

## **Section 3 Zone 2 East Kalihi (Test Excavations T-021 through T-047)**

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### **3.1 Overall Location**

For reporting purposes for this AIS, the City Center Section 4 of the HHCTCP has been divided into 11 zones based on geographical and cultural boundaries. The East Kalihi Geographic Zone is located within the eastern portion of Kalihi Ahupua'a, Honolulu District, Island of O'ahu, in a physiographic division known as the Pearl Harbor Plain (Armstrong 1983:36). The East Kalihi Zone extends approximately 0.6 km along Kamehameha Highway and Dillingham Boulevard and extends from the western side of Laumaka Street on the west to Kalihi Street on the east (Figure 13).

As part of the City Center AIS, a total of 27 test excavations (T-021 through T-047) were excavated in the East Kalihi Zone along and adjacent to Kamehameha Highway and Dillingham Boulevard. Test excavation numbering proceeds from northwest to southeast. Test excavations documented within the East Kalihi Zone fall primarily under the jurisdiction of the City and County of Honolulu (T-021 through T-030, T-033, T-041, T-043, and T-045 through T-047), while those located in lots adjacent to Dillingham Boulevard are privately owned by Florante S. Sebastian, LLC (T-031, T-032, T-035, T-038, T-039, and T-042); Michael H. M. Kam Trust (T-034, T-036, T-037, and T-040); and Rosebud Holdings, Ltd. (T-044). T-031 through T-032, T-035, T-038, T-039, and T-042 are located within TMK [1] 1-2-09:001; T-034, T-036, T-037, and T-040 are located within TMK [1] 1-2-10:068; and T-044 is located within TMK [1] 1-2-03:018; The remaining test excavations are located within TMK Plats [1] 1-2-003 (T-043 and T-045 through T-047), [1] 1-2-009 (T-027 through T-030, T-033, T-041), and [1] 1-2-013 (T-021 through T-026), and are within the Dillingham Boulevard right-of-way.

### **3.2 Transit Infrastructure**

HHCTCP facilities for the current project within the East Kalihi Zone consist of the Kalihi Station, which will be constructed over Dillingham Boulevard just west of Mokauea Street, 18 single columns to support the fixed guideway system spaced along Kamehameha Highway and Dillingham Boulevard, and utility relocation corridors throughout. Test excavations focused on column locations (T-023 through T-030, T-033, T-041, T-043, and T-045 through T-047), utility relocation corridors (T-021 and T-022 for a 6-inch gas line and T-044 for a storm drain), and the footprint of the Kalihi Station (T-030 through T-040 and T-042).

### **3.3 Geography, Geology, and Land Forms**

The East Kalihi Zone is situated along the low-lying coastal flats immediately inland of Ke'ehi Lagoon, an embayment or estuary of the Kalihi Stream. Elevations in the zone range from approximately 3.50 to 7.25 m AMSL, and the average annual rainfall measures 760 to 810 mm (30 to 32 inches) (Giambelluca et al. 2011). The East Kalihi Zone consists of a portion of the emerged reef in southern O'ahu that formed during the 7.5-meter (Waimānalo) stand (Macdonald et al. 1983:420–421). In general, the East Kalihi Zone is located between 1.0 and 1.5 km inland from the modern shoreline. At the end of the nineteenth century, the shore

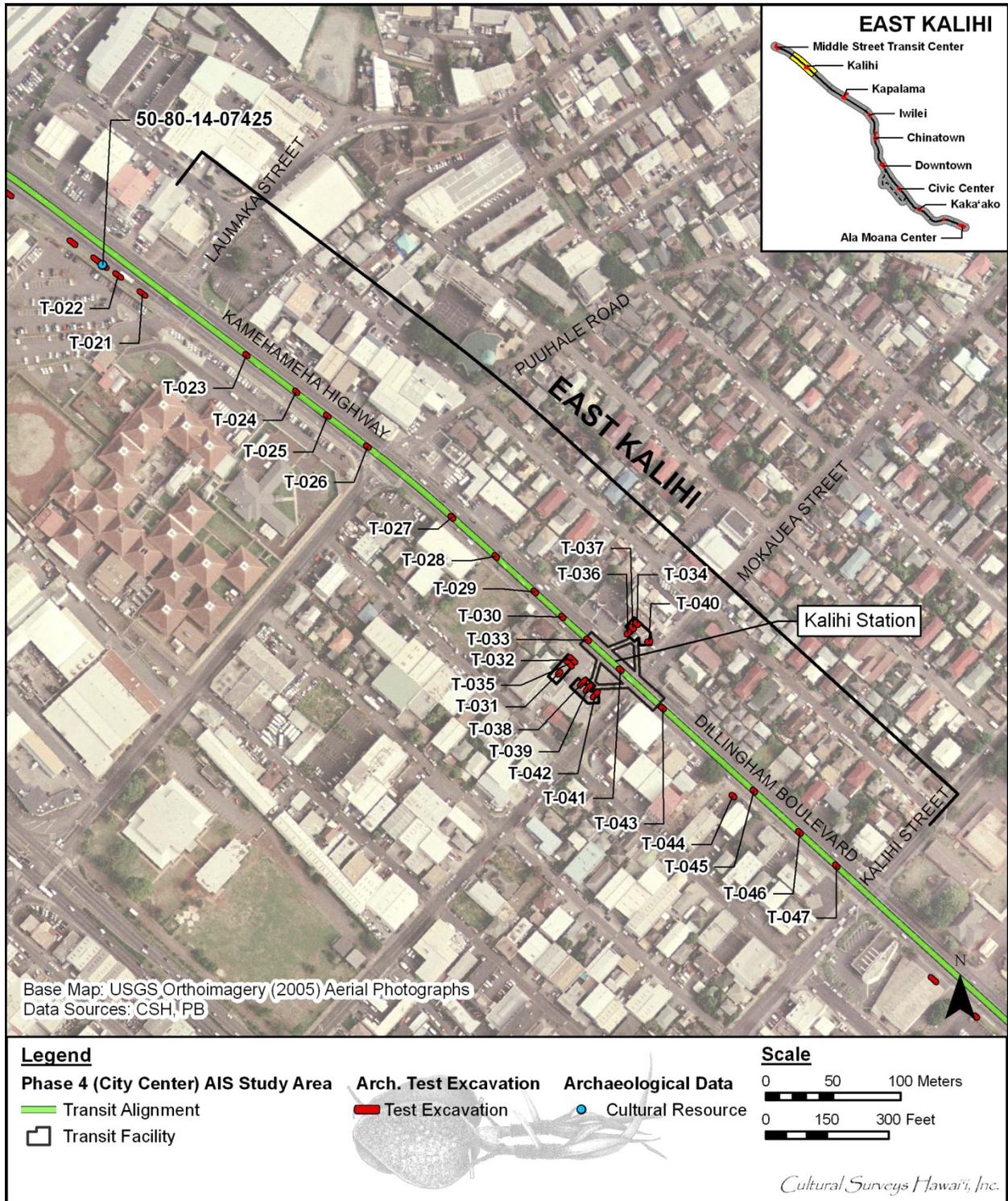


Figure 13. Aerial photograph (source: U.S. Geological Survey orthoimagery 2005) showing the location of the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

of Ke'ehi Lagoon was between 0.5 and 1.0 km away from the East Kalihi Zone. Vegetation in the study area and immediate vicinity is primarily the result of landscaping and includes but is not limited to: *kukui* (*Aleurites moluccana*), *noni* (*Morinda citrifolia*), coconut (*Cocos nucifera*), mango (*Mangifera*), banana (*Musa*), Cook pine (*Araucaria columnaris*), plumeria (*Plumeria obtusa*), monkeypod (*Albizia saman*), and bougainvillea.

According to the U.S. Department of Agriculture Soil Survey Geographic (SSURGO) Database (2001) and soil survey data gathered by Foote et al. (1972), soils within the East Kapālama Zone consist exclusively of Ewa silty clay loam (EmA) (Figure 14). Ewa silty clay loam soils are described as follows:

...well-drained soils in basins and on alluvial fans...[that] developed in alluvium derived from basic igneous rock.... These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of fingergrass, kiawe, koa haole, klu, and uhaloa. [Foote et al. 1972:29]

## 3.4 Traditional and Historic Land Use

### 3.4.1 Traditional Accounts of East Kalihi Zone

There are only a few traditional accounts originating from the coastal areas of Kalihi Ahupua'a. They primarily concern fishing, the sea, and a resident shark deity. Pukui (1983:186) relates that "the sea at Pu'uhale, Kalihi, O'ahu was said to murmur softly as it washed ashore. There were once many fishponds there." Today Pu'uhale Road traverses East Kalihi Geographic Zone and continues towards the coast to where the former fishponds Pahouiki and Auiki were once located (Figure 15).

One legend tells of the shark guardian Makali'i who was known to frequent the waters of Kalihi Kai and had his cave at Kahaka'aulana (Oppenheimer 1976:15). In *Place Names of Hawai'i*, Kahaka'aulana is listed as the old name for Sand Island (Pukui et al. 1974:62). The literal translation, "the floating swimmers pass by," may refer to the travelers who would make their way to or from Pu'uloa by swimming through the channel of Kalihi instead of walking. Alternatively, this may refer to the fishermen's containers that would float by as they fished for crabs and seaweed (Pukui et al. 1974:62). This sea crossing would have been well to the south of the HHCTCP alignment. Kahaka'aulana was also noted as a place in Kalihi Harbor that was used as a passage for travelers going from Kou (adjacent to Nu'uanu Stream and Honolulu Harbor) toward Pu'uloa (Pearl Harbor). This allowed them to avoid the long inland detour by way of Moanalua (Sterling and Summers 1978:322).

Place names can offer insight into former features in the landscape and potential land use. Place names that appear in the LCA documents of the East Kalihi Zone are provided in Table 4.

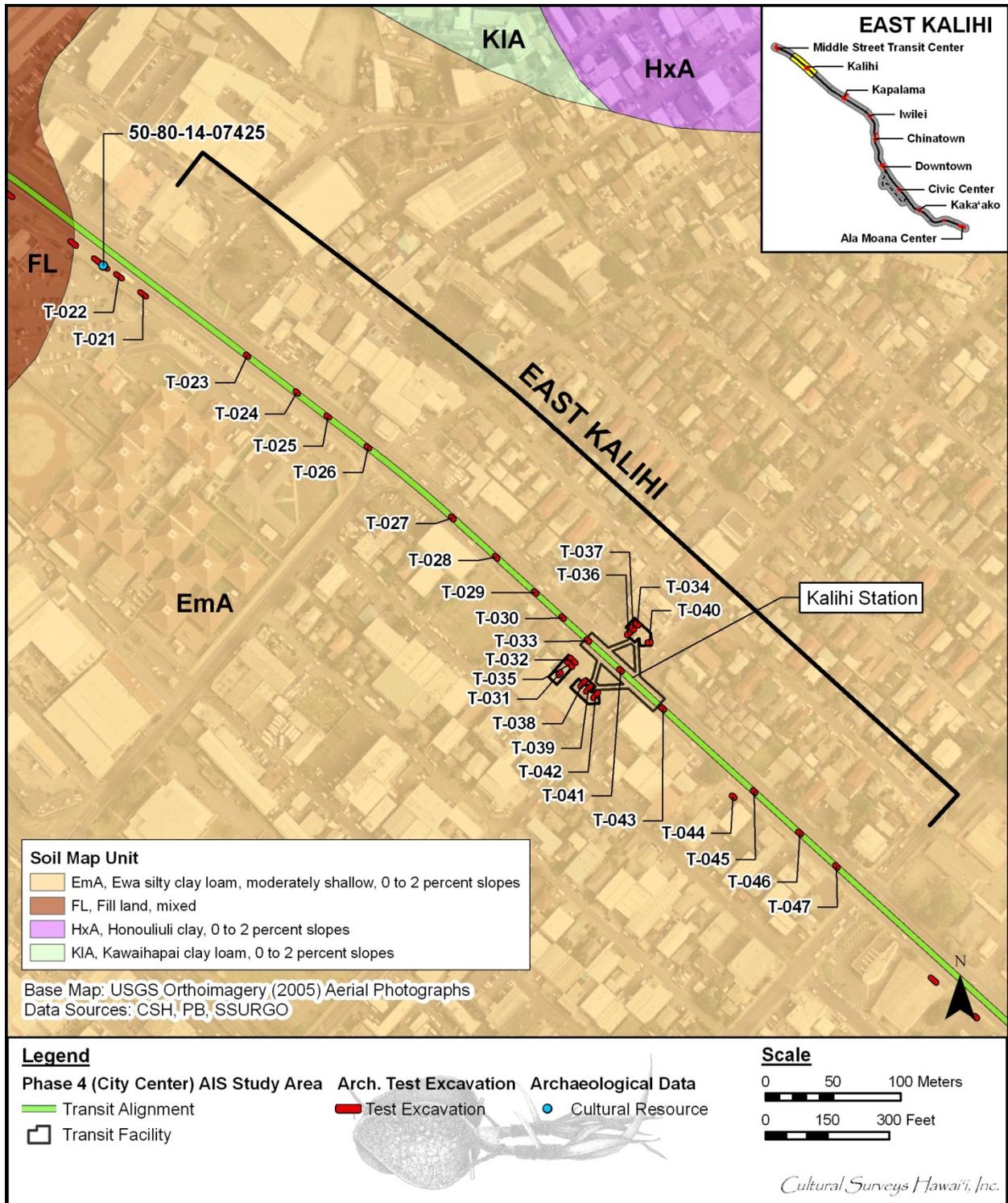


Figure 14. Aerial photograph (source: U.S. Geological Survey orthoimagery 2005) with overlay of the *Soil Survey of Hawai'i* (Foote et al. 1972) showing sediment types near the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

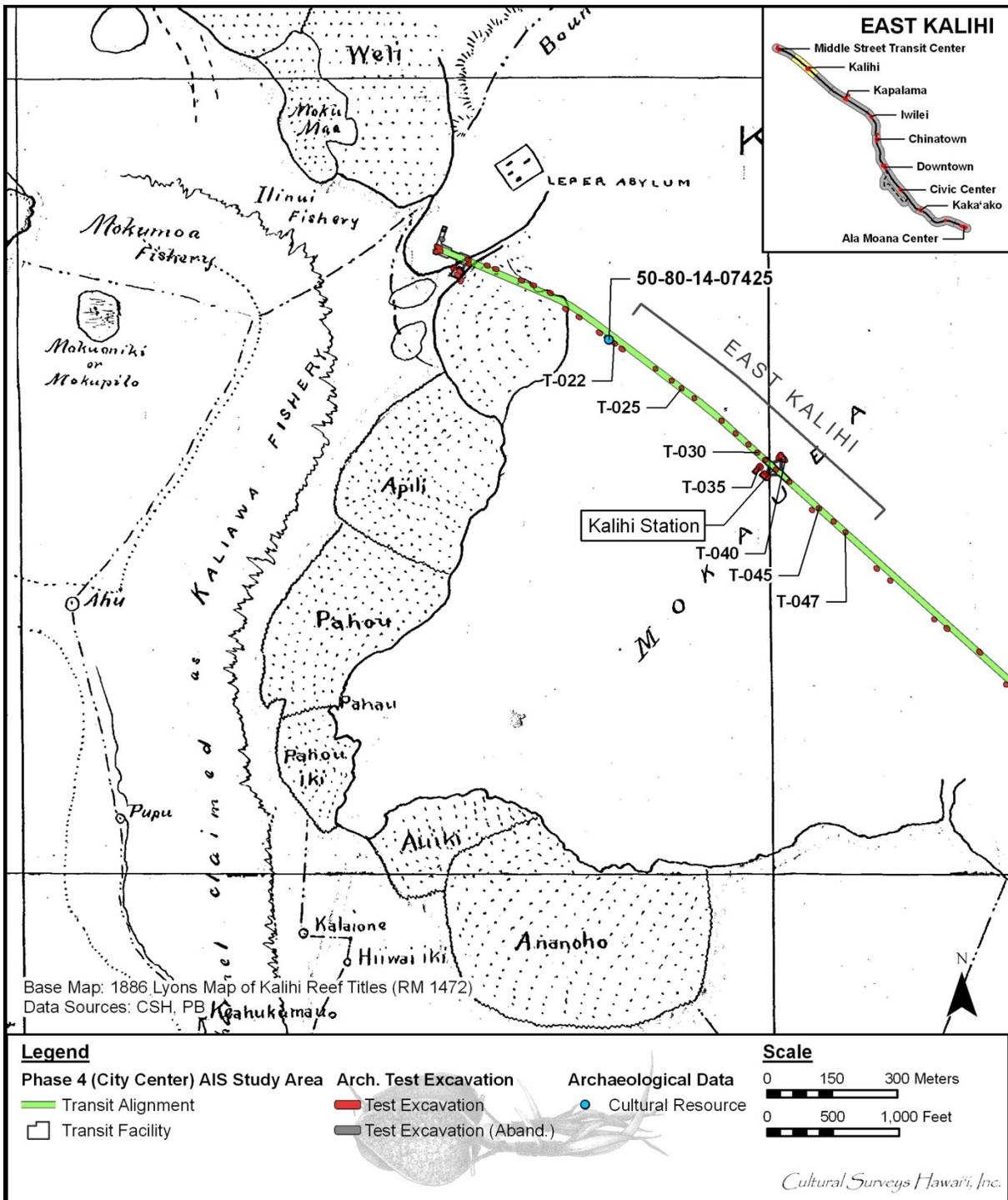


Figure 15. Portion of Registered Map 1472, Map of Reef Titles of Kalihi, compiled by C. J. Lyons (1886) showing the location of seven fishponds (Weli, Waikulu, Apili, Pahounui, Pahouiki, Auiki, and Ananoho) in relation to the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

Table 4. Place Names in LCA Documents from East Kalihi Zone

Name	Description
Kaluapuhi (Kaluapulu)	Name of a land parcel adjoining Pahouiki and Auiki fishponds (see Volume II). The name means “the eel pit.”
Kawaiholo	Name associated with Alexander Adams’ LCA No. 803 ‘ <i>āpana</i> 5 (elongated <i>mauka/makai</i> ) traversed by the HHCTCP corridor 300 m northwest of Middle Street Transit Center Station. The name means “the running water.”
Mokauea	Lands on the east edge of Alexander Adams’ LCA No. 803 ‘ <i>āpana</i> 5. Seemingly a large ‘ <i>ili</i> of land running <i>mauka/makai</i> , including the vicinity of Middle Street Transit Center Station (and also Mokauea Island).
Niau	Lands on edge of Alexander Adams’ LCA No. 803 ‘ <i>āpana</i> 5 (see Volume III Appendix B, LCA No. 803).
Pāhounui	Name of coastal fishpond, but the place name may have included land immediately <i>mauka</i> .
Umi	Name of Alexander Adams’ LCA No. 803 ‘ <i>āpana</i> 3 100 m northeast of the Middle Street Transit Center Station. It appears the Umi land area was bound on the west and north by a major curve of Kalihi Stream.

### 3.4.2 LCA Documentation

Records of the LCAs (see Volume III Appendix B for a more complete introduction to land documents) associated with the Kuleana Act of 1850 allow us to reconstruct something of the land use pattern in Kalihi at that time. Undoubtedly, residential patterns had changed from pre-Contact times as a result of massive depopulation owing to introduced diseases on the one hand and in-migration into greater Honolulu from out-lying areas on the other. The pattern of land holdings circa 1850 suggest the majority of Hawaiians in the *ahupua‘a* were living relatively close to Kalihi Stream, inland of present day Dillingham Boulevard and seaward of the confluence of Kalihi and Kamañaki Streams. Coastal habitation was somewhat less than might have been expected. This may have been because the coast was exposed to occasional storm surf, high winds, tsunami, and hurricanes or it may have reflected a cultural pattern in which relatively few people lived close to fishponds. It may simply have been an avoidance of the low-lying coastal mudflats that were close to the water table.

Most Kalihi LCAs (see Volume III Appendix B) consisted of four to seven *lo‘i* and *kula*, and a house lot. The gardens described are predominantly *lo‘i*, etched into the surface of the alluvial stream terraces and interconnected by elaborate systems of ‘*auwai* (ditch, canal). Moreover, seven fishponds were located along the Kalihi shore. In general, the pattern of land award distribution shown in the coastal Kalihi LCAs indicates that it is likely that the traditional Hawaiian practice of maintaining residences dispersed within and throughout their agricultural fields continued in Kalihi at least until the mid-nineteenth century.

