Archaeological Resources Technical Report
Honolulu High-Capacity Transit Corridor Project

August 15, 2008

Prepared for:
City and County of Honolulu

Preface

The work covered in this report was completed by Cultural Surveys Hawai‘i, Inc.

This technical report supports the Draft Environmental Impact Statement (EIS) prepared for the Honolulu High-Capacity Transit Corridor Project. It provides additional detail and information as it relates to:

- Methodology used for the analysis
- Applicable regulations
- Results of the technical analysis
- Proposed mitigation
- Coordination and consultation (as appropriate)
- References
- Model output (as appropriate)
- Other information/data

As described in the Draft EIS, the Locally Preferred Alternative, called the “Full Project,” is an approximate 30-mile corridor from Kapolei to the University of Hawai‘i at Mānoa with a connection to Waikīkī. However, currently available funding sources are not sufficient to fund the Full Project. Therefore, the focus of the Draft EIS is on the “First Project,” a fundable approximately 20-mile section between East Kapolei and Ala Moana Center. The First Project is identified as “the Project” for the purpose of the Draft EIS.

This technical report documents the detailed analysis completed for the Full Project, which includes the planned extensions, related transit stations, and construction phasing. The planned extensions and related construction planning have not been fully evaluated in the Draft EIS and are qualitatively discussed in the Cumulative Effects section of the Draft EIS as a foreseeable future project(s). Once funding is identified for these extensions, a full environmental evaluation will be completed in a separate environmental study (or studies), as appropriate.

Figure 1-3 through Figure 1-6 (in Chapter 1, Background) show the proposed Build Alternatives and transit stations, including the areas designated as planned extensions.

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Acronyms and Abbreviations

APE	area of potential effect
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSH	Cultural Surveys Hawai‘i, Inc.
DLNR	City and County of Honolulu Department of Land and Natural Resources
DTS	City and County of Honolulu Department of Transportation Services
EIS	environmental impact statement
EPA	Environmental Protection Agency
‘Ewa (direction)	toward the west (see also Wai‘anae)
FTA	Federal Transit Administration
GPR	ground-penetrating radar
H-1	Interstate Route H-1 (the H-1 Freeway)
HAR	Hawai‘i Administrative Rules
HECO	Hawaiian Electric Company
HRS	Hawai‘i Revised Statutes
HRT&L	Honolulu Rapid Transit & Land, Ltd.
Koko Head (direction)	toward the east
kV	kilovolt
LCA	Land Commission Award
makai (direction)	toward the sea
mauka (direction)	toward the mountains
MOA	memorandum of agreement
mph	miles per hour
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
O‘ahuMPO	O‘ahu Metropolitan Planning Organization
OR&L	O‘ahu Railway & Land Co.

PHRI	Paul H. Rosendahl, Ph.D. Inc.
SHPD	State Historic Preservation Division
SHPO	State Historic Preservation Officer
SIHP	State Inventory of Historic Properties
TMK	Tax Map Key
TPSS	traction power substation
UH	University of Hawai‘i
USDA	United States Department of Agriculture
Wai‘anae (direction)	toward the west (see also ‘Ewa)
WWII	World War II

Summary

The City and County of Honolulu Department of Transportation Services Rapid Transit Division (RTD), in coordination with the U.S. Department of Transportation Federal Transit Administration (FTA), is preparing a Draft Environmental Impact Statement (EIS) to evaluate alternatives that would provide high-capacity transit service on O'ahu. The Honolulu High-Capacity Transit Corridor Project's primary study area is the travel corridor between Kapolei and the University of Hawai'i (UH) at Mānoa, with a connection to Waikīkī. The alternatives being considered are as follows:

1. No Build
2. Fixed Guideway Transit Alternative via Salt Lake Boulevard (Salt Lake Alternative)
3. Fixed Guideway Transit Alternative via the Airport (Airport Alternative)
4. Fixed Guideway Transit Alternative via the Airport & Salt Lake (Airport & Salt Lake Alternative)

Because the Project is receiving Federal funds, it must comply with both State and Federal historic preservation regulations, including Section 106 of the National Historic Preservation Act (CFR 1986), the National Environmental Policy Act (NEPA), the Department of Transportation Act, State of Hawai'i environmental and historic preservation review legislation, and State of Hawai'i burial law. Additional compliance with the Federal Archaeological Resource Protection Act and Native American Graves Protection and Repatriation Act may be required pending the investigation, use, and/or appropriation of Federal lands.

For this Archaeological Resources Technical Report, the analysis identifies likely impacts to archaeological resources within the archaeological study area, which is divided and described in ten sub-areas from Kapolei to Waikīkī (Table S-1, Figure S-1). The Salt Lake and Airport Alternatives are individual sections of the archaeological study area and considered as separate units. The relative greater or lesser impacts to archaeological resources are evaluated depending on which alternative might be selected.

Three general categories of impacts on archaeological resource are identified: burials, pre-contact (A.D. 1778) archaeology, and post-contact archaeology. With few exceptions, the archaeological resources that could be affected by the Project are subsurface features and deposits that have not been previously identified. Such impacts would occur during construction. Once negative impacts from construction (e.g., archaeological resource destruction) and positive impacts from construction (e.g., an increase in archaeological knowledge about O'ahu's south shore) have occurred, no long-term project-related impacts are expected on archaeological resources.

The No Build Alternative may involve construction by others not related to the Project that could impact archaeological resources. However, these impacts are not considered in this archaeological technical report because any construction derived from projects

approved in the No Build Alternative would undergo a separate environmental review as part of its planning and implementation.

Table S-1: Summary of Archaeological Consequences by Archaeological Study Sub-Area

Archaeological Study Sub-Areas	Burials	Pre-Contact Archaeological Resources	Post-Contact Archaeological Resources
Honouliuli Sub-Area*	Low	Low	Low
Farrington Highway Sub-Area	Moderate	Moderate	Moderate
Kamehameha Highway Sub-Area	Moderate	Moderate	Moderate
Salt Lake Sub-Area	Moderate	Moderate	Moderate
Airport Sub-Area	Low	Moderate	Low
Dillingham Sub-Area	High	High	High
Downtown Sub-Area	High	High	High
Kaka'ako Sub-Area	High	High	High
Mānoa Sub-Area*	Moderate	Moderate	Moderate
Waikīkī Sub-Area*	High	High	High

* These sub-areas are located in the planned extensions

Construction of any of the Build Alternatives would result in impacts to pre-contact and post-contact archaeology and burials and would be considered High/Moderate (Table S-2). Based on the impacts analysis, selection of the Airport Alternative would result in a somewhat lesser impact on archaeological resources than either the Salt Lake Alternative or the Airport & Salt Lake Alternative (Table S-2). Impacts to burials, pre-contact archaeological resources, and post-contact archaeological resources unique to the Airport Alternative are considered Low, Moderate, and Low, respectively. Impacts to burials, pre-contact archaeological resources, and post-contact archaeological resources unique to both the Salt Lake and the Airport & Salt Lake Alternatives (i.e., along Salt Lake Boulevard) are all considered Moderate.

Potential project consequences and the Project's required effort for archaeological resource identification, significance evaluation, and mitigation are directly related. For example, where project impacts to archaeological resources are likely to be High, the effort associated with the Project's archaeological resource identification and mitigation is also likely to be High. Table S-1 summarizes archaeological consequences by the various archaeological study sub-areas. These High, Moderate, and Low assessments for archaeological impacts are also an assessment of the likely archaeological inventory survey and mitigation work that would be needed for each archaeological study sub-area.

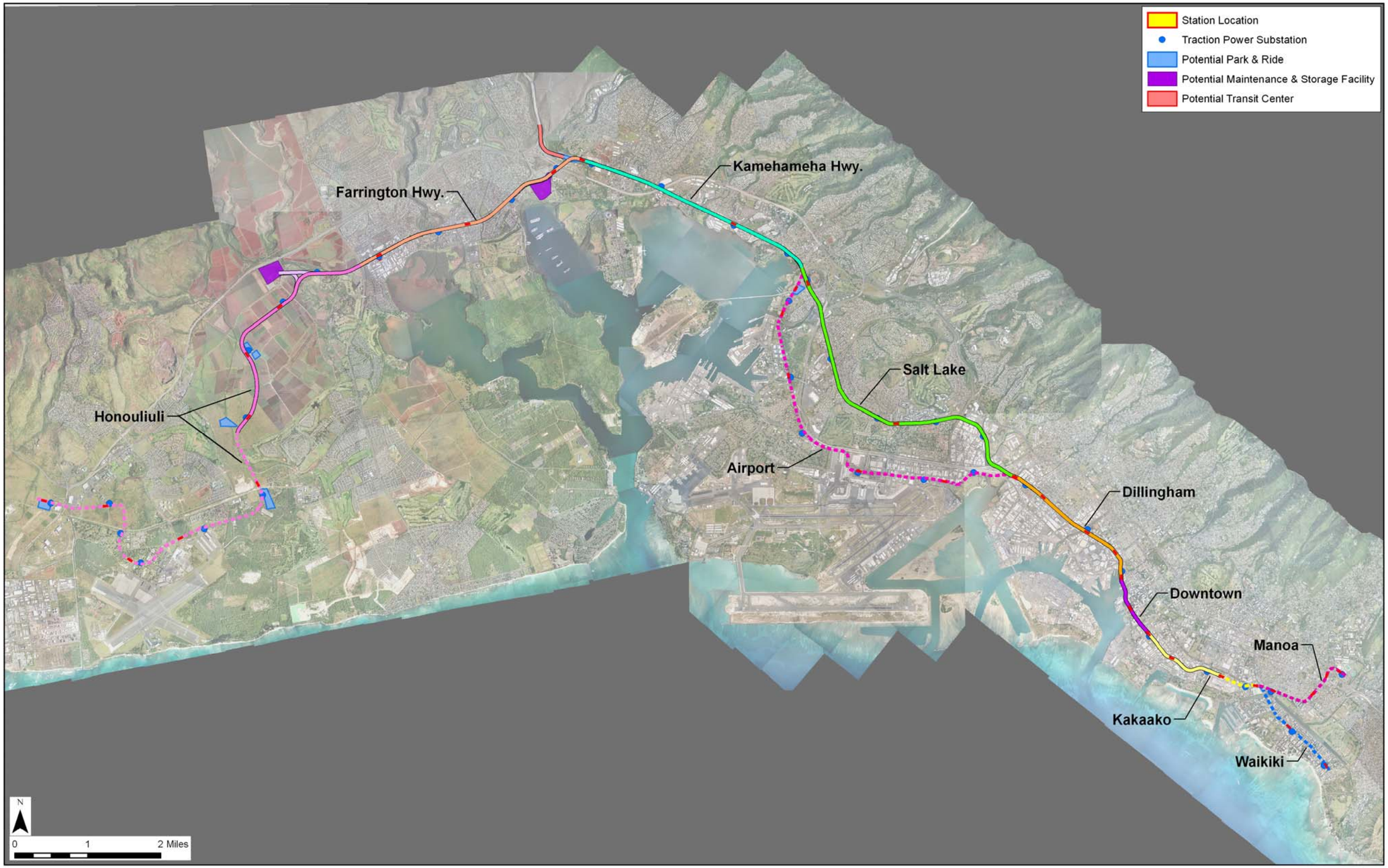

Figure S-1: Map of the Ten Archaeological Sub-Areas

Table S-2: Summary of Archaeological Consequences

Alternative	Burials	Pre-Contact Archaeological Resources	Post-Contact Archaeological Resources
No Build	N/A	N/A	N/A
Consequences Common to All Build Alternatives	High/Moderate	High/Moderate	High/Moderate
Salt Lake	Moderate	Moderate	Moderate
Airport	Low	Moderate	Low
Airport & Salt Lake	Moderate	Moderate	Moderate

Note: Because of the types of archaeological resources potentially affected and the surrounding built environment, all consequences are direct and construction related. Secondary and/or cumulative consequences are not applicable.

1 Background

1.1 Introduction

The City and County of Honolulu Department of Transportation Services Rapid Transit Division (RTD), in cooperation with the U.S. Department of Transportation Federal Transit Administration (FTA), is evaluating fixed-guideway alternatives that would provide high-capacity transit service on O‘ahu. The project study area is the travel corridor between Kapolei and the University of Hawai‘i at Mānoa (UH Mānoa) (Figure 1-1). This corridor includes the majority of housing and employment on O‘ahu. The east-west length of the corridor is approximately 23 miles. The north-south width is, at most, 4 miles because the Ko‘olau and Wai‘anae Mountain Ranges bound much of the corridor to the north and the Pacific Ocean to the south.

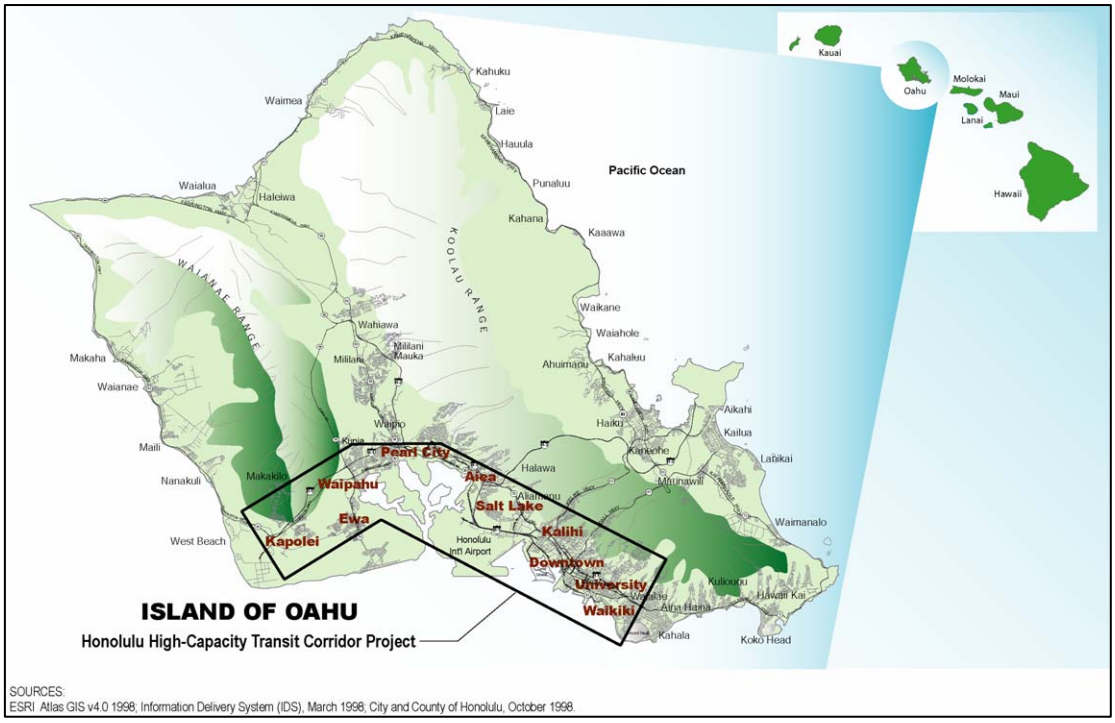

Figure 1-1: Project Vicinity

1.2 Description of the Study Corridor

The Honolulu High-Capacity Transit Corridor extends from Kapolei in the west (Wai‘anae or ‘Ewa direction) to UH Mānoa in the east (Koko Head direction) and is confined by the Wai‘anae and Ko‘olau Mountain Ranges in the mauka direction (towards the mountains, generally to the north within the study corridor) and the Pacific Ocean in the makai direction (towards the sea, generally to the south within the study corridor). Between Pearl City and ‘Aiea, the corridor’s width is less than 1 mile between Pearl Harbor and the base of the Ko‘olau Mountains (Figure 1-2).

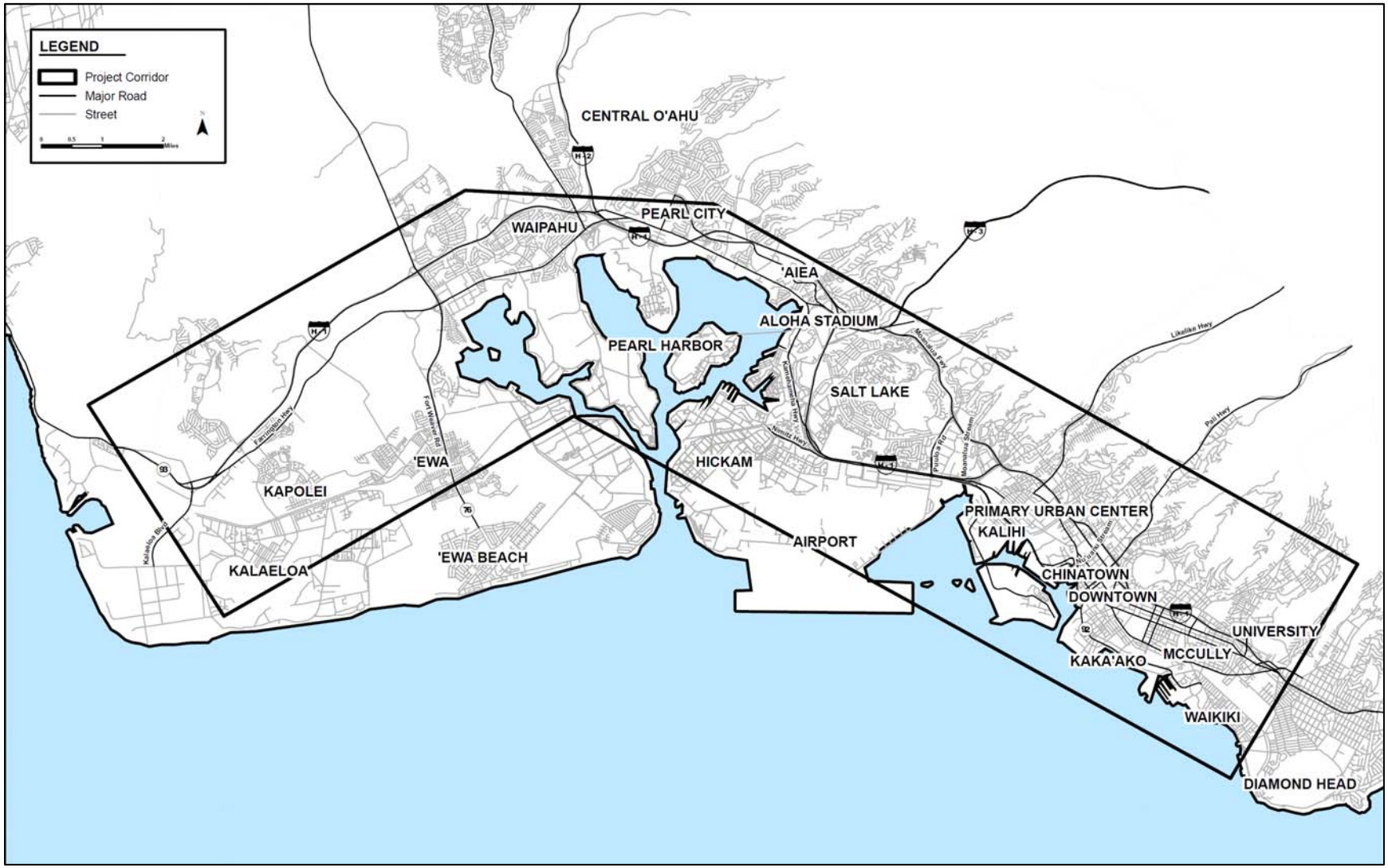

Figure 1-2: Areas and Districts in the Study Corridor

1.3 Alternatives

Four alternatives are being evaluated in the Environmental Impact Statement (EIS). They were developed through a screening process that considered alternatives identified through previous transit studies, a field review of the study corridor, an analysis of current and projected population and employment data for the corridor, a literature review of technology modes, work completed by the Oʻahu Metropolitan Planning Organization (OʻahuMPO) for its *Oʻahu Regional Transportation Plan 2030* (ORTP) (OʻahuMPO 2007), a rigorous Alternatives Analysis process, selection of a Locally Preferred Alternative by the City Council, and public and agency comments received during the separate formal project scoping processes held to satisfy National Environmental Policy Act (NEPA) (USC 1969) requirements and the Hawaiʻi EIS Law (Chapter 343) (HRS 2008). The alternatives evaluated are as follows:

1. No Build Alternative
2. Salt Lake Alternative
3. Airport Alternative
4. Airport & Salt Lake Alternative

1.3.1 No Build Alternative

The No Build Alternative includes existing transit and highway facilities and committed transportation projects anticipated to be operational by 2030. Committed transportation projects are those identified in the ORTP*,* as amended (OʻahuMPO 2007). Highway elements of the No Build Alternative also are included in the Build Alternatives. The No Build Alternative would include an increase in bus fleet size to accommodate growth, allowing service frequencies to remain the same as today.

1.3.2 Build Alternatives

The fixed guideway alternatives would include the construction and operation of a grade-separated fixed guideway transit system between East Kapolei and Ala Moana Center (Figure 1-3 to Figure 1-6). Planned extensions are anticipated to West Kapolei, UH Mānoa, and Waikīkī. The system evaluated a range of fixed-guideway transit technologies that met performance requirements, which could be either automated or employ drivers. All parts of the system would either be elevated or in exclusive right-of-way.

Steel-wheel-on-steel-rail transit technology has been proposed through a comparative process based on the ability of various transit technologies to cost-effectively meet project requirements. As such, this technology is assumed in this analysis.

The guideway would follow the same alignment for all Build Alternatives through most of the study corridor. The Project would begin by following North-South Road and other future roadways to Farrington Highway. Proposed station locations and

other project features in this area are shown in Figure 1-3. The guideway would follow Farrington Highway Koko Head on an elevated structure and continue along Kamehameha Highway to the vicinity of Aloha Stadium (Figure 1-4).

Between Aloha Stadium and Kalihi, the alignment differs for each of the Build Alternatives, as detailed later in this section (Figure 1-5). Koko Head of Middle Street, the guideway would follow Dillingham Boulevard to the vicinity of Ka‘aahi Street and then turn Koko Head to connect to Nimitz Highway in the vicinity of Iwilei Road.

The alignment would follow Nimitz Highway Koko Head to Halekauwila Street, then along Halekauwila Street past Ward Avenue, where it would transition to Queen Street and Kona Street. Property on the mauka side of Waimanu Street would be acquired to allow the alignment to cross over to Kona Street. The guideway would run above Kona Street through Ala Moana Center.

Planned extensions would connect at both ends of the corridor. At the Wai‘anae end of the corridor, the alignment would follow Kapolei Parkway to Wākea Street and then turn makai to Saratoga Avenue. The guideway would continue on future extensions of Saratoga Avenue and North-South Road. At the Koko Head end of the corridor, the alignment would veer mauka from Ala Moana Center to follow Kapi‘olani Boulevard to University Avenue, where it would again turn mauka to follow University Avenue over the H-1 Freeway to a proposed terminal facility in UH Mānoa’s Lower Campus. A branch line with a transfer point at Ala Moana Center or the Hawai‘i Convention Center into Waikīkī would follow Kalākaua Avenue to Kūhiō Avenue to end near Kapahulu Avenue (Figure 1-6).

Salt Lake Alternative

The Salt Lake Alternative would leave Kamehameha Highway immediately ‘Ewa of Aloha Stadium, cross the Aloha Stadium parking lot, and continue Koko Head along Salt Lake Boulevard (Figure 1-5). It would follow Pūkōloa Street through Māpunapuna before crossing Moanalua Stream, turning makai, crossing the H-1 Freeway and continuing to the Middle Street Transit Center. Stations would be constructed near Aloha Stadium and Ala Liliko‘i. The total guideway length for this alternative would be approximately 19 miles and it would include 19 stations. The eventual guideway length, including planned extensions, for this alternative would be approximately 28 miles and it would include 31 stations.

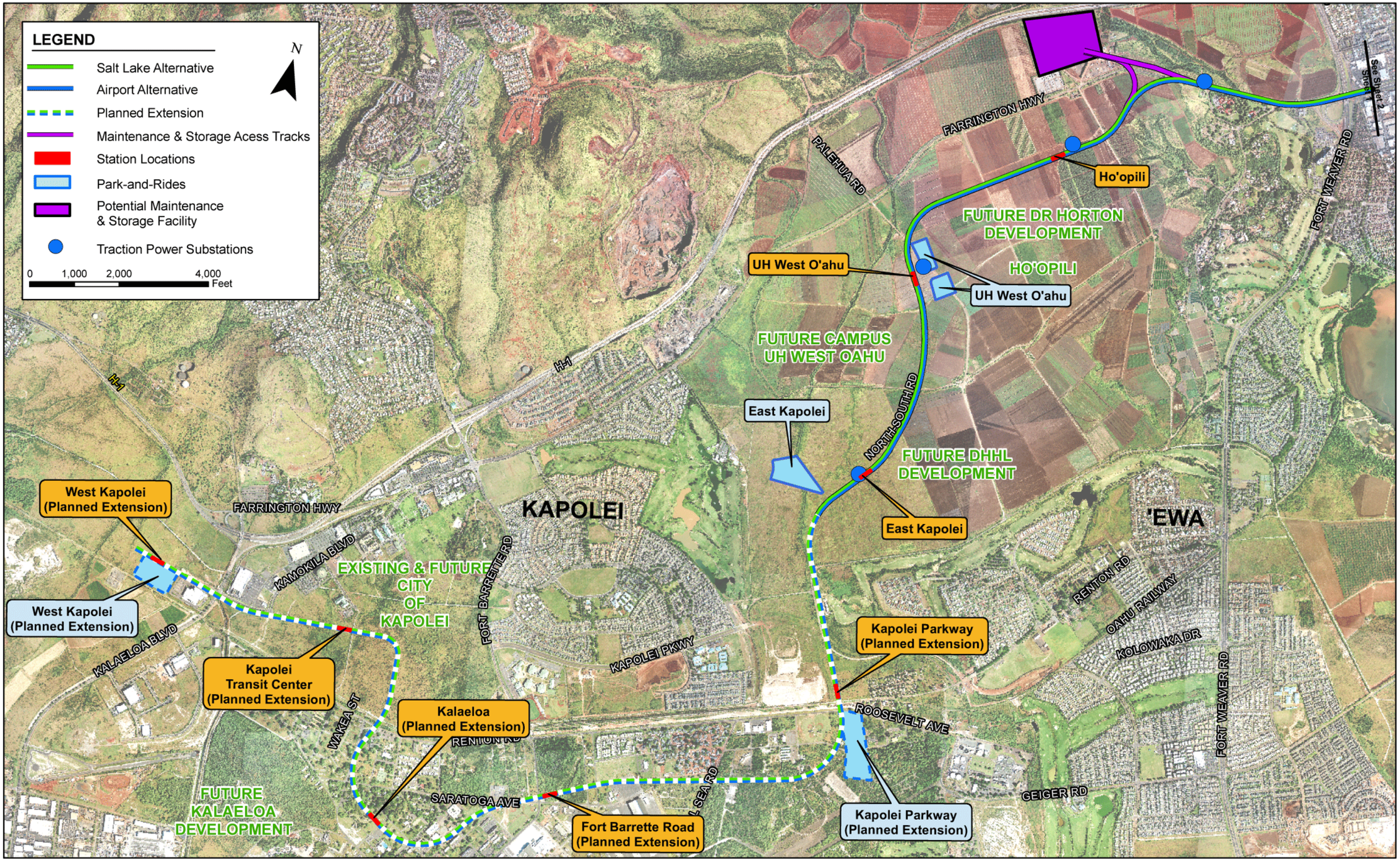

Figure 1-3: Fixed Guideway Transit Alternative Features (Kapolei to Fort Weaver Road)

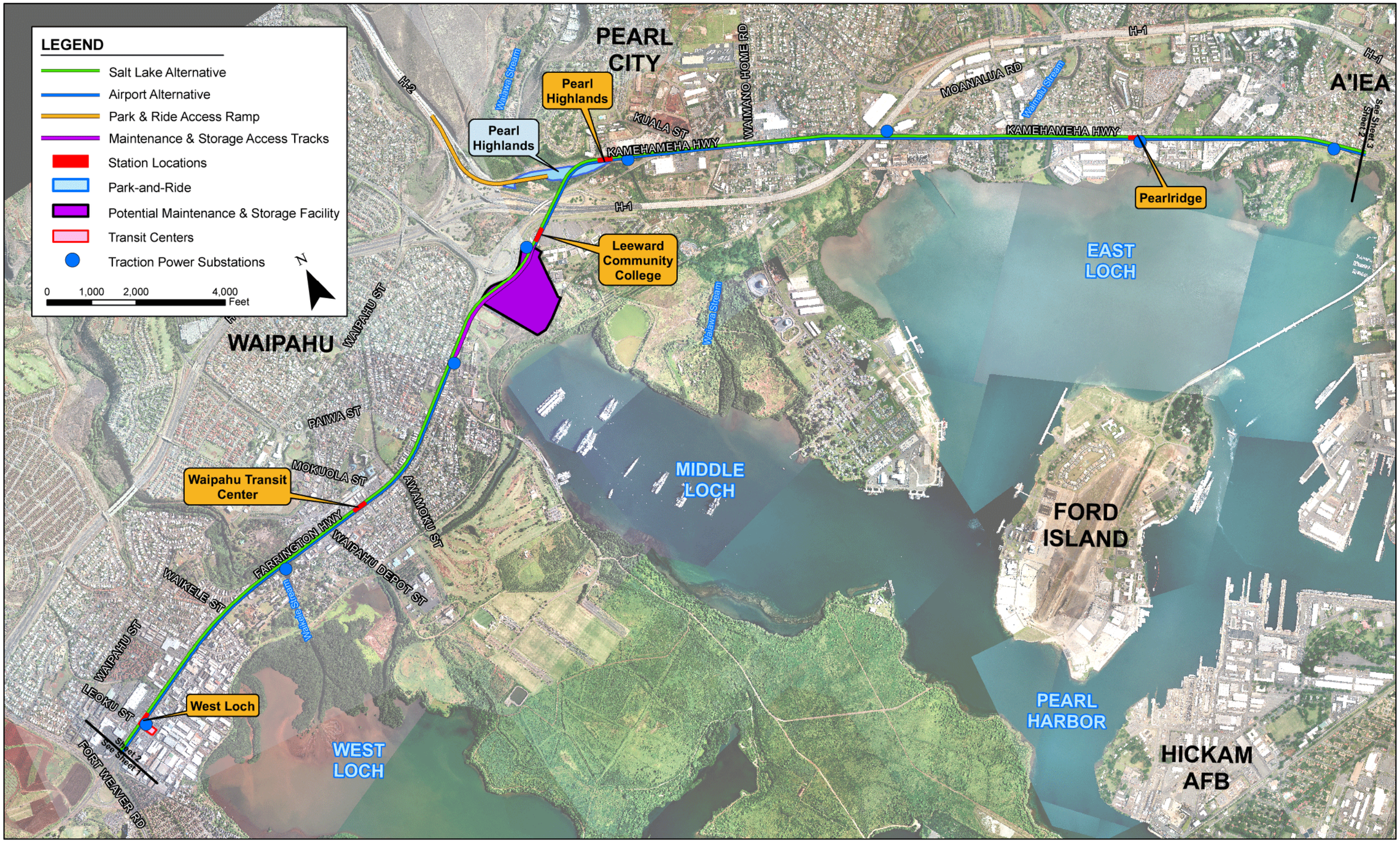

Figure 1-4: Fixed Guideway Transit Alternative Features (Fort Weaver Road to Aloha Stadium)

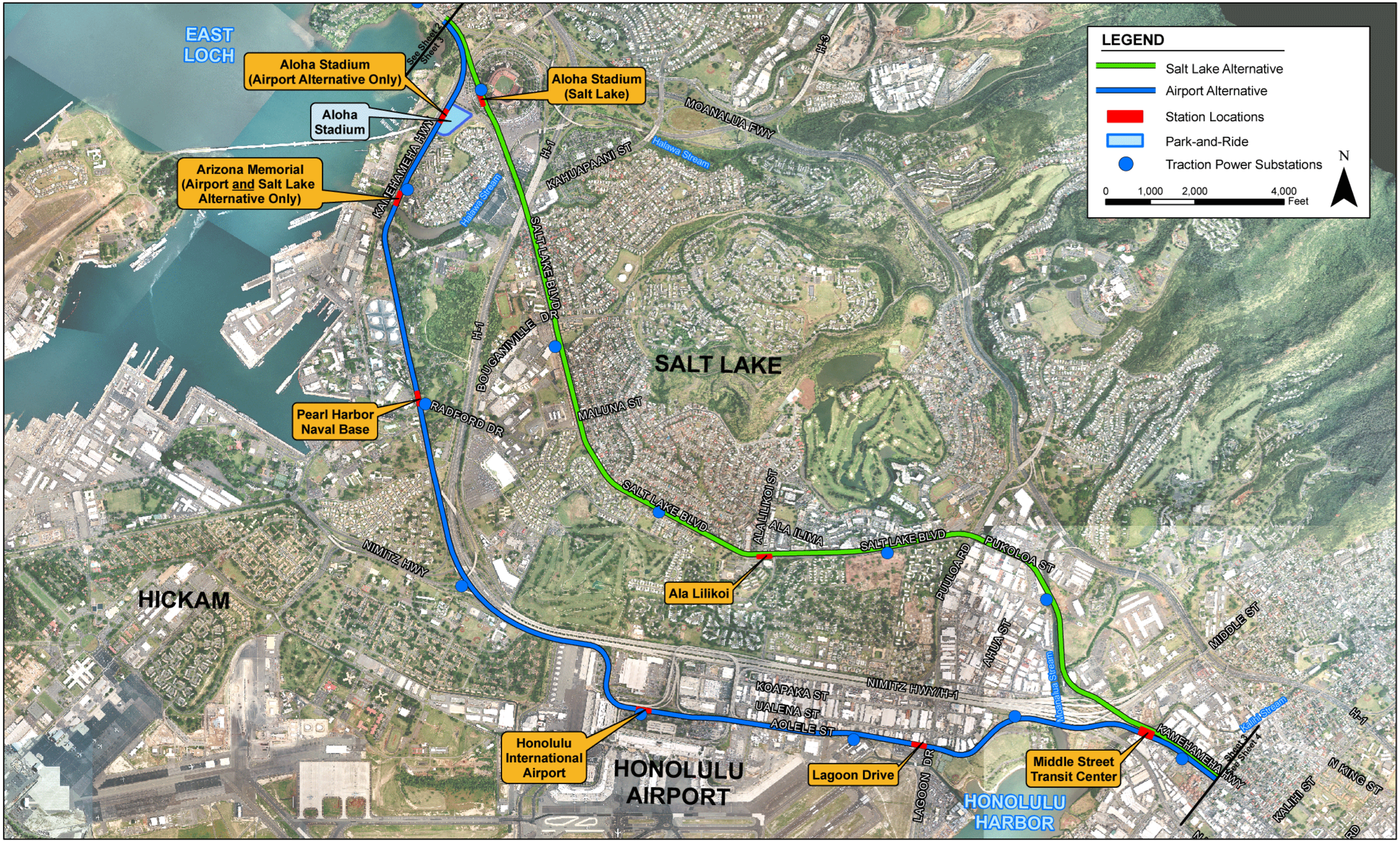

Figure 1-5: Fixed Guideway Transit Alternative Features (Aloha Stadium to Kalihi)

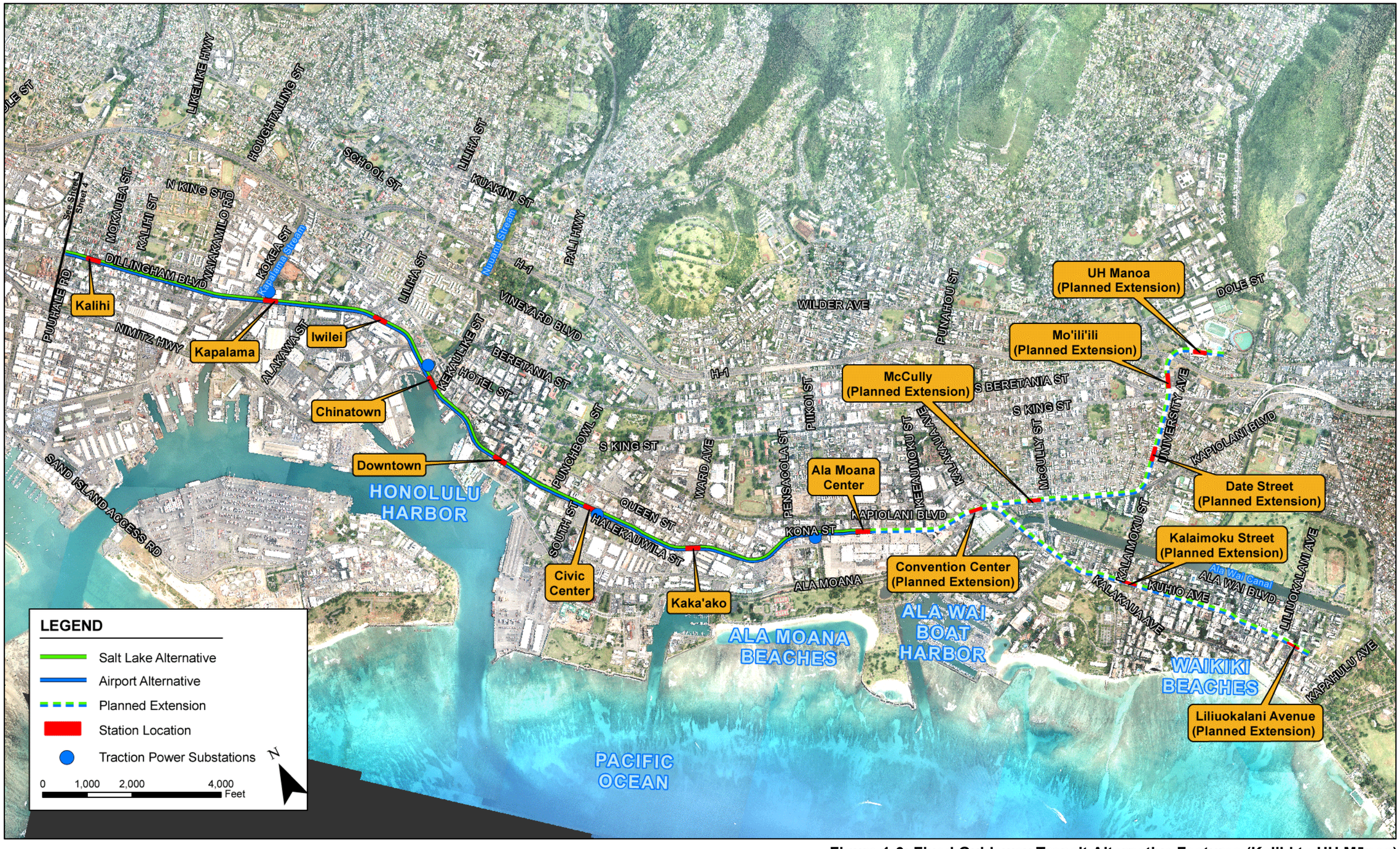

Figure 1-6: Fixed Guideway Transit Alternative Features (Kalihi to UH Mānoa)

Airport Alternative

The Airport Alternative would continue along Kamehameha Highway makai past Aloha Stadium to Nimitz Highway and turn makai onto Aolele Street and then follow Aolele Street Koko Head to reconnect to Nimitz Highway near Moanalua Stream and continuing to the Middle Street Transit Center (Figure 1-5). Stations would be constructed at Aloha Stadium, Pearl Harbor Naval Base, Honolulu International Airport, and Lagoon Drive. The total guideway length for this alternative would be approximately 20 miles and it would include 21 stations. The eventual guideway length, including planned extensions, for this alternative would be approximately 29 miles and it would include 33 stations.

Airport & Salt Lake Alternative

The Airport & Salt Lake Alternative is identical to the Salt Lake Alternative, with the exception of also including a future fork in the alignment following Kamehameha Highway and Aolele Street at Aloha Stadium that rejoins at Middle Street. The station locations discussed for the Salt Lake Alternative would all be provided as part of this alternative. Similarly, all the stations discussed for the Airport Alternative also would be constructed at a later phase of the project; however, the Aloha Stadium Station would be relocated makai to provide an Arizona Memorial Station instead of a second Aloha Stadium Station. At the Middle Street Transit Center Station, each line would have a separate platform with a mezzanine providing a pedestrian connection between them to allow passengers to transfer. The total guideway length for this alternative would be approximately 24 miles and it would include 23 stations. The eventual guideway length, including planned extensions, for this alternative would be approximately 34 miles and it would include 35 stations.

1.3.3 Features Common to All Build Alternatives

In addition to the guideway, the project will require the construction of stations and supporting facilities. Supporting facilities include a maintenance and storage facility, transit centers, park-and-ride lots, and traction power substations (TPSS). The maintenance and storage facility would either be located between North-South Road and Fort Weaver Road or near Leeward Community College (Figure 1-3 and Figure 1-4). Some bus service would be reconfigured to transport riders on local buses to nearby fixed guideway transit stations. To support this system, the bus fleet would be expanded.

2 Studies and Coordination

2.1 Historic Preservation Regulatory Context

Because the Project would receive Federal funds, it must comply with Section 106 of the National Historic Preservation Act (CFR 1986), the National Environmental Policy Act (NEPA), and the Department of Transportation Act. Because portions of the Project may involve investigation, use, and/or appropriation of Federal lands (e.g., land from U.S. military installations), compliance with the Federal Archaeological Resource Protection Act and Native American Graves Protection and Repatriation Act may be required. Additionally, as a State of Hawai'i and City and County of Honolulu project within State and County property, the Project will be subject to State of Hawai'i environmental and historic preservation review legislation (Hawai'i Revised Statutes (HRS) Chapter 343 and HRS 6E-8/Hawai'i Administrative Rules (HAR) Chapter 13-275, respectively). Compliance with State of Hawai'i burial law (HRS Chapter 6E-43 and HAR Chapter 13-300) will also likely be necessary. These historic preservation regulations, as they apply to archaeological resources, are described briefly below:

- NEPA (101[b][4]) establishes a Federal policy of preserving not only the natural aspects but also the historic, cultural, and archaeological aspects of American national heritage when undertakings regulated by Federal agencies are planned. Implementing regulations (40 CFR 1502.16[g]) issued by the Council on Environmental Quality stipulate that the consequences of Federal actions on historic, cultural, and archaeological resources must be analyzed.
- Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to consider the effects of their activities and programs on cultural (including archaeological) resources that are listed on or eligible for listing on the National Register of Historic Places (National Register).
- Section 4(f) of the Department of Transportation Act of 1966, re-codified in 1983 as 49 USC 303(c), established a Federal policy of making special efforts to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Section 4(f) stipulates that the U.S. Department of Transportation may only approve a program or project that uses or otherwise affects land from any significant historic site (including certain types of archaeological sites) if two conditions are met. First, there must be no prudent and feasible alternative to the use of the land from the property. Second, the action must include all possible planning to minimize harm to the property resulting from such use.
- The Archaeological Resource Protection Act of 1979 was created in response to congressional recognition that archaeological resources are irreplaceable to the nation's heritage and that these resources are often accessible, have intrinsic commercial value, and are increasingly endangered by looting and pillage. This legislation protects archaeological resources that are at least 100 years old and

located on tribal and public lands, including U.S. military installations. The legislation establishes a permitting procedure to regulate the excavation and investigation of applicable archaeological resources. Although possible, it is less likely that project-related archaeological investigations would require an Archaeological Resource Protection Act permit because these investigations would likely be completed under the aegis of a Federal contract.

- The Native American Graves Protection and Repatriation Act of 1990 protects Native Hawaiian graves and clarifies the right of ownership of Native Hawaiian human remains and artifacts, including funerary objects, religious objects, and objects of cultural patrimony found on Federal or tribal lands. The legislation outlines procedures for excavating or removing Native Hawaiian human remains or cultural artifacts, including obtaining consent from appropriate Native Hawaiian organizations, and establishes notification requirements for the inadvertent discovery of Native Hawaiian human remains or cultural artifacts.
- Hawai'i State historic preservation review legislation (HRS 6E-8 and HAR 13-275) is designed after Federal Section 106 legislation and is applicable to all non-federal land within the State. It describes a process that identifies significant historic properties including archaeological resources, and develops and executes plans to handle impacts to significant historic properties in the public interest.
- Hawai'i has specific burial laws (HRS 6E-43 and HAR 13-300) pertaining to human remains older than 50 years that are found outside established, maintained cemeteries on non-federal lands within the State. This legislation establishes proper notification and treatment procedures for these burials. This legislation is particularly designed to ensure the appropriate and dignified treatment of Native Hawaiian burials discovered though land development projects.

2.2 Definitions: Cultural Resources, Historic Properties, and Archaeological Resources

In historic preservation parlance, cultural resources are generally considered to be the physical remains and/or geographic locations that reflect the activity, heritage, and/or beliefs of ethnic groups, local communities, states, and/or nations. Some have argued for a broader definition of cultural resources that includes personalities (e.g., master craftsman and artisans), and intangible concepts (e.g., community values and religious practices) (King 2004:8-11). In general usage however, the term *cultural resource* is not so broadly defined. Generally, these resources are at least 50 years old (although there are exceptions) and include buildings and structures; groupings of buildings or structures (historic districts); certain objects; archaeological artifacts, features, sites, and/or deposits; groupings of archaeological sites (archaeological districts); and in some instances, natural landscape features, floral and/or faunal communities, and/or geographic locations of cultural significance.

This technical report focuses on a specific subset of cultural resources: archaeological resources. Historic buildings and structures are the focus of the *Honolulu High-Capacity Transit Corridor Historic Resources Technical Report* and cultural impacts (e.g., on-going cultural practices) are the focus of the *Honolulu High-Capacity Transit Corridor Cultural Resources Technical Report.*

This report is designed to comply with both Federal and State historic preservation legislation. Generally, under both State and Federal historic preservation legislation, cultural resource inventories are designed to identify, document, and make significance recommendations for "historic properties." As discussed in the following paragraphs, there are important distinctions between the Federal and State definitions of "historic properties." To alleviate any confusion these different definitions might cause, this document uses the more generic term "archaeological resources" in discussing archaeological remains within the current project area. This term is more generic than "historic property" or "archaeological historic property" and avoids the difference in definition of the term "historic property" between the State and Federal historic preservation regulatory frameworks. The more generic term "archaeological resource" also avoids the Federal distinction of whether a particular archaeological site or deposit has been determined eligible for the National Register of Historic Places (refer to the following definitions).

Historic properties, as defined under Federal historic preservation legislation, are cultural resources that are at least 50 years old (with exceptions) that are included in or that have been determined eligible for inclusion in the National Register of Historic Places based on established Significance Criteria (36 CFR 800.16). Determinations of eligibility are generally made by a Federal agency official in consultation with the State Historic Preservation Division (SHPD). Under Federal legislation, a project's (undertaking's) potential effect on historic properties must be evaluated and potentially mitigated.

Under Hawai'i State historic preservation legislation, historic properties are defined as any cultural resources that are 50 years old, regardless of their archaeological, historical, and/or cultural significance under State law. A project's effect and potential mitigation measures are evaluated based on the Project's potential impact to "significant" historic properties (those historic properties determined eligible, based on established Significance Criteria, for inclusion in the Hawai'i Register of Historic Places). Determinations of eligibility to the Hawai'i Register result when a State agency official's historic property "significance assessment" is approved by SHPD, or when SHPD itself makes an eligibility determination for a historic property.

2.3 Federal and Hawai'i State Historic Preservation Review Process in Brief

Both State of Hawai'i and Federal historic preservation legislation require the identification, documentation, significance assessment, project effect assessment, and development of appropriate mitigation measures for archaeological resources within a project's area of potential effect (APE). These procedural steps are carried

out through appropriate investigation and through consultation among project proponents, the Hawai'i State Historic Preservation Officer (SHPO), and as appropriate, the Advisory Council on Historic Preservation, interested individuals, and community groups including Native Hawaiian organizations.

The following six steps describe the Federal Section 106 "consultation process" outlined in *Regulations for Protection of Historic Properties* (36 CFR 800):

- Identify the area where a proposed undertaking could affect cultural resources (the APE)
- Identify and evaluate the National Register eligibility of cultural resources within the APE
- Assess the potential effects of the undertaking on cultural resources currently listed or deemed eligible for listing on the National Register
- Consult with SHPO, Native American and/or Native Hawaiian groups, other interested parties, and the Advisory Council on Historic Preservation (if appropriate) to develop ways to mitigate any anticipated adverse effects to National Register listed or eligible cultural resources
- If appropriate, provide the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed undertaking, its effects on National Register listed or eligible cultural resources, and proposed mitigation measures to alleviate adverse effects
- Proceed with the undertaking under the terms of appropriate mitigation agreements (e.g., programmatic agreements or memoranda of agreement)

Hawai'i's historic preservation review legislation [HAR 13-275(b)] describes the following similar six-step process:

- Determine whether historic properties are located in the project area and if so, identify and document (inventory) them
- Evaluate the significance of historic properties, determined in terms of eligibility for inclusion on the Hawai'i Register of Historic Places
- Determine the Project's effect
- Commit to acceptable forms of mitigation in order to properly handle or minimize impacts to significant properties
- Develop a detailed mitigation plan and scope of work to properly carry out the general mitigation commitments
- Verify completion of a detailed mitigation plan

To be considered eligible for listing on the Hawai'i and/or National Registers, a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association. In addition, it must meet one or more of the following broad cultural/historic Significance Criteria. Criterion A reflects major trends or events in the history of the State or Nation; Criterion B is associated with the lives

of persons significant in the past; Criterion C is an excellent example of a site type or work of a master; and Criterion D has yielded, or may be likely to yield information important in prehistory or history (36 CFR 60.4). In addition the Hawai‘i register adds another category for properties that have traditional cultural significance to an ethnic group, including religious structures and/or burials.

3 Methodology

3.1 Archaeological Investigations Associated with Prior High-Capacity Rapid Transit Environmental and Historic Preservation Documentation

Much previous archaeological research has been conducted within the Project's archaeological study area. J.G. McAllister conducted some of the earliest archaeological documentation within the study area in the early 1930s as part of his archaeological and ethnographic survey of Oʻahu (McAllister 1933). Sterling and Summers (1978) collected information on many of the early archaeological resources and important legendary locations identified by the Bernice P. Bishop Museum (including archaeological resources identified by McAllister) in their book *Sites of Oʻahu*.

Archaeological resources already documented within the study area span nearly the entire history of human habitation of Oʻahu and include remnants of fishponds, human burials, subsurface cultural layers related to traditional Native Hawaiian occupation, historic building and structure foundations, and historic trash pits and privies. Various low-energy alluvial deposits likely contain paleoenvironmental information that provide information on the history of human land use along Oʻahu's south shore. The vast majority of these archaeological resources already documented within the current study area were identified, investigated, and recorded as the result of cultural resource management work conducted since the 1970s. This work supported the historic preservation and/or environmental compliance of various private, municipal, state, and federally funded projects and undertakings.

The historic/archaeological documentation that accompanied prior proposed high-capacity transit service along Oʻahu's south shore, including most recently PrimCor (Davis 2002) and the earlier Honolulu Rapid Transit study (Rosendahl 1988), were largely syntheses of the pertinent cultural resource management studies described previously. They provided varying consideration of potential effects on archaeological resources within their proposed study corridors. These prior high-capacity transit-related investigations focused on different areas of Oʻahu's south shore, but the overall study corridors overlap substantially. These earlier transit-related studies served as a starting point for the archaeological resource documentation and impact analysis for the current Honolulu High-Capacity Transit Corridor Project.

3.2 Context and Approach for Archaeological Support of the Project's Environmental and Historic Preservation Review

In 2006, Cultural Surveys Hawaiʻi, Inc. (CSH) prepared an archaeological technical report to support the Honolulu High-Capacity Transit Corridor Project's Alternatives Analysis process. CSH compiled a substantial amount of archaeological information about the study corridor. This information was synthesized from U.S. Department of Agriculture (USDA) soils survey data, previous archaeological investigation results,

previously recorded archaeological resources, historic land records, and previously recorded burial locations. The available archaeological information was reduced into a form that provided sufficient detail to evaluate potential impacts to archaeological resources along the various alternative alignments under consideration during the Alternatives Analysis process. This process resulted in selection of a Locally Preferred Alternative. Based on the earlier Alternatives Analysis archaeological research, construction of any of the Build Alternatives described in Chapter 2 of this report is expected to most likely affect archaeological resources eligible for the Hawai‘i State and National Registers of Historic Places.

Based primarily on Alternatives Analysis background research, the potential for discovering archaeological resources increases within the Project's Koko Head portions, particularly within the area Koko Head of Dillingham Boulevard, within Downtown, and within Kaka‘ako. Unidentified archaeological resources likely lie beneath modern agricultural fields in the Project's ‘Ewa portions and beneath in-use paved streets, sidewalks, and highways in remaining portions of the proposed alignments.

Identification of these archaeological resources beneath in-use streets, sidewalks, and highways would likely pose a significant disruption of traffic. The cost and time requirements associated with identifying subsurface archaeological deposits beneath developed roadways and sidewalks greatly increase, because of the need to disrupt traffic, saw-cut and remove existing pavement to expose underlying sediments, search for archaeological deposits, and then repave the affected area. Additionally, the Project's potential archaeology-affecting ground disturbance would be over a large geographic area, requiring an extensive archaeological historic property/archaeological resource identification effort. Finally, the project design and engineering are still under development, and the actual footprints of the elevated guideway's support columns will not be known until after completion of the Project's Federal environmental and historic preservation reviews. Until there is certainty regarding column placement, any archaeological testing associated with the Project's archaeological historic property/archaeological resource identification effort could be outside the actual project footprint and could disturb archaeological resources that would otherwise not be disturbed by the Project. Nevertheless, to comply with the Project's State and Federal environmental and historic preservation review process, a reasonable, good faith effort was made to identify archaeological resources located within the proposed alignments and to provide sufficient information to make reasonable decisions regarding their mitigation during the Project's construction.

The following Section 106 implementation language, 36 CFR 800—Protection of Historic Properties, provides for a phased approach, or a deferral, for the identification and evaluation of historic properties for undertakings where large land areas would be affected and access to potential historic properties would be restricted:

> Where alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process to conduct identification and evaluation efforts. The agency official may also defer final identification and evaluation of historic properties if

> it is specifically provided for in a memorandum of agreement executed pursuant to § 800.6, a programmatic agreement executed pursuant to § 800.14 (b), or the documents used by an agency official to comply with the National Environmental Policy Act pursuant to § 800.8. The process should establish the likely presence of historic properties within the area of potential effects for each alterative or inaccessible area through background research, consultation and an appropriate level of field investigation, taking into account the number of alternatives under consideration, the magnitude of the undertaking and its likely effects, and the views of the SHPO/THPO and any other consulting parties. As specific aspects or locations of an alternative are refined or access is gained, the agency official shall proceed with the identification and evaluation of historic properties . . .[§ 800.4(b)(2)]

It is reasonable to expect that the Project would have an adverse effect on archaeological resources and that a Project Memorandum of Agreement (MOA) would be written to govern the treatment of these affected historic properties. Because of the Project's need for extensive subsurface archaeological investigations, their cost in time and money, the relative inaccessibility of the archaeological resources beneath in-use roadways and sidewalks, and current uncertainty regarding the actual location of the project footprint, it is reasonable to defer to the approach described previously.

This approach was discussed with the State Historic Preservation Division (SHPD) staff archaeologists at two project-related meetings in October 2007. The SHPD agreed with the approach. This approach was discussed with the O'ahu Island Burial Council at its October 2007 meeting. Again, they agreed with the approach.

Based on this positive response, project proponents have proceeded with the environmental and historic preservation review following the approach to defer most of the Project's archaeological resource identification and evaluation effort. With this approach, the bulk of the archaeological investigation, documentation, and associated mitigation decisions will be deferred and carried out subsequent to conclusion of the Project's Federal environmental and historic preservation review. This work would be carried out under the strict guidance of the portions of the Project's MOA dealing with archaeological resources. Accordingly, the primary goal of the Project's archaeological effort in support of the Project's environmental and historic preservation review will be to provide the additional background research, limited field investigation results, and cultural consultation to support implementation of the archaeological portions of the Project's MOA. This MOA would describe the archaeological historic property/archaeological resource identification and evaluation effort, as well as the mitigation procedures for identified archaeological resources. This would be carried out in advance of, and possibly in some situations, during the different phases of construction within the Project's different geographic areas.

Based on the current project time line, with a construction start date of late 2009 for the 'Ewa end of the Project between UH West O'ahu and Leeward Community College, there will likely be a need for archaeological historic property/archaeological resource identification, evaluation, and possibly mitigation, prior to completion of the Project's Federal historic preservation and environmental review. Because this initial

archaeological historic property/archaeological resource identification effort would start before the Project's MOA is approved by SHPD, the archaeological historic property/archaeological resource identification effort for this `Ewa portion of the Project would be completed as part of the Project's Section 106 and NEPA review process.

3.3 Archaeological Study Area and Area of Potential Effect

For the purposes of this archaeological technical report to support the Project's EIS, the archaeological study area is defined generally as an approximately 300-foot-wide corridor centered on the project alignment. This definition of the archaeological study area includes the footprint of the station locations and is sufficiently broad to cover potential minor realignments of the elevated guideway's route. Additionally, the study area includes the footprint of the potential locations of project-related park-and-ride lots, maintenance facilities, and construction staging areas. This archaeological technical report focuses on the Project's study area as defined previously.

For the purposes of this investigation the archaeological study area has been divided into ten sub-areas to facilitate analysis. These ten sub-areas were based on various natural and man-made environmental considerations. These archaeological sub-areas, from ʻEwa to Koko Head (Figure 3-1) are as follows:

1. Honouliuli (partially within planned extensions)
2. Farrington Highway
3. Kamehameha Highway
4. Salt Lake
5. Airport
6. Dillingham
7. Downtown
8. Kakaʻako
9. Mānoa (planned extension)
10. Waikīkī (planned extension)

Background research focused on the archaeological study area, with more general discussion of the surrounding area to provide environmental, archaeological, historical, and cultural context.

