

# **Archaeological Resources Technical Report Honolulu High-Capacity Transit Corridor Project**

**August 15, 2008**

Prepared for:  
City and County of Honolulu

## *Preface*

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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***

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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

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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.

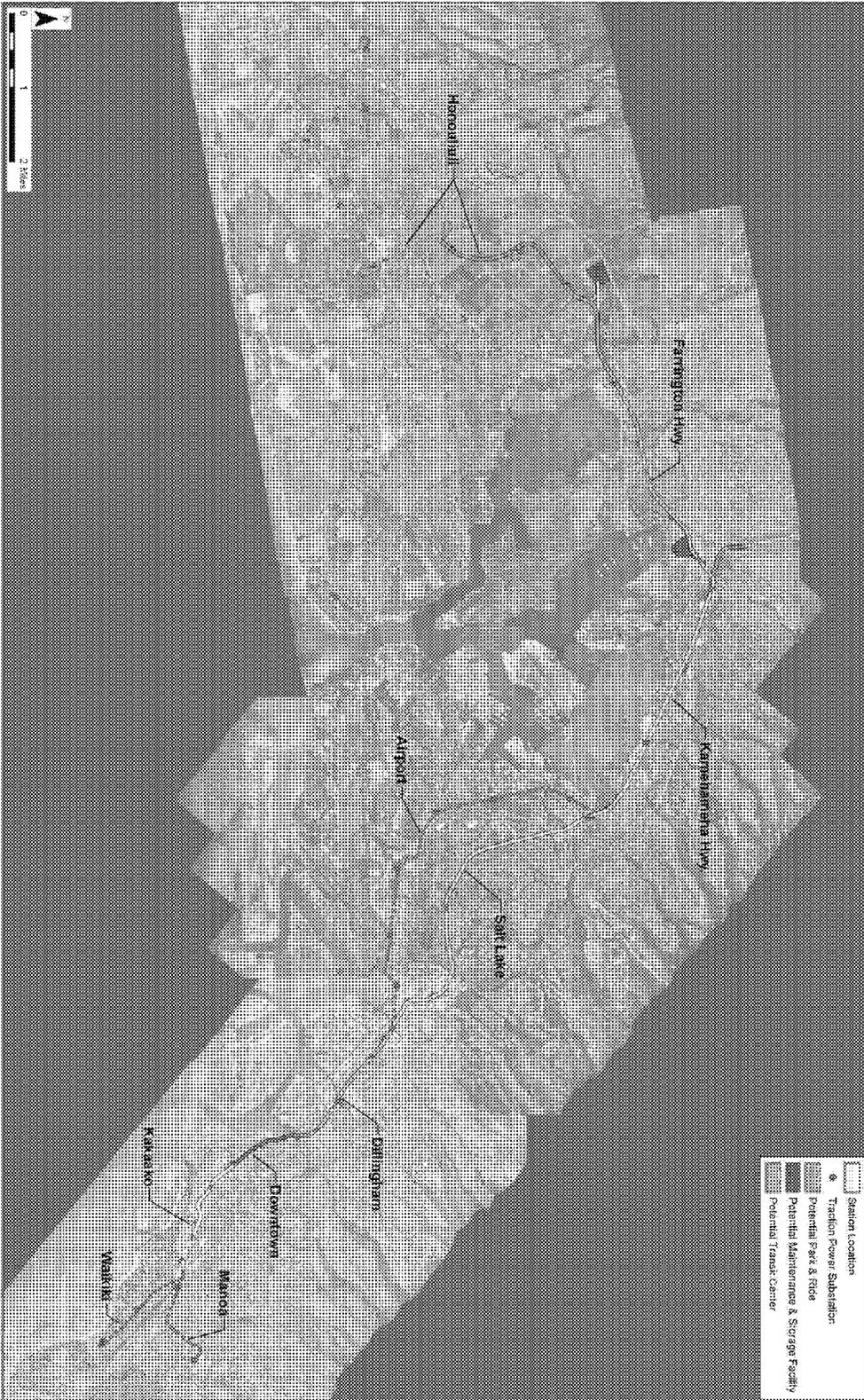


Figure S-1: Map of the Ten Archaeological Sub-Areas