Lands in the East Kalihi Zone (Table 5, Figure 16, and Figure 17) were awarded to members of royalty (*ali‘i*). Land use indicated in the East Kalihi LCA documentation consisted of *lo‘i*, *kula*, and *loko*.

LCA 6450 was awarded to Kaunuohua, a high ranking female *ali'i* of Hawai'i Island, and the guardian of Kamehameha IV. Although she had many lands prior to the Māhele, or the division of lands in 1848, most of these were lost. The three exceptions were Pu'ulena in Waikīkī, Mokauea in Kalihi, and Kalaupapa on Moloka'i (Kame'eiehiwa 1992:249).

Captain Alexander Adams was awarded a large parcel of land (LCA 803) in the East Kalihi Geographic Zone. Adams befriended Kamehameha I, who made him the captain of his personal fleet of ships. In 1816, he sailed the *Kaahumanu* to Kaua'i to expel the Russians from their forts on that island. In 1817, he sailed to Canton on the *Forrester* to sell a load of sandalwood for the king. During Kamehameha II's reign, he encouraged the king to allow the first American missionaries to stay in the islands and helped design the Hawaiian flag, placing the Union Jack in one corner. In 1823, he became the first official pilot for Honolulu Harbor, a job he held for 30 years (Day 1984:1).

Table 5. LCAs in the East Kalihi Zone (in numeric order)

LCA Number	Contents of Award
803	<i>Lo'i, kula, and loko</i> (292.41 acres) awarded to Alexander Adams in 1828/1829 by Kaahumanu.
6450	<i>'Ili of Mokauea</i> (737.76 acres) awarded to Kaunuohua; no description of land use in award.

### 3.4.3 Historic Land Use

Kalihi Ahupua'a consisted of a deep and, at times, narrow valley along with an adjacent, much shallower side valley (Kamanaiki). The abundant mountain rains were carried down to the coastal floodplain via the perennial Kalihi Stream and the intermittent Kamanaiki Stream, which joined the larger Kalihi Stream at the mouth of Kalihi Valley (see Volume II).

The rich alluvial coastal plains, watered by the mountain streams, provided favorable conditions for the cultivation of wetland taro as well as other crops. Early historic accounts of the East Kalihi Geographic Zone (see Volume II Section 3) describe a richly cultivated coastal plain of taro fields and gardens, with scattered habitations stretching from the lower plain up to the mouth of Kalihi Valley. The productivity of this coastal environ was supplemented by rich offshore fisheries and coastal fishponds.

In 1897, a rice plantation was located immediately *mauka* of T-028 through T-047 (see Volume II).

At the beginning of the twentieth century, the East Kalihi Zone witnessed a period of rapid development. By the early 1900s, the O'ahu Railway and Land Company (OR&L) installed a railroad that traversed Kalihi Kai (Figure 20 and Figure 18). The lands adjacent to the railroad consisted largely of light industry and warehousing (Dega and Davis 2005:8). The growing demand for residential land gradually resulted in the reclamation of aquaculture and agricultural lands in Kalihi Kai. The 1904 map by A. C. Alexander, the 1914 Sanborn Series maps,

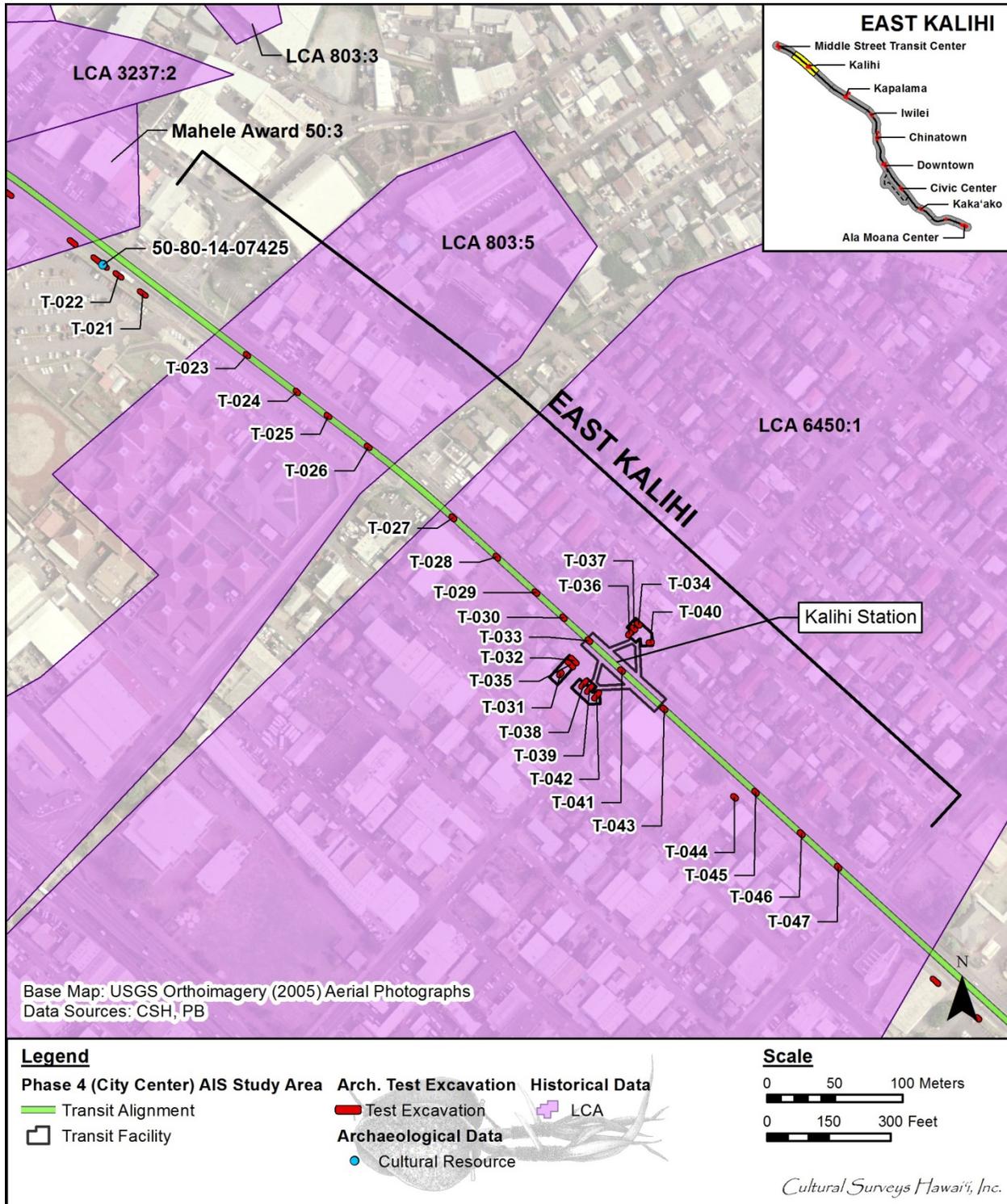


Figure 16. Aerial photograph (base map: U.S. Geological Survey orthoimagery 2005) showing the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station relative to LCAs in the area

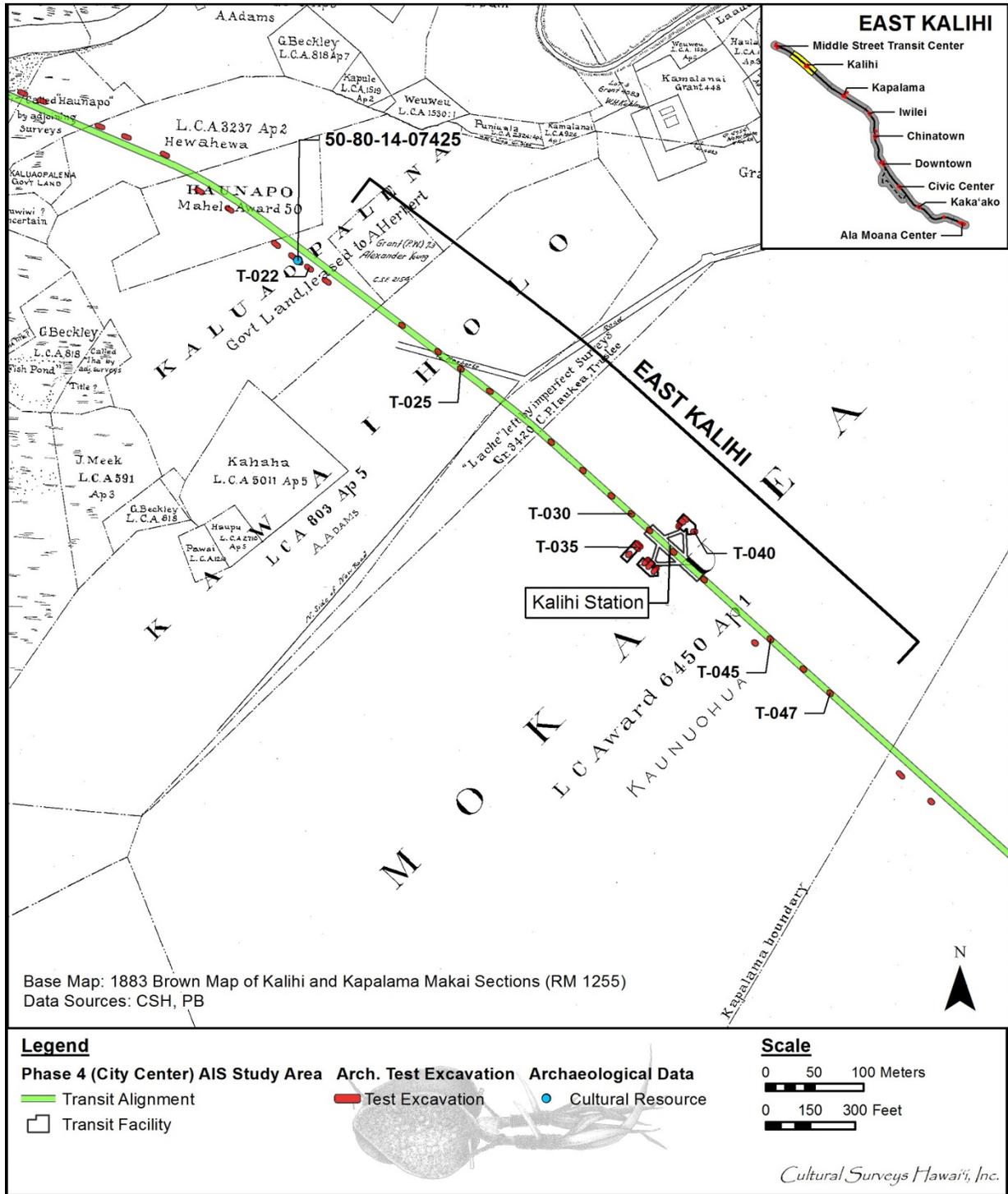


Figure 17. Portion of Registered Map 1255, Kalihi and Kapalama Makai Sections, compiled by J. F. Brown (1883), showing the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station relative to LCAs in the area

the 1919 U.S. Army War Department Fire Control map, the 1927 Sanborn Series maps, the 1933 U.S. Army War Department Fire Control map, and the 1950 Sanborn Series map depict an urbanized landscape in the East Kalihi Zone (see Figure 20 through Figure 23). The Oahu Jail is located 50 m *makai* of T-023 through T-025 within a tight network of buildings and streets (see Figure 20, labeled “Jail,” and Figure 22, marked by a large “X”). This jail was originally located in Iwilei and called the Oahu Prison, but it was relocated to Kalihi and renamed the Oahu Jail between 1916 and 1918. Today, this area is occupied by the Oahu Community Correctional Center (OCCC).

### 3.4.4 Settlement Pattern Summary

A review of the LCA documentation indicates that the coastal settlement pattern in the East Kalihi Zone included a mix of marine resource cultivation, occasional houses, and farm land. The flat of Kaluapuhi where Kalihi Kai meets the ocean was likely reserved for aquaculture. Fishponds were prominent in the coastal environs of Kalihi, particularly in East Kalihi.

Seven fishponds formerly dotted the Ke‘ehi Lagoon shoreline, south and west of the East Kalihi Zone (see Figure 15). These fishponds include, from northwest to southeast: Weli (SIHP #-0075), Waikulu, Apili (SIHP #-0074), Pahounui (SIHP #-0074), Pahouiki (SIHP #-0074), Auiki (SIHP #-0073), and Ananoho (SIHP #-0073). Modern development, including the dredging of Ke‘ehi Lagoon for the construction of the harbor and the nearby seaplane runway prior to World War II, have destroyed or filled in any remnants of these fishponds (Dega and Davis 2005:13; McAllister 1933:90–91). Previous surveys and studies in the area provide some general information about these fishponds.

Weli Fishpond was located more than 500 m northwest of the East Kalihi Zone. Sterling and Summers (1978:327) document it as measuring approximately 30 acres, bounded by earthen embankments. Waikulu fishpond is depicted in the 1886 Lyons map (see Figure 15) lying southwest of the East Kalihi Zone and north of Apili fishpond. It was located in *āpana* 11 of LCA 818 which belonged to Captain George Beckley. The pond covered an area of only one acre and was classified by Kikuchi (1973) as a *loko wai*, or a freshwater pond, that was artificially separated from an adjacent stream by an earthen or stone embankment (Dega and Davis 2005:13). Apili fishpond (lit. “caught, snared, or stuck”), located below Waikulu and 470 m southwest of the East Kalihi Zone, encompassed an area of 38 acres and was renowned for the *awa* (milkfish) it produced (see Figure 15) (Sterling and Summers 1978:322–323). Pahounui (26 acres) and Pahouiki (14 acres) were joined to one another and bounded by artificial coral walls (see Figure 15) (Sterling and Summers 1978:322). Auiki fishpond was relatively small, measuring approximately 12 acres in extent. The final fishpond, Ananoho, encompassed 52 acres and was enclosed by coral walls that averaged 6 ft in width and 3 ft in height (Sterling and Summers 1978:322). Given their proximity to the coastline (more than 500 m southwest of the East Kalihi Zone), these fishponds were likely brackish environments that supported *awa* and *‘ama ‘ama* (mullet) (Dega and Davis 2005:12).



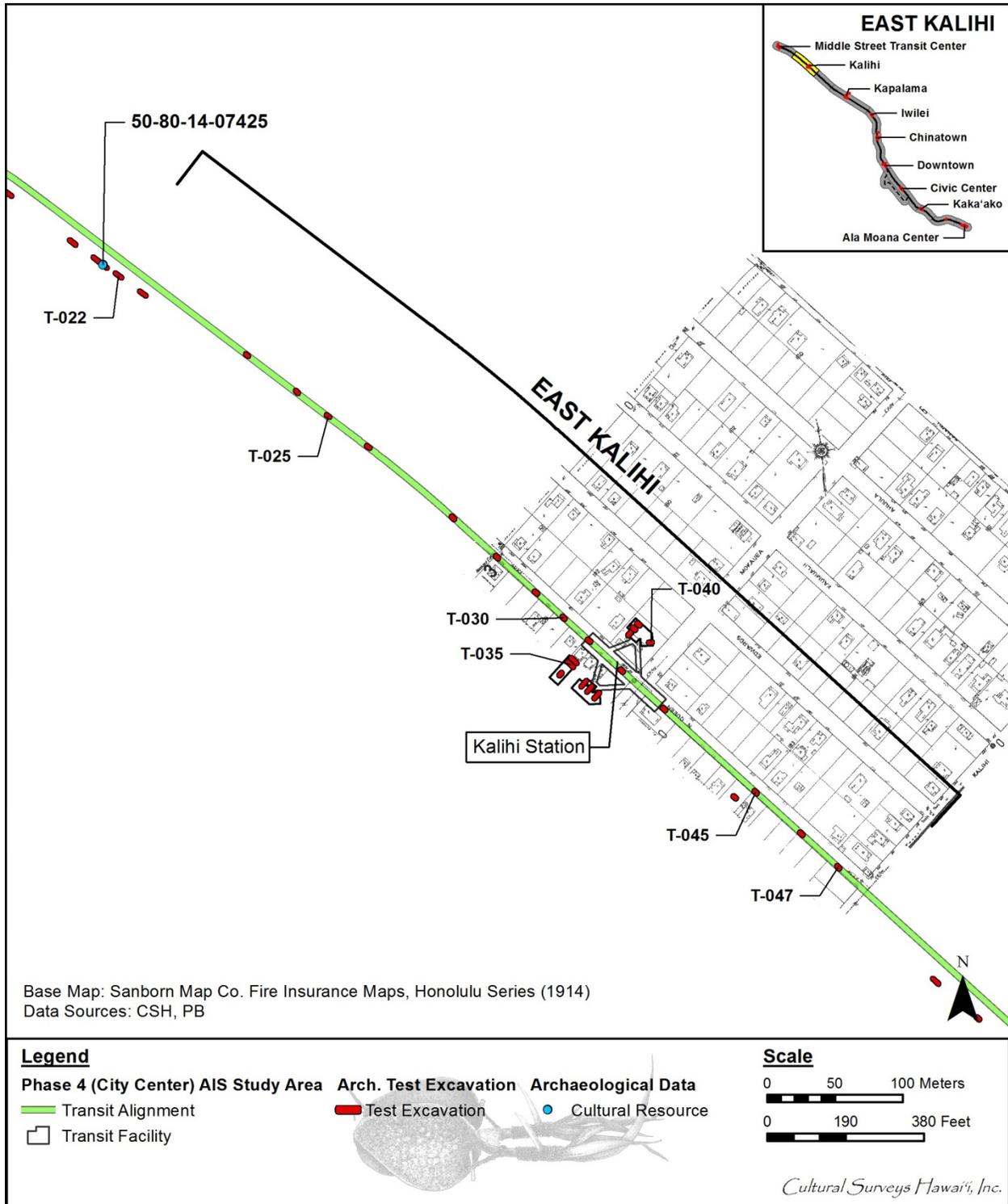


Figure 19. Portion of the Sanborn Map Co. Fire Insurance Maps, Honolulu Series (1914), showing the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

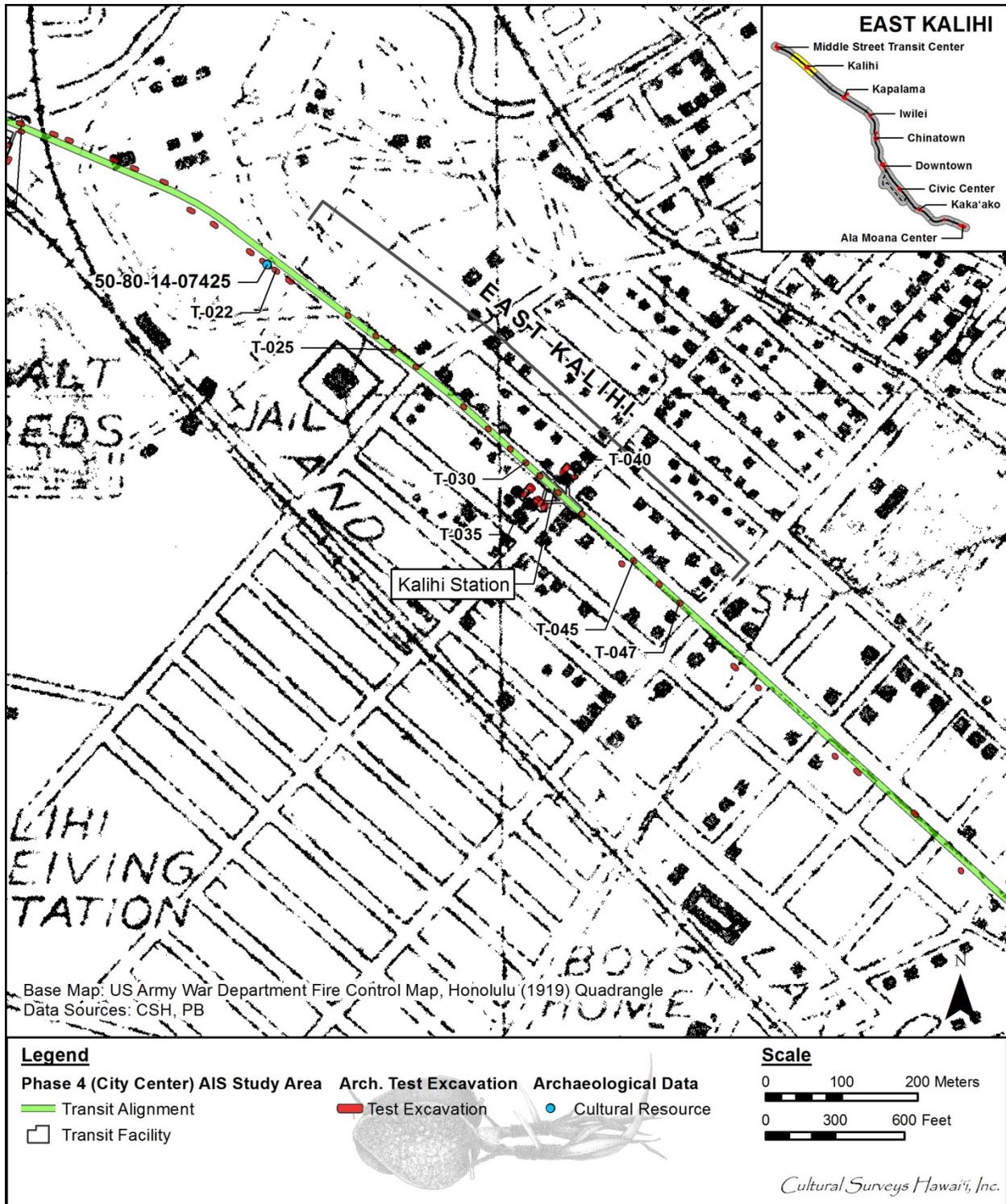


Figure 20. Portion of the 1919 U.S. Army War Department Fire Control Map, Honolulu Quadrangle, showing the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

