (TCC) with 8 to 15 percent slopes (see Figure 4). Soils of the Makiki series are found on alluvial fans and terraces. They are deep, well drained soils that formed in material weathered from alluvium mixed with ash and cinders. The Tantulus series are well-drained soils on uplands that developed in volcanic ash and material weathered from cinders (Soil Survey Staff 2016).

Based on the lack of fresh water sources in the vicinity of the two BWS facility sites, the land was not likely a place of permanent habitation. However, Handy (1940:78) noted that the lands to the west were intensively cultivated, and that below Punchbowl, between Pacific Heights and King Street [where Pauoa Stream runs], there must have been more or less continuous terraces on the ground now covered by the city..

The two to three decades following the Mahele, Honolulu experienced rapid change. An 1893 map (see Figure 6) indicates that the APE contained several new residential structures. At the turn of the century, more structures are depicted along with what appear to be walls or fences surrounding small parcels (see Figure 7). As of 1912, the APE was divided into multiple small, regularly-shaped land grant parcels known as the Auwaiolimu Lots (see Figure 8). The lane that ran partially down the center of the western portion of the APE was called Weaver Lane. Over the next few decades, private individuals leased or purchased parcels throughout the APE. By 1927, the APE contained numerous residential structures (see Figure 9), reflecting the rapid growth of urban Honolulu.

By the end of the 19th century the city water sources were insufficient for the growing Honolulu population (Thrum 1909:166). As a solution, pumping stations and inland reservoirs were planned by the Minister of the Interior to the Monarchy. The first pumping station (a brick structure) in the APE was constructed in 1894. A 1914 Sanborn Fire Insurance map (see Figure 16 in O'Hare et al. 2012) shows the original brick pumping station at BWS Site 7, along with two drilled wells, businesses, and residences, while the future location of BWS Site 6 was predominantly residential.

In 1927, this pumping station was replaced by the current concrete pumping station at BWS Site 7. The BWS Public Service Building, situated at BWS Site 6, was constructed in 1958 and designed by the architectural firm of Wood, Weed, and Kubala. Connecting the building to the Engineering Building (constructed in 1939) is an elevated footbridge across Lisbon Street (Hibbard 2011:119; Murai 2000:4–6).

As of 1927 (see Figure 17 in O'Hare et al. 2012), a new concrete pumping station was under construction and the future location of the Engineering Building contained three concrete slab, which were used for automobile storage, all of which were located in the BWS Site 6 property. According to MAI's assessment, the historic BWS buildings on BWS Site's 6 and 7 are eligible for listing on the National Register of Historic Places (NRHP) under Criterion A, for their association with the development of O'ahu's water system), and under Criterion B, for their association with their modern, Hawaii regionalist design by Architect Hart Wood (see Appendix A).

By 1950, a majority of the residences at the BWS Site 6 (on the west side of Lisbon Street) had been removed (see Sanborn Fire Insurance map in O'Hare et al. 2012: Figure 18). Similarly, a 1952 aerial photograph indicates that parking lots replaced the former houses (see Figure 10). By 1959, the entire north portion of the property containing BWS Site 6 had been converted to parking lots (see Figure 11). This configuration in the BWS Site 6 property remains today, with the north portion comprised of the paved parking lots (including the EPL, CVPL, and the VPL), and the south portion containing the Public Service Building (shown under construction in 1958) with an elevated walkway to the Engineering Building, which is situated north of the Beretania Street Pumping Station in the BWS Site 7 property.

Previous archaeological investigations in the vicinity of the APE suggest a potential for encountering subsurface historic properties. Cultural resources that have been identified in the vicinity of the APE included historic period human burials and cultural deposits (O'Hare et al. 2007a,b; Pammer et al. 2009; Sroat et al. 2013). Numerous burials were previously identified on the south side of South King Street, west of Ward Avenue, both within and on the outside west

and south borders of the Catholic cemetery (Anderson 1997; Anderson and Aronson 1997; Perzinski et al. 2006). Based on proximity of the APE to the Alapai Transits Center property human burials, and the unpredictable locations of these burial finds, there was potential for human burials being encountered. Deposits associated with post-Contact land use were anticipated, possibly consisting of cultural layers and/or structural remnants, including trash pits, privies, and building foundations that are buried by modern and/or historic fill layers.

FIELD RESULTS

The AIS field activities conducted within the APE (BWS Site 6 and BWS Site 7) consisted of a pedestrian survey and subsurface testing program. Sixty-three archaeological features were identified during the AIS, including 44 above-ground features and 19 subsurface features identified within 21 test excavations (see Table 2). The site complex has been designated as SIHP Site 50-80-18-xxxx (Site T-1), and reflect three separate land uses with three time periods, two of which overlap. From the most recent to the latest time period, these uses include:

- Current BWS parking lot: 1952 to present
- Residential use: late 1800s to circa 1958
- Human burial: Possibly late pre-Contact period

The features associated with these three time periods are summarized below.

Site 50-80-18-xxxx, Features 1-32, BWS Parking Lot Era-1952-Present

The BWS parking lots were constructed between 1952 and 1962 (see Figures 10 and 11) and are currently in use. It is possible that some alterations to the lots may have occurred after 1962. Features 1 through 32 comprise the BWS parking lot period(see Table 2 and Figure 14).

Features 1-4 include four basalt and mortar retaining wall segments parallel to Lisbon Street (see Figures 18 and 19) along the southern parcel boundary, and Features 5-9 are basalt and mortar retaining wall segments parallel to Lauhala Street along the northern parcel boundary (see Figures 20 and 21). The architecture of the Feature 1-9 walls are different than earlier residential walls. The following observations were noted for the Feature 1-9 walls:

1. More dark gray basalt boulders were used in the construction of these walls than in earlier residential walls;
2. Little to no mortar is visible in these walls;
3. The tops of these walls are capped with smooth, flat concrete;
4. Chain-link fences have been erected on the tops of these walls;
5. The length of these walls are determined by the presence of exit and entrance gates in EPL and CVPL the parking lots (see Figure 14)

Based on their locations, the Feature 1-9 walls were built to serve as boundary walls for the BWS Site 6 parcel and for the two parking lots (EPL and CVPL).

Features 10, 22, and 23, located at the eastern end of the EPL, are soil terraces with three types of retaining elements at the eastern end of the APE near Lusitana Street (see Figures 22 and 23). Feature 10 is a well-built terrace with a rock and mortar wall retaining a level soil surface. An embedded concrete curb defines the north side of the terrace. The retaining walls of Features 22 and 23 are expediently constructed with retaining elements

consisting of concrete parking stall bumpers (Feature 22) and cut basalt blocks, concrete slabs and a plastic barrel (Feature 23). It is possible that Features 22 and 23 were constructed sometime after the parking lots were constructed.

Features 11, 13, and 14 are include the three levels of parking lot terraces in the EPL (see Figures 24-26), Feature 15 in a parking lot terrace in the CVPL (see Figure 27), and Feature 12 is a double curb configuration that divides the Feature 13 terrace into two parking areas (see Figure 27). These features comprise the two primary parking lots in BWS Site 6, and, based on aerial photographs (see Figures 10 and 11), were built in the 1950s. Like the retaining walls that border the EPL and CVPL, the construction of the parking lot retaining walls used more dark gray basalt boulders than the earlier residential walls. The mortar is flush with the rock facings in the Feature 11 and 13 retaining walls, while the mortar in Features 14 and 15 is inset (crude tuckpointing) from the rock faces. Like Feature 1-9 walls, the tops of the retaining walls of Features 11, 13, 14, and 15 are capped with capped with flat, smooth, concrete.

Features 16-18, are three soil terraces located at the eastern end of the CVPL (see Figures 28 and 29). Like Features 22 and 23 at the eastern end of the EPL, Features 16-18 have been expediently constructed using retaining materials such as parking stall bumpers (Feature 16), and cut basalt blocks (Feature 17). The retaining wall of Feature 18 includes concrete slabs, parking stall bumpers, red bricks, decorative concrete blocks, concrete chunks, an iron bed frame, and an old bathtub. It is possible that Features 16-18 were constructed sometime after the parking lots were constructed.

Features 19-21 and Features 24-26 are a series of narrow rectangular terraces in both the EPL and the CVPL defined by low concrete walls and curbs used to retain level soil areas. These terraces are being used as planters for bougainvillea, hibiscus, and other flowering shrubs. Features 24 and 25 in the EPL are retained by low concrete walls (see Figure 32), while Feature 26 in the EPL and Features 19-21 in the CVPL are retained by lower concrete curbs (see Figures 30, 31, and 33). Although it is not certain whether or not these terraced planters were constructed soon after the parking lots, but it is believed likely that they were.

Features 27 through 32 are low rectangular and irregular-shaped terraces with level soil areas along the southern boundary of the EPL. While two of these features are being used as planters (Feature 27 and 30), the remaining features do not have planted shrubs; it is assumed all of these terraced planters were contructed for planning purposes. Features 27 through 30 are defined by low concrete curbs (see Figures 34 and 35), while Features 31 and 32 are defined by cut coral block curbs (see Figure 36). Feature 32 is the only feature where historic artifacts (a white porcelain button) was observed (but not collected) (see Figure 37).

Site T-1, Features 33-54, Residential Era- Late 1800s to 1958

The pedestrian survey of BWS Site 6 identified three basalt walls and a terrace that appear to be older than the basalt rock walls associated with the construction of the EPL and CVPL. These features, designated Features 33 through 36 are believed to be associated with the Residential period of Site T-1 (see Figure 14 and Table 2). In addition, 18 subsurface features (Features 37-54) encountered during subsurface testing are also associated with the residential use of the BWS Site 6 parcel.

Feature 33 is a retaining wall located at the eastern end of BWS Site 6, and is constructed parallel to Lusitana Street. The architectural characteristics of the southern portion of the Feature 33 wall differ than the northern portion of the wall. Observations of the architecture of the southern portion of the wall include:

- The use of primarily reddish brown basalt boulders and cobbles in the wall's construction (see Figures 38);
- The application of mortar flush with the rock faces (see Figure 38);
- The use of dark gray basalt boulders to cap the top of the wall (see Figure 39)
- The presence of at least two entry ways (Features 33.1 and 33.2) built into the wall

Unlike the southern portion, the construction material used in the northern portion of the Feature 33 wall includes primarily gray basalt boulders. The mortar is inset and not typically visible on the wall faces. In addition, the top of the wall lacks uniform boulder capping but is well faced with basalt (see Figure 40). In some areas, mortar is present on the top of the wall and is grooved (see Figure 41). Based on these observations, it is likely that the northern portion of the Feature 33 wall was rebuilt, possibly during or shortly after the parking lots were constructed. The boulder capping may reflect a desire to assimilate some of the architectural components of the original wall.

The primary evidence that Feature 33 is associated with residential use is the presence of two entry ways (Features 33.1 and 33.2-see Figure 42) bordered by basalt rock entry piers that, like the wall, is capped with basalt boulders. These entry ways were probably built for pedestrian access-concrete slabs at the base of the entry ways probably served as thresholds. The sealing of these entry ways (see Figure 42) is believed to have occurred after the residential structures were removed from BWS Site 6 and the parking lots were constructed. This event reflects a change in the use of the Feature 33 wall from a residential wall with entry ways to a boundary wall.

Based on architectural similarities to Features 33.1 and 33.2 entry piers, Features 33.3 and 33.7 are interpreted as two additional basalt rock entry piers that are the remnants of two additional entry ways that were present in the Feature 33 wall.

Two features of the Feature 33 wall, including Feature 33.4, a concrete retaining wall segment built between Features 33.3 and 33.7 entry piers (see Figure 44), and Feature 33.8, a repaired portion of the wall (see Figure 45) suggest that the wall underwent changes prior to parking lot construction. The concrete retaining wall is believed to have been built when the BWS Site 6 parcel was still in residential use. This interpretation is based on the fact that the entry way (Feature 33.5) in the concrete the wall segment (like Features 33.1 and 33.2) was also (see Figure 45).

Features 34 and 35, two retaining wall segments located on the southern boundary of the EPL and CVPL, respectively, are believed to be associated with residential use of the BWS Site 6 parcel. This is based on architectural similarities to the Feature 33 wall, including the use of primarily reddish brown basalt boulders and cobbles in the construction, mortar that was applied flush to the rock faces, and the use of basalt boulder caps on the tops of the walls (see Figures 46 and 47).

Feature 36, a rock-faced terrace in the southeast corner of the CVPL, is also believed to be associated with residential use of this parcel. This interpretation is based on architectural similarities of the central and southern portions of the Feature 36 retaining wall to Features 33, 34, and 35 (primarily the use of reddish brown basalt boulders and cobbles and the application of mortar flush with the rock face-see Figure 48), and the fact that the Feature 36 terrace retaining wall is fairly massive (44.2 m in length and from 70 to 125 cm in downslope height, and is not consistent with the architecture of the Feature 11, 13, 14, and 15 parking lot retaining walls (see above discussion of the parking lot terraces). In addition, the location of the Feature 36 retaining wall is situated from 1,0 to 5.0 m west of the Feature 14 retaining wall; the presence

of two retaining walls so close together, suggests the Feature 36 terrace is not associated with construction of the EPL or the CVPL.

The northern portion of the Feature 36 retaining wall, which curves up to the east, shows evidence of rebuilding (see Figure 49). This is based on the presence of dense dark gray basalt boulders in the construction, and the top of the wall is capped with a flat, smooth concrete surface, similar to the Feature 1-9 walls and to the parking lot terrace retaining walls. It is not certain whether this curved portion of the terrace wall reflects how the terrace was originally built. The presence of cut coral blocks at the base of the north end of the wall suggests that it was originally curved at the north end.

It is believed that the Feature 36 terrace may be associated with one of the residential structures present on the parcel prior in the early twentieth century prior to the construction of the parking lots. This is based on the architecture of the terrace retaining wall and the presence of historic glass and ceramic artifacts present on the soil surface.

It is not known how far east the leveled surface behind Feature 36's retaining wall once extended, but if it is associated with a residential structure, the level surface likely extended for 20 m or more. During excavation of TR11 in the EPL, directly east of Feature 36, it was noted that the subsurface proveniences had been disturbed due to grading and filling activities in the EPL. The artifacts found in TR11 may be associated with the residential structure likely associated with Feature 36.

Features 19-54

Features 37 through 54 are subsurface components of Site T-1's Residential Era. These 18 features, identified in backhoe and hand-excavated trenches within the EPL, CVPL, and VPL, are believed to be associated with former residential structures within the APE as seen on old maps (see Figures 6-11).

The 18 subsurface features include nine pits (Features 37, 44, and 46-52), three possible pits (Features 41-43), three post molds (Features 38, 40, and 53), one possible post mold (Feature 45), one rusted metal concentration (Feature 39) and one cobble/pebble concentration (Feature 54).

Of the 18 subsurface features, 11 contained archaeological materials (see Table 3). These include Features 37 (pit), 39 (concentration of rusted metal), 40 (post mold), 41 (possible pit), 44 (two connecting pits), 46 (pit), 47 (pit), 49 (pit), 50 (pit), 51 (pit), and 53 (post mold). Much of the observed archaeological materials was non-diagnostic and not collected. Household artifacts and vertebrate faunal remains were, however, recovered from Features 37, 40, 41, 46, and 47. The remaining seven subsurface features did not contain such materials, nor were there any materials visible in the profiles within excavated trenches.

