Final Environmental Assessment

Mauna Lahilahi Beach Park Improvements
Wai'anae, O'ahu, Hawai'i

Prepared Pursuant to Chapter 343
Hawaii Revised Statutes

Prepared for:

Department of Design and Construction
City and County of Honolulu

Prepared by:

Environmental Communications, Inc.

May 2004

Final Environmental Assessment
Mauna Lahilahi Beach Park Improvements
Wai'anae, O'ahu, Hawai'i

Proposing Agency:

City and County of Honolulu
Department of Design and Construction
650 South King Street
Honolulu, Hawai'i 96813

Primary Consultant:

Brownlie & Lee
201 Merchant Street, Suite 1930
Honolulu, Hawai'i 96813

EIS Consultant:

Environmental Communications, Inc.
1188 Bishop Street, Suite 2210
Honolulu, Hawai'i 96813

May 2004

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I. PROJECT SUMMARY

APPLICANT:	Dept. of Design and Construction for the Dept. of Parks and Recreation City and County of Honolulu 650 South King Street Honolulu, Hawai'i 96813
AGENTS:	Brownlie & Lee 201 Merchant Street, Suite 1930 Honolulu, Hawai'i 96813 AM Partners, Inc. 1164 Bishop Street, Suite 1000 Honolulu, Hawai'i 96813
PROJECT NAME:	Mauna Lahilahi Beach Park Improvements
PROJECT LOCATION:	Mauna Lahilahi Beach Park Wai'anae, O'ahu, Hawai'i
TAXMAPKEY/ OWNERSHIP:	8-4-01: 1 City and County of Honolulu 8-5-17: 1-7 State of Hawai'i 8-5-18: 1 State of Hawai'i 8-5-18: 2 City and County of Honolulu 8-5-18: 3 State of Hawai'i
LOT AREA:	478,495 square feet (10.985 acres)
ZONING:	P-2, General Preservation
DEVELOPMENT PLAN:	Parks and Recreation
DEVELOPMENT PLAN AREA:	Wai'anae
STATE LAND USE:	Urban
CURRENT LAND USE:	Existing City and County Park with improvements including a restroom facility, picnic tables and unimproved on-site parking.
NATURE OF DEVELOPMENT:	The proposed action consists of comprehensive park improvements that will include a new parking lot and comfort station, an open pavilion for large gatherings, new picnic and grilling areas throughout

the site, a relocated bus shelter, and other general site improvements.

PROJECT COST:

The total cost of the proposed improvements is approximately $1,445,000. The scope of work proposed consists of 3 phases. The majority of improvements proposed will be completed in Phase I at a cost of $919,000. Phases II and III consist of additional landscaping and additional costs of $373,500 and $152,000 respectively.

II. PROPOSED PROJECT AND STATEMENT OF OBJECTIVES

A. Project Location

The proposed improvements are located on the existing Mauna Lahilahi Beach Park, Wai'anae, O'ahu, Hawai'i. The project site is also identified as TMKs:

- 8-4-01: 1 City and County of Honolulu
- 8-5-17: 1 State of Hawai'i
- 8-5-17: 2 State of Hawai'i
- 8-5-17: 3 State of Hawai'i
- 8-5-17: 4 State of Hawai'i
- 8-5-17: 5 State of Hawai'i
- 8-5-17: 6 State of Hawai'i
- 8-5-17: 7 State of Hawai'i
- 8-5-17: 22 State of Hawai'i
- 8-5-18: 1 State of Hawai'i
- 8-5-18: 2 City and County of Honolulu
- 8-5-18: 3 State of Hawai'i

The project site is located immediately seaward of Farrington Highway in the general vicinity between Lahilahi Point and Wai'anae High School. The portion of the park located along the Makaha Surfside Condominium does not front Farrington Highway. The major intersecting roads in the project vicinity are Orange Street, Makaha Valley Road and Maiuu Road (see Figures 1 & 2).

B. Project Description

The improvements proposed by the Department of Parks and Recreation are part of a community-based master park plan intended to provide the community with a functional and desirable public amenity (see Figure 3).

To facilitate this planning process, a series of site visits, community meetings and presentations were conducted to define user needs, assess environmental considerations, and ultimately, provide a basis for final plans.

Presently the park is minimally improved and does not operate at its potential resource capacity. Parking for the park was previously located along Farrington Highway but has been eliminated by recent road widening improvements. Due to these conditions and the general lack of amenities, park use is relatively low. This was recognized by the Department of Parks and Recreation and subsequently, a master plan was commissioned with the following elements.

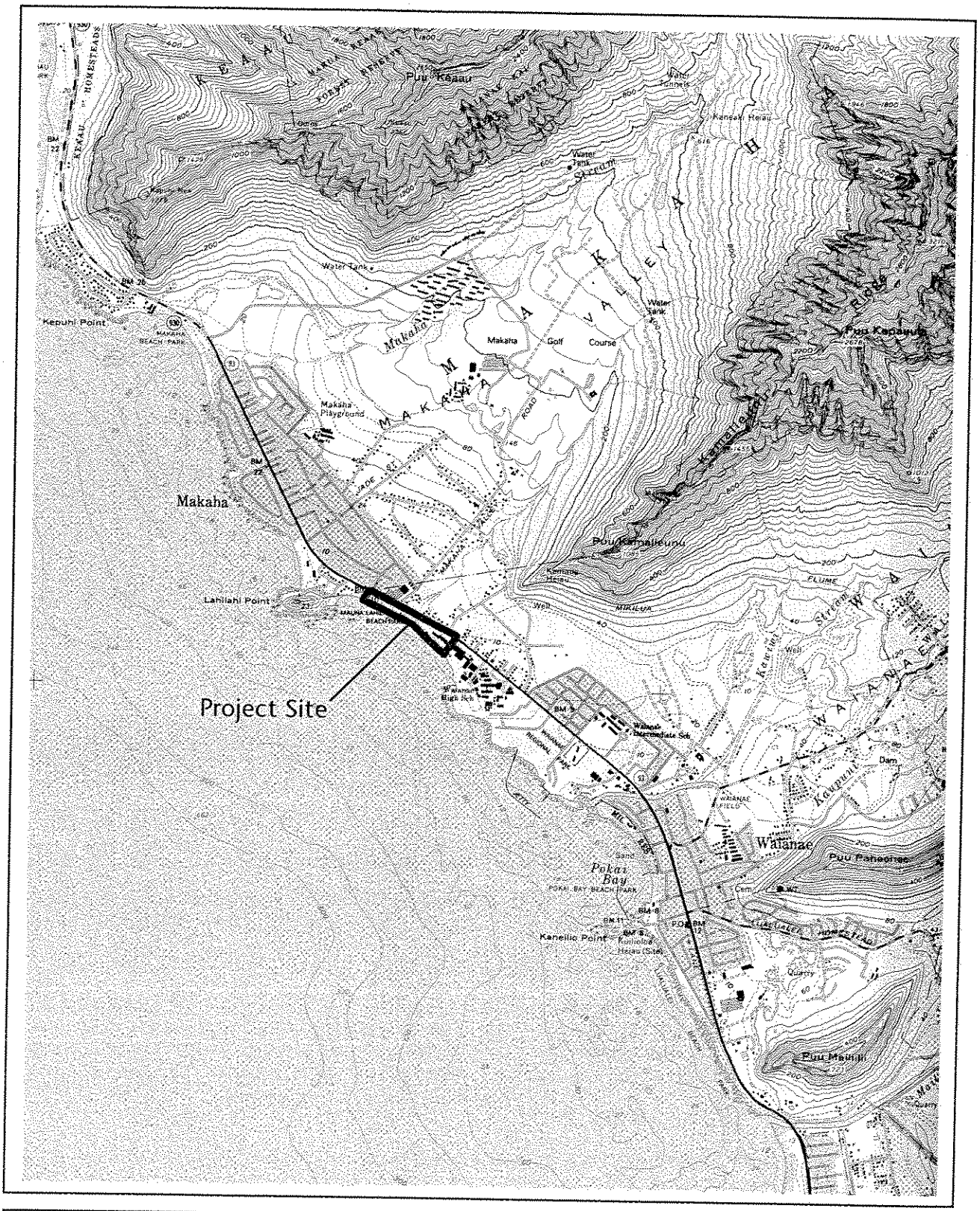


Figure 1: Location Map
Source: U.S. Geological Survey

Mauna Lahilahi Beach Park Improvements
City and County of Honolulu

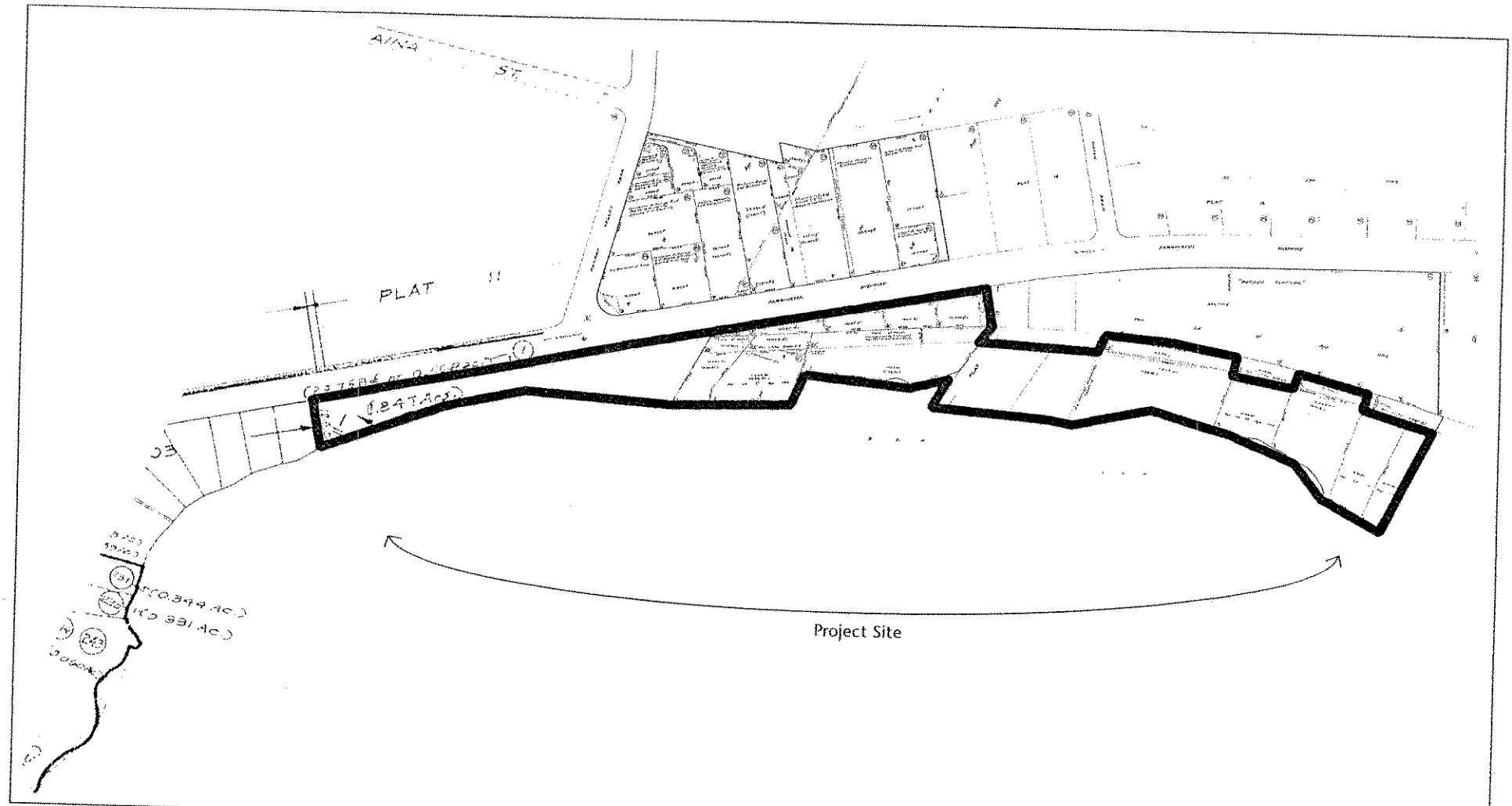
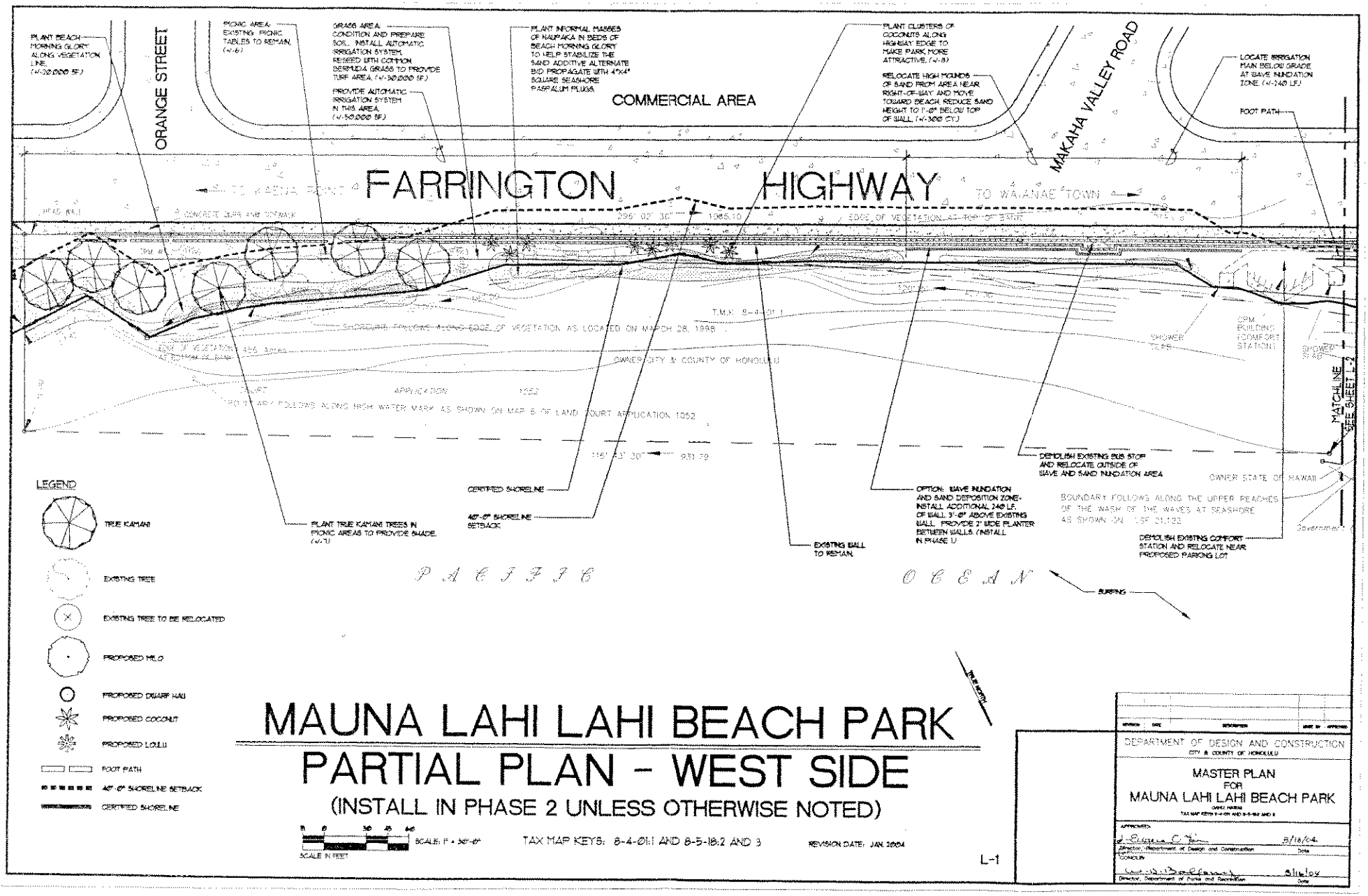


Figure 2: Tax Map
Source: Department of Finance, City and County of Hawaii

Mauna Lahilahi Beach Park Improvements
City and County of Honolulu



MAUNA LAHI LAHI BEACH PARK

PARTIAL PLAN - WEST SIDE

(INSTALL IN PHASE 2 UNLESS OTHERWISE NOTED)

SCALE IN FEET

SCALE: 1" = 30'-0"

TAX MAP KEYS: 8-4-01:1 AND 8-5-18:2 AND 3

REVISION DATE: JAN. 2004

L-1

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY & COUNTY OF HONOLULU

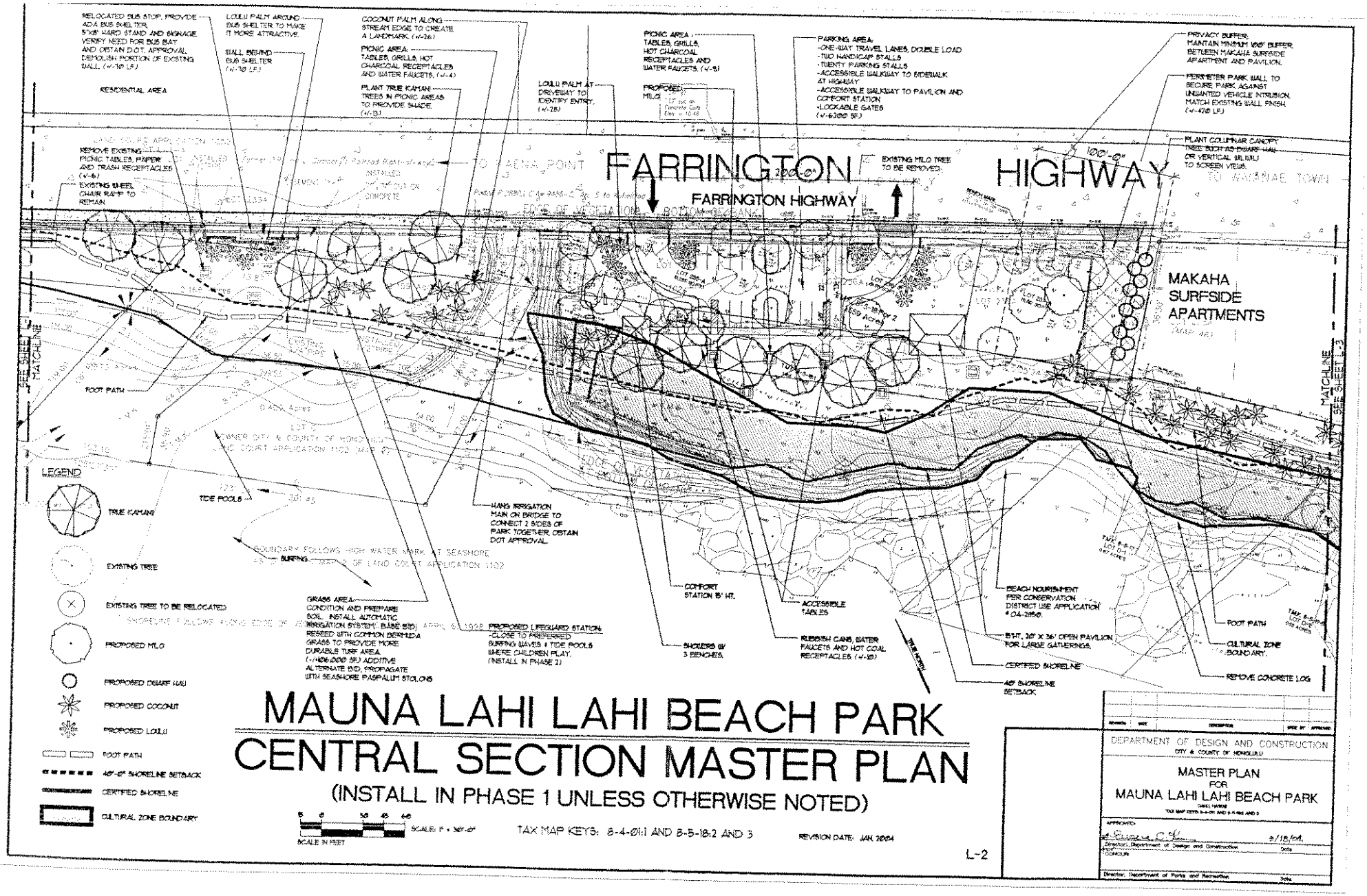
MASTER PLAN
FOR
MAUNA LAHI LAHI BEACH PARK

APPROVED:

Director, Department of Design and Construction — Date: 8/18/04

CONCUR:

Director, Department of Parks and Recreation — Date: 8/16/04



MAUNA LAHI LAHI BEACH PARK
CENTRAL SECTION MASTER PLAN

(INSTALL IN PHASE 1 UNLESS OTHERWISE NOTED)

TAX MAP KEYS: 8-4-01:1 AND 8-5-18:2 AND 3

REVISION DATE: JAN 2004

L-2

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY & COUNTY OF HONOLULU

MASTER PLAN
FOR
MAUNA LAHI LAHI BEACH PARK

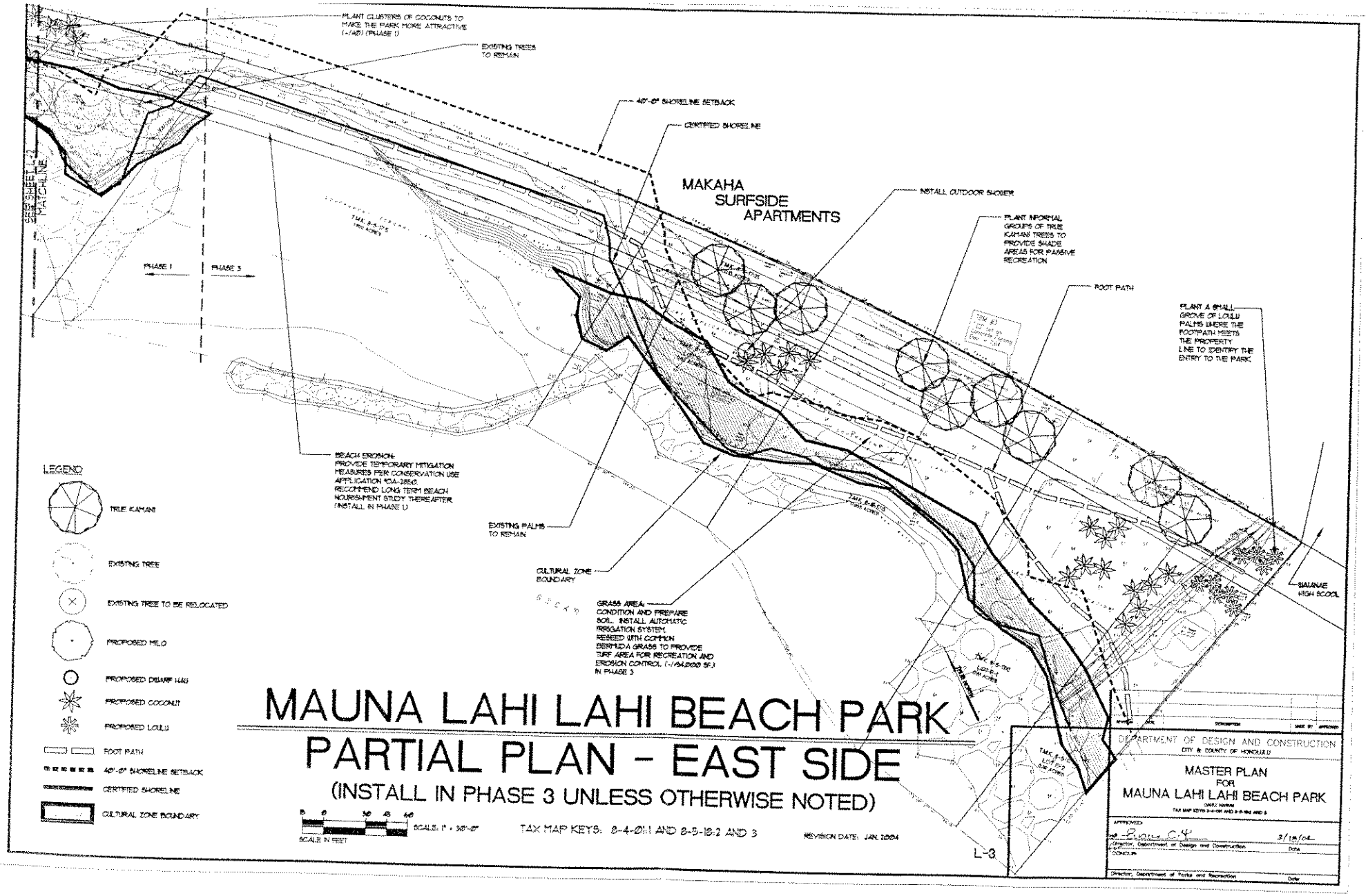
TAX MAP KEYS: 8-4-01: 1 AND 8-5-18:2 AND 3

APPROVED:

Director, Department of Design and Construction — Date: 5/18/04

CONCUR:

Director, Department of Parks and Recreation — Date:



MAUNA LAHI LAHI BEACH PARK

PARTIAL PLAN - EAST SIDE

(INSTALL IN PHASE 3 UNLESS OTHERWISE NOTED)

1. Parking

The lack of accessible parking was identified as a primary deficiency in facilitating park use. Presently, park users must use an unimproved open area located along the western end of the Farrington Highway frontage. This area is often chained for security purposes, and is also located adjacent to the Makaha Surfside Condominium where noise impacts can become a nuisance to residents.

The new master plan proposes a new parking lot located further west, directly fronting Farrington Highway. This location was selected because it is less prone to tidal inundation and because it provides optimal site lines for ingress and egress. The proposed 22-stall double-loaded lot parallels Farrington Highway and allows ingress ~~and egress from both openings~~ from the western opening and egress from the eastern access point. Two handicap accessible stalls are provided within the lot. This addition will mitigate parking across the Highway on private property, and will also eliminate the potentially hazardous condition of loading and unloading on the shoulder of the Highway.

Accessible walkways serving the lot will connect to the sidewalk along the Highway, to the new comfort station, and to the new pavilion structure. Lockable gates will be provided at both entry points to allow the lot to be secured after park operation hours.

2. Structural Improvements

Comfort Station

Presently, a comfort station is located near the intersection of Farrington Highway and Makaha Valley Road. This location has been problematic because it is subject to invasive high-surf conditions and may potentially be undermined under future heavy surf.

The proposed master plan calls for a new comfort station located immediately west of the new parking lot. This location provides a more stable site improving accessibility to the parking lot and the central portion of the park. The old comfort station will be removed and replaced with an additional grassed park area.

The site is divided by the East Makaha Stream. Visitors picnicking on the eastern portion of the site must cross the stream on the Highway sidewalk or wade across the ponding water or sand to reach the comfort station's present location on the western end of the park. By relocating the comfort station near the parking lot, areas of heavier use will be provided with more convenient accessibility. Showers with benches will be located to the west of the new comfort station. The structure will be approximately 15-feet tall.

Open Pavilion

The master plan also proposes the addition of an open pavilion to the park. This 20-foot by 35-foot open structure will provided as a shelter for beachgoers and as a possible cultural gathering place. This structure will be located on the opposite side of the parking lot from the new comfort station. User interviews found that large gatherings are a common activity on beach sites and that the addition of this structure would become an important amenity while creating less wear on the grass turf.

Lifeguard Station

A lifeguard station tower is proposed in the vicinity of the park west of the East Makaha Stream. This location was selected due to its proximity both to desirable surfing spots and to the tide pools frequented by children. The lifeguard station is proposed for a later date when staffing for the station becomes available.

Relocated Bus Stop

The master plan proposes relocation of the bus stop situated near the intersection of Makaha Valley Road and Farrington Highway. This location has been a maintenance problem due to the severely eroded shoreline fronting this portion of the park. During heavy surf conditions, wave overtopping washes sand over the retaining wall that serves as the back wall of the existing bus stop, rendering the location unusable and potentially hazardous.

The new location proposed for the bus stop is further east where shoreline and more stable land areas buffer the bus stop from heavy surf and sand debris. The new stop will include an ADA compliant bus shelter located on a 5-foot by 8-foot hard stand. This location is also further away from the intersection, providing a safer loading area.

Approximately 70 feet of low perimeter wall area will be removed to accommodate the bus shelter. A new wall that is offset towards the park will be added to replace the former wall. The original bus shelter will be removed in favor of additional park space.

3. Landscaping

Proposed landscaping improvements will include the addition of various trees and plantings to enhance the park's functionality and convenience. Loulu Palms situated around the bus stop and the driveways will signify entry and exit points. Milo trees will serve as shade canopies for the parking lot. True Kamani trees in the picnic areas will also provide shade, and coconut palms along the banks of the East Makaha Stream will create a vertical landmark. All grassed areas are

proposed to be conditioned, improved with irrigation systems, and reseeded with Common Bermuda Grass or Seashore Paspalum to provide a more durable turf area.

To ensure buffering for the adjacent residents of the Makaha Surf Condominium, the plan recommends a 100-foot privacy buffer between the open pavilion and the condominium. This area would be secured by the closure of the existing vehicular access point into the unimproved parking area. A new wall that matches the existing Farrington Highway frontage wall will be added to secure this portion of the site.

New columnar canopy trees, such as Dwarf Hau or Vertical Wili Wili, will serve to screen views and to ensure noise attenuation.

Other landscaping improvements include the addition of picnic tables, grills, hot charcoal receptacles, water faucets and rubbish cans throughout the site. Two handicap accessible tables will also be located within the central portion of the parking fronting the parking lot. Various "housekeeping" improvements, such as the removal of concrete log barriers, dilapidated picnic tables, and selective plant removal, are also proposed.

4. Shoreline Management

Two areas along the shoreline were specifically identified for beach nourishment. While not specifically related to the project master plan, this action is related to improvement of the park as well as the general safety of the Makaha Surfside Condominium. The areas targeted for this beach nourishment action are subject to Conservation District Use Application (CDUA) No. OA-2850.

C. Project Objective

The proposed improvements are aimed at providing park users with a more accessible and pleasant park experience. The proposed improvements will also increase safety for park users, bus riders, and adjacent residents. As previously stated, the planning process has utilized a community-based approach, including numerous site visits, user interviews, public informational meetings and an official presentation to the Neighborhood Board.

Site improvements will significantly improve the physical environment and will transform the Mauna Lahilahi Beach Park into a new community center. Safety, convenience and sound environmental mitigation will provide the park with the necessary improvements to create a highly desirable community asset.

III. DECRIPTION OF ANTICIPATED IMPACTS

A. Environmental Setting

The project site is located on a relatively flat grassed area flanked by a sandy and rocky shoreline that changes with seasonal surf. The park is 478,495 square feet in size, and consists of approximately 2,900 linear feet of shoreline frontage. Presently there are minimal improvements within the park.

A low perimeter stone wall defines the park boundary along Farrington Highway, while a chain link fence separates the park from the Makaha Surfside Condominium. The park transitions into unimproved private property along its western boundary. The eastern boundary is fenced-off from the Wai'anae High School campus.

The shoreline fronting the park varies from expansive sand area with minimal turf to grassed areas that abruptly drop into rocky shoreline. It was evident during the site visits that wave action from large surf undermines grassed areas and exposes the rock base beneath. Interviews with residents indicate that the beach has lost significant amounts of beach sand from Hurricanes Iwa and Iniki. Exposed reef is found throughout the length of the beach. Sand areas terminate in front of the Makaha Surfside Condominium where the shoreline becomes rocky and less suitable for swimming and wading.

The East Makaha Stream crosses the park approximately midway between Makaha Valley Road and Maiuu Road. Though blocked by a sand berm during normal surf, the mouth of the stream opens during heavy stream flow. Ponding was observed during site visits and is likely attributable to the water table and streambed depth. To traverse the park requires crossing the stream mouth or crossing along Farrington Highway.

A second intermittent break is a storm drain outlet located west of Makaha Valley Road. This outlet was observed to be dry during the site visits, but a drain flow pattern is clearly defined by sand and vegetation patterns. Again, during rain/storm events, park crossing will be limited to the sidewalk along Farrington Highway.

An existing comfort station is located near the Makaha Valley Road intersection. This structure is located on the vegetation line and appears to be in jeopardy of becoming undermined by wave action. The ramped facility is handicap accessible from the Farrington Highway sidewalk but does not connect to other park areas.

Existing vegetation is limited to a Hau, Keawe, Koa Haole, Coconuts and dried grasses. No irrigation system is presently provided.

Although picnic tables and trash receptacles are found throughout the site, their remote proximity to shaded areas makes these amenities less desirable.

B. Surrounding Uses

The Mauna Lahilahi Beach Park is located within the urbanmost area of Makaha. The intersection of Makaha Valley Road and Farrington Highway is a central point within the Makaha community. While the park is zoned for general preservation use at the County level, surrounding uses are zoned for single-family and medium density residential uses and commercial use. The commercial area is generally defined by the Farrington Highway frontage located between Orange Street and Makaha Valley Road and a small portion east of Makaha Valley Road. The area immediately east of the Makaha Surfside Condominium and the park is used as the campus for the Wai'anae High School.

C. Environmental Considerations

1. Geological Characteristics

Topography

Turfed portions of the park are relatively flat with less than 5% variation in slope. Minor grade changes occur adjacent to the East Makaha Stream and the storm drain opening. Larger topographic variations occur beyond the grassed areas toward the shoreline. Along the shoreline, variations in topography range from gradual sand slopes to the ocean to abrupt transitions where erosion from surf results in a drop-off of approximately 4 feet.

Climate

While Hawai'i is generally characterized as being temperate, the geography of the Wai'anae District is notable for its prevailing dry, warm climate. Rainfall in this area is the lowest of all coastal regions on O'ahu. Prevailing tradewinds are diminished by the Wai'anae mountain range, contributing to the general arid feeling of the coast.

According the *Atlas of Hawai'i, Second Edition*, the Wai'anae District typically experiences less than 5 inches of rainfall during peak rainfall months. Average mean temperatures on the Wai'anae coast range from mean highs between 80 and 90 degrees to mean lows between 60 and 75 degrees Fahrenheit.

USDA Soil Survey Report

The project site is located on soils classified as BS beach, CR coral outcrop, and HnA Hanalei silty clay (see Figure 4). Beach sand and coral outcrops are typical of shoreline areas. Hanalei silty clay is associated with stream bottoms and flood

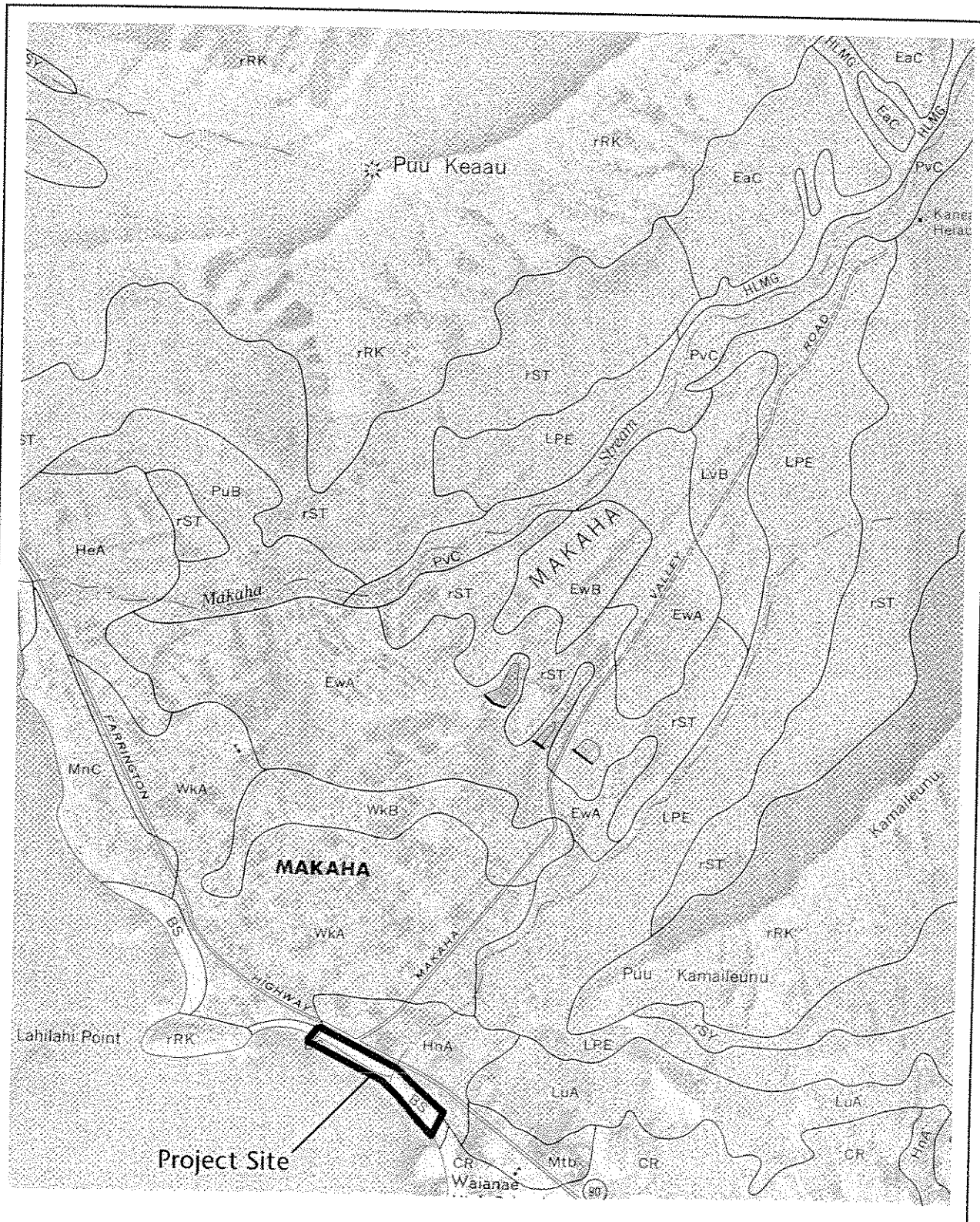


Figure 4: Soils Map

Source: USDA Soil Survey of Islands of Kauai, Oahu, Maui, Molocai, Lanai, State of Hawaii

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plains. Generally, on O'ahu, these areas are characterized by deep, well-drained alluvial soils and small areas of poorly drained clay soils underlain by peat, muck, or massive marine clay.

2. Water Resources

Hydrologic Hazards and Resources

According to Panels 150001 0065 C, 150001 0100 C and inset J of the Federal Emergency Management Agency Flood Insurance Rate Map (see Figure 5), the project site is located in Zones VE, AE and X. Areas in Zones VE and AE have been determined to have coastal base flood elevations of 11 to 13 feet above mean sea level. Areas in Zone X are within the 500-year flood plain.

It should be noted that erosion caused by high surf has resulted in hazardous conditions in front of the Makaha Surfside property. Severe erosion has narrowed the turf areas to approximately 3 feet. A drop of approximately 3 or 4 feet onto a rocky shelf occurs seaward of the pathway. This condition also jeopardizes the condominium property where large surf can wash onto the depressed site and flood the lower level residential units and swimming pool. As part of a separate initiative, a beach nourishment plan is being implemented under Conservation District Use Application OA-2850 and is subject of a separated draft environmental assessment titled Mauna Lahilahi Breakwater, prepared by Oceanit was published on August 8, 2000 in the Environmental Notice.

Tsunami Inundation

The Civil Defense Tsunami Inundation Maps indicate that the project site is vulnerable to tsunami inundation (GTE Hawaiian Tel).

Special Management Area

The project site is located within the Special Management Area (SMA) and is consequently subject to the provisions of Chapter 205A Hawai'i Revised Statutes. This environmental assessment will be used to fulfill the requirements for a Special Management Area Use Permit (SMP), which will be filed under separate cover.

3. Archaeological, Botanical and Faunal Resources

Archaeological Resources

The Department of Land and Natural Resources (DLNR) has initiated a Chapter 6E-8 Historic Preservation Review of the project site. Based on historic reports as well as a field inspection conducted on March 5, 1999, habitation sites within the beach park area have been exposed during periods of high surf. Based on this

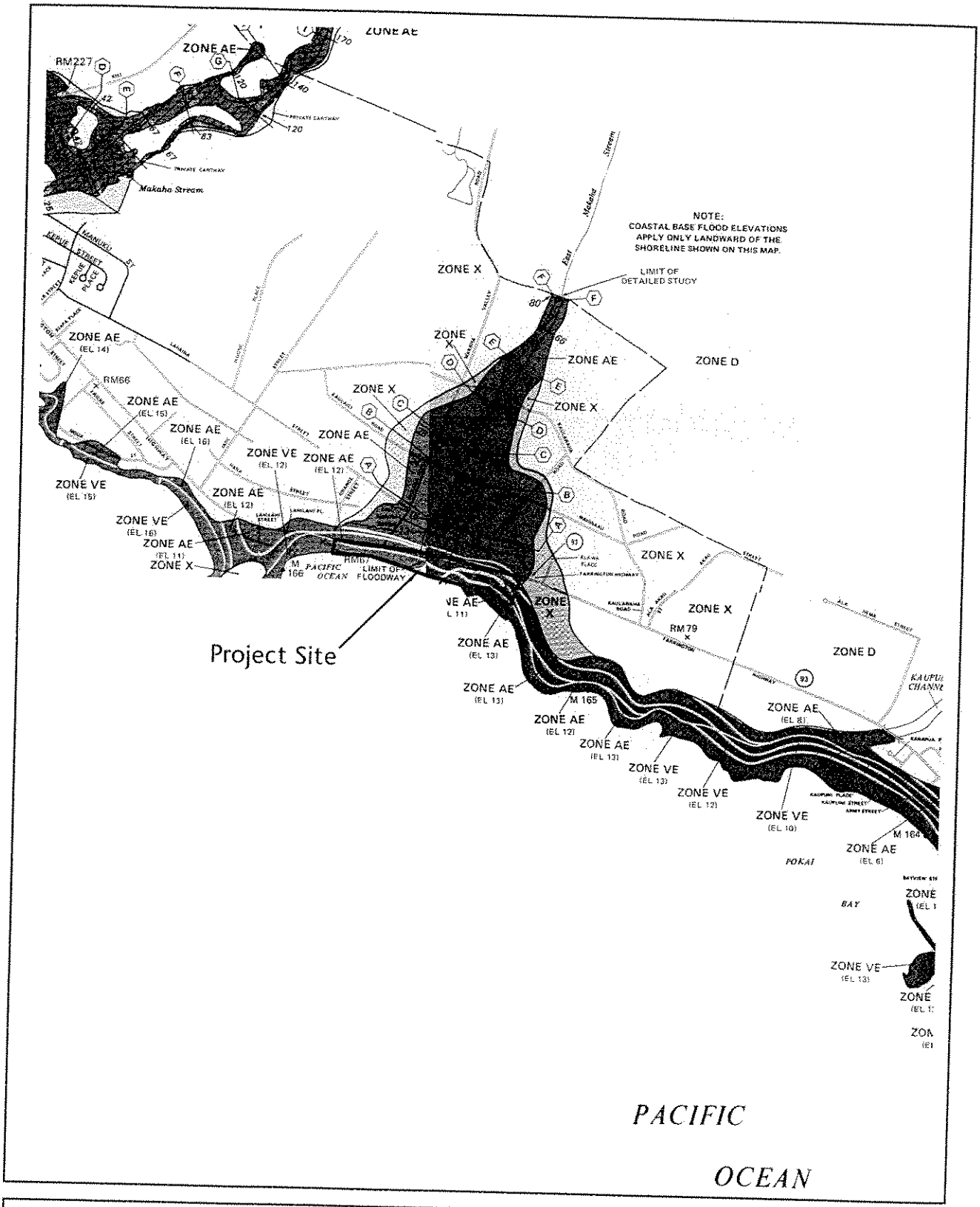

Figure 5: Flood Insurance Rate Map
Source: Federal Emergency Management Agency

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City and County of Honolulu

February 1999

information, the DLNR recommended that an archaeological inventory survey of the proposed project be performed to determine if any historic sites are present within the park area. This study was conducted in August of 2003 and a report was completed in April of 2004. The report entitled *Archaeological Inventory Survey Report for Proposed Improvements at Mauna Lahilahi Beach Park in the Ahupua'a of Wai'anae, District of Waianae, Island of O'ahu* is attached as an appendix in its entirety. A summary of the report is presented as follows. ~~The extent of these deposits has not been determined but are quite likely to be found through the park area. Consequently, the proposed improvements may have an "adverse effect" on any significant historic sites that may be present.~~

~~DLNR recommends that an archaeological inventory survey of the proposed project be performed to determine if any historic sites are present within the park area. A report of the findings must be submitted to the Historic Preservation Division for an adequacy review. In the event that historic sites are found, a mitigation plan by be need to be developed and executed. All of the above actions must be completed prior to construction.~~

Site Descriptions

A total of two new sites and two previously documented sites were recorded within the project area. The new sites consist of an intact cultural layer (Site 50-80-07-6634) and an historic basalt alignment (Site 50-80-07-6635). The two previously recorded sites are a concentration of burials (Site 50-80-07-4064) and a portion of the OR&L Railroad (Site 50-80-07-9714).

State Site #: 50-80-07-6634
Site Type: Cultural layer
Function: Occupation
Features (#): 1
Age: ca. 15th century A.D. to present

Description: Site 50-80-07-6634 is an intact cultural layer located in the southern portion of the project area along the shoreline (see Figure 6). The site is represented within the Stratum II layers (II, IIA, IIB, and/or IIC) and contains varying concentrations of midden, artifacts and charcoal. Based on radiocarbon analysis of the charcoal from II, IIA and IIB (IIC had insufficient quantities for accurate measurement), it is indicated that Stratum IIB was deposited no earlier than A.D. 1430. Continued use and settlement of the shoreline deposited additional stratigraphic layers (i.e. IIA) while expansion of settlement deposited culture bearing layers in previously unused portions of the shoreline.

Within Stratum IIB and IIC no historic midden or artifacts (modern bottle glass, rusted metal) was encountered. These layers were generally distinguishable by a slightly lighter color, a lack of historic midden and artifacts and a higher concentration of marine and vertebrate midden. Stratum II and IIA, however, were distinguished by a very dark gray color and in most instances a presence of

historic trash as well as invertebrate midden, cut bone, and few fish hooks. Based on laboratory analysis, charcoal dating and historical research, it is suggested that Stratum IIB and IIC represent the pre-contact component of the site while Strata II and IIA represent an early post-contact to historic cultural deposit. This site is in excellent condition.

State Site #: 50-80-07-6635
Site Type: Rectangular alignment
Function: Indeterminate
Features (#): 1
Age: Historic

Description: Site 50-80-07-6635 consists of a rectangular alignment measures 5 m N/S by 24 m E/W (see Figure 38). The alignment is constructed of one course of medium basalt cobbles to small boulders. The interior surface of the site is soil covered with no paving stones or ' ili 'ili observed. A test unit was excavated along the interior of the eastern wall of the alignment to better understand the sites subsurface component. No cultural layer was encountered and it was observed that the alignment did not penetrate more than 5 cm below the surface suggesting that the site was constructed in historic times. The function of the site is indeterminate, though may have been the footprint of a previous beach structure. Overall, the site is in fair condition.

State Site #: 50-80-07-4064
Site Type: Human burials
Function: Burial Interment
Features (#): 2
Age: Pre-contact to Early Historic

Site –4064 consists of 2 human burials (one in situ and currently eroding and one probable crypt burial). The burial currently eroding out of the wave cut bank (Feature 1) was initially documented by the SHPD (Cordy, 1997) and was left in place pending a decision on the final disposition. The burial is located 30 m southwest of the northeast corner of the Makaha Surfside Apartments. No burial pit was observed and is was unclear whether the burial was intact or to what extent the erosion had disturbed the remains.

The one probable burial crypt (Feature 2) encountered during subsurface testing was located 10 m north of the partially exposed burial (see Figures 6, 34 and 35). The portion of the crypt that was exposed measured 85 cm N/S by 40 cm E/W by 105 cm deep and extends into the north wall. A basalt capstone and a basalt lined pit were encountered at the base of Stratum I and intruded through Stratum IIA and IIB and into the sterile soil. Though no human remains were encountered during testing, the feature was classified as a probable burial crypt based on it's proximity to Feature 1 and to a second burial just north of Feature 1 that is believed to have eroded out prior to September, 2001.

In addition to Features 1 and 2, a human metatarsal was encountered during the excavation of Test Unit 3. The fragment was within disturbed fill material and was not associated with a cultural layer or burial pit. The fragment was recorded, the SHPD Burials Program was notified and it was determined that excavation within the test unit should be halted and refilled.

Just north of the site of the former Badayos residence is a large shrub which marks the reinterment area used by the Badayos' for burials found eroding out of the shoreline. This locale is known by the community as a reinterment site, though in personal communication with the SHPD, it was determined that no state site number would be designated to this site. This site is in good condition.

State Site #: 50-80-12-9714
Site Type: Railroad Berm
Function: Transportation
Features (#):
Age: Historic

Site 50-80-12-9714 consists of a portion of the former OR&L Railroad berm which was formerly used to transport sugarcane from Wai'anae Sugar Company land to the 'Ewa Mill. The track was completed in 1898 when the line was extended around Ka'ena Point, linking Wai'anae with Waialua. The portion of the berm still present within the project area extends along the *mauka* portion of the project area, just *makai* of the Makaha Surfside Apartment fenceline. The remaining berm is roughly 110 m long and 3 m wide. Subsurface testing over a portion of the berm encountered a layer of compact coral fill, rusted metal and a railroad spike. This site is in fair to poor condition.

Summary of Project Area
The traditional settlement pattern for the *ahupua'a* of Wai'anae consisted of an intensively utilized coastal zone (which includes the project area), a wet, resource rich mountain interior and a less utilized intermediate zone consisting of dry scrubland interspersed with stream fed lo'i. The earliest settlement in Wai'anae appears to have occurred, at least temporarily, by the A.D. 1200s with more permanent coastal settlements appearing by the A.D. 1300s. The upper mountainous regions were likely settled later in the A.D. 1400s, though procurement of forest resources was likely occurring much earlier.

The present project area is situated along a stretch of coast between Mauna Lahilahi and Pokai Bay. Kawiwi Stream, located south of the project area offered a continuous supply of fresh water, while an intermittently flowing drainage once bisected the current study parcel. In total, an intact cultural layer (Site 50-80-07-6634), a concentration of burials (previously documented; Site 50-80-07-4064) and an historic alignment (Site 50-80-07--6635) were described and tested during the present inventory survey.

Radiocarbon dating of charcoal recovered from the cultural layer (Site –6634) suggests an initial settlement of the shoreline by the mid 1400s with 400 to 500 years of continual occupation into the 20th century. Recovered midden and artifacts suggest the shoreline was utilized for procurement of marine resources, with a focus on fishing and fishhook production. At the time of western contact, Wai'anae was noted as having a relatively small population, though findings from previous archaeological research suggests that by "the A.D. 1700's…the upper valley down to the first Kawiwi drainage was covered with agricultural fields and had a sizable population…"(Cordy, 2001:ii).

The presence of two (and up to three) distinct cultural layers making up Site –6634 suggests a shift in intensity, temporal length, and type of use along the shoreline. Natural factors, including erosion and accretion, tsunamis and shifting drainages, invariably affected occupation along the relatively thin stretch of shoreline. The earliest occupation is represented as Stratum IIB (IIC in some places) and is generally situated directly above the sterile clay and sandy clay. The layer(s) (Stratum IIB and IIC) are generally slightly lighter in color than II and IIA, possibly the result of less intensive occupation, and generally had a slightly lower CI values.

The correlation between CI value and permanent/recurrent habitation versus temporary habitation can be defined generally as CI <500 suggests temporary habitation, CI >1000 suggests permanent habitation (Hammatt et al. 1991). CI values for invertebrate midden at Mauna Lahilahi Beach Park are depicted graphically in Figure 51 and indicate areas of greatest midden concentration, thus the colors represent the CI values from Stratum II or IIA. Only one location (Test Unit 35) had a higher CI value in Stratum IIB than IIA, which suggests that the project area was first utilized in a temporary habitation basis, and later was occupied on a more permanent basis.

Previous archaeological research along the Wai'anae coast indicates early use of the shoreline. Excavations at the Wai'anae Army Recreation Center returned carbon dates as early as the 14th century (Riford 1984; Hammatt et al, 1985) The depositional pattern encountered at Mauna Lahilahi shows initial occupation during the development of Stratum IIC or IIB (the lower cultural layers) ca. mid-1400's. Following this development, the stratigraphic sequence indicates an abrupt shift in site utilization with a generally darker and more midden rich stratigraphic layer as seen in Stratum IIA (or II if no other II layers were encountered).

The artifacts recovered during test excavations further evidence the shift in specialization of the site. The fishhook assemblage recovered from excavations at Mauna Lahilahi totaled 37 pieces. Of the 21 pieces recovered from test units with multiple cultural layers (i.e. IIA and IIB), 11 were recovered from IIB, 5 from IIA and 5 from IIC. In addition, 5 were recovered from Stratum IC in TU 25 which

had undergone mixing and likely represented fishhooks originally deposited during the occupation of IIA.

Activities occurring during the formation of Stratum II appear fairly consistent though with a marked difference in intensity. Midden remains increased as the strata increased in age (i.e. from IIA increasing in age to IIB), as did the number of artifacts. It is clear that grubbing and other construction activities occurring in historic times likely adversely affected the integrity of the upper portions of the cultural layers. A relatively sparse basalt flake count suggests that little stonework or woodworking was occurring within the site's boundaries, though the *ulu maika* suggests that some leisure activities were enjoyed by the inhabitants.

Historically, the current project area was known to have contained four LCAs and had been occupied by at least one family into the 1970's. Remnants of an eroded cement stairway were observed in the southern portion of the project area near the small inlet and subsurface testing in that area encountered an historic trash pit and two cultural layers containing both western and indigenous artifacts and midden. Remnants of the former OR&L Railroad (Site -50-80-12-9714) were encountered within Test Unit 12 including the coral track bed and a rusted railroad spike. The railroad berm is extant in the southern / *mauka* portions of the project area and continues from the southern boundary of the project area (adjacent to Wai'anae High School) to the northern end of the Makaha Surfside Condominiums.

Based on historic background research and previous archaeological studies a predictive model was completed which indicated probable use of this portion of the coast by the 13th century with permanent settlement occurring by the A.D. 1400's. Previous archaeological research at the Wai'anae Recreation Center (south of the current project area) encountered intact cultural layers with radiocarbon dates from the 14th century (Riford, 1984) with subsequent work in the same area returning similar dates (ca. A.D. 1340 +/- 70 years) (Hammatt et al, 1985). Stratigraphic and radiocarbon information suggest settlement along coastal Ohikilolo by the 17th century (Hammatt, et al, 1987; Tuggle, 1994). Within the current project area, subsurface testing uncovered intact cultural layers (Strata II, IIA-IIC), which contained, in places, a high volume of both historic and indigenous artifacts and midden. Radiocarbon dating of charcoal from the cultural layers returned dates ranging from A.D. 1430-1640, suggesting settlement of the project area by the 15th century, with occupation continuing into historic and modern times. Historic documentation of commercial agriculture and transport indicated the presence of a portion of the OR&L railroad passing through the project area. Along the makai side of the Makaha Surfside Condominiums a low, linear berm was observed and tested and found to contain compact, crushed coral and a railroad spike which confirmed the presence of the abandoned line.

Recommendations
Of the four sites recorded in the project area it is recommended that two sites be preserved. The remaining 2 sites are recommended for no further work, as it is believed that no additional scientific data is obtainable, beyond what was acquired during the inventory survey (e.g. site configuration, description and subsurface testing).

Preservation
Two sites in the project area are recommended for preservation. Recommendations for site preservation were based on the significance criteria of the National and State Registers of Historic Places. The two sites include a previously documented burial actively eroding out of the shoreline (Site 50-80-07-6634) and one adjacent probable crypt burial (-4064: 4 and 5), as well as the intact cultural layer that runs along the southern portion of the project area (south of the drainage/existing beach park). Preservation of the human burials is recommended, though it is also suggested that the remains that are actively eroding be subjected to a burial treatment plan that will address the long term preservation and immediate concerns regarding this burial. The preservation concept allows for the long term preservation of the intact cultural layer, thus maintaining its integrity for future study.