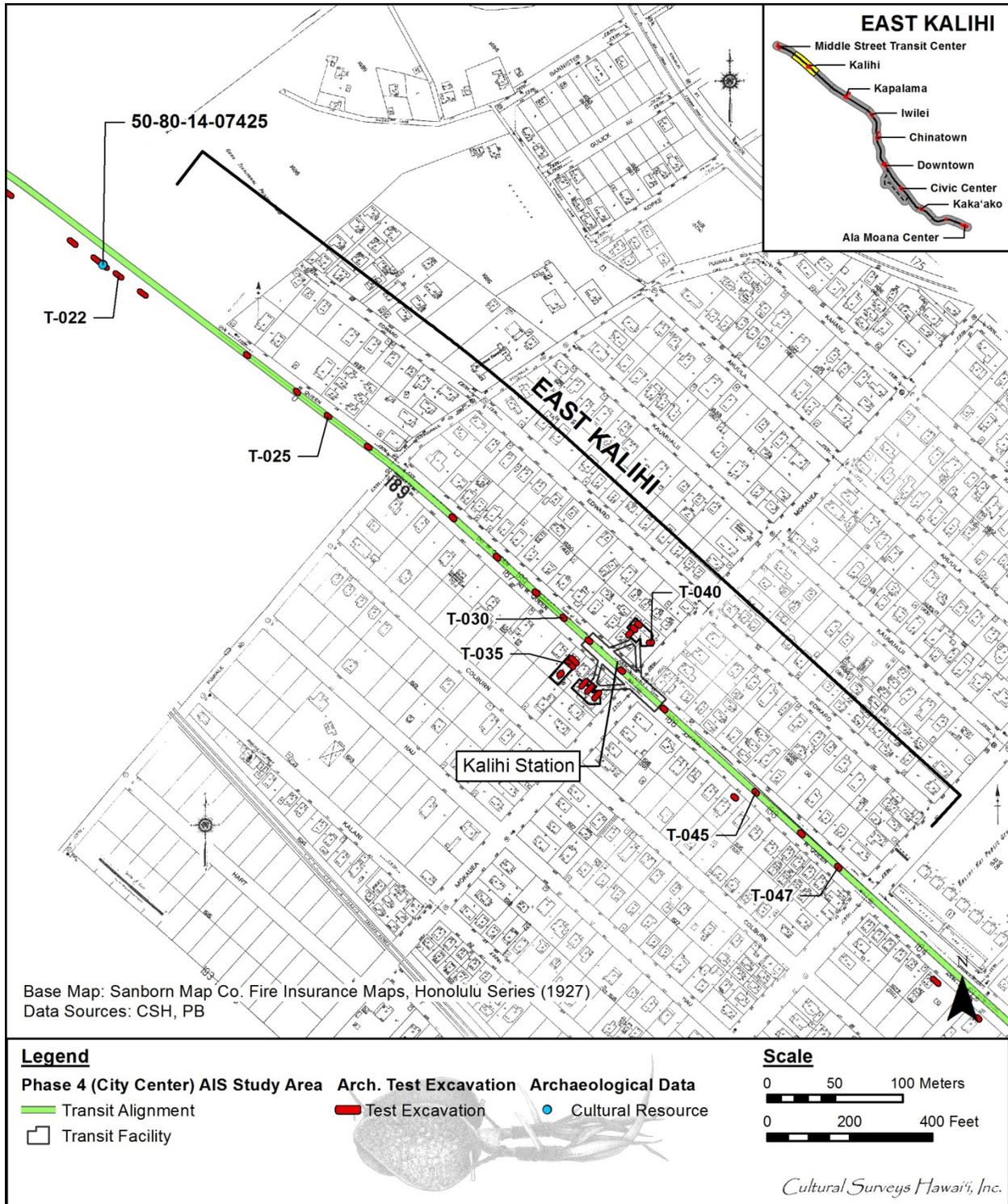


Figure 21. Portion of the Sanborn Map Co. Fire Insurance Maps, Honolulu Series (1927), showing the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

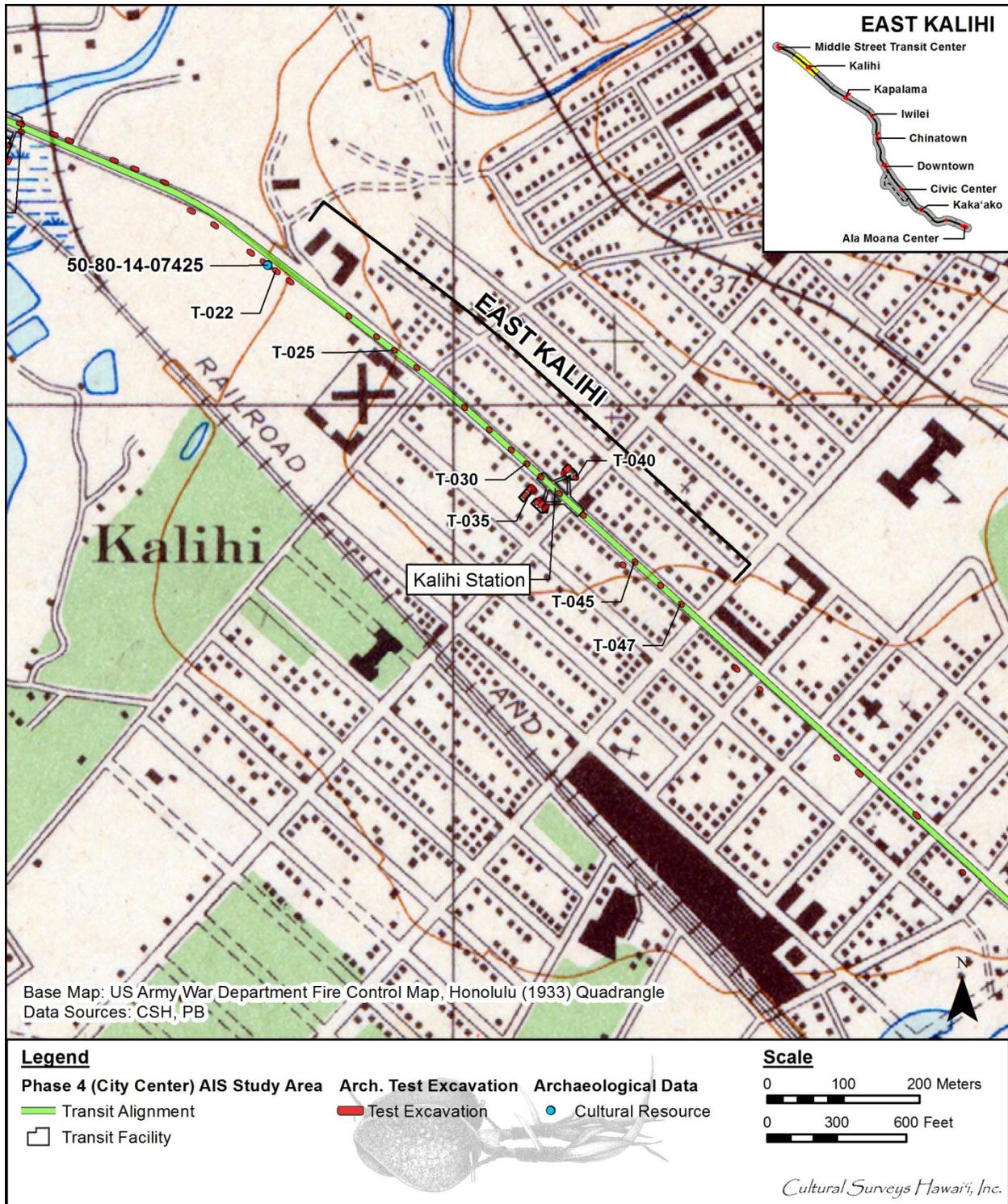


Figure 22. Portion of the 1933 U.S. Army War Department Map, Honolulu Quadrangle, showing the urban landscape of the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

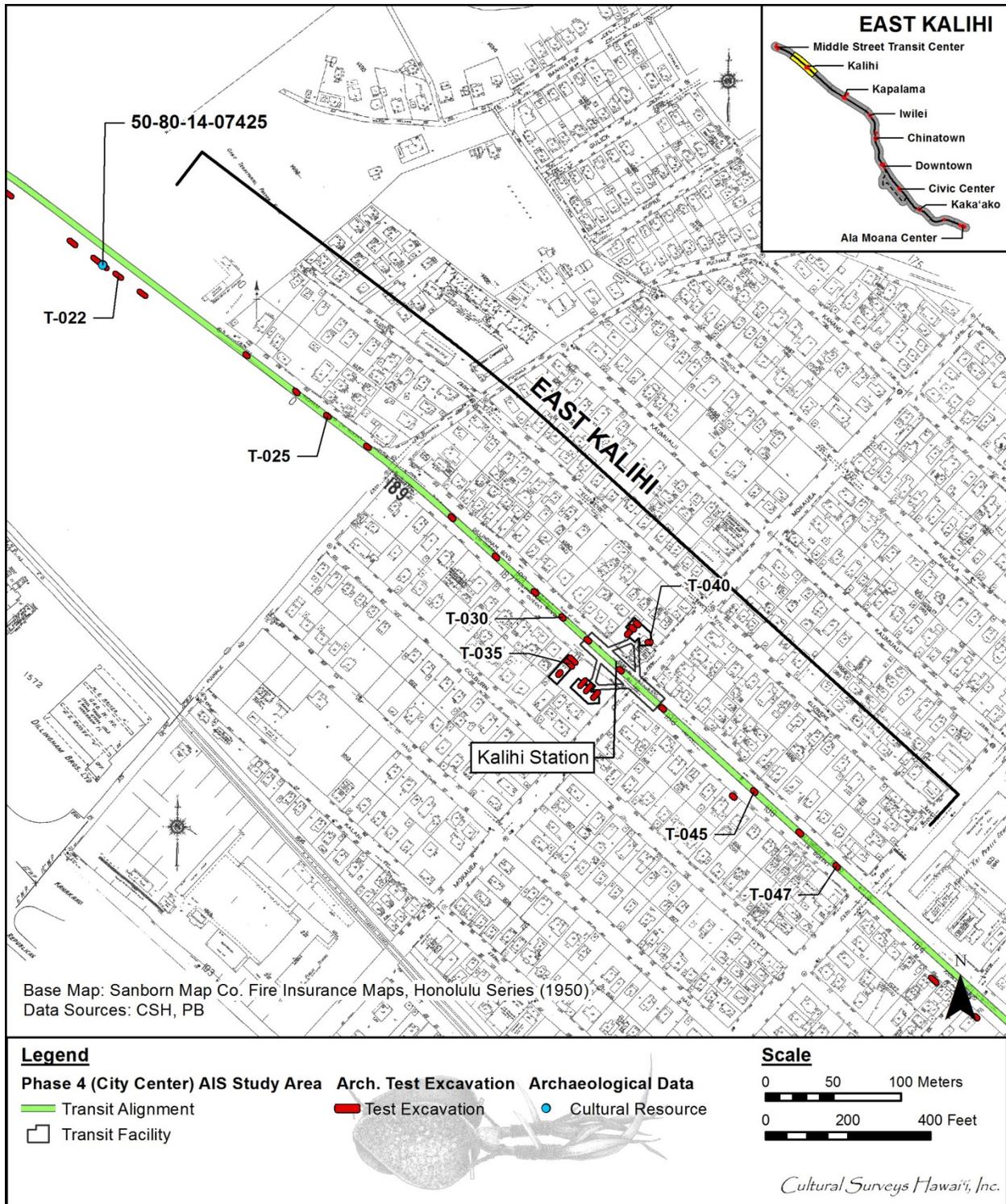


Figure 23. Portion of the Sanborn Map Co. Fire Insurance Maps, Honolulu Series (1950), showing the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station

A paleoenvironmental study of Auiki and Ananoho Fishponds (Athens and Ward 2002) concluded that they were probably constructed sometime between the sixteenth and seventeenth centuries. Toward the end of the nineteenth century, their use became more commercial. A period of infilling the historic coastal fishponds followed the construction of an asphaltic concrete plant along the eastern shoreline of Ke‘ehi Lagoon in the 1940s. Ananoho and Auiki were completely filled during World War II, at which time an Army port and warehouse complex was built (Athens and Ward 2002:1). Later, this became part of the Kapālama Military Reservation. By 1954, Apili, Pahounui, Pahouiki, Auiki, and Ananoho fishponds had disappeared from the coastal landscape (Moore et al. 2004:11).

### 3.5 Previous Archaeology

Commercial development in coastal Kalihi primarily occurred prior to the late 1970s, when archaeological investigation became standard during project planning and construction activities. As a result, few archaeological studies have been conducted in Kalihi. One previous archaeological investigation was conducted within the wider vicinity of the East Kalihi Zone, along the Ke‘ehi shoreline (Table 6 and Figure 24).

Table 6. Previous Archaeological Studies in the East Kalihi Zone

Author	SIHP #50-80-14-#	Report Description and Findings
Moore, Bevan, and Kennedy 2004	0074	Inventory survey of eastern coastline of Ke‘ehi Lagoon; portion of one historic property identified: three adjoining fishponds

#### Eastern Coastline of Ke‘ehi Lagoon (Moore, Bevan, and Kennedy 2004)

Moore, Bevan, and Kennedy (2004) conducted an archaeological inventory survey of the eastern shoreline of Ke‘ehi Lagoon. During their study, they encountered portions of SIHP #50-80-14-0074, which consists of three historic fishponds (Apili, Pahounui, and Pahouiki). Sediment samples were collected from six geotechnical borings to identify fishpond sediments. Palynology and radiometric analysis of these samples provided information on the paleoenvironment of Kalihi prior to human colonization but did not yield definitive evidence of fishpond sediments.

### 3.6 Modern Land Use and Built Environment

The East Kalihi Zone traverses a predominantly urban environment, through the neighborhoods of coastal Kalihi. The centerline of the project alignment is generally within Kamehameha Highway and Dillingham Boulevard rights-of-way. Parcels bordering the roads and highways include a mix of commercial, industrial, and residential developments. Large developments in the vicinity of the project include the OCCC. A massive utility corridor is also present throughout the East Kalihi Zone containing electrical, gas, water, sewer, and storm lines. The number and distribution of these existing utilities indicates that this East Kalihi portion of Dillingham Boulevard has been heavily disturbed in the past.

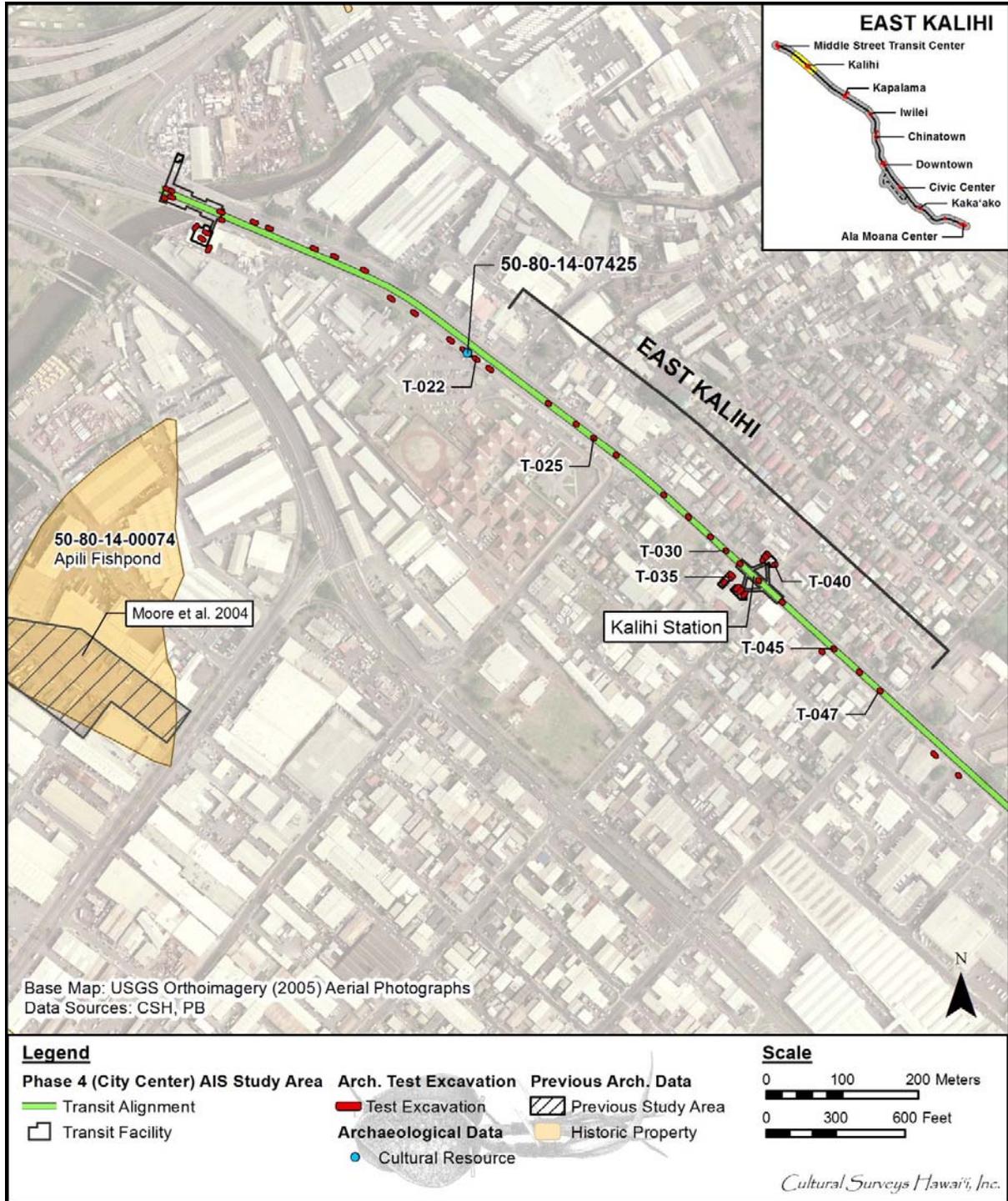


Figure 24. Previous archaeological studies in the vicinity of the East Kalihi Zone AIS test excavations (T-021 through T-047) along the HHCTCP corridor and at the Kalihi Station (base map: U.S. Geological Survey orthoimagery 2005)

### 3.7 Test Excavation 21 (T-021)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	N/A
<b>TMK #:</b>	1-2-013 [Plat]
<b>Elevation Above Sea Level:</b>	4.02 m
<b>UTM:</b>	615661.76 mE, 2359183.14 mN
<b>Max Length/Width/Depth:</b>	6.00 m/0.65 m/1.91 mbs
<b>Orientation:</b>	132/312° TN
<b>Targeted Project Component:</b>	Utility Relocation
<b>USDA Soil Survey Soil:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 21 (T-021) was located within the eastbound right lane on Kamehameha Highway near the Laumaka Street intersection, northeast of OCCC. T-021 was located on public property belonging to the City and County of Honolulu. One telephone line (6.3 m northeast) and one AT&T line (3.8 m southwest) were located near T-021. A gas line was marked on site 2.8 m southwest (*makai*) of T-021. T-021 was level with the surrounding land surface.