The presence of trash pits and post molds is consistent with residential use of the parcel. The trash pits likely reflects the practice of people burying trash in their yards. The identified of post molds may be associated with residential structures, fence posts, and other supporting structures. Feature 53, a post mold that is associated with concrete (see Figure 66), suggests that the post and pier method of construction was used in construction of at least one residential structure.

Features 37, 46, and 47 are interpreted as trash pits, which is consistent with residential use of the BWS Site 6 parcel. Feature 37, a trash pit identified in TR9, contained one partial soda bottle that has a manufacturing date of 1902-1903 (see Table B1), several ceramic bowl and plate fragments that date from the late 1800s to the early 1900s (see Table B2), butchered (saw cut) bone, (see Table 6), and vertebrate remains of unidentified large mammal.

Feature 40, a post mold identified in TR5, contained two ceramic bowl fragments that date from 1891 to 1913 (see Table B2). Feature 41, a possible pit identified in TR6, contained six wire nails of the type that date from around 1894 to the present (see Table B3).

Feature 46, a trash pit found in TR14, contained 206 artifacts as well as vertebrate faunal remains. The artifacts represent personal household items including beer, medicine, ink, and condiment bottles, ceramic plate, bowl, and chamber pot fragments, metal items such as a cut nail fragment, a suspender fastener, and a needle, shell buttons, butchered mammal bone, and a battery fragment. Based on dates of manufacture of the bottles and ceramics, items in this trash pit date from the late 1800s to the 1920s. Vertebrate faunal remains include unidentified medium, medium to large, and, large mammal bone as well as and pig bone.

Feature 47, a second trash pit in TR14, contained 61 artifacts as well as vertebrate faunal remains. Like the items in Feature 46, the artifacts in Feature 47 represent personal household items, including alcoholic beverage (e.g., beer and gin), medicine, ink, soda, shoe polish bottles, ceramic plate, bowl, pitcher and saucer fragments, and porcelain doll fragments, fragments of a metal chain and copper wire, and cut nails, and a bone button. The age range of these items is generally from the late 1800s to the 1920s-30s. One medicine bottle (Artifact #25.3 in Table B1) dates to around 1882. The bone button indicates a date of pre-1900 (see Table B4). Vertebrate faunal remains include unidentified medium vertebrates and unidentified medium mammal.

With the exception of Features 42 (possible pit), 43 (possible pit), and 54 (cobble/pebble concentration), all subsurface features originate within Layer I (see Table 3). Features 42 and 43, identified in TR2, appear to be associated with Fill B deposits (Layer I is not present in TR2). The fills for these two features, however, resemble fills of features associated with Layer I. Feature 54, a cobble/pebble concentration interpreted as a possible buried road bed, is associated with Fill B2.

It should be noted here that some of the archaeological materials (artifacts and faunal remains) recovered from screening of the back dirt pile in TR15 may be associated with Features 49, 50, and 51, three pits identified on the north face of this trench (see Figure 65). While this cannot be confirmed, it appears likely based on the observed presence of archaeological materials in the profiles in these features. The back dirt pile contained 119 artifacts and included items fashioned from glass, ceramic, metal, shell, celluloid, and bone.

Site 50-18-T-1, Feature 55, Late Pre-Contact Use Era

The late pre-Contact Era of Site T-1 is represented by one subsurface feature, designated as Feature 55. This feature, a human burial, was encountered during backhoe excavation of TR15 in central portion of the CVPL (see Figure 14).

Observations of the north face of TR15 indicated that upper portions of Layer I had been mixed and disturbed, and it was noted that upper portions of the Feature 55 burial pit had been truncated. Screening the back dirt pile from TR15 yielded additional human skeletal remains from the TR15 burial. These were recovered, wrapped in linen, placed inside a paper bag, and placed under a protective wooden box in TR15. This burial is currently considered to be associated with the late pre-Contact period, based on the assumption that residential use of the parcel did not include burial within residential lots.

EXCAVATIONS

A total of 16 backhoe excavations and four hand-excavated trenches was conducted in the EPL, CVPL, the VPL in the BWS Site 6 parcel, and one backhoe trench was excavated in the BWS Site 7 parcel (see Figure 14; see Table 5). Important information, including the

presence of subsurface features (see above) and a fairly straight forward stratigraphic sequence that provides a subsurface context and relative chronology for the late-pre-Contact use and historic residential use for Site T-1, was obtained from the excavations.

A majority of the excavations revealed stratigraphic sequences that were similar or the same: Fill A underlying asphalt, Layer I, and Layer II (see Table 5). The presence of other cultural fills, and the land use history of the parcel, expanded our understanding of the natural and cultural events that has affected the development of the documented stratigraphic sequences in the excavations. The presence of cultural materials in Layer I, has confirmed the information obtained previously regarding recent land use history (e.g., residential development).

A notable exception to the stratigraphic information discussed above is Trench 11 in the EPL (see Figure 14). The stratigraphic position of Fill B deposits in TR11 (directly underlying Layer I), the presence of Fill D deposits underlying Layer II (see Figure 71), and the presence of archaeological materials in Layer II black cinder sands was initially enigmatic. TR11, however, was the first excavated trench and documentation of the stratigraphic sequences in other parts of the BWS Site 6 parcel and not yet been conducted. Based on stratigraphic sequences observed across the BWS Site 6 parcel, and the absence of archaeological materials in Layer II in all other trenches, it was ultimately concluded that the TR11 locale has undergone impacts that are not yet clearly understood. Additional excavations in this locale may help clarify these impacts.

Topography and Stratigraphy

While no intact surfaces of the pre-Contact landscape remain in either parcel, it is believed that both parcels had a topography that sloped toward the west. Upper portions of the parcel likely were steeper than lower portions. The relatively level coastal alluvial plain on which Kaka‘ako and Waikiki are located possibly began leveling out around Beretania Street or further *mauka*, based on observations of the current topography, which still slopes toward the west, and on the soils present in the project area. Based on Figure 4, the Tantalus silty clay loams are present in upper portions of the BWS Site 6 parcel (the EPL and eastern portions of the CVPL), and the Makiki clay loam soils are present in western portions of the CVPL and the VPL. Makiki clay loams, which are found on alluvial fans and terraces (e.g., the plains of Kakaako and Waikiki), are deep, well drained soils that formed in material weathered from alluvium mixed with ash and cinders (Soil Survey Staff 2016). The Tantulus series are well-drained soils on uplands that developed in volcanic ash and material weathered from cinders (Soil Survey Staff 2016). The in situ stratigraphic layers observed in AIS excavations are consistent with the soils information provided by the Soil Survey Staff (2016).

It is likely that the original topography of BWS Site 6 and 7 was altered prior to the development of the parcels for residential use, thereby impacting (at a minimum the surface A horizon) the soils in this area. The presence of the massive Feature 36 terrace suggests fairly significant cutting and filling of the landscape in this locale. The topography was probably further altered during construction of the parking lots. The terraced nature of the various asphalted parking lot terraces suggests additional grading (cut and filling) activities occurred during their construction. The surfaces of the parking lots are level to gently sloping (toward the west).

The stratigraphic sequences within the 21 excavations conducted for the AIS identified nine stratigraphic layers including seven (7) fill deposits, designated as Fills A, A1, B, B1, B2, C, and D, and two *in situ* stratigraphic layers, designated as Layers I and II (see Table 4). Interpretive discussions of these layers follow.

With the exception of TR11, the basal sediments in all excavations consisted of Layer II black cinders (cinder sands). According to the Soil Survey Staff (2016) (see Figure 4), the Tantalus silty clay loams and the Makiki clay loam soils are associated with Tantalus cinders According to Macdonald and Abbott (1972: 376), these cinders were deposited during eruptions of the Tantalus cinder cone many thousands of years ago. Based on this information, Layer II is interpreted as an in situ C Horizon soil that predates human occupation of the Hawaiian Islands.

With the exception of TR21, Layer I throughout the APE was consistently a very dark grayish brown (10YR 3/2, m.) silty sand consisting of cinder sands mixed with silts. Based on its stratigraphic position directly overlying Layer II cinder sands, Layer I is interpreted as a buried A Horizon soil that developed in Layer II. Based on the presence of archaeological materials and features, Layer I has also been identified an anthropic A Horizon, indicating that this layer probably contains organic materials associated with human occupation.

The color and textural variations (reddish brown [5YR 4/3, m.] silt loam) observed in Layer I in TR21 are are interpreted as the result of grading and filling activities in the vicinity of TR21, excavated in the BWS Site 7 parcel.

During excavations, it was noted that Layer I was discontinuously present in the EPL and CVPL. It was absent in TRs1-3, and discontinuously present in TRs 7, 12, 13, 15, and 18. In two trenches (TRs10 and 15), it was observed that Layer I soils were mixed. The discontinuous presence of Layer I, suggests that this layer has been significantly impacted in the past. These impacts are believed to be the result of relatively recent cultural events, including the residential development of the BWS Site 6 parcel starting in the late 1800s and continuing into the early to mid-twentienth century, and the construction of the parking lots in the 1950s. The residential development of this parcel likely included alterations of a probable intact landscape involving cutting and filling of the original sloping topography to create level areas for house lots and foundations. It is believed that subsequent construction of a series of terraced parking lots likely required deeper and more extensive cutting and filling to create relatively large, level parking areas. The cutting and grading activities during parking lot construction likely resulted in the scraping of surface soils, specifically Layer I, in the parcel resulting in the removal of Layer I in some areas (e.g., the EPL), and truncating upper portions of Layer I throughout the EPL and the CVPL.

Less significant impacts to Layer I were observed in western portions of the CVPL and in the VPL. In the VPL, Layer I deposits were quite thick, and the presence of Layer I deposits in tree molds suggests that trees growing here may not have The least amount of impact

Where Layer I was encountered, it was found directly underlying many of the fill deposits, including Fill A, Fill B1 (TR21), Fill B2 (TR19), and Fill C (TR20). Interpretations of all fill deposits are presented below.

Fill D deposits consist primarily of grayish brown, medium to coarse basalt (cinder) and coral sands, and were found only in TR11. Although only a small portion of Fill D was exposed in TR11, based on the presence of coral sands, and it's stratigraphic position, directly underlying disturbed sediments of Layer II, Fill D sediments are interpreted as a cultural fill. No archaeological materials were identified in Fill D deposits in TR11.

Fill C is a dark brown to dark grayish brown silty clay loam found only in TR20. Based on its color and texture, and its stratigraphic position in TR20, directly underlying Fill B2 and directly overlying Layer I, it is interpreted as a cultural fill. No archaeological materials were encountered in Fill C.

Fill B2 is a reddish brown, very cobbly, pebbly clay deposit with approximately 25%, by volume, angular to subangular basalt and coral cobbles and pebbles. Fill B2 was found only in

TR19 (see Table 4), and was found directly underlying Fill A and directly overlying both a possible buried road feature, designated as Feature 54, and Layer I. No artifacts were encountered in Fill B2. The buried road feature, Feature 54, is situated within Fill B2 deposits

Fill B1 is a dark reddish brown clay with less than 5%, by volume, basalt and coral pebbles; this fill was found only in TR20 and TR21 (see Table 4). Based on it's color and texture, and it's stratigraphic position in TR20 and 21, directly underlying base course sediments of Fills A and A1, these sediments are interpreted as a cultural fill deposit associated with infilling of western areas in the BWS Site 6 parcel. One piece of non-diagnostic clear bottle glass was observed (but not collected) in Fill B1 deposits in TR20. No archaeological materials were observed in Fill B1 deposits in TR21.

Fill B, a dark yellowish brown (7.5YR 3/4, m.) cobbly, pebbly silty clay loam with approximately 10-15%, by volume, subrounded coral cobbles and pebbles, was identified in TRs 1-3 and TR11 in the EPL (see Table 3). It was not identified in the CVPL or the VPL. Based on its stratigraphic position in TR1-3, directly underlying Fill A, Fill B is interpreted as a cultural fill deposits associated with filling in isolated, lower elevated areas in the EPL prior to the deposition of Fill A and the paving of this parking lot. Features 42 and 43 appear to originate in Fill B in TR2 in the EPL (see Figure 52). The fill in these features, however, do not contain Fill B sediments. Instead, they have a mixture of Layer I and Layer II soils. No archaeological materials were encountered in Fill B deposits in TR1-3. In TR11, however, Fill B deposits contain glass, ceramic and cut bone artifacts as well as vertebrate faunal remains (unidentified vertebrate and chicken [*Gallus gallus]*).

Based on the coral cobble/pebble composition and the stratigraphic position of Fill A, directly underlying the asphalt paving in all three parking lots, this coral fill is interpreted as the base course for the asphalt paving in the three parking lots (e.g., see Figure 51). Glass, ceramic and cut bone artifacts were found in Fill A deposits in TR8.

Similarly, the basalt pebble composition of Fill A1, and it's stratigraphic position directly underlying the asphalt of the paved road leading to the pump station and engineering building in the BWS Site 7 parcel, this fill is interpreted as the base course for the asphalt paving on this road (see TR21 on Figure 14; see Figure 72). No archaeological materials were found in Feill A1.

ARTIFACTS

The AIS investigations at BWS Sites 6 and 7 yielded a total of 712 artifacts (see Table 6; see Tables B1-B4 in Appendix B). These included 269 glass artifacts, 129 ceramic artifacts, 149 metal artifacts, 30 miscellaneous artifacts (primarily shell, bone and, celluloid), and 135 pieces of butchered mammal bone.

Artifact types include complete, and fragmentary examples of hand-made, mold-blown, bottles and complete, partial, and fragmentary bottles manufactured by automatic bottle machine (ABM). Glass artifacts also include a glass insulator, a glass marble, fragments of window glass, light bulb fragments, light globe fragments, two glass applicators, and a glass button (see Table B1). The ceramic assemblage is dominated by fragments, and one complete example, of refined earthenware, fragments (and one complete example) of stoneware vessels, examples of porcelain include tableware, porcelain insulators, porcelain doll parts, and a porcelain door knob. Also present in the ceramic assemblage are ceramic marbles and fragments of terra cotta (see Table B2). Metal artifacts (see Table B3) include a 1915 penny, cut and wire nails, spikes, horse and buggy harness tack, clothing accessories, emblems and insignia, automobile parts, cartridges and button fragments. Miscellaneous artifacts (see Table

B4) include butchered bone, bone, shell, and celluloid buttons, a bone toothbrush, hard rubber syringe parts and fragments of several carbon core batteries.

The variety of artifacts recovered listed above were found in Layer I and associated subsurface features (Features 37, 40, 41, 46, and 47), and represents items found in residential households. The dates of manufacture for artifacts are provided in Appendix B tables and appear to be fairly consistent for all material classes (glass, ceramic, metal and miscellaneous). These items are believed to be associated with the residential use of BWS Sites 6 and 7 parcels.

As can be seen in Tables B1-B4 in Appendix B, a majority of the manufacturing dates of the various artifacts generally range from the late 1800s to the late 1920s and 30s. Items that provide a date from the early 1900s to the present can be interpreted as being no older than the 1950s because the residential structures had all been removed by the late 1950s. These dates are consistent with the time period associated with residential use of these parcels.