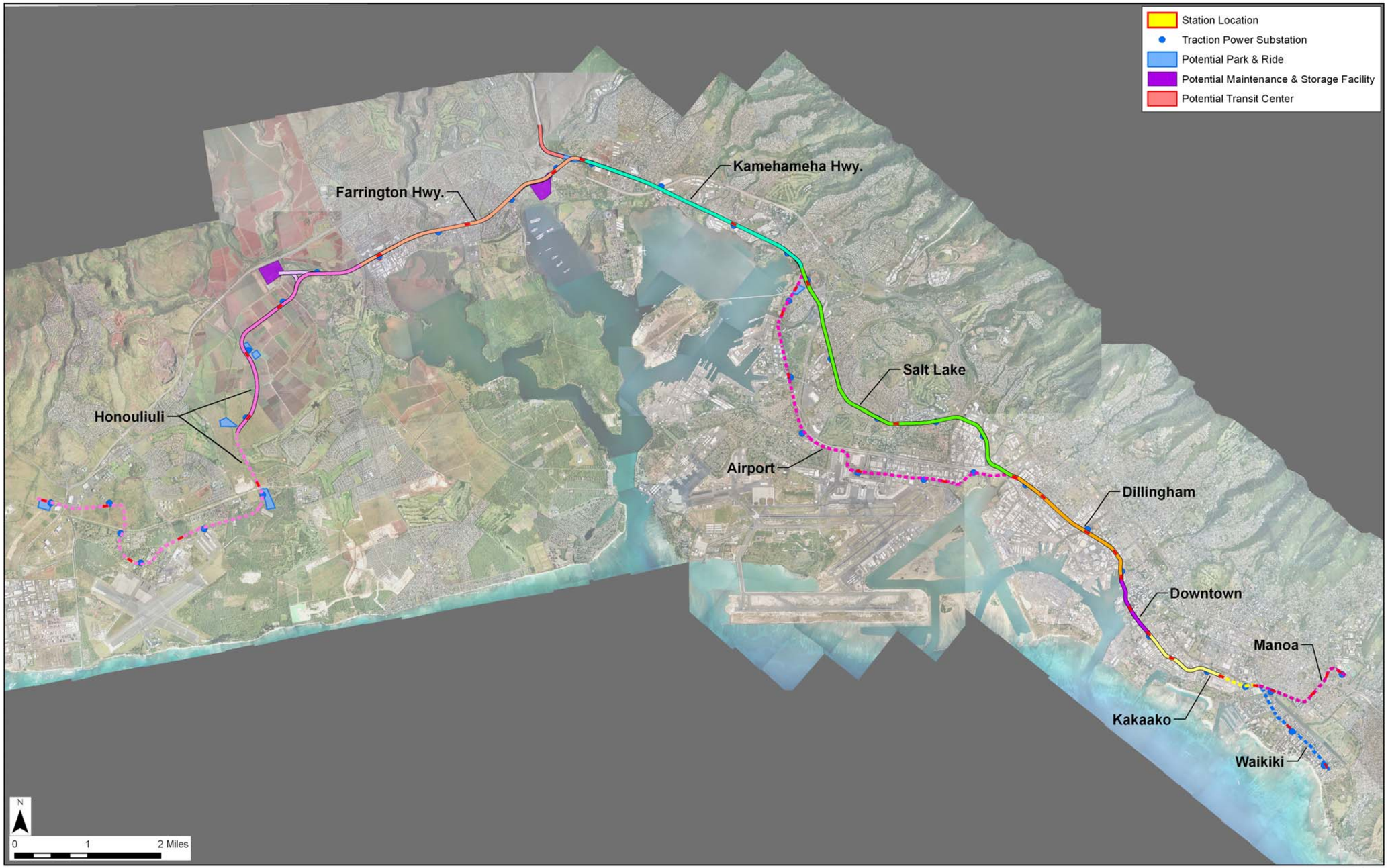

Figure 3-1: Map of the Ten Archaeological Sub-Areas

The Project's detailed archaeological resource identification effort and subsequent archaeological resource evaluation and mitigation effort, which will be conducted after completion of this archaeological technical report, will be more narrowly focused than the current investigation's archaeological study area. This subsequent identification, evaluation, and mitigation effort will focus on the Project's APE. In consultation with the SHPD, concerning archaeological resources, the APE for the Project is defined as all areas of direct ground disturbance. This would include any areas excavated for the placement of piers to support the elevated structures, foundations for buildings and structures, excavations for utility installation, grading to provide parking, or other construction-related ground disturbance including preparation of construction staging areas.

Confining the archaeological resources APE to the limits of ground disturbance is warranted, because the surrounding built environment is largely developed and becoming progressively more urban as the Project progresses Koko Head. As a result of the existing level of development, construction of the elevated guideway would not generate secondary effects (e.g., visual, atmospheric, or audible elements) that could diminish the integrity of archaeological resources. Accordingly, the concern is direct construction impacts to archaeological resources that are known and those that are as yet unidentified.

3.4 Archaeological Resource Categories and Potential Impact Evaluation

Three general categories of archaeological resources are used in the following discussion: burials, pre-contact archaeology, and post-contact archaeology. Burials include pre-contact and traditional Hawaiian interments, as well as historic burials. Under both Federal and Hawai'i historic preservation law, burials are treated as a unique type of archaeological resource. Disarticulated, previously disturbed human remains are by definition "burial sites" under Hawai'i law (HRS 13-300-2). Accordingly, potential impacts to burials and burial sites are discussed.

Pre-contact archaeological resources include the physical remains of past pre-contact land use (e.g., artifacts, food remains, and features such as postholes, hearths, and structural remains). Structural remnants include fishponds, irrigated pond fields, and irrigation ditches. Also included in the pre-contact archaeological resource category are paleoenvironmentally informative sedimentary deposits that can provide data on human-induced environmental change over time. These types of sediments are often found in low-energy alluvial deposits such as ponds, marshes, and tidal flats.

Post-contact archaeological resources are those that accumulated after the arrival of Captain James Cook in 1778, when the first known records of Hawai'i were written. These include historic building and structure remnants, trash pits, privies, and remnants of transportation and agricultural infrastructure.

To evaluate project-related impacts to archaeological resources within different sub-areas, a general rating system was developed for evaluating potential impacts. The different sub-areas of the archaeological study area are rated Low, Moderate, or High based on their potential impact to each of the three archaeological resource categories. Ratings are based on the reasonable expectation of potential impacts along the length of specific sub-areas within the study area. A Low rating indicates that potential impacts are possible but not considered likely, or that there is a reasonable expectation of potential impacts along no more than 10 percent of a given sub-area. A Moderate rating indicates that there is reasonable potential for impacts between 10 and 50 percent of that sub-area. A High rating indicates a reasonable expectation of potential impacts along more than 50 percent of that sub-area. However, a High rating does not mean that, based on background archaeological research, at least 50 percent of that sub-area will encounter archaeological deposits. Rather, this rating means that, based on archaeological research, there is a reasonable potential to encounter archaeological deposits over at least 50 percent of that sub-area. The actual percentage of the proposed sub-area where archaeological resources are encountered will undoubtedly be small.

3.5 Archaeological Program to Support the Project's Environmental and Historic Preservation Review

The following three-component program was developed to provide the needed additional background research, information synthesis, field investigation results, and cultural consultation to support the Project's historic preservation and environmental review and develop the archaeological portions of the Project's MOA:

1. Prepare this archaeological technical report for the Project to support the Draft EIS
2. Assist with additional cultural consultation with stakeholding groups, including Native Hawaiian organizations and individuals, to support preparation of the Project's Final EIS and the archaeological portions of the Project's MOA
3. Complete the appropriate archaeological historic property/archaeological resource identification effort to support the historic preservation review of the Project's planned first phase of construction between UH West O'ahu and Leeward Community College.

3.5.1 Archaeological Technical Report

This archaeological analysis expands on the archaeological research that supported the Alternatives Analysis process. The *Honolulu High-Capacity Transit Corridor Project Alternatives Analysis Archaeological Technical Report* used the following data sources, from which additional information was synthesized specific to the study area for this technical report. Generally, the resources and methods described in the following paragraphs were developed as part of another large, linear development project that encompassed vast geographic areas and had the potential to affect archaeological resources.

In 2001, CSH completed an archaeological assessment of approximately 112.6 miles of road corridor on O‘ahu. These road corridors are proposed for installation of a telecommunications cable system connecting Department of Hawaiian Home Lands properties on O‘ahu. The objective of this assessment was to identify areas within the corridors that have the potential to contain archaeological resources (Hammatt 2001a and 2001b). The methods for archaeological resource identification and geographic synthesis using existing archaeological data and proxy historical and environmental data sets proved to be effective. These methods were discussed with the Office of Hawaiian Affairs in late January 2006 and the SHPD in early February 2006. Response to this approach was positive. The following methods/data sources were used for this technical report:

- Inspection of USDA soil survey data (Foote 1972) for the study area, to identify soil types under or immediately adjacent to the area of investigation that, based on past experience, are more likely to contain archaeological deposits. For example, Fill Land in coastal regions is often associated with former Native Hawaiian fishponds, and Jaucas sand deposits are often associated with traditional Hawaiian burials. Using ESRI’s ArcMap 9.1 Geographic Information System software, a shapefile of the soil survey data was overlain on a shapefile of the study area.
- Inspection of tax maps and historic maps showing presence of Land Commission Award (LCA) parcels within or adjacent to the study area. The Organic Acts of 1845 and 1846 initiated the process of the Māhele (the division of Hawaiian lands), which introduced private property into Hawaiian society. In 1848, the crown, the Hawaiian government, and the ali‘i (royalty) received their land titles. Kuleana (commoner) awards for individual parcels within the ahupua‘a were subsequently granted in 1850. (An ahupua‘a is a traditional Hawaiian land division unit that ideally stretches from the mountains to the sea and includes a wide range of marine and terrestrial resources [Kirch 1985]). These LCAs were presented to tenants—Native Hawaiians, naturalized foreigners, non-Hawaiians born on the Islands, or long-term resident foreigners—who could prove occupancy on the parcels before 1845. Maps and other documents associated with these awards provided clues to settlement, land use, and other activities within and nearby the study area in the mid-1850s. LCA data are commonly used by archaeologists as indicators of past land use that may not be readily apparent on the current land surface. Historic maps, particularly Land Court Application maps, were georeferenced using ESRI’s ArcMap 9.1 software to provide the locations and identifying numbers for the LCAs in the study area. CSH obtained documentation for the LCAs within the study area from the Waihona ‘Aina on-line database.
- Review of Geographic Information System data (as available) and archaeological reports and records at SHPD. This provided specific information on the location and distribution of previously recorded surface and subsurface archaeological resources within or near the study area. Additionally, archaeological reports contained results of subsurface testing near the study area.

- Inspection of historic maps and early land survey maps to locate areas of potential archaeological concern.
- Field observations of portions of the study area to evaluate the study area's relationship to possible surface and subsurface archaeological resources.
- Consultation with SHPD to make use of its resources and expertise.

All available archaeological background information was synthesized to support predictions regarding the types, locations, and distributions of archaeological resources within the archaeological study area. The Alternatives Analysis archaeological technical report also summarized ongoing cultural consultation with stakeholder groups regarding the identification and treatment of archaeological resources. Based on this background research, this report outlines appropriate archaeological resources identification methods and levels of effort for the Project's different construction phases. These recommendations for future archaeological investigation are a combination of more traditional archaeological research methods (e.g., background research, surface survey, and excavation) with less traditional technology such as sediment coring, paleoenvironmental research, and Ground Penetrating Radar (GPR) (Conyers *in press*).

Appropriate consultation with SHPD and knowledgeable stakeholders, including Native Hawaiian groups and individuals, is an important component of the impact analysis process. Consulted stakeholders included Hui Malama, the Office of Hawaiian Affairs, the O'ahu Island Burial Council, and other groups. The groups or agencies included in initial Section 106 consultation are:

- Historic Hawai'i Foundation
- University of Hawai'i Historic Preservation Certificate Program
- American Institute of Architects (AIA Honolulu)
- Hawai'i Community Development Authority (for Kaka'ako and Kalaeloa)
- U.S. Navy, Naval Facilities Engineering Command, Hawai'i
- Office of Hawaiian Affairs
- O'ahu Island Burial Council
- Hui Malama I Na Kupuna O Hawai'i Nei
- Royal Order of Kamehameha
- The Ahahui Ka'ahumanu
- The Hale O Na Ali'i o Hawai'i
- The Daughters & Sons of the Hawaiian Warriors
- Association of Hawaiian Civic Clubs—and 15 individual clubs

Their input was incorporated into the technical report and will serve as the foundation for subsequent consultation that will support drafting the portions of the

Project's MOA dealing with archaeological resources. This MOA consultation will be carried out during preparation of the Project's Final EIS. Consultation will include written correspondence and face-to-face meetings.

This technical report discusses the requirements of HRS 13-300 and HAR 6E-43 relating to burial sites. It also discusses the following issues as they relate to archaeological resources:

- Background regarding the applicable legal and regulatory requirements of the Hawai'i State and Federal historic preservation review process.
- The affected environment, including identification and description of known archaeological resources in the study area, as well as (where possible based on past documentation) discussion of the following:
  - The attributes that make these previously identified archaeological resources eligible for the Hawai'i State and/or National Register of Historic Places
  - Status of the resource with respect to listing on the Hawai'i State or National Register of Historic Places
  - Present use, ownership, and condition
  - Location relative to the elevated guideway's alignment, stations, potential park-and-ride locations, and potential maintenance facilities.
- Likely impacts on archaeological resources, both previously identified and potential. Where appropriate, this includes discussion of the probable impacts of taking part or all of the archaeological resource and the introduction of indirect impacts through project construction.
- Potential mitigation actions to avoid or minimize project impacts to archaeological resources, including design and alignment variations to avoid or minimize impacts and archaeological data recovery investigations where impacts cannot be avoided.
- Description and results of coordination with the SHPD and the Advisory Council on Historic Preservation.

3.5.2 Cultural Consultation to Support Development of the Project's MOA

Based on a synthesis of the available information, the archaeological components of the Project's MOA will be drafted. Consultation with Native Hawaiian groups and organizations, including Hui Malama, the Office of Hawaiian Affairs, and the O'ahu Island Burial Council will be particularly important. This cultural consultation will provide appropriate public input for the proposed archaeological historic property archaeological resource identification effort. It will also help to make decisions regarding the appropriate level of research effort for the Project's different construction phases.

Project archaeologists will work with project planners and engineers to work out the schedule of the Project's phased archaeological historic property/archaeological resource identification, evaluation, and mitigation effort. This effort will be carried out prior to and in conjunction with project construction. GPR technology, as a potentially less destructive and more cost-effective means of identifying archaeological resources, will likely be an important component of the identification effort. A detailed assessment of the types of mitigation measures that are realistically available will be required. Options considered will include:

- The potential relocation of guideway support columns or other project structures, if archaeological resources are discovered beneath the structure's footprint
- Archaeological data recovery when archaeological resources that cannot be avoided are located
- The level of data recovery that will be carried out for different types of archaeological resources
- How burial deposits will be identified and treated

3.5.3 Future Work Anticipated Prior to Construction and Before Implementation of the Project's MOA

The appropriate archaeological resource identification effort will be completed during the Project's first construction phase, between UH West O'ahu and Leeward Community College. This work will be carried out in parallel with Section 106 coordination related to establishing the Project's MOA. This will occur after project engineering for this first construction phase is sufficiently detailed to accurately locate the footprints of the elevated guideway's support columns and other structures.

4 Affected Environment

This description of the affected environment for the Project's archaeological resources proceeds from `Ewa to Koko Head and is divided into the ten sub-areas of the archaeological study area (Figure 3-1). All other figures referenced in Chapter 4 are located in Appendix A.

4.1 Honouliuli Sub-Area

4.1.1 Sub-Area Description

The Honouliuli sub-area is in the ahupua'a of Honouliuli. This sub-area is approximately 8 miles long and includes the West Kapolei, Kapolei Transit Center, Kalaeloa, Fort Barrette Road, Kapolei Parkway, East Kapolei, UH West O'ahu, and Ho'opili Stations. Potential park-and-ride lots could be located near the West Kapolei, Kapolei Parkway, East Kapolei, and UH West O'ahu Stations. A potential maintenance and storage facility could be located near the Koko Head end of the sub-area. Figures A-1 through A-3 in Appendix A depict the geography and features of the Honouliuli sub-area and show the location of various environmental and cultural information.

4.1.2 Natural Environment

The Honouliuli sub-area extends through the 'Ewa Plain, makai of the Wai'anae Mountain Range. 'Ewa Plain is a Pleistocene (>38,000 year old) reef platform overlain by alluvium. The terrain consists of limestone and alluvial deposits, which overlie flows of the Wai'anae volcanic series (MacDonald 1983 [423]). In pre-contact Hawai'i, the project area would have been covered by lowland dry shrub and grassland, but this area has been extensively disturbed and transformed by human activity; it is now dominated by a variety of exotic grasses, weeds, and shrubs.

The surface of the Pleistocene limestone outcrop, where not covered by alluvium or stockpiled material, has characteristic dissolution "pit caves" (Mylroie 1995) that are nearly universally, but erroneously, referred to as "sink holes" (Halliday 2005). These pit caves vary widely in area extent and depth, with some of the more modest features comparable in volume to 5-gallon buckets, and some of the larger features (although usually irregularly shaped) several meters wide and deep. The clay and silty clay loam deposits that overly the sinkhole-pocked Pleistocene limestone outcrop are likely of historic deposition, resulting from a combination of increased erosion caused by introduced grazing animals and deliberately induced erosion.

To augment the arable land of the 'Ewa Plain that was suitable for intensive sugar cane cultivation, the 'Ewa Plantation Company in the late 19th and early 20th centuries installed ditches running from the lower slopes of the mountain range to the lowlands, then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972 [17]). This relocated sediments from the higher, volcanic, soil-rich slopes of the Wai'anae Range down onto the soil-poor Pleistocene

limestone plains of the Kalaeloa area. The agricultural lands in Honouliuli resulted partially from this arable land expansion program. In traditional Hawaiian times, the areas of exposed coral outcrop were undoubtedly more extensive.

The Honouliuli sub-area is approximately 0.4 mile from West Loch at its closest point to Pearl Harbor and 2.8 miles from the ocean at its closest point to the south shore of O‘ahu. The only major stream running through the sub-area is Honouliuli Stream, crossing the proposed alignment approximately 0.5 mile from the Koko Head end of the sub-area. Elevations within the sub-area vary between approximately 80 and 160 feet, and the area receives an average of 24 inches of rain annually (Giambelluca 1986) (Figure A-1).

According to USDA soil survey data (Foote 1972), sediments in the Honouliuli sub-area consist of Coral Outcrop (CR), Mamala Stony Silty Clay Loam (MnC), Waipahu Silty Clay (WzA, WzB, WzC), Kawaihapai Clay Loam (KlA), and Honouliuli Clay (HxA, HxB) at various slopes (Figure A-1).

Coral Outcrop is described (Foote 1972) as follows:

> Coral outcrop (CR) consists of coral or cemented calcareous sand on the Island of O‘ahu. The coral reefs formed in shallow ocean water during the time the ocean stand was at a higher level. Small areas of coral outcrop are exposed on the ocean shore, on the coastal plains, and at the foot of the uplands. Elevations range from sea level to approximately 100 feet. The annual rainfall amounts to 18 to 40 inches. Coral outcrop is geographically associated with Jaucas, Keaau, and Mokuleia soils.
>
> Coral outcrop makes up about 80 to 90 percent of the acreage. The remaining 10 to 20 percent consists of a thin layer of friable, red soil material in cracks, crevices, and depressions within the coral outcrop. This soil material is similar to that of the Mamala series.

The Mamala soil series is described (Foote 1972) as follows:

> This series consists of shallow, well-drained soils along the coastal plains on the islands of O‘ahu and Kauai. These soils formed in alluvium deposited over coral limestone and consolidated calcareous sand. They are nearly level to moderately sloping. Elevations range from nearly sea level to 100 feet on O‘ahu but extend to 850 feet on Kauai. The annual rainfall amounts to 18 to 25 inches, most of which occurs between November and April. The mean annual soil temperature is 74° F. Mamala soils are geographically associated with ‘Ewa, Honouliuli, and Lualualei soils on O‘ahu, and with Koloa and Nohili soils on Kauai.

The Waipahu soil series is described (Foote 1972) as follows:

> This series consists of well-drained soils on marine terraces on the Island of O‘ahu. These soils developed in old alluvium derived from basic igneous rock. They are nearly level to moderately sloping. Elevations range from nearly sea level to 125 feet. Rainfall amounts to 25 to 35 inches annually; most of it

occurs between November and April. The mean annual soil temperature is 75° F. Waipahu soils are geographically associated with Hanalei, Honouliuli, and Waialua soils.

The Kawaihapai soil series is described (Foote 1972) as follows:

> This series consists of well-drained soils in drainageways and on alluvial fans on the coastal plains on the islands of O‘ahu and Moloka‘i. These soils formed in alluvium derived from basic igneous rock in humid uplands. They are nearly level to moderately sloping. Elevations range from nearly sea level to 300 feet. The annual rainfall amounts to 30 to 50 inches and occurs mainly between November and April. The mean annual soil temperature is 73° F. Kawaihapai soils are geographically associated with Haleiwa, Waialua, and Jaucas soils.
>
> These soils are used for sugar cane, truck crops, and pasture. The natural vegetation consists of kiawe, koa haole, lantana, and bermudagrass.

Lastly, the Honouliuli soil series is described (Foote 1972) as follows:

> This series consists of well-drained soils on coastal plains on the Island of O‘ahu in the ‘Ewa area. These soils developed in alluvium derived from basic igneous material. They are nearly level and gently sloping. Elevations range from 15 to 125 feet. The annual rainfall amounts to 18 to 30 inches and occurs mainly between November and April. The mean annual soil temperature is 74° F. Honouliuli soils are geographically associated with ‘Ewa, Lualualei, Mamala, and Waialua soils.
>
> These soils are used for sugar cane, truck crops, orchards, and pasture. The natural vegetation consists of kiawe, koa haole, fingergrass, bristly foxtail, and bermudagrass.

The Honouliuli sub-area extends through a number of cultivated fields that are currently producing crops. Vegetation elsewhere in the sub-area consists predominantly of introduced perennial grasses and weeds, along with kiawe (*Prosopis pallida*) and koa haole (*Leucaena leucocephala*).

4.1.3 Built Environment

The sub-area has been drastically altered by historic and modern land use, including intensive sugar cane cultivation, large-scale limestone quarrying operations, and residential and commercial development (Figure A-2).

4.1.4 Past Land Use and Land Commission Awards Information

Various Hawaiian legends and early historical accounts indicate that the ahupua‘a of Honouliuli was once widely inhabited by pre-contact populations, including the Hawaiian ali‘i. The plentiful marine and estuarine resources available at the coast, the irrigated lowlands suitable for wetland taro cultivation, and the lower forest area of the mountain slopes used to procure forest resources made this ahupua‘a an

attractive residence. The Lochs of Pearl Harbor were ideal for constructing fishponds and fishtraps. Forest resources along the slopes of the Waiʻanae Range probably acted as a viable subsistence alternative during times of famine and/or low rainfall (Handy 1940; Handy 1972). The upper valley slopes may have also been a resource for sporadic quarrying of basalt used in manufacturing stone tools (Hammatt 1991b).

Early historical accounts of the general region typically refer to the more populated areas of the ʻEwa district, but archaeological resources along the barren coral plains and coast of southwest Honouliuli ahupuaʻa indicate that prehistoric and early historic populations also adapted to less inviting areas, despite environmental hardships. The attraction of the coastal area and the plains to early Hawaiians was the plentiful and easily exploited bird population. There is some indication of limited agriculture in mulched sinkholes and limited soil areas; this activity would probably have involved tree crops and sweet potatoes. The archaeological features indicate a major focus on marine resources.

At contact, Honouliuli was the largest and most populous ahupuaʻa on the Island, with the majority of the population centered near Pearl Harbor. Disease and resettlement in the first half of the 19th century drastically reduced the region's population. By the mid-19th century the inland area of the ʻEwa District was probably abandoned and the remaining population had consolidated around the town of Honouliuli.

During the Māhele (the division of Hawaiian lands), 72 kuleana land claims were registered and awarded by King Kamehameha III to tenants in the ahupuaʻa of Honouliuli; almost all LCAs were adjacent to Honouliuli Stream, which contained fishponds and irrigated taro fields (Figure A-2). An 1878 map of the Honouliuli Taro Lands by M.D. Monsarrat shows all of the LCAs positioned makai of the archaeological study area. Five of these LCAs were awarded near the study area. All five were small awards; each included multiple loʻi (taro fields) and a kula (pasture or dry field), and two included a house lot (Table 4-1).

Table 4-1: Honouliuli Sub-Area Land Commission Awards

LCA Number	Contents of Award
848:5	5 loʻi and 1 kula
847:1 and 847:2	14 loʻi, 1 kula, and 1 guard house for the loʻi
911:1	1 house, 1 kula, 5 loʻi
831:3	No data
1570:1	Several loʻi and 1 kula

In 1855 all of the unclaimed lands in Honouliuli (43,250 acres) were awarded to Miriam Keʻahikuni Kekauʻōnohi, a granddaughter of Kamehameha I and the heir of Kalanimōkū, who had been given the land by Kamehameha after the conquest of Oʻahu. She was also awarded the ahupuaʻa of Puʻuloa, which she sold in 1849 to Isaac Montgomery, a British lawyer.

Kekauʻōnohi was the wife of Chief Levi Haʻalelea. Upon her death on June 2, 1851, all her property was passed on to her husband and his heirs. In 1864, Haʻalelea died, and his second wife, Anadelia Amoe, transferred ownership of the land to her sister's husband, John Coney (Yoklavich 1995).

John Coney rented the land to James Dowsett and John Meek in 1871, who used the land for cattle grazing. In 1877, the land, except for the ʻili (smaller land division) of Puʻuloa, was sold to James Campbell for $95,000. Most of Campbell's lands in Honouliuli were used exclusively for cattle ranching. In 1879, Campbell brought in a well-driller from California to drill for water on the ʻEwa Plain. Following the discovery of fresh water 240 feet below the surface, plantation developers and ranchers drilled numerous wells in search of the valuable resource. A portion of Mr. Campbell's lands was also used to grow rice.

By 1885, 200 acres in Honouliuli were used for rice and 50 acres were used to grow bananas. These rice fields were planted in former taro fields or in undeveloped swamps, such as those in the former Honouliuli taro lands along Honouliuli Stream. Additionally, an agricultural trial was conducted in the Honouliuli area for the cultivation of sisal, a plant used to make fibers for rope and other material. Some sisal was planted before 1898 and production continued until the 1920s (Frierson 1972). Sisal was grown mainly on the coastal plain of Honouliuli in Kānehili, just mauka of Kualakaʻi Beach.

In 1886, Campbell and B.F. Dillingham collaborated in an attempt to sell Honouliuli land to homesteaders (Thrum 1886). After the homestead idea failed, Dillingham decided that the area could be used for large-scale cultivation (Pagliaro 1987). Dillingham subleased all land below 200 feet to William Castle, who sublet the area to the newly formed ʻEwa Plantation Company (Frierson 1972). Dillingham's Honouliuli lands above 200 feet that were suitable for sugar cane cultivation were sublet to the Oʻahu Sugar Company. Throughout this time, and continuing into modern times, cattle ranching continued in the area.

ʻEwa Plantation Company was incorporated in 1890 and by the 1920s was generating large profits. By the 1930s, the plantation encompassed much of the Koko Head half of Honouliuli ahupuaʻa. Rapid growth and technical developments of the plantation significantly altered the land. The growth also compelled the creation of plantation villages to house the growing immigrant labor force working the fields.

After the outbreak of World War II, which siphoned off much of the plantation's manpower, along with the changeover to almost complete reliance on mechanical harvesting in 1938, there was little need for the large, multi-racial (Japanese, Chinese, Okinawan, Korean, Portuguese, Spanish, Hawaiian, Filipino, European) labor force that had characterized most of the plantation's early history.

In the early 1930s, the U.S. Navy leased 700 acres of the Campbell Estate to build ʻEwa Field. In 1931 the Navy built an ammunition depot at West Loch on a 213-acre parcel that it had bought from the Campbell Estate. Construction of a new depot in Lualualei Valley and at West Loch Harbor began in 1931. By 1937, 18 miles of roads were built in the coastal Honouliuli area, and in 1939-1940 the U.S. bought 3,500

acres of land in this area to build several other military camps and installations, including Naval Air Station Barbers Point (currently known as Kalaeloa Community Development District).

The O‘ahu Sugar Company took control of the ‘Ewa Plantation Company lands in 1970 and gradually phased out sugar cane operations in the ‘Ewa District until 1995 when the sugar cane production in the combined plantation area shut down (Dorrance 2000). More recently, former cane lands have been rezoned for residential development. Structures in the area of the former plantation villages have fallen into disrepair or have been demolished. However, portions of the area—including Varona Village, Tenney Village, and Renton Village—have been designated the ‘Ewa Villages Historic District (State Inventory of Historic Places SIHP #50-80-12-9786). Additionally, the still-existing O‘ahu Railway & Land Company (OR&L) rail line passing through Honouliuli has been placed on the National Register of Historic Places (SIHP #50-80-12-9714).

The Honouliuli sub-area passes mauka of the primary area of pre-contact settlement and intensive agriculture on the floodplain extending from Honouliuli Stream. Although the study area has been modified by sugar cane production and urban development throughout the 20th century, previous archaeological finds suggest that intact prehistoric and early contact cultural deposits associated with Hawaiian habitation, work, and recreation may lie undisturbed beneath historic and modern development. Features related to traditional agriculture, such as lo‘i and ‘auwai (irrigation ditches), as well as prehistoric and historic archaeological features such as hearths, building foundations, trash pits, and privies, may be found in the study area.

4.1.5 Previous Archaeological Investigations

The Honouliuli sub-area and neighboring environs have experienced much residential and commercial growth in the last 20 years, which has led to an increase in archaeological investigations in the area. The Naval Air Station Barbers Point lands have been investigated over the last 20 years. Previous archaeological investigations within this sub-area usually cover large parcels of land (hundreds of acres). It is noteworthy that nearly 100 percent of the sub-area has been previously investigated through prior archaeological investigations. The following discussion of previous archaeological investigations proceeds from ‘Ewa to Koko Head (Figure A-3 shows locations of prior archaeological investigations).

O’Hare et al. 2004

In 2004, CSH documented plantation infrastructure at a 474-acre parcel in Kapolei (O’Hare 2004a, 2004b). Documentation included historical research describing the nature and history of the plantation infrastructure, as well as fieldwork to locate, map, and describe archaeological resources. Archival research indicated that the project area was once part of the ‘Ewa Plantation Company, which was incorporated in 1890 for sugar cane cultivation. The ‘Ewa Plantation Company was the first sugar plantation to totally rely on artesian water. Water was pumped to the surface at several pumping stations and then transported to fields through irrigation ditches and

flumes. This irrigation system was continually improved during the history of the plantation, which grew sugar into the 1970s.

During the field survey of the project area, two archaeological resources were identified. SIHP #50-80-12-6678 consists of five features related to sugar cane plantation infrastructure: a concrete culvert and ditch intersection, a metal flume, two stone-and-mortar-lined ditches, and a flume constructed of pre-cast portable concrete blocks. SIHP #50-80-12-6679 consists of an earthen drainage canal, excavated into the ground, used by the plantation for flood control and/or to induce erosion and sedimentation of lowland areas with poor soil development (O'Hare 2004a, 2004b). SIHP #50-80-12-6678 and -6679 are evaluated as eligible for the State and National Register of Historic Places under Significance Criterion D, because the resources may yield information important to the history of sugar plantations in Hawai'i. Neither resource is currently listed on the State or National Registers.

Burgett and Rosendahl 1989

In 1989, Paul H. Rosendahl, Ph.D. Inc. (PHRI) completed subsurface archaeological testing for the Ko 'Olina Resort Phase Project in the ahupua'a of Honouliuli. The project area consisted of approximately 360 acres bounded mauka by Farrington Highway and Honokai Hale Subdivision, bounded 'Ewa by Ko 'Olina Resort Phase I and O'ahu Sugar Company lands (including a short section of Pump 10 Road), bounded makai by the OR&L right-of-way (railroad bed), and bounded Koko Head by the O'ahu Sugar Company cultivated cane lands adjacent to Kalaeloa Boulevard (Koko Head boundary is 700 to 900 feet 'Ewa of Kalaeloa Boulevard). Seventy-two backhoe trenches were excavated. No significant archaeological resources were encountered during the investigation (Burgett 1989).

Rasmussen and Tomonari-Tuggle 2006

In 2004, monitoring was conducted along the Waiau Fuel Pipeline corridor in the 'Ewa District. This linear investigation extended across Honouliuli ahupua'a (Figure A-3). This monitoring occurred near the previously identified archaeological resources recorded near the West Loch of Pearl Harbor, including traditional Hawaiian burials (SIHP #50-80-09-3761 and # 50-80-09-5302) and the fishponds of Loko Luakahaole (SIHP #50-80-09-0115), Loko Kuhialoko (SIHP #50-80-09-0119), Loko Mo'o (SIHP #50-80-09-0120), Loko Eo (SIHP #50-80-09-0123), and Loko Pouhala (SIHP #50-80-09-0126). However, no new archaeological remains were discovered during the investigation (Rasmussen 2006).

Hammatt and Shideler 2001

In 2001, CSH conducted an archaeological inventory survey in support of the proposed 360 Fiber Optic Cable Project (Hammatt 2001b). The project involved a cable landing manhole approximately 3,500 feet mauka of the intersection of Mai'akole Road and Kalaeloa Boulevard, as well as a loop bounded mauka by Interstate Route H-1 (the H-1 Freeway), bounded makai by the OR&L right-of-way,

and bounded Koko Head by Kalaeloa Boulevard. No archaeological resources were identified. The field investigation and background research indicated that the cable corridors are through areas that have been intensively disturbed by sugar cane cultivation and modern development. Based on the survey findings, no further work was recommended (Hammatt 2001b).

Haun 1987

In 1986, PHRI conducted a preliminary archaeological reconnaissance survey of the ‘Ewa Town Center/Second Urban Center Project between Farrington Highway, H-1 Freeway, and the OR&L right-of-way (Haun 1987). Field work consisted of a systematic pedestrian survey. Two features (an irrigation ditch and a World War II military structure) were identified but eventually dismissed from consideration because the features appeared to be less than 50 years old. No archaeological remains are known to exist within the project area (Haun 1987).

Tuggle and Tomonari-Tuggle 1997

In 1997, International Archaeological Research Institute, Inc. (Tuggle 1997) wrote a synthesis of all the archaeological work conducted at Barbers Point up to that time. They concluded that 64 archaeological resources had been recorded at Barbers Point. These resources were initially identified during surveys conducted by the Bernice P. Bishop Museum (Haun 1991), Ogden Environmental and Energy Services (Landrum 1992), PHRI (Burgett 1992), and International Archaeological Research Institute, Inc. (Tuggle 1994). The 64 archaeological resources recorded within the Naval Air Station were used for habitation, agriculture, animal enclosures, fishtraps, wells and catchments, religious structures, boundary markers, walls, trails, human burials, and special activity areas.

Numerous radiocarbon dates have been determined for charcoal samples from Barbers Point. A few are found in the A.D. 1000 to 1400 range, but most fall within the A.D. 1400 to 1800 range, indicating a concentration of cultural activity at this time. One of the most interesting aspects of the archaeological record at Barbers Point is the research into the numerous sinkholes, which were used for water catchment, planting, temporary habitation, and burials. They also have paleontological significance, as bones from extinct species of birds have been recovered from the sediments at the base of the sinkholes. The site location map for these 64 archaeological resources shows that only one site is within the archaeological study area, SIHP #50-80-12-1729. It is an isolated sinkhole filled with historic and modern trash that appeared to be still in use as a trash pit at the time of the investigation.

Hammatt et al. 1990

In 1990, CSH conducted an archaeological reconnaissance survey for the ‘Ewa Villages Project near extant plantation villages (e.g., Renton, Tenney, and Varona Villages) on the ‘Ewa Plain (Hammatt 1990a, 1990b). Literature, maps, photographs, records of the ‘Ewa plantation, and previous research

were reviewed, and the parcel was traversed by foot and vehicle. Discussions were also held with several employees who had worked at the plantation 40 or more years previously. Although no prehistoric sites were identified within the project area, further documentation of remnants and dismantled plantation-era structures was recommended (Hammatt 1990a, 199b).

Hammatt and Chiogioji 1997

In 1997, CSH completed an archaeological reconnaissance survey of a 29,100-foot-long land corridor extending from the H-1 Freeway to 5,300 feet inland from the ʻEwa Beach shoreline (Hammatt 1997). Background research and a pedestrian survey revealed that the entire area had been extensively graded in association with sugar cane cultivation and construction of plantation infrastructure. The study corridor crosses two previously identified areas of archaeological concern: SIHP #50-80-12-9786 consists of the ʻEwa Villages Historic District and SIHP #50-80-12-9714 is the OR&L right-of-way (National Register of Historic Places 1982).

Spear 1996

In 1996, Scientific Consultant Services, Inc. conducted an archaeological reconnaissance and assessment of the East Kapolei Development Project, southeast of the H-1 Freeway, ʻEwa of Fort Weaver Road, and including portions of Kaloʻi and Hunehune Gulches. A limited field inspection of the project area identified sugar cane infrastructure within Kaloʻi and Hunehune Gulches (Spear 1996).

O'Hare et al. 2006

In 2005 and 2006, CSH conducted an inventory survey of the East Kapolei Project, which was ʻEwa bound by Fort Weaver Road, makai bound by Mango Tree Road, Koko Head bound by Pālehua Drive, and mauka bound by H-1 Freeway (O'Hare 2006a, 2006b). A second non-contiguous portion of the study area was mauka of H-1 Freeway surrounding a reservoir. Several sites within the study area had previously been identified during a survey in 1990 (Hammatt 1990a, 1990b). These previously identified historic archaeological sites included SIHP #50-80-12-4344 (plantation infrastructure), -4345 (railroad berm), -4346 (northern pumping station), -4347 (central pumping station), and -4348 (southern pumping station). Four additional features were documented and recommended eligible to the State Register of Historic Places during the 2005-2006 survey. These additional features, grouped under SIHP #50-80-14-4344, are -4344-D, a linear wall along the Koko Head bank of Honouliuli Stream; -4344-E, a linear wall along the Koko Head bank of Honouliuli Stream; -4344-F, a stone-faced berm constructed perpendicular to the orientation of the stream; and -4344-G, a concrete ditch and concrete masonry catchment basement on the ʻEwa bank of Honouliuli Gulch (O'Hare 2006a, 2006b).

Hammatt and Shideler 1990

In 1990, CSH completed an archaeological inventory survey prior to development of the West Loch Bluffs Project in Honouliuli, makai of Farrington Highway. Five historic

archaeological sites were identified (SIHP #s 50-80-12-4344, -4345, -4346, -4347, and -4348) and were recommended eligible to the Hawai'i Register of Historic Places under Significance Criteria C and D. These five sites consisted of 'Ewa Plantation Company remnants, including evidence of irrigation systems, two pump houses and wells, and additional architectural and industrial features. This survey also attempted to find the remains of several villages associated with the 'Ewa Plantation, including Pipeline Village, 'Ewa Villages, Drivers Village, and Stables Village. The villages and a Roman Catholic Church were identified on historic maps but no surface remains directly associated with these resources were found (Hammatt 1990a, 1990b).

Hammatt and Shideler 1999

In 1999, CSH conducted an archaeological assessment for the proposed expansion of St. Francis Medical Center West, makai of Farrington Highway and 'Ewa of Fort Weaver Road (Hammatt 1999a). The archaeological investigation involved historical research to construct a history of land use and determine whether archaeological resources had been recorded on or near the project area. It also included a limited field inspection of the project area to identify any surface archaeological resources. No archaeological resources were identified within the project area. However background research revealed that a subsurface cultural layer (SIHP #50-80-13-3321) containing a human burial, artifacts, a midden, subsurface features, and structural remains was previously identified 'Ewa of the project area. This cultural layer was determined to be of pre-contact origin and may have been occupied as early as the mid-6th to mid-9th centuries, with subsequent occupations occurring up to the early 1800s. Because of this, an archaeological inventory survey with a focus on subsurface testing was recommended for the project area prior to any development involving ground disturbance (Hammatt 1999a).

Hammatt and Shideler 1991

In 1991, CSH conducted an archaeological assessment for an approximately 24-acre parcel between Farrington Highway and (the new) Fort Weaver Road (Hammatt 1991a). A pedestrian survey and background research revealed that the entire area had been extensively disturbed, contained no surface structures or other remains, and was unlikely to contain any subsurface archaeological resources.

4.1.6 Previously Recorded Archaeological Resources

The previously recorded archaeological resources within the Honouliuli sub-area are characterized by their association with the 'Ewa Plantation, including infrastructure, transportation, or the villages of plantation workers. This also includes remnants of the former OR&L, which provided important transportation services to the plantation and its workers. The discussion of the archaeological resources proceeds from 'Ewa to Koko Head (Figure A-3 shows archaeological resource locations).

SIHP #50-80-12-9714—OR&L Right-of-Way

SIHP #50-80-12-9714 consists of the OR&L's railroad tracks, raised roadbed, and in some cases the associated 40-foot-wide right-of-way. The railroad has a long history that is well documented. The 36-inch, narrow-gauge railway was constructed by Benjamin Franklin Dillingham in the 1880s and 1890s and was in use until 1947. At its farthest extent, the railway extended from Iwilei near the Honolulu Harbor docks, around Pearl Harbor, across Honouliuli and the ʻEwa Plain, through Waiʻanae, around Kaʻena Point, and on to Kahuku on Oʻahu's North Shore (Dorrance 2000 [44-45]). The OR&L had several locomotives that hauled both freight cars and passenger cars. Most of the freight consisted of sugar from various plantations throughout the Island, with about 21,000 tons per year being hauled by the railroad in 1895 (NRHP 1982).

Since the railroad closed in 1947, the railway infrastructure including the steel rails and crossties, bridges, and culverts, and the right-of-way itself have slowly deteriorated and been removed. As an archaeological resource, portions of the railway, generally assigned and recorded under SIHP #50-80-12-9714, have been documented along Oʻahu's south, west, and north shores.

Several archaeological reports have focused on this particular archaeological resource and detailed historical work has been conducted. The Hawaiian Railway Society, a non-profit organization, has been restoring the right-of-way since 1970 and has acquired much historical information. Another important work concerning the OR&L is the book *Next Stop Honolulu!: The Story of the Oʻahu Railway & Land Company* (Chiddix 2004).

The best-preserved portion of the railway is the 13-mile-long section that extends from the intersection of Auyong Homestead Road and Farrington Highway in Nānākuli, across the ʻEwa Plain and Honouliuli, to Fort Weaver Road. These 13 miles still have their track, crossties, and right-of-way intact. The Hawaiian Railway Society runs locomotives over portions of this 13-mile stretch of railway, which was listed on the National Register of Historic Places in 1975 (NRHP 1982).

In 1982, an additional 12.5 miles of former railway right-of-way was nominated for inclusion on the National Register. This section of the former railway, extending from Fort Weaver Road to Hālawa Stream, no longer had intact tracks and cross ties. Because it lacked integrity, it was not added to the National Register (NRHP 1982).

Makai and Koko Head of Hālawa Stream, the integrity of the railway has largely deteriorated. Not only are the tracks no longer present, but the former right-of-way has been encroached upon and is no longer extant as a linear alignment. Between Hālawa Stream and Iwilei, small features of the alignment have been documented, but these are discontinuous and fragmented portions of the former railway.

The OR&L railway alignment and the proposed project alignment share a similar route and cross paths (Figure A-3). Starting in Honouliuli, the railway borders the makai side of the potential park-and-ride lot at the West Kapolei Station. The railway runs parallel to Roosevelt Avenue (along the mauka side), which the project

alignment crosses twice, first near Hornet Avenue then between Corregidor and Kassan Bay Streets. The railway alignment is within 160 feet of the project alignment for about 2,000 feet around the border of ʻAiea Bay. The railway alignment also borders the project alignment along the ʻEwa side of Kamehameha Highway just after Hālawa Stream in Pearl Harbor for about 300 feet.

Since 1980, the Hawaiʻi Department of Transportation has owned the 13-mile portion of the alignment on the National Register, although portions of the track had been purchased by the Department earlier (NRHP 1982).

The railway alignment is already established and is unlikely to extend beyond the currently registered boundary.

SIHP #50-80-12-1729—Limestone Sinkhole

SIHP #50-80-12-1729 is a single, isolated sinkhole in the mauka section of Naval Air Station Barbers Point. It is adjacent to former company housing and has been heavily modified and filled to the surface with recent historic trash. Because of extensive disturbance, no testing was conducted at this site during a 1996 intensive survey and testing project conducted by PHRI (O'Hare 1996). The site was evaluated eligible under Significance Criterion D for information content, but this resource appears to have little integrity.

SIHP #50-80-12-9786—ʻEwa Villages Historic District

SIHP #50-80-12-9786, the ʻEwa Villages Historic District, is a post-contact archaeological resource consisting of three former plantation villages: Varona Village, Tenney Village, and Renton Village. These villages were constructed for plantation workers by the ʻEwa Plantation Company, which operated a successful sugar cane plantation on Oʻahu from approximately 1880 to 1995 (Hammatt 1997).

SIHP #50-80-12-9786 encompasses an area of approximately 619 acres, bounded mauka by Mango Tree Road, bounded toward Koko Head by Fort Weaver Road, and bounded makai by the OR&L right-of-way (SIHP #50-80-12-9714). The makai and ʻEwa edge of the ʻEwa Villages Historic District is approximately 125 feet Koko Head of the alignment.

SIHP #50-80-12-9786 is listed on the State Register of Historic Places and has been determined eligible to the National Register. State and National Register Significance Criteria were not included in the archaeological reconnaissance study in which this historic property is discussed (Hammatt 1997). SIHP #50-80-12-9786 is currently under the land jurisdiction of the City and County of Honolulu.

SIHP #50-80-12-4344—ʻEwa Plantation Infrastructure

SIHP #50-80-12-4344 consists of several features associated with ʻEwa Plantation infrastructure, including walls for erosion prevention, berms, concrete ditches, pipes, and other structures associated with the ʻEwa Plantation irrigation system. The archaeological resource was first defined during an Archaeological Inventory Survey conducted by CSH (Hammatt 1990a, 1990b). Three features (a sign and various

pipes) were found during this survey and assigned SIHP #50-80-12-4344. Additional investigation was recommended, but these features were destroyed during bulldozing in the area by an unknown source before this investigation took place.

Additional features of this archaeological resource were documented in 2006 during another archaeological inventory survey conducted by CSH, Inc. (O'Hare 2006a, 2006b). Features of SIHP #50-80-12-4344 are found 200 feet mauka of the Project alignment along Farrington Highway in Honouliuli, and additional features of SIHP #50-80-12-4344 are 5,500 feet makai of the proposed alignment. This area is owned by the City and County of Honolulu and is so large because of the original plantation size. Certain features of the 'Ewa Plantation infrastructure have been determined eligible to the Hawai'i Register of Historic Places under Significance Criteria C and D, but the overall archaeological resource does not appear on either the State or National Registers (Hammatt 1990a, 1990b; O'Hare 2006a, 2006b).

4.2 Farrington Highway Sub-Area

4.2.1 Sub-Area Description

The sub-area is in the ahupua'a of Honouliuli, Ho'ae'ae, Waikele, Waipi'o, and Waiawa. The Farrington Highway sub-area includes the project alignment, as well as various ramps and roadway sections associated with the Project's connections with the H-1 and H-2 Freeways. These ramps and roadways are at the sub-area's Koko Head end, at the Waiawa Interchange of the H-1 and H-2 Freeways. Figures A-4 through A-6 in Appendix A depict the geography and features of the Farrington Highway sub-area and summarize various types of environmental and cultural information.

The Farrington Highway sub-area is approximately 3.5 miles long, with an additional 0.6-mile-long park-and-ride access ramp paralleling the H-2 Freeway. The sub-area includes the West Loch, Waipahu Transit Center, Leeward Community College, and Pearl Highlands Stations. Also included within the sub-area is a potential transit center location associated with the West Loch Station, a potential maintenance and storage facility at the Leeward Community College Station, and a potential park-and-ride lot at the Pearl Highlands Station. The maintenance facility would also have separate access railway that is approximately 0.6 miles long and connecting to the main project alignment Koko Head near the Leeward Community College Station and 'Ewa near Waipi'o Point Access Road.

4.2.2 Natural Environment

The Farrington Highway sub-area is between 0.4 and 1.2 miles inland of the West and Middle Lochs of Pearl Harbor. Terrain is fairly level with elevations between 20 and 40 feet above sea level, rising to 100 to 200 feet above sea level toward the Koko Head end. The sub-area receives an average of 24 to 31 inches of annual rainfall (Giambelluca 1986) (Figure A-4).

The largest stream intersecting the project alignment in this sub-area is Waikele Stream in Waikele ahupua‘a (Figure A-4). The name Waikele means “muddy water” (Pukui 1983) and this appellation likely refers to the two permanent streams, Waikakalaua Stream and Kīpapa Stream, which flow through the Schofield Plateau and converge with Waikele Stream. Waikakalaua Stream has tributaries in the Ko‘olau and Wai‘anae Ranges; Kīpapa Stream originates in the Ko‘olau Range; and Waikele Stream originates in the Wai‘anae Range. These streams drain a “large expanse of lateritic soils of fine particle size [and therefore] the water would have appeared muddy in prehistoric times even during periods of normal flow” (Hammatt 1988). The permanent streams form steep gulches that cut through layers of interbedded thick basalt flows and thinner layers of weathered alluvium, which consist of loosely consolidated saprolitic pebbles and cobbles with occasional boulders (Riford 1986). Within the gulches, the bottom-lands along the stream channels consist of deep, well-drained Haleiwa silty clay on nearly level slopes.

Four smaller, non-perennial streams intersect this sub-area: Ho‘ae‘ae Stream at the ‘Ewa end, Kapakahi and Makalena Streams between West and Middle Lochs, and Waiawa Stream at the Koko Head end (Figure A-4).

According to the USDA soil survey data, the majority of soils in this sub-area are Waipahu Silty Clay (WzA, WzB, WzC), Fill Land, mixed (FL), Molokai Silty Clay Loam (MuC), Pearl Harbor Clay (Ph), and Tropaquepts (TR). These soils are described by Foote et al. (Foote 1972) as follows:

- The Waipahu series are described as “well-drained soils on marine terraces on the island of O‘ahu. These soils developed in old alluvium derived from basic igneous rock.”
- Mixed fill land “consists of areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources.”
- The Molokai series “consists of well-drained soils on uplands on the islands of Maui, Lanai, Molokai, and O‘ahu. These soils formed in material weathered from basic igneous rock.”
- The Pearl Harbor series “consists of very poorly drained soils on nearly level coastal plains on the island of O‘ahu. These soils developed in alluvium overlying organic material.”
- Tropaquepts are described as “poorly drained soils that are periodically flooded by irrigation in order to grow crops that thrive in water. They occur as nearly level flood plains on the islands of O‘ahu and Maui.”

The Koko Head end of the sub-area is characterized by a different set of soils. These are Helemano Silty Clay (HLMG), Kawaihapai Clay Loam (KlA), Rock Land (rRK), and Molokai Silty Clay Loam (MuB). These are described as follows:

- The Helemano series are “well-drained soils on alluvial fans and colluvial slopes on the sides of gulches… They developed in alluvium and colluvium derived from basic igneous rock.”

- The Kawaihapai series “consists of well-drained soils in drainageways and on alluvial fans on the coastal plains on the islands of O‘ahu and Molokai. These soils formed in alluvium derived from basic igneous rock in humid uplands.”
- Rock Land is described as “areas of exposed rock covering 25 to 90 percent of the surface. The rock outcrops, mainly basalt and andesite, and very shallow soils are the main characteristics of this sediment.”
- The Molokai Series consists of “well-drained soils on uplands… formed in material weathered from basic igneous rock.”

Vegetation in the sub-area consists primarily of grasses, shrubs, and introduced non-native plants and trees used for landscaping and decoration.

4.2.3 Built Environment

The Farrington Highway sub-area begins near Leeward Community College at the Koko Head end and continues ‘Ewa through a naval reserve and Waipahu Town. The naval reserve is completely landscaped and graded. Waipahu Town consists of developed areas of residential and commercial buildings and infrastructure (Figure A-5).

The park-and-ride access ramp portion of the sub-area closely follows the H-2 Freeway (Figure A-5). Although there are no residences or commercial buildings in the immediate vicinity of this sub-area, its alignment with a major seven-lane freeway (H-2 Freeway) suggests that the land was very likely previously modified during the initial freeway construction.

4.2.4 Past Land Use and Land Commission Awards Information

The Farrington Highway sub-area traverses four ahupua‘a: Honouliuli, Ho‘ae‘ae, Waikele, and Waipi‘o. Honouliuli, Ho‘ae‘ae, and Waikele each had their own plains watered by streams flowing down from the Wai‘anae and Ko‘olau Mountains. Waipi‘o had a spring-fed floodplain that drained into Middle Loch. In this sub-area, the pre-contact population was focused along the lowlands of Pearl Harbor, which had fishponds and extensive irrigated taro fields (lo‘i). House lots and dry fields (kula) were spread along the mauka slopes nearby. Fishponds ringed the deep bays of Pearl Harbor, and behind the plains were long valleys and gradually sloping ridges where yams and bananas were grown.

The Organic Acts of 1845 and 1846 initiated the Māhele (the division of Hawaiian lands), which introduced private property into Hawaiian society. In 1848, the crown (Hawaiian government) and the ali‘i received their land titles. Subsequently in the Māhele, LCAs for kuleana parcels were awarded to commoners and others who could prove residency on and use of the parcels they claimed.

The distribution of LCAs during the Māhele reflects the distribution of population in these four ahupua‘a in the mid-19th century. In all four cases the bulk of the ahupua‘a was awarded to one or more ali‘i, government officials, or foreign residents favored by the throne. In Honouliuli, Ho‘ae‘ae, and Waikele all kuleana awards (and

in Waipiʻo most kuleana awards) were granted for small claims on the low floodplains near Pearl Harbor.

Within this sub-area, 37 LCAs were awarded; 4 were large awards to aliʻi (Table 4-2). The remaining LCAs reflect the agricultural nature of the region. Nearly all of the other 33 awards included loʻi (irrigated pondfields–an average of two loʻi per award); half of the awards included kula; and a third included house lots. Many LCAs were clustered near Government Road, which ran mauka of the plain (Figure A-5).

In the late 18th century, the ʻEwa District was one of the most densely populated regions on Oʻahu, with most housing and irrigated farming concentrated along the shores of Pearl Harbor. This population diminished drastically during the early 19th century because of disease and migration to Honolulu. Upland valleys and slopes were abandoned for the fertile farmlands near Pearl Harbor (Cordy 1996).

Large-scale cultivation of rice, then sugar took over most of the arable land in the late 19th and 20th centuries. In 1897, the Oʻahu Sugar Company was incorporated with fields mauka of Government Road and on the Waipiʻo Peninsula (Condé 1973 [313]). The sugar mill was constructed just mauka and Koko Head of Waikele Stream, makai of Government Road. The plantation's board of directors named the mill site "Waipahu" (Nedbalek 1984). Plantation workers were housed in ethnic settlements around the mill and scattered across the plantation. By 1920, rice production had declined because of blight and foreign competition, and a town had grown up on the plain makai of the sugar mill. By 1940 the population of Waipahu Town had grown to nearly 7,000 (Nedbalek 1984).

A 1908 lease led to the formation of the Waipiʻo Pineapple Company. The Oʻahu Railway & Land (OR&L) Company, organized in 1889, connected outlying areas of Oʻahu to Honolulu. By 1890, the railroad reached from Honolulu to Pearl City and continued on to Waiʻanae in 1895 (Kuykendall 1967 [100]). The OR&L transported sugar and pineapple from Honouliuli through Waipiʻo to Honolulu. Oʻahu Sugar Company continued to produce sugar until closing in 1995 when its leases expired (Dorrance 2000).

Early in the 20th century, the U.S. Government began acquiring the coastal lands of ʻEwa for the development of a naval base at Pearl Harbor. By 1941, Pacific Naval Air Bases expenditures for new construction at Pearl Harbor were in the hundreds of millions of dollars. The Japanese attack on Pearl Harbor on December 7, 1941 damaged or destroyed much of the new construction. Reconstruction was instituted to double Pearl Harbor's military capacity. Military expansion around Pearl Harbor during World War II dramatically changed land use as cane fields were cleared for military facilities. After the war, roads replaced railroads within the sugar plantation, and by the 1960s areas along Farrington Highway were covered with residential developments in the towns of Waikele and Waipahu.

Table 4-2: Farrington Highway Sub-Area Land Commission Awards

LCA Number	Contents of Award
9368:1	3 taro patches (loʻi) and 1 pasture (kula)
8241 L.K.:2	5 loʻi
8241 S.S.:2	(0.73-acre) lot
1685:1	3 taro patches (loʻi) and 1 pasture (kula)
10613:4	Lands to Abner Paki (Aliʻi Award)
10512:	3 loʻi
1712 C:2	1 house lot and garden
7260:2	ʻili of Waikele and Kaolipea (291.58 acres) to Bennett Namakeha
1614 B:2	1 house lot
5989:1	3 taro patches (loʻi) and 1 pasture (kula)
1682 B:	2 loʻi
6545:1	ʻili of ʻŌhua (30.32 acres) to Hana Hupa Haalilio
908:	1 loʻi
1015:1	1 house lot (1 house), 3 loʻi, and 1 kula
5663:1	ʻili of Pahao (14.37 acres) to Kahonu
860:1 and 860:2	1 house lot (1 house), 6 loʻi, and 2 salt lands
1005:2 and 1005:3	4 loʻi and 1 kula
858 C:2	5 loʻi
857:1	I house lot (2 houses)
1018:	I house lot (1 house) and 1 kula
858:2	5 loʻi and 1 fishpond
1003:1	No data
5930:	ʻili of Hanohano to Puhalahua
1578:2	1 loʻi and 1 kula
887:1	1 house, 1 kula, and 5 loʻi
1533 and 1696:	1 house lot (1 house), 4 loʻi, 1 kula
750:	5 loʻi
1571:	1 house lot (1 house), 1 loʻi, and 1 kula
899:	1 house lot (1 house), 5 loʻi, and 1 kula
1561:	2 loʻi and 1 kula
1707:2	3 loʻi and 1 kula
10942:1, 10942:2, 10942:3, and 10942:4	1 house lot (1 house) and 8 loʻi to William Wallace
9294:	1 house lot
904:3	1 house lot (3 houses), 1 loʻi, and 2 fishponds
4213:1 and 4213:2	3 loʻi and 1 kula, ½ house lot
5591 and 9357:1	5 loʻi and 1 kula
4259 and 2685:	I house lot, 6 loʻi, 1 ʻauwai, and 1 steep banana plantation

This sub-area passes directly through a primary area of pre-contact settlement and intensive agriculture. Although the study area has been modified by sugar cane production and urban development throughout the 20th century, previous archaeological finds suggest that intact prehistoric and early-contact cultural deposits associated with Hawaiian habitation, work, and recreation may lie undisturbed beneath modern development. Features related to traditional agriculture (e.g., loʻi and ʻauwai levees) as well as prehistoric and historic archaeological features (e.g., hearths, building foundations, trash pits, and privies) may be found in this sub-area.