**Summary of Background Research and Land Use:** Brown's 1883 Kalihi and Kapālama map (see Figure 17) locates T-021 on government lands leased to A. Herbert. In 1919, T-021 was approximately 225 m northeast of the former OR&L railroad tracks in a lightly developed area, according to the 1919 U.S. Army War Department Fire Control map (see Figure 20). The 1933 U.S. Army War Department Fire Control map (see Figure 22) and the 1943 U.S. Army War Department Terrain map indicate major urban development to the northeast and planned development in the area surrounding T-021. The 1953 U.S. Army Mapping Service topographic map documents an extended shoreline to the southeast and a completed Nimitz Highway.

No previous archaeology was conducted in the vicinity of T-021. A single archaeological inventory survey study by Moore, Bevan, and Kennedy (2004) was conducted of the eastern shoreline of Ke'ehi Lagoon, more than 400 m to the southwest. During their study, they encountered portions of SIHP #50-80-14-0074, which consists of three historic fishponds (Apili, Pahounui, and Pahouiki). However, sediment samples did not yield definitive evidence of fishpond sediments.

**Documentation Limitations:** T-021 was excavated to the coral shelf at 1.91 mbs. There were no factors that limited the documentation of T-021.

**Stratigraphic Summary:** The stratigraphy of T-021 consisted of fill strata to the coral shelf. Observed strata were asphalt (Ia), very gravelly loamy sand crushed coral base course (Ib), and loam fill (Ic) overlying the natural coral shelf (II). Stratum Ic was likely a natural alluvial sediment that was completely removed then re-deposited as fill as a result of intensive urban development as evidenced by the presence of concrete chunks, glass fragments, and a horse

faunal remain. The stratigraphy did not conform to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were collected.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** A single unmodified faunal fragment was collected from Stratum Ic at 1.8 to 1.9 mbs. It is a complete metacarpus identified as *Equus ferus caballus* (horse).

**Sample Results:** No sample analysis was conducted.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded with the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.75 mbs.

GPR depth profiles for T-021 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.25 mbs and again at around 0.75 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 1.25 mbs.

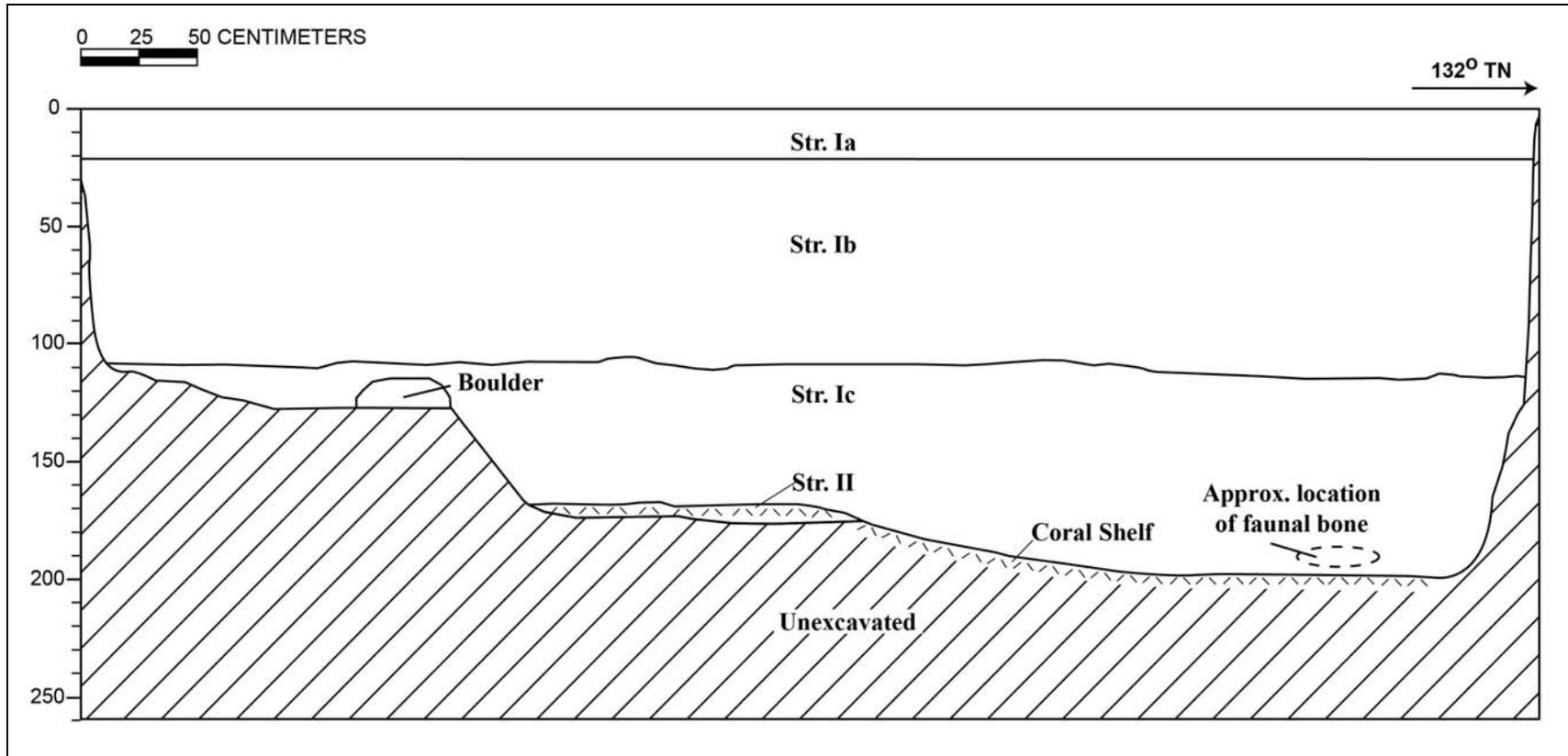
**Summary:** T-021 was excavated to the coral shelf at 1.91 mbs. The stratigraphy of T-021 consisted of fill strata (Ia–Ic) to the coral shelf (II). The stratigraphy did not conform to the USDA soil survey designation of Ewa silty clay loam (EmA). Stratum Ic was likely a natural alluvial sediment that was completely removed and then re-deposited as fill as a result of intensive urban development, as evidenced by the presence of concrete chunks, glass fragments, and an unmodified horse bone at the lower boundary. No natural sediment was observed. No archaeological cultural resources were identified in T-021.



T-021 general location, view to the southeast



T-021 northeast wall profile, view to the northeast



T-021 northeast profile

## T-021 Stratigraphic Description

Stratum	Depth (cmbs)	Description
Ia	0–20	Asphalt; road surface
Ib	20–111	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; marine origin; abrupt, smooth lower boundary; crushed coral base course
Ic	105–191	Fill; 10 YR 3/3 (dark brown); loam; weak, fine crumb structure; moist, very friable consistency; slightly plastic; terrigenous origin; abrupt, smooth lower boundary; few, medium roots; contained angular concrete chunks and boulders, glass fragments (not collected); faunal bone (Equidae metacarpus); fill deposit
II	162–191 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; coral shelf

### 3.8 Test Excavation 22 (T-022)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	N/A
<b>TMK #:</b>	1-2-013 [Plat]
<b>Elevation Above Sea Level:</b>	3.6 m
<b>UTM:</b>	615643.72 mE, 2359196.49 mN
<b>Max Length/Width/Depth:</b>	6.09 m/0.80 m/2.35 mbs
<b>Orientation:</b>	134/314° TN
<b>Targeted Project Component:</b>	Utility Relocation
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 22 (T-022) was located within the eastbound right lane on Kamehameha Highway near the Laumaka Street intersection, northeast of the OCCC. T-022 was located on public property belonging to the City and County of Honolulu. One telephone line (4.3 m northeast) and one AT&T line (3.5 m southwest) were located near T-022. T-022 was originally located southeast (Diamond Head) of the Laumaka Street intersection but was shifted 44 m northwest ('Ewa) to avoid obstructing a City and County bus station. T-022 was level with the surrounding land surface.

**Summary of Background Research and Land Use:** Brown's 1883 Kalihi and Kapālama map (see Figure 17) locates T-022 on government lands leased to A. Herbert, near Māhele Award 50:3 to Hāunapō (30 m north), Grant (P.W.) 73 to Alexander Young (34 m east), and LCA 803:5 to A. Adams (75 m southeast). In 1919, T-022 was in a lightly developed area approximately 218 m northeast of the former OR&L railroad tracks and 320 m northeast of salt beds as indicated by the 1919 U.S. Army War Department Fire Control map (see Figure 20). The 1933 U.S. Army War Department Fire Control map (see Figure 22) and the 1943 U.S. Army War Department Terrain map indicate major urban development to the northeast and planned development in the area surrounding T-022. In addition, the 1953 U.S. Army Mapping Service topographic map documents an extended shoreline to the southeast and a completed Nimitz Highway.

No previous archaeology was conducted in the vicinity of T-022. A single archaeological inventory survey study by Moore, Bevan, and Kennedy (2004) was conducted of the eastern shoreline of Ke'ehi Lagoon, more than 350 m to the southwest. During their study, they encountered portions of SIHP #50-80-14-0074, which consists of three historic fishponds (Apili, Pahounui, and Pahouiki). However, sediment samples did not yield definitive evidence of fishpond sediments.

**Documentation Limitations:** T-022 was excavated to the coral shelf at 2.35 mbs. There were no factors that limited the documentation of T-022.

**Stratigraphic Summary:** The stratigraphy of T-022 consisted of fill strata overlying natural sediment. Observed strata were asphalt (Ia), very gravelly loamy sand crushed coral base course (Ib), overlying natural sandy clay loam alluvium (II) to the coral shelf (III). Stratum II was a

natural alluvium that contained amber glass bottle fragments, charcoal flecking, and a small band of charcoal that was likely impacted as a result of intensive urban development. The stratigraphy generally conformed to the USDA soil designation of Ewa silty clay loam (EmA).

**Artifacts Discussion:** See sample results below.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** One bulk sediment sample was collected from Stratum II at 1.84–2.02 mbs (3.0 L). The sediment sample was wet screened. The sample contained charcoal (0.3 g), non-midden gastropods (0.2 g), a burned shell (possible naturally-transported midden) (0.5 g), and glass fragments (0.4 g). Sample results documented a sparse amount of cultural material including historic glass fragments within Stratum II.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded with the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.5 mbs.

GPR depth profiles for T-022 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.2 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 1.1 mbs.

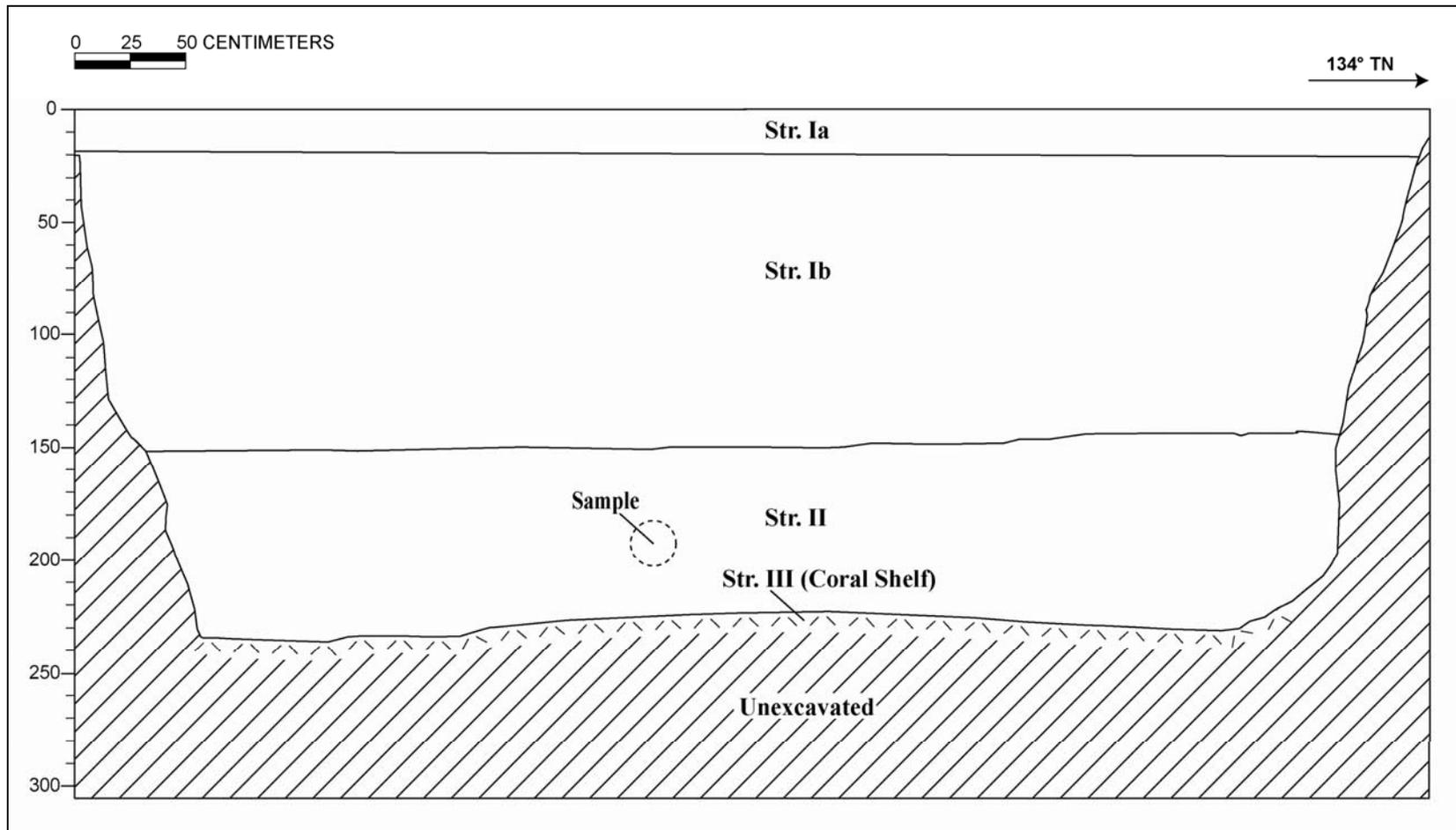
**Summary:** T-022 was excavated to the coral shelf at 2.35 mbs. The stratigraphy of T-022 consisted of fill strata (Ia–Ic) overlying natural sediment (II) and the coral shelf (III). The stratigraphy generally conformed to the USDA soil designation of Ewa silty clay loam (EmA). Sample results documented a sparse amount of cultural material including historic glass fragments within Stratum II. No archaeological cultural resources were identified in T-022.



T-022 general location, view to the southeast



T-022 northeast wall profile, view to the northeast



T-022 northeast profile

## T-022 Stratigraphic Description

Stratum	Depth (cmts)	Description
Ia	0–20	Asphalt; road surface
Ib	20–152	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; marine origin; abrupt, smooth lower boundary; crushed coral base course
II	143–235	Natural; 10 YR 3/4 (dark yellowish brown); sandy clay loam; weak, fine crumb structure; moist, friable consistency; slightly plastic; terrigenous origin; abrupt, smooth and wavy lower boundary; contained glass bottle fragments (amber), thin band of charcoal, few small shells; natural alluvium impacted by intensive urban development; charcoal flecks and chunks throughout stratum with common hollow tubes from previous root action
III	235 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; exposed coral shelf

### 3.9 Test Excavation 23 (T-023)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	803:5
<b>TMK #:</b>	1-2-013 [Plat]
<b>Elevation Above Sea Level:</b>	5.5 m
<b>UTM:</b>	615739.18 mE, 2359138.07 mN
<b>Max Length/Width/Depth:</b>	3.20 m/0.60 m/0.77 mbs
<b>Orientation:</b>	126/306° TN
<b>Targeted Project Component:</b>	Guideway Column
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 23 (T-023) was located within the center lane of Kamehameha Highway, southeast of the Laumaka Street intersection and northeast of OCCC. T-023 was located on public property belonging to the City and County of Honolulu. One storm drain (2 m northeast) and one water line (2.8 m southwest) were located near T-023. The dimensions of T-023 were adjusted from a planned 3.0 m by 0.9 m unit to a 3.0 m by 0.6 m unit in order to avoid existing utilities. T-023 was level with the surrounding land surface.

**Summary of Background Research and Land Use:** Brown's 1883 map of Kalihi and Kapālama (see Figure 17) locates T-023 within LCA 803:5, which was a 292.41-acre plot awarded to Alexander Adams and contained *lo'i*, *kula*, and *loko*. Additionally, a road labeled "to Herbert's" was situated approximately 17.5 m south of T-023, and the Kalihi stream was 407 m northwest of T-023. M. D. Monsarrat's 1897 map of Honolulu shows the road as having been extended further south with a rice plantation approximately 270 m east of T-023. The 1919 (see Figure 20) to 1943 U.S. Army War Department maps document the former OR&L railroad 230 m southwest of T-023 and also indicate that the area around T-023 was heavily developed into multiple residential areas. The 1953 U.S. Army Mapping Service topographic map indicates that Kamehameha Highway was expanded into four lanes and Nimitz Highway was completed 320 m southwest of T-023.

No previous archaeology was conducted in the vicinity of T-023. A single archaeological inventory survey study by Moore, Bevan, and Kennedy (2004) was conducted of the eastern shoreline of Ke'ehi Lagoon, more than 400 m to the southwest. During their study, they encountered portions of SIHP #50-80-14-0074, which consists of three historic fishponds (Apili, Pahounui, and Pahouiki). However, sediment samples did not yield definitive evidence of fishpond sediments.

**Documentation Limitations:** T-023 was excavated to the coral shelf at 0.77 mbs. There were no factors that limited the documentation of T-023.

**Stratigraphic Summary:** The stratigraphy of T-023 consisted of fill strata overlying natural sediment. Observed strata were asphalt (Ia), very gravelly loamy sand crushed coral base course (Ib), and silty loam fill (Ic) overlying the coral shelf (II). Stratum Ic consists of alluvial sediment; however, due to its lack of structure and color variation from the natural alluvium seen throughout the general area, it was likely previously removed then re-deposited as fill as a result of intensive urban development. The stratigraphy did not conform to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifacts Discussion: Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

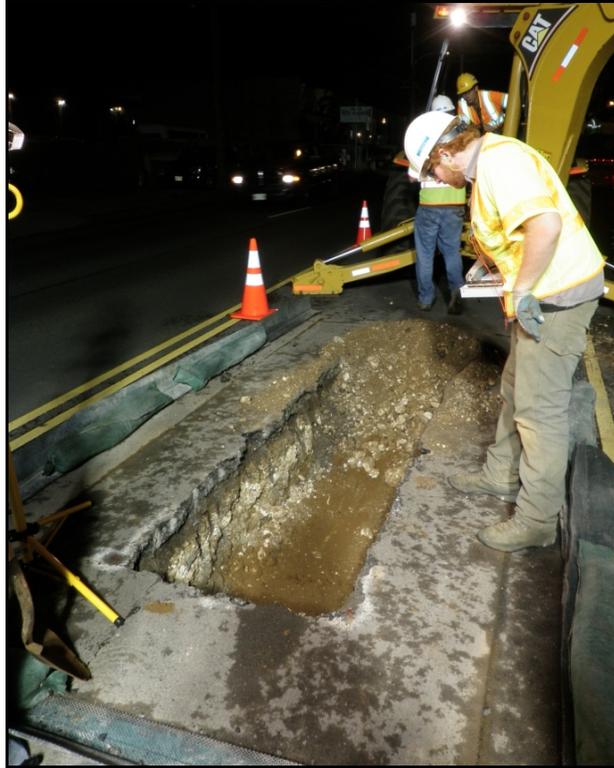
**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** No sample analysis was conducted.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded with the presence of utilities. Reflectivity is relatively uniform throughout the grid and decreases with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.5 mbs.

GPR depth profiles for T-023 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.15 mbs and again at around 0.50 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 0.65 mbs.