As mentioned in the Artifact Analysis section, none of the bottles recovered in excavations were manufactured after 1935 (see Table B1). This is interesting because the residential use of these parcels extended into the 1950s, and it was expected that some of these artifacts would yield dates from the 1940s and 1950s . One possible explanation for this is that people living in the ‘Auwaiolimu Lots from the late 1800s into the twentieth century probably buried unwanted “trash” in their yards, but in the mid-1930s this practice may have changed with the introduction of trash pickup by the County. According to *Garbage In Paradise: A History of Honolulu's Refuse Division,* (http://www.opala.org/solid_waste/archive/History%20_Garbage_in_paradise.html#report), there was refuse collection in Honolulu prior to 1935. Residential fees were collected likely beginning in 1905, however, no ordinance was established until 1925 ("In 1925, Ordinance 275 superseded the provisions of Ordinance 27 concerning tenement houses, and stated that persons and businesses that wanted refuse collection service must put their refuse in substantially constructed receptacles. A charge of $0.04 per cubic foot was established for business collection, and the fee for dumping was $0.25 per cubic yard. Although this was the first ordinance to set refuse fees, there must have been some other prior authorization to collect refuse fees, since such fees were being collected by Oahu County in 1905.). Garbage was collected by horse-drawn wagons, followed by trucks circa 1919.

Speculating on this information, it is likely that during the 1930s there were new ordinances passed concerning residential refuse. Swill was collected by the Hog Raisers Association (as it was before) and garbage was ordered to be separated into combustible and non-combustible components. Perhaps prior to the 1930s it was residents' priority to have the organic trash collected, which cost a fee. In 1923 there were 10 garbage trucks in the city. In 1937, 10 more garbage trucks were purchased, which suggests an increase in trash collection. There was also a new incinerator built in 1930 in Kapalama. Perhaps in the mid-1930s the residents living in the APE decided to have their rubbish collected. The new trucks and new incinerator suggests an increase in demand.

FAUNAL REMAINS

The faunal remains recovered during excavations include 36.4 g of invertebrate remains (marine mollusks and sea urchin), and 676 pieces (NISP) of vertebrate fauna (see Tables 7 and 8). While the recovery of vertebrate remains was expected, especially medium, medium to large, and large mammal, the presence of invertebrate remains was not anticipated.

The invertebrate remains include four marine mollusk species, including two gastropod species (*Nerita picea* and *Turbo sandwicensis)*, two bivalve species (*Brachidontes crebristriatus*

and *Tellina palatam)*, and sea urchin remains identified as *Echinothrix diadema.* These marine invertebrates are often found in pre-Contact archaeological sites and are considered to be traditional Hawaiian food resources. Their presence in Layer I, which is associated with residential use of the BWS Site 6 parcel, suggests that the use of traditional Hawaiian food sources continued into the late 1800s to early 1900s in this locale.

The vertebrate faunal remains included three zoological classes, including bony fish, birds, and mammals. In addition, unidentified vertebrates were also present. Identified taxa included vertebrates, bony fish, unidentified small and medium birds, medium Passeriforms, medium, medium to large, and large mammals, cow (*Bos taurus*), and pig (*Sus scrofa*).

None of the taxa listed above is unusual for an urban archaeological deposit in Hawai‘i. All are found routinely in similar excavations. In the case of the APE, most of the identifiable vertebrate faunal remains appear to be derived from midden deposits and as such represent food remains, probably from historic, post-Contact activities.

SITE SIGNIFICANCE AND NATIONAL REGISTER ELIGIBILITY EVALUATION

To be considered significant pursuant to Chapter 6E and HAR 13-275-6, a historic property such as Site T-1 must meet one of the following criteria:

- **Criterion a:** Applies to properties associated with events that have made a significant contribution to the broad patterns of history.
- **Criterion b:** applies to properties associated with the lives of persons important in our past.
- **Criterion c:** applies to properties that embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value.
- **Criterion d:** applies to properties that have yielded or have the potential to yield information important to our understanding of the past
- **Criterion e:** applies to properties that 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.

Based on the above criteria, Site T-1 is considered significant under Criterion d (potential to yield information) and Criterion e (cultural value). Excavations across Site T1, including lower areas located in the western (*makai*) portions of the EPL, the entire CVPL, the VPL, and the northwest portion of BWS Site 7, has yielded data that is important to our understanding of the prehistory and history of Hawaii. The presence of subsurface archaeological materials (artifacts and faunal remains) in Layer I and in subsurface features indicates that Site T-1 still has the potential to yield further data. Site T-1 is also considered to be significant under Criterion e based on the presence of the human burial encountered in TR15 in the CVPL.

To evaluate Site T-1’s eligibility for inclusion in the National Register of Historic Places (NRHP) and the Hawaii Register of Historic Places (HRHP), Criteria A through D above are used. Site T-1 is recommended to be considered eligible to the HRHP and NRHP under Criterion D.

Table 11 summarizes site significance and HRHP and NRHP eligibility, effect determinations and mitigation recommendations for Site T-1.

Table 11. Site Significance Assessments, HRHP and NRHP Eligibility Evaluation, and Effect Determinations and Mitigation Recommendations for Site 50-80-18-XXXX

SIHP Site No. or Resource Name	Chapter 6E Significance Assessment	HRHP / NRHP Eligibility	Chapter 6E Effect Determination Recommendations	Chapter 6E Mitigation Recommendations	Section 106 Effect Determination Recommendations	Section 106 Mitigation Recommendations
50-80-18-XXXX	d, e	D	Effect, with proposed mitigation commitments	Archaeological monitoring and burial treatment in the form of preparation of a Burial Treatment Plan	Adverse Effect	Archaeological monitoring and preparation of an Archaeological Monitoring Plan for all 58 BWS sites; burial treatment in the form of preparation of a Burial Treatment Plan

PROJECT EFFECT DETERMINATIONS AND MITIGATION RECOMMENDATIONS

Pursuant to HRS, Chapter 6E-8 and its implementing regulations at HAR §13-275-7(2), the recommended project effect determination based on the AIS report is "effect, with proposed mitigation commitments" as the proposed construction of the PV arrays in BWS Sites 6 and 7 have the potential to adversely impact Site 50-80-18-XXXX (subsurface cultural deposits and features, including a human burial). The recommended mitigation for Site T-1 is archaeological monitoring per HAR §13-275-8(a)(1)(C) and burial treatment, in the form of preparation of a Burial Treatment Plan (BTP) for the human burial encountered in TR15. It is presumed that the Honolulu BWS will recommend in situ preservation for this burial, and as such, the BTP shall be reviewed and approved by SHPD and the Oahu Island Burial Council (OIBC), and include temporary protective measures during construction activities as well as and long-term, permanent protective measures for the burial. Consultation with appropriate Native Hawaiian Organizations and individuals shall be included in the BTP.

Pursuant to applicable Federal regulations (36 CFR § 800.5(d)(2), the AIS findings indicate that the proposed undertaking will have an "adverse effect" on historic properties eligible for listing in the NRHP. Consequently, the AIS report recommendation is that the "adverse effect" be mitigated through archaeological monitoring and the preparation of an Archaeological Monitoring Plan (AMP) for all 58 BWS sites associated with Honolulu BWS's Energy Efficiency Program as required by SHPD (S. Lebo to J. Seto, letter, 18 October 2016; SHPD Log. No: 2016.02181; Doc. No: 1610GC09). Burial treatment, in the form of preparation of a Burial Treatment Plan (BTP) for the human burial encountered in TR15, is also recommended.

The recommendation for archaeological monitoring is based on the AIS findings within the project APE. Numerous artifacts and subsurface features determined to be historic in age (over 50 years old), including a human burial probably associated with the late pre-Contact period, are present in Site T-1. It is likely that more archaeological materials and subsurface features are present. Based on the presence of the human burial, the probability is moderately high that additional human burials may be present.

REFERENCES

Anderson, Lisa
1995a *Historical Background Research: The King Street Place Property, Honolulu, Hawai'i (TMK No. 1-2-1-044: 041, 042, and 043)*. Ogden Environmental and Energy Services Co., Inc., Honolulu.
1995b *Archaeological Subsurface Inventory Survey of the King Street Place Property, Honolulu, Hawai'i (TMK No. 1-2-1-044: 041, 042, and 043)*. Ogden Environmental and Energy Services Co., Inc., Honolulu.
1997 *An Exploratory Excavation of the Proposed Reinterment Plot for One Archer Lane, Honolulu, Hawai'i (TMK No. 1-2-1-044: 041, 042, and 043)*. Ogden Environmental and Energy Services Co., Inc., Honolulu.

Anderson, Lisa and Karen 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 Co., Inc., Honolulu.

Barnes
1972 Cartridges of the World etc

Berge, Dale L.
1980 Simpson Springs Station: Historical Archaeology in Western Utah, 1974-1975. Utah State Office.

Bevan, Amy, Michelle Elmore, Joseph Kennedy
2004 *An Archaeological Monitoring Report for the City Hall Annex Auditorium Restoration Project Located at TMK: 2-1-33:07 (Par.) in Honolulu Ahupua'a, Kana District, Island of O'ahu*. Archaeological Consultants of the Pacific, Inc., Haleiwa, HI

Bingham, Rev. Hiram
1981 *Residence of Twenty-one Years in the Sandwich Islands; or the Civil, Religious and Political History of those Islands* [publ. in 1847], Praeger Publishers, New York, New York.

Bishop, Rev. Sereno .E
1916 *Reminiscences of Old Hawaii*. Hawaiian Gazette Co., Ltd., Honolulu, Hawai'i.

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

Bordner, Richard
1990 *The Change in Church and Community in Honolulu: Kawaiahao Church Field Research.* Chaminade University Archaeology Club. Copy on file at State Historic Preservation Division Library, Kapolei, Hawai'i.

Bowen, Robert N.
1961 *Hawaiian Disposal of the Dead.* Unpublished master's thesis, University of Hawaii, Honolulu.

Buckles
1978 in IMAX

Burke, Kelly and Hallett H. Hammatt
2011 *Final Archaeological Monitoring Report for Utility Upgrades at the Pacific Club, Honolulu Ahupua'a, Kona District, Island of O'ahu, TMK: [1] 2-1-019:014*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Carpenter, Alan and Martha Yent
1995 *Archaeological Monitoring: Kennel Construction at Washington Place (50-80-14-9907), Honolulu, O'ahu TMK 2-1-18:01*. Department of Land and Natural Resources, Division of State Parks, Honolulu, Hawai'i.

Chase
1975 chinese ceramics in ventura

Chinen, Jon J.
1958 *The Great Māhele: Hawaii's Land Division of 1848*. University of Hawaii Press, Honolulu.

Chiogioji, Rodney, and Hallett Hammatt
1994 An Archaeological Assessment of an 8.4-Acre Parcel in Downtown Honolulu, Island of O'ahu (TMK 2-1-18:46 and PORS. 1, 11, 16 & 47). Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Chiogioji, Rodney, Mathew M. McDermott, David Borthwick, and Hallett H. Hammatt
1991 *Archaeological Investigations at the Hawai'i State Public Library Addition Site*. Cultural Surveys Hawai'i, Kailua, Hawai'i.

Clark, T. Blake
1939 Honolulu's Streets. *Papers of the Hawaiian Historical Society 20:5-26.*

Cordy, Dominique Leu and Hallett H. Hammatt
2005 *Archaeological Monitoring Report for Punchbowl Street Improvements, Phase 2 Downtown Honolulu, Makiki Ahupua'a, Kona District, O'ahu Island, Hawai'i, (TMK 2-1-15, 25-27, & 29-33)*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Covil
1971 ink bottles

Cushion
1959 ceramics

Denham, Tim and Joseph Kennedy
1993 *Monitoring Report for Excavations Associated with the State Capital Complex Telecommunication Conduits, Phase III, Kona District, Honolulu Ahupua'a, Island of O'ahu*. Archaeological Research Center Hawai'i, Hale'iwa, Hawai'i.

Department of Land Utilization
1991 *Special District Design Guidelines*. Hawaii Capital. Department of Land Utilization, City and County of Honolulu. Available online at https://www.hawaiihome.cc/pdf/hcsd.pdf. Accessed 12/2/2016.

Desha, Stephen L.
1930 "Na anoai o oahu nei." *Ka Hoku o Hawai'i* Feb. 11. Available online at http://nupepa.org/gsdl2.5/cgi-bin/nupepa?a=p&p=about&l=en. Accessed 12/2/2016.

Dockall, John E., Susan A. Lebo, Helen Higman Leidemann, and Wendy Tolleson
2003 *Phase I Archaeological Inventory Survey and Monitoring, Washington Place (50-80-14-9907), TMK 2-1-18:1, Project No. 542*. Benice P. Bishop Museum, Honolulu, Hawai'i.

Dye, Thomas S.
2002 *Archaeological Monitoring Report for Renovations to No. 1 Capitol District Building*. T.S. Dye & Colleagues, Archaeologists, Inc., Honolulu, Hawai'i.

Elliot, Rex, and Stephan Gould
1988 *Hawaiian Bottles of Long Ago*. Hawaiian Service, Inc., Honolulu, HI.

Fontana and Greenleaf
1962 nails, buttons in IMAX

Fike, Richard
1987 A Comprehensive Guide to Historic, Embossed Medicine Bottles. Gibbs M. Smith, Salt Lake City.

Fink and Pitzler
1993 buttons

Giambelluca ,Thomas W., Qi Chen, Abby G. Frazier, Jonathan P. Price, Yi-Leng Chen, Pao-Shin Chu, John K. Eischeid, and Donna M. Delparte
2013 "The Rainfall Atlas of Hawai'i." *Bull. Amer. Meteor. Soc*. 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.Available online at http://rainfall.geography.hawaii.edu. Accessed 12/2/2016.

Gilman, G.D.
1903 "Streets of Honolulu in the Early Forties." *Hawaiian Almanac and Annual for 1904*, Honolulu. Thrum, Honolulu, Hawai'i.

Goodden, Geoffrey)
1963

1964 Encyclopedia of British Pottery and Porcelain Marks. Bonanza Books, New York.
2004

Gosser, Dennis and Stephan D. Clark
2016 *Archaeological Inventory Survey Work Plan for the Honolulu Board of Water Supply's Beretania Complex and Water Facility on Beretania Street, Honolulu Ahupua'a, Honolulu District, O'ahu Island, Hawai'i. (TMK) Parcels [1] 2-1-036:004 and 005.* Prepared for NORESCO and Honolulu Board of Water Supply by Pacific Consulting Services, Inc., Honolulu.

Groza, Randy, Douglas Borthwick, and Hallett H. Hammatt
2009 *Archaeological Monitoring Report for the Queen's Medical Center Redevelopment Project, Honolulu (Kona) District, Honolulu Ahupua'a, Island of O'ahu TMK: [1] 2-1-018:048; [1]-2-1-035:001, 003-008, and 010; [1] 2-1-037:002*. Cultural Surveys Hawai'i, Kailua, Hawai'i.

Groza, Randy and Hallett H. Hammatt
2008 *FINAL Archaeological Monitoring Report For the Rehabilitation of Streets Project, Unit 5A, Beretania Street (Between North King and Alapa'i Streets), Honolulu Ahupua'a,*

Kona District, Island of Oʻahu. TMK: [1] 1-7-004, -005, -026, 027; 2-1-003, - 04, -009, -010, -017, -018, -024, -033-036. Cultural Surveys Hawaiʻi, Inc., Kailua, Hawaiʻi.

Hammatt, Hallett H.
2013 *Archaeological Inventory Survey Report for the City Center (Section 4) of the Honolulu High-Capacity Transit Corridor Project, Kalihi, Kapālama, Honolulu, and Waikīkī Ahupuaʻa, Honolulu (Kona) District, Island of Oʻahu TMK [1] 1-2, 1-5, 1-7, 2-1, 2-3 (Various Plats and Parcels)*. Cultural Surveys Hawaiʻi, Inc. Kailua, Hawaiʻi.

Han, Toni L.
1980 Royal Queen Emma Burials, TMK [1] 2-1-018:042; 1-8-4-002. Bernice P. Bishop Museum, Honolulu.