4.2.5 Previous Archaeological Investigations

Most of the Farrington Highway sub-area as it exists today (along with much of the built environment around it) was constructed during the 1960s (Voss 2008). Although the highway was built over existing roadways (including the previously mentioned Government Road), reconstruction led to residential and commercial growth, which occurred before archaeological investigations became standard in the late 1970s. This may explain why there have been so few archaeological investigations within this area. The sub-area also parallels a portion of the H-2 Freeway, which was built in 1977 (Voss 2008). However, according to traditional land use and historical LCA information, there is little evidence of Native Hawaiian habitation in the vicinity of the H-2 Freeway.

Near Farrington Highway, previous archaeological investigations show varied types of archaeological resources including traditional Hawaiian remains, plantation infrastructure, and World War II historic infrastructure. Three of the five previous archaeological investigations are located near the Project's potential maintenance and storage facility, near the Leeward Community College Station. The discussion of previous archaeological investigations proceeds from ʻEwa to Koko Head (Figure A-6 shows locations of prior archaeological investigations in this sub-area).

Rasmussen and Tomonari-Tuggle 2006

In 2004, monitoring was conducted along the Waiau Fuel Pipeline corridor in the ʻEwa District. This monitoring occurred in the direct vicinity of previously identified traditional Hawaiian burials (SIHP #50-80-09-3761 and SIHP #50-80-09-5302) and the fishponds of Loko Luakahaole (SIHP #50-80-09-0115), Loko Kuhialoko (SIHP #50-80-09-0119), Loko Moʻo (SIHP #50-80-09-0120), Loko Eo (SIHP #50-80-09-0123), and Loko Pouhala (SIHP #50-80-09-0126). No new archaeological remains were discovered however (Rasmussen 2006).

Hammatt and Chiogioli 2000

In 2000, CSH prepared an archaeological assessment of an approximately 2,600-foot-long portion of Farrington Highway for proposed improvements between Anini Place and Waipahu Depot Road in Waikele (Hammatt 2000). Background research indicated that the study area ran along land that was loʻi (taro fields) until the mid-19th century. Many loʻi were replaced by rice fields in the 20th century. During the 20th century, Oʻahu Sugar Company was established and Waipahu Town developed around the sugar mill and plantation. OR&L tracks ran perpendicular across Hammatt and

Chiogioji's (Hammatt 2000) study area. Background research also indicated the study area includes historic buildings and construction over 50 years old. The historic features mentioned in the report include a railway overpass on the makai side of Farrington Highway with a drainage canal bridge constructed in the late 1930s (which had no markings or relation to the OR&L), and the St. Joseph Church and school, also located on the makai side of Farrington Highway, built in the 1940s. St. Joseph Church and school are in use today, are not currently listed on either the State or National Register of Historic Places, and do not appear to have been evaluated for State or National Register eligibility. Background research also indicated that no archaeological inventory surveys were conducted within the current Farrington Highway sub-area or within the immediate vicinity. In addition, no surface archaeological resources were observed, indicating little likelihood of finding prehistoric surface or subsurface archaeological remains since all areas along the study area have been subjected to decades of urban development that would have removed any surface remnants related to traditional Hawaiian activities.

Rainalter et al. 2006

In 2006, CSH conducted an archaeological field inspection and literature search for construction of the Leeward Community College Second Access Road. The study area was bounded on the mauka side by the Middle Loch of Pearl Harbor, on the makai side by Farrington Highway, on the 'Ewa side by Waipi'o Point Access Road, and on the Koko Head side by Waiawa Stream (Rainalter 2006). Two archaeological resources were identified within the study area: SIHP #50-80-09-5302, a burial site containing both coffin and pit burials, and SIHP #50-80-09-6764, the 'Ewa Junction Navy Fuel Drum Site, a fuel storage facility designed to store automobile gasoline and aviation kerosene in underground storage tanks.

Rechtman and Henry 1998

In 1998, PHRI completed an archaeological reconnaissance survey at the Red Hill Fuel Storage Area mauka of Moanalua Freeway, and at the 'Ewa Junction Drum Filling and Fuel Storage Area makai of Farrington Highway and mauka of Middle Loch (Rechtman 1998). The Red Hill facility, a series of subterranean tunnels and vaults, was built by the military between 1940 and 1943 after the Pearl Harbor attack. It is not currently in use. Both archaeological study areas displayed a large amount of previous ground disturbance and development. No subsurface cultural materials were found.

Goodman and Nees 1991

In 1991, the Bishop Museum (Goodman 1991) conducted a reconnaissance survey of 3,600 acres in Waiawa ahupua'a adjacent to the H-2 Freeway. Seventeen sites were reported from the study area (SIHP #50-80-09-1469 to 1472; 2261 to 2273). Four pre-contact sites were recorded: a rock-shelter complex, a mound complex, a trail, and a lithic scatter. Post-contact features such as irrigation ditches, a railroad system, and a cannery were described. Four features associated with World War II military training were also found. None of these recorded resources are within or in the vicinity of the current Farrington Highway sub-area.

4.2.6 Previously Recorded Archaeological Resources

The few previously recorded archaeological resources within the Farrington Highway sub-area are associated with plantation transportation and World War II storage facilities. The discussion of the archaeological resources proceeds from ʻEwa to Koko Head (Figure A-6 shows the locations of previously recorded archaeological resources discussed in the following sections).

SIHP #50-80-12-9714—OR&L Right-of-Way

SIHP #50-80-12-9714 consists of the railroad tracks, the raised roadbed, and in some cases the associated 40-foot-wide right-of-way of the OR&L. The OR&L Railway has a long history that is well documented. For a discussion of this resource, refer to Section 4.1.6.

SIHP #50-80-09-6764—ʻEwa Junction Navy Fuel Drum Site

SIHP #50-80-09-6764 is a historical archaeological resource (the ʻEwa Junction Navy Fuel Drum Resource, constructed in 1943) that was identified during an archaeological reconnaissance conducted by PHRI (Rechtman 1998) and further documented during an archaeological field inspection and literature search conducted by CSH (Rainalter 2006). It consisted of various aboveground and underground fuel tanks, related aboveground vent pipes, a drumming warehouse and loading dock, a collapsed unidentified building, power line poles, asphalt and concrete road surfaces, and other various fuel maintenance facilities.

The ʻEwa Junction Fuel Drum Resource boundary (approximately 1,400 feet long and 850 feet wide) is in the immediate vicinity of a potential project maintenance and storage facility. The collapsed building is approximately 190 feet inward from the proposed facility area's ʻEwa edge; the underground storage tanks are 290 feet from its Koko Head edge; the fuel drumming warehouse and loading dock are 350 feet from its makai edge; and a valve pit is within a few feet of the present archaeological study area centerline (Figure A-6).

Although the individual features of this archaeological resource have not been formally evaluated for State or National Register eligibility, based on an evaluation by the Navy and CSH it is likely that at least portions of it are eligible for the State and National Registers under Significance Criterion D (for its informative potential regarding World War II military facilities in the Pacific). Current land jurisdiction rests among the City and County of Honolulu, the Department of the Navy, Kamehameha Schools, and the Magoon Estate.

4.3 Kamehameha Highway Sub-Area

4.3.1 Sub-Area Description

The Kamehameha Highway sub-area is within the ahupuaʻa of Waiawa, Mānana, Waimano, Waiau, Waimalu, Kalauao, and ʻAiea. This sub-area is approximately

3.4 miles long and includes the Pearl Highlands and Pearlridge Stations. Figures A-7 through A-9 in Appendix A depict the geography and features of the sub-area and summarize various types of environmental and cultural information.

4.3.2 Natural Environment

The Kamehameha Highway sub-area extends along the northern coast of East Loch in Pearl Harbor, about 500 feet from the coastline at its closest point and extending just under a mile from the coastline at its farthest point. This sub-area is fairly level, varying in elevation from 0 and 40 feet, remaining close to sea level throughout most of the sub-area, then increasing in elevation to 40 feet at the ʻEwa end. Mean annual rainfall in this area ranges between 24 and 40 inches (Figure A-7).

Five streams cross the sub-area: three are perennial (Waimalu, Kalauao, and ʻAiea) and two are not (Waiau and an unnamed stream ʻEwa of Kalauao Stream) (Figure A-7).

According to USDA soil survey data (Foote 1972), this sub-area passes through a wide variety of soils, primarily clays. The soils present are Waipahu Silty Clay (WzB, WzC), Kawaihapai Clay Loam (KlA), Hanalei Silty Clay (HnB), Honouliuli Clay (HxA), Molokai Silty Clay Loam (MuB, MuC), Keauu Clay (KmbA), Pearl Harbor Clay (Ph), Rock Land (rRK), and Tropaquepts (TR).

The soils are described by Foote et al. (Foote 1972) (Figure A-7) as follows:

- The Waipahu series are “well-drained soils on marine terraces…[that] developed in old alluvium derived from basic igneous rock”.
- The Kawaihapai series are “well-drained soils in drainageways and on alluvial fans on the coastal plains,” the Mokulēʻia series are “well-drained soils along the coastal plains… [that] formed in recent alluvium deposited over coral sand”
- The Hanalei series is described as “somewhat poorly drained to poorly drained soils on bottom lands on the islands of Kauai and Oʻahu. These soils developed in alluvium derived from basic igneous rock. They are level to gently sloping.”
- The Honouliuli series and the Molokai series are “well-drained soils on coastal plains on the Island of Oʻahu in the ʻEwa area [which] developed in alluvium derived from basic igneous material.”
- The Keaʻau series are “poorly drained soils on coastal plains on the Island of Oʻahu [which] developed in alluvium deposited over reef limestone or consolidated coral sand.”
- The Pearl Harbor series are “poorly drained soils on nearly level coastal plains on the Island of Oʻahu [which] developed in alluvium overlying organic material.”
- Rock land is described as “areas of exposed rock covering 25 to 90 percent of the surface. The rock outcrops, mainly basalt and andesite, and very shallow soils are the main characteristics of this sediment.”

- Tropaquepts are described as “poorly drained soils that are periodically flooded by irrigation in order to grow crops that thrive in water. They occur as nearly level flood plains on the islands of O‘ahu and Maui.”

4.3.3 Built Environment

The Kamehameha Highway sub-area consists of roadways running through highly developed residential and commercial areas (Figure A-8).

4.3.4 Past Land Use and Land Commission Award Information

The Kamehameha Highway sub-area traverses a portion of the ‘Ewa District within the Waiawa, Mānana, Waimano, Waiau, Waimalu, Kalauao, and ‘Aiea ahupua‘a that until the mid-19th century was comprised of taro lands with associated traditional Hawaiian habitation. Fishponds ringed the deep bays of Pearl Harbor, and the well-watered coastal plain was ideal for irrigated taro cultivation. Behind the plain were long wooded valleys and gradually sloping ridges where yams and bananas were grown. In 1809 Archibald Campbell described the region thus:

> “… an extensive and fertile plain, the whole of which is in the highest state of cultivation. Every stream was carefully embanked, to supply water for taro beds. Where there was no water, the land was under crops of yams and sweet potatoes. The roads and numerous houses were shaded by cocoa-nut trees, and the sides of the mountains were covered with wood to a great height” (Campbell 1967).

John Papa ‘Ī‘ī (Ii 1959) mentions a trail around Pearl Harbor passing through the lowlands of Waiawa. This trail was one in a system of trails that served as “main arteries through Central O‘ahu and out to the Leeward Coast joined in west coastal Waiawa (as the H-1 and H-2 Freeways do today) to continue on to East O‘ahu… [this] would have been a natural place for people to gather and was the place of two famous maika (a game similar to bowling) playing fields” (Bushnell 2003 [11]).

The project alignment extends through 38 LCAs (Figure A-8 and Table 4-3). Of these 38 LCAs, 5 were awarded as large grants to ali‘i, government officials, or foreign residents favored by the throne. The remaining LCAs reflect the agricultural nature of the region: nearly all of the remaining 33 awards included lo‘i (an average of 4.5 lo‘i per award); nearly half included kula (pasture lands or dry fields); and only a third included house lots. Most LCAs were clustered near the Government Road, which ran mauka of the plain (the modern Kamehameha Highway and the project alignment follow the route of this trail).

During the second half of the 19th century, ‘Ewa maintained its agricultural focus. Rice production began to supplant taro in the 1860s, and beginning in the 1890s two large sugar cane plantations dominated the landscape: ‘Ewa Plantation Company and the O‘ahu Sugar Company.

Table 4-3: Kamehameha Highway Sub-Area Land Commission Awards

LCA Number	Contents of Award
2102:	1 house lot (1 house), 3 taro patches (loʻi), 1 pasture (kula), and 1 pond
2054:	2 loʻi and 1 kula
2052:	4 loʻi and 1 kula
5918 and 9337:	4 loʻi
2141:	1 house lot, 2 loʻi, and 1 fishpond
7344:1 and 7344:2	4 loʻi and 1 pond
1990:	2 loʻi and 1 kula
5365:	ʻili of Paaiau (62.15 acres), a place with no houses, to William Stevens
5910 and 5934:1	4 loʻi and 1 kula
5840:1	3 loʻi
9297:	4 loʻi
9400:1 and 9400:2	1 house lot (1 house), 5 loʻi, 1 spring and pond, 1 breadfruit tree
2494:1	2 loʻi
2494:2	2 loʻi
6156 B:1	11 loʻi and 1 kula
6156:1 and 6156:2	5 loʻi and 1 kula
5581:2	3 loʻi and 1 kula
8525 B:3	ʻili of Waiele and Kainakoi (522.06 acres) to Julia Alapai Kauwa (aliʻi award)
9315:1	8 loʻi, 4 dry loʻi, and 1 kula
2938 Part 5:3	ʻili of Pohakapu (418.75 acres) to the heirs of Lahilahi and Juan Marin
9407:1 and 9407:2	6 loʻi and 1 fishpond
5649:	1 house lot (1 house) and 3 loʻi
5586:	1 house lot, 5 loʻi, and 1 pasture kula
9387 B:1	(1.73-acre) lot including loʻi and 2 houses
9385:	6 loʻi
8340:8	No data
9339:2	5 loʻi
9410 B:1	8 loʻi to Wahaolelo
9338:1	1 house lot, 2 loʻi, and 1 fishpond
9409:	5 loʻi, 1 kula, and 1 ditch (ʻauwai)
9410:1 and 9410:2	1 house lot, 10 loʻi, and 1 kula
9369:1, 9369:2 and 9369:3	15 loʻi and 1 kula
9344:2	I house lot (1 house), 10 loʻi, and 1 kula
9328:1	9 loʻi and 1 kula
11029:2	ʻili of Kukona (522.42 acres) to John Stevenson
5662:1	1 loʻi and 1 kula
8305:14	ʻili of Kaholona (150.49 acres) to Paulo Kanoa
9372:2	1 loʻi and pond

The early 20th century brought significant changes to the ‘Ewa District. Historic documents show one of ‘Ewa’s first major land alterations. The Waiāhole Water Company, a subsidiary of O‘ahu Sugar, created the Waiāhole Ditch System that ran from the mauka end of the Ko‘olaus:

> “[T]hrough Waiāhole Valley, then connecting [these tunnels] to 14 tunnels on the southern [*makai*] side of the Ko‘olau at Waiawa, and thence by ditch westward [‘Ewa bound] Honouliuli, covering a total of 13.6 kilometers. The ditch system was completed in 1916, and with some modifications is still in use. It is included on the State inventory of archaeological sites as Site # 50-80-09-2268” (Bushnell 2003).

This system generated intense agricultural, as well as urban growth throughout the entire ‘Ewa District.

Development of the OR&L route across ‘Ewa also established the first urban development at Pearl City in the late 19th century. By 1920, urban development had begun at ‘Aiea, followed by further development at Waimalu and Pearl City in the 1950s.

Military expansion prior to and during World War II also brought dramatic changes in land use around Pearl Harbor as large areas were cleared for military facilities or housing. Although some large military reservations remain, these have reverted to public use and extensive urban development.

Although the study area has been extensively modified by land reclamation, sugar cane production, military construction, and urban development, previous archaeological investigations suggest that intact pre-contact and early-contact cultural deposits associated with Hawaiian habitation and agriculture may lie undisturbed beneath modern fill layers. Additionally, post-contact archaeological features (e.g., hearths, building foundations, trash pits, and privies) may also be encountered within this sub-area.

4.3.5 Previous Archaeological Investigations

Most of the Kamehameha Highway sub-area was developed prior to the establishment of legislation requiring cultural resource management efforts to mitigate the impact of development on archaeological resources. As a result, there have been relatively few archaeological studies conducted in this area. The few archaeological resources that have been identified document post-contact land use associated with World War II military operations, the OR&L, and historic burials. The discussion of previous archaeological investigations proceeds from ‘Ewa to Koko Head (Figure A-9 shows locations of prior archaeological investigations).

McGerty and Spear 1995

In 1995, Scientific Consultant Services completed an archaeological assessment for the Department of Housing and Community Project. The project area consisted of 138.5 acres on two parcels bisected by Kamehameha Highway in the Mānana Pearl

City Junction (TMK 9-7-23 and 9-7-24). The upper parcel is bounded on the ‘Ewa side by Hale Ola, Holiday City sub-divisions, and Mānana-Kai Park; on the makai side by Cane Haul Road; on the Koko Head side by Waimano Home Road and the Kauhale Mānana sub-division; and on the mauka side by Kamehameha Highway. The lower parcel is bounded on the makai side by Kamehameha Highway; on the ‘Ewa and Koko Head side by cleared lots; and on the mauka side by land belonging to the University of Hawai‘i. The background research indicated intensive post-contact agricultural and military use of the project area. Thus, the potential of locating intact archaeological resources has been significantly decreased. No archaeological resources were encountered during this investigation (McGerty 1995).

Yent 1985

In 1985, the Department of Land and Natural Resources (DLNR) Division of State Parks, Outdoor Recreation, and Historic Sites conducted an archaeological reconnaissance and limited subsurface testing at Hale Mohalu, a defunct facility used to treat patients with Hansen’s disease, located Koko Head of Sunset Memorial Park (Yent 1985). The purpose of this archaeological work was to define and evaluate archaeological resources on the property as part of an Environmental Assessment and prior to the leasing of the property by DLNR. No archaeological resources were identified during the archaeological investigation. However, archival research revealed the presence of LCAs within the project area, indicating traditional Hawaiian agriculture. Thus it was recommended that if a construction project involving ground disturbance is proposed for the study area, a more intensive archaeological subsurface testing regimen using a backhoe should be conducted prior to any ground disturbance (Yent 1985).

Groza et al. 2007a

In June 2007, CSH completed an archaeological inventory survey for the Hale Mohalu II Project, an affordable rental housing project in Pearl City off Kamehameha Highway and Koko Head of Sunset Memorial Park (Groza 2007a). One archaeological resource, SIHP #50-80-09-6918, was identified within the project area—a former World War II barracks built by the U.S. Navy in 1945. This barracks was used as a tuberculosis treatment annex at the end of World War II and leased a few years later by the Hawaiian Board of Health to treat Hansen’s disease patients. The features associated with SIHP #50-80-09-6918 are two freestanding walls at the property entrance, a rock and mortar wall around the base of a banyan tree, and concrete stairs. SIHP #50-80-09-6918 was determined eligible under Significance Criterion D, although the resource is not listed on either the State or National Registers.

Kaschko 1990

In 1990, International Archaeological Research Institute, Inc. (Kaschko 1990) investigated a property in Pearl City adjacent to Kamehameha Highway (TMK 1-9-7-019:010). Five intact graves with whole or partial headstones were

found at the ‘Ewa end of the property. In addition, a number of broken headstones were piled in the makai and ‘Ewa corner. A majority of the headstones contained Portuguese names with dates ranging from 1900 to 1908. A backhoe excavated five trenches on the property, extending to the Koko Head boundary of the project area. Seven burial pits containing wooden coffins were identified. Thus, the property contains at least twelve burials. All burials were left in place and the trenches were backfilled. An SIHP number was not assigned to this post-contact cemetery. Subsequent to testing, the cemetery was identified as “Lockview B Cemetery.”

Sinoto 1986

In 1986, Eric Komori and Dr. Aki Sinoto conducted an archaeological surface survey for the Pearl Promenade Project in Kalauao, ‘Ewa (Sinoto 1986). Because of extensive previous and compounded land alterations (e.g., filling of the marshland) in the project area, no archaeological resources were observed.

Yent and Ota 1981

In 1981, the Division of State Parks conducted an archaeological reconnaissance survey at Rainbow Bay State Park on the East Loch of Pearl Harbor. No archaeological resources were observed, and intense land disturbance was noted (Yent 1981).

4.3.6 Previously Recorded Archaeological Resources

Archaeological resources identified within the Kamehameha Highway sub-area include the OR&L Company right-of-way, remnants of World War II infrastructure, and a cemetery. The discussion of the archaeological resources proceeds from ‘Ewa to Koko Head.

SIHP #50-80-12-9714—OR&L Right-of-Way

SIHP #50-80-12-9714 consists of the railroad tracks, the raised roadbed, and, in some cases the associated 40-foot wide right-of-way of the OR&L. The OR&L has a long history that is well documented. For information regarding this resource, refer to Section 4.1.6.

SIHP #50-80-09-6918—WWII Barracks

SIHP #50-80-09-6918 consists of post-contact remnants of a World War II Navy barracks that later became Hale Mohalu, a medical center that treated patients with Hansen’s disease (Groza 2007a). SIHP #50-80-09-6918 is composed of three features. Feature A consists of two free-standing rock and mortar walls at the Kamehameha Highway entrance to the barracks and hospital grounds. Feature B is a rectangular landscaping rock and mortar base around a large banyan tree similar in construction and materials to the entry walls of Feature A. Feature C is a concrete staircase adjacent to Feature B. The age of the banyan tree base and staircase is uncertain. It is unlikely that the staircase would have been built after Hale Mohalu was demolished in 1983, so the stairs are most likely associated with Hale Mohalu.

Features A, B, and C are respectively 167 feet, 180 feet, and 351 feet makai of the project alignment (Figure A-9).

SIHP #50-80-09-6918 was recommended to the Hawai'i and National Registers of Historic Places under Significance Criterion D (is likely to yield information important to research on prehistory or history). SIHP #50-80-09-6918 lies on land owned by DLNR.

Lockview B Cemetery

In 1990, the International Archaeological Research Institute, Inc. documented 12 post-contact burials within a historic cemetery while conducting an archaeological inventory survey at an approximately 175-foot by 105-foot property in Pearl City on the makai side of Kamehameha Highway between Pu'u Momi and Pu'u Poni Streets (Kaschko 1990) (Figure A-9). An SIHP number was not assigned to this post-contact cemetery despite it being reported to the State Historic Preservation Division.

The inventory survey conducted by Kaschko (1990) identified five intact graves with whole or partial headstones at the 'Ewa end of the property. Additionally, a number of broken headstones were observed piled in the makai and 'Ewa corner of the property. A majority of the headstones contained Portuguese names with dates ranging from 1900 to 1908. Backhoe excavations and subsequent hand probing identified seven burial pits containing wooden coffins within the property. All burials were left in place and the trenches were backfilled. Subsequent to testing, the cemetery was identified as "Lockview B Cemetery."

This archaeological resource consists of a post-contact cemetery containing both marked and unmarked burials. A firm boundary has not been established for this archaeological resource, and it is likely that its boundaries extend beyond the area where it was identified (Figure A-9).

'Aiea Cemetery

'Aiea Cemetery is located on the mauka side of Kamehameha Highway, adjacent to Aloha Stadium, at the Koko Head end of the Kamehameha Highway sub-area. The approximately 1.5-acre, roughly diamond-shaped cemetery parcel is surrounded by roadways, including Kamehameha Highway and the access roads that feed traffic into Aloha Stadium and the H-1 Freeway. The project alignment would pass over the makai and Koko Head corner of the cemetery parcel and the makai two-thirds of the cemetery is located within the sub-area. The cemetery is owned by the State of Hawai'i and appears to be actively maintained, based on the recently trimmed lawn and graves with fresh flowers. A rusted, partially collapsed chain link fence marks the cemetery boundary. Based on a brief inspection of the cemetery perimeter, there are no marked graves or potential grave sites outside the cemetery boundary fence.

The graves appear to be grouped in clusters and cover nearly all of the available area within the cemetery. Grave markers are concrete, native basalts, and various non-native stones such as granite. Most grave markers have some sort of inscription, either in the Roman alphabet or in Japanese characters. The largest, centrally located grave marker or monument may be inscribed with Chinese characters. The Roman

inscriptions are predominantly Portuguese names with associated text in English, although in some cases the text is written in Portuguese as well. What appeared to be Anglo-American and Filipino names were also noted. The observed Roman alphabet inscriptions all marked interments between 1911 and 1948. The date on a single Japanese character inscription was tentatively translated as 1917. Based on available evidence, the cemetery's period of use was the first half of the 20th century, although the many Japanese inscriptions were not dated.

Based on background research, there are no prior archaeological descriptions or investigations of this archaeological resource, with the possible exception of a letter report associated with Aloha Stadium construction by William Barrera (Barrera 1971 [refer to Section 4.4.5]). No SIHP number has been designated for the cemetery and it does not appear to have been evaluated for eligibility for either the Hawai‘i or National Register of Historic Places.

4.4 Salt Lake Sub-Area

4.4.1 Sub-Area Description

The Salt Lake sub-area of the archaeological study area crosses the ahupua‘a of Hālawa, Moanalua, and Kalihi. This sub-area is approximately 4.8 miles long and includes the Aloha Stadium (Kamehameha Highway), Ala Liliko‘i, and Middle Street Transit Center Stations. Figures A-10 through A-12 in Appendix A depict the geography and features of the Salt Lake sub-area and summarize various types of environmental and cultural information.

4.4.2 Natural Environment

The Salt Lake sub-area begins at the ‘Ewa end approximately 600 feet mauka of Pearl Harbor's East Loch shoreline, then continues inland past Salt Lake and ends within a few hundred feet of Ke‘ehi Lagoon in Honolulu. This sub-area varies in elevation from sea level at each end to approximately 140 feet in its central portion. This sub-area receives a mean annual rainfall of 24 to 40 inches (Giambelluca 1986) (Figure A-10).

Salt Lake, known as *Āliapa‘akai* by the Hawaiians, is the remnant of a tuff cone, which has the characteristic broad, saucer shape of a crater formed from a violent explosion. There was once a shallow lake within the crater fed by springs or brackish water. Since there was no outlet in the crater, most of the water evaporated, concentrating salt in the remaining water. This salt was collected by the Hawaiians for their own use, and later collected to sell to visiting ships. Since 1910, wells and tunnels have been dug into the crater to control the water flow, raising the water level and reducing the salt content (MacDonald 1983).

Most of the sub-area is relatively dry. Major streams that flow year-round span each end. Hālawa Stream crosses the ‘Ewa portion and the Moanalua and Kalihi Streams cross the Koko Head end, flowing into Honolulu Harbor. The only other body of

water (besides landscaped lakes or pools) is Salt Lake, which is approximately one-quarter mile mauka of the archaeological study area's centerline (Figure A-10).

According to USDA soil survey data (Foote 1972), soils throughout the Salt Lake sub-area (Figure A-10) consist of the following:

- Makalapa Clay (MdB, MdC) is described as "well-drained soils on uplands on the Island of O'ahu, near Salt Lake Crater, Diamond Head, and the Mōkapu Peninsula … formed in volcanic tuff".
- The 'Ewa end of this sub-area lies in clays that are common around Pearl Harbor, including the Hanalei series (HnB), which are "somewhat poorly drained to poorly drained soils on bottom lands on the islands of Kaua'i and O'ahu [which] developed in alluvium derived from basic igneous rock."
- The Kawaihapai series (KIA) are "well-drained soils in drainageways and on alluvial fans on the coastal plains."
- The Koko Head portion of the sub-area lies primarily within mixed fill land (FL), described as "areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources."
- Kokahi Very Stony Clay (KTKE) is described as "moderately well drained soils on talus slopes and alluvial fans on the Island of O'ahu. These soils developed in colluvium and alluvium derived from basic igneous rock. There are many stones and boulders on the surface and throughout the profile."
- Rock land (rRK) is "made up of areas where exposed rock covers 25 to 90 percent of the surface. It occurs on all five islands. The rock outcrops and very shallow soils are the main characteristics. The rock outcrops are mainly basalt and andesite."

Vegetation along the sub-area consists primarily of non-native weeds and ornamental grasses, shrubs, and trees as a result of land modification and construction activities associated with urban and residential areas. Any undeveloped portions of the study area would contain kiawe, koa haole, and a variety of exotic weeds.

4.4.3 Built Environment

The Salt Lake sub-area follows major roadways and proceeds through dense residential and commercial areas. A portion of this sub-area runs along the channelized Moanalua Stream (Figure A-11).

4.4.4 Past Land Use and Land Commission Awards Information

The Salt Lake sub-area lies within the ahupua'a of Hālawa, Moanalua, and Kalihi. These three ahupua'a had rich and varied environments, with coastal and stream resources, fishponds along the shore, central plains for lo'i, and upland forest regions. In particular, the present day "Fill land" located along the margins of

Moanalua Stream at the Koko Head end of the sub-area (Figure A-10) was likely an area intensively used for fishponds and irrigated agriculture. Inland of the coast was an excellent zone for planting gourds, yams, and bananas, as well as slopes for terraced loʻi kalo (Handy 1972 [468-469]). Salt, sold to foreign ships, was also an important resource. These foreign seamen used the salt to preserve their own stores or to cure the sealskins they collected on their trading trips to the northwest coast of America and Canada (Ellis 1969 [18-19]). Important early salt works were located in Puʻuloa near Hālawa; at Āliapaʻakai (later called Salt Lake) in Moanalua; and near the coastal fishponds of Kalihi.

By 1826, Western diseases and the growth of urban Honolulu had depopulated large portions of the inland areas of Hālawa and Moanalua, and the coastal lowlands were sparsely populated well into the 20th century. Kalihi was less affected by this depopulation, as it became an early suburb of Honolulu. This population distribution is reflected in the LCAs for this sub-area: 20 were awarded at the Koko Head end of the sub-area within one cluster, and two were awarded along Hālawa Stream at the ʻEwa end of the sub-area (Table 4-4) (Figure A-11).

Table 4-4: Salt Lake Sub-Area Land Commission Awards

LCA Number	Contents of Award
1044:7 and 1044:8	Konohiki lands to Hoomoeapule, included taro patches (loʻi), houses, and fishponds
1317:	1 house lot and 5 loʻi
1978 B:	(1.28-acre) lot to Hoomoeapule
5621:1	2 loʻi, 2 pastures (kula), and 1 ditch (ʻauwai)
1322:1 and 1322:2	7 loʻi and 2 kula
1793:2	1 house lot (1 house), 4 loʻi, and 4 coconut trees
868:5	(2.78-acre) kula lot and 7 houses
2761:	2 loʻi
1197:	1 loʻi and 1 ʻauwai
2270:	6 loʻi, 3 ʻauwai, and 1 kula
3183:	2 loʻi
1318:	1 house lot (1 house), 6 loʻi, and 1 ʻauwai
1315:	1 house lot, 5 loʻi, 1fishpond, and 1 ʻauwai
3130:	1 house lot, 1 loʻi, and 1 kula
2851:	4 loʻi
1344:	1 house lot, 5 loʻi, and 1 kula
1328:1 and 1328:2	1 house lot, 3 loʻi, and 1 kula
2156:1 and 2156:2	I house lot and 4 taro patches (loʻi)

Honolulu Sugar Company leased much of Hālawa and Moanalua ahupuaʻa during the first half of the 20th century. By the early 1900s, almost all of the ʻEwa Plain had been transformed and planted in sugar cane. Nevertheless, the Honolulu Plantation Company kept expanding until the sugar harvest peaked in 1920 (Klieger 1995 [93]). Eventually, the lower portions of Hālawa were transformed by the construction of the H-1 and H-3 Freeways and the Pearl Harbor Naval Base.

By 1943, development had begun makai and ‘Ewa of Nimitz Highway, and the fishponds and low-lying tidal flats ‘Ewa of Moanalua Stream had been filled to create land for Rogers Airport (the present Honolulu International Airport). The fishponds of Hālawa, Moanalua, and Kalihi were filled, and this new land was used for the airport and harbor facilities.

4.4.5 Previous Archaeological Investigations

The Salt Lake sub-area is similar to the Kamehameha Highway and Farrington Highway sub-areas in many respects. Growth and expansion of the Pearl Harbor Naval Base, as well as residential and commercial growth, primarily occurred prior to the late 1970s when archaeological investigation became standard during construction activities. Much of the construction since that time has occurred in areas where previous construction has already disturbed the sediments. Within this sub-area, three of the five archaeological studies are proximal to the Middle Street Transit Center Station. The discussion of previous archaeological investigations proceeds from ‘Ewa to Koko Head (Figure A-12 shows the locations of the previous archaeological investigations discussed in the following sections).

Barrera 1971

In 1971, a letter report was written by William Barrera and addressed to the DLNR regarding marked and unmarked graves among the housing near the construction of Aloha Stadium (Barrera 1971). It appears that the graves were not given an SIHP number. The letter report seems to be unavailable through the Hawai‘i State Historic Preservation Division. It appears that no other archaeological resources were encountered during the investigation. It is possible that this letter report could be referring to the historic, in-use, State of Hawai‘i-owned ‘Aiea Cemetery immediately ‘Ewa of Aloha Stadium on the mauka side of Kamehameha Highway (refer to this discussion in the previous Kamehameha Highway sub-area section).

Williams and Anderson 1997

In 1997, Ogden Environmental and Energy Services Co., Inc. conducted archaeological monitoring and sampling during construction of a warehouse at Fort Shafter Flats, Moanalua ahupua‘a, O‘ahu (TMK 1-1-1-035). Subsurface cores were collected from five locations for paleoenvironmental analysis. The results indicated that the deposits in the parcel had been subjected to repeated erosion and redeposition (Williams 1997), making it difficult to interpret the findings.

Dega and Davis 2005

In 2005, Scientific Consultant Services Inc. conducted an archaeological inventory survey with subsurface testing at the proposed Middle Street Intermodal Center near the intersection of Middle Street and Dillingham Boulevard (Dega 2005). One archaeological resource was identified: SIHP #50-80-14-6683, a subsurface historic refuse pit and material remains associated with a slaughterhouse. Archival research of the study area also indicated that a traditional Hawaiian fishpond, named Waikulu,

might be present beneath fill sediments within the project area. Subsurface testing results were not definitive for the presence of the fishpond, and additional sampling of subsurface sediments was recommended as an additional phase of archaeological investigation.

Folk et al. 1993

In 1993, CSH conducted an archaeological inventory survey with subsurface testing of a 4.2-acre parcel for a proposed City and County of Honolulu bus repair facility at 711 Middle Street (Folk 1993). One archaeological resource was identified within the project area: SIHP #50-80-14-4525, a post-contact cultural layer containing three human burials, two of which were in coffins. Data recovery at SIHP #50-80-14-4525 was recommended for the study area, as well as a burial treatment plan to address the three human burials.

Hammatt and Shideler 2002

In 2002, CSH prepared an archaeological literature review and field inspection to evaluate the potential for encountering archaeological sites, provide mitigation recommendations, and provide background study in support of any archaeological inventory survey conducted on an approximately 10.35-acre parcel at the mauka and Koko Head corner of Middle Street and Kamehameha Highway in Kalihi (Hammatt 2002). Background research indicated that during the late 1870s to present times, the land was used for the installation of animal pens and structures associated with the meat company enterprises of Gilbert F. Waller. No surface archaeological resources or historic buildings and structures were observed during the field inspection. Based on background research, the authors indicated little potential for finding subsurface structural remains and more traditional archaeological resources in the study area. Instead, the authors recommended subsurface testing focused primarily on paleoenvironmental research, particularly near the former Waikulu fishpond in the makai and central portion of the study area.

4.4.6 Previously Recorded Archaeological Resources

The previously recorded archaeological resources within the Salt Lake sub-area include a post-contact refuse pit and a subsurface fishpond. The fishpond sediments did not receive an SIHP number, but the deposit is an example of the paleoenvironmental remains that may be affected by the Project. Figure A-12 shows the locations of the previously recorded archaeological resources discussed in the following sections.

SIHP #50-80-14-6683—Subsurface Post-Contact Refuse Pit

SIHP #50-80-14-6683 is a subsurface post-contact refuse pit that contained bottles and a glass jar. Similar refuse was found in several excavation trenches. The recovered bottle assemblage dates between the mid-19th to later 20th century, but most of the bottles date between 1929 and 1958. The refuse pit was exposed during an archaeological inventory survey completed by Scientific Consultant Services, Inc.

(Dega 2005). The refuse pit is located on land currently owned by the City and County of Honolulu and borders Waikulu fishpond. Waikulu fishpond was at one time a brackish shore pond (Kikuchi 1973). The refuse pit was 5.9 feet wide and 1.9 feet deep, and the boundary was defined. The refuse pit does not appear on either the State or National Registers of Historic Places and does not appear to have been assessed for eligibility.

4.5 Airport Sub-Area

4.5.1 Sub-Area Description

The Airport sub-area lies within the ahupua'a of Moanalua. This sub-area is approximately 5.7 miles long and includes the Aloha Stadium (Kamehameha Highway), Arizona Memorial, Pearl Harbor Naval Base, Honolulu International Airport, Lagoon Drive, and Middle Street Transit Center Stations. A potential park-and-ride lot is also proposed in conjunction with this sub-area's Aloha Stadium Station. Figures A-13 through A-15 in Appendix A depict the geography and features of this sub-area and summarize various environmental and cultural information.

4.5.2 Natural Environment

The Airport sub-area lies on what is known as the Hālawa-Moanalua Plain. The plain consists primarily of a raised reef limestone shelf. The sub-area is believed to have been very close to sea level until fill activities took place between 1931 and 1943. Most of the fill material is of marine origin, relating to either dredging of the Pearl Harbor entrance or dredging of a seaplane airstrip in Ke'ehi Lagoon. This sub-area is fairly level, remaining less than 40 feet above sea level throughout its length. The surrounding area receives between 24 and 31 inches of rainfall annually (Giambelluca 1986) (Figure A-13).

The sub-area is close to Pearl Harbor on the 'Ewa end and Honolulu Harbor on the Koko Head end (approximately 600 feet and 750 feet, respectively). Hālawa Stream crosses the 'Ewa portion of this sub-area and Moanalua and Kalihi Streams cross the Koko Head end, emptying into Honolulu Harbor (Figure A-13). A number of short, non-perennial man-made drainage canals are located on the grounds of Honolulu International Airport makai of this sub-area.

According to USDA soil survey data (Foote 1972), the sub-area extends primarily through Mixed Fill Land (FL), "areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources," and Makalapa Clay (MdB), "well-drained soils on uplands on the island of O'ahu, near Salt Lake Crater, Diamond Head, and the Mōkapu Peninsula… formed in volcanic tuff" (Figure A-13). This sub-area also crosses through smaller portions of Keaau Stony Clay (KmaB), "poorly drained soils on coastal plains on the island of O'ahu [which] developed in alluvium deposited over reef limestone or consolidated coral sand;" Hanalei Silty Clay (HnB) "poorly drained soils on bottom lands…developed in alluvium derived from basic igneous rock;" and 'Ewa Silty Clay Loam (EmA), "well-

drained soils in basins and on alluvial fans …developed in alluvium derived from basic igneous rock" (Foote).

The entire length of the sub-area is developed, so vegetation consists of non-native ornamental grasses, trees, flowers, and shrubs and other landscaping plants. Land that has not been landscaped would likely contain kiawe, koa haole, and a variety of exotic weeds.

4.5.3 Built Environment

All land in this portion of the Moanalua ahupua'a has undergone significant urban development. Commercial and residential areas span the sub-area. A portion of the sub-area passes through the extensively paved Honolulu International Airport and the equally paved commercial center just Koko Head of the airport. The entire sub-area follows existing roadways, including Kamehameha Highway and the eight-lane H-1 Freeway (Figure A-14).

4.5.4 Past Land Use and Land Commission Awards Information

The Airport sub-area traverses Moanalua, a large ahupua'a on the 'Ewa end of the Kona District. Early visitors, such as Otto von Kotzebue in 1817, recorded the major population center as a large village near the mouth of Moanalua Stream. Habitations were scattered along a string of fishponds adjacent to numerous farm plots below Āliapa'akai (Salt Lake) that extended 'Ewa across the lowlands of Moanalua (Anderson 1996).

Western disease and the growth of urban Honolulu quickly depopulated the ahupua'a. In 1826, following the same route Kotzebue had traveled, naval officer Hiram Paulding (Paulding 1971 [205]) saw no such fields and described the area as only "…thinly inhabited." Although traditional fishing villages survived near the entrance to Pearl Harbor, the coastal lowlands of Moanalua remained essentially unpopulated well into the 20th century (Anderson 1996).

The Organic Acts of 1845 and 1846 initiated the Māhele (the division of Hawaiian lands), which introduced private property into Hawaiian society. In 1848, the crown (Hawaiian government) and the ali'i received their land titles. Subsequently in the Māhele, LCAs for kuleana parcels were awarded to commoners and others who could prove residency on and use of the parcels they claimed.

This population distribution is reflected in the LCAs in the sub-area; other than the overlapping award of Moanalua ahupua'a (granted to both Captain William Sumner and Lot Kamehameha), the only LCA near the sub-area was a small award near Hālawa Stream at the 'Ewa end (Figure A-15 and Table 4-5). The overlapping title claims to Moanalua were not contested, because Sumner's interest was in the uplands (where he raised cattle) and Lot (later Kamehameha V) was interested in lowland taro fields and seaside fishponds.

Table 4-5: Airport Sub-Area Land Commission Award

LCA Number	Contents of Award
2131:1	1 taro patch (loʻi) and 1 pasture (kula)

In 1884, Samual Mills Damon, a prominent businessman in Bishop & Company and the son of a missionary, acquired a large portion of the ahupuaʻa bequeathed to him in the will of Princess Pauahi Bishop, who had inherited the land from the Kamehamehas (Day 1984 [31]).

Honolulu Sugar Company leased much of Moanalua ahupuaʻa during the first half of the 20th century, particularly the ʻEwa and makai portions of the ahupuaʻa. Their sugar cane fields were gradually supplanted by military reservations centered around Hickam Air Force Base and Pearl Harbor Naval Base. By 1943, development had begun makai and ʻEwa of what is now Nimitz Highway, and the fishponds and low-lying tidal flats ʻEwa of Moanalua Stream had been filled to create land for Rogers Airport (the present Honolulu International Airport). The fishponds and estuary at the mouth of Moanalua Stream had also been filled in.

During the 1940s, the U.S. military began buying additional land from the Damon family for construction of the Tripler Army Medical Center Facility. Construction began in 1944 and the hospital was completed in 1950. The Estate of S.M. Damon sold most of its land to developers in 1956 (Day 1984 [31]). Following statehood, the lands of Moanalua were intensely developed for residential and light industrial uses.

This sub-area passes through areas that were largely uninhabited prior to development in the 20th century. This sub-area is situated makai of the primary area of settlement and agriculture in the vicinity of Moanalua Stream and mauka of the fishponds between Moanalua Stream and Pearl Harbor. Although the study area has been extensively modified by land reclamation, sugar cane production, and development throughout the 20th century, previous archaeological finds suggest that intact pre-contact and early contact cultural deposits associated with Hawaiian habitation, work, and recreation may lie undisturbed beneath modern fill layers. Post-contact archaeological resources (such as hearths, building foundations, trash pits, and privies) may also be encountered within this sub-area.

4.5.5 Previous Archaeological Investigations

Most of the Airport sub-area was developed prior to the establishment of legislation requiring cultural resource management efforts to mitigate the impact of development on archaeological resources. As a result, there have been relatively few archaeological studies conducted in this area. The few archaeological resources that have been identified indicate pre-contact land use associated with fishpond aquaculture, as well as post-contact land use associated with the OR&L. The discussion of previous archaeological investigations proceeds from ʻEwa to Koko Head. Figure A-15 shows the locations of the prior archaeological investigations.

Avery et al. 1994

From 1992 to 1993, Archaeological Consultants of Hawai'i, Inc. monitored subsurface drilling associated with the installation of power line poles along Kamehameha Highway from Aloha Stadium to Makalapa Gate (Avery 1994). No archaeological resources were encountered during the archaeological monitoring. A paleoenvironmental analysis of alluvial sediments was also undertaken, revealing the possible existence of a lowland Pritchardia palm forest prior to Polynesian settlement.

Williams 1994

In 1993, Ogden Environmental and Energy Services Company, Inc. conducted subsurface archaeological investigations as part of the Subsurface Fuel Investigation NAVBASE Pearl Harbor Project, near the corner of North Road and Makalapa Gate Road at Pearl Harbor Naval Base (Williams 1994) (Figure A-15). Subsurface investigations identified one archaeological resource, SIHP #50-80-13-102, a pre-contact traditional Hawaiian fishpond named Loko Kunana (a.k.a. McAllister Site #102).

4.5.6 Previously Recorded Archaeological Resources

Due to the limited archaeological investigations conducted within this sub-area, only two archaeological resources, SIHP #50-80-13-102 (Loko Kunana) and SIHP #50-80-12-9714 (OR&L right-of-way) have been identified in this sub-area. Figure A-15 shows archaeological resource locations.

SIHP #50-80-13-102—Loko Kunana fishpond

SIHP #50-80-13-102 (a.k.a. McAllister Site #102) consists of the subsurface remains of Loko Kunana, a pre-contact traditional Hawaiian fishpond previously identified by McAllister in 1933 and then re-identified by Williams in 1994. According to McAllister (1933), Loko Kunana was 25 acres in size and surrounded by two large walls that were approximately 5 feet wide and 3 feet high. During a subsurface archaeological investigation, Ogden Environmental (Williams 1994) excavated a trench down to the water table inside the boundaries of Loko Kunana. Fishpond sediments were found within this trench, and a continuous core sample was taken and analyzed. Radiocarbon dates indicate that the fishpond was most likely constructed between A.D. 1200 and 1400, well within the pre-contact period.

The archaeological investigations by McAllister (1933) and Williams (1994), coupled with a review of historic documents, have tentatively placed SIHP #50-80-13-102 (Loko Kunana) 100 feet 'Ewa of the archaeological study area (Figure A-15).

SIHP #50-80-12-9714—OR&L Right-of-Way

SIHP #50-80-12-9714 consists of the railroad tracks, the raised roadbed, and, in some cases the associated 40-foot wide right-of-way of the OR&L. The OR&L has a long history that is well documented. For information on this resource, refer to Section 4.1.6.

4.6 Dillingham Sub-Area

4.6.1 Sub-Area Description

The Dillingham sub-area lies within the ahupua'a of Kalihi, Kapālama, and Honolulu. This sub-area is approximately 2.3 miles long and includes the Middle Street Transit Center, Kalihi, Kapālama, Iwilei, and Chinatown Stations. Figures A-16 through A-18 in Appendix A depict the geography and features of the sub-area and summarize various types of environmental and cultural information.

4.6.2 Natural Environment

The Dillingham sub-area runs parallel to the coast of Honolulu Harbor, and varies in distance from approximately 0.25 to 1.0 mile from the coastline. Elevations range between approximately 0 to 20 feet, and the sub-area receives a mean annual rainfall of 24 to 40 inches (Giambelluca 1986) (Figure A-16).

The Honolulu leeward coastal plain is stratified with late-Pleistocene coral reef substrate overlaid with calcareous marine beach sand, terrigenous sediments, and/or stream-fed alluvial deposits (Armstrong 1983 [36]). Terrigenous sediments are formed and deposited on land, or are materials derived from land mixed with purely marine material. The modern Hawaiian shoreline configuration, including Honolulu Harbor, is primarily the result of three factors: 1) the rising sea level following the end of the Pleistocene (Stearns 1978; Macdonald 1983); 2) the 1.5 to 2.0-meter-high stand of the sea during the mid to late Holocene; and 3) prehistoric and historic human landscape modification.

The sub-area crosses three major streams that flow year-round. Kalihi Stream lies just at the 'Ewa end of the sub-area; Kapālama Stream runs through the central portion; and Nu'uanu Stream crosses at the Koko Head end (Figure A-16).

According to USDA soil survey data (Foote 1972), only two soils are present within this sub-area: Fill Land, Mixed (FL), "areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources;" and the 'Ewa Silty Clay Loam (EmA), "well-drained soils in basins and on alluvial fans on the islands of Maui and O'ahu [which] developed in alluvium derived from basic igneous rock" (Figure A-16).

The primary vegetation throughout this sub-area consists of non-native ornamental trees, grasses, and shrubs used for landscaping in urban areas. Natural vegetation for the area consists of fingergrass (*Chloris* spp.), kiawe (*Prosopis pallida*), koa haole (*Leucaena glauca*), klu (*Acacia farnesiana*), and 'uhaloa (*Waltheria americana*).

4.6.3 Built Environment

The pre-contact construction of fishponds near Honolulu Harbor and Nu'uanu Stream helped create the modern landform of today. Fishpond walls served as sediment anchors for the accumulation of detrital reef sediments. They also likely

affected long-shore sedimentary transport, resulting in new littoral deposition and erosion patterns. In the post-contact period when the fishponds were no longer used, they became obvious locations for the deposition of fill. These reclaimed areas provided valuable new land for the expansion of Downtown Honolulu and Dillingham Boulevard.

The Dillingham sub-area extends along the existing roadway of Dillingham Boulevard adjacent to buildings and infrastructure used primarily for commercial purposes. All portions of this sub-area pass through completely developed urban areas (Figure A-17).

4.6.4 Past Land Use and Land Commission Awards Information

By the time of first contact with Europeans during the late 18th century, the south coast of O‘ahu from Makapu‘u to Pearl Harbor, known as the District of Kona, and the area today encompassed by part of Downtown Honolulu (Honolulu, Kalihi, and Kapālama ahupua‘a)–known to the Hawaiians as *Kou*–had long been a center of population and activity. The ahupua‘a of Honolulu, Kalihi, and Kapālama are all within the Dillingham sub-area.

Historical records indicate that Kapālama was an intensely used ahupua‘a. Stretching from the base of the ridge toward Honolulu Harbor, the irrigated lo‘i (taro) fields were fed by ample streams descending from the Nu‘uanu and Pauoa Valleys, “almost continuous from Iwilei up to the foothills above School Street…” (Handy 1972). The protected shoreline provided ample marine resources, including salt flats and a chain of fishponds that skirted the coast. Remnants of two of these fishponds, Kūwili (SIHP #50-80-14-5966) and Kāwā (SIHP #50-80-14-5368), underlie fill layers beneath this sub-area (Figure A-18).

In his history of Hawai‘i written in the 1860s, John Papa ‘Ī‘ī describes a trail (around the year 1810) that extended from Nu‘uanu to Moanalua:

> “When the trail reached a certain bridge, it began going along the banks of taro patches, up to the other side of Kapālama, to the plain of Kaiwi‘ula on to the taro patches, up to the other side of Kapālama, to the plain of Kaiwi‘ula; on into Kahauiki and up to the other side; turned right to the houses of the Portuguese people. . . . “ (‘Ī‘ī 1959 [95]).

The Dillingham sub-area extends through 34 LCAs (Figure A-17 and Table 4-6).

Table 4-6: Dillingham Sub-Area Land Commission Awards

LCA Number	Contents of Award
6450:1	ʻili of Mokauea (737.76 acres) to Kaunuohua
803:3, 5	loʻi and pastures (kula land) (292.41 acres) to Alexander Adams
Māhele Award 50:3 and 50:4	½ ʻili of Kaunapo to Laumaka
3237:2	ʻili of Kaluapulu to Hapukuka Hewahewa
818 Part 6:11 and 818 Part 6:12	ʻili of Kaliawa to George Beckley
10498:	½ ʻili of Kiona (46.17 acres) to Nahinu
6236:	6 house lots to Kaaiawaawa
64 F.L.:	Fort Lands (0.25-acre) lot to Kapulani
61 F.L.:	Fort Lands (0.22-acre) lot to Aholo
1089:	1 house lot (1 house) and 8 taro patches (loʻi) to Kapehe
826:3	1 loʻi to Keakahiwa
2440 B:1 and 2440 B:2	2 house lots (one house on each), 1 loʻi, 1 sand pond to Kauaua
826:1 and 826:2	2 loʻi to Keakahiwa
2107:	1 house lot (1 house) and 8 loʻi to Kahina
655:	1 house lot (3 houses) to John Kahaleaahu
23 F.L.:	Fort Lands, 1 house lot (1 house), 5 loʻi, and 1 hog sty to Moeino
9 F.L.:	Fort Lands, 0.92-acre lot to Kewa
7681:5	½ of Kaukahoku ʻili (4 acres) to Kekai
4747:3	1 house lot (2 houses), 5 loʻi, to Kama
8504:3	11 loʻi, 1 fishpond, to George Holmes
1723 B:1 and 1723 B:2	1 house lot (2 houses, 2 tombs), 3 loʻi to John Neddles
2937:2	1 pasture (kula land) with taro to William Harbottle
2073:1	5 ½ loʻi to Kauhiwa
3142:2	1 house lot, 2 loʻi, and 1 sand dune to Hooliku
4034:2	1 loʻi, to Robert G. Davis
4889:2	1 house lot, 4 loʻi to Kalimaiki
11056:	2 loʻi to Mauli
1034 and 8400:2, 8400:3, and 8400:4	3 loʻi to Kuhelelei
1053:	3 loʻi to Kahenawai
8504:2	8 loʻi to George Holmes
591:4	(9.58 acre) lot to John Meek
275 B:2	(0.66-acre) lot to Henry Zupplien
8856:1 and 8856:2	1 house lot and 3 loʻi to Kalanui
3144:1	2 loʻi to Ku
1222:1, 1222:2, and 1222:4	1 house lot (1 house) and 2 loʻi to Alua
3153:2	1 loʻi to Nakoa

The geographical distribution of LCAs that were granted during the Māhele presents a good picture of settlement patterns in Kalihi in the mid-19th century. The overall pattern is one of land claims for houses and garden plots (irrigated taro ponds, dry

fields for pastures, and dry-land crops) on the natural terraces on both sides of Kalihi and Niuhelewai Streams, predominantly in the lower Kalihi Valley and on the flat lands seaward of the valley. The gardens described are predominantly loʻi, etched into the surface of the alluvial stream terraces and interconnected by elaborate systems of ʻauwai. Most Kalihi LCAs consisted of four to seven loʻi, kula lands, and a house lot. Ocean resources were farmed as well; five of the twelve large fishponds bordering Keʻehi Lagoon were along the Kalihi shore. Salt was also harvested on lands just Koko Head of Kalihi Stream. The pattern of land award distribution shown in the LCAs infers that the traditional Hawaiian practice of maintaining residences dispersed within and throughout their agricultural fields continued in Kalihi at least until the mid-19 century.

Many of the initial LCAs in Kalihi were to notables, including advisors to the Kamehameha line and members of royalty. This is reflected in the LCAs in the vicinity of the project alignment; land awards along the corridor between the Middle Street Transit Center Station and Kalihi Station were large awards, consisting of tens or even hundreds of acres of land granted to aliʻi and foreign advisors to the throne (Figure A-17).

In contrast to the LCAs in Kalihi, LCAs in the Kapālama portion of this sub-area (from Kapālama Station to Iwilei Station) consisted of small holdings of one to eight loʻi. As many as a third of the study area's LCAs are clustered around the Kūwili and Kāwā fishponds at the Koko Head end of the sub-area. Four awards, each less than 1 acre in size, were Fort Lands that produced crops to support the troops at the Fort at Honolulu Harbor.

By the 1830s, Western commercial interests had supplanted the Native Hawaiian impulses that had once defined the environment. By the 1850s, newly introduced diseases and immigration into greater Honolulu from out-lying areas drastically changed residential patterns from pre-contact times, resulting in massive depopulation. The pattern of land holdings during the 1850s suggest that most Hawaiians in the ahupuaʻa were living relatively close to Kalihi Stream, inland of present-day Dillingham Boulevard and makai of the confluence of Kalihi and Kamanaiki Streams. It was during this period that Honoluluʻs streets were laid out and Honolulu Harbor was developed (O'Hare 2007a, 2007b).

Development of the Kalihi-Kapālama coastal area for residences began quickly in the mid-19th century. The establishment of Kamehameha Schools on Kamehameha Heights and later on Kapālama Heights stimulated development of the ridge slopes mauka of King Street. During the 1880s, the coastal landscape was intensely altered as the marshlands adjoining Nuʻuanu Stream were filled with nearby dredged marine sediment and development advanced rapidly in the area.

In 1889, Kūwili and Kāwā fishponds in Iwilei were filled to provide space for the OR&L terminal and facilities. The railroad officially opened on November 16, 1889. At that time the line extended only between ʻAiea and Honolulu.

In the beginning of the 20th century, the taro lands (which had partly been converted to rice fields by the 1870s) were filled to provide land for housing and industrial

subdivisions. This land use change was facilitated by construction of Kapālama Canal, which channeled the two streams of Kapālama and allowed for sub-street collection of storm drain runoff. Many residents of the crowded Chinatown District moved into Kapālama and Kalihi after the 1900 Chinatown Fire, generating the construction of 40 subdivisions in Kalihi between 1910 and 1920.

As concentrations of people within the Honolulu and Kapālama ahupua‘a increased, the limited burial space posed a problem and increased worries for the public’s health. The establishment of churches before the year 1900 is important not only for historical significance, but also because there may be undocumented burials near these churches.

> “In the early post-contact period, burial interment was not regulated by the government and many were buried near churches. In 1900, the Board of Health reported a “crisis,” with all known cemeteries at their maximum level” (Purnell 1998 [26]).

These cemeteries were becoming a danger to public health. In 1900 a law was passed:

> “All deaths occurring in the Territory of Hawai‘i must be reported to the Registrar of Deaths, with name, age, sex, nationality, residence, cause of death, attending physician, and place of burial. No interment will be allowed in the Island of O‘ahu . . . without permission of an agent of the Board of Health” (Purnell 1998 [26]).