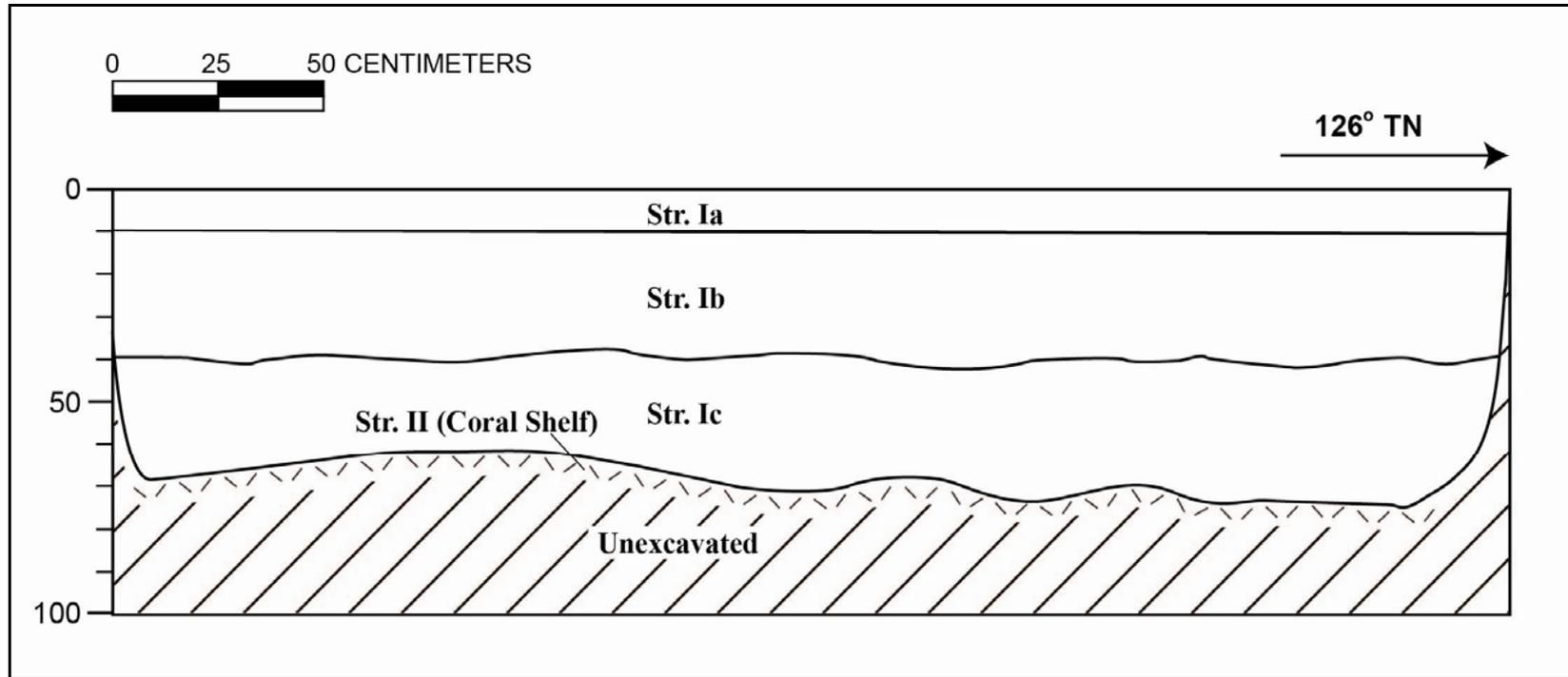
**Summary:** T-023 was excavated to the coral shelf at 0.77 mbs. The stratigraphy of T-023 consisted of fill strata (Ia–Ic) overlying the coral shelf. The stratigraphy did not conform to the USDA soil survey designation of Ewa silty clay loam (EmA). No natural sediment was observed. No archaeological cultural resources were identified in T-023.



T-023 general location, view to the east



T-023 northeast profile wall, view to the northeast



T-023 north wall profile

## T-023 Stratigraphic Description

<b>Stratum</b>	<b>Depth (cmbs)</b>	<b>Description</b>
Ia	0–10	Asphalt
Ib	10–40	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; marine origin; abrupt, smooth lower boundary; crushed coral base course
Ic	40–77	Fill; 10 YR 3/4 (dark yellowish brown); silty loam; structureless; dry, loose consistency; slightly plastic; terrigenous origin; abrupt, smooth lower boundary; fill deposit
II	77 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; exposed coral shelf

### 3.10 Test Excavation 24 (T-024)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	803:5
<b>TMK #:</b>	1-2-013 [Plat]
<b>Elevation Above Sea Level:</b>	6.2 m
<b>UTM:</b>	615776.15 mE, 2359111.01 mN
<b>Max Length/Width/Depth:</b>	3.20 m/0.61 m/0.52 mbs
<b>Orientation:</b>	129/309° TN
<b>Targeted Project Component:</b>	Guideway Column
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 24 (T-024) was located within the center lane of Kamehameha Highway between Laumaka Street and Puuhale Road and northeast of OCCC. T-024 was located near a sewer line (1.45 m northeast), a telephone line (1.56 m southeast), and a water line (3.27 m southwest). The dimensions of T-024 were adjusted from a planned 1.00 m by 0.90 m to 1.00 m by 0.60 m and shifted 0.36 m northeast (*mauka*) in order to avoid existing utilities. The topography of the excavation area was gently sloped toward the west. T-024 was located on public property owned by the City and County of Honolulu.

**Summary of Background Research and Land Use:** Brown's 1883 map of Kalihi and Kapālama (see Figure 17) indicates that T-024 was located within LCA 803:5, a 292.41-acre plot with *lo'i*, *kula*, and *loko* awarded to Alexander Adams. A road labeled "to Herbert's" was situated within the south end of T-024, and Kalihi Stream was 320 m northwest of T-024. M. D. Monsarrat's 1897 map of Honolulu indicates T-024 was near two unlabeled roads and approximately 233 m west of rice plantations. The U.S. Army War Department maps from 1919 (see Figure 20) to 1943 document the former OR&L railroad approximately 226 m southwest of T-024 and also indicate that the area around T-024 was heavily developed into multiple residential areas. The 1953 U.S. Army Mapping Service topographic map indicates that T-024 was located on the outskirts of the formal Kalihi and Kapālama area, that Kamehameha Highway was expanded into four lanes, and that Nimitz Highway was completed 360 m southwest of T-024.

No previous archaeology was conducted in the vicinity of T-024. A single archaeological inventory survey study by Moore, Bevan, and Kennedy (2004) was conducted of the eastern shoreline of Ke'ehi Lagoon, more than 450 m to the southwest. During their study, they encountered portions of SIHP #50-80-14-0074, which consists of three historic fishponds (Apili, Pahounui, and Pahouiki). However, sediment samples did not yield definitive evidence of fishpond sediments.

**Documentation Limitations:** T-024 was excavated to the coral shelf at 0.52 mbs. There were no factors that limited the documentation of T-024.

**Stratigraphic Summary:** The stratigraphy of T-024 consisted of fill strata to the coral shelf. Observed strata were asphalt (Ia) and sandy loam fill (Ib) overlying the coral shelf (II). Stratum Ib was likely a natural alluvial sediment that was completely removed then re-deposited as fill as a result of intensive urban development. The stratigraphy did not conform to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifacts Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** No sample analysis was conducted.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded with the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.75 mbs.

GPR depth profiles for T-024 identify horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponds to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred around 0.2 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 1 mbs.

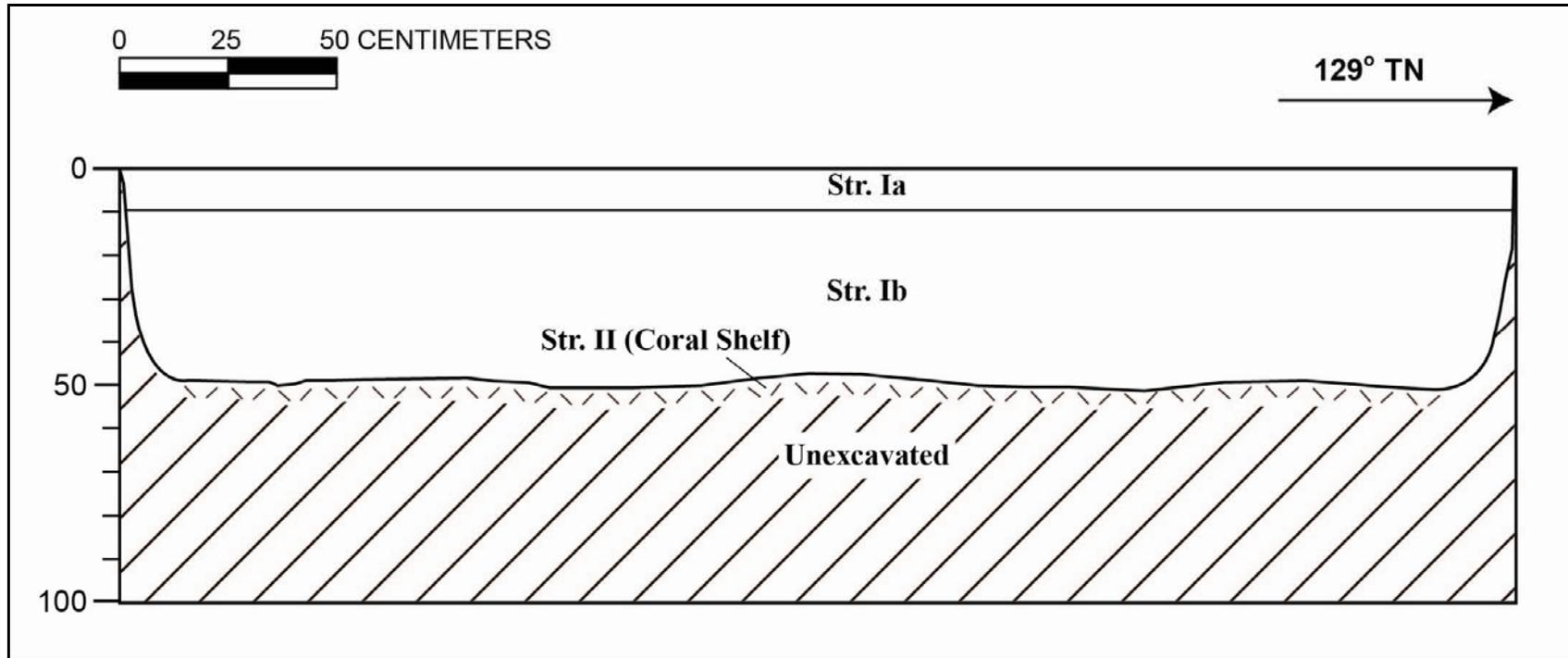
**Summary:** T-024 was excavated to the coral shelf at 0.52 mbs. The stratigraphy of T-024 consisted of fill strata (Ia–Ib) to the coral shelf. The stratigraphy did not conform to the USDA soil survey designation of Ewa silty clay loam (EmA). No natural sediment was observed. No archaeological cultural resources were identified in T-024.



T-024 general location, view to the east



T-024 northeast profile wall, view to the northeast



T-024 northeast wall profile

## T-024 Stratigraphic Description

<b>Stratum</b>	<b>Depth (cmts)</b>	<b>Description</b>
Ia	0–10	Asphalt; road surface
Ib	10–52	Fill; 10 YR 4/3 (brown); sandy loam; weak, fine, crumb structure; dry, weakly coherent consistency; non-plastic; mixed origin; abrupt, smooth lower boundary; imported fill with crushed coral inclusions
II	52 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; exposed coral shelf

### 3.11 Test Excavation 25 (T-025)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	803:5
<b>TMK #:</b>	1-2-013 [Plat]
<b>Elevation Above Sea Level:</b>	6.68 m
<b>UTM:</b>	615799.34 mE, 2359093.31 mN
<b>Max Length/Width/Depth:</b>	3.10 m/0.61 m/0.97 mbs
<b>Orientation:</b>	317/137° TN
<b>Targeted Project Component:</b>	Guideway Column
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 25 (T-025) was located in the median of Kamehameha Highway. T-025 was directly in front of the OCCC, approximately 50 m northwest from the Puuhale Road and Kamehameha Highway intersection. A sewer line was located 1.50 m northeast of T-025 and a water line was 2.60 m southwest. T-025 was shifted 0.45 m northeast to avoid existing utilities. The test excavation was level with the surrounding road surface. T-025 was located within public property owned by the City and County of Honolulu.

**Summary of Background Research and Land Use:** Brown's 1883 Kalihi and Kapālama map (see Figure 17) locates T-025 within LCA 803:5, which was awarded to Alexander Adams and contained *lo'i*, *kula*, and *loko*. T-025 was in a section of LCA 803:5 that was part of Kawaihōlo. In 1919, T-025 was approximately 245 m northeast of the former OR&L railroad tracks and approximately 400 m northeast of some salt beds, according to the 1919 U.S. Army War Department Fire Control map (see Figure 20). The 1933 U.S. Army War Department Fire Control map (see Figure 22) and the 1943 U.S. Army War Department Terrain map show T-025 located just west of a heavily developed residential area. According to the 1953 U.S. Army Mapping Service topographic map, T-025 was located in Kamehameha Highway with Nimitz Highway to the southwest.

No previous archaeology was conducted in the vicinity of T-025. A single archaeological inventory survey study by Moore, Bevan, and Kennedy (2004) was conducted of the eastern shoreline of Ke'ehi Lagoon, more than 500 m to the southwest. During their study, they encountered portions of SIHP #50-80-14-0074, which consists of three historic fishponds (Apili, Pahounui, and Pahouiki). However, sediment samples did not yield definitive evidence of fishpond sediments.

**Documentation Limitations:** T-025 was excavated to the coral shelf at 0.97 mbs. There were no factors that limited the documentation of T-025.

**Stratigraphic Summary:** T-025 stratigraphy consisted of two layers of fill over a disturbed natural sediment. Observed strata were asphalt (Ia), very gravelly loamy sand crushed coral base course (Ib), and naturally deposited silty loam alluvium (II) over the coral shelf (III). The

stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** No sample analysis was conducted.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded with the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.5 mbs.

GPR depth profiles for T-025 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.15 mbs and again at around 0.6 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 1 mbs.

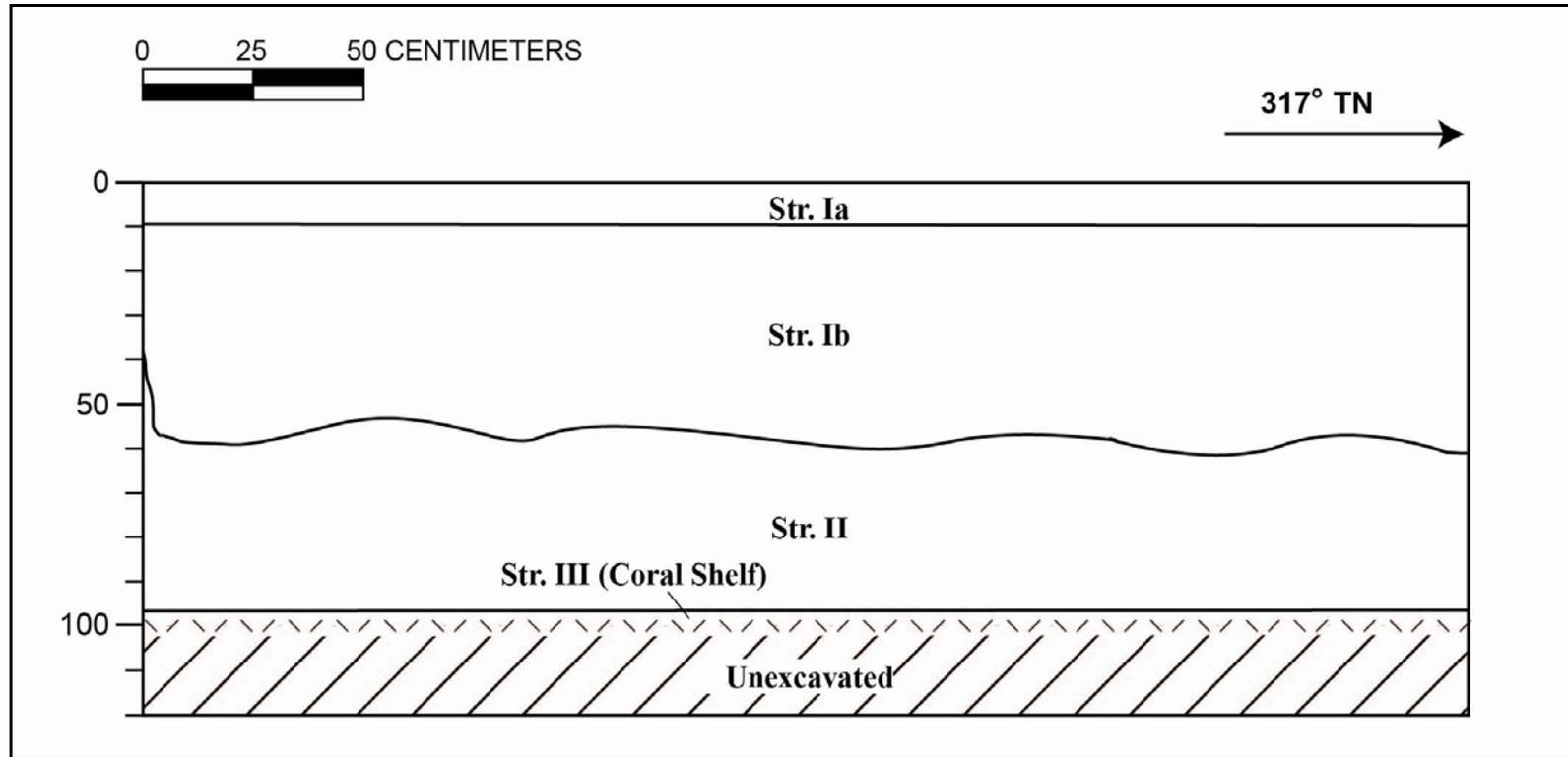
**Summary:** T-025 was excavated to the coral shelf at a depth of 0.97 mbs. The stratigraphy consisted of two fill layers (Ia and Ib) over naturally deposited silty loam alluvium (II). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). No archaeological cultural resources were identified in T-025.



T-025 general location, view to the southeast



T-025 northeast wall, view to the east



T-025 southwest wall profile

## T-025 Stratigraphic Description

<b>Stratum</b>	<b>Depth (cmts)</b>	<b>Description</b>
Ia	0–10	Asphalt
Ib	10–60	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; marine origin; abrupt, smooth lower boundary; crushed coral base course
II	40–97	Natural; 7.5 YR 3/3 (dark brown); silty loam; moderate, fine crumb structure; moist, very friable consistency; slightly plastic; terrigenous origin; abrupt lower boundary; naturally deposited alluvium
III	97 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral shelf; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; exposed coral shelf

### 3.12 Test Excavation 26 (T-026)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	803:5
<b>TMK #:</b>	1-2-013 [Plat]
<b>Elevation Above Sea Level:</b>	6.8 m
<b>UTM:</b>	615829.20 mE, 2359070.68 mN
<b>Max Length/Width/Depth:</b>	3.05 m/0.61 m/1.0 mbs
<b>Orientation:</b>	310/130° TN
<b>Targeted Project Component:</b>	Guideway Column
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 26 (T-026) was located in the center lane of Kamehameha Highway near the intersection of Kamehameha Highway and Puuhale Road. T-026 was adjacent to the OCCC and was situated 2.3 m north and 3.8 m south of two waterlines. The test excavation was reduced from 3.0 m by 0.9 m to 3.0 m by 0.6 m to avoid existing utilities along the southern wall. The test excavation was level to the surrounding road surface and was on City and County of Honolulu property.

**Summary of Background Research and Land Use:** Brown's 1883 map of Kalihi and Kapālama (see Figure 17) indicate T-026 was within LCA 803:5 in the land part of Kawaihōlo, which was awarded to Alexander Adams and contained *lo'i*, *kula*, and *loko*. Monsarrat's 1897 map of Honolulu indicates that T-026 was near the intersection of two roads and approximately 180 m west of a rice plantation. The 1919 U.S. Army War Department Fire Control map (see Figure 20) locates the OR&L railroad approximately 250 m southwest of T-026. In addition, continued urban development of Kalihi into multiple residential neighborhoods is indicated between the 1919 (see Figure 20) and 1943 U.S. Army War Department maps of Honolulu. According to the 1953 U.S. Army Mapping Service topographic map, T-026 was located in Kamehameha Highway at the intersection of two main roads on the outskirts of the formal Kalihi and Kapālama area.

No previous archaeology was conducted in the vicinity of T-026. A single archaeological inventory survey study by Moore, Bevan, and Kennedy (2004) was conducted of the eastern shoreline of Ke'ehi Lagoon, more than 500 m to the southwest. During their study, they encountered portions of SIHP #50-80-14-0074, which consists of three historic fishponds (Apili, Pahounui, and Pahouiki). However, sediment samples did not yield definitive evidence of fishpond sediments.