Handy, E.S., Craighill
1940 T*he Hawaiian Planter, Volume 1*. Bishop Museum Bulletin No. 161, Bernice Pauahi Bishop Museum, Honolulu.

Hawaiian Studies Institute
1987 *Oʻahu: Pre-Mahale Moku and Ahupuaʻa* [map]. *Hawaiian Place Names* 2:1, Kamehameha Schools, Honolulu, Hawaiʻi. Available online at http://manoa.hawaii.edu/coe/kulia/resources/ahupuaa_maps/OahuAhupuaa.pdf. Accessed 12/2/2016.

Hazlett, Alexander, Christopher M. Monahan, and Hallett H. Hammatt
2008 *Archaeological Monitoring Report for the 2.7-Acre Keola Laʻi Condominium Project at the Intersection of Queen and South Streets, Honolulu Ahupuaʻa, Kona District, Island of Oʻahu TMK: [1] 2-1-048:008*. Cultural Surveys Hawaiʻi, Inc., Kailua, Hawaiʻi.

Hibbard, Don J.
2011 *Buildings of Hawaii*. University of Virginia Press, Charlottesville, Virginia.

Hume, Ivor N.
1985 A Guide to Artifacts of Colonial America. Alfred A. Knopf, New York.

Kamakau, Samuel M.
1991 *Tales and Traditions of the People of Old, Nā Moʻolelo a Ka Poʻe Kahiko.* Bernice Pauahi Bishop Museum Special Publication 51. Bishop Museum Press, Honolulu, Hawaiʻi.
1992 *Ruling Chiefs of Hawaiʻi.* Revised Edition. The Kamehameha Schools Press, Honolulu, Hawaiʻi.

Kapeleila, Kanaʻi
1996 *Inadvertently Discovered Human Remains at One Archer Lane, King Street, Oʻahu*. Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawaiʻi.

Kawachi, Carol T.
1991 *Queen Emmalani Tower Project Monitoring, Kakaʻako, Kona, TMK 2-1-48: 8-19.* Department of Land and Natural Resources, State Historic Preservation Division, Kapolei, Hawaiʻi.

Kovel and Kovel
1986 ceramics

LaChance, Frederick, Ena M. Sroat, and Hallett H. Hammatt
2012 *Addendum to the Final Archaeological Monitoring Report for the Queen's Medical Center Redevelopment Project, Honolulu Ahupua'a, Honolulu (Kona) District, Island of O'ahu TMK: [1] 2-1-018:048; [1]-2-1-035:001, 003-008, and 010; [1] 2-1-037:002*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Lebo, Susan A., Editor
1996 Native Hawaiian and Euro-American Culture Change in Early Honolulu. Prepared by the Anthropology Department, Bishop Museum for McCormack Properties, Ltd, Honolulu.

LeSuer, Celeste C. and Paul Cleghorn
2004 *Archaeological Assessment for the Hawaiian Electric Company, Inc. East O'ahu Transmission Project 46kV Phased Project*. Pacific Legacy, Inc. Kailua, HI. Cultural Surveys Hawai'i, Inc., Kailua, HI.

Lowell, F.L.
1900 *Punchbowl and Beretania* [map]. Register map 1997. Archived at Hawaii Land Survey Division, Department of Accounting and General Services, 1151 Punchbowl St., Room 210, Honolulu, Hawai'i.

Luscomb, Margaret L. K., Roland Reeve, Peggy Luscomb, and Aki Sinoto
1976 *Archaeological Surveillance and Salvage During the Electrical Conduit Excavations on the Grounds of Iolani Palace, Honolulu, Oahu*. Bernice P. Bishop Museum, Department of Anthropology, Honolulu.

Luscomb
1967 buttons etc in IMAX

Lyons
2007 sears catalogue

Majewski, T., and M. J. O'Brien
1987 The Use and Misuse of Nineteenth-Century English and American Ceramics in Archaeological Analysis. Advances in Archaeological Method and Theory 11:97-209. Academic Press, New York.

Mcdonald, Gordon A. and Agatin Abbott
1977 *Volcanoes in the Sea: The Geology of Hawaii*. B.P. University Press of Hawai'i, Honolulu.

McAllister, J.G.
1933 *Archaeology of Oahu*. Bernice P. Bishop Museum, Honolulu, HIawai'i

Major, Maurice and Alan Carpenter
2000 *Archaeological Monitoring at Washington Place (Governor's Residence)*. Department of Land and Natural Resources, Division of State Parks, Honolulu.

Mann, Melanie and Hallett H. Hammatt
2002 *Archaeological Monitoring Report for the King Street Rehabilitation Project, Honolulu Ahupua'a, Kana Distrzct, Island of O'ahu (TMK 2-1 par. And 1-7 par.)*. Cultural Surveys Hawaii, Inc., Kailua, HI.

Metcalf, Theophilus
1847 Honolulu [Map]. Register Map 241. Hawaii Government Survey. Archived at Hawaii Land Survey Division, Department of Accounting and General Services, 1151 Punchbowl St., Room 210, Honolulu, Hawai‘i.

Millar, Jim
2002 The Handbook of Hawaiian Machine Made Soda Bottles. The Soda Mart, Goodlettsville, Tennessee.

Munsell
2000 *Munsell Soil Color Charts*. Gretag Macbeth, New Windsor, New York.

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

Murai, Gavin
2000 *Board of Water Supply Public Service Building. Paper written for Course AMST 423, University of Hawai‘i-Mānoa, Honolulu*. Available online at http://scholarspace.manoa.hawaii.edu/handle/10125/20293. Accessed 12/2/2016.

Nagata, Ralston
2000 Letter Report: *Archaeological Monitoring of ADA Sidewalk Compliance at Washington Place.* Copy on file, Hawaiian and Pacific Studies, Bemice P. Bishop Museum, Honolulu.

Nakuina, Emma
1909 “Daughters of Hawaii Unveil Tablet on the Battle of Nuuanu.” *Pacific Commercial Advertiser* June 29:1–2. Available online at http://chroniclingamerica.loc.gov/lccn/sn85047084/1909-06-29/ed-1/seq-1/. Accessed 12/2/2016.

Norman-Wilcox
1965 in IMAX

O’Hare, Constance. R., Kelly L. Burke, David W. Shideler, and Hallett H. Hammatt
2012 *Draft. Archaeological Assessment with Subsurface Testing Report for the American Cancer Society Hope Lodge Construction Project, Honolulu Ahupua‘a, Honolulu District, O‘ahu (TMK: [1] 2-1-018:009, 010)*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

O’Hare, Constance. R., Chris Monahan, and Hallett H. Hammatt
2008 *Burial Treatment Plan for the Alapai Transit Center Honolulu District, Honolulu Ahupua‘a, Island of O‘ahu TMK: (1) 2-1-042:004, 013.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

O’Hare, Constance R., David W. Shideler, and Hallett H. Hammatt
2007a *Pauoa-Makiki Portion of the Kalihi/Nu‘uanu Sewer Rehabilitation Project, Field Inspection and Literature Review Report, Pauoa and Makiki Ahupua‘a, Kona District, Oahu. TMK: [1] 2-1-021, 038, and 039; 2-2-002 to -008, -013, -019, 021, 023, 024, 029, 030, 031, 038, 056; 2-4-014 to -017, -029 to -033*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.
2007b *Archaeological Inventory Survey and Cultural Impact Evaluation for the Alapai Transit Center and Joint Traffic Management Center Project, Honolulu, Ahupua‘a, Honolulu District, Island of O‘ahu, TMK: (1) 2-1-0042:004, 013*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

2012 *Archaeological Literature Review and Field Inspection for the Technical Advisory Services Project for the Development of the Board of Water Supply Beretania Property, Honolulu Ahupua'a, Honolulu (Kona) District, Island of O'ahu TMK [1] 2-1-036:001, 004, 005 and 006*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Olsen
1963 in IMAX

O'Neal, Robert
1912 *Auwaiolimu Lots, West Slope of Punchbowl, Honolulu-Oahu*. Surveyed by H.E. Newton and S. W. Tay. Map by Robt. O'Neal. Registered Map No. 2530. Archived at Hawaii Land Survey Division, Department of Accounting and General Services, 1151 Punchbowl St., Room 210, Honolulu, Hawai'i.

Pammer, Michelle, Jon Tulchin, and Matt McDermott
2009 *Addendum to an Archaeological Inventory Survey and Cultural Impact Evaluation for the Alapai Transit Center and Joint Traffic Management Center Project, Honolulu Ahupua'a, Honolulu District, Island of O'ahu TMK: (1) 2-1-042:004, 013*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Pearson, Richard
1980 *A Brief Report on Test Excavations at the Hawaiian Mission, Honolulu*. University of British Columbia. Copy on file at the SHPD library, Kapolei, Hawai'i.
1995 A Brief Report on Test Excavations at the Hawaiian Mission, Honolulu. *Hawaiian Archaeology* 4:27–33.

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 Ahupua'a, Kona District TMK: 2-1-48:008, Island of O'ahu*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

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

Pfeffer, Michael T., Douglas K. Borthwick and Hallett H. Hammatt
1993 *An Archaeological Summary of the Kaka'ako Improvement District 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)*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Pietrusewsky, Michael and Rona Ikehara
1992 *Human Skeletal Remains form Queen Emalani Tower, Honolulu, Hawai'i*. University of Hawai'i, Honolulu, Hawai'i.

Pukui, Mary Kawena, Samuel H. Elbert, and Ester T. Mookini
1974 *Place Names of Hawaii.* University of Hawai'i Press, Honolulu.

Rieth, Timothy M. and Trever Duarte
2015 *Archaeological Monitoring and Emergency Data Recovery at the Ka Malanai at Kailua Development, Kailua Ahupua'a, Ko'olaupoko District, Island of O'ahu (TMK 4-2-01:30, 33, 34, 57, and 58).* Prepared for D.R. Horton, Schuler Division by International Archaeological Research Institute, Inc., Honolulu.

Rosendahl, Paul H.
1971 *A Report on the Archaeological Excavation and Exploration of the Old Carriage Road at 'Iolani Palace*. Anthropology Department, Bernice Pauahi Bishop Museum, Honolulu, Hawai'i.

Sando and Fenton
1984 in IMAX

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

Seelye, Michael D.
1968 The Archaeology of Kona. The Preliminary Archaeology of Hale Akala, the Royal Bungalow. University of Hawai‘i, Dept. of Anthropology, Hawai‘i State Archaeological Journal 69-1, Honolulu.

Simons, Jeannette, Carol Kawachi, Katherine Rogers, Gwen Hurst, and Jane Allen
1991 *Historical Research, Archaeological Monitoring, & Artifact Analysis, Armed Forces YMCA Rehabilitation Project, Downtown Honolulu, O‘ahu*. Applied Research Group, Bernice Pauahi Bishop Museum, Honolulu, Hawai‘i.

Sinoto, Aki
1977 Archaeological Surveillance and Salvage during Trenching and Installation of Service Conduit for Iolani Barracks, Grounds of Iolani Palace. Department of Anthropology, Bernice P. Bishop Museum, Honolulu.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture
2016 Official Soil Series Descriptions [Online WWW]. Available URL: http://soils.usda.gov/technical/classification/osd/index.html [Accessed 10 February 2015]. USDA-NRCS, Lincoln, NE.

Sroat, Ena, Erin Coward, and Matt McDermott
2013 *Archaeological Monitoring Report for the Alapai Transit Center and Joint Traffic Management Center Parking Structure Project, Honolulu Ahupua‘a, Honolulu District, O‘ahu Island TMK: [1] 2-1-042:004, 01*. Cultural Surveys Hawai‘i, Inc. Kailua, Hawai‘i.

Stein, Erika T. and Hallett H. Hammatt
2007 *Archaeological Monitoring Report for the Capitol Signage Project, (D.A.G.S. Job No. 16-10-0196) Honolulu Ahupua‘a, Kona District, Island of O‘ahu TMK: (1) 2-01-017, 024, 025, 026, 030 & 031*. Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

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

Thrum, Thomas G.
1896 “Retrospect for 1895.” *Hawaiian Almanac and Annual for 1896,* pp. 140–149. Thomas G. Thrum, Honolulu.
1906 *Heiaus and Heiau Sites Throughout the Hawaiian Islands*. Hawaiian Almanac and Annual for 1907, pp. 38-47, Honolulu, Hawai‘i.
1909 “Retrospect for 1909.” *Hawaiian Almanac and Annual for 1910*, pp. 164–182. Thomas G. Thrum, Honolulu.
1922 “Item on Beretania pumping station.” *Hawaiian Almanac and Annual for 1923*, p.53. Thomas G. Thrum, Honolulu.
1927 “Disappearing Houses.” *The Hawaiian Annual for 1928*, pp. 76–78. Thomas G. Thrum, Honolulu.

2006 *An Archaeological Subsurface Investigation at Kawaiahaʻo Church Cemetery, Honolulu Ahupuaʻa, Kona District, Island of Oʻahu (TMK: [1] 2-1-032:016 & 017)*. Cultural Surveys Hawaiʻi, Inc., Kailua, Hawaiʻi.

2011 *Archaeological Monitoring Plan for the BWS Water Main Replacement Project at Ward Avenue, Honolulu Ahupuaʻa, Honolulu District, Oʻahu Island TMK: [1]-2-4-14:024; 2-1-40:01; [1] 2-1-41:024, 026, 028; [1] 2-4-01:001; [1] 2-4-14:021; [1] 2-1-42:018, 024; [1] 2-1-44:001, 003, 005, 032, 033; [1] 2-3-08:001, 002; [1] 2-1-49:080*. Cultural Surveys Hawaiʻi, Inc. Kailua, Hawaiʻi.

Titchenal, Paul

2003 An Analysis of Glass, Shell, and Ivory Beads from the Wal-Mart Burial Complex at Ala Moana, Honolulu, Hawaiʻi. Prepared by Aki Sinoto Consulting, Honolulu.

Toulouse, Julian Harrison

1969 A Primer on Mold Seams. *Western Collector* Vol. 7, No. 12, December, San Francisco.

1971 *Bottle Makers and Their Marks.* Thomas Nelson Inc., New York.

U.S. Geological Survey

1927-1928 U.S. Geological Survey 7.5 minute topographic map, Honolulu Quad. Available at U.S. Geological Survey Maps/U.S. Department of War Maps, USGS Information Services, Box 25286, Denver, Colorado.

1953 Honolulu [photo]. Date: 19520403. Flight Line No: 022. ID: 2412.

1959 Honolulu [photo]. Date: 19590130. Flight Line No: 082. ID: 2483

2013 U.S. Geological Survey 7.5 minute topographic map, Honolulu Quad. Available at U.S. Geological Survey Maps/U.S. Department of War Maps, USGS Information Services, Box 25286, Denver, Colorado.

Vernon, Nicole, Melanie Mintmier, Jackie Walden, and Stephan D. Clark

2016 A Literature Review Report in Support of Honolulu Board of Water Supply's Energy Efficiency Project, Oʻahu Island, Hawaii. Prepared for Mason Architects, Inc. by Pacific Consulting Services, Inc.

Vince, Thomas L.

2008 "WRA's interesting links with schools and sugar in Hawaii" [web site]. Available at http://wra-pastandpresent.blogspot.com/2008_11_01_archive.html. Accessed 12/2/2016.

Wall, W. A.

1893 *Honolulu and Vicinity* [map]. Register map 1690. Archived at Hawaii Land Survey Division, Department of Accounting and General Services, 1151 Punchbowl St., Room 210, Honolulu, Hawaiʻi.

