
**Archaeological Inventory Survey
for the Proposed 345-Acre Kapolei Harborside Center,
Honouliuli Ahupua'a, 'Ewa District, O'ahu Island**

TMK: [1] 9-1-14:027, 034, 035, & 9-1-15:001

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Prepared for

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(CSH Job Code: HONO 69)

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Exhibit "30"

Management Summary

Reference	Archaeological Inventory Survey for the Proposed 345-Acre Kapolei Harborside Center, Honouliuli Ahupua'a, 'Ewa District, O'ahu Island (McDermott et al. 2006)
Date	July 2006
Project Number	Cultural Surveys Hawai'i Inc. (CSH) Job Code: HONO 69
Permit Number	The fieldwork for this investigation was carried out under archaeological permit numbers 0508 and 0605, issued by the Hawai'i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai'i Administrative Rules (HAR) Chapter 13-282.
Project Agencies	SHPD
Project Funding and Land Jurisdiction	Private, Kapolei Property Development, LLC
Project Location	TMK: [1] 9-1-014: 027, 034, 035, & 9-1-015: 001 in Kalaeloa (Barber's Point), Honouliuli Ahupua'a, 'Ewa District, Island of O'ahu. This area is depicted on the 1998 'Ewa USGS 7.5-minute topographic quadrangle. Generally, the project area lies south of the Oahu Railway and Land Company (O. R. & L.) railroad right-of-way, north of Malakole Road, west of Kalaeloa Boulevard, and east of the Kalaeloa Harbor.
Project Acreage	Approximately 345 acres
Project Description and Related Ground Disturbance	The project area is proposed predominantly for industrial development. Minimally, this development would include grading, foundation work, street and utility installation, and landscaping.
Area of Potential Effect (APE) and Survey Area Acreage	For this inventory survey investigation, the project's APE is defined as the entire approximately 345-acre project area. This includes a proposed intersection of the O. R. & L. Railroad with the proposed Hanua Street, along the northern boundary of the project area. The survey area included the entire project APE, however, 100 percent pedestrian inspection was limited to approximately 20 acres, the only portions of the project area that had not been heavily modified by extensive prior ground disturbance related to commercial agricultural, quarrying, green waste processing, and materials stockpiling. The approximately 325 acres of the project area that were not subjected to 100 percent pedestrian inspection were subjected to less intensive pedestrian and vehicular inspection to confirm the extensive prior ground disturbance and resulting unlikelihood of surviving historic properties within these areas.
Project Historic Preservation Regulatory Context	As a privately funded project on privately owned land, the proposed industrial development is subject to Hawai'i state environmental and historic preservation review legislation [Hawai'i Revised Statutes (HRS) Chapter 343 and HRS Chapter 6E-42/HAR Chapter 13-284, respectively].
Document Purpose	This investigation was designed to fulfill Hawai'i state requirements for an archaeological inventory survey per HAR Chapter 13-276 and Chapter 13-284.

	A companion cultural impact assessment (CIA) study (Souza and Hammatt <i>in prep.</i>), prepared to support the project's Hawai'i state environmental review, per the guidelines of the Hawai'i State Department of Health's Office of Environmental Quality Control " <i>Guidelines for Assessing Cultural Impacts</i> ", further evaluates the project's potential impacts to cultural resources. Both documents will support the project's historic preservation consultation effort.
Fieldwork Effort	Matt McDermott, M.A., and Hallett H. Hammatt, Ph.D. conducted initial field inspections of the project area on November 21 and December 7, 2005. Intensive pedestrian survey of relatively undisturbed lands and documentation of historic properties within the project area was completed by Todd Tulchin, B.S. and Bradley Garrett, M.A. on June 19-20, 2006. Fieldwork for the archaeological inventory survey required a total of five person-days to complete.
Number of Historic Properties Identified	Six historic properties were identified within the project's APE. Three historic properties (SIHP # 50-80-12-6679 drainage channel, SIHP # 50-80-12-2888 Barber's Point Harbor Archaeological District, and SIHP # 50-80-12-9714 O. R. & L. right-of-way) were previously identified. Three historic properties (CSH 1, 2, and 3) were newly recorded as part of the current inventory survey investigation.
Historic Properties Recommended Eligible to the Hawai'i Register of Historic Places (Hawai'i Register)	<ol style="list-style-type: none"> 1) State Inventory of Historic Properties (SIHP) # 50-80-12-6679, historic plantation-era drainage channel, previously determined Hawai'i Register-eligible under Criterion D. 2) SIHP # 50-80-12-2888, the Barber's Point Harbor Archaeological District, listed on the National Register. 3) CSH 1, pre-contact stacked stone enclosure, recommended Hawai'i Register-eligible under Criterion D. 4) CSH 2, pre-contact stacked stone enclosures and mounds, recommended Hawai'i Register-eligible under Criterion D. 5) CSH 3, numerous sinkhole features within the project area's approximately 6-acre archaeological/paleontological preserve area, recommended Hawai'i Register eligible under Criterion D, and because of the potential for human burials, Criterion E. 6) SIHP # 50-80-12-9714, the O. R. & L. right-of-way, immediately adjacent to the project area, will be intersected by the project's proposed construction of Hanua Street, currently listed on the National Register of Historic Places (National Register) under Criteria A, B, and C.
Historic Properties Recommended Ineligible to the Hawai'i Register	None
Project Effect and Mitigation Recommendations	Based on the results of this investigation, the project will affect historic properties currently listed on the National Register as well as historic properties recommended eligible to the Hawai'i Register. Accordingly, a project-specific effect recommendation of "effect, with agreed upon mitigation commitments" is warranted under HAR Chapter 13-284-7. The following mitigation

recommendations are proposed to alleviate the project's affect to significant historic properties.

SIHP # 50-80-12-6679, historic plantation-era drainage channel: The proposed project will most likely completely remove this feature. No further cultural resource management work is recommended to mitigate this impact, however, because sufficient information regarding this feature has been collected by this investigation and a past investigation of the same feature outside the current project area (Hoffman et al. 2005).

CSH 1 and CSH 2 stacked stone prehistoric or early historic enclosures: These features are within or immediately adjacent to a proposed park and passive preservation is recommended.

CSH 3 the numerous sinkhole features within the project area's archaeological/paleontological preserve area: Project proponents intend to avoid this portion of the project area. No impact to the sinkholes is anticipated as a result of the proposed project. For the current project, the preserve area will continue under passive preservation.

SIHP # 50-80-12-2888, the Barber's Point Harbor Archaeological District: the portions of the archaeological preserve within the current project area appear to have already been completely disturbed by historic and modern land use. It is likely that the previously documented surface archaeological features within this portion of the project area have been completely removed. Accordingly, the proposed project is not regarded as having an impact on SIHP # 50-80-12-2888.

SIHP # 50-80-12-9714, the O. R. & L. right-of-way, located immediately adjacent to the project area: the Kapolei Harborside Center project master plan indicates a northern extension of Hanua Street will cross the O. R. & L. right-of-way. This crossing will likely involve modification of the railroad bed and right away, including modifications to the track and the installation of vehicular traffic crossing signals and/or gates. Similar past road crossings of the O. R. and L. in the vicinity of the current project area have required the development of appropriate mitigation measures among SHPD, the State of Hawaii Department of Transportation (understood as the land owner of the right-of-way), and the Hawaiian Railway Society. It is recommended that appropriate treatment of this National Register-listed historic property include, to the extent possible, preservation in place of existing track and railway ties and installation of necessary crossing features (signals and/or gates) that are in keeping with the railway's historic appearance.

It is recommended that a cultural resource mitigation plan be prepared for the project. This should include a preservation plan for CSH 1 through 3 detailing the short and long term preservation measures that will safe-guard these historic properties during project construction and subsequent use of the project area. It should also include the mitigation measures for the proposed intersection of the O. R. and L. right-of-way and Hanua Street.

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Section 1 Introduction

1.1 Project Background

At the request of Group 70 International, Inc., Cultural Surveys Hawai'i, Inc. (CSH) completed this archaeological inventory survey investigation for the proposed 345-acre Kapolei Harborside Center. The irregularly-shaped project area is located in the Kapolei area of Honouliuli Ahupua'a, 'Ewa District, in the southwest corner of the Island of O'ahu. Generally the project area is located south of the Oahu Land and Railway Company (O.R. & L.) railway alignment, north of Malakole Road, west of Kalaeloa Boulevard, and east of the Barber's Point Harbor (TMK: [1] 9-1-014: 027, 034, 035, & 9-1-015: 001). This area is depicted on the 1998 'Ewa USGS 7.5-minute topographic quadrangle and additional location maps (Figures 1-4).

The approximately 345-acre project area is proposed predominantly for industrial development. Minimally, this development would include grading, foundation excavations, street and utility installation, and landscaping. As a privately funded project on privately owned land, the proposed industrial development is subject to Hawai'i state environmental and historic preservation review legislation [Hawai'i Revised Statutes (HRS) Chapter 343 and HRS Chapter 6E-42/ Hawai'i Administrative Rules (HAR) Chapter 13-284, respectively]. The archaeological inventory survey investigation was designed to fulfill State requirements for an archaeological inventory survey per HAR Chapter 13-276 and Chapter 13-284. CSH completed the fieldwork component of the archaeological inventory survey under SHPD permit Nos. 0508 and 0605, per Hawai'i Administrative Rules (HAR) Chapter 13-13-282.

For this inventory survey investigation, the project's area of potential effect (APE) is defined as the entire approximately 345-acre project area. This includes a proposed intersection of the O. R. & L. Railroad with the proposed Hanua Street, along the northern boundary of the project area (refer to Figure 4). The survey area included the entire project APE, however, 100 percent pedestrian inspection was limited to approximately 20 acres, the only portions of the project area that had not been heavily modified by extensive prior ground disturbance related to commercial agricultural, quarrying, green waste processing, and materials stockpiling. The approximately 20 acres that was subjected to 100 percent pedestrian inspection include the geographic areas 1, 9, and 10, as shown on Figure 12 and 13, below. The remaining approximately 325 acres of the project area that were not subjected to 100 percent pedestrian inspection were subjected to less intensive pedestrian and vehicular inspection to confirm the extensive prior ground disturbance and resulting unlikelihood of surviving historic properties within these areas. This past disturbance is clearly visible on project area aerial photographs (refer to Figure 3 and Figure 6, below). This past disturbance is more thoroughly described in Sections 1.3 and 3.1 of this report.

Under Hawai'i state historic preservation legislation, archaeological inventory surveys are designed to identify, document, and provide significance and mitigation recommendations for historic properties. Under this legislation, historic properties are defined as any "building, structure, object, district, area, or site, including *heiau* and underwater site, which is over fifty years old." A project's effect and potential mitigation measures are evaluated based on the

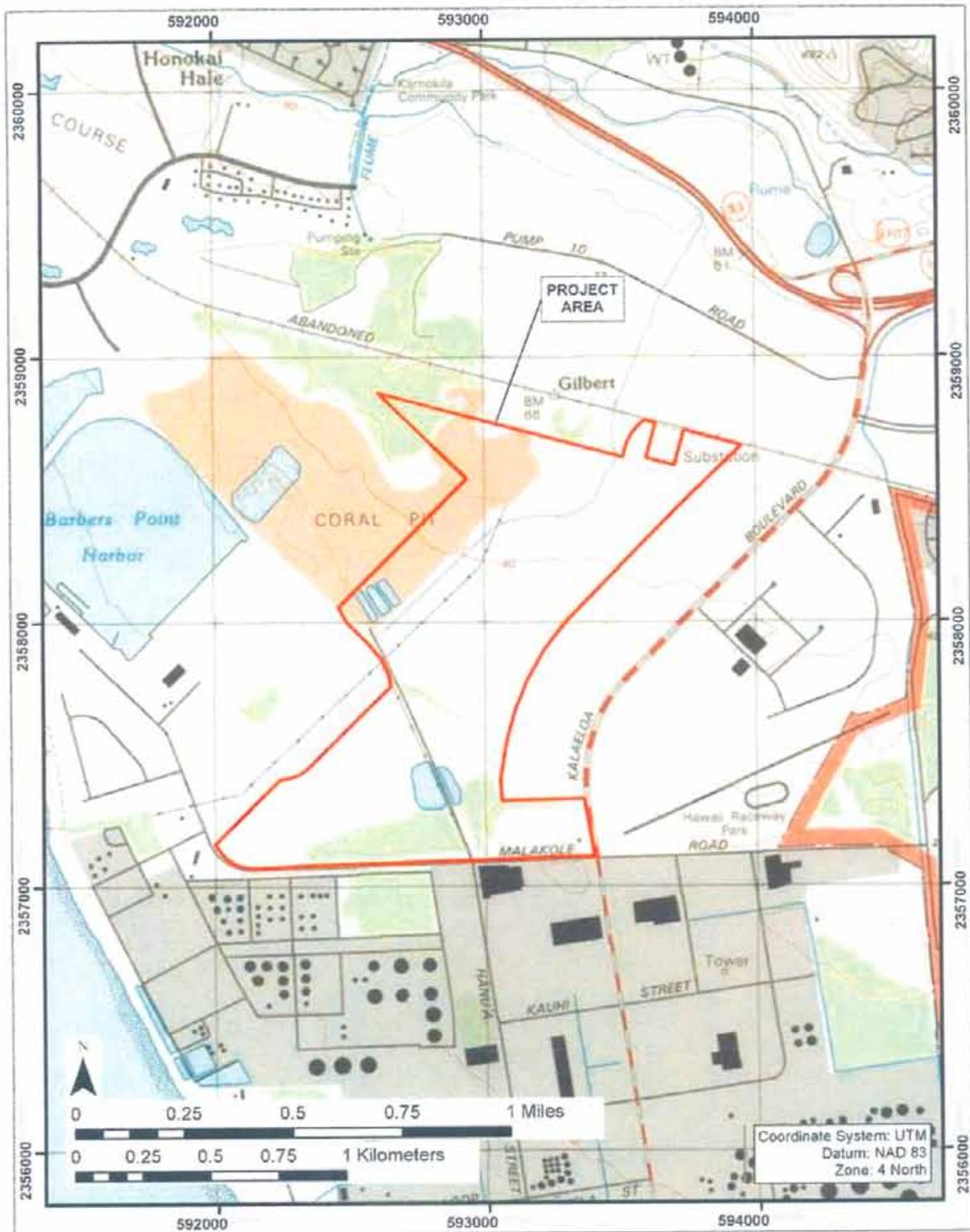


Figure 1. USGS 7.5-minute series topographic map, 'Ewa quadrangle (1998), showing the location of the project area.

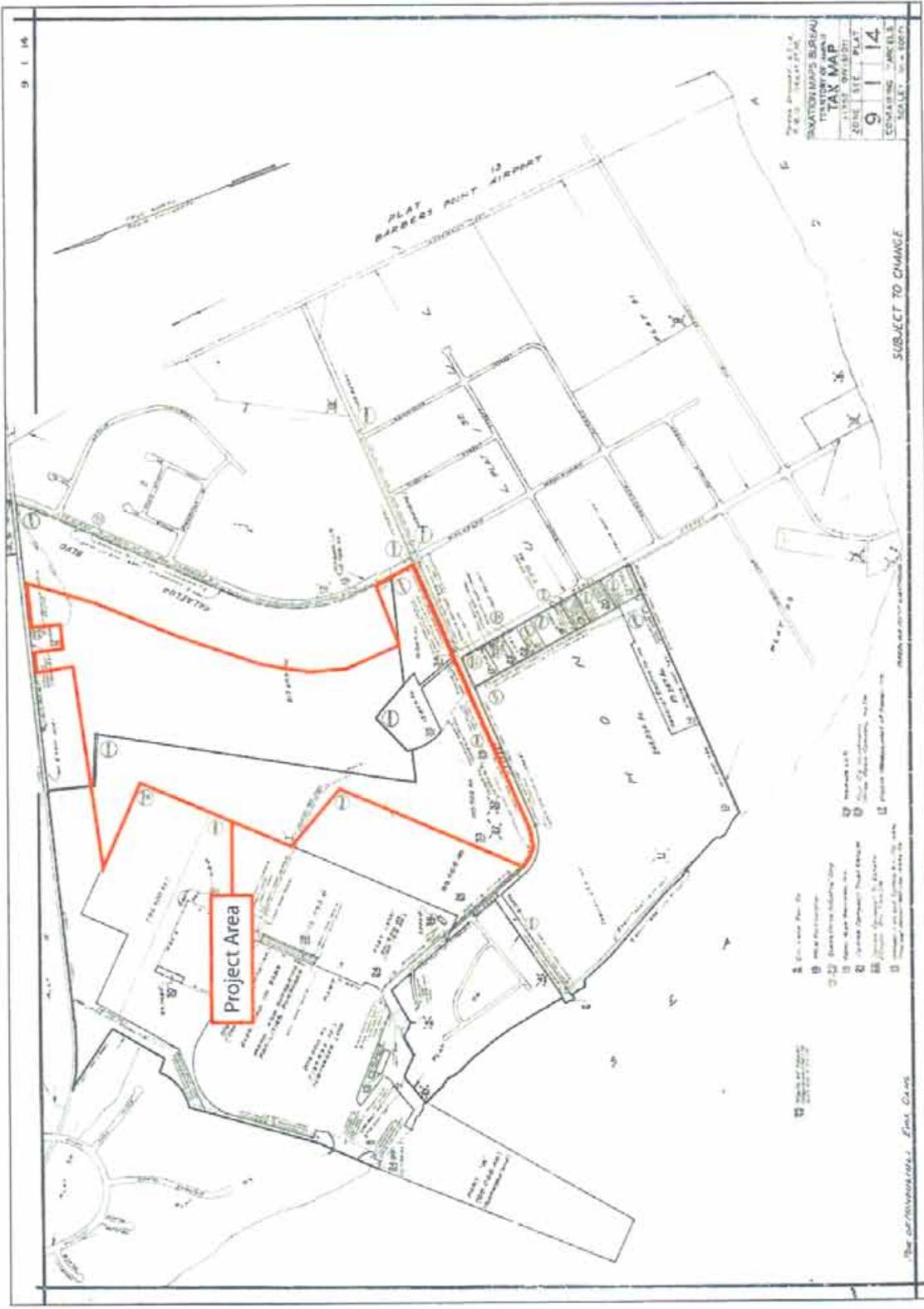


Figure 2. TMK 9-1-14 showing the location of the project area.

Archaeological Inventory Survey for the Kapolei Harborside Center
Prepared for Group 70 International, Inc.



Figure 3. Aerial photograph, showing the location of the project area (source: USGS Orthoimagery 2005).