Thus, land around churches established before circa 1900 are of special concern when discussing the likelihood of finding historic burials, since there may be undocumented burials outside the current boundaries of cemeteries shown on modern maps (O’Hare 2007 [63,66]). Two churches, St. John the Baptist Catholic Church on ‘Ōmilo Lane, which is still in the area, and Kalihi Protestant Church-Kawaiaha‘o ‘Āpana (Branch) Church on Hiu Street, which existed only until the early 20th century, should be considered since these churches were in the vicinity mauka of the project alignment.

During the second half of the 20th century, the area continued to undergo changes associated with the urban expansion of Honolulu, primarily associated with industrial and commercial activities. By the 1920s, Iwilei and its environs had become Honolulu’s leading industrialized area. Businesses flourished once the ponds were filled, and the area, once known for its “red light” district and railroad depot, was now being embraced by new industries.

From previous archaeological projects, the primary area of settlement and intensive agriculture seems to have been in the upper valleys of Kalihi and Kapālama, as well as near streams and springs. Seaward areas also contain evidence of burial practices, fishpond aquaculture, and habitation. Although the study area has been extensively modified by development throughout the 20th century, previous archaeological finds suggest that intact pre-contact and early post-contact cultural deposits associated with traditional Hawaiian habitation, work, and recreation lie

undisturbed beneath modern fill layers near the project alignment. Pre-contact archaeological features including hearths, building foundations, trash pits, and privies may also be found in the sub-area.

4.6.5 Previous Archaeological Investigations

Most of the Dillingham sub-area was developed prior to the establishment of legislation requiring cultural resource management efforts to mitigate the impact of development on archaeological resources. As a result, there have been relatively few archaeological studies conducted in this area, and these are concentrated between the Iwilei and Chinatown Stations. Archaeological resources identified indicate pre-contact traditional Hawaiian land use, as well as post-contact land use associated with the historic urbanization of Downtown Honolulu. The discussion of previous archaeological investigations proceeds from the ‘Ewa to Koko Head. Figure A-18 shows locations of prior archaeological investigations.

McGerty et al. 1997

In 1993, Scientific Consultant Services Inc. conducted an archaeological inventory survey at the site of the proposed Liliha Civic Center. The project area was between Iwilei Road, N. King Street, and Ka‘aahi Place. Subsurface testing identified soil layers interpreted to be the remains of Kūwili Fishpond (SIHP #50-80-14-5368). Radiocarbon analysis of pond sediments suggests that Kūwili Fishpond may have been constructed as early as A.D. 1100 (McGerty 1997).

McDermott and Mann 2001

In 2001, CSH conducted an archaeological inventory survey for the proposed Nimitz Highway Water System Improvements Project in Downtown Honolulu (McDermott 2001). The project area was between Iwilei Road, N. King Street, River Street, and Kukahi Street. The archaeological fieldwork focused primarily on the investigation of Kāwā Fishpond, designated SIHP #50-80-14-5966. Five boring cores were extracted to determine the boundaries of the pond, and three backhoe trenches were excavated near cores with positive results for fishpond sediments. Radiocarbon dating results of fishpond samples did not provide a clear date of construction for Kāwā Fishpond, but based on the samples it appears that fishpond sediments were accumulating since at least A.D 1150-1350.

Chiogioji and Hammatt 1992

In 1992, CSH conducted an archaeological assessment of an approximately 100,000-square-foot trapezoidal-shaped parcel between Nimitz Highway, Iwilei Road, and King Street (Chiogioji 1992). Historic documents and maps were reviewed, and a pedestrian inspection of the project area was conducted. No archaeological resources were identified. However, historic maps and LCA and land grant documents indicated that a wall segment of Kāwā Fishpond (SIHP #50-80-14-5966) might remain intact beneath fill layers in the mauka and ‘Ewa quadrant of the project area. The study also determined that a buried A horizon

(former land surface) may be present beneath historic and modern fill layers along the King Street boundary of the project area.

Winieski and Hammatt 2001

In 2001, CSH conducted archaeological monitoring for the Nimitz Highway Reconstructed Sewer Project (Winieski 2001a, 2001b). The route of the sewer construction began on River Street at the intersection of River and Hotel Street, ran to Nimitz Highway, and extended to Bethel Street where it merged into the ʻEwa end of Queen Street. The route then extended along Queen Street to South Street, along South Street to Ala Moana Boulevard, and terminated at the Ala Moana Wastewater Pump Station. Only one archaeological resource was encountered:
SIHP #50-80-14-5942, a remnant of a light-gauge rail associated with the historic Honolulu Rapid Transit trolley system, identified during excavations conducted at the intersection of Queen Street and Nimitz Highway. Based on the monitoring findings and previous archaeological research, it was recommended that an archaeological monitor be present during any future ground disturbance in the area to mitigate the impact of subsurface disturbance to significant pre-contact and post-contact archaeological resources.

4.6.6 Previously Recorded Archaeological Resources

The previously recorded archaeological resources within the Dillingham sub-area consist of fishpond sediments that serve as an example of paleoenvironmental resources that may be affected by the Project. The following discussion of archaeological resources proceeds from the ʻEwa to Koko Head end. Figure A-18 shows archaeological resource locations.

SIHP #50-80-14-5368—Kūwili Fishpond

SIHP #50-80-14-5368 consists of the subsurface remains of Kūwili Fishpond, previously identified during an archaeological inventory survey for the proposed Liliha Civic Center (McGerty 1997). This fishpond was constructed by pre-contact traditional Hawaiians as a means to procure marine resources (via aquaculture) and was used into the early post-contact period. SIHP #50-80-14-5368 is primarily composed of a subsurface cultural deposit consisting of stratigraphic layers that reflect both pre-contact and post-contact land use. Pre-contact strata consisted of alluvial sediments that accumulated because of fishpond walls, and contained sparse cultural material. Post-contact strata overlaid the pre-contact alluvial deposits and consisted of varying sediment types probably associated with dredge material from the mouth of Nuʻuanu Stream and Honolulu Harbor. The post-contact strata contained an abundance of 19th-century artifacts including glass bottles, ceramics, pipe stems, a shell casing, marbles, and coins.

Subsurface investigations by McGerty et al. (McGerty 1997) identified 12 features associated with SIHP #50-80-14-5368, including a human femur fragment within fill sediments, a post-contact kiʻo pua (fry pond), a dredge channel, a coral platform, a cement drain, metal pipes, stacked basalt walls, and a stacked basalt and brick wall.

These features confirm the pre-contact and post-contact use of this archaeological resource.

In addition to the archaeological inventory survey completed by Scientific Consultant Services, Inc. (McGerty), a paleoenvironmental study was conducted by International Archaeological Research Institute, Inc. (McGerty 1997 [citing Athens and Ward 1997]). The dating and stratigraphy of the Kūwili Fishpond differs between the two studies. McGerty et al. conducted radiocarbon dating that suggested that the Kūwili Fishpond was constructed in A.D. 1100, while Athens and Ward's radiocarbon analysis suggested that construction occurred in the late 1400s.

The archaeological investigations by McGerty et al. (McGerty 1997) coupled with a review of historic documents have tentatively placed the boundaries of SIHP #50-80-14-5368 (Kūwili Fishpond) between Iwilei Road, Sumner Street, N. King Street, and the intersection of Dillingham Boulevard and Akepo Lane (Figure A-18). SIHP #50-80-14-5368 was determined to be eligible for the State Register of Historic Places under Significance Criterion D, but is currently not listed on the Register. This archaeological resource is under the land jurisdiction of the State of Hawai'i, the Hawaiian Electric Company (HECO), and other various smaller private entities.

SIHP #50-80-14-5966—Kāwā Fishpond

SIHP #50-80-14-5966 consists of the subsurface remains of Kāwā Fishpond, previously identified during an archaeological inventory survey for the proposed Nimitz Highway Water System Improvements (McDermott 2001). Similar to the Kūwili Fishpond, this fishpond was constructed by pre-contact Native Hawaiians as a means to procure marine resources (via aquaculture), and was used into the early post-contact period. SIHP #50-80-14-5368 is primarily composed of a subsurface cultural deposit consisting of stratigraphic layers that reflect both pre-contact and post-contact land use.

In the 1890s, a cholera outbreak along the mouth of Nu'uanu Stream led the Honolulu Board of Health to recommend filling Kāwā Fishpond, which was done with dredge material from Honolulu Harbor. Excavations within Kāwā Fishpond (SIHP #50-80-14-5966) unearthed historic artifacts from the late 19th century. Sediment samples taken from the fishpond yielded radiocarbon dates between A.D. 1150 and A.D. 1960, which did not give clear enough results to determine when the fishpond was built. Pollen analysis of the fishpond and underlying lagoonal sediments revealed floral taxa native to Hawai'i, indicating that the sediments dated back to a time early in the Polynesian settlement before Native Hawaiian plants were removed. These fishpond sediments have preserved an important paleoenvironmental record of past vegetation communities (McDermott 2001).

The archaeological investigations by McDermott and Mann (McDermott 2001) and a review of historic documents have tentatively placed the boundaries of SIHP #50-80-14-5966 between Iwilei Road, Awa Street, N. King Street, and Kukahi Street (Figure A-18). SIHP #50-80-14-5966 was determined to be eligible for the State Register of Historic Places under Significance Criterion D, but is currently not

listed on the Register. This archaeological resource is under the land jurisdiction of the Harry and Jeanette Weinberg Foundation, Inc., and the State of Hawai‘i.

4.7 Downtown Sub-Area

4.7.1 Sub-Area Description

The Downtown sub-area lies within the ahupua‘a of Honolulu. This sub-area is approximately 0.9 miles long and includes the Chinatown, Downtown, and Civic Center Stations. Figures A-19 through A-21 in Appendix A depict the geography and features of the sub-area and summarize various types of environmental and cultural information.

4.7.2 Natural Environment

The Downtown sub-area is approximately 0.6 to 1.1 miles mauka of the coastline of O‘ahu. The mouth of Nu‘uanu Stream is approximately 215 feet north of the proposed Chinatown Station (Figure A-19).

This sub-area receives an average of 24 to 31 inches of annual rainfall (Giambelluca 1986). The entire sub-area has been extensively disturbed and transformed by urban development, leaving no naturally occurring vegetation.

The sub-area is within a topographic portion of O‘ahu called the Honolulu Plain, an area generally less than 15 feet above sea level (Davis 1989 [5]). The Honolulu Plain is stratified with late-Pleistocene coral reef substrate overlaid with calcareous marine beach sand or terrigenous sediments and stream fed alluvial deposits (Armstrong 1983 [36]). The top stratum of soil consists of Fill Land, Mixed (FL), and contains areas filled with material dredged from the ocean and hauled from nearby areas.

At the end of the Pleistocene between approximately 20,000 and 5,000-6,000 years ago, water previously locked in glacial ice returned to the world’s oceans, and the sea level rose more than 100 meters to their current level. In the Honolulu sub-area, rising sea levels flooded the previously dry, earlier Pleistocene reef deposits, which had formed hundreds of thousands of years previously. In 1911, it was estimated that about one-third of the Honolulu Plain was a wetland (Nakamura 1979 [65, citing a Hawaiian Territory Sanitary Commission report]). Pre-contact Hawaiians used the lagoonal/estuary environment of the Honolulu Plain to construct fishponds. Fishpond walls served as sediment anchors for the accumulation of detrital reef sediments. They also likely affected long-shore sedimentary transport, resulting in new littoral deposition and erosion patterns. In the post-contact period when the fishponds were no longer used, they became obvious locations for the deposition of fill. These reclaimed areas provided valuable new land near the heart of growing urban Honolulu.

Lands within this portion of the study corridor are level. with an elevation of 3 feet above mean sea level. According to USDA soil survey data (Foote 1972), sediments within this sub-area consist of Fill Land, Mixed (FL) and ‘Ewa Silty Clay Loam (EmA).

Fill Land, Mixed is described as “areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources…used for urban development including airports, housing areas, and industrial facilities.” The ‘Ewa series consists of “well-drained soils in basins and on alluvial fans…developed in alluvium derived from basic igneous rock…used for sugar cane, truck crops, and pasture” (Figure A-19).

4.7.3 Built Environment

This sub-area is surrounded by modern urban development, including harbor infrastructure (e.g., piers and docks), high-rise condominiums, apartments, commercial buildings, streets, sidewalks, and utility infrastructure (Figure A-20).

4.7.4 Past Land Use and Land Commission Awards Information

The area that today comprises the portion of Downtown Honolulu surrounding Honolulu Harbor and extending to the mouth of Nu‘uanu Stream was known to the Hawaiians as *Kou*, a center of population and activity similar to Waikīkī. Kou stretched from “… Nu‘uanu to Alakea Streets and from Hotel Street to the sea” (McAllister 1933) and possessed shoreward fishponds and irrigated fields fed by streams descending from the Nu‘uanu and Pauoa Valleys.

Waikīkī was the favored area for chiefly residence in the pre-contact period. Honolulu’s prominence didn’t begin until after the peace established by Kamehameha I led to open and reliable trade at Honolulu Harbor. In 1809, the King moved his court, government, and residence from Waikīkī to Honolulu. Francisco de Paula Marin, a Spaniard who arrived in the Hawaiian Islands in 1793 or 1794 and had become a confidante of Kamehameha, recorded in his journal, “In the end of 1809 and beginning of 1810 I was employed building a stone house for the King (Gast 1973).” This was the first stone structure in Honolulu, a town that, according to Marin, was “…[by 1810] a village of several hundred native dwellings centered around the grass houses of Kamehameha on Pākākā Point near the foot of what is now Fort Street. Of the 60 white residents on O‘ahu, nearly all lived in the village, and many were in the service of the king” (Gast 1973).

It is unclear whether Kamehameha ever resided in the completed stone house, because in 1810 he returned to the Island of Hawai‘i where he lived the remainder of his life, traveling intermittently to O‘ahu. However, construction in Honolulu continued, and Marin and other foreign residents built their own stone houses and buildings during the ensuing decade. By the 1840s, Western commercial and missionary interests had supplanted the Native Hawaiian traditions that had previously shaped the environment.

In 1846, Honolulu was made the capitol of the Hawaiian Kingdom and was becoming the commercial and political hub of the Islands. By 1850, Honolulu was, as described by Charles Wilkes, “very conspicuous from the sea and has more the appearance of a civilized land, with its churches and spires, than any other island in

Polynesia" (Fitzpatrick 1986 [69, citing Wilkes 1844]). During this period there was an obvious increase in density of land use and urbanization.

Historic maps and documents indicate that LCAs in the present Downtown Honolulu area were awarded to a variety of Native Hawaiians and foreign settlers who had moved into Honolulu as the city developed. With the exception of a wharf lot and a vineyard, all 23 LCAs near the transit alignment between the Downtown and Chinatown Stations were small awards consisting of house lots or store lots (Table 4-7) (Figure A-20).

During the second half of the 19th century the waterfront of Honolulu changed significantly. At the peak of the whaling industry, around 1850, the Honolulu Harbor area became crowded with trading and whaling vessels and required additional wharfs to accompany them. Between 1857 and 1870, 22 acres of reef land between Fort and Alakea Streets was filled with material dredged from the harbor (Bush 1957 [14]).

As Honolulu became more populated throughout the 20th century, the areas surrounding the harbor became increasingly important for commercial construction. Today, the harbor area still functions as the State's major port facility. Additionally, this area includes the Aloha Tower Marketplace and the Maritime Museum. Farther inland is a dense commercial area as well as several government buildings, including the Federal Building, State Court, City Hall, and State Capitol. Significant historic resources near the archaeological study area include Washington Place, Mission Homes Museum, and 'Iolani Palace.

4.7.5 Previous Archaeological Investigations

The Downtown sub-area has had a dense population since A.D. 1200. The city has also been the locale of the government of Hawai'i since 1809. The ground surface of some portions of Downtown is fairly unmodified, but other areas have extensive surface fill layers. For example, the entire coastline was filled in and extended from 1857 to 1870 to provide more land for business development. There have been several archaeological investigations within the area because of the excellent preservation of archaeological resources, as well as on-going reconstruction and growth since the late 1980s. The following discussion of previous archaeological investigations proceeds from the 'Ewa to Koko Head end (Figure A-21).

McDermott and Mann 2001

In 2001, CSH (McDermott 2001) conducted an inventory survey for the proposed Nimitz Highway Water System Improvements (TMK: 1-5-08, 1-7-01, 2-1-02) in Downtown Honolulu. The archaeological fieldwork focused primarily on the investigation of Kāwā Fishpond, designated SIHP #50-80-14-5966. Five boring cores were extracted to determine the boundaries of the pond, and three backhoe trenches were excavated near cores with positive results for fishpond sediments. Radiocarbon dating results of fishpond samples did not provide a clear date of construction for Kāwā Fishpond, but based on the samples, it appears that fishpond sediments were accumulating since at least A.D. 1150-1350.

Table 4-7: Downtown Sub-Area Land Commission Awards

LCA Number	Contents of Award
Māhele Aw.61	1 house lot
677:	1 house lot (2 houses) to Mataio Kekuanaoa
735:	1 house lot (2 houses, partially fenced) to Kaahumanu
729:	1 house lot (3 houses
7712:6 Lot 2	Lands to Mataio Kekuanaoa
129:1	1 house lot (house, fence)
704:	1 house lot (3 houses)
180:	1 house lot to Mataio Kekuanaoa for Lot Kamehameha
164:	1 house lot to Mataio Kekuanaoa for Victoria Kamamalu
247:2	1 of 12 house lots and store lots claimed for Wm. C. Lunalilo by C. Kanaina
784 and 9971:1 and 784 and 9971:2	1 wharf lot to James Robinson and William Pitt Leileiohoku
186 B:	(0.43 acre) lot at Nu'uanu and Queen Streets to Victoria Kamamalu
626:1 and 626:3	(0.49-acre) lot at Nu'uanu and Merchant Streets, (0.06-acre) lot on Merchant Street to Stephen Reynolds (who was awarded 17 lots in the Downtown area)
38:	1 house lot (including wharf and dwelling) to Elias and Hiram Grimes
810:1	2 house lots to Francis C. Jones, Rosalie Jones, and John Jones (heirs to Lahilahi, daughter of Francisco Marin)
46:	Former (Marin) cow yard, small yard, and house to Joseph Maughan for his wife, Cruz (Marin's daughter)
2938:	1 vineyard (planted by Francisco Marin) to Juan Marin (grandson of Marin)
256:	1 house lot to Kalukini
30:1 and 30:2	1 house lot (six houses) to Kahoowaha
2065:	1 house lot to Keo Bolabola for Kawaii
57:	1 house lot, to Simeona Kau
66:	1 house lot
22:	1 house lot
170:	1 house lot to Mataio Kekuanaoa

Winieski and Hammatt 2001

In 2001, CSH conducted archaeological monitoring for the Nimitz Highway Reconstructed Sewer Project (Winieski 2001a, 2001b). The route of the sewer construction began on River Street at the intersection of River and Hotel Streets, ran to Nimitz Highway, and extended to Bethel Street, where it merged into the 'Ewa end

of Queen Street. The route then extended along Queen Street to South Street, along South Street to Ala Moana Boulevard, and terminated at the Ala Moana Wastewater Pump Station. Only one archaeological resource was encountered: a remnant of a light-gauge rail associated with the historic Honolulu Rapid Transit trolley system (SIHP #50-80-14-5942) at the intersection of Queen Street and Nimitz Highway. Based on the monitoring findings and previous archaeological research, it was recommended that an archaeological monitor be present for any future ground disturbance in the area to mitigate the impact of subsurface disturbance to significant pre-contact and historic archaeological resources.

Landrum and Dixon 1992

In 1989, findings from an emergency mitigation of construction activities for the River-Nimitz Redevelopment work on the corner of River Street and Nimitz Highway revealed five post-contact-era pits and trash dump features. The numerous artifacts discovered in these pits appeared to be deposited in the early 19th century through early 20th century. A single human burial was found in a wet environment, which is unusual for Hawai‘i. The burial artifacts found, such as braided cordage and matted pandanus fibers, testify to the exceptional preservation of the burial (Landrum 1992). The resource was given the designation of SIHP #50-80-14-4192.

Goodwin et al. 1992

In 1991, the International Archaeological Research Institute, Inc. completed an archaeological data recovery for Marin Tower housing between Smith, King, and Maunakea Streets and Nimitz Highway (Goodwin 1992). Thirteen post-contact burial features and the remains of several displaced human skeletal elements were disinterred.

Goodwin et al. 1995

In 1992, International Archaeological Research Institute, Inc. completed an archaeological data recovery in the Marin Tower area (Goodwin 1995). This previous study area, which is bounded by Nimitz Highway in the Koko Head direction, Smith Street to the makai, a series of private businesses in the ‘Ewa direction, and Maunakea Street to the mauka, is now occupied by Marin Tower and a six-story parking garage. The entire block is designated SIHP #50-80-14-4494. This archaeological report, Volume II, covers the burial component of the property. The personal diary of Don Pablo Francisco Marin (interred in a tomb on his property on November 7, 1837) and other accounts indicate that Marin and a number of his wives and children were most likely buried on this property in a family cemetery. Fifteen burial features and several isolated, displaced human skeletal remains were found during the data recovery effort on the Marin Tower lands. Many iron coffin nails, both for adult and child coffins, were recovered. A large variety of associated grave goods were also recovered, including small glass beads (0.08 inches in diameter), large glass beads, a copper ring, bone discs and buttons, an iron and wood smoking pipe, a glass bead necklace, copper alloy buttons, shell buttons, ceramics, an iron-blade kitchen knife, and a copper cross necklace. A Memorandum

of Agreement was drawn up with the present Marin family relatives and the skeletal remains were disinterred then re-interred elsewhere on the property on March 3, 1994.

Goodwin et al. 1996

In 1992, the firm International Archaeological Research Institute, Inc. (Goodwin 1996) conducted monitoring, an inventory survey, and data recovery at the Marin Tower property. This entire property has been designated SIHP #50-80-14-4494. The archaeological resource comprises pre-contact features such as firepits; early post-contact features and structures associated with the residence of the Marin family from about 1810 to 1850; artifacts associated with the use of the makai portion of the property as part of the Honolulu Ironworks from 1850 to 1900; the use of the mauka portion for shops and families of Chinese merchants during the same period; and artifacts and structures related to the commercial development of the property as part of Downtown Honolulu from 1900 to 1950. Information on features and structures is presented in Volume I.

Lebo and McGuirt 2000a

A subsurface inventory survey was conducted by the Bishop Museum in December 1996 (Lebo 2000a) at 800 Nu‘uanu Avenue. Six trenches were excavated in the parking lot of a Bank of Hawai‘i building at the corner of Marin and Smith Streets. An analysis of the trench stratigraphy and recovered cultural remains allowed the researchers to identify five cultural periods within a cultural deposit designated SIHP #50-80-14-5496: (1) pre-contact (pre-1810), when the area was inhabited only by Native Hawaiians; (2) 1810 to 1850, when early foreign residents such as the Spaniard Don Francisco de Paula de Marin and the Englishman Isaac Davis began to build dwellings and storehouses in the area; (3) 1850-1890s, when large industrial structures such as the Honolulu Flour Mill and the Honolulu Iron Works were built on the property; (4) 1890s-1925, when many smaller wooden structures for businesses took over the area; and (5) 1925 to present, when most buildings were demolished and the study area was used as a parking lot. A few Hawaiian artifacts and numerous historic artifacts were recovered during the excavations.

Lebo and McGuirt 2000b

Data recovery was conducted by the Bishop Museum (Lebo 2000a, 2000b) in the 800 Nu‘uanu block (TMK 1-1-7-002:002) in October 1997. Ten backhoe trenches were excavated within the parking lot on the Diamond Head portion of the block bounded by Nu‘uanu Avenue and Nimitz, Marin, and Smith Streets. A total of 76 features were identified, including building foundations, post molds, coral block floors and walls, firepits, trash deposits, and cast-iron sewer pipes. All features within the project area were designated as part of one site, SIHP #50-80-14-5496. The earliest cultural remains were believed to date to earlier than A.D. 1810. Numerous historic artifacts were recovered, dating to the early post-contact period when the area was used for storehouses, to later historic periods when the lot was used for industrial structures, small businesses, and a parking lot.

Hurst 1991

In 1990, Bishop Museum (Applied Research Group) conducted an archaeological data recovery for the Kaʻahumanu Parking Garage and the Harbor Court redevelopment property, two lots on each side of Bethel Street. The two lots are bound ʻEwa by Nuʻuanu Avenue, Koko Head by the Fort Street Mall pathway, makai by Nimitz Highway/Queen Street, and mauka by Merchant Street in Downtown Honolulu (Hurst 1991). The excavation of test pits and trenches revealed pre-contact and post-contact period layers, and further data recovery efforts were set to continue.

Dunn and Rosendahl 1993

In 1993, six backhoe trenches were excavated on the site of the proposed Nuʻuanu Court Project (formerly called the Kaʻahumanu Parking Garage) by the firm Paul H. Rosendahl, Ph.D. Inc. (PHRI) (Dunn 1993). Under a layer of historic fill, a large, single cultural deposit (SIHP #50-80-14-2456) was discovered consisting of marine shell midden, charcoal, non-human bone, and a variety of artifacts. This cultural deposit is a portion of the same cultural deposit found at an adjacent lot on Bethel Street, the Harbor Court property (Hurst 1991).

Hurst and Allen 1992

In 1991, a cache of mainly post-contact artifacts was revealed by backhoe removal of piers and surface fill at the Harbor Court property (SIHP #50-80-14-2456) near the corner of Queen and Bethel Streets. These artifacts included lithics and a wide range of imported historic artifacts (Hurst 1992).

Lebo et al. 1997

In 1991, the Bishop Museum completed an archaeological data recovery for the Harbor Court redevelopment property at the intersection of Queen and Bethel Streets with South Nimitz Highway. Data recovered from SIHP #50-80-14-2456 provided information on Native Hawaiian occupation associated with the village of Kou/Honolulu from the late 18th to mid-19th century. A combination of traditional Hawaiian artifacts including lithic, bone, and shell tools and ornaments were recovered, along with introduced artifacts such as ceramics and bottle glass (Lebo 1997).

Lebo and Rosendahl 2002

In 1991 and 1992, PHRI conducted data recovery at the proposed Harbor Court redevelopment property at the corner of Queen and Bethel Streets in Downtown Honolulu, Nuʻuanu ahupuaʻa, Kona District, Oʻahu (TMK 1-2-1-022:016, 020 and 056). Previous work at the parcel conducted by the Bishop Museum in 1990 and 1991 had adequately recorded three stratigraphic deposits: (1) 1950s building rubble, (2) 19th-century building construction, and (3) post-1845 deposits. The cultural deposit was later considered part of SIHP #50-80-14-2456. PHRI excavated large blocks by hand (after mechanical removal of the fill layers by a backhoe) to

explore two remaining deposits: (4) the transitional period from 1794 (the date of Western discovery of Honolulu Harbor) to 1845; and (5) pre-contact use before 1794. The work indicated that the near-shore Honolulu area was inhabited as early as A.D. 1000-1200. A line of post molds may be the remains of a wooden palisade that once surrounded Kamehameha's compound (established in 1809). A coral wall may be the remains of the property boundary of Richard Charlton, the British Consul who claimed ownership of this area between 1826 and 1847. Numerous traditional Hawaiian artifacts, faunal material, and historic artifacts were recovered. The analysis of this material is presented in full in the report (Lebo 2002).

Hazlett et al. 2007

In 2007 CSH completed an archaeological monitoring report for the 12-inch and 16-inch water main installation work on Aloha Tower Drive between the intersections with Bishop and Richards Streets. No archaeological resources were identified during the monitoring work (Hazlett 2007).

Pfeffer et al. 1993

From April 1986 through August 1988, CSH (Pfeffer 1993) conducted monitoring, data recovery, and excavation services within the Hawai'i Community Development Authority's Kaka'ako Improvement District 1. This work was conducted almost exclusively underneath the streets in District 1; very little private property was excavated. A total of 149 burial sets were recovered during this study. Four burial areas were encountered: two cemeteries and two isolated burials. The cemetery on Queen Street (SIHP #50-80-14-4534) contained 116 burial sets. These burials are associated with Kawaiaha'o Cemetery, which was used from about 1875 to 1920. A total of 31 burials were recorded from the South Street/Quinn Lane burial cluster (SIHP #50-80-14-4531; could be considered part of # SIHP 50-80-14-3712). These burials are associated with the Honuakaha Smallpox Cemetery, which was used for burial only in 1853 and 1854. The two isolated burials—on Punchbowl Street (SIHP #50-80-14-4532) and Halekauwila Street (SIHP #50-80-14-4533)—each contained one set of remains. A variety of other archaeological and historical features was noted, excavated, and recorded during the monitoring process, including historic trash layers, historic cultural features, and fill layers associated with the urbanization of the Kaka'ako area. No osteological analysis was conducted on the 116 sets of remains from the Queen Street area. These were reinterred in a special vault built on the grounds of the present Kawaiaha'o Cemetery. Osteological analysis was conducted on the burial material from the South Street/Quinn Lane area. These remains were later reinterred in a special vault built next to the Honuakaha Affordable Housing Area.

Cordy and Hammatt 2005

In 2004, monitoring by CSH was conducted along the Koko Head shoulder of Punchbowl Street between King and Pohukaina Streets for installation of electrical lines and planters. No cultural materials were found, but the authors emphasized the

possibility of human burials associated with the nearby Kawaiahaʻo Church (Cordy 2005).

Clark 1987

In 1988, Bishop Museum monitored construction of a parking garage on the corner of Punchbowl and Halekauwila Streets. Archaeological features revealed both pre-contact and post-contact use of the study area. Seven human burials, of which four were complete with well-defined burial pit features, were unearthed. Two complete burials were in a flexed position, one was a bundle burial, and one was too disturbed to determine burial position. Charcoal from one of the complete burials (Feature 28) was dated to A.D. 1270-1410. Feature 28 also showed post-mortem breakage of the limb bones. Only the femoral heads were still present in the burial pit; the shafts had been broken off and removed. Osteological analyses of the burials and analysis of grave goods indicated that the individuals were of Hawaiian ancestry, probably from the commoner class rather than the aliʻi class. The burial area was considered part of the previously identified SIHP #50-80-14-2963. Artifacts recovered at the parcel ranged from basalt tools (including an adze, a hammerstone, and a poi pounder top) and a coral abrader to glass bottles, ceramic fragments, and metal objects (Clark 1987).

Hammatt and Chiogioji 1995

On July 30, 1995 an archaeological assessment of 20 parcels bound by Punchbowl, Halekauwila Street, Kuola, and Ilalo Streets was made by CSH (Hammatt 1997a, 1997b). Based on background research, four areas of archaeological concern were listed: (1) the locations of fishponds noted on historic maps; (2) burials known from background research or from previous archaeological studies; (3) the location of a leprosy hospital recorded as built in 1881 near the seashore; and (4) the locations of possible ethnic “camps” or areas in which people of different ethnic backgrounds lived in separate enclaves. A recommendation for future development, and a brief history of known archaeological resources and archaeology was given for the parcels. No buildings or establishments at the time of the inspection were added to the National or State Registers of Historic Places.

Leideman 1988

From 1985 to 1986, the Bishop Museum monitored the construction of a parking complex at the corner of South and Pohukaina Streets in Downtown Honolulu (Leideman 1988). Two backhoe trenches (4.9 and 8.2 feet in depth) were examined and revealed considerable disturbance. Historic artifacts were recovered throughout the study area, which was then wholly denoted as SIHP #50-80-14-1973 based on the quantity and diversity of these artifacts as aspects of Hawaiʻi’s immigrant heritage.

Avery and Kennedy 1993

In 1993 during sewer line excavation, three burials were inadvertently discovered by Archaeological Consultants of Hawaiʻi, Inc. at 614 South Street, Kakaʻako in the

central portion of the lot (TMK 2-1-031:020) on the corner (TMK 2-1-031:020) of South Street and Quinn Lane. It was determined that these burials were in the Honuakaha Cemetery (SIHP #50-80-14-3712). Subsequent monitoring at the lot identified six additional burials in the same location, totaling nine smallpox cemetery burials in this area (Avery 1993).

4.7.6 Previously Recorded Archaeological Resources

The archaeological resources within the Downtown sub-area are notable because of the historic record that they provide. In particular, these resources record the adaptation of some, but not all, Western lifestyles by traditional Native Hawaiian culture. In fact, the pili grass structural remnants at SIHP #50-80-14-5496 and SIHP #50-80-14-4494 show that Hawaiian traditions persisted long into the 19th century and often coexisted with introduced Western traditions. An example is the archaeological resource associated with European Don Francisco de Paula Marin: this residential complex had several traditional Hawaiian features, as well as introduced European features. The discussion of the archaeological resources proceeds from ʻEwa to Koko Head (Figure A-21).

SIHP #50-80-14-9986—Chinatown Historical District

"The Chinatown Historic District is generally bounded by Nuʻuanu Avenue, the ʻEwa side of Nuʻuanu Stream, Beretania Street, and a portion of Honolulu Harbor encompassing Piers 13-15 and the edge of Pier 12" (Mason 2007a, 2007b).

The first Chinese contract laborers arrived in the Islands to work the sugar cane plantations. When their contracts were up, they started their own businesses and many moved to what became known as Chinatown. By 1884, 75 percent of the Chinese on Oʻahu lived in Chinatown (Carter 1988 [5,9]).

In April of 1886, a Chinese eatery caught fire which spread to and destroyed eight blocks (Carter 1988 [11]). The fire affected the area bounded makai by Queen Street, ʻEwa by the Nuʻuanu River, mauka by Beretania Street, and Koko Head by Nuʻuanu Street (Charvet-Pond 1989). A second fire struck Chinatown in 1900, this time as the result of an intentionally set flame. Bubonic plague had begun to spread through Chinatown, and the Board of Health determined that the best way to contain the disease was to set a number of controlled fires. A strong wind caused flames from one of the controlled fires to spread to neighboring buildings, eventually spreading to every block from Beretania Street to the sea. Residents of these buildings were moved to a quarantine camp in Kakaʻako (Carter 1988 [12,17]).

The rebuilding of Chinatown took place throughout the early 1900s. Since then, many structures have remained the same while the businesses inside have changed. The Chinatown Historical District (SIHP #50-80-14-9986) was listed on the National Register of Historic Places on January 17, 1973. It was determined eligible because of the high concentration of original buildings that have largely remained unaltered since the beginning of the 20th century. There are 500 properties that were built before 1965. Of these resources, 67 are already on the State or National

Registers or are under consideration, and an additional 141 are potentially eligible for the Registers (Mason 2007 [4-18]).

The boundaries of the component buildings and structures that comprise the Chinatown Historical District are well known as they have been specifically defined. There is some ambiguity pertaining to associated archaeological resources that exist beneath the District's makai boundary along Nimitz Highway. Nimitz Highway, the current proposed alignment in this area, was built on fill, but it is unknown whether the fill is covering historic remnants of Chinatown. During archaeological monitoring for excavations along Nimitz Highway in the portion that borders the Chinatown Historical District, CSH archaeologists did not observe any cultural remains, and the only sediments present were fill layers down to the water table (Winieski 2001a, 2001b). However, burials and cultural layers have been documented on land immediately mauka of Nimitz Highway (Hurst 1991; Goodwin 1995).

SIHP #50-80-14-4192—Pre-Contact Burial and Historic Cultural Deposits

SIHP #50-80-14-4192 (Bishop Museum # 50-Oa-A5-16) consists of a pre-contact burial and several pre-contact and post-contact features, much of which were heavily disturbed. An inadvertent burial discovery warranted an emergency mitigation of archaeological resources by the Bishop Museum (Landrum 1992). The archaeological resource boundary is firmly established between River, Kekaulike, and King Streets and North Nimitz Highway, extending directly from the project alignment to approximately 230 feet Koko Head. This archaeological resource was deemed eligible for the National Register of Historic Places under Significance Criterion D. Current land jurisdiction rests with the City and County of Honolulu. All archaeological materials have been curated at the Bishop Museum's Department of Anthropology, pending final decisions by the Department of Land and Natural Resources regarding the disposition of the data (as of 1992).

SIHP #50-80-14-4494—Marin Tower Cultural Deposits

SIHP #50-80-14-4494 consists of numerous archaeological features and artifacts (ranging from pre-contact to post-contact times) and 15 post-contact burials, all part of the Marin Tower cultural deposits. The burials were disinterred as part of an archaeological data recovery conducted by the International Archaeological Research Institute, Inc. (Goodwin 1992, 1995, 1996). Starting in 1992, previous fieldwork included archaeological monitoring of the demolition of existing modern structures and archaeological subsurface testing, both of which were also conducted by the International Archaeological Research Institute, Inc. (Moblo and Goodwin 1992). According to Part II of the data recovery report, all burials are presumed to be part of the Marin family or household, with most exhibiting evidence of some Hawaiian ancestry (Goodwin 1995).

The archaeological resource is bounded by Maunakea, King, and Smith Streets and Nimitz Highway, extending directly from the project alignment to approximately 375 feet mauka (toward King Street). The Marin Tower property lies within the Chinatown Historical District, which was placed on the National Register of Historic Places on

January 17, 1973 and current land jurisdiction rests with the City and County of Honolulu. The built environment consists of the 28-story Marin Tower and related parking structures. On March 3, 1994 the human remains were ceremonially reinterred on the property.

SIHP #50-80-14-5496—Subsurface Cultural Deposits

SIHP #50-80-14-5496 (Bishop Museum number, 50-Oa-A5-22) consists of Native Hawaiian historic cultural deposits, including post-contact traditional and non-traditional artifacts, at the 800 Nu‘uanu Block. These artifacts include post molds, historic architectural remains, ‘ili ‘ili (pebble) stones, worked bone, faunal remains, lithic artifacts, pits, and fire-affected rock. These artifacts were recovered during an archaeological inventory survey completed by the Bishop Museum in 2000 (Lebo 2000a). This was followed by data recovery, also completed by the Bishop Museum in 2000 (Lebo 2000b). Lebo and McGuirt state:

> The contemporaneity of the pili grass structures and the prefab dwelling indicates that many aspects of traditional Hawaiian culture were carried out simultaneously with traditional aspects of European or American culture (Lebo 2000b).

Studies record three different cultural zones within the nine excavated trenches. The first zone contains the first visible signs of archaeological evidence. This zone (A.D. 1810-1860s) contained pits, post molds (associated with pili grass houses), midden, a cut coral block foundation, a stone wall, trash pits, fire pits, and a kiln. The second zone (A.D. 1860s-1890s) contained six large trash pits, trenches, and cast iron pipe remnants. The third zone (A.D. 1890s-present) contained the remains of wood-framed buildings, brick buildings, a large pit with brick rubble, a trench, a sewer pipe, and two parking areas below the modern-day surface parking lot.

The extent of the Native Hawaiian post-contact cultural deposits is unknown. The deposit may be found during excavation within the vicinity of the archaeological resource. The inventory survey and data recovery were conducted on privately owned land bound by Nu‘uanu Avenue, Marin Street (mauka), and Nimitz Highway. This area is within 80 feet Koko Head of the project alignment and borders the alignment for about 150 feet. The Native Hawaiian historic cultural deposits are likely to extend makai of their present known boundary. The archaeological resource was recommended eligible for the State Historic Register under Significance Criteria A, B, and D, but remains unregistered. The Native Hawaiian historic cultural deposits are considered to provide an important contribution to the broad patterns of history (Significance Criterion A), are associated with significant people such as Isaac Davis, Kuihelani, and John Jones (Significance Criterion B), and also likely to yield important information concerning the pre-contact and post-contact history of Native Hawaiians (Significance Criterion D). This archaeological resource remains unlisted on State and National Registers of Historic Places.

SIHP #50-80-14-2456—Subsurface Cultural Deposits

SIHP #50-80-14-2456 is a multi-component archaeological resource consisting of subsurface deposits, features, and artifacts. The boundary of the resource, in the ʻili of Pulaholaho, is defined as the same as the boundary of the both the Nuʻuanu Harbor and Harbor Court study parcels, the Honolulu city blocks within Merchant, Fort, Bethel, and Queen Streets (Lebo 2002). The Bishop Museum was the first to identify the resource, using hand excavation units in the two parcels (Hurst 1991). Archaeologists from the museum excavated the upper deposits of the Harbor Court property (Hurst 1992; Lebo 1997), and archaeologists from PHRI excavated the earlier, lower deposits (Lebo 2002). PHRI also excavated a portion of the cultural layer in the Nuʻuanu Court parcel (Dunn 1993).

The archaeological remains studied by PHRI were dated to three periods: the late pre-contact period (circa 1650-1795), the early post-contact transitional period (circa 1795-1820), and a later post-contact period (1820-1850). Although charcoal from one feature indicates that this area was occupied as early as A.D. 1000 to 1200, most of the earliest remains were associated with scattered use of the area by fishermen in the late pre-contact period. In the post-contact transitional period, Kamehameha I established a compound in the area around 1820, which his wife Kaʻahumanu occupied until 1825. In 1826, Richard Charlton, the British Consul, rented, and later claimed ownership of a section of Pulaholaho. He constructed several coral block storehouses. Other foreign-born businessmen soon followed, and the Native Hawaiians in the area were forced to move out. In the post-1850 period, permanent storehouse and business structures were built. Most of the foundations of these buildings remained unaltered until the urban redevelopment of the 1930s to 1950s. The report does not assess Significance Criteria for this resource.

SIHP #50-80-14-5942—Honolulu Rapid Transit & Land, Ltd. Light Gauge Rail

SIHP #50-80-14-5942 consists of the remnants of a light-gauge rail associated with the historic Honolulu Rapid Transit streetcar (trolley) system. The remnants were comprised of a concrete barrier attached to light-gauge rail (Winieski 2001a, 2001b). The construction of the Honolulu Rapid Transit & Land, Ltd. (HRT&L) was directed by Clinton G. Ballentyne. Despite financial difficulties, HRT&L had electric streetcars along with an overhead electric catenary system in operation by 1901. The electric streetcars were a welcome change, and Honolulu was no longer limited to mulecars (Simpson 2000). It was considered the most effective means of transportation for the next three decades, at which point the privately owned automobile became the favorite mode of transportation. The HRT&L supplemented the streetcars with electric trolley buses for a few years, but by July 1941 electric trolley buses completely replaced electric trolley streetcars (Simpson 2000).

Most of the tracks were removed in 1933. It is not apparent which tracks were removed and which were not. The HRT&L tracks extended from Moanalua Stream ʻEwa bound along King Street to Koko Head Avenue. There were also transit lines that followed Liliha Street, Nuʻuanu Avenue, Oʻahu Avenue, and Kalākaua Avenue (crossing the Ala Wai Canal on the McCully Street Bridge). Historical information

concerning the HRT&L trolley system is found in the book *Streetcar Days in Honolulu* by MacKinnon Simpson and John Brizdle.

This portion of the archaeological resource was found during archaeological monitoring by CSH in 2001 during reconstruction of sewer lines along Nimitz Highway. The measurement of the tracks is unstated. The features were discovered at Queen Street and Nimitz Highway on land under the jurisdiction of the City and County of Honolulu less than 50 feet mauka of the project alignment. The archaeological resource does not appear to have been assessed for Significance Criteria and remains unlisted on State and National Registers of Historic Places.

SIHP #50-80-14-2963—Burials and Cultural Deposits

SIHP #50-80-14-2963 (Bishop Museum number, 50-Oa-A5-12) consists of seven human burials, historic trash pits, faunal remains (pig, goat, dog, and cow), and building foundations. Sixteen pit features were identified, some of pre-contact origin and some of post-contact origin. One subsurface pit feature had a mixture of post-contact artifacts and traditional Hawaiian artifacts. Three of the human burials were disturbed disarticulated remains.

The features were discovered during archaeological monitoring of the Makai Parking Garage by the Bishop Museum (Clark 1987). The burials were uncovered at the corner of Halekauwila Street and Punchbowl Street, about 25 to 220 feet mauka of the project alignment on State-owned land. It is unclear if the remains were removed or reinterred in place. The previous archaeological study area was determined to be the boundary of the archaeological resource. It is possible that SIHP #50-80-14-2963 extends beyond its current known boundaries. The archaeological resource does not appear to have been assessed for Significance Criteria and remains unlisted on State and National Registers of Historic Places.

SIHP #50-80-14-1973—Historic Trash Deposit

SIHP #50-80-14-1973 (Bishop Museum number, 50-0a-A5-11) consists of a historic trash deposit found throughout the study parcel, which is bound by Halekauwila Street mauka, Reed Street makai, and South Street toward Koko Head. The deposit was significantly disturbed, so no provenience could be established. A large amount of artifacts was recovered (more than 750) including bottles, tableware, stoneware containers, chamber pots, and a metal pail. The deposition of these artifacts occurred approximately between 1870 and 1930. All artifacts are currently stored at the Bishop Museum in Honolulu. The historic trash deposit was discovered during monitoring work completed by the Bishop Museum in 1986 (Leidemann 1988). The land is privately owned and contains commercial buildings and parking lots. This historic trash deposit extends from 20 feet to 220 feet makai of the present archaeological study area centerline and borders the project alignment for about 500 feet. Because artifacts were found throughout the entire monitoring study area, the archaeological resource is very likely to extend mauka across the alignment. The archaeological resource does not appear to have been assessed for the State or National Register of Historic Places.

SIHP #50-80-14-4533—Single Burial

SIHP #50-80-14-4533 is a single burial found at Halekauwila Street. The burial location is 135 feet ‘Ewa of South Street (Pfeffer 1993) on City and County of Honolulu land. The burial was determined to be that of an adult male, approximately 50 years old, buried in a fully extended position. The burial was determined to be pre-contact Native Hawaiian because the remains were found in natural beach sand, and Native Hawaiian artifacts including 11 basalt slingstones were found associated with the remains. The remains were taken to the Bishop Museum in preparation for reinterment; however, no information on the final reinterment location was available. The burial was located directly along the present project alignment. Because this burial has been disinterred, construction of the project alignment would not affect SIHP #50-80-14-4533. However, the presence of natural sand in that area may indicate that other burials may be present.

SIHP #50-80-14-3712—Honuakaha Cemetery

Thirty-one burials, designated SIHP #50-80-14-3712, were excavated by CSH at the juncture of South Street and Quinn Lane in Downtown Honolulu during archaeological monitoring of a sewer line installation along South Street (Pfeffer 1993). The sewer excavations were part of the construction and renovation of the Kaka’ako Improvement District on lands owned by the City and County of Honolulu.

These burials were part of the larger Honuakaha Cemetery, created solely for the victims of a smallpox epidemic between 1853 and 1854. The cemetery is believed to contain more than 1,000 burials. Currently, Honuakaha Cemetery is covered by urban development. A historic account describes the burials as tightly grouped and buried at a depth that averaged only 3 feet.

CSH excavated a series of trenches, with the goal of outlining the boundaries of Honuakaha Cemetery, and discovered that all of the burials were located only within natural sand layers, as opposed to the cinder layer also found throughout Kaka’ako. In an osteological analysis, the remains were confirmed to be of Polynesian ancestry. Buttons, beads, jewelry, and glass and metal coffin fragments were also associated with the burials.

A separate excavation at 614 South Street on privately owned property inadvertently uncovered three burials that were also a part of Honuakaha Cemetery (Avery 1993). Archaeological Consultants of Hawai‘i excavated the remains, noting that two of the burials were in an extended position and one was in a flexed position. Buttons and unidentified copper items were found with one of the extended burials.

All of the burials that comprise SIHP #50-80-14-3712 are between 115 and 220 feet mauka of the project alignment and 130 feet ‘Ewa of the proposed Civic Center Station. The historical boundaries of the cemetery are unclear, but based on the location of the previously discovered burials and the historical reference that more than 1,000 people were buried in Honuakaha Cemetery, it is likely that more burials would be discovered during construction of the Project.

4.8 Kaka‘ako Sub-Area

4.8.1 Sub-Area Description

The Kaka‘ako sub-area of the archaeological study area is within the ahupua’a of Honolulu and Waikīkī. This sub-area is approximately 1.8 miles long and includes the Civic Center, Kaka‘ako, Ala Moana Center, and Convention Center Stations. Figures A-22 through A-24 in Appendix A depict the geography and features of the Kaka‘ako sub-area and summarize various types of environmental and cultural information.

4.8.2 Natural Environment

The majority of the Kaka‘ako sub-area is about one-quarter of a mile mauka of the coastline. The sub-area is extremely level, remaining at elevations between 0 and 10 feet above sea level, and receives a mean annual rainfall of 24 to 32 inches. No streams or other major fresh water bodies are found within this area (Figure A-22).

According to USDA soil survey data (Foote 1972), the full length of the Kaka‘ako sub-area extends through Fill Land, Mixed (FL), with the exception of a small portion of ‘Ewa Silty Clay Loam (EmA) at the ‘Ewa end. Fill Land, Mixed (FL) is described as “areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources.” The ‘Ewa series of soils is described as “well-drained soils in basins and on alluvial fans on the islands of Maui and O‘ahu. These soils developed in alluvium derived from basic igneous rock” (Foote 1972). Prior to the deposition of these fill layers, the study area and its vicinity consisted of low-lying marshes, sand berms, tidal flats, fishponds, and reef areas. The filling and subsequent development of Kaka‘ako permanently changed the area and allowed for its current, fully urbanized character (Figure A-22).

Previous archaeological work in the Kaka‘ako area has shown that natural Jaucus sand still exists beneath the layers of fill (McDermott 2007). The USDA Soil Survey describes Jaucas sand as follows:

> This series consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. These soils occur on all the islands of this survey area. They developed in wind and water deposited sand from coral and seashells…
>
> In a representative profile, the sediment is single grain, pale brown to very pale brown, sandy, and more than 60 inches deep. In many places, the surface layer is dark brown as a result of the accumulation of organic matter and alluvium. The sediment is neutral to moderately alkaline throughout the profile (Foote 1972).

Vegetation along this sub-area consists of non-native ornamental trees, shrubs, and grasses planted primarily as landscaping.

4.8.3 Built Environment

The Kakaʻako sub-area follows existing roadways through Kakaʻako or passes over completely developed lots of commercial and residential buildings and high-rises, with infrastructure such as parking lots, sidewalks, and landscaped planters (Figure A-23).

4.8.4 Past Land Use and Land Commission Awards Information

In the pre-contact period, Kakaʻako was located between two centers of population: Kou (Honolulu) and Waikīkī, on the southern shore of pre-contact Oʻahu. Unlike these two densely populated areas, it had no large expanse of irrigated taro patches. Instead, the terrace was exposed coral flats dotted with salt pans and fishponds. Habitations were scattered along the shore and along trails.

In the early post-contact period, Kakaʻako was a portion of the area called the "salt plains of Honolulu" (Bingham 1847 [92-93]). The Protestant missionary church, established in 1820 (Kawaiahaʻo Church and the Mission Houses), was built at the edge of this dry plain. Converted Hawaiians, including many Hawaiian chiefs and members of the monarchy, began to build houses in the same area to be near the mission. This appears to have been a major factor pulling the development of Honolulu toward Koko Head, away from Nuʻuanu Stream and into an area that had been relatively less inhabited in pre-contact times.

The project alignment would extend through 19 LCAs (Table 4-8 and Figure A-23).

By the time of the Māhele, Honolulu was firmly established as the capital of the Hawaiian Islands and the city boundaries were spreading out to encompass Kakaʻako. The marginal swamp and intertidal lands in the makai portion of Kakaʻako became more valuable and more than a third of the awards in this sub-area were to the royal family, loyal retainers, and other important people. A number of large LCAs were awarded in the section of the Kakaʻako sub-area between the Civic Center and Kakaʻako Stations. The LCAs near the Civic Center Station at the ʻEwa end (near Downtown) of the sub-area were for large house sites, many with multiple dwellings. The LCAs near the Kakaʻako Station were smaller and were for house lots with adjacent loʻi and the rights to fishponds and salt lands.

Table 4-8: Kakaʻako Sub-Area Land Commission Awards

LCA Number	Contents of Award
10463:1	1 house lot, 2 ponds, and a salt land
1504:	1 house lot (house, pond, and salt land), 2 taro patches (loʻi)
1503:1 and 1503:2	1 house lot and fishpond, 2 fishponds
10605:7	Lands to Iona Piʻikoi and Kamakee
10605:3	Lands to Iona Piʻikoi and Kamakee
7712:6	Lands to Mataio Kekuanaoa
2405:	no data
982:	1 house lot (4 houses)
677:	1 house lot (2 houses) to Mataio Kekuanaoa
Māhele Aw.61	1 house lot
735:	1 house lot (2 houses, partially fenced) to Kaahumanu
729:	1 house lot (3 houses
7712:6 Lot 2	Lands to Mataio Kekuanaoa
129:1	1 house lot (house, fence)
704:	1 house lot (3 houses)
180:	1 house lot to Mataio Kekuanaoa for Lot Kamehameha
100 F.L.:2	Fort Lands: 2 ponds, 5 fry ponds (kiʻo pua), 1 taro patch (loʻi), 1 house lot, 1 pasture (kula land)
101 F.L.:1 and 101 F.L.:2	Fort Lands: 2 ponds, 3 kiʻo pua

On March 8, 1848 Kamehameha III divided his property in the Islands of Hawaiʻi reserved for him through the Māhele into two parts: the smaller portion he retained for himself and his heirs, and the larger portion was given "…to his Chiefs and People." The latter became known as "Government Lands" (Chinen 1958 [26]). Fifty-two ʻili in Honolulu, Kalihi, and Waikīkī were set aside from the Government Lands as "Fort Lands" for the support of the garrison of the Fort at Honolulu. A distinct series of LCAs was issued for the kuleana in these lands, marked F.L. (Fort Land), to distinguish them from other awards. The Fort Land kuleana were granted free of charge to the awardees.

Three of these Fort Land awards were granted near the project alignment near Ala Moana Station. Only one loʻi and one house lot were awarded, but all three awards included ponds and kiʻo pua (separate ponds for raising fry, or fish hatchlings).

In the pre-contact and early post-contact periods, Kakaʻako was a mosaic of low-lying marshes, tidal flats, fishponds, and reef areas split by elevated sand ridges. The sand ridges were a favored location for traditional Native Hawaiian burials. In the 19th and early 20th centuries, the land was used to quarantine contagious

patients and as a burial ground for those who succumbed to numerous diseases and epidemics that decimated the population.

During the smallpox epidemic of 1853 to 1854, the Honuakaha Cemetery and Hospital were established makai of Queen Street, within LCA 677 (Figure A-23; makai of the Civic Center Station). More than 1,000 victims of smallpox were interred in the cemetery during the epidemic. It appears that the cemetery was not used following the epidemic. Although the presence of burials on this lot is known, there has been an apparent lack of concern shown by both those who owned the land and those who later leased it for various businesses. In 1928, the LCA parcel was set aside for a new fire station. In 1979 the old Kakaʻako fire station, along with six other original fire stations, was nominated to the Hawaiʻi and National Register of Historic Places for its architectural and social/humanitarian significance. This status was granted in 1980 (Smith 1978).

By the 1880s the filling of mud flats, marshes, and salt ponds in the Kakaʻako area had been mandated, both for sanitation reasons and to provide more land for the expanding Honolulu landscape. The last ponds were filled during the construction of the Ala Wai Canal in the 1920s and 1930s (Griffin 1987). Dredged coral, soil, and trash were used to fill low-lying areas. By the 1940s, defined streets, houses, and other structures with their accompanying infrastructure development were present. During this time, Kakaʻako was used as a place for sewage treatment and garbage burning, finally becoming an area for cheap housing and commercial industries (Griffin 1987 [13]). As Honolulu has expanded, the Kakaʻako area is now characterized by high-rise apartment buildings and condominiums.

4.8.5 Previous Archaeological Investigations

The Kakaʻako sub-area contains archaeological resources of both pre-contact and post-contact origin. The area has been subject to intensive reconstruction and growth since the mid-1990s as a consequence of the growth of Honolulu and Waikīkī. Several investigations have uncovered subsurface elevated sand ridges, often containing burials in addition to other archaeological resources. These factors have led to the generation of numerous archaeological reports for the area. The discussion of previous archaeological investigations proceeds from ʻEwa to Koko Head. Figure A-24 shows the locations of the previous archaeological investigations discussed in the following sections.

Hammatt and Chiogioji 1995

On July 30, 1995, an archaeological assessment of 20 parcels bound by Punchbowl, Halekauwila, Kuola, and Ilalo Streets was made by CSH (Hammatt 1997a, 1997b). Based on the background research, four areas of archaeological concern were listed: (1) the locations of fishponds noted on historic maps; (2) burials known from background research or from previous archaeological studies; (3) the location of a leprosy hospital recorded as built in 1881 near the seashore; and (4) the locations of possible ethnic “camps” or areas in which people of different ethnic backgrounds lived in separate enclaves. A recommendation for future development, as well as a

brief history of known resources and archaeology, was given for the parcels. No buildings or establishments at the time of the inspection were added to the National or State Registers of Historic Places.

Winieski and Hammatt 2000a

Between November 1990 and September 1992, monitoring was conducted at the Kaka‘ako Improvement District 3 area, the Pohulani Elderly Rental Housing property, and the Kauhale Kaka‘ako study area (TMK 2-1-30, 31, 32, 44, 46, 47, 48, 50, 51, 52, 54) by CSH. The monitoring of sub-surface excavations revealed that although the area had been previously disturbed to a great extent, a cultural layer and in situ beach sand and volcanic cinder deposits are still intact below fill layers. The cultural layer contained historic artifacts mixed with scant traditional Hawaiian cultural materials. Twenty human burials were discovered during these archaeological studies, nine at the Pohulani Elderly Rental Housing area (SIHP #50-80-14-4380) and eleven in and around Mother Waldron Park (SIHP #50-80-14-5820). Five burials were in an extended position; seven were flexed; and the position of the eighth could not be determined. One burial was in a coffin, and one contained a glass trade bead, suggesting that the burials were of post-contact age. Seventeen of the burials were recovered and reinterred in Mother Waldron Park. Three were left in place beneath the Pohulani Elderly Rental Housing Facility (Winieski 2000a).

Hammatt and Chiogioji 1998a

In 1998, CSH conducted an archaeological assessment of the Mother Waldron Playground and Former Pohukaina School parcel between Halekauwila, Pohukaina, Cook, and Keawe Streets. SIHP #50-80-14-1388, Mother Waldron Playground, has been on the State Register of Historic Places since June 1988. The Mother Waldron Playground was developed in 1937 and the buildings and walls have retained their integrity. No other archaeological remains were discovered (Hammatt 1998a).

Douglas 1991

In 1991, during excavation of a waterline trench between Coral and Queen Streets across Mother Waldron Park, human and pig skeletal remains were discovered and disinterred by an archaeologist from CSH (Douglas 1991). The remains of a single skeleton were determined to be of Hawaiian ancestry, with the pig remains possibly associated with the burial. These burials were considered part of SIHP #50-80-14-4380.