**Documentation Limitations:** T-026 was excavated to the coral shelf at 1.0 mbs. A utility pipe was observed at 0.9 mbs, but did not limit documentation.

**Stratigraphic Summary:** T-026 stratigraphy consisted of fill and natural sediment to the base of the excavation. The observed strata were asphalt (Ia), gravelly silty clay crushed coral base course (Ib), sandy clay loam fill (Ic), natural silty clay loam alluvium (II), and exposed coral

shelf (III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

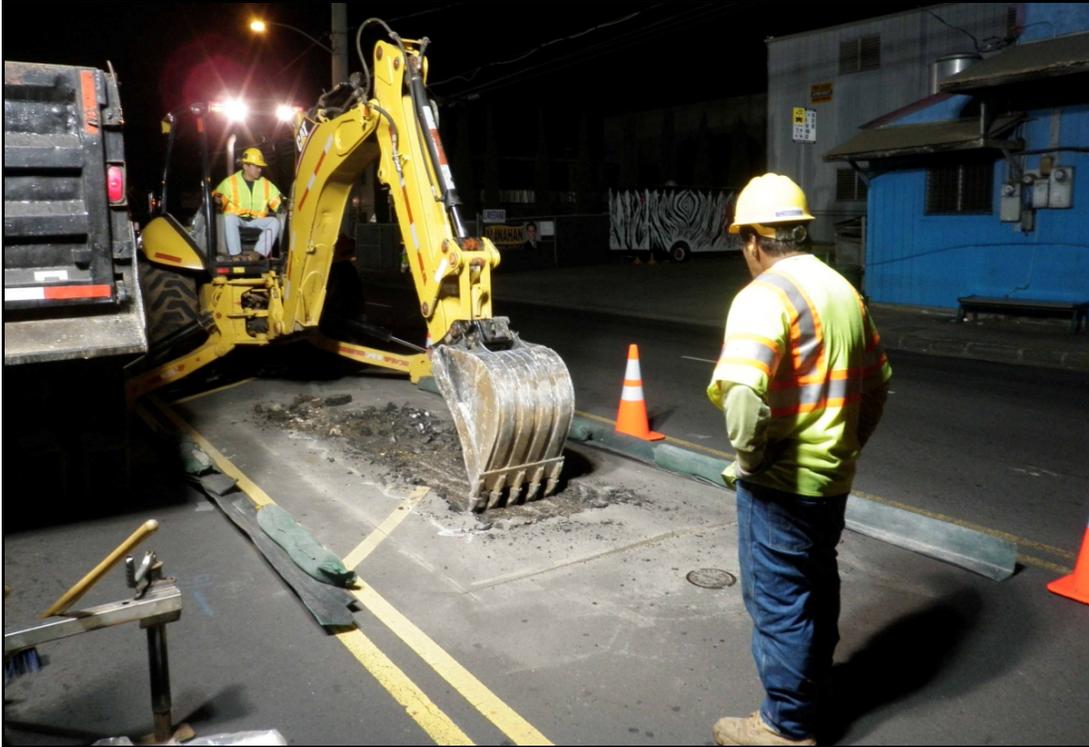
**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** No sample analysis was conducted.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might correspond to the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.5 mbs.

GPR depth profiles for T-025 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.15 mbs and again at around 0.6 mbs. The maximum depth of clean signal return was approximately 1 mbs.

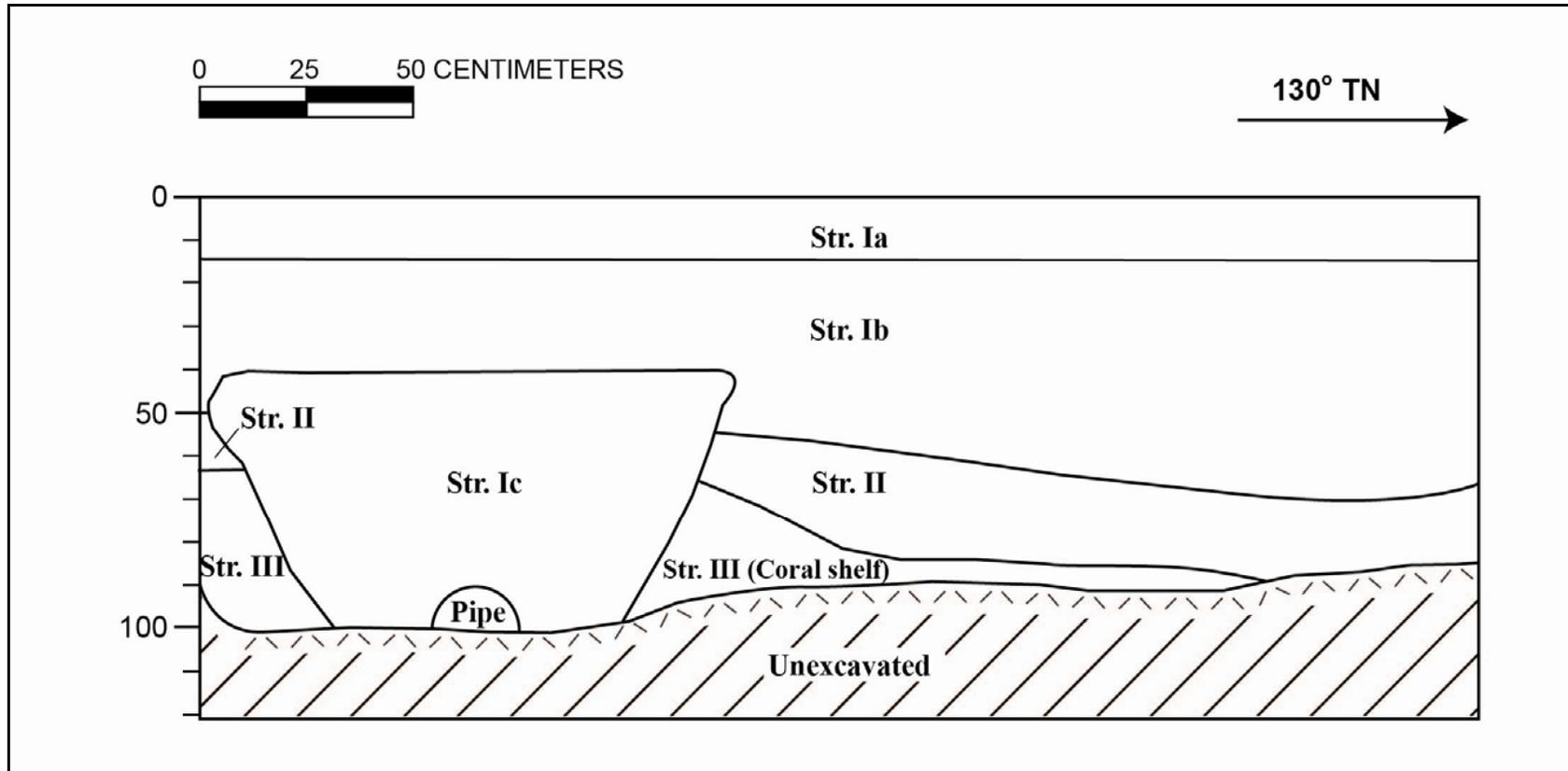
**Summary:** T-026 was excavated to the coral shelf at 1.0 mbs. The stratigraphy of T-026 consisted of fill strata (Ia–Ic) and natural sediment (II) overlying the coral shelf (III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). Stratum Ic consisted of fill material associated with the placement of a utility. No archaeological cultural resources were identified in T-026.



T-026 general location, view to the north



T-026 northeast profile wall, view to the northeast



T-026 northeast wall profile

## T-026 Stratigraphic Description

<b>Stratum</b>	<b>Depth (cmts)</b>	<b>Description</b>
Ia	0–15	Asphalt
Ib	15–70	Fill; 10 YR 3/3 (dark brown), with mottles 10 YR 8/2 (very pale brown); gravelly silty clay; crushed coral; structureless, single-grain; moist, very friable consistency; non-plastic; mixed origin; very abrupt, smooth lower boundary; crushed coral fill
Ic	40–100	Fill; 10 YR 4/3 (brown); sandy clay loam; structureless, single-grain; moist, very friable consistency; non-plastic; mixed origin; lower boundary not visible; contains utility pipe; back fill of utility pipe
II	54–63	Natural; 7.5 YR 3/4 (dark brown); silty clay; weak, fine granular structure; moist, friable consistency; slightly plastic; terrigenous origin; very abrupt, irregular lower boundary; naturally deposited alluvial sediments
III	63–100 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral shelf; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; exposed coral shelf

### 3.13 Test Excavation 27 (T-027)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	6450:1
<b>TMK #:</b>	1-2-009 [Plat]
<b>Elevation Above Sea Level:</b>	6.8 m
<b>UTM:</b>	615892.28 mE, 2359018.65 mN
<b>Max Length/Width/Depth:</b>	3.04 m/0.99 m/1.15 mbs
<b>Orientation:</b>	134/314° TN
<b>Targeted Project Component:</b>	Guideway Column
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 27 (T-027) was located in the left westbound lane of Dillingham Boulevard, northeast of the Blood Bank of Hawaii building. T-027 was located on City and County of Honolulu property. Two water lines (3.5 m north and 3.7 m south), one AT&T line (2.7 m south), and one telephone line (0.7 m southeast) were located near T-027. T-027 was shifted approximately 2 m southeast from its original location in order to avoid damaging a survey monument.

**Summary of Background Research and Land Use:** Brown's 1883 map of Kalihi and Kapālama (see Figure 17) indicate T-027 was within LCA 6450:1, which was awarded to Kaunuohua and was an *'ili* of Mokauea. There is no description of the land use within LCA 6450:1 but other LCA records indicate *lo'i* were present in the area. Monsarrat's 1897 map of Honolulu places T-027 approximately 115 m west of a rice plantation and approximately 43 m southeast of two roads. In 1919, the OR&L railroad was about 260 m southwest of T-027. The area surrounding T-027 was developed into residential neighborhoods with continued urban development of the formal Kalihi and Kapālama area during the period between the 1919 U.S. Army War Department Fire Control map (see Figure 20) and the 1953 U.S. Army Mapping Service topographic map.

No previous archaeology was conducted in the vicinity of T-027.

**Documentation Limitations:** T-027 was excavated to the coral shelf at 1.15 mbs. There were no factors that limited the documentation of T-027.

**Stratigraphic Summary:** T-027 stratigraphy contained fill and natural sediments. Observed strata were asphalt (Ia), very gravelly loamy sand crushed coral base course (Ib), natural silty clay alluvium (II) overlying an exposed coral shelf (III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** A bulk sediment sample was collected from Stratum II between 0.59 and 0.72 mbs (2.5 L). It was wet screened and yielded no material.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded to the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth except for the survey monument. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.25 mbs.

GPR depth profiles for T-027 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.15 mbs and again at around 0.8 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 0.9 mbs.

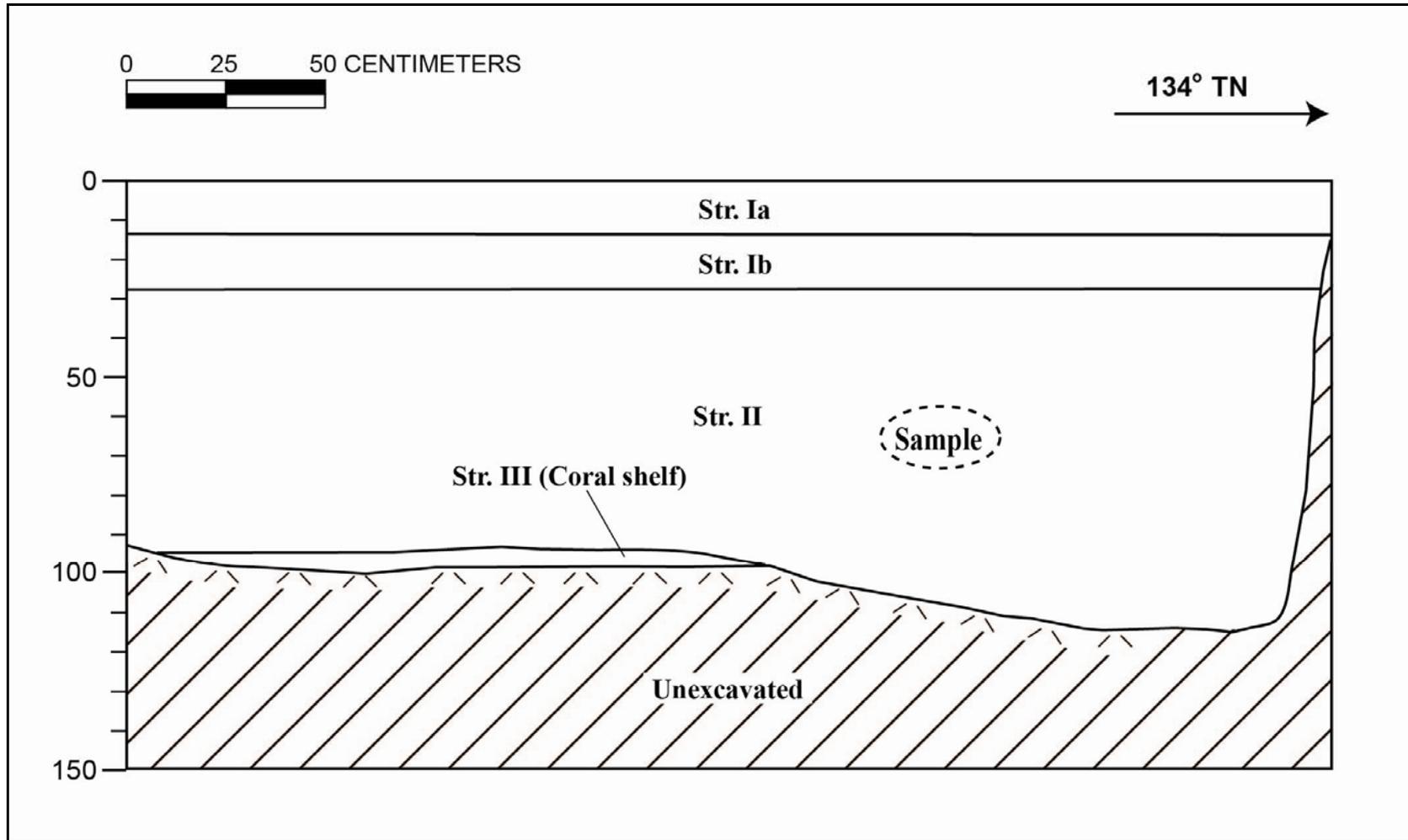
**Summary:** T-027 was excavated to the coral shelf at 1.15 mbs. T-027 stratigraphy contained fill (Ia and Ib) and natural sediments (II and III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). No archaeological cultural resources were identified in T-027.



T-027 general location, view to the west



T-027 northeast profile wall, view to the northeast



T-027 northeast wall profile

## T-027 Stratigraphic Description

Stratum	Depth (cmbs)	Description
Ia	0–14	Asphalt
Ib	14–29	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; marine origin; abrupt, smooth lower boundary; crushed coral base course
II	29–115 (BOE)	Natural; 7.5 YR 3/4 (dark brown); silty clay; moderate, fine, blocky structure; moist, friable to firm consistency; slightly plastic; terrigenous origin; clear, smooth lower boundary; naturally deposited alluvial sediment
III	96–100 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; coral shelf

### 3.14 Test Excavation 28 (T-028)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	6450:1
<b>TMK #:</b>	1-2-009 [Plat]
<b>Elevation Above Sea Level:</b>	6.7 m
<b>UTM:</b>	615924.89 mE, 2358989.76 mN
<b>Max Length/Width/Depth:</b>	2.93 m/0.91 m/1.05 mbs
<b>Orientation:</b>	156/336° TN
<b>Targeted Project Component:</b>	Guideway Column
<b>USDA Soil Survey Soil:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 28 (T-028) was located in the left-hand, eastbound lane of Dillingham Boulevard between Puuhale Road and Mokauea Street. T-028 was located on public property owned by the City and County of Honolulu. T-028 was located approximately 2 m south and 0.6 m west of two waterlines. The test excavation was level with the surrounding road surface.

**Summary of Background Research and Land Use:** Brown's 1883 Kalihi and Kapālama map (see Figure 17) indicates T-028 was in LCA 6450:1. LCA 6450:1 was an *'ili* of Mokauea and was awarded to Kaunuohua. There was no description of the land, but it possibly contained taro *lo'i*. By 1919, T-028 was approximately 270 m northeast of the former OR&L railroad tracks according to the 1919 U.S. Army War Department Fire Control map (see Figure 20). The 1933 U.S. Army War Department Fire Control map (see Figure 22) and the 1943 U.S. Army War Department Terrain map of Honolulu indicate the surrounding area was developed into residential neighborhoods, with urban development throughout the Kalihi area. According to the 1953 U.S. Army Mapping Service topographic map, T-028 was in the center of the formal Kalihi and Kapālama area.

No previous archaeology was conducted within the vicinity of T-028.

**Documentation Limitations:** T-028 was excavated to the coral shelf at 1.05 mbs. There were no factors that limited the documentation of T-028.

**Stratigraphic Summary:** The observed strata were asphalt (Ia), very gravelly loamy sand crushed coral base course (Ib), impacted natural silty clay (II), and the exposed coral shelf (III). Stratum II was a natural alluvium, likely impacted as a result of intensive urban development. The stratigraphy generally conformed to the USDA soil designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** One red brick was observed at approximately 0.35 mbs within the east end of T-028.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** Bulk sediment samples were collected from Stratum II at 0.40–0.48 mbs (2.0 L) and at 0.41–0.60 mbs (2.0 L and 7.5 L field screened). Two samples were wet screened. No material was collected from the sample taken at 0.40–0.48 mbs. The sample collected at 0.41–0.60 mbs contained charcoal (27.5 g), vesicular basalt (181.9 g), and coral (84.1 g). Wood taxa identification results for the charcoal sample included the non-native species conifer. Sample results determined the charcoal scatter found within the upper boundary of Stratum II to be historic in origin.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded to the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.5 mbs.

GPR depth profiles for T-028 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.25 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 0.85 mbs.

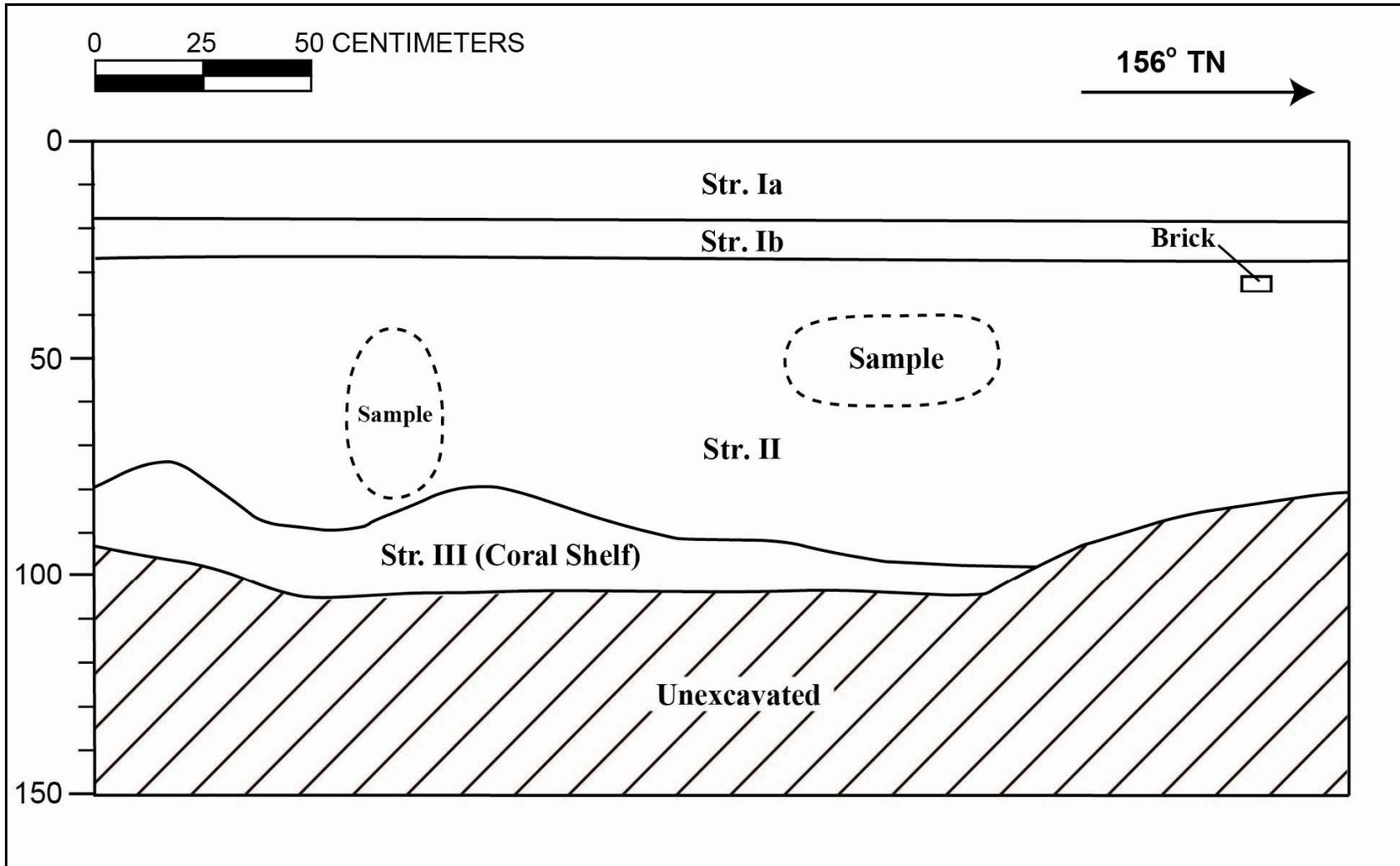
**Summary:** T-028 was excavated to the coral shelf at 1.05 mbs. The stratigraphy of T-028 consisted of fill strata (Ia and Ib) over natural silty clay (II) and the exposed coral shelf (III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). Sample results determined that Stratum II contained a historic charcoal scatter and artifact inclusions (brick). No significant archaeological cultural resources were identified T-028.