Wetherbee

1974 in IMAX

Wheeler, Momi, and Hallett H. Hammatt

2012 *Draft. Archaeological Monitoring Report for an Electric Duct Line Trenching Project (intersection of Kīnaʻu, Alapaʻi and Lusitania Streets), Honolulu Ahupuaʻa, Honolulu (Kona) District, Oʻahu Island, [TMK: (1) 2-1, Right of Way (ROW) adjacent to plats 36, 37, 41]*. Cultural Surveys Hawaiʻi, Inc., Kailua, Hawaiʻi.

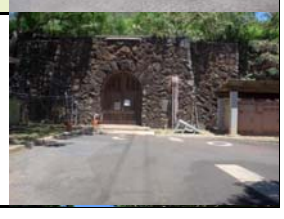
Wilson, Bill, and Betty Wilson
1968 *Spirits Bottles of the Old West.* Henington Publishing Company, Wolfe City, Texas.
1971 *19th Century Medicine in Glass.* 19th Century Hobby and Publishing Company, Amador City, California.

Worthy, L. H.
1982 Classification and Interpretation of Late Nineteenth and Early Twentieth Century Ceramics. In *Archaeology of Urban America*, edited by R. S. Dickens.

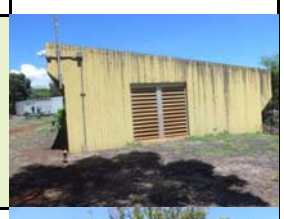
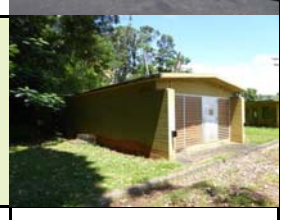
Zumwalt
1980 condiment bottles

Winieski, John P. and Hallett H. Hammatt
2000 *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)*. Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

APPENDIX A: ARCHITECTURAL ASSESSMENT OF 58 HONOLULU BOARD OF WATER SUPPLY SITES IN SUPPORT OF THE ENERGY EFFICIENCY PROGRAM

No.	Worksite	Address	Tax Map Key	SIHP#	Year Built	Architect, if known	Historic Dwgs Found?	NRHP Eligible?	Evaluation of Effect on Historic Properties	Proposed measures to resolve affect on historic properties	Photo
1	AHUIMANU 272	47577 HUI KELU ST KANEOHE HI 96744	4-7-070:060		1975	NS	NS	NS	N/A	N/A	N/A
2	AIEA 497	99915 KALAWINA PL AIEA HI 96701	9-9-067:001		1949 or older	Unknown	No	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation, ground PV)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible. Realign proposed ground PV so that the removal of trees is not required.	
3	AIEA 782	991336 AIEA HEIGHTS DR AIEA HI 96701	9-9-007:005		1953	J.Higa (Engineer)	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	No Adverse Effect (Pumping controls)	None required	
4	AINA KOA 865	2065 HALEKOA DR HONOLULU HI 96821	3-5-062:044		1969	Unknown	No	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	
5	BARBERS POINT 215	91040 FARRINGTON HWY KAPOLEI HI 96707	9-1-015:023		1987	NS	NS	NS	N/A	N/A	N/A
6	BERETANIA COMPLEX	650 S BERETANIA ST HONOLULU HI 96813	2-1-036:005		1958	Wood, Weed and Associates	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its modern, Hawaii regionalist design by Hart Wood.	No Adverse Effect (New carport with rooftop PV installation and lighting upgrades)	None Required New carport PV is on a portion of the site that was added after original 1958 Thompson designed landscape plan	
7	BERETANIA WATER FACILITIES	620 S BERETANIA ST HONOLULU HI 96813	2-1-036-004		1939	Hart Wood	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its modern, Hawaii regionalist design by Hart Wood.	No Adverse Effect (New carport with rooftop PV installation and lighting upgrades)	None Required New carport PV is on a portion of the site that was added after original 1958 Thompson designed landscape plan	
8	HALAWA 277	99700 ALIIPOE DR AIEA HI 96701	9-9-051:054		1961	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	No Adverse Effect (Power factor correction, install capacitor banks)	None required	
9	HALAWA WATER FACILTIES	991268 IWAENA ST AIEA HI 96701	9-9-073:025		1944	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	No Adverse Effect (Power factor correction, install capacitor bank)	None required	
10	HALEIWA 225	66400 KAMEHAMEHA HWY HALEIWA HI 96786	6-4-001:009		1981	NS	NS	NS	N/A	N/A	N/A
11	HEEIA CORPORATION YARD	46231 KAMEHAMEHA HWY KANEOHE HI 96744	4-6-004:020		1955	Unknown	No	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	No Adverse Effect (Interior/exterior lighting upgrade)	None required	
12	HOAEAE	94439 HOAEAE ST WAIPAHU HI 96797	9-4-034:074		1960	Weed, Wallace & Associates	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its distinctive Asian design including a ceramic glazed tile roof.	No Adverse Effect (No exterior work, interior pumping controls)	None required	
13	HONOULIULI WELLS II	911440 FARRINGTON HWY EWA BEACH HI	9-2-001:006		1990	NS	NS	NS	N/A	N/A	N/A
14	KAHUKU 228	56430 PAHELEHALA LOOP KAHUKU HI 96731	5-6-008:005		1979	NS	NS	NS	N/A	N/A	N/A
15	KALAUAO	98731 IHO PL AIEA HI 96701	9-8-011:032		1965	Unknown	No	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	No Adverse Effect (Ground PV on site that does not contribute to significance, pumping controls and power factor correction)	None required	
16	KALIHI CORPORATION YARD	2442 KINI PL HONOLULU HI 96819	1-3-021:004		1965	Unknown	No	Yes Adit structure (date unknown), with its distinctive wood and iron gate, and lava rock retaining wall, is evaluated as eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its distinctive early design.	No Adverse Effect - adit structure not affected (Interior/exterior lighting upgrades, HVAC equipment replacement, install capacitor banks)	None required	

No.	Worksite	Address	Tax Map Key	SIHP#	Year Built	Architect, if known	Historic Dwgs Found?	NRHP Eligible?	Evaluation of Effect on Historic Properties	Proposed measures to resolve affect on historic properties	Photo
17	KALIHI WATER FACILITIES	1381 N KING ST HONOLULU HI 96819	1-5-003:020		1925	Unknown	No	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its distinctive design as one of Oahu's early water supply facilities.	No Adverse Effect (Power factor correction and capacitor banks)	None required	
18	KAMEHAME 500	1180 KAMEHAME DR HONOLULU HI 96825	3-9-106:078		1972	NS	NS	NS	N/A	N/A	N/A
19	KAMILOIKI 170	7834 HAWAII KAI DR HONOLULU HI 96825	3-9-063:001		1973	NS	NS	NS	N/A	N/A	N/A
20	KAONOHI 277	98570 KAONOHI ST AIEA HI 96701	9-8-040:001		1966	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
21	KUNIA 228	94533 KUNIA RD KUNIA HI 96759	9-4-002:014		1963	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Ground PV installation, pumping controls, reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
22	KUNIA 440	94251 KUNIA RD KUNIA HI 96759	9-4-157:099		1960	Unknown	No	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir #1 & #2 roof replacement with new PV installation, power factor correction, install interior capacitor banks)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
23	KUNIA III	94111 HEAHEA WAIPAHU HI 96797	9-4-137:138		1995	NS	No	NS	N/A	N/A	N/A
24	MAKAHA 525	87-790 KILI DR WAIANAE HI 96792	8-4-002:061		1969	Unknown	Yes	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	
25	MAKAKILO 440	92635 MAKAKILO DR KAPOLEI HI 96707	9-2-019:010		1961	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Ground PV installation, reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
26	MAKAKILO 920	921063 MAKAKILO DR KAPOLEI HI 96707	9-2-019:026		1969	Unknown	Yes	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	
27	MAKAKILO 1	92419 MAKAKILO DR KAPOLEI HI 96707	9-1-016:033 9-1-016:014		1962	Weed and Kelley AIA	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Ground PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
28	MAKAKILO 2	92405 MAKAKILO DR KAPOLEI HI 96707	9-2-016:014		1969	Unknown	No	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	
29	MANANA CORPORATION YARD	1186 WAIMANO HOME RD PEARL CITY HI 96782	9-7-024:004		1940s/1963	Unknown	No	Yes The large-scale warehouse buildings are eligible under Criterion A and C as a distinctive World War II storehouse building type built for Naval Supply Depot Manana.	No Adverse Effect. (Exterior lighting upgraded to LED, HVAC upgrades, interior lighting upgrade to LED, install interior capacitor banks)	None required	
30	MARINERS RIDGE 170	759 KALUANUI RD HONOLULU HI 96825	3-9-073:043		1971	NS	NS	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	N/A
31	MARINERS RIDGE 500	948 KALUANUI RD HONOLULU HI 96825	3-9-075:079		1972	NS	NS	NS	N/A	N/A	N/A

No.	Worksite	Address	Tax Map Key	SIHP#	Year Built	Architect, if known	Historic Dwgs Found?	NRHP Eligible?	Evaluation of Effect on Historic Properties	Proposed measures to resolve affect on historic properties	Photo
32	MILILANI I	951049 AHIKAO ST MILILANI HI 96789	9-5-049:016 9-5-049:018		Older than 1991	NS	NS	NS	N/A	N/A	N/A
33	MOANALUA	3014 MOANALUA RD HONOLULU HI 96819	1-1-037:006		1958	Unknown	No	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its distinctive design with perforated concrete walls in a modern woven motif.	No Adverse Effect (Pumping control, power factor correction and capacitor banks)	None required	
34	NEWTOWN 285	3140 PALI HWY AIEA HI 96701	1-9-001:001		1971	NS	NS	NS	N/A	N/A	N/A
35	NUUANU 405	3064 PALI HWY HONOLULU HI 96817	1-9-001:001		1921	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its distinctive design as one of Oahu's early water supply facilities.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
36	PEARL CITY 285	1619 WAIMANO HOME RD PEARL CITY HI 96782	9-7-070:111 9-7-070:112		1960	Weed and Kelley AIA	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its distinctive Hawaii regional design.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
37	PEARL CITY 640	2274 AUPAKA ST PEARL CITY HI 96782	9-7-052:063		1961	Weed and Kelley AIA	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its thoughtfully conceived, Hawaii regional design.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible. Avoid penetrations to lava rock walls.	
38	PUNALUU III	53380 KAMEHAMEHA HWY HAUULA HI 96717	5-3-007:014		1977	Weed and Kelley AIA	Yes	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	N/A
39	PUNANANI	98-1445 KOMO MAI DR PEARL CITY HI 96782	9-8-060:003		1970	Walter Tagawa & Assoc	Yes	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	
40	PUPUKEA 600	59443 PUPUKEA RD HALEIWA HI 96712	5-9-025:039		1964	Weed and Kelley AIA	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its Hawaii regional influences.	No Adverse Effect (No exterior work, interior pumping controls)	None required	
41	ST. LOUIS HTS 640	1704 BERTRAM ST HONOLULU HI 96817	3-3-058:067		1950	Hart Wood	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its modern, Hawaii regionalist design by Hart Wood, and as one of the many thoughtfully-conceived BWS facilities developed under the guidance of BWS Manager Frederick Ohrt.	No Adverse Effect (Pumping controls)	None required	
42	WAHIAWA 1075	1610 GLEN AVE WAHIAWA HI 96786	7-5-021:006		1960 probably older	Weed and Kelley AIA	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
43	WAHIAWA 1180	2206 CALIFORNIA AVE WAHIAWA HI 96786	7-2-001:004		1961	Weed and Kelley AIA	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	No Adverse Effect (No exterior work, interior pumping controls)	None required	
44	WAHIAWA CORPORATION YARD	141 CALIFORNIA AVE WAHIAWA HI 96786	7-3-007:009		1977	NS	NS	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	N/A	N/A	N/A
45	WAHIAWA I	324 WALKER AVE WAHIAWA HI 96786	7-4-002:007		1963	Unknown	No (file damaged, may be able to get backup)	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	No Adverse Effect (No exterior work, replace existing well pump underground, power factor corrector, install interior capacitor banks)	None required	
46	WAHIAWA II	141 CALIFORNIA AVE WAHIAWA HI 96786	7-3-007:009		1987	NS	NS	NS	N/A	N/A	N/A

No.	Worksite	Address	Tax Map Key	SIHP#	Year Built	Architect, if known	Historic Dwgs Found?	NRHP Eligible?	Evaluation of Effect on Historic Properties	Proposed measures to resolve affect on historic properties	Photo
47	WAIALUA 225	64205 KAMEHAMEHA HWY HALEIWA HI 96791	6-5-005:006 6-5-005-007		1955	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Ground PV installation, pumping controls, reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
48	WAIANAE CORPORATION YARD	871070 FARRINGTON HWY WAIANAE HI 96792	8-7-006:032		1984	Unknown	Yes	NS	N/A	N/A	N/A
49	WAIAU 285	1193 KOMO MAI DR PEARL CITY HI 96782	9-8-052:001		1971	Unknown	Yes	NS	N/A	N/A	N/A
50	WAIAU 550	981900 KAAHUMANU ST PEARL CITY HI 96782	9-8-002:020		1971	Unknown	Yes	Yes	N/A	N/A	N/A
51	WAIPAHU 228	4204 LUMIAINA PL WAIPAHU HI 96797	9-4-007:016		1954	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation, pumping controls, install interior capacitor banks)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	
52	WAIPAHU III	94801 KAMEHAMEHA HWY WAIPAHU HI 96797	9-4-005:076		1998	NS	NS	NS	N/A	N/A	N/A
53	WAIPAHU IV	941150 MANAGERS DR WAIPAHU HI 96797	9-4-002:076		2004	NS	NS	NS	N/A	N/A	N/A
54	WAIPIO HTS 395	941112 PULAI ST WAIPAHU HI 96797	9-4-115:003		1968	Weed and Kelley AIA	Yes	No This facility does not exhibit distinctive design, nor does it have associations with an event or person that would warrant exceptional importance under NRHP Criteria Consideration G for properties less than 50 years of age.	No Adverse Effect (No exterior work, interior pumping controls)	None required	
55	WAIPIO HTS 595	94560 KAMEHAMEHA HWY WAIPAHU HI 96797	9-4-006:014		1978	NS	NS	NS	N/A	N/A	N/A
56	WAIPIO HTS II	941014 KA UKA BLVD WAIPAHU HI 96797	9-4-099:043		1979	NS	NS	NS	N/A	N/A	N/A
57	WILDER	2022 CLEMENT ST HONOLULU HI 96822	2-8-017:029		1962	Weed, Wallace & Associates	No	Yes Eligible under Criterion A for its association with the development of Oahu's water system, and eligible under Criterion C for its distinctive design with rough textured stucco exterior walls, and decorative aluminum grille.	No Adverse Effect (Power factor correction)	None required	
58	WILHELMINA RISE 405	1550 PUALELE PL HONOLULU HI 96822	3-3-032:012		1934	Unknown	Yes	Yes Eligible under Criterion A for its association with the development of Oahu's water system.	The building/site will be affected, but the proposed project will be modified with conditions to ensure No Adverse Effect. (Reservoir roof replacement with new PV installation)	Eliminate or minimize the amount of exposed conduit on the exterior of historic facilities, specifically on primary facades by making vertical runs on the interior to the greatest extent feasible and concealing exterior exposure where possible.	