No Further Work
Site –6635 and 50-80-12-9714 are recommended for no further work. Site -6635 (historic rectangular alignment) was mapped, placed on a plan view map and tested for subsurface deposits. Site –9714 was previously mapped on a survey map and one test unit was excavated on the existing berm. Based on the findings of the research on this site, it is believed that no further documentation is necessary.
Other Concerns

Two additional concerns should be addressed prior to development of Mauna Lahilahi Beach Park. In the southern portion of the project area, immediately south of the wave eroded embayment, is a former reinterment area utilized by Mr. Badayos for burials found eroding out of the shoreline. This reinterment site was designated with site number R1992-1-0001-001, provided by Mr. Kana'i Kapeliela of the SHPD Burials Program. Additionally, two isolated and previously disturbed human bone fragments were encountered within Test Unit #3. No associated in situ remains were encountered, suggesting that the remains had either been disturbed by groundwork or had been imported with fill material. In personal communication with SHPD archaeologist Dr. Sara Collins (Oct. 13, 2003), it was determined that neither of these two areas will be designated with an SIHP site number.

Based on the findings of isolated human remains outside of the cultural layer and the overall cultural sensitivity of the project area, it is recommended that on-site

archaeological monitoring take place during any subsurface construction activities associated with the proposed improvements to Mauna Lahilahi Beach Park.

Cultural Resources

A companion cultural impact assessment for the project was prepared by Cultural Surveys Hawaii, Inc. The summary of this study is provided below and is attached in its entirety in the appendix.

In summary, Hawaiian traditions centered on Wai'anae suggest the area's significance and association with the *ali'i* in prehistoric times. The district is a focus in the mythological cycles of Mui, Kamapua'a, and Kamohoali'i.

Archaeological and historic documentation of the Wai'anae District suggests initial occupation (at least temporary) by the early 1200's A.D. Population pressures on the windward side and Kona District forced permanent settlement of the Wai'anae District, especially in the well-watered coastal areas by the 1300's and permanent settlement of the upper valleys by the 1400's (Cordy, 2002). The numerous house and agricultural sites, including terraces and pond fields, in the well watered portion of the valley likely had ample resources available for trade with the marine resource rich coastal portion of Wai'anae Ahupua'a.

The traditional settlement pattern for the *ahupua'a* of Wai'anae consisted of an intensively utilized coastal zone (which includes the project area), a wet, resource rich mountain interior and a less utilized intermediate zone consisting of dry scrubland interspersed with stream fed *lo'i*. The earliest settlement in Wai'anae appears to have occurred, at least temporarily, by the A.D. 1200's with more permanent coastal settlements appearing by the A.D. 1300's. The upper mountainous regions were likely settled later in the A.D. 1400's, though procurement of forest resources was likely occurring much earlier.

Following European contact, the populations experience a decline due to introduced diseases and a shifting of labor force from traditional agriculture and resource gathering to the harvesting of sandalwood for trade. Once the sandalwood resources were diminished, a shift to ranching and sugarcane further occupied once fertile agricultural land.
Historically, the current project area was known to have contained four LCAs and had been occupied by at least one family into the 1970's. Historic documentation of commercial agriculture and transport indicated the presence of a portion of the OR&L railroad passing through the project area. Along the *makai* side of the Makaha Surfside Condominiums a low, linear berm was observed and tested and found to contain compact, crushed coral and a railroad spike, which confirmed the presence of the abandoned line.

Previous archaeological research along the Wai'anae coast indicates early use of the shoreline. Archaeological research in the current project area was limited to

studies of human burials eroding from the sand fronting the Makaha Surfside Apartments). Four studies were conducted documenting at least seven burials. These include one male, ~48 years old, located *makai* of 85-175 Farrington Highway, that was removed (Douglas and Peitrusewsky 1988); one child and one middle-aged male (both incomplete) (Douglas 1991); one male and one female disinterred Oct. 1979 (Kawachi 1991); a separate pit burial (#50-80-07-6592-1) that was relocated (Jourdane 1995) and 2 burials exposed in the wave cut banks (50-80-07-6592- 2&3) (Cordy 1997). Burial –6592- 2 is believed to have eroded out of the bank prior to September, 2001, burial 6592- 3 is presently in situ until final disposition is agreed upon.

Interviews were conducted with members of the Wai'anae community. Four interviewees noted that in traditional times the area *makai* of the project area was most likely used for various fishing activities and the gathering of *limu* by early Hawaiians. The other interviewee referred CSH to the State Historic Preservation Division/ Department of Land and Natural Resources for information needed for the interview involving the present project area. Two members of the community noted that the proposed project is a good idea to stabilize the exisiting shorelines along Mauna Lahilahi Beach Park.

Based on the above findings, the proposed project will have minimal or no impact on Hawaiian culture, its practices and traditions.

It should be noted, however, that subsurface properties associated with former traditional Hawaiian activities in the project area, such as burials, artifacts and cultural layers, may be present despite the previous development of Mauna Lahilahi Beach Park. As a precautionary measure, personnel involved in future development activities in the area should be informed of the possibility of inadvertent cultural finds, and should be made aware of the appropriate notification measures to follow.

Flora

The project site is presently covered with grass and various weedy species, as well as trees and shrubs such as Keawe, Koa Haole, Coconut and Hau, all of which are common in beach areas. No rare or endangered species of flora were identified on the park site, and no adverse impacts will occur to flora as a result of the implementation of master plan objectives.

Fauna

The site does not serve as a wildlife habitat although avifauna, feral cats, dogs and rodents may be found on-site.

4. Infrastructure and Utilities

The proposed improvements are not expected to have a significant impact on existing infrastructure and utilities. The proposed improvements are intended to improve park safety and convenience with only minimal infrastructure expansion.

Vehicular Access and Traffic Conditions

With the addition of the proposed parking lot, safety is expected to be greatly improved by the elimination of pedestrian street crossings and loading on the highway shoulder. The proposed parking lot is configured to facilitate ingress and egress at two openings, which will allow both right hand and left hand turning movements to occur at separate entry points, thus minimizing the potential for vehicular congestion. Furthermore, the parking lot is located away from the Makaha Valley intersection and features improved traffic sight lines for traffic safety.

No adverse traffic impacts are expected along the project street frontages. The distance between the proposed park improvements and the relocated bus stop will minimize conflicts between bus and park user traffic. Sidewalks will be maintained along Farrington Highway.

Water

The project will continue to be serviced by existing waterlines. Use of this service will increase from current levels due to the addition of irrigation lines. It is believed that this increase will be offset by the aesthetic benefits of a well-maintained lawn and enhanced comfort for park users.

Wastewater

The Department of Wastewater Management has indicated that the municipal wastewater system will not be affected by the proposed project since no additional water fixtures will be incorporated into the project. Drainage

The site is presently naturally drained. Storm runoff will not run into the City's storm runoff system. Because the site largely consists of sand and coral, the site is well drained. The East Makaha Stream serves as a collector for Makaha Valley storm runoff and outflows through the park. In addition, a second storm drain channel is located on the western portion of the site. All storm water runoff from the proposed improvements will be reviewed for conformance with City and County of Honolulu Ordinance 96-34 regarding peak runoff.

Solid Waste

It is expected that City and County refuse collection service will continue to be used to service the project location.

Telephone and Electrical Services

Telephone and electrical services are presently not provided to the site. The proposed improvements do not include lighting or telephone service at this time. In the event that such services are deemed appropriate for the site, connections can be readily made to service lines located on Farrington Highway.

5. Public Facilities

The proposed project is not expected to have any impact on public facilities including schools, parks, police, and fire or emergency medical services.

Wai'anae Fire Station Number 26 provides fire protection service to the project area as well as emergency medical service. The station is located at 85-645 Farrington Highway and is located less than 1 mile from the project site. Response time to the park is approximately 5 minutes.

Police service is provided by the Honolulu Police Department Wai'anae Station located at 85-939 Farrington Highway. Response time to the Beach Park is approximately 5 minutes or less, depending on the location of patrol units.

D. Relationship to Plans, Codes and Ordinances

The project site is zoned P-2 General Preservation according the City and County of Honolulu Zoning Map (see Figure 6). Park uses are consistent with this designation. The Development Plan Designation for the site is Parks and Recreation, which is also consistent with the existing and proposed use.

The State Land Use Commission Boundary Maps identify the project site as being within the Urban area. This is consistent with the surrounding uses that include commercial uses and single-family to medium density residential units.

Due to its location within the Special Management Area (SMA) boundaries, a Special Management Area Use Permit (SMP) is required for this project (see Figure 7).

E. Probable Impact on the Environment

It is anticipated that the proposed project will significantly improve the existing site conditions. These improvements and public benefits will occur as a result of the additional amenities, safety improvements, parking, conveniences and park beautification.

Positive environmental impacts are expected to increase park use and desirability. As stated in the project description, the proposed improvements are based on a community input process that identified salient needs, major concerns, and long-term goals. Each of these areas has been addressed by the proposed improvements, as have other initiatives not part of this specific improvement plan.

A pocket beach located in a small cove at the southeast end of Mauna Lahilahi Beach Park (Waianae, Oahu) has undergone severe coastal erosion. An estimated $750,000 worth of City and County of Honolulu Park land has already been lost due to shoreline erosion. In addition, hurricanes Iwa and Iniki caused nearly $2 million in damage to the Makaha Surfside apartment complex, which is located mauka of the park. In an effort to develop a long-term erosion control solution, the City and County of Honolulu, Department of Design and Construction (DDC), proposes to construct a shore-connected breakwater that will reduce wave energy that has been causing beach erosion. DDC also plans to nourish the beach inside the breakwater with 5,000 cubic yards of suitable sand. The proposed solution was selected after investigating other alternatives including no action, beach nourishment without structures, a rock revetment, an enclosed and filled cove, and a detached offshore breakwater.

As a temporary emergency measure, a sandbag revetment was constructed between the beach and top of the eroded embankment in 1999. The sandbags worked well during periods of high waves in early 2000, but were not designed as a long-term erosion solution. The existing sandbag revetment will be removed

after completion of the breakwater and the sand in the bags will be added to the beach nourishment.

Anticipated impacts from the project include short-term water quality degradation, destruction of a small benthic habitat area, and visual changes to the shoreline. Degradation of water quality will be short-term and will be mitigated through the use of a best management practices plan and water quality monitoring plan. Benthic habitat covered by the proposed breakwater will be lost. However, habitat loss will be mitigated by the surface area on the breakwater stones, which provides increased fish habitat and space for marine growth. The Makaha Surfside Apartment buildings block coastal roadway views of the ocean. The breakwater will be visible from certain stationary viewpoints along the shoreline. Beach nourishment, shoreline re-vegetation, and removal of the sandbags will improve the shoreline's appearance.

F. Adverse Impacts Which Cannot be Avoided

Adverse impacts that cannot be avoided are generally related to short-term construction impacts. These impacts can be minimized by sound construction practices, adherence to applicable construction regulations as prescribed by the Department of Health, and coordination with applicable County agencies.

G. Alternatives to the Proposed Action

No other use alternatives beyond the non-action alternative were considered for this project. Non-action was considered and rejected since no benefit to the community would be provided. Within the scope of proposed improvements, alternative parking configurations were considered and rejected. This alternative limited ingress and egress to a single point and proposed that parking be configured perpendicular to Farrington Highway. This alternate parking plan was reviewed and rejected because it would decrease the amount of turf buffer between the parking lot and shoreline, and because traffic into and out of the site may become congested from the single opening.

H. Mitigation Measures

Long-term impacts resulting from the proposed improvements are expected to be minimal or non-existent based upon the subject environmental assessment. Long-term traffic, air and noise impacts are not expected to change significantly after improvements are completed. Short-term construction related noise and air quality impact mitigation measures include general good housekeeping practices and scheduled maintenance to avoid a prolonged construction period. The contractor will be directed to use best management practices (BMP) wherever applicable.

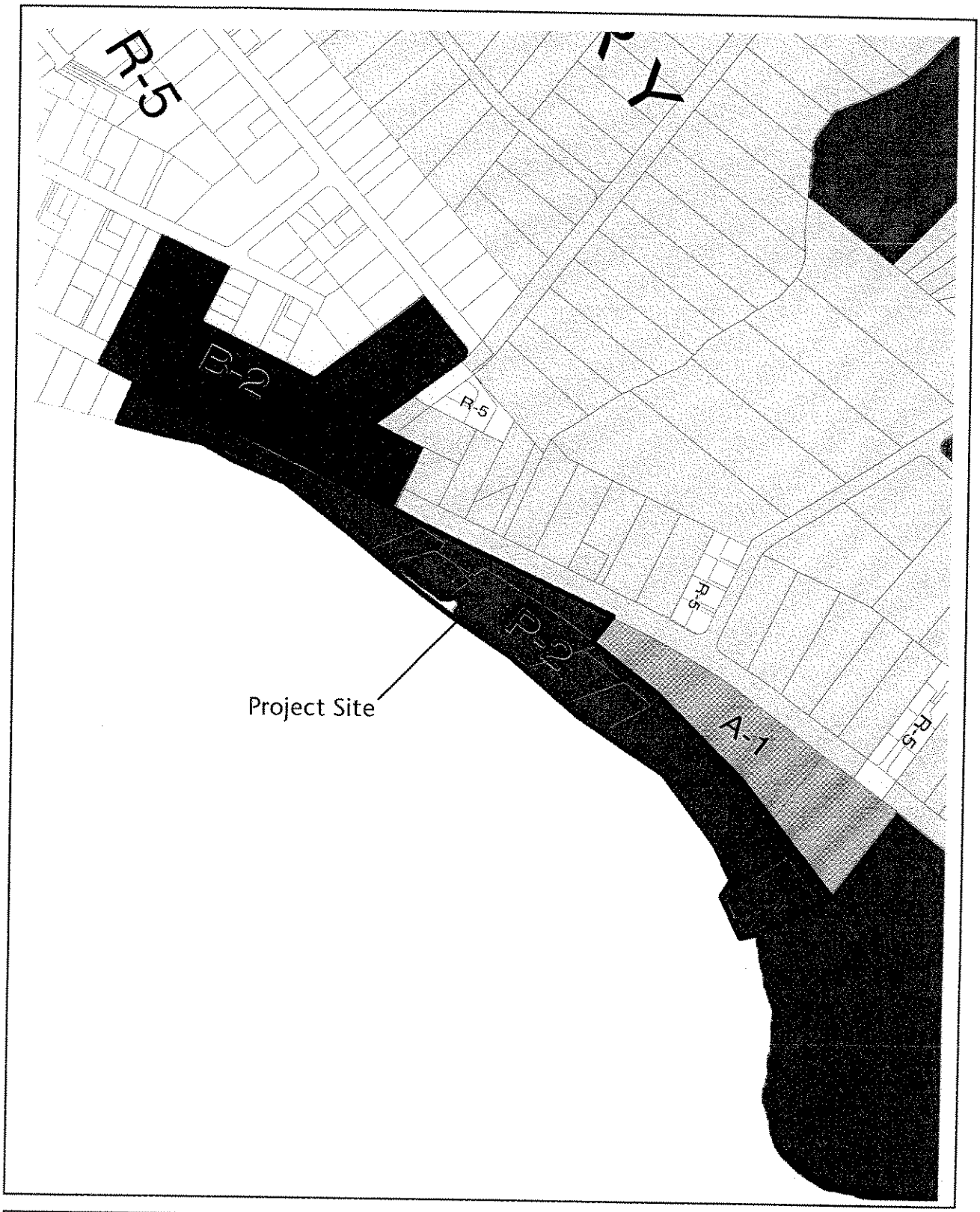

Figure 6: Zoning Map
Source: City and County of Honolulu, Digital Map Data

Mauna Lahilahi Beach Park Improvements
City and County of Honolulu

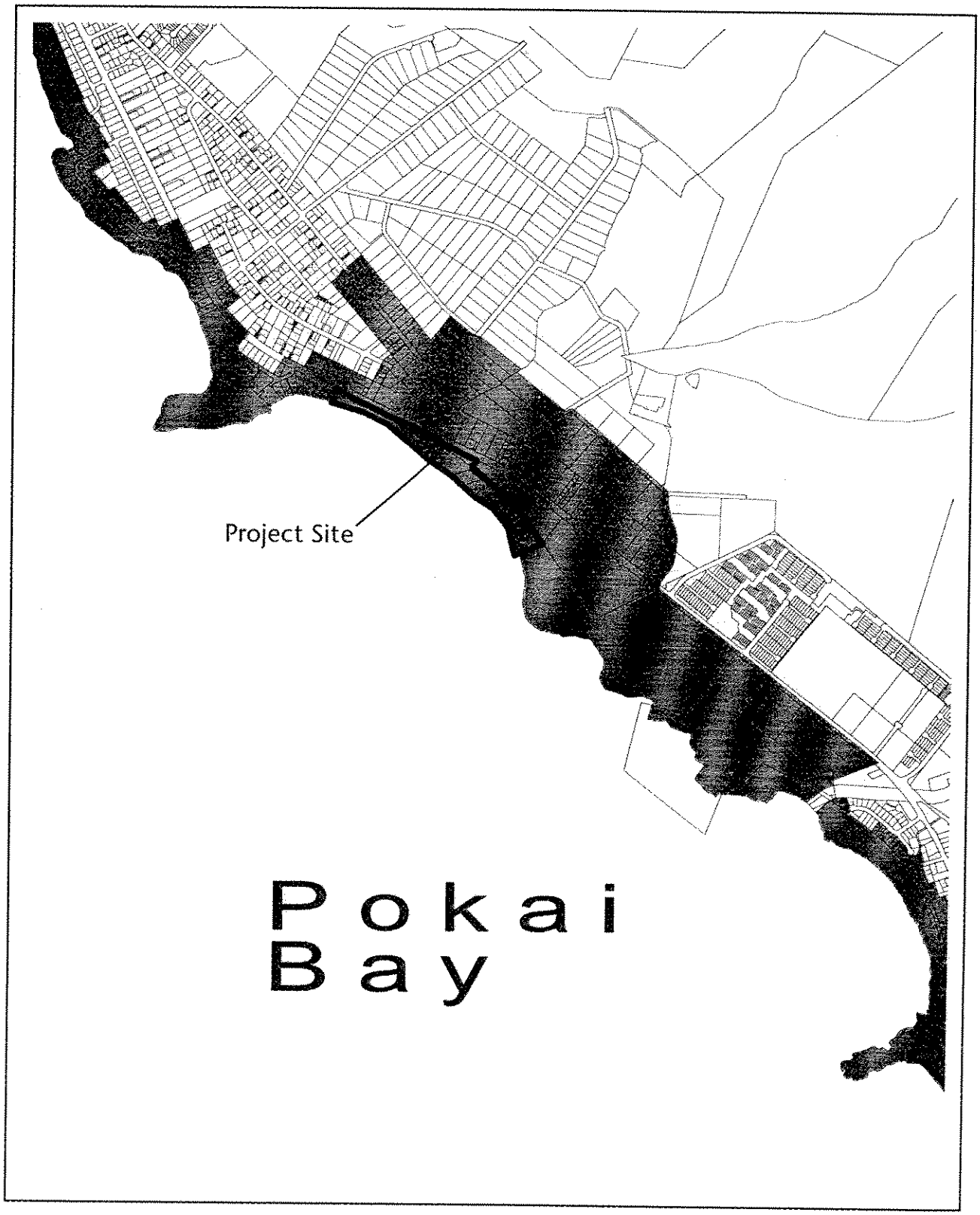

Figure 7: Special Management Area Map
Source: City and County of Honolulu, Digital Map Data

Mauna Lahilahi Beach Park Improvements
City and County of Honolulu

I. Irreversible and Irretrievable Commitment of Resources

Implementation of the proposed project will result in the irreversible and irretrievable commitment of resources in the use of non-recyclable energy expenditure and labor. Materials used for new construction may have salvage value; however, it is unlikely that such efforts will be cost-effective. The expenditure of these resources is offset by gains in construction-related wages, increased tax base and tertiary spending.

IV. FINIDNGS AND REASONS SUPPORTING DETERMINATION

As stated in Section 11-200-12, EIS Rules, Significance Criteria: in determining whether an action may have a significant effort on the environment, every phase of a proposed action shall be considered. The expected consequences of an action, both primary and secondary, and the cumulative as well as the short-term and long-term effects must be assessed in determining if an action shall have significant effect on the environment. Each of the significance criteria is listed below and is followed by the means of compliance or conflict (if extant).

- Involves the loss or destruction of any natural or cultural resource.

The proposed action will occur on an existing developed site and will not impact any natural areas or cultural resources.

- Curtails the range of beneficial uses of the environment.

The proposed use will result in additional benefit to the environment in its consistency with existing zoning regulations and in its improvement to existing site conditions.

- Conflicts with the State's long-term goals or guidelines as expressed in Chapter 343, Hawaii Revised Statutes.

The proposed action is consistent with the goals and guidelines expressed in Chapter 343, Hawaii Revised Statutes. The proposed action is triggered by the location of the proposed project within the Special Management Area. The subject Environmental Assessment has been developed in compliance with the Chapter 343.

- Substantially affects the economic or social welfare of the community or state.

The proposed action will make a positive contribution to the welfare of the City and State by providing an improved park with safety, accessibility and general amenities that will result in a desirable and more productive park.

- Substantially affects public health.

The proposed improvements are not expected to have any direct impact on public health. The proposed action does however represent a substantial improvement over existing site conditions and associated liabilities. Improvements that will result in greater safety include a dedicated parking area, accessible walkways, a relocated bus stop, charcoal receptacles and the removal of dilapidated equipment.

- Involves substantial or adverse secondary impacts, such as population changes or effect on public facilities.

The proposed action will not produce substantial secondary impacts resulting in population changes or significant increase in public facilities.

- Involves substantial degradation of environmental quality.

The proposed action will improve environmental quality through the creation of an improved park site. Though not a subject of the proposed improvements, a related beach nourishment plan is being processed simultaneously with the master plan improvements.

- Cumulatively have a considerable effect upon the environment or involve a commitment for larger actions.

The proposed action is not a first phase of, or related to, any larger action. The cumulative effect of the project is disclosed in this document (and associated figures and charts) and does not involve any planned future actions that will cumulatively impact the environment.

- Affect rare, threatened or endangered species, or their habitats.

The proposed action will not affect any rare, threatened or endangered species of flora or fauna, nor is it known to be near or adjacent to any know wildlife sanctuaries.

- Detrimentally affect air or water quality or ambient noise levels.

The proposed action will not impact air or water quality. Noise levels may increase slightly due to an increase in use; however, this increase is not expected to exceed levels typically associated with park use.

Minimal impacts on air quality and noise are anticipated during construction, but will be limited by normal construction practices and Department of Health construction mitigation standards.

- Affect scenic vistas and viewplanes identified in County or State plans or studies.

The proposed action will not affect any scenic vistas or viewplanes. The project can be viewed as a beautification effort and will result in a more aesthetically pleasing environment.

- Require substantial energy consumption.

The project will not increase energy consumption.

Based on the above stated criteria, it is the determination of the Department of Design and Construction that the subject action warrants a Finding of No Significant Impact (FONSI).

V. LIST OF PARTIES CONSULTED PRIOR TO DEVELOPMENT OF THE DRAFT ENVIRONMENTAL ASSESSMENT

Agencies with ministerial or specific interests regarding the proposed project were contacted for their early comments regarding the proposed project. Parties contacted are listed below.

Department of Planning and Permitting
City and County of Honolulu

Department of Parks and Recreation
City and County of Honolulu

Department of Public Works
City and County of Honolulu

Department of Transportation Services
City and County of Honolulu

Department of Wastewater Management
City and County of Honolulu

Honolulu Fire Department
City and County of Honolulu

Honolulu Police Department
City and County of Honolulu

Department of Land and Natural Resources
Historic Preservation Division
State of Hawaii

VI. LIST OF COMMENTS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT REVIEW PROCESS

State of Hawaii Agencies	Date of Response
Dept. of Land and Natural Resources Historic Preservation Division	9/25/2000
Dept. of Transportation	5/11/2000
Office of Environmental Quality Control	9/8/2000
University of Hawaii at Manoa Environmental Center	9/7/2000
City and County of Honolulu Agencies	
Dept. of Transportation Services	10/31/2000
Fire Dept.	8/22/2000
Organizations and Individuals	
Ms. Paulette Dibibar	9/1/2000
Waianae Coast Neighborhood Board No. 24	9/7/2000

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

SEP 8 8 2000

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCE ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

September 25, 2000

AM Partners, Inc. and
Environmental Communications, Inc.
1164 Bishop Street, Suite 1000
Honolulu, Hawaii 96813

LOG NO: 26227
DOC NO: 0009RC11

Dear Sir or Madam:

SUBJECT: Chapter 6E-8 Historic Preservation Review – City and County of Honolulu Draft Environmental Assessment (DEA) for the Mauna Lahilahi Beach Park Improvements
Wai`anae Ahupua`a, Wai'anae District, O`ahu
TMK: 8-4-01:1, 8-5-17: 1-7; 8-5-18:1-3

Thank you for the opportunity to review the DEA for the Mauna Lahilahi Beach Park Improvements. The proposed improvements include parking areas, a pavilion, comfort stations, planting of trees, foot paths, irrigation system, etc. Considerable land alteration is involved in this project.

The project area from the middle of the Makaha Surfside Apartments northwest to the drainage channel contains a sizable significant historic site. In the past, subsurface habitation deposits have been identified eroding out along the shore, and associated burials have been (and continue to be) eroding out from this deposit. Our Branch Chief for Archaeology (Ross Cordy) has been working with Waianae High School Hawaiian Studies students over the last two years to document this site. In Summer 1999, they documented the eroding deposits and estimated site length (approximately from the middle of the Surfside Apartments to the drainage channel). (Note: The extent of this site from the middle of the Surfside Apartments to Waianae High School has not been investigated.) This site probably extends to Farrington Highway, but this is not confirmed. Charcoal samples were also taken from firepits at the base of the habitation deposits, and these are being held until funds can be obtained for radiocarbon dating. Plans existed to test excavate between the shore and highway to document the size of the site, and the Department of Parks was willing for this work to occur, but scheduling problems prevented the work. In Summer 2000, further documentation of the eroding shore deposits occurred, with profiling of several meters of the deposits and an analysis of erosion from the prior year. Thus, at this time, it is clear that a subsurface habitation deposit is present in the area of this park between the middle of the Surfside Apartments and the northwest drainage. It contains multiple layers, beginning only 30 cm below ground surface. Burials are associated with these habitation deposits, and at least one burial is exposed at present. This habitation site appears to be the coastal habitation area associated with the Kamaile 'ili taro marsh within Wai'anae ahupua'a. This spring-fed marsh provided an ample water source, making it likely that the Kamaile coastal area was one of the earliest settlements on the Wai'anae coast. Thus, these coastal habitation deposits could be extremely significant.

AM Partners, Inc. and
Environmental Communications, Inc.
Page Two

The area of the beach park from the drainage towards Mauna Lahilahi has not undergone archaeological inventory survey, and it is unknown whether significant historic sites are present in that area. Again, the same is true of the park area from Waianae High School to the middle of the Surfside Apartments.

Additionally, according to our records, the City & County, Department of Parks and Recreation has provided a reinterment site for human skeletal remains on parcel TMK: 8-5-17:7. The reinterment site contains remains from this beach park as well as from the beach fronting the Makaha Surf Condominium. This site needs to be clearly indicated on any development plans for this project so that it can be avoided during construction activities.

Given the above, it is clear that archaeological inventory survey is needed for this project area as soon as possible, so planning for park improvements can be appropriately made. This survey should establish the size and age of the significant historic site located between the drainage and the Surfside Apartments and should establish whether significant historic sites are present in the portions of the park from the drainage towards Mauna Lahilahi and from the High School to the middle of the Surfside Apartments. Because the significant historic site between the drainage and the Surfside Apartments does contain quite shallow archaeological deposits and associated burials, a scope of work for the survey needs to be approved by our office prior to any subsurface testing. Typical backhoe trenches do not appear to be appropriate in this area of the park. Also, as part of the survey work, we request that one or more of the charcoal samples recovered by our office from the base of the deposits be dated, to help establish the age of the deposits. Because this may be an early site, charcoal species analysis of the charcoal samples must first be done, to select out short-lived native plants for dating.

Given the above, park plans should be considered very preliminary at this time. Given the likely importance of the known significant historic site and the fact that it contains burials, preservation of these deposits may be the appropriate mitigation approach with very limited subsurface alteration authorized.

If you have any questions please call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

RC:jk

c: William Balfour, Department of Parks and Recreation, City & County of Honolulu, 650 South King Street, Honolulu, HI 96813

ENVIRONMENTAL COMMUNICATIONS, INC

May 28, 2004

Ms. P. Holly McEldowney, Acting Administrator
Department of Land and Natural Resources
State Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Ms. McEldowney:

Thank you for your department's comments of September 25, 2000 regarding the subject project. We have reviewed your comments and concur that an archaeological inventory survey is warranted for the project site. Cultural Surveys Hawaii, Inc. has been contracted to conduct this survey. The survey report was completed in April of 2004 and is incorporated in the Final Environmental Assessment FEA both in summary form as well as in entirety in the FEA appendix.

Based on the findings of the archaeological survey, the proposed improvements will proceed with archaeological monitoring taking place during any subsurface construction activities. Please refer to the report for a full discussion regarding the sites recorded during the survey process.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Tacyong M. Kim
Principal
Environmental Communications, Inc.

9 BISHOP STREET SUITE 2216 HONOLULU HAWAII 96813 • TEL 808 528 4861 • FAX 808 528 4862

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

MAY 11 2000

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

IN REPLY REFER TO:
HWY-PS
2.8356

Mr. Taeyong M. Kim
Environmental Communications, Inc.
P. O. Box 536
Honolulu, Hawaii 96809

Dear Mr. Kim:

Subject: Preparation of Draft Environmental Assessment, Mauna Lahilahi Beach Park Improvements, Department of Design and Construction, City and County of Honolulu, Waianae, Oahu, TMK: 8-4-1: 1; 8-5-17: 1-7; 8-5-18: 1-3

The proposed park improvements are not anticipated to have a significant impact on Farrington Highway, our State facility. However, we still have the following comments:

1. The access driveways serving the proposed parking lot should be limited (a) to one two-way driveway or (b) two driveways (one for ingress and the other for egress).

2. If the location of these proposed accesses has not yet been formally approved, this applicant should contact Thomas Toyama, Rights-Of-Way Manager, Highways Division, at 692-7325 to inquire about the process involved in obtaining the necessary approvals.

3. Design of the access driveways shall conform to current State Highway Design Standards.

4. Plans for construction work within the State highway right-of-way must be submitted for our review and approval.

If there are any questions regarding these comments, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

ENVIRONMENTAL COMMUNICATIONS, INC

May 23, 2004

Mr. Rodney K. Haraga, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Mr. Haraga:

Thank you for your department's comments of May 11, 2000 regarding the subject project. We have reviewed your comments and offer the following:

1. We understand that the proposed park improvements will not have a significant impact on Farrington Highway. The project has been designed with two driveways with one serving as an ingress point and the other serving as an egress point.

2. Formal approval of the driveway access points will be coordinated with the Rights-of-Way Manager at the Highways Division.

3. The driveways will be constructed in conformance with current State Highway Design Standards.

4. Any construction work within the State Highway right-of-way will be submitted for DOT's review and approval.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Taeyong M. Kim
Principal
Environmental Communications, Inc.

1 BISHOP STREET SUITE 2210 HONOLULU HAWAII 96813 • TEL 808 528 4661 • FAX 808 528 4663

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

September 8, 2000

Mr. Don Griffin
Department of Design and Construction
City and County of Honolulu
650 South King Street
Honolulu, Hawai'i 96813

Dear Mr. Griffin:

We submit the following comments on the July 2000, draft environmental assessment for proposed shore protection at Mauna Lahilahi Beach Park in Makaha, Wai'anae, O'ahu, prepared by Oceanit for the City and County of Honolulu.

1. CUMULATIVE IMPACTS ANALYSIS: The project is one of two projects our Office has received with respect to Mauna Lahilahi Beach park. The other project submitted by the Department of Parks and Recreation is for Mauna Lahilahi Beach Park Improvements (parking lot, etc.). Section 11-200-7 of the Hawai'i Administrative Rules requires that "a group of actions proposed by an agency or an applicant shall be treated as a single action when: (1) [t]he component actions are phases or increments of a larger total undertaking; (2) [a]n individual project is a necessary precedent for a larger project; (3) [a]n individual project represents a commitment to a larger project; or (4) [t]he actions in question are essentially identical and a single statement will adequately address the impacts of each individual action and those of the group of actions as a whole." (Underscoring supplied). While these two projects may have been segmented for budgetary reasons, an analysis of the cumulative effects of the overall project needs to be addressed. Please consult with the Department of Parks and Recreation and include in the final environmental assessment for this project a discussion of the relationship between the park improvements and your proposed shoreline protection scheme, including an analysis of cumulative effects to water quality, air, ground water, historic/cultural resources, flora, fauna, etc., which may arise when both projects are implemented.
2. LANDSCAPING: The environmental assessment for the park improvements prepared by AM Partners Inc., and Environmental Communications Inc., discusses landscaping. We are concerned as to the timing of the landscaping - will this take place after the shoreline protection regime is implemented? Please coordinate with the Department of Parks and Recreation on the phasing and timing of this project.
3. ARCHAEOLOGICAL INVENTORY SURVEY: The environmental assessment for the park improvments prepared by AM Partners Inc., and Environmental Communications Inc., mentions that an archaeological inventory survey will be completed before construction. Because of potential cumulative and indirect effects, this survey must be completed before the submission of the final environmental assessment and notice of determination for this project.
4. CONSULTANTS TO CONTACT: Please consult with Mr. Taeyong Kim, Environmental Communications, telephone (808) 528-4661.

Thank you for the opportunity to comment. If there are any questions, please call Leslie Segundo at (808) 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

c: Mr. Ian Wasnich, Oceanit
Mr. Taeyong Kim, Environmental Communications Inc.

ENVIRONMENTAL COMMUNICATIONS, INC

May 23, 2004

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Ms. Salmonson:

Thank you for your comments of September 8, 2000 regarding the subject project. We have reviewed your comments and offer the following:

Cumulative Impacts Analysis
The proposed project was conceived and was separately funded from the beach restoration project. As such, each action has proceeded on separate courses to due to the uncertainties of timing and likelihood of implementation. Consequently, two separated environmental assessments were prepared for the respective actions. To address this concern, a summary of the breakwater and nourishment project is included in the Final EA in Section III.E. Probable Impact to the Environment. The Final Environmental Assessment for the breakwater project was published in July of 2001. The project has since been completed.

Landscaping
Landscape plantings are generally located in soil-covered areas that are stable and not subject to regular tidal inundation. It is in the City's best interest to plan the project improvements during stable seasonal conditions. Project scheduling will be coordinated with the Department of Parks and Recreation.

Archaeological Inventory Survey
An archaeological inventory survey as well as a cultural impact assessment has been conducted for the project site. These studies are summarized in the Final Environmental Assessment and are included in their entirety as appendices to the FEA document.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Taeyong M. Kim
Principal
Environmental Communications, Inc.

1 BISHOP STREET SUITE 2210 HONOLULU HAWAII 96813 • TEL (808) 528-4081 • FAX (808) 528-4083

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
2550 Campus Road · Crawford 317 · Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 · Facsimile: (808) 956-3980

September 7, 2000
EA: 1208

Mr. Don Griffin
City and County of Honolulu
Department of Design and Construction
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Griffin:

Mauna Lahi Lahi Beach Park Improvements
Draft Environmental Assessment
Waianae, Oahu

The Department of Design and Construction proposes various improvement s to Mauna Lahi Lahi Beach Park, including increased accessibility, landscaping, additional parking, improved comfort stations, a lifeguard station, a relocated bus stop, and shoreline management. The purpose of these improvements is to increase accessibility, aesthetics, safety, and recreational value of the Park. This review was conducted with the assistance of Charles Fletcher, Geology and Geophysics; and Sherri Hiraoka, Environmental Center.

General Comments

This proposed beach park improvement appears to be a well-planned project. Coordination with the community seems to have resulted in a master plan that satisfies user needs, as well as accommodates the needs of neighbors.

The project spans the entire length of the Mauna Lahi Lahi Beach Park, including the area that fronts the Makaha Surfside Apartments. The Department of Design and Construction has submitted a separate EA on a shoreline protection project including an offshore breakwater and beach nourishment on the area directly makai off the Makaha Surfside. Only vague references to "a separate initiative" including a "beach nourishment plan" (page 16) are made in this EA. This shoreline protection should be discussed in either a cumulative impact section or more preferably, as part of this improvement project.

Flora and Fauna

Due to the close proximity of the project to the ocean, we suggest that the final EA include background on the nearshore environment. Potential impacts and any necessary mitigation measures should also be included.

Also, our reviewers recommend that minimal amounts of topsoil be imported near the beach to support the new landscaping. Most of the proposed landscape plants are salt tolerant and survive well in sandy substrate.

Sand Dunes

As stated on page 12, "two areas along the shoreline were specifically identified for beach nourishment." These nourishment projects should be coordinated with this project. The County can contribute to this nourishment by ensuring that there is an adequate amount of sand for nourishment through coordination with the Department of Land and Natural Resources in revitalizing sand dunes. These dunes act as a natural buffer against storm waves in the winter and are important for beach survivability during periods of high waves. Sand dunes also act as a natural storehouse of sand. Vegetation will help to keep dune sand from wind erosion, but dune fencing should also be implemented. Dune walkways or pathways should also be put in.

Beach Processes

The EA should include more information on beach processes including the rates of shoreline retreat, past storm surges, and other coastal processes that may effect the landscape designs that are being proposed mauka of the certified shoreline. This type of information will enable planners to estimate the long-term sustainability of the beach park improvements.

Past aerial photographs of the area may allow for the development of a map that shows past shoreline positions. "Erosion hotspots" can then be identified and coordinated with design improvements. For example, "hotspot" areas may be indicate areas where planners may want to avoid putting in infrastructure such as parking lots and pavilions. Sand dune restoration and development may also be targeted for these "hotspots."

Fragmentation and Cumulative Impacts

The Hawaii Administrative Rules, § 11-200-7 state that a group of actions proposed by an agency or an applicant shall be treated as a single action when: (1) The component actions are phases or increments of a larger total undertaking." The shoreline protection project easily qualifies as a phase of the larger project of improving the safety and recreational quality of the Mauna Lahi Lahi Beach Park. Therefore, the shoreline protection project should be included with the Mauna Lahi Lahi Beach Park Master Plan, in one comprehensive document.

Conclusion

The EA details the need for beach park improvements well, and we commend the County on its efforts to include the community in the planning process. To best achieve the goals of this project, we offer several suggestions for your consideration. These include the examination of coastal processes to ensure compatibility with the proposed improvements, the use of a sand dune ecosystem to provide a buffer against high waves and to provide a sand storage function, and the inclusion of the shoreline protection (breakwater) project fronting the Makaha Surfside Apartments in a comprehensive document to properly place the breakwater project within the context of the entire Mauna Lahi Lahi Beach Park Master Plan

Thank you for the opportunity to comment on this Draft Environmental Assessment.

Sincerely,

Peter Rappa
Environmental Review Coordinator

cc: Taeyong Kim, Environmental Communications
OEQC
James Moncur, Water Resources Research Center
Charles Fletcher, Geology and Geophysics
Sherri Hiraoka, Environmental Center

ENVIRONMENTAL COMMUNICATIONS, INC.

May 23, 2004

Mr. Peter Rappa, Environmental Review Coordinator
University of Hawaii at Manoa
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Mr. Rappa:

Thank you for your comments of September 7, 2000 regarding the subject project. We have reviewed your comments and offer the following:

General Comments
A description of the beach nourishment action and anticipated impacts are included in the Final Environmental Assessment in Section III.E. Probable Impact to the Environment.

Flora and Fauna
The nearshore environment will be minimally affected by the proposed improvements. The Department of Design and Construction considers the Beach Park Improvements project largely a landscaping effort that do not significantly affect flora or fauna in the nearshore area. In general, the park consists of beach sand below the shoreline and area, and grass and naupaka as the predominant flora.

Sand Dunes and Beach Processes
The areas planned for beach nourishment are specifically discussed in the Mauna Lahilahi Beach Breakwater project. Your comments are well taken and are discussed in detail the Breakwater DEA.

Fragmentation and Cumulative Impacts
The proposed project was conceived and was separately funded from the urgently needed shoreline protection project. As such, each action has proceeded on separate courses to due to the uncertainties of timing and likelihood of implementation. Consequently, two separate environmental assessments were prepared for the respective actions. To address your concern, a summary of the breakwater and nourishment project is included in the Final EA as addressed in the General Comments above. The Final Environmental Assessment for the breakwater project was published in July of 2001. The project has since been completed.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Taeyong M. Kim
Principal
Environmental Communications, Inc.

1188 BISHOP STREET SUITE 2210 HONOLULU HAWAII 96813 • TEL 808 528 4881 • FAX 808 528 4883

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

PACIFIC PARK PLAZA • 711 KAPIOLANI BOULEVARD, SUITE 1200 • HONOLULU, HAWAII 96813
PHONE: (808) 523-4529 • FAX: (808) 523-4730

JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

JOSEPH M. MAGALDI, JR.
DEPUTY DIRECTOR

October 31, 2000

TPD8/00-03830R

Mr. Taeyong Kim
Environmental Communications, Inc.
1188 Bishop Street, Suite 2210
Honolulu, Hawaii 96813

Dear Mr. Kim:

Subject: Mauna Lahilahi Beach Park Improvements

We have reviewed the draft environmental assessment (EA) for the subject project and have the following comments:

1. It is important that an adequate number of off-street parking stalls be provided for park users. The determination of the number of parking stalls that would be adequate should consider the needs of the entire Mauna Lahilahi Beach Park. Overflow parking areas that could be used in the event that the supply of off-street parking stalls proves to be inadequate should be identified.

2. The description of the proposed traffic pattern within the parking lot appearing in the figure showing the Central Section Master Plan is not consistent with the text of the draft EA.

3. The proposed relocation of the bus stop should be coordinated with the State Department of Transportation and our Public Transit Division.

4. In accordance with the Americans with Disabilities Act, the transitions from the bus stop to the park comfort station, pavilion, and other amenities should be accessible. The proposed footpath should also be accessible.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

Cheryl D. Soon

CHERYL D. SOON
Director

ENVIRONMENTAL COMMUNICATIONS, INC

May 23, 2004

Ms. Cheryl D. Soon, Director
Department of Transportation Services
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Ms. Soon:

Thank you for your comments of October 31, 2000 regarding the subject project. We have reviewed your comments and offer the following:

1. We understand your department's concern regarding the adequacy of off-street parking and believe that the proposed parking lot capacity is appropriate for the park. Limited open space precludes the designation of an overflow parking area.

2. The text of the Final Environmental Assessment has been revised to be consistent with the project plan.

3. The relocation of the bus stop will be coordinated with the State Department of Transportation and DTS Public Transit Division.

4. Transitions from the bus stop to the comfort station, pavilion and accessible picnic areas will be designed in conformance with the Americans with Disabilities Act.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Taeyong M. Kim
Principal
Environmental Communications, Inc.

1188 BISHOP STREET SUITE 2210 HONOLULU HAWAII 96813 • TEL 808 528 4661 • FAX 808 528 4663

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819-1869
TELEPHONE: (808) 831-7761 • FAX: (808) 831-7750 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

August 22, 2000

TO: GARY Q. L. YEE, AIA, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: JOHN CLARK, ACTING FIRE CHIEF

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR
MAUNA LAHILAHI BEACH PARK IMPROVEMENTS
WAIANAE, OAHU, HAWAII

We received a letter dated July 25, 2000, from Mr. Taeyong M. Kim of Environmental Communications, Inc., regarding the Draft Environmental Assessment for the Mauna Lahilahi Beach Park improvements. We have no objections to this project.

Should you have any questions, please call Battalion Chief Kenneth Silva of our Fire Prevention Bureau at 831-7778.

JOHN CLARK
Acting Fire Chief

JC/KS:ms

cc: Environmental Communications, Inc.

ENVIRONMENTAL COMMUNICATIONS, INC.

May 23, 2004

Mr. Attilio K. Leonardi
Fire Chief
Fire Department
City and County of Honolulu
3375 Koopaka Street, Suite H425
Honolulu, Hawaii 96819-1869

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Chief Leonardi:

Thank you for your department's comments of August 21, 2000 regarding the subject project. We understand that the Fire Department does not have any objections to the proposed improvements.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Taeyong M. Kim
Principal
Environmental Communications, Inc.

1188 BISHOP STREET SUITE 2710 HONOLULU HAWAII 96813 • TEL 808 528 4881 • FAX 808 528 4883

From: Jpdbbar13@cs.com
To: <T.KIM@environcom.com>
Date: Friday, September 1, 2000 9:26 AM
Subject: (no subject)

Dear Mr. Kim,

First of all, I'd like to thank you so very much for giving me your copy of the Mauna Lahilahi Beach Park Improvements. I took the time out late last night to review it and I liked what I saw as well as what the plan is for this community. I also would like to commend you and everyone who worked on this draft because of the simple fact that you folks took the time to work with the residents of Makaha Surfside Apartments. They are very pleased and satisfied with the outcome and are eager to have the project commence as soon as possible.

I myself, after reviewing the draft like it and would like to support it wholeheartedly, except for one or two minor adjustments I would like to see put into the plan; it's listed as follows:

(1) Is the walkpath going to be as a hard surface kind of path, if so, why can't a bridge be put in going over the stream?

(2) A bridge should be put in so that even those with disability problems may also enjoy a walk along the beach and also enjoy the fresh ocean breeze.

These are the only comments I would like to make at this time and would like to hope that a bridge can be made over the stream, then I can say that this is a "perfect" plan for this community to enjoy!

Mahalo nui loa, me ke aloha pumehana! Paulette

ENVIRONMENTAL COMMUNICATIONS, INC.

May 23, 2004

Ms. Paulette Dibibar
87-828 Helekula Way
Waianae, Hawaii 96792

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Ms. Dibibar:

Thank you for your comments of September 1, 2000 regarding the subject project. We appreciate your review of the Draft Environmental Assessment. We understand that you support the project and suggest the addition of a bridge over the stream. At the present time, project budget constraints preclude the addition of this structure however this suggestion will be taken into consideration for possible future park improvements.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Taeyong M. Kim
Principal
Environmental Communications, Inc.

1188 BISHOP STREET SUITE 2716 HONOLULU HAWAII 96813 • TEL 808 528 4081 • FAX 808 528 4083

WAIANAE COAST NEIGHBORHOOD BOARD NO. 24

c/o NEIGHBORHOOD COMMISSION • CITY HALL, ROOM 400 • HONOLULU, HAWAII 96813

September 7, 2000

City & County of Honolulu
Dept. of Design and Construction
650 South King Street
Honolulu, Hawaii 96813
Attn: Don Griffin

Re: Mauna Lahilahi Beach Park Comfort Station & Parking Lot

Dear Mr. Griffin:

The Wai`anae Coast Neighborhood Board No. 24 (WCNB24) reviewed the aforementioned Draft Environmental Assessment (DEA) at its' Parks and Recreation Committee meeting, in August, and then at its' regularly scheduled board meeting for September. At that time, the board heard a motion to support the intent of the improvements as outlined in the DEA and voted unanimously to support these efforts.

If you have any questions, please contact me at 696-0131.

Sincerely,

Cynthia K. L. Rezentes, Chair
Wai`anae Coast Neighborhood Board No. 24

cc: Neighborhood Commission
Councilmember John DeSoto
Representative Mike Kahikina
Representative Emily Auwae
Senator Colleen Hanabusa

wcnb24-letter006

ENVIRONMENTAL COMMUNICATIONS, INC.

May 23, 2004

Mr. Glen Kila, Chair
Waianae Coast Neighborhood Board No. 24
C/o Neighborhood Commission
530 South King Street, Room 400
Honolulu, Hawaii 96813

Subject: Mauna Lahilahi Beach Park Improvements DEA

Dear Mr. Kila:

Thank you for your comments of September 7, 2000 regarding the subject project. We understand that the Waianae Coast Neighborhood Board No. 24 has voted to unanimously support the proposed improvements project.

Thank you for participating in the environmental review process. Your comments will be included in the Final Environmental Assessment to be prepared for the project.

Sincerely,

Taeyong M. Kim
Principal
Environmental Communications, Inc.

1188 BISHOP STREET SUITE 2210 HONOLULU HAWAII 96813 • TEL 808 528 4861 • FAX 808 528 4883

Appendix A

Archaeological Inventory Survey Report for Proposed Improvements at Mauna Lahilahi Beach Park in the *Ahupua'a* of Wai'anae, District of Wai'anae, Island of O'ahu

(portions of TMK 8-4-01:1, 8-5-17:1-7, 8-5-18:1-3)

by

David Perzinski, BA

and

Hallett H. Hammatt, PhD

Prepared for

City & County of Honolulu

by

Cultural Surveys Hawai'i, Inc.

April, 2004

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I. INTRODUCTION

A. Project Background

At the request of the City and County of Honolulu Department of Design and Construction, Cultural Surveys Hawai'i Inc. (CSH), has completed an archaeological inventory survey for the proposed improvements to Mauna Lahilahi Beach Park (portions of TMK 8-4-01:1, 8-5-17:1-7, 8-5-18:1-3). The project area is located within Wai'anae Ahupua'a in the district of Wai'anae and is bounded by Wai'anae High School to the south, Farrington Highway and the Makaha Surfside apartments to the east, the existing Mauna Lahilahi Beach Park to the north and the Pacific Ocean to the west (Figures 1 and 2).

B. Scope of Work

The following archaeological inventory survey scope of work was completed to satisfy the State and County requirements per the State Historic Preservation Division (SHPD) Hawaii Administrative Rules Title 13, Sub-Title 13, Chapter 276 - Rules Governing Standards for Archaeological Inventory Surveys and Reports.

1) A complete 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 of selected sites and complexes. All sites were assigned State site numbers.

2) Subsurface testing to determine the significance of the subsurface deposits within the project area. Samples from these excavations were found and analyzed for their chronological information.

3) Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. The research focused on the specific area with general background on the *ahupua'a* and district and emphasized settlement patterns.

4) Preparation of a survey report, which included the following:

5) A topographic map of the survey area showing all archaeological sites and site areas;

6) Description of all archaeological sites with selected photographs, scale drawings, and discussions of function;

7) Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the archaeological features;

8) A summary of site categories and their significance in an archaeological and historic context;

9) Recommendations based on all information generated which specify what steps should be taken to mitigate impact of development on archaeological resources - such as data recovery (excavation) and preservation of specific areas. The recommendations were developed in consultation with the client and the State agencies.

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. In consultation with the SHPD, additional guidelines were set particular to the study parcel.

1. Field Work Methodology

The inventory survey took place from August 11-22, 2003 using six Cultural Surveys Hawai'i Inc. archaeologists working under the direction of William Fok, B.A. and Hallett H. Hammatt, Ph.D. The inventory survey covered 100% of the project area using 10 m wide pedestrian sweeps oriented in a roughly north/south direction which paralleled the shoreline. Surface sites were documented with written descriptions, photographs and plan view maps. The sites were then placed on project area maps using GPS and tape and compass measurements using existing structures as reference points. In addition, 32 one-meter by one meter test units were excavated to demarcate the extent of any subsurface cultural layers.

In the portion of the project area lying southeast of the main drainage, excavations were accomplished by hand in 1-m^2 units (see Figure 6). Excavations were carried out along northeast/southwest (*mauka/makai*) trending transect lines with, typically, four 1-m^2 excavation units being spaced along each transect line in a manner to characterize the subsurface nature of the project area. Six of these transect lines were spaced across the length of this portion of the project area. A total of 32 1-m^2 test units and four cleaned wave cut bank profiles were excavated and documented. In areas in which imported fill was identified in the top 20-30 cm, shovels were occasionally employed but excavations within potential culture-bearing sediments were done by trowel according to standard archaeological methods per Hawai'i Administrative Rules (HAR) Title 13, Sub-Title 13, Chapter 276. Excavations were continued to the base of any culture bearing sediment.

In the western portion of the project area, excavations were accomplished by a combination of hand and backhoe. Six trenches were excavated, spaced in a manner to characterize the subsurface nature of the project area.

There is a previously known set of human remains in the project area. These exposed human remains were dealt with appropriately according to law and in consultation with the SHPD burial staff and O`ahu Island Burial Council.

SHPD expressed the desire that arrangements be made to have students visit the site. This was accomplished on September 21, 2003 with a field trip by Wai'anae High School students accompanied by Dr. Ross Cordy. The students were under the supervision of the archaeologists during the field visit and assisted in excavation and sifting of soils for approximately one hour.

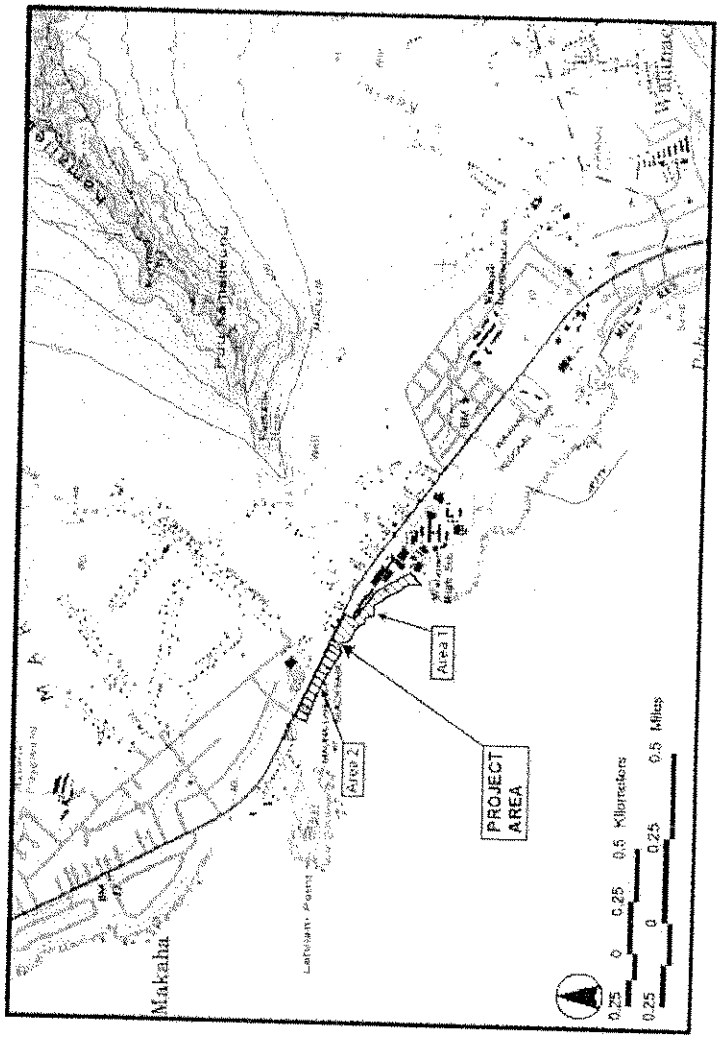

Figure 1 Portion of USGS Topographic Map (Wai'anae Quadrangle) Showing Location of Project Area

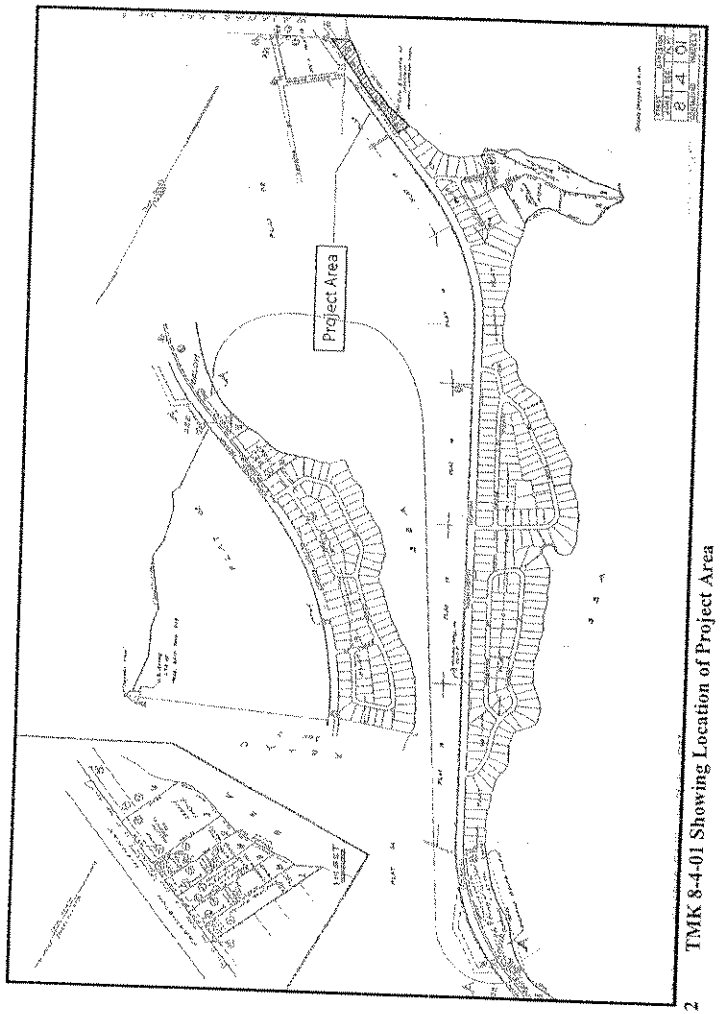

Figure 2 TMK 8-4-01 Showing Location of Project Area

2. Laboratory work

During the course of hand excavation of the test units charcoal samples, midden and artifacts were collected both *in situ* and through screening. Samples were collected for analysis of chronological development of the site, paleoenvironment reconstruction and subsistence analysis.