T-028 general location, view to the southeast



T-028 northeast profile wall, view to the east



T-028 northeast wall profile

## T-028 Stratigraphic Description

<b>Stratum</b>	<b>Depth (cmbs)</b>	<b>Description</b>
Ia	0–17	Asphalt
Ib	17–26	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; marine origin; abrupt, smooth lower boundary; crushed coral base course
II	26–97	Natural; 10 YR 3/3 (dark brown); silty clay; moderate, medium, blocky structure; moist, friable consistency; non-plastic; terrigenous origin; abrupt, wavy lower boundary; contains some charcoal flecking; impacts to the natural alluvial sediment as a result of intensive urban development
III	75–105 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; coral shelf

### 3.15 Test Excavation 29 (T-029)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	6450:1
<b>TMK #:</b>	1-2-009 [Plat]
<b>Elevation Above Sea Level:</b>	6.6 m
<b>UTM:</b>	615954.05 mE, 2358963.58 mN
<b>Max Length/Width/Depth:</b>	3.05 m/0.92 m/3.05 mbs
<b>Orientation:</b>	316/136° TN
<b>Targeted Project Component:</b>	Guideway Column
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 29 (T-029) was located in the left eastbound lane of Dillingham Boulevard, approximately 100 m northwest from the Dillingham Boulevard and Mokauea Street intersection. T-029 was 2.3 m northwest of a sewer line, 2.7 m north of a water line, and 2.7 m south of an AT&T line. The excavation surface was level with the surrounding land surface. T-029 was located within property owned by the City and County of Honolulu.

**Summary of Background Research and Land Use:** T-029 was within LCA 6450:1, awarded to Kaunohua. Brown's 1883 Kalihi and Kapālama map (see Figure 17) places T-029 within the portion of the LCA known as Mokauea. According to the 1919 U.S. Army War Department Fire Control map (see Figure 20), T-029 was approximately 270 m northeast of the former OR&L railroad tracks and approximately 550 m east of some salt beds. The 1933 U.S. Army War Department Fire Control map (see Figure 22) and the 1943 U.S. Army War Department Terrain map indicate that T-029 was located within a heavily developed area of Kalihi that was likely residential. According to the 1953 U.S. Army Mapping Service topographic map, T-029 was in the center of the formal Kalihi and Kapālama area.

No previous archaeology was conducted within the vicinity of T-029.

**Documentation Limitations:** T-029 was excavated to the maximum allowable depth of 3.05 mbs. The water table and coral shelf were not encountered.

**Stratigraphic Summary:** The stratigraphy of T-029 consisted of fill strata overlying natural sediment. Observed strata were asphalt (Ia), very gravelly loamy sand crushed coral basalt base course (Ib), natural silty clay loam (II), and natural gravelly silty clay with water rounded basalt cobbles (III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** A bulk sediment sample was collected from Stratum III at 3.0 mbs (2.0 L). It was wet screened and yielded water-rounded gravel and cobbles. No archaeological materials were recovered from this sample.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded to the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.25 mbs.

GPR depth profiles for T-029 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.4 mbs and again at around 0.75 mbs. An anomaly was observed in the profile; however, no utilities were observed during excavation. The maximum depth of clean signal return was approximately 1 mbs.

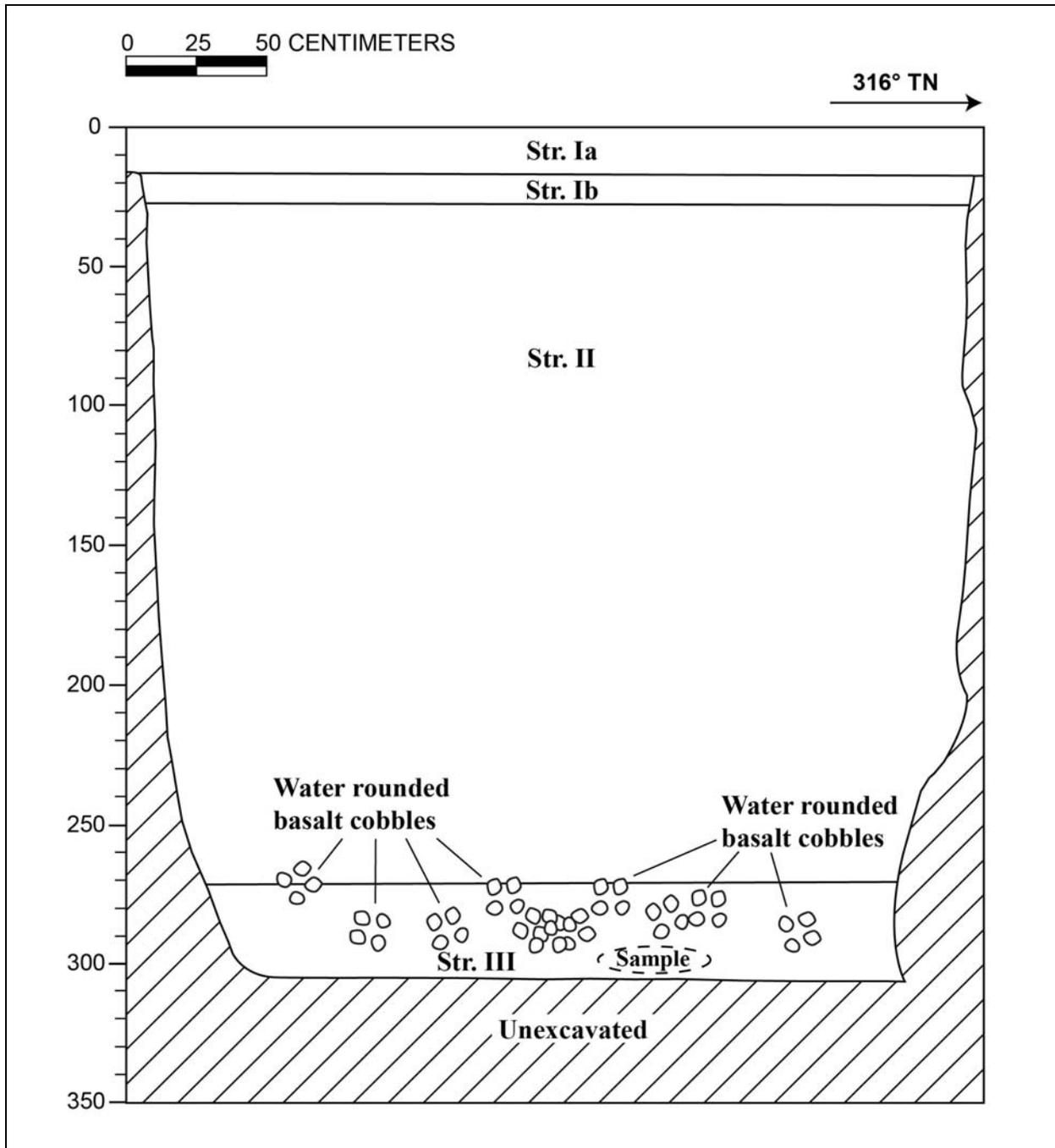
**Summary:** T-029 was excavated to a maximum allowable depth of 3.05 mbs. Stratigraphy included both fill (Ia and Ib) and natural material (II and III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). No archaeological cultural resources were identified in T-029.



T-029 general location, view to the northwest



T-029 southwest profile wall, view to the south



T-029 southwest wall profile

## T-029 Stratigraphic Description

Stratum	Depth (cmbs)	Description
Ia	0–16	Asphalt
Ib	16–26	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; mixed origin; abrupt, smooth lower boundary; crushed coral base course
II	26–270	Natural; 10 YR 3/3 (dark brown); silty clay; weak, fine crumb structure; moist, friable consistency; slightly plastic; terrigenous origin; clear, smooth, lower boundary; natural alluvium; water-rounded pebbles, cobbles observed near lower boundary
III	270–305 (BOE)	Natural; 10 YR 3/3 (dark brown); gravelly silty clay; weak, fine crumb structure; moist, friable consistency; slightly plastic; terrigenous origin; lower boundary not visible; probable buried stream sediment with water-rounded cobbles

### 3.16 Test Excavation 30 (T-030)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	6450:1
<b>TMK #:</b>	1-2-009 [Plat]
<b>Elevation Above Sea Level:</b>	6.8 m
<b>UTM:</b>	615974.46 mE, 2358945.26 mN
<b>Max Length/Width/Depth:</b>	3.05 m/0.92 m/1.0 mbs
<b>Orientation:</b>	132/312° TN
<b>Targeted Project Component:</b>	Station Column
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 30 (T-030) was located in the left westbound turn lane of Dillingham Boulevard between the Puuhale Road and Mokauea Street intersections. T-030 was located on property owned by the City and County of Honolulu. T-030 was located 3.9 m south of a water line and 2.9 m north of an AT&T line. The excavation surface was level with the surrounding land surface.

**Summary of Background Research and Land Use:** Brown's 1883 map of Kalihi and Kapālama (see Figure 17) shows T-030 was within LCA 6450:1, an *'ili* of Mokauea awarded to Kaunuohua. No description of the land use is given in the LCA records but it may have contained *lo'i*. In 1919, T-030 was approximately 273 m northeast of the former OR&L railroad tracks and approximately 550 m east of several salt beds, according to the 1919 U.S. Army War Department Fire Control map (see Figure 20). The 1933 U.S. Army War Department Fire Control map (see Figure 22) and the 1943 U.S. Army War Department Terrain map locate T-030 within a heavily developed area within growing residential blocks. According to the 1953 U.S. Army Mapping Service topographic map, T-030 was in the center of the formal Kalihi and Kapālama area.

No previous archaeology was conducted in the vicinity of T-030.

**Documentation Limitations:** T-030 was excavated to the coral shelf at a depth of 1.0 mbs. There were no factors that limited the documentation of T-030.

**Stratigraphic Summary:** The stratigraphy of T-030 consisted of fill strata overlying natural sediment to the coral shelf. Observed strata were asphalt road surface (Ia), very gravelly loamy sand crushed coral base course (Ib), sandy clay loam fill (Ic), and natural sandy clay loam (II) overlying the exposed portion of the coral shelf (III). A concentration of water-worn pebbles was observed in the northwestern end of the test excavation within Stratum II. Stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

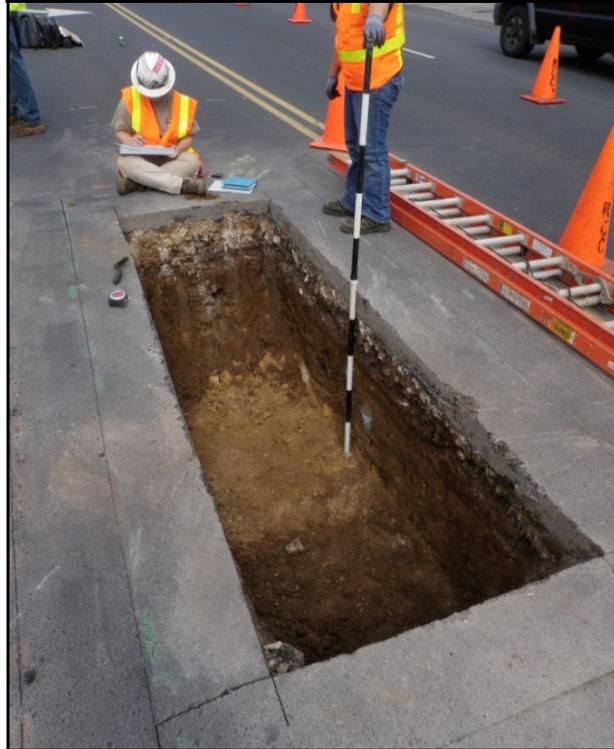
**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** No sample analysis was conducted.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features that might have corresponded to the presence of utilities. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.75 mbs.

GPR depth profiles for T-030 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.2 mbs. No utilities were observed in the profile. The maximum depth of clean signal return was approximately 0.85 mbs.

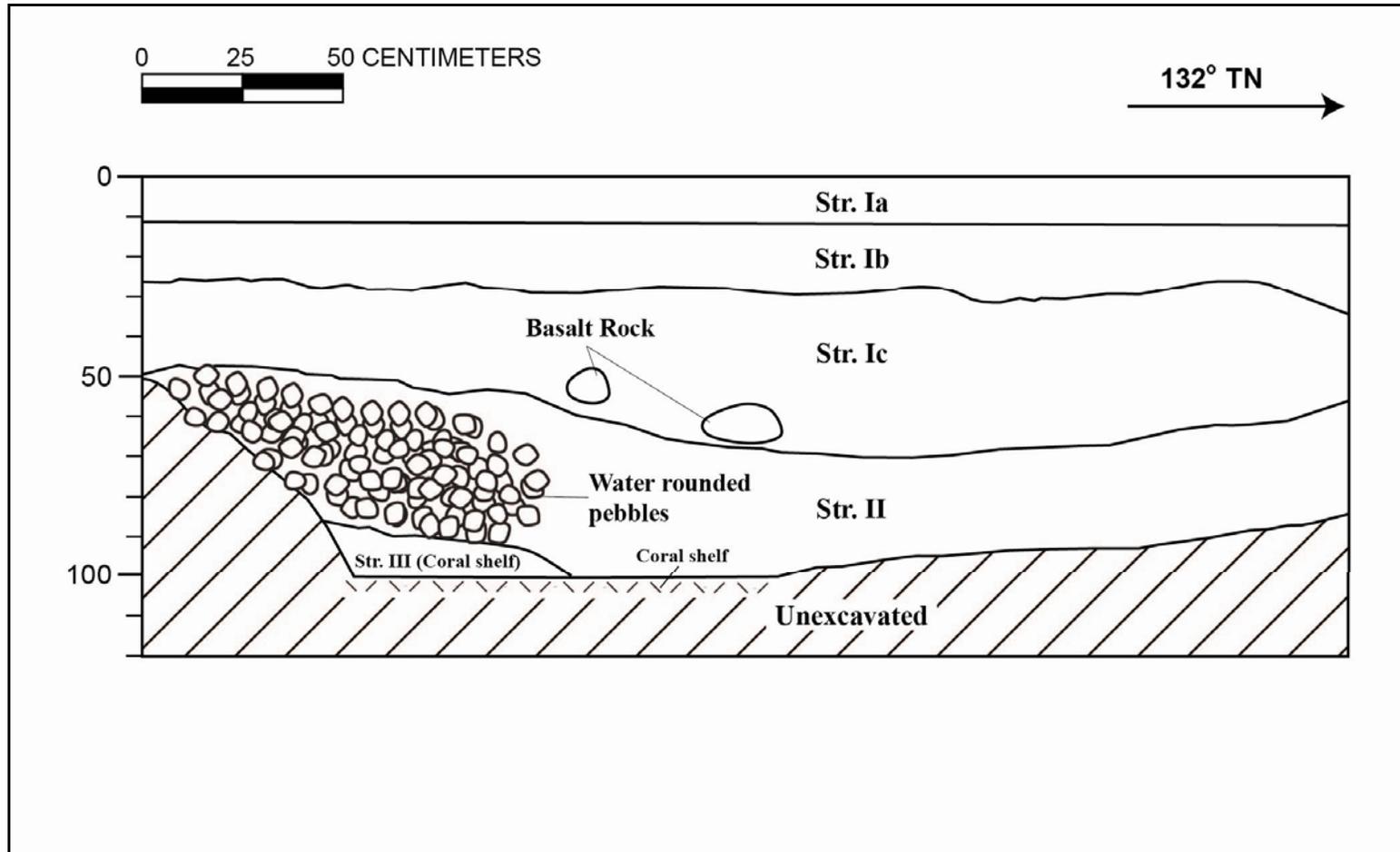
**Summary:** T-030 was excavated to the coral shelf at 1.0 mbs. The stratigraphy of T-030 consisted of fill strata (Ia–Ic) overlying natural sediment (II and III) to the coral shelf. Stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). No archaeological cultural resources were identified in T-030.



T-030 general location, view to the north



T-030 northeast profile wall, view to the northeast



T-030 northeast profile

## T-030 Stratigraphic Description

Stratum	Depth (cmts)	Description
Ia	0–12	Asphalt
Ib	12–35	Fill; 10 YR 8/2 (very pale brown); very gravelly loamy sand; structureless, single-grain; moist, loose consistency; non-plastic; marine origin; abrupt, smooth lower boundary; crushed coral base course
Ic	35–65	Fill; 5 YR 3/2 (dark reddish brown); mottles of 10 YR 6/6 (brownish yellow); sandy clay loam; weak, fine blocky structure; moist, loose consistency; slightly plastic; terrigenous origin; clear, wavy lower boundary; fill
II	50–100	Natural; 10 YR 4/4 (dark yellowish brown); sandy clay loam; weak fine crumb structure; moist, friable consistency; slightly plastic; terrigenous origin; clear, smooth lower boundary; lower boundary only seen on N side of excavation; basalt cobbles and water rounded 30% pebbles; high concentration on northwestern end; southwestern wall has 50% water rounded pebbles
III	87–100 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; coral shelf

### 3.17 Test Excavation 31 (T-031)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	6450:1
<b>TMK #:</b>	1-2-009:001
<b>Elevation Above Sea Level:</b>	7.0 m
<b>UTM:</b>	615972.34 mE, 2358903.65 mN
<b>Max Length/Width/Depth:</b>	3.57 m/0.95 m/1.83 mbs
<b>Orientation:</b>	220/40° TN
<b>Targeted Project Component:</b>	Station Building
<b>USDA Soil Survey Soil:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 31 (T-031) was located in the abandoned Dillingham Café, on the west side of the Dillingham and Mokauea Street intersection. T-031 was located on private property. No existing utilities were indicated to be near T-031. The dimensions of T-031 were adjusted from a planned 6.0 m by 0.6 m to 3.0 m by 0.9 m, and the excavation was shifted 1.6 m east of the original location to avoid damaging the existing building structure. The excavation surface was level with the surrounding land surface.

**Summary of Background Research and Land Use:** The 1883 Brown map of Kalihi and Kapālama (see Figure 17) shows T-031 located within LCA 6450:1. LCA 6450:1 was awarded to Kaunuohua and contained taro *lo'i*. M.D. Monsarrat's 1897 map of Honolulu shows T-031 just outside a rice plantation. The 1919 (see Figure 20), 1933 (see Figure 22), and 1943 U.S. Army War Department maps indicate that between 1919 and 1943, T-031 was within a heavily developed area near the center of Kalihi. The 1953 U.S. Army Mapping Service Honolulu map locates T-031 within the formal Kalihi and Kapālama area.