APPENDIX B: ARTIFACT ANALYSIS TABLES B1 THROUGH B4

Table B1. Glass Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Method of Manufacture	Finish	Color	Shape	Measurements (cm)	Embossing	Maker's Mark	Contents	Date/Date Range
1.2	TR 11	I	Glass	Bottle	Fragment	1	Mold Blown	Patent	Amythest					Extract/ Medicine	Ca. 1880-1915
2.7	TR 11	Fill B	Glass	Bottle	Fragment	2	Automatic Bottle Machine	Milk	Clear	Cylinder	D. 7.4	"SANITARY MILK" Partial	"IPG" Illinois Pacific Glass Co, SF	Milk	1902-1925
2.8	TR 11	Fill B	Glass	Bottle	Fragment	1	Mold Blown		Amber	Cylinder	D. 6.1				1880-1920
2.9	TR 11	Fill B	Glass	Bottle	Fragment	1	Mold Blown		Amber	Cylinder	D. 6.5		"AB Co." American Bottle Co. Chicago, Illinois	Alcoholic Beverage	1905-1916
2.10	TR 11	Fill B	Glass	Bottle	Fragment	1	Mold Blown		Amber	Cylinder	D. 7.8			Alcoholic Beverage	1880-1920
2.11	TR 11	Fill B	Glass	Bottle	Fragment	1	Mold Blown	Brandy	Amber					Alcoholic Beverage	1880-1920
2.13	TR 11	Fill B	Glass	Window	Fragments	1			Clear						
2.18	TR 11	Fill B	Glass	Bottle	Whole	1	Automatic Bottle Machine	Milk	Clear	Cylinder	H. 18 D. 7.5	PROPERTY OF ALOHA DAIRY WASH & RETURN BOTTLES DAILY	"I.P.G." Illinois Pacific Glass Co, SF	Milk	1902-1925
2.19	TR 11	Fill B	Glass	Bottle	Whole	1	Automatic Bottle Machine	Collar	Agua	Cylinder	H. 30.50-8.			Wine/Beer	1920-20th C.
2.20	TR 11	Fill B	Glass	Bottle	Whole	1	Mold Blown	Bead	Clear	Cylinder	H.9.D.4.6.	大 (Base)		Medicine?	1915-1920
2.21	TR 11	Fill B	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Bead	Clear	Cylinder	H.9.2 D.5.1			Polish	1915-1930
2.22	TR 11	Fill B	Glass	Bottle	Fragment	1	Mold Blown	Thread	Clear					Condiment	1900-1920
2.24	TR 11	Fill B	Glass	Bottle	Whole	1	Automatic Bottle Machine	Crown Cap	Amber	Cylinder	H.23 D. 6.8		"E"	Beer	1920-1930
2.25	TR 11	Fill B	Glass	Bottle	Whole	1	Mold Blown	Packer	Olive Green	Cylinder	H.23.7 D. 6.7			Wine	1880-1910
2.26	TR 11	Fill B	Glass	Bottle	Whole	1	Mold Blown		Amber	Cylinder	D.6.5		"R & Co." Roth & Co. SF	Alcoholic Beverage	1880-1900
3.1	TR 11	II	Glass	Bottle	Whole	1	Automatic Bottle Machine	Crown Cap	Amber	Cylinder	H.24.5 D. 6.5			Beer	1915-1930
3.2	TR 11	II	Glass	Bottle	Fragment	1	Mold Blown		Olive Green	Cylinder	D. 8			Wine	1880-1910
3.3	TR 11	II	Glass	Bottle	Fragment	1	Mold Blown		Amber	Cylinder	D. 6.6			Alcoholic Beverage	1880-1920
3.4	TR 11	II	Glass	Bottle	Whole	1	Mold Blown	Bead	Aqua	Cylinder	H.9.5 D.5.1	"WHITTEMORE'S POLISH"		Shoe Polish	Ca. 1920
3.5	TR 11	II	Glass	Bottle	Fragment	1			Amber	Cylinder					1900-1920
3.6	TR 11	II	Glass	Bottle	Partial	1	Mold Blown	Patent	Agua	Rectangle				Extract/ Medicine	1920-1940
3.9	TR 11	II	Glass	Bottle	Fragment	2	Automatic Bottle Machine		Olive	Cylinder	D. 7.9	"MARUKIN"		Soya sauce	1880-1920

Table B1. Glass Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Method of Manufacture	Finish	Color	Shape	Measurements (cm)	Embossing	Maker's Mark	Contents	Date/Date Range
3.10	TR 11	II	Glass	Bottle	Fragment	1	Mold Blown	Packer	Amber	Cylinder				Alcoholic Beverage	1880-1900
3.11	TR 11	II	Glass	Bottle	Fragment	1	Mold Blown		Aqua	Cylinder	D. 7.5		"R & Co." Roth & Co. SF	Alcoholic Beverage	1880-1910
3.12	TR 11	II	Glass	Bottle	Fragment	2	Mold Blown	Champagne	Olive	Cylinder				Wine	1880-1900
3.13	TR 11	II	Glass	Bottle	Fragment	1	Mold Blown		Amber	Cylinder			"FHGW" Frederick Hampson Glassworks/ England	Alcoholic Beverage	1915-1930
3.15	TR 11	II	Glass	Bottle	Fragment	1			Amber	Cylinder					1880-1910
3.16	TR 11	II	Glass	Bottle	Fragment	1	Mold Blown	Packer	Olive						1880-1920
3.17	TR 11	II	Glass	Bottle	Fragment	2	Free Blown		Olive	globe				Alcoholic Beverage	1850-1900
4.1	TR 11	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown	Grooved Ring	Olive Green	Cylinder				Alcoholic Beverage	1880-1920
4.2	TR 11	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown	Brandy	Olive Green					Alcoholic Beverage	1880-1920
4.3	TR 11	Back dirt pil	Glass	Bottle	Fragment	1			Clear	Cylinder	D. 9.9				1915-1930
5.2	TR 8	Fill A	Glass/Metal	Bottle	Partial	1	Automatic Bottle Machine	Thread	Clear	globe	H 4.9 D.2			Salt?	1910-1930
6.1	TR 9	Fe37	Glass	Bottle	Partial	3	Mold Blown	Blob	Agua	octagon	D. 5.7	ARCTIC SODAWORKS, HONOLULU		Soda	1902-1903
7.1	TR 10	I	Glass	Bottle	Fragment	1	Mold Blown	Collar	Amber	Cylinder				Beer	1880-1910
10.1	TR 6	I	Glass	Bottle	Fragment	1	Mold Blown	Packer	Green					Alcoholic Beverage	1880-1920
10.2	TR 6	I	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Interrupted Thread	Clear					Condiment	1920-20th C.
10.3	TR 6	I	Glass	Bottle	Fragment	1	Automatic Bottle Machine		Clear	Cylinder				Soda	1934-20th C.
10.4	TR 6	I	Milk Glass	Jar	Whole	1	Automatic Bottle Machine	Thread	Milk Glass	Cylinder	H.5. D. 5.9			Cosmetic	1910-1940
10.5	TR 6	I	Milk Glass	Jar	Partial	1	Automatic Bottle Machine	Thread	Milk Glass	Cylinder				Cosmetic	1910-1940
21.1	TR 14	Fe46	Glass	Bottle	Whole	1	Mold Blown	Prescription	Clear	Rectangle	H.12.3 B 4.7			Medicine	1900-1920
21.2	TR 14	Fe46	Glass	Bottle	Whole	1	Mold Blown	Bead	Clear	Cylinder	H. 5.4 D.4.5			Ink	1900-1920
21.3	TR 14	Fe46	Glass	Bottle	Fragment	1	Mold Blown	Crown Cap	Amber	Cylinder				Beer	1900-1920
21.7	TR 14	Fe46	Glass	Lamp Globe	Fragment	7	Mold Blown		Milk Glass	Globe				Lamp	1900-1920
21.12	TR 14	Fe46	Glass	Fruit Bowl	Fragment	3			Clear						1915-1930
22.1	TR 14	Fe46	Glass	Bottle	Whole	1	Automatic Bottle Machine	Thread	Clear	Square	H.12.6 B. 4.2		"I.P.G. Co" Illinois Pacific Glass Co, San Francisco	Medicine	1902-1925

Table B1. Glass Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Method of Manufacture	Finish	Color	Shape	Measurements (cm)	Embossing	Maker's Mark	Contents	Date/Date Range
22.2	TR 14	Fe46	Glass	Bottle	Whole	1	Mold Blown	Thread	Aqua	Rectangle	H - 17.5, B -5.6			Condiments	Ca. 1900-1920
22.3	TR 14	Fe46	Glass	Bottle	Fragment	1			Clear	Cylinder	D - 6.1				
22.4	TR 14	Fe46	Glass	Insulator	Partial	2			Green	Mushroom	H - 9.5, D - 8.0				
22.5	TR 14	Fe46	Glass	Bottle	Fragment	1	Mold Blown		Clear	Square					Ca. 1900-1920
23.1	TR 14	Fe46	Glass	Bottle	Fragment	3	Mold Blown	Double Ring	Aqua	Oval	H - 19.0, B - 8.0	"AYER"		Medicine	Ca. 1890-1910
23.5	TR 14	Fe46	Glass	Bottle	Fragment	1			Clear						
23.11	TR 14	Fe46	Glass	Window	Fragment	119			Clear						
24.3	TR 14	Fe47	Glass	Bottle	Fragment	1			Clear	Cylinder	D - 4.5	"CARTER'S"		Ink	
24.4	TR 14	Fe47	Glass	Bottle	Fragment	1			Clear	Square	B - 3.7				
24.5	TR 14	Fe47	Glass	Bottle	Fragment	1			Clear	Square	B - 4.0				
25.2	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown	Blob	Aqua	Cylinder	D - 6.2	"STAR SODA WATER WORKS HONOLULU"		Soda	Ca. 1900
25.3	TR 14	Fe47	Glass	Bottle	Whole	1	Mold Blown	Extract	Aqua	Oval	H - 13.2, D -6.1	"POND'S EXTRACT 1846"		Medicine	Ca. 1882
25.4	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown		Aqua	Rectangle	B - 8.0	"DR. KENNEDY'S MEDICAL DISCOVERY ROXBURY MASS."		Medicine	Ca. 1885
25.5	TR 14	Fe47	Glass	Bottle	Whole	1	Mold Blown	Packer	Aqua	Cylinder	H - 16.5, D - 4.5			Condiment	Ca. 1880-1920
25.6	TR 14	Fe47	Glass	Bottle	Whole	1	Mold Blown	Prescript	Clear	Oval	H - 10.7, D - 4.5			Medicine	Ca. 1880-1910
25.7	TR 14	Fe47	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Crown Cap	Aqua	Cylinder				Alcoholic Beverage	Ca. 1910-1920
25.8	TR 14	Fe47	Glass	Bottle	Whole	1	Automatic Bottle Machine	Thread	Clear	Cylinder	H - 8.0, D -4.0				Ca. 1920-1930
26.1	TR 14	Fe47	Glass	Bottle	Fragment	1	Automatic Bottle Machine		Amber	Cylinder	D - 10.3				
28.1	TR 14	Fe47	Glass	Bottle	Whole	1	Mold Blown	Wide Pat.	Aqua	Cylinder	H -20, D - 7.4			Olives, Fruit, Pickles	Ca. 1890-1910
28.2	TR 14	Fe47	Glass	Bottle	Partial	1	Mold Blown	Blob	Aqua	Cylinder	D - 6.0	PROPERTY OF HAWAIIAN SODA WORKS HONOLULU T.H. THIS BOTTLE NOT SOLD		Soda	Ca. 1910
28.3	TR 14	Fe47	Glass	Bottle	Whole	1	Automatic Bottle Machine	Bead	Clear	Cylinder	H - 9.5, D - 5.0			Shoe Polish	Ca. 1910-1920
28.4	TR 14	Fe47	Glass	Bottle	Whole	1	Automatic Bottle Machine	Thread	Clear	Square	H - 12.1, B - 4.4		Fairmount Glass Co. , Fairmount Ind.		1930-1945

Table B1. Glass Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Method of Manufacture	Finish	Color	Shape	Measurements (cm)	Embossing	Maker's Mark	Contents	Date/Date Range
28.5	TR 14	Fe47	Glass	Bottle	Whole	1	Automatic Bottle Machine	Bead	Aqua	Cylinder	H - 9.5, D - 6.2	"WHITTEMORE'S POLISH"		Shoe Polish	Ca.1910-1920
28.6	TR 14	Fe47	Glass	Bottle	Partial	1			Aqua	Cylinder	D - 4.0			Shoe Polish	Ca.1910-1920
28.7	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown	Brandy	Clear					Alcoholic Beverage	Ca.1900-1920
29.1	TR 15	Layer I	Glass	Bottle	Whole	1	Mold Blown	Crown Cap	Aqua	Cylinder	H - 23.5, D - 6.2	NET CONTENTS 11oz	Illinois Pacific Glass Co San Francisco		1902-1925
29.2	TR 15	Layer I	Glass	Bottle	Whole	1	Automatic Bottle Machine	Crown Cap	Olive Green	Cylinder	H - 23.0, D - 6.5	B.C. BREWERIES LTD, VANCOVER B.C.		Beer	1915-1930
29.3	TR 15	Layer I	Glass	Bottle	Whole	1	Mold Blown	Reinforced Extract	Clear	Oval	H - 9.7, D - 3.5	1oz		Medicine	Ca. 1900-1915
29.4	TR 15	Layer I	Glass	Bottle	Partial	1	Automatic Bottle Machine		Aqua	Cylinder	D -5.5				1910-1930
29.5	TR 15	Layer I	Glass	Bottle	Partial	1	Automatic Bottle Machine		Clear	Rectangle	B - 6.0 X 3.1		Diamond Glass Co. Royersford Pa.		Ca. 1917-1920
29.6	TR 15	Layer I	Glass	Bottle	Partial	1	Automatic Bottle Machine	Lug Thread	Clear	Square	H - 11.2, B - 3.5		Owens Bottle Co Toledo, Ohio		1911-1929
29.7	TR 15	Layer I	Glass	Cup	Partial	1	Automatic Bottle Machine		Clear	Cylinder	H - 9.7, D - 6.0				
29.8	TR 15	Layer I	Glass	Bottle	Fragment	1	Automatic Bottle Machine		Clear	Square	B - 4.0		Illinois Pacific Glass Co San Francisco		1930-1932
29.9	TR 15	Layer I	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Patent	Clear					Medicine	Ca. 1915-1930
29.10	TR 15	Layer I	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Crown Cap	Amber	Cylinder				Beer	Ca. 1920-Present
29.12	TR 15	Layer I	Glass	Light Bulb	Fragment	1			Clear	Globe	D - 3.5				ca.1904-1908
31.1	TR 15	Layer I	Glass	Vial	Whole	1		Snap Top	Clear	Cylinder	H - 2.5, D - 6.0			Medicine	Ca. 1900
32.1	TR 21	Layer I	Glass	Bottle	Whole	1	Automatic Bottle Machine	Milk	Clear	Cylinder	H - 13.0, D - 6.2	HALF PINT PROPERTY OF RAWLEY'S ICE CREAM AND DAIRY PRODUCTS CO.LTD	Illinois Pacific Glass Co San Francisco	Cream	1902-1930
32.2	TR 21	Layer I	Glass	Bottle	Fragment	1	Mold Blown		Olive Green	Cylinder	D - 6.5			Alcoholic Beverage	
32.3	TR 21	Layer I	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Milk	Clear	Cylinder				Milk	1910- 1940