A total of 12 samples were submitted for carbon dating. In consultation with the SHPD, these included two samples recovered during a previous site visit by SHPD archaeologists from the project area.

Prior to submitting charcoal samples for carbon dating, three charcoal samples were submitted to Gail Murakami (IARII) for species identification study. This was done primarily to select for short-lived species but also served in the study of paleo-environment reconstruction and environmental utilization.

In consultation with the SHPD, previously taken profiles within the project area were drafted and included within the study.

Faunal analysis focused on vertebrate species identification. Number of individual species present (NISP) analysis was carried out where possible. Qualitative and rough quantitative data on marine invertebrates was reported.

All collected materials and records data will be stored at CSH offices until further notification from the City and County and SHPD of an agree upon a final repository.

C. Consultation with Individuals Knowledgeable About the Project Area

Interviews were conducted with members of the Wai'anae community. Four interviewee noted that in traditional times the area *makai* of the project area was most likely used for various fishing activities and the gathering of *limu* by early Hawaiians. The other interviewee referred CSH to the State Historic Preservation Division/ Department of Land and Natural Resources for information needed for the interview involving the present project area. Two members of the community noted that the proposed project is a good idea to stabilize the exisiting shorelines along Mauna Lahilahi Beach Park. For the complete cultural impact assessment associated with this project, refer to *Cultural Impact Assessment of Mauna Lahilahi Beach Park, Wai'anae Ahupua'a, O'ahu, (portions of TMK 8-4-01:1, 8-5-17:1-7, 8-5-18:1-3)* (Mitchell and Hammatt, 2004)

D. Project Descripiton Area

The project area is located *makai* of Farrington Highway in coastal West O'ahu (see Figures 1 and 2). Generally, the coastal areas of this region are characterized by white sand beaches with areas of old, uplifted coral reefs and limestone flats. Much of the coastal area has been disturbed by both historic and modern development as well as high surf which has eroded large sections of the coastline. Historically, *muliwai*, or backwater marshy areas would often develop behind dunes when streams were blocked.

Vegetation along this arid coast is sparse. With 20 inches (500 mm) or less of annual rainfall, only the hardiest plants adapted to coastal environments can thrive in this zone (Giambelluca et al. 1986). The vegetation in the project area is typical of dry seashore environments in Hawai'i and is dominated by alien species. Indigenous species include *hau* (*Hibiscus tiliaceus*), *kamani* (*Calophyllum inophyllum*), *naupaka* or *naupaka kahakai* (*Scaevola sericea*), and the coconut or *niu* (*Cocos nucifera*). Introduced species within the project area include *kiawe* (*Prosopis pallida*). The soils underlying the project area consist mainly of ancient

reefs or compacted sandstone and sands overlain by alluvial clays. Beginning in the northwest (*mauka*) portion of the project area is Waialua silty clay, 0 to 3 percent slopes (WkA). Waialua series soils are characterized as moderately well drained soils developed from basic igneous rock and found on alluvial fans (Foote *et al.* 1972). The *makai* portion of the project area is dominated by beach sand (BS) which is also present below the imported fill material which has been deposited in the majority of the project area.

II. HISTORICAL BACKGROUND

The present study area is located within Wai`anae Ahupua`a in the district of Wai`anae. Clues to the history of land use and activity within the *ahupua`a* - and specifically within the study area - are found in preserved records including journals, government records, scholarly studies, memoirs, archaeological studies, maps, historic photographs, and oral histories. The earliest records present glimpses of landmarks and events within the general Wai`anae area, especially around the coastal settlement above Pokai Bay. However, by the middle decades of the 19th century, it is possible to focus more precisely on the study area as documentation becomes more abundant and specific.

A. Pre-Contact to Early Historic Period

Archaeological study within the Wai`anae district suggests that the earliest permanent habitation of the district was focused in Wai`anae Ahupua`a along Kaupuni Stream. In an archaeological study of Makaha (the *ahupua`a* immediately adjacent to Wai`anae). Green (1980) proposed:

> The first settlement of the district was probably, as tradition tends to suggest, on the coast around the stream at the mouth of the Wai`anae-kai Valley where the foreign chief from Kahiki planted the first coconut of the famous grove. That area, with its well-watered valley behind, would have been the most favored locality in the district...[Green 1980:72]

Archaeological investigations at Pokai Bay have processed dates for occupation of the area well within the prehistoric period. During monitoring of 943 meters of sewer and waterline trenching at the Wai`anae Army Recreation Center, Riford (1984) identified five articulated human burials, which were recovered, and a charcoal sample from the prehistoric cultural layer. The charcoal sample from the cultural layer (Layer V) yielded a radiocarbon age of A.D. 1376 +/-50 A.D. (C13 adjusted). Further study at the Wai`anae Army Recreation Center (Hammatt et al. 1985) encountered additional burials and testing of a sample from a pit feature yielded a radiocarbon date of AD 1340 +/-70 A.D. Hammatt (et al. 1985:i) notes:

> The archaeological assemblage points to the heavy use of the site as a communal area for fishing preparation, canoe launching and return. The site was the focus of beach access for the inhabitants of Wai`anae-Kai as well as occasional informal sand burial from at least 1300 A.D. onwards.

Inland of Pokai Bay, dates from three trenches in a complex of possible taro lo`i were obtained: A.D. 1170-1430, 1270-1480 and 1299-1510 (Shapiro and Rosendahl 1988:32). The range of dates suggests that permanent habitation in lower Wai`anae Ahupua`a (where the only perennial water sources within the makai portion of the district were located) was likely established by the latter 1100s to early 1200's A.D.

The elaboration and expansion of settlement throughout the *ahupua`a* during the prehistoric period is supported by the number and variety of sites recorded during the first investigation of Wai`anae during the 1930s. McAllister (1933) noted sixteen sites within the ahupua`a including ten *heiau* (seven of which had been destroyed), the Puehu fishpond, the Kawiwi place of refuge, and several house sites. The sites extend well *mauka* into lands adjacent to streams at the head of Wai`anae Valley. McAllister (1933: 116) recorded one burial site (Site 162) at Mauna Kuwale which may be located within the present project area; it is described as

"A small cave near the top of the peak facing Kawiwi. Contains fragments of skeletal material, but none of the objects said to have been buried with the dead."

The number of *heiau* recorded within Wai`anae Ahupua`a points to its political centrality within the district and its association with the *ali`i* (royalty) during the prehistoric period. The pioneering 19th-century Hawaiian historian Samuel Kamakau (1992: 134) recorded the oral traditions that associated some of the Wai`anae *heiau* to prominent *ali`i*, "At Wai`anae [Ka-hahana, late 18th-century O`ahu ruling chief] restored the heiau of Ka-moho-ali`i..."

> Take the story of Ka-welo when he sailed for Kauai to make war. He set a tabu over the heiau at Puehu at Wai`anae, and at the end of the sacrifice ordered that the wood of the paehumu, both the fence and the images themselves, be used for firewood for the expedition to Kauai. (Kamakau, 1992: 203)

The Hawaiian traditions centered on Wai`anae further suggest the area's significance and association with the *ali`i* in prehistoric times. The district is a focus in the mythological cycles of Maui, Kamapua`a, and Kamohoali`i. The demigod Maui and his brothers were said to have been born in Wai`anae, and it was here that Maui learned the secret of making fire for mankind. Kamakau (1870) enumerates, among the famous locales in Wai`anae, the cave in which Hina (moon goddess and mother of Maui) made her tapa, the fishhook, Manaia Kalani (with which Maui attempted to unite the Hawaiian islands), the snare for catching the sun (which Maui used to advantage on Haleakala), and the place where Maui's adzes were made. The pig demi-god, Kamapua`a, battled with the giant man-dog Ku-ilio-loa (after whom the heiau in Wai`anae is named) and raised the taro patches of Wai`anae Valley. The people caught him, tied him up, and were preparing to sacrifice him when his many supernatural bodies swept over the plains, devouring the men of Wai`anae and sending the rest fleeing in terror. Pele's older and favorite brother, Kamohoali`i, the shark god, became enamored with a maiden of the Wai`anae coast and begot a half-man/half-shark child who devoured many people before being captured and killed.

By the time of the first contact with European expeditions during the latter 18th century, Wai`anae Valley appeared to remain the primary locus of settlement within the Wai`anae district. Captain George Vancouver sailing off the southwest coast of O`ahu in 1792, noted:

> From the commencement of the high land to the westward of Opooroah (Puuloa) was...one barren rocky waste, nearly destitute of verdure, cultivation or inhabitants, with little variation all the way to the west point of the island. Not far from the south-west point is a small grove of shabby cocoanut trees, and along those shores are a few straggling fishermen's huts. Nearly in the middle of this side of the island is the only village [i.e. at Wai`anae above Pokai Bay] we had seen westward from Opooroah. In its neighbourhood the bases of the mountains retire further from the sea-shore, and a narrow valley, presenting a fertile cultivated aspect, seems to separate and wind some distance through the hills. The shore here forms a small sandy bay. On its southern side, between the two high rocky precipices, in a grove of cocoanut and other trees, is situated the village, and in the center of the bay, about a mile to the north of the village, is a high rock (Mauna Lahilahi), remarkable for its projecting from a sandy beach...[Vancouver in Sterling and Summers 1978:67-68]

The coconut grove above Pokai Bay observed by Vancouver was not insignificant in the Hawaiian consciousness; it was recognized as the "largest and best-known coconut grove on O`ahu, famed in chants and songs" (Pukui 1983:160).

The latter 18th century also saw the involvement of Wai`anae Ahupua`a and its population in the political changes impelled by the struggle of ali`i from other islands for political control and conquest of O`ahu. The Maui king Kahekili invaded O`ahu c. 1783, vanquishing the O`ahu chiefs in a series of battles that culminated in Wai`anae:

> Pupuka [an O`ahu chief] rallied the retainers of the chiefs of Kona, `Ewa, Wai`anae, Waialua, and Ko`olau at Kawiwi, a stronghold between Wai`anae and Makaha, where many died of starvation or were flung over the precipice because of famine, and many perished [Kamakau 1992:139-140].

In 1794, Ka-`eo-ku-lani recruited the "warriors of Waialua and Wai`anae" to make war on his nephew Ka-lani-ku-pule, then ruler of O`ahu (Kamakau, 1992.:168); by December 1794 Ka`eo had been killed and his forces were defeated. Kalanikupule would himself be deposed the following year when the invading Hawai`i Island forces of Kamehameha prevailed at the Battle of Nu`uanu in April 1795. Although apparently Wai`anae was not itself the site of major conflicts associated with Kamehameha's conquest of O`ahu, traditions record it as the refuge where large numbers of O`ahu residents resettled after fleeing from the Hawai`i Island invaders.

In 1796, Kamehameha would himself come to Wai`anae where his fleet of eighty double canoes stopped on their way to invade Kaua`i. "The fleet went on to Wai`anae and the war god [Ku-ka`ili-moku] was carried ashore that evening" (Kamakau 1992:173). Kamakau records that the fleet departed Wai`anae before midnight, but Wai`anae tradition maintains that Kamehameha remained on the coast long enough to re-dedicate two *heiau* to his war god, and that his presumption so angered the Wai`anae gods that they sent the storm which caused the disastrous end of his Kaua`i expedition. That setback notwithstanding, Kamehameha's ascendancy on O`ahu in the 1790s would have immediate consequences for Wai`anae during the decades of the next century. Additionally, the *ahupua`a's* isolation would not protect it from the economic and social pressures impelled by the growing presence of western missionaries, settlers and entrepreneurs on O`ahu.

B. Early to Mid 1800s

The Hawaiian Islands began exporting sandalwood to the Orient shortly after 1800 and the commerce flourished until supply dwindled in the mid-1830s. Trade in sandalwood was the strict monopoly of the *ali`i* beginning with Kamehameha. At the height of the sandalwood boom, Kamehameha was buying foreign ships, including six vessels between 1816 and 1818, to transport his own wood to the Orient (Kuykendall 1965:87). When Kamehameha bought the schooner Columbia in 1817, it was paid with sandalwood from Kauai and from the districts of Waimea and Wai`anae on O`ahu (Kuykendall, 1965: 88). Peter Corney, the chief officer on the Columbia, alludes to Wai`anae's perhaps more marginal involvement in the sandalwood trade on O`ahu. In an account of a voyage in March 1818 from Honolulu to Waimea Bay (O`ahu) Corney (1896: 89-90) reported:

> Next day we sailed for Whymea bay, on the west end of the island, to get another cargo of wood. In our passage we touched at Wyeni (Waianae), and took on board some wood and hogs. We lay here for a few days, and then sailed along the shore for Whymea...where we took on board a full cargo of wood in thirty-six hours - more than 200 canoes employed in bringing it off, day and night.

After Kamehameha's death in 1819, Liholiho (Kamehameha II) allowed his chiefs to share in the sandalwood trade, resulting in an unrestrained demand on the stocks of the wood and upon the commoners who did the harvesting.

"Traders' records from Kamehameha's last years show several important ali`i trafficking in sandalwood on their own, including...Kalaimoku, Cox, Boki, Ka`ahumanu, and some others" (Kirch and Sahlins 1992:59). Among these ali`i, Boki Kama`ule`ule was the Kamehameha chief that the monarch had made chief of Wai`anae. Sometime before Kamehameha's death, Boki also became governor of O`ahu. Diaries and journals of the western entrepreneurs on O`ahu record Boki's travels to and from Wai`anae and the unfolding of the sandalwood trade there. Don Francisco de Paula Marin, who had arrived in the islands in the 1790s, noted in his diary Boki's departure from Honolulu to Wai`anae aboard the schooner Paula on April 18, 1820. Three days later, on April 21, Boki returned "with a cargo of taro, dogs & hogs from Guallanae [Wai`anae]" (Gast and Conrad 1973:239). During succeeding months, until May 1822, Marin recorded four more voyages by Boki to and from Wai`anae, presumably to procure additional goods from the Leeward coast. In December 1829 Boki sailed to the New Hebrides in search of sandalwood but he and his ship were lost at sea. Boki had appointed his favorite wife, Liliha, governor of O`ahu during his absence. She continued in that position and also retained control of Wai`anae after his death had been reported.

More detailed accountings of Wai`anae's role in the sandalwood trade during the 1820s appear in the journal of Stephen Reynolds, a clerk for the Honolulu merchant William French. French had settled in Honolulu in the 1820s, becoming involved in business enterprises throughout the islands. In 1828, he was among a company of foreign residents who converted a Honolulu sugar mill into a rum distillery. Unfortunately for the investors:

> ...by this time the Queen Regent Kaahumanu and most of the powerful chiefs had become Christians and had taken a strong stand in favor of temperance. A kapu was placed upon the business of making rum; the missionaries, who had the only ox-carts in the village [Honolulu], refused to allow them to be used for carrying cane to the mill; and Kaahumanu caused the cane fields to be destroyed. This was about 1829. The foreign residents were greatly enraged and one of them, William French, afterwards accused the missionary Rev. Hiram Bingham of having made him lose $7,000 through the failure of the distillery [Kuykendall 1965:173].

Other investments undertaken by French were more successful and by the 1830s he was a leading merchant in the islands.

Reynolds' journal suggests how haphazard was the collection of the wood. On May 10, 1824 the vessel Water-witch went to Wai`anae; it returned to Honolulu on May 12 and, Reynolds recorded, "got no wood, nor saw any" (King, 1989:29). Two months later, the Prince-Regent "sailed for Wainai after wood" and returned with "160 piculs" (King, 1989:44). Reynolds' journal contain no further record of Wai`anae sandalwood until August 5, 1827 when he noted: "Fine morn. Fine day. Black Joe came from Wainai said Teignmouth took about Four hundred pics sand'wood on board & sailed for Wainea" (King, 1989:193). William French himself was in Wai`anae in November 1827, awaiting "goods" which were shipped to him there, perhaps in payment for a stock of sandalwood (King, 1989:203). On January 17, 1828 Boki "went to Wainai to weigh Sandlewood...", and later that month, on the 28th, Reynolds reported: "Hunnewell [a trader] weighing Tax wood from Wainai" (King, 1989:211-212). The next month, February 1828, Reynolds recorded that Boki was in Wai`anae and that "Capt Meek, Chinchilla went to Wainai after tax wood"; on February 26, Meek returned from Wai`anae with "508 piculs

tax wood" (King, 1989:214-215). Reynolds sailed to the leeward coast in June 1828, reporting his vessel "got 171 piculs on Board" at Makua on the 18th, but at Wai`anae the next day, "Went ashore at daylight. Tabuiki [Kapuiki], the Head man of Wainai was in the mountains & would not come down At 10 got under weigh" (King, 1989:228).

Apparently, no sandalwood was loaded at Wai`anae. The June 19, 1828 entry is the last record in Reynolds' journal of any attempt, successful or not, to procure sandalwood at Wai`anae. By the middle of 1828 the stands of sandalwood above the Wai`anae coast may already have been depleted. When Boki himself supervised "collecting Sandlewood to pay [his] Debts" in August 1828, he went to the Ko`olaus (King, 1989:234).

Already in October 1817, a Russian visitor noted on O`ahu: "There are now many fields left uncultivated, since the natives are obliged to be cutting sandalwood" (Barratt 1988:218). By 1828, the disruptive force of the sandalwood commerce must have been extreme in Wai`anae where the existing limited agricultural resources would have demanded strict marshalling.

During the same decades that commercial ventures were forcing changes upon the Hawaiian landscape, western missionary interests were establishing their foothold in the islands. The American Board of Commissioners for Foreign Missions, headquartered in Boston, sent its first company of missionaries to the Hawaiian Islands in 1819, leaving Boston on October 23rd aboard the brig Thaddeus. By the 1820s, the Protestant missionaries had established close links with the *ali`i*. From July to August 1826, Ka`ahumanu and an entourage consisting of up to 300 persons conducted a proselytizing tour around O`ahu. Rev. Hiram Bingham's (1847:296-297) account of the proceedings in Wai`anae suggests that traditional beliefs remained strong in the district, and that its inhabitants knew how to deal with their visitors.

> ...we passed on round the promontory [Kaena Point] to Waianae, the western district of Oahu, separated from the rest of the island by a range of mountains. Its valleys and plains, nearly level with the sea, are interspersed with small steep mountains. The district was called Boki's. Here we spent the third Sabbath. While there, Kaahumanu spoke with concern of the stupidity of the people...
>
> A man in that region, pretending to know something about the fabled god, Kamapuaa, assuming the form of a hog, was sent for to tell us what he knew; but his efforts to enlighten us on that subject, proved the ignorance, darkness, imbecility, and confusion of the heathen mind, as did also the first efforts to lead this man into the light of Christianity. He was once asked by a native teacher, at a meeting for prayer and conference, to tell his thoughts, that it might be known how to stood in respect to the service of God. Dropping his face low towards the ground, he stretched forth his hand, holding a small stone, and said: "What is this? It is a stone, by which we cook food;" then holding up a little tinder, said: "What is this? It is tinder, by which we kindle fire." Having made some advance when we arrived and conversed with him, he said: "I have been fed with the Word of God; and Jesus Christ has given me light. I know this body of dust will soon die, but my spiritual body will continue, and it is for that I want salvation." He continued with us several days, and had opportunity to learn something infinitely above the idle stores about Kamapuaa.
>
> As we took leave of the place, the head man, Kapuiki, being personally pressed to give his heart to God without delay, said, "Such is my intention." Such personal appeals extensively and kindly made, were generally kindly received.

Censuses taken by Protestant missionaries throughout the Hawaiian Islands beginning in 1831 provide the earliest documentation of the size of the native population after the first decades of western contact. During the first census of O`ahu in 1831-1832, the population of the *ahupua`a* within the Wai`anae District totalled 1,868 people: 757 adult males, 695 adult females, and 416 children (Schmitt 1973:19). Four years later, in 1835-1836, the total district population had dropped to 1,654 (Ibid.:9).

The Organic Acts of 1845 and 1846 initiated the process of the Mahele - the division of Hawaiian lands - which introduced private property into Hawaiian society. In 1848 the crown and the ali`i (royalty) received their land titles. Waianae Ahupua`a was retained by the crown.

Kuleana awards for individual parcels within the *ahupua`a* of the Hawaiian Islands were subsequently granted in 1850. These awards were presented to tenants - native Hawaiians, naturalized foreigners, non-Hawaiians born in the islands, or long-term resident foreigners - who could prove occupancy on the parcels before 1845. Four parcels were awarded within the project area

The four awards reflect the pre-contact or mid-19th century population and land usage within the portion of Wai`anae Ahupua`a though within the project area it is probable that the *lo`i* mentioned were associated with *āpana* in the more *mauka* portions of the *ahupua`a*.

LCA 9479

Awarded to Kahinu who claimed to have received it during the time of Kekauluohi. Kahinu claimed 18 *lo`i* in three *āpana*. The lands were said to have been bounded:
Mauka by the lo`i, Kumano by name
Ewa by the moo `āina Kumukou
Makai by the sea shore
Waialua by the moo `āina Hawaiiloa
It was also noted that the land was bounded on the west by the Government road.

LCA 9480:5

Awarded 7 āpana to Ohule (Sections 1-4 from Kuheleloa, Section 5 from Piiapoo, Section 6 from Kao-pukea and Section 7 from Kahue) during the time of Kamehameha I.
Which āpana is associated with the project area is difficult to determine based on the recorded descriptions. It is probable that up to 6 of the āpana were located in the well watered regions near Kamaile Point.

LCA 9489-B:1

Awarded 2 āpana to Holi from Manu in the time of Kekauluohi. The land of the claimant is a moo `āina called Kumumaomao in the ili of Kamaile 1, and contains 18 lo`i and a kula in one piece and is bounded:
Mauka by the koele Kumuaomao
`Ewa by the moo `āina Hawaiiloa
Makai by the sea shore
Waialua by the kula Kumanomano

LCA 9793

Awarded an āpana to Kuheleloa from Nakoolele in the time of Liholiho. The land of the claimmant is a moo `āina called Mooiki in the ili of Kamaile 2 and contains 10 lo`i and a kula in one piece, bounded:
Mauka by the moo `āina Kalaulaula

`Ewa by the sea of Keawaiki
Makai by the moo `āina Puhakaa
Waialua by the koele
One other claim was made though was denoted with a "court action".
Records for these LCAs are problematic. Only two of the LCAs (9479 an 9489) suggest that the parcels are bounded by the sea, though the other two are clearly along the shoreline. No indication of houselots are made on the testimonies either, though it is presumed that the shoreline was the foci of habitation whereas the āpana in the more mauka areas was reserved primarily for cultivation.

C. Mid-1800's to 1900

In October of 1819, two whale ships had anchored in the Hawaiian Islands. During the next decades, other whale ships would follow, as the islands became a victualing and layover base in the mid-Pacific. Supplies of beef, fresh and salted, were in demand, and a trade in hide and tallow developed. Following the collapse of the sandalwood trade, in the 1840s, the Hawaiian economy had been dependent primarily on supplying whale ships during their long layovers in the islands. The trade sustained the islands until the collapse of the whaling industry in the mid-1860s.

In 1851, Paul F. Manini, son of Don Francisco de Paula Marin, leased 17,000 acres in Lualualei Valley for grazing livestock. By 1863, a missionary could report that "most of the land in the Waianae District was devoted to grazing and had already been divided `into six or seven divisions; and secured to as many parties or individuals on long lease or fee simple titles'" (McGrath et al. 1973:31). The experience of the *maka`ainana* in Waialua likely mirrored that of the remaining Hawaiians in Wai`anae:

> ...the depredations of the foreigners' cattle had virtually reduced agriculture to the cultivation of wetland taro. For destruction of sweet potato fields and gardens of melons, bananas, maize, and other crops was causing the people to take these out of cultivation, and in some cases to take themselves out of Waialua [Kirch and Sahlins 1992:149].

A missionary account in 1863 reported that only a hundred acres were in taro in Wai`anae Valley and that the only items for sale were fish and fungus. Censuses taken during the second half of the 19th century record the diminishing population of the Wai`anae District. In 1853 a combined total of 2,451 persons were recorded in the `Ewa and Wai`anae districts; nineteen years later, in 1872, that total had dropped to 1,671. By 1890, when the districts were recorded separately, the population of Wai`anae had been reduced to 903 (Schmitt 1977:12-13).

Part of that population of 903 in 1890 would have consisted of workers at the then twelve-year old Wai`anae Plantation. The livestock industry in the islands had reached its peak in the 1870s. At Wai`anae, a new venture arose to supplant ranching. In 1878, Hermann A. Widemann, a retired Hawaiian Supreme Court justice, leased Wai`anae Plantation, the first sugar plantation on O`ahu. In 1879, he leased most of Wai`anae-Kai for 25 years.

Between 1878 and 1884 the economy and community of Wai`anae underwent a major change, in which the former Hawaiian landscape virtually disappeared. The reason was the production of sugar. The results were the conversion beginning in 1878 of coastal and central valley garden plots and irrigation systems to large fields of sugarcane. This was followed by the construction in 1880 of a plantation railway to haul the cane to the mill, and the building, in the

former Hawaiian village, not only of the mill itself, but the creation of a whole town to support the processing of cane (Green 1980:12).

Widemann hired twenty local Hawaiians, brought in 15 technicians and almost sixty Chinese laborers. He built 24 new houses in Wai`anae Valley and a plantation manager's mansion on the site of Haua heiau. He built a water reservoir and installed a flume system to bring water from the reservoir to the mill. A tramway was built from the mill site to the coast where a jetty was constructed. Seven miles of track were laid to haul harvested cane to the mill. In 1880, a Chinese firm planted 122 acres of cane in Wai`anae and employed about 30 men. One hundred and fifty acres were planted in sugar in Makaha Valley by A. Hastings and Company.

By 1884 Wai`anae Sugar Company had 475 acres under cultivation, nine miles of railroad, and 175 men employed. A map of the port of Wai`anae (Hydrographic Office, U.S. Navy, Port Waianae, 1891) based on an 1884 Hawaiian Government survey (Figure 3) indicates that sugar cultivation had not reached the present study area.

In 1890, Wai`anae Sugar Company had 600 acres in cultivation. On July 4, 1895 Wai`anae's isolation was broken when a rail line from Ewa Mill reached the Wai`anae Sugar Company track. In 1898, the railway was extended around Ka`ena Point, linking Wai`anae with Waialua on O`ahu's north shore. A portion of the railroad berm (State Site # 50-80-12-9714) is still visible in the southeastern portion of the project area, just *makai* of the property line of the Makaha Surfside Condominiums.

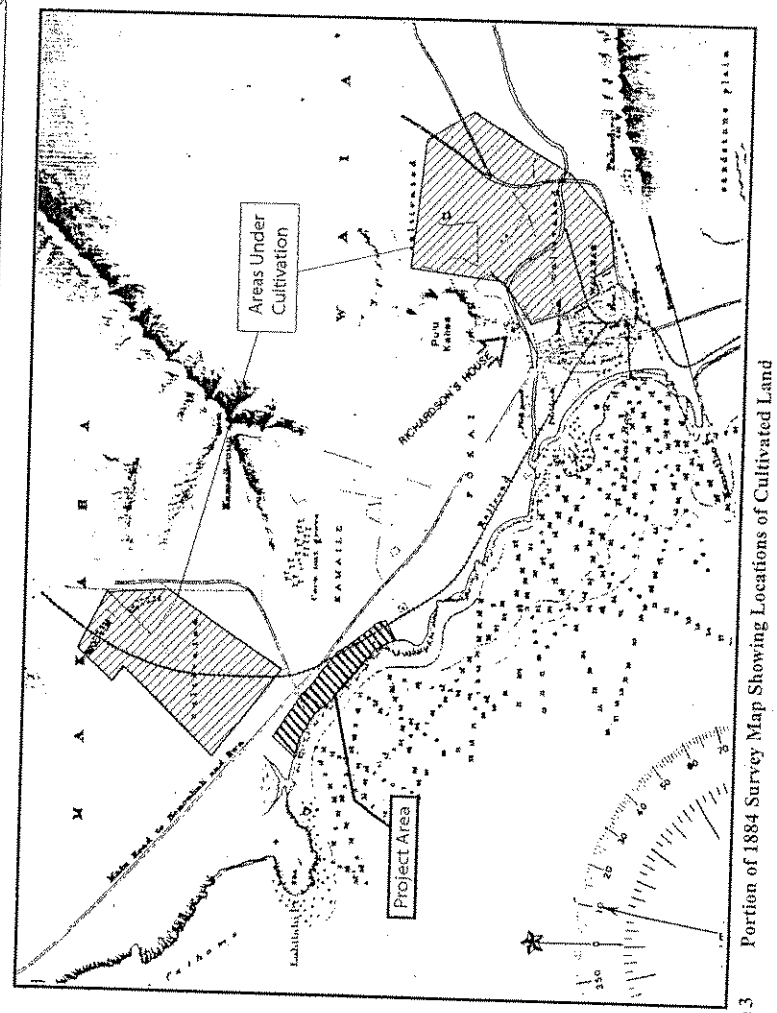

Figure 3 Portion of 1884 Survey Map Showing Locations of Cultivated Land

D. 1900 to Present

Agriculture in the early 1900's had become less diversified, following similar trends throughout Hawai'i. Smaller individual farms growing coffee, taro, and rice were supplanted by larger corporate farms which emphasized large scale cultivation of single crops such as sugarcane (Green, 1970). The purchase of Makaha Ahupua'a in 1923 by the Wai'anae Sugar company and the previously constructed railroad (which ran through the *mauka* portion of the current project area) allowed for easy transport from Makaha to Honolulu for shipment expediting the shift in agricultural practices.

Lack of water in Mākaha Valley, however, curtailed success for Wai'anae Sugar Company, and in the 1930s Wai'anae Sugar Plantation sold out to American Factors Ltd. (Amfac, Inc.). American Factors Ltd. initiated a geologic study of the ground water in the mountain ridges in the back of Mākaha and Wai'anae Valleys, which revealed positive results that tunneling for water would be successful. Before tunneling could commence, World War II came about and plans were put on hold (Green 1970) (Figure 4). In 1945, American Factors Ltd. contracted the firm of James W. Glover, Ltd. o tunnel in the ridge. The completed tunnel (Glover Tunnel) was 4200 ft. long and upon completion had a daily water capacity of 700,000 gallons. The water made available was mainly used for the irrigation of sugar.

In 1946, Capital Investment Corporation bought the Mākaha lands from American Factors Ltd. and attempted to convert the sugar lands back to ranching, but soon realized that tourism and golf courses were more profitable. Numerous other small scale agricultural interests were pursued during this time period including coffee, rice and watermelons (Ladd and Yen 1972). Water from Glover Tunnel was now used to water Mākaha Valley farms, and the lush grounds of the Mākaha Inn and Country Club, and its associated golf course.

In Wai'anae Kai, J.M. Dowsett took over Widemann's lease on the Wai'anae Sugar Company's lands in 1906 (Flood et al. 1994). That same year, the Wai'anae Kai lands were put to public auction and Dowsett bought the lands.

E. Modern Use

Modern use of the land within the project area has been limited to two residences (until ca. 1970) and is currently maintained by the city and county as a park utilized mainly by transients, fishermen and beachgoers.

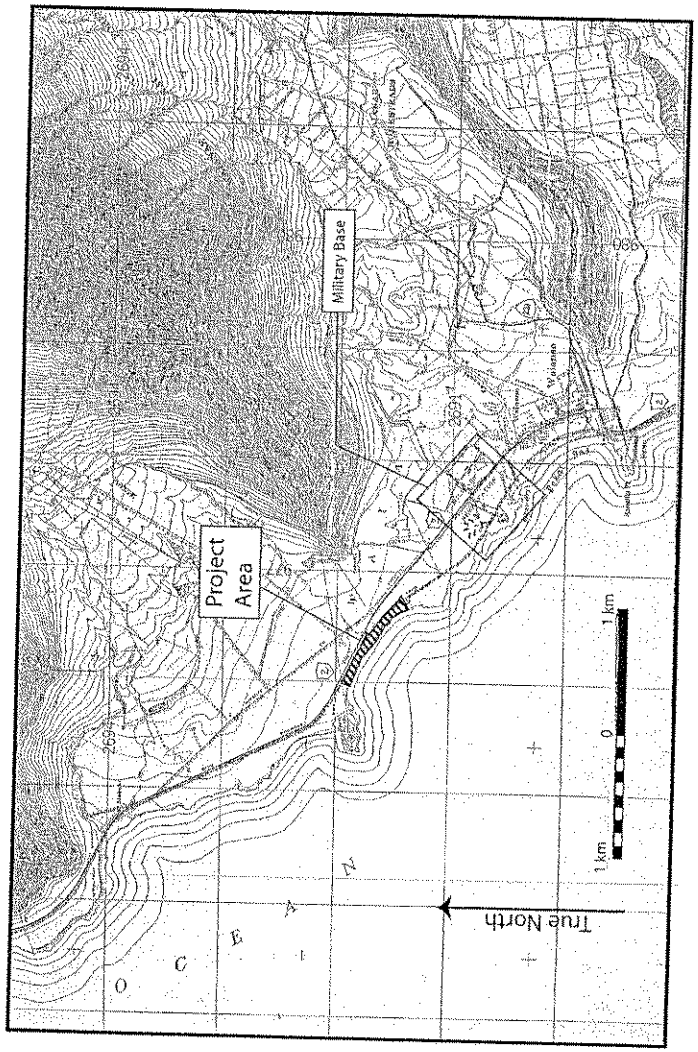

Figure 4 Portion of 1943 USGS Map (Wai'anae Quadrangle) Showing Location of Project Area

III. PREVIOUS ARCHAEOLOGICAL RESEARCH

Table 1 summarizes the previous archaeological investigations in Wai'anae Ahupua'a. these areas of investigation are illustrated in Figure 5.

Previous archaeological research in the current project area was limited to studies of human burials eroding from the sand fronting the Mākaha Surfside Apartments (Figure 5). Four studies were conducted documenting at least seven burials. These include one male, ~48 years old, located *makai* of 85-175 Farrington Highway, that was removed (Douglas and Peitrusewsky 1988); one child and one middle-aged male (both incomplete) (Douglas 1991); one male and one female disinterred Oct. 1979 (Kawachi 1991); a separate pit burial (#50-80-07-6592-1) that was relocated (Jourdane 1995) and 2 burials exposed in the wave cut banks (50-80-07-6592-2&3) (Cordy 1997). Burial –6592- 2 is believed to have eroded out of the bank prior to September, 2001, burial 6592- 3 is presently in situ until final disposition is agreed upon.

One additional historic property currently lies within the project area boundaries. A section of the O. R. & L railroad berm fronting the Makaha Surfside Apartments (50-80-12-9714) is visible resembling a low, linear rise in the mauka portion of the project area. The berm is just *makai* of the fenceline enclosing the Makaha Surfside Apartments. The berm is not visible in the northern portion of the project area, though remnants of the bridge are still observable in the central drainage, just south of Mauna Lahilhahi beach.

Table 1 Previous Archaeological Studies in Wai'anae *Ahupua'a*

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Thrum 1906	Island-wide	Describes numerous *heiau*
McAllister 1933	Island-wide	Designates sites 152-168
Chapman 1967	Central Wai'anae Valley	Documentation of agricultural and habitation sites in central portion of Wai'anae Valley (Site 50-80-07-2320): 24 pieces of poi-pounders were photographed and measured.
Rosendahl & Rosendahl 1973	Wai'anae Kai	Describes four features: 2 mounds, a walled enclosure and a platform
Sinoto 1975a	Central coast	Recorded 5 sites (3 enclosures, a wall and an L-shape)
Sinoto 1975b	Central Wai'anae Valley	Inspection of enclosure (Site 50-0a-C3-22), located in the central portion of the valley, on the eastern bank of Kaupuni Stream; determined that structure was not a *heiau*, but probably a habitation enclosure.
Ching 1978	NE Valley floor (Camp Ka'ala)	Notes *heiau*, habitations, agriculture and burials in the vicinity
Hommon 1978	Kamaile	Describes Kamaile complex
Sinoto 1978	Back of valley	Describes a pre-contact agricultural complex
Sterling and Summers 1978	Island-wide	Compendium of data describes numerous sites
Sinoto 1979	Back of valley	Describes agricultural terraces, plots, enclosure, walls

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Tao et al. 1979	Kū'ilioloa Heiau	Kū'ilioloa Heiau (Site 50-80-07-153): excavation undertaken; five pieces of volcanic glass, sourced to the Kolekole area of Wai'anae.
Yent and Griffin 1979	NW slope	Describes complex of walls and platforms
Ahlo 1980	NW slope	Describes complex of mounds, walls, terrace and enclosure
Bordner 1981	Back of Valley	No sites described
Ota 1981	Back of valley	Describes boundary or ranching walls
Rosendahl 1981	Central valley floor	Describes plantation era walls and ditches
Barrera 1982	Back of valley	No sites described
EISC (Bordner) 1982	Back of valley	Describes agricultural terraces on Kānewai Stream
Neller 1982	NE valley floor and slope	Describes walls and pondfields
Kam & Ota 1984	Wai'anae Army Recreation Center	Two burials reported
Riford 1984	Wai'anae Army Recreation Center	Monitoring of 943 meters of sewer and waterline trenching at the Wai'anae Army Recreation Center, Site 50-0a-C3-23: Five articulated human burials were recovered from trenches at the site. One charcoal sample from the prehistoric cultural layer (Layer V) obtained a radiocarbon age of A.D. 1376+/-50 (C13 adjusted).
Hammatt et al. 1985	NE Valley floor (Camp Ka'ala)	Documents excavations
Hammatt et al. 1985	Wai'anae Army Recreation Center	Excavation of 42 meter-square test pits and 114 square meters at Wai'anae Army Recreation Center: Burials of at least ten individuals were found. Archaeological assemblage points to the heavy use of the site as a communal area for fishing preparation, canoe launching and return.
Hammatt et al. 1987	West Slope, Wai'anae Valley	Excavation at Site 50-80-07-3200: agricultural complex consisting of stone terraces and rock clearance mounds in level soil areas on either side of a rock spur, and was interpreted as typical of Hawaiian dry land agriculture. The two habitation features, a walled terrace, and a U-shaped shelter, both well-constructed, were excavated. A hearth feature yielded a radiocarbon date of A.D. 1630-1950. Only two artifacts and a little midden were found, suggesting minimal occupation.

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Komori 1987	Mauna Lahilahi	Located 16 features of site –3704
Douglas and Pietrusewsky 1988	Makaha Beach Surfside Apartments	Report on one burial recovered by SHPD
Shapiro and Rosendahl 1988	Waiʻanae Kai	Reconnaissance survey of 250 acres of land in the central to back part of Waiʻanae Valley: 34 sites were recorded, all were interpreted as historic, associated with agriculture, tool manufacture, habitation, transportation, recreation, erosion and water control. Trenching in former LCA awards area revealed gleyed deposits, possibly indicating previous taro cultivation.
Bordner and Cox 1988	Back of Waiʻanae Valley	Describes cattle walls, agriculture, habitation and religious complex
Cleghorn 1989	N. Coastal Waiʻanae	Documents bulldozing
Masse 1989	East Waiʻanae Valley floor,	Reconnaissance of a Waiʻanae Valley Interceptor Sewer Line: Stonewalls, terraces, and portions of a stone enclosure were observed during survey. Survey was not completed due to denied access by armed property owner.
Social Research Systems Co-op (Bordner) 1989	Back of Valley	Describes habitation complex
Kawachi 1990	Mauna Lahilahi	Field check of burial site
Douglas 1991	Makaha Beach Surfside Condominiums	Documents one burial
Kawachi 1991 (1979)	Makaha Beach Surfside Condominiums	Documents burial find from 1979
Denham et al. 1992	Central Coast	No sites
Kawachi 1992	Waiʻanae Regional Park	Documents one burial
Flood et al. 1994	West central valley floor	Documents one site with 24 features including 18 sinkholes

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Schilz 1994	Waiʻanae Army Recreation Center	15 burials recovered
Jourdane 1995	Makaha Beach Surfside Condominiums	Describes two burials
Kolb et al. 1995	Paheʻeheʻe Ridge	Documents two shrine sites, reports five carbon dates
Collins 1996	No provenience	bones from at least ten people (MNI) in possession of a Waiʻanae resident
Borthwick & Hammatt 1997	West central valley floor	Documents six burials
Devereux *et al.* 1997	Waiʻanae, Oʻahu	Archaeological Reconnaissance Survey of the 55-Acre Freitas Dairy; Two single featured archaeological sites were identified: a bi-faced stone wall (Site 50-80-07-5493) and a single room rectangular military bunker (site 50-80-07-5494).
Kapeliela 1997	Central Valley	Documents 1 burial
Borthwick *et al.* 1999	Pōkaʻī Bay Beach Park	Archaeological survey with subsurface testing at Pōkaʻī Bay Beach Park: A total of thirty-four test units were excavated. No undisturbed prehistoric cultural layer or any burials were observed within any of the test units. Subsurface testing revealed extensive historic disturbance to all areas examined.
Cordy 1999	Kūmaipō Stream	Discusses numerous archaeological sites previously lumped under site # 2951
Gora et al. 2000	Kūmaipō area	Documents a house site and terraces
Magnuson 2000	North coastal Waiʻanae	No sites
Abordo et al. 2001	Back of the Valley	Documents a house site and agricultural fields (Site 5706)
Cordy 2001a	Waianae Valley Ranch	Discusses 74 historic sites including 23 agricultural sites with hundreds of features, habitation, religious, and possible burial sites
Cordy 2001b	Kamaileʻīli	Review of Māhele records

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Hammatt and Shideler 2001	Pōka'ī Bay, just seaward of Farrington Hwy.	Discusses finding of three historic coffin burials
Kaikala 2001	Back of the Valley	Documents a house site and agricultural fields (site 5705)
Elmore and Kennedy 2001	Wai'anae coast	Documents findings from five separate corridors. One habitation/burial –5949 believed to be part of the Wai'anae (Kamaile) Complex (Site –1181), and one sugar plantation camp –5950.
Shun and Shaw 2002	Wai'anae Army Recreation Center	No significant finds

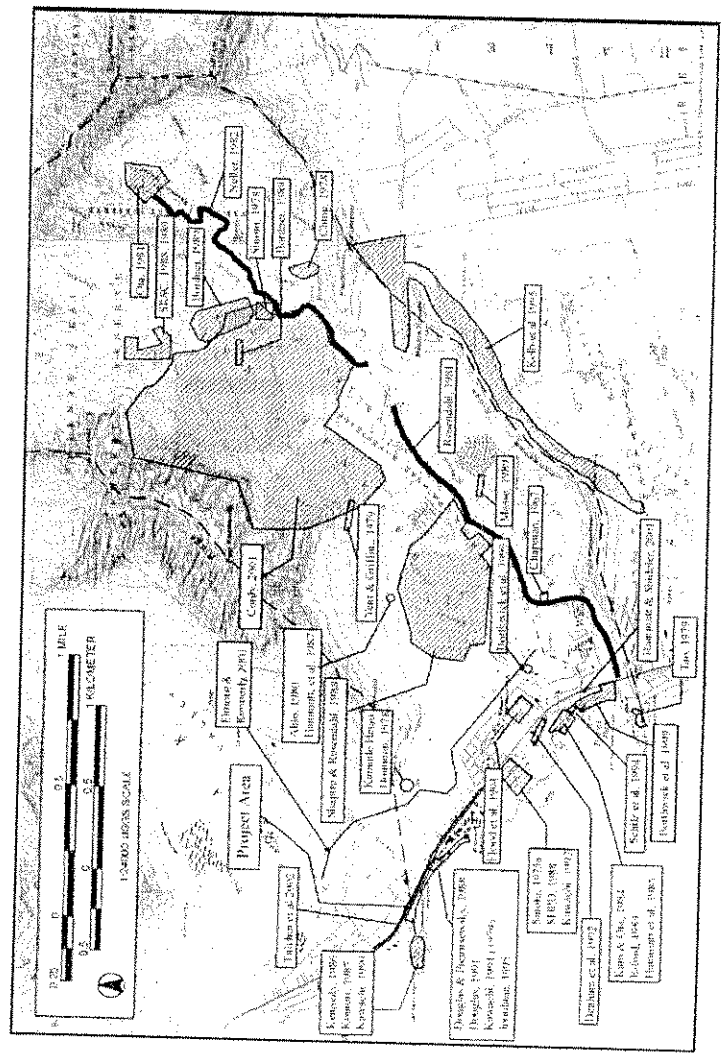

Figure 5 Previous Archaeological Studies in Wai'anae Ahupua'a

Table 2 Previous Archaeological Investigations in the Vicinity of the Project Area

SIHP Site #50-80-07	Nature of Site
-3704	Mauna Lahilahi (Kennedy 1986; Komori 1987; Kawachi 1990) A natural promontory at the southern end of Mākaha Valley. Subsurface cultural deposits, evidence of marine and religious activities and stone tool production, petroglyphs and crevice burials all included under one site designation.
-3967	Wai'anae Regional Park (Kawachi 1992) This area encompasses sites 4822-4826 (Sinoto 1975). It contains sinkholes, enclosures, wells (sinks with water), mounds and walls. A summer E'ala youth group tends this site and may have modified some structures. Also, an adult female skeleton was exposed by Hurricane 'Iniki here. The burial sits approximately 25 meters from the water.
-4822	An enclosure (possible animal pen) located approximately 100-120 meters *makai* of Farrington Highway.
-4823	Two features: an enclosure and an L-shape, located approximately 100-120 meters *makai* of Site -4822.
-4824	A wall section.
-4825	An enclosure, partially destroyed.
-4826	An L-shape (possible habitation) located *makai* of Sites -4822 and -4823.
-4064	Burials at Mākaha Beach Surfside Apts. (Douglas and Pietrusewsky 1988; Douglas 1991; Kawachi 1991; Jourdane 1995*; Cordy, 1997*) * redesignated SIHP #50-80-07-6592- 1 through 3

IV. PREDICTIVE MODEL

Cordy (1998) has provided a synthesis of the settlement patterns and prehistory of the Wai`anae District. The study places the settlement of Wai`anae into the wider context of O`ahu settlement as a whole. The proximity of expansive forest resources and well-watered agricultural lands to abundant marine resources made the windward side of O`ahu most appealing to the early O`ahu settlers and their descendants. Foraging trips to the dryer areas of the island would have occurred and were most likely associated with recurrent, temporary habitation used during resource procurement. The rich marine resources of the Wai`anae District, particularly the fishing grounds off shore, would have been a strong draw for early windward O`ahu inhabitants. As population in the windward areas increased, permanent settlement began to spill over into the well-watered regions of the leeward side. Eventually, with further population expansion, permanent settlement spread to the less watered regions of the leeward side, which included much of the Wai`anae District and possibly the current project area (Cordy 1998:1-6). Settlement would most likely begin as temporary habitation along the coast in association with marine resource procurement or small shelters in the valleys occupied by those gathering mountain resources. Later, permanent settlement would have developed in response to expanding populations in previously unsettled, better watered areas.

Prehistorically, land use in Wai'anae was most intense within the coastal zone and in the mid-valley where lo'i were fed by Wai'anae Stream and in the mountainous interior, where there was sufficient rainfall and stream flow for agricultural pursuits and forest resources. The lands between the sea and the mountains were a dry scrub-land. Although potentially useful for dryland agriculture in the wet winter months, it is unlikely that this area would have been largely utilized by Native Hawaiians in a more than temporary habitation/shelter basis. The settlement pattern prior to Western contact for this region was likely dispersed residences concentrated at the sea and the mountains. It is suggested by an account provided by Pukui (cited in McGrath et al. 1973:10), that there existed an informal exchange network where by coastal dwellers traded marine resources for the agricultural and forest resources of the inland dwellers.

Archaeological work in the upper portions of Wai'anae Valley has located the remains of several traditional Hawaiian sites. Permanent habitations, ceremonial, and agricultural structures have been recorded most recently by Cordy (2001) during a reconnaissance survey of the Wai'anae Valley Ranch. The findings from the survey suggest "in the A.D. 1700's…the upper valley down to the first Kawiwi drainage was covered with agricultural fields and had a sizable population…" (Cordy 2001:ii). Additional agricultural terraces have also been described (Bordner 1982 and Kaikala 2001) . Several historic features including ranching walls and plantation era infrastructure were documented (Ota 1981; Rosendahl 1981; Shapiro and Rosendahl 1988; Bordner and Cox 1988) suggesting that historic and modern human modifications (i.e. construction of historic ranch walls) likely reduced the number and scope of the pre-contact sites in the upper reaches of the valley.

Pokai Bay, located south of the current project area, and one of the only areas along the Wai`anae Coast to have a perennial stream reach the coast was undoubtedly one of the more attractive areas for early temporary and, later, permanent settlement (Cordy 1998:6). Carbon samples collected from the Wai'anae Army Recreation center suggest that by A.D. 1350 there was at least temporary coastal habitation on the Wai`anae coast. These dates come from samples collected from intact cultural layers (Stratum V), which returned dates of A.D. 1326 +/- 50 years (Riford 1984) and A.D. 1340 +/- 70 years (Hammatt et al. 1985). Along coastal Ohikilolo,

radiocarbon dating suggests settlement by 1640 AD (Hammatt, et al 1997). Available radiocarbon dates from nearby Makaha Valley suggests that dryland agriculture was a stable subsistence pattern at least as early as A.D. 1200 in the lower portion of the valley (Green 1970).

By western contact, Wai'anae was noted by explorers as having a relatively small population. The sandlewood trade and ensuing ranching industry caused a sharp decline in agricultural pursuits. From 1853 to 1872 the population of the 'Ewa and Wai'anae districts dropped by 32%, with census figures showing the population of Wai'anae totaling only 903 persons (Schmitt 1977). In 1878, Wai'anae Plantation began production, which completely changed the landscape along the Wai'anae coast. Small central valley garden plots and irrigation systems were converted into vast fields of sugarcane and a new railway was constructed in 1880 for the transportation of the cane to the mill (Green 1980:12).

Population numbers slowly increased when homesteading was instituted in the first part of the 1900s. WWII greatly affected the landscape of the Wai'anae coast by placing bunkers, gun emplacements and barbed wire along the waterfront. Local informants indicate that tsunamis have also altered the landscape, particularly the large tsunami of 1946 (McDermott and Hammatt 2000c:44).

The current project area has been directly affected in historic and modern times by the construction and use of O.R. & L Railroad as well as the construction of the Makaha Surfside Apartments. Annual high surf continues to erode the shoreline, with several human burials being reported washing out of the banks (see Section III- Previous Archaeological Research).

In summary, archaeological and historic documentation of the Wai'anae District suggests initial occupation (at least temporary) by the early 1200's A.D. Population pressures on the windward side and Kona District forced permanent settlement of the Wai'anae District, especially in the well-watered coastal areas by the 1300's and permanent settlement of the upper valleys by the 1400's (Cordy, 2002). The numerous house and agricultural sites, including terraces and pondfields, in the well watered portion of the valley likely had ample resources available for trade with the marine resource rich coastal portion of Wai'anae Ahupua'a. Following European contact, the population experience a decline due to introduced diseases and a shifting of labor force from traditional agriculture and resource gathering to the harvesting of sandlewood for trade. Once the sandlewood resources were diminished, a shift to ranching and sugarcane further occupied once fertile agricultural land.

V. STRATIGRAPHY

Area 1

Archaeological fieldwork associated with the inventory survey consisted of thirty-two hand dug test units, four stratigraphically profiled wave-cut banks and six backhoe trenches. In Area 1 of the project area (see Figure 1; Figure 6) the stratigraphic sequence was generally characterized by 1-4 layers of imported fill or mixed/disturbed sediment (Stratum I), 1-3 intact culture bearing layers (Stratum II) and a culturally sterile layer (Stratum III).

In general, Stratum II (intact cultural layer) was encountered within 10 m of the shoreline in the southeastern portion of the project area and up to 25 meters from the shoreline in the northwestern portion of Area 1. Stratum II consisted primarily of: 10 YR 5/3 to 3/3 (brown to dark brown), medium to coarse sand; moderate, medium, granular structure; dry, slightly hard consistency; non plastic; no cementation; containing abundant charcoal, marine shell midden, vertebrate midden and artifacts, with an abrupt and smooth lower boundary

Within Stratum IIB and IIC no historic midden or artifacts (modern bottle glass, rusted metal) was encountered. These layers were generally distinguishable by a) a slightly lighter color; b) a lack of historic midden and artifacts; and c) a higher concentration of marine and vertebrate midden as well as a slightly higher artifact count.

Mauka of the Stratum II bearing test units, the stratigraphic sequence did not include a rich cultural layer but rather a series of mixed/disturbed layers which included both modern/historic trash and scant amounts of midden and charcoal. These layers may have previously contained an intact albeit thin cultural layer though railroad construction and modern usage of this area appears to have mixed the cultural layers with the developing "A" horizon.