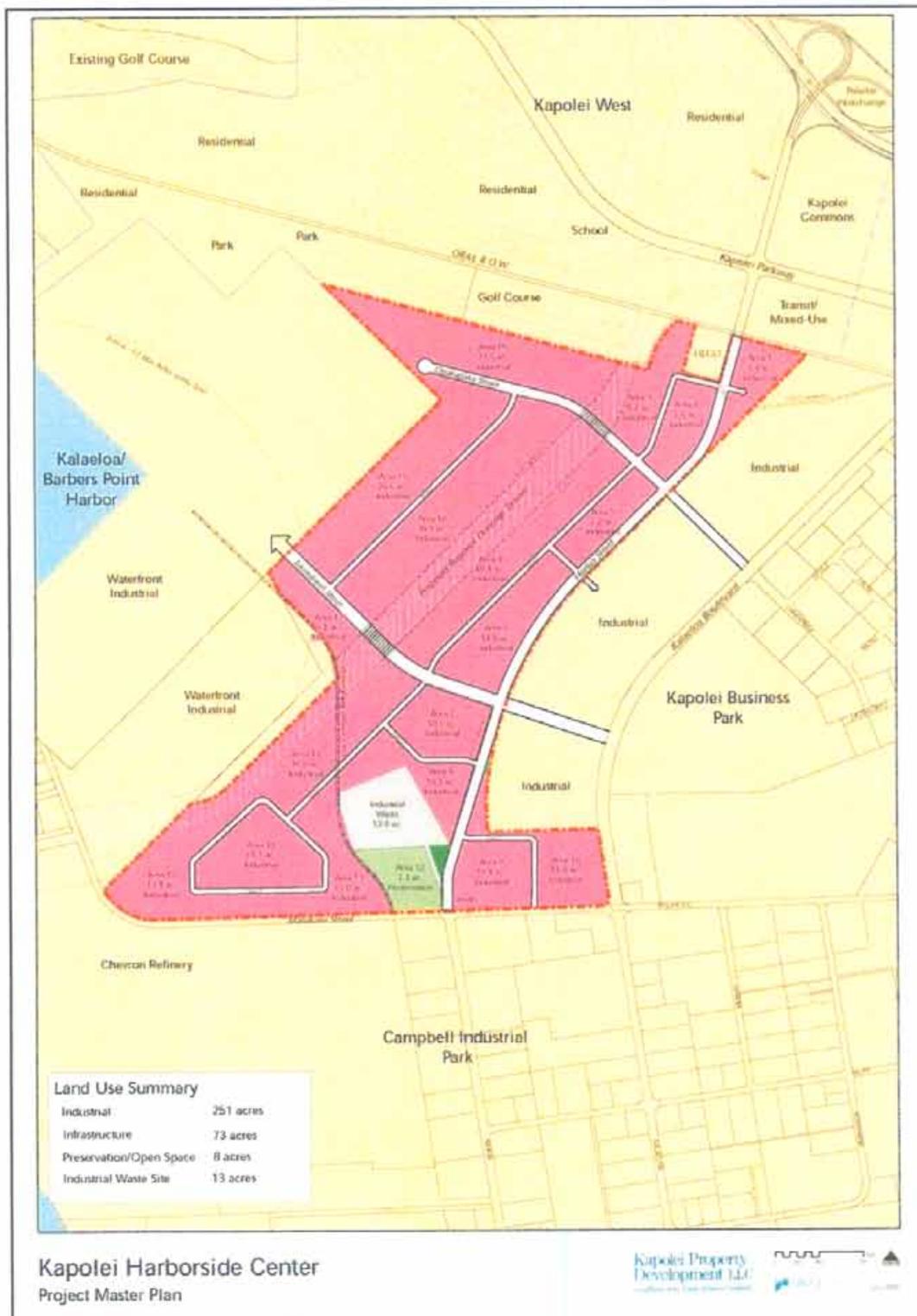


Figure 4. Kapolei Harborside Center project master plan.

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 [Hawai'i Register]). Determinations of eligibility to the Hawai'i Register result when a state agency official's historic property "significance assessment" is approved by the State Historic Preservation Division (SHPD), or when SHPD itself makes an eligibility determination for an historic property (HAR Chapter 13-284).

The archaeological inventory survey report includes a project-specific effect recommendation and mitigation recommendations for the project area's historic properties that are recommended eligible to the Hawai'i Register. This document is intended to support project-related historic preservation consultation among state agencies and interested Native Hawaiian and community groups.

A companion cultural impact assessment (CIA) study (Souza and Hammatt 2006), prepared to support the project's Hawai'i state environmental review (HRS Chapter 343), per the Hawai'i State Department of Health's Office of Environmental Quality Control "*Guidelines for Assessing Cultural Impacts*", further evaluates the project's potential impacts to historic properties. Both documents will support the project's historic preservation consultation effort.

1.2 Scope of Work

The scope of work for this archaeological inventory survey was a little different given the extraordinary extent of previous archaeological study on these lands and the prior obliteration of almost all of the previously documented historic properties by land modifications going back several decades. Following an initial field inspection of current conditions within the project area, it was determined that intensive (100 percent) pedestrian survey within the project area was only necessary within lands observed to be relatively undisturbed. The locations of these areas are described in Section 3: Results of Fieldwork.

The archaeological inventory survey and this report document all extant historic properties within the subject parcel. The following scope of work satisfies State and County requirements for an archaeological inventory survey [per HAR 13-13-276]: The scope of work included:

1. A ground survey of the entire project area for the purpose of site inventory. All sites were located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation included photographs and scale drawings. All sites are to be assigned State Inventory of Historic Properties (SIHP) numbers.
2. Limited subsurface testing was conducted to determine if subsurface deposits were located in archaeological sites of the project area and, if so, to evaluate their significance.
3. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research focused on the specific area with general background on the *ahupua'a* and district and emphasizes settlement patterns.
4. Preparation of this inventory survey report including the following:
 - a. A topographic map of the survey area showing all archaeological sites and site areas;

- b. Description of all archaeological sites with selected photographs, scale drawings, and discussions of function;
- c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the archaeological features;
- d. A summary of site categories and their significance in an archaeological and historic context;
- e. Recommendations based on all information generated specifying what steps should be taken to mitigate the impact of development on archaeological resources - such as data recovery (excavation) and preservation of specific areas. These recommendations will be developed in consultation with the client and the State Historic Preservation Division.

This scope of work also includes full coordination with the State Historic Preservation Division (SHPD), and County relating to archaeological matters. This coordination takes place after consent of the owner or representatives.

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is located on the 'Ewa plain, south of the Wai'anae Mountain Range in the southwest corner of O'ahu. The terrain is limestone and alluvial deposits, overlying flows of the Wai'anae volcanic series (Macdonald et al. 1983:423). The project area is generally quite level varying between 10 feet at the southern (*makai*) end of the project area and 70 feet elevation above sea level at the project area's northern (*mauka*) end.

Lying in the lee of the Wai'anae mountain range, the project area is one of the driest areas of O'ahu with most of the area averaging about 18 inches of rainfall annually (Juvik and Juvik 1998:56). In pre-contact Hawai'i the project area would have been mostly lowland dry shrub and grassland, but this area has been extensively disturbed and transformed by human activity with a variety of exotic grasses, weeds, and shrubs now dominating. These grasses and shrubs, along with pockets of *kiawe* forest, and a few scattered banyan trees are characteristic of the vegetation of the project area.

Based on USGS soil survey data, the project area is largely covered with thin clay soils including a moderately shallow 'Ewa silty clay loam (EmA and EmB), and Mamala stony silty clay loam (MnC) overlying coral (limestone) outcrop (CR) (Foote et al. 1972) (Figure 5). The surface of the Pleistocene limestone outcrop, where not covered by alluvium or stockpiled material, has characteristic dissolution "pit caves" (Myloie and Carew 1995), which are nearly universally, but erroneously, referred to as "sink holes" (Halliday 2005). These pit caves, or sinkholes, vary widely in areal extent and depth, with some of the more modest features comparable in volume to five-gallon buckets, while some of the larger features, although usually irregularly shaped, are several meters wide and several meters 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 from introduced grazing animals and deliberately induced erosion to augment the portions of the 'Ewa Plain that were suitable for

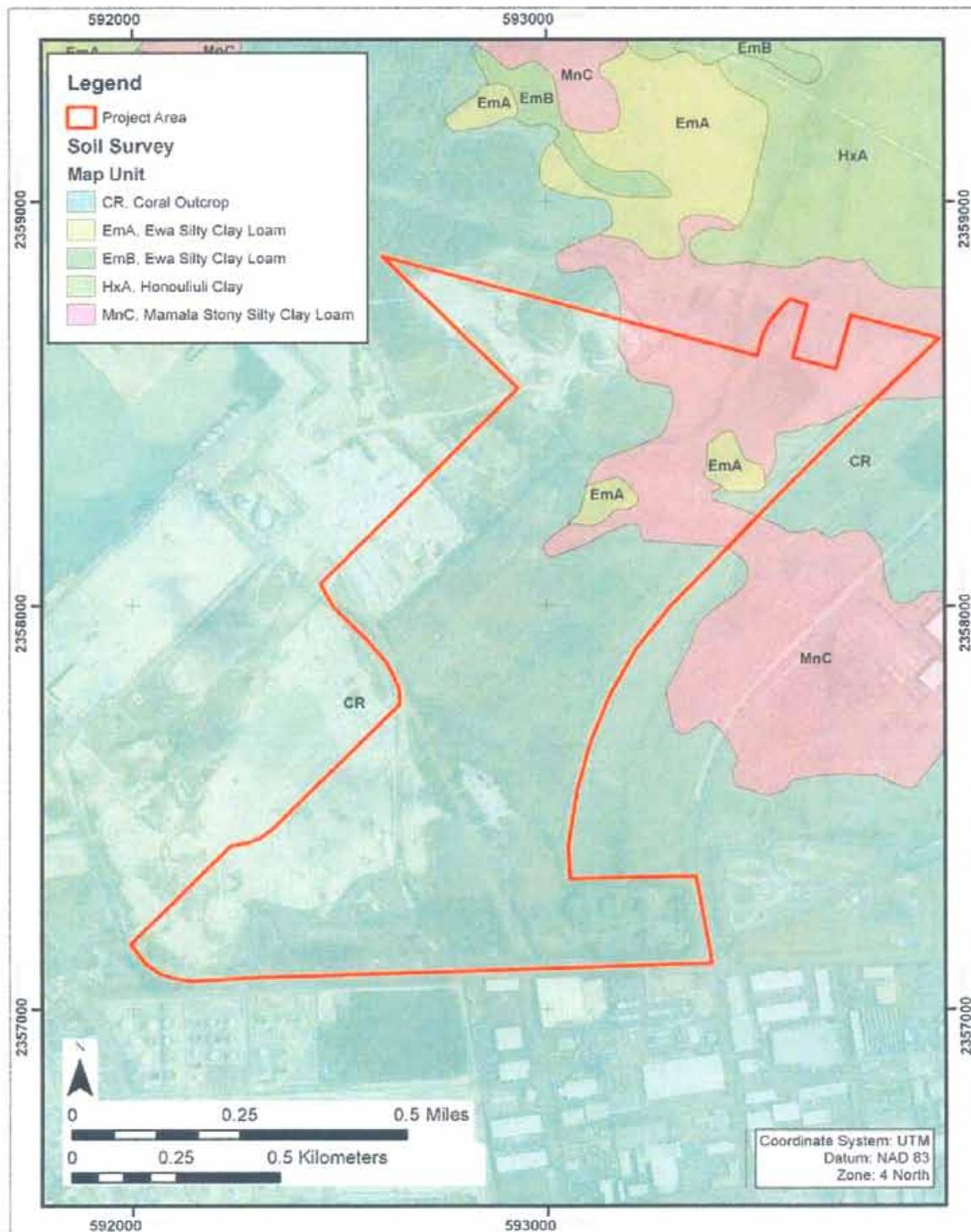


Figure 5. Aerial photograph (source: USGS Orthoimagery 2005) with overlay of USDA Soil Survey (Foote et al. 1972), showing the soil types within the project area.

erosion and transport during heavy rains down onto the adjacent limestone plain. The agricultural lands in the project area likely resulted, at least partially, from this arable land expansion program.

In Figure 6, the extensive quarrying and quarry-stockpiling activity are visible as the white areas along the project area's western side. These quarrying operations are also clearly visible in Figure 3. The extent of this quarrying is greater than it may initially appear as haole koa and other vegetation have covered some quarried material stockpile areas over the decades.

The only portions of the current project area that have not been greatly altered by past land use are the approximately 6-acre archaeological/paleontological preserve of limestone sinkholes, located along the project area's southern boundary, and the northwestern tip of the project area. Both these areas have been moderately affected by *kiawe*-wood cutting activity and minor bulldozing in the past, but they still have the characteristic limestone land surface and *kiawe* thicket vegetation. The preserve area is enclosed within a chain-link fence, and contains scores of limestone sinkholes.

1.4 Methods

1.4.1 Document Review

Background research included a review of previous archaeological studies on file at SHPD/DLNR and a review of documents and maps at the Cultural Surveys Hawai'i library. Individuals knowledgeable about the project area's history and significance regarding traditional cultural practices are being consulted in conjunction with the companion cultural impact assessment for the project (Souza and Hammatt 2006 *in prep.*).

1.4.2 Field Methods

Matt McDermott, M. A., and Hallett H. Hammatt, Ph.D., conducted initial field inspections of the project area on November 21 and December 7, 2005. Intensive pedestrian survey of relatively undisturbed lands and documentation of historic properties within the project area

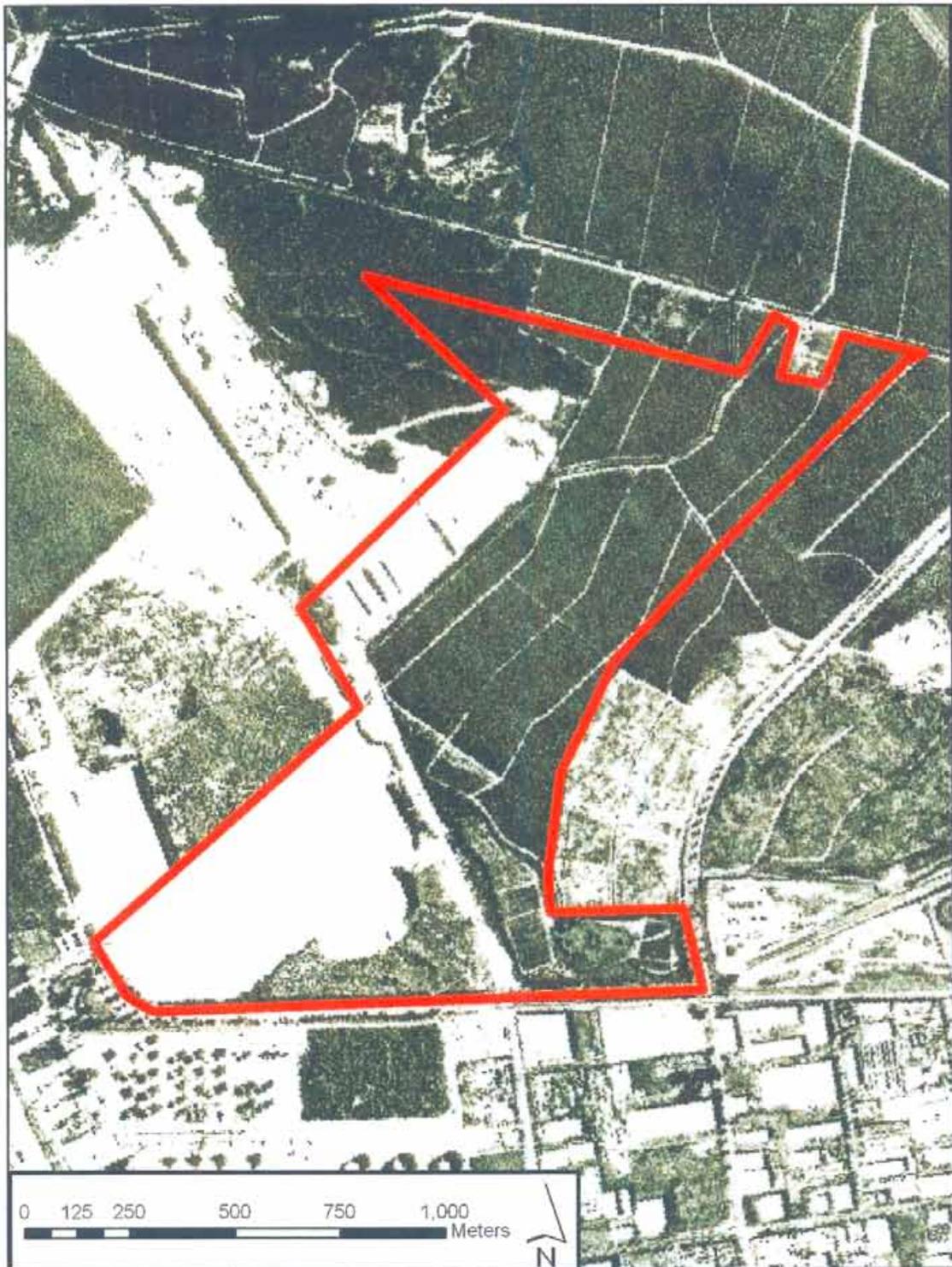


Figure 6. 1980s aerial photograph showing extensive land modification within the project area by historic and modern land use.

was completed by Todd Tulchin, B.S. and Bradley Garrett, M.A. on June 19-20, 2006. Fieldwork for the archaeological inventory survey required a total of five person-days to complete.

The initial field inspection of the project area was accomplished on foot and by vehicle. Inspection coverage was not 100 percent owing to the large stockpile areas, but was sufficient to characterize the extent of prior land use disturbance within different parts of the project area. It was also sufficient to determine the likelihood of previously recorded cultural resources surviving this extensive disturbance.

Lands determined to be relatively undisturbed by the initial field inspection were subsequently subjected to a 100% coverage pedestrian inspection. The intensive pedestrian inspection was accomplished through systematic sweeps. The interval between the archaeologists was generally 5-10 m. All historic properties encountered were recorded and documented with a written field description, site maps, photographs, and each site was located using Trimble Pro XR GPS survey technology (accuracy +/- 0.5 m). The general locations of sinkhole features within the approximately 6-acre sinkhole preserve area were recorded with a handheld, 12-channel, WAAS-enabled, Garmin GPSMAP 76S unit, which has a usual horizontal accuracy of three to six meters.

Subsurface testing consisted of the partial excavation, by hand, of selected surface archaeological features located during the pedestrian survey. The purpose of the subsurface testing was to aid in determining the function of located surface sites, as well as to possibly obtain datable materials for later radiocarbon dating. All excavated material was sifted through a 1/8 in. wire mesh screen to separate out the soil matrix, then all cultural material was collected for analysis in the lab. Each test excavation was documented with a scale section profile, photographs, and sediment descriptions. Sediment descriptions included characterizations of Munsell color designations, compactness, texture, structure, inclusions, cultural material present, and boundary distinctness and topography.

1.4.3 Laboratory Methods

Laboratory analyses of material recovered from limited subsurface testing within the project area included:

- 1) Identification of invertebrate midden. Common marine shells were identified and analyzed at the Cultural Surveys Hawai'i laboratory in Kailua, Hawai'i.
- 2) Identification of vertebrate faunal material. All vertebrate faunal material was identified and analyzed at the Cultural Surveys Hawai'i laboratory in Kailua, Hawai'i.
- 3) Identification and cataloguing of traditional Hawaiian artifacts. Any artifacts collected in situ at the project area or contained within sediment samples were measured, weighed and classified by material type and artifact type. The analysis then focused on distinguishing the possible function of the artifact.

1.4.4 Discussion of Cultural Resource Significance

In Hawai'i cultural resource management, historic property significance is generally evaluated and expressed as eligibility for listing on the Hawai'i Register of Historic Places (Hawai'i Register). To be considered eligible for listing on the Hawai'i Register, an historic property must possess integrity of location, design, setting, materials, workmanship, feeling, and

association, and meet one or more of the following broad cultural/historic significance criteria: "A" reflects major trends or events in the history of the state or nation; "B" is associated with the lives of persons significant in our past; "C" is an excellent example of a site type/work of a master; "D" has yielded or may be likely to yield information important to prehistory or history; and, "E" has traditional cultural significance to an ethnic group; includes religious structures and/or burials. For this report, historic property integrity and significance were considered based on the guidance provided in National Register Bulletin # 15, "How to Apply the National Register Criteria for Evaluation."

1.5 Community Consultation

Individuals knowledgeable about the project area's history were consulted in conjunction with the companion Cultural Impact Assessment for the project area (Souza and Hammatt *in prep.*).

Section 2 Background Research

2.1 Traditional and Historical Background

2.1.1 Mythological and Traditional Accounts and Early Historic Period

Various legends and early historical accounts indicate that the *ahupua'a* of Honouliuli (Figure 7) was once heavily populated by pre-contact Hawaiians. This substantial settlement is attributable for the most part to the plentiful marine and estuarine resources available at the coast, as well as lowlands fronting the west loch of Pearl Harbor (Kaihuopala'ai) suitable for wetland taro cultivation. In addition, forest resources along the slopes of the Wai'anae Range, as suggested by E.S. and E.G. Handy, probably acted as a viable subsistence alternative during times of famine and/or low rainfall.