Chiogioji and Hammatt 1991

In 1991, CSH prepared a preliminary archaeological assessment of a 177-by-105-foot parcel located approximately 0.5 miles mauka of the present shoreline in Pauoa ahupua‘a. The parcel is on the Koko Head third of the block, bordered on the mauka boundary by Ilaniwai Street, on the Koko Head boundary by Kamani Street, on the makai boundary by Halekauwila Street, and on the ‘Ewa boundary by Cooke Street (Chiogioji 1991). Background research indicated that the study area is in a region unlikely to have been extensively populated during traditional Hawaiian times

when fishpond farming and salt making dominated the area. The same research indicated that trash and refuse pits from the early to late 19th century, as well as human burials of pre-contact and post-contact provenance, had been found in proximity to the previous study area. No surface archaeological resources or historic buildings and structures were noted. Based on background research, the authors indicated that a potential exists for subsurface archaeological resources in the study area, including pre-contact and post-contact habitation and burial deposits.

Souza et al. 2002

In 2000, excavation associated with the Kakaʻako Improvement District 7 construction was undertaken by CSH. Three human burials were encountered, which were severely disturbed by excavation activity (Souza 2002). The burials' age and ethnicity are unknown, though the lack of grave goods may indicate they are pre-contact or early post-contact. Burial 1 (SIHP #50-80-14-6376) was inadvertently discovered by Delta Construction Company personnel on October 13, 2000 in the base yard backdirt pile. Burial 2 (SIHP #50-80-14-6377) was encountered by a CSH archaeologist during backhoe excavations for a box drain. The burial was within an undisturbed beach sand deposit. Burial 3 (SIHP #50-80-14-6378) was recovered in the Delta Construction Company's base yard on Pensacola Avenue and Kapiʻolani Boulevard.

Winieski and Hammatt 2000b

In 2000, archaeological monitoring by CSH for the Kakaʻako Improvement District 4 construction documented two isolated historic coffin burials (SIHP #50-80-14-5598) on Kamakeʻe Street, between the intersections of Kawaiahaʻo and Waimanu Streets (Winieski 2000b). The two adjacent burials were found in undisturbed beach sand with an associated "A" horizon (former land surface) that was capped by modern fill. Well-defined burial pits were present, as well as staining from the deteriorated coffin wood. No associated artifacts other than the coffins were discovered during disinterment.

Bell et al. 2006

In 2006, an archaeological inventory survey was conducted for the Victoria Ward Village Shops in Downtown Honolulu. Two archaeological resources were identified as significant, and these resources are currently under review by SHPD for assignment of SIHP numbers. CSH-1 is a cultural horizon containing both historic and prehistoric artifacts and five human burials. CSH-2 is a pronounced subsurface traditional Hawaiian cultural layer that included scallop-shaped pit features and six human burials. The burials found are thought to be most likely Hawaiian (Bell 2006a, 2006b).

Oʻ Hare et al. 2006

CSH conducted monitoring for the Kakaʻako Community Improvement Study between April 2003 and July 2004. Three significant resources were found. SIHP #50-80-14-6658 is a cluster of 28 burials within the Queen Street extension.

Seventeen of the 28 burials were determined to be of Hawaiian ethnicity based on the types of grave goods, the presence of tooth ablation, and a traditional burial position (flexed vs. extended). The ethnicity of the remaining 11 could not be definitively determined, but it is assumed that most of these were also Hawaiian since this area of Kaka‘ako was not inhabited by other ethnic groups until the 20th century. All grave goods were historic; most were dated to the mid to late 19th century. It is possible that many of these individuals were victims of the 1853 smallpox epidemic or one of the other epidemics that decimated the Hawaiian population in the last half of the 19th century. SIHP #50-80-14-6659 consists of two isolated burials in a previously disturbed stratigraphic context. The age or ethnicity of these burials could not be determined. SIHP #50-80-14-6660 is a discrete historic dump area containing bottles dated to the early 20th century (O’Hare 2006a, 2006b).

O‘Hare et al. 2004

In 2003, CSH conducted an archaeological inventory survey for the Ko‘olani Condominium parcel in the Kewalo area of Honolulu. Two previously unrecorded archaeological resources were found. SIHP #50-80-14-6639 and SIHP #50-80-14-6641 are historic trash pits dating from the early 20th century. One previously recorded resource, the original wetland surface of Kewalo (SIHP #50-80-14-6636), was also documented (O’Hare 2004a, 2004b).

Tulchin and Hammatt 2005

In 2005, an inventory survey was conducted for the Phase II portion of the Ko‘olani Condominium parcel (see O’Hare 2004 for Phase I) in the Kewalo area of Honolulu. Only four historic artifacts consisting of glass bottles manufactured between 1880 and 1925 were found in the thirteen trenches excavated. No new SIHP number was assigned (Tulchin 2005).

Hammatt 2007

In 2007, CSH completed archaeological monitoring prior to development of the Ko‘olani Towers, located in Kaka‘ako and makai of Waimanu Street. Three resources were identified and recommended eligible to the Hawai‘i Register of Historic Places under Significance Criteria D and E. SIHP #50-80-14-6910 consisted of a single pre-contact isolated burial. SIHP #50-80-14-6911 consisted of a cluster of 16 historic coffin burials believed to comprise a discrete cemetery. SIHP #50-80-14-6912 consisted of a single isolated burial. In addition, various historic trash deposits were observed throughout the study area but were not considered eligible for the Hawai‘i Register of Historic Places (Hammatt 2007).

Barnes and Shideler 2007

In 2007, CSH conducted an archaeological field check and literature review for the proposed 1235 Kona Street/1226 Waimanu Street Reserved Housing (Barnes 2007). No archaeological resources were identified within the parcel. However, background research identified numerous pre-contact and post-contact burial finds

in the vicinity. The archaeological investigation recommended that an archaeological inventory survey be conducted prior to any ground disturbance within the parcel.

Esh and Hammatt 2006a

In August 2004, CSH conducted archaeological monitoring for the Rehabilitation of Streets Unit 5B on Pi'ikoi Street between Ala Moana Boulevard and Matlock Street (Esh 2006a). No cultural materials or significant features were found during monitoring.

Smith 1989

In 1989, four bone fragments were found by construction workers in a property (TMK 2-3-39:19) on the corner of Kapi‘olani Boulevard and Pi‘ikoi Street. The find was reported to Marc Smith (1989) of SHPD. Smith examined the bones and determined that only one was human; the others were pig bones. The human bone was a right tibia shaft fragment. The bone was temporarily taken to the Honolulu SHPD office, and the location was given the designation of SIHP #50-80-14-4243.

Hammatt 2006a

In 2006, CSH completed an archaeological literature review and field inspection prior to development of a residential condominium. The parcel, 1391 Kapi‘olani Boulevard, is bound by Kapi‘olani Boulevard and Kona Iki, Kona, and Ke‘eaumoku Streets. The investigation concluded that all buildings within the parcel were less than 50 years old, although subsurface cultural remains and burials may be present, given the prevalence of similar previous finds in the area (Hammatt 2006a).

Hammatt 2006b

In late 2005 and early 2006, an inventory survey of the Ala Moana Expansion property (TMK: 1 2-3-38: 001 and 2-3-40: 005, 007, 009, 011, 014, 016, and 018) was conducted by CSH (Hammatt 2006b). The investigation's 30 backhoe trenches revealed no Jaucas sand deposits within the property. The natural land surface, prior to historic/modern fill episodes, was either sandy clay or a highly organically enriched peaty layer. The natural "pre-fill" land surface had been completely removed by prior construction-related disturbances within large portions of the parcel. One historic resource (SIHP #50-80-14-6847) was found, consisting only of a wooden box placed in a pit cut down into the sandy-clay former land surface. The box contained a mix of historic artifacts, including printed material, wooden chopsticks, pig bone, and a horse brush. It was dated to the late 19th or early 20th century.

LeSuer and Cleghorn 2004

In 2004, Pacific Legacy, Inc. conducted an archaeological assessment for the HECO East O‘ahu Transmission 46kV Phased Work in Honolulu (LeSuer 2004). The work involved two phases: Phase 1, the installation of 0.5 miles of new underground ductline for 46kV subtransmission lines in the Ala Moana, McCully, Mō‘ili‘ili, and

Kapahulu areas; and Phase 2, the installation of 1.9 miles of new underground ductline for 46kV subtransmission lines beginning at the corner of Cooke and King Streets and extending makai and Koko Head on King Street until the intersection with McCully Street. The archaeological investigation involved research on the area's land use history and the results of previous archaeological investigations, to determine the potential of encountering archaeological resources during construction.

A review of historic maps indicated that a complex of three fishponds may lie beneath the existing surface of the HECO Ward Avenue Complex. Additionally, the traditional pond Loko Opu was indicated to be located near the HECO Makaloa Substation. A review of previous archaeological investigations documented the presence of human burials associated with a historic 19th-century Catholic Cemetery during excavations for the One Archer Lane development, which was adjacent to a portion of the Phase 2 area.

Thus, because of numerous archaeological resources in the vicinity of the study area and the high potential for subsurface archaeological resources to be located within the area, an archaeological monitoring regimen was recommended to mitigate the potential impact to subsurface archaeological resources. An archaeological inventory survey was determined to be unfeasible because of the heavily urbanized nature of the area.

O'Leary and Hammatt 2004

CSH conducted archaeological monitoring in association with the emergency sewer line repairs that occurred along Kapiʻolani Boulevard between August and October 2004. Five 1.9-foot-deep trenches were excavated. Because these excavations took place in fill materials associated with the original placement of the sewer pipes, no cultural resources were encountered (O'Leary 2004).

Tulchin and Hammatt 2004

In 2004, CSH conducted a field inspection of the Kapiʻolani Area Revised Sewer System over a large area from Ala Moana Boulevard to one block makai of King Street in the Kapiʻolani area. Nine sub-areas of the region were inspected, but no surface archaeology or historical features were found (Tulchin 2004a).

4.8.6 Previously Recorded Archaeological Resources

Traditional land use within the Kakaʻako sub-area consisted of wetland agriculture and habitation along elevated sand ridges. The fishponds and taro loʻi were filled in, but the sand ridges preserved many archaeological resources, including burials. This is the first sub-area of the Project in which burials are a common archaeological resource, occurring in four of the seven listed archaeological resources. This area was once viewed as being outside the Honolulu city limits (refer to Section 4.8.4) and was used as a dump. The preservation of trash and refuse offers a pragmatic glimpse into the daily goods used by Native Hawaiians and Westerners alike. The discussion of the archaeological resources proceeds from ʻEwa to Koko Head. Figure A-24 shows the locations of previously recorded archaeological resources.

SIHP #50-80-14-5820—Subsurface Cultural Deposits and Burials

SIHP #50-80-14-5820 is a subsurface cultural layer containing 11 human burials, identified intermittently between 1991 and 1992 during excavations associated with subsurface utility installation (Douglas 1991; Winieski 2000a). Cultural material observed within the cultural layer consisted of both pre-contact and post-contact materials. Pre-contact cultural material consisted of shell midden, volcanic glass, adze-cut pig bone, and charcoal. Post-contact materials included saw-cut mammal bone, glass bottles, ceramics, metal refuse, and what appeared to be the structural remnants of an outhouse.

Of the 11 human burials identified, six were intact, tightly flexed burials with associated burial pits. Three burials were partially disturbed, with some in situ elements within the disturbed burial pits. In these instances, burial position and orientation could not be determined. The remaining two burials were heavily disturbed and consisted of sparse bone scatters, making the determination of burial context (position, orientation, pit or coffin interment) impossible. All burials were disinterred, and subsequently reinterred in Mother Waldron Park (SIHP #50-80-14-1388).

The horizontal boundaries for this archaeological resource have not been firmly established and would likely expand upon further subsurface investigation. The current extent of SIHP #50-80-14-5820 is a 230-foot-wide, 643-foot-long area through which the project alignment would cross.

SIHP #50-80-14-1388—Mother Waldron Park

SIHP #50-80-14-1388 is a historical archaeological resource (specifically, Mother Waldron Park/Playground, developed in 1937) that was entered on the Hawai‘i Register of Historic Places during the early 1980s and nominated to the National Register of Historic Places in 1988 (although it is not presently on the National Register). CSH later conducted an archaeological assessment (Hammatt 1998a) of this area, referencing this historical archaeological resource as well as a proximal reinterment resource for Hawaiian burials (inadvertently discovered during earlier infrastructure improvements). This particular archaeological resource has a firmly established boundary consisting of Keawe, Pohukaina, Cooke, and Halekauwila Streets. The archaeological resource extends from directly beside to approximately 490 feet makai of the project alignment. Current land jurisdiction rests with the City and County of Honolulu.

SIHP #50-80-14-6658—Historic Hawaiian Burials

SIHP #50-80-14-6658 consists of 28 burials discovered in clusters and believed to be mainly Native Hawaiians, interred in the mid to late 19th century. The first cluster consists of six burials; the second cluster consists of sixteen burials (the majority are extended burials); and the third cluster contains six scattered burials along the makai end of a discrete cemetery area. These burials were discovered during archaeological monitoring conducted by CSH (O’Hare 2006a, 2006b). The area, owned by the City and County of Honolulu, is at Queen and Waimanu Streets. The project alignment is directly in the midst of this cemetery, which extends 20 feet mauka and 55 feet makai of

the alignment and could extend farther. From Koko Head to ‘Ewa, the discrete cemetery is known to extend 35 feet. All of the burials were reinterred in the area in concrete vaults. The location is to be developed as a public park in the future. Plans to develop the area would require consultation with the SHPD and the Office of Hawaiian Affairs. The discrete cemetery does not appear on either the State or National Registers.

SIHP #50-80-14-6660—Historic Trash Pit

SIHP #50-80-14-6660 is a historic trash pit that contained ceramic fragments, brick, metal, bottles, and jars. The earliest bottles date to 1905. This trash pit was uncovered during excavation of burials at SIHP #50-80-14-6658 during archaeological monitoring conducted by CSH in O’Hare et al. 2006. The area, owned by the City and County of Honolulu, is at Queen and Waimanu Streets. The trash pit is near the discrete cemetery described previously (SIHP #50-80-14-6658) and near the boundaries of the former Kolowalu Pond. It is also within 10 feet of the project alignment. The historic trash pit does not appear on either the State or National Registers.

SIHP #50-80-14-6856—Kolowalu Fishpond

SIHP #50-8014-6856 is a paleoenvironmental stratum, interpreted as pre-contact and early post-contact fishpond sediments from Loko (fishpond) Kolowalu, identified during an inventory survey and monitoring at Ward Village Shops (Bell 2006a, 2006b). The boundaries of Loko Kolowalu are defined within Land Commission Grant 3194 and shown on several historic maps. The archaeological resource is recommended eligible to the Hawai‘i Register under Significance Criterion D for its information content. Loko Kolowalu lies 60 feet from the project alignment.

SIHP #50-80-14-6659—Burials

SIHP #50-80-14-6659 consists of two disturbed burials. The burials were incomplete and fragmented. These burials were discovered during archaeological monitoring conducted by CSH (O’Hare 2006a, 2006b). The study area, owned by the City and County of Honolulu, is at Queen and Waimanu Streets. The burials are 50 feet makai of the project alignment. These burials were reinterred in concrete vaults alongside the burials from SIHP #50-80-14-6658. These burials do not appear on either the State or National Registers.

SIHP #50-80-14-6636—Kewalo Wetland Ground Surface

SIHP #50-80-14-6636 is the original wetland ground surface in the Kewalo area that existed before the area was filled during the 1920s and 1930s for urban development. SIHP #50-80-14-6636 was recommended to the State and National Registers under Significance Criteria A (associated with events that have made a significant contribution to the broad patterns of history) and D (yielded or may be likely to yield information important in prehistory or history) (Tulchin 2005). The periods of filling preserved the original wetland surface with its associated features as it was at the time of filling. During an archaeological inventory survey at the current Ko’olani Condominiums in Kaka’ako on privately owned land, CSH identified

SIHP #50-80-14-6636 in 10 of the 13 excavated trenches (O'Hare 2004a, 2004b). Some of the trenches revealed charcoal flecking and marine shell within the wetland surface, which is suggestive of pre-contact use. A second inventory survey conducted by CSH within the same archaeological study area also found SIHP #50-80-14-6636 during subsurface investigations (Tulchin 2005). This wetland surface contained an abundance of organic material and land snail shells. The boundary of SIHP #50-80-14-6636 is unknown and discontinuous due to land fill activities. The wetland surface, at its closest known location, is 115 feet makai of the project alignment.

SIHP #50-80-14-4243—Single Burial

SIHP #50-80-14-4243 is an incomplete burial that was discovered during Nordic Construction work at 1341 Kapiʻolani Boulevard (Smith 1989). The archaeological resource consists of an isolated left femoral shaft from an adult female of undeterminable ethnicity and was collected by the Honolulu SHPD office (at the time of the 1989 report). The archaeological resource was recovered approximately 165 feet mauka of the project alignment within back dirt and appeared to have been previously disturbed (based on its post-mortem fractures at both ends). The land is currently occupied by a hotel.

4.9 Mānoa Sub-Area (planned extension)

4.9.1 Sub-Area Description

The Mānoa sub-area of the proposed project alignment is in the ahupuaʻa of Waikīkī and crosses through the Mōʻiliʻili and McCully neighborhoods. This sub-area is approximately 1.5 miles long and includes the Convention Center, McCully, Date Street, Mōʻiliʻili, and UH Mānoa Stations. Figures A-25, A-26, and A-27 in Appendix A depict the geography and features of the sub-area and summarize environmental and cultural information.

4.9.2 Natural Environment

The Mānoa sub-area is approximately 0.7 to 1.3 miles mauka of the southeastern coastline of Oʻahu. Makiki Stream crosses the ʻEwa end of this sub-area, and the confluence of Mānoa and Pālolo Streams is approximately 0.3 miles Koko Head of the proposed UH Mānoa Station.

This section of the project alignment receives an average of 24 to 39 inches of annual rainfall (Giambelluca) (Figure A-25). The Mānoa sub-area has been extensively disturbed and transformed by urban development, leaving no naturally occurring vegetation.

Mānoa Valley was formed during the volcanic eruptions that formed the Koʻolau Mountains starting about 10 million years ago. This volcanic activity and the following erosion caused amphitheater-headed, deep V-shaped valleys on the southeast coast of Oʻahu, which are separated by sharp, high ridges. The Koʻolau

volcano reactivated approximately 250,000 years ago, pouring lava into the valley. The lava cascaded down the ʻEwa ridge of Mānoa Valley. This shifted Mānoa Stream to the Koko Head side and partially filled in the V-shaped valley, giving it a more rounded U-shaped appearance (Bouslog 1994 [4-5]).

During the Pleistocene Sangamon Interglacial Stage (130,000 to 114,000 years ago), the sea level was at least 25 feet higher than today (Stearns 1978). This led to the deposit of fossil reef limestone in south coastal Oʻahu. The rise and retreat of the sea level led to the formation of interbedded marine and terrestrial deposits miles inland. This limestone, called the Mōʻiliʻili Karst, is composed of detritus, calcareous sand, reef-dwelling organisms, and coralline algae. Alluvium and marshy lagoon sediments eventually accumulated on top of the Mōʻiliʻili Karst.

The Mōʻiliʻili Karst is subject to dissolution from water and has formed a series of connected and isolated caves under the Mōʻiliʻili area. The caves were probably once one large interconnected cave or series of caves about 0.5 miles long. Subsequent construction in this area, involving extensive dewatering and filling, damaged the cave system. In the Mōʻiliʻili area, only one section called the Mōʻiliʻili Water Cave can still be accessed.

Before construction of the Ala Wai Canal, the lower portion of the stream, called Kālia Stream, flowed ʻEwa, then made a wide bend to Koko Head where it joined the Pālolo Channel near the present-day Date Street near the mauka side of the Ala Wai Golf Course. ʻAuwai, or irrigation ditches, extended once from this wide bend to water the loʻi. After completion of the Ala Wai Canal in the 1930s, the course of the lower stream was pushed Koko Head (the course of the Pālolo Stream was also pushed Koko Head) to form an artificial Mānoa/Pālolo Channel that now empties into the Ala Wai Canal (Oceanit 2004 [7]).

Lands within the sub-area are relatively level, with elevation ranging from 3 to 30 feet above mean sea level. According to USDA soil survey data (Foote 1972), sediments within this sub-area consist primarily of Fill Land, Mixed (FL) and ʻEwa Silty Clay Loam (EmA), with smaller pockets of Kawaihapai Clay Loam (KlA), Makiki Stony Clay Loam (MlA), and Makiki Clay Loam (MkA) (Figure A-25). Also of note is the presence of a former basalt quarry (QU) at the Koko Head end of the sub-area.

Fill Land, Mixed is described as “areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources…used for urban development including airports, housing areas, and industrial facilities” (Foote 1972). The ʻEwa series consists of “well-drained soils in basins and on alluvial fans…developed in alluvium derived from basic igneous rock…used for sugar cane, truck crops, and pasture” (Foote 1972). The Kawaihapai series consists of “well-drained soils in drainageways and on alluvial fans …formed in alluvium derived from basic igneous rock in humid uplands…used for sugar cane, truck crops, and pasture” (Foote 1972). The Makiki series consists of “well-drained soils on alluvial fans and terraces…formed in alluvium mixed with volcanic ash and cinders…used almost entirely for urban purposes” (Foote 1972).

4.9.3 Built Environment

This sub-area is surrounded by modern urban development, including apartments, commercial buildings, streets, sidewalks, and utility infrastructure (Figure A-26). Athletics facilities (swimming pools, athletic fields, and related buildings) associated with the University of Hawai‘i surround the Koko Head end of the Mānoa sub-area.

4.9.4 Past Land Use and Land Commission Awards Information

The marshland of Waikīkī was watered from streams in the Makiki, Mānoa, and Pālolo Valleys. The well watered, fertile and relatively level lands of Mānoa Valley supported extensive wet taro cultivation from pre-contact times well into the 20th century. Additionally, the abundance of water promoted the dissolution of the Mō‘ili‘ili Karst, creating springs and ponds that were used by Native Hawaiians for drinking water, irrigation, and aquaculture during pre-contact and early post-contact periods.

Beginning in the 15th century, a vast system of irrigated taro fields was constructed, extending across the littoral plain from Waikīkī to the lower Mānoa and Pālolo Valleys. This field system took advantage of streams descending from the Makiki, Mānoa, and Pālolo Valleys and also provided ample fresh water for the Hawaiians living in the ahupua‘a. Closer to the Waikīkī shoreline, coconut groves and fishponds dotted the landscape. A sizeable population developed amidst this Hawaiian-engineered abundance.

Early 19th-century visitors described Mānoa Valley as “[c]hecquered with taro patches” (Handy 1940 [77]). Handy and Handy (Handy 1972 [480]) estimated that in 1931 “there were still about 100 terraces in which wet taro was planted, although these represented less than a tenth of the area that was once planted by Hawaiians.” One early depiction of the pre-contact Native Hawaiian shaping of Honolulu and Waikīkī is an 1817 map of the south coast of O‘ahu by Otto von Kotzebue that shows taro lo‘i (rectangular areas depicting irrigated fields) massed around streams descending from the Nu‘uanu and Mānoa Valleys.

Seventeen LCAs were awarded in the vicinity of the project alignment in this sub-area (Figure A-26 and Table 4-9).

Table 4-9: Mānoa Sub-Area Land Commission Awards

LCA Number	Contents of Award
5397:7	ʻili of Kiki, Waikīkī (7.57 acres, house, fence, and well)
2362:	1 house lot, 3 loʻi, and 5 hala trees (for lei and mats)
1257:7	(6.75-acre) lot
1274:4	1 house lot (2 houses) and kula, 3 coconut and 3 hala trees, and 12 loʻi
1536:1 and 1536:2	1 house lot (house and stone wall) and 3 loʻi
1265:1	1 house lot, 4 loʻi
2619:	18 loʻi
8559 B:29	Lands to Wm. C. Lunalilo (aliʻi award)
6252:4	1 loʻi
1269 B:	2 loʻi
7713:39	Lands to Victoria Kamamalu (aliʻi award)
8559:29	Lands to C. Kanaina
1272:2	1 house lot (two houses), 3 loʻi
1270 A:1	4 loʻi
6235:1	5 loʻi
8515 Part4:2	Lands to Keoni Ana (John Young, Jr.) (aliʻi award)

LCA records document that awardees continued to maintain fishponds as well as irrigated and dry land agricultural plots. An 1855 map of Honolulu by LaPasse shows fields on both sides of Mānoa Stream from Waikīkī into Mānoa Valley, with a large cluster of fields where King Street crosses it in Mōʻiliʻili. These awards were recorded on an 1881 Hawaiian Government Survey map by S.E. Bishop, which reveals an extensive complex of irrigated fields, streams, irrigation watercourses, and ponds stretching from the plains of Mōʻiliʻili to the Waikīkī shoreline. LCA records shown on the Bishop 1881 map house lots near the shore with associated taro loʻi located inland, as well as house lots adjacent to inland taro loʻi. Half of the awards were small landholdings (including one to five loʻi) and the remaining half were much larger parcels, including three aliʻi-awarded landholdings.

The sub-area runs through the ʻEwa edge of this agricultural area. LCAs within this sub-area from Isenberg Street to the UH Mānoa Station indicate traditional Hawaiian taro cultivation and habitation (Figure A-26).

Hawaiians and Chinese continued to grow taro on the floor of Mānoa Valley in the late 18th century. However, disease, emigration to large centers of population, the loss of traditional culture, and other factors decimated the resident Hawaiian population. By the end of the century, half of the taro lands in Mānoa Valley were cultivated by Chinese, who were later followed by other immigrant groups such as the Japanese. On these lands, the people raised taro, bananas, other vegetables,

and flowers to sell in the Honolulu markets, set up dairies, and constructed small stores next to their habitations (Emery 1956 [57]). Subdivisions began to take over the former agricultural land in the late 19th century, and by 1955 the valley floor was covered with 21 new housing tracts (DeLeon 1978).

The Mōʻiliʻili Quarry opened in 1900 and was later operated by Honolulu Construction and Dredging, organized in 1908. It provided jobs to the residents until it closed in 1947. Many downtown buildings were built with the blue basalt blocks from this quarry, including the stones used to build Kawaiahaʻo Church, the first stone church on Oʻahu. The former quarry land was given to the University of Hawaiʻi in 1951, which used it as a parking lot into the 1960s, a part of which is still used for parking today. Portable classrooms were sometimes set up in the area in the 1970s, when the Stan Sheriff athletic facilities and several athletic fields were built on the former quarry floor.

In the 19th century, people and goods within and through Mōʻiliʻili were moved by walking, horses, or mule trams. In 1903, traffic throughout Mōʻiliʻili was expanded by the introduction of electric trolley cars, operated by the Honolulu Rapid Transit & Land Company (Ruby 2005 [87]). It also became much faster to travel to Honolulu, allowing early residents to live in a rural area and commute to jobs in urban Honolulu. In the 1930s, the growing number of automobiles in Oʻahu gradually led to the decline of the transit system.

Although the study area has been extensively modified by land reclamation and development throughout the 20th century, previous archaeological finds suggest that intact pond sediments and intact pre-contact and early post-contact cultural deposits associated with Hawaiian habitation, work, and recreation lie undisturbed beneath modern fill layers within the sub-area. These cultural deposits may include features related to ponds and agriculture, such as loʻi, ʻauwai levees, irrigation ditches, and berms. Other cultural deposits associated with early 20th-century residential locales, including historic trash pits, may also be present.

4.9.5 Previous Archaeological Investigations

The Mānoa sub-area contains many historic houses. Most were built prior to the 1950s and several are on the State Register of Historic Places. This means that the archaeological investigations within this sub-area are few and mainly deal with excavation related to municipal utility repair. The discussion of previous archaeological investigations proceeds from ʻEwa to Koko Head. Figure A-27 shows the locations of these prior archaeological investigations.

LeSuer and Cleghorn 2004

In 2004, Pacific Legacy, Inc. conducted an archaeological assessment for the HECO East Oʻahu Transmission 46kV Phased Project in Honolulu (LeSuer 2004). The project involved two phases: Phase 1, the installation of 0.5 miles of new underground ductline for 46kV subtransmission lines in the Ala Moana, McCully, Mōʻiliʻili, and Kapahulu areas; and Phase 2, the installation of 1.9 miles of new

underground ductline for 46kV subtransmission lines beginning at the corner of Cooke and King Streets and extending makai and Koko Head on King Street until the intersection with McCully Street. The archaeological investigation involved research on the area's land use history and the results of previous archaeological investigations, to determine the potential of encountering archaeological resources during project construction.

A review of historic maps indicated that a complex of three fishponds might lie beneath the existing surface of the HECO Ward Avenue Complex. The traditional pond Loko Opu was also indicated to be near the HECO Makaloa Substation.

A review of previous archaeological investigations documented the presence of human burials associated with a historic 19th-century Catholic Cemetery. These were found during excavations for the One Archer Lane development, which was adjacent to a portion of Phase 2 of the Project.

Because of the numerous archaeological resources near the study area and the high potential for subsurface archaeological resources to be located within the study area, an archaeological monitoring regimen was recommended to mitigate the study's potential impact to subsurface archaeological resources. An archaeological inventory survey was determined to be unfeasible because of the heavily urbanized nature of the project area.

Wolforth and Haun 1996

In 1996, PHRI completed an archaeological inventory survey for the Kamoku-Pukele 138-kV Transmission Line Project. The study area consisted of several overhead and underground routes that began at the Kamoku Substation near the corner of Date Street and Kapi‘olani Avenue and terminated at the Pukule Substation near the end of Myrtle Street. Six cultural resources were identified as part of this investigation: four previously recorded and two new discoveries (Wolforth 1996).

SIHP #50-80-14-1352 (University of Hawai‘i Buildings) and 50-80-14-9749 (Church of the Crossroads) are listed on the National Register of Historic Places. SIHP #50-80-14-4266 is a previously recorded inadvertent discovery consisting of pre-contact Native Hawaiian burials, a hearth feature, artifacts, and midden (Hammatt 1991a, 1991b). Data recovery investigations were conducted at SIHP #50-80-14-4498 in 1992 (Liston and Butchard 1996) to determine the extent of the buried pre-contact and historic features beneath the active pondfields at this location. Archaeological Resource 1726.1, previously unrecorded, is a complex of elements associated with the old Kawao Community Park and was considered insignificant with no further work recommended. SIHP #50-80-14-5463 is a complex consisting of three low basalt walls and a terrace. The preliminary assessment suggested that SIHP #50-80-14-5463 represents the remains of an agricultural area, with potential habitation features (Wolforth 1996).

O'Hare et al. 2007

In 2007, CSH completed an archaeological literature review and field inspection for the Kamehameha Schools University Parcels and Varsity Theater Parcel Project in Mānoa (O'Hare 2007a, 2007b). The study area consisted of 30 parcels within a general area bounded by Kalo Place in the Koko Head direction, bounded makai by Beretania/King Street, by Isenberg Street in the 'Ewa direction, and mauka by lots fronting both Coyne Street and Kolo Place. Most of the lots makai were once within three loko (fishponds) used for taro cultivation. The area continued to be used for taro and rice cultivation into the 1920s. Test excavations in the former loko were not recommended because of extensive sediment modification from rice farming. Monitoring was recommended during excavation around the pond edges because of the possibility of intact habitation deposits and burials. No surface archaeological resources were identified within the study area.

4.9.6 Previously Recorded Archaeological Resources

The few previous archaeological investigations documented no archaeological resources within the present archaeological study area. However, this does not indicate that archaeological resources would not be found during excavation for the Project.

4.10 Waikīkī Sub-Area (planned extension)

4.10.1 Sub-Area Description

The Waikīkī sub-area lies within the ahupua'a of Waikīkī. This sub-area is approximately 1.6 miles long and includes the Convention Center, Kālaimoku Street, and Liliuokalani Avenue Stations. Figures A-28, A-29, and A-30 in Appendix A depict the geography and features of this sub-area and summarize available environmental and cultural information.

4.10.2 Natural Environment

The Waikīkī sub-area varies between 0.17 to 0.50 miles inland of the O'ahu coastline. The confluence of Makiki Stream and the Ala Wai Canal is approximately 150 feet Koko Head of the 'Ewa portion of the sub-area. The confluence of Mānoa and Pālolo Streams with the Ala Wai Canal is approximately 0.25 miles Koko Head of the proposed Kālaimoku Station (Figure A-28).

In the late Pleistocene/early Holocene, the Waikīkī area was characterized by an expansive delta drainage system that flowed from the Ko'olau Mountains to the sea. The ancient Mānoa stream channel drained into the sea but was filled and cut off by the Sugar Loaf eruptions during the interglacial advance to the present sea level. At that time, the Mānoa Stream was rerouted farther Koko Head, joining the Pālolo Stream and draining through a channel farther makai and Koko Head. Following this event, the modern reef formed a barrier offshore, creating a lagoon behind it. When

the ocean reached its present sea level, the area filled with both marine and terrigenous sediment deposits and became a lagoonal marshy wetland (Ferrall 1976).

The sub-area receives an average of 24 to 31 inches of annual rainfall (Giambelluca 1986) (Figure A-28). The entire sub-area has been extensively disturbed and transformed by urban development, leaving no naturally occurring vegetation (Figure A-29).

Lands within the sub-area are level, with an average elevation of 3 feet above mean sea level. According to USDA soil survey data (Foote 1972), sediments within this section of the study corridor consist of Fill Land, Mixed (FL) and Jaucas (JaC) sand deposits (Figure A-28). Fill Land is described as "areas filled with material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources…used for urban development including airports, housing areas, and industrial facilities" (Foote 1972). The Jaucas series consists of "excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean…developed in wind and water deposited sand from coral and seashells…used for pasture, sugar cane, truck crops, alfalfa, recreational areas, wildlife habitat, and urban development" (Foote 1972).

4.10.3 Built Environment

The Waikīkī sub-area is highly urban and includes high-rise condominiums, apartments and hotels, streets, sidewalks, and utility infrastructure.

4.10.4 Past Land Use and Land Commission Awards Information

The ahupua'a of Waikīkī in the centuries before the arrival of Europeans was a much used, densely populated locale with abundant natural and cultivated resources. An expansive system of irrigated taro fields and numerous fishponds extended across the littoral plain from the coast mauka to the lower Mānoa and Pālolo Valleys. The field system within the ahupua'a supported a large population that included the highest-ranking ali'i who resided in the coastal area.

By the late 18th century, Waikīkī had long been a center of population and political power on O'ahu. Kanahele notes the continuity in the royal residences: "The royal residences were generally located in the same areas that all of Waikīkī's ancient chiefs had located their residences for hundreds of years" (Kanahele 1995). Kankakee further explains, "Three features were common to royal locations in Waikīkī. They were situated 1) near the beach, 2) next to a stream or 'auwai, and 3) among a grove of cocoanut or kou trees" (Kanahele 1995). The preeminence of Waikīkī continued into the 18th century and is betokened by Kamehameha's decision to reside there upon seizing control of O'ahu in 1795. However, the traditional Hawaiian focus on Waikīkī as a center of chiefly and agricultural activities changed drastically once the ahupua'a of Honolulu became the center for trade with visiting foreign vessels, drawing increasing numbers of Hawaiians away from their traditional environments.

LCA records document awardees continuing to maintain fishponds as well as irrigated and dry land agricultural plots in this area. These awards were recorded on an 1881 Hawaiian Government Survey map by S.E. Bishop, which reveals an extensive complex of irrigated fields, streams, irrigation watercourses, and ponds stretching inland from the Waikīkī shoreline to the plains of Mō'ili'ili and the lower Mānoa Valley. The sub-area extends through 12 LCAs (Table 4-10 and Figure A-29).

Table 4-10: Waikīkī Sub-Area Land Commission Awards

LCA Number	Contents of Award
1457:1	1 house lot, 2 taro patches (lo'i) and a ditch, 1 pasture (kula land)
1455:1	1 fenced house lot, 2 lo'i, 1 pasture
1458:1	1 house lot, 1 lo'i and ditch ('auwai), 1 pasture
1452:1	1 house lot, 1 lo'i and 'auwai
104 F.L.:3 and 104 F.L.:5	1 house lot, 23 lo'i, 5 fishponds, 1 riverbank, to Kekuanaoa (ali'i award)
8559B:29 and 8559B:31	Lands to Wm. C. Lunalilo (ali'i award)
2079:1	1 house lot, 13 lo'i (including some for family members and children), 1 pasture
6386:7	'ili of Niukukahi, Waikīkī (13.54 acres) to Kauhao
2083:2	1 house lot, 3 lo'i
2081:1	1 house lot, 3 lo'i, 1 fry pond (ki'o pua)

Coastal Waikīkī's royal and residential nature is evident in the distribution of LCAs in the sub-area. Four small landholdings (including a house lot and 1 to 3 lo'i, and possibly kula land or a fishpond) were awarded at the Koko Head end of the sub-area, but the remaining six awards were much larger landholdings (including a house lot and many lo'i) for ali'i. All of these large properties fit Kanahele's three criteria: they were 1) close to the sea, 2) bordered by 'auwai, and 3) according to historic maps of Waikīkī such as LaPasse's 1855 map of the coast from Honolulu to Koko Head, set among large groves of coconut trees.

Increased development and a prelude of changes that dramatically altered the Waikīkī's landscape began in the mid-19th century and continued into the 20th century. These major changes included improvement of the road connecting Waikīkī to Honolulu (the route of the present Kalākaua Avenue), building a tram line between the two areas, and the opening of Kapi'olani Park on June 11, 1877. Traditional land uses in Waikīkī were abandoned or modified, and by the end of the 19th century most of the fishponds that had previously flourished had been neglected and allowed to deteriorate. The remaining taro fields were replaced with rice to supply the growing number of immigrant laborers from China and Japan, and for shipment to the west coast of the United States (Nakamura 1979).

During the early 20th century, the U.S. War Department acquired more than 70 acres in the Kālia portion of Waikīkī for the establishment of a military reservation

known as Fort DeRussy. The Waikīkī landscape would further be altered by land reclamation plans that intensely transformed the area in 1921 with construction of the Ala Wai Canal. The canal project resulted in multiple off-shore and inland dredge and fill projects that obliterated what remained of traditional Hawaiian cultivation processes in Waikīkī (Hibbard 1986).

Ultimately, the Ala Wai Canal project drained and filled in the remaining ponds and irrigated fields, and replaced wetland plains with materials dredged from the sea floor and the area of the present Ala Wai Canal. Drainage from the Koʻolau Mountains was also diverted through the new Ala Wai Canal, leaving the rich agricultural land buried below layers of imported dredged sediments and coral fill. During the canal's construction, the irrigated fields and ponds between the canal and the mauka side of Kalākaua Avenue were filled, and the present grid of streets was laid out (Nakamura 1979).

The canal was just one element of a plan to urbanize Waikīkī and the surrounding districts. Although World War II temporarily delayed plans for continuing development of Waikīkī, the process of expansion resumed in the 1950s, increasing Waikīkī's tourist and resident population.

Although the study area has been extensively modified by land reclamation and development throughout the 20th century, previous archaeological finds in Waikīkī suggest that intact pond sediments and intact prehistoric and early-contact cultural deposits associated with Hawaiian habitation, work, and recreation lie undisturbed beneath modern fill layers within the sub-area. Features related to ponds and agriculture such as loʻi, irrigation ditches, and berms may be found in the sub-area. Other cultural deposits associated with early-20th-century residential sites, including historic trash pits, may also be present. Previous archaeological research in Waikīkī has also revealed a number of human burials.

4.10.5 Previous Archaeological Investigations

The urban, highly developed landscape along the Waikīkī sub-area was already in place by the 1970s when historic preservation legislation went into effect. Accordingly, most development took place without prior archaeological investigations. However, during the last 20 years many buildings have been rebuilt and there have been numerous municipal utility line improvements. These recent developments have been accompanied by archaeological investigations that have documented the wealth of archaeological remains preserved beneath Waikīkī's modern surface. Burials and pre-contact and post-contact archaeological resources have been identified and documented beneath the extensive fill layers related to the Ala Wai Canal Project. The discussion of previous archaeological investigations proceeds from ʻEwa to Koko Head. Figure A-30 shows the locations of these prior archaeological investigations.

Maly et al. 1994

In 1994, PHRI conducted an archaeological and historical assessment of the Waikīkī Convention Center Project at the corner of Kalākaua Avenue and Kapiʻolani Boulevard (Maly). Based on background research, the possibility exists that subsurface archaeological remains may be present in this area.

Hammatt and Shideler 1995

In 1994, CSH completed an archaeological inventory survey for the Waikīkī Convention Center Project at the corner of Kapiʻolani Boulevard and Kalākaua Avenue (Hammatt 1995). Because the study area had previously been graded and used for various enterprises and no significant archaeology was extant on the surface, the investigation focused on subsurface testing. Ten backhoe trenches were excavated, seven cores were taken, stratigraphy was analyzed, and samples were submitted for faunal, palynological, radiocarbon dating, and diatom analysis. No archaeological remains were found. Because of the lagoonal environment within the study area, there was little to no suitable land for habitation or human burial during pre-contact times.

Hammatt and Shideler 1996

In 1995, CSH conducted data recovery for the proposed Waikīkī Convention Center at 1777 Kapiʻolani Boulevard (Hammatt 1996). One backhoe trench was excavated in the general area of a former fishpond, Loko Kūwili, shown on late-19th and early 20th-century maps. Radiocarbon analysis of four samples from the trench indicates that most in situ sediments in the study area date to no earlier than A.D. 1520 to 1690. No culturally significant sites or features were encountered.

Perzinski et al. 1999

In 1999, two human burials were inadvertently encountered near the intersection of ʻEna Road and Kalākaua Avenue during excavation for the first phase of the Waikīkī Anti-Crime Lighting Improvements Project (Perzinski 1999). Both appeared to be pre-contact (possibly early post-contact) Native Hawaiian burials. These burials (SIHP #50-80-14-5744) were not associated with any cultural remains.

Hammatt and Chiogioji 2004

In September 2004, an archaeological literature review and field check (Hammatt 2004) was conducted for a project area in Waikīkī bounded by Ala Wai Boulevard, Kalākaua Avenue, ʻEna Road, Hobron Lane, and Līpeʻepeʻe Street. Based on background and archival research, it was determined that there had been no previous archaeological investigations conducted in the project area. Intact stratigraphy, pre-contact burials, and other pre-contact cultural deposits have been located near the project area (Perzinski 1999). This suggests that subsurface archaeological deposits and burials could also exist within the project area. A field check of the project area conducted on September 4, 2004 concluded that there had been little subsurface disturbance within this project area.

Hammatt and Chiogioji 2006

In 2006, CSH prepared an archaeological literature review and field inspection for the 2.3-acre Waikīkī Allure condominium development at the corner of Kalākaua Boulevard and ‘Ena Road in Waikīkī (Hammatt 2006c). Background research indicated that the study area, from traditional Hawaiian times to the modern era, comprised a dryer portion of Waikīkī, at least partially elevated above the region's fishponds and wetland agricultural fields. Fieldwork included only a brief pedestrian inspection of the project area. No surface archaeological resources or historic buildings or structures were noted. Based on background research, the authors indicated a potential for subsurface archaeological resources in the project area, including pre-contact and post-contact habitation and burial deposits.

Bell and McDermott 2006

In 2006, CSH conducted an archaeological inventory survey for the Allure Waikīkī Development Project between Ala Wai Boulevard, Kalākaua Avenue, and ‘Ena Road (Bell 2006a, 2006b). After a pedestrian inspection was conducted and 35 backhoe trenches were excavated, three archaeological resources were documented. SIHP #50-80-14-6873 and 50-80-14-6875 are isolated traditional Hawaiian burials found in sand deposits, and SIHP #50-80-14-6874 is a subsurface cultural layer of pre-contact and post-contact origin.

Jones and Hammatt 2004

Monitoring of excavation for the Waikīkī Anti-Crime Street Lighting Improvement Project on the mauka side of Kalākaua Avenue from Ala Wai Boulevard to Pau Street was conducted from August 2003 to February 2004 (Jones 2004). No significant cultural deposits were located, and much of the project area was dominated by fill. Some pond or loʻi sediments were noted near the intersection of Kalākaua Avenue and McCully Street. A pre-1920 base course for an older McCully Road was also documented.

Hammatt and McDermott 1999

Two burials that were inadvertently discovered during excavation of a utility trench are suggested as being of Native Hawaiian ethnicity. After consultation with the SHPD, these two burials were disinterred for eventual relocation (Hammatt 1999b) (refer to Perzinski et al. 1999 in the same study area).

Tulchin and Hammatt 2007

In 2007, CSH conducted an archaeological assessment for the 1944 Kalākaua Avenue Project at the corner of Niu Street and Kalākaua Avenue (Tulchin 2007). The proposed project involved construction of a new commercial building. No archaeological resources were identified, but background research indicated extensive traditional Hawaiian agriculture and habitation in the immediate vicinity of the study area.

Bush et al. 2002

From July 1999 to October 2000, four sets of human remains were inadvertently encountered during excavation relating to the Waikīkī Anti-Crime Street Lighting Improvement Project along portions of Kalākaua Avenue (Bush 2002). The first burial was encountered on Kalākaua Avenue, just before Dukes Lane and assigned SIHP #50-80-14-5864. The burial was left in place and the light post was repositioned. The second burial was encountered at the intersection of Kalākaua and Kaʻiulani Avenues. Earlier, during archaeological monitoring for the water mains project, two burials were encountered in the immediate area of the second burial find and assigned SIHP #50-80-14-5856, Features A and B. Because of the proximity to the previously encountered burials, the second burial was assigned the same SIHP #50-80-14-5856 and designated Feature C. Burials 3 and 4 were recovered at the intersection of Kalākaua Avenue and Kealohilani, near an area of concentrated burials assigned SIHP #50-80-14-5860 during monitoring for the water mains project. Consequently, Burials 3 and 4 were also assigned SIHP #50-80-14-5860, Features U and V. In addition to human remains, pre-contact deposits, historic and modern rubbish concentrations, and pond sediments were encountered.

Putzi and Cleghorn 2002

In 2000 and 2001, PHRI conducted monitoring for sewer line trenching near the corner of Kalākaua Avenue and Ala Moana Boulevard. A part of the previously identified Loko Kaipuni fishpond complex (SIHP #50-80-14-4573) was encountered, as well as a wall feature that may have been associated with the fishpond. Two extreme ends of one ʻauwai were exposed along Ala Moana Boulevard. No other archaeological remains were found (Putzi 2002).

Davis 1989

As part of excavation and monitoring work at Fort DeRussy conducted by the Hawaiʻi County Planning Commission, substantial subsurface archaeological deposits and pre-contact, historic, and modern deposits were documented (Davis 1989). These deposits included buried fishpond sediments, ʻauwai sediments, midden and artifact-enriched sediments, structural remains such as post holes and fire pits, historic trash pits, and a human burial. Previously identified fishpond sites include SIHP #50-80-14-4573, 4574, 4575, 4576, 4577, 4578, and 4579. Newly identified sites include SIHP #50-80-14-0058, 0062, 0064, 0065, 2870, 3705, 3706, 3707, 3745, 2986, 4127, 4224, 4225, 4226, 4570, 9500, 9901, and 9980.

Davis 1991

In 1991, the International Archaeological Research Institute, Inc. monitored an environmental baseline survey for a Fort DeRussy Military Reservation project at the corner of Ala Moana Boulevard and Kalākaua Avenue (Davis 1991). No archaeological remains were recovered from the coring process. However, based on excavations conducted where intact deposits and features (dating to the 15th century A.D.) were previously noted, it was concluded that nearly continuous, intact

prehistoric and early historic cultural deposits underlie the entire area between Battery Randolph and the beach.

Streck 1991

In 1995, BioSystems Analysis, Inc. discovered the remains of one post-contact individual (SIHP #50-80-14-9500) between a probable 19th-century and pre-contact cultural deposit at the mauka end of the Kuroda Parade Ground at Fort DeRussy (Streck 1992).

Simons et al. 1995

In 1992, BioSystems Analysis, Inc. conducted excavations at Fort DeRussy in Waikīkī in anticipation of new building construction there. Four previously identified pondfield systems were encountered: Loko Pāweo I (SIHP #50-80-14-4574), Loko Kaʻihikapu (SIHP #50-80-14-4575), Loko Pāweo II (SIHP #50-80-14-4576), and an associated ʻauwai system (SIHP #50-80-14-4590). Another ʻauwai system was also discovered (SIHP #50-80-14-4570). One ethnically undetermined human coffin burial, along with habitation features and midden, were also discovered and designated as site SIHP #50-80-14-4579 (Simons 1995).

Denham and Pantaleo 1997a

BioSystems Analysis, Inc. conducted archaeological monitoring along the Kālia Road Realignment Project at Fort DeRussy Military Reservation from January through September 1993 (Denham 1997a). During the monitoring of utility trenches, 10 subsurface features and 9 burials were recorded. These were grouped into three sites. SIHP #50-80-14-4574 consists of the sediments of a fishpond (Loko Pāweo I), three historic trash pits, and two burials (the authors did not determine the age of the burials). SIHP #50-80-14-4570 is comprised of a historic trash pit, four fire pits, an ash lens, and an unknown number of human burials (in six distinct locations) found in the sand dunes near the Kālia fishponds. SIHP #50-80-14-4966 is comprised of pre-contact features and burials representing at least five individuals found in the Koko Head portion of the reservation. The historic trash pits contained various artifacts with manufacture dates ranged from the early-19th through mid-20th century.

Denham and Pantaleo 1997b

In 1992, Garcia and Associates conducted an archaeological data recovery at Fort DeRussy. Six previously identified sites were investigated. One site (SIHP #50-80-14-4570) was characterized by features such as a firepit, coral rock concentration, and postholes. An ʻauwai and bund system (SIHP #50-80-14-4970) revealed two channels, three bunds, and a charcoal stain. Another site (SIHP #50-80-14-4579) revealed a number of features related to permanent historic occupation and possible intermittent prehistoric use such as five firepits, two historic middens, and a human burial. Three fishponds, Loko Pāweo I (SIHP #50-80-14-4570, Loko Kaʻihikapu (SIHP #50-80-14-4575), and Loko Pāweo II (SIHP #50-80-14-4576) were also identified (Denham 1997b).

Roberts and Bower 2001

In 2000, Garcia and Associates monitored excavation associated with installation of a security fence for the Asia-Pacific Center of Fort DeRussy (Roberts 2001). Seventeen fence postholes (12 inches in diameter and 24 to 36 inches in depth) were excavated. No archaeological resources were identified.

Elmore and Kennedy 2002

Archaeological monitoring required for installation of a security fence for the Asia-Pacific Center at Fort DeRussy was carried out in 2002 by Archaeological Consultants of the Pacific, Inc. (Elmore 2002). No historical sites were found during monitoring.

Rasmussen 2005

In 2005, the International Archaeological Research Institute, Inc. completed archaeological monitoring for construction of the Asia-Pacific Center for Security Studies Perimeter Barrier Wall at Fort DeRussy. Although no cultural artifacts were discovered during monitoring, sediments were observed that were consistent with previous archaeological research (Rasmussen 2005).

McMahon 1994

On April 28, 1994 the SHPD made an inadvertent burial discovery (SIHP #50-80-14-4890—Figure A-30 shows the location of this archaeological resource) during excavation for a water line at the intersection of Kalākaua Avenue and Kuamoʻo Street (just mauka of Fort DeRussy). No other cultural remains were found in association with the burial. These remains represented a single individual and ethnicity was not determined (McMahon 1994).

Esh and Hammatt 2006b

In 2004, monitoring was conducted for landscaping improvements along Kūhiō Avenue from Kalākaua Avenue to Kaʻiulani Street. No archaeological remains were encountered, with the exception of in situ dog remains. These dog remains were not associated with any cultural material. No SIHP number was assigned (Esh 2006b).

Cleghorn 1996

An archaeological inventory survey was conducted by Pacific Legacy, Inc. for the proposed Kalākaua Plaza in Waikīkī (Cleghorn 1996). No significant traditional features or sites were encountered during the inventory survey.

Borthwick et al. 2002

Ten backhoe trenches were excavated by CSH (Borthwick 2002) in 2002 as part of an archaeological inventory survey. The study area was a 71,000-square-foot parcel in Waikīkī in the block bounded by Kālaimoku Street, Olohana Street, Kūhiō Avenue, and Ala Wai Boulevard. The excavations exposed sediments of a paukū/kuana (an

embankment along an irrigated taro patch) and a pond, both designated part of site SIHP #50-80-14-6407.

Tulchin et al. 2004

Data recovery excavations between August 27 and 29, 2003 conducted by CSH on a parcel bounded by Kūhiō Avenue, Olohana Street, and Kālaimoku Street documented an embankment and agriculturally enriched soils designated as SIHP #50-80-14-6407 (Tulchin 2004a, 2004b). The embankment was found to postdate the first agricultural activity but was continually used from the late prehistoric throughout the historic period. Palynomorph samples show clear changes in the ecological landscape, including a loss of biodiversity in the area and the historic influx of introduced species. LCA maps suggest that these recorded agricultural features extend well beyond the study area and are likely to be documented elsewhere.

Hammatt and Chiogioji 1998b

In 1998, CSH conducted an archaeological assessment (Hammatt 1998b) for an irregularly shaped parcel in Waikīkī. The project area comprises the ‘Ewa portion of a block bound by Kālaimoku Street, Kūhiō Avenue, Lewers Street, and Kalākaua Avenue. The investigation focused on both archaeological and historic building concerns in the project area. Based on background and archival research, it was determined that an ‘auwai (SIHP #50-80-14-4970) that fed the Fort DeRussy fishponds once extended through the ‘Ewa portions of this project area. It was also determined that intact prehistoric and early-contact cultural deposits likely existed. A field inspection conducted in August 1998 found no surface archaeological sites or features and no surface evidence for the ‘auwai. An archaeological inventory survey and subsurface testing was recommended for the project area. It was also recommended that the Canis Charcoal Broiler building be further reviewed by the SHPD.

LeSuer et al. 2000

In 2000, CSH conducted an archaeological inventory survey for the King Kalākaua Plaza Project between Kūhiō and Kalākaua Avenues and Kālaimoku Street (LeSuer 2000). Archival and historical research was followed by excavation of 13 backhoe trenches, which resulted in identifying one archaeological resource.
SIHP #50-80-14-5796 is a prehistoric to historic original agricultural wetland surface that represents a portion of the previously identified ‘Auwai O Pau (SIHP #50-80-14-4970).

McIntosh and Cleghorn 2004

In 2004, Pacific Legacy, Inc. conducted an inventory survey of 0.687 acres on the Koko Head side of Launiu Street. Nine backhoe trenches were excavated (McIntosh 2004). Trenches six, seven, and eight revealed a greenish gray clay, massive sticky, plastic layer determined to be an old lo‘i deposit (SIHP #50-80-14-6680). The authors concluded that only the Koko Head end of the lo‘i was found and that it probably

continued under Launiu Street toward ‘Ewa. A single radiocarbon date was submitted from the layer that returned a date of 1280 to 1010 B.C. This date is extremely early for Hawai’i, and the authors declared it to be anomalous.

Kailihiwa and Cleghorn 2003

In 2002, Pacific Legacy, Inc. conducted monitoring during Waikīkī water system improvements on portions of Lau‘ula Street, Waikolu Way, and Royal Hawaiian Avenue. No archaeological remains were found. Stratigraphic layers consisted mostly of sands ranging in color from olive yellow to light gray and greenish gray gley (Kailihiwa 2003).

Pammer and Hammatt 2007

In 2007, CSH provided archaeological monitoring services for a single large trench for a grease trap installation and upgrade of the existing kitchen sewer line for Perry’s Smorgy Restaurant. The investigation was at the corner of Kanekapolei Street and Kūhiō Avenue (Pammer 2007). No surface archaeological resources or historic structures were observed. All subsurface deposits within the project area had been disturbed by a utility installation, a process that included extensive “earthmoving activity and importation of fill sediments into the project area.” The trench yielded no Hawaiian pre-contact and post-contact habitation or burial deposits.

Esh and Hammatt 2006c

In 2004, CSH conducted monitoring for landscaping improvements along Kūhiō Avenue, from Ka‘iulani Street to Kapahulu Street. No archaeological remains were encountered (Esh 2006c).

Havel and Spear 2004

Between 2003 and 2004, Scientific Consultant Services, Inc. conducted monitoring for construction of an ABC Store on the corner of Kūhiō Avenue and Kanekapolei Street. No archaeological remains were found, and soils consisted mainly of sterile fill layers (Havel 2004).

Mann and Hammatt 2002

In 2001 and 2002, CSH performed archaeological monitoring for installation of 8 and 12-inch water mains on Uluniu Avenue and Lili‘uokalani Avenue (Mann 2002). During the course of monitoring, five burial finds consisting of six pre-contact burials were recorded within the project area. Four burial finds were recorded on Uluniu Avenue; three were inadvertent finds found in fill sediment. Because of the nature of these three finds, it was concluded that no SIHP numbers would be assigned to these disturbed burials. The only primary in situ burial encountered on Uluniu Avenue was assigned SIHP #50-80-14-6369. The fifth burial find, consisting of two individuals in fill material, was recorded from Lili‘uokalani Avenue. Since three burials had been found in the immediate vicinity during a previous project (Winieski

2002a) and had been assigned SIHP #50-80-14-5859, the two new individuals were recorded as Feature H of this previously recorded archaeological resource. In addition, two historic trash pits were assigned SIHP #50-80-14-6372 and SIHP #6398 and contained bottles, ceramics and animal bone fragments. The pits appear to have been in use from 1880 through the 1950s.

Groza et al. 2007b

In 2007 CSH completed an archaeological literature review and field check for the Waikīkī Marriot Project. The project area consisted of approximately 1 acre makai of Kūhiō Avenue between Kealohilani and ʻŌhua Avenues. Background research indicated that the ahupuaʻa of Waikīkī supported a large population for centuries prior to the arrival of Europeans. Based on background research and the results of previous investigations in the area, CSH concluded that potential archaeological resources exist beneath the modern fill. In addition, CSH recommended consultation with the SHPD because of the study findings and the area's cultural sensitivity (Groza 2007b).

Winieski and Hammatt 2000c

In 1997 during archaeological monitoring by CSH for the Waikīkī Force Main Replacement Project, scattered human bones were encountered on ʻŌhua Street (Winieski 2000c). These included the proximal end and mid-shaft of a human tibia, a patella, and the distal end and mid-shaft of a femur. These remains occurred within a coralline sand matrix that had been heavily disturbed by previous construction and by the ongoing construction project. No precise location for the original burial site was identified. The burial was designated SIHP #50-80-14-5797.