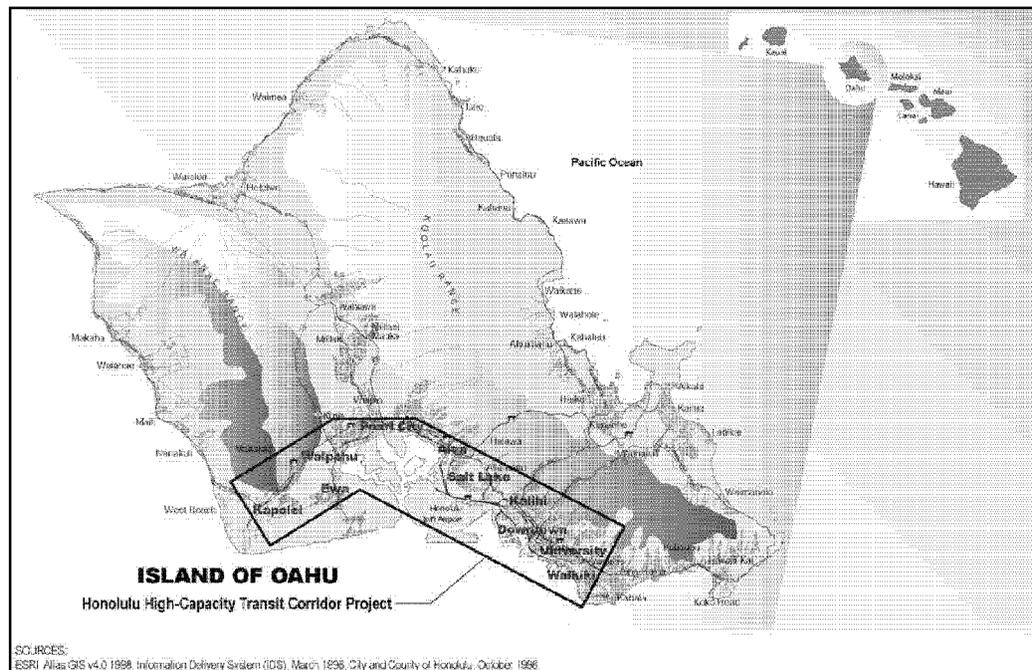
**Table S-2: Summary of Archaeological Consequences**

<b>Alternative</b>	<b>Burials</b>	<b>Pre-Contact Archaeological Resources</b>	<b>Post-Contact Archaeological Resources</b>
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.

## 1.1 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 O'ahu Metropolitan Planning Organization (O'ahuMPO) for its *O'ahu Regional Transportation Plan 2030* (ORTP) (O'ahuMPO 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 Hawai'i 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 (O'ahuMPO 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.