The length or depth of the valleys and the gradual slope of the ridges made the inhabited lowlands much more distant from the 'wao, or upland jungle, than was the case on the windward coast. Yet the 'wao here was more extensive, giving greater opportunity to forage for wild foods during famine time [Handy and Handy 1972:469-470].

John Papa 'I'i describes a network of Leeward O'ahu trails that in later historic times encircled and crossed the Wai'anae Range, allowing passage from West Loch to the Honouliuli lowlands, past Pu'u Kapolei and Waimānalo Gulch to the Wai'anae coast and onward, circumscribing the shoreline of O'ahu ('I'i 1959:96-98). Following 'I'i's description, a portion of this trail network would have passed close to the present Farrington Highway alignment.

The Hawaiian *ali'i* were also attracted to this region. One historical account of particular interest refers to an *ali'i* residing in Ko'olina, a kilometer and a half to the northwest of the project area:

Ko'olina is in Waimānalo near the boundary of 'Ewa and Wai'anae. This was a vacationing place for chief Kākuhihewa and the priest Napuaikamao was the caretaker of the place. Remember reader, this Ko'olina is not situated in the Waimānalo on the Ko'olau side of the island but the Waimānalo in 'Ewa. It is a lovely and delightful place and the chief, Kākuhihewa loved this home of his [Ke Au Hou July 13, 1910 in Sterling and Summers 1978:41].

Other early historical accounts of the general region typically refer to the more populated eastern portion of the 'Ewa district, where missions and schools were established and subsistence resources were perceived to be greater. However, the presence of archaeological sites along the barren coral plains and coast of southwest Honouliuli Ahupua'a indicate that pre-contact and early post-contact populations also adapted to less inviting areas, despite the environmental hardships.

Barber's Point is named after Captain Henry Barber, whose ship ran aground on October 31, 1796. Subsequent to western contact in the area, the landscape of the 'Ewa plains and Wai'anae slopes was adversely affected by the over-harvesting of the sandalwood forest, and particularly by the introduction of domesticated animals and exotic plant species. Domesticated animals

including goats, sheep and cattle were brought to the Hawaiian Islands by Capt. George Vancouver in the early 1790s, and were allowed to graze freely about the land for some time after. L.A. Henke reports the existence of a longhorn cattle ranch in Wai'anae by circa 1840 (in Frierson 1972:10).

During this same time, perhaps as early as 1790, exotic plant species were introduced to and flourished in the area. The following dates of specific vegetation introduced to Hawai'i are given by R. Smith and outlined by Frierson (1972:10-11):

- 1) "early", c. 1790: Prickly pear cactus (*Opuntia tuna*); *Haole koa* (*Leucaena glauca*); Guava (*Psidium guajava*)
- 2) 1835-1840: Burmuda [sic] grass (*Cynodon dactylon*); Wire grass (*Eleusine indica*)
- 3) 1858: Lantana (*Lantana camara*)

The *kiawe* tree was also introduced during this period, either in 1828 or 1837 [Frierson 1972:11].

2.1.2 Mid- to late-1800s

Following the Māhele of 1848, 99 individual land claims in the *ahupua'a* of Honouliuli were registered and awarded by King Kamehameha III. The present study area appears to have been included in the largest award (Royal Patent 6071, LCA 11216, 'Āpana 8) granted in Honouliuli Ahupua'a to Miriam Ke'ahi-Kuni Kekau'ōnohi on January 1848 (Native Register). Kekau'ōnohi acquired a deed to all unclaimed land within the *ahupua'a*, totaling 43,250 acres.

Kekau'ōnohi was one of Liholiho's (Kamehameha II's) wives, and after his death, she lived with her half-brother, Luanu'u Kahala'i'a, who was governor of Kaua'i. Subsequently, Kekau'ōnohi ran away with Queen Ka'ahumanu's stepson, Keli'i-ahonui, and then became 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. When Levi Ha'alelea died, the property went to his surviving wife, who in turn leased it to James Dowsett and John Meek in 1871 for stock running and grazing.

In 1877, James Campbell purchased most of Honouliuli Ahupua'a -including the current project area- for a total of \$95,000. He then drove off 32,347 head of cattle belonging to Dowsett, Meek and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva 1983:C-12). By 1881, the Campbell property of Honouliuli prospered as a cattle ranch with "abundant pasturage of various kinds" (Briggs in Haun and Kelly 1984:45).

In 1889, Campbell leased his property to Benjamin Dillingham, who subsequently formed the O'ahu Railway and Land Company (O.R. & L.) as the result of a franchise granted by King Kalākaua in 1886. In 1889, Dillingham opened the first nine miles of narrow gauge track on the King's birthday. To attract business to his new railroad system, Dillingham subleased all land below 200 feet to William Castle who in turn sublet the area to the Ewa Plantation Company for sugar cane cultivation (Frierson 1972:15).

Ewa Plantation Co. grew quickly and continued in full operation up into modern times. As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Co. installed ditches running from the lower slopes of the mountain range to the

lowlands and then plowed the slopes vertically just before the rainy season to induce erosion (Frierson 1972:17).

2.1.3 1900s

Twentieth century land use in the vicinity of the project area included transportation along the former O.R. & L. alignment. Passenger totals on the O.R. & L. line increased throughout the first half of the twentieth century. In 1908, a total of 446,318 people rode on the line. This total rose to approximately 1,200,000 by 1922 and 1943 saw an all time high of 2,642,516 passengers. Throughout WWII, the rail way served a critical function in moving both personnel and equipment.

The development of a better road system and more cars on the island began to cut into passenger totals on the O.R. & L. According to the National Register of Historic Places Inventory forms on file at SHPD/DLNR, on December 12, 1947, all operations outside of Honolulu were ceased. In 1950, the U.S. Navy purchased the track and right-of-way from Pearl Harbor to the Naval Ammunition Depot (NAD) access road in Nānākuli for \$1.00 in the name of "National Defense". The NAD maintained this 25.5-mile stretch of track until the early 1950s when a 6.5-mile stretch from Pearl Harbor to Waipahu was ceded to the state of Hawai'i. A further 6 miles was reverted to the state in 1954 after a heavy flood. The final 13-mile stretch was in use until 1968, when it too was ceded to the state in 1980.

The 1922 Fire Control Map (Figure 8) shows a road and architectural features in the area of the Gilbert Station understood as the site of a very small Gilbert Camp associated with the railway and 'Ewa Plantation. These features also appear, though less extensive, in the 1928 U.S. Geological Survey map (Figure 9). A 1943 war department map (Figure 10) shows the same features and indicates that only a small part of the northeast portion of the project area (light shading) may have been under cultivation at that time. None of these three maps shows any further development within the area of present concern.

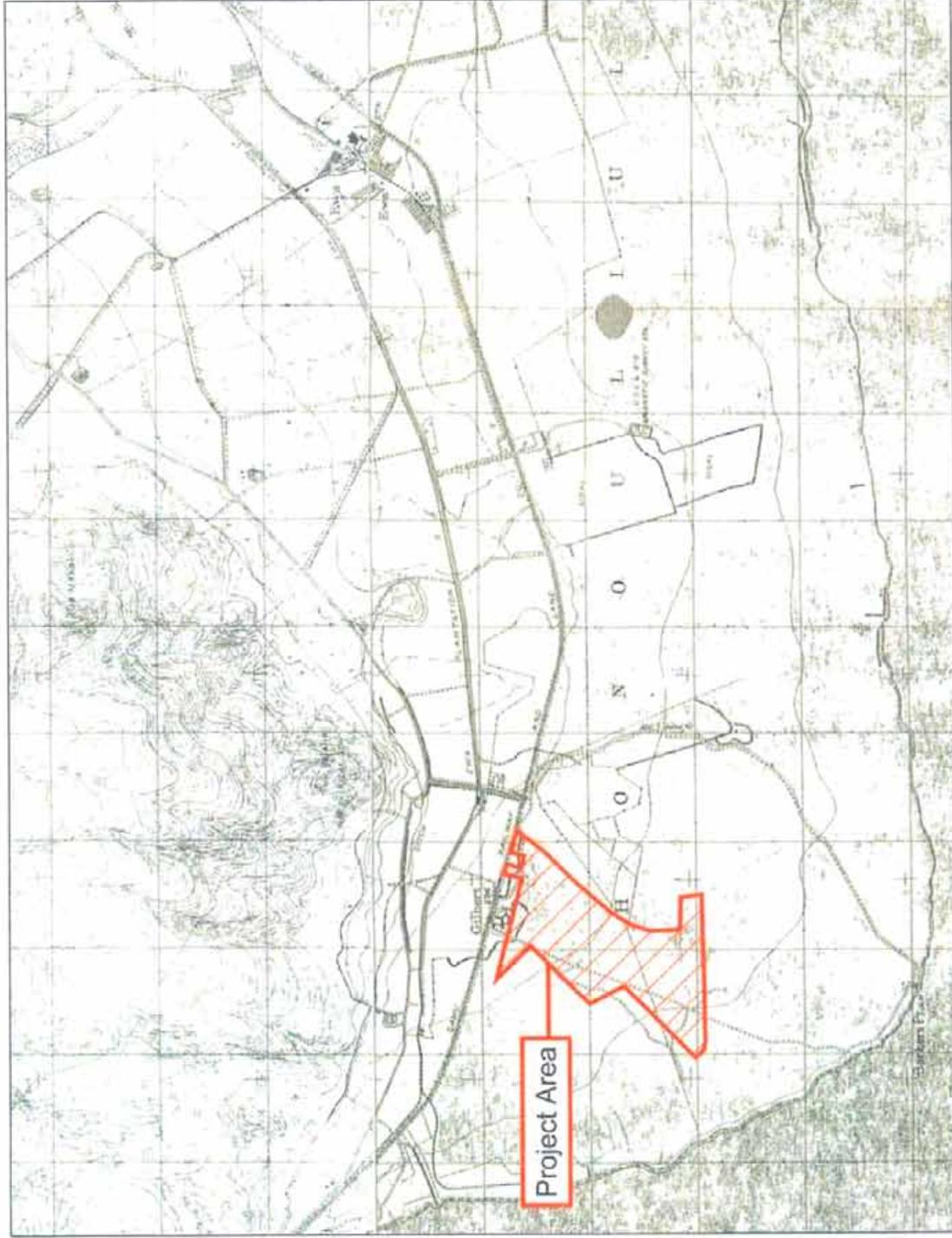


Figure 8. 1922 fire control map showing the location of the project area.

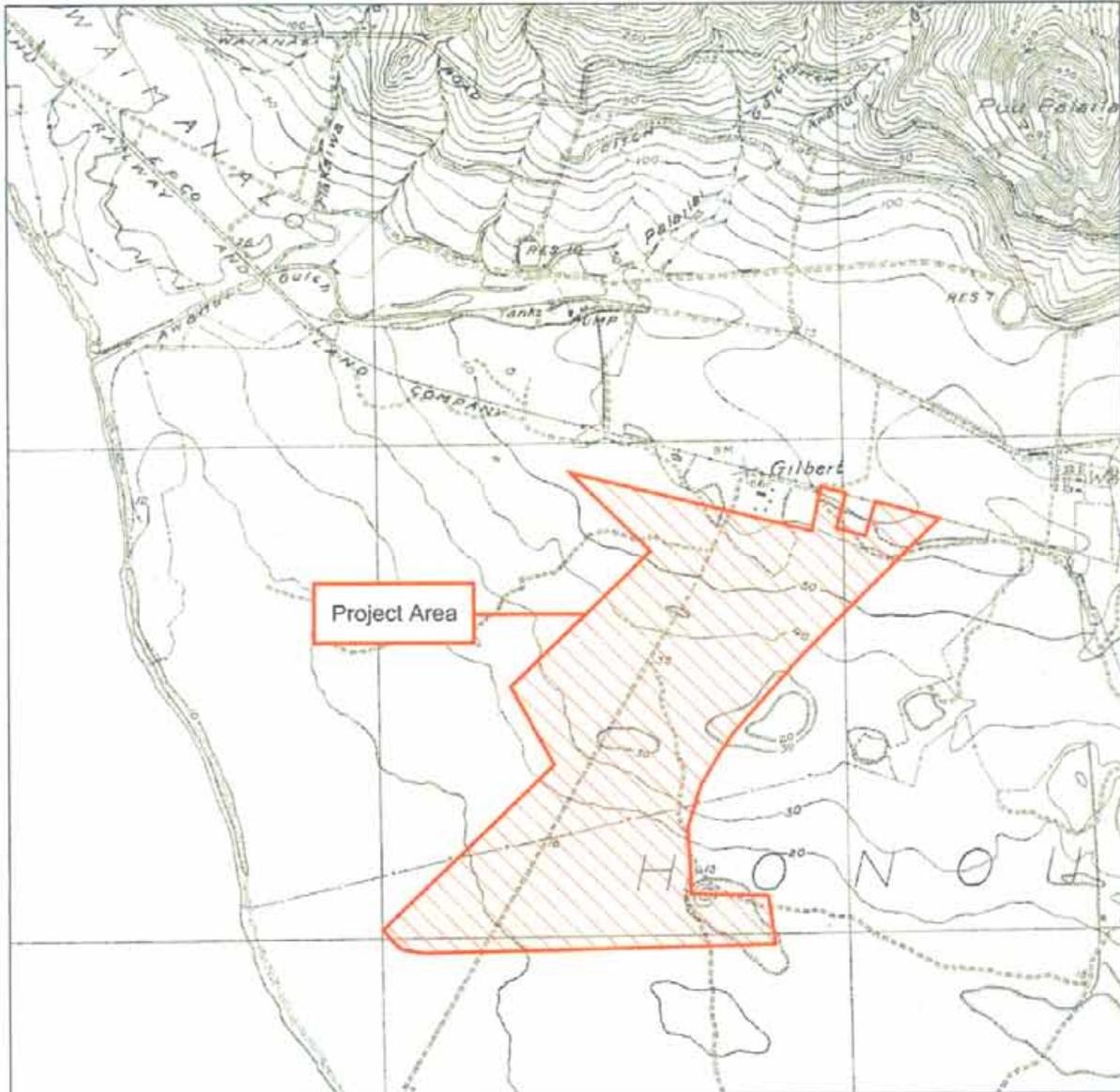


Figure 9. 1928 USGS Topographic Map, 'Ewa Quadrangle, showing the location of the project area.

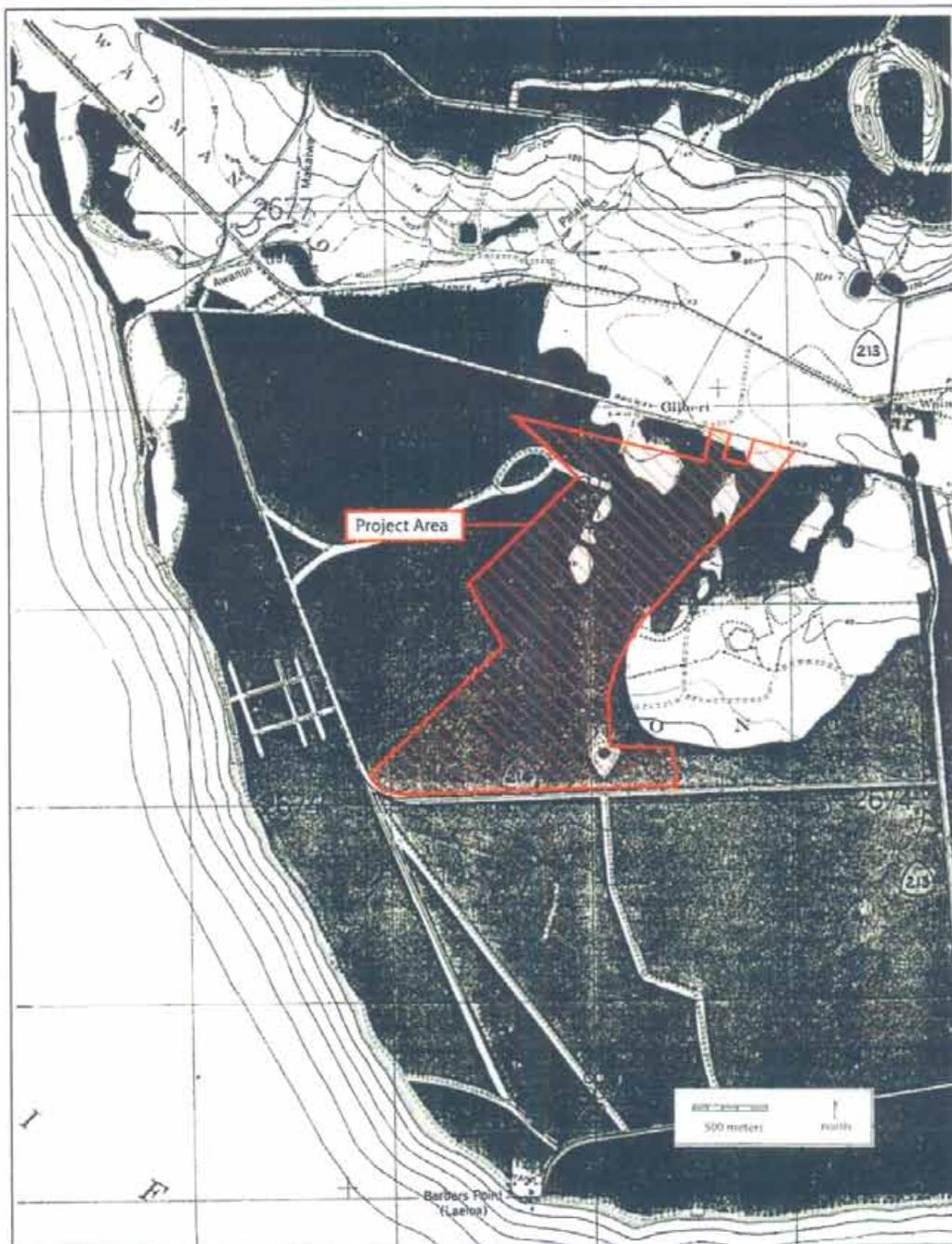


Figure 10. 1943 War Department map showing the location of the project area.

2.2 Review of Past Archaeological / Paleontological Studies

2.2.1 Overview of Archaeological Studies in Western Honouliuli

An overview of archaeological studies in the west half of Honouliuli Ahupua'a is presented in Table 1 and Figure 11. A discussion of archaeological findings germane to the present project area follows.