Across the project area the test units were excavated down to culturally sterile layers. The layers were first identified in the exposed wave-cut sidewalls to aid in identification of the sterile sediments in the test units. In general, Stratum III contained more sand in the more northern portion of the project area and contained some midden in the transitional zones with Stratum I or II and generally consisted of: 10 YR 3/2 (very dark grayish brown), clay to sandy clay; strong, medium, columnar to blocky structure; dry, hard consistency; plastic; weakly cemented; with a clear and smooth lower boundary

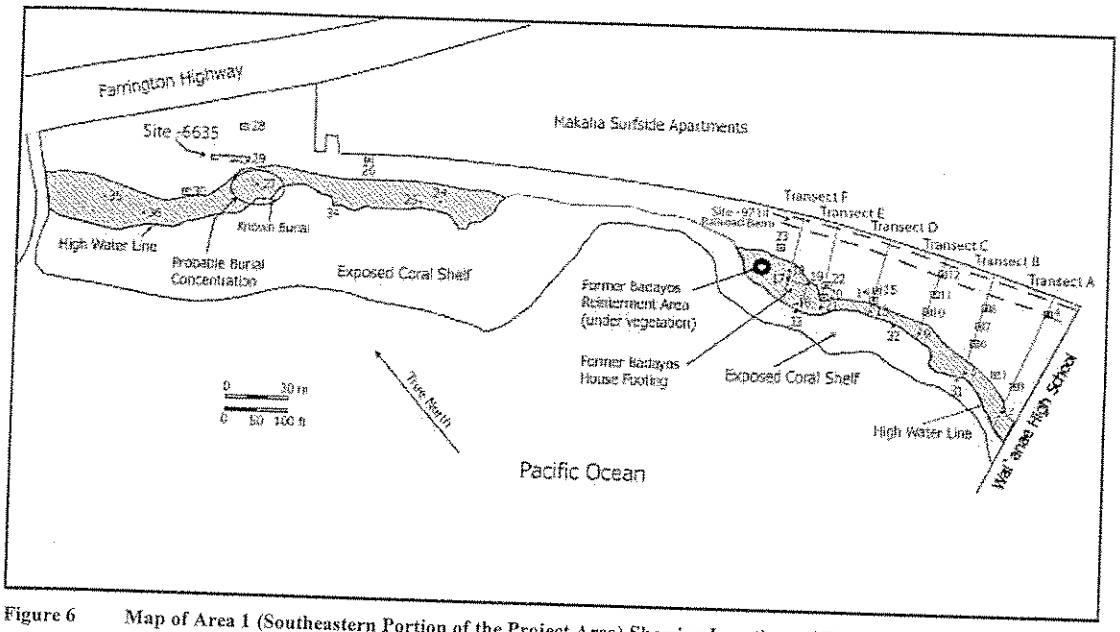

Figure 6 **Map of Area 1 (Southeastern Portion of the Project Area) Showing Locations of Test Units**

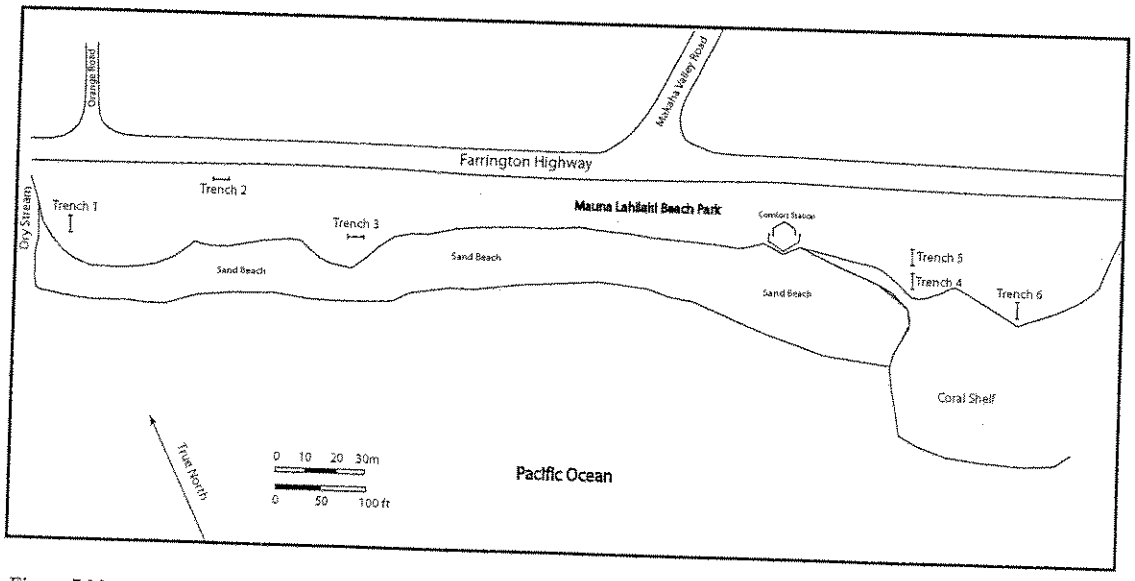

Figure 7 Map of Area 2 (Northwestern Portion of Project Area) Showing the Location of the Backhoe Trenches

A. Test Unit 1

Stratum IA: 0-10 cmbs "A1" Horizon; 10 YR 3/2 (very dark grayish brown), fine, sandy silt; weak, fine, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum IB: 10-30 cmbs "A1" Horizon; 10 YR 4/2 (dark grayish brown), sandy loam; weak, fine to medium, granular structure; slightly hard consistency; nonplastic; no cementation; clear and wavy lower boundary

Stratum IIIA: 30-40 cmbs "C" Horizon; 10 YR 4/3 (dark brown), clay; moderate, medium, blocky structure; hard consistency; plastic; no cementation; clear and smooth lower boundary; sterile

Stratum IIIB: 60-103 cmbs "C" Horizon; 10 YR 5/3 (brown), clay loam; moderate, coarse or thick, blocky structure; hard consistency; slightly plastic; no cementation; clear and smooth lower boundary; sterile

Stratum IIIC: 60-103 cmbs "C" Horizon; 10 YR 6/2 (light brownish gray), decomposing bedrock, hard consistency; nonplastic; sterile

Test Unit 1 (Figure 8) was excavated in the southern portion of the project area in the open grassy field (see Figure 6). Stratum IA represents a mixed layer of the developing A horizon which contained modern and historic trash that appears previously disturbed. An historic trash pit was encountered originating from the base of Stratum IA and extended into Stratum IB. Strata IIIA-IIIC represent sterile clay and clay loam layers. The origin and development of these strata are attributed to floodplain deposition which likely preceded human settlement of the Hawaiian Islands.

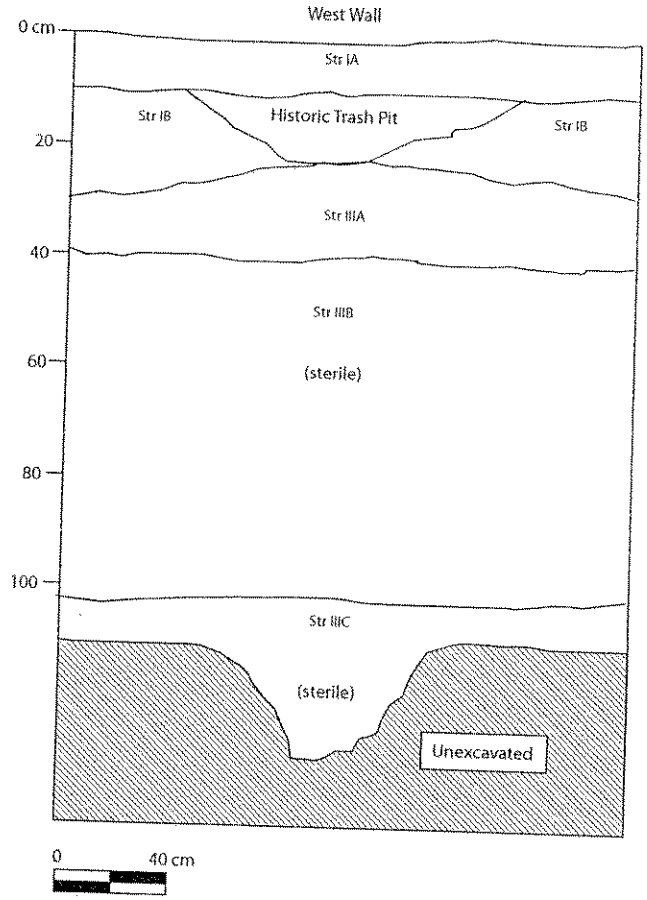

Figure 8 **Profile of West Wall of Test Unit #1**

B. Test Unit 2

Stratum IA: 0-5 cmbs "A" Horizon; 10 YR 4/1 (dark gray), sandy loam; weak, fine, crumb structure; soft consistency; nonplastic; no cementation; clear and smooth lower boundary
Stratum IB: 15-40 cmbs "A" Horizon; 10 YR 3/1 (very dark gray), sandy clay loam; moderate, medium, crumb structure; slightly hard consistency; nonplastic; no cementation; abrupt and irregular lower boundary; previously disturbed
Stratum II: 40-75 cmbs Cultural Layer; 7.5 YR 2.5/1 (black), sandy loam; structureless; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary; undisturbed
Stratum III: 75-BOE "C" Horizon; 2.5 Y 4/4 (olive brown), sandy clay; moderate, medium, crumb structure; slightly hard consistency; slightly plastic; weak cementation; sterile with the exception of charcoal from Stratum IIA filtering into cracks of Stratum III

Stratum IA and IB (Figure 9) are consist of sandy loam and sandy clay loams which were previously disturbed and mixed. The layers are distinguishable by a slightly higher sand content in IA and a more developed soil structure in IB. In total, 25.0 and 80.8 g of invertebrate midden were recovered from the layers IA and IB respectively, as well as 25.6 g of vertebrate midden recovered from Stratum II.

Stratum II is a cultural layer that contained vertebrate and invertebrate midden, charcoal and historic trash (glass, cut bone, ceramics and rusted metal). No indigenous artifacts were encountered in the layer though 208.3 g of invertebrate and 72.0 g of vertebrate midden were recovered. Vertebrate midden was dominated by *Canis familiaris* (30.5 g) and unidentified medium to large mammal (31.2g).

Stratum III represents the "C" Horizon and consists of a slightly hard, sandy clay layer. No indigenous artifacts and few historic ones were encountered at the transition of II to III.

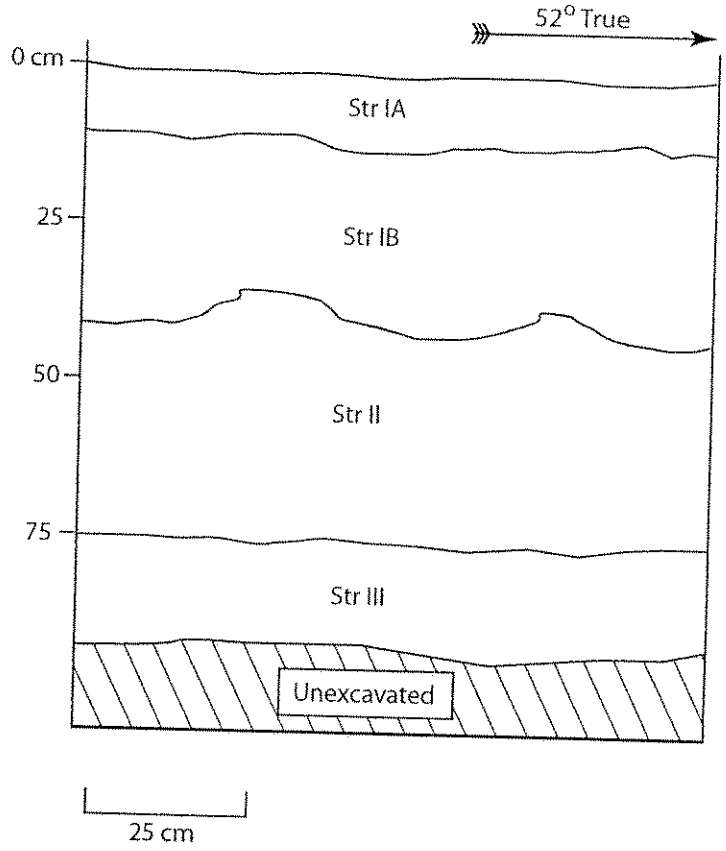

Figure 9 **Profile of North Wall of Test Unit #2**

C. Test Unit 3

Stratum IA: 0-5 cmbs "O" Horizon; 7.5 YR 2.5/3 (very dark brown), silty sand; moderate, fine, crumb structure; slightly hard consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum IB: 5-9 cmbs "A1" Horizon; 7.5 YR 2.5/1 (black), clay loam; hard, medium, blocky structure; hard consistency; slightly plastic; no cementation; abrupt and smooth lower boundary

Stratum IC: 9-BOE cmbs "A2" Horizon; 10 YR 4/4 (dark yellowish brown), clay loam; moderate, fine, crumb structure; slightly hard consistency; slightly plastic; no cementation; abrupt and wavy lower boundary

FEAT A: 14-BOE cmbs 10YR4/4 (dark yellowish brown), clay; strong, medium, platy structure; slightly hard consistency; slightly plastic; no cementation; contains disturbed human remains

Stratum IA, IB and IC (Figure 10) are analogous to the previous test units and are composed of disturbed A Horizons mixed with sand and clay (C horizon). Strata I layers contained modern and historic trash. Feature A consisted of two isolated human bone fragments which were not articulated and had no obvious pit. It appeared as though the remains were previously disturbed or may have been grubbed and transported to their current location. After the remains were encountered, the SHPD Burials Program was notified and under their consultation, the remains were left in place and the test unit was backfilled.

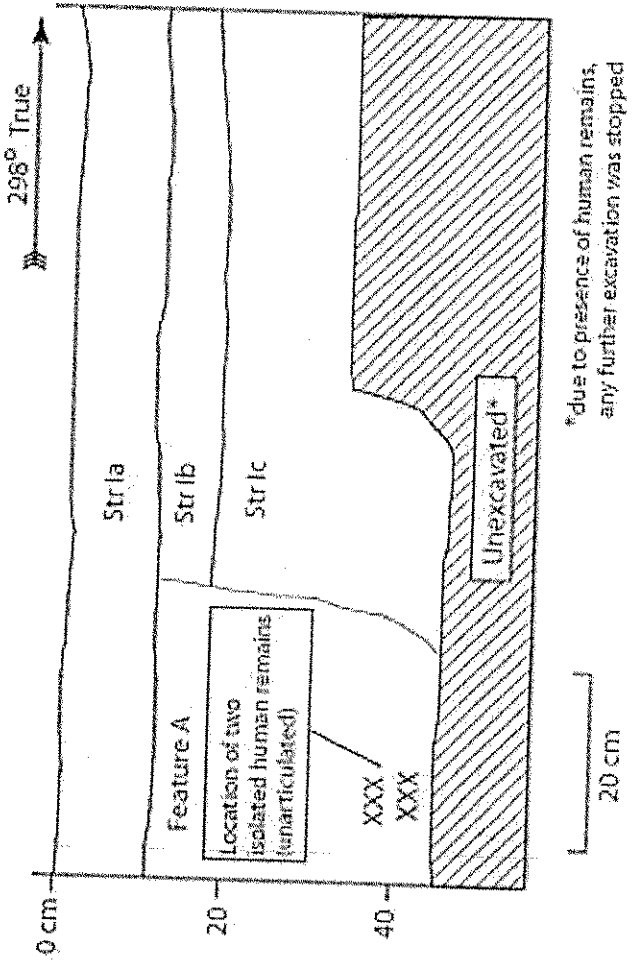

Figure 10 Profile of West Wall of Test Unit #3

D. Test Unit 4

Stratum IA: 0-10 cmbs Fill; 10 YR 3/2 (very dark grayish brown), sandy loam; weak, medium, granular structure; slightly hard consistency; nonplastic; no cementation; clear and wavy lower boundary; 20% crushed basalt
Stratum IB: 10-25 cmbs "A1" Horizon; 10 YR 3/2 (very dark grayish brown), sandy loam; strong, medium, granular structure; slightly hard consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IC: 25-40 cmbs "A2" Horizon; 10 YR 3/2 (very dark grayish brown), silt loam; strong, medium, granular structure; hard consistency; nonplastic; no cementation; very abrupt and wavy lower boundary
Stratum IIIA: 40-55 cmbs Sand deposit; 10 YR 6/4 (light yellowish brown), fine, sand; structureless; loose consistency; nonplastic; no cementation; very abrupt and wavy lower boundary; sterile
Stratum IIIB: 55-BOE cmbs "C" Horizon; 10 YR 4/2 (dark grayish brown), clay; strong, medium, granular structure; hard consistency; plastic; no cementation; sterile

Stratum IA (Figure 11) is an imported fill layer which contains approximately 20% crushed/quarried basalt. Stratum IB and IC are buried A horizons with very similar characterists. Both contained modern and historic trash inclusions and differed only in their consistency and sand content. Stratum IIIA is a buried sand deposit which lies atop the sterile C horizon. The sand was well sorted and may represent an aeolian deposit, though the presence of the layer was fairly localized. Stratum IIIB is a sterile, clay C horizon

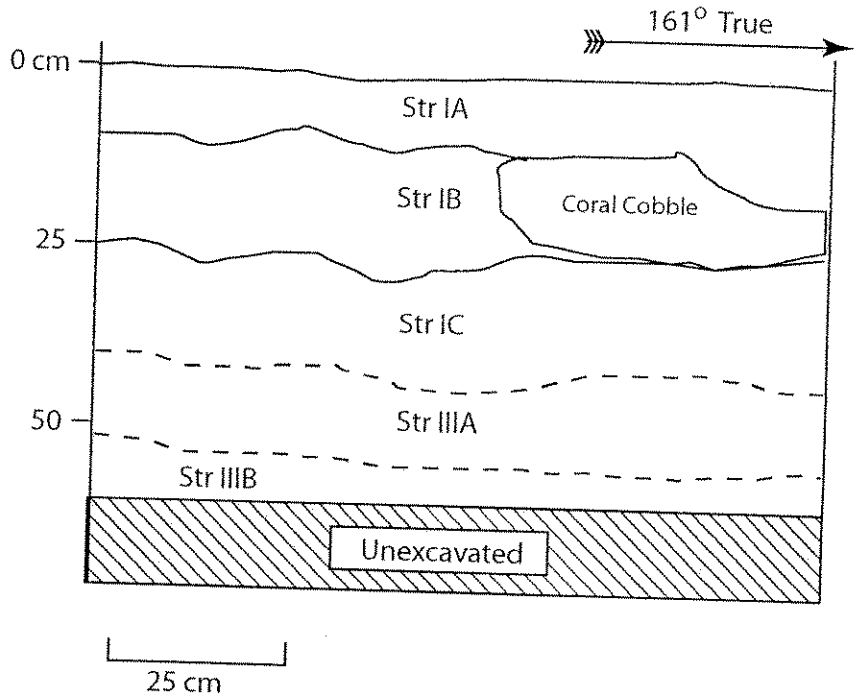

Figure 11 **Profile of East Wall of Test Unit #4**

E. Test Unit 5

Stratum IA: 0-5 cmbs "O" Horizon; 10 YR 6/3 (pale brown), fine to medium, sand; structureless; loose consistency; nonplastic; no cementation; clear and smooth lower boundary
Stratum IB: 5-15 cmbs "A1" Horizon; 10 YR 6/3 (pale brown), fine to medium, sand; structureless; loose consistency; nonplastic; no cementation; clear and smooth lower boundary; contains historic/modern trash
Stratum III: 15-35 cmbs "C" Horizon; 10 YR 3/2 (very dark grayish brown), sandy clay; strong, medium, crumb structure; hard consistency; slightly plastic; indurated; intrusions (i.e. charcoal) filtered into the stratum via cracks in the the hard clay, otherwise sterile
Test unit 5 (Figure 12) was located near the wave cut embankment. Stratum IA consisted of mixed sands with modern trash. Stratum IB is a buried sand layer which was likely disturbed by high surf and human activities and contained abundant historic and modern trash with 27.4 g of invertebrate midden and 0.2 g of vertebrate midden recovered from the stratum. Stratum III is the sterile C horizon which was severely cracked in the upper 15 cm and had sand and charcoal intrusions into the cracks.
The presence of invertebrate midden and charcoal, which is generally assumed to be associated with Stratum I and II(where II is present), will often appear as being associated and collected with III. Because there was a high degree of difficulty distinguishing between the Strata I and II filled cracks extending into Stratum III, midden and charcoal will often be listed as being associated with Stratum III. It should be noted that the cracked clay C horizon was fairly common throughout the site and inclusions were usually associated with the cracks.

F. Test Unit 6

Stratum IA: 0-3 cmbs Fill; 7.5YR3/4 (dark brown), clay; weak, fine, granular structure; soft consistency; plastic; no cementation; very abrupt and smooth lower boundary
Stratum IB: 3-10 cmbs "A1" Horizon; 10YR3/4 (very greyish brown), sandy loam; weak, fine, granular structure; slightly hard consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IC: 10-15 cmbs Fill; compact crushed coral fill
Stratum III: 15-BOE cmbs "C" Horizon; 10YR3/2 (very dark greyish brown), sandy clay; strong, medium, blocky structure; hard consistency; nonplastic; no cementation; sterile
Stratum IA (Figure 13) consisted of an imported clay fill layer over the top 3 cm of the surface. Stratum IB is an A horizon consisting of sandy loam with modern and historic trash mixed in. Stratum IC is an imported crushed coral fill layer overlying the sterile sandy clay C horizon. Based on these observations it is suggested that this area was previously grubbed down to the C horizon and later filled with imported or grubbed material.

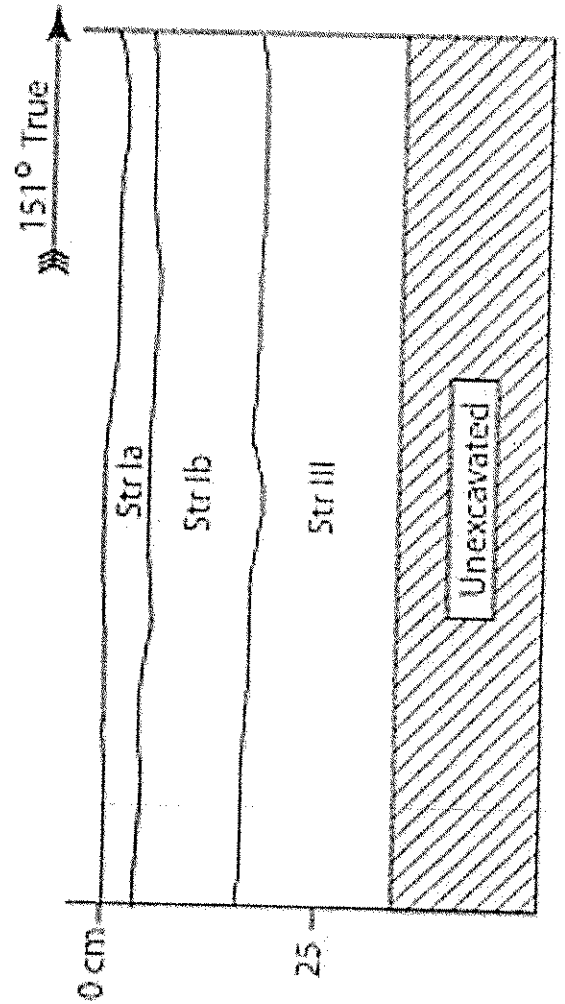

Figure 12 Profile of East Wall of Test Unit #5

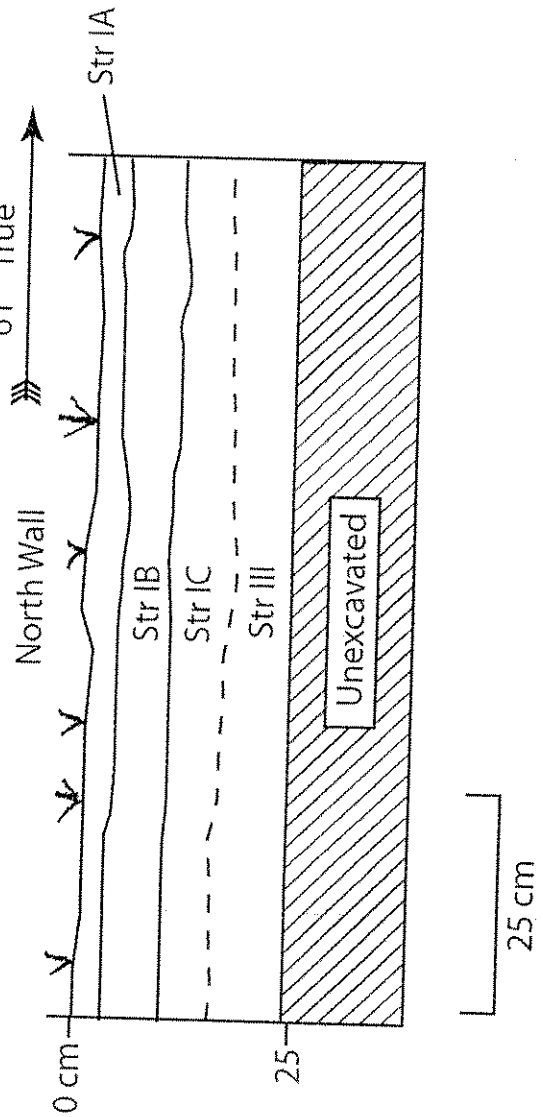

Figure 13 Profile of North Wall of Test Unit #6

G. Test Unit 7

Stratum IA: 0-3 cmbs O horizon; 10 YR 3/2 (very dark grayish brown), sandy loam; weak, fine, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary; test unit lies just makai of RR berm
Stratum IB: 10-20 cmbs "A1" Horizon; 10 YR 3/1 (very dark gray), sandy loam; moderate, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and irregular lower boundary
Stratum III: 20-BOE "C" Horizon; 10 YR 3/2 (very dark grayish brown), sandy clay; strong, medium, blocky structure; hard consistency; nonplastic; no cementation; charcoal flecking from Stratum IB filtering into cracks in clay as observed in sidewall, otherwise sterile
Stratum IA (Figure 14) is a loose, thin O horizon which contains abundant broken glass and rootlets. Stratum IB is a mixed A horizon which also contains abundant historic trash (i.e. broken glass, rusted metal). Stratum III is the sterile C horizon which has few charcoal inclusions via cracks in the dry clay material.

H. Test Unit 8

Stratum IA: 0-12 cmbs Fill; 2.5 YR 2.5/4 (dark reddish brown), silt loam; strong, medium, angular blocky structure; soft consistency; nonplastic; no cementation; very abrupt and smooth lower boundary; imported topsoil
Stratum IB: 12-18 cmbs Fill; 10 YR 8/1 (white), coral fill; structureless; hard consistency; nonplastic; no cementation; very abrupt and smooth lower boundary; imported crushed coral fill
Stratum III: 18-30 cmbs "C" Horizon; 10 YR 2/2 (very dark brown), silty clay; moderate, medium, blocky structure; hard consistency; slightly plastic; no cementation; Stratum IB charcoal flecks filtering into cracked clay of Stratum III.
Stratum IA (Figure 15) consists of a dark reddish brown imported fill layer, 10-12 cm in thickness. Stratum IB is a crushed, white coral fill layer and Stratum III is the sterile clay C horizon. This test unit was located just makai of the "old coral road" formerly the O. R. & L railroad berm.

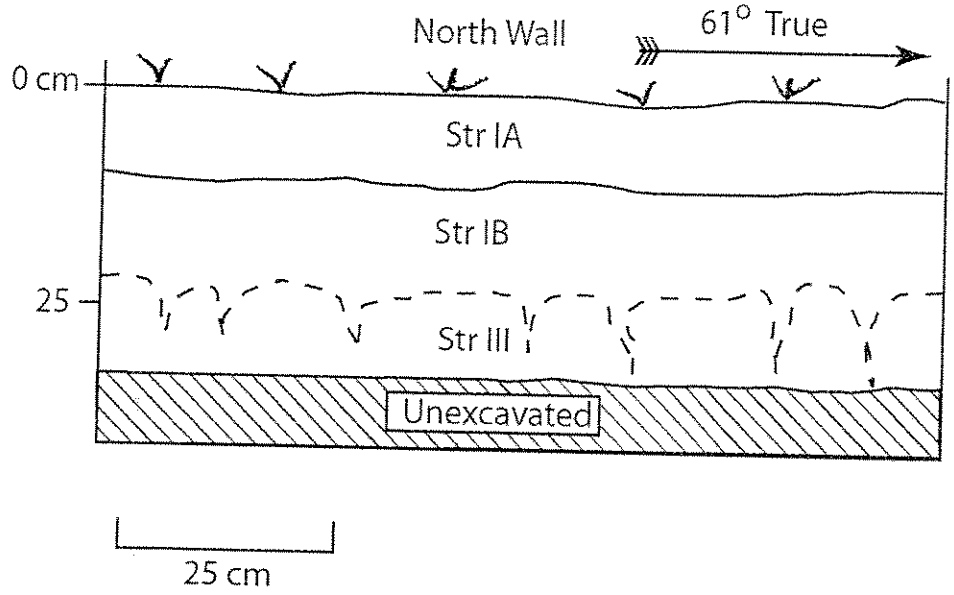

Figure 14 Profile of North Wall of Test Unit #7

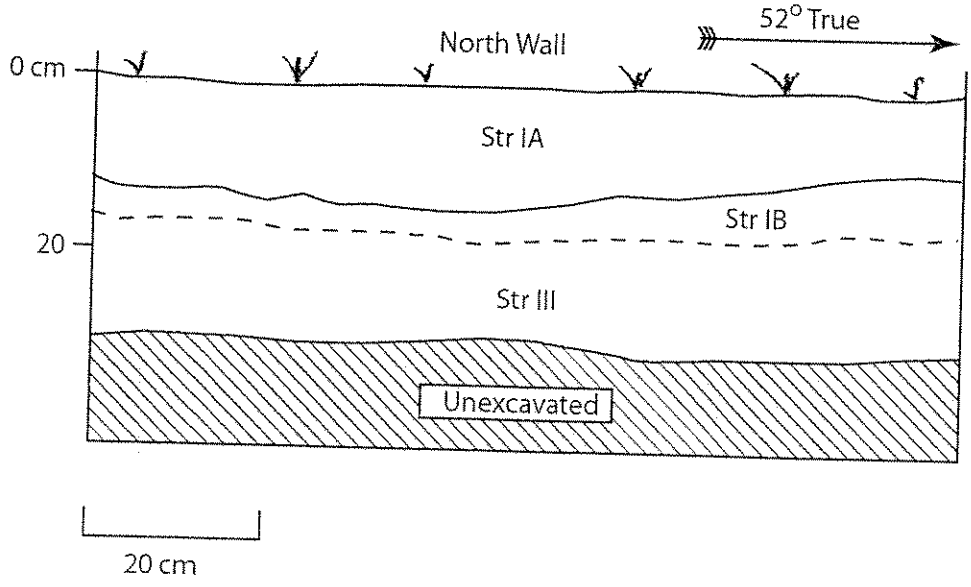

Figure 15 Profile of North Wall of Test Unit 8

I. Test Unit 9

Stratum IA: 0-5 cmbs "A1" Horizon; 10 YR 5/2 (grayish brown), sandy loam; strong, medium, angular blocky structure; hard consistency; nonplastic; no cementation; clear and smooth lower boundary
Stratum IB: 5-10 cmbs "A2" Horizon; 10 YR 7/2 (light gray), fine to medium, sand; weak, fine, crumb structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum II: 10-17 cmbs "A3" Horizon; 7.5 YR 2/2 (very dark brown), sandy loam; moderate, medium, blocky structure; slightly hard consistency; nonplastic; no cementation; very abrupt and smooth lower boundary
Stratum IIIA: 17-30/40 cmbs "C" Horizon; 10 YR 8/2 (very pale brown), sand; weak, medium, crumb structure; hard consistency; nonplastic; no cementation; very abrupt and smooth lower boundary; sterile
Stratum IIIB: 30/40 - BOE "C" Horizon; 7.5 YR 2/2 (very dark brown), sandy clay; strong, medium, blocky structure; hard consistency; slightly plastic; no cementation; sterile
Feature A: 17-35 cmbs 10 YR 6/3 (pale brown), fine to medium, sand; moderate, medium, granular stucture; loose consistency; abrupt and broken lower boundary; Feature A is a pit feature extending from the base of Stratum II and intruding into Stratum IIIB.
Feature B and C 15-40 cmbs 7.5 YR 2/2 (very dark brown), sandy loam; moderate, medium, blocky structure; slightly hard consistency; nonplastic; no cementation; very abrupt lower boundary; originating from the base of Stratum II, contains abundant charcoal flecking, intruding into Stratum IIIA

Stratum IA (Figure 16) is a sandy loam A horizon which appeared partially mixed and contained both historic and modern trash inclusions. Stratum IB is a sand layer (lying just above the cultural layer) and contained modern trash and marine midden inclusions. Stratum II is a sandy loam cultural layer with 13.3 g of invertebrate midden recovered from the layer as well as charcoal flecking and historics including glass and rusted metal. Stratum IIIA is sterile sand layer and Stratum IIIB is a sterile sandy clay C horizon. Some filtration of charcoal and marine midden were evident in the upper portion of the stratum. Both Stratum IIIA and IIIB appeared to pre-date human activity in this area.

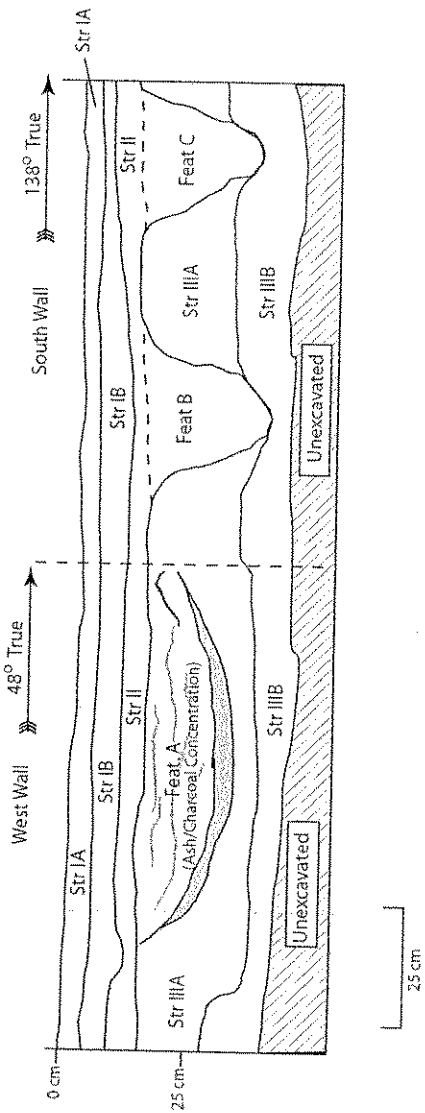

Figure 16 Profile of West and South Walls of Test Unit 9

J. Test Unit 10

Stratum IA: 0-15 cmbs Disturbed; 10 YR 5/4 (yellowish brown), fine, sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 15-30 cmbs "A" Horizon; 10 YR 3/2 (very dark grayish brown), sandy clay; moderate, medium, crumb structure; hard consistency; plastic; no cementation; abrupt and smooth lower boundary
Stratum III: 30 cm-BOE "C" Horizon; 10 YR 2/2 (very dark brown), sandy clay; weak, medium, granular structure; loose consistency; nonplastic; no cementation; sterile
Stratum IA (Figure 17) is a weakly structured sand layer which appeared previously disturbed. The layer contained both historic and modern trash. Stratum IB consists of a sandy clay A horizon which also contained a mixture of historic/modern trash, charcoal and midden, suggesting that this layer was possibly disturbed as well. Stratum III is the sterile, sandy clay C horizon.

K. Test Unit 11

Stratum IA: 0-5 cmbs Mixed; 10 YR 4/2 (dark grayish brown), fine to medium, sand; structureless; loose consistency; nonplastic; no cementation; very abrupt and smooth lower boundary
Stratum IB: 5-10 cmbs Fill; 7.5 YR 3/4 (dark brown), clay; weak, fine, granular structure; loose consistency; plastic; no cementation; very abrupt and smooth lower boundary; imported terrestrial fill
Stratum IC: 10-15 cmbs Mixed; 10 YR 4/2 (dark grayish brown), fine to medium, sand; structureless; loose consistency; nonplastic; no cementation; very abrupt and smooth lower boundary
Stratum ID: 15-25 cmbs "A1" Horizon; 10 YR 3/1 (very dark gray), sandy loam; moderate, fine, granular structure; soft consistency; nonplastic; no cementation; clear and smooth lower boundary
Stratum III: 25-35 cmbs "C" Horizon; 10 YR 3/1 (very dark gray), sandy clay; strong, medium, blocky structure; hard consistency; plastic; no cementation; sterile
Stratum IA and IC (Figure 18) are mixed sand layers with both historic and modern trash. Stratum IB appears to be a clay fill layer (either grubbed or imported). Stratum ID is a buried A horizon with historic trash and mixed invertebrate midden. Stratum III is the sterile clay C horizons.

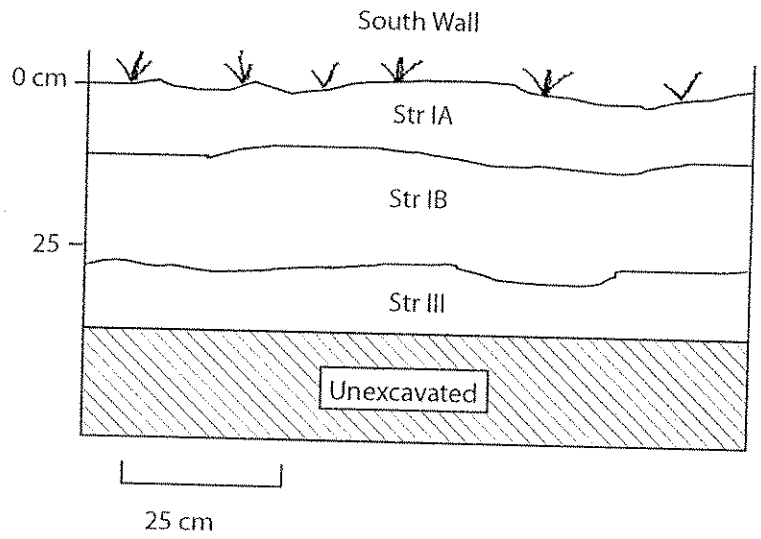

Figure 17 Profile of South Wall of Test Unit 10

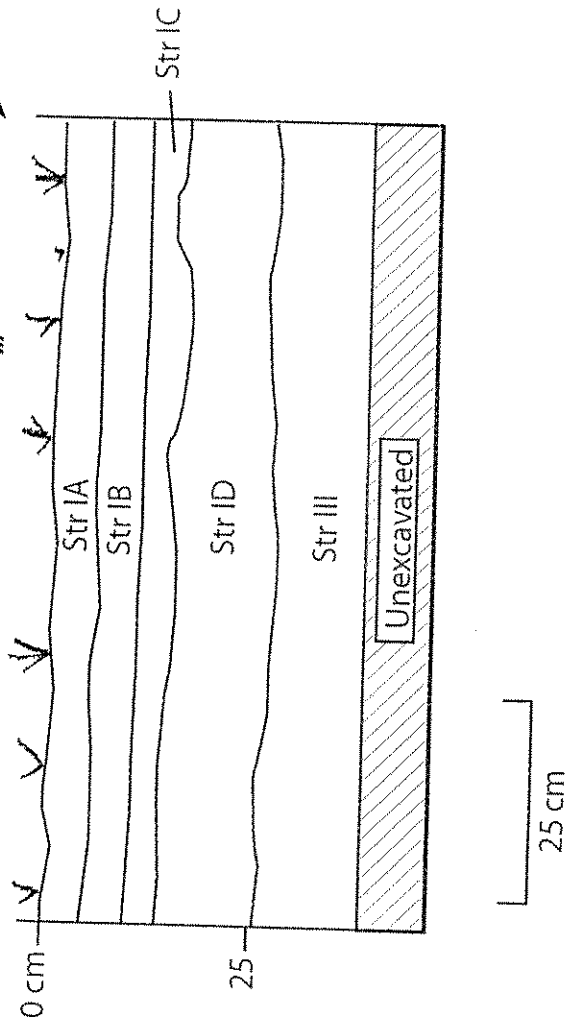

Figure 18 Profile of West Wall of Test Unit 11

L. Test Unit 12

Stratum IA: 0-10 cmbs Fill; 10 YR 3/2 (very dark grayish brown), sandy loam; structureless; loose consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IB: 10-15 cmbs Fill; 10 YR 3/1 (very dark gray), sandy loam; structureless; soft consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IC: 15-20 cmbs Fill; 10 YR 6/2 (light grayish brown), coral cobble fill; structureless; loose consistency; nonplastic; no cementation; very abrupt and smooth lower boundary; probable coral road bed
Stratum ID: 20-30 cmbs "A1" Horizon; 10 YR 4/2 (dark grayish brown), silt loam; moderate, medium, crumb structure; hard consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum III: 30-45 cmbs "C" Horizon; 10 YR 2/1 (black), clay loam; strong, medium, blocky structure; hard consistency; slightly plastic; no cementation; sterile

Test Unit 12 (Figure 19) was located on the old coral road/railroad berm. Stratum IA through IC are fill layers with IC representing the "coral" component with a 5 cm thick crushed coral fill layer. Stratum ID is a buried A horizon with historic trash (metal RR spikes). Stratum III is the sterile clay C horizon.

M. Test Unit 13

Stratum IA: 0-5 cmbs "O" Horizon; 10 YR 6/4 (light yellowish brown), sandy loam; weak, fine, single grain structure; loose consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IB: 5-15 cmbs "A1"Horizon; 10 YR 7/3 (very pale brown), sandy loam; weak, fine, single grain structure; loose consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IIA: 15-18 cmbs "A2" Horizon; 10 YR 4/1 (dark gray), silt loam; moderate, medium, crumb structure; soft consistency; nonplastic; no cementation; clear and wavy lower boundary; charcoal and midden inclusions
Stratum IIB: 18-35 cmbs Cultural Layer; 10 YR 5/2 (grayish brown), silt loam; moderate, medium, crumb structure; soft consistency; nonplastic; no cementation; clear and wavy lower boundary; common midden inclusions
Stratum IIIA 35-45 cmbs "C" Horizon; 10 YR 7/2 (light gray), sandy loam; weak, medium, single grain structure; dry, loose, nonplastic; no cementation; sterile
Stratum IIIA: 35-50 cmbs "C" Horizon; 10 YR 3/1 (very dark gray), clay loam; strong, medium, blocky structure; hard consistency; nonplastic; no cementation; sterile

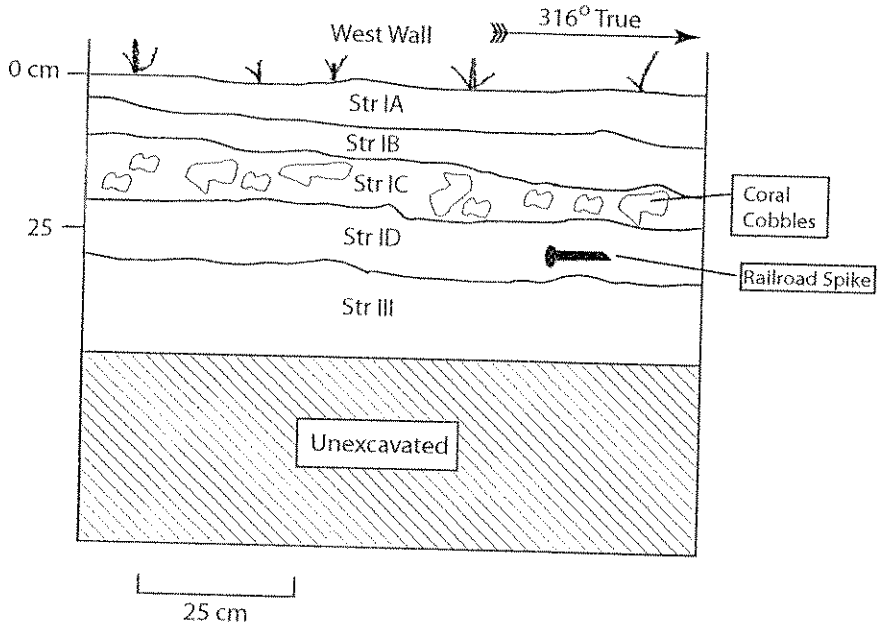

Figure 19 **Profile of West Wall of Test Unit 12**

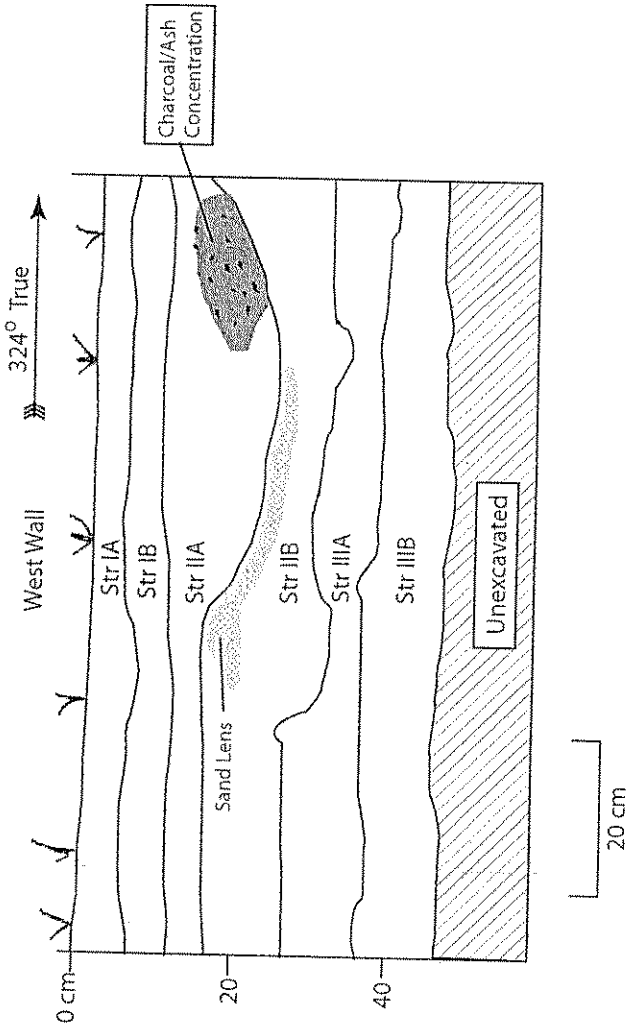

Figure 20 **Profile of West Wall of Test Unit 13**

Stratum IA and IB (Figure 20) are sandy loam O/A horizons overlying a dark gray silty loam cultural layer. Both layers contained charcoal flecks and a total of 72.3 g of invertebrate midden but also had mixed historic and midden trash, suggesting previous disturbance in the top 15 cm of the ground surface.

Stratum IIA is a buried A horizon which contained 58.7 g of invertebrate midden and lacked historic trash. Stratum IIB is a 17 cm thick cultural layer with 47.5 g of invertebrate midden, 3.6 grams of vertebrate midden and abundant charcoal.

Stratum IIIA and IIIB are gray clay loam C horizons. A total of 14.1 g of midden were recovered from the strata, though the intrusions into the layer were via cracks in the upper 10 cm of the layer.

N. Test Unit 14

Stratum IA: 0-5 cmbs "A1" Horizon; 10 YR 5/2 (yellowish brown), fine, sand; weak, fine, single grain structure; loose consistency; nonplastic; no cementation; very abrupt and smooth lower boundary

Stratum IB: 5-7 cmbs Fill; 5 YR 3/2 (dark reddish brown), clay; strong, coarse or thick, blocky structure; very hard consistency; plastic; no cementation; very abrupt and smooth lower boundary; imported fill

Stratum IC: 7-14 cmbs "A2" Horizon; 10 YR 5/4 (yellowish brown), fine, sand; weak, fine, single grain structure; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary

Stratum II: 14-25 cmbs Cultural Layer; 10 YR 2/2 (very dark brown), sandy loam; weak, fine, granular structure; loose consistency; slightly plastic; no cementation; clear and smooth lower boundary; charcoal and midden inclusions

Stratum IIIA: 25-39 cmbs "C" Horizon; 10 YR 3/2 (very dark grayish brown), sandy clay; moderate, medium, granular structure; hard consistency; slightly plastic; no cementation; clear and smooth lower boundary; charcoal flecking filtered into top 5 cm via cracks in Stratum III clay

Stratum IIIB: 39-43 cmbs "C" Horizon; 10 YR 4/2 (dark grayish brown), sandy clay; moderate, medium, blocky structure; hard consistency; plastic; no cementation; sterile

Stratum IA (Figure 21) is a 5 cm thick, fine sand, developing A horizon. The surface sand is likely derived from high surf and aeolian deposition. Stratum IB is an imported clay fill layer. Stratum IC is a weak, buried A horizon consisting of stained sand with few historic trash inclusions.

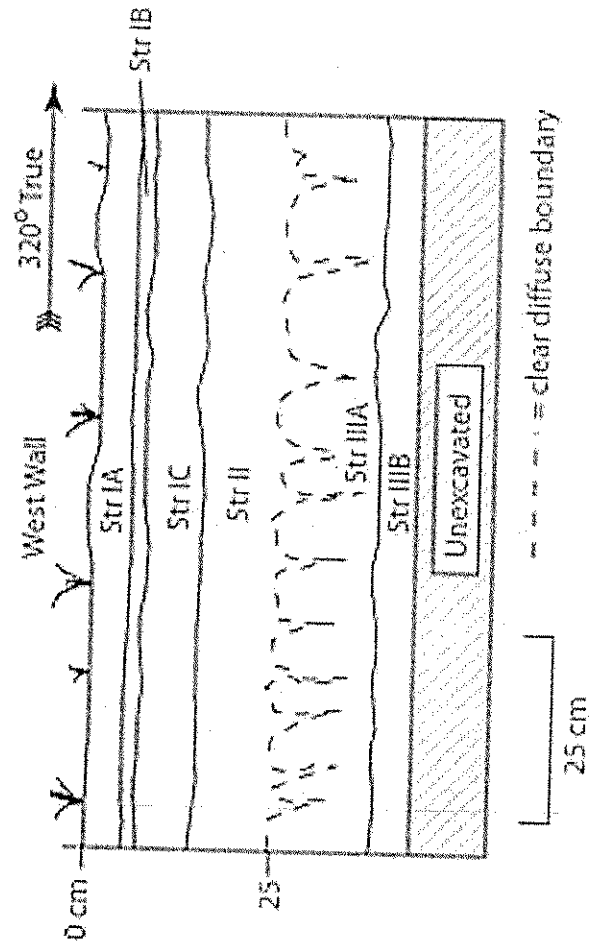

Figure 21 Profile of West Wall of Test Unit 14

Stratum II is an 11 cm thick sandy loam cultural layer which contained abundant charcoal and marine invertebrate inclusions.
Stratum IIIA and IIIB are sterile, sandy clay C horizons. The upper 5 cm of IIIA contained few charcoal flecks though these were derived from filtration into cracks of IIIA clay.

O. Test Unit 15

Stratum IA: 0-4 cmbs Fill; 7.5 YR 4/2 (brown), medium, sand; weak, medium, granular structure; soft consistency; nonplastic; weak cementation; abrupt and smooth lower boundary
Stratum IB: 4-8 cmbs Fill; 5 YR 3/3 (dark reddish brown), clay; strong, fine, crumb structure; very hard consistency; very plastic; no cementation; abrupt and wavy lower boundary; imported fill
Stratum IC: 8-23 cmbs "A1" Horizon; 7.5 YR 5/4 (brown), medium, sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum II: 23-40 cmbs Cultural Layer; 10 YR 3/2 (very dark grayish brown), sandy loam; strong, medium, crumb structure; very hard consistency; slightly plastic; weak cementation; abrupt and wavy lower boundary
Stratum III: 50-BOE cmbs "C" Horizon; 10 YR 3/1 (very dark gray), sandy clay; strong, medium, crumb structure; hard consistency; slightly plastic; weak cementation; sterile
Stratum IA and IB (Figure 22) are grubbed and imported fill layers. Stratum IC is a buried A horizon consisting of brown, stained fine sand. No cultural material was observed in any of the Stratum I layers Stratum II is a cultural layer which contains invertebrate midden and charcoal flecking. Stratum III is a sterile clay C horizon.

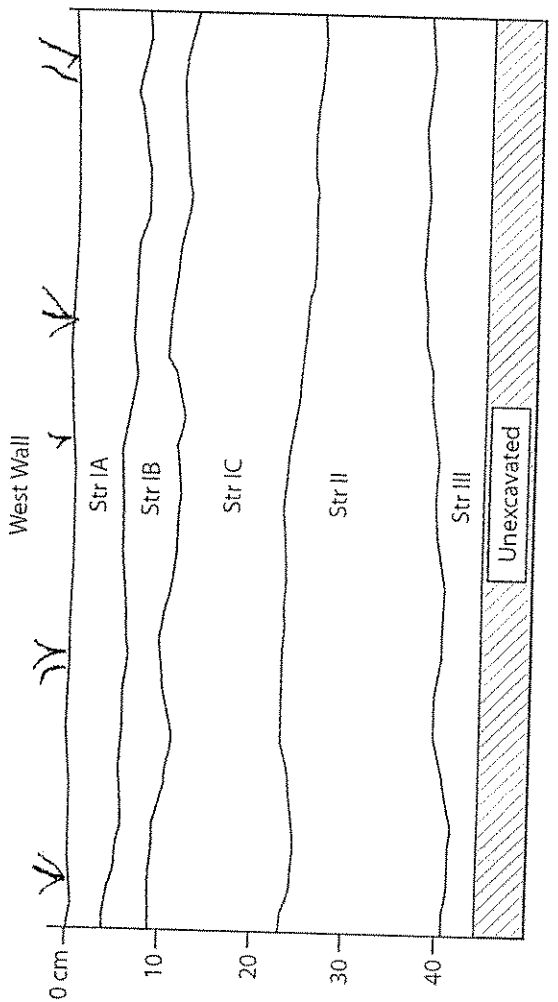

Figure 22 Profile of West Wall of Test Unit 15

P. Test Unit 16

Stratum I: 0-10 cmbs "A" Horizon; 10 YR 4/1 (dark gray), sandy loam; structureless; loose consistency; nonplastic; no cementation; clear and smooth lower boundary; trash pit containing historic bottles (broken) originating from the base of the layer and extending to 105 cmbs

Stratum IIA: 10-20 cmbs Cultural Layer; 10 YR 4/2 (dark grayish brown), sandy loam; weak, fine, crumb structure; soft consistency; nonplastic; no cementation; clear and wavy lower boundary

Stratum IIB: 20-30 cmbs Cultural Layer; 10 YR 4/2 (dark grayish brown), sandy loam; moderate, medium, granular structure; slightly hard consistency; nonplastic; no cementation; abrupt and smooth lower boundary; more compact than IIA

Stratum IIIA: 40-60 cmbs "C" Horizon; 10 YR 4/3 (brown), sandy loam; structureless; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary; sterile

Stratum IIIB: 60-110 cmbs "C" Horizon; 10 YR 4/3 (brown), sandy clay; moderate, medium, crumb structure; hard consistency; nonplastic; no cementation; and lower boundary; sterile

Stratum I (Figure 23) is a 10 cm thick, structureless, sandy loam A horizon. An historic trash pit was encountered in the northeast quadrant originating at the base of Stratum I and extending into Stratum IIIB which contained plentiful ca.1940's glass bottles and trash.

Stratum IIA and IIB are cultural layers with abundant historic artifacts likely associated with late-19th to early 20th century occupation of the shoreline. Numerous pieces of broken glass and rusted metal were collected from the strata.

Stratum IIIA is a sandy loam layer with diminishing amounts of historics intermingled with invertebrate midden and charcoal. Stratum IIIB is a sterile sandy clay C horizon with very sparse charcoal flecking in the upper 5 cm.

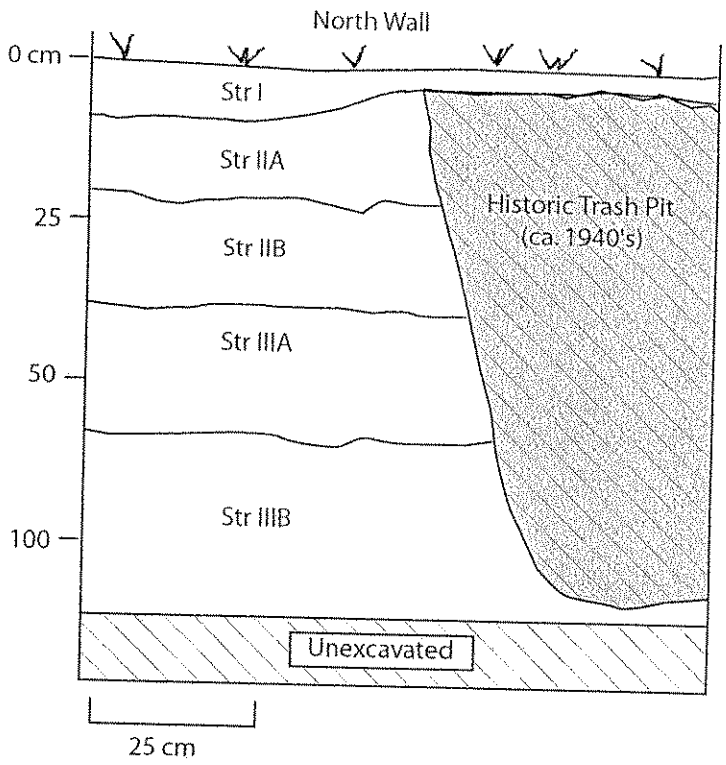

Figure 23 Profile of North Wall of Test Unit 16

Q. Test Unit 17

Stratum IA: 0-5 cmbs "O" Horizon; 10 YR 5/2 (grayish brown), unsorted, sand; structureless; loose consistency; nonplastic; no cementation; very abrupt and smooth lower boundary; modern fire pit with modern trash extending from the base of IA to 20 cmbs

Stratum IB: 5-15 cmbs "A1" Horizon; 10 YR 3/2 (very dark grayish brown), sandy loam; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum IC: 15-25 cmbs "A2" Horizon; 10 YR mixed, sandy loam; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary; striated with three 1-cm thick layers of beach sand

Stratum ID: 25-30 cmbs Beach Sand; 10 YR 7/6 (yellow), medium, sand; structureless; loose consistency; nonplastic; no cementation; very abrupt and broken lower boundary

Stratum II: 30-40 cmbs Cultural Layer; 10 YR 4/2 (dark grayish brown), silt loam; weak, medium, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum III: 40-55 cmbs "C" Horizon; 10 YR 3/1 (very dark gray), sandy clay; moderate, medium, blocky structure; slightly hard consistency; slightly plastic; no cementation; sterile

Stratum I (Figure 24) is a loose sandy O horizon which contained a modern hearth feature extending from the bas of the stratum. Stratum IB and IC are buried A horizons containing abundant invertebrate midden concentrations (198.0 g and 113.4 g respectively) and a total of 7.6 g of vertebrate midden (2.6 and 5.0g repectively). Historic trash was also present in the layers indicating that the layer was contemporaneous with historic occupation. Stratum ID (beach sand) contained 8.4 g of invertebrate midden was sterile and had a broken topography.