Table B1. Glass Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Method of Manufacture	Finish	Color	Shape	Measurements (cm)	Embossing	Maker's Mark	Contents	Date/Date Range
32.4	TR 21	Layer I	Glass	Bottle	Fragment	1	Automatic Bottle Machine		Clear	Cylinder					
33.1	TR 21	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown		Olive Green	Cylinder	D - 7.5			Alcoholic Beverage	Ca 1880-1920
33.2	TR 21	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown		Amber	Cylinder	D - 7.6		Illinois Glass Co., Alton Ill.	Alcoholic Beverage	1880-1900
33.3	TR 21	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown	Blob	Light Green						Ca 1880-1920
36.1	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown		Aqua	Cylinder	D 4.5		J		1880-1920
36.2	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown	Blob	Aqua					Alcohol Beverage	Ca. 1880-1920
36.3	TR 14	Fe47	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Thread	Clear					Condiment	Ca. 1920's
36.4	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown	Double Oil	Aqua	Rectangle				Medicines	Ca. 1880-1920
36.5	TR 14	Fe47	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Bead	Clear	Cylinder				Ink	1910-1930
36.6	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown		Aqua	Cylinder		HAWAIIAN SODA WORKS HONOLULU TH		Soda	1905-1908
36.7	TR 14	Fe47	Glass	Bottle	Fragment	1	Mold Blown		Dark Olive Green	Square				Gin	Ca. 1880- Ca. 1910
36.8	TR 14	Fe47	Glass	Cut Glass	Fragment	1			Clear						
37.1	TR 21	Back dirt pil	Glass	Bottle	Whole	1	Automatic Bottle Machine	Crown Cap	Aqua	Cylinder	H - 23.5, D - 2.0		Illinois Pacific Glass Co, S.F		1902-1925
37.2	TR 21	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown		Dark Olive Green	Cylinder	D -6.5		WOOD PORTOBELLO, Scotland	Alcohol Beverages	1866-1920
37.3	TR 21	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown		Aqua	Rectangle				Medicine	Ca. 1900-1920
39.1	TR 15	Back dirt pil	Glass	Bottle	Whole	1	Automatic Bottle Machine	Patent	Aqua	Rectangle	H - 13, B - 5.0	BURNETT'S STANDARD FLAVORING EXTRACTS BOSTON	Illinois Glass Co. Alton Ill.	Flavoring	1916-1929
39.3	TR 15	Back dirt pil	Glass	Bottle	Whole	1	Mold Blown	Thread	Clear	Oval	H - 6.5, D - 2.1			Medicine	Ca 1900-1920
39.22	TR 15	Back dirt pil	Glass	Bottle	Fragment	1			Amythest						Ca. 1880-1915
39.23	TR 15	Back dirt pil	Glass	Jar	Fragment	3	Automatic Bottle Machine	Ring	Clear	Cylinder					
39.24	TR 15	Back dirt pil	Glass		Fragment	1			Clear						Ca. 1915-1930
39.25	TR 15	Back dirt pil	Glass	Jar	Fragment	2	Automatic Bottle Machine	Thread	Clear	Cylinder				Food	Ca. 1910-1930
39.29	TR 15	Back dirt pil	Glass	Applicator	Fragment	1			Clear	Rod					
40.1	TR 15	Back dirt pil	Glass	Bottle	Whole	1	Mold Blown	Prescript	Clear	Square					Ca. 1900
40.2	TR 15	Back dirt pil	Glass	Bottle	Whole	1	Mold Blown	Ring	Clear	Cylinder	H - 6.0, D 2.2	ED PINAUD PARIS		Perfume	Ca. 1900-1910

Table B1. Glass Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Method of Manufacture	Finish	Color	Shape	Measurements (cm)	Embossing	Maker's Mark	Contents	Date/Date Range
40.3	TR 15	Back dirt pil	Glass	Cup/Glass	Fragment	1	Automatic Bottle Machine		Clear	Cylinder	D - 6.0				
40.4	TR 15	Back dirt pil	Glass	Jar	Fragment	2	Automatic Bottle Machine	Bead	Clear	Cylinder	D - 6.0				
40.5	TR 15	Back dirt pil	Glass	Cup/Glass	Fragment	1	Automatic Bottle Machine		Clear	Cylinder	H - 10, D - 6.1			Pickles	Ca. 1900-1920
40.6	TR 15	Back dirt pil	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Lug Thread	Clear						
40.7	TR 15	Back dirt pil	Glass	Bottle	Fragment	1	Automatic Bottle Machine		Clear	Square	B - 3.5		Owens Bottle Co		1911-1929
40.8	TR 15	Back dirt pil	Glass	Bottle	Fragment	1	Mold Blown		Dark Olive Green	Cylinder				Wine	Ca. 1880-1920
40.9	TR 15	Back dirt pil	Glass	Bottle	Fragment	1			Clear	Rectangle					
40.10	TR 15	Back dirt pil	Glass	Bottle	Fragment	1	Automatic Bottle Machine		Clear	Cylinder		PAT. FEB 10			
40.13	TR 15	Back dirt pil	Glass	Stem Ware	Fragment	1			Clear		B - 5.5				
40.14	TR 15	Back dirt pil	Glass	Bottle	Fragment	1	Automatic Bottle Machine	Milk	Clear	Cylinder				Milk	
40.15	TR 15	Back dirt pil	Glass	Bottle	Fragment	1			Clear				Owens Bottle Co		1911-1929
40.20	TR 15	Back dirt pil	Glass	Marble	Whole	1			Milky		D - 1.2				
40.22	TR 15	Back dirt pil	Glass	Applicator	Fragment	1			Clear		L - 5.0				
40.28	TR 15	Back dirt pil	Glass	Button	Whole	1			Black		D, 1.3				c. 1861-1900
41.4	TR 21	Back dirt pil	Glass	Insulator	Fragment	1			Light Green		L - 5.5				
43.5	TR 16	Layer I/3	Glass	Cut Glass	Fragment	1			Clear						
43.6	TR 16	Layer I/3	Glass	Window	Fragment	1			Clear						
47.7	TR 16	Layer I/1	Glass	Bottle	Fragment	1	Mold Blown	Blob							Ca. 1880-1920
47.8	TR 16	Layer I/1	Glass	Bottle	Fragment	1	Mold Blown	Prescript						Medicine	Ca. 1880-1920
47.9	TR 16	Layer I/1	Glass	Bottle	Fragment	1	Mold Blown	Straight							Ca. 1900-1920

Table B2. Ceramic Artifacts from Site T-1.

Artifact #	Trench	Layer/Feature	Material	Vessel Form	Condition	Count	Ware Type	Paste Color	Body Glaze	Decoration Color/Design	Origin	Maker's Mark	Date
1.1	TR 11	I	Ceramic	Tea Cup	Fragment	1	Porcelain	White	Clear/Blue Tint	hand painted, floral	China		
2.1	TR 11	Fill B	Ceramic	Doll Arm	Fragment	1	Porcelain	White					
2.2	TR 11	Fill B	Ceramic	Bowl	Fragment	3	Refined Earthenware (whiteware)	White	Clear	hand painted, red/green floral, banded	England		Ca. 1851-20th century
2.3	TR 11	Fill B	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear	decal over glaze, floral			Ca. 1880's-1950's
2.4	TR 11	Fill B	Ceramic	Insulator Tube	Partial	1	Porcelain	White			US		Ca. 1900-1920
2.5	TR 11	Fill B	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear		England	Royal Ironstone (Partial)	ca. 1850-1910
2.6	TR 11	Fill B	Ceramic	Bowl	Fragment	3	Refined Earthenware (whiteware)	White	Clear				Ca. 1840-1910
2.14	TR 11	Fill B	Ceramic	Door Knob	Whole	1	Porcelain	White					
2.15	TR 11	Fill B	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted, green/red floral, banded			Ca. 1851-20th century
2.16	TR 11	Fill B	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear	gilded band, scallop rim			ca. 1860-20th century
2.23	TR 11	Fill B	Ceramic	Marble	Whole	1	Refined Earthenware (whiteware)	Grey					
2.27	TR 11	Fill B	Ceramic	Bottle	Fragment	1	Stoneware	Tan	Clear				ca 1880's-1900's
3.22	TR 11	II	Ceramic	Cup	Fragment	1	Porcelain	White	Clear	hand painted stripe			
3.23	TR 11	II	Ceramic	Lid (chamber	Fragment	1	Refined Earthenware (whiteware)	White	Clear				Ca. 1840-1910
3.24	TR 11	II	Ceramic	Pitcher	Fragment	1	Refined Earthenware (whiteware)	White	Clear	molded relief, rim			ca 1840-20th century
4.4	TR 11	Back dirt pile	Ceramic	Bottle	Fragment	1	Stoneware	Buff	Tan, Salt Glaze				Ca. 1880-1900
5.1	TR 8	Fill A	Ceramic	Bowl	Fragment	1	Terracotta	Red/Brown					
6.2	TR 9	Fe37	Ceramic	Bowl	Fragment	2	Refined Earthenware (whiteware)	White	Clear		England	Royal Ironstone China Baker & Co. LTD England	ca.1893-1932
6.3	TR 9	Fe37	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear				
6.4	TR 9	Fe37	Ceramic	Plate	Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted sponge red/green floral			Ca. 1880-1905

Table B2. Ceramic Artifacts from Site T-1.

Artifact #	Trench	Layer/Feature	Material	Vessel Form	Condition	Count	Ware Type	Paste Color	Body Glaze	Decoration Color/Design	Origin	Maker's Mark	Date
6.5	TR 9	Fe37	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted sponge, green floral, banded			Ca. 1845-20th century
7.2	TR 10	I	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear				
8.1	TR 5	Fe40	Ceramic	Bowl	Fragment	2	Refined Earthenware (whiteware)	White	Clear		England	Royal Ironstone China Johnson Bros. England	Post 1891-1913
10.6	TR 6	I	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted, floral			ca 1870's-20th century
19.1	TR 19	I	Ceramic	Brick	Fragment	2	Terracotta	Red/Brown					
21.1	TR 14	Fe46	Ceramic	Chamber Pot	Fragment	3	Refined Earthenware (whiteware)	White	Clear				
21.4	TR 14	Fe46	Ceramic	Bowl	Fragment	2	Refined Earthenware (whiteware)	White	Clear	hand painted, blue floral			Ca. 1860-20th century
21.6	TR 14	Fe46	Ceramic	Plate	Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted , blue floral			Ca. 1860-20th century
21.7	TR 14	Fe46	Ceramic		Fragment	7							
21.8	TR 14	Fe46	Ceramic	Doll	Fragment	1	Porcelain	White	Pink				
21.9	TR 14	Fe46	Ceramic	Lid	Fragment	5	Refined Earthenware (whiteware)	Off-White	Clear	transfer printed, brown floral/ butterfly			Ca. 1820-20th century
21.11	TR 14	Fe46	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear				
22.6	TR 14	Fe46	Ceramic	Bowl	Fragment	2	Refined Earthenware (whiteware)	White	Clear		England	Royal Patent Ironstone George Jones & Sons England	1891-1907
22.7	TR 14	Fe46	Ceramic	Chamber Pot	Fragment	2	Refined Earthenware (whiteware)	White	Clear				Ca. 1840-20th century
22.8	TR 14	Fe46	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear	transfer printed, blue floral			Ca. 1800-1900
22.9	TR 14	Fe46	Ceramic	Bowl	Fragment	4	Refined Earthenware (whiteware)	White	Clear	transfer printed, blue floral			Ca. 1800-1900
23.7	TR 14	Fe46	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear		England	Ironstone China	ca 1840-1910
24.1	TR 14	Fe47	Ceramic	Tea Cup	Whole	1	Porcelain	White	Clear	hand painted, floral	China		Ca. 1860-1910

Table B2. Ceramic Artifacts from Site T-1.

Artifact #	Trench	Layer/Feature	Material	Vessel Form	Condition	Count	Ware Type	Paste Color	Body Glaze	Decoration Color/Design	Origin	Maker's Mark	Date
24.2	TR 14	Fe47	Ceramic	Cup	Fragment	4	Refined Earthenware (whiteware)	White	Clear	decal over glaze, floral molded relief			Ca. 1880-1950
25.1	TR 14	Fe47	Ceramic	Doll Arm	whole	1	Porcelain	White					
27.1	TR 14	Fe47	Ceramic	Bowl	Fragment	4	Refined Earthenware (whiteware)	White	Clear	hand painted, floral, blue			Ca. 1860-20th century
27.3	TR 14	Fe47	Ceramic	Plate	Fragment	3	Refined Earthenware (whiteware)	White	Clear				
27.4	TR 14	Fe47	Ceramic	Pitcher	Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted, floral molded relief			Ca. 1870-20th century
27.5	TR 14	Fe47	Ceramic	U.I	Fragment	1	Refined Earthenware (whiteware)	Off-White	Clear				
27.6	TR 14	Fe47	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear		England	Royal Arms Staffordshire	Ca. 1891-1900
27.7	TR 14	Fe47	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear	transfer printed, flow blue, floral			Ca. 1840-1910
27.8	TR 14	Fe47	Ceramic	Pitcher	Fragment	1	Refined Earthenware (whiteware)	White	Clear	decal over glaze, floral			Ca. 1880-1950
28.8	TR 14	Fe47	Ceramic	Saucer	Fragment	1	Refined Earthenware (whiteware)	Off-White	Clear/Blue tint	transfer printed, flow blue			Ca. 1840-1910
28.9	TR 14	Fe47	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted sponge, green, blue, red floral / rim band			Ca. 1880-1905
28.10	TR 14	Fe47	Ceramic		Fragment	1	Refined Earthenware (whiteware)	Off-White	Clear	transfer printed, black floral			Ca. 1820-20th century
28.11	TR 14	Fe47	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted annular band, pink			Ca. 1800-20th century
30.1	TR 15	Layer I	Ceramic	Plate	Fragment	1	Refined Earthenware (whiteware)	White	Clear		England	Royal Patent Ironstone George Jones & Sons England	Ca. 1891-1907
30.2	TR 15	Layer I	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear		England	Partial Royal Arms	ca 19th century
30.3	TR 15	Layer I	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear	decal over glaze, floral			Ca. 1880-1950

Table B2. Ceramic Artifacts from Site T-1.