Table 1. Archaeological and Related Studies in Western Honouliuli Ahupua'a

Reference	Nature of Study	General Location of Study
Thrum 1907	<i>Heiau</i> study	Hawaiian Islands
McAllister 1933	All island survey	O'ahu Island
Kikuchi 1959	Site letter report	Barbers Point
Lewis 1970	Reconnaissance survey	Barbers Point (harbor area)
Frierson 1972	Study of land use & vegetation change	Honouliuli
Barrera 1975	Reconnaissance survey	Barbers Point (harbor area)
Clark and Connolly 1975	Reconnaissance survey	Barbers Point (harbor area)
Oshima 1975	Reconnaissance survey	Barbers Point
Sinoto 1976	Cultural resources survey	Barbers Point (harbor area)
Bordner 1977	Reconnaissance survey	Kalo'i Gulch
Davis 1978	Scholarly paper	Barbers Point (harbor area)
Davis and Griffin 1978	Archaeological Survey	Barbers Point (harbor area)
Hawai'i Marine Research Inc. 1978	Geoarchaeological reconnaissance	Barbers Point (harbor area)
Kirch 1978	Land snail study	Barbers Point (harbor area)
Sinoto 1978	Archaeological & Paleontological salvage	Barbers Point (harbor area)
Barrera 1979	Archaeological Survey	West Beach
Clark 1979	Reconnaissance survey	Barbers Point (harbor area)
Cleghorn 1979	Reconnaissance survey	Barbers Point
Davis 1979a	Emergency excavations	Barbers Point (harbor area)
Davis 1979b	Emergency excavations	Barbers Point (harbor area)
Davis 1979c	Emergency excavations	Barbers Point (harbor area)
Komori and Dye 1979	Archaeological testing	West Beach
Sinoto 1979	Cultural resources survey	Barbers Point (harbor area)
Davis 1980	Research design	Barbers Point
Kirch and Christensen 1980	Land snail study	Barbers Point (harbor area)
Christensen and Kirch 1981	Land snail study	Barbers Point (harbor area)
Hammatt and Folk 1981	Archaeological and Paleontological Investigation	Barbers Point (harbor area)
Davis 1982	Academic paper	Barbers Point
McCoy et al. 1982	Proposal for investigations	Barbers Point (harbor area)

Reference	Nature of Study	General Location of Study
Neller 1982	Scholarly study	Barbers Point
Olson 1982	Fossil avifauna study	Barbers Point
Ahlo and Homon 1983	Reconnaissance survey	Barbers Point (harbor area)
Bordner and Silva 1983	Reconnaissance survey	Waimānalo Gulch
Ahlo and Homon 1984	Test excavations	Barbers Point (harbor area)
Barrera 1984	Archaeological Status Report	West Beach
Hammatt 1984	Reconnaissance survey	Kahe Point
Haun and Kelly 1984	Research resign	Naval Air Station
Tuggle 1984	Survey report	Naval Air Station
Neller 1985	Review and evaluation	West Beach
Barrera 1986	Archaeological Investigations	West Beach
Davis and Haun 1986	Intensive survey and test excavations	West Beach
Davis et al. 1986 a and b	Research design	West Beach
Haun 1986a	Reconnaissance survey	Kapolei Town
Haun 1986b	Reconnaissance survey	Kapolei Town
Davis and Haun 1987 a and b	Intensive survey & test excavations	West Beach
Rosendahl 1987a	Reconnaissance survey	Kapolei Town
Rosendahl 1987b	Survey report	Kapolei Town
Welch 1987	Reconnaissance survey	Naval Air Station
Bath 1989a	Petroglyph study	Waimānalo Gulch
Bath 1989b	Burial documentation	Kahe
Burgett and Rosendahl 1989	Subsurface archaeological testing	North of O.R.&L.
Hammatt and Shideler 1989a	Archaeological assessment	Barbers Point (harbor area)
Hammatt and Shideler 1989b	Reconnaissance survey	Kahe
Sinoto 1989	Letter report	Barbers Point
Carlson and Rosendahl 1990	Inventory survey	Kaomi Loop Subdivision
Cleghorn and Davis 1990	Archaeological and paleontological investigation	Barbers Point (harbor area)
Davis 1990b	Archaeological and paleontological investigation	Barbers Point (HECO area)
Davis 1990a	Archaeological and paleontological study (Ph.D. dissertation)	Barbers Point (harbor area)
Rosendahl 1990	Letter report	Kapolei Town
Kennedy 1991	Subsurface testing	Pu'u o Kapolei
Folk 1991	Archaeological reconnaissance	Drainage channel
Hammatt et al. 1991	Inventory survey	Makaīwa Hills
Hammatt and Shideler 1991	Archaeological assessment	Barbers Point (harbor area)
Haun et al. 1991	Survey report	Naval Air Station

Reference	Nature of Study	General Location of Study
Burgett and Rosendahl 1992	Inventory survey	Barbers Point (harbor area)
Hammatt and Folk 1992	Subsurface testing	Barbers Point (drainage beach berm)
Glidden et al. 1993	Data recovery excavations	Paradise Cove
Jones 1993	Fossil coral reefs study (Ph.D. dissertation)	Hawaiian Islands
Landrum 1993	Reconnaissance and subsurface testing	Naval Air Station
Miller 1993	Data recovery	Barbers Point (harbor area)
Hammatt and Shideler 1994	Archaeological assessment	Barbers Point (harbor area)
Hammatt et al. 1994	Inventory survey	Barbers Point (harbor area)
Davis 1993	Archaeological and paleontological investigation	Barbers Point (harbor area)
Erkelens 1992	Archaeological survey	Naval Air Station
Hammatt and Shideler 1995	Data recovery plan	Barbers Point (harbor area)
Jourdane 1995	Burial documentation	Paradise Cove
O'Hare et al. 1996	Intensive survey and testing	Naval Air Station
Athens et al. 1997	Cultural resource inventory, paleoenvironmental investigation	'Ewa Plain:Naval Air Station
Tuggle 1997a	Cultural resource inventory	Naval Air Station
Tuggle 1997b	Synthesis	'Ewa Plain
Tuggle and Tomonari-Tuggle 1997	Cultural resource inventory survey	Naval Air Station
Wickler and Tuggle 1997	Cultural resource inventory, Inventory Survey	Naval Air Station
Wulzen and Rosendahl 1997	Subsurface testing & data recovery	Naval Air Station
McDermott et al. 2000	Data recovery	Barbers Point (harbor area)
Cordy and Hammatt 2003	Archaeological assessment	Barbers Point, North of O.R.&L.
O'Hare et al. 2004	Documentation of Plantation Infrastructure	North of O.R.&L.
Terry et al. 2004	Archaeological Inventory Survey of Two Sinkholes	North of O.R.&L.
Hoffman et al. 2005	Archaeological Inventory Survey	South of O.R.&L.

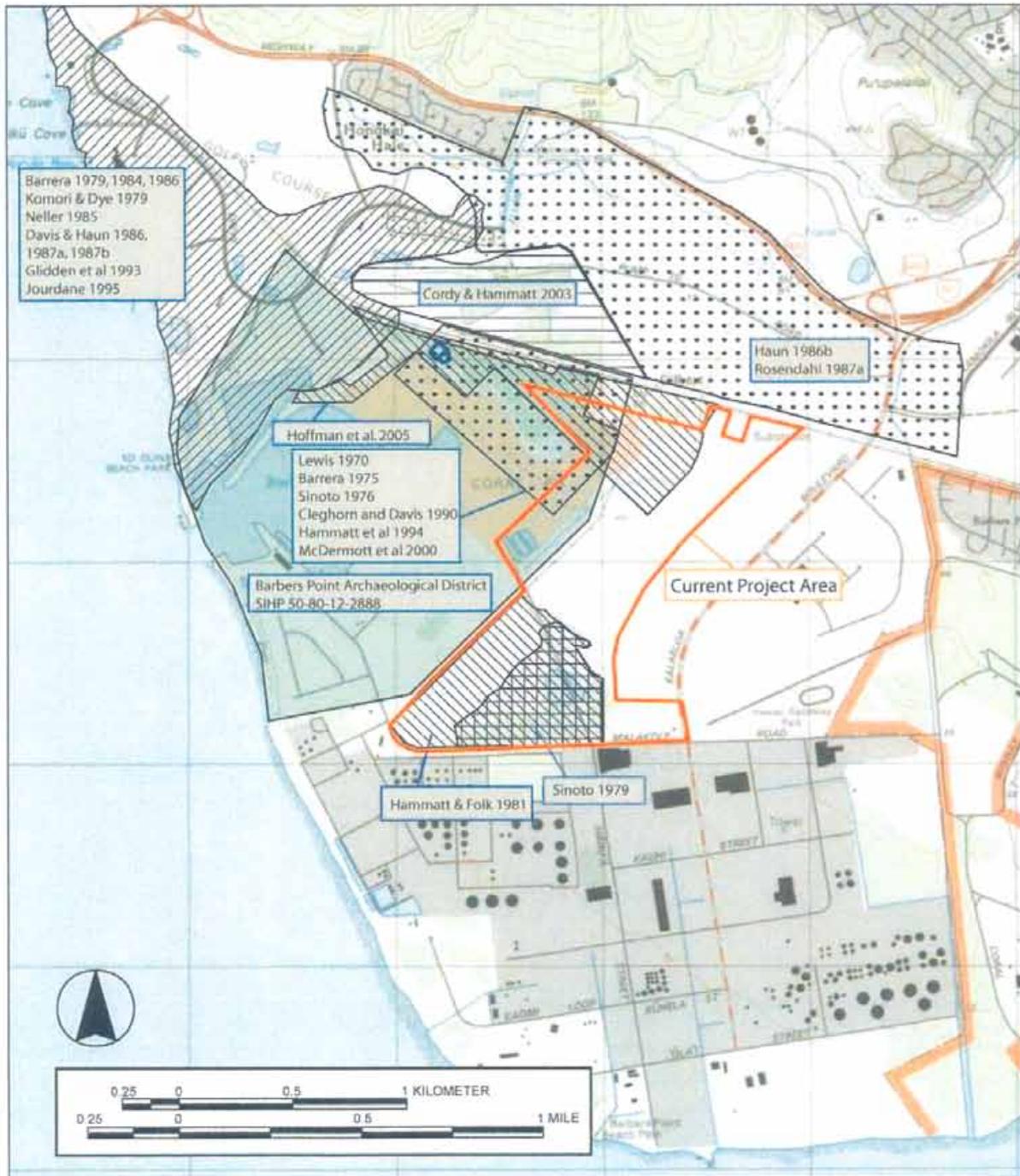


Figure 11. USGS 7.5-minute series topographic map, 'Ewa quadrangle (1998), showing general areas of archaeological study in the vicinity of the project area

The first effort to record archaeological sites in Honouliuli was by Thrum (1907:46), who references "a *heiau* on Kapolei hill, 'Ewa - size and class unknown. Its walls thrown down for fencing." The former *heiau* was on Pu'u Kapolei, 3 kilometers northeast of the present study area.

In his 1930 surface survey of the island of O'ahu, archaeologist J. Gilbert McAllister recorded the specific locations of important archaeological and cultural sites, and the general locations of some sites of lesser importance. McAllister (1933:107-108) recorded seven specific sites at Honouliuli (numbered 133-139) and these became the first seven sites in the Bishop Museum's Site Numbering System (OA-B6-1 through OA-B6-7). The nearest of these specific sites to the present project area is McAllister Site 138, including the Pu'u Kapolei *heiau* and an adjacent rock shelter. McAllister (1933:109), however designated his Site 146 to include archaeological features covering a large but poorly defined area along the coast. His impressions of Site 146 are recorded as follows:

'Ewa coral plains, throughout which are remains of many sites. The great extent of old stone walls, particularly near the Pu'u'loa Salt Works belongs to the ranching period of about 75 years ago [c. 1850s]. It is probable that the Hawaiians formerly used the holes and pits in the coral. Frequently the soil on the floor of larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here.

These archaeological sites of the 'Ewa coral plains would be the subject of some 40 or so archaeological reports in the 1970s and 1980s.

From the period between McAllister's 1930 study and the flurry of work that began in 1969, there are only a few sporadic pieces of poorly documented research. "In 1933, Dr. Kenneth P. Emory examined a well-preserved house site and a possible *heiau* in the western part of the coral plain; these sites were later destroyed by sugar-cane planting" (Sinoto 1976:1). In 1959, William Kikuchi removed a number of burials from a burial cave site (Bishop Museum Site OA-B6-10) at the Standard Oil Refinery, which was subsequently destroyed (Barrera 1975:1). Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road at the southwest corner of the present project area (Kikuchi 1959; Davis 1990:146, 147). In 1960, Yoshi Sinoto and Elspeth Sterling made note of a house site (Bishop Museum Site OA-B6-8). "In 1962, Lloyd Soehren recorded another secondary human burial in a sinkhole at the Barber's Point Naval Air Station" (Davis 1990a:147). In 1966 (per Sinoto 1960), Lloyd Soehren "carried out salvage excavations at BPBM Site # 50-OA-B6-13 (a possible fishing shrine.)" The site was reported as destroyed by construction (Barrera 1975:1) but Davis (1990a:148) relocated the shrine and performed additional excavations in 1982. In 1969, artifacts were recovered by Roger Green from a beach midden site (B6-14), south of the barge harbor.

These reports of a number of sites resulted in a number of visits by Dr. Sinoto and student volunteers in late 1969 and early 1970. A University of Hawaii graduate student, Ernest Lewis did a preliminary survey and test excavations for a graduate seminar in Polynesian Archaeology and donated his report to the Bishop Museum. Lewis was the first to document sites within the present project area.

As Barrera (1975:3) points out there are "a number of discrepancies and inconsistencies" in Lewis' report. "For example, some sites mentioned in the [Lewis] text are not indicated on any of his maps, and some sites shown on his maps are not discussed in the report" (Barrera 1975:3). However, taken for what it professes to be: "a preliminary report of a preliminary survey" (Lewis 1970:3), the survey is useful. Lewis provides a good summary of historical accounts (pages 4-18) and early maps of the region and a summary of significant aspects of the geography and geology of the study area. Lewis also provided an extensive bibliography suggesting directions for further historical research.

Lewis conducted a surface survey that located some 22 archaeological sites of the types that are typical for the Kalaheo region, including various types of enclosures and mounds, as well as walls, made of the locally available stacked limestone cobbles and boulders. Lewis' site map indicates that four of these sites existed within the current project area (Lewis 1970: Fig. 21). Three that would have been in the southeast corner of the present project lands by a former pond were interpreted as house sites (Bishop Museum site #s B6-15, 16, and 17). The fourth (Bishop Museum site # B6-36) was comprised of two stonewalls 30 m apart that extended in an east-west direction for 400 m near the northwest corner of the present project lands.

In 1975, William Barrera of the Bishop Museum, under contract with the U.S. Army Corps of Engineers (USACE), conducted an archaeological reconnaissance survey for the proposed Barber's Point Harbor. Barrera located 24 sites of which two are believed to have been located within the current project area: a 15 m long wall (T-10), and another wall section (not designated) described as to the west of the site B6-36 parallel walls. Both of these walls appear to have been in the northwest corner of the present project lands.

The USACE continued the archaeological research in 1976 by requesting another survey (Sinoto 1976) of the cultural remains in the area previously surveyed in 1970 (Lewis) and 1975 (Barrera). Sinoto designated four survey areas (A, B, C, and D) but only a small portion of Area D lies within the current project area. Sinoto's work included mapping of 68 new archaeological sites and more complete mapping of 30 previously recorded sites. In the course of this research, two excavations were conducted in the large, presently fenced, sinkhole Site 9545, located west of the current project area. This large sinkhole yielded archaeological remains and a radiocarbon date from a hearth feature, as well as bones of extinct bird species. Aki Sinoto considered his 1976 work a reconnaissance survey and recommended an inventory level survey with location and plan mapping in addition to test excavation and mapping of any areas in which sites may remain extant.

An important aspect of this first research (1976) by Sinoto was the identification of the presence of numerous avifaunal skeletal remains within limestone sinkholes, which led to the contacting of Storrs Olson, Associate Curator of Birds at the Smithsonian Institution. After a field inspection of sites in the vicinity of the project area and a brief review of the recovered material he knew that many extinct endemic species, new species, and even new genera were present. Olson stated that:

The various limestone sinks...contain probably the most extensive fossil avifauna in Hawaii with many new species endemic to the island. Such fossils have not and probably cannot be found anywhere else on the island. Furthermore, the nature of preservation is such as to insure that virtually complete skeletons can probably be assembled for most species. Thus, there is much highly significant and totally new

biological and paleontological information that can be obtained at the Barbers Point site.

Destruction of any of the potential fossil sinks would result in the loss of many specimens, some possibly unique, since one sinkhole might contain species absent in another. Also, the fauna of one sinkhole might not be coetaneous with that of another, the age of a deposit being determined by when a sinkhole first formed. Therefore, an investigation of the fauna of different sinks might show changes in species composition and changes in morphology within a species through time. Finally, it would also be desirable to retain some sinks intact as fossil "banks" should some new technique or different information be desired in the future. The fossil deposits at Barbers Point are a unique and irreplaceable resource. (Olson in Sinoto, 1976:74)

In 1980, Storrs Olson extended the test pit of Aki Sinoto in the large sinkhole site # 9545 and conducted extensive excavation of this area in 1981 (Olson, 1982:27).

In 1977, Aki Sinoto (1978) undertook salvage archaeological and paleontological excavations in the proposed barge harbor area (in Areas A and E). These investigations were just west and south (outside) of the proposed Barber's Point Harbor Expansion Area. Sinoto's work for the Corps of Engineers (1978) included preliminary sampling and analytical studies of avifaunal remains and terrestrial gastropods (land snails) and a geological study of the emerged coral reef based on the excavation of one sinkhole.

In late 1977 and early 1978, archaeological survey was conducted by the Archaeological Research Center of Hawaii in the deep draft port facility area. This research (Davis and Griffin, 1978) included within its Survey Zone 1 a number of sites within or just to the west of the southwest portion of the present project lands. As is often the case with the early Barber's Point studies ascertaining the true location of sites is remarkably problematic.

In 1977, Barber's Point Archaeological District was assigned Site # 50-80-12-2888 and listed on the National Register of Historic Places, based on the SHPD's Hawai'i/National Register web site (<http://www.hawaii.gov/dlnr/hpd/hpgreeting.htm>). A portion of this district overlaps with the current project area (see Figure 11).

To complete the archaeological survey of the entire area to be affected by the harbor and support facilities, the USACE contracted for survey of the areas designated as Optional Area 1 and Study Area 1a (Davis, 1978) and Area 1b (Sinoto 1978) located in the southwest portion of the present study area. Those surveys by Davis and Sinoto located numerous archaeological sites, as well as sinks of late Pleistocene to early Holocene age that are of considerable paleontological interest.

Sinoto's (1979) work shows that, although sinks containing remains of extinct species are dispersed throughout his study area, only 3 out of 19 sinks tested (or 16%) contained extinct species. However, this amounts to a considerable number of sinks as Sinoto estimated the total number of testable sinks in the 1979 study area as between 1,100 and 2,500 (Sinoto, 1979:34). The majority of Sinoto's New Disposal Site Area has been utilized for chemical dumps and coral stockpiling. That portion which remains is the site of the proposed Sinkhole Reserve and Park, comprising approximately 6 acres of the southern portion of the current project area.

In 1979, Bertell Davis carried out "emergency excavations" (Davis, 1979; a, b, c.) within the area he had previously designated as Area II, located east of the easternmost corner (the *mauka*, Diamond Head corner) of the present harbor open water. These excavations were carried out in advance of the quarry expansion operation (which preceded the harbor expansion) and it is believed that all sites in this area were salvaged or lost. This work was conducted a kilometer to the west of the current project area.

Also in 1979, an archaeological reconnaissance survey of a proposed waterline route down the east side of Kalaeloa Blvd. and then east along the north side of Malakole Road. "No archaeological sites were found along the proposed waterline route." and it was noted that "this area is either presently in sugar cane cultivation or has been used for this purpose in the past" (Cleghorn 1979:5).

Hammatt and Folk (1981) undertook archaeological testing and salvage excavations in three adjoining parcels designated Study Areas 1A, 1B and Optional Area. Of 138 archaeological sites, 88 sites were tested and 26 were excavated. Associated paleontological studies show that the limestone solution sinks and surrounding terrain were a major habitat of many fossil birds. Appendix I of their report, by Storrs Olson and Helen James, lists over 30 species of extinct fossil birds identified at Barber's Point. A total of ten new archaeological sites were identified. All of these Hammatt and Folk sites were located within the southwest corner of the current study area.

The most voluminous study (Cleghorn and Davis 1990) started in 1982 and concentrated in the area just northeast of the main bend of Malakole Road. Many of these sites were within the southwest and south central portion of the present project lands and many were outside just to the northwest.. A "final draft" (Davis 1993) report documents that research as does Dr. Bertell Davis' Ph.D. dissertation (1990).

Lynn Miller (1993) produced a report on her findings in a 31-acre parcel located just to the southeast of the present Deep Draft Harbor. Her research covers some 20 features at two state sites (2710 and 2711) that included enclosures, sinkhole caves, and a single burial.