No previous archaeology was conducted in the vicinity of T-031.

**Documentation Limitations:** T-031 was excavated to the coral shelf at a depth of 1.83 mbs. The northeast end of T-031 was not fully excavated due to the presence of several utilities between 0.5 and 0.6 mbs (see plan view). The status of the metal pipes could not be determined.

**Stratigraphic Summary:** T-031 stratigraphy consisted of multiple fill layers above a single natural layer. Observed strata were concrete/tile (Ia), extremely gravelly sandy loam base course (Ib), very gravelly silty loam (Ic), extremely gravelly loam (Id), gravelly sandy clay loam (Ie), very gravelly sand crushed coral (If), and natural alluvial silty clay loam (II) over the coral shelf (III). Stratum Ie was the re-worked upper boundary of Stratum II. Stratigraphy conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifacts Discussion:** A single metal makeup compact (Acc. #031-A-1) was collected from Stratum Ic at approximately 0.33 mbs. The metal makeup compact had "VALAZE" engraved on the back with "HR" and "Helena Rubinstein Inc." engraved on the sides. The artifact was dated to the 1930s–1940s. The artifact collected from Stratum Ic (imported fill) indicated the fill post-dates 1930.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** The collected terrestrial faunal remains consisted of a single faunal bone (*Sus scrofa*) collected from the back dirt pile of Stratum Ic at approximately 0.30 mbs. The bone was cut with a metal blade.

**Sample Results:** A bulk sediment sample was collected from Stratum II between 0.8 and 1.2 mbs (2.5 L). No material was recovered from the wet-screened and sorted sample.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features although several metal utility pipes were encountered during excavation. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.5 mbs.

GPR depth profiles for T-031 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity that occurred at around 0.35 mbs. No utilities were observed in the profile although several utilities were encountered during excavation. The maximum depth of clean signal return was approximately 0.75 mbs.

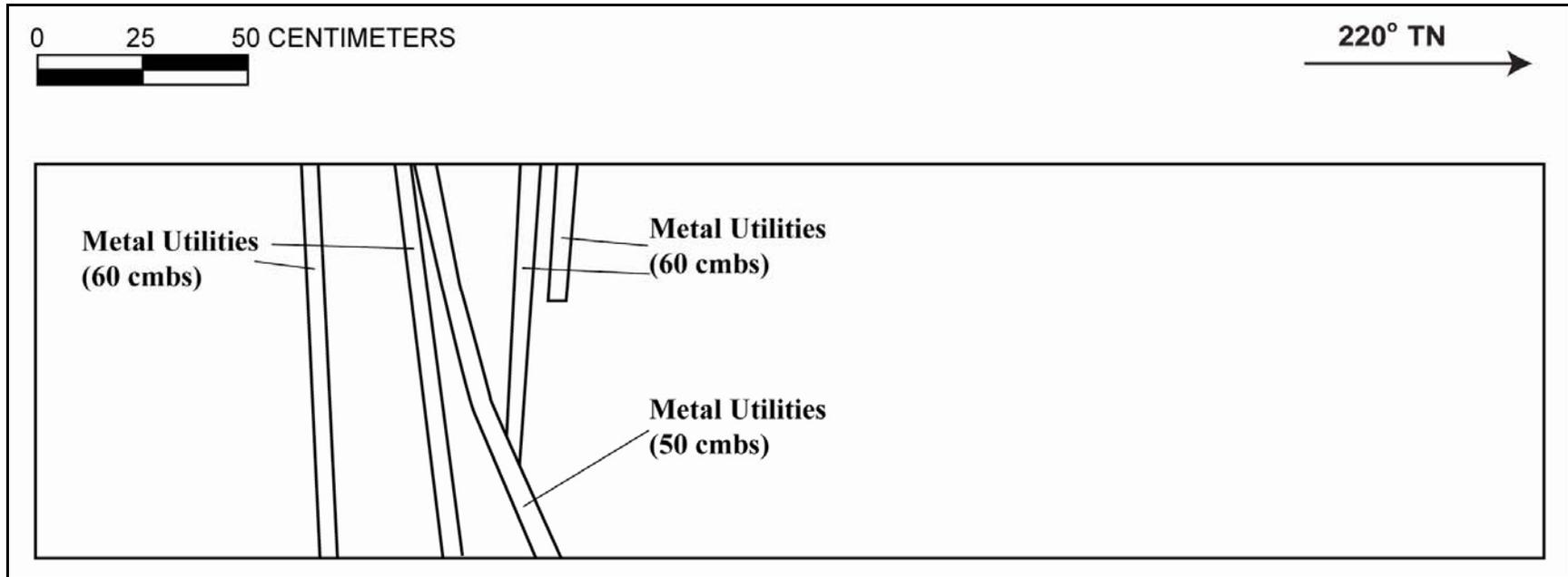
**Summary:** T-031 was excavated to the coral shelf at a depth of 1.83 mbs. T-031 stratigraphy consisted of multiple fill layers (Ia–If) above a single natural layer (II). Stratigraphy conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). The artifact collected was dated 1930s–1940s. The food bone had cut marks. The findings in T-031 indicated fill layers and disturbance of Stratum II was related to urban development of the Kalihi area that began in 1919. No archaeological cultural resources were identified in T-031.



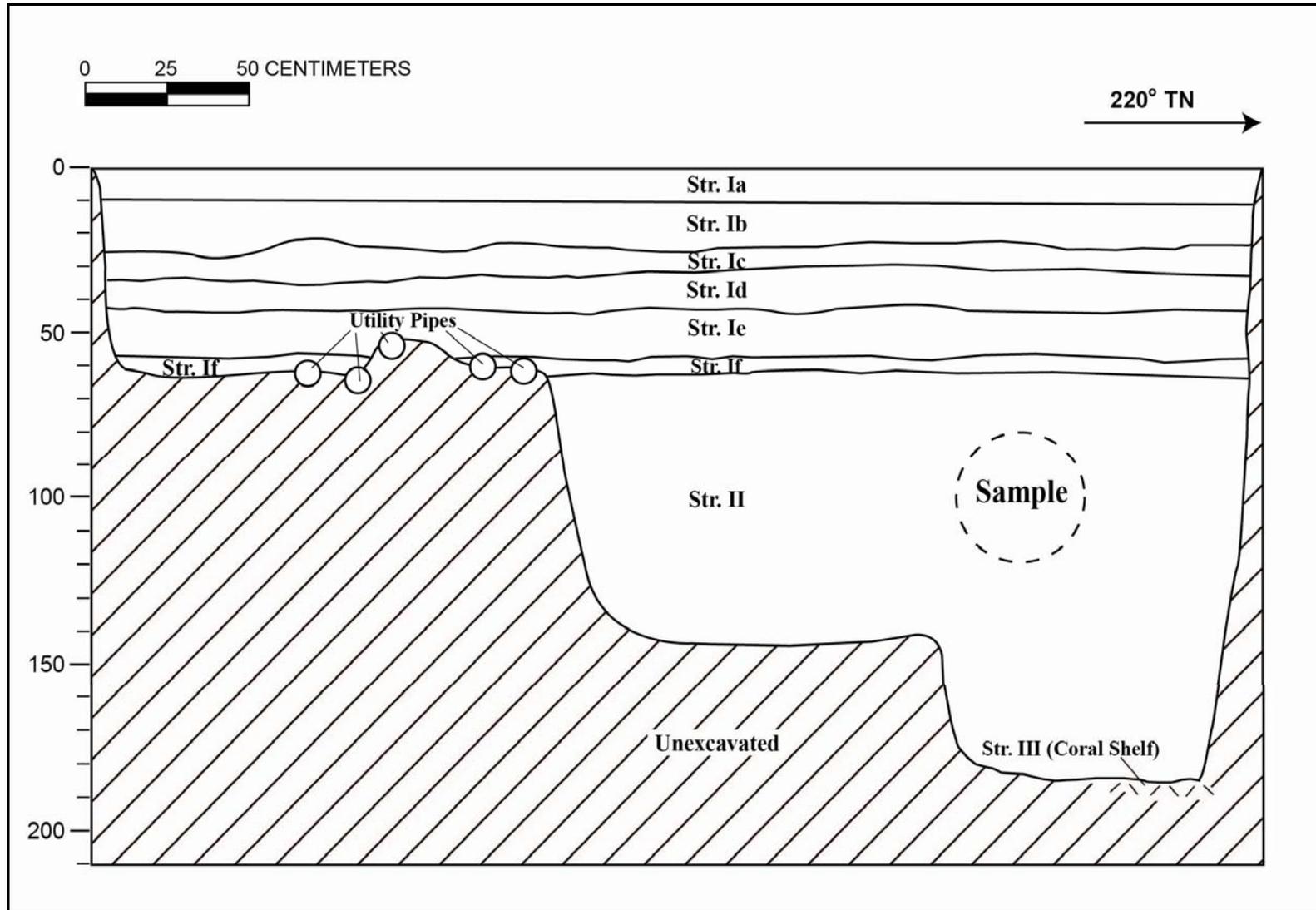
T-031 general location, view to the northeast



T-031 southeast profile wall, view to the southwest



T-031 plan view of the excavation floor between 50 and 60 cmbs (Ie-If)



T-031 southeast wall profile

## T-031 Stratigraphic Description

Stratum	Depth (cmbs)	Description
Ia	0–11	Concrete; tile surface
Ib	11–26	Fill; 10 YR 5/1 (gray); extremely gravelly sandy loam; structureless, single-grain; moist, friable consistency; non-plastic; terrigenous origin; abrupt, smooth lower boundary; gravel base course
Ic	26–33	Fill; 10 YR 3/2 (very dark grayish brown); very gravelly silty loam; weak, fine crumb structure; moist, friable consistency; slightly plastic; terrigenous origin; abrupt, smooth lower boundary; contained cut faunal bone and makeup compact (both collected)
Id	33–44	Fill; 10 YR 5/1 (gray); extremely gravelly loam; structureless, single-grain; moist, friable consistency; non-plastic; terrigenous origin; abrupt, smooth lower boundary; contains asphalt pieces; second gravel base course
Ie	44–57	Fill; 10 YR 3/3 (dark brown); gravelly sandy clay loam; weak, very fine to fine crumb structure; moist, friable to firm consistency; slightly plastic; terrigenous origin; abrupt, smooth lower boundary; possibly locally procured fill of natural alluvium; contains coral gravel/cobble (<15%)
If	57–62	Fill; 10 YR 8/3 (very pale brown); very gravelly sand; weak, fine crumb structure; moist, friable consistency; non-plastic; mixed origin; abrupt, smooth lower boundary; crushed coral base course
II	62–183 (BOE)	Natural; 7.5 YR 3/4 (dark brown); silty clay loam; weak, fine crumb structure; moist, friable consistency; plastic; terrigenous origin; abrupt, smooth lower boundary; few subangular basalt gravel inclusions
III	183 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; coral shelf

### 3.18 Test Excavation 32 (T-032)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	6450:1
<b>TMK #:</b>	1-2-009:001
<b>Elevation Above Sea Level:</b>	7.0 m
<b>UTM:</b>	615982.46 mE, 2358913.57 mN
<b>Max Length/Width/Depth:</b>	6.10 m/0.72 m/1.19 mbs
<b>Orientation:</b>	315/135° TN
<b>Targeted Project Component:</b>	Station Building
<b>USDA Soil Designation:</b>	Ewa silty clay loam (EmA)

**Setting:** Test Excavation 32 (T-032) was located within the paved parking lot of the abandoned Dillingham Café on the west side of the Dillingham and Mokauea Street intersection. T-032 was located on private property. T-032 was not located near any existing utilities. The excavation surface was level with the surrounding land surface.

**Summary of Background Research and Land Use:** Brown's 1883 map of Kalihi and Kapālama (see Figure 17) shows T-032 was located within LCA 6450:1, which was awarded to Kaunuohua and contained taro *lo'i*. M. D. Monsarrat's 1897 map of Honolulu shows T-032 just outside a rice plantation. The 1919 (see Figure 20), 1933 (see Figure 22), and 1943 U.S. Army War Department maps indicate that between 1919 and 1943 T-032 was within a heavily developed area near the center of Kalihi. The 1953 U.S. Army Mapping Service topographic map shows T-032 within the formal Kalihi and Kapālama area.

No previous archaeology was conducted within the vicinity of T-032.

**Documentation Limitations:** T-032 was excavated to the coral shelf at 1.19 mbs. A buried concrete slab at 0.27 mbs initially prevented further excavation. The concrete slab was subsequently removed and T-032 was fully excavated.

**Stratigraphic Summary:** The stratigraphy of T-032 consisted of fill strata overlying natural sediment to the coral shelf. Observed strata were asphalt (Ia), very gravelly sandy loam base course (Ib), and concrete (Ic) overlying silty clay loam (IIa) and silty sandy loam (IIb) to the coral shelf (III). Stratum Ic was a modern buried surface younger than 50 years old and was not considered a cultural resource. The stratigraphy conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** A bulk sediment sample was collected from Stratum IIa at 0.53–0.72 mbs (1.0 L). It was wet screened and sorted and yielded no material.

**GPR Discussion:** A review of amplitude slice maps indicated no linear features although a concrete slab was encountered during excavation. Reflectivity was relatively uniform throughout the grid and decreased with depth. A transition from higher reflectivity to lower reflectivity was observed at approximately 0.75 mbs.

GPR depth profiles for T-032 identified horizontal banding, commonly associated with stratigraphic layering, throughout the survey area. This banding corresponded to variations of density and chemical composition within fill deposits. The profile also indicated a change in reflectivity at around 0.15 mbs. No utilities were observed in the profile although a concrete slab was encountered during excavation. The maximum depth of clean signal return was approximately 0.9 mbs.

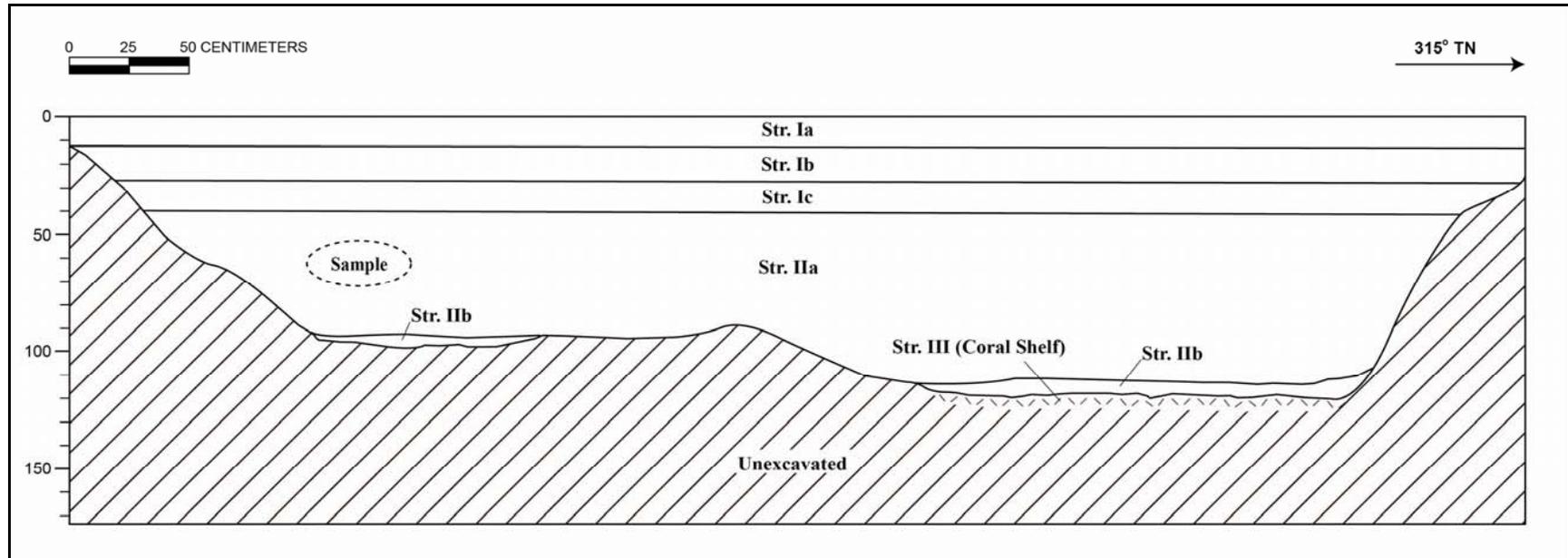
**Summary:** T-032 was excavated to the coral shelf at 1.19 mbs. The stratigraphy of T-032 consisted of fill strata (Ia–Ic) overlying natural sediment (IIa and IIb) to the coral shelf (III). Stratum Ic was a modern buried concrete slab younger than 50 years old. The stratigraphy conformed to the USDA soil survey designation of Ewa silty clay loam (EmA). No archaeological cultural resources were identified in T-032.



T-032 general location, view to the northwest



T-032 southwest profile wall, view to the south



T-032 southwest wall profile

## T-032 Stratigraphic Description

Stratum	Depth (cmbs)	Description
Ia	0–13	Asphalt
Ib	13–27	Fill; 10 YR 3/2 (very dark grayish brown); very gravelly sandy loam; structureless, single-grain; moist, loose consistency; non-plastic; terrigenous origin; abrupt, smooth lower boundary; gravel base course
Ic	27–40	Buried concrete slab
IIa	40–112	Natural; 5 YR 3/2 (dark reddish brown); silty clay loam; weak, fine blocky structure; moist, friable consistency; plastic; terrigenous origin; diffuse, wavy lower boundary; natural alluvial deposit with water-worn cobbles
IIb	95–119	Natural; 10 YR 6/8 (brownish yellow); silty sandy loam; fine crumb structure; friable consistency; non-plastic; mixed origin; abrupt, smooth lower boundary; natural sediment, coral oxidizing within sediment
III	119 (BOE)	Natural; 10 YR 5/8 (yellowish brown); coral; structureless, massive; indurated consistency; non-plastic; marine origin; lower boundary not visible; exposed coral shelf

### 3.19 Test Excavation 33 (T-033)

<b>Ahupua'a:</b>	Kalihi
<b>LCA:</b>	6450:1
<b>TMK #:</b>	1-2-009 [Plat]
<b>Elevation Above Sea Level:</b>	6.9 m
<b>UTM:</b>	615993.28 mE, 2358928.36 mN
<b>Max Length/Width/Depth:</b>	3.10 m/0.92 m/1.20 mbs
<b>Orientation:</b>	312/132° TN
<b>Targeted Project Component:</b>	Station Column
<b>USDA Soil Designation :</b>	Ewa silty clay loam (EmA)

**Setting:** Test excavation 33 (T-033) was located within the left eastbound turn lane of Dillingham Boulevard, approximately 40 m northwest of the Mokauea Street intersection. T-033 was located on public property owned by the City and County of Honolulu. Two waterlines (3.8 m southwest and 4.3 m southeast) and an AT&T line (2.8 m northeast) were located near T-033. The excavation surface was level with the surrounding land surface.

**Summary of Background Research and Land Use:** Brown's 1883 map of Kalihi and Kapālama (see Figure 17) depict T-033 within LCA 6450:1, or the *'ili of Mokauea* (737.76 acres), awarded to Kaunuohua. There was no description of land use in the award. However, East Kalihi LCA documentation indicates land use consisted of *lo'i*, *kula*, and *loko*. M. D. Monsarrat's 1897 map shows T-033 was located southeast of a rice plantation. The 1919 (see Figure 20), 1933 (see Figure 22), and 1943 U.S. Army War Department maps indicate that between 1919 and 1943 the region that surrounded T-033 was developed heavily with increased street grids and structures. The 1953 U.S. Army Mapping Service topographic map shows that the formal Kalihi and Kapālama area had developed to its present configuration by this time.

No previous archaeology was conducted within the vicinity of T-033.

**Documentation Limitations:** T-033 was excavated to the coral shelf at 1.2 mbs. There were no factors that limited the documentation of T-033.

**Stratigraphic Summary:** The stratigraphy of T-033 consisted of fill strata overlying natural sediment to the coral shelf. Observed strata were asphalt (Ia), very gravelly loamy sand crushed coral base course (Ib), and silty clay (II) to the coral shelf (III). The stratigraphy generally conformed to the USDA soil survey designation of Ewa silty clay loam (EmA).

**Artifact Discussion:** No artifacts were observed.

**Feature Discussion:** No features were observed.

**Terrestrial Faunal Remains Discussion:** No terrestrial faunal remains were collected individually during excavation.

**Sample Results:** No sample analysis was conducted.