Stratum II is a buried, intact cultural layer which consisted of silt loam and contained 144.0 g of marine invertebrate midden and 1.7 grams of vertebrate midden. In addition, several indigenous artifacts were recovered (i.e. worked basalt flake, fish hook fragments) were recovered. Based on the absence of any historic artifacts (vs the relative abundance in IB and IC), it is suggested that Stratum II represents a pre-contact/early historic layer.

Stratum III is a sandy clay C horizon which contained 19.7 g of invertebrate imidden in the upper 10 cm, which intruded into the stratum via cracks in the clay.

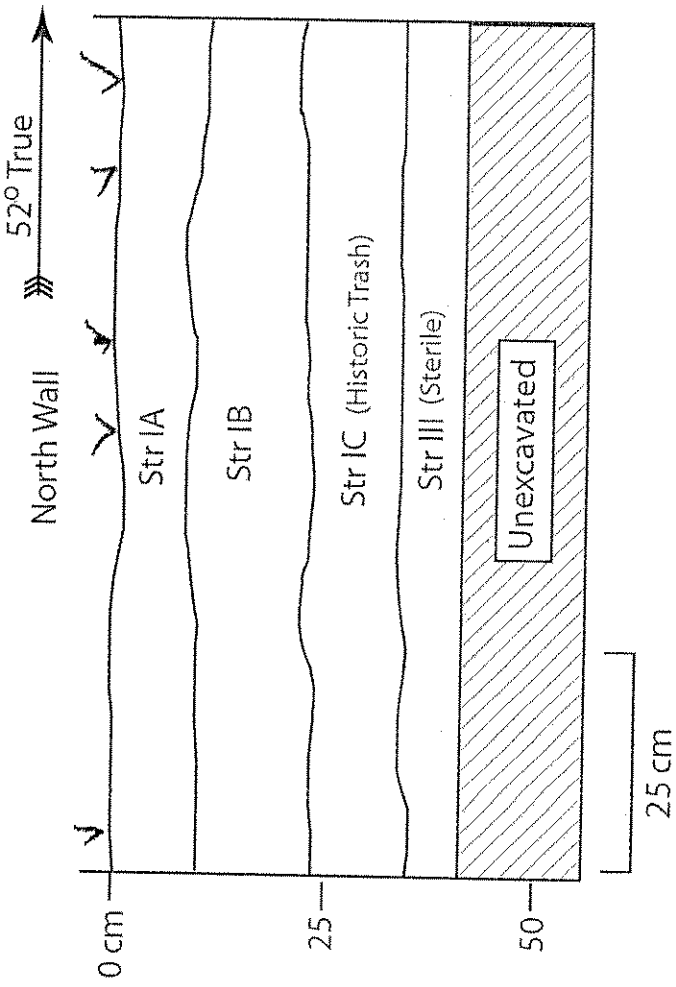

Figure 26 Profile of North Wall of Test Unit 19

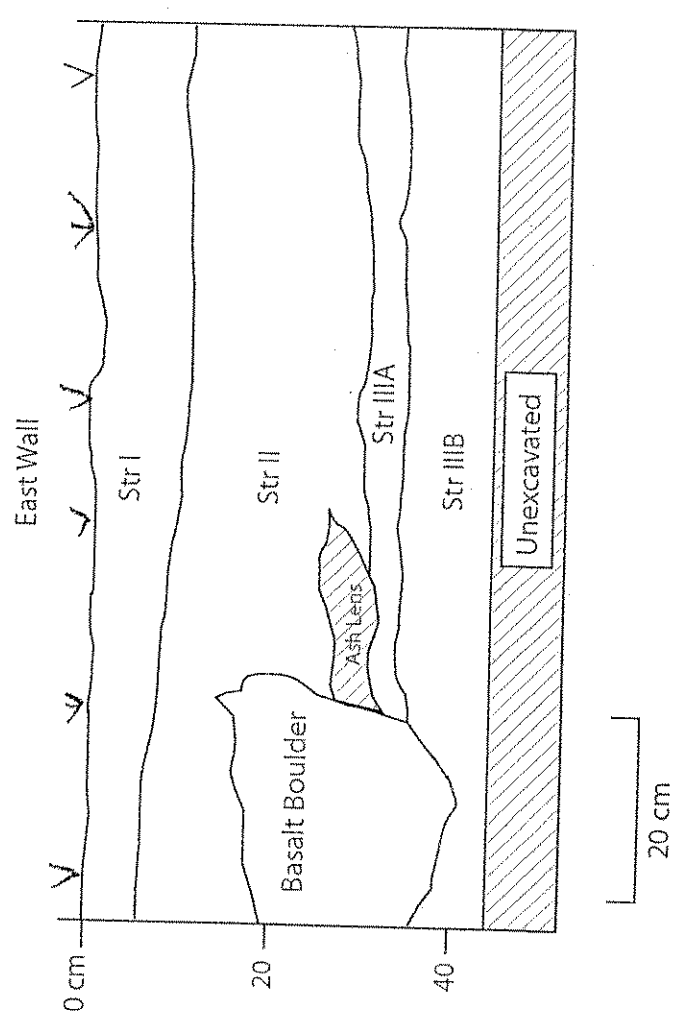

Figure 27 Profile of East Wall of Test Unit 20

U. Test Unit 21

Stratum I: 0-3 cmbs "O"Horizon; 10 YR 5/2 (grayish brown), sandy loam; weak, medium, single grain structure; loose consistency; nonplastic; no cementation; clear and irregular lower boundary
Stratum IIA: 3-20 cmbs "A1"Horizon; 10 YR 4/2 (dark grayish brown), sandy loam; moderate, medium, crumb structure; slightly hard consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IIB: 20-30 cmbs Cultural Layer; 10 YR 3/2 (very dark grayish brown), sandy loam; moderate, medium, crumb structure; slightly hard consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum III: 30-45 cmbs "C"Horizon; 10 YR 3/2 (very dark grayish brown), clay loam; strong, medium, blocky structure; very hard consistency; slightly plastic; no cementation; and lower boundary
Feature A: 30-35 cmbs "ash lens"Horizon; 10 YR 6/4 (light yellowish brown), sand; structure; loose consistency; nonplastic; no cementation; abrupt and broken lower boundary; Ash lens is at the base of Stratum IIB
Stratum I (Figure 28) is a thin O horizon comprised of loose sandy loam. Directly below is Stratum IIA. Stratum IIA is a 17 cm thick A horizon with abundant historic and modern trash (i.e. battery, glass, nails) as well as charcoal and 66.5 g of invertebrate midden and 7.4 g of vertebrate midden. Stratum IIB is a cultural layer which contained both historic and indigenous artifacts and 51.2 g of invertebrate and 7.6 g of vertebrate midden. Two volcanic glass flakes and one shell fishhook were recovered at approximately 30 cmbs. Stratum III contained 52.1 g of pig bone in the upper boundary and is sterile at 38 cmbs. The stratum consisted of clay loam.

V. Test Unit 22

Stratum I: 0-10 cmbs "A1" Horizon; 7.5 YR 4/3 (brown), sandy loam; moderate, medium, granular structure; hard consistency; nonplastic; no cementation; abrupt and wavy lower boundary
Stratum III: 10-15 cmbs "C" Horizon; 10 YR 3/3 (dark brown), sandy clay; strong, medium, crumb structure; hard consistency; plastic; no cementation; sterile
Stratum I (Figure 29) is an A horizon which, based on it provenience, was likely graded down during previous disturbances. Stratum III was encountered only 10 cmbs and represents the sterile C horizon.

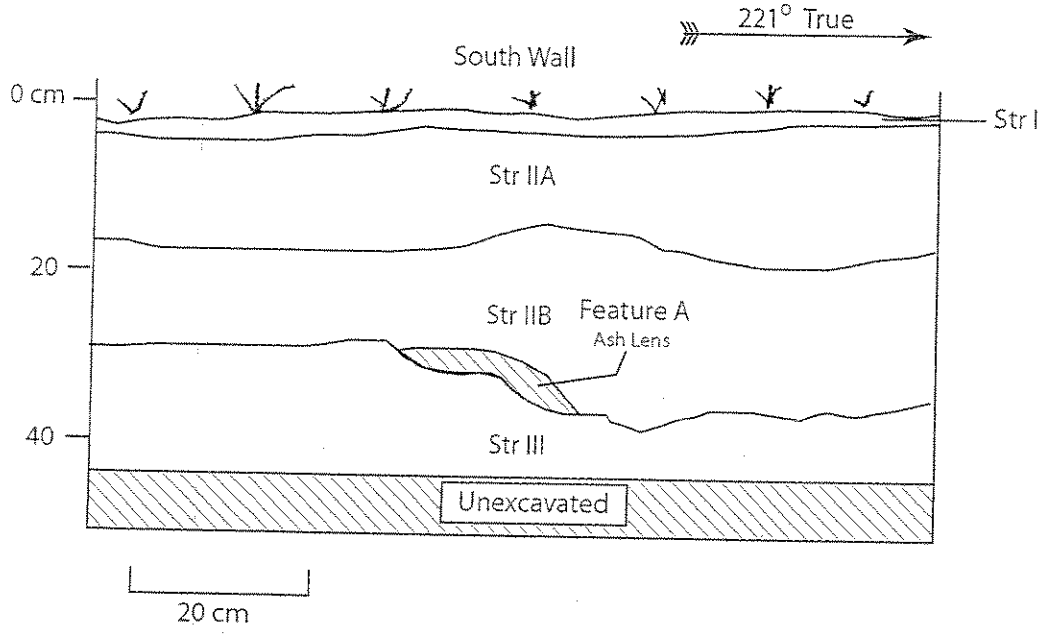

Figure 28 **Profile of South Wall of Test Unit 21**

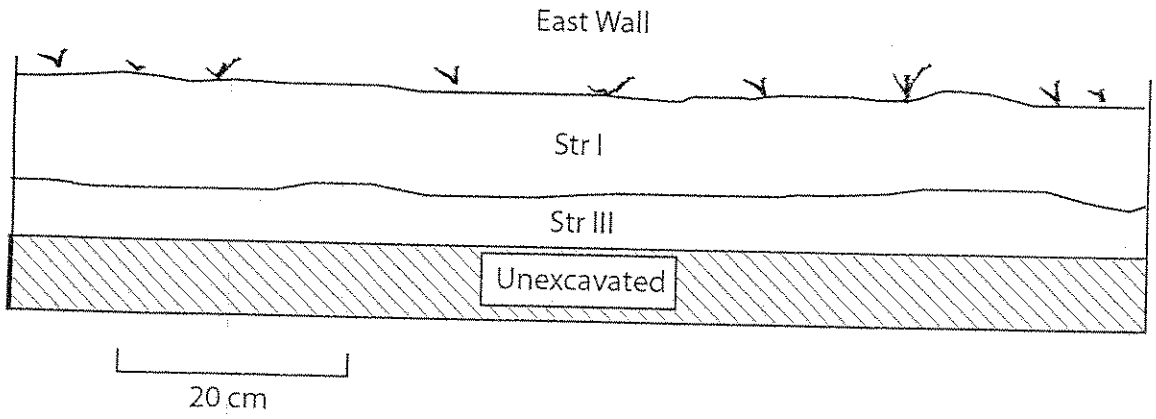

Figure 29 **Profile of East Wall of Test Unit 22**

W. Test Unit 23

Stratum IA: 0-5 cmbs "O" Horizon; 10 YR 4/2 (dark grayish brown), unsorted, sand; weak, medium, granular structure; slightly hard consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 5-12 cmbs "A1" Horizon; 10 YR 3/3 (dark brown), sandy clay; moderate, medium, granular structure; friable consistency; plastic; no cementation; clear and irregular lower boundary
Stratum III: 12-BOE "C" Horizon; 10 YR 3/3 (dark brown), clay; strong, medium, granular structure; friable consistency; plastic; no cementation; and lower boundary; sterile
Stratum IA and IB (Figure 30) are mixed layers which contained both modern and historic trash as well as marine midden and charcoal. Stratum III is the sterile, clay, C horizon. The location of Test Unit 23 is just mauka of the Badayos reinterment area which is marked by a large shrub.

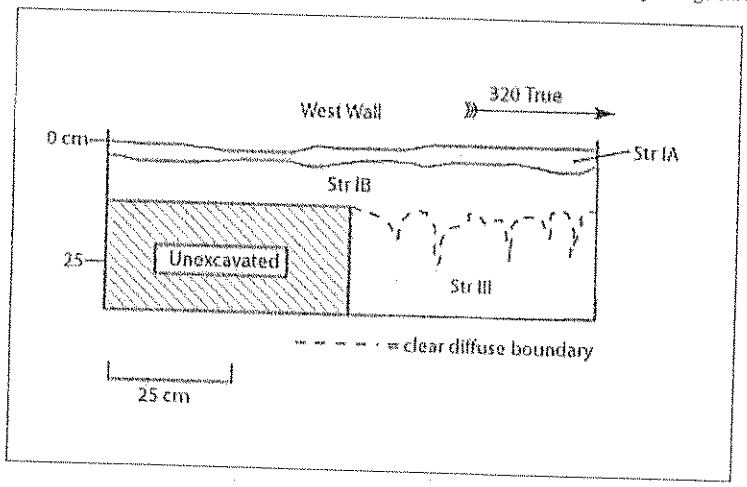

Figure 30 Profile of West Wall of Test Unit 23

X. Test Unit 24

Stratum IA: 0-5 cmbs "O" Horizon; 10 YR 7/2 (light gray), medium to coarse, sand; structureless; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary; disturbed surface deposit
Stratum IB: 5-10 cmbs Fill; 10 YR 4/1 (dark gray), sandy clay; moderate, medium, granular structure; very hard consistency; slightly plastic; strong cementation; abrupt and smooth lower boundary; compacted road fill from abandoned "coral road"
Stratum IC: 10-30 cmbs "A1" Horizon; 10 YR 4/2 (dark grayish brown), coarse, sand; 10 YR 7/4 (striations); weak, fine, granular structure; soft consistency; nonplastic; no cementation; very abrupt and smooth lower boundary; previously disturbed; contains both historic and traditional trash and midden.
Stratum ID: 30-35 cmbs "A2" Horizon; 10 YR 7/2 (light gray), medium, sand; weak, medium, granular structure; loose consistency; nonplastic; no cementation; abrupt and broken lower boundary; mixed in places with IC
Stratum IIA: 35-45 cmbs Cultural Layer; 10 YR 3/3 (dark brown), medium to coarse, sand; moderate, medium, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IIB: 45-70 cmbs Cultural Layer; 10 YR 5/3 (brown), medium to coarse, sand; moderate, medium, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary; intact cultural layer
Stratum IIC: 70-80 cmbs Cultural Layer; 10 YR 3/3 (dark brown), medium to coarse, sand; 10 YR 5/4 (mottling); moderate, medium, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary; intact cultural layer
Stratum IIIA: 80-90 cmbs "C" Horizon; 10 YR 4/4 (dark yellowish brown), medium to coarse, sand; weak, medium, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary; sterile
Stratum IIIB: 90 cm-BOE "C" Horizon; 10 YR 4/3 (brown), sandy clay; strong, medium, granular structure; friable consistency; slightly plastic; no cementation; sterile

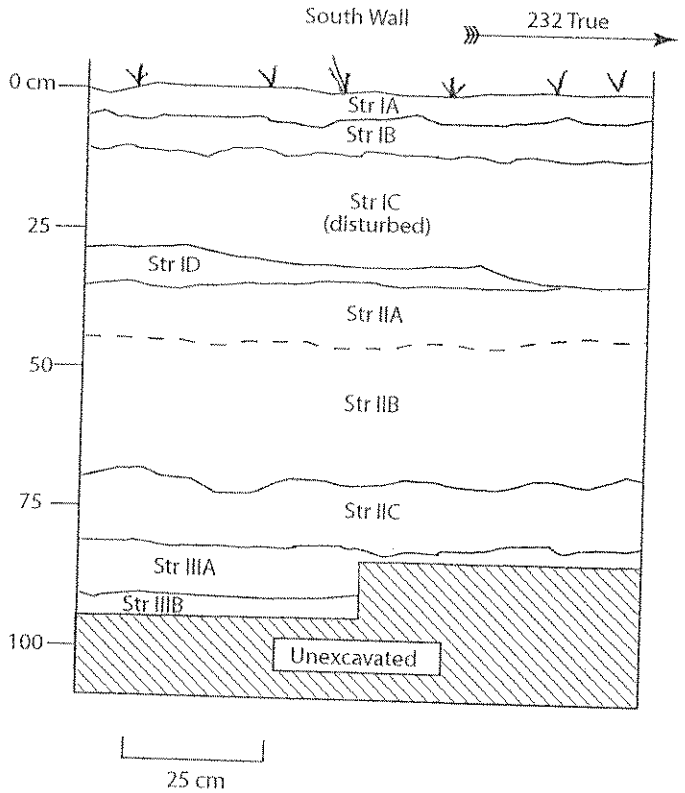

Figure 31 **Profile of South Wall of Test Unit 24**

Stratum IA through ID (0-35 cmbs) (see Figure 31) represent previously disturbed A horizons which contained a mixture of midden, charcoal, historic and modern trash.
Stratum IIA is a medium to coarse, stained sand cultural layer that contains both historic and indigenous artifacts including a coral sinker. The layer averaged 10 cm in thickness and appears intact (no prior disturbances). Invertebrate midden totaled 405.4 g and vertebrate midden totaled 33.3 g.
Stratum IIB is a medium to coarse, brown sand cultural layer which contains a rich assemblage of indigenous artifacts, 526.7 g of invertebrate midden and 22.6 g of vertebrate midden. Five fishhook and fishhook fragments and a fragmented bone pick were recovered from IIB.
Stratum IIC is distinguishable from IIB by a darker hue and mottles. Like IIB, IIC contained indigenous artifacts (five fishhooks/fragments and two coral file tips) which is indicative of marine exploitation.
Stratum IIIA is a nearly sterile, coarse sand layer which had few flecks of charcoal noted as inclusions. Below IIIA at 90 cmbs is IIIB which represents the sterile, sandy clay C horizon.

Y. Test Unit 25

Stratum IA: 0-2 cmbs "O" Horizon; 10 YR series, medium to coarse, sand; structureless; loose consistency; nonplastic; no cementation; clear and smooth lower boundary
Stratum IB: 2-45 cmbs "A1" Horizon; 10 YR 4/1 (dark gray), sandy clay; moderate, medium, granular structure; hard consistency; nonplastic; weak cementation; abrupt and wavy lower boundary
Stratum IIA: 45-62 cmbs Cultural Layer; 10 YR 3/2 (very dark grayish brown), sandy loam; structureless; soft consistency; nonplastic; no cementation; abrupt and wavy lower boundary; intact cultural layer
Stratum IIB: 62-82 cmbs Cultural Layer; 10 YR 8/2 (pale yellow), sandy loam; structureless; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary; intact cultural layer
Stratum III: 82 cm-BOE "C" Horizon; 10 YR 3/4 (dark yellowish brown), sandy clay; strong, medium, crumb structure; very hard consistency; plastic; weak cementation; sterile

Stratum IA and IB (Figure 32) are modern, mixed layers which contain both modern to historic trash as well as a rich concentration of charcoal. Indigenous artifacts were also recovered from this layer, suggesting that previous construction activities likely mixed this layer.
Stratum IIA and IIB are cultural layers which contained indigenous artifacts and midden, and had an absence of historic trash/artifacts. IIA also contained a thin layer of small cobbles and pebbles at the interface with IIB. These stone inclusions were scattered within the layer as well, but were in the highest concentration at the base of the layer. In total, 441.7 g of invertebrate midden was recovered from IIA as well as 5.7 of vertebrate midden. Several artifacts were documented as well, including an *ulu maika*, volcanic glass and two fish hook fragments.
Stratum IIB is approximately 20 cm in thickness and contains a rich midden deposit and several indigenous artifacts. Invertebrate midden collected from IIB totaled 298.3 g and 2.1 g of vertebrate midden was noted. Several artifacts including basalt flakes, 2 fishhook fragments, basalt abrader and volcanic glass were recovered.

Stratum III represents the sterile, sandy clay C horizon.

Z. Test Unit 26

Stratum IA: 0-7 cmbs "A1" Horizon; 10 YR 3/2 (very dark grayish brown), sandy clay; weak, fine, granular structure; soft consistency; slightly plastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 7-10 cmbs "A2" Horizon; 10 YR 3/6 (dark yellowish brown), clay; moderate, fine, crumb structure; slightly hard consistency; nonplastic; no cementation; abrupt and wavy lower boundary
Stratum IC: 10-22 cmbs Fill; 10 YR 3/2 (very dark brown), gravelly clay; strong, coarse or thick, blocky structure; extremely hard consistency; nonplastic; strong cementation; clear and wavy lower boundary; inclusions of basalt and coral gravel- graded and filled area just mauka of old railroad bed
Stratum III: 22-BOE "C" Horizon; 10 YR 5/6 (yellowish brown), clay; strong, coarse or thick, columnar structure; slightly hard consistency; plastic; no cementation; sterile-decomposing bedrock
Stratum IA and IB (Figure 33) are fill layers overlying remains of the old coral road bed (Stratum IC). Historic to modern trash was found in IA and IB. The location of the test unit was within a low area which appeared to have been previously graded down to the common sandy clay C horizon (IIIA). No indigenous cultural material was recovered from the test unit.

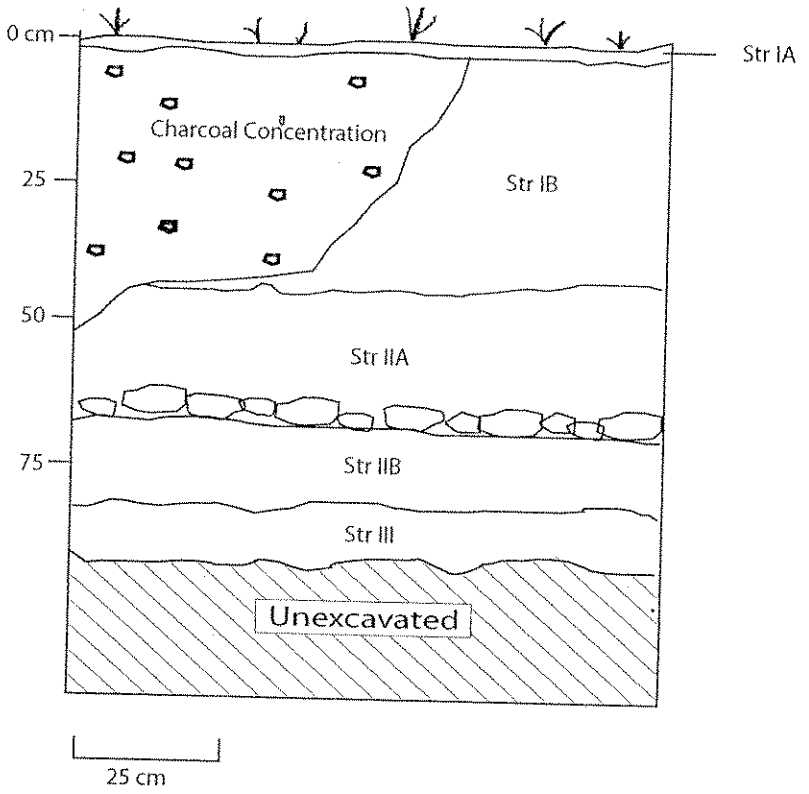

Figure 32 Profile of North Wall of Test Unit 25

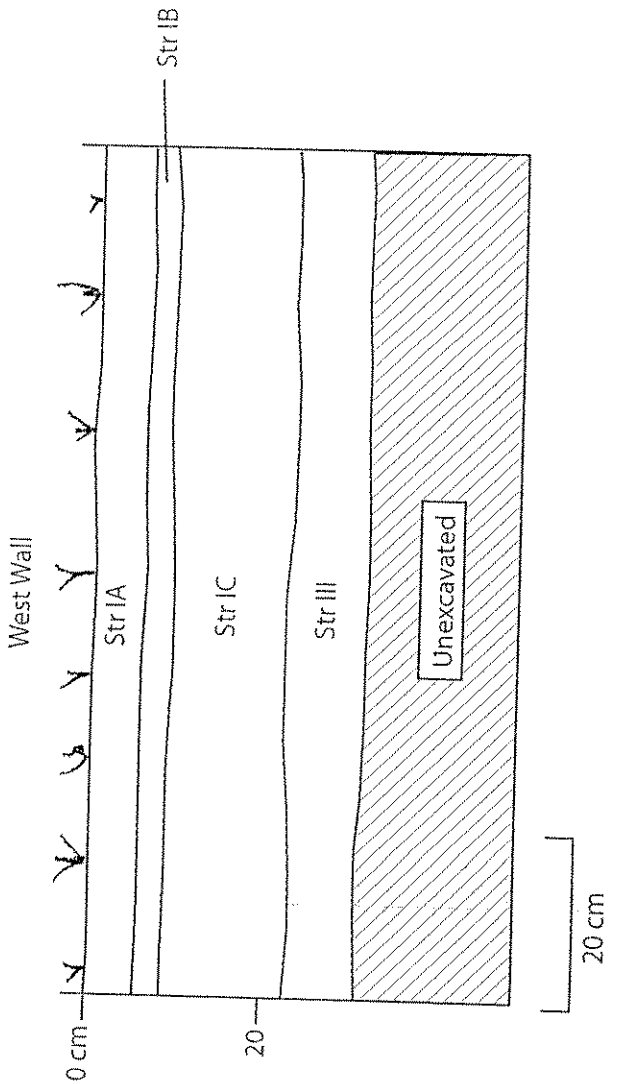

Figure 33 Profile of Wall of Test Unit 26

AA. Test Unit 27

Stratum I: 0-25 cmbs "A1" Horizon; 10 YR 3/2 (very dark grayish brown), sandy loam; structureless; loose consistency; nonplastic; no cementation; clear and wavy lower boundary

Stratum IIA: 25-40 cmbs "A2" Horizon; 10 YR 3/2 (very dark grayish brown), sandy loam; weak, fine, single grain structure; soft consistency; nonplastic; no cementation; very abrupt and smooth lower boundary; cultural layer

Stratum IIB: 40-60 cmbs Cultural Layer; 10 YR 5/2 (grayish brown), sandy loam; moderate, medium, columnar structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary; intact cultural layer

Stratum III: 60-65 cmbs "C" Horizon; 10 YR 6/4 (light yellowish brown), fine, sand; structureless; loose consistency; nonplastic; no cementation; sterile

Stratum I (Figure 34) is a thick, loose, structureless A horizon located near the wave cut bank. Only 23.3 g of invertebrate midden was recovered from the layer. Extending from the base of the stratum is a pit feature which is ringed with basalt cobbles and "marked" by basalt capstones (see Feature I description below).

Stratum IIA is a cultural layer that contained 84.5 g of invertebrate midden, 4.0 g of vertebrate midden and a small amount of historic trash suggesting a late 19th to early 20th century age. One coral file and one piece of worked bone were recovered suggesting a possible mixing of strata or that the stratum represents a transition from traditional to imported tool implements. Stratum IIB is a second distinct and intact cultural layer with a less dense midden concentration (59.7 g invertebrate and 21.6 g vertebrate) and no indigenous artifacts.

Stratum III represents a thin, sterile sand layer, overlying the sandy clay C horizon.

Feature I (see Figure 35) represents a probable burial crypt which intruded 40 cm into the northern portion of the test unit. The feature originated from the base of Stratum I and extended into the C horizon. The feature was marked by a cover of basalt "capstones" and a ring of basalt cobbles around the perimeter of the feature. No human remains were encountered within the feature, but based on its proximity to previously documented burials, its depth of origin (from the base of Stratum I) and the construction style of the pit, it is suggested that the feature represents a possible 19th century burial crypt.

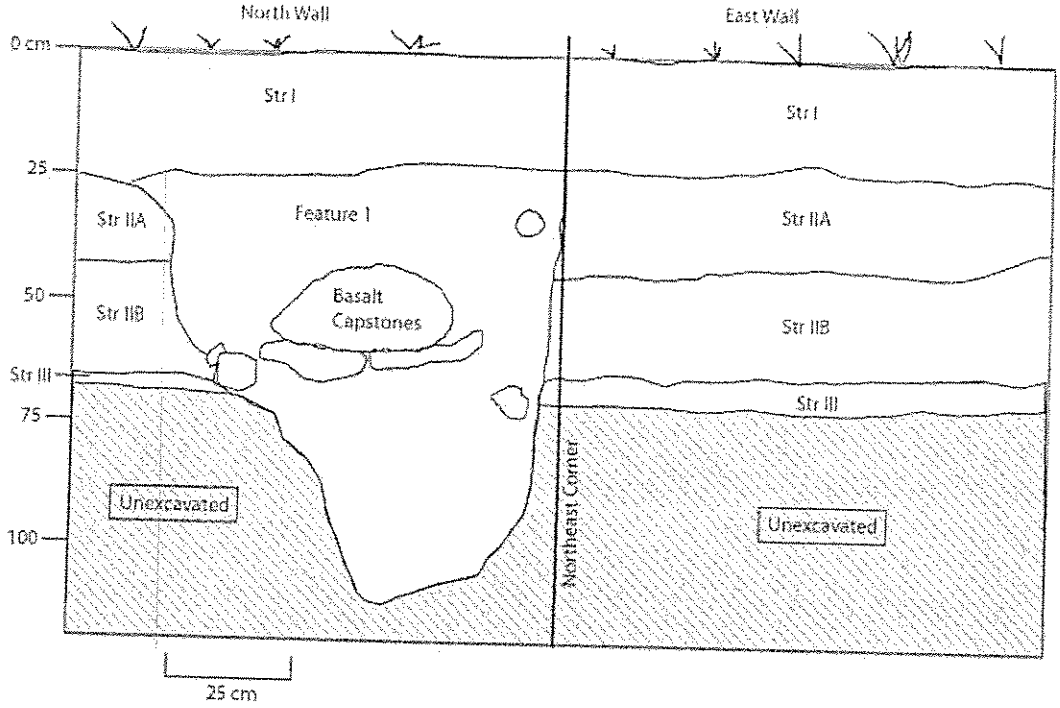

Figure 34 **Stratigraphic Sequence of the North and East Walls of Test Unit 27**

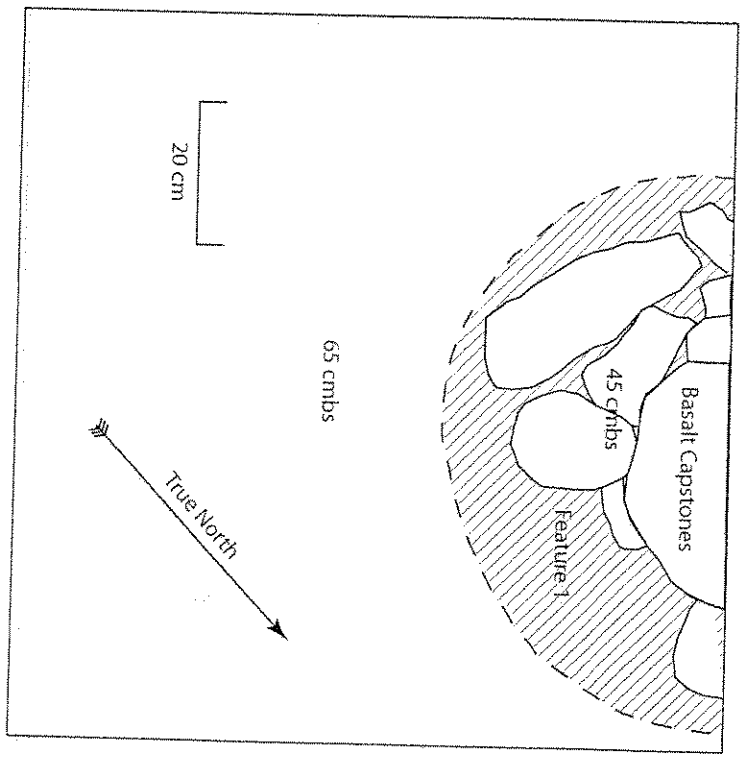

Figure 35 **Plan View of Feature 1 in Test Unit 27**

BB. Test Unit 28

Stratum IA: 0-3 cmbs "O" Horizon; 10 YR 4/3 (brown), sandy loam; moderate, medium, crumb structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum IB: 3-10 cmbs "A1" Horizon; 10 YR 3/2 (very dark grayish), sandy clay; moderate, medium, crumb structure; hard consistency; slightly plastic; strong cementation; abrupt and smooth lower boundary

Stratum III: 10-30 cmbs "C" Horizon; 10 YR 3/1 (very dark gray), sandy clay; strong, medium, crumb structure; very hard consistency; plastic; strong cementation; abrupt and smooth lower boundary; sterile

Stratum IA (Figure 36) is a thin, soft sandy loam O horizon with abundant organic materials. Stratum IB is a 7 cm thick A horizon with very few midden or charcoal inclusions. Stratum III is a sterile C horizon. This test unit was situated near the right-of-way of the old O.R.&L. railroad. The absence of an intact cultural layer and a relatively shallow C horizon suggest that the area was likely graded prior to construction.

CC. Test Unit 29

Stratum IA: 0-12 cmbs "O" Horizon; 10YR 6/4 (pale brown), fine, sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; very abrupt and smooth lower boundary

Stratum IB: 12-17 cmbs "A1" Horizon; 10 YR 5/3 (brown), sandy loam; weak, medium, granular structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum III: 17-boe cmbs "C" Horizon; 10 YR 3/2 (very dark grayish brown), sandy clay; moderate, medium, crumb structure; slightly hard consistency; plastic; no cementation; and lower boundary

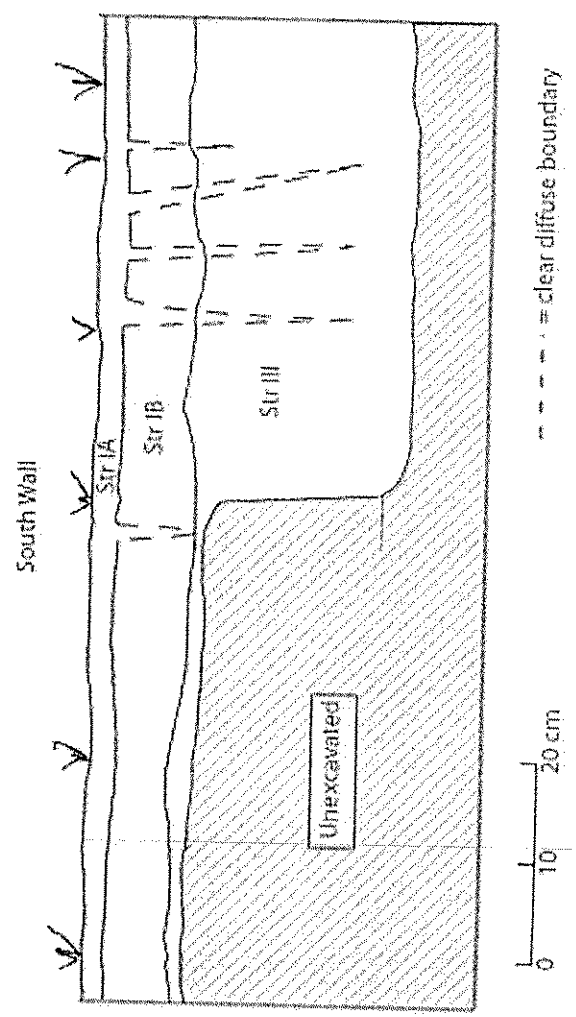

Figure 36 Profile of South Wall of Test Unit 28

Stratum IA (Figure 37) is a 12 cm thick layer of fine, structureless sand that contained abundant organic matter. Stratum IB is the buried, sandy loam A horizon, which contained very little invertebrate midden, charcoal or historic trash. Stratum III is the sterile, sandy clay C horizon. This unit was placed on the inside of a basalt boulder alignment (Figure 38). It was anticipated that excavation of the unit would clarify the nature and function of the alignment. Subsequent to excavation, it was observed that many of the aligned boulders were surface deposits and did not extend below the sandy Stratum IA. Like Test Unit 27 the absence of an intact cultural layer and a relatively shallow C horizon suggest that the area was likely graded prior to construction of the O.R.&L. railroad.

DD. Test Unit 30

Stratum IA: 0-5 cmbs "O" Horizon; 10 YR 5/2 (grayish brown), medium to coarse, sand; structureless; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 5-10 cmbs Fill; 2.5 YR 3/4 (dark reddish brown), sandy clay; weak, medium, granular structure; soft consistency; slightly plastic; no cementation; very abrupt and smooth lower boundary
Stratum IC: 10-40 cmbs "A1" Horizon; 10 YR series, sand; structureless; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary; previously disturbed
Stratum IIIA: 40-50 cmbs "C" Horizon; 10 YR 4/2 (dark graysih brown), sandy loam; moderate, medium, granular structure; slightly hard consistency; nonplastic; no cementation; abrupt and wavy lower boundary;
Stratum IIIB: 50-BOE "C" Horizon; 10 YR 5/2 (grayish brown), sandy loam; strong, coarse or thick, granular structure; slightly hard consistency; nonplastic; no cementation; sterile
Stratum IA through IC (Figure 39) are previously disturbed or fill layers. Very little invertebrate midden or charcoal were recovered from these layers. Stratum IIIA is a buried A horizon which contained very little charcoal flecking which had filtered down through cracks in the hard sandy loam and clay. Stratum IIIB represents the sterile, sandy clay C horizon encountered throughout the project area.

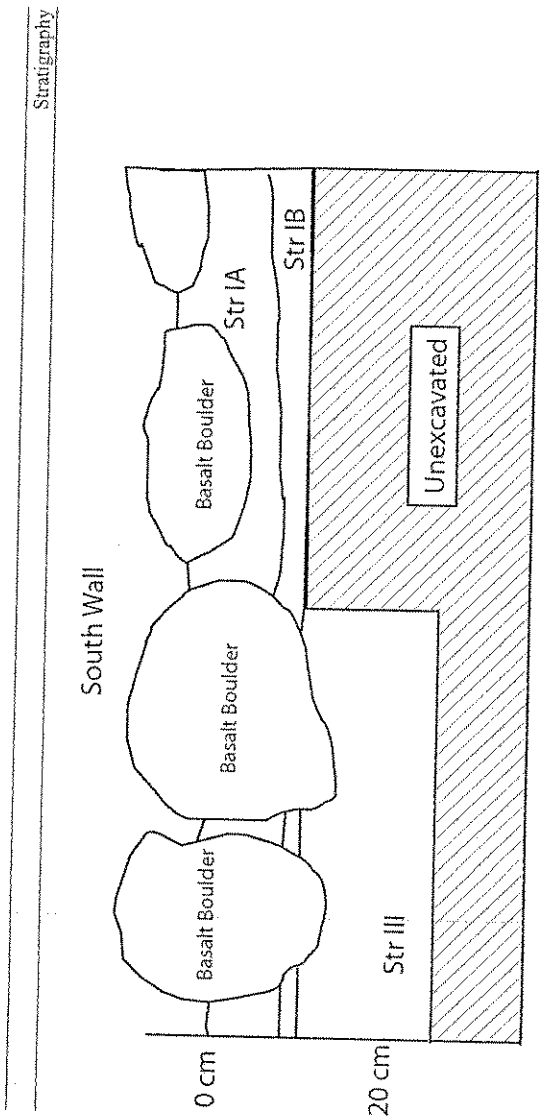

Figure 37 Profile of East Wall of Test Unit 29

Figure 38 Plan View of Rectangular Alignment (State Site 50-80-07-6635) and Location of Test Unit 29

Figure 39 View of West Wall of Test Unit 30

EE. Test Unit 35

Stratum IA: 0-7 cmbs "O" Horizon; 10 YR 6/3 (pale brown), fine, sand; weak, fine, single grain structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum IB: 7-15 cmbs "A1" Horizon; 10 YR 7/4 (very pale brown), fine, sand; weak, fine, single grain structure; loose consistency; nonplastic; no cementation; very abrupt and smooth lower boundary

Stratum IIA: 15-25 cmbs Cultural Layer; 10 YR 3/2 (very dark grayish brown), , sandy loam; weak, fine, single grain structure; soft consistency; nonplastic; no cementation; clear and wavy lower boundary

Stratum IIB: 25-35 cmbs Cultural Layer; 10 YR 4/2 (dark grayish brown), sandy loam; weak, fine, single grain structure; soft consistency; nonplastic; no cementation; abrupt and wavy lower boundary

Stratum IIC: 35-50 cmbs Cultural Layer; 10 YR 7/4 (very pale brown), fine, sand; weak, fine, single grain structure; soft consistency; nonplastic; no cementation; abrupt and wavy lower boundary

Stratum III: 50- BOE cmbs "C" Horizon; 10 YR 4/4 (dark yellowish brown), sandy clay; strong, medium, granular structure; hard consistency; slightly plastic; no cementation; sterile

Strata IA and IB (Figure 40) are pale brown sands that contain modern trash inclusions. Stratum IIA, IIB and IIC are cultural layers with plentiful invertebrate midden (29.1, 154.9, and 88.6 g respectively) and charcoal. One bone fishhook fragment was recovered from Stratum IIB. Stratum III contained almost 90 g of invertebrate midden in the transition from IIC (likely due to infiltration into cracks in the upper 5-10 cm) though is otherwise a sterile, sandy clay C horizon, which correspond to the C horizon encountered throughout the project area.

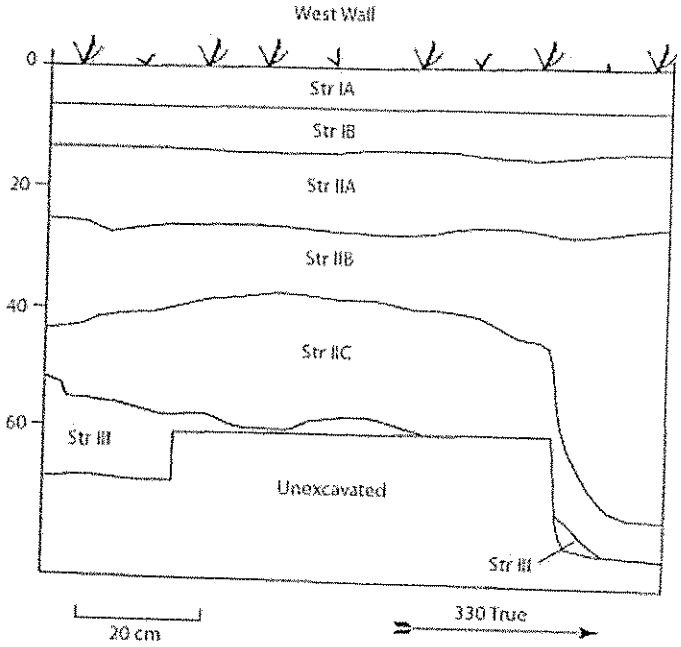

Figure 40 Profile of West Wall of Test Unit 35

FF.Test Unit 36

Stratum IA: 0-8 cmbs "O" Horizon; 10 YR 5/2 (grayish brown), medium to coarse, sand; structureless; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 8-15 cmbs "A1" Horizon; 10 YR 4/2 (dark grayish brown), sandy loam; weak, medium, crumb structure; soft consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IC: 15-30 cmbs "A2" Horizon; 10 YR series (mixed), medium to coarse, sand; weak, medium, granular structure; soft consistency; nonplastic; no cementation; clear and smooth lower boundary; Striated with 10 YR 7/3 sand
Stratum IIA: 30-50 cmbs Cultural Layer; 10 YR 4/1 (dark gray), sandy loam; moderate, medium, granular structure; slightly hard consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IIB: 50-67 cmbs Cultural Layer; 10 YR 4/1 (dark gray), sandy clay; moderate, medium, granular structure; hard consistency; nonplastic; no cementation; very abrupt and wavy lower boundary; abundant charcoal, marine shell, flakes
Stratum III: 67 cmbs-BOE "C" Horizon; 10 YR 6/4 (light yellowish brown), fine to medium, sand; moderate, coarse or thick, blocky structure; hard consistency; nonplastic; weak cementation; sterile
Strata IA through IC (Figure 41) represent recent and mixed deposits of sand and sandy loams. Historic and modern trash were encountered in all three layers.
Stratum IIA and IIB represent probable historic layers which also contain an indigenous artifact component. Stratum IIA contained a coral file tip, a basalt abrader and a basalt flake. Invertebrate midden recovered totaled 225.3g. Stratum IIB contained two basalt flakes as well as a rusted metal fragment suggesting a post-contact date. A total of 184.8 g of invertebrate midden were recovered from this stratum. The presence of such a small amount of historics however may have been caused by bioturbation in the soft sands.
Stratum III is a sterile sand layer similar to Stratum IIIA in Test Unit 35. The sand was excavated down to the top of sterile C horizon.

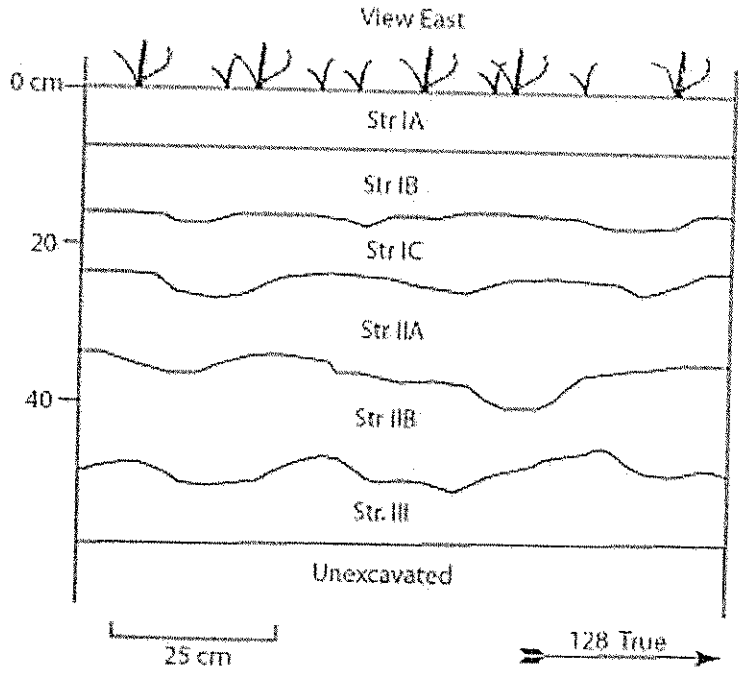

Figure 41 Profile of East Wall of Test Unit 36

The following profiles numbered 31-34 were taken from cleaned wave cut banks along the high surf line of the project area.

GG. Profile 31

Stratum IA: 0-3 cmbs "O" Horizon; 10 YR 8/3 (very pale brown), fine to medium, sand; structureless; soft consistency; nonplastic; no cementation; very abrupt and smooth lower boundary
Stratum IB: 3-18 cmbs "A1" Horizon; 10 YR 8/3 (very pale brown), fine to medium, sand; structureless; soft consistency; nonplastic; no cementation; very abrupt and smooth lower boundary
Stratum IIIA: 18-40 cmbs "C" Horizon; 10 YR 3/4 (dark yellowish brown), clay with 10 YR 7/2 mottling; strong, medium, blocky structure; hard consistency; plastic; weak cementation; clear and smooth lower boundary
Stratum IIIB: 40-80 cmbs "C" Horizon; 10 YR 3/3 (dark brown), clay; 10 YR 2/1, common, mottles; strong, medium, blocky structure; hard consistency; plastic; weak cementation; clear and smooth lower boundary
Stratum IIIC: 80-120 cmbs "C" Horizon; 10 YR 4/1 (dark gray), clay; 10 YR 4/6, common mottles; moderate, coarse or thick, blocky structure; slightly sticky consistency; plastic; no cementation; abrupt and irregular lower boundary
Stratum IIID: 120 cmbs - BOE "C" Horizon; Coral bedrock
Strata IA and IB (Figure 42) are the O horizon and developing A horizon, respectively. No cultural materials were observed in either of the layers. Strata IIIA through IIID represent descending layers of the C horizon. These layers represent pre-human occupation of the Wai'anae Coast and are likely associated with accumulation of alluvial clays.

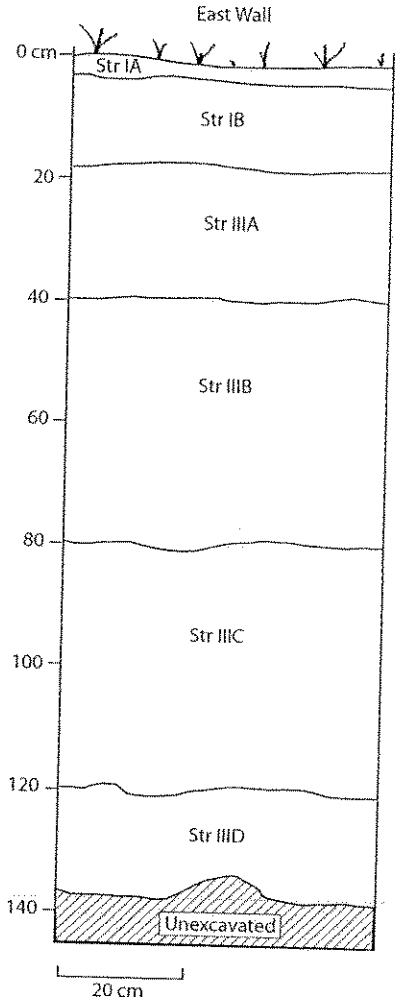

Figure 42 Stratigraphic Sequence of East Wall of Profile 31

HII. Profile 32

Stratum I: 0-15 cmbs "A1" Horizon; 10 YR 4/2 (dark grayish brown), sandy loam; weak, fine, granular structure; soft consistency; nonplastic; weak cementation; abrupt and smooth lower boundary

Stratum II: 15-25 cmbs "A2" Horizon; 10 YR 5/1 (gray), loamy sand; weak, fine, blocky structure; soft consistency; nonplastic; weak cementation; abrupt and irregular lower boundary

Stratum IIIA: 25-45 cmbs "C" Horizon; 10 YR 7/4 (very pale brown), very fine, sand; structureless; loose consistency; nonplastic; weak cementation; abrupt and smooth lower boundary; sterile

Stratum IIIB: 45-59 cmbs "C" Horizon; 10 YR 3/3 (dark brown), fine, sandy clay; weak, fine, blocky structure; friable consistency; slightly plastic; weak cementation; clear and irregular lower boundary; sterile

Stratum IIIC: 59-77 cmbs "C" Horizon; 10 YR 3/4 (dark yellowish brown), clay loam; strong, medium, blocky structure; friable consistency; slightly plastic; no cementation; clear and wavy lower boundary; sand grains between peds in vertically drying cracks, sterile

Stratum IIID: 77-102 cmbs "C" Horizon; 10 YR 3/2 (very dark grayish brown), clay; strong, medium, blocky structure; extremely firm consistency; sterile

Stratum I (Figure 43) is a sandy loam A, horizon which contained very few charcoal and *pipipi* shells. The layer was likely intermittently mixed by high surf and human disturbances though no historic or modern trash was observed.

Stratum II is a loamy sand cultural layer / buried A horizon, which contained very few marine shells and charcoal.

Stratum IIIA is a fine sand, structureless, C horizon. No cultural materials were observed in the 20 cm thick layer. Stratum IIIB through IIID are derived from clay material and range in texture from sandy clay to clay loam to clay. The layers represent parent C horizons and did not contain any cultural material.

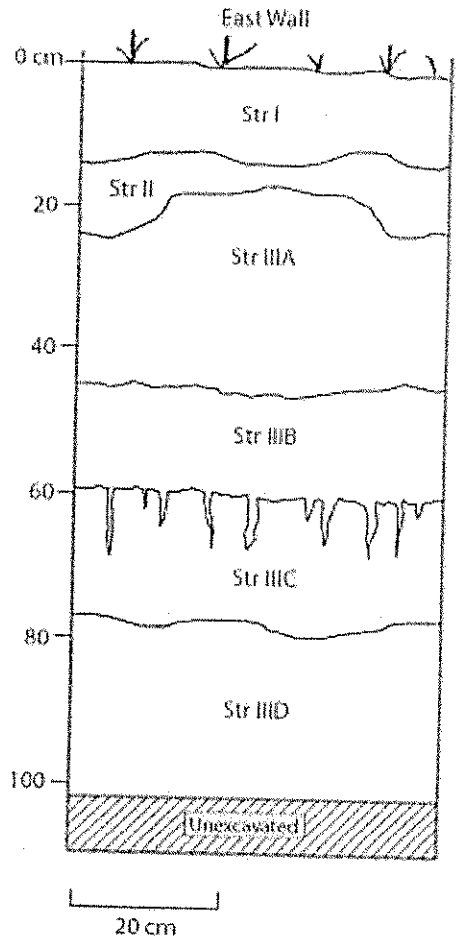

Figure 43 Stratigraphic Sequence of East Wall of Profile 32

II. Profile 33

Stratum I: 0-2 cmbs "O" Horizon; 10 YR 3/1 (very dark gray), fine to medium, sand; structureless; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary
Stratum II: 2-40 cmbs "A1" Horizon; 10 YR 3/1 (very dark gray), sandy loam; structureless; loose consistency; nonplastic; no cementation; clear and wavy lower boundary
Stratum IIIA: 30-45 cmbs "C" Horizon; 10 YR 7/4 (very pale brown), very fine, sand; structureless; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary; sterile
Stratum IIIB: 45-65 cmbs "C" Horizon; 10 YR 3/4 (dark yellowish brown), sandy clay; weak, medium, blocky structure; nonsticky consistency; slightly plastic; no cementation; clear and smooth lower boundary; sterile
Stratum IIIC: 65-115 cmbs "C" Horizon; 10 YR 2/2 (very dark brown), clay; strong, coarse or thick, blocky structure; slightly sticky consistency; slightly plastic; no cementation; overlays limestone bedrock, sterile
See Figure 44 and for description. Only slight changes in hue and thickness were observed though the overall development of the stratigraphic sequence was the same as that of Profile 32 (Figure 43).