The extensive archaeological and paleontological research conducted prior to development of West Beach (Ko'olina) to the west of the current project area is certainly relevant to the work accomplished within the project area. It is the second area of the 'Ewa Plain in which major data recovery was accomplished. Barrera (1979, 1984, 1986) conducted preliminary surveys and Davis (1986) undertook intensive survey and data recovery. Over 600 sinkholes were identified in the area along with around 180 surface sites, many of them similar in function to those at Barber's Point.

In 1985, Haun reported on a survey of the Naval Air Station at Barber's Point (Haun 1985) which lies along the coast to the southeast of the present project lands.

In 1991, Hammatt et al. conducted an archaeological inventory survey on a 1,915-acre Makaīwa Hills project area located 1.5 km to the north, *mauka* of Farrington Highway, identifying 34 sites.

Haun's (1986) archaeological reconnaissance survey for the 'Ewa Town Center/Secondary Urban Center study covered an area of approximately 1,400 acres north of the present project

area. A study by Burgett and Rosendahl (1989) involved the excavation of seventy-two backhoe test trenches in a 360-acre portion of the Haun study area. There were no significant finds.

A preliminary reconnaissance survey conducted by Haun (1986a) covered approximately 200 acres on the *mauka* side of Farrington Highway. Only one site was identified, an irrigation ditch that extended from the northwestern edge of his project area to a quarry at the northeastern edge. The ditch was described as "constructed of concrete and stone. Elevated flumes constructed of timbers and galvanized steel bridge the gulches" (Haun 1986a:3). This site was later designated SIHP 50-80-12-4341.

Haun's (1986b) preliminary reconnaissance survey of a 1,400-acre parcel was conducted on both the *mauka* and *makai* side of Farrington Highway, and surrounded the 200-acre parcel surveyed in earlier in 1986. One previously recorded site was known to have once been in the project area, a portion of the Oahu Railroad and Land Company right-of-way (Site 50-80-12-9714). One portion of Haun's project area *makai* of Farrington Highway is adjacent on the *mauka* side of the OR&L right-of-way to the northeast corner of the current study area (Figure 10). Haun's (1986b) project area also extended up the eastern slope of Pu'u Pālailai (this is not shown on Figure 10). The additional sites Haun (1986b) identified included an irrigation ditch (a portion of the same site -4341 identified during the 200-acre survey), a military structure, and a rock wall that paralleled the irrigation ditch.

Between 1989 and 1994 Hammatt and Shideler produced a number of archaeological assessments of the Barber's Point area. An archaeological assessment was conducted of the entire current project area (Hammatt and Shideler 1989). A detailed discussion of the creation of the preserve area that is centrally located along the southern edge of the current project area is included in the report (Hammatt and Shideler 1989:33-36). At the time the authors stated:

We agree whole-heartedly with the principle of such a sinkhole park and reserve. The scientific merit of the proposition is very high. (Hammatt and Shideler 1989: 23).

The authors of this report are of the opinion that there are no other areas of the 'Ewa Plain where sinkholes containing fossil bird bones survive in accessible locations... We favor the use of the 8-acre Malakole area as an educational/scientific reserve. (Hammatt and Shideler 1989: 34).

To the west of the project area, Paradise Cove, Lanikūhonua, and West Beach have been the subject of numerous archaeological studies (Barrera 1979, 1984, 1986; Komori & Dye 1979; Neller 1985; Davis & Haun 1986, 1987; Glidden et al. 1993; and Jourdane 1995).

To the west of the current project area Hammatt et al. (1994) and McDermott et al. (2000) conducted an archaeological inventory survey and a large archaeological data recovery project respectively. This work resulted in the creation of two archaeological preserve areas. SIHP site 50-80-12-9633 is a cave that was found to contain human remains and part of a wooden canoe (Hammatt et al. 1994:93-94). Because of its function as a burial site, the cave was not excavated and the remains were protected in the state in which they were discovered. Just east of that fenced preserve is another smaller preserve area surrounding the very large sinkhole SIHP site 50-80-12-9545.

Cordy and Hammatt (2003) made a study of a land parcel north of the current project area, across the O.R.&L. Several sinkholes were noted as of potential archaeological interest. The study also documented the presence of a historic chicken farm as well as other twentieth century architectural remains, including a Quonset hut. Two follow-up studies of plantation infrastructure (O'Hare et al. 2004) and two of these sinkholes (Terry et al. 2004) further addressed cultural resources north across the O.R.&L. alignment from the present study area.

Most recently, Hoffman (et al. 2005) identified several archaeological and historic sites as part of an archaeological inventory survey that covered portions of the northwest corner of the current project area. This investigation noted that this northwest portion of the current project area had been greatly affected by past land use; particularly the limestone quarry operation; however, there were still remnant archaeological features preserved within the less disturbed *kiawe* thickets. The types of features documented included sinkholes and stacked limestone wall segments and enclosures.

2.3 Background Summary and Predictive Model

The one general observation regarding the archaeology of the 'Ewa Plain is that there was more pre-contact utilization of the area than might be expected given its present day uninviting ambiance and "marginal ecology" (Sinoto 1976:71). Within the current project area, however, back from the coast and seaward of the forested inlands, pre-contact land use was likely less intensive.

Prior to extensive historic and modern land alteration, this area of Honouliuli would be expected to yield the remnants of traditional Hawaiian temporary habitations used during forays for marine resources and/or evidence of opportunistic seasonal agriculture. Based on ethnographic accounts and past archaeological investigations in the project area and its vicinity, limestone sinkholes on the 'Ewa Plain were used for agriculture and burial interment, with the largest overhangs used for temporary shelter. With the spread of Western land use in the 19th century, the project area was used for ranching first, then intensive commercial agriculture. Intensive agriculture would have destroyed or buried portions of the project area's traditional Hawaiian archaeological record, including surface features and sinkholes. Archaeological documentation in the 1970s (particularly Sinoto 1979 and Hammatt & Folk 1981) confirmed that traditional Native Hawaiian archaeological remains survived agricultural land use in portions of the project area. It also recognized the sinkholes as a storehouse of data on more than a score of previously unknown, extinct, bird species.

The most recent land use within the project area, subsequent to the 1970s, includes limestone quarrying, materials stockpiling and green waste processing. These activities have expanded into and largely removed or covered over the portions of the project area where Native Hawaiian archaeological remains and sinkholes were previously documented.

Section 3 Results of Fieldwork

The document review focused on synthesizing the abundant background historical and archaeological information that already exists for the project area and its vicinity. This synthesis revealed that large portions of the project area had been previously inspected as part of previous archaeological investigations in the last 35 years (particularly Sinoto 1979 and Hammatt & Folk 1981, Cleghorn and Davis 1990 and Davis 1993). There is a very substantial record of survey, site mapping and excavation within the project area as part of these investigations. The portions of the project area that had not been previously inspected for historic properties were previously used for commercial sugar cane cultivation, and have been thought to have little likelihood for significant archaeological deposits.

This section outlines the results of the fieldwork portion of the archaeological inventory survey undertaken by CSH personnel. Prior to fieldwork, background research identified where earlier cultural resource management investigations had identified historic properties within the project area. Background research also compiled available land use information to determine where modern land alteration had been extensive. Based on this information, the portions of the project area that had been previously surveyed for historic properties were inspected to determine how likely it was that the previously documented historic properties within these areas had survived modern and current disturbances, including on-going land use practices. The portions of the project area that had not been previously inspected for historic properties, because they had been under commercial sugarcane cultivation, were also inspected to determine if historic properties are present. As noted above, pedestrian field inspection of the ground surface was limited by stockpiling activities; however, all portions of the project area were inspected.

As noted in the report introduction, the approximately 20 acres that was subjected to 100 percent pedestrian inspection include the geographic areas 1, 9, and 10, as shown on Figure 12 and 13, below. The remaining approximately 325 acres of the project area that were not subjected to 100 percent pedestrian inspection were subjected to less intensive pedestrian and vehicular inspection to confirm the extensive prior ground disturbance and resulting unlikelihood of surviving historic properties within these areas.

3.1 Survey Findings

Because of the complexities of land-use history, field survey findings are best discussed by geographic area (Figure 12 and 13). In these figures, the project area has been divided into ten geographic areas based predominantly on past and current land use. Inventory survey findings are discussed below by these ten geographic areas.

3.1.1 Area 1—Sinkhole Preserve

The sinkhole preserve encompasses approximately six acres along the southern edge of the project boundary (refer to Figure 4, 12 and 13). Although documentation regarding the creation of the sinkhole preserve is difficult to find, it appears the sinkhole preserve was created in the early 1990s through the efforts of Dr. Alan Ziegler, a noted Hawai'i Zoologist with a long history of research in the Barber's Point area.

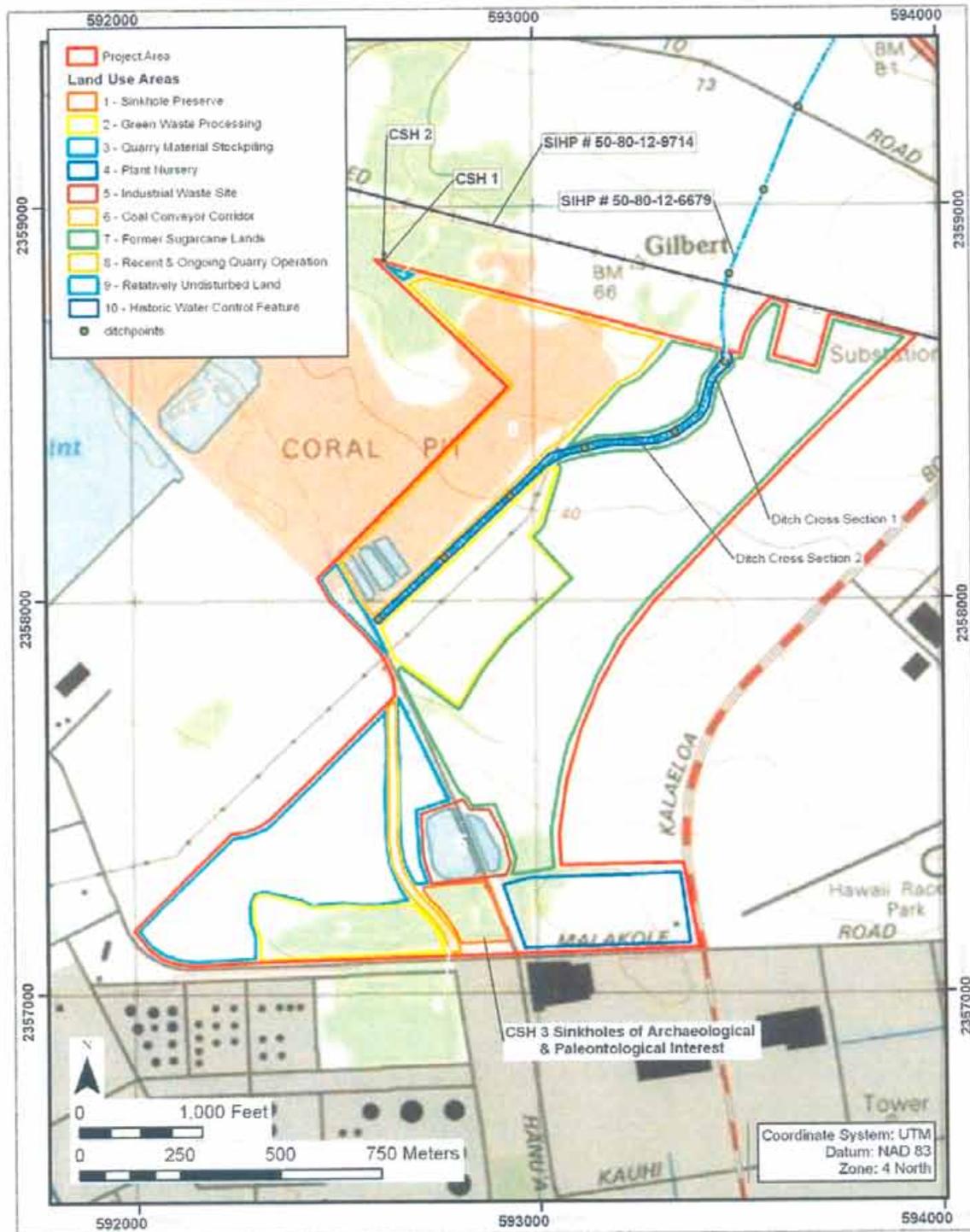


Figure 12. Portion of the 2002 'Ewa USGS 7.5-minute topographic quadrangle showing the ten geographic areas of the project area discussed in the text and the locations of the cultural resources observed in the project area

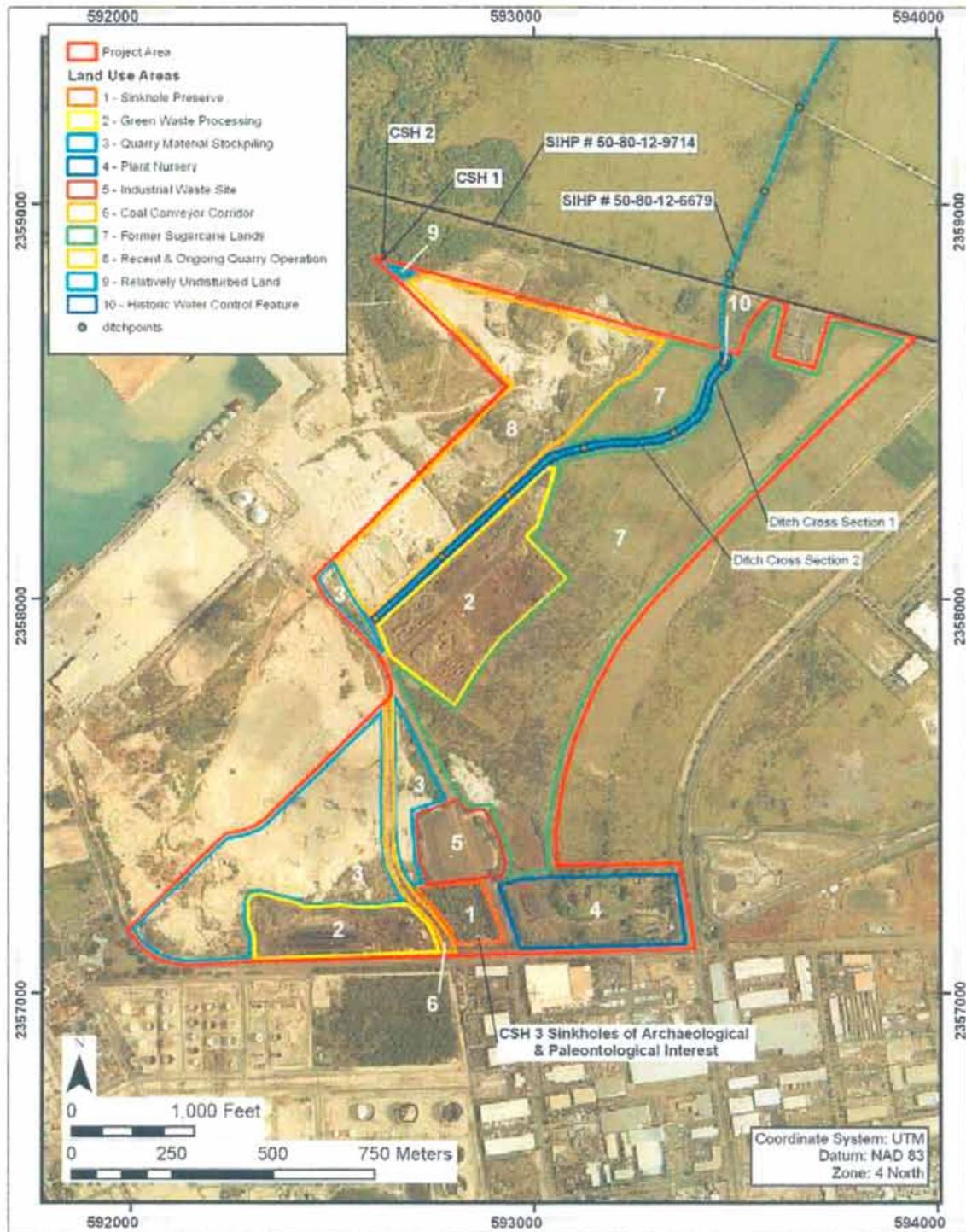


Figure 13. Aerial photograph showing the ten geographic areas of the project area discussed in the text and the locations of the cultural resources observed in the project area (source: USGS Orthoimagery 2005)

Through consultation between Dr. Ziegler, the property owner, Campbell Estate, and apparently the State Senate, and the City and County of Honolulu, the sink area preserve was established (Haliday 2005; Ziegler 1990a and 1990b). At the time that this report was prepared, the status and permanence of the sinkhole preserve could not be determined. During the inventory survey fieldwork, a chain link fence bounded the sinkhole preserve area ensuring protection against accidental damage. As part of the inventory survey, CSH personnel recorded the locations of 40+ sinkholes within the preserve (Figure 14). For the current investigation, the numerous sink hole features that comprise the sink hole preserve area were grouped together and designated temporary site number CSH 3.

Figure 15 and 16 show typical sinkholes within the sinkhole preserve. These sinkhole features vary greatly in size and shape. Many are over three meters deep and most are irregular in shape. Some of the sinkhole features have been partially or completely filled in by past bulldozing activity. Other sinkhole features have apparently been the focus of controlled stratigraphic excavation in the relatively recent past, as indicated by the adjacent back dirt piles. These features have potential to contain the remains of more than a score of extinct endemic bird species both known and presently un-described. They may also contain cultural deposits related to traditional Native Hawaiian land-use. The latter could include human burial interment.

The present Kapolei Harborside Center project proposal intends to completely avoid development within this portion of the project area. Consequently, no further archaeological work, such as site mapping or excavations, were undertaken as part of the current inventory survey investigation. Should any future development plans consider impacts within this fenced preserve then further archaeological documentation and mitigation would be indicated.

3.1.2 Area 2—Green Waste Processing

Two sections of the project lands are included under Area 2 (see Figure 12 and 13). One of these portions is located along the southwest edge of the project area and the other is located in the west central portion of the project lands. These two portions are primarily used for green waste processing and are covered in large mounds of plant material and wood chips (Figure 17). These large mounds, varying between 3 and 5 meters high, are frequently moved by heavy equipment. New material is added as the final processed material is removed for use as mulch.

Inspection of the ground surface between the piles revealed that the area beneath the piles has been bulldozed, thus destroying any surface historic properties. There still is the possibility, however, that sinkholes could be located under the piles of green waste. If present, these sinkhole features would have undoubtedly been filled by past grubbing and grading of these portions of the project area. No historic properties were identified within the Area 2 portions of the project area.

3.1.3 Area 3—Quarry Material Stockpiling

Much of the south side of the project lands (see Figure 12, 13 & 18 as well as Figure 6), are covered in stockpiled limestone from quarrying operations in Area 8 (described below). The overall effect of this stock piling can be seen in Figure 13, where the landscape has been completely covered by bleached piles of limestone material. The older stockpile areas have *koa haole* vegetation growing on the piles. The mounds of stockpiled limestone vary greatly in size; some mounds are massive, measuring over ten meters in height and covering several acres.



Figure 14. Aerial photograph, showing sinkhole locations within the approximately 6-acre sinkhole preserve (source: USGS Orthoimagery 2005).