4.10.6 Previously Recorded Archaeological Resources

The Waikīkī sub-area was once the locale of royal residences as well as common residences, loʻi, and fishponds. The fishponds tended to be clustered at the ʻEwa end of Waikīkī where Fort DeRussy currently stands, although there is evidence of wetland agriculture throughout the sub-area. Many burials have been discovered throughout Waikīkī and are often found during construction excavation related to utility installation or replacement. The discussion of archaeological resources proceeds from ʻEwa to Koko Head. Figure A-30 shows the locations of the archaeological resources discussed in the following sections.

SIHP #50-80-14-9757—Ala Wai Canal

SIHP #50-80-14-9757, the Ala Wai Canal, covers 48.5 acres between Kapahulu Avenue and the Ala Wai Boat Harbor. The canal is between 150 and 250 feet wide and was dredged between 1921 and 1928 by Hawaiian Dredging Company, which was owned by Walter F. Dillingham at that time. Three major concerns led to construction of the canal. First, there was a push for land reclamation to make more room for progress. Second, the wetlands of Waikīkī were seen as a health hazard because of mosquitoes, and legislation passed in 1911 called for the filling in

wetlands. Third, the canal would carry runoff away from the beaches of Waikīkī, which were becoming popular. The Ala Wai Canal is considered important for its part in transforming agricultural land into a "tourist mecca" (NRHP 1992) that supports the State's economy. The canal was and is used as an outdoor recreation venue. For the most part, the structure retains integrity, although a concrete facing was used to reinforce the original masonry in 1950.

One historical study of the Ala Wai Canal is provided by the National Register of Historic Places Registration Form submitted in 1992. Numerous archaeological studies within Waikīkī have documented how the material that was dredged during the canal's construction was used as fill material throughout Waikīkī. Another significant factor that is noted through most archaeological studies of Waikīkī is the change that the Ala Wai Canal produced on the landscape. The traditional Hawaiian wetlands were completely eradicated with the building of the Ala Wai Canal, causing a significant change in the archaeological record.

The Ala Wai Canal was placed on the Hawai'i Register of Historic Places in July 1992 and placed on the National Register of Historic Places in October 1985 under the Significance Criterion A, because of its contribution to the broad patterns of Hawai'i's history.

SIHP #50-80-14-6874—Subsurface Cultural Layer

SIHP #50-80-14-6874 consists of a subsurface cultural layer primarily composed of pre-contact and post-contact trash pits, postholes, and a pre-contact pit of undetermined use. The postholes and historic trash pits are associated with historic residential houses from the 19th through 20th centuries. This cultural layer was found during an archaeological inventory survey completed by CSH (Bell 2006a, 2006b). The privately owned land is bound by Kalākaua Avenue and 'Ena Road. This archaeological resource is about 150 feet makai of the project alignment, with a width of 60 feet and a length of 90 feet. The boundaries of the subsurface cultural layer were established during the inventory survey investigation. The subsurface cultural layer was determined eligible to the Hawai'i Register of Historic Places under Significance Criterion D, although the archaeological resource is not listed on either the Hawai'i or National Registers.

SIHP #50-80-14-6873—Single Burial

SIHP #50-80-14-6873 is a single human burial. It was discovered during hand excavation and was only partially exposed, but appeared to be a complete and primary inhumation. It also appeared to be a traditional Hawaiian burial. This burial was found during an archaeological inventory survey completed by CSH (Bell 2006a, 2006b). The privately owned land is bound by Kalākaua Avenue and 'Ena Road. This archaeological resource is about 140 feet makai of the project alignment. The burial was determined eligible under Significance Criteria D and E because of the integrity of the burial location and materials, although it is not listed on either the Hawai'i or National Registers of Historic Places. Burial treatment was preservation in place beneath a landscaped burial preserve area (McDermott 2007).

SIHP #50-80-14-5744—Native Hawaiian Burials

During archaeological monitoring of the City and County of Honolulu's installation of anti-crime lighting in Waikīkī, archaeologists from CSH discovered two inadvertent burials (designated SIHP #50-80-14-5744-1 and 2) near the intersection of Kalākaua Avenue and ʻEna Road (Perzinski 1999). The burials were recovered from previously undisturbed sand layers, indicating that despite the large amount of construction that has taken place, undisturbed sand layers still exist in this portion of Waikīkī. Burial 1 (SIHP #50-80-14-5744-1), on the makai edge of Kalākaua Avenue, was found undisturbed and in a fully flexed position, indicating that the remains were Native Hawaiian and dating to pre-contact or early post-contact times. Burial 2 (SIHP #50-80-14-5744-2), located along ʻEna Road, had been previously disturbed by installation of a concrete utilities jacket. Based on available evidence, this burial was also thought to be Native Hawaiian from pre-contact or early post-contact times. Both burials were disinterred and the City and County of Honolulu was to decide upon a location from reinterment. However, the location of the reburial site was not available. SIHP #50-80-14-5744-1 was 80 feet and SIHP #50-80-14-5744-2 was 90 feet, respectively, from the project alignment.

SIHP #50-80-14-4573—Kaipuni Fishpond

SIHP #50-80-14-4573 is a complex of four fishponds, known collectively as Loko Kaipuni, located on the federally owned lands of Fort DeRussy in Waikīkī. PHRI conducted archaeological monitoring of subsurface excavations for the Hilton Hotels Corporation in Fort DeRussy, which exposed portions of all four of the Kaipuni ponds (Putzi 2002). Radiocarbon dates suggest that the ponds in the Kaipuni complex were the oldest in the Kalia group (the group of fishponds in the Fort DeRussy area) and built in pre-contact times. Rich gray silty clay layers were found in all four fishpond locations (known from historic maps), but no basalt or coral cobbles that could be associated with fishpond walls were found. Despite this, three of the ponds were distinct and positively identified. The fourth, the farthest ʻEwa and makai, had a more general outline and was possibly the result of the confluence of two ʻauwai also exposed in the area. The three distinct ponds are laid out in a line oriented in the Koko Head/ʻEwa direction. The pond farthest Koko Head abuts the makai side of Kalākaua Avenue and is thus located within the archaeological study area. It is also approximately 1,100 feet ʻEwa of the proposed Kālaimoku Station.

SIHP #50-80-14-4890—Single Burial

An inadvertent discovery of a human burial, designated SIHP #50-80-14-4890, was found along Kalākaua Avenue on City and County of Honolulu-owned lands in the Fort DeRussy area (McMahon 1994). A construction company reported the discovery to SHPD and an SHPD representative visited the study area to confirm and identify the human remains. No remains were located in the sidewalls of the construction trench due, to the placement of steel plates along the trench sidewalls and water seeping into the bottom of the trench. Fragmented bones were found associated with the back dirt pile stored at the construction company's base yard. No

further information on age, ethnicity, or burial treatment was available. Remnants of SIHP #50-80-14-4890 may still remain in Kalākaua Avenue.

SIHP #50-80-14-6407—Agriculture Sediments

SIHP #50-80-14-6407 consists of two subsurface features: an agricultural berm and a former agricultural cultural layer. Only the more extensive subsurface agricultural cultural layer extends into the current archaeological study area. The feature consists of agriculturally enriched sediments (Paukū) that appear to have once been associated with a loʻi berm. This archaeological resource is of pre-contact origin and was discovered during an archaeological inventory survey completed by CSH in 2002 (Borthwick 2002). This inventory survey was followed by archaeological data recovery completed in 2004 by CSH (Tulchin 2004a, 2004b). The land is privately owned and bound by Kūhiō Avenue, Kālaimoku Street, Ala Wai Boulevard, and Olohana Street. The Paukū extend from 25 feet to 520 feet mauka of the project alignment and border the alignment for 90 feet. The subsurface cultural layer's horizontal extent is not well established. This archaeological resource was determined eligible under Significance Criteria A and D but is not listed on the Hawaiʻi or National Registers.

SIHP #50-80-14-5796—Wetland Ground Surface

SIHP #50-80-14-5796 is a pre-contact to early-20th-century subsurface wetland ground surface, revealed during an archaeological inventory survey conducted by CSH for the King Kalākaua Plaza Phase II Project (LeSuer 2000). CSH also conducted a prior archaeological assessment for the same project's study area (Hammatt 1998b). Background research, including historic maps and photographs, showed that the former prehistoric/historic land surface should contain remnants of agricultural features related to banana cultivation, ponds, loʻi, and ʻauwai. During the inventory survey investigation (LeSuer 2000), a disturbed remnant of the ʻAuwai O Pau, which was previously documented in the Fort DeRussy area as SIHP #50-80-14-4970 (Davis 1989), was visible in cross-section in the profiles of three (out of 13) backhoe trenches. No beach sand deposits (such as those that commonly harbor human burials) were encountered within the King Kalākaua Plaza Phase II study area.

The archaeological resource is located on private land, within parcels bounded by Kalākaua and Kūhiō Avenues and Kālaimoku and Lewers Streets. As documented in the CSH inventory survey (LeSuer 2004), this resource extends directly from the project alignment (along Kūhiō) to approximately 450 feet makai of Kūhiō Avenue.

Because prior land alteration has adversely affected SIHP #50-80-14-5796's integrity, this archaeological resource (at least where documented in the archaeological inventory survey) was determined ineligible for the Hawaiʻi and National Registers of Historic Places (LeSuer 2004 [81]). In other locations in Waikīkī (Fort DeRussy), better-preserved portions of the ʻAuwai O Pau (SIHP #50-80-14-4970) have been previously evaluated as eligible for the National Register under Significance Criterion D (Denham 1997b).

SIHP #50-80-14-4970—Fort DeRussy ‘Auwai

SIHP #50-80-14-4970 is an ‘auwai and berm complex, once located in the Fort DeRussy area of Waikīkī and extending mauka through the current study area (Figure A-30). The main channel of this water conveyance feature is called the ‘Auwai o Pau (Pau’s ditch). It extends past the boundary of Fort DeRussy, crossing to the mauka side of Kalākaua Avenue. It was first identified by Davis in 1989. Additional work at Fort DeRussy was conducted in 1992 (Simons 1995; Denham 1997b) and the following eight features of the ‘auwai complex were identified: two sections of the ‘auwai channel, three sections of the berm surrounding the ‘auwai, two rock alignments, and a charcoal stain. The berms were formed from material dredged from the bottom of the ponds and dumped on the ground between the ponds, forming the berms. One portion of the ‘auwai was radiocarbon dated to A.D. 1460-1960. The ‘auwai complex was buried in the early 20th century during construction of Fort DeRussy.

SIHP #50-80-14-4970 extends at least as far as Kūhiō Avenue, based on the results of LeSeur et al. (2000). The archaeological inventory survey investigation was conducted by LeSuer et al. in 2000 on a property on the makai side of Kalākaua Avenue, across from Fort DeRussy. The cross-section and the floor of the ‘auwai were exposed in several backhoe trenches. Prior land alteration had adversely affected SIHP #50-80-14-4970. Elsewhere in Waikīkī (Fort DeRussy), remnants of the ‘Auwai O Pau (SIHP #50-80-14-4970) have been previously evaluated as significant to the National Register under Significance Criterion D (Denham 1997b).

SIHP #50-80-14-5797—Partial Burial

SIHP #50-80-14-5797 consists of a partial human burial. The remains were found during a monitoring project of water main replacements conducted by CSH (Winieski 2000c). The burial was at Kūhiō and ‘Ōhua Avenues on land owned by the City and County of Honolulu. The burial was within 100 feet makai of the archaeological study area centerline. The burial was disinterred from surrounding fill material and stored at SHPD, and does not appear on either the State or National Registers.

5 Consequences

This discussion of consequences is based on the information available at the time this report was written and should be considered provisional. Additional information will become available as the Project's archaeological resource identification and significance evaluation effort is completed. Archaeological resource consequences may need to be reconsidered in light of this additional information.

With few exceptions, the archaeological resources that could be affected by the Project consist of subsurface deposits, including burials, remnants of fishponds and agricultural fields, paleoenvironmentally informative sediment layers, habitation remnants, limestone sinkholes, irrigation features, trash pits, and building and structure remnants. Throughout most of the archaeological study area, these subsurface resources are buried beneath roadways, residences, businesses, and parking lots. In the `Ewa-most portions of the archaeological study area, these subsurface resources lie beneath remnant agricultural fields within a portion of O'ahu that is rapidly developing with the construction of roadways, businesses, and large housing developments. The Project's construction would be another development in an already developed or rapidly developing environment. With the exception of direct, construction-related impacts (e.g., disturbance caused by the excavation of a foundation), the Project's construction would pose no additional impacts to these subsurface archaeological resources than what they have already been exposed to (e.g., through traffic vibration).

The few surface archaeological remains known within the archaeological study area (e.g., the historic OR&L alignment [SIHP #50-80-12-9714] in the Honouliuli and Farrington Highway sub-areas, or the `Ewa Junction Fuel Drum Facility [SIHP #50-80-09-6764] in the Farrington Highway sub-area) are located in environments that are at least partially developed or soon to be developed. Accordingly, the Project's construction, within the current and developing built environment, would pose no additional secondary impacts (e.g., visual, atmospheric, or audible elements) that are not already extant.

Accordingly, direct construction impacts to known and as-yet-unidentified archaeological resources are the concern. Based on available information, secondary, long-term, and/or cumulative consequences are not expected.

All Build Alternatives would likely affect archaeological resources through direct construction-related impacts. The largest direct construction impact would probably be excavations associated with the foundations for the fixed guideway's support columns. The grubbing and grading of the larger land areas associated with the Project's maintenance and storage facilities, transit centers, construction staging areas, and park-and-ride facilities would be another direct construction impact.

5.1 Summary of Affected Environment and Project Consequences by Sub-Area

5.1.1 Honouliuli Sub-Area (partially within planned extension)

Early historical accounts indicate that the ahupua‘a of Honouliuli was once widely inhabited by pre-contact populations, including the Hawaiian ali‘i. This was because of plentiful marine and estuarine resources available at the coast, irrigated lowlands suitable for wetland taro cultivation, and the lower forest area of the mountain slopes used for procuring forest resources.

At contact, Honouliuli was the largest and most populous ahupua‘a on the Island of O‘ahu, with the majority of the population centered near Pearl Harbor. However, the archaeological resources identified along the barren coral plains and coast of southwestern Honouliuli ahupua‘a indicate that pre-contact and early post-contact populations also adapted to less inviting areas, despite environmental hardships.

Disease and resettlement in the first half of the 19th century drastically reduced the region’s population. By the mid-19th century, the inland area of ‘Ewa was probably abandoned and the remaining population had consolidated around the town of Honouliuli.

Between the end of the 19th century and beginning of the 20th century, the lands of Honouliuli were being used for either commercial sugar cane production or cattle ranching. Cattle ranching took place in the mauka lands of western Honouliuli, which were unsuitable for commercial sugar cane production. The ‘Ewa Plantation Company was incorporated in 1890 and continued in full operation up to modern times. To generate soil deposition on the coral plain and increase arable land in the lowlands, the ‘Ewa Plantation Company installed ditches to induce erosion.

As a result of over a century of sugar cane cultivation, coupled with modern development associated with military operations and residential subdivisions, any archaeological resources associated with pre-contact Hawaiian land use would be limited to subsurface cultural deposits and/or sinkholes. If cultural deposits are identified, they are likely to have been heavily disturbed by decades of land modification associated with sugar cane cultivation. Pre-contact cultural deposits associated with traditional Hawaiian agriculture and habitation would probably be focused around the Koko Head end of this sub-area near Honouliuli Stream and West Loch Harbor. Traditional accounts attribute this area as the pre-contact population center of Honouliuli ahupua‘a, rich with marine and estuarine coastal resources, as well as irrigated lowlands. Additionally, LCAs clustered in this area indicate traditional Hawaiian land use in the form of wet and dry land agriculture as well as habitation. Also of note is the makai and ‘Ewa portion of this sub-area, which is situated within a karst limestone plain that contains numerous dissolution pit caves that were used by pre-contact Hawaiians for water catchment, planting, and temporary habitation. These sinkholes also contain paleontological information from several extinct birds identified by recovered bones.

Because most of this sub-area consisted of sugar cane fields cultivated for more than a century by the ʻEwa Plantation Company, post-contact archaeological resources in the form of plantation infrastructure (e.g., ditches, flumes, wells, labor camps,) are expected to be present. Previous archaeological investigations identified four post-contact archaeological resources within or in the immediate vicinity of this sub-area: SIHP #50-80-12-9714, the OR&L right-of-way; SIHP #50-80-12-9786, the ʻEwa Villages Historic District; SIHP #50-80-12-1729, a limestone sinkhole; and SIHP #50-80-12-4344, ʻEwa Plantation infrastructure.

SIHP #50-80-12-9714, the OR&L right-of-way may be affected by construction related to the Project. However, it is likely that impacts to the railway could be avoided by locating the Project's support columns away from the railway alignment. Particular care should be taken to avoid portions of the railway that are currently listed on the National Register (portions ʻEwa of Fort Weaver Road). Any plans to disturb the railway should be made in consultation with the SHPD, the Hawaii Department of Transportation, and the Hawaiian Railway Society to determine appropriate mitigation. SIHP #50-80-12-9786, ʻEwa Villages Historic District and SIHP #50-80-12-4344, ʻEwa Plantation infrastructure are unlikely to be affected by construction related to the Project, because of the distance between the features and the project alignment. SIHP #50-80-12-1729, the limestone sinkhole/historic trash pit, is also unlikely to be affected by the Project.

Regarding burials, no archaeological resources containing human burials have been identified within or in the immediate vicinity of this sub-area. However, the Koko Head terminus of this sub-area extends through the pre-contact population center of Honouliuli. Additionally, the makai and ʻEwa portion of this sub-area contain numerous dissolution pit caves that were used as burial sites by pre-contact Hawaiians. Also of note is the presence of SIHP #50-80-12-9786, the ʻEwa Villages Historic District, which consists of three post-contact plantation villages constructed by the ʻEwa Plantation Company to house its laborers. Thus, although no burials have been identified within this sub-area, pre-contact and post-contact habitations have been identified in areas just outside the sub-area, indicating the potential to encounter burials during ground disturbance activities (e.g., excavations) within this sub-area.

Considering the sparse LCAs and archaeological resources present along this sub-area, coupled with the fact that the area has undergone extensive previous archaeological investigation and there is a high probability that most of the resources within this sub-area have been already identified, there is a potential for archaeological resources along only 10 percent of the sub-area. Thus the potential for the Project to impact burials and pre-contact and post-contact archaeological resources is Low in this sub-area.

Specific areas where archaeological resources can be expected are the Koko Head terminus of this sub-area near Honouliuli Stream and West Loch in the makai and ʻEwa portion of this sub-area, as well as the area near the ʻEwa Villages Historic District (SIHP #50-80-12-9786) where Kaloʻi Gulch crosses the project alignment. Also of note is the OR&L right-of-way (SIHP #50-80-12-9714), which runs adjacent to the makai boundary of the proposed park-and-ride lot and crosses this sub-area

at the intersection of Franklin D. Roosevelt and Hornet Avenues, as well as at the intersection of Franklin D. Roosevelt Avenue and Anson Street.

5.1.2 Farrington Highway Sub-Area

The Farrington Highway sub-area crosses the ahupua‘a of Honouliuli, Ho‘ae‘ae, Waikele, Waipi‘o, and Waiawa. The last four lands are narrow strips that extend from Pearl Harbor along narrow valleys to the uplands. Traditionally, population was concentrated at the Pearl Harbor lochs, the shoreline fishponds, or along the lower valleys where wetland taro could be cultivated. In the 19th and 20th centuries, the former taro lands were modified for the cultivation of rice and then sugar.

Because much of Farrington Highway and the surrounding area were developed before the mid-20th century prior to Federal and State-mandated archaeological studies, there have been few previous archaeological studies in the area. LCAs show that there were house lots, lo’i, and kula along this section at the time of the Māhele. The few existing archaeological studies near these LCAs indicate that many surface and subsurface archaeological resources that once existed have most likely been destroyed by urban development. However, there may be areas where intact subsurface deposits still exist.

The portion of this sub-area that follows the H-2 Freeway is unlikely to contain archaeological resources. An archaeological study identified pre-contact archaeological resources in the general area, but these were not close to the Farrington Highway sub-area (Goodman 1991). The H-2 Freeway portion of the sub-area is close to already-disturbed lands along the existing highway, and is unlikely to contain any new archaeological resources.

Two historic archaeological resources are located near the sub-area. The OR&L right-of-way is over 50 feet from the sub-area, so it is unlikely that it would be affected by the Project. However, a project maintenance and storage facility may be built within the boundaries of the ‘Ewa Junction Navy Fuel Drum Resource, and would affect this resource’s existing surface structures.

Considering the locations of the LCAs and of the ‘Ewa Junction Navy Fuel Drum Resource, there is a potential for archaeological resources along 40 percent of this sub-area. As a result, the potential for the Project to affect burials and pre-contact and post-contact archaeological resources in this sub-area is Moderate.

5.1.3 Kamehameha Highway Sub-Area

The Kamehameha Highway sub-area traverses a portion of the ‘Ewa District within the Waiawa, Mānana, Waimano, Waiau, Waimalu, Kalauao, and ‘Aiea ahupua‘a that until the mid-19th century were used by Native Hawaiians for agriculture and habitation. Fishponds ringed the deep bays of Pearl Harbor and the well-watered coastal plain was ideal for irrigated taro cultivation. LCA documents for this sub-area indicate traditional Hawaiian land use in the form of irrigated taro cultivation, dry land agriculture, and habitation. Unfortunately, there is scant archaeological evidence of traditional Hawaiian land use because most of the area was developed prior to the

establishment of legislation requiring cultural resource management efforts to mitigate the impact of development on archaeological resources.

During the second half of the 19th century, ‘Ewa maintained its agricultural focus. Rice production began to supplant taro in the 1860s, and beginning in the 1890s two large sugar cane plantations dominated the landscape: ‘Ewa Plantation Company and the O‘ahu Sugar Company. By 1920 urban development had also begun at ‘Aiea. By the 1950s the coastal areas of ‘Aiea, Waimalu, and Pearl City were urbanized.

The development of the OR&L railway across ‘Ewa resulted in establishing the first urban development at Pearl City in the late 19th century. A section of the OR&L right-of-way (SIHP #50-80-12-9714) lies within the Koko Head terminus of this sub-area (makai of Kamehameha Highway, between Kihale and Laulima Streets). SIHP #50-80-12-9714, the OR&L right-of-way, may be affected by construction related to the Project, but it is possible that impacts to the railway could be avoided by locating the Project’s support columns away from the railway alignment.

Military expansion prior to and during World War II also dramatically changed land use around Pearl Harbor as large areas were cleared for military facilities or housing. Previous archaeological investigations identified SIHP #50-80-09-6918, the remnants of a WWII Navy barracks, within the ‘Ewa portion of this sub-area (makai of Kamehameha Highway, just Koko Head of Pu‘u Momi Street), confirming the presence of historic military activities in this area. This archaeological resource consists of surface architectural features and its boundaries have been firmly established. It is unlikely that these features extend beyond their documented locations. Because of the distance of SIHP #50-80-09-6918 from the project alignment and the study area, it is unlikely that it would be affected by construction of the Project.

Because of extensive ground disturbance associated with historic sugar cane cultivation and the subsequent military and urban development, any evidence of pre-contact and post-contact land use would likely be limited to subsurface cultural deposits, with a small probability of encountering surface remnants associated with WWII-era military infrastructure. If cultural deposits are identified, they are likely to have been heavily disturbed by decades of land modification associated with sugar cane cultivation and the subsequent military and urban development. Pre-contact cultural deposits could include fishpond and taro cultivation sediments, alignments and/or walls associated with fishponds and taro cultivation, and buried living surfaces containing midden, artifacts, and hearth features. Post-contact subsurface deposits could include trash pits, privies, and building foundations.

Regarding burials, a historic cemetery (Lockview B Cemetery) was identified approximately 50 feet makai of the ‘Ewa portion of this sub-area’s centerline, near the intersection of Kamehameha Highway and Pu‘u Poni Road (Kaschko 1990) (Figure A-9). Also of note is the presence of ‘Aiea Cemetery, an active, in-use, early to mid-20th-century cemetery under the jurisdiction of the State of Hawai‘i, located within the Koko Head end of this sub-area. (Figure A-9). The makai/Koko Head corner of the ‘Aiea Cemetery is beneath the project alignment, and this burial site could be affected by the Project’s construction. Adjustment makai of the fixed guideway’s alignment could likely avoid impact to the burial site. The presence of two documented cemeteries

within this sub-area indicates that the potential exists to encounter burials during ground disturbance activities (e.g., excavations) within this sub-area.

Taking into account the broad yet even distribution of LCAs along this sub-area coupled with the presence of two documented cemeteries, WWII-era infrastructure, and the OR&L right-of-way, the potential exists for archaeological resources along 35 percent of this sub-area. Thus the potential for the Kamehameha Highway sub-area to impact pre-contact and post-contact archaeological resources and burials is Moderate.

5.1.4 Salt Lake Sub-Area

The Salt Lake sub-area lies within a narrow plain that is relatively dry, although it is bordered by two streams: Hālawa Stream toward ʻEwa and Kalihi Stream toward Koko Head. The other body of water in this area is Salt Lake. The sediments are mainly composed of clay, although Kalihi is mostly comprised of fill. The LCA information shows that the population in this sub-area was clustered at each end, near the Hālawa and Kalihi Streams. It is likely that few people lived in the middle portion of the sub-area in pre-contact times. The low-lying margins of Moanalua Steam and the tidal flats farther makai would have been intensively used for fishponds, irrigated agriculture, and marine resource procurement. Habitation would have been associated with this heavily used area. Salt collection and production was another important resource within the sub-area. The depopulation of rural areas of Oʻahu caused by emigration to Honolulu and loss of life from epidemics was a further impetus for the remaining Native Hawaiians to cluster in areas of ample freshwater, such as at the ʻEwa and Koko Head ends of the sub-area around Hālawa and Kalihi and Moanalua Streams, respectively.

By the late 19th century, Kalihi was absorbed by the urban growth of neighborhoods around Honolulu. During this time, the Honolulu Sugar Company extended its fields to Hālawa and Moanalua. However, by 1920 the sugar cane fields were being sold because of severe declines within the industry. Over the next 20 years the tidal lands were filled for expansion of the Pearl Harbor Naval Base and construction of Honolulu International Airport.

The few previous archaeological studies within this sub-area focused on areas adjacent to Hālawa and Kalihi Streams, at each end of the sub-area. One investigation of possible historic graves (no SIHP number) was conducted near Hālawa Stream at Aloha Stadium (Barrera 1971), and one investigation of subsurface fishpond deposits (no SIHP number) was conducted in Moanalua (Dega 2005). Additional studies took place in Kalihi at the junction of Middle Street and Kamehameha Highway, near the Project's proposed Middle Street Transit Center Station. In this area, a historic trash pit (SIHP #50-80-14-6683) associated with a slaughterhouse was recorded within 50 feet of the study area's centerline (Dega 2005). A post-contact cultural layer with three historic burials (SIHP #50-80-14-4525) was documented mauka of the study area (Folk 1993) (Figure A-12) and is unlikely to be affected by construction related to the Project.

The study area has been extensively modified by sugar cane production, land reclamation, and urban development into the 20th century. Previous archaeological finds suggest that although some intact pre-contact and early post-contact cultural deposits associated with Hawaiian habitation, work, and recreation may be found beneath modern fill layers, it is likely that there has been intensive disturbance and fill deposition over these remains. Features related to the later post-contact period (e.g., building foundations, trash pits, and historic burials) may occur in the study area, although they may have been disturbed by more recent development.

Assessing this sub-area is difficult because of the paucity of prior archaeological work. Based on available information, it is anticipated that the two portions of the sub-area where archaeological resources may be disturbed by project construction are located at the two ends, at Hālawa and Moanalua and Kalihi Streams. In particular, the relatively large areas of "Fill Land" (Figure A-12) around Moanalua Stream may contain preserved pre-contact and post-contact archaeological resources related to the intensive use of this stream and littoral environment for resource procurement, agriculture, aquaculture, and habitation. Burials associated with local habitation are possible, based on the results of Folk et al. (1993).

There is a reasonable expectation for finding pre-contact and post-contact archaeological resources and burials along approximately 25 to 30 percent of the sub-area's length—particularly within the Fill Land along Moanalua Stream. Accordingly, the potential for impacts to pre-contact and post-contact archaeological resources and burials in this sub-area is considered Moderate.

5.1.5 Airport Sub-Area

The Airport sub-area once consisted of low-lying tidal flats, fishponds, and salt ponds. The greatest population density was clustered around settlements adjacent to Moanalua Stream and Pearl Harbor. Historic documents indicate that this sub-area was sparsely inhabited, as is reflected by the presence of only one LCA.

Previous archaeological investigations identified fishpond sediments to be present below modern fill layers (Williams 1994), such as those from Loko Kunana (SIHP #50-80-13-0102), a pre-contact traditional Hawaiian fishpond. The Koko Head boundaries of Loko Kunana are unknown and it is possible that the fishpond sediments may be disturbed by construction related to the Project.

In the post-contact period, the low-lying tidal flats and marshlands were filled to provide a new surface for sugar cane cultivation, transportation facilities, military construction of Pearl Harbor defenses, and urban development. After the attack on Pearl Harbor, the military rebuilt and expanded its facilities. By 1943, additional land was reclaimed for construction of Honolulu International Airport. The only post-contact archaeological resource identified in the vicinity of this sub-area is SIHP #50-80-12-9714 (OR&L right-of-way), which extends along the 'Ewa edge of this sub-area (Figure A-15).

The probability for either pre-contact or post-contact burials in this sub-area is Low. Much of the area consisted of former marshland and would not have been readily used for burial, as coastal areas with Jaucas sand deposits were more preferable.

Although this sub-area crosses Moanalua Stream, the pre-contact and post-contact population center, its makai location within fill land suggests that this portion of the sub-area consists entirely of reclaimed land and would not contain any burials.

Extensive land modifications associated with historic and modern development indicate that the only archaeological resources within this sub-area are likely limited to subsurface cultural deposits associated with pre-contact land use related to traditional Hawaiian habitation, agriculture and fishponds. Pre-contact subsurface archaeological resources could be found near one small section of the Airport sub-area in the vicinity of Moanalua Stream, which was a pre-contact and early post-contact population center. The area around Moanalua Stream comprises 5 percent of the total length of the sub-area. Additionally, archaeological resources may be encountered along the ‘Ewa portion of this sub-area in the vicinity where traditional Hawaiian fishponds and lo’i are known to have existed around Pearl Harbor. This area covers 25 percent of the length of the sub-area.

In summary, the potential for the Project to impact burials and post-contact archaeological resources in this sub-area is Low, and the potential to impact pre-contact archaeological resources, in the form of subsurface cultural deposits, is considered Moderate.

5.1.6 Dillingham Sub-Area

The Dillingham sub-area crosses through the makai sections of Kalihi and Kapālama, an area now considered part of Honolulu ahupua‘a. Hawaiians intensively used the Dillingham sub-area in the pre-contact and early post-contact periods for permanent habitation, agriculture, including irrigated taro cultivation, and aquaculture in man-made fishponds along the coast. Previous archaeological investigations have identified two archaeological resources within the sub-area: Kūwili Fishpond (SIHP #50-80-14-5368) and Kāwā Fishpond (SIHP #50-80-14-5966) constructed in the pre-contact period and used into the late 19th century.

In the beginning of the 20th century, the low-lying taro lands and fishponds were filled to provide new land for railroad infrastructure, industrial parks, and housing subdivisions. Kalihi and Kapālama became early suburbs of the urban center at Honolulu. This land reclamation and subsequent urban development would have destroyed and/or buried any surface archaeological resources that may have been present. It is likely that archaeological resources in the form of subsurface cultural deposits are present beneath historic and modern fill layers. These subsurface deposits could contain pre-contact and early post-contact archaeological resources. Pre-contact subsurface deposits could include fishpond and taro cultivation sediments; walls, berms, and ‘auwai associated with fishponds and taro cultivation; and buried living surfaces containing midden, artifacts, and hearth features. Post-contact subsurface deposits could include trash pits, privies, and railroad infrastructure dating to the 18th and 19th centuries.

This sub-area crosses through 36 LCAs that cover about 40 percent of the sub-area. Because pre-contact and early post-contact traditional Hawaiians used this area for

habitation, it is probable that human burials may be present. Pre-contact Hawaiians typically used coastal areas with Jaucas sand deposits for human interment. Although no Jaucas sand deposits are currently exposed within this sub-area, its proximity to the coast raises the possibility that intact Jaucas sand deposits lie beneath historic and modern fill layers. Previous archaeological investigations have identified one previously disturbed burial near Iwilei Station, discovered during subsurface investigations of SIHP #50-80-14-5368 (Kūwili Fishpond). The remains consisted of a human femur fragment located within fill containing historic debris from the 19th century.

Taking into account the density of small kuleana awards in this sub-area (40 percent of the sub-area) and the presence of two fishponds (17 percent), one of which contained a previously disturbed burial, the potential exists for archaeological resources along 56 percent of the sub-area. Accordingly, the potential for impacts to pre-contact and post-contact archaeological resources and burials in this sub-area is considered High. Specific areas with a high potential to impact archaeological resources is the portion of the project alignment between Kalihi Stream and Laumaka Street and the portion between Waiakamilo Street and Nu‘uanu Stream.

5.1.7 Downtown Sub-Area

Background research indicates that Downtown Honolulu was intensively used by pre-contact and early post-contact Hawaiians for agriculture, aquaculture, and habitation. Previous archaeological investigations have identified numerous pre-contact subsurface cultural deposits in the immediate vicinity of this sub-area, providing further evidence of extensive traditional Hawaiian activity in this area.

Historic accounts by Don Francisco Marin, an early historic settler, indicate that by 1810 a village of several hundred native dwellings surrounded the grass houses of Kamehameha on Pākākā Point near the foot of what is now Fort Street (Gast 1973). Marin’s account reflects the integration of traditional Hawaiians and Westerners during this period. Around half of the LCAs identified within this sub-area of the archaeological study area were awarded to foreigners, which emphasizes the area’s cosmopolitan nature. Additionally previous archaeological investigations have identified two subsurface cultural deposits (SIHP #50-80-14-5496 and SIHP #50-80-14-2456) dated between 1795 and 1860, which contain evidence of contemporaneous traditional Hawaiian habitation and early historic Western settlement.

By the 1840s, Western commercial and missionary interests had supplanted the Native Hawaiian traditions that had previously shaped the environment. During the second half of the 19th century, the waterfront of Honolulu changed significantly. At the peak of the whaling industry, around 1850, the Honolulu Harbor area became crowded with trading and whaling vessels, and required additional wharfs to accompany them. Between 1857 and 1870, 22 acres of reef land between Fort and Alakea Streets were filled with material dredged from the harbor.

During the 1880s, Chinatown become the main metropole for Chinese laborers in Hawai‘i. After the intentional fire set in 1990 to control bubonic plague, Chinatown was rebuilt and many of these buildings still exist for the most part unaltered. The

Chinatown Historical District (SIHP #50-80-14-9986) was listed on the National Register of Historic Places on January 17, 1973. During archaeological monitoring for excavations along Nimitz Highway in the portion that borders the Chinatown Historical District, CSH archaeologists did not observe any cultural remains, and the only sediments present were fill layers down to the water table (Winieski 2001a, 2001b). However, burials and cultural layers have been documented on land immediately mauka of Nimitz Highway within the Chinatown Historical District (Hurst 1991; Goodwin 1995). Based on this information, the Project has the potential to affect archaeological resources associated with the Chinatown Historical District (SIHP #50-80-14-9986).

In the 19th and 20th centuries, the urban development of the Downtown waterfront and surrounding areas involved extensive filling associated with developing the harbor infrastructure, industrial subdivisions, and commercial districts. These land reclamations and subsequent urban developments would have destroyed and/or buried any surface archaeological resources that may have been present within this sub-area. It is likely that archaeological resources in the form of subsurface cultural deposits are present beneath historic and modern fill layers. These subsurface deposits could contain pre-contact and post-contact archaeological resources. Pre-contact subsurface deposits could include fishpond and taro cultivation sediments; alignments and/or walls associated with fishponds and taro cultivation; and buried living surfaces containing midden, artifacts, and hearth features. Post-contact subsurface deposits could include trash pits, privies, building foundations, and Honolulu Rapid Transit & Land Ltd. streetcar infrastructure.

Also of note is the probable presence of human burials beneath the proposed project alignment in this sub-area. The immediate area surrounding this sub-area was used for habitation by pre-contact Hawaiian populations and early historic Western settlers. Previous archaeological investigations have identified Jaucas sand deposits containing numerous pre-contact and post-contact burials within this sub-area. Of particular interest are SIHP #50-80-14-4494, a post-contact cultural deposit containing 15 burials associated with the Marin family, and SIHP #50-80-14-3712, a post-contact burial ground containing 31 burials associated with victims of the 1850s smallpox epidemic. These two burial clusters, along with other pre-contact burials identified in the area, suggest that a high probability exists of encountering additional burials during ground disturbance within this sub-area.

Considering the numerous LCAs in the corridor and the presence of Jaucas sand deposits containing both pre-contact and post-contact cultural deposits that contain numerous human burials, the potential exists for archaeological resources to occur along 70 percent of this sub-area. Thus, in the Downtown sub-area the Project would have a high potential to impact pre-contact and post-contact archaeological resources, including burials; underlying modern and historic fill, in the form of subsurface cultural deposits associated with pre-contact Hawaiian agriculture, aquaculture, and habitation; and post-contact land use associated with habitation and commercial and industrial development. Specific areas where the Project would have a high potential to impact archaeological resources are the portions of this sub-area between Nu‘uanu Stream and Fort Street and between Mililani and Keawe Streets.

5.1.8 Kaka‘ako Sub-Area

From pre-contact time into the early 1900s, Kaka‘ako was considered separate from the two main population centers of the region, Honolulu and Waikīkī. It was sparsely populated and characterized by a barren plain dotted with fishponds and salt pans.

LCA testimony in the mid-19th century indicates that much of these lands were given to the ali‘i as fort lands to support the soldiers in Honolulu, and to commoners who claimed small house lots adjacent to fish or salt ponds. In the early 1900s, Kaka‘ako was used as a place for cemeteries and quarantine of medical patients, then became an area for dumping sewage and burning garbage, and finally was used as cheap housing or commercial purposes.

Previous archaeology throughout the area has shown that much of the sediments in the area are fills, which sometime extend down to the water table. In other cases, some natural sediments remain intact below the fill layers, including sections with Jaucus sands. This is important because sand dunes or berms seem to have been the preferred location for burial, especially for Native Hawaiian commoners.

Scattered burials have been found in the vicinity of the Kaka‘ako sub-area. Some are isolated bones, and other burials are so disturbed that it is difficult to determine the date of interment. Some of these burials are in a flexed position in a burial pit with no historic artifacts. These are probably Native Hawaiians who were buried in the pre-contact or early post-contact period (before circa 1850), before most Hawaiians adapted to the Western custom of burial in an extended position, often within a wood coffin. Extended and/or coffin burials were found at SIHP #50-80-14-4380 (Winieski 2000a), SIHP #50-80-14-5598 (Winieski 2000b), SIHP #50-80-14-6658 (O’Hare 2006a, 2006b), and SIHP #50-80-14-6911 (Hammatt 2007), of which only SIHP #50-80-14-6658 is within the present study area, although all are in the study area’s vicinity. These probably date from the mid-19th to early 20th century. Because these are definitely post-contact burials, they could be Native Hawaiian or non-Native Hawaiian individuals. The majority may have died from one of the many epidemics that decimated the population in the late 19th century, such as the 1853 smallpox epidemic.

Burial clusters at SIHP #50-80-14-5820 and # 50-80-14-1388 (Mother Waldron Park) appeared to consist of pre-contact Native Hawaiian burials. These burials were disinterred and subsequently reinterred in concrete vaults at Mother Waldron Park.

SIHP #50-80-14-6658 consists of historic Hawaiian burials, some of which were extended or coffin burials and others that were flexed, more traditional Native Hawaiian interments. These burials were reinterred in concrete vaults near their discovery location. These burials were discovered in close proximity to the project alignment and it is possible that additional burials from this area would be affected by project construction. Adjusting the alignment of the fixed guideway’s support columns may alleviate potential impacts in this area along Queen Street.

SIHP #50-80-14-4243 and 50-80-14-6659 consist of disturbed, fragmented burials of undetermined age and ethnicity. The two fragmented burials comprising

SIHP #50-80-14-6659 were reinterred along with the burials discovered at SIHP #50-80-14-6658. SIHP #50-80-14-4243, a disarticulated single bone, is unlikely to be affected by project construction because of the distance between the burial location and the project alignment.

Other archaeological resources include the original wetland surface of Kewalo, SIHP #50-80-14-6636, which was buried during the early 1900s by fill. Based on the available information, it is possible that project construction would affect SIHP #50-80-14-6636 because of the wetland surface's unknown boundaries. Kolowalu fishpond (SIHP #50-80-14-6856) is within close proximity of the project alignment and it is likely that this archaeological resource would be affected by the Project. SIHP #50-80-14-6660, a historic trash dump, is in close proximity to the project alignment and may be affected by project construction.

Previous archaeological studies identified archaeological resources along 40 percent of the Kakaʻako sub-area. All of the available information indicates that further archaeological resources exist in these portions and are almost certainly present in the remaining 60 percent of the sub-area. Based on these considerations, the Kakaʻako sub-area of the archaeological study area is determined to have a High potential to affect burials and pre-contact and post-contact archaeological resources such as fish/salt ponds, cultural layers, and historic trash pits.

5.1.9 Mānoa Sub-Area (planned extension)

Background research has indicated that the well-watered, fertile lands of Mānoa were used extensively for wet taro cultivation in pre-contact times and into the 20th century, and also used for other types of crops such as bananas and a variety of vegetables. The springs and ponds created in the Mōʻiliʻili Karst provided abundant available water and were used by traditional Hawaiians for drinking water, irrigation, and aquaculture during pre-contact and early post-contact times. During the 19th century, land use began to include an increasing number of habitations and small stores, eventually shifting by the mid-1900s to residential housing. The Mōʻiliʻili Quarry, a basalt quarry near the mouth of Mānoa Valley, was opened in 1900 and was active through 1947. Another influence on life in Mānoa was the Honolulu Rapid Transit & Land Company's electric trolley car system that operated throughout Mōʻiliʻili from 1903 to the 1930s.

In the beginning of the 19th century, the taro lands and fishponds, including those of the Mōʻiliʻili Karst, were filled to provide land for housing and commercial activities. These land reclamations and subsequent urban development would have destroyed or buried any surface archaeological resources that may have been present. However, it is likely that archaeological resources in the form of subsurface cultural deposits are present beneath modern development. These subsurface deposits could contain pre-contact and post-contact archaeological resources. Pre-contact subsurface deposits could include fishpond and taro cultivation sediments, alignments or walls associated with fishponds and taro cultivation, and buried living surfaces containing midden, artifacts, and hearth features. Post-contact subsurface

deposits could include trash pits, privies, and the Honolulu Rapid Transit & Land Company's electric trolley infrastructure.

Archaeological resources identified in the vicinity of this sub-area include historic buildings, such as some University of Hawai'i buildings (SIHP #50-80-14-1352) and the Church of the Crossroads (SIHP #50-80-14-9749), and pre-contact or early post-contact artifacts and habitation structures, such as hearths and walls. Because Mānoa was used primarily for agriculture, it is less likely that burials or cemeteries were located here. However, multiple pre-contact Native Hawaiian burials (SIHP #50-80-14-4266) were discovered less than one-half mile mauka and 'Ewa of the sub-area terminus, suggesting that Native Hawaiians were using some of the land for burials. The shift of land use toward habitation throughout the 1800s and 1900s might increase the potential for burials from those eras in the sub-area. This is supported by the large number of LCAs that contain house lots intersecting the project alignment and would have been the most likely location for family burials.

Although no archaeological resources have been identified within the sub-area, all of the previous archaeological investigations conducted within this sub-area were limited to surface surveys and reviews of historic documents. The fact that no subsurface archaeological investigations have been conducted within this sub-area, coupled with the presence of numerous LCAs indicating pre-contact and early post-contact traditional Hawaiian land use, suggest that the potential exists for archaeological resources along 33 percent of the sub-area. Thus, the potential for the Project to impact pre-contact and post-contact archaeological resources, including burials, is Moderate, particularly in the area between Isenberg Street and Kalo Place. This area contains a high density of LCAs and is aligned with a major roadway that may have also been used by the Honolulu Rapid Transit & Land Company for its trolley line (Figure A-26).

5.1.10 Waikīkī Sub-Area (planned extension)

Waikīkī has been a significant center for agriculture, aquaculture, habitation, and politics from pre-contact times. Numerous fishponds and taro fields were present during pre-contact times. LCAs reveal an extensive network of irrigated fields, streams, irrigation watercourses, and fishponds. Waikīkī was a seat of political power, and royalty maintained their residences there, including King Kamehameha I who chose to reside in Waikīkī upon seizing control of O'ahu in 1795.

Construction of the Ala Wai Canal and the associated filling of the lo'i (taro patches) and ponds of Waikīkī to make way for urban development significantly changed the landscape of Waikīkī. The Ala Wai Canal (SIHP #50-80-14-9757) could be affected by construction related to the Project. Plans to cross the canal should be addressed with the SHPD to determine appropriate mitigation.

Much of the original wetland surface is likely to be preserved beneath the layers of historic fill. This is the case of SIHP #50-80-14-5796, the pre-contact to early-20th-century wetland ground surface observed in previous archaeological studies. Fishponds, irrigation ditches, and 'auwai such as SIHP #50-80-14-4573 (Loko Kaipuni),

SIHP #50-80-14-4970 (an ‘auwai and berm complex at Fort DeRussy) and SIHP #50-80-14-6407 (agricultural sediments) have also been uncovered during previous archaeological studies. Sediments associated with these agriculture and aquaculture resources are likely to be affected by construction related to the Project because the project alignment would pass through the known boundaries of several of these resources.

Cultural layers derived from habitation have also been preserved beneath fill, such as SIHP #50-80-14-6874, a subsurface cultural layer mainly composed of historic trash pits and postholes likely associated with historic residential houses. The subsurface cultural layer is about 150 feet makai of the project alignment and unlikely to be affected by project construction because of the distance between the two. However, this resource may be indicative of similar, as yet unfound resources within the sub-area.

Many areas of Waikīkī still contain Jaucus sand, the common matrix for Native Hawaiian burials, below the historic fill. During previous archaeological studies, numerous burials have been found throughout Waikīkī and along this sub-area. SIHP #50-80-14-4890 is a fragmented burial of which portions may still be found. This resource is near the project alignment and may be affected by project construction. SIHP #50-80-14-6873 is a single human burial located 140 feet makai of the alignment that was left in place after discovery. It is unlikely to be affected by project construction because of the distance between the resource and the project alignment. SIHP #50-80-14-5797 and SIHP #50-80-14-5744, a single partial burial and two Native Hawaiian burials, respectively, would not be affected by project construction because of complete disinterment of the burials. Although some of these archaeological resources would not be disturbed by construction of the Project because they have been disinterred, the identification of undisturbed sand layers and burials within this area indicate a potential for more burials to be found in this vicinity.

Considering the continuous land use of Waikīkī from pre-contact to modern times, the evidence from LCAs that many house lots and agricultural structures were present in the archaeological study area, the abundance of Jaucus sand (the preferred soils for Native Hawaiian burials), the copious archaeological resources identified in the area, and many of these resources being located near the project alignment, impacts to archaeological resources are expected along more than 90 percent of the sub-area’s length. The likelihood of the Project affecting burials and pre-contact and post-contact archaeological resources along the Waikīkī Branch is therefore High.

5.2 No Build Alternative

The No Build Alternative may lead to construction by others, for independent projects that could impact archaeological resources. However, these impacts were not considered for this archaeological technical report because any construction resulting from the No Build Alternative would undergo a separate environmental review as part of its planning and implementation by others.

5.3 Build Alternatives

For this archaeological technical report, the analysis identifies likely impacts to archaeological resources within the archaeological study area, which is divided and described in ten sub-areas from Kapolei to Waikīkī (Table 5-1). The Salt Lake and Airport Alternatives are individual sub-areas of the archaeological study area and considered as separate units. Based on the analysis results, the relative greater or lesser impacts to archaeological resources are evaluated depending on which alternative might be selected.

Table 5-1: Summary of Archaeological Consequence by Archaeological Sub-Area

Archaeological Sub-Area	Burials	Pre-Contact Archaeological Resources	Post-Contact Archaeological Resources
Honouliuli Sub-Area	Low	Low	Low
Farrington Highway Sub-Area	Moderate	Moderate	Moderate
Kamehameha Highway Sub-Area	Moderate	Moderate	Moderate
Salt Lake Sub-Area	Moderate	Moderate	Moderate
Airport Sub-Area	Low	Moderate	Low
Dillingham Sub-Area	High	High	High
Downtown Sub-Area	High	High	High
Kaka'ako Sub-Area	High	High	High
Mānoa Sub-Area	Moderate	Moderate	Moderate
Waikīkī Sub-Area	High	High	High

Three general categories of archaeological resource impacts are identified: burials, pre-contact archaeology, and post-contact archaeology. With few exceptions, the archaeological resources that could be affected by the Project are subsurface features and deposits that have not been previously identified. Such impacts would occur during construction. Once negative impacts from construction (e.g., archaeological resource destruction) and positive impacts from construction (e.g., an increase in archaeological knowledge about O'ahu's South Shore) have occurred, no long-term, project-related impacts are expected on archaeological resources.

5.3.1 Consequences Common to All Build Alternatives

Considering construction of the entire project, including all Build Alternatives (in all sub-areas of the archaeological study area), potential overall impacts to pre-contact and post-contact archaeology and burials are considered to be High/Moderate (Table 5-2).

5.3.2 Salt Lake Alternative

For the Salt Lake Alternative, potential impacts to burials, pre-contact archaeological resources, and post-contact archaeological resources are all considered Moderate (Table 5-2).

5.3.3 Airport Alternative

Based on this analysis of archaeological impacts, selection of the Airport Alternative would result in a somewhat lesser impact on archaeological resources than either the Salt Lake Alternative or the Airport & Salt Lake Alternative (Table 5-2). For the Airport Alternative, potential impacts to burials, pre-contact archaeological resources, and post-contact archaeological resources are considered Low, Moderate, and Low, respectively.

5.3.4 Airport & Salt Lake Alternative

For the Airport & Salt Lake Alternative, potential impacts to burials, pre-contact archaeological resources, and post-contact archaeological resources are all considered Moderate (Table 5-2).

Table 5-2: Summary of Archaeological Consequences

Alternative	Burials	Pre-Contact Archaeological Resources	Post-Contact Archaeological Resources
No Build Alternative	N/A	N/A	N/A
Consequences Common to All Build Alternatives	High/Moderate	High/Moderate	High/Moderate
Salt Lake	Moderate	Moderate	Moderate
Airport	Low	Moderate	Low
Airport & Salt Lake	Moderate	Moderate	Moderate

Note: Because of the types of archaeological resources potentially affected and the surrounding built environment, all consequences are direct and construction-related. Secondary and/or cumulative consequences are not applicable.

6 Historic Preservation Review Compliance and Mitigation

6.1 Context and Approach

Both State and Federal historic preservation legislation discuss mitigation to alleviate a project's effect on significant cultural resources. Mitigation can only be initiated following: 1) the Project's identification effort, 2) the significance assessment of a project's cultural resources, and, 3) the determination of a project's effect on significant cultural resources. Only after these steps in the historic preservation review process have been completed can appropriate mitigation measures be developed and implemented.

Chapter 3 of this document describes the Project's approach to fulfilling the Federal and State environmental and historic preservation review process relating to archaeological resources. In this approach, it is understood that the Project would have an adverse effect on known and as yet undetected archaeological resources. For a number of reasons discussed in Chapter 3, it is reasonable to defer the Project's archaeological resource identification effort, as well as the associated significance evaluations and development and implementation of appropriate mitigation measures. Implementation guidelines for Section 106 of the National Historic Preservation Act, 36 CFR 800—Protection of Historic Properties provides for this deferral of the identification and evaluation of historic properties, for undertakings where large land areas would be affected and access to potential historic properties would be restricted.

Based on the results of this archaeological technical report, the Project would require a substantial archaeological resource identification, evaluation, and mitigation effort. With the exception of the Project's first construction phase between UH West O'ahu and Leeward Community College, this effort would be completed following the provisions of the Project's Memorandum of Agreement (MOA) governing archaeological resources. For the Project's first construction phase, the appropriate archaeological resource identification, significance evaluation, and mitigation would likely be carried out prior to drafting and implementation of the Project's MOA.

The portions of the Project's MOA pertaining to archaeological resources should be developed in consultation with the SHPD, the Advisory Council on Historic Preservation, Native Hawaiian Organizations, and other stakeholders. The archaeological portions of the MOA will need to be comprehensive, thoroughly describing how the archaeological resource identification, significance evaluation, and mitigation would be carried out. They would need to describe procedural steps, archaeological methods, consulting parties, and timelines for stakeholder consultation and review of the reports for the various investigations that would be required. The documentation, consultation results, and agreements supporting the archaeological resources components of the Project's MOA should be developed as

a comprehensive archaeological resources management and mitigation plan, based on input from all stakeholding parties.

The archaeological resources component of the Project's MOA should outline how the Project would be divided into manageable components—for example, into four or five proposed construction phases. Each component should be treated as a distinct unit in the Project's historic preservation compliance.

The project's MOA should describe how the first step in the archaeological resource identification effort for each project component should be the preparation of an Archaeological Inventory Survey Plan based on State historic preservation requirements. Next, the Archaeological Inventory Survey Plan should be carried out following the plan. Finally, appropriate mitigation measures should be developed and carried out. For each construction component, archaeological mitigation would likely take the form of burial treatment, archaeological data recovery, and archaeological monitoring. If there is some flexibility in the construction design, it is possible that preservation of archaeological resources in place might be another form of mitigation. These steps in the archaeological resource identification, significance evaluation, and mitigation effort are described in the following section.

For the Project's first construction phase between UH West O'ahu and Leeward Community College, where historic preservation compliance would likely be carried out prior to completion of the Project's MOA, a similar archaeological resource effort is recommended. This includes preparing an Archaeological Inventory Survey Plan, completing the archaeological inventory survey and significance evaluations, and developing and implementing any necessary mitigation measures to be carried out prior to, or in conjunction with, project construction.

6.2 Archaeological Resource Identification, Significance Evaluation, and Mitigation Effort

6.2.1 Archaeological Inventory Survey Plan

A detailed Archaeological Inventory Survey Plan will be developed as the first step in the archaeological resource identification effort for each of the Project's construction components. Because of the probable diversity, distribution, and number of archaeological resources within each component, an Archaeological Inventory Survey Plan will serve to effectively coordinate the effort. The plan will include detailed procedures for the identification, documentation, significance evaluation, and assessment of the Project's effects on archaeological resources for each component (per the requirements of Hawai'i Administrative Rules (HAR) Chapter 13-275 and 13-276). Preparation of the Archaeological Inventory Survey Plan will include, as appropriate, additional background research for each construction components. The plan will be reviewed and approved by SHPD and appropriate project stakeholders, as described in the Project's MOA. This will ensure appropriate agency and stakeholder review of the proposed archaeological resource identification effort for each construction component. The Archaeological Inventory

Survey Plan will describe the sampling strategy for all surface and subsurface investigations.

Because the Project covers such a large area and so many different environments, archaeological inventory survey methods will have to be developed for each project component. A combination of traditional archaeological research methods, such as a pedestrian surface survey, archaeological backhoe testing, and controlled excavation testing, will be used. Additionally, less traditional archaeological methods will likely be employed, such as paleoenvironmental coring with associated laboratory work, inspection and interpretation of construction-related geotechnical boring logs, and ground-penetrating radar (GPR).

6.2.2 Ground-Penetrating Radar

GPR is a near-surface geophysical remote sensing method used for the identification and mapping of buried archaeological resources, among many other uses. At least archaeologically, this method has not been used extensively in Hawai‘i. The method generates the best results when used to identify and map subsurface features up to 10 feet beneath the surface (Conyers *in press*).

Conyers and Connell (*in press*) describe the GPR method as follows:

> The GPR method functions by measuring the elapsed time between when pulses of radar energy are transmitted from a surface antenna, reflected from buried discontinuities, and then received back at another surface antenna (Conyers 2004). When paired antennas are moved along transects on the ground surface, two-dimensional profiles of buried stratigraphy can be produced by stacking many hundreds or thousands of reflections together to produce what are termed reflection profiles. Changes in the strength (measured as wave amplitudes) and the geometry of the reflections in profiles can then be related to the distribution and orientation of subsurface units and features of interest. These changes might be stratigraphic layers, archaeological materials, or a variety of other objects or biogenic disturbances in the ground (Conyers 2006). Many tens or sometimes hundreds of reflection profiles, collected in a grid can then be analyzed within a three-dimensional “cube” of reflection data as a way to produce complex images of buried materials (Conyers 2004 [148]) in ways not possible using other near surface geophysical methods (Johnson 2006) . . .
>
> The success of GPR surveys is to a great extent dependent on soil and sediment mineralogy, clay content, ground moisture, depth of burial, surface topography, and vegetation (Conyers *in press*).

Conyers and Connell’s (*in press*) recent paper “*An Analysis of Ground-Penetrating Radar’s Ability to Discover and Map Buried Archaeological Sites in Hawai‘i”* studied the effectiveness of GPR in various field conditions and sedimentary contexts including carbonate sand dunes, weathered basalt soils, and basalt rock and rubble. Results indicate that although GPR results in Hawai‘i have been mixed in the past,

recent advances in GPR technology reveal that GPR may be increasingly effective in many different Hawaiian environments and sediment types (Conyers *in press*).

6.2.3 Archaeological Inventory Survey

Following the approved Archaeological Inventory Survey Plan, appropriate investigation will be conducted for each construction component. As appropriate, this will include intensive surface pedestrian surveys and extensive and intensive subsurface testing using many different methods (e.g., backhoe trenching, coring, shovel tests, controlled test excavations, potentially limited controlled areal excavation, and GPR).

For larger land areas associated with the Project such as the park-and-ride facilities, transfer centers, and maintenance and storage facilities, systematic pedestrian surface surveys may be required as part of the archaeological inventory survey effort. This is particularly true for the large undeveloped park-and-ride facilities, transfer centers, and maintenance and storage facilities in the `Ewa end of the Project. For the elevated railway's alignment, where ground disturbance would be limited to specific support column locations, the archaeological inventory survey effort will likely be more narrowly focused on the specific support column footprints.