Artifact #	Trench	Layer/Feature	Material	Vessel Form	Condition	Count	Ware Type	Paste Color	Body Glaze	Decoration Color/Design	Origin	Maker's Mark	Date
30.4	TR 15	Layer I	Ceramic	Cup	Fragment	1	Refined Earthenware (whiteware)	White	Clear	gilded band			ca. 1860-20th century
30.5	TR 15	Layer I	Ceramic	Cup	Fragment	1	Refined Earthenware (whiteware)	White	Clear	molded relief			Ca. 1840-20th century
30.6	TR 15	Layer I	Ceramic	Plate	Fragment	3	Refined Earthenware (whiteware)	White	Clear	decal over glaze, floral			Ca. 1880-1950
32.5	TR 15	Layer I	Ceramic	Insulator	Partial	1	Porcelain	White					ca 1900-1950
33.4	TR 21	Back dirt pile	Ceramic		Fragment	2	Refined Earthenware (whiteware)	White	Clear	hand painted annular band, red			Ca. 1830-20th century
33.5	TR 21	Back dirt pile	Ceramic	Pipe	Fragment	1	Stoneware	Red/Brown	Brown				
37.5	TR 21	Back dirt pile	Ceramic	Bottle	Fragment	1	Stoneware	Grey	Brown				Ca. 1880-1900
37.6	TR 21	Back dirt pile	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear		England	Royal Arms	Ca. 1890-1910
37.7	TR 21	Back dirt pile	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear		England	"trademark" England	ca 1891-1910
37.8	TR 21	Back dirt pile	Ceramic	Plate	Fragment	4	Refined Earthenware (whiteware)	White	Clear	gilded band, rim interior			Ca. 1860-20th century
39.2	TR 15	Back dirt pile	Ceramic	Marble	Whole	3		Brown, Tan, Grey					
39.17	TR 15	Back dirt pile	Ceramic	Wine Cup	Fragment	1	Porcelain	White	Clear/ blue tint	hand painted, blue floral, four seasons	China		Ca. 1860-1910
39.19	TR 15	Back dirt pile	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear	hand painted, floral			ca. 1870's-20th century
39.20	TR 15	Back dirt pile	Ceramic	Cup	Fragment	1	Refined Earthenware (whiteware)	White	Clear	gilded band, base			ca. 1860's- 20th century
39.21	TR 15	Back dirt pile	Ceramic	Plate	Fragment	2	Refined Earthenware (whiteware)	White	Clear				
40.16	TR 15	Back dirt pile	Ceramic	Plate	Fragment	2	Refined Earthenware (whiteware)	White	Clear	decal over glaze, floral			Ca. 1880-1950
40.18	TR 15	Back dirt pile	Ceramic		Fragment	1	Stoneware	Buff	Tan	Incized Lettering "LONDON" Partial	England		ca. 1880-1910
40.23	TR 15	Back dirt pile	Ceramic	Marble		1	Earthenware	Reddish					
41.2	TR 21	Back dirt pile	Ceramic	Light Post	Fragment	1	Porcelain	White	Brown				
41.3	TR 21	Back dirt pile	Ceramic	Light Post	Fragment	1	Porcelain	White					
42.1	TR 16	Layer I/4	Ceramic	Marble	Whole	1	Stoneware	White					
43.4	TR 16	Layer I/3	Ceramic	Sewer	Fragment	1	Terracotta	Tan					

Table B2. Ceramic Artifacts from Site T-1.

Artifact #	Trench	Layer/Feature	Material	Vessel Form	Condition	Count	Ware Type	Paste Color	Body Glaze	Decoration Color/Design	Origin	Maker's Mark	Date
45.2	TR 17	Layer I/2	Ceramic	Plate	Fragment	1	Porcelain	White	Clear	gilded band, scallop rim			Ca. 1860-20th century
47.3	TR 16	Layer I/1	Ceramic	Flower Pot	Whole	1	Terracotta	Red/Brown					
47.4	TR 16	Layer I/1	Ceramic	Marble	Fragment	1	Refined Earthenware	Red/Brown					
47.5	TR 16	Layer I/1	Ceramic		Fragment	1	Refined Earthenware (whiteware)	White	Clear	transfer printed, blue floral			Ca. 1840-20th century
47.6	TR 16	Layer I/1	Ceramic	Cup	Fragment	1	Refined Earthenware (whiteware)	White	Clear	transfer printed, black floral			Ca. 1840-20th century
53.3	TR 17	Layer I/2	Ceramic		Fragment	1	Terracotta	Red/Brown					
53.4	TR 17	Layer I/2	Ceramic		Fragment	2	Refined Earthenware (whiteware)	White	Clear	gilded band/ edge			Ca. 1860-20th century
53.5	TR 17	Layer I/2	Ceramic		Fragment	1	Refined Earthenware (whiteware)	Buff	Clear				
58.1	TR 13	Layer I/2	Ceramic	Bowl	Fragment	1	Refined Earthenware (whiteware)	White	Clear		Enlgand	Royal Arms (partial)	ca 19th century

Table B3. Metal Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Date Range
3.19	TR 11	II	Metal	Pencil Ferrule	Whole	1	
3.20	TR 11	II	Metal	Bell	Whole	1	
3.21	TR 11	II	Metal	Silver plated headland Reflector	Whole	1	1908-1940
3.27	TR 11	II	Metal	Nails Wire	Whole	4	1890-Present
4.5	TR 11	Back dirt pile	Metal	Decorative Wrought Iron	Whole	1	
4.7	TR 11	Back dirt pile	Metal	Cork Screw	Fragment	1	
9.1	TR 6	I	Metal	Iron Hames		1	Ca. 1897
10.7	TR 6	I	Metal	Fork embossed "Niagara Silver Plate"	Whole	1	Introduced as Glendale Pattern c. 1930
10.8	TR 6	I	Metal	Stainless Steel Cake Server Stamped "Stainless Steel Made in USA"	Fragment	1	patented 1912
10.9	TR 6	I	Metal	Handle	Whole	1	
17.1	TR 6	Fe41	Metal	Nails Wire	Whole	6	ca 1894-Present
20.1	TR 11	Back dirt pile	Metal	Bucket	Fragment	1	
21.13	TR 14	Fe46	Metal	U.I	Fragments	2	
22.1	TR 14	Fe46	Metal	Nail Cut	Fragment	1	Ca 1820-1910
23.1	TR 14	Fe46	Metal	Needle	Whole	1	
23.6	TR 14	Fe46	Metal	Nail Wire	Whole	3	Ca 1890-Present
23.8	TR 14	Fe46	Metal	Suspender Fastener	Fragment	3	
25.9	TR 14	Fe47	Metal	Chain	Fragment	1	
27.9	TR 14	Fe47	Metal	Wrought Iron Bar With Forged Eyelet	Fragment	1	
27.10	TR 14	Fe47	Metal	Copper Wire	Fragment	1	
27.11	TR 14	Fe47	Metal	Copper Wire	Fragment	1	
27.12	TR 14	Fe47	Metal	Iron Pipe	Fragment	1	
28.13	TR 14	Fe47	Metal	Nails Cut	Fragment	2	Ca 1820-1910
29.13	TR 15	Layer I	Metal	Light Bulb Screw Base	Whole	1	ca 1908-Present
29.14	TR 15	Layer I	Metal	Light Bulb Screw Base	Whole	1	ca 1908-Present
30.9	TR 15	Layer I	Metal	Wrought Iron Bar With Forged Welded Piece	Whole	1	
35.1	TR 14	Fe47	Metal	Ax	Fragment	1	
36.9	TR 14	Fe47	Metal	Silver Plate Tube	Fragment	1	

Table B3. Metal Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Date Range
37.9	TR 21	Back dirt pile	Metal	Battery Terminal For Zinc-Carbon Dry Cell	Fragment	1	
39.5	TR 15	Back dirt pile	Metal	1915 Penny	Whole	1	1915
39.7	TR 15	Back dirt pile	Metal	Bullet Case .45 centerfire	Whole	1	1897
39.8	TR 15	Back dirt pile	Metal	Tag	Whole	1	
39.9	TR 15	Back dirt pile	Metal	Button	Whole	1	
39.10	TR 15	Back dirt pile	Metal	2 piece Button	Whole	1	ca. 1830-present
39.11	TR 15	Back dirt pile	Metal	Button	Whole	1	
39.12	TR 15	Back dirt pile	Metal	Rivet	Whole	1	
39.13	TR 15	Back dirt pile	Metal	Suspender Loops	Whole	1	
39.14	TR 15	Back dirt pile	Metal	Washer	Whole	1	
39.15	TR 15	Back dirt pile	Metal	Pencil Ferrule	Whole	1	
39.18	TR 15	Back dirt pile	Metal	Light Bulb Screw Base	Whole	2	ca 1908-Present
39.26	TR 15	Back dirt pile	Metal	U.I	Fragment	3	
39.28	TR 15	Back dirt pile	Metal	Monkey Wrench	Fragment	1	c. 1897
40.12	TR 15	Back dirt pile	Metal	Pencil Ferrule	Fragment	3	
40.19	TR 15	Back dirt pile	Metal	Harmonica	Fragment	2	
40.24	TR 15	Back dirt pile	Metal	Safety Pin	Fragment	2	
40.25	TR 15	Back dirt pile	Metal	Clips	Whole	1	
40.26	TR 15	Back dirt pile	Metal	Clip	Whole	1	
40.27	TR 15	Back dirt pile	Metal	Light Bulb Screw Base	Whole	2	ca 1908-Present
40.28	TR 15	Back dirt pile	Glass	Button	Whole	1	ca 1900-1940
40.30	TR 15	Back dirt pile	Metal	Corset Hooks	Whole	1	
40.32	TR 15	Back dirt pile	Metal	Clasp Suspender	Fragment	2	
40.33	TR 15	Back dirt pile	Metal	Tag	Whole	1	
40.34	TR 15	Back dirt pile	Metal	U.S. Artillery Pin Probably Hat Insignia	Whole	1	1872-1895
40.35	TR 15	Back dirt pile	Metal	Emblem Shield Pin	Whole	1	
43.1	TR 16	Layer I/3	Metal	Horse Shoe	Whole	1	
43.2	TR 16	Layer I/3	Metal	Cut Nail	Whole	12	ca 1820-1910
43.3	TR 16	Layer I/3	Metal	Bullet Case .32 cal.	Whole	1	.32 s&w? (S+R 1897)
45.1	TR 17	Layer I/2	Metal	Plate	Partial	1	
45.3	TR 17	Layer I/2	Metal	Bronze Wheel	Fragment	1	

Table B3. Metal Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Condition	Count	Date Range
47.1	TR 16	Layer I/1	Metal	Nails Wire	Fragment	13	ca 1894-Present
47.2	TR 16	Layer I/1	Metal	Nails Cut	Fragment	17	ca 1820-1910
53.1	TR 17	Layer I/2	Metal	Nails Wire	Fragment	7	ca 1894-Present
53.2	TR 17	Layer I/2	Metal	Nails Cut	Fragment	17	ca 1820-1910
53.6	TR 17	Layer I/2	Metal	Bullet Case .22 BB cap or CB cap	Whole	2	ca. 1845-1942

Table B4. Miscellaneous Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Measurement (cm)	Condition	Count	Date Range
10.10A	TR6	I	Bone	Unidentified large mammal		Saw cut	1	
10.10A	TR6	I	Bone	Unidentified medium-large mammal		Saw cut	1	
5.3	TR8	Fill A	Bone	Unidentified large mammal		Saw cut	1	
6.7A	TR9	Fe37	Bone	Unidentified medium-large mammal		Saw cut	9	
63.10A	TR9	Fe37	Bone	Unidentified medium mammal		Saw cut	2	
7.3	TR10	I	Bone	Unidentified medium-large mammal		Saw cut	2	
7.3	TR10	I	Bone	Unidentified large mammal		Saw cut	3	
2.12A	TR11	Fill B	Bone	Unidentified large mammal		Saw cut	3	
3.29	TR 11	II	Bone	Unidentified large mammal poss. *Bos taurus*		Saw cut	5	
4.6	TR 11	Back dirt pile	Bone	Unidentified large mammal poss. *Bos taurus*		Saw cut	4	
21.14A	TR 14	Fe46	Bone	Unidentified large mammal		Saw cut	3	
21.14A	TR 14	Fe46	Bone	Unidentified medium-large mammal		Saw cut	11	
22.12A	TR 14	Fe46	Bone	Unidentified medium-large mammal		Saw cut	3	
23.9A	TR 14	Fe46	Bone	Unidentified medium-large mammal		Saw cut	6	
36.10	TR 14	Fe47	Bone	Unidentified medium-large mammal		Saw cut	2	
64.2	TR15	Back dirt pile	Bone	Unidentified medium-large mammal		Saw cut	3	
34.1	TR 15	Back dirt pile	Bone	Unidentified large mammal		Saw cut	14	
34.1	TR 15	Back dirt pile	Bone	Unidentified medium-large mammal		Saw cut	2	

Table B4. Miscellaneous Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Measurement (cm)	Condition	Count	Date Range
39.27A	TR 15	Back dirt pile	Bone	Unidentified large mammal		Saw cut	1	
39.27A	TR 15	Back dirt pile	Bone	Unidentified medium mammal		Saw cut	2	
40.11A	TR 15	Back dirt pile	Bone	Unidentified large mammal		Saw cut	5	
44.1	TR16	Layer I/3	Bone	Unidentified medium-large mammal		Saw cut	16	
55.1	TR16	Layer I/5	Bone	Unidentified large mammal		Saw cut	10	
55.1	TR16	Layer I/5	Bone	Unidentified medium-large mammal		Saw cut	10	
45.4	TR17	Layer I/2	Bone	Unidentified large mammal		Saw cut	3	
52.2	TR17	Layer I/2	Bone	Unidentified medium-large mammal		Saw cut	2	
53.7	TR17	Layer I/2	Bone	Unidentified medium mammal		Saw cut	1	
49.2	TR17	Layer I/3	Bone	Unidentified medium-large mammal		Saw cut	5	
32.6	TR 21	Layer I	Bone	Unidentified medium-large mammal		Saw cut	1	
32.6	TR 21	Layer I	Bone	Unidentified large mammal		Saw cut	2	
37.10	TR 21	Back dirt pile	Bone	Unidentified large mammal		Saw cut	1	
28.12	TR 14	Fe47	Bone	Button, 4 hole	D, 1.8	Whole	1	c. pre 1900
38.2	TR 15	Back dirt pile	Bone	Button	D, 1.7	Partial	1	pre 1900
40.17	TR 15	Back dirt pile	Bone	Toothbrush	L, 16.5	Fragments	2	c. 1900
23.2	TR 14	Fe46	Shell	Button, 1 hole	D, 1.9	Whole	1	ca 1900-Present
23.3	TR 14	Fe46	Shell	Button		Fragments	1	ca 1900-Present
38.1	TR 15	Back dirt pile	Shell	Button, 2 hole	D, 1.0	Whole	1	c. 1900-Present
40.21	TR 15	Back dirt pile	Shell	Button	D, 0.9	Whole	3	c. 1900-
40.29	TR 15	Back dirt pile	Shell	Button, Shank	D, 1.5	Whole	1	c. 1900
39.4	TR 15	Back dirt pile	Shell	Button, 2 hole	D, 0.8	Whole	3	c. 1900-present
51.10	TR 17	Layer I/2	Shell	Button, 4 hole	D, 0.5	Whole	1	c. 1900 - present

Table B4. Miscellaneous Artifacts from Site T-1.

Artifact #	Trench	Layer/ Feature	Material	Form	Measurement (cm)	Condition	Count	Date Range
23.4	TR 14	Fe46	Celluloid	Button, Shank	D, 1.3	Fragments	1	c. 1870-1950
29.11	TR 15	Layer I	Celluloid	Button, 1 hole	D, 2.3	Fragments	1	c. 1870-1950
30.7	TR 15	Layer I	Celluloid	Button, 1 hole cuff/collar	D, 2.3	Whole	1	c. 1870-1950
39.6	TR 15	Back dirt pile	Celluloid	Button, 1 hole	D, 1.5	Whole	2	c. 1870-1950
40.23	TR 15	Back dirt pile	Celluloid	Button, 1 hole cuff/collar	D, 2.3	Whole	3	c. 1870-1950
40.31	TR 15	Back dirt pile	Celluloid	Button, 1 hole	D, 1.0	Whole	1	c. 1870-1950
39.16	TR 15	Back dirt pile	Hard Rubber	Syringe Pipe/Fitting	L, 4.7	Whole	2	c. 1900
30.8	TR 15	Layer I	Zinc-carbon	Battery, zinc-carbon cell		Fragments	1	c. 1896-1959
37.4	TR 21	Back dirt pile	Zinc-carbon	Battery, zinc-carbon cell		Fragments	2	1896-1959
41.1	TR 21	Back dirt pile	Concrete	Lamp Post			1	