JJ. Profile 34

Stratum IA: 0-2 cmbs "O" Horizon; 10 YR 3/3 (dark brown), sandy loam; moderate, medium, crumb structure; slightly hard consistency; slightly plastic; strong cementation; abrupt and smooth lower boundary
Stratum IB: 2-16 cmbs "A1" Horizon; 10 yr 4/3 (brown), sandy loam; moderate, medium, granular structure; soft consistency; nonplastic; weak cementation; abrupt and wavy lower boundary
Stratum IC: 16-20 cmbs "A2" Horizon; 10 YR 3/3 (dark brown), sandy loam; strong, medium, crumb structure; hard consistency; nonplastic; weak cementation; clear and wavy lower boundary; previously disturbed

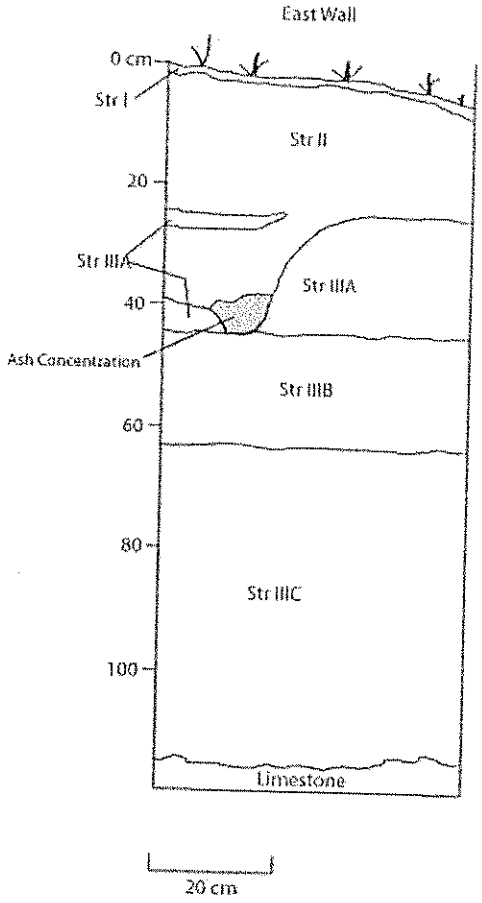

Figure 44 Stratigraphic Sequence of East Wall of Profile 33

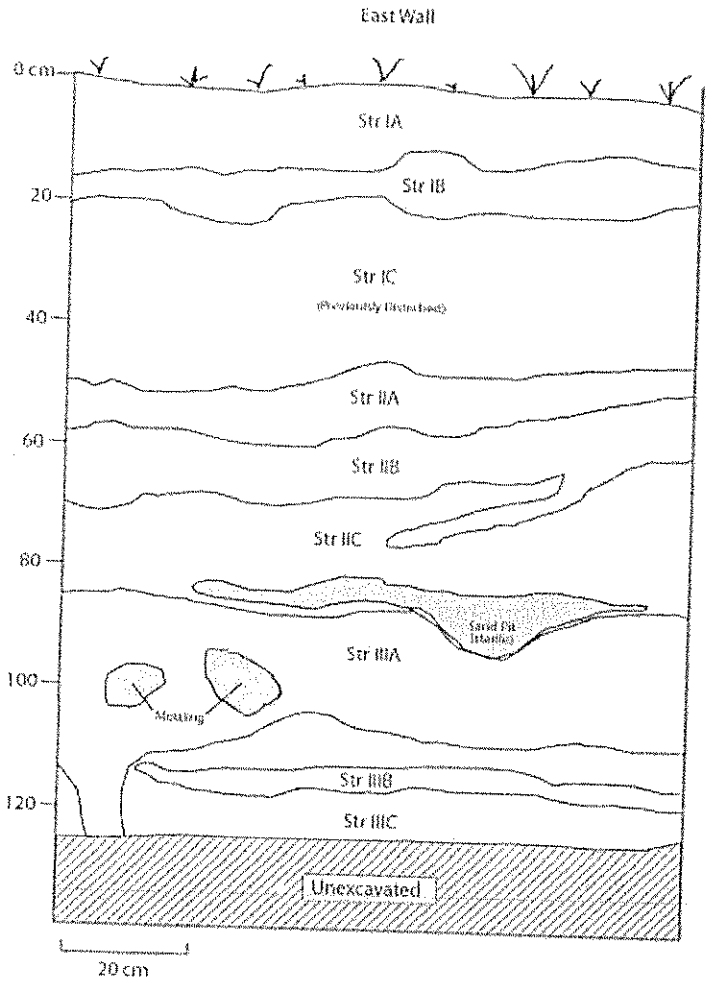

Figure 45 Profile of East Wall of Profile 34

Stratum IIA: 20-50 cmbs Charcoal Layer; 10 YR 4/3 (brown), sandy loam; strong, medium, crumb structure; hard consistency; nonplastic; strong cementation; abrupt and wavy lower boundary; contains charcoal and midden

Stratum IIB: 50-70 cmbs Cultural Layer; 7.5 YR 6/3 (light brown), medium to coarse, sand; weak, medium, single grain structure; soft consistency; nonplastic; weak cementation; abrupt and wavy lower boundary; contains charcoal and midden

Stratum IIC: 70-84 cmbs Cultural Layer; 10 YR 5/3 (brown), sand; strong, medium, granular structure; slightly hard consistency; nonplastic; weak cementation; abrupt and wavy lower boundary

Stratum IIIA: 116-118 cmbs "C" Horizon; 10 YR 6/6 (brownish yellow), sand; moderate, medium, crumb structure; slightly hard consistency; nonplastic; strong cementation; abrupt and wavy lower boundary

Stratum IIIB: 116-118 cmbs "C" Horizon; 10 YR 5/6 (brownish yellow), sand; moderate, medium, crumb structure; slightly hard consistency; nonplastic; weak cementation; abrupt and irregular lower boundary; may represent a storm deposit

Stratum IIIC: 110-BOE "C" Horizon; 10 YR 3/2 (very dark grayish brown), sandy clay; strong, fine, prismatic structure; very hard consistency; very plastic; weak cementation; abrupt and smooth lower boundary

Stratum IA through IC (see Figure 45) represent modern to historically mixed sandy loams which contain both modern to historic trash. Charcoal and marine shells were observed though it is likely that these were derived from 20th century activities.

Stratum IIA through IIC are pre-contact to early post-contact cultural layers which did not contain any historic trash. The layers from this sequence correspond similarly to those in Test Units 24 and 25 approximately 30 m to the south, which contained an abundance of midden and indigenous artifacts.

Stratum IIIA through IIIC are sterile layers. IIIA and IIIB are yellowish sands which display cemented characteristics, and have moderate structure grade. Stratum IIIC is a sandy clay C horizon found commonly across the project area.

Area 2

In Area 2 (see Figure 1; Figure 7) of the project area, six backhoe trenches were excavated in the grassy backbeach area in an attempt to locate any culture bearing sediments the stratigraphic sequence was similar to the non-culture bearing layers in Area 1. In general the stratigraphy consisted of 1-2 layers of imported fill overlying 1-3 layers of mixed and/or disturbed "A" horizon and sand which contained historic and modern trash. A sterile clay to sandy clay layer was encountered as shallow as 60 cmbs in the northern portion of Area 2

KK. Backhoe Trench #1

Stratum IA: 0-17 cmbs Fill; 7.5 YR 3/3 (dark brown), loamy silt; weak, fine, granular structure; slightly sticky consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum IB: 17-35 cmbs "A1" Horizon; 10 YR 6/4 (light yellowish brown), sandy loam; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary

Stratum IC: 35-60 cmbs "A2" Horizon; 2.5 YR 8/6 (pale yellow), fine, sand; weak, fine, granular structure; loose consistency; abrupt and smooth lower boundary;

Stratum III: 60 -BOE "C" Horizon; 10 YR 2/1 (black), clay; strong, fine, granular structure; very sticky consistency; sterile
Stratum IA (Figure 46) is an imported soil introduced for growth of park grass. Contains very little modern trash (plastic fragments). Stratum IB is a mixture of imported top soil and beach sand. Contains small amount of fine shell fragments. Stratum IC is a white /blond fine to large grain sand with few inclusions. Stratum II is a thick wet clay with no visible inclusions . A soil sample was taken at 2.98 m near the base of excavation of Stratum III.

LL. Backhoe Trench #2

Stratum IA: 0-5 cmbs Fill; 7.5 YR 3/3 (dark brown), loamy silt; weak, fine, granular structure; slighlty sticky consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 5-50 cmbs Beach Sand; 2.5 YR 8/6 (pale yellow), sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IIA: 50-98 cmbs Cultural Layers; 7.5 YR 4/3 (brown), sand; moderate, fine, granular structure; very friable consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IIB: 98-125 cmbs Cultural Layer: 7.5 YR 4/2 (brown), sand; moderate, fine, granular structure; friable consistency; nonplastic, no cementation, abrupt and smooth lower boundary
Stratum III: 125 cmbs - BOE "C" Horizon; 10 YR 2/1 (black), clay; strong, fine, granular structure; very sticky consistency; plastic; no cementation; and lower boundary
Stratum IA (Figure 47) is an imported soil introduced for growth of park grass. Contains very little modern trash (plastic fragments). Stratum IB is a sterile white/blond beach sand, no inclusions.

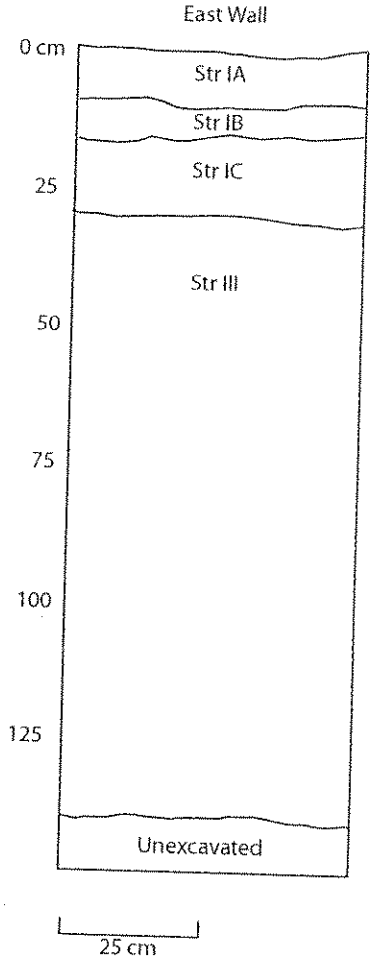

Figure 46 Profile of East Wall of Backhoe Trench #1

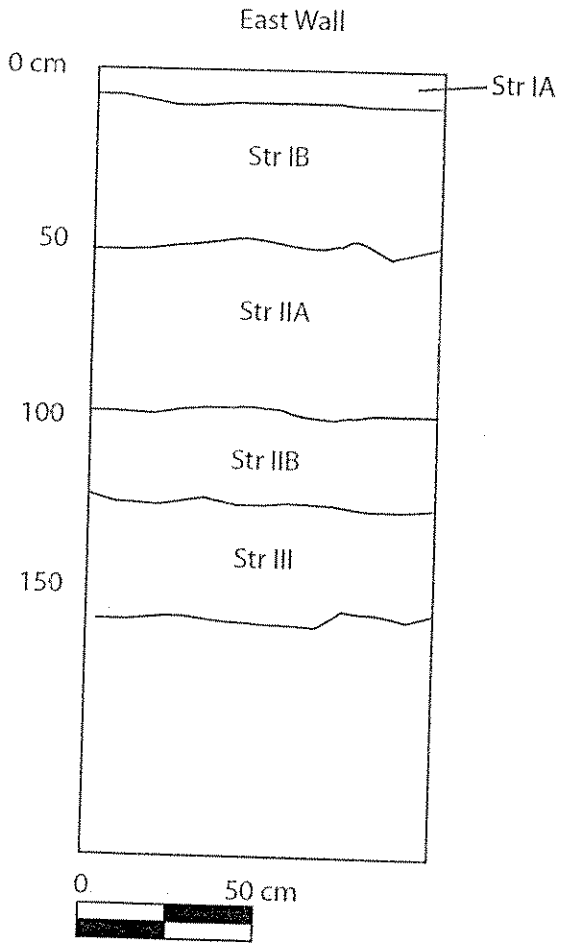

Figure 47 **Profile of West Wall of Backhoe Trench #2**

Stratum II is a mixture of imported top soil and beach sand. Contains small amount of fine shell fragments. Stratum IIC is a mixture of loamy clay and beach sand. This stratum contained small flecks of charcoal, a charcoal sample was taken at 1.08 m in Stratum IIC. Stratum III is a thick wet clay with no visible inclusions. A soil sample was taken at 1.55 m in Stratum III. A modern beer or soda bottle neck was also found at 1.49 m in Stratum III.

MM. Backhoe Trench #3

Stratum IA: 0-20 cmbs Fill; 7.5 YR 3/3 (dark brown), loamy silt; weak, very fine or very thin, granular structure; slightly sticky consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 20-53 cmbs "A1" Horizon; 2.5 YR 8/6 (pale yellow), sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IC: 53-60 cmbs "A2" Horizon; 7.5 YR 6/4 (light brown), sand; weak, medium, granular structure; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary
Stratum III: 60-105 cmbs "C" Horizon; 10 YR 2/1 (black), clay; strong, very fine or very thin, granular structure; slightly hard consistency; no cementation; sterile

Stratum IA (Figure 48) is an imported soil introduced for growth of park grass. Contains very little modern trash (plastic fragments). Stratum IB is a sterile white/blond beach sand with no inclusions. Stratum IC appears to be an historic hearth bearing layer and appears to represent a former A horizon/cultural layer. This stratum contains many medium to small flecks of charcoal (30% by volume). A soil/charcoal sample was taken at 0.54 m in Stratum IC. Stratum III is a thick wet clay with no visible inclusions.

NN. Backhoe Trench #4

Stratum I: 0-132 cmbs Beach Sand; 2.5 Y 8/6 (pale yellow), fine to medium, sand; structureless; loose consistency; nonplastic; no cementation; sterile
Backhoe Trench 4 contained only sterile sand with the exception of roots and rootlets at the surface. Backhoe unable to excavate because of very unstable sidewalls. No representative profile was drawn for BT # 4.

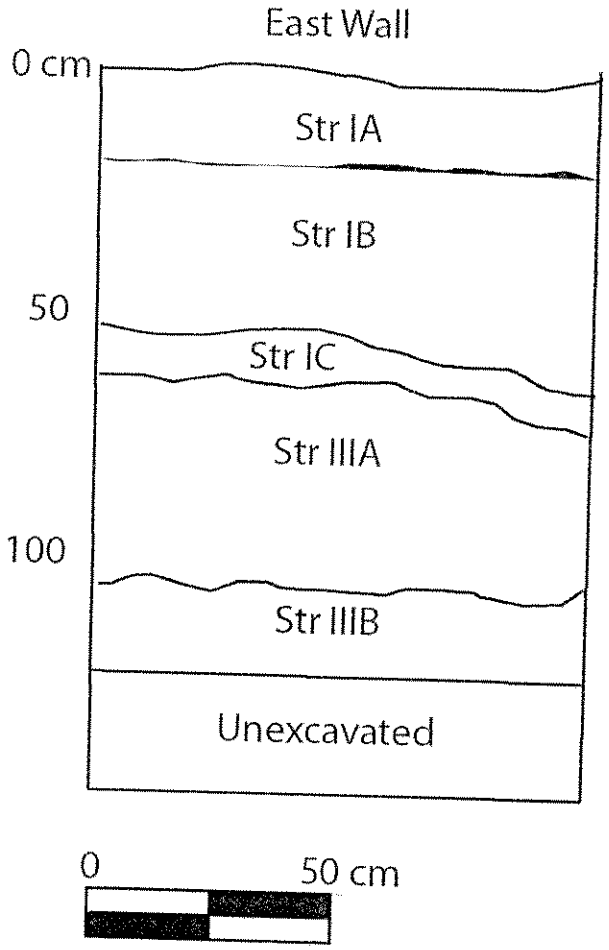

Figure 48 **Profile of East Wall of Backhoe Trench #3**

OO. Backhoe Trench #5

Stratum IA: 0-12 cmbs Fill; 7.5 YR 3/3 (brown), loamy silt; weak, fine, granular structure; slightly sticky consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 12-55 cmbs Beach sand; 2.5 Y 8/6 (pale yellow), sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum II: 55-70 cmbs "A" Horizon; 7.5 YR 6/4 (light brown), sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary; sterile
Stratum III: 70 cm-BOE Beach sand; 2.5 YR 8/6 (pale yellow), sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; sterile
Stratum IA (Figure 49) is an imported soil layer brought in for park grass. Stratum IB is a blond sand layer containing small amounts of charcoal and some modern trash (plastic fork fragments, aluminum can fragments). Stratum II is a previous A Horizon layer and contains charcoal (20% by volume) and a light brown mixture of fine to very fine charcoal flakes and beach sand. *Imu* stones were excavated at the lowest boundary of Stratum II and continued into III. Stratum III is a beach sand layer which contains *imu* stones at the extreme upper boundary continuing into the extreme lower boundary of Stratum II. Stratum III consists of sterile beach sand with no observable inclusions.

PP.Backhoe Trench #6

Stratum IA: 0-27 cmbs Fill; 7.5 YR 3/3 (dark brown), loamy silt; weak, fine, granular structure; slightly sticky consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum IB: 27-57 cmbs Beach sand; 2.5 Y 8/6 (pale yellow), sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary
Stratum IC: 57-128 cmbs "A1" Horizon; 7.5 YR 4/3 (brown), sandy loam; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and wavy lower boundary.
Stratum ID: 128-133 cmbs Beach sand; 2.5 Y 8/6 (pale yellow), sand; weak, fine, granular structure; loose consistency; nonplastic; no cementation; abrupt and smooth lower boundary
Stratum III: 133 cm-BOE "C" Horizon; 10 YR 2/1 (black), clay loam; strong, fine, granular structure; sticky consistency; plastic; no cementation; sterile
Stratum IA (Figure 50) is an imported soil for the park grass. Stratum IB is a layer of sterile beach sand with no visible inclusions. Stratum IC is a mixed layer containing a combination of silt loam and beach sand. Stratum ID is a pale yellow beach sand. Stratum III is black clay loam closely resembling the BOE layers in the other backhoe excavations but with a considerable amount (15%) of beach sand.

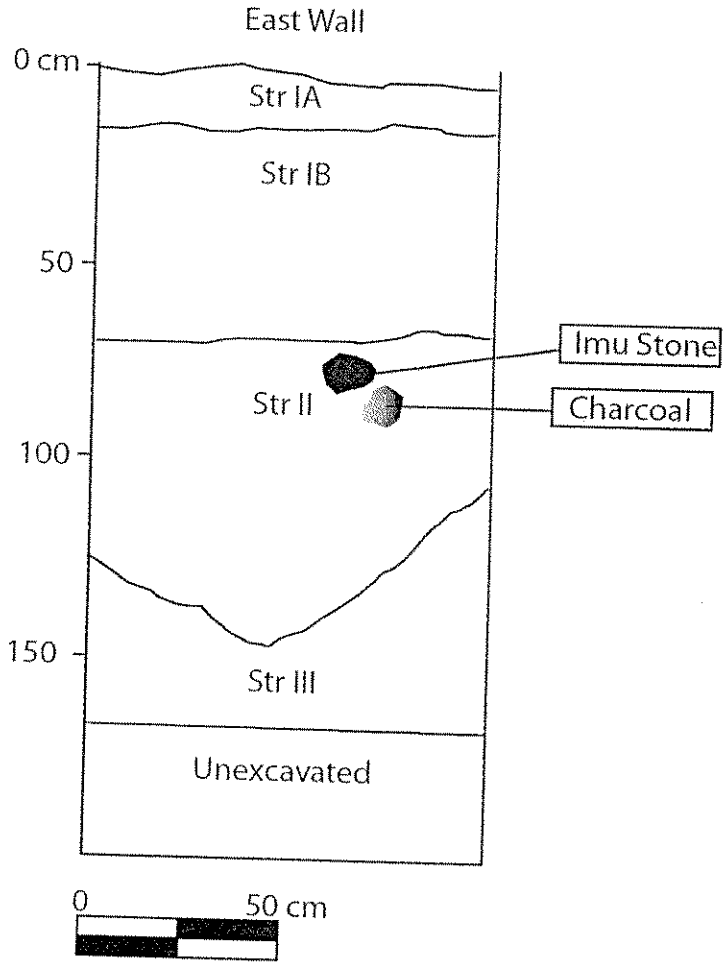

Figure 49 **Profile of East Wall of Backhoe Trench #5**

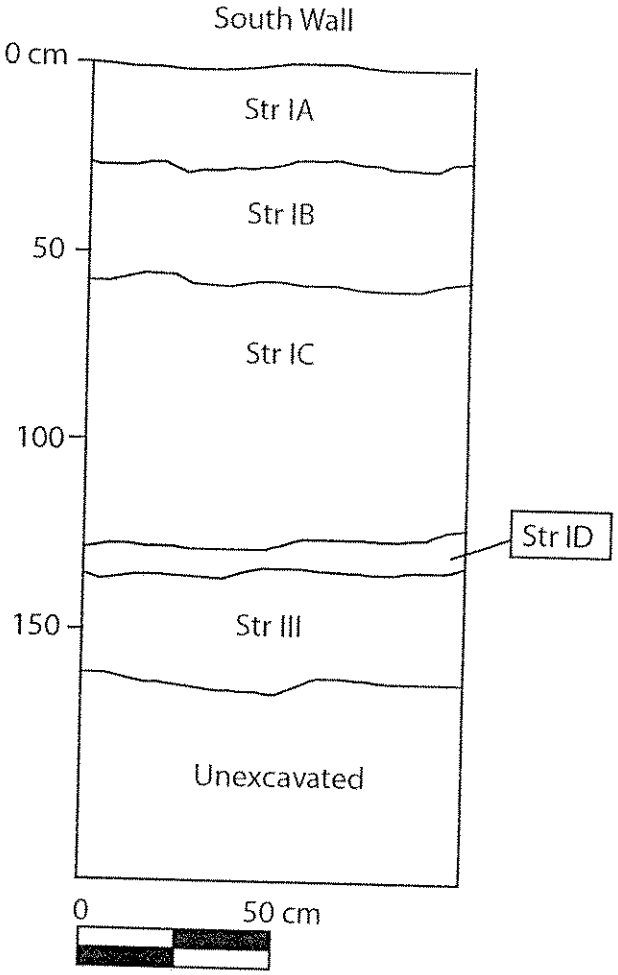

Figure 50 **Profile of South Wall of Backhoe Trench #6**

VI. LABORATORY ANALYSIS

A. Introduction

The subsurface excavations at Mauna Lahilahi Beach Park produced a total of 942 artifacts including 74 (7.9%) indigenous artifacts. The indigenous artifacts include fishhooks, preforms, lithic tools, picks, files, an *ulu maika* and debitage of stone, bone, shell, sea urchin spines and coral that are typical of pre-contact Hawaiian society. Many of these artifacts are assumed to pre-date Western contact in 1778, but many of them could have been produced, as needed, in the immediately following decades. A rather small percentage of lithic debris was recovered though many shell and fishhook fragments and preforms were found. Though it is possible that indigenous tools were being used contemporaneously with the historic debitage, it is more likely that spatial association is the result of mixing of the layers in later historic to modern times.

Analysis of invertebrate and vertebrate midden was completed on 12 trenches throughout the project area. All midden and artifacts recovered during excavation were roughly sorted (vertebrate/invertebrate, charcoal and artifacts). Amplified analysis was chosen for trenches which had an intact, undisturbed cultural layer and high density of midden relative to all trenches.. The trenches that contained the densest concentration of midden and charcoal were analyzed qualitatively and quantitatively with faunal and invertebrate midden sorted down to species. Trenches devoid of an intact cultural layer were not analyzed. Midden from the 12 trenches had a total mass of 5835.2g. Vertebrate midden totaled 488.7g (8.4%) and invertebrate midden totaled 5346.5g (91.6%).

B. Midden

1. Invertebrate Midden Concentration Index (CI) Values

The density of cultural material recovered from distinct stratigraphic layers is an important measure when analyzing the activities and function of a site. The density of invertebrate and/or vertebrate midden can then be compared to cultural material recovered in the same stratum in different locations to help determine the focus of human activities (i.e. eating areas, cooking areas, tool making areas, etc.). Comparisons can also be drawn to other sites of similar spatial and temporal contexts, which can aid in the determination of the "significance" of the study site.

The midden densities, referred as concentration indices or CI values is simply the mass of the target material (i.e. invertebrate and vertebrate midden) divided by the volume of material from which the sample was recovered. The volumes are calculated by multiplying the thickness of the stratigraphic layer by its area. For example, if 200 g of midden were recovered from a test unit 1 m^2 with a stratum 10 cm in thickness, the CI value would be calculated:

CI = mass of material/volume of sediment

CI = 200g / 0.1 m^3 or CI = 2000

Units are generally dropped in this equation, though it is noted that the volume of a cubic meter is equal to 1000 L.

It should be noted that these values are subject to error because of irregularities in the topography of a stratigraphic layer, as well as the distinctness of the layer. Transitions in clear and diffuse lower boundaries are often difficult to determine during

excavation and are often only noticed during profiling of the stratigraphic sequence. Because of these discrepancies, CI values should not be used alone and are only one of many tools utilized in the analysis of a site.

Table 3 shows the invertebrate midden CI values calculated for 12 test units in the project area. Based on the data below, concentration indices indicate the greatest midden densities near the small inlet just makai of the Makaha Surfside Condominiums. A second concentration on dense midden occurs near the middle drainage located in between the improved and unimproved portions of the beach park. Lowest densities occurred at the extreme southern end of the project area adjacent to Wai'anae High School (Figure 51).

Eight of the test units subjected to CI analysis contained two cultural layers (Test Units 24 and 35 contained, a third, Stratum IIC as well). Of these eight units, the upper layer (IIA) contained a higher CI value than the underlying cultural layers, suggesting that initial occupation of the shoreline may have been more transient followed by a more permanent settlement

2. Vertebrate midden

Analysis of vertebrate midden was completed on the same 12 trenches subjected to invertebrate midden analysis. Vertebrate midden totals were substantially smaller than invertebrate totals and are thus discussed separately. In total, 488.7 grams of fish, bird, and mammal bone were analyzed compared 5346.5 g of invertebrate midden. Of the 488.7 grams, mammal remains accounted for 54% (265.1 g, fish 34% (164.5 g) and bird 3% (16.6 g). Unidentified vertebrate totaled 9% (45.6 g).

Medium to large mammals accounted for a majority of the mammal midden, specifically that of pig (*Sus scofra*, both adult and fetal) and dog (*Canis familiaris*).

Fish remains were dominated by filefish (*Pervagor spp.*- 53.6g) and shark (25.5 g). Unidentified fish bone fragments totaled 81.4 g and accounted for the majority of the fish midden.

Bird bone totaled 16.6g though was not speciated for the present study.

Based on the results from these findings, it is clear that the early occupants of this shoeline were utilizing the sea for procurement of shellfish with only a small emphasis on littoral fishes and mammal consumption.

Table 3 **Invertebrate Midden Concentration Indices for 12 Test Units in the Project Area**

Test Unit	Stratum	Depth (cmbs)	Weight (g)	CI value
2	IA	0-15	25	167
	IB	15-40	80.8	323
	II	40-75	208.3	833
	III	75-BOE	43.7	174
5	IA	0-5	0	0
	IB	10-15	27.4	274
	III	15-35	3.4	17
9	IA - IB	0-10	13.2	132
	II	10-17	13.3	196
	IIIA	17-30	19.6	85
13	IA	0-5	9.7	194
	IB	5-15	62.6	626
	IIA	15-18	58.7	1957
	IIB	18-25	47.5	679
	IIC	25-35	87.1	871
	III	35-50	14.1	94
17	IA	0-5	1.3	26
	IB	5-15	198	1980
	IC	15-25	113.4	1134
	ID	25-30	8.4	168
	II	30-40	144	1440
	III	40-55	19.7	131
18	IA	0-5	0	0
	IB	5-15	0	0
	IIA	15-25	202.7	2027
	IIB	25-50	118.1	472
	III	50-60	0	0
21	IA	0-3	65.3	2177
21	IIA	3-20	66.5	391
	IIB	20-30	51.2	512
	III	30-45	39.3	262
24	IA	0-5	7.9	158
	IB-ID	2-35	244.5	815
	IIA	35-45	405.1	4051
	IIB	45-70	526.7	2106
	IIC	70-80	0	0
25	IA	0-2	0	0
	IB	2-45	562.8	1309
	IIA	45-62	441.7	2598
	IIB	62-82	298.3	1492

Test Unit	Stratum	Depth	weight	CI value
	III	82-100	32.2	179
27	I	0-25	23.3	93.2
	IIA	25-40	84.5	563
	IIB	40-60	59.7	299
	III	60-65	0	0
35	IA	0-7	0	0
	IB	7-15	0	0
	IIA	15-25	29.1	291
	IIB	25-35	154.9	1549
	IIC	35-50	88.6	591
	III	50-	0	0
36	IA	0-8	0	0
	IB	8-15	0	0
	IC	15-25	234.8	2348
	IIA	25-35	225.3	2253
	IIB	35-45	184.8	1848
	III	45-	0	0

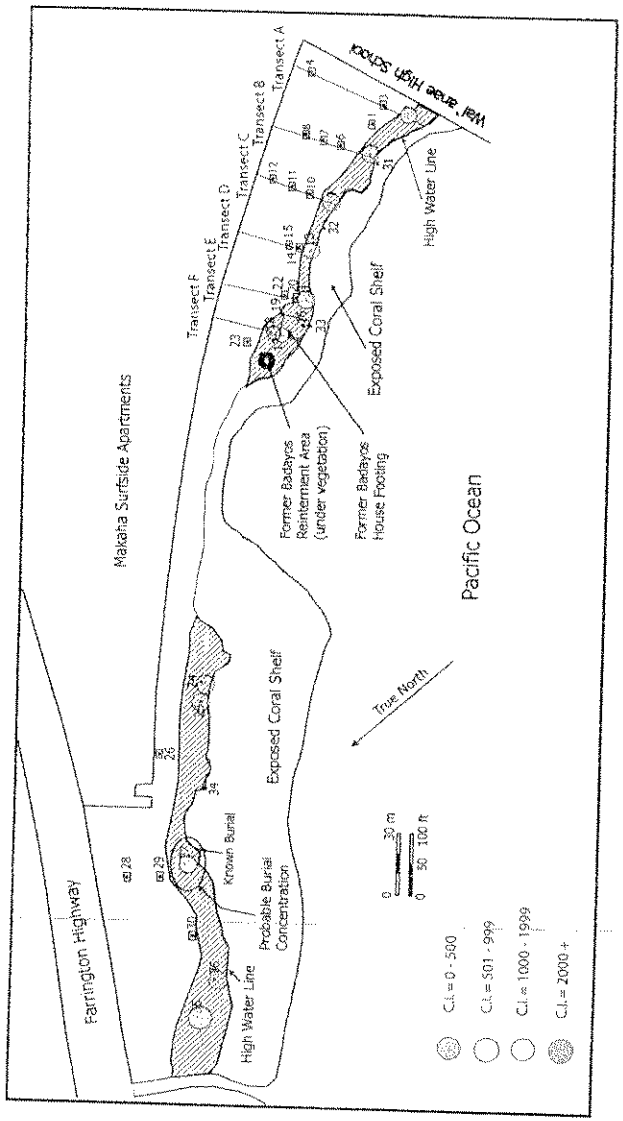

Figure 51 Concentration Indices of Stratum II Bearing Test Units in the Southern Portion of the Project Area

C. Indigenous Artifacts

A breakdown of the 942 artifacts recovered at Mauna Lahilahi Beach Park subsurface inventory excavations is summarized in Table 4 and is discussed below.

1. Lithic Assemblage

The lithic assemblage (Figures 52 and 54) was relatively small considering the substantial cultural layers that were encountered in several portions of the project area (Tables 5-8). The majority of the lithics encountered were basalt flakes, volcanic glass flakes and few tools. Volcanic glass flakes (34) accounted for 61% of the lithic assemblage (2.3% of total artifact assemblage) followed by basalt flakes (11) at 19.5% (1.2% of total) and basalt artifacts (11) at 19.5% (1.2% of total). The adze assemblage included one broken tip. Two *ulu maika* and three abrader stones were also recovered from the test units.

A stratigraphic breakdown of the assemblage shows a roughly equal number of volcanic glass flakes in Stratum II and IIA compared to the older layers (IIB and IIC). Eleven of the 34 flakes recovered originated in either Stratum II or IIA with thirteen recovered from Stratum IIB and IIC. The remaining 10 were recovered from various mixed Strata I layers. Basalt flakes were generally equally distributed between the younger II and IIA layers and the older IIB and IIC layers (5:4 respectively). Of the five basalt artifacts recovered, four were from Strata II and IIA with only one recovered from IIB.

The relatively small quantity of lithics recovered from test excavations suggest that very little stone tool manufacture was occurring at the a specific site. Finished or fragments of finished artifacts suggests that manufacture was likely occurring in a different location. The presence of a few reworked basalt flakes (3) and 34 volcanic glass flakes suggests that butchering was likely occurring within the site. The recovery of four basalt abraders (along with three coral file fragments) also suggests that fish hook manufacture or alterations (i.e. sharpening) was happening within the project area.

2. Bone

A total of two, non-fishing, bone artifacts (0.2% of total) were recovered. The two artifacts appeared to have functioned as picks, as both were tip fragments. The tip fragments were recovered from IIB, while no additional bone tool artifacts (minus fish hooks) were recovered from the Stratum II "permanent habitation" layers.

3. Coral

A total of 4 (0.4% of total artifacts) coral artifacts were recovered during excavations. The artifacts included 2 file tips, one file and one coral fishing weight. Three of the four artifacts were recovered in Stratum IIA (sinker and two file tips) suggesting fish hook manufacture and/or modification was occurring during this episode of occupation.

Table 4 Indigenous Artifacts Recovered From Mauna Lahilahi Excavations

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Weight (g)	Material Type	Function	Comments
82	A2		I	38-51	5.7	Basalt	Unknown	Worked
81	A2	SW	III	71-79	0.8	Bone	Unknown	Cut bone
80	A2		III	71-79	0.5	Bone	Unknown	Cut bone
79	D13	SE	III	20-30	0.1	Bone	Tool	Pick fragment
76	E20	NE	II	21-32	0.4	Bone	Tool	Fishhook fragment
77	E20		II	21-32	0.8	Bone	Tool	Fishhook fragment
75	E20	SW	II	23-33	1.6	Basalt	Flake	
84	E21			30	1.4	Shell	Tool	Fishhook
71	F16		IA	9	20.9	Bone	Unknown	Cut whale tooth
70	F16	NW	IB	29	0.3	Shell	Tool	Fish hook
72	F16	SE	IIB	23.31	0.2	Shell	Tool	Fishhook fragment
74	F16		IC	39-57	1.7	Shell	Preform	Fishhook blank
75	F16	SW	II	25-33	16.1	Basalt	Flake	
73	F16	trash pit	TRASH PIT	39-89	0.1	Shell	Tool	Fishhook fragment
31	G17	SE	IE	29-39	0.1	Shell	Unknown	Worked shell fragment

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Weight (g)	Material Type	Function	Comments
30	G17		IE	29-39	0.4	Basalt	Unknown	Worked flake
29	G17		IE	29-39	0.9	Bone	Tool	Fishhook fragment
28	G17		IB	37880	198.5	Basalt	Unknown	Worked stone
62	G18	NE	IIA	15-25	0.2	Bone	Tool	fishhook fragment
97	G18		IA	36647	29.8	Ivory	Unknown	Whale tooth
67	G18		IIA	15-25	0.7	Bone	Tool	Fishhook
60	G18		IIA	15-25	11.7	Basalt	Unknown	Reworked flake
66	G18		IIB	40-50	0.2	Bone	Tool	Fishhook fragment
87	G18	SE	IIB	40-50	0.3	Bone	Preform	Fishhook blank
63	G18		IIB	30-40	1.1	Basalt	Flake	
68	G18		IIB	30-40	0.2	Bone	Tool	Fishhook fragment
65	G18	Uknown			0.1	Shell	Tool	Fishhook fragment
5	I24		IIB	50-60	0.15	Shell	Tool	Fishhook fragment
9	I24		IIB	50-60	0.1	Bone	Tool	Fishhook
10	I24		IIC	70-80	0.1	Shell	Tool	Fishhook fragment
8	I24		IIB	50-60	0.1	Shell	Tool	Fishhook
15	I24		IC	20-30	0.5	Shell	Preform	Notched

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Weight (g)	Material Type	Function	Comments
2	I24		IIC	70-80	1.2	Coral	Tool	File tip
1	I24		IC	13-19	14.3	Basalt	Flakes	
3	I24		IIB	60-70	0.1	Shell	Tool	Fishhook fragment
7	I24		IIB	60-70	0.1	Shell	Tool	Fishhook fragment
14	I24		IIC	70-80	0.4	Bone	Tool	Fishhook fragment
13	I24		IIC	70-80	0.8	Bone	Tool	Fish hook preform (triangular)
12	I24		IIC	70-80	0.1	Bone	Tool	Fishhook
11	I24		IIC	70-80	0.1	Bone	Tool	Fishhook fragment.
6	I24		IIB	50-60	0.4	Bone	Tool	Pick tip
4	I24		IIA	40-50	96.5	Coral	Tool	Sinker
52	J25		II	clean up	0.1	Shell	Tool	Notched and worked
59	J25		IIB	64	1.8	Basalt	Flake	
58	J25		IIB	64	63.2	Basalt	Tool	Abrader
46	J25		IB	15-25	0.1	Bone	Tool	Fishhook fragment
55	J25		IC	53-66	17.7	Basalt	Tool	Abrader
49	J25	SE	IC	41-51	0.1	Shell	Tool	Fishhook fragment
56	J25		IC	41-51	0.3	Bone	Tool	Fishhook

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Weight (g)	Material Type	Function	Comments
51	J25		IC	41-51	0.9	Basalt	Flake	
54	J25		IIA	51	119.2	Basalt	Recreation	Ulu maika stone
50	J25		IC	41-51	0.3	Bone	Tool	Fish hook
57	J25		IC	52-62	0.2	Bone	Tool	Fishhook fragment
24	J25		IIB	62-71	0.1	Shell	Tool	Fishhook fragment
48	J25	SW	IB	30-40	0.1	Bone	Tool	Fishhook fragment
44	J25		IIA	51-62	0.1	Bone	Tool	Fishhook fragment
23	J25		IIA	62-BD	0.1	Shell	Tool	Fishhook fragment
22	L27		IIB	55-65	2.3	Sea Urchin	Tool	
16	L27		IIA	35-45	53.7	Basalt	Tool	Adz tip fragment
17	L27		IIA	25-35	0.1	Shell	Tool	Fishhook fragment
20	L27		IIA	35-45	0.3	Bone	Unknown	Worked: notched and filed
18	L27		IIA	35-45	17.3	Basalt	Flake	
19	L27		IIA	35-45	26.9	Basalt	Tool	Abrader
21	L27		IIA	34	13.8	Coral	Tool	File
94	O35		IIB	42-51	3.4	Basalt	Flake	
69	O35		IIB	46-61	0.1	Shell	Unknown	Notched
98	O35		IIB	38	0.3	Bone	Tool	Fishhook fragment
92	O36		IIA	40-50	19.2	Basalt	Flake	
89	O36	NE	IIA	40-50	1.6	Coral	Tool	File tip

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Weight (g)	Material Type	Function	Comments
95	O36		IIB	42-51	2.8	Basalt	Flake	
93	O36		IA	34	138.5	Basalt	Recreation	Ulu Maika
91	O36		IA	30-40	66.7	Basalt	Tool	Possible abrader
90	O36		IA	30-40	10.5	Basalt	Flake	
88	O36		IA	40-50	0.1	Shell	Tool	Fishhook, delaminated into 2 pieces

Table 5 Volcanic Glass

ACC#	French	Stratum	Depth (cmbs)	#ofPieces	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Function
83	A2	I	0-32	1	1.1	0.8	0.3	0.3	Flake
96	A2	III	40-59	1	1	0.7	0.3	0.3	Flake
86	E21	II	20-30	1	1.2	1.1	0.3	0.3	Flake
85	E21	II	20-30	1				0.7	Flake
78	F16	III	40-59	1	1.1	0.8	0.3	0.3	Flake
64	G18	IIB	30-40	1				0.1	Flake
64	G18	IIB	30-40	1				0.1	Flake
25	I24	IIC	70-80	2				0.2	Detritus
26	I24	IIB	50-60	1				0.1	Detritus
27	I24	IIB	50-60	1				0.1	Detritus
40	I24	IIC	70-80	1				0.1	Detritus
53	J25	II		1	1	0.8	0.2	0.2	Flake
43	J25	IIB		1				0.2	Detritus
56	J25	IC	53-66	1	0.3	0.2	0.2	0.1	Detritus
47	J25	IC		1				0.9	Detritus
42	J25	IIB	62-71	2				0.1	Detritus
45	J25	IIA	51-62	4				0.6	Flakes/detritus
41	J25	IIA	62-71	1	1	0.9	0.15	0.1	Detritus
36	L27	Surface and I	36800	1				0.3	Detritus
37	L27	I	16-24	2				1.1	Detritus
39	L27	II	55-65	1				0.3	Detritus
32	L27	IIB	45-55	3				2.6	Flakes
34	L27	IIA	20-30	1				0.4	Detritus
33	L27	IIA	20-30	1				0.5	Detritus
38	L27	I	36800	2				0.1	Detritus

Table 6 Basalt Artifacts

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material Type	Function	Comments
82	A2		I	36-51	4.1	1.5	0.9	5.7	Basalt	Unknown	Worked
30	G17		IE	29-39	1.7	0.9	0.3	0.4	Basalt	Unknown	Worked flake
28	G17		IB	37880	6.5	4.2	2.3	198.5	Basalt	Unknown	Worked stone
60	G18		IIA	15-25	3.6	2.2	1.1	11.7	Basalt	Unknown	Reworked flake
58	J25		IIB	64	5.3	4.2	2.5	63.2	Basalt	Tool	Abrader
55	J25		IC	53-66	3.8	1.9	1.6	17.7	Basalt	Tool	Abrader
54	J25		IIA	51	5.25	5.15	2.7	119.2	Basalt	Recreation	Ulu maika stone
16	L27		IIA	35-45	4.9	1.1	1.1	53.7	Basalt	Tool	Adze tip fragment
19	L27		IIA	35-45	5.9	2.8	1.9	26.9	Basalt	Tool	Abrader
93	O36		IA	34	5.2	5	3.6	138.5	Basalt	Recreation	*Ulu Maika*
91	O36		IIA	30-40	2.2	3.9	1.9	66.7	Basalt	Tool	Possible abrader

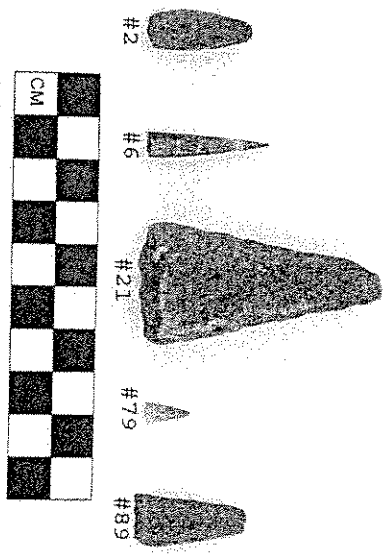

Figure 53 Coral and Basalt Files and Abraders

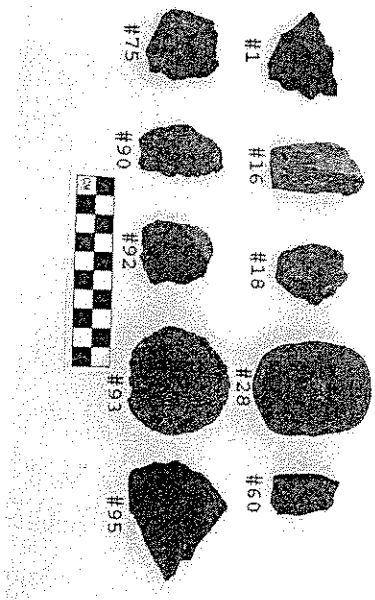

Figure 52 Lithic Tools

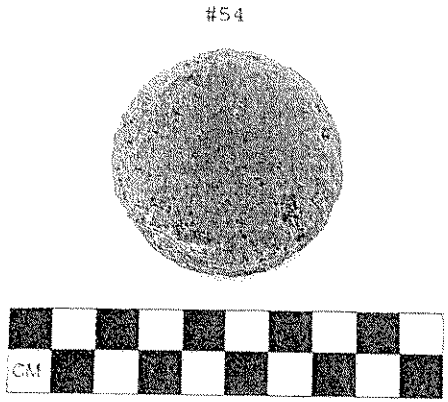

Figure 54 **Basalt *Ulu Maika* from Test Unit 25**

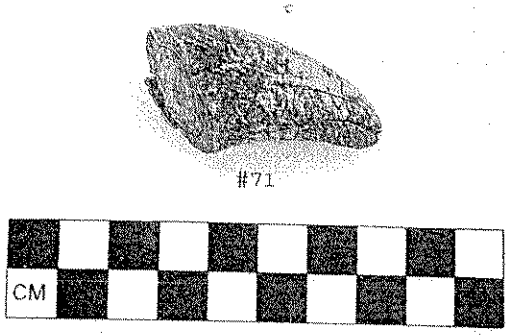

Figure 55 **Historic Cut Whale Tooth Recovered Near Former Badayos House**

Table 7 **Coral Artifacts**

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material Type	Function	Comments
2	I24		IIC	70-80	1	0.9	0.7	1.2	Coral	Tool	File tip
4	I24		IIA	40-50	5	3.6	3.1	96.5	Coral	Tool	Sinker
21	L27		IIA	34	2.6	1.3	1.5	13.8	Coral	Tool	File
89	O36	NE	IIA	40-50	2.7	1.1	0.9	1.6	Coral	Tool	File tip

Table 8 **Bone, Basalt Tool Fragments and Game Artifacts**

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material Type	Function	Comments
79	D13	SE	III	20-30	1.1	0.5	0.2	0.1	Bone	Tool	Pick fragment
71	F16		IA	9	5	2.8	2	20.9	Bone	Unknown	Cut whale tooth
97	G18		IA	0-7	5	2.2	1.7	29.8	Ivory	Unknown	Whale tooth
6	I24		IIB	50-60	3	0.7	0.4	0.4	Bone	Tool	Pick tip
16	L27		IIA	35-45	4.9	1.1	1.1	53.7	Basalt	Tool	Adze tip fragment
93	O36		IA	34	5.2	5	3.6	138.5	Basalt	Recreation	*Ulu Maika*

4. Fishing Related Artifacts

The durable materials used in Hawaiian fishhook manufacture are largely limited to bone, shell, coral and sea urchin spines. Based on quantities of source materials associated with fishing related artifacts, there is a clear indication that the fabrication of fishing related objects was occurring in certain areas of the project area. The small inlet directly *makai* of the Makaha Surfside Condominiums appears to have been one focus with 35 of the 38 fishing related artifacts recovered within 40 m of the inlet. Coral abraders and files, and sea urchin files may have had multiple uses including both woodworking and fishhook manufacture. Of particular interest are the bone and shell fishing implements which include the cut and worked pieces, fishhook preforms, fishhook blanks, fishhook fragments and whole fishhooks. Figure 56 shows the distinguishing characteristics of Hawaiian fishhook head type typology (Sinoto, 1968).

In all, 37 fishhooks and fishhook fragments and one coral fishing weight were recovered (Table 9; Figures 57 & 58). Twenty (53%) of the fishhooks and fishhook fragments were bone and 17 (45%) were shell. The one coral weight accounts for the remaining 2% of the assemblage.

Two-piece fishhooks consisted of two points (type IID3) and two shafts (type IID4 and IID5) (Sinoto, 1968: 58-60). Of the 21 finished fragments and complete hooks, eight retained a diagnostic head type (Figure 56). Of the eight, five consisted of HT1a (flat with outer side notched) and three were HT4 (pointed with a distinctive protruding knob). The three complete hooks consisted of one jabbing hook (type IA), one with a point tip at an angle (type IB1) and one with an incurved point (type IB2). Excavations at Nualolo Shelter in Kaua'i indicates an increase in the HT4 headtypes in the uppermost layers with a decrease in HT1a from the upper to lower layers. Sinoto (1968) points out an "increase of HT4 continued until historic times and almost all of the Hawaiian one-piece hooks in ethnological collections have this type of head" (Sinoto, 1968:61).

The most dominant breakage pattern observed was that of an intact bend with a broken point and broken shaft. The remaining 17 implements were too fragmented to be analyzed for any typological evaluation.

Though finished and/or fragmented fishhooks constituted the majority of the fishing implements, 9 fish hook preforms and blanks were also recovered. Five of the nine were bone and four were shell. The preforms and blanks ranged in completeness from square and rectangular tabs to nearly complete hooks.

5. Summary

The artifact assemblage recovered during subsurface excavations clearly indicates a focus on fishing activities. The small sample of lithics and lithic debitage suggests a relatively minor focus on wood and stone working, though the presence of unfinished fish hooks and files and abraders indicates that manufacturing or alteration of fishing implements was likely occurring. Butchering activity, though minor, is evidenced by the presence of reworked basalt flakes (knives) as well as several volcanic glass flakes.

Based on the quantities of fishing implements and the high invertebrate midden CI values, fishing and gathering activities were the focus along the shoreline. The intact cultural layer(s) (Strata II, IIA, IIB, IIC) extant in the makai portion of the project area suggests multiple episodes of occupation. Stratum II generally consisted of a dark

grayish brown, sandy to silty loam layer containing abundant charcoal flecking and marine midden. In test units with multiple undisturbed cultural layers, Strata IIA, IIB and IIC were used. These strata ranged from brown to dark gray in color with textures ranging from sandy and silty loams to silty clay loam. Varying concentrations of midden and charcoal were observed. The earliest dates returned from 14C analysis were from Stratum IIB (no Stratum IIC charcoal was submitted due to insufficient sample size) with dates ranging from A.D. 1430-1640 and A.D. 1460-1690. One sample collected previously by the SHPD was recovered from Stratum V (likely corresponding to IIB or IIC) and returned a date of A.D. 1440-1680.

In comparing indigenous artifact assemblages from previous archaeological work in nearby Pokai Bay, Kea'au, and Ohikilolo, the excavations at Mauna Lahilahi Beach Park had a lower lithics to fishing implement ratio than expected. Previous archaeological excavation at the Wai'anae Army Recreation Camp (WARC) (Hammatt, et al, 1985) recovered a very high count of basalt and volcanic glass debitage (75% of recovered artifacts were volcanic glass flakes) compared to the fishing implement count (4.1% of recovered artifacts). Additional work at WARC by Schilz (1994) recovered 1787 modified stone flakes and debitage versus 84 fishing implements, a 21:1 ratio that indicates a likely focus on stone tool manufacture. In contrast, the excavations at Mauna Lahilahi recovered a relatively equal ratio of volcanic glass to fishing implements (34:37 respectively), each representing 2.3% of the total artifact count. Clearly, stone tool manufacture was not a major endeavor along the shoreline near Mauna Lahilahi with the focus remaining on fishing and fishhook manufacture. Hammatt (1985) suggests that Pokai Bay was likely near a volcanic glass source and thus the high percentage of volcanic glass debitage is reflected in the artifact assemblage.

Limited excavations at Makaha Bridge 4 (Tuggle, 1994) within Ohikilolo āhupua'a recovered a variety of post-contact and a few traditional artifacts. Traditional artifacts included a shell scraper, basalt flakes, volcanic glass and an adz fragment. Midden recovered from the limited excavations included a preponderance of fishbone, indicating the expected reliance on marine resources for subsistence.

In summary, within the current project area, no archaeological signatures were noticed within the recovered artifacts and midden suggesting any "activity specific areas" such as eating houses, sleeping houses or stone working. Though it is likely that some permanent habitation was occurring along this section of the Wai'anae Coast, natural shifting of the shoreline sediments and erosion has likely reduced the overall area of the culture bearing layers.

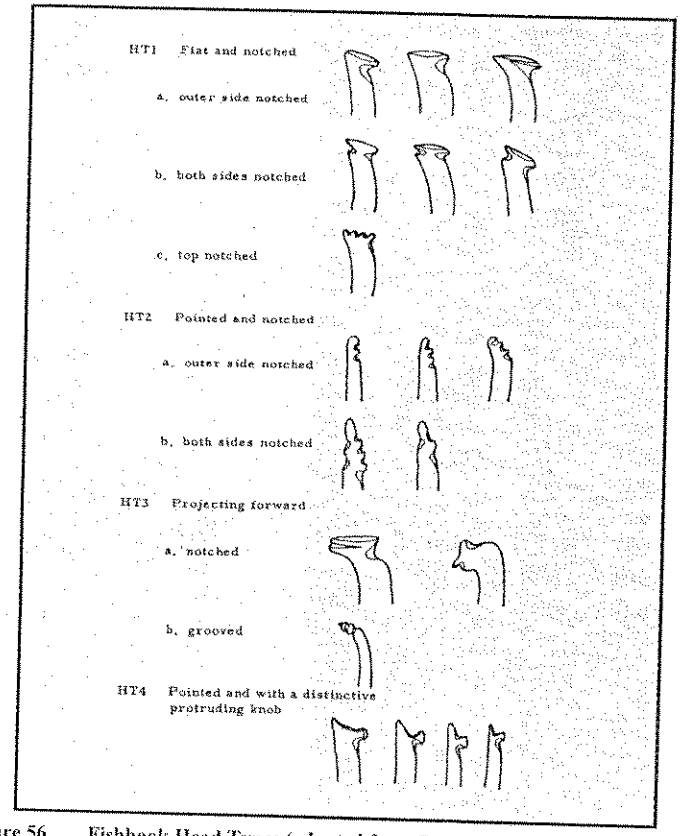

Figure 56 Fishhook Head Types (adapted from Te Rangi Hiroa 1968:59)

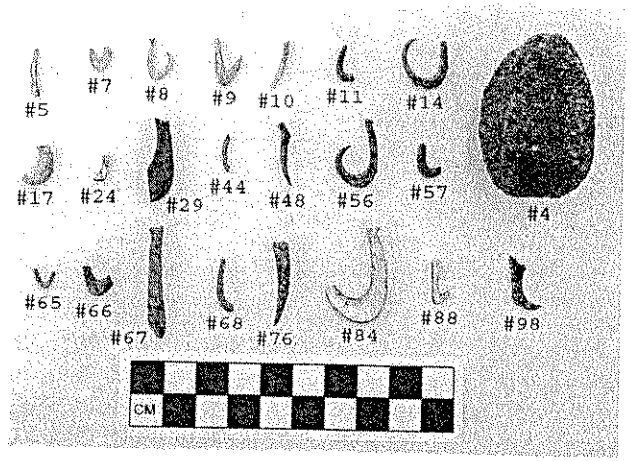

Figure 57 Fishhooks and Fishhook Fragments with Coral Weight (Acc #4)

Figure 58 Fishhook Tabs and Preforms

Table 9 Fishing Related Artifacts

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material Type	Function	Comments
76	E20	NE	II	21-32	1.1	0.5	0.3	0.4	Bone	Tool	Fishhook fragment
77	E20		II	21-32	2.2	1.1	0.4	0.8	Bone	Tool	Fishhook fragment
84	E21		II	30	3	2	0.3	1.4	Shell	Tool	Fishhook
70	F16	NW	IB	29	1.6	0.8	0.2	0.3	Shell	Tool	Fishhook
72	F16	SE	IIB	23-31	1.7	0.4	0.2	0.2	Shell	Tool	Fishhook fragment
74	F16		IC	39-57	3	1.2	0.2	1.7	Shell	Preform	Fishhook blank
73	F16	trash pit	trash pit	39-89	1.2	0.5	0.1	0.1	Shell	Tool	Fishhook fragment
31	G17	SE	IE	29-39	1.1	0.5	0.2	0.1	Shell	Unknown	Worked shell fragment.
29	G17		IE	29-39	2.5	0.8	0.5	0.9	Bone	Tool	Fishhook fragment.
62	G18	NE	IIA	15-25	1.3	0.3	0.2	0.2	Bone	Tool	fish hook fagment.
67	G18		IIA	15-25	3.6	0.6	0.35	0.7	Bone	Tool	Fish hook
66	G18		IIB	40-50	1	1.1	0.2	0.2	Bone	Tool	Fishhook fragment
87	G18	SE	IIB	40-50	1.2	1.1	0.3	0.3	Bone	Preform	Fishhook blank
68	G18		IIB	30-40	1.7	0.4	0.2	0.2	Bone	Tool	Fishhook fragment

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material Type	Function	Comments
65	G18	Uknown			0.9	0.7	0.1	0.1	Shell	Tool	Fishhook fragment
5	I24		IIB	50-60	1.6	0.2	0.15	0.15	Shell	Tool	Fishhook fragment
9	I24		IIB	50-60	1	1.6	0.9	0.1	Bone	Tool	Fishhook
10	I24		IIC	70-80	1	1.6	0.2	0.1	Shell	Tool	Fishhook fragment
8	I24		IIB	50-60	1	1.3	0.8	0.1	Shell	Tool	Fishhook
3	I24		IIB	60-70	1.1	0.4	0.2	0.1	Shell	Tool	Fishhook fragment
7	I24		IIB	60-70	0.9	0.7	0.2	0.1	Shell	Tool	Fishhook fragment
14	I24		IIC	70-80	1.7	1.5	0.4	0.4	Bone	Tool	Fishhook fragment
13	I24		IIC	70-80	2.1	2.1	0.4	0.8	Bone	Tool	Fishhook preform (triangular)
12	I24		IIC	70-80	1.2	0.7	0.2	0.1	Bone	Tool	Fishhook
11	I24		IIC	70-80	1.2	0.6	0.2	0.1	Bone	Tool	Fishhook fragment
4	I24		IIA	40-50	5	3.6	3.1	96.5	Coral	Tool	Sinker
46	J25		IB	15-25	0.9	0.3	0.1	0.1	Bone	Tool	Fishhook fragment
49	J25	SE	IC	41-51	1.1	0.2	0.1	0.1	Shell	Tool	Fishhook fragment
56	J25		IC	41-51	2.2	1.9	0.25	0.3	Bone	Tool	Fishhook
50	J25		IC	41-51	2.2	1.9	0.25	0.3	Bone	Tool	Fishhook

ACC#	Trench	Quadrant	Stratum	Depth (cmbs)	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material Type	Function	Comments
57	J25		IC	52-62	1.1	0.3	0.3	0.2	Bone	Tool	Fishhook fragment
24	J25		IIB	62-71	0.9	0.4	0.2	0.1	Shell	Tool	Fishhook fragment
48	J25	SW	IIB	30-40	2	0.3	0.2	0.1	Bone	Tool	Fishhook fragment
44	J25		IIA	51-62	1.2	0.2	0.1	0.1	Bone	Tool	Fishhook fragment
23	J25		IIA	62-BD	1	0.2	1.5	0.1	Shell	Tool	Fishhook fragment
17	L27		IIA	25-35	1.3	0.5	0.3	0.1	Shell	Tool	Fishhook fragment
98	O35		IIB	38	2.1	0.8	0.3	0.3	Bone	Tool	Fishhook
88	O36		IA	40-50	1.4	0.6	0.1	0.1	Shell	Tool	Fishhook

D. Charcoal Dating

In total, 12 charcoal samples were submitted for radiometric dating (Table 10). Samples were selected based on their stratigraphic context and association with presumed indigenous cultural layers. The samples included charcoal from 10 different locations, including two (Samples 11 and 12) which were collected previously by SHPD archaeologists.