Along most of the elevated railway's alignment, there will be no surface indications of potential archaeological resources from the area's prior development, for example along and within paved city streets. Therefore, the concern will be subsurface archaeological deposits. Accordingly, in these areas, the archaeological inventory survey effort will focus on subsurface testing to evaluate the presence or absence of archaeological resources. Where appropriate and feasible based on the environment (considering traffic, etc.), subsurface testing will be conducted in conjunction with GPR analysis. For subsurface testing along the elevated railway's alignment, a sampling strategy will be developed to test a representative portion of the Project's support columns.

The general approach regarding GPR will be to test the GPR's ability to locate subsurface archaeological deposits, including burial deposits—which are particularly sensitive to the Native Hawaiian community—in the different sediment types through which the Project crosses. GPR analysis will be done first, before excavation. Excavation results following GPR analysis will provide a means of "ground-truthing" the GPR results and evaluating GPR's ability to locate buried archaeological deposits. These results will greatly help evaluate GPR's archaeological utility in different sedimentary environments along O'ahu's south shore.

6.2.4 Archaeological Data Recovery

Archaeological data recovery is the method of extracting important information from archaeological resources to alleviate the resources' destruction by a project. Data recovery research questions and methods are particular to the types of archaeological resources being mitigated. Typically, a detailed data recovery plan is written and approved by SHPD and describes the data recovery investigation's

research questions, data requirements, and methods for acquiring the needed information to answer research questions. Once the archaeological investigation is complete, a data recovery report is written to document all results. Many of the same methods used in archaeological inventory surveys would be used in data recovery programs.

6.2.5 Archaeological Monitoring

Archaeological monitoring is done to mitigate (and hopefully negate) the impact of a development on as-yet-unidentified or incompletely documented archaeological resources. The goal is to document exposed archaeological resources and, for the most important resources, potentially save them from destruction. Archaeological monitoring can be used as a form of archaeological resource identification or mitigation, or as a post-mitigation contingency measure to collect additional information or protect extant archaeological resources. Although archaeological monitoring can be research driven, salvage is often the driving force. Typically, archaeological monitoring programs follow an archaeological monitoring plan that outlines the construction methods and impacts of the proposed project, the types of archaeological resources expected, and the archaeological methods to be used to document the resources encountered. A monitoring report is prepared with all results.

6.2.6 Preservation of Archaeological Resources

Archaeological preservation is the avoidance of archaeological resources and their protection and safeguarding in place. Archaeological preservation can include active interpretation of the archaeological resource, for example with signage and other forms of public interpretation. More basically, it can entail conservation of the resource through avoidance. Preservation strategies and methods differ depending on the type of archaeological resource encountered. With flexibility in the location of the individual elevated railway support columns, preservation in place of archaeological deposits identified during the archaeological inventory survey is an option. Typically for archaeological resources to be preserved in place, a preservation plan is written describing the archaeological resources and the preservation measures to be enacted. A single preservation plan would likely be required for each construction component that has archaeological resources to be preserved. Once approved by SHPD, the plan is implemented during project construction. If archaeological resources are found during project construction, preservation is a much more difficult form of mitigation to carry out. .

6.2.7 Burial Treatment

Because there is a reasonable potential for burials, particularly Native Hawaiian burials, to be disturbed by project construction, the Project's program for the treatment of burials should be proactive and conscientious. Early consultation with the O'ahu Island Burial Council is appropriate regarding the potential discovery of Native Hawaiian burials. As a unique class of archaeological resource, burial

treatment must be conducted following the specific guidelines of State and Federal burial law. Should the Federal or Department of Hawaiian Home Lands be involved, Native American Graves Protection and Repatriation Act guidelines would need to be followed. Because most, if not all of the Project would be on private, municipal, or State lands, the guidelines of State burial law (HRS 6E-43 and HAR 13-300) should be followed for most of the Project.

As appropriate—and in consultation with the project proponents, the O'ahu Island Burial Council, SHPD, and recognized lineal and/or cultural descendants—a burial treatment plan should be developed for each construction component. This plan should outline the treatment for all previously identified burials (those found during the archaeological inventory survey) and make suggestions for the treatment of inadvertent burial finds (burials encountered by the Project during construction). Inadvertent burials to be preserved in place will need to be documented with a burial site component of an archaeological preservation plan. Inadvertent burials to be relocated will need to be documented with a burial site component of an archaeological data recovery plan.

6.3 Discussion by Sub-Area of Likely Archaeological Inventory Survey and Mitigation Requirements

Potential project consequences and the effort required for archaeological resource identification, significance evaluation, and mitigation are directly related. For example, where project impacts to archaeological resources are likely to be high, the effort associated with the Project's archaeological resource identification and mitigation is likely to be high as well. Table 5-1 summarizes archaeological consequences by the various archaeological sub-areas. These High, Moderate, and Low assessments for archaeological effects also serve as an assessment for the likely archaeological inventory survey and mitigation needs for each sub-area.

6.3.1 Honouliuli Sub-Area (partially within planned extension)

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has the lowest potential to affect pre-contact and post-contact archaeology and burials (Table 5-1). The sub-area has been heavily altered by historic and modern commercial agriculture over the last 125 years. As depicted on Figure A-3, nearly all of the sub-area has been part of prior archaeological investigations. The most commonly recorded archaeological resources in the sub-area's vicinity are post-contact remnants of plantation, ranching, and transportation infrastructure.

Based on available information, it is reasonable for the Honouliuli sub-area's archaeological inventory survey effort to be more modest compared to other project sub-areas. The effort should be more extensive rather than intensive, and should focus on further verifying the current assessment that project construction in this sub-area would have a relatively low potential to affect archaeological resources.

The sub-area's archaeological inventory survey should focus on a systematic pedestrian inspection of the undeveloped portions of the sub-area. This should include the portions of the fixed guideway alignment that do not traverse existing City and County of Honolulu or State of Hawai'i roadways, and the larger land areas of the sub-area's potential park-and-ride facilities and maintenance and storage facilities.

Throughout much of the sub-area's length, the potential exists for encountering limestone sinkholes buried beneath alluvial sediments. As part of the sub-area's archaeological inventory survey, limited subsurface testing with a backhoe should be carried out within the Project's construction footprint (e.g., at the location of specific elevated railway support columns or the location of buildings and structures associated with the sub-area's potential park-and-ride facilities and maintenance and storage facilities). This limited subsurface testing should be carried out in conjunction with GPR analysis to test GPR's utility to detect subsurface archaeological features and limestone sinkholes beneath the sub-area's alluvial sediments.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.2 Farrington Highway Sub-Area

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a Moderate potential to affect pre-contact and post-contact archaeology and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be Moderate.

Nearly the entire sub-area has been completely developed with roadways, businesses, and residences. Two exceptions are the potential maintenance and storage facility located 'Ewa of the Leeward Community College Station and the potential park-and-ride adjacent to the Pearl Highlands Station. The maintenance and storage facility is the location of the `Ewa Junction Navy Fuel Drum Facility (SIHP #50-80-09-6764), which has been the subject of previous archaeological investigations (Rainalter 2006; Rechtman 1998) (Figure A-6). These prior investigations indicate that this relatively large land area has been greatly disturbed by WWII-era and later development. The Pearl Highlands Station potential park-and-ride is located along the margins of Waiawa Stream and shows less evidence of modern development. Aerial photographs of this area show only a few buildings and structures.

Because of the disturbed and developed condition of most of the sub-area, only a limited systematic pedestrian inspection is recommended for this sub-area's archaeological inventory survey. This surface inspection should focus on the

potential park-and-ride and maintenance and storage facility described previously. Because there is so little potential for surface archaeological resources throughout most of the sub-area, most of the archaeological inventory survey effort should focus on subsurface testing, with a particular focus on the central portion of the sub-area around the Waipahu Transit Center Station. Centered around Waikele and Kapakahi Streams (Figure A-4), numerous LCAs with associated habitation, burials, and agricultural lands were once extant in this area (Figure A-5). There have been insufficient prior archaeological investigations within this area to adequately determine whether archaeological resources related to these LCAs are still extant beneath modern developments (Figure A-6).

Subsurface testing should also be conducted near the Pearl Highlands Station and its associated park-and-ride facility. This location along Waiawa Stream is a likely location for subsurface archaeological deposits, as several LCAs were located there (Figure A-5). The subsurface testing program should include GPR analysis prior to excavation, to assess GPR's ability to identify subsurface features in this alluvial environment.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.3 Kamehameha Highway Sub-Area

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a Moderate potential to affect pre-contact and post-contact archaeological resources and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be Moderate.

The Kamehameha Highway sub-area is in an area that until the mid-19th century was used by traditional Hawaiians for agriculture and habitation. The entire sub-area is completely developed with modern roadways, residences, businesses, and parking lots. Aerial photographs show that Waimalu Stream, at the center of the sub-area, and Kalauao and 'Aiea Streams, at the Koko Head end of the sub-area, are all channelized with development along their banks (Figures A-7 and A-9).

Because the entire sub-area is disturbed and/or developed, there is little potential to find surface archaeological resources. Accordingly, a systematic pedestrian inspection is not recommended for this sub-area's archaeological inventory survey. Instead, the effort should focus on subsurface testing, including GPR analysis, within the Project's construction footprint. Due to the broad yet even distribution of LCAs along this sub-area, coupled with the presence of two documented cemeteries, a specific area of focus cannot be applied to this sub-area (Figure A-8 and Figure A-9). This sub-area has the potential to contain preserved archaeological

resources including the remnants of fishponds, agricultural fields, habitations, and burials.

Project geotechnical boring logs should also be consulted, if available for this area, because they may provide useful information on the depth of modern fill layers and the sediments immediately beneath them. Geotechnical boring log information may also help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.4 Salt Lake Sub-Area

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a Moderate potential to affect pre-contact and post-contact archaeology and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be Moderate.

The majority of the Salt Lake sub-area is relatively inland from the coast and passes through an area that, based on available evidence, was not intensively used for agriculture or habitation in the pre-contact and early post-contact eras. The entire sub-area is completely developed with modern roadways, residences, businesses, and parking lots. Aerial photographs show that North Hālawa Stream at the `Ewa end of the sub-area is channelized with development along its banks. At the Koko Head end of the sub-area, Moanalua Stream appears less modified by channelization (Figures A-10 and A-11).

Because all of the sub-area is disturbed or developed, there is little potential to find surface archaeological deposits. Accordingly, a systematic pedestrian inspection is not recommended. Instead, the effort should focus on subsurface testing within the Project's construction footprint. This subsurface effort, including GPR analysis, should focus on the fill around the makai portions of Moanalua and Kalihi Streams (Figure A-10). This area has the potential to contain preserved archaeological resources including the remnants of fishponds, agricultural fields, habitations, and burials. Project geotechnical boring logs should be consulted, if available for this area, because they may provide useful information on the depth of the fill layers and the sediments immediately beneath them. Geotechnical boring log information may help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment,

preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.5 Airport Sub-Area

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a Moderate potential to affect pre-contact archaeological resources and a Low potential to affect post-contact archaeological resources and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is thought to be Moderate.

This sub-area is in a location that once consisted of low-lying tidal flats used by pre-contact traditional Hawaiians for constructing fishponds and salt ponds. A majority of the sub-area is developed with modern roadways, residences, businesses, and parking lots. The exception is the potential park-and-ride facility at the Aloha Stadium (Kamehameha Highway) Station, which currently consists of an open grassy field. Aerial photographs show that the North Hālawa Stream at the `Ewa end of the sub-area is channelized with development along its banks. At the Koko Head end of the sub-area, Moanalua Stream appears less modified by channelization (Figures A-13 and A-14).

Because of the disturbed and developed condition of most of the sub-area, only a limited systematic pedestrian inspection is recommended. This surface inspection should focus on the potential park-and-ride facility described previously. Because there is so little potential for surface archaeological resources throughout most of the sub-area, most of the archaeological inventory survey effort should focus on subsurface testing, including GPR analysis, particularly in the 'Ewa portion of this sub-area. In this portion, traditional Hawaiian fishponds and lo'i are known to have existed around Pearl Harbor and near Moanalua Stream, which was a pre-contact and early post-contact population center (Figures A-13 and A-15). These areas have the potential to contain preserved archaeological resources including the remnants of fishponds, agricultural fields, habitations, and burials located beneath modern fill layers.

Project geotechnical boring logs should also be consulted, if available for this area, because they may provide useful information on the depth of the fill layers and the sediments immediately beneath them. Geotechnical boring log information may help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.6 Dillingham Sub-Area

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a High potential to affect pre-contact archaeological resources, post-contact archaeological resources, and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be High.

This sub-area is in an area that was intensively used by pre-contact and early post-contact traditional Hawaiians for habitation, agriculture, and aquaculture in man-made fishponds constructed along the coast. The entire sub-area is completely developed with modern roadways, residences, businesses, and parking lots. Aerial photographs show that all three streams that cross this sub-area (Kalihi, Kapālama, and Nu'uanu) are channelized with development along their banks (Figures A-16 and A-18).

Because the entire sub-area is disturbed or developed, there is little potential to find surface archaeological resources. Accordingly, a systematic pedestrian inspection is not recommended. Instead, the effort should focus on subsurface testing, including GPR analysis, within the Project's construction footprint. This effort should focus on the portions of the sub-area between Kalihi Stream and Laumaka Street and between Waiakamilo Street and Nu'uanu Stream. These areas have had limited archaeological investigation and contain dense clusters of LCAs, indicating pre-contact and early post-contact traditional Hawaiian land use (Figures A-17 and A-18). These areas have the potential to contain preserved archaeological resources including the remnants of fishponds, agricultural fields, habitations, and burials located beneath modern and historic fill layers.

Project geotechnical boring logs should also be consulted, if available for this area, because they may provide useful information on the depth of the fill layers and the sediments immediately beneath them. Geotechnical boring log information may also help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.7 Downtown Sub-Area

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a High potential to affect pre-contact and post-contact archaeology and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be High.

Background research has indicated that Downtown Honolulu was intensively used by pre-contact and early post-contact Hawaiians for agriculture, aquaculture, and habitation. There are many historic structures in this sub-area, especially in the Chinatown Historic District at the ʻEwa end. Subsurface post-contact deposits adjacent and below buildings in this district would be considered archaeological resources, but the present surface structures are not considered to be archaeological features and are not discussed in this report. Thus, only a limited pedestrian surface survey of the sub-area should be required, and the inventory survey should instead focus on subsurface remains.

The entire sub-area has been completely developed with roadways, businesses, and residences (Figure A-21). More than 60 percent of the sub-area's centerline extends along the middle of Nimitz Highway over fill. Approximately 30 percent extends along Halekauwila Street. In these sections, geotechnical boring information should be used to locate areas with undisturbed natural sediments below modern fill. This would include fishpond sediments, which would be expected near the Chinatown Station in the former area covered by Kāwā and Kūwili Ponds. In areas with undisturbed sediments, archaeological coring could be used to identify fishpond sediments and agricultural areas adjacent to Nuʻuanu Stream. Paleoenvironmental analysis of sediments, pollen, diatoms, and other material may be warranted.

Early post-contact deposits (dating from pre-1810 to the late 19th century) were recorded along Nimitz Highway/Queen Street from Maunakea Street to Fort Street before construction of the Marin Towers, 800 Nuʻuanu, Queen's (Nuʻuanu) Court, and Harbor Court structures. Archaeological testing in this area should focus on the identifying building foundations, walls, and privies and collecting diagnostic (dateable) artifacts.

Numerous pre-contact and early post-contact (pre-20th century) burials, including those of the 1853-1854 Honuakaha Smallpox Cemetery, have been recorded along Halekauwila Street from Punchbowl Avenue to South Street. Testing for intact Jaucus sands in this area should be intensive, to identify likely areas of pre-contact and early post-contact Hawaiian burials.

One area that would allow for broader areal excavations is the Civic Center Station at the Koko Head end of the sub-area, which is currently used as a parking lot. In this area, prior to any excavation, the testing program should include GPR analysis to assess GPR's ability to identify subsurface features, undisturbed Jaucus sands, and burial pits below modern fill. A large block could then be opened, after removal of the fill layers by a backhoe, for areal excavation by hand tools.

Project geotechnical boring logs should also be consulted, if available, for all portions of this sub-area, because they may provide useful information on the depth of the fill layers and the sediments immediately beneath them. Geotechnical boring log information may also help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Based on inventory survey results, potential mitigation could include an archaeological

monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.8 Kaka‘ako Sub-Area

An Archaeological Inventory Survey Plan should be prepared for the Project’s construction component that includes this sub-area. Based on available information, in this sub-area the Project has a High potential to affect pre-contact and post-contact archaeology and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be High.

Approximately 50 percent of this sub-area is aligned with four major roads: Halekauwila, Queen, Kona, and Kapi‘olani Streets (Figure A-24). In the remaining 50 percent of the sub-area, the study area centerline cuts across developed business lots in three sections: near the Kaka‘ako Station; between Halekauwila and Queen Streets; and between Kona Street and Kapi‘olani Boulevard at the Koko Head end. It is unlikely that any surface archaeological features lie within these areas, but a limited pedestrian survey could be conducted.

The major focus of the inventory survey should be on subsurface testing, including GPR analysis, within the Project’s construction column footprints and station footprints. As noted, the proposed location of the Kaka‘ako Station is on a paved lot with buildings. The station area, and the other sections distant from roads, may be more likely to have undisturbed sediments below fill layers. In these areas, coring and backhoe testing may be appropriate.

The Kaka‘ako sub-area is in a location that was characterized by sparse, scattered habitations along the trails, fishponds, and salt pans that characterized the landscape between the two population centers of Kou (Honolulu) and Waikīkī. The majority of pre-contact and early post-contact archaeological resources in the Kaka‘ako sub-area have not been habitation cultural deposits, but clusters of pre-contact burials in Jaucus sand deposits, early post-contact burials in defined cemeteries, and isolated burials of unknown interment date.

In this sub-area, burials have been found in two clusters: along Halekauwila Street between South and Cooke Streets, and along Queen Street between Kamake‘e and Pensacola Streets. These clusters probably reflect the intensity of archaeological studies in certain areas rather than the true distribution of burials. It is highly likely that additional burials would be found in the sub-area, especially between Cooke and Kamake‘e Streets which have not been the subject of intensive archaeological subsurface investigations. Testing for intact Jaucus sands in this area, which includes the Kaka‘ako Station, should be intensive in order to identify likely areas of pre-contact and early post-contact Hawaiian burials.

Subsurface inventory projects have also uncovered fishpond sediments in this sub-area. Project geotechnical boring logs should be consulted, if available for this area, because they may provide useful information on the depth of the fill layers and the

sediments immediately beneath them. Such information may also help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Fishpond sediments are not only important for paleoenvironmental information, but the stable, sandy rims around the ponds also seem to have been a favored spot for Native Hawaiian burials. Paleoenvironmental analysis of core samples from fishpond sediments may be warranted.

The third type of site in the sub-area is 19th to early 20th-century trash dumps. For much of Honolulu's early history, Kaka'ako was considered outside the habitation area of the town, and was thus a convenient place for incinerators, trash dumps, and sanitation stations. The fishponds were also a convenient place for trash dumps when the City ordered that low-lying areas be filled. Archaeological testing in the column footprints would allow for the collection of diagnostic (dateable) historic artifacts.

Based on the inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.9 Mānoa Sub-Area (planned extension)

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a Moderate potential to affect pre-contact and post-contact archaeological resources and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be Moderate.

The Mānoa sub-area is in a location that was used in the pre-contact and early post-contact periods for agriculture and habitation. The entire sub-area is completely developed with modern roadways, residences, businesses, and parking lots (Figures A-25 and A-26).

Because the entire sub-area is disturbed and/or developed, there is little potential to find surface archaeological resources. Accordingly, a systematic pedestrian inspection is not recommended. Instead, the effort should focus on subsurface testing, including GPR analysis, within the Project's construction footprint. This effort should focus on the portion of this sub-area between Isenberg Street and Kalo Place. The fact that this area has not undergone subsurface archaeological investigation and contains a dense cluster of LCAs indicates a potential to encounter archaeological resources, including the remnants of agricultural fields, habitations, and burials located beneath modern fill layers (Figures A-26 and A-27).

Project geotechnical boring logs should also be consulted, if available for this area, because they may provide useful information on the depth of the fill layers and the

sediments immediately beneath them. Such information may also help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

6.3.10 Waikīkī Sub-Area (planned extension)

An Archaeological Inventory Survey Plan should be prepared for the Project's construction component that includes this sub-area. Based on available information, in this sub-area the Project has a High potential to affect pre-contact and post-contact archaeological resources and burials (Table 5-1). Accordingly, based on available information, the required archaeological resource identification and mitigation effort for this sub-area is also thought to be High.

The Waikīkī sub-area is in a location that was intensively used in by pre-contact and early post-contact traditional Hawaiians for agriculture, aquaculture, and habitation. The entire sub-area is completely developed with modern roadways, residences, businesses, and parking lots (Figure A-29).

Because the entire sub-area is disturbed or developed, there is little potential to find surface archaeological resources. Accordingly, a systematic pedestrian inspection is not recommended. Instead, the effort should focus on subsurface testing, including GPR analysis, within the Project's construction footprint. Considering Waikīkī's continuous land use from pre-contact to modern times; the high density of LCAs indicating traditional Hawaiian habitation, fishponds, and agriculture; the presence of abundant Jaucus sand deposits (the preferred interment location of traditional Hawaiians); and the numerous archaeological resources identified, the entire sub-area has the potential to contain archaeological resources including the remnants of agricultural fields, fishponds, habitations, and burials located beneath modern and historic fill layers (Figures A-28, A-29, and A-30).

Project geotechnical boring logs should also be consulted, if available for this area, because they may provide useful information on the depth of the fill layers and the sediments immediately beneath them. Such information may also help select more promising areas for subsurface testing. Based on initial testing results, paleoenvironmental coring and/or sampling, including collecting stratified sediment column samples, may be warranted.

Based on inventory survey results, potential mitigation could include an archaeological monitoring program during project construction, burial treatment, preservation/avoidance of archaeological resources, and/or archaeological data recovery.

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Appendix A
Chapter 4 Maps

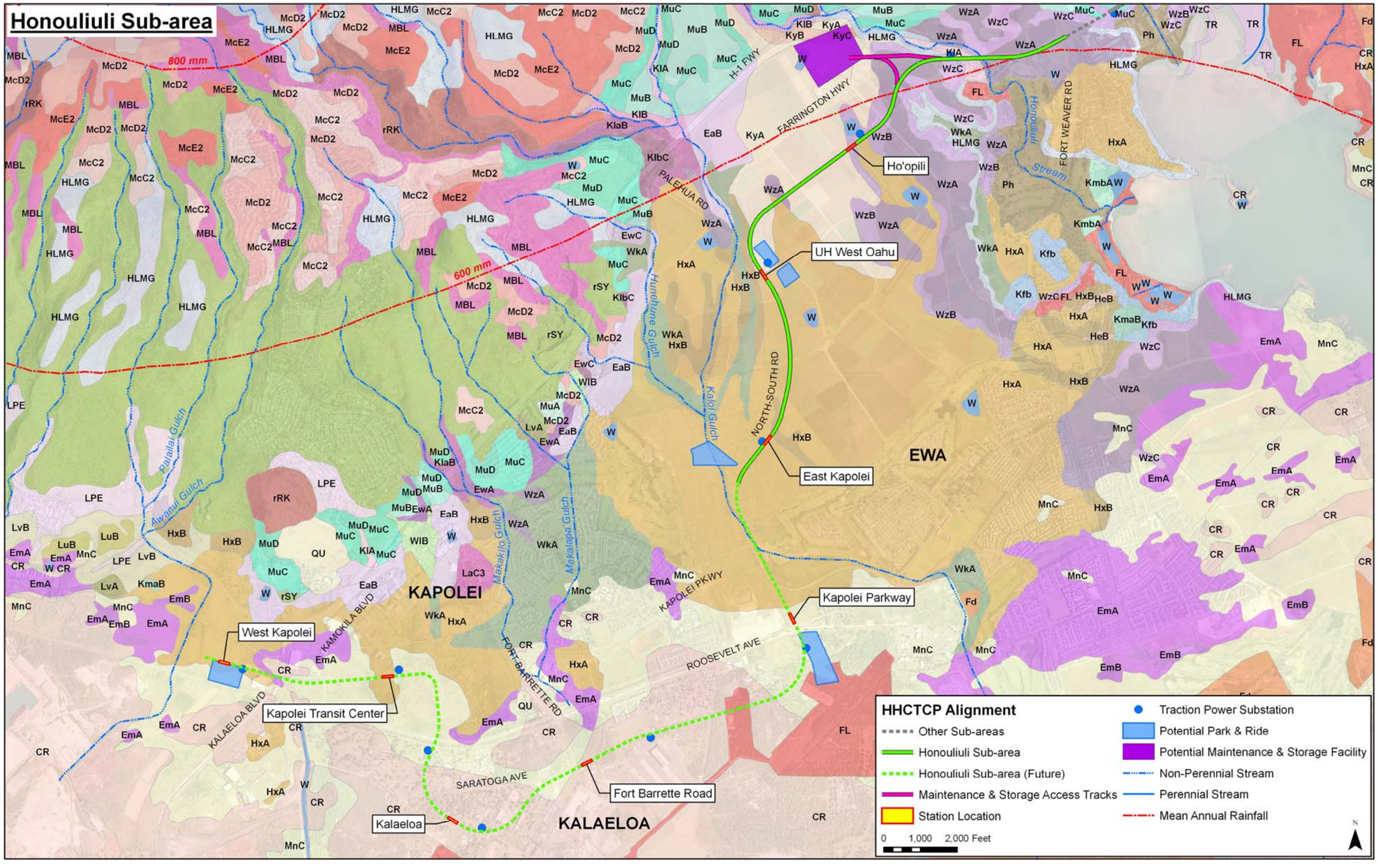

Figure A-1. Honouliuli sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

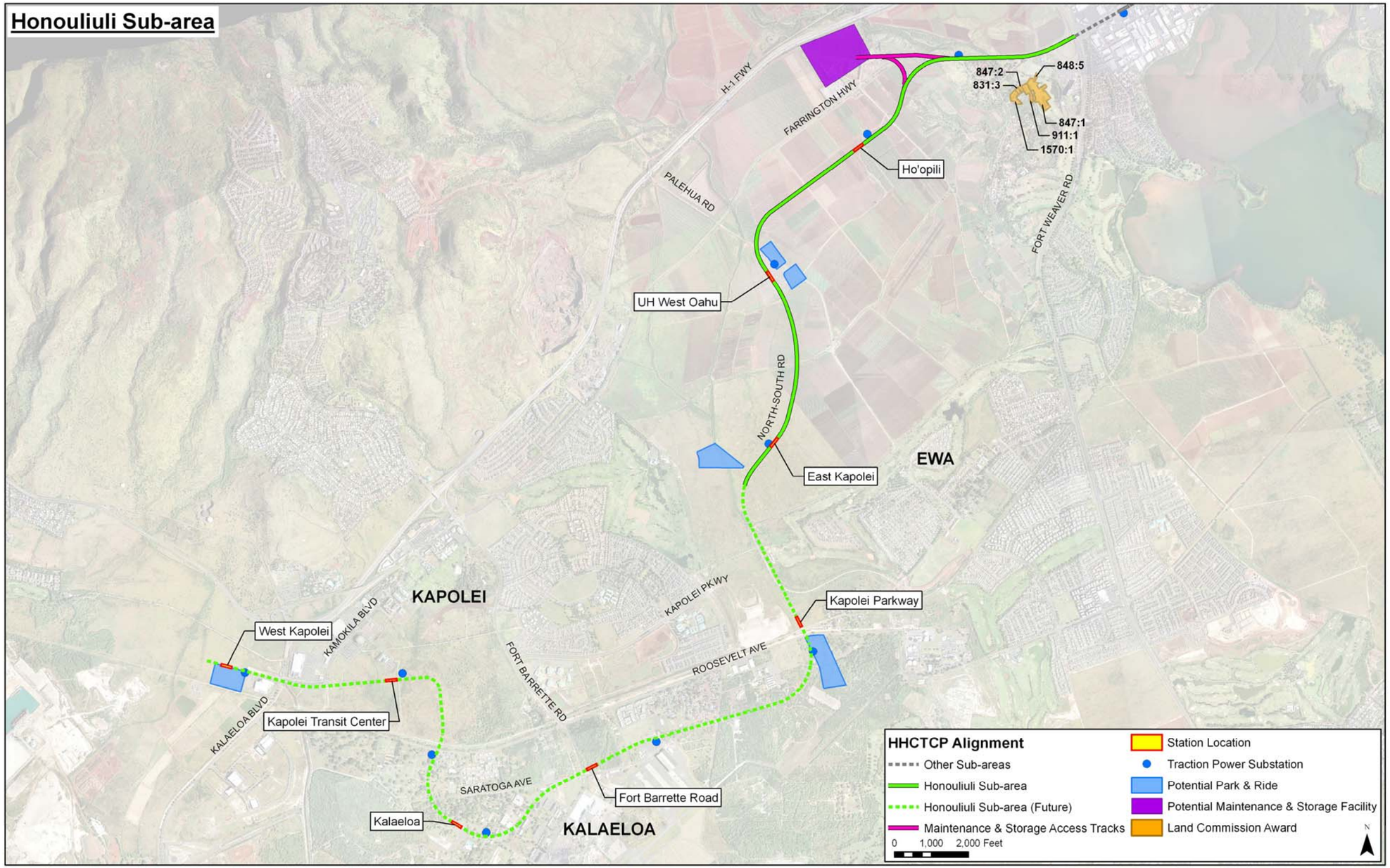

Figure A-2: Honouliuli sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

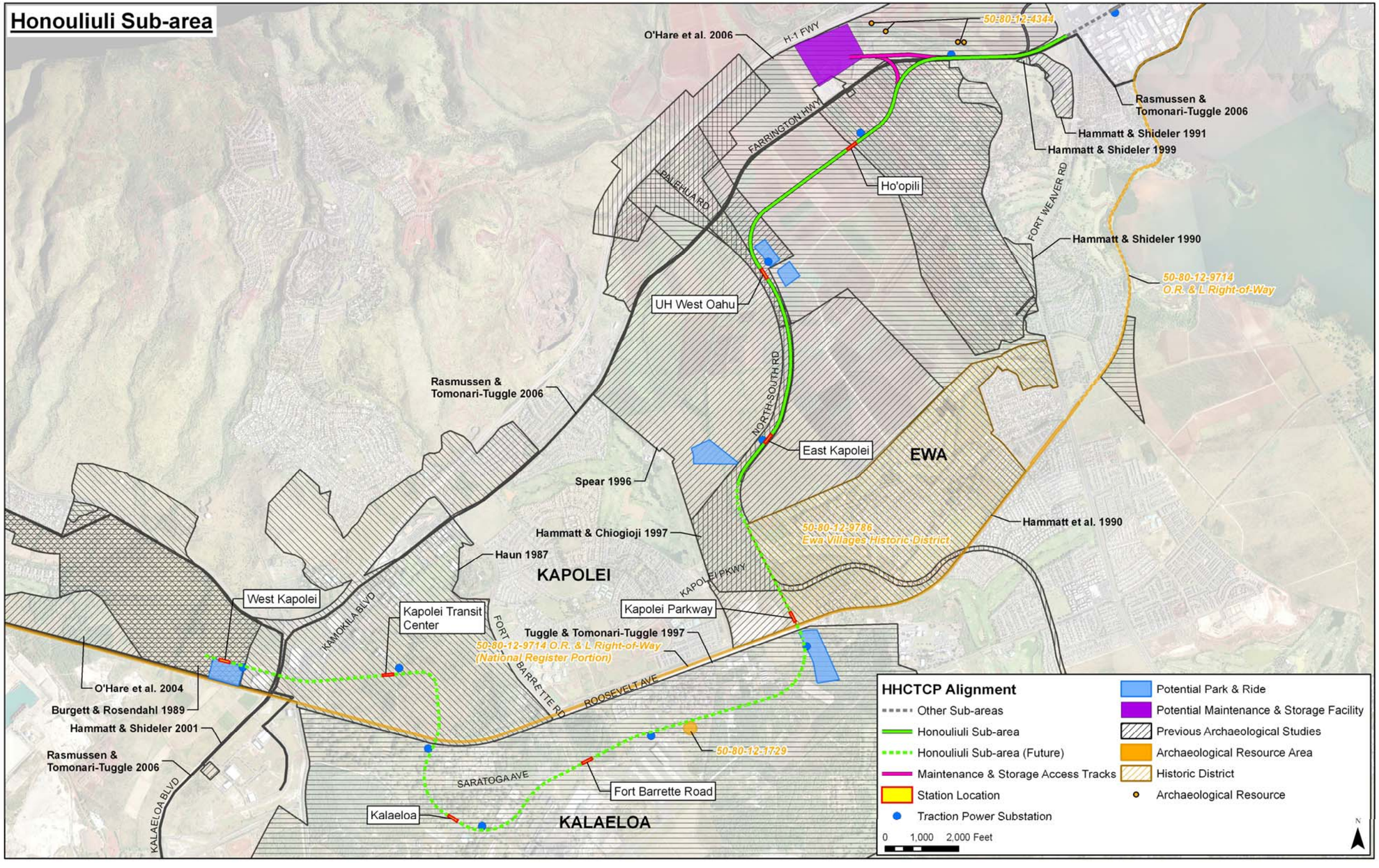

Figure A-3: Honouliuli sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

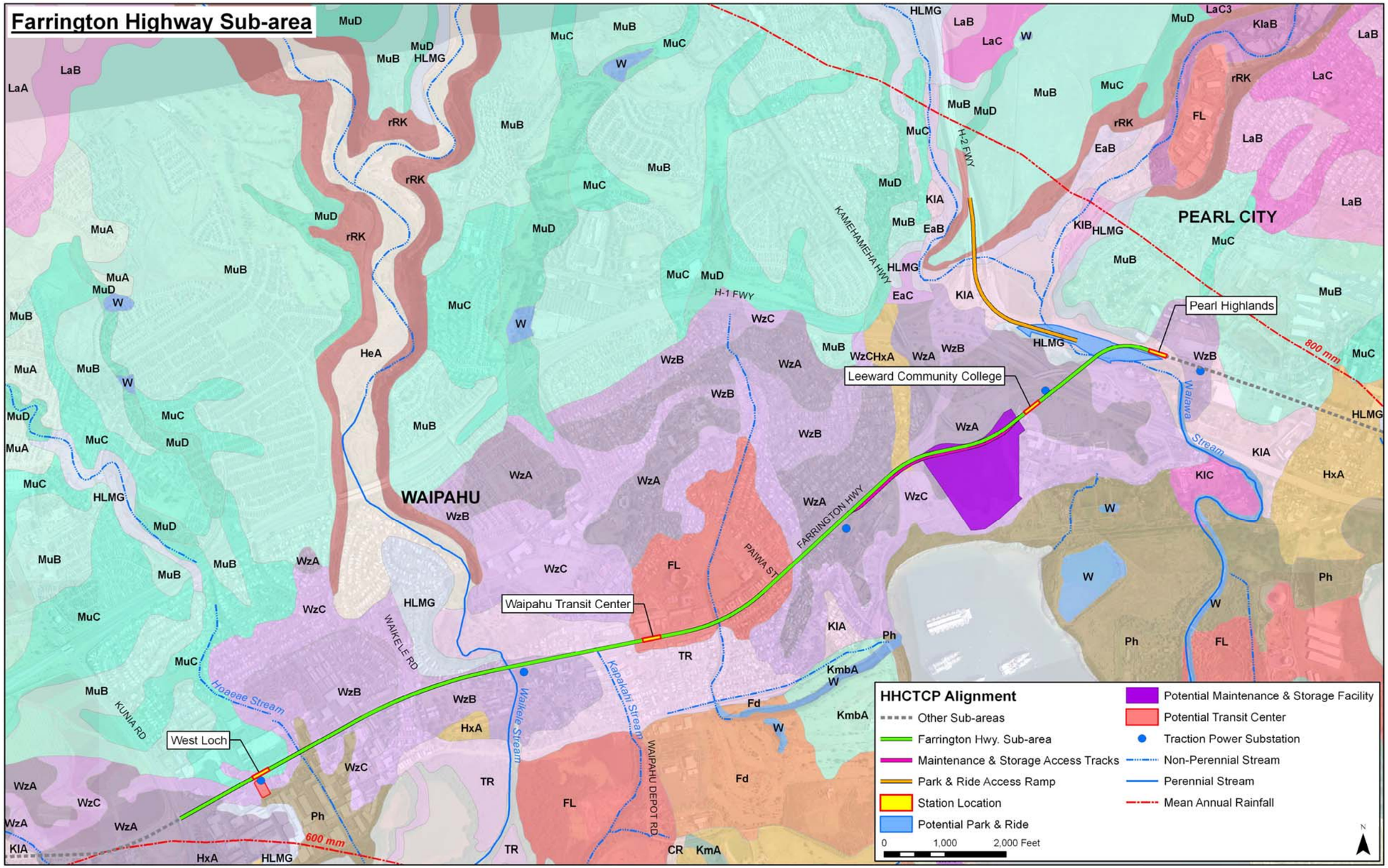

Figure A-4: Farrington Highway sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

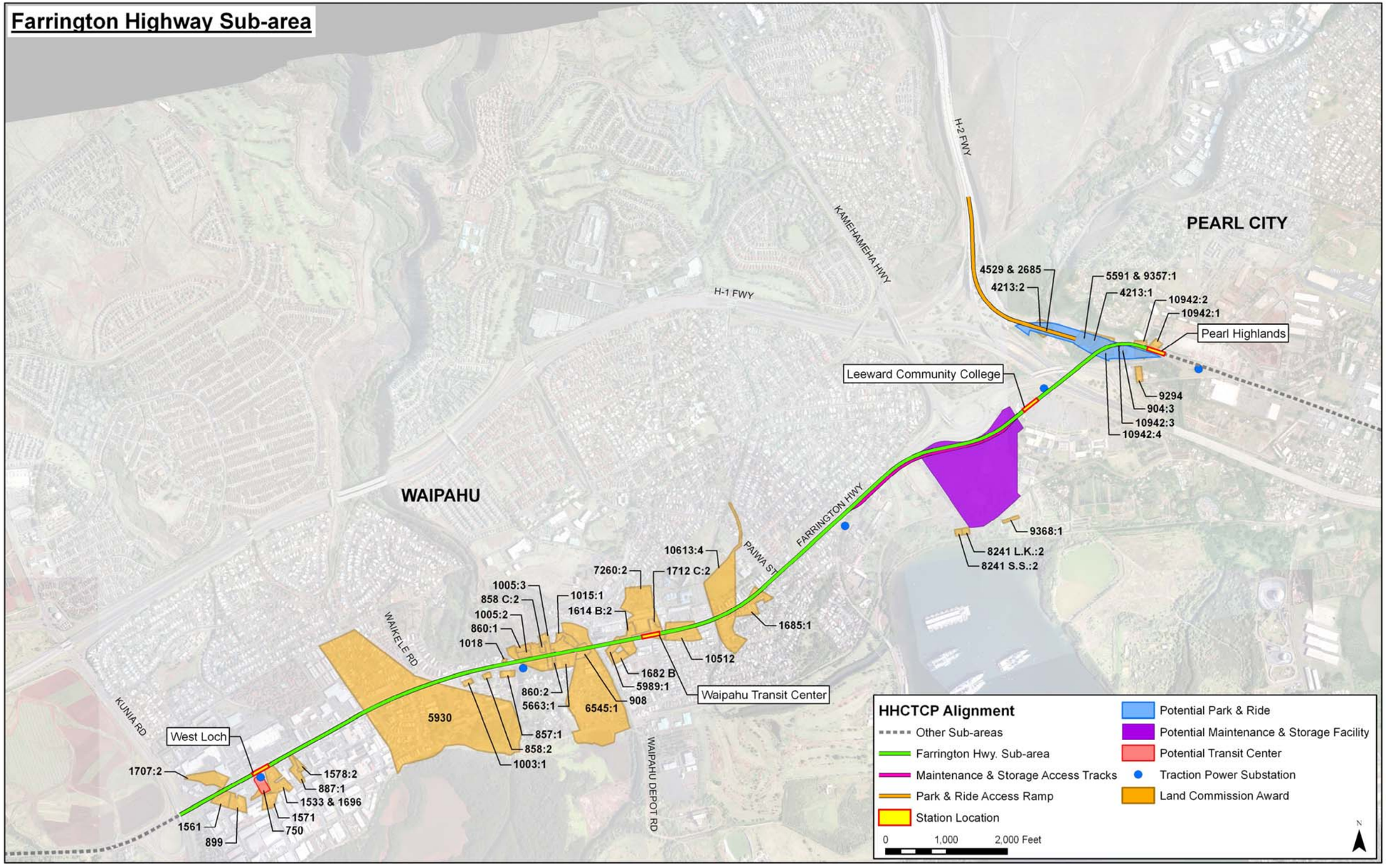

Figure A- 5: Farrington Highway sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

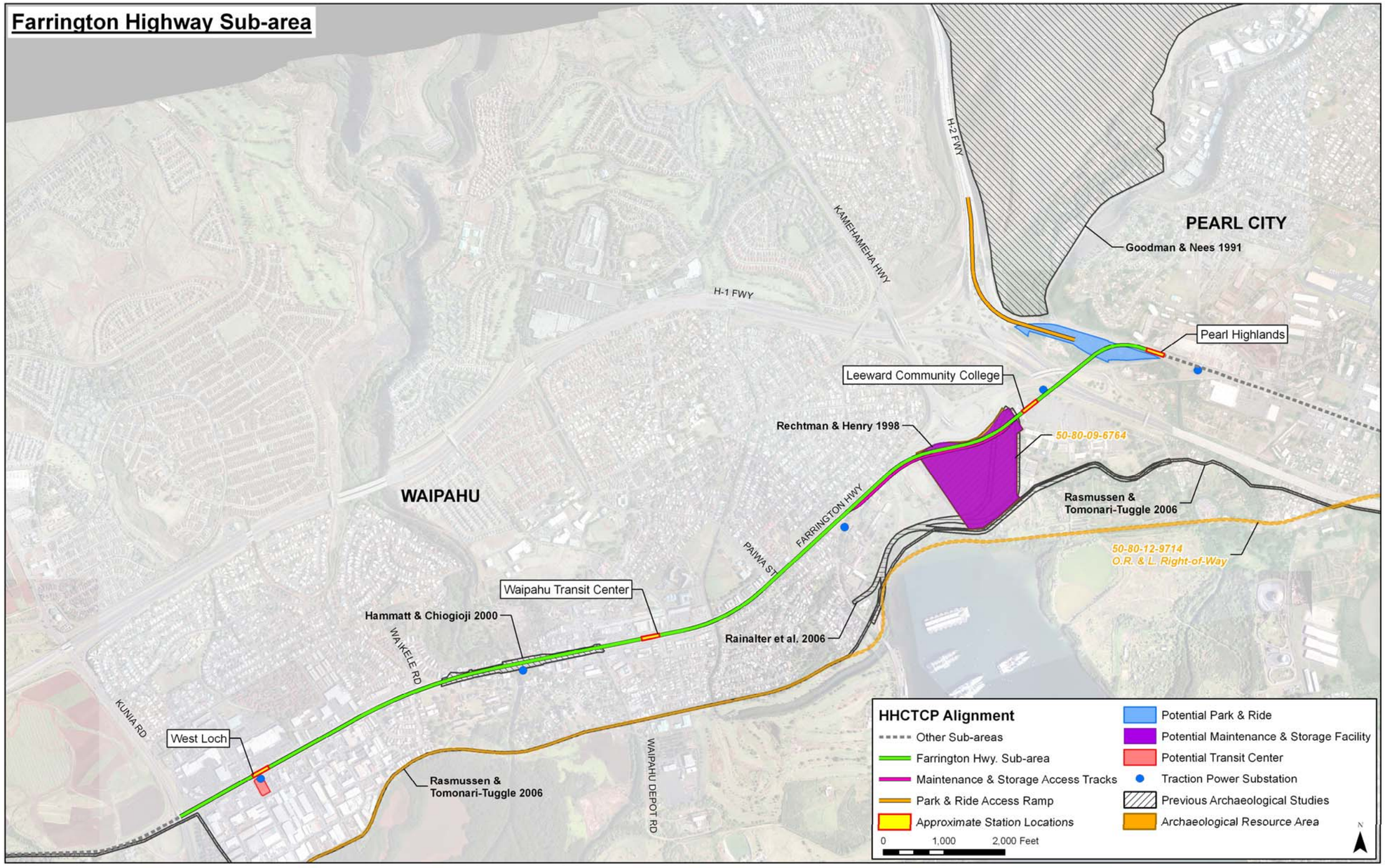

Figure A-6: Farrington Highway sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

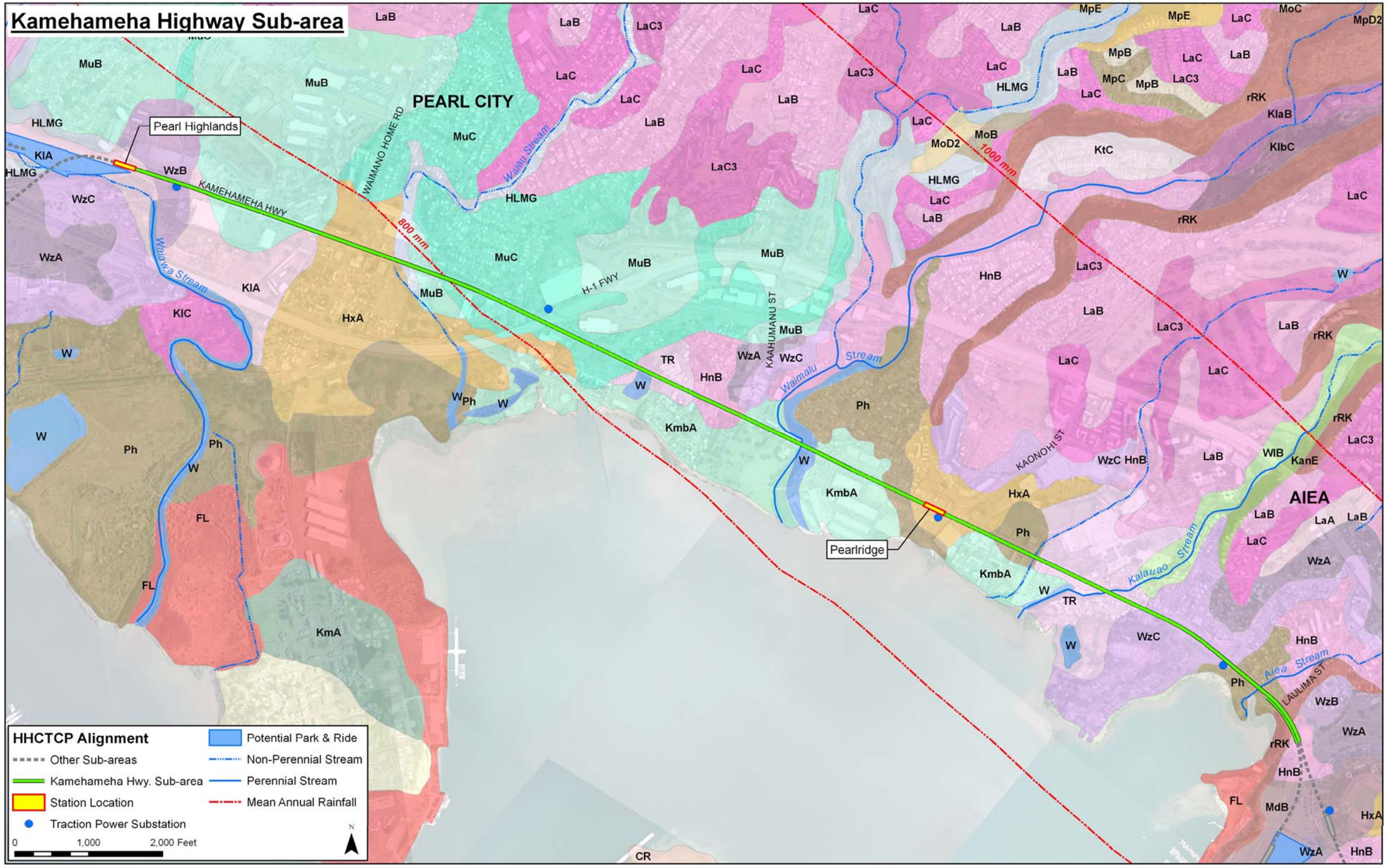

Figure A-7: Kamehameha Highway sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

Figure A-8: Kamehameha Highway sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

Figure A-9: Kamehameha Highway sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