Figure 15. Photograph of typical limestone sinkhole located within the 6-acre archaeological/paleontological sinkhole preserve (Area 1) along the south edge of the project lands



Figure 16. Photograph of another typical limestone sinkhole located within the 6-acre archaeological/paleontological sinkhole preserve (Area 1) along the south edge of the project lands (note the chain link fence surrounding the preserve area)



Figure 17. View of the green waste processing operation (the brown mounds) in the central portion of the project (Area 2); view to west

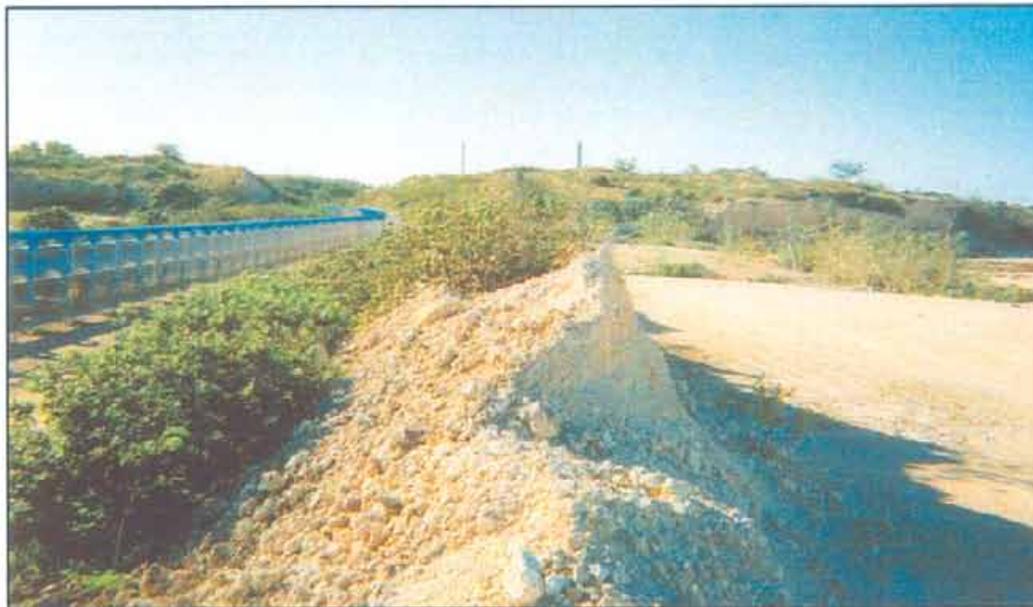


Figure 18. View of the quarry stockpile (Area 3) with the conveyor line to the left. The low mounds in the background are stockpiled quarry material covered with vegetation; view to south

Inspection of the area did not reveal any exposures of the pre-limestone stockpiling landsurface. Undoubtedly, past stockpiling activity has destroyed the fairly abundant surface archaeological features that were once extent in this portion of the project area (see the previous archaeology summary, above). There still is the possibility, however, that sinkholes could be located under the stockpiled limestone. If present, these sinkhole features have undoubtedly been filled by past stockpiling activity within this portion of the project area. No historic properties were identified within the Area 3 portions of the project area.

3.1.4 Plant Nursery

A commercial plant nursery designated here as Area 4 is located in the southeast corner of the project lands (see Figure 12 and 13). This portion of the project area is currently being used as a plant nursery, with dirt roads, equipment storage, and plant growing areas (Figure 19). Like much of the project area, this portion has been previously bulldozed, thus eliminating any surface historic properties. It is likely that any sink holes within the Area 4 have been filled through prior earth moving activity.. No historic properties were identified within the Area 4 portion of the project lands.

3.1.5 Area 5—Industrial Waste Site

The industrial waste site is located within the south central portion of the project lands (see Figure 12 and 13). The site consists of mounded earth capped with asphalt pavement, covering approximately 12-acres (see Figures 12, 13, & 20). Area 5 has undergone substantial prior disturbance and no historic properties are present.

3.1.6 Area 6—Coal Conveyor Corridor

The coal conveyor corridor enters the project lands from Malakole Street, on the south central edge, continues up along the west side of the sinkhole preserve area and the industrial waste site, and cuts through the quarry material stock pile areas. The coal conveyor then exits the central western edge of the project area and continues west to the Kalaëloa Harbor facilities (see Figures 12 and 13). Within the project area, the coal conveyor measures approximately 700 m in length. The coal conveyor consists of a conveyor belt and two parallel PVC pipes that are vertically supported above the ground by a metal frame. A chain link fence protects the conveyor belt on each side (Figure 20). The conveyor was apparently built on areas that were originally bulldozed and cleared for the stockpiling of quarry materials. No historic properties were identified within the Area 6 portion of the project area.

3.1.7 Area 7—Former Sugarcane Lands

Nearly the entire east half of the project lands (designated as Area 7) were formerly under sugarcane cultivation. (see Figure 12 & 13 as well as Figure 6). Sugarcane was grown here for decades and most recently, corn was planted in parts of the area (Figure 21). Large stands of *koa haole* (*Leucaena leucocephal*) and other opportunistic invasive grasses and shrubs have sprung up in the sections of this portion of the project area that have been neglected the longest (Figure 22). Two sections of the northwest corner of this portion of the project area are bounded by the O.R. & L Railroad (SIHP # 50-80-12-9714).



Figure 19. View of the plant nursery operation in the southeast corner of the project lands (Area 4); view to east



Figure 20. View of the industrial waste site (Area 5, background) with the coal conveyor corridor (Area 6) in the foreground; view to east



Figure 21. View of former sugarcane lands (Area 7) in the central north portion of the project lands showing the remnants of a recent corn crop; view to southeast



Figure 22. View of the now fallow, former sugar cane fields (Area 7) in the northern portion of the project lands, the HECO substation is on the left; view to northeast

As discussed above, Dillingham began construction of the O.R. & L. in 1889. The section of the O.R. & L. adjacent to the northwest corner of the present project lands (Figure 23) is listed on the National Register of Historic Places, under criteria A, B & C. The tracks are in place today and are still used by the Hawaiian Railway Society train tours. According to the file on record at the SHPD/DLNR, the O. R. & L. Right-of-Way consists of 25.5 miles of raised roadbed 40 feet wide running from Hālawā Stream at Pearl Harbor on the easternmost end, to the intersection of Farrington Highway and Auyong Homestead Road in Nānākuli at the northwestern-most point. The railroad is a narrow gauge (36 inches inside dimension).

The intensive land use in this area, including decades of agricultural plowing and grading, would have destroyed any surface traditional Native Hawaiian historic properties that may have been present. In addition, layers of alluvium likely bury any sinkholes that may be present. No historic properties were identified within the Area 7 portion of the project area.

3.1.8 Area 8—Recent and Ongoing Quarry Operation

The northwestern portion of the project lands principally consists of the ongoing quarrying of limestone for various construction projects throughout O'ahu (see Figure 12 & 13). Large sections of this portion of the project area have been excavated over ten meters below the natural ground level (Figure 24 & 25). The effect of the quarrying can be seen in Figure 13.

The excavation and extensive use of heavy earth-moving machinery in this area has completely destroyed any cultural resources that may have been present in the past. Sinkholes that may once have been present in the area are likely all destroyed. No historic properties were identified within the Area 8 portion of the project area.

3.1.9 Area 9—Relatively Undisturbed Land

Area 9 makes up the northwestern corner of the project area (see Figure 12, 13 & 26). This portion of the project area has not undergone the same level of bulldozing or agricultural disturbance as the rest of the project area (with the exception of the Area 1 sinkhole preserve.) A 100% coverage pedestrian inspection of Area 9 was made to identify any historic properties within this relatively undisturbed portion of the project area.

There is evidence of limited bulldozing and *kiawe* wood cutting activity within Area 9. At the time of the initial field inspection, the area had fairly recently been burned, the underbrush had been completely removed, and the larger tree trunks were scorched. Largely as a result of this drastically reduced underbrush, two small limestone enclosure features (given temporary site designations as CSH 1 and 2), along with some crude mounds and alignments, were discovered (see Figure 12 & 13).

These two enclosures and the more ephemeral mound and alignment features around them appear to be typical examples of the types of surface traditional Hawaiian archaeological features that have been documented at Barber's Point in the past. These features do not appear to have been previously identified, although this portion of the project area was previously surveyed (Hoffman et al. 2005.) Heavy undergrowth may have obscured these features that were revealed by the recent burning. Detailed descriptions of the identified historic properties are provided in Section 3.2 (Site Descriptions) of this study.

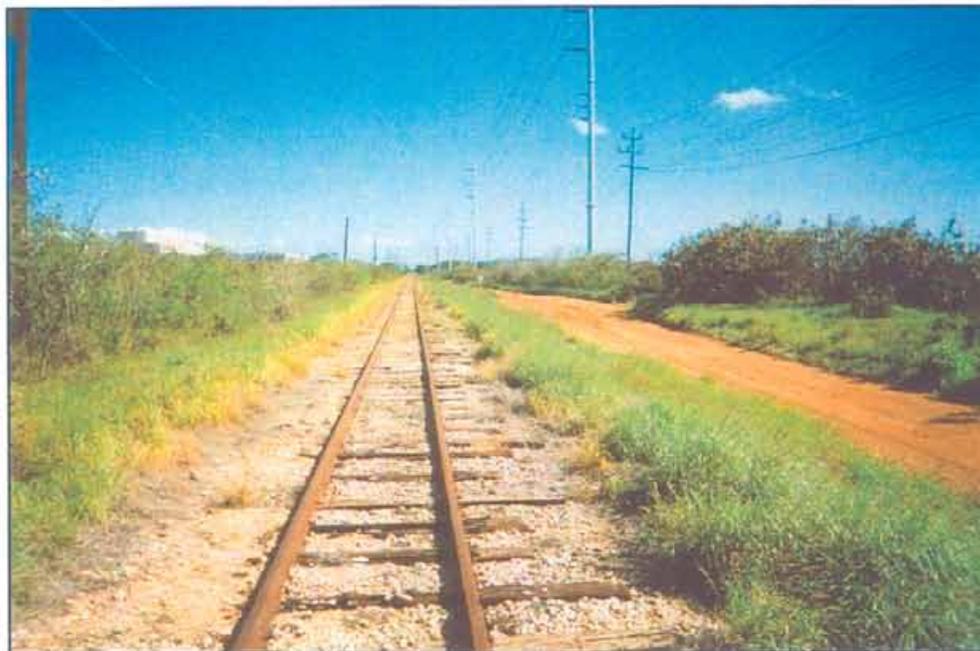


Figure 23. View of the O. R. and L. Railroad line (SIHP # 50-80-12-9714) that extends along the northwest corner of the project lands; view to southeast



Figure 24. View of the ongoing limestone quarry operation (Area 8) in the northwest portion of the project area; view to west



Figure 25. View of on-going quarrying activities (Area 8), Barbers Point Harbor in the background; view to west



Figure 26. View of relatively undisturbed land (Area 9) in the northwest corner of the project lands, view to northeast

3.1.10 Area 10—Historic Water Control Feature

Area 10 designates a historic plantation-era drainage channel, which extends through the northern and central portions of the project area (see Figure 12 & 13). The drainage channel enters the project lands from the north, crosses through the former sugarcane lands, then runs between the active quarry and green waste processing areas ending at the middle of the east side of the project lands where it had apparently been bulldozed during the construction of the road or the adjacent coal conveyor corridor (Figure 27). Koa haole, exotic grasses, and other invasive plants have grown up inside and outside of the drainage channel.

The historic plantation-era drainage channel has been documented in a previous archaeological study (Hoffman et al. 2005) and assigned SIHP # 50-80-12-6679. The historic property was determined to be eligible for the Hawaii Register of Historic Places under criterion D. A detailed description of the SIHP # 50-80-12-6679 historic plantation-era drainage channel is provided in Section 3.2: Site Descriptions below.

3.2 Site Descriptions

3.2.1 SIHP #	50-80-12-6679
SITE TYPE:	Drainage Channel
FUNCTION:	Flood Control
FEATURES:	1
DIMENSIONS:	Approx 1200 m long by 20 m wide
CONDITION:	Good
AGE:	Historic
TAX MAP KEY:	[1] 9-1-014:027, 9-1-015:001

SIHP # 50-80-12-6679 consists of a historic plantation-era drainage channel, located in the northern and central portions of the project area (see Figure 12 & 13). The drainage channel was previously identified north of the current project area (Hoffman et al. 2005) and assigned SIHP # 50-80-12-6679. The following description was provided:

Site 50-80-12-6679 consists of a single drainage canal. The drainage canal runs through the eastern portion of the project area, this being only a small portion of the entire canal. The drainage canal was observed to be mechanically excavated, with the excavated material mounded approximately 3 m above the ground surface along each edge of the canal. The interior of the canal measured approximately 7.5-9.0 m wide and 4.5-6.0 m deep. The canal was generally earth-lined and exhibited significant erosion of the sidewalls.

The canal was observed to have sidewalls reinforced with a cemented basalt boulder lining. The lining extended approximately 2 m above the base of the canal. The base of the canal, throughout its observed length, appeared to be earth-lined, though heavy sedimentation may have covered any evidence of improvements.

Site 50-80-12-6679 appears to serve the function of channeling storm water from gulches upslope, as to prevent flooding of the lowland plantation fields. The



Figure 27. View of the bulldozed terminus of SIHP # 50-80-12-6679, historic plantation-era drainage channel at intersection with the main access road, central west edge of project lands; view to northeast

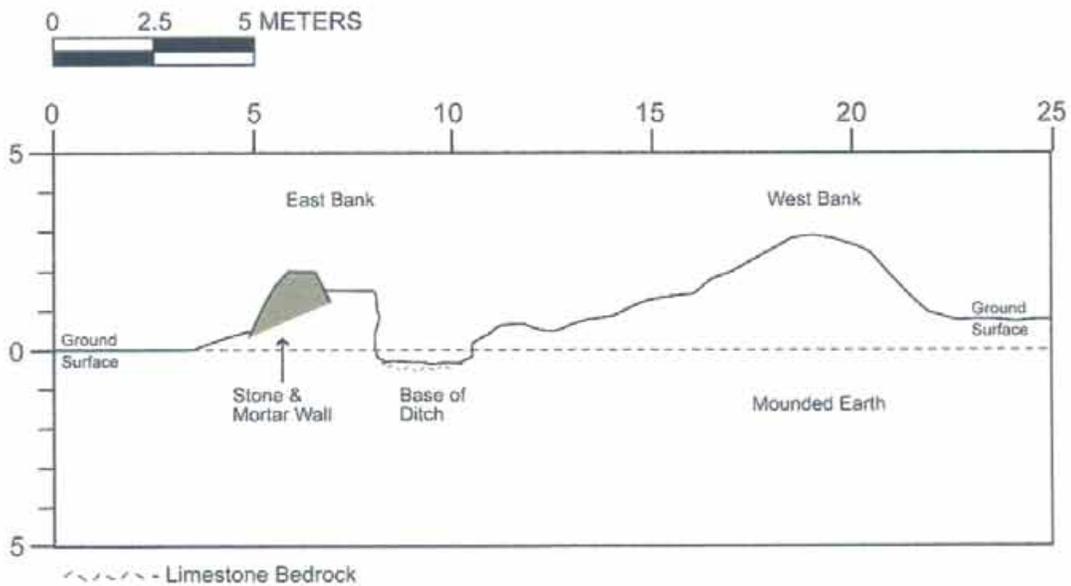


Figure 28. Cross-section 1 of northern portion of SIHP # 50-80-12-6679 drainage channel (see Figures 12 & 13 for location of cross-section)

canal may also be related to efforts by the Ewa Plantation to induce erosion and sedimentation of the lowlands. Site-50-80-12-6679 is in good condition and appears to continue to function as a flood control measure. (Hoffman et al. 2005:45)

As the SIHP # 50-80-12-6679 drainage channel enters the northern end of the current project area, the western edge of the channel consists of mounded earth, and the eastern edge consists of a combination of mounded earth and a stone and mortar retaining wall (Figure 28). At the location of Cross Section 1 (see Figure 12 & 13), the drainage channel measures approximately 20 m wide, with an interior width of approximately 7 m and depth of approximately 3 m. The retaining wall running along the eastern berm of the drainage channel is trapezoidal shaped, with a wide base and narrower top (Figure 29 & 30). The wall measured 60 cm wide at the top and a maximum height of 1.6 m above the exterior ground surface. The base of the wall is flush with the exterior ground level. The western berm of the drainage channel measured approximately 2.5 m in height above the exterior ground surface and approximately 8.5 m wide. The base and western bank of the drainage channel are earth lined, with the pronounced water flow channel at the base consisting of exposed limestone bedrock. Significant erosion of the sidewalls was observed.

At the central portion of the SIHP # 50-80-12-6679 drainage channel, the western edge of the channel consists of mounded earth, and the eastern edge consists of a combination of mounded earth and a dry masonry retaining wall (Figure 31). At the location of Cross Section 2 (see Figure 12 & 13), the drainage channel measures approximately 20 m wide, with an interior width of approximately 7 m and depth of approximately 2.5 m. The eastern bank measures 6.8 m wide and 2.2 m in height above the exterior ground surface. The dry masonry retaining wall along the interior of the eastern berm of the drainage channel is constructed of stacked limestone boulders and cobbles, 5-7 courses high, with a maximum of 0.9-1.3 m high facing observed (Figure 32). The western berm of the drainage channel measured approximately 2.0 m in height above the exterior ground surface and approximately 7.5 m wide. The base and western bank of the drainage channel are earth lined, with the pronounced water flow channel at the base consisting of exposed limestone bedrock. Significant erosion of the sidewalls was observed.

At the southern portion of the SIHP # 50-80-12-6679 drainage channel, in the vicinity of the Area 2 green waste processing area, the eastern and western banks of the channel consist of mounded earth (Figure 33). The embankments measure a maximum of 2.4 m above the base of the channel, and 0.9-1.1 m above the exterior ground surface. The elevation of the embankments above both the exterior ground surface and the base of the channel decreases with distance *makai*. The overall width of the drainage channel and mass of the embankments also decreases with distance *makai*. The base and banks of the drainage channel are earth lined, with the pronounced water flow channel at the base consisting of both exposed limestone bedrock and soil (Figure 34). The SIHP # 50-80-12-6679 drainage channel terminates at the intersection with the project area's access road, where it had apparently been bulldozed during the construction of the road or the adjacent coal conveyor corridor (see Figure 27).



Figure 29. View of stone and mortar wall along east bank of SIHP 50-80-12-6679 drainage channel; view from exterior of channel to north



Figure 30. View of stone and mortar wall along east bank of SIHP 50-80-12-6679 drainage canal; view from interior of channel to southeast

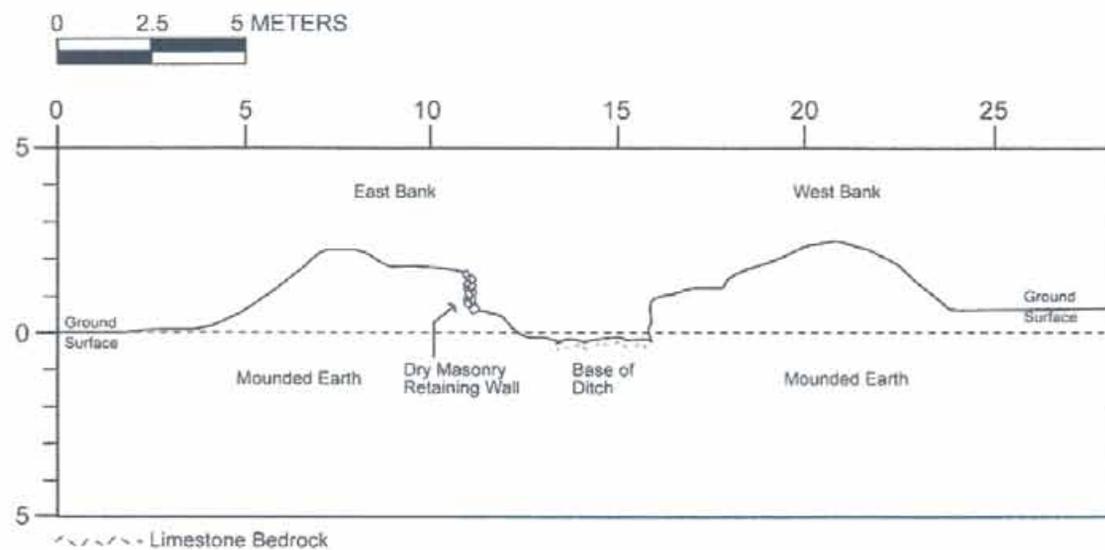


Figure 31. Cross-section 2 of central portion of SIHP # 50-80-12-6679, historic plantation-era drainage channel (see Figures 12 & 13 for location of cross-section)



Figure 32. View of the dry masonry, limestone lining of the interior of the eastern berm of SIHP # 50-80-12-6679, historic plantation-era drainage channel; view to south.