Two samples (#3 and #6) returned dates of a pre-contact time frame. Sample #3 (see Table 10), collected from Test Unit 27 (Stratum IIB; 55-65 cmbs), had a conventional radiocarbon age of 250 +/- 50 BP with an Oxcal determination of A.D. 1480-1690 and A.D. 1730-1810 (95.4% probability). Analysis of Sample #3 indicates a late pre-contact to early post-contact occupation of the shoreline. Sample #6 was a 6.4 gram sample collected from Stratum IIB (66-76 cmbs) in Test Unit 25 had a conventional radiocarbon age of 390 +/- 50 years BP with an Oxcal determination of A.D. 1430-1640 (94.5% probability) indicating a pre-contact deposit. Additional samples from Stratum IIB returned Oxcal dates of A.D. 1610-1890 (Test Unit 36, Sample #4) and A.D. 1660-1960 (Test Unit 13 and 18; Samples 1 and 9). Test Unit 2 (Stratum II) returned a date of A.D. 1660-1950 and Feature 1 of Test Unit 27 indicated a date range of A.D. 1690-1840. Samples 11 and 12 which were collected from discrete charcoal concentrations in the wave cut banks returned Oxcal dates of A.D. 1440-1680 (95.4% probability) and A.D. 1630-1960 (95.4% probability).

Of the 12 charcoal samples submitted for 14C analysis, six were from Stratum IIB, two were from Stratum IIA, one was from Stratum II and two were previously collected from SHPD stratum V (though based on the depth and location likely corresponds to Stratum IIB or IIC). All of the Stratum IIB charcoal had minimum dates earlier than AD 1730 though the maximum dates were often 19th and 20th century which suggests a late pre-contact to early post-contact deposition. The two Stratum IIA samples returned dates of AD 1830-1880 and AD 1800 to 1960. Based on these results, it is suggested that Stratum IIB and IIC (though no samples were analyzed from this strata) represent the initial occupational layer with Stratum II and IIA representing a later, post-contact-historic deposition.

Stratum IIB and IIC were generally encountered in the central portion of the project area from the site of the former Badayos houselot to the drainage at the southern end of the improved beach park. Based on the samples that were analyzed, it is suggested that this portion of the shoreline was likely settled in late pre-contact times (ca. 15th to 16th century) with occupation continuing into the 20th century.

In the context of the Wai'anae Coast, occupation at Mauna Lahilahi appears to have occurred approximately 100 years later (ca. 15th century) than settlement in Pokai Bay. Carbon samples recovered from excavations at Pokai Bay at the WARC suggest that by A.D. 1350 there was at least temporary coastal habitation on the Wai'anae coast. These dates come from samples collected from intact cultural layers (Stratum V), which returned dates of A.D. 1326 +/- 50 years (Riford 1984) and A.D. 1340 +/- 70 years (Hammatt et al. 1985). The earlier dates returned from Pokai Bay may suggest utilization of the current project area contemporaneously with the earlier settlement (based on it's close proximity) for the gathering of marine resources and fishing. Radiocarbon dates,

from Mauna Lahilahi however, indicate that settlement did not occur for perhaps another century.

Based on the stratigraphic and artifactual information it was suggested that coastal Ohikilolo was "continuously occupied from some time in the pre-contact periods until the mid to late 1800's" (Tuggle, 1994:49). Additional charcoal samples from Ohikilolo were dated 1645-1950 AD (Hammatt, et al, 1987) during the testing phase of a 4" waterline in Ohikilolo Valley. During the installation of the main, three additional samples were dated to an adjusted age of 580-890 AD, 1190-1480 AD and 570 BC – 595 AD (Hammatt, et al 1986). Because the samples were taken immediately below the asphalt, were clearly inconsistent with their stratigraphic provenience and were inconsistent with other dates obtained during the testing phase, the results were discounted.

Based on carbon dates recovered from Pokai Bay, Mauna Lahilahi, and coastal Ohikilolo, it is suggested that settlement occurred first within the naturally sheltered and well watered area of Pokai Bay ca. mid 1300's. Though utilization of nearby coastal areas likely occurred in conjunction with this settlement, the earliest dates recovered from Mauna Lahilahi suggest occupation by the early to mid 1400's. Further up the coast, along coastal Makaha and Ohikilolo, ^{14}C dates suggest settlement slightly later, ca 17th century.

Table 10 Results from C14 Dating Analysis

Acc#	Quad/Feat	Trench #	Stratum	Depth cm bgs	Weight (g)	Oxcal Dates 95.4% Prob
1	SE	13	IIB	32-40	12.1	A.D. 1660-1960
2	Feat 1	27		65-110	5	A.D. 1690-1840 (72.8% of 95.4%)
3	SW	27	IIB	55-65	13.3	A.D. 1480-1690 (65.3%) A.D. 1730-1810 (24.5%)
4	NE	36	IIB L-1	50-60	5.1	A.D. 1610-1890 (72.8%)
5	SE	36	IIB L-2	58-68	10	A.D. 1650-1960
6	NW	25	IIB	66-76	6.4	A.D. 1430-1640
7	SW	2	II	61-69	2.7	A.D. 1660-1950
8	BH Tr 5	5	IIA	99	37.8	A.D. 1830-1880 (66.9%)
9	NE	18	IIB	40-50	9.1	A.D. 1660-1960
10	NE	24	IIA	30-40	4.2	A.D. Post 1800 (69.3%)
11	Hearth	SHPD	V	60	6.4	A.D. 1630-1960
12	Hearth	SHPD	V	97	3	A.D. 1440-1680

VII. SUMMARY

A. Site Descriptions

A total of two new sites and two previously documented sites were recorded within the project area (Figure 59). The new sites consist of an intact cultural layer (Site 50-80-07-6634) and an historic basalt alignment (Site 50-80-07-6635). The two previously recorded sites are a concentration of burials (Site 50-80-07-4064) and a portion of the OR&L Railroad (Site 50-80-07-9714).

State Site #: 50-80-07-6634
Site Type: Cultural layer
Function: Occupation
Features (#): 1
Age: ca. 15th century A.D. to present

Description: Site 50-80-07-6634 is an intact cultural layer located in the southern portion of the project area along the shoreline (see Figure 6). The site is represented within the Stratum II layers (II, IIA, IIB, and/or IIC) and contains varying concentrations of midden, artifacts and charcoal. Based on radiocarbon analysis of the charcoal from II, IIA and IIB (IIC had insufficient quantities for accurate measurement), it is indicated that Stratum IIB was deposited no earlier than A.D. 1430. Continued use and settlement of the shoreline deposited additional stratigraphic layers (i.e. IIA) while expansion of settlement deposited culture bearing layers in previously unused portions of the shoreline.

Within Stratum IIB and IIC no historic midden or artifacts (modern bottle glass, rusted metal) was encountered. These layers were generally distinguishable by a slightly lighter color, a lack of historic midden and artifacts and a higher concentration of marine and vertebrate midden. Stratum II and IIA, however, were distinguished by a very dark gray color and in most instances a presence of historic trash as well as invertebrate midden, cut bone, and few fish hooks. Based on laboratory analysis, charcoal dating and historical research, it is suggested that Stratum IIB and IIC represent the pre-contact component of the site while Strata II and IIA represent an early post-contact to historic cultural deposit. This site is in excellent condition.

State Site #: 50-80-07-6635
Site Type: Rectangular alignment
Function: Indeterminate
Features (#): 1
Age: Historic

Description: Site 50-80-07-6635 consists of a rectangular alignment measures 5 m N/S by 24 m E/W (see Figure 38). The alignment is constructed of one course of medium basalt cobbles to small boulders. The interior surface of the site is soil covered with no paving stones or ' ili 'ili observed. A test unit was excavated along the interior of the eastern wall of the alignment to better understand the sites subsurface component. No cultural layer was encountered and it was observed that the alignment did not penetrate more than 5 cm below the surface suggesting that the site was constructed in historic times. The function of the site is indeterminate, though may have been the footprint of a previous beach structure. Overall, the site is in fair condition.

State Site #: 50-80-07-4064
Site Type: Human burials
Function: Burial Interment
Features (#): 2
Age: Pre-contact to Early Historic

Site –4064 consists of 2 human burials (one in situ and currently eroding and one probable crypt burial). The burial currently eroding out of the wave cut bank (Feature 1) was initially documented by the SHPD (Cordy, 1997) and was left in place pending a decision on the final disposition. The burial is located 30 m southwest of the northeast corner of the Makaha Surfside Apartments. No burial pit was observed and the is was unclear whether the burial was intact or to what extent the erosion had disturbed the remains.

The one probable burial crypt (Feature 2) encountered during subsurface testing was located 10 m north of the partially exposed burial (see Figures 6, 34 and 35). The portion of the crypt that was exposed measured 85 cm N/S by 40 cm E/W by 105 cm deep and extends into the north wall. A basalt capstone and a basalt lined pit were encountered at the base of Stratum I and intruded through Stratum IIA and IIB and into the sterile soil. Though no human remains were encountered during testing, the feature was classified as a probable burial crypt based on it's proximity to Feature 1 and to a second burial just north of Feature 1 that is believed to have eroded out prior to September, 2001.

In addition to Features 1 and 2, a human metatarsal was encountered during the excavation of Test Unit 3. The fragment was within disturbed fill material and was not associated with a cultural layer or burial pit. The fragment was recorded, the SHPD Burials Program was notified and it was determined that excavation within the test unit should be halted and refilled.

Just north of the site of the former Badayos residence is a large shrub which marks the reinterment area used by the Badayos' for burials found eroding out of the shoreline. This locale is known by the community as a reinterment site, though in personal communication with the SHPD, it was determined that no state site number would be designated to this site. This site is in good condition.

State Site #: 50-80-12-9714
Site Type: Railroad Berm
Function: Transportation
Features (#):
Age: Historic

Site 50-80-12-9714 consists of a portion of the former OR&L Railroad berm which was formerly used to transport sugarcane from Wai'anae Sugar Company land to the 'Ewa Mill. The track was completed in 1898 when the line was extended around Ka'ena Point, linking Wai'anae with Waialua. The portion of the berm still present within the project area extends along the *mauka* portion of the project area, just *makai* of the Makaha Surfside Apartment fenceline. The remaining berm is roughly 110 m long and 3 m wide. Subsurface testing over a portion of the berm encountered a layer of compact coral fill, rusted metal and a railroad spike. This site is in fair to poor condition.

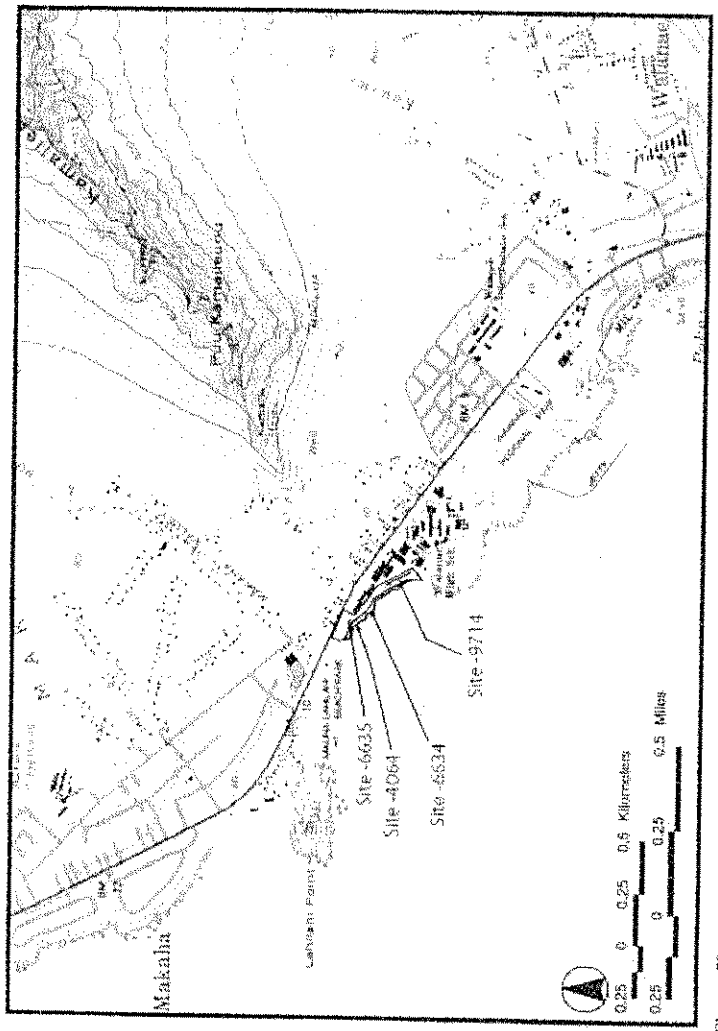

Figure 59 Portion of USGS Map Showing Locations of the Sites Documented on the Project Area

B. Summary of Project Area

The traditional settlement pattern for the *ahupua'a* of Wai'anae consisted of an intensively utilized coastal zone (which includes the project area), a wet, resource rich mountain interior and a less utilized intermediate zone consisting of dry scrubland interspersed with stream fed lo'i. The earliest settlement in Wai'anae appears to have occurred, at least temporarily, by the A.D. 1200s with more permanent coastal settlements appearing by the A.D. 1300s. The upper mountainous regions were likely settled later in the A.D. 1400s, though procurement of forest resources was likely occurring much earlier.

The present project area is situated along a stretch of coast between Mauna Lahilahi and Pokai Bay. Kawiwi Stream, located south of the project area offered a continuous supply of fresh water, while an intermittently flowing drainage once bisected the current study parcel. In total, an intact cultural layer (Site 50-80-07-6634), a concentration of burials (previously documented; Site 50-80-07-4064) and an historic alignment (Site 50-80-07--6635) were described and tested during the present inventory survey.

Radiocarbon dating of charcoal recovered from the cultural layer (Site -6634) suggests an initial settlement of the shoreline by the mid 1400s with 400 to 500 years of continual occupation into the 20th century. Recovered midden and artifacts suggest the shoreline was utilized for procurement of marine resources, with a focus on fishing and fishhook production. At the time of western contact, Wai'anae was noted as having a relatively small population, though findings from previous archaeological research suggests that by "the A.D. 1700's...the upper valley down to the first Kawiwi drainage was covered with agricultural fields and had a sizable population..."(Cordy, 2001:ii).

The presence of two (and up to three) distinct cultural layers making up Site –6634 suggests a shift in intensity, temporal length, and type of use along the shoreline. Natural factors, including erosion and accretion, tsunamis and shifting drainages, invariably affected occupation along the relatively thin stretch of shoreline. The earliest occupation is represented as Stratum IIB (IIC in some places) and is generally situated directly above the sterile clay and sandy clay. The layer(s) (Stratum IIB and IIC) are generally slightly lighter in color than II and IIA, possibly the result of less intensive occupation, and generally had a slightly lower CI values.

The correlation between CI value and permanent/recurrent habitation versus temporary habitation can be defined generally as CI <500 suggests temporary habitation, CI >1000 suggests permanent habitation (Hammatt et al. 1991). CI values for invertebrate midden at Mauna Lahilahi Beach Park are depicted graphically in Figure 51 and indicate areas of greatest midden concentration, thus the colors represent the CI values from Stratum II or IIA. Only one location (Test Unit 35) had a higher CI value in Stratum IIB than IIA, which suggests that the project area was first utilized in a temporary habitation basis, and later was occupied on a more permanent basis.

Previous archaeological research along the Wai'anae coast indicates early use of the shoreline. Excavations at the Wai'anae Army Recreation Center returned carbon dates as early as the 14th century (Riford 1984; Hammatt et al, 1985) The depositional pattern encountered at Mauna Lahilahi shows initial occupation during the development of Stratum IIC or IIB (the lower cultural layers) ca. mid-1400's. Following this development, the stratigraphic sequence indicates an abrupt shift in site utilization with a generally darker and more midden rich stratigraphic layer as seen in Stratum IIA (or II if no other II layers were encountered).

The artifacts recovered during test excavations further evidence the shift in specialization of the site. The fishhook assemblage recovered from excavations at Mauna Lahilahi totaled 37 pieces. Of the 21 pieces recovered from test units with multiple cultural layers (i.e. IIA and IIB), 11 were recovered from IIB, 5 from IIA and 5 from IIC. In addition, 5 were recovered from Stratum IC in TU 25 which had undergone mixing and likely represented fishhooks originally deposited during the occupation of IIA.

Activities occurring during the formation of Stratum II appear fairly consistent though with a marked difference in intensity. Midden remains increased as the strata increased in age (i.e. from IIA increasing in age to IIB), as did the number of artifacts. It is clear that grubbing and other construction activities occurring in historic times likely adversely affected the integrity of the upper portions of the cultural layers. A relatively sparse basalt flake count suggests that little stonework or woodworking was occurring within the site's boundaries, though the *ulu maika* suggests that some leisure activities were enjoyed by the inhabitants.

Historically, the current project area was known to have contained four LCAs and had been occupied by at least one family into the 1970's. Remnants of an eroded cement stairway were observed in the southern portion of the project area near the small inlet and subsurface testing in that area encountered an historic trash pit and two cultural layers containing both western and indigenous artifacts and midden, Remnants of the former OR&L Railroad (Site -50-80-12-9714) were encountered within Test Unit 12 including the coral track bed and a rusted railroad spike. The railroad berm is extant in the southern / *mauka* portions of the project area and continues from the southern boundary of the project area (adjacent to Wai'anae High School) to the northern end of the Makaha Surfside Condominiums.

Based on historic background research and previous archaeological studies a predictive model was completed which indicated probable use of this portion of the coast by the 13th century with permanent settlement occurring by the A.D. 1400's. Previous archaeological research at the Wai'anae Recreation Center (south of the current project area) encountered intact cultural layers with radiocarbon dates from the 14th century (Riford, 1984) with subsequent work in the same area returning similar dates (ca. A.D. 1340 +/- 70 years) (Hammatt et al, 1985). Stratigraphic and radiocarbon information suggest settlement along coastal Ohikilolo by the 17th century (Hammatt, et al, 1987; Tuggle, 1994). Within the current project area, subsurface testing uncovered intact cultural layers (Strata II, IIA-IIC), which contained, in places, a high volume of both historic and indigenous artifacts and midden. Radiocarbon dating of charcoal from the cultural layers returned dates ranging from A.D. 1430-1640, suggesting settlement of the project area by the 15th century, with occupation continuing into historic and modern times. Historic documentation of commercial agriculture and transport indicated the presence of a portion of the OR&L railroad passing through the project area. Along the makai side of the Makaha Surfside Condominiums a low, linear berm was observed and tested and found to contain compact, crushed coral and a railroad spike which confirmed the presence of the abandoned line.

VIII. SIGNIFICANCE EVALUATIONS

A total of four sites of varied archaeological significance are present in the project area. Individual significance and recommended treatment are specified in Table 11. Sites were evaluated for significance according to the broad criteria established for the National and State Registers. The five criteria are:

A Site reflects major trends or events in the history of the state or nation.
B Site is associated with the lives of persons significant in our past.
C Site is an excellent example of a site type.
D Site may be likely to yield information important in prehistory or history.
E Site has cultural significance; probable religious structures and/or burials present.

The initial significance assessments are based on functional interpretations of the sites and site types. All four sites within the project area are considered significant. One (50-80-07-4064) is considered significant under Criteria D and E and three (50-80-07-6634 and –6635; and 50-80-12-9714) are considered significant under Criterion D.

Site –4064, assessed with Criteria D and E, consists of human burials (one in situ and currently eroding and one probable crypt burial). This site (with possible burial structure crypt) reflects traditional belief systems and burial practices and is thus considered significant under Criterion E. This site is in good condition based on the probable intact condition of the remains and the slightly disturbed probable burial crypt.

In addition to the two burials comprising site –4064, a human metacarpal and a previously identified reinterment site were encountered within the project area. The human metacarpal was encountered in Test Unit #3 in the extreme southern portion of the project area within disturbed fill material. This finding was not recommended for a state site number as determined by SHPD. Just north of the former Badayos residence is a large shrub marking the location of a reinterment site used by the Badayos' for human remains which had eroded out of the shoreline. It is unclear however, as to the number of remains which are currently within the reinterment site.

Site assessed with Criterion D include Site 50-80-12-9714 (portion of the O.R.& L railroad berm), Site 50-80-07-6634 (intact cultural layer) and Site 50-80-07--6635 (historic rectangular alignment). Site –9714 is in fair to poor condition based on the absence of any intact track. Site –6634 is in excellent condition based on its intact condition, thickness of cultural deposits and relative undisturbed condition. Site –6635 is in good to fair condition though offers little potential for further research based on the results of the subsurface testing within the site. These sites are believed to offer varying degrees of scientific data which could further contribute to some or all of the following analyses: (1) material culture; (2) architecture; (3) chronology; and (4) settlement patterns.

IX. RECOMMENDATIONS

Of the four sites recorded in the project area it is recommended that two sites be preserved. The remaining 2 sites are recommended for no further work, as it is believed that no additional scientific data is obtainable, beyond what was acquired during the inventory survey (e.g. site configuration, description and subsurface testing).

A. Preservation

Two sites in the project area are recommended for preservation. Recommendations for site preservation were based on the significance criteria of the National and State Registers of Historic Places. The two sites include a previously documented burial actively eroding out of the shoreline (Site 50-80-07-6634) and one adjacent probable crypt burial (-4064: 4 and 5), as well as the intact cultural layer that runs along the southern portion of the project area (south of the drainage/existing beach park). Preservation of the human burials is recommended, though it is also suggested that the remains that are actively eroding be subjected to a burial treatment plan that will address the long term preservation and immediate concerns regarding this burial. The preservation concept allows for the long term preservation of the intact cultural layer, thus maintaining its integrity for future study.

B. No Further Work

Site –6635 and 50-80-12-9714 are recommended for no further work. Site -6635 (historic rectangular alignment) was mapped, placed on a plan view map and tested for subsurface deposits. Site –9714 was previously mapped on a survey map and one test unit was excavated on the existing berm. Based on the findings of the research on this site, it is believed that no further documentation is necessary.

C. Other Concerns

Two additional concerns should be addressed prior to development of Mauna Lahilahi Beach Park. In the southern portion of the project area, immediately south of the wave eroded embayment, is a former reinterment area utilized by Mr. Badayos for burials found eroding out of the shoreline. This reinterment site was designated with site number R1992-1-0001-001, provided by Mr. Kana'i Kapeliela of the SHPD Burials Program. Additionally, two isolated and previously disturbed human bone fragments were encountered within Test Unit #3. No associated in situ remains were encountered, suggesting that the remains had either been disturbed by groundwork or had been imported with fill material. In personal communication with SHPD archaeologist Dr. Sara Collins (Oct. 13, 2003), it was determined that neither of these two areas will be designated with an SIHP site number.

Based on the findings of isolated human remains outside of the cultural layer and the overall cultural sensitivity of the project area, it is recommended that on-site archaeological monitoring take place during any subsurface construction activities associated with the proposed improvements to Mauna Lahilahi Beach Park.

Table 11 Significance and Recommendations of Mauna Lahilahi Beach Park Sites

Site 50-80-07-	Site Type	Significance	Recommendations
4064	Human Burials	D, E	Preservation
6634	Cultural Layer	D	Preservation
6635	Historic Alignment	D	No further work
50-80-12-9714	O.R. & L. Railroad	D	No further work

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Appendix B

Cultural Impact Assessment

of Mauna Lahilahi Beach Park, Wai'anae Ahupua'a, O'ahu,

(portions of TMK 8-4-01:1, 8-5-17:1-7, 8-5-18:1-3)

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Prepared for
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Cultural Surveys Hawai'i, Inc.
March 2004

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A. Project Background

At the request of the City and County of Honolulu Department of Design and Construction, Cultural Surveys Hawai'i Inc. (CSH), has completed a cultural impact assessment for the proposed Landscaping Improvements at Mauna Lahilahi Beach Park (portions of TMK 8-4-01: 1, 8-5-17: 1-7, 8-5-18:1-3). The project area is located within Wai'anae Ahupua'a in the district of Wai'anae and is bounded by Wai'anae High School to the south, Farrington Highway and the Makaha Surfside apartments to the east, the existing Mauna Lahilahi Beach Park to the north and the Pacific Ocean to the west (Figures 1 and 2).

The function of this Cultural Impact Assessment is to document and evaluate the effects the planned development may have on native Hawaiians or any other concerned ethnic group in terms of their culture and their rights to practice traditional customs. The State Constitution, state laws and courts "require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups" (in Office of Environmental Quality Control, *Guidelines for Assessing Cultural Impacts*, Adopted by the Environmental Council, State of Hawai'i, November 19, 1997).

Under Act 50, Chapter 343, Hawai'i Revised Statutes, 2000, the following protocol are encouraged when preparing a Cultural Impact Assessment.

> Identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or *ahupua'a*;
>
> Identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;
>
> Receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;
>
> Conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;
>
> Identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and
>
> Assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices, and beliefs identified.

B. Scope of Work

This study is meant to satisfy requirements related to Cultural Impact Assessments (CIAs). The scope of work is summarized as follows:

1) Examination of historical documents, Land Commission Awards, historic maps, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal and other resources, or agricultural pursuits as may be indicated in the historic record.

2) A review of the existing archaeological information pertaining to the properties and vicinity as they may allow us to reconstruct traditional land use activities and identify and describe the cultural resources, practices and beliefs associated with the parcels and identify present uses, if appropriate.

3) Conduct consultations and oral interviews with persons knowledgeable about the historic and traditional practices in the project area and region. We anticipate both formal and informal interviews and consultation with numerous parties.

4) Preparation of two reports on Items 1-3 summarizing the information gathered related to traditional practices and land use for each of the two project areas. The reports will assess the impact of the proposed actions on the cultural practices and features identified within the project areas.

C. Methods

Historical documents, maps and existing archaeological information pertaining to historical properties in the vicinity of this project were researched at the State Historic Preservation Division library, Cultural Surveys Hawai'i library, Asian Pacific Digital Library of Kapi'olani Community College, and the University of Hawai'i's Hamilton library. The Office of Hawaiian Affairs, O'ahu Island Burial Council, Hui Mālama O Nā Kūpuna, and members of other community organizations were contacted in order to identify potentially knowledgeable individuals with cultural expertise and or knowledge of the study area and the surrounding vicinity. A discussion of the consultation process can be found in the section on "Community Consultations." Please refer to Table 2 for a complete list of individuals and organizations contacted. Two informal interviews were conducted for this assessment with Aunty Hannah Kaneaiala, and Mr. Glen Kila. A formal interview was conducted with Mr. Vince Dodge. Telephone interviews were conducted with Mr. William Āila on February 5, 2004, and Aunty Nettie Pualani Tiffany on March 15, 2004.

D. Project Description Area

The project area is located *makai* (seaward) of Farrington Highway in coastal West O'ahu (see Figures 1 and 2). Generally, the coastal areas of this region are characterized by white sand beaches with areas of old, uplifted coral reefs and limestone flats. Much of the coastal area has been disturbed by both historic and modern development as well as high surf which has eroded large sections of the coastline. Historically, *muliwai*, or backwater marshy areas would often develop behind dunes when streams were blocked.

Vegetation along this arid coast is sparse. With 20 inches (500 mm) or less of annual rainfall, only the hardiest plants adapted to coastal environments can thrive in this zone (Giambelluca et

al. 1986). The vegetation in the project area is typical of dry seashore environments in Hawai'i and is dominated by alien species. Indigenous species include *hau* (*Hibiscus tiliaceus*), *kamani* (*Calophyllum inophyllum*), *naupaka* or *naupaka kahakai* (*Scaevola sericea*), and the coconut or *niu* (*Cocos nucifera*). Introduced species within the project area include *kiawe* (*Prosopis pallida*). The soils underlying the project area consist mainly of ancient reefs or compacted sandstone and sands overlain by alluvial clays. Beginning in the northwest (*mauka*) portion of the project area is Waialua silty clay, 0 to 3 percent slopes (WkA). Waialua series soils are characterized as moderately well drained soils developed from basic igneous rock and found on alluvial fans (Foote *et al.* 1972). The *makai* portion of the project area is dominated by beach sand (BS) which is also present below the imported fill material, which has been deposited in the majority of the project area.

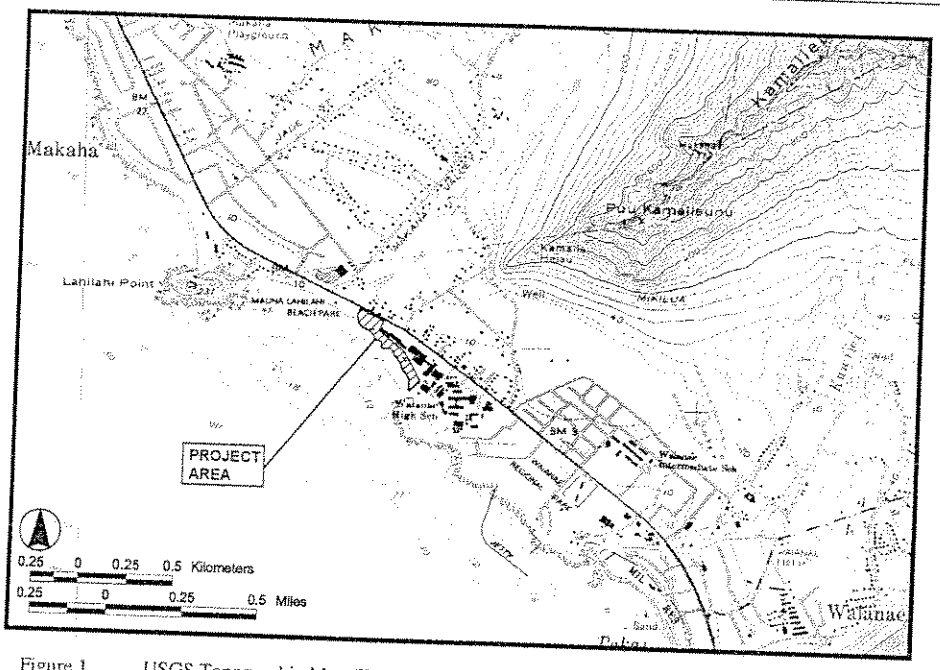

Figure 1 USGS Topographic Map (Wai'anae Quadrangle) Showing Location of Project Area

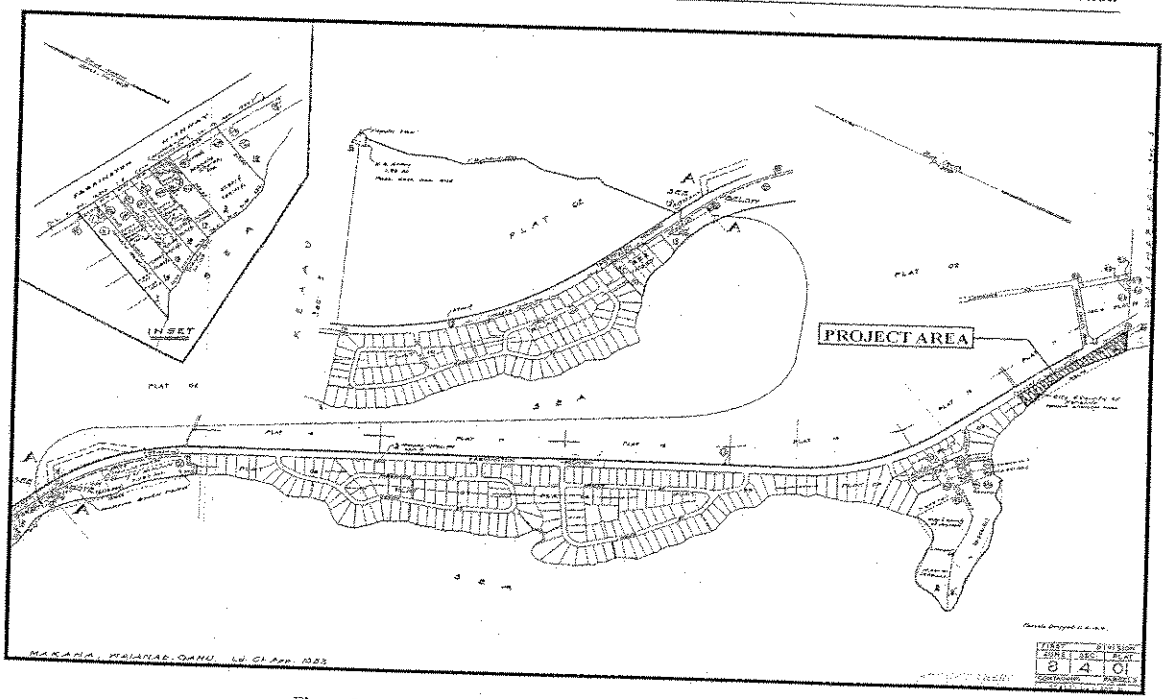

Figure 2 TMK 8-4-01 Showing Location of Project Area

II. MYTHOLOGICAL AND TRADITIONAL ACCOUNTS

The Hawaiian traditions centered on Waiʻanae suggest the area's significance and association with the *aliʻi* in prehistoric times. The district is a focus in the mythological cycles of Māui, Kamapuaʻa, and Kamohoaliʻi. The demigod Māui and his brothers were said to have been born in Waiʻanae, and it was here that Māui learned the secret of making fire for mankind. Kamakau (1870) enumerates, among the famous locales in Waiʻanae, the cave in which Hina (moon goddess and mother of Māui) made her *tapa,* the fishhook, Manaia Kalani (with which Māui attempted to unite the Hawaiian Islands), the snare for catching the sun (which Māui used to advantage on Haleakala), and the place where Māui's adzes were made. The pig demi-god, Kamapuaʻa, battled with the giant man-dog Kūʻīlio-loa (after whom the *heiau* in Waiʻanae is named) and destroyed the taro patches of Waiʻanae Valley. The people caught him, tied him up, and were preparing to sacrifice him when his many supernatural bodies swept over the plains, devouring the men of Waiʻanae and sending the rest fleeing in terror. Pele's older and favorite brother, Kamohoaliʻi, the shark god, became enamored with a maiden of the Waiʻanae coast and begot a half-man/half-shark child who devoured many people before being captured and killed.

Māui in other Polynesian traditions is said to have been born as a premature abortion with eight heads. (Luomala 88; The number eight suggests power: the pig-god Kamapuaʻa had eight feet and; the bat-god Peʻapeʻa had eight eyes and so was all seeing.) Māui's mother threw her abortion into the sea, where the gods rescued and raised it and later became heroes in Polynesian legends (http://apdl.kcc.hawaii.edu/).

Traditional and legendary accounts are presented below starting with the meaning of the names Lahilahi and Pōkaʻī, the genealogy from the kings and then in a loose arrangement from more mythological accounts of gods and demi-gods to accounts of more historical nature. There is o sharp distinction in this regard.

A. Place Names

According to Pukui (1974), Lau-kī-nui, *literally,* large ti leaf, was originally the name of Lahilahi Beach, in Waiʻanae. Today the name came to be Lahilahi, meaning thin, frail, or delicate (Pukui 1985:190).

Pōkaʻī was originally the name of the coconut grove in Waiʻanae, but in the last century the name came to be used for the adjacent bay as well. Thus Mālaea came to be known as Pōkaʻī Bay. Eventually the coconut grove disappeared, leaving only the bay to perpetuate the name. Today, Pōkaʻī Bay has been incorporated into a number of business and residential names in the neighborhood (Perzinski 2004:8).

Pōkaʻī – The pronunciation reflected by this spelling was recorded from the older residents of Waiʻanae early in this century. This pronunciation (rhyming with "row the sea") is still used and perpetuated by many people in the district. People unfamiliar with the origin and pronunciation of the name often use a slurred form, *Pokai* (rhyming with "go by"). This slurred form is frequently heard in reference to the bay and its many namesakes, while the Hawaiian pronunciation, Pōkaʻī, is used in songs that mention the famous coconut grove (Pukui 1974:25).

Pōkaʻī is said to be the name of a chief and, like many person names, its original meaning may never be known. Because the chief Pōkaʻī was said to be from Kahiki, the name may even originate from another Polynesian language.

Efforts to interpret the Hawaiian meaning of the name have been based on the parts of name, divided as follows:

Pō – night, of great antiquity; the time of the gods.

Ka – the; definite article

ʻī – supreme; the finest. A Hawaiian clan name.

From this interpretation comes the translation:

"Ancient are the supreme ones".

Ka Ululniu ʻO Pōkaʻī (Pōkaʻī Coconut Grove) was a large, famous grove in ancient times. Coconuts from there were considered to be chiefly gifts. It was said to have been planted by a chief named Pōkaʻī on his arrival from Kahiki around 1300 A.D. At this grove, Kahahana's priest, Kaʻōpulupulu prophesied Kamehameha's conquest of Oʻahu, saying, "*…no ke kai lā ho ʻi ka ʻāina."* (The land shall belong to [those from over] the sea.) Mostly cleared by the 1950's, a few of the oldest coconut trees in the area are remnants of this ancient grove (Kamehameha Schools 1988:Vol. 3:1).

B. Māui's Birth

In the *Kumulipo* Martha Beckwith (1972:135) gives the following account of Māui's birth as a fowl:

Waolana was the man, Mahuiʻe the wife

Akalana was the man, Hina-of-the-fire (Hinaakeahi) the wife

Born was Māui mus (Māui the first), born was Māui waena (Māui the middle one)

Born was Māui-kiʻiki'i, born was Māui-a-ka-malo (Māui of the loincloth)

The loincloth which Akalana girded his loins

Hina-of-the-fire conceived, a fowl was born

The child of Hina was delivered in the shape of an egg

She had not slept with a fowl

But a fowl was born

The child chirped, Hina was puzzled

Not from sleeping with a man did this child come

It was a strange child for Hina-of-the-fire

The two guards were angry, the tall and the short one

The brothers of Hina

The two guards within the cave

Māui fought, those guards fell

Red blood flowed from the brow of Māui

That was Māui's first strife…

C. Māui's Genealogy

According to early nineteenth century Hawaiian writers such as David Malo and Samuel M. Kamakau note that the histories of the ancient kings, from Keali'iwahilani and his wife, Lailai, down, from Kahiko and his wife, Kupu-lana-ka-hau, down, and from Wākea and his wife, Papa, down to the time of Līloa, are but scantily and imperfectly preserved. We have, however, it is true, a fragmentary, traditional knowledge of some kings. Of the kings from Līloa to Kamehameha I, we have probably a fair historical knowledge.

Another version of Māui's *mo'okū'auhau* is given by Samuel Kamakau (*Tales and Traditions* 1991: 134-136). Māui's genealogy, from Wākea, (the Sky Father), and his daughter Ho'ohokukalani is given as follows:

Wākea/Papa

Wākea/Ho'ohokukalani

Hāloa/Hina-Manouluae

Waia/Hununе

Hinalo/Haunu'u

Kakaihili/Haulani

Wailoa/Hikawao'opuaianea

Ki'o/Kamole

'Ole/Ha'i

Pupue/Kamahele

Manaku/Hikoho'ale

Kahiko/kaea

Luanu'u/Kawa'amaukele

Ki'i/Hinako'ula

'Ulu/Kapunu'u

Nana'ie/Kahaumokule'ia

Nanaialani/Hina-kina'u

Waikulani/Kekauilani

Kuheleimoana/Mapunaia'a'ala

Konohiki/Hika'ululena

Wawena/Hina-mahuia

Akalana/Hina-kawea

Māui/Hinaakealoha

Nanamaoa/Hinakapa'ikua

D. Māui Gets Fire from 'Alae (Mud Hen)

According to the story told by Samuel Kamakau (1991), the first fire of the people of old was a continual fire, kept going by the gods. The gods snatched it away, so Māui-a-Kalana sought a source of fire, and found it in the *māpele* [creating fire by rubbing sticks; *māpele* was a shrub tree]. From *māpele* fire, *ahi māpele*, was named volcanic fire, *ahi pele*. [The volcano goddess Pele brought volcanic fire; fire was made by friction before Pele's volcanic fire was brought.]

> Two women, 'Alae-huapipi and 'Alae-nui-a-Hina, had fire in the *māpele*, and from them fire was obtained. From then on men have had fire. The source of fire was in the possession of those two-bodied bird women, but Māui constantly spied on them and found the source. At one time Māui-a-Kalama was living *makai* of Ulehawa in Wai'anae, O'ahu, and he saw the fire over which these two women broiled bananas in the valley of Poho-a-'alae. One of them was just saying, "Hina's cock of a son is swift," when [the "cock" himself] Maui appeared.
>
> The women changed themselves into their *'e'epa* or peculiar forms of *'alae* [mudhens] (Figure 3); Māui caught hold of the head of 'Alaehuapipi, but her companion escaped, and the heartless women called out, "'O 'Alaehuapipi, hid the fire!". Māui held 'Alaehuapipi dangling by the head, with her wings crossed, and said to her, "Tell me the source of fire! If you hide it, I will kill you!" Knowing that she would die if she did not tell him, 'Alaehuapipi told him the *māpele* because it took the combined efforts of two, three, or four women to make fire with the fire-plow.

> After Māui had found that fire was in wood, fire was obtained from sparks, from two sticks rubbed together. The stick laid underneath was called the *'aunaki*, and the one grasped firmly in the palms of the hands and rubbed in the flat place hewn on the under stick was called the *'aulima*. The wood dust produced by the rubbing of the two sticks was called "*hana*"; the rubbing itself was called "*heahi'a*". The fire started in the wood dust that accumulated. Fire by friction was the ancient source of fire of the Hawaiian people.

This Wai'ane version of the story of Māui's getting fire from the mud hen is quoted from Kamakau's *Nā Hana a ka Po'e Kahiko* (1991:116-117).

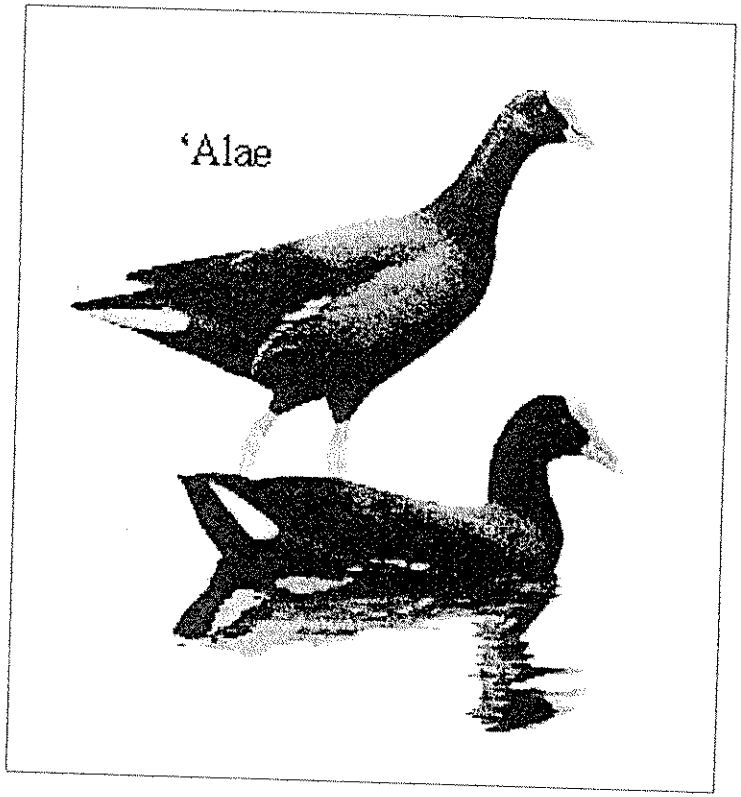

Figure 3 Picture of the 'Alae 'ula'ula or The Hawaiian Mudhen (*Gallinula chloropus sandvicensis*)

E. Māui Tries To Join the Islands

This story depicting Māui's failure to pull together the islands embodies a common mythological motif: an explanation of why things are as difficult as they are (i.e., why the islands of Hawai'i are far apart, so that one needs to paddle to get from one to the next). The explanation given in this story is also widespread: human inadequacy to resist seemingly simple temptations results in failure to achieve one's purposes. The strictness of Māui's command to his brothers to paddle and not look back is linked to Hawaiian belief in the importance of concentration for any ritual or activity to be effective. During rituals at the *heiau* (temples), absolute silence and rigid posture were required. Any sound or movement could result in failure of the ritual to achieve its purpose (Kamakau 1976:141-142).

Māui-kupua (Māui the demi-god) and Hina his mother lived together at Kaneana in the direct of Wai'anae. One day he asked her why the Hawaiian Islands were separated by water?

"What?" she exclaimed.

"Why are they separated instead of being one big land? I'm thinking that they should be joined together."

So Māui-kupua went to Ka'alaenuiahina and sat with him. Ka'alaenuiahina asked him the reason for his visit.

"I've come to ask for you help in joining the islands of Hawai'i together."

Ka'alae replied, "You and I can't do this. Only Unihokahi (one tooth) has that power".

Māui: ""Where is Unihokahi to be found?"

"At Ponahakeone [a fishing ground off of Ulehawa]."

Maui returned home and told Hina what Ka'alae said. The next day he came to his mother and said, "I'm going out fishing." She told him to ask his brothers to go with him, so he did. His brothers agreed and got their fishing gear ready. Māui also made ready his famous hook named Manaiakalani ("Come from heaven").

As soon as everything was ready they launched their canoe and paddled to the middle of the sea of Ulehawa. Māui was in command, holding the steersman's paddle at the stern of the canoe. He said to his brothers, "When a *kaliu* (bailer) appears at the bow of the canoe, reach over and grasp it."

They paddled on. Māui looked back toward Hina's place for drying *kapa* (bark cloth). He couldn't see it at first; when it came into full view, it gave him his bearings. He then looked forward, and there floated the *kaliu*. He called to his oldest Brother, Māui-nua ("Māui the first born"), to catch hold of it, but Māui-mua replied: "We don't need a bailer, we already have one."

Meanwhile, the bailer floated toward Māui-kupua at the stern of the canoe. He caught it and put it into the canoe. The name of this bailer was Hina-a-ke-ka ("Hina, the bailer").

Māui-kupua called to his brothers, "Paddle until we reach the *ko'a* (fishing ground)." They turned around and saw a beautiful woman in the canoe. They paddled on until they reached the fishing ground of Ponahakeone and, anchoring the canoe, the brothers looked back again, but the beautiful woman was gone; the bailer had dropped into the sea. Māui-kupua called out to his elder brother, "Let down your hook," and Māui-mua did so. When Māui-mua felt a bite, he boasted: "Say, I've caught an *ulua* (crevalle)."

But Māui-kupua said, "No! It's a *mano* (Shark)."

"That despicable fish caught by my hook?"

Māui-kupua said, "Haul it in and see for your self." Māui-mua pulled in his line and saw he had indeed caught a shark, whereupon he cut the line and let the shark go. And the same thing occurred also with Māui-waena (Māui the middle born) and Māui-hope (Māui the last born).

Māui-kupua then said, "All of you keep quiet it's my turn." He prepared and let down his famous hook Manaiakalani and called to his brothers, "Get your paddles ready."

Manaiakalani went down until it reached the bottom of the sea, where it was caught by Hinaakeka, who went to Unihokahi. The fish said, "What brings you here?"

Hina replied: "I've come to settle a dispute I had with Māui-kupua. I said you had only one tooth, and he said no one has just one tooth, everyone had many teeth; and so I came to determine who was right. Will you open your mouth?"

Unihokai opened his mouth, and Hinaakeka put the hook Manaiakalani in: at the same time she jerked the line, signaling to Māui that the hook was set. Securing his end of the line to the outrigger of the canoe, Māui told his brothers, "Paddle, the fish is caught. But keep looking forward; don't look back."

They started to paddle; their strength was so great that the canoe flew forward as swiftly as ashes blown from a fireplace. They paddled vigorously until they began to get tired. Māui-kupua urged them on: "Keep paddling and we'll soon reach shore." They kept paddling, but were soon exhausted.

Māui said, "We're almost ashore; don't look back."

They continued to paddle for a while and then said: "This is no fish—if it was, we would have reached shore long ago."

Māui said, "Be patient. Keep paddling."

"We can't, we're exhausted," they replied.

Māui-kupua grabbed his paddle to help his brothers. While he was paddling, his three brothers looked back and saw the islands of Hawai'i moving behind them, whereupon they exclaimed "No wonder we're exhausted, we've been pulling islands!"

When Māui-kupua heard this he was very angry with them. His hook fell from the mouth of Unihokahi and the islands floated back to their original positions; thus Māui-kupua failed in his attempt to join the islands together.

F. Kamapua'a and 'Olopana's Victory

This version of the O'ahu adventures of Kamapua'a is from the *Fornander Collection of Hawaiian Folklore and Antiquities* (Vol. V, 314-327).

Kahiolo gives the following list of O'ahu's "*wai*"-lands given to Lonoaohi by Kamapua'a: "Waialua, Wai'anae, Waimānalo, Waikele, Waipi'o, Waiawa, Waimano, Waiau, Waimalu, Waikīkī, Wai'alae, Wailupe, Waimānalo 2, Waihe'e, Waiāhole, Waialea, and so on."

These were the best agricultural lands on O'ahu: "When Kamapua'a's parents, Hina and Kahiki'ula, realized how many choice sections of land with water was given to the *kahuna*, they complained. His older brothers and grandmother, however, did not complain; they agreed that the *kahuna* should have all these lands, and that the rest of the lands of O'ahu were theirs."

Kamapua'a went to Kahiki, the home of his great grandmother Humahuma. He married Kekaihaakuloulaniokahiki, the daughter of the chief Koea, then defeated a rival chief named Lonoka'eho from the other side of the island (cf. the battle between Kaulu and Lonoka'eho in "Kaulu").

On the way back to Hawai'i, Kamapua'a fought with and defeated the giant dog Kū'ilioloa (cf. the battle between Kaulu and Kū'ilioloa in "Kaulu").

When Malae arrived at Wai'anae, he told 'Olopana: "My lord and king, your opponent Kamapua'a has the character of a god. You will never be able to destroy him; nor will you survive if you fight him in a regular battle. There is but one way for you to overcome your opponent, and it is this: Get all the pigs, *'awa*, chickens, fish, men, and bananas you can; take these and lay them before Kamapua'a as offerings. These offerings will enfeeble him, and his strength will be gone."

'Olopana carried out Malae's instructions and prepared all the different things ordered by the priest. Then he and his followers went to Kamapua'a's dwelling place. The offerings were laid at Kamapua'a's feet as directed by the *kahuna*, and Kamapua'a became weak and feeble. The men then seized Kamapua'a and dragged him to Pāhoa in Wai'anae. When they arrived at there, 'Olopana was very tired from the excitement and hard work of capturing and carrying the pig, so he returned home, leaving his men to bring Kamapua'a along later.

Lonoaohi was bound and fastened to a post in the center of a house. 'Olopana intended to sacrifice him with Kamapua'a on the altar of the *heiau*.

Through his powers as a *kahuna*, Lonoaohi knew what the men intended to do to Kamapua'a, which was this: When the men arrived with Kamapua'a at Pāhoa, they would look for stone knives with which to cut open the pig and take out his intestines and other innards, making him easier to carry back to 'Olopana's place. Lonoaohi knew that if Kamapua'a was killed, he, too, would be killed, so he directed his sons Kapuaaolomea and Kapuaahiwa to go and speak to the men: "You two go to the men and tell them, 'Ē! the king said not to cut the pig open. Take him as he is to the sacrificial altar. It will take several days to reach 'Olopana's place; if you kill the pig now, he will surely decay, and the king's sacrifice will be spoiled. The pig must not be dragged on the ground, either, for his skin will get bruised and damaged. The pig must be carried on poles. When you get tired, put the hog on the ground and rest. Thus said the king. This is the only way to save your master from death. If he lives, we will all live; but if he dies, we will all die."

When Lonoaohi's two sons reached the men at Pāhoa, they found the men sharpening their knives so they could cut open Kamapua'a's belly. The sons told the men what their father told them to say, and the men abandoned their knives. (Till this day, this area is called Pāhoa, or "Stone Knives.") The men carefully carried Kamapua'a to 'Olopana's place and put him in the *heiau*.

That night Lonoaohi slept at the post to which he was tied, his sons with him, while the guards kept watch around the house; and Kamapua'a slept in the *heiau*, also under guard. Late that night when the Milky Way turned (i.e. past midnight), Lonoaohi was awakened by his god. Lonoaohi then kneeled down and prayed, and at the close of his prayer, the ropes which held him fell from his body and he rose and walked out of the house, where he found the guards all asleep. When he arrived at the place where Kamapua'a was being held, he found the guards asleep. Lonoaohi then placed his hand at the nostrils of Kamapua'a and discovered he was still alive and breathing. Lonoaohi said: "Alive! I thought you might be dead, but I see that you're not. These bones will live!"

After a while he again said to Kamapua'a: "Ē! The *wai* lands of O'ahu are mine."

Kamapua'a grunted: "Huh!" The meaning of the request was this: Lonoaohi wanted all the lands containing the word "*wai,*" such as, Wai'anae, Waialua and so on. Lonoaohi knew, through his great powers, that 'Olopana would be killed, and that Kamapua'a would conquer and possess the island of O'ahu. This was the reason he made this request. After this exchange between Lonoaohi and Kamapua'a, the *kahuna* returned to his place and sat down. For the rest of the night, he prayed to his god because at dawn he was to be placed on the sacrificial altar with Kamapua'a.

When the early morning crowing of the cocks became a din, 'Olopana and the priest Malae came to began the ceremonies performed before a human sacrifice was offered. The two went and climbed onto the terrace *('anu'u)* of the sacrificial stand *(lele)*; Kamapua'a was unbound and placed on the terrace as well. 'Olopana and the priest, both naked, turned to face each other and began chanting and praying. Before the prayer ended, Kamapua'a rose above them and opened his fiery eyes. When Malae and 'Olopana saw Kamapua'a standing above them, they froze with fear and awe. Kamapua'a prayed and invoked his many bodies and all his gods. At the close of the prayer the *heiau* was surrounded by the gods and pigs. Kamapua'a then called out to the priest Lonoaohi:

> Ē Lonoaohi ē!
>
> Line the *imu* with rocks;
>
> Gather them there, gather them here.

Then Lonoaohi appeared and raised a *kapa* banner to mark off an area of *kapu;* those who entered this area would be saved from death. After this, the slaughter began and the only one who survived Kamapua'a's wrath was Makali'i, who sat on the lap of Kamaunuaniho [another *kapu* place]. This was how Kamapua'a killed 'Olopana and conquered O'ahu.

Arriving on the Big Island of Hawai'i, he traded insults and fought with Pele. As he was about to marry her on a lava field, a bunch of supernatural bananas enticed him away. He chased after the bananas. To save her brother from being eaten by the voracious pig-man, Kapomaikele lured Kamapua'a to Wailua, Maui, and slept with him. Her husband beat him with a canoe paddle until he realized that it was Kamapua'a.

Kamapua'a continued on to Moloka'i, where he got news from O'ahu: his brother Kekeleiaiku was dead, his parents had gone to Kaua'i, and O'ahu had been taken over by some usurpers.

Arriving on O'ahu, he devoured all the bananas in the plantation in Kalua'ōlohe (Pālolo Valley) belonging to the O'ahu chiefs. At Pu'uokapolei, he found his grandmother living in poverty. He ate all her sweet potatoes, then visited the hut of some fishermen and ate all their poi and bananas. He revived his dead brother Kekeleiaiku, whose spirit was wandering around the desolate plains of Pu'uokapolei. Then he went and demanded fish from those who ruled O'ahu; only Lonoawohi's two sons Kapua'a-hiwa [The black pig] and Kapua'a-olomea [The brown spotted or striped pig] gave him fish. Kamapua'a then killed and ate the stingy chiefs and reconquered O'ahu. On his way back to 'Ewa, he straightened the humpback of Kūolohele by throwing a stone at it. (Cf. a similar incident in "Māui," in which the demigod Māui straightens the back of his grandfather Kuolokele.)