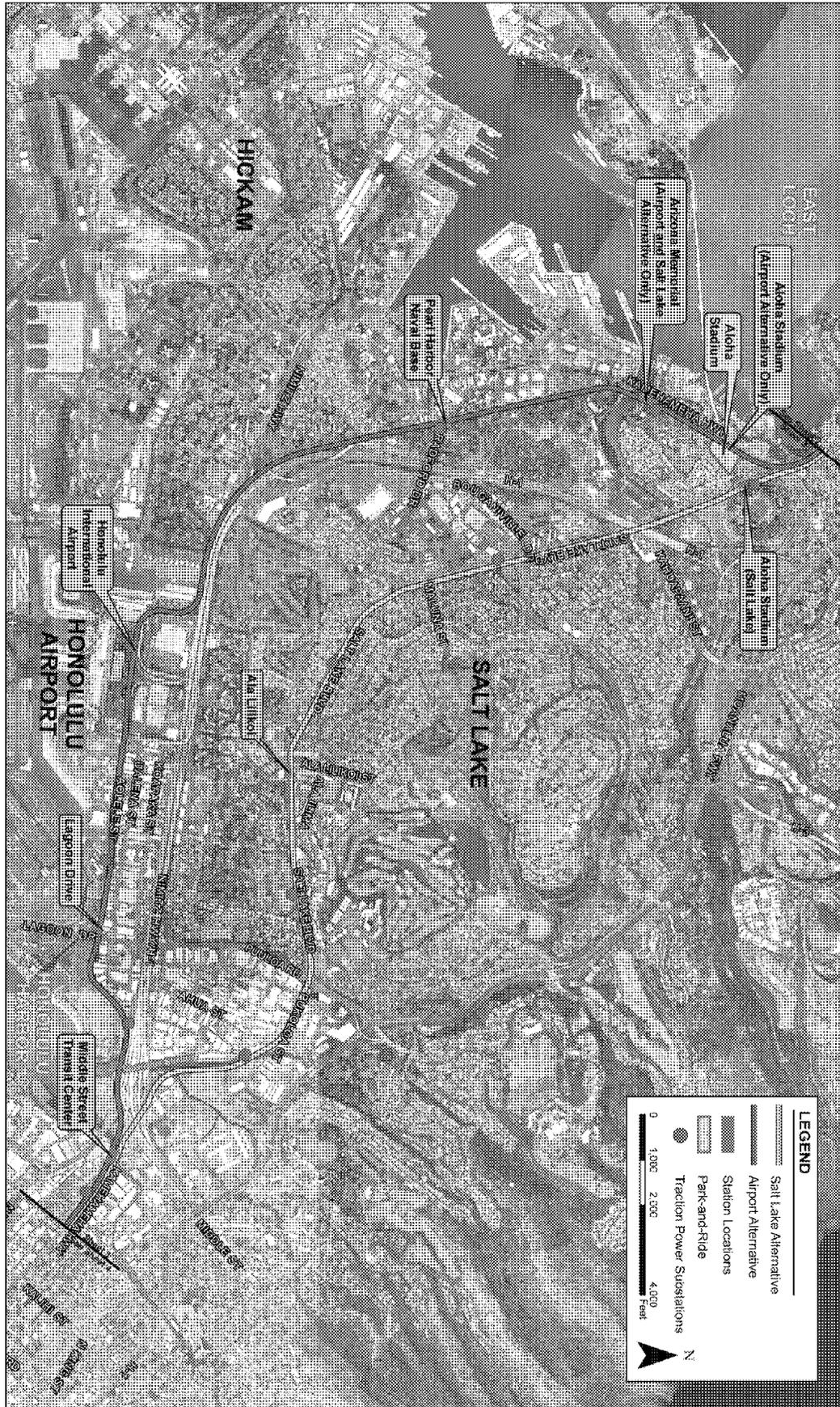


Figure 1-5: Fixed Guideway Transit Alternative Features (Aloha Stadium to Kalia)



Figure 1-6: Fixed Guideway Transit Alternative Features (Kailahi to UH Manoa)

### ***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.

## 2.1 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 through 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.

### **3.1 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 O'ahu (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 O'ahu*.

Archaeological resources already documented within the study area span nearly the entire history of human habitation of O'ahu 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 O'ahu'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 O'ahu'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 O'ahu'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 Hawai'i, 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 alternative 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 'Ewa 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. Kaka'ako
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.