Figure 33. View of the eastern berm of SIHP # 50-80-12-6679, historic plantation-era drainage channel; view to west



Figure 34. View of the interior of SIHP # 50-80-12-6679, historic plantation-era drainage channel, view to northeast.

3.2.2 Temp Site # CSH 1

SITE TYPE: Enclosure
FUNCTION: Habitation
FEATURES: 1
DIMENSIONS: 4.2 m NE/SW x 3.8 m NW/SE
CONDITION: Good
AGE: Prehistoric
TAX MAP KEY: [1] 9-1-014:027

CSH 1 consists of a single, stacked stone enclosure located near the northwest corner of the project area (see Figure 12 and 13). The enclosure is situated on a level coral plain, with a thin soil layer overlying limestone bedrock. Exposed limestone outcrops are abundant in the immediate vicinity of the feature.

The CSH 1 enclosure is rectangular in shape, measuring 4.2 m NE/SW by 3.8 m NW/SE, with a maximum height of 0.8 m (Figure 35 and Figure 36). A constructed entrance to the enclosure is located in the central portion of the western wall, and consists of an approximately 0.8 m wide break in the wall. The perimeter walls of the enclosure are constructed of loosely stacked limestone boulders and cobbles, 3-5 courses high. The stacked stones average 10-15 cm in diameter, with larger stones along the edges and base of the walls, and smaller interior stones. The walls have a maximum thickness of 1.4 m and are generally faced on both the interior and exterior sides, with considerable collapse observed along the west and south interior faces and the east exterior face. The northern wall of the enclosure is the best preserved of the feature construction. The interior facing of the enclosure walls includes large, flat limestone slabs situated in an upright orientation, generally 1 course high, with stacked stones behind. The interior of the enclosure measures 2.5 m NE/SW by 1.5 m NW/SE and consists of a level soil floor, generally cleared of surface stones. No surface cultural material was observed within or in the immediate vicinity of the enclosure. A 50 cm by 50 cm test unit (Test Unit 1) was excavated within the interior of the enclosure (see Section 3.3 Test Excavations Findings). No cultural material was observed through the excavation of Test Unit 1.

The southeastern portion of the CSH 1 enclosure is constructed adjacent to an unusually large and conspicuous limestone boulder, measuring approximately 2 m in diameter and 0.75 m in height. At its eastern end, the boulder overhangs, creating an open crevice measuring 1.0 m deep, 1.2 m wide, and 0.5 m high. The interior surface of the overhang consisted of sloping soil with scattered limestone cobbles and pebbles. No surface cultural material was observed within the overhang. A 50 cm by 50 cm test unit (Test Unit 2) was excavated within the interior of the overhang (see Section 3.3 Test Excavations Findings). No cultural material was observed through the excavation of Test Unit 2.

CSH 1 enclosure is interpreted to function as a traditional Hawaiian habitation site. The enclosure was likely utilized as a temporary shelter associated with the procurement of nearby marine resources. The enclosure dates to the pre-contact or possibly early historic period, based on construction-type and lack of historic artifacts in the vicinity. The area immediately west and southwest of the CSH 1 enclosure was observed to have been disturbed by bulldozing, with possible disturbance to the western edge of the enclosure. Despite the limited disturbance to the feature, CSH 1 is in good condition with essentially intact walls.



Figure 35. Plan view diagram of CSH 1 enclosure



Figure 36. View of CSH 1, remnant stacked limestone boulder rectangular enclosure located near the northwestern tip of the project area; view to northeast

3.2.3 Temp Site # **CSH 2**
SITE TYPE: C-Shaped Enclosure
FUNCTION: Habitation
FEATURES: 1
DIMENSIONS: 3.2 m N/S x 4.2 m E/W
CONDITION: Good
AGE: Prehistoric
TAX MAP KEY: [1] 9-1-014:027

CSH 2 consists of a single, stacked stone C-shaped enclosure located near the northwest corner of the project area (see Figure 12 and 13). The enclosure is situated on a level coral plain, with a thin soil layer overlying limestone bedrock. Exposed limestone outcrops are abundant in the immediate vicinity of the feature.

The CSH 2 C-shaped enclosure measures 3.2 m N/S by 4.2 m E/W, with a maximum height of 0.5 m (Figure 37 and Figure 38). The perimeter wall of the enclosure is constructed of loosely stacked limestone boulders and cobbles, 2-3 courses high. The walls are predominantly collapsed, with limited facing observed along portions of the interior wall edge. The constructed entrance to the C-shape is on the southern portion of the enclosure and consists of a 0.8 m wide break in the perimeter wall. The entrance area is also paved with limestone pebbles and cobbles. The interior of the enclosure measures approximately 2 m in diameter and consists of a level soil floor, generally cleared of surface stones. No surface cultural material was observed within or in the immediate vicinity of the enclosure. A 1.0 m by 50 cm test unit (Test Unit 1) was excavated within the entrance area of the CSH 2 C-shaped enclosure (see Section 3.3 Test Excavations Findings). The test excavation revealed the presence of marine vertebrate and invertebrate midden and a small amount of avian midden. The composition of the invertebrate midden indicates a pattern of inter-tidal harvesting at a rocky shore environment with significant wave wash. Such environments are common in the immediate area of Barber's Point. The midden collection represents typical traditional Hawaiian foodstuffs. In addition to the midden, four limestone flakes were recovered from the test excavation, possibly indicative of limited limestone tool manufacture at the site.

CSH 2 C-shaped enclosure is interpreted to function as a traditional Hawaiian habitation site. The enclosure was likely utilized as a temporary shelter associated with the procurement of nearby marine resources. The enclosure dates to the pre-contact or possibly early historic period, based on construction-type, presence of traditional Hawaiian cultural material, and lack of historic artifacts in the vicinity. The CSH 2 C-shaped enclosure is in fair condition, with much of the wall construction suffering from collapse.

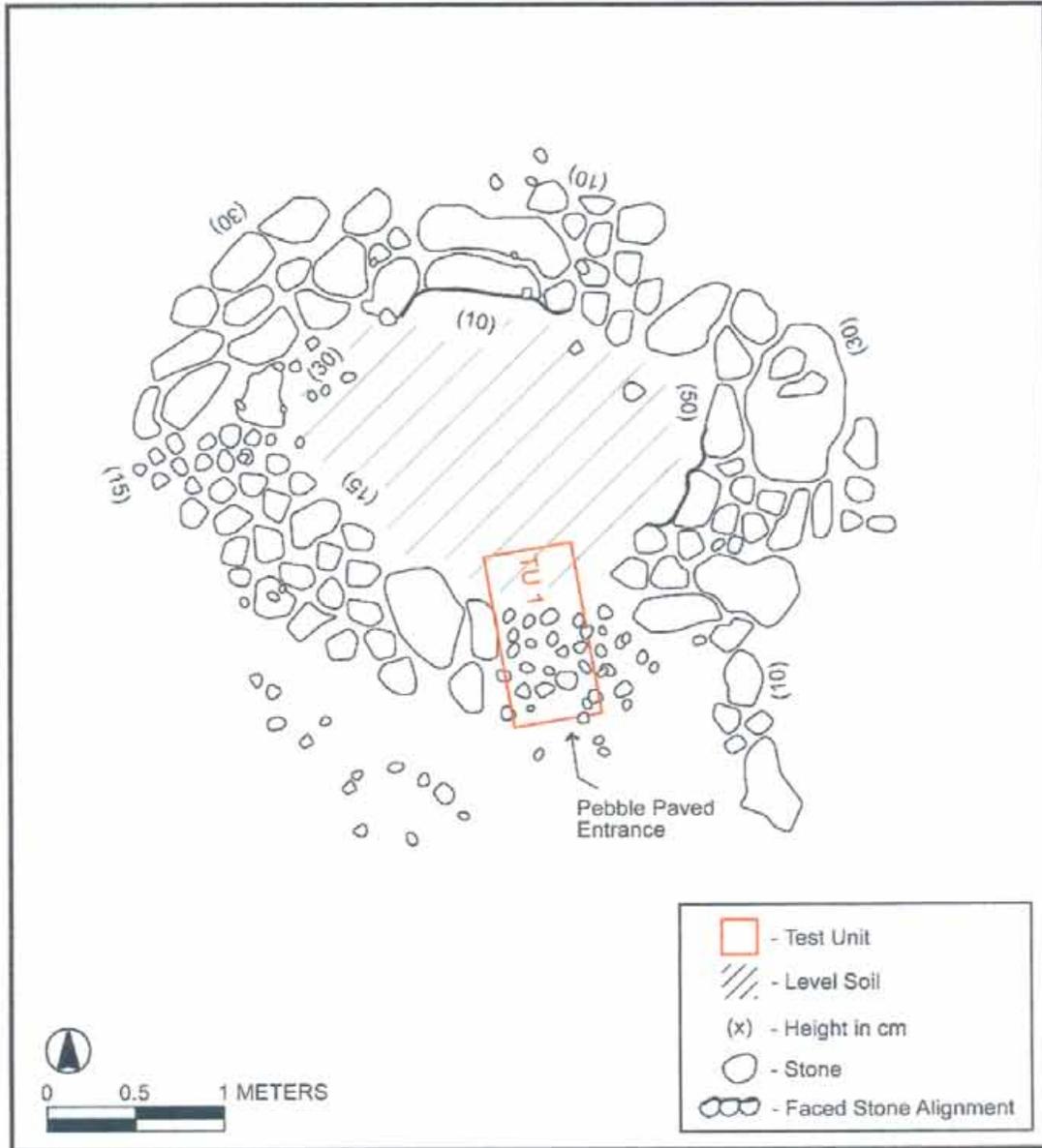


Figure 37. Plan view diagram of CSH 2 C-shaped enclosure



Figure 38. View of a remnant stacked limestone boulder C-shape enclosure located near the northwestern tip of the project area; view to west

3.2.4 Temp Site # CSH 3

SITE TYPE: Numerous sink hole features of archaeological and paleoenvironmental interest
FUNCTION: Various
FEATURES: 40+
AREA: c. 6 acres
CONDITION: Good
AGE: Prehistoric
TAX MAP KEY: [1] 9-1-014:027

Refer to Section 3.1.1, above, and Figures 12, 13, 14, 15, and 16 regarding CSH 3. The component features of CSH 3 are to be preserved by the current project within the sinkhole preserve area.

3.3 Test Excavations Findings

3.3.1 CSH 1: Test Unit 1

A 50 cm by 50 cm test unit was excavated within the interior of the CSH 1 enclosure to better determine the age and function of the feature (see Figure 35). The test excavation was located adjacent to the central portion of the northern interior wall face as this was the best constructed and least disturbed portion of the enclosure. This area was thought to have the highest likelihood of containing intact cultural material.

The surface of the test excavation was level soil with scattered limestone cobbles and pebbles (Figure 39). A total of two sediment strata were observed through the excavation of Test Unit 1 (Figure 40). Stratum I consisted of ash, leaf litter and humus accumulated within the interior surface of the enclosure. The ash deposit was the result of recent, as well as past, brush fires that are common in the area. Stratum II consisted of a brownish yellow silt sediment, consisting of sterile saprolite developed from the decomposition of the underlying limestone bedrock. The test excavation terminated at limestone bedrock, approximately 30 cm below the existing ground surface. No cultural material of any kind was observed through the excavation of Test Unit 1. Detailed sediment descriptions are as follows:

Strata	Depth (cmbd)	Description
Stratum I	0-5	Ash, leaf litter, and humus accumulated on ground surface; no cultural material observed; Lower Boundary (LB) is abrupt, smooth.
Stratum II	5-BOE	10YR 6/8 brownish yellow silt; weak, fine granular structure; dry, loose consistency; non-plastic; no cementation; terrestrial origin; contains abundant roots and decomposing limestone cobbles and pebbles; no cultural material observed; LB is at limestone bedrock.



Figure 39. CSH 1 Test Unit 1, pre-excitation (above) and post-excitation (below) photographs; views to northwest

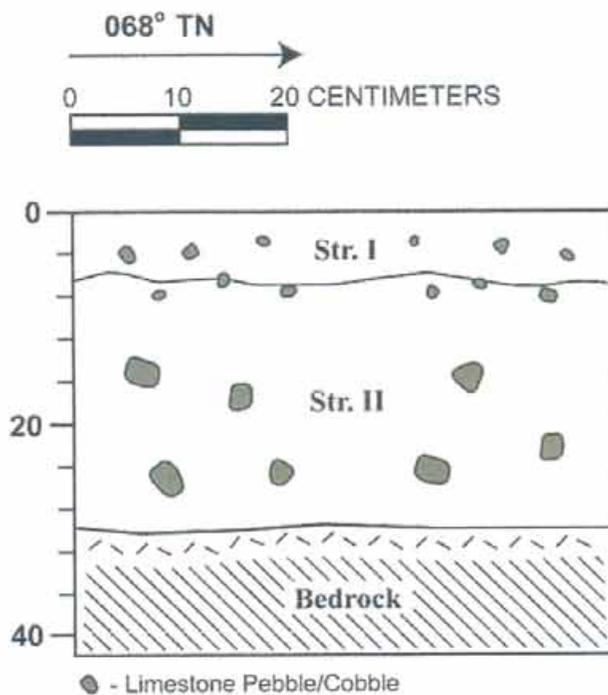


Figure 40. Stratigraphic profile (above) and photograph (below) of north wall of CSH 1 Test Unit 1.

3.3.2 CSH 1: Test Unit 2

A 50 cm by 50 cm test unit was excavated within the interior of a small overhang created by a large limestone boulder located 1 m south of the southeast corner of the CSH 1 enclosure (see Figure 35). With the construction of the CSH 1 enclosure adjacent to a conspicuous and unusually large limestone boulder, it was thought that the overhang area under the boulder may have functioned as a possible storage area or cupboard. The test excavation was made to prospect for possible intact cultural material related to the CSH 1 enclosure.

The surface of the test excavation was sloping soil with scattered limestone cobbles and pebbles (Figure 41). A total of two sediment strata were observed through the excavation of Test Unit 2 (Figure 40). Stratum I consisted of ash, leaf litter and humus accumulated within the interior surface of the overhang. The ash deposit was the result of recent, as well as past, brush fires that are common in the area. Stratum II consisted of a brownish yellow silt sediment, consisting of sterile saprolite developed from the decomposition of the underlying limestone bedrock. The test excavation terminated at limestone bedrock, approximately 40 cm below the existing ground surface. No cultural material of any kind was observed through the excavation of Test Unit 2. Detailed sediment descriptions are as follows:

Strata	Depth (cmbd)	Description
Stratum I	0-8	Ash, leaf litter, and humus accumulated on ground surface; no cultural material observed; Lower Boundary (LB) is abrupt, smooth.
Stratum II	8-BOE	10YR 6/8 brownish yellow silt; weak, fine granular structure; dry, loose consistency; non-plastic; no cementation; terrestrial origin; contains abundant roots and decomposing limestone cobbles and pebbles; no cultural material observed; LB is at limestone bedrock.



Figure 41. CSH 1 Test Unit 2, pre-excavation (above) and post-excavation (below) photographs, views to southwest

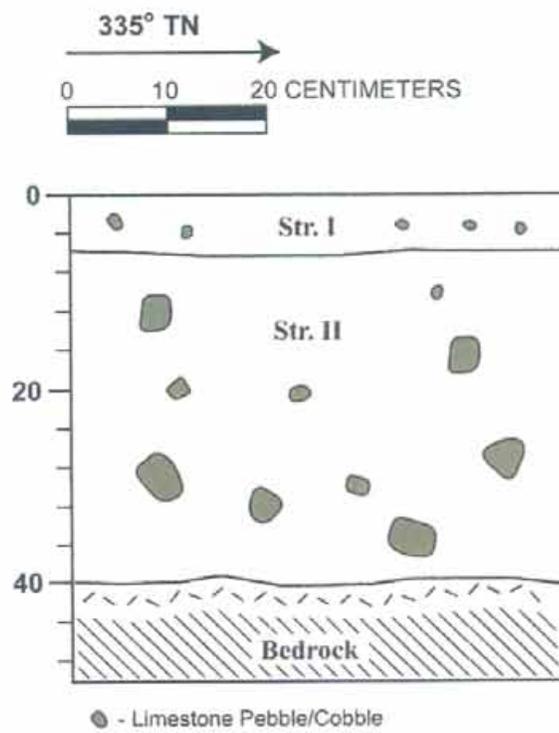


Figure 42. Stratigraphic profile (above) and photograph (below) of west wall of CSH 1 Test Unit 2.

3.3.3 CSH 2: Test Unit 1

A 1 m by 50 cm test unit was excavated within the CSH 2 C-shaped enclosure to better determine the age and function of the feature (see Figure 37). The test excavation was placed at the constructed entrance area of the enclosure, with roughly half of the excavation within the enclosure and half outside of the enclosure. Excavation within this well-constructed and minimally disturbed portion of the enclosure was thought to have the highest likelihood of containing intact cultural material.

The surface of the test excavation was a combination of level soil and level limestone cobble paving (Figure 43). The excavation of Test Unit 1 revealed a roughly 1-2 course limestone cobble and pebble pavement serving as the entrance to the CSH 2 C-shaped enclosure. Underlying the paving were limestone cobbles and small boulders that extended down into the sterile subsoil overlying limestone bedrock.

A total of three sediment strata were observed through the excavation of Test Unit 1 (Figure 44). Stratum I consisted of ash, leaf litter and humus accumulated within the interior surface of the enclosure. The ash deposit was the result of recent, as well as past, brush fires that are common in the area. Stratum II consisted of a very dark grayish brown silt loam. A total of 79.7 grams of marine shell midden, 13.1 grams of unidentified fish bone and 0.4 grams of unidentified bird bone were recovered from the portion of Stratum II that was excavated in the interior portion of the CSH 2 C-shaped enclosure (Figure 44). Four limestone flakes, weighing a total of 13.1 g, were also recovered from Stratum II. Stratum III consisted of a yellowish brown silt sediment, consisting of sterile saprolite developed from the decomposition of the underlying limestone bedrock. The test excavation terminated at limestone bedrock and clearly sterile sediments, approximately 25 cm below the existing ground surface. Detailed sediment descriptions are as follows:

<u>Strata</u>	<u>Depth (cmbd)</u>	<u>Description</u>
Stratum I	0-4	Ash, leaf litter, and humus accumulated on ground surface; no cultural material observed; Lower Boundary (LB) is abrupt, smooth.
Stratum II	4-16	10YR 3/2 very dark grayish brown silt loam; weak, fine granular structure; dry, loose consistency; non-plastic; no cementation; terrestrial origin; contains abundant marine vertebrate and marine invertebrate midden and limestone flakes; LB is abrupt, smooth
Stratum III	16-BOE	10YR 5/4 yellowish brown silt; structureless; dry, loose consistency; non-plastic; no cementation; terrestrial origin; contains abundant roots and decomposing limestone cobbles and pebbles; no cultural material observed; LB is at limestone bedrock.