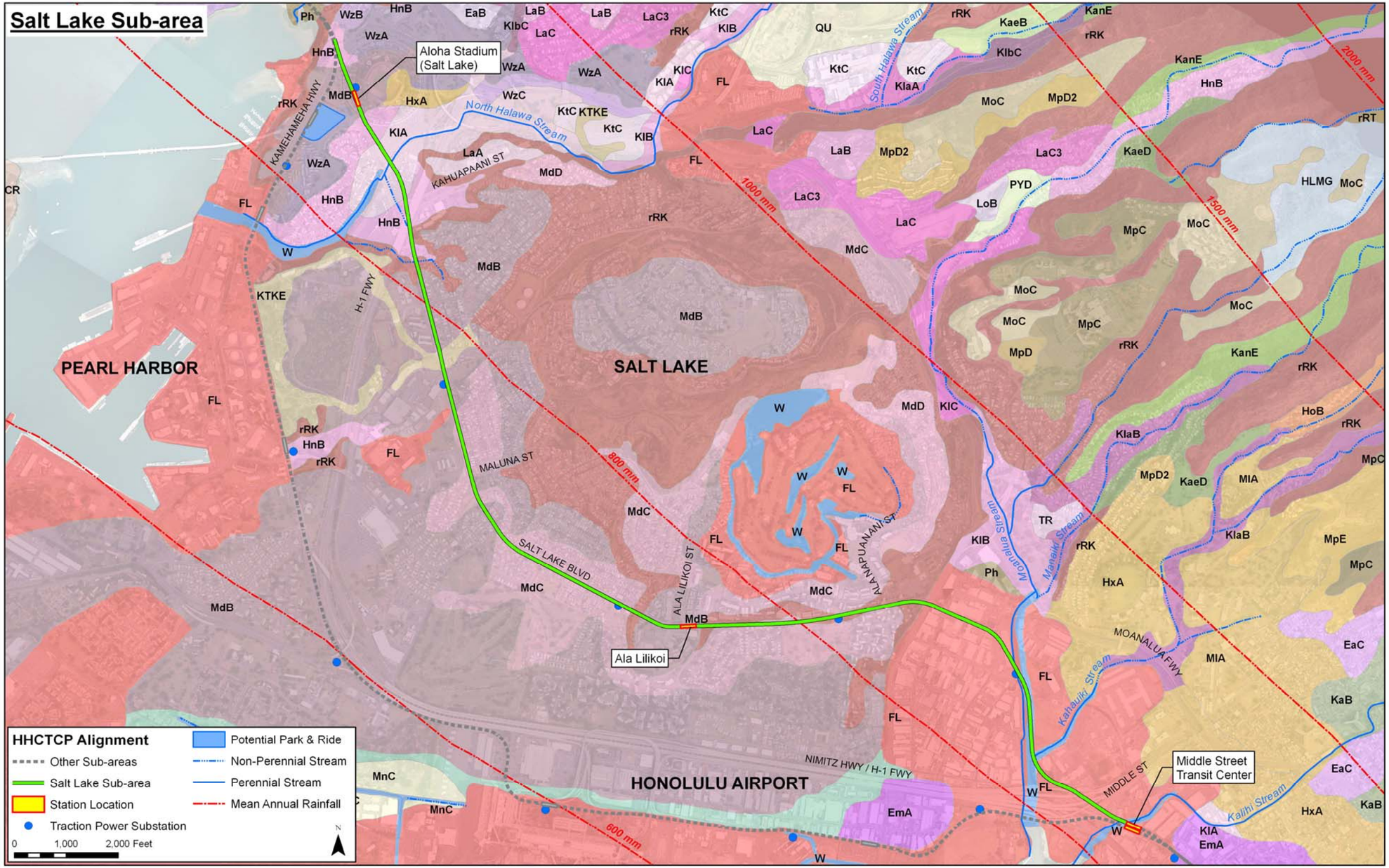

Figure A-10: Salt Lake sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

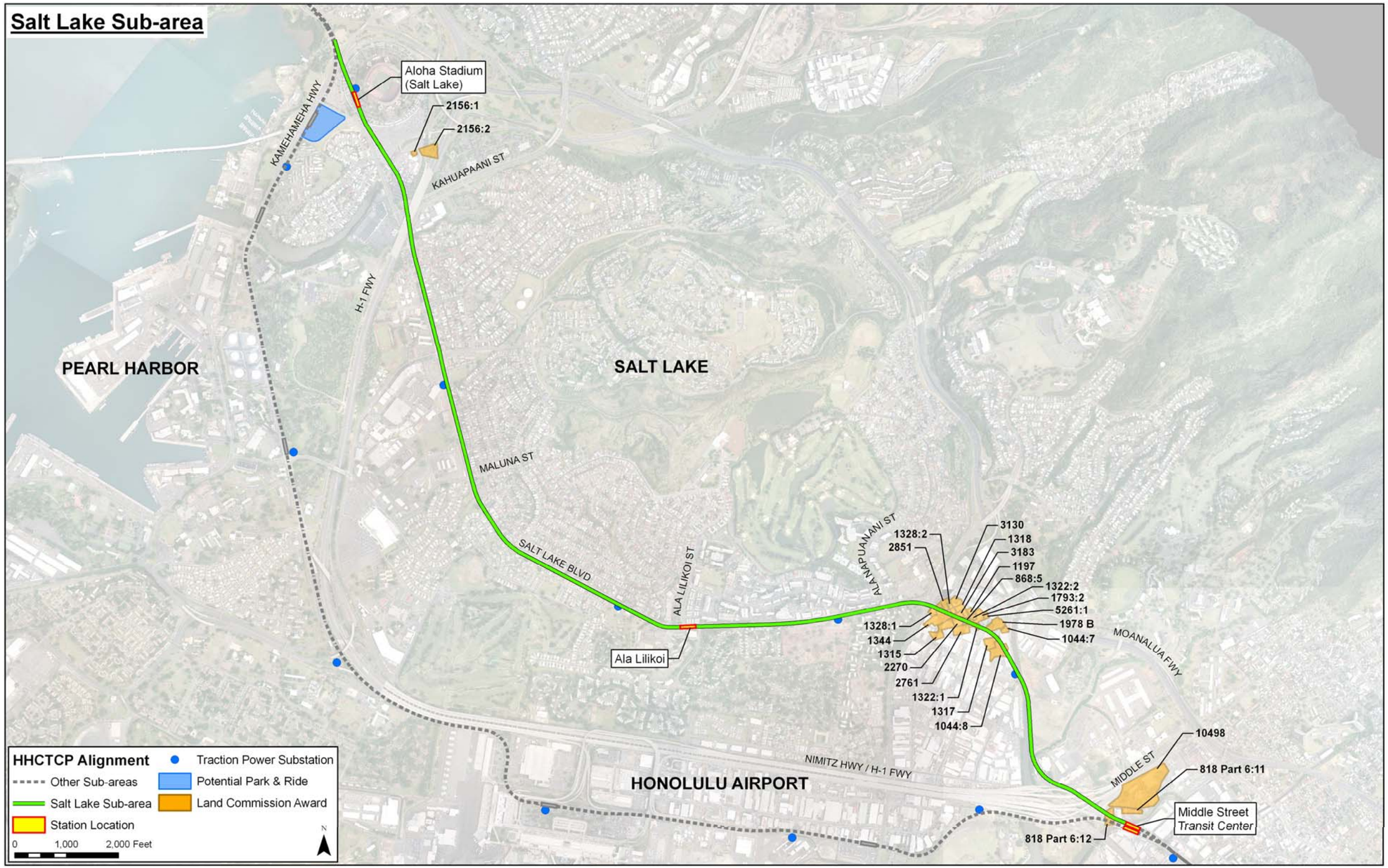

Figure A-11: Salt Lake sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

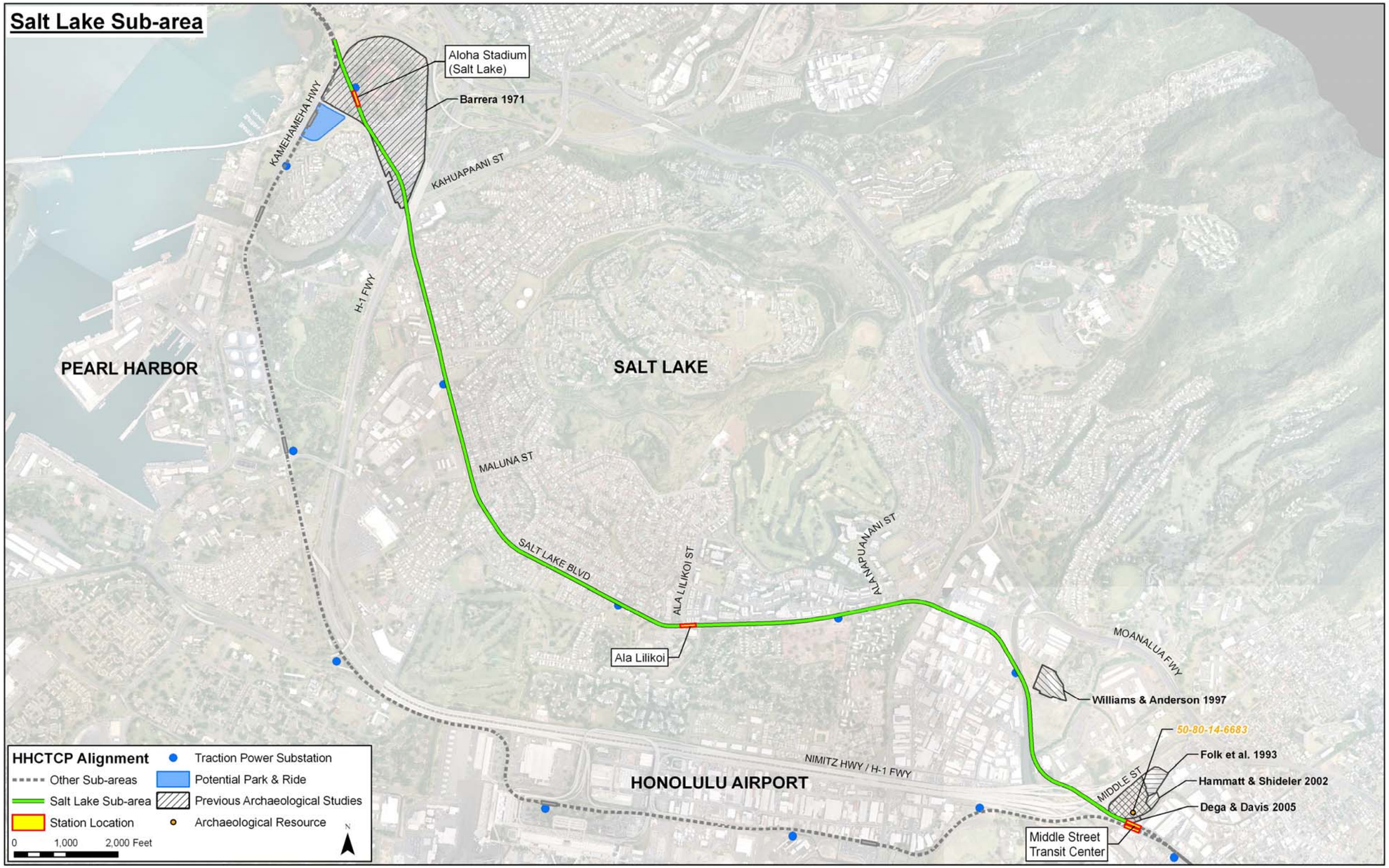

Figure A-12: Salt Lake sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

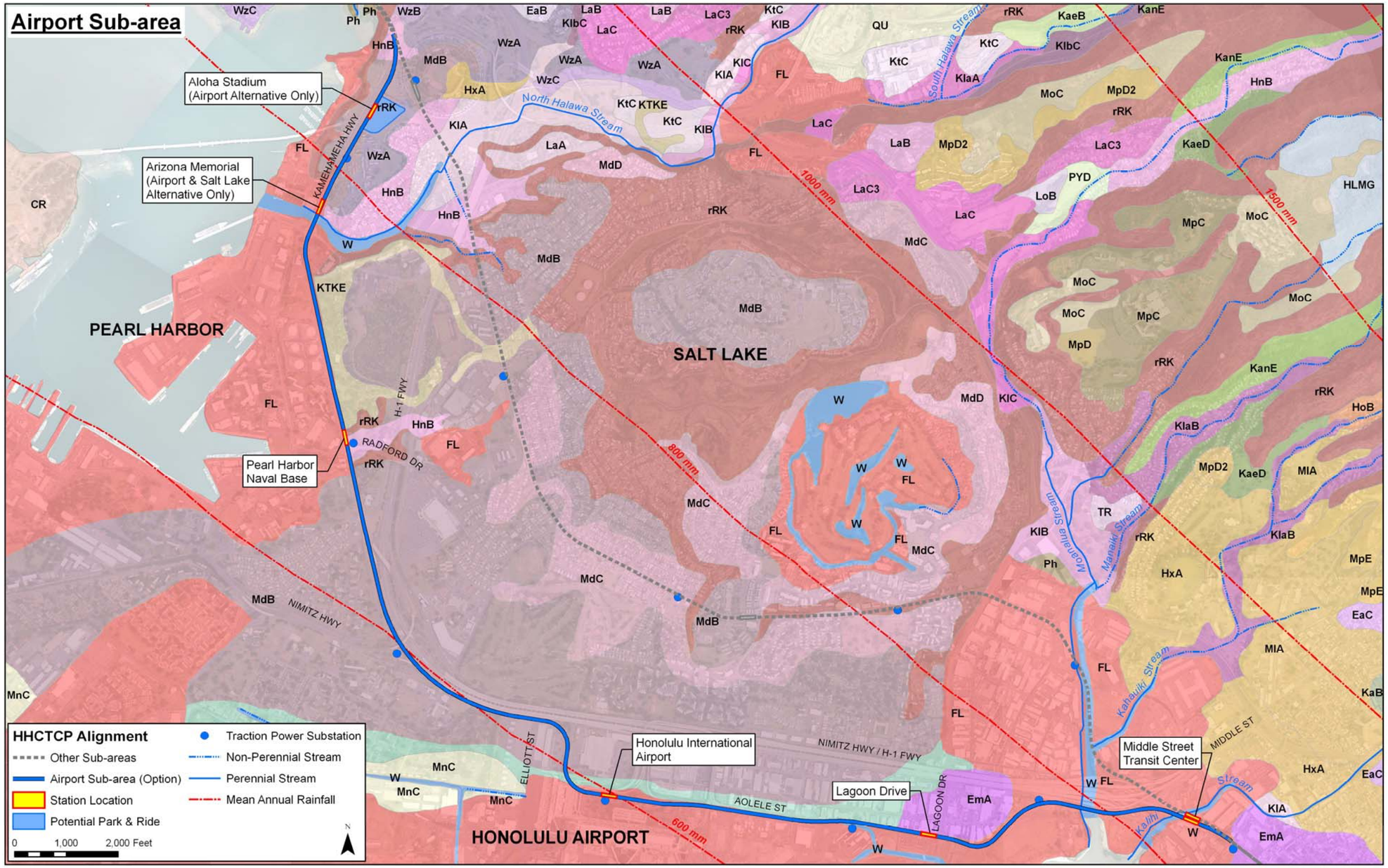

Figure A-13: Airport sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

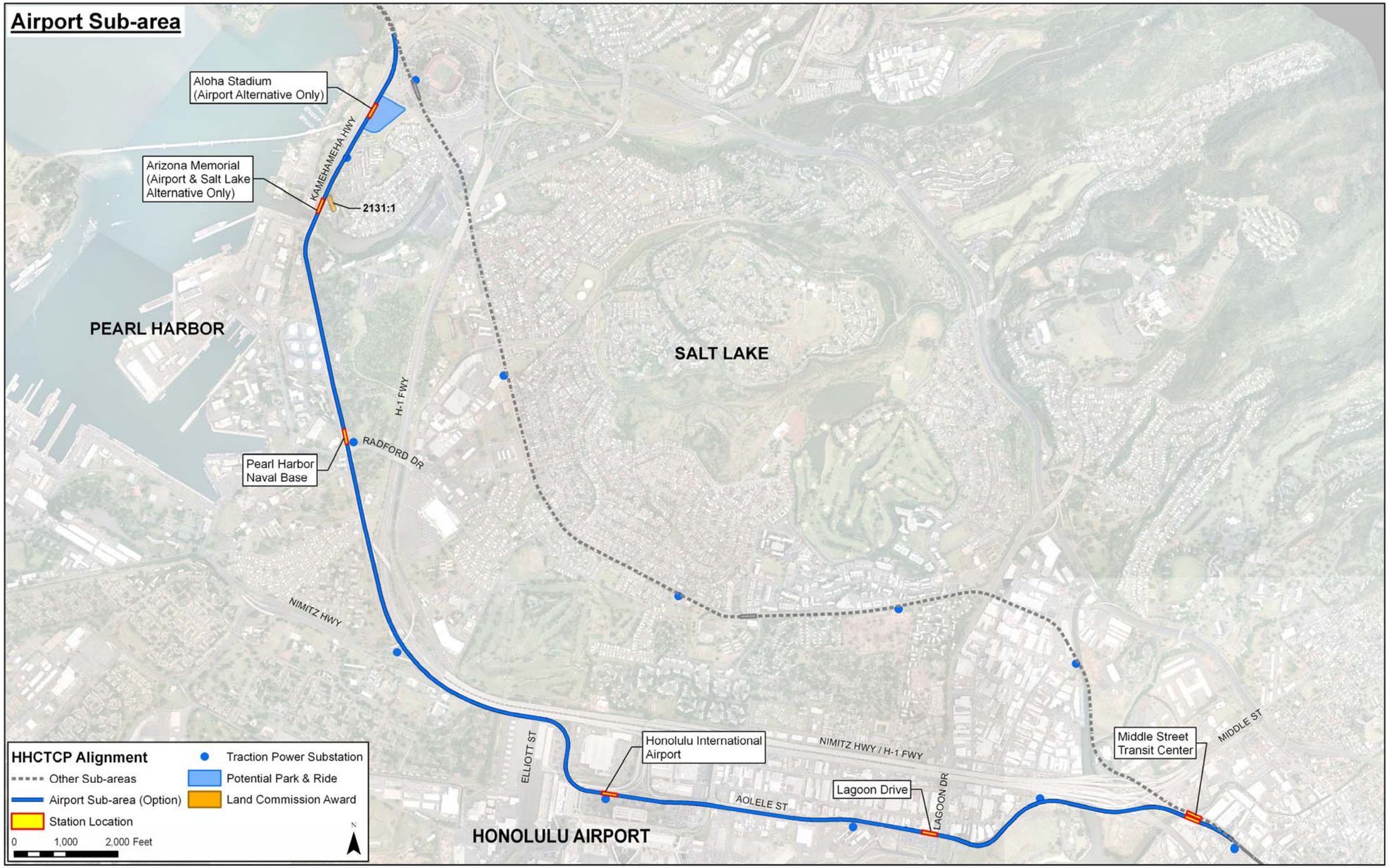

Figure A-14: Airport sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

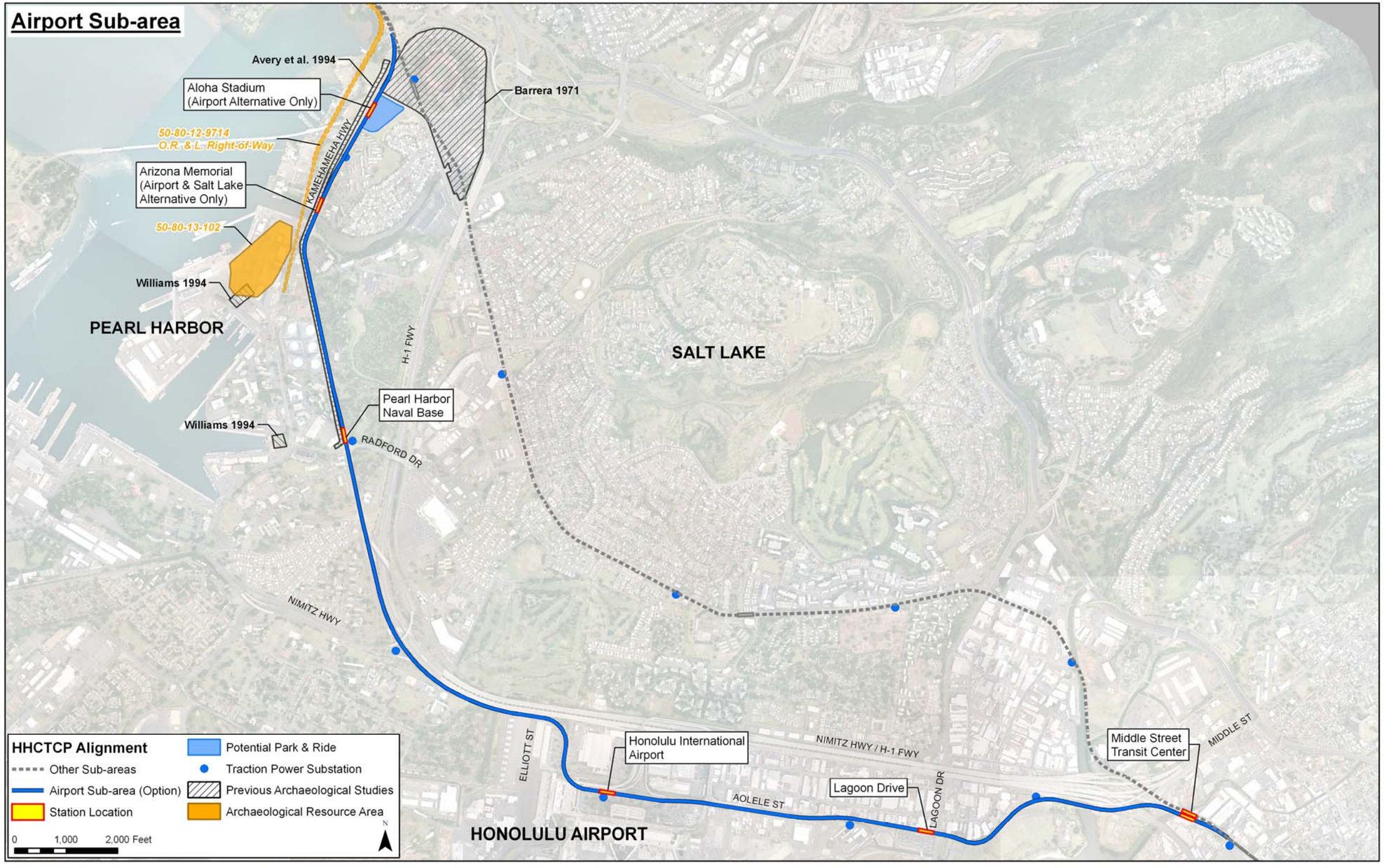

Figure A-15: Airport sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

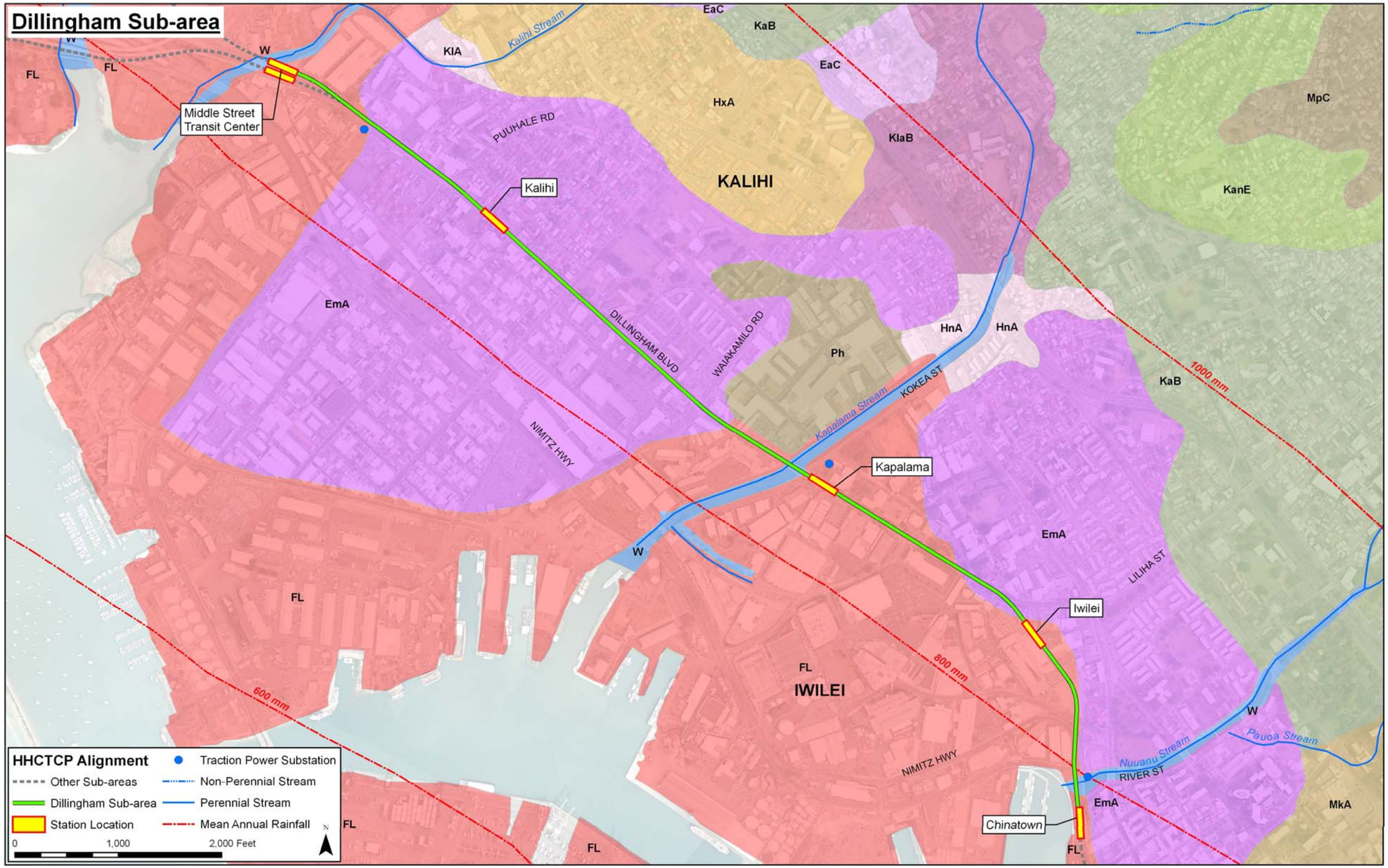

Figure A-16: Dillingham sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

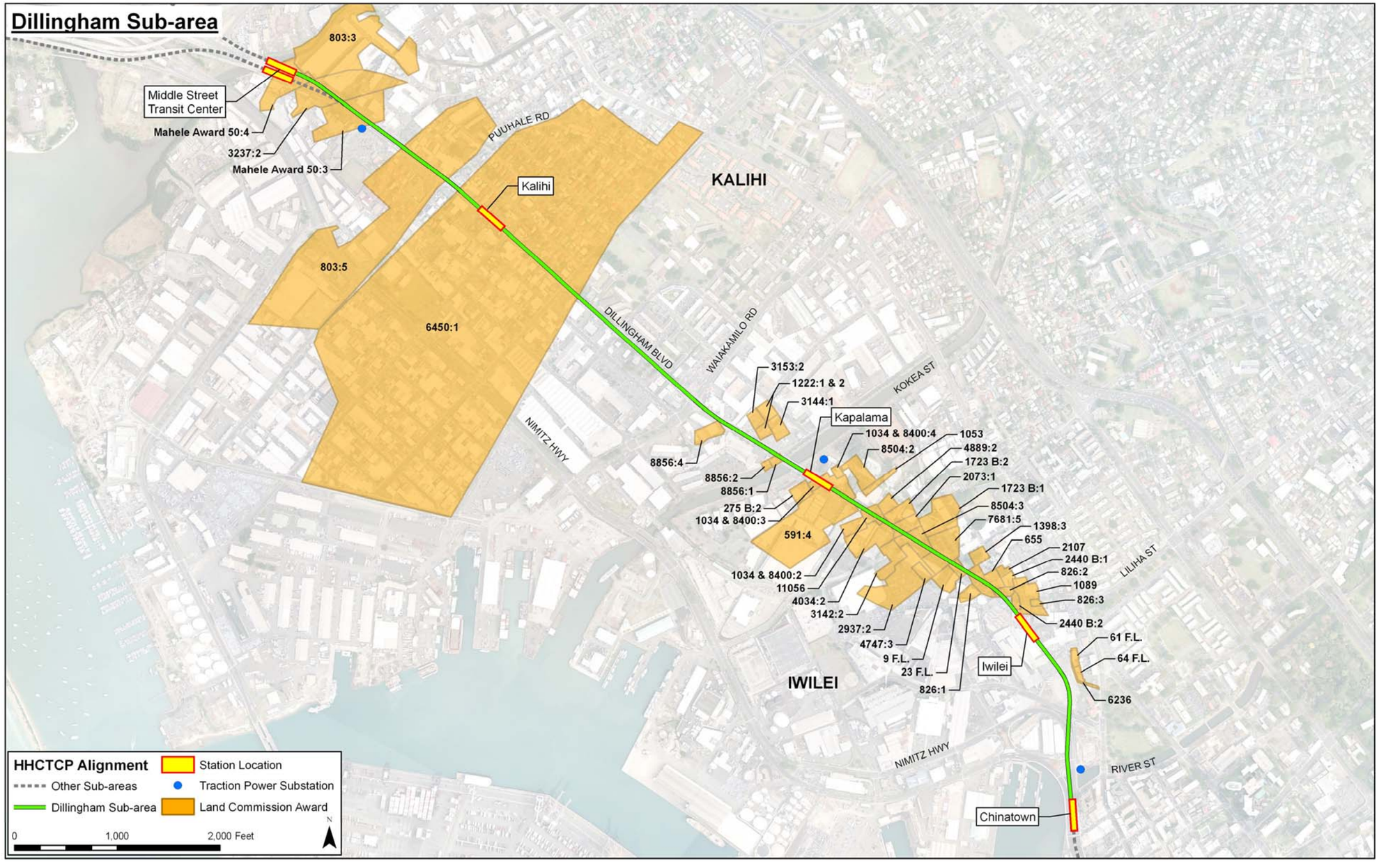

Figure A-17: Dillingham sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

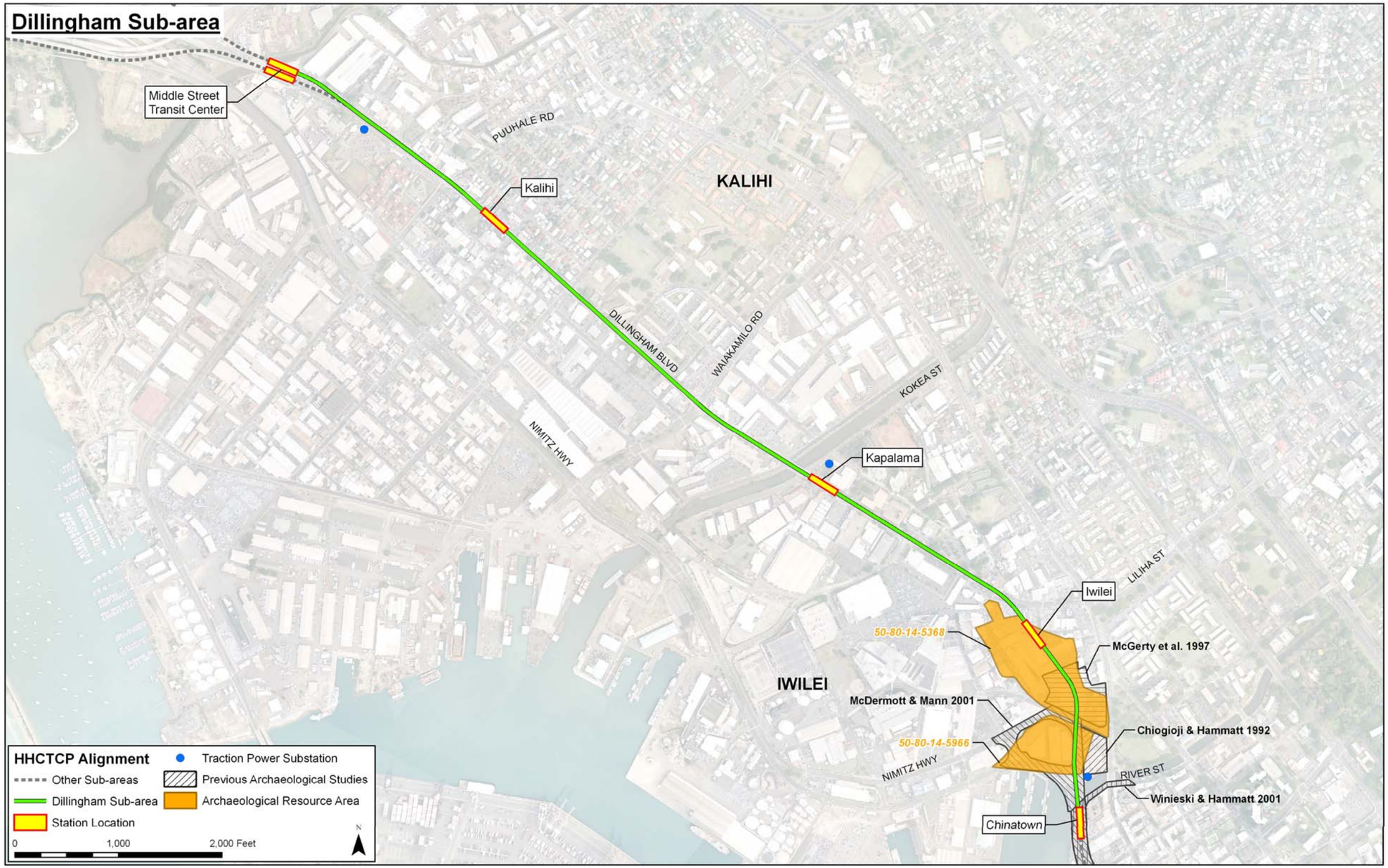

Figure A-18: Dillingham sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

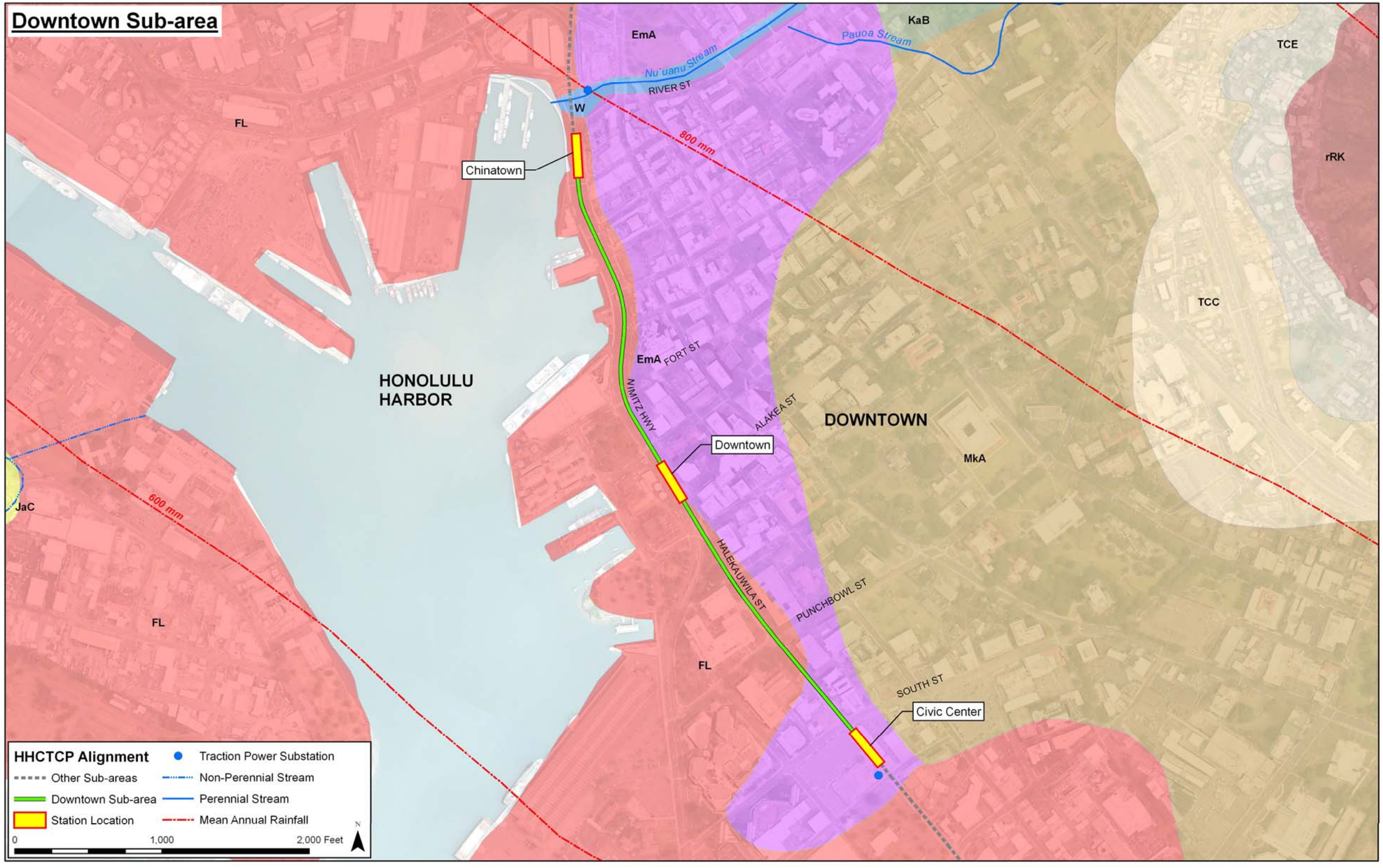

Figure A-19: Downtown sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

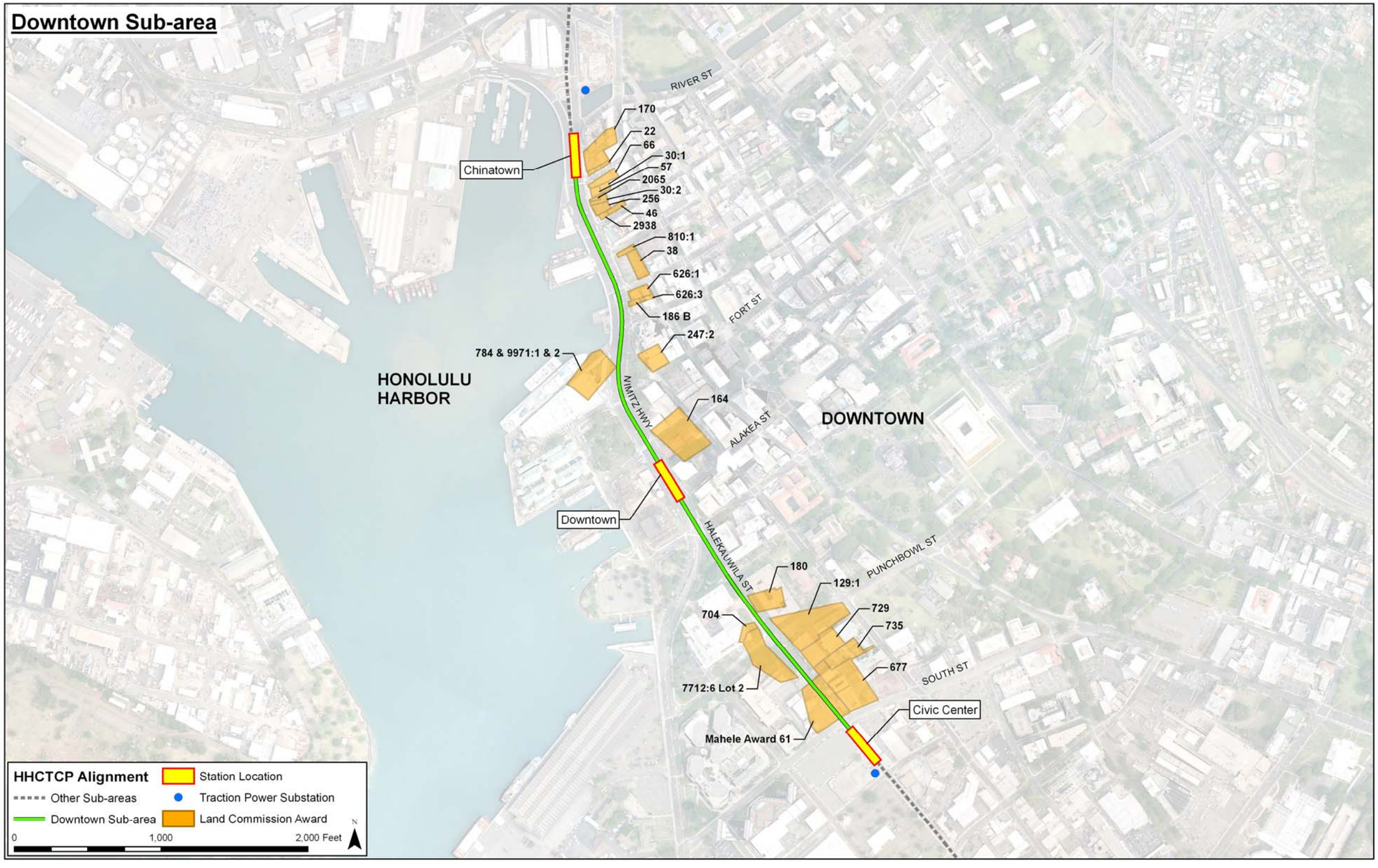

Figure A-20: Downtown sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

Figure A-21: Downtown sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

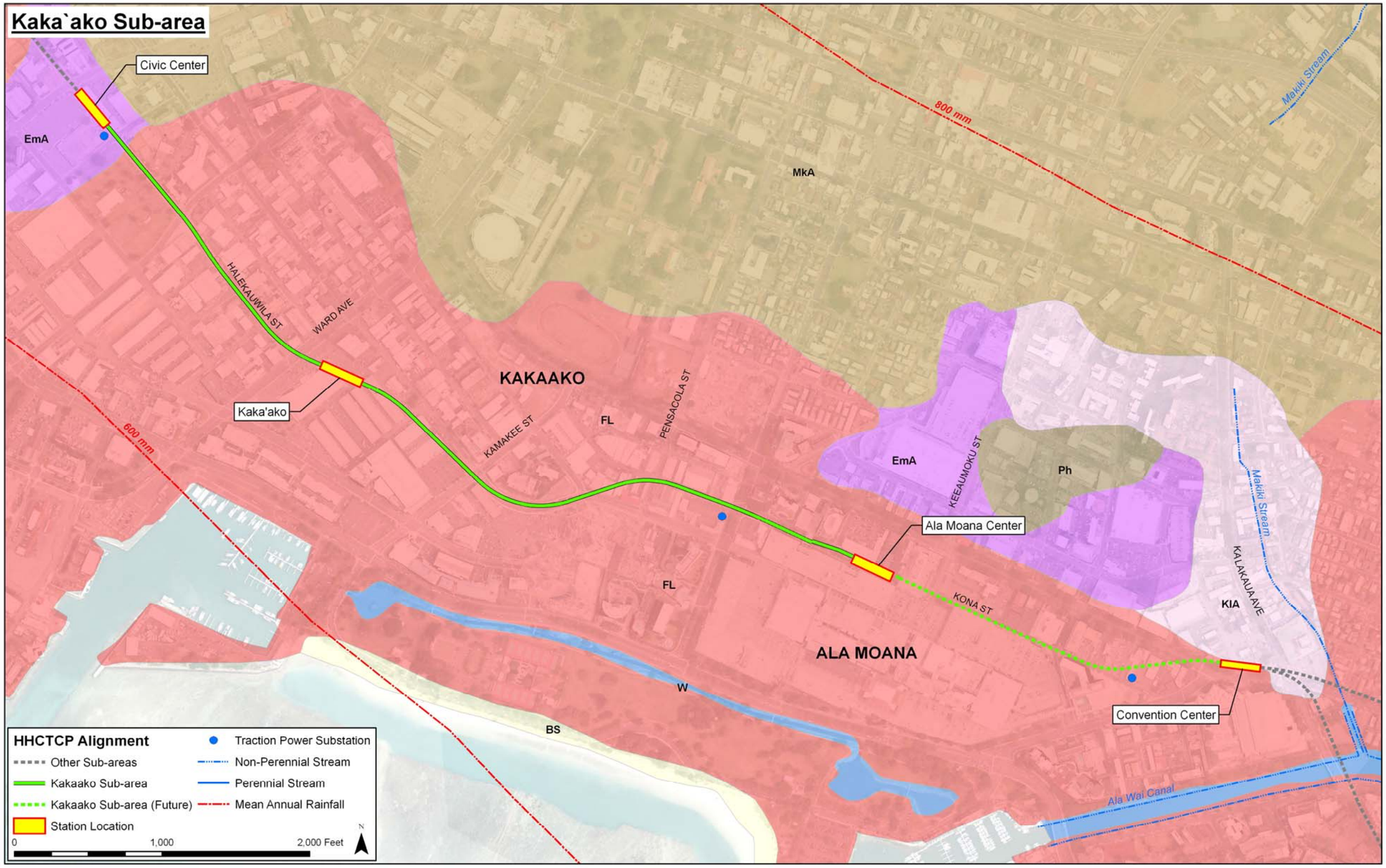

Figure A-22: Kaka’ako sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

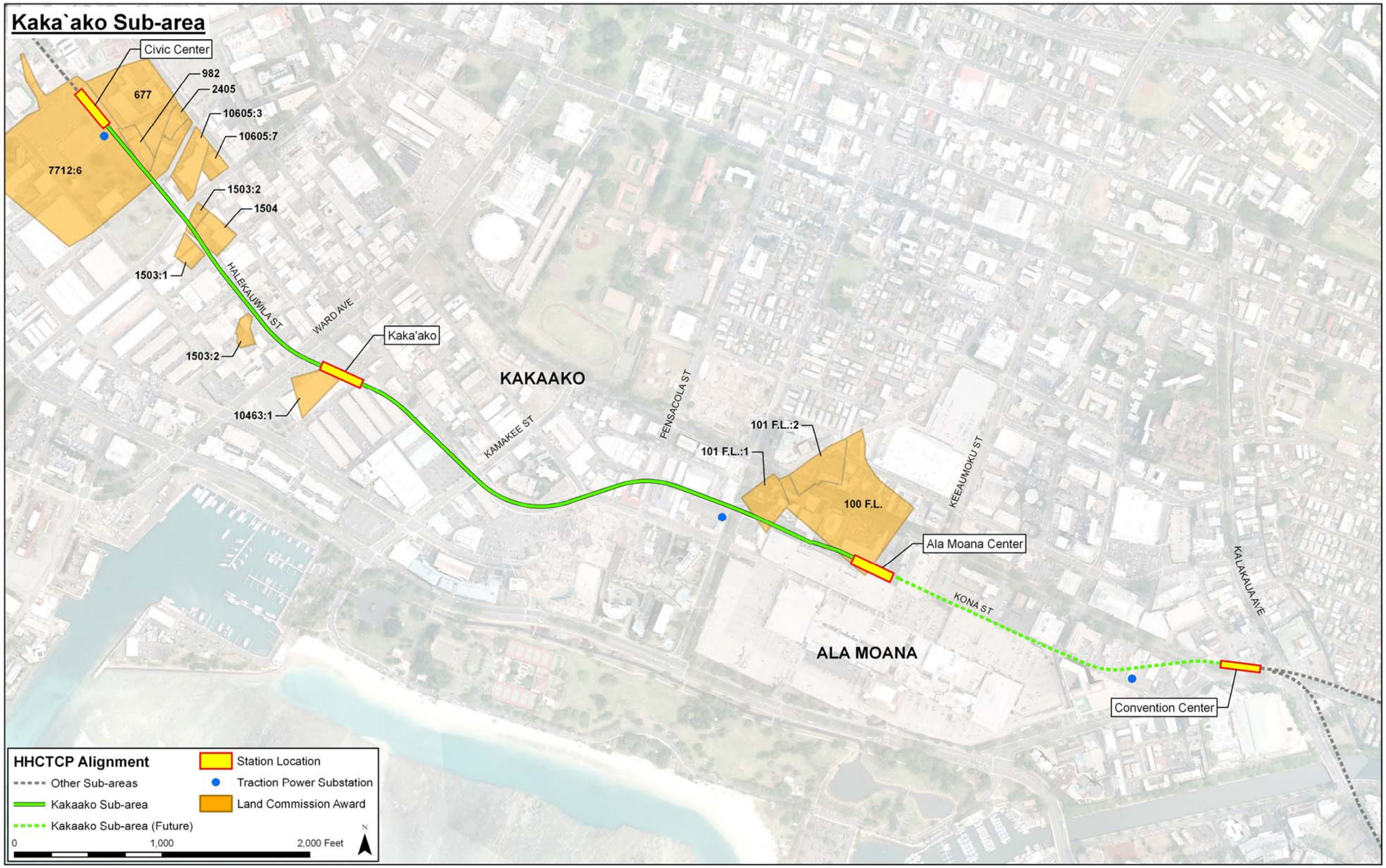

Figure A-23: Kaka’ako sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

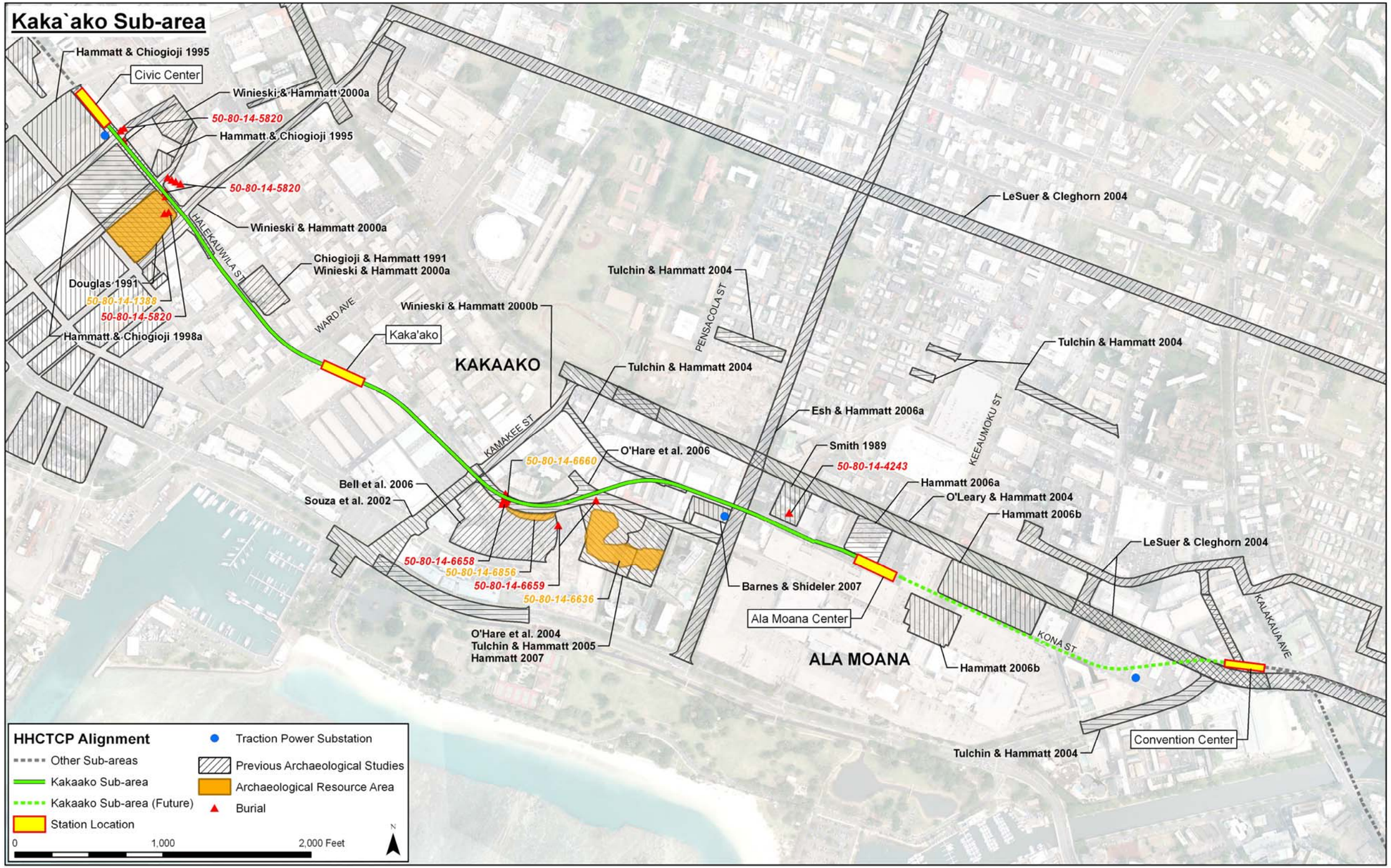

Figure A-24: Kaka'ako sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

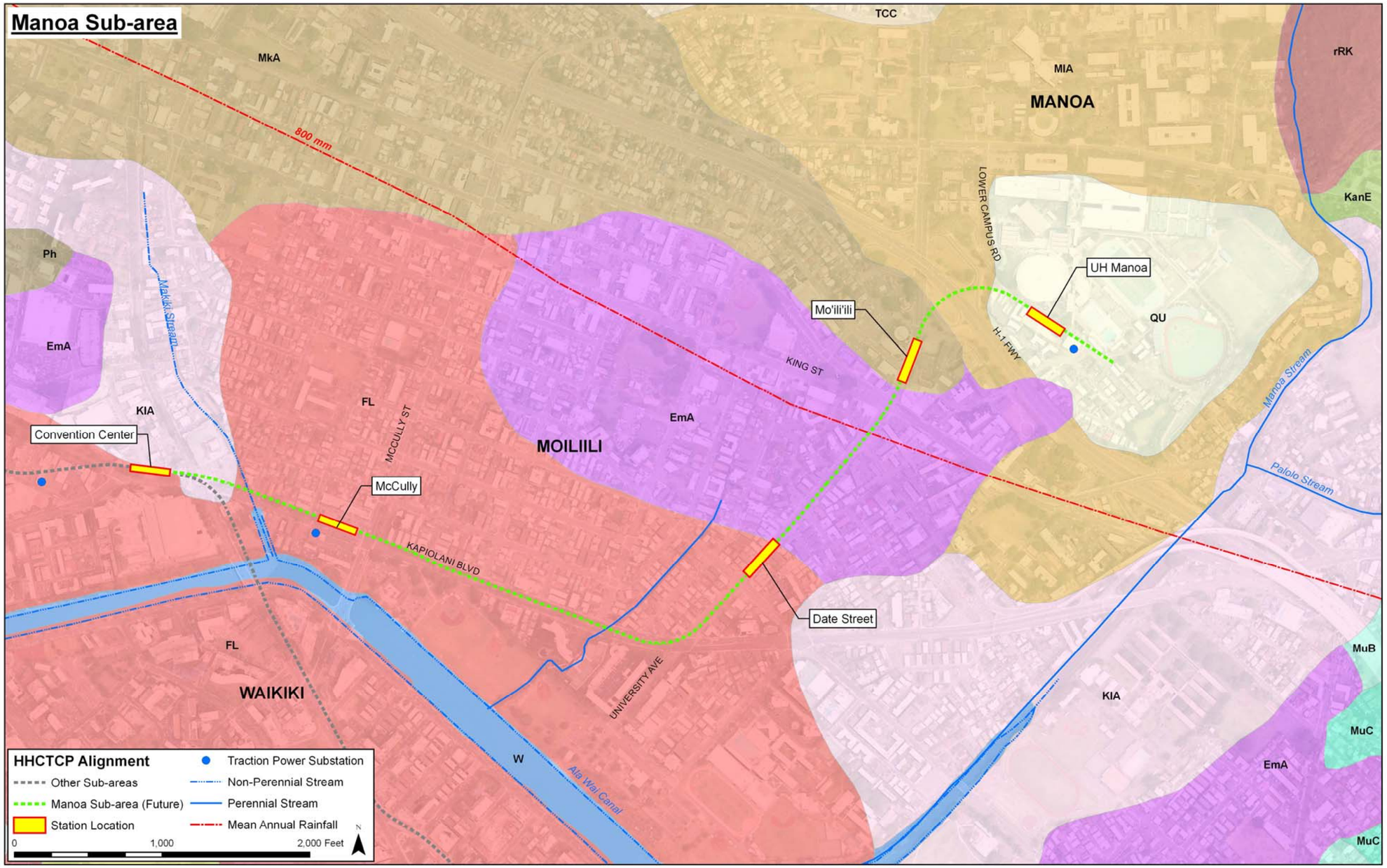

Figure A-25: Mānoa sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

Figure A-26: Mānoa sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

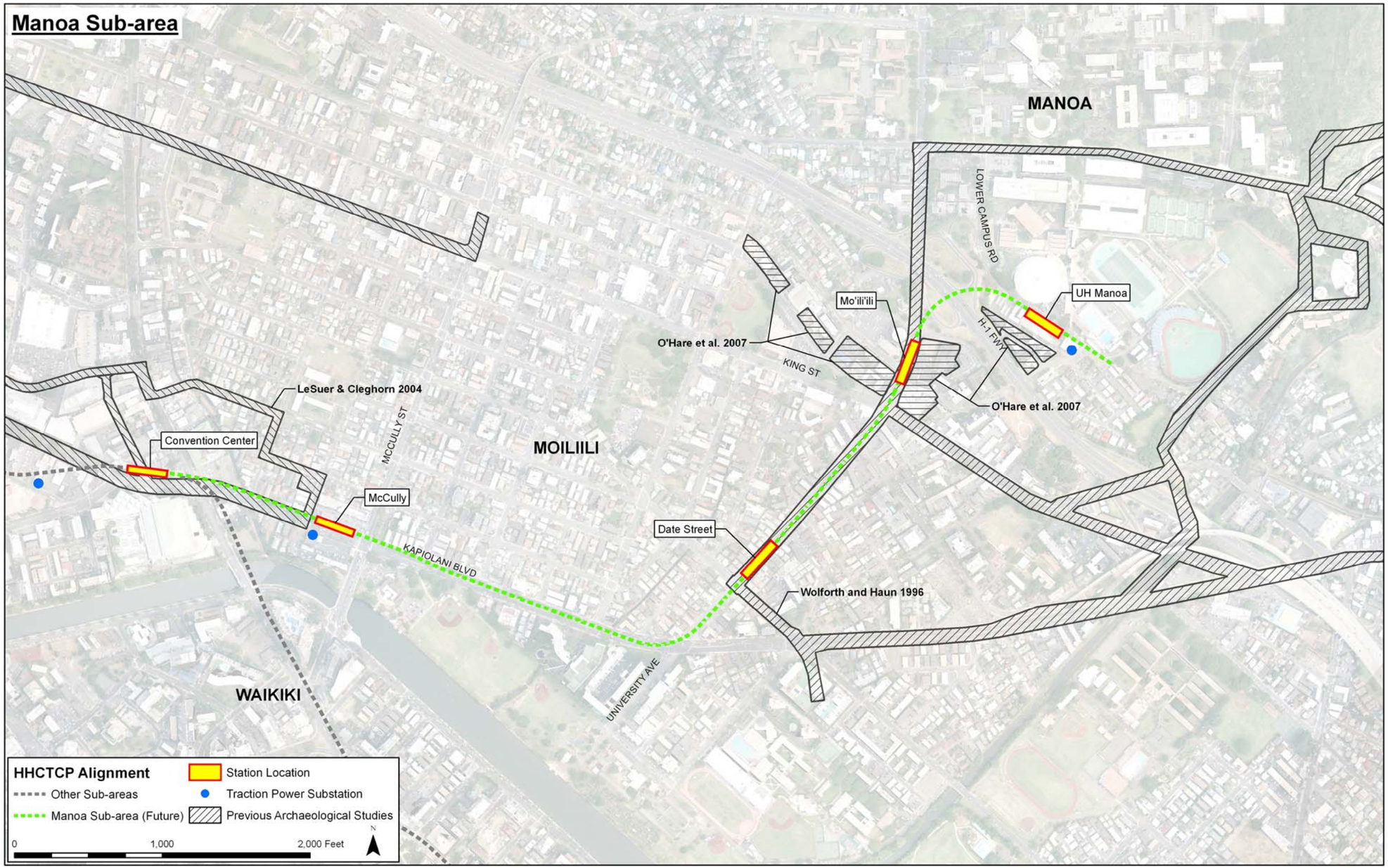

Figure A-27: Mānoa sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources

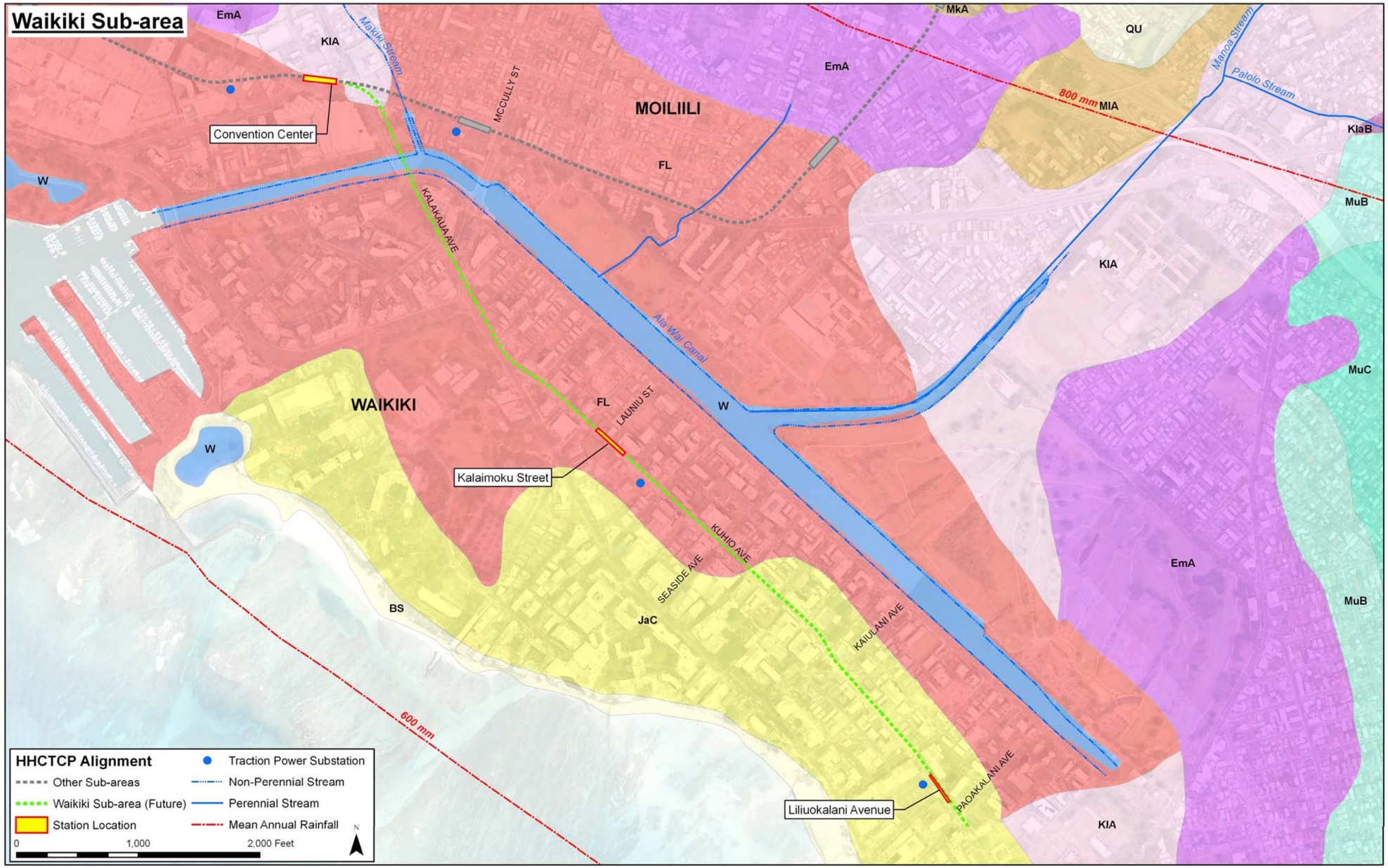

Figure A-28: Waikīkī sub-area of the archaeological study area depicting environmental information, including soils, rainfall, and streams

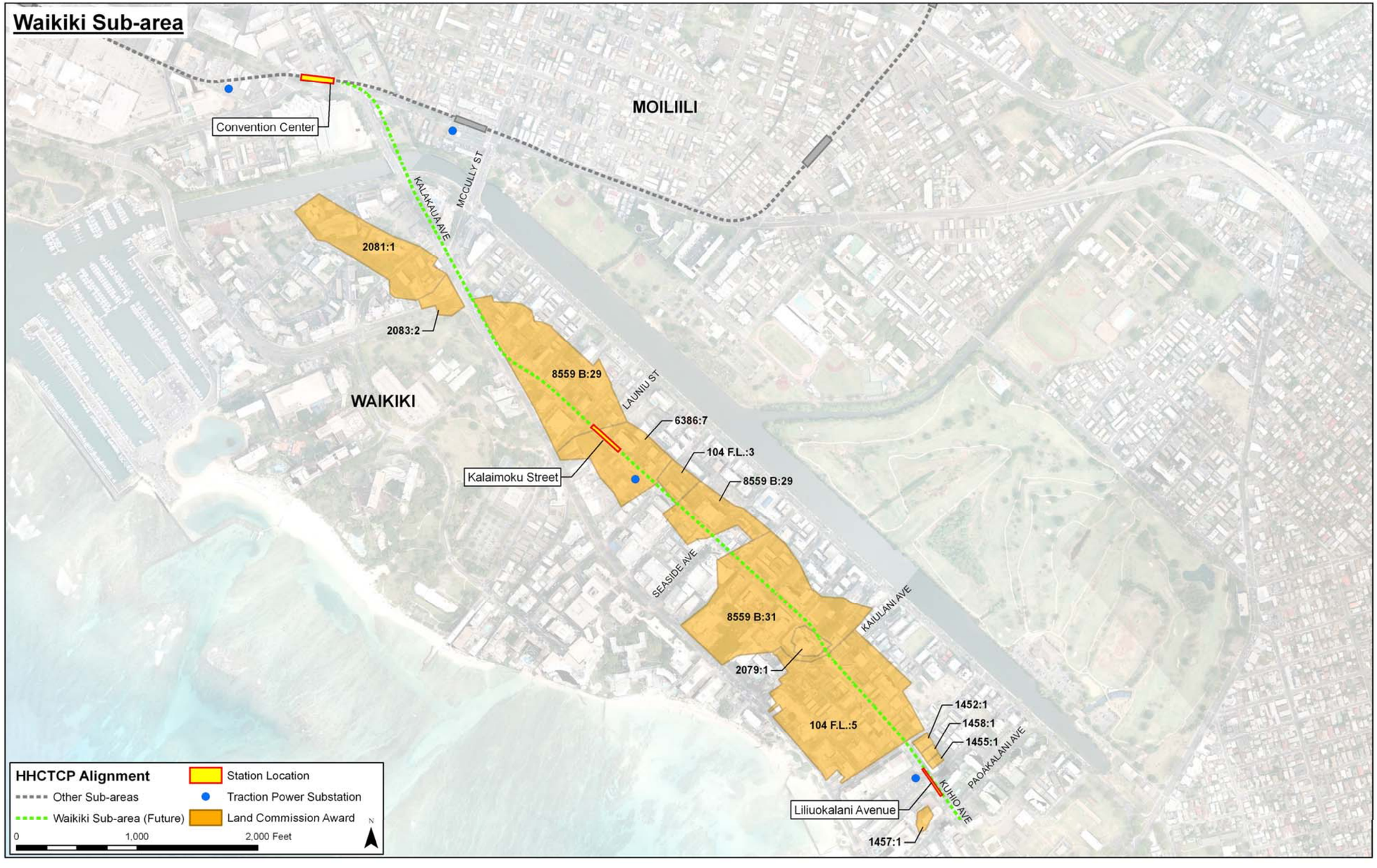

Figure A-29: Waikīkī sub-area of the archaeological study area depicting current land use and built environment (aerial photograph) and Land Commission Awards

Figure A-30: Waikīkī sub-area of the archaeological study area depicting previous archaeological investigations and previously recorded archaeological resources