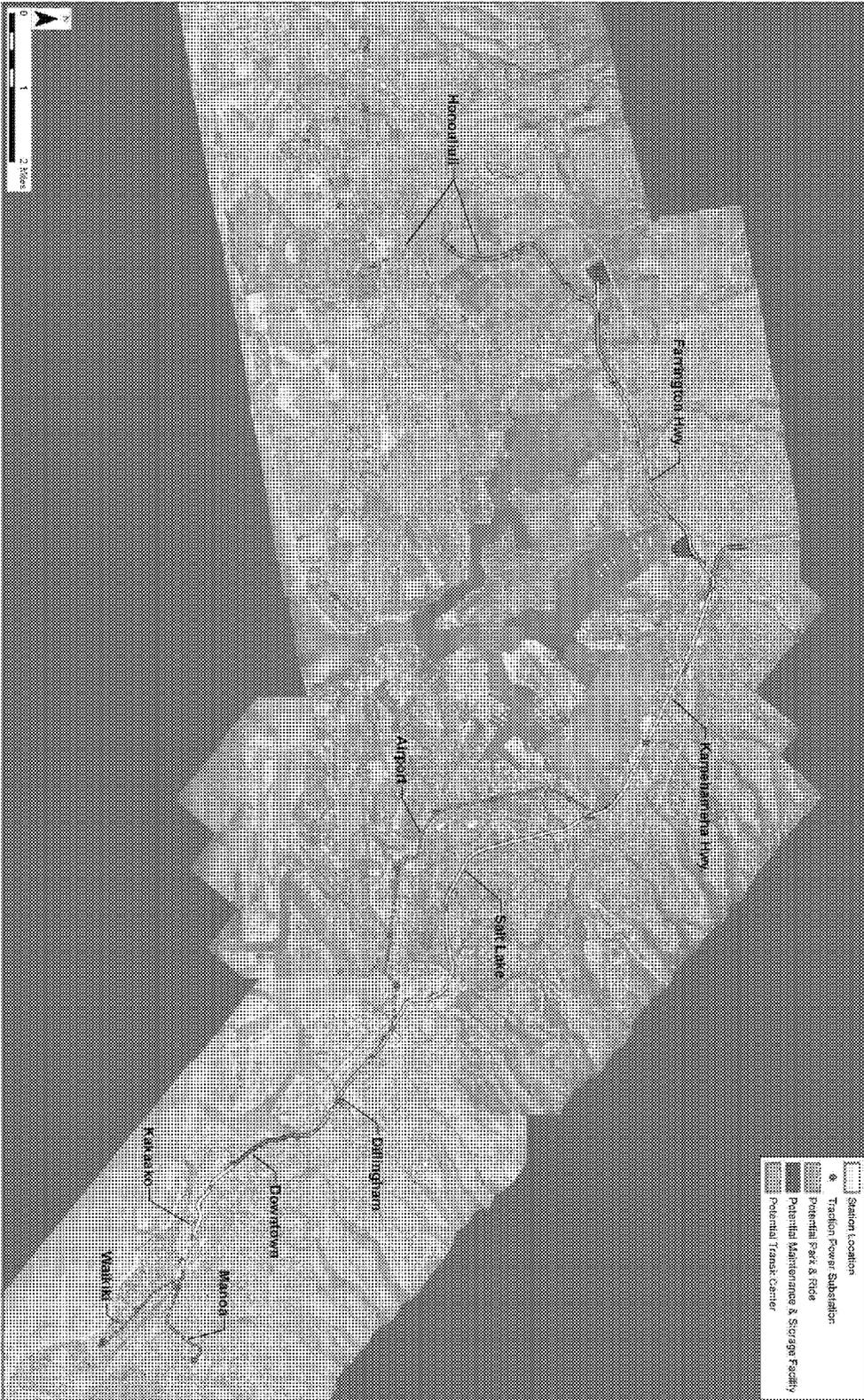


Figure 3-1: Map of the Ten Archaeological Sub-Areas

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.

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 (KIA), 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 Wai‘anae 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 ‘Ewa district, but archaeological resources along the barren coral plains and coast of southwest Honouliuli ahupua‘a 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 ahupua‘a 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 ‘Ewa 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 ahupua‘a 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 lo‘i (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 lo‘i and 1 kula
847:1 and 847:2	14 lo‘i, 1 kula, and 1 guard house for the lo‘i
911:1	1 house, 1 kula, 5 lo‘i
831:3	No data
1570:1	Several lo‘i and 1 kula

In 1855 all of the unclaimed lands in Honouliuli (43,250 acres) were awarded to Miriam Ke‘ahikuni Kekau‘ōnohi, a granddaughter of Kamehameha I and the heir of Kalanimōkū, who had been given the land by Kamehameha after the conquest of O‘ahu. She was also awarded the ahupua‘a of Pu‘uloa, which she sold in 1849 to Isaac Montgomery, a British lawyer.

Kekau'ōnohi was the wife of Chief Levi Ha'alelea. Upon her death on June 2, 1851, all her property was passed on to her husband and his heirs. In 1864, Ha'alelea 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 'ili (smaller land division) of Pu'uloa, 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 'Ewa 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 Kualaka'i 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 'Ewa Plantation Company (Frierson 1972). Dillingham's Honouliuli lands above 200 feet that were suitable for sugar cane cultivation were sublet to the O'ahu Sugar Company. Throughout this time, and continuing into modern times, cattle ranching continued in the area.

'Ewa 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 ahupua'a. 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 'Ewa 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 Waiiau 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 'Ewa 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 'Ewa 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, 'Ewa of Fort Weaver Road, and including portions of Kalo'i and Hunehune Gulches. A limited field inspection of the project area identified sugar cane infrastructure within Kalo'i 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 'Ewa 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 'Ewa 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 'Ewa Plain, through Wai'anae, around Ka'ena Point, and on to Kahuku on O'ahu'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 O'ahu'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 O'ahu 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 'Ewa 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 Kassar Bay Streets. The railway alignment is within 160 feet of the project alignment for about 2,000 feet around the border of 'Aiea Bay. The railway alignment also borders the project alignment along the 'Ewa side of Kamehameha Highway just after Hālawā Stream in Pearl Harbor for about 300 feet.

Since 1980, the Hawai'i 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—'Ewa Villages Historic District***

SIHP #50-80-12-9786, the 'Ewa 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 'Ewa Plantation Company, which operated a successful sugar cane plantation on O'ahu 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 'Ewa edge of the 'Ewa 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—'Ewa Plantation Infrastructure***

SIHP #50-80-12-4344 consists of several features associated with 'Ewa Plantation infrastructure, including walls for erosion prevention, berms, concrete ditches, pipes, and other structures associated with the 'Ewa 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).