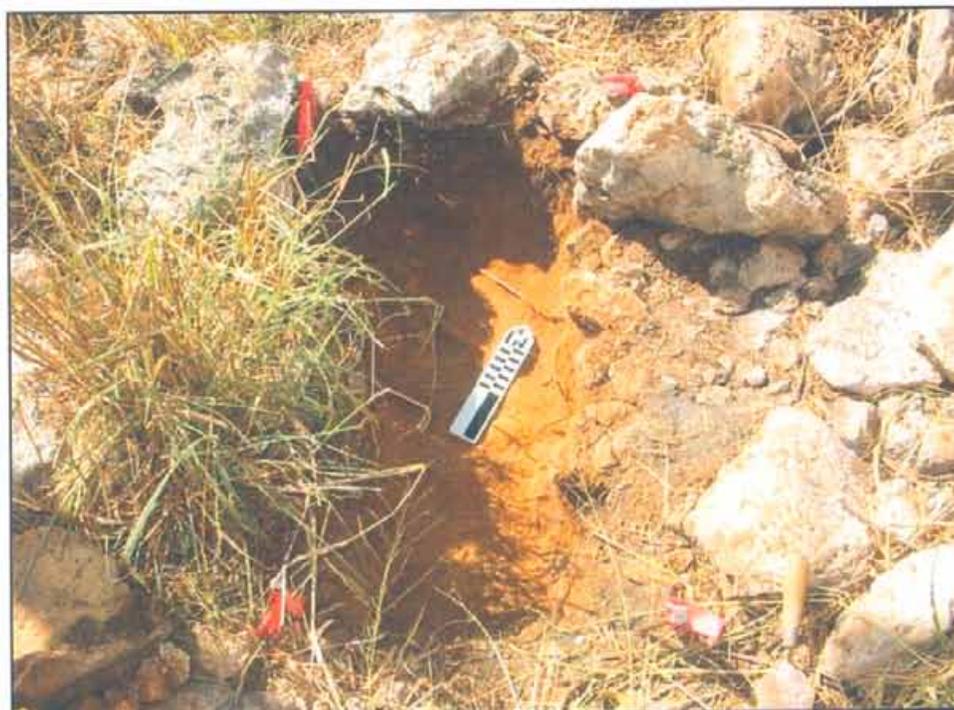


Figure 43. CSH 2 Test Unit 1, pre-excitation (above) and post-excitation (below) photographs; views to NNW

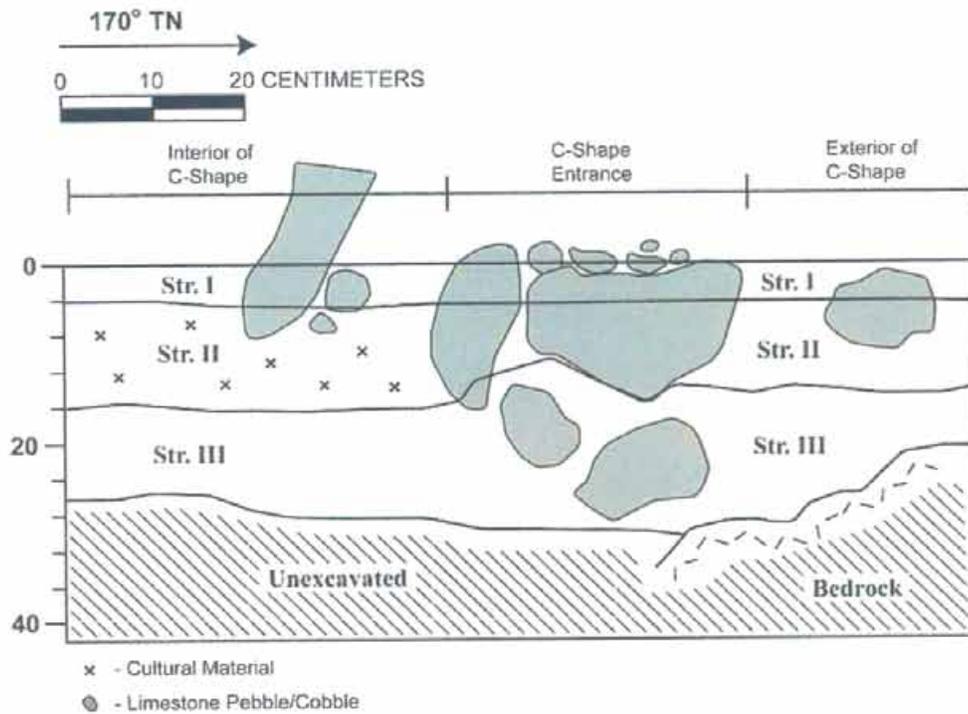


Figure 44. Stratigraphic profile (above) and photograph (below) of north wall of CSH 2 Test Unit 1.

Section 4 Results of Laboratory Analyses

Cultural material was only encountered in the 1.0 m by 0.5 m Test Unit 1 excavation at Site CSH 2. A total of 79.7 grams of marine shell midden, 13.1 grams of unidentified fish bone and 0.4 grams of unidentified bird bone were recovered from this excavation unit (Table 2). The composition of the invertebrate midden indicates a pattern of inter-tidal harvesting at a rocky shore environment with significant wave wash. Such environments are common in the immediate area of Barber's Point. In addition to the midden, four limestone flakes, weighing a total of 13.1 g, were recovered from the test excavation (Table 3), possibly indicative of limited limestone tool manufacture at the site.

Table 2. Catalog of Marine and Terrestrial Midden Recovered from CSH 2, Test Unit 1.

Depth (cmbs)/Stratum	Weight (g)	
	4-16/II	TOTAL
<i>Class Gastropoda</i>		
<i>Conus sp.</i>	9.3	9.3
<i>Cypraea sp.</i>	6.2	6.2
<i>Littorina sp.</i>	0.4	0.4
<i>Nerita sp.</i>	4.8	4.8
Unidentified/Other	1.3	1.3
<i>Class Pelecypoda (Bivalvia)</i>		
<i>Brachidontes crebristriatus</i>	31.4	31.4
<i>Trapezium oblongum</i>	21.3	21.3
TOTAL MOLLUSCA	74.7	74.7
Crustacean	0.7	0.7
Echinoderm	4.3	4.3
TOTAL INVERTEBRATE MIDDEN	79.7	79.7
<i>Class Osteichthyes</i>		
Unidentified Fish	13.1	13.1
TOTAL CHORDATA	13.1	13.1
TOTAL MARINE MIDDEN	92.8	92.8
<i>Class Aves</i>		
Unidentified Bird	0.4	0.4
TOTAL AVES	0.4	0.4
TOTAL TERRESTRIAL MIDDEN	0.4	0.4
TOTAL MIDDEN	93.2	93.2

Table 3. Catalog of Indigenous Artifacts Recovered from CSH 2, Test Unit 1.

Acc. #	Stratum	Depth (cmbd)	Pieces	Weight (g)	Material Type	Comments
1	II	4-16	4	13.1	Limestone	Limestone Flakes

Section 5 Summary and Interpretation

Cultural Surveys Hawai'i's senior staff has a long history of association with the project lands including in particular the work documented in Hammatt and Folk (1982). Based on previous archaeological work (particularly Sinoto 1979, Hammatt and Folk 1982, Cleghorn and Davis 1990 and Davis 1993) this was once a surprisingly rich natural and cultural landscape. Most of this landscape was lost to commercial agriculture and mining prior to documentation and most of what was documented has long since been lost. What remains is summarized in Table 4 and is discussed below.

5.1 SIHP 50-80-12-2888, the Barber's Point Harbor Archaeological District

SIHP # 50-80-12-2888, the Barber's Point Harbor Archaeological District was declared eligible for the National Register of Historic Places in 6/10/77 and then following boundary revision was again found eligible for the National Register on 12/28/79. The portions of the archaeological preserve within the current project area (see Figure 11) appear to have already been completely disturbed by historic and modern land use. It is likely that the previously documented surface archaeological features within this portion of the project area have been completely removed. Accordingly, the proposed project is not regarded as having an impact on SIHP # 50-80-12-2888.

5.2 SIHP 50-80-12-6679 Flood Control Drainage Channel

The previously described (Hoffman et al. 2005) SIHP # 50-80-12-6679 flood control drainage channel was described in greater detail with cross sectional drawings, photographs and descriptions. This is suggested to be sufficient and appropriate documentation for this site that appears to us to have no particular aesthetic merit or historic import.

5.3 SIHP 50-80-12--9714 O.R. & L. Right-of-Way

The portion of the O.R. & L. Right-of-Way (SIHP 50-80-12-9714) that lies adjacent to the northeast corner of the project area was placed on the National Register of historic Places on 12/1/1975. Any plans to cross or breach this rail line need to be addressed with the State Historic Preservation Division, 2) the State Department of Transportation & 3) the Hawaiian Railway Society to determine appropriate mitigation.

5.4 CSH 1 and CSH 2 Stacked Stone Enclosures

The only traditional Hawaiian surface sites observed in the project lands are the two stacked stone enclosures at the northwest tip of the project area. Both are regarded as pre-contact temporary habitation features. The results of subsurface testing indicate that modest quantities of midden and artifacts are present. Many such sites have been described from the surrounding lands but few remain.

Table 4. Historic Properties within the Study Area

SIHP # (50-80-12)	Site Type	Age	Posited Function	Work Accomplished	Significance	Recommendation
-2888	Barber's Point Harbor Archaeological District	Primarily pre-contact	Primarily temporary habitation	Inspected the portion of the District within the current project area	Determined Eligible for the National Register D	A small portion of the District lies within the present project area—lacking historic properties—No Further Work
-6679	Drainage Channel	Historic	Flood Control	L, M, P, D	D	No Further Work
-9714	O.R. & L. Right-of-Way	Historic	Transportation	D	Determined Eligible to the National Register A, B, C	Consultation with 1) the SHPD 2) State DOT & 3) the Hawaiian Railway Society
CSH 1	Stacked-Stone Enclosure	Pre-contact	Habitation	L, M, P, D, T	D	Preservation within park
CSH 2	Stacked-Stone Enclosure	Pre-contact	Habitation	L, M, P, D, T	D	Preservation within park
CSH 3 Sinkhole Preserve	archaeological/paleontological resources	Pre-contact	cultural remains could include habitation deposits and/or burials	L,M,P,D	D (E because of possibility of burials)	Continued passive preservation*

L=Located with a GPS, M. = Mapped, P = Photographed, D=Described, T=Tested

*Prior to any development of this parcel further study in consultation with the state historic preservation division is recommended

5.5 CSH 3 Sinkhole Preserve

It was known going into this study that a particularly important remnant of this archaeological/paleontological landscape is still extant within a fenced preserve area (see section 3.1.1 Area 1 – Sink Preserve discussion.) Because there are no plans for development in this area at this time and the area is to continue under passive preservation, the work accomplished within the preserve in the course of the present study was limited. Prominent sinkholes within the preserve were mapped (Figure 14). There is good reason to believe that the sinkholes in this area contain the remains of more than 20 extinct species of birds both new to science and still undescribed. The resources within this preserve are a unique trove of information on Hawai'i's past without parallel elsewhere. However, it may be noted from the distribution of sinkholes within the preserve (Figure 14) that they tend to be somewhat clumped particularly on the east side and northwest corner. Preservation of the vast majority of these sinks may be compatible with some limited development of the parcel. Prior to any development in this preserve further archaeological study including both inventory documentation and data recovery mitigation would be warranted.

Section 6 Significance Assessments

Each historic property identified within the project area was evaluated for significance according to the broad criteria established for the Hawai'i State Register of Historic Places. The five criteria are:

- A Associated with events that have made an important contribution to the broad patterns of our history;
- B Associated with the lives of persons important in our past;
- C Embodies the distinctive characteristics of a type, period, or method of construction, represent the work of a master, or possess high artistic value;
- D Have yielded, or is likely to yield information important for research on prehistory or history;
- E Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property, or due to associations with traditional beliefs, events or oral history accounts – these associations being important to the group's history and cultural identity.

CSH 1 consists of a single, stacked stone enclosure located near the northwest corner of the project area. The enclosure is interpreted to be a prehistoric, traditional Hawaiian habitation site. The enclosure was likely utilized as a temporary shelter associated with the procurement of nearby marine resources. The enclosure is in good condition and maintains integrity of location, design, materials, and workmanship. Due to the extensive land modification in the vicinity, the enclosure does not have integrity of setting, feeling, or association. CSH 1 is recommended eligible to the Hawai'i Register of Historic Places under Criterion D.

CSH 2 consists of a single, stacked stone C-shaped enclosure located near the northwest corner of the project area. The C-shaped enclosure is interpreted to be a prehistoric, traditional Hawaiian habitation site. The enclosure was likely utilized as a temporary shelter associated with the procurement of nearby marine resources. The C-shaped enclosure is in fair condition and maintains integrity of location, design, and materials. Due to the extensive land modification in the vicinity, and the primarily collapsed condition of the C-shaped enclosure. CSH 2 does not have integrity of setting, workmanship, feeling, or association. CSH 2 is recommended eligible to the Hawai'i Register of Historic Places under Criterion D.

CSH 3, the component, 40+ sinkhole features that comprise the project area's sinkhole preserve, is recommended eligible to the Hawai'i Register of Historic Places under Criterion D, for its archaeological and paleoenvironmental information potential. Additionally, because of the potential for traditional Native Hawaiian burial deposits, the preserve area may be eligible under Criterion E, for its traditional cultural significance to Native Hawaiians. The component sinkhole features are generally in good condition and maintain integrity of location and materials. As largely natural features, integrity of workmanship is not relevant. Due to the extensive land modification in the vicinity, the sinkholes do not have integrity of setting, feeling, or association.

SIHP 50-80-12-9714, the O.R. & L. Railroad right-of-way, and SIHP 50-80-12-2888, the Barber's Point Harbor Archaeological District are currently listed or have been determined eligible to the National Register of Historic Places, under Criteria A, B, and C, and Criterion D, respectively. As such, generally they are considered eligible to the Hawai'i Register of Historic Places.

A portion of SIHP 50-80-12-6679, the historic drainage channel has already been determined eligible to the Hawai'i Register of Historic Places under Criterion D (Hoffman et al. 2005). The portion within the current project area is likewise recommended Hawai'i Register-eligible under Criterion D.

Section 7 Project Effect and Mitigation Recommendations

7.1 Project Effect Recommendations

The following project effect discussion and cultural resource management recommendations are intended to facilitate project planning and support the project's required historic preservation consultation. This discussion is based on the results of this archaeological inventory survey investigation, the results of the companion CIA investigation (Souza and Hammatt *in prep.*), and CSH's communication with agents for the project proponents regarding the project's potential impacts to the historic properties described in the Results of Fieldwork section, above.

This investigation identified the following historic properties within or near the project area. These features likely, or potentially, will be affected by the proposed project:

1. State Inventory of Historic Properties (SIHP) # 50-80-12-6679, historic plantation-era drainage channel, a portion of which has already been determined Hawai'i Register-eligible under Criterion D. The alignment of this feature through the project area is shown on Figure 12. The proposed project will most likely completely remove this historic feature.
2. CSH 3 numerous sinkhole features within the project area's archaeological/paleontological preserve area, recommended Hawai'i Register eligible under Criterion D, and, because of the potential for human burials, Criterion E. There has been some past archaeological and/or paleontological investigation of these sinkhole features (Sinoto 1978; Hammatt and Folk 1981) but direct correlation of specific sinkholes to those previously reported on was not attempted as part of this study. Project proponents intend to avoid this portion of the project area. No impact to the sinkholes is anticipated as a result of the proposed project.
3. CSH 1 and CSH 2 stacked stone prehistoric or early historic enclosures, recommended eligible to the Hawai'i Register under Criterion D. These features lie very close, if not within proposed park land (Figure 4). The effect of the project on these sites is unclear at this time.
4. SIHP # 50-80-12-2888, the Barber's Point Harbor Archaeological District, listed on the National Register. The boundaries of this archaeological district area shown in Figure 11 in relation to the project area's boundaries. The portions of the archaeological preserve within the current project area appear to have already been completely disturbed by historic and modern land use. It is likely that the previously documented surface archaeological features within this portion of the project area have been completely removed. Accordingly, the proposed project is not regarded as having an impact on SIHP # 50-80-12-2888.
5. The O. R. & L. right-of-way, SIHP # 50-80-12-9714, is immediately adjacent to the project area (refer to Figure 12), and is currently listed on the National Register under

Criteria A, B, and C. The Kapolei Harborside Center project master plan (see Figure 4) indicates a northern extension of Hanua St. will cross the O. R. & L. right-of-way.

7.2 Mitigation Recommendations

The extensive past cultural resource management investigations of the project area and its vicinity have documented the area's rich historic properties; however, historic and modern intensive agriculture, modern quarrying and materials stockpiling, and modern green waste processing have greatly disturbed the vast majority of the 345-acre project area. These activities have largely removed the historic properties that were once extant. Accordingly, no further cultural resource management work is recommended for these portions of the project area, which include Areas 2, 3, 4, 5, 6, 7 and 8, as described above and shown on Figure 12.

7.2.1 Recommendations for SIHP # 50-80-12-2888, the Archaeological District

No further documentation of the small portion of SIHP # 50-80-12-2888, the archaeological district, that extends into the current project area is recommended because the archaeological features once extant have been removed by modern quarrying operations.

7.2.2 Recommendations for SIHP # 50-80-12-6679 Historic Drainage Channel

The SIHP # 50-80-12-6679 historic plantation-era drainage channel was initially described in an adjacent study area (Hoffman et al. 2005). The present study describes the portion of this canal site that traverses the present project area and provides further documentation in the form of descriptions, photographs and cross-section drawings. No further work is recommended for SIHP# 50-80-12-6679. Sufficient information regarding the location, function, age, and construction methods of the SIHP# 50-80-12-6679 Historic Drainage Channel has been generated by the current study.

7.2.3 Recommendations for SIHP # 50-80-12-9714 O. R. & L. Right-of-Way

Although there are several existing road crossings of the O. R. & L. right-of-way (such as neighboring Kalaeloa Blvd. and Fort Barrette Road), it is nevertheless concluded that the proposed undertaking would have a potentially adverse impact on this National Register listed historic property. The Kapolei Harborside Center project master plan indicates a northern extension of Hanua Street will cross the O. R. & L. right-of-way (Figure 4). This crossing will likely involve modification of the railroad bed and right away, including modifications to the track and the installation of vehicular traffic crossing signals and/or gates. Similar past road crossings of the O. R. and L. in the vicinity of the current project area have required the development of appropriate mitigation measures among SHPD, the State of Hawaii Department of Transportation (understood as the land owner of the right-of-way), and the Hawaiian Railway Society.

It is recommended that appropriate treatment of this National Register-listed historic property include, to the extent possible, preservation in place of existing track and railway ties and installation of necessary crossing features (signals and/or gates) that are in keeping with the railway's historic appearance. It might be appropriate to formally detail the agreed upon mitigation measures in a formal Memorandum of Agreement-type document.

7.2.4 Recommendations for CSH 1 and CSH 2 Prehistoric Stacked-Stone Structures

CSH 1 enclosure and CSH 2 C-shaped enclosure were newly identified by the current inventory survey investigation. Each feature was documented with written descriptions, scale drawings, photographs, and accurately located with GPS survey technology. Limited subsurface testing was also conducted within each feature. These historic properties lie very close, if not within, designated park land (refer to Figure 4). They are characteristic remnants of Kalaeloa's prehistoric land use and potential resources for future archaeological research. These features are recommended for passive preservation (conservation: avoidance and protection) within the proposed park land.

7.2.5 Recommendations for CSH 3 Sinkhole Preserve

As noted above, project proponents intend to avoid all impact to the sinkhole preserve as part of the current project. For the current project, the preserve area will continue under passive preservation (conservation: avoidance and protection).

7.2.6 Mitigation Plan Preparation

It is recommended that a cultural resource mitigation plan be prepared for the project. This should include a preservation plan for CSH 1 through 3 detailing the short and long term preservation measures that will safe-guard these historic properties during project construction and subsequent use of the project area. It should also include the mitigation measures for the proposed intersection of the O. R. and L. right-of-way and Hanua Street

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Appendix A: Historic Property Location Information

Coordinate System: UTM

Datum: NAD 83

Zone: 4 North

Coordinates of Central Points of Each Historic Property

Temp Site #	SIHP #	Easting (m)	Northing (m)
CSH 1		592624.97	2358863.66
CSH 2		592625.88	2358878.11
CSH 3		592796.52	2357193.16
	50-80-12-6679	592604.39	2357949.86
	50-80-12-6679	592769.96	2358106.37
	50-80-12-6679	592935.39	2358263.03
	50-80-12-6679	593122.90	2358383.47
	50-80-12-6679	593345.88	2358421.44