Kamapua'a reaffirmed the right of Lonoawohi's two sons to the "*wai*"-lands of O'ahu, and gave the remaining O'ahu lands to his grandmother and the brother he revived. Then he continued on to Kaua'i to seek his parents.

On Kaua'i, he married the two sisters (or daughters) of Kaneiki. After Kaneiki fed him, Kamapua'a defeated the warriors of Makali'i, who had fled O'ahu after the defeat of 'Olopana and settled on Kaua'i. Makali'i acknowledged Kamapua'a's superiority by chanting in honor of Kamapua'a, so Kamapua'a spared his life and allowed him to live on Kaua'i.

Kamapua'a went next to Waiahulu, where he married again. After he became sick with dropsy, his wife deserted him, but his parents-in-law and brother-in-law took care of and fed him. He sent his parents-in-law to ask for some fish from his mother Hina, but Hina refused, believing that the request could not have come from her son Kamapua'a because of a rumor that he had been killed by Pele. Angry, Kamapua'a appeared to his family and sat on, then trampled his mother, his father and his older brother Kaikihonuakele. After his anger subsided, he lived peacefully with them until he felt an urge to return to Kahiki. He revealed all of his bodily forms to his parents, and then swam back to Kahiki in his fish form. His father-in-law Koea wanted to prevent his further wanderings so he cut Kamapua'a's scrotum. Thus Kamapua'a remained in Kahiki, and after his death, he "became a mountain with tree and forests growing all over."

G. Māui Battles with Pe'ape'a

According to Kamakau (1976:141-142), some time after his effort to pull Kaua'i closer to O'ahu failed; Māui and his three brothers went out fishing again at the fishing ground of Ponahakeone, where each of them in turn let down his hook. Each brother caught a shark; Māui, with his famous hook Manaiakalani, caught a *moi* (threadfish) and a large *ulua.*

Māui-kupua told his brothers to paddle ashore and directed them to the best landing place. After they landed, he grabbed his *hokeo* (fishing gear gourd), his paddle, and his two fish and returned home to his mother Hina. He left his *hokeo* and paddle with her and continued on his way, carrying the fish to the *heiau* (temple) called Luaehu, because he was supposed to eat the fish there. He began to eat the fish from the head and had almost reached the tail, when, looking up

toward Pōhākea, he saw Kumulama, his wife, being carried away by the chief Peʻapeʻa-maka-walu (Eight-eyed-bat) Māui left the tail of the fish and pursued the bat to get his wife back. But Peʻapeʻa-maka-walu was too swift for him and disappeared into the sky beyond the sea.

Realizing he could not overtake his enemy, Māui returned to the road, crying over his wife's misfortune. When he arrived again at the *heiau,* where he had left the fish tail, the fish was gone, having recovered its form and returned to the sea.

Still weeping bitter tears, Māui returned to his mother Hina.

"Why are you crying?" she asked.

"My wife was been stolen by Peʻapeʻa-maka-walu."

"You're a swift runner couldn't you catch him?"

"I chased after him but he flew off," replied Māui.

"Then rest a while. Later, I'll tell you what to do," said Hina.

Still grieving, Māui rested and waited patiently until the next day. At the appointed time, he went to his mother, who told him: "Go to the land of Keahumoa; there you'll see a large hut. Your grandfather Kū-olokele (Kū-honeycreeper) lives there and he'll instruct you on how to recover your wife."

Māui went to Keahumoa and found the hut. He peeped in but no one was inside. He looked at the sweet potato fields on the other side of Pōhākea, toward Honouliuli, but could not see anyone. He then climbed a hill and after a while saw a man coming toward Waipahu with a load of sweet potato leaves, one bundle of which, it is said, could cover the whole land of Keahumoa.

Kūolokele was crossing into Keahumoa from Waipahu, and as he reached the stream, he put down his load of leaves, went, and bathed. Māui saw that he had a humpback.

He picked up a stone and threw it at his grandfather, striking him on the back, whereupon Kūolokele's back was straightened. Kūolokele picked up the stone Māui threw at him, and threw it to Waipahu, where it has remained to this day.

Kūolokele then turned and saw Māui and said to himself, "Oh, there you are." He went back to pick up his load. Putting his arms into the strings of the bundle of leaves and lifting it onto his back, he went and met Māui, his grandchild. Then they both went to the hut, where Kūolokele put down his load and said, "What brings you here?"

"My wife has been stolen away."

"Who took her?"

"Peʻapeʻa-maka-walu."

"Are you very swift?"

"Yes."

"Then go and catch birds for feathers, and gather *kī* leaves, and *ʻieʻie* vine and fill that house over there with them."

Māui went to gather all these things together and put them in the house. Then he went back to Kūolokele and said, "Everything is ready."

"Return home, and in three days come again."

"Very well," said Māui and he left.

On the first day, from the bird feathers, *kī* leaves, and *ʻieʻie* vines, Kūolokele made the body and wings of a bird. On the second day, he finished the bird and tested it. It flew the first flying-craft ever in Hawai'i.

On the third day, Māui appeared before Kūolokele. As soon as he arrived, food and water were loaded into the *moku-manu* ("bird-ship.") Kūolokele told Māui "Fly in this bird until you come to Moanaliha, the land of Peʻapeʻamakawalu. When you reach it, look for the village. If the village is deserted, then look toward the sea and you'll see a great number of people gathered there, among whom will be Peʻapeʻamakawalu, along with your wife. Fly near them, but not too close, just close enough to attract their notice; then fly far out to sea. On your return the people watching you will shout, 'The bird! The strange bird!' Peʻapeʻamakawalu will say, Perhaps that's my bird; let's see if it flies to and rests on my sacred box.'"

Māui entered the body of the bird, and Kūolokele called out, "Pull the strings fastened to the wings to make the bird fly." Māui pulled the strings and started to fly. He flew for two days and two nights. Arriving at Moanaliha, he looked over the land and noticed that the houses were beautiful, but there were no people. According to an ancient chant:

There stood the houses of Limaloa
There were no inhabitants.
Basking in the sun, the sea, and the smile of chief
All were at Mānā.

And when he looked toward the seashore he saw a crowd gathered there. He flew until he was right over the multitude and saw his wife, Kumulama. He continued flying over the deep ocean. Passing over the small waves and resting on the rolling billows of the sea, he was moistened by the fine sea-spray. Then Māui turned and flew toward land. As he neared the shore, the people exclaimed, "Oh, an enormous bird! An enormous bird!"

Peʻapeʻamakawalu said, "Perhaps it's my bird; if it is, it'll land on my sacred box."

Māui heard him and flew and landed on the sacred box. The people shouted excitedly, "The bird's now resting on the sacred box, there it is!" After this, the chief and the people arose and returned to their village.

Arriving at his house, the chief told his attendants to go and bring the bird into the sleeping house. The order was carried out and the chief said, "Give the bird poi and fish." Food was brought to the bird. Māui reached out from the opening of the mouth and took the food inside. After a while more food was brought but the bird's mouth didn't open again, so the attendants

concluded that the bird was satisfied. The people then returned to their own houses to eat. Night fell. Pe'ape'amakawalu and Kumulama lay down to sleep. Māui saw his wife lying with the bat, and his anger boiled within him. He wanted to kill Pe'ape'amakawalu right then, but restrained himself, knowing the time was coming when what had been foretold would be fulfilled.

This chief Pe'ape'amakawalu had eight eyes, four in front, and four behind, and that was why he was called "eight eyes." Māui eagerly waited for all eight to close. After a while one of the eyes closed, and seven remained open. He waited until four more closed, and three remained. He continued waiting until almost daylight, when he prayed to Hina: "Hold back the night!" Hina held back the night.

Māui waited patiently until seven eyes closed and one remained open. He kept awake until the last eye closed. Then he emerged from the bird, went to where Pe'ape'amakawalu was sleeping, and cut off his head. Māui took his wife and the head and entered the bird again. Then he broke a hole in the roof thatching and flew out.

The next day, Pe'ape'amakawalu's people waited outside his house a long time. They became restless when he did not appear. When they opened the door and went in, there was neither bird, nor woman, only the headless body of Pe'ape'amakawalu. Looking up, they saw the hole in the roof and knew the bird had killed their chief and flown away while they slept. The land of Moanaliha, from one end to the other, went into mourning for their dead chief.

Meanwhile Māui was flying back to O'ahu. He dodged clouds; he was battered by strong winds and pelted by rain. But all these were as nothing to his bird. It flew and arrived at Kūolokele's house. The grandfather greeted him, "Come, the feast is ready the *poi*, the fish, the pig, and the *'awa*." As soon as Māui alighted, his grandfather asked, "Where is your wife and your bundle?"

"Here they are inside," replied Māui.

"Then let your wife out first," said Kūolokele, and Kumulama came out; then Maui brought out the head of Pe'ape'amakawalu.

The eyeballs were plucked out by Kūolokele and placed in the *'awa* cup, and the *'awa* was prepared. When the cup was filled, he gave it to Māui, who drained it. Then they ate the prepared feast until they were satisfied, and Māui's anger was appeased. After they enjoyed some time together, Kūolokele excused Māui and Kumulama, and they returned home to Hina, who welcomed them back with joy.

H. Kū'īlioloa (dog *kupua*)

Kū'īlioloa is described by Kamakau (Beckwith 1970:347), as a dog with a human body and supernatural power, "a great soldier and famous warrior." The dog man came with his owner Lono-ka-ehu from Kahiki to seek his brother.

Kū'īlioloa Heiau was an ancient temple named for this legendary dog who protected travelers (Figure 4). The dog was also known as Kāne'īlio, and his image is found in petroglyhs along the Wai'anae Coast including those located *makai* of Maunalahilahi immediately west of the current project area. This *heiau* is located east of the present project area. This *heiau* is unique. It is surrounded on three sides by water. The *heiau* was a famous training site for astronomy, navigation, and religious traditions. After Kamehameha's conquest of the island, this *heiau*

became a refuge for O'ahu *kāhuna* (priests) and a center for the perpetuation of their lore. The site was mostly destroyed during World War II, but local efforts to rebuild the *heiau* were completed in 1982. Keaupuni and Kahōali'i (or Hāua), two other heaiu adjacent to Pōka'ī coconut grove, have been completely demolished (Beckwith 1970:347).

I. Kamohoali'i (Kahoali'i)

The most celebrated of the ancestral shark gods is Ka-mohoali'i, Pele's many bodied brother and the shark god to whom all members of the Pele family offer corpses to become sharks. His home upon a cliff on the northern edge overlooking the crater is so sacred that even Pele dare not blow smoke across it, and the *mo'o* goddess Kihawahine, when she had her celebrated tussle with Pele, feared to spew phlegm upon it. When Kamohoali'i takes human form, he appears without his loincloth, a privilege, says Emerson, which marks the god! In the story of Laukaieie, he and his shark people are living at Kaho'olawe. Kauhi, the cruel husband of Kahalaopuna (Famous in the leeward legends of O'ahu), who kills his wife in his shark form is represented as a member of Kamohoali'i's family. He may be identical with Kahoali'i, the naked god of the *makahiki* to whom the eye of fish or man is dedicated in a cup of 'awa. Mrs. Pukui recalls in corroboration of this identification the lines of a chant in which the cliff summit above the crater of Kilauea, so sacred to Kamohoali'i that smoke from the burning pit never touches it, is ascribed to Kahoali'i:

Ka mahu a i luna o Wahinekapu,

Ua kapu aku la ia Kahoali'i.

The smoke rises above [the place called] Sacred-woman

The place sacred to Kahoali'i

It is on the whole as savior from sorcery that the shark *aumakua* (guardeian) is so universally worshiped in Hawai'i (Beckwith 1976:131).

J. Kaopulupulu, the Prophet

Kaopulupulu, the prophet, protested against Kahahana's (the ruler of O'ahu) cruelty. Kahekili, Maui's chief, resented the refusal of Kaopulupulu to permit Kahahana to give him Oahu's best lands. He sent a man to deceive Kahahana into believing that the prophet tried to betray him. He ordered him killed. A messenger was sent to Waimea to get him to come. The chief went to the coconut grove of Wai'anae (Pōka'ī) at a place called Pu'ukahea, to await him. Kaopulupulu knew beforehand what was to come so he told is son, Kahulupue to watch for the chief's messenger, that if his shoulder covering was knotted on the left, he brought a warning of death to them. When the man appeared, the know was on the left. The two, Kaopulupulu and Kahulupue went, the son weeping for love of wife, home and family. They proceeded to

After Kamehameha's death in 1819, Liholiho (Kamehameha II) allowed his chiefs to share in the sandalwood trade, resulting in an unrestrained demand on the stocks of the wood and upon the commoners who did the harvesting.

"Traders' records from Kamehameha's last years show several important *ali'i* trafficking in sandalwood on their own, including...Kalaimoku, Cox, Boki, Ka'ahumanu, and some others" (Kirch and Sahlins 1992:59). Among these *ali'i*, Boki Kama'ule'ule was the Kamehameha chief that the monarch had made chief of Wai'anae. Sometime before Kamehameha's death, Boki also became governor of O'ahu. Diaries and journals of the western entrepreneurs on O'ahu record Boki's travels to and from Wai'anae and the unfolding of the sandalwood trade there. Don Francisco de Paula Marin, who had arrived in the islands in the 1790s, noted in his diary Boki's departure from Honolulu to Wai'anae aboard the schooner Paula on April 18, 1820. Three days later, on April 21, Boki returned "with a cargo of taro, dogs & hogs from Guallanae [Wai`anae]" (Gast and Conrad 1973:239). During succeeding months, until May 1822, Marin recorded four more voyages by Boki to and from Wai'anae, presumably to procure additional goods from the Leeward coast. In December 1829, Boki sailed to the New Hebrides in search of sandalwood but he and his ship were lost at sea. Boki had appointed his favorite wife, Liliha, governor of O`ahu during his absence. She continued in that position and retained control of Wai'anae after his death had been reported.

More detailed accountings of Wai'anae's role in the sandalwood trade during the 1820s appear in the journal of Stephen Reynolds, a clerk for the Honolulu merchant William French. French had settled in Honolulu in the 1820s, becoming involved in business enterprises throughout the islands. In 1828, he was among a company of foreign residents who converted a Honolulu sugar mill into a rum distillery. Unfortunately for the investors:

> ...by this time the Queen Regent Ka'ahumanu and most of the powerful chiefs had become Christians and had taken a strong stand in favor of temperance. A *kapu* was placed upon the business of making rum; the missionaries, who had the only ox-carts in the village [Honolulu], refused to allow them to be used for carrying cane to the mill; and Ka'ahumanu caused the cane fields to be destroyed. This was about 1829. The foreign residents were greatly enraged and one of them, William French, afterwards accused the missionary Rev. Hiram Bingham of having made him lose $7,000 through the failure of the distillery [Kuykendall 1965:173].

Other investments undertaken by French were more successful and by the 1830s he was a leading merchant in the islands.

Reynolds' journal suggests how haphazard the collection of the wood was. On May 10, 1824 the vessel Water witch went to Wai'anae; it returned to Honolulu on May 12 and, Reynolds recorded, "got no wood, nor saw any" (King, 1989:29):

> Two months later, the Prince-Regent "sailed for Wainai after wood" and returned with "160 piculs" (King, 1989:44). Reynolds' journal contain no further record of Wai`anae sandalwood until August 5, 1827 when he noted: "Fine morn. Fine day. Black Joe came from Wainai said Teignmouth took about Four hundred pics sand'wood on board & sailed for Wainea" (King, 1989:193). William French himself was in Wai'anae in November 1827, awaiting "goods" which were shipped to him there, perhaps in payment for a stock of sandalwood (King, 1989:203). On January 17, 1828 Boki "went to Wainai to weigh Sandlewood...", and later that month, on the 28th, Reynolds reported: "Hunnewell [a trader] weighing Tax wood from Wainai" (King, 1989:211-212). The next month, February 1828, Reynolds recorded that Boki was in Wai'anae and that "Capt Meek, Chinchilla went to Wainai after tax wood"; on February 26, Meek returned from Wai'anae with "508 piculs tax wood" (King, 1989:214-215). Reynolds sailed to the leeward coast in June 1828, reporting his vessel "got 171 piculs on Board" at Makua on the 18th, but at Wai'anae the next day, "Went ashore at daylight. Tabuiki [Kapuiki], the Head man of Wainai was in the mountains & would not come down At 10 got under weigh" (King, 1989:228).

Apparently, no sandalwood was loaded at Wai'anae. The June 19, 1828 entry is the last record in Reynolds' journal of any attempt, successful or not, to procure sandalwood at Wai'anae. By the middle of 1828 the stands of sandalwood above the Wai'anae coast may already have been depleted. When Boki himself supervised "collecting Sandalwood to pay [his] Debts" in August 1828, he went to the Ko'olaus (King, 1989:234).

Already in October 1817, a Russian visitor noted on O'ahu: "There are now many fields left uncultivated, since the natives are obliged to be cutting sandalwood" (Barratt 1988:218). By 1828, the disruptive force of the sandalwood commerce must have been extreme in Wai'anae where the existing limited agricultural resources would have demanded strict marshalling.

During the same decades that commercial ventures were forcing changes upon the Hawaiian landscape, western missionary interests were establishing their foothold in the islands. The American Board of Commissioners for Foreign Missions, headquartered in Boston, sent its first company of missionaries to the Hawaiian Islands in 1819, leaving Boston on October 23rd aboard the brig Thaddeus. By the 1820s, the Protestant missionaries had established close links with the *ali'i*. From July to August 1826, Ka'ahumanu and an entourage consisting of up to 300 persons conducted a proselytizing tour around O'ahu. Rev. Hiram Bingham's (1847:296-297) account of the proceedings in Wai'anae suggests that traditional beliefs remained strong in the district, and that its inhabitants knew how to deal with their visitors.

> ...we passed on round the promontory [Kaena Point] to Waianae, the western district of Oahu, separated from the rest of the island by a range of mountains. Its valleys and plains, nearly level with the sea, are interspersed with small steep mountains. The district was called Boki's. Here we spent the third Sabbath. While there, Ka'ahumanu spoke with concern of the stupidity of the people...

> A man in that region, pretending to know something about the fabled god, Kamapua'a, assuming the form of a hog, was sent for to tell us what he knew; but his efforts to enlighten us on that subject, proved the ignorance, darkness, imbecility, and confusion of the heathen mind, as did also the first efforts to lead this man into the light of Christianity. He was once asked by a native teacher, at a meeting for prayer and conference, to tell his thoughts, that it might be known how to stood in respect to the service of God. Dropping his face low towards the ground, he stretched forth his hand, holding a small stone, and said: "What is this? It is a stone, by which we cook food;" then holding up a little tinder, said: "What is this? It is tinder, by which we kindle fire." Having made some advance when we arrived and conversed with him, he said: "I have been fed with the Word of God; and Jesus Christ has given me light. I know this body of dust will soon die, but my spiritual body will continue, and it is for that I want salvation." He continued with us several days, and had opportunity to learn something infinitely above the idle stores about Kamapua'a.
>
> As we took leave of the place, the headman, Kapuiki, being personally pressed to give his heart to God immediately, said, "Such is my intention." Such personal appeals extensively and kindly made, were generally kindly received.

Censuses taken by Protestant missionaries throughout the Hawaiian Islands beginning in 1831 provide the earliest documentation of the size of the native population after the first decades of western contact. During the first census of O'ahu in 1831-1832, the population of the *ahupua'a* within the Wai'anae District totaled 1,868 people: 757 adult males, 695 adult females, and 416 children (Schmitt 1973:19). Four years later, in 1835-1836, the total district population had dropped to 1,654.

The Organic Acts of 1845 and 1846 initiated the process of the Mahele the division of Hawaiian lands, which introduced private property into Hawaiian society. In 1848 the crown and the *ali'i* (royalty) received their land titles. Wai'anae Ahupua'a was retained by the crown (Perzinski 2004:12).

Kuleana awards for individual parcels within the *ahupua'a* of the Hawaiian Islands were subsequently granted in 1850. These awards were presented to tenants native Hawaiians, naturalized foreigners, non-Hawaiians born in the islands, or long-term resident foreigners - who could prove occupancy on the parcels before 1845. Four parcels were awarded within the project area (Perzinski 2004:12).

The four awards provide clues to mid-19th century population and land usage within this portion of Wai'anae Ahupua'a. The awards indicate multiple parcels (i.e. āpana) in different environmental zones. The *lo'i* mentioned were associated with *āpana* in the more *mauka* portions of the *ahupua'a* in the area near the base of Kamaile Ridge and presumably associated with a spring in that location (Figure 6) (Perzinski 2004:12).

LCA 9479

Awarded to Kahinu who claimed to have received it during the time of Kekauluohi. Kahinu claimed 18 *lo'i* in three *āpana*. The lands were said to have been bounded:

Mauka by the *lo'i*, Kumano by name

Ewa by the moo 'āina Kumukou

Makai by the seashore

Waialua by the *moo 'āina* Hawaiiloa

It was also noted that the land was bounded on the west by the Government road.

LCA 9480:5

Seven *āpana* were awarded to Ohule (Sections 1-4 from Kuheleloa, Section 5 from Piiapoo, Section 6 from Kao-pukea and Section 7 from Kahue) during the time of Kamehameha I.

Which *āpana* is associated with the project area is difficult to determine based on the recorded descriptions. It is probable that up to six of the *āpana* were located in the well-watered regions near Kamaile Ridge.

LCA 9489-B:1

The award included two *āpana* to Holi from Manu in the time of Kekauluohi. The land of the claimant is a *moo 'āina* called Kumumaomao in the *ili* of Kamaile 1, and contains 18 *lo'i* and a *kula* in one piece and is bounded:

Mauka by the *koele* Kumuaomao

'Ewa by the *moo 'āina* Hawaiiloa

Makai by the seashore

Waialua by the *kula* Kumanomano

LCA 9793

Kuheleloa was awarded an *āpana* from Nakoolele in the time of Liholiho. The land of the claimant is a *moo 'āina* called Mooiki in the *ili* of Kamaile 2 and contains 10 *lo'i* and a *kula* in one piece, bounded:

Mauka by the *moo 'āina* Kalaulaula

'Ewa by the sea of Keawaiki

Makai by the *moo 'āina* Puhakaa

Waialua by the *koele*

One other claim was made, though it was challenged with a "court action".

Records for these LCAs are problematic. Only two of the LCAs (9479 an 9489) suggest that the parcels are bounded by the sea, though the other two are clearly along the shoreline. No indications of houselots are made on the testimonies either, though it is presumed that the shoreline was the foci of habitation whereas the *āpana* in the more *mauka* areas was reserved primarily for cultivation (Perzinski 2004:12).

D. Mid 1800s to 1900s

In October of 1819, two whale ships had anchored in the Hawaiian Islands. During the next decades, other whale ships would follow, as the islands became a victualing and layover base in the mid-Pacific. Supplies of beef, fresh and salted, were in demand, and a trade in hide and tallow developed. Following the collapse of the sandalwood trade, in the 1840s, the Hawaiian economy had been dependent primarily on supplying whale ships during their long layovers in the islands. The trade sustained the islands until the collapse of the whaling industry in the mid-1860s (Perzinski 2004:13).

In 1851, Paul F. Manini, son of Don Francisco de Paula Marin, leased 17,000 acres in Lualualei Valley for grazing livestock. By 1863, a missionary could report that "most of the land in the Waiʻanae District was devoted to grazing and had already been divided into six or seven divisions; and secured to as many parties or individuals on long lease or fee simple titles'" (McGrath et al. 1973:31). The experience of the *makaʻāinana* in Waialua likely mirrored that of the remaining Hawaiians in Waiʻanae:

> ...the depredations of the foreigners' cattle had virtually reduced agriculture to the cultivation of wetland taro. For destruction of sweet potato fields and gardens of melons, bananas, maize, and other crops was causing the people to take these out of cultivation, and in some cases to take themselves out of Waialua [Kirch and Sahlins 1992:149].

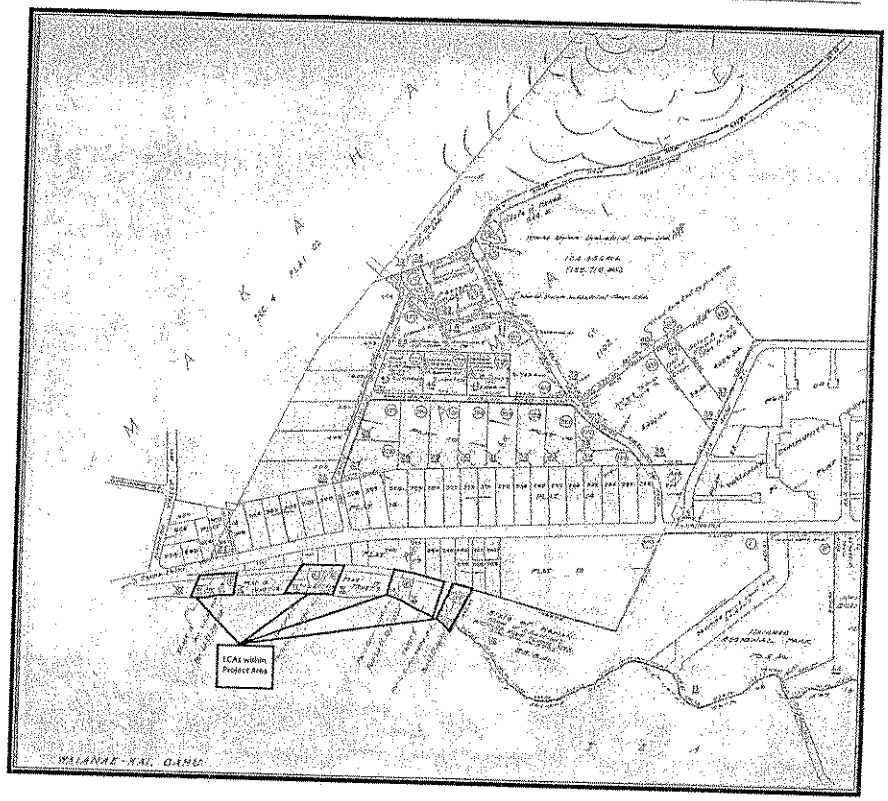

Figure 6 Portion of TMK Map Showing Land Commission Awards within the Project Area

A missionary account in 1863 reported that only a hundred acres were in taro in Wai'anae Valley and that the only items for sale were fish and fungus. Censuses taken during the second half of the 19th century record the diminishing population of the Wai'anae District. In 1853 a combined 2,451 persons were recorded in the 'Ewa and Wai'anae districts; nineteen years later, in 1872, that total had dropped to 1,671. By 1890, when the districts were recorded separately, the population of Wai'anae had been reduced to 903 (Schmitt 1977:12-13).

Part of that population of 903 in 1890 would have consisted of workers at the then twelve-year old Wai'anae Plantation. The livestock industry in the islands had reached its peak in the 1870s. At Wai'anae, a new venture arose to supplant ranching. In 1878, Hermann A. Widemann, a retired Hawaiian Supreme Court justice, leased Wai'anae Plantation, the first sugar plantation on O'ahu. In 1879, he leased most of Wai'anae-Kai for 25 years (Schmitt 1977:12-14).

Between 1878 and 1884 the economy and community of Wai'anae underwent a major change, in which the former Hawaiian landscape virtually disappeared. The reason was the production of sugar. The results were the conversion beginning in 1878 of coastal and central valley garden plots and irrigation systems to large fields of sugarcane. This was followed by the construction in 1880 of a plantation railway to haul the cane to the mill, and the building, in the former Hawaiian village, not only of the mill itself, but the creation of a whole town to support the processing of cane (Green 1980:12).

Widemann hired twenty local Hawaiians, brought in 15 technicians and almost 60 Chinese laborers. He built 24 new houses in Wai'anae Valley and a plantation manager's mansion on the site of Haua Heiau. He built a water reservoir and installed a flume system to bring water from the reservoir to the mill. A tramway was built from the mill site to the coast where a jetty was constructed. Seven miles of track were laid to haul harvested cane to the mill. In 1880, a Chinese firm planted 122 acres of cane in Wai'anae and employed about 30 men. A. Hastings and Company planted 150 acres in sugar in Makaha Valley (Green 1980:13).

By 1884 Wai'anae Sugar Company had 475 acres under cultivation, nine miles of railroad, and 175 men employed. A map of the port of Wai'anae (Hydrographic Office, U.S. Navy, Port Waianae, 1891) based on an 1884 Hawaiian Government survey (Figure 7) indicates that sugar cultivation had not reached the present study area (Perzinski 2004:15).

In 1890, Wai'anae Sugar Company had 600 acres in cultivation. On July 4, 1895 Wai'anae's isolation was broken when a rail line from 'Ewa Mill reached the Wai'anae Sugar Company track. In 1898, the railway was extended around Ka'ena Point, linking Wai'anae with Waialua on O'ahu's north shore. A portion of the railroad berm (State Site # 50-80-12-9714) is still visible in the southeastern portion of the project area, just *makai* of the property line of the Mākaha Surfside Condominiums (Green 1980:13).

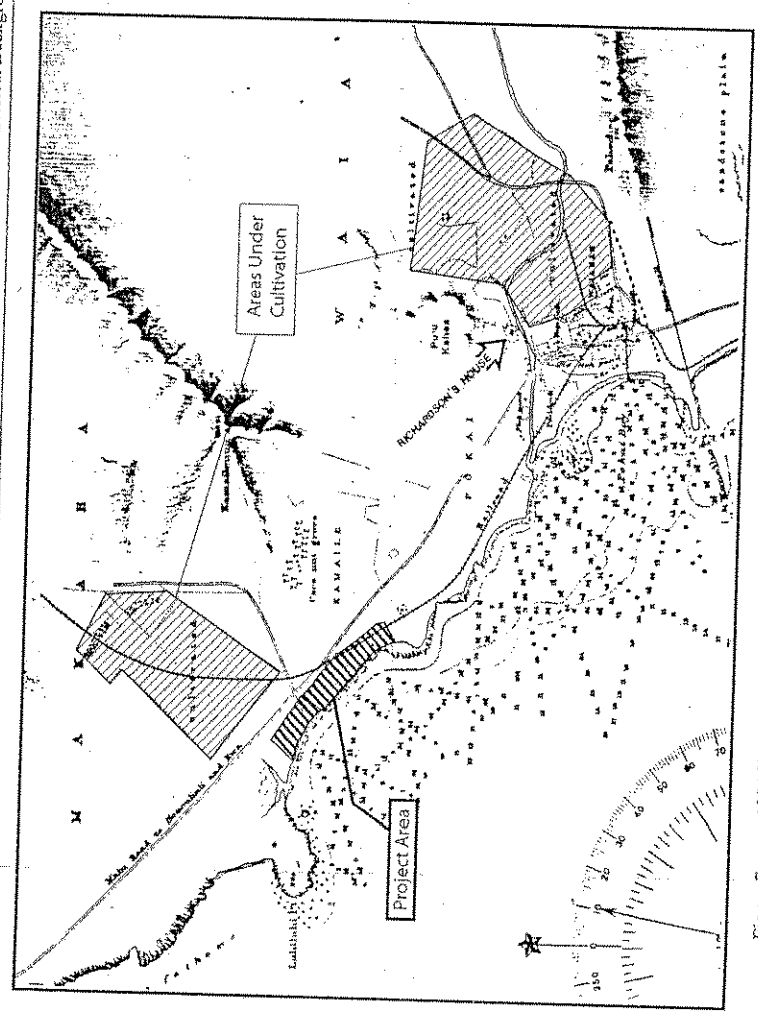

Figure 7 1884 Hawaiian Government Survey Map Showing Areas of Sugar Cane Cultivation

E. 1900 to Present

Agriculture in the early 1900's had become less diversified, following similar trends throughout Hawai'i. Smaller individual farms growing coffee, taro, and rice were supplanted by larger corporate farms which emphasized large scale cultivation of single crops such as sugarcane (Green, 1970). The purchase of Mākaha Ahupua'a in 1923 by the Wai'anae Sugar company and the previously constructed railroad (which ran through the *mauka* portion of the current project area) allowed for easy transport from Makaha to Honolulu for shipment expediting the shift in agricultural practices.

Lack of water in Mākaha Valley, however, curtailed success for Wai'anae Sugar Company, and in the 1930s Wai'anae Sugar Plantation sold out to American Factors Ltd. (Amfac, Inc.). American Factors Ltd. initiated a geologic study of the ground water in the mountain ridges in the back of Mākaha and Wai'anae Valleys, which revealed positive results that tunneling for water would be successful. Before tunneling could commence, World War II came about and plans were put on hold (Green 1970) (Figure 8). In 1945, American Factors Ltd. contracted the firm of James W. Glover, Ltd. o tunnel in the ridge. The completed tunnel (Glover Tunnel) was 4200 ft. long and upon completion had a daily water capacity of 700,000 gallons. The water made available was mainly used for the irrigation of sugar.

In 1946, Capital Investment Corporation bought the Mākaha lands from American Factors Ltd. and attempted to convert the sugar lands back to ranching, but soon realized that tourism and golf courses were more profitable. Numerous other small scale agricultural interests were pursued during this time period including coffee, rice and watermelons (Ladd and Yen 1972). Water from Glover Tunnel was now used to water Mākaha Valley farms, and the lush grounds of the Mākaha Inn and Country Club, and its associated golf course.

F. Modern Use

Modern land use within the project area has been limited to the city and county after demolition of two remaining residences ca. 1970.

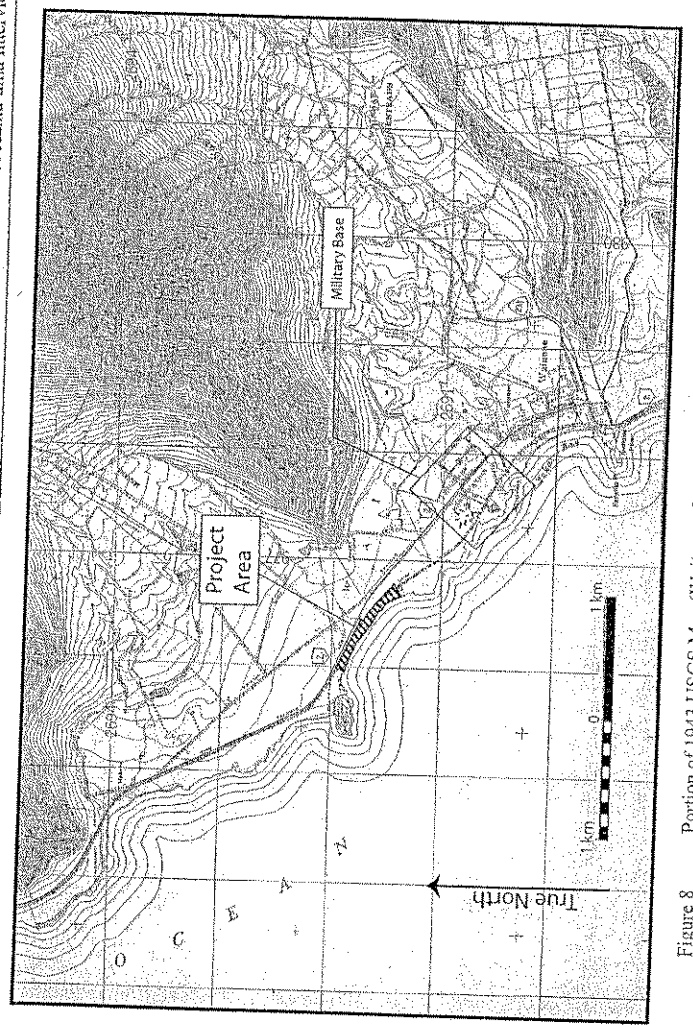

Figure 8 Portion of 1943 USGS Map (Wai'anae Quadrangle) Showing Location of Project Area

IV. PREVIOUS ARCHAEOLOGICAL RESEARCH

Archaeological study within the Waiʻanae district suggests that the earliest permanent habitation of the district was focused in Waiʻanae Ahupuaʻa along Kaupuni Stream. In an archaeological study of Mākaha (the *ahupuaʻa* immediately adjacent to Waiʻanae). Green (1980) proposed:

> The first settlement of the district was probably, as tradition tends to suggest, on the coast around the stream at the mouth of the Waiʻanae-kai Valley where the foreign chief from Kahiki planted the first coconut of the famous grove. That area, with its well-watered valley behind, would have been the most favored locality in the district...[Green 1980:72]

Archaeological investigations at Pōkaʻī Bay have processed dates for occupation of the area well within the prehistoric period. During monitoring of 943 meters of sewer and waterline trenching at the Waiʻanae Army Recreation Center, Riford (1984) identified five articulated human burials, which were recovered, and a charcoal sample from the prehistoric cultural layer. The charcoal sample from the cultural layer (Layer V) yielded a radiocarbon age of A.D. 1376 +/-50 A.D. (C13 adjusted). Further study at the Waiʻanae Army Recreation Center (Hammatt et al. 1985) encountered additional burials and testing of a sample from a pit feature yielded a radiocarbon date of AD 1340 +/-70 A.D. Hammatt (et al. 1985:i) notes:

> The archaeological assemblage points to the heavy use of the site as a communal area for fishing preparation, canoe launching and return. The site was the focus of beach access for the inhabitants of Waiʻanae-Kai as well as occasional informal sand burial from at least 1300 A.D. onwards.

Inland of Pōkaʻī Bay, dates from three trenches in a complex of possible taro *loʻi* were obtained: A.D. 1170-1430, 1270-1480, and 1299-1510 (Shapiro and Rosendahl 1988:32). The range of dates suggests that permanent habitation in lower Waiʻanae Ahupuaʻa (where the only perennial water sources within the *makai* portion of the district were located) was likely established by the latter 1100s to early 1200's A.D.

The elaboration and expansion of settlement throughout the *ahupuaʻa* during the prehistoric period is supported by the number and variety of sites recorded during the first investigation of Waiʻanae during the 1930s. McAllister (1933) noted sixteen sites within the *ahupuaʻa* including ten *heiau* (seven of which had been destroyed), the Puehu fishpond, the Kawiwi place of refuge, and several house sites. The sites extend well *mauka* into lands adjacent to streams at the head of Waiʻanae Valley. McAllister (1933: 116) recorded one burial site (Site 162) at Mauna Kuwale which may be located within the present project area; it is described as "A small cave near the top of the peak facing Kawiwi. Contains fragments of skeletal material, but none of the objects said to have been buried with the dead."

The number of *heiau* recorded within Waiʻanae Ahupuaʻa points to its political centrality within the district and its association with the *aliʻi* (royalty) during the prehistoric period. The pioneering 19th-century Hawaiian historian Samuel Kamakau (1992: 134) recorded the oral traditions that associated some of the Waiʻanae Heiau to prominent *aliʻi*, "At Waiʻanae [Ka-hahana, late 18th-century Oʻahu ruling chief] restored the *heiau* of Ka-moho-aliʻi..."

> Take the story of Ka-welo when he sailed for Kauaʻi to make war. He set a tabu over the *heiau* at Puehu at Waiʻanae, and at the end of the sacrifice ordered that the wood of the paehumu, both the fence and the images themselves, be used for firewood for the expedition to Kauaʻi. (Kamakau, 1992: 203)

Table 1 summarizes the previous archaeological investigations in Waiʻanae Ahupuaʻa. these areas of investigation are illustrated in Figure 9.

Previous archaeological research in the current project area was limited to studies of human burials eroding from the sand fronting the Mākaha Surfside Apartments (Figure 9). Four studies were conducted documenting at least seven burials. These include one male, ~48 years old, located *makai* of 85-175 Farrington Highway, that was removed (Douglas and Peitrusewsky 1988); one child and one middle-aged male (both incomplete) (Douglas 1991); one male and one female disinterred Oct. 1979 (Kawachi 1991); a separate pit burial (#50-80-07-6592-1) that was relocated (Jourdane 1995) and 2 burials exposed in the wave cut banks (50-80-07-6592-2&3) (Cordy 1997). Burial –6592- 2 is believed to have eroded out of the bank prior to September, 2001, burial 6592- 3 is presently in situ until final disposition is agreed upon.

One additional historic property currently lies within the project area boundaries. A section of the O. R. & L railroad berm fronting the Mākaha Surfside Apartments (50-80-12-9714) is visible resembling a low, linear rise in the *mauka* portion of the project area. The berm is just *makai* of the fence line enclosing the Mākaha Surfside Apartments. The berm is not visible in the northern portion of the project area, though remnants of the bridge are still observable in the central drainage, just south of Mauna Lahilhahi beach.

Table 1 Previous Archaeological Studies in Waiʻanae *Ahupuaʻa*

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Thrum 1906	Island-wide	Describes numerous *heiau*
McAllister 1933	Island-wide	Designates sites 152-168
Chapman 1967	Central Waiʻanae Valley	Documentation of agricultural and habitation sites in central portion of Waiʻanae Valley (Site 50-80-07-2320): 24 pieces of poi-pounders were photographed and measured.
Rosendahl & Rosendahl 1981	Waiʻanae Kai	Describes four features: 2 mounds, a walled enclosure and a platform
Sinoto 1975a	Central coast	Recorded 5 sites (3 enclosures, a wall and an L-shape)
Sinoto 1975b	Central Waiʻanae Valley	Inspection of enclosure (Site 50-0a-C3-22), located in the central portion of the valley, on the eastern bank of Kaupuni Stream; determined that structure was not a *heiau*, but probably a habitation enclosure.
Ching 1978	NE Valley floor (Camp Kaʻala)	Notes *heiau*, habitations, agriculture and burials in the vicinity
Hommon 1978	Kamaile	Describes Kamaile complex

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Sinoto 1978	Back of valley	Describes a pre-contact agricultural complex
Sterling and Summers 1978	Island-wide	Compendium of data describes numerous sites
Sinoto 1979	Back of valley	Describes agricultural terraces, plots, enclosure, walls
Tao et al. 1979	Kū'ilioloa Heiau	Kū'ilioloa Heiau (Site 50-80-07-153): excavation undertaken; five pieces of volcanic glass, sourced to the Kolekole area of Wai'anae.
Yent and Griffin 1979	NW slope	Describes complex of walls and platforms
Ahlo 1980	NW slope	Describes complex of mounds, walls, terrace and enclosure
Bordner 1981	Back of Valley	No sites described
Ota 1981	Back of valley	Describes boundary or ranching walls
Rosendahl 1981	Central valley floor	Describes plantation era walls and ditches
Barrera 1982	Back of valley	No sites described
EISC (Bordner) 1982	Back of valley	Describes agricultural terraces on Kānewai Stream
Neller 1982	NE valley floor and slope	Describes walls and pond fields
Kam & Ota 1984	Wai'anae Army Recreation Center	Two burials reported
Riford 1984	Wai'anae Army Recreation Center	Monitoring of 943 meters of sewer and waterline trenching at the Wai'anae Army Recreation Center, Site 50-0a-C3-23: Five articulated human burials were recovered from trenches at the site. One charcoal sample from the prehistoric cultural layer (Layer V) obtained a radiocarbon age of A.D. 1376+/-50 (C13 adjusted).
Hammatt et al. 1985	NE Valley floor (Camp Ka'ala)	Documents excavations
Hammatt et al. 1985	Wai'anae Army Recreation Center	Excavation of 42 meter-square test pits and 114 square meters at Wai'anae Army Recreation Center: Burials of at least ten individuals were found. Archaeological assemblage points to the heavy use of the site as a communal area for fishing preparation, canoe launching, and return.

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Hammatt et al. 1987	West Slope, Wai'anae Valley	Excavation at Site 50-80-07-3200: agricultural complex consisting of stone terraces and rock clearance mounds in level soil areas on either side of a rock spur, and was interpreted as typical of Hawaiian dry land agriculture. The two habitation features, a walled terrace, and a U-shaped shelter, both well-constructed, were excavated. A hearth feature yielded a radiocarbon date of A.D. 1630-1950. Only two artifacts and a little midden were found, suggesting minimal occupation.
Komori 1987	Mauna Lahilahi	Located 16 features of site -3704
Douglas and Pietrusewsky 1988	Makaha Beach Surfside Apartments	Report on one burial recovered by SHPD
Shapiro and Rosendahl 1988	Wai'anae Kai	Reconnaissance survey of 250 acres of land in the central to back part of Wai'anae Valley: 34 sites were recorded, all were interpreted as historic, associated with agriculture, tool manufacture, habitation, transportation, recreation, erosion and water control. Trenching in former LCA awards area revealed gleyed deposits, possibly indicating previous taro cultivation.
Bordner and Cox 1988	Back of Wai'anae Valley	Describes cattle walls, agriculture, habitation and religious complex
Cleghorn 1997	N. Coastal Wai'anae	Documents bulldozing
Masse 1989	East Wai'anae Valley floor,	Reconnaissance of a Wai'anae Valley Interceptor Sewer Line: Stonewalls, terraces, and portions of a stone enclosure were observed during survey. Armed property owner did not complete survey due to denied access.
Social Research Systems Co-op (Bordner) 1989	Back of Valley	Describes habitation complex
Kawachi 1990	Mauna Lahilahi	Field check of burial site
Douglas 1991	Makaha Beach Surfside Condominiums	Documents one burial
Kawachi 1991 (1979)	Makaha Beach Surfside Condominiums	Documents burial find from 1979

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Denham et al. 1992	Central Coast	No sites
Kawachi 1992	Wai'anae Regional Park	Documents one burial
Flood et al. 1994	West central valley floor	Documents one site with 24 features including 18 sinkholes
Schilz 1994	Wai'anae Army Recreation Center	15 burials recovered
Jourdane 1995	Makaha Beach Surfside Condominiums	Describes two burials
Kolb et al. 1995	Pahe'ehe'e Ridge	Documents two shrine sites, reports five carbon dates
Collins 1996	No provenience	bones from at least ten people (MNI) in possession of a Wai'anae resident
Borthwick & Hammatt 1997	West central valley floor	Documents six burials
Devereux *et al.* 1997	Wai'anae, O'ahu	Archaeological Reconnaissance Survey of the 55-Acre Freitas Dairy; Two single featured archaeological sites were identified: a bi-faced stone wall (Site 50-80-07-5493) and a single room rectangular military bunker (site 50-80-07-5494).
Kapeliela 1997	Central Valley	Documents 1 burial
Borthwick *et al.* 1999	Pōka'ī Bay Beach Park	Archaeological survey with subsurface testing at Pōka'ī Bay Beach Park: A total of thirty-four test units were excavated. No undisturbed prehistoric cultural layer or any burials were observed within any of the test units. Subsurface testing revealed extensive historic disturbance to all areas examined.
Cordy 1999	Kūmaipō Stream	Discusses numerous archaeological sites previously lumped under site # 2951
Gora et al. 2000	Kūmaipō area	Documents a house site and terraces
Magnuson 2000	North coastal Wai'anae	No sites
Abordo et al. 2001	Back of the Valley	Documents a house site and agricultural fields (Site 5706)

REFERENCE	LOCATION	DESCRIPTION AND RESULTS
Cordy 2001a	Waianae Valley Ranch	Discusses 74 historic sites including 23 agricultural sites with hundreds of features, habitation, religious, and possible burial sites
Cordy 2001b	Kamaile 'Ili	Review of Māhele records
Hammatt and Shideler 2001	Pōka'ī Bay, just seaward of Farrington Hwy.	Discusses finding of three historic coffin burials
Kaikala 2001	Back of the Valley	Documents a house site and agricultural fields (site 5705)
Shun and Shaw 2002	Wai'anae Army Recreation Center	No significant finds

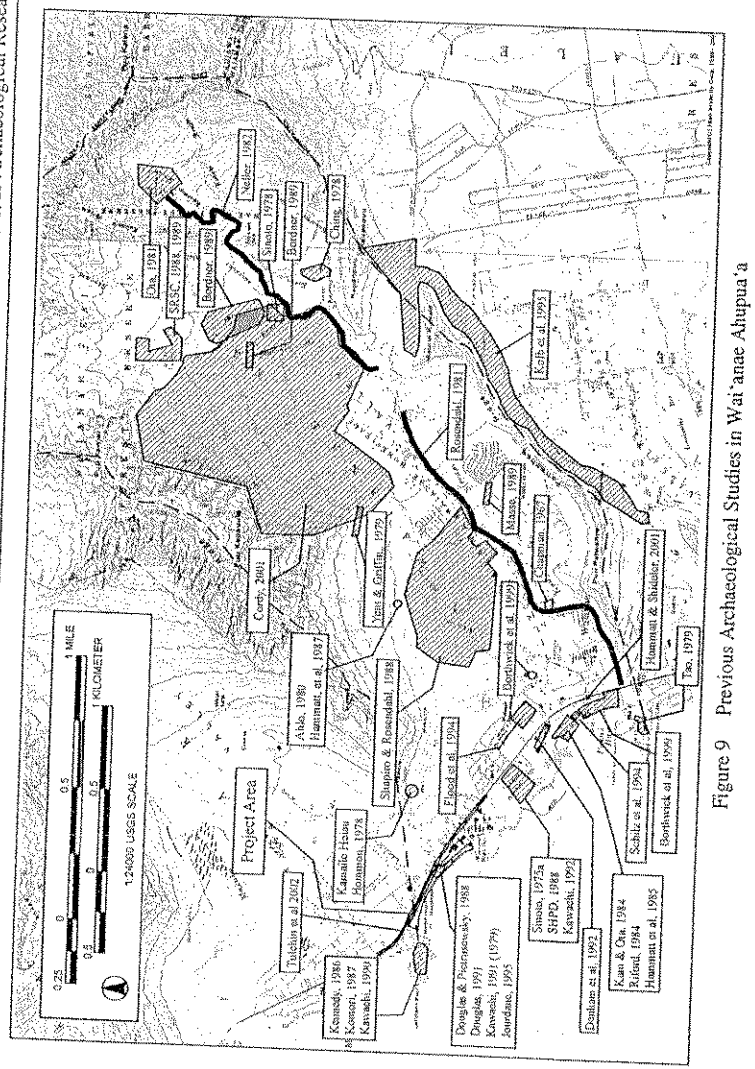

Figure 9 Previous Archaeological Studies in Wai'anae Ahupua'a

V. COMMUNITY CONSULTATIONS

Throughout the course of this study, an effort was made to contact and consult with Hawaiian cultural organizations, government agencies, and individuals who might have knowledge of and/or concerns about traditional cultural practices specifically related to the project area. This effort was made by letter, e-mail, telephone and in person contact. In the majority of cases, letters along with a map of the project area were mailed with the following text:

> In collaboration with, City and County of Honolulu, Department of Design and Construction Cultural Surveys Hawai'i is conducting a Cultural Impact Assessment for the proposed Environmental Assessment for Landscaping Improvements at Mauna Lahilahi Beach Park (portions of TMK 8-4-01: 1, 8-5-17: 1-7, 8-5-18:1-3). The purpose of the cultural study is to assess potential impacts to traditional cultural practices. This study is meant to satisfy requirements related to Chapter 343 HRS Articles IX and XII and Act 50 and t heir applicability to the project area.
>
> We are seeking your input regarding the following issues:
>
> General history and present and past land use of the study area.
>
> Knowledge of cultural sites which may be impacted by the project, e.g., historic sites, archaeological sites, burials, etc…
>
> Knowledge of traditional gathering practices in the study area-both past and present.
>
> Cultural associations with the study area through legends, traditional use or otherwise.
>
> Referrals of *kūpuna* who might be willing to share their cultural knowledge of the study area in general.
>
> Any other cultural concerns the community might have related to Hawaiian or other cultural practices in this area of the district of Wai'anae, Island of O'ahu.

The individuals, organizations, and agencies we attempted to contact and the results of any consultations are presented in Table 2. Cultural Surveys Hawai'i starts out with a list of community contacts and then follows up on their referrals.

Key:

Y= Yes

N= No

A= Attempted (at least 3 attempts were made to contact individual, with no response)

S= Some knowledge of project area

D=Declined to comment

U=Unable to contact, i.e., no phone or forwarding address, phone number unknown

OHA= Office of Hawaiian Affairs

OIBC= O'ahu Island Burial Council

SHPD= State Historic Preservation Division

DOE= Department of Education

HSL= Hawai'i State Legislature

DHHL= Department of Hawaiian Home Lands

DOA= Department of Agriculture

NRCS= Natural Resources Conservation Service

DLNR= Department of Land and Natural Resources

Table 2 Community Contact and Comments

Name	Affiliation	Contacted	Personal Knowledge	Comments
Aila, William	Wai'anae Harbor Master – Hui Malama	Y	S	Referred to Mr. Badayos and Koa Mana
Aiu, Dr. Pua	OHA	Y	N	Request that if *iwi* are found during improvements, work will cease, and the appropriate agencies will be contacted pursuant applicable law.
Badayos, Lucio	Wai'anae Resident	Y	S	He is not well under doctor's

				care.
Collins, Sarah	SHPD	Y	S	Referred to Kai Markell of SHPD
De Lude, Clarence	KOA Mana	Y	A	
De Soto, Frenchie	OHA, Wai'anae Resident	Y	A	
Dodge, Vince	Wai'anae Resident	Y	S	There was a Cultural Community Center at Park in the 1980s
Enos, Eric	Ka'ala Farms	Y	A	
Greenwood, Alilce	Kupuna and Wai'anae Resident	Y	S	Her *Tūtū* told her that the shadow they saw as children by the *heiau mauka* of Lahilahi Point was the *ki'ai* who guarded the *heiau*.
Hanabusa, Colleen	HSL	Y	A	
Kapeliela, Kana'i	SHPD	Y	N	
Kaneaiakala, Hannah	Kupuna	Y	S	Her family used to live where the Makaha Surf Side Apartments are today.
Keamo, Marlene	Wai'anae Ahupua'a Council	Y	A	
Kila, Glen	Wai'anae Coast No. 24	Y	S	Referred to SHPD.
Kimoto, Ernest	OHA	Y	N	
Landis Ornellas, Owner	Mahana	Y	A	
Markell, Ka'iana	SHPD	Y	S	Helped in researching the

				MOA of Koa Mana.
Pelekai, Pikake	OIBC	Y	N	
Silva, Alika	Koa Mana	Y	A	
Tiffany, Lynette Pualani	OIBC	Y	S	Referred to Nainoa Thompson.
Vielareah, Frannie	Ka Waihona O Ka Na'auao Charter School	Y	A	

VI. SUMMARIES OF KAMA'ĀINA INTERVIEWS

Kama'āina and *kūpuna* with knowledge of the Mauna Lahilahi Beach Park area were interviewed for this assessment. Five informants with knowledge of the planned project area were interviewed for this assessment., Mr. Glen Kila and Aunty Hannah Kaneaiakala participated in an informal face-to-face interview "talk-story" session. Both Nettie Pualani Tiffany and William Āila participated in telephone interviews with Cultural Surveys Hawai'i. Mr. Vince Dodge participated in a formal interview session that was taped and transcribed. To assist in discussion of natural and cultural resources and any traditional cultural practices specific to the project area (CSH) initiated interviews with questions from five broad categories. The categories include: Burials, Trails, Native Gathering Practices of Ocean Resources, Stream Resources, and Religious Shrines and sites.

A. William Āila

Interview Summary:

A telephone interview was conducted with William Āila by Cultural Surveys Hawai'i on February 5, 2004.

William Āila was raised in Wai'anae where he presently resides. Mr. Āila is the Wai'anae Harbor Master where he has been employed for the past 18 years. He is a member of Hui Malama, a Hawaiian organization advocating for the proper treatment of Native Hawaiian burials.

Mr. Āila specifically commented:

> There has been at least one re-internment of *iwi* from behind the Makaha Surfside Apartments. The *iwi* were re-buried *makai* of the apartments by Mr. Badayos and Koa Mana. Currently there is one burial where the *iwi* has been eroding. The O'ahu Burial Council has possession of the *iwi*. The coastal area along the beach park has a connection to Kamaile in the early years. There has been and continues to be fresh water flowing from underground to ocean. Cultural practices may have been impacted by previous industries like sugar. Impact on shore ecosystems and certain types of *limu* may no longer be available due to the changing of the flow of waters from upland streams. There were also sinkholes in old times.

B. Vince Dodge

Interveiw Summary:

CSH met with Mr. Vince Dodge at the Aloha 'Āina Café in Wai'anae, O'ahu for a formal interview on January 29, 2004.

Vince Dodge was born in Japan. He arrived in Hawai'i in 1961 at the age of four years old and was raised in Honolulu and Pearl City on the island of O'ahu. Vince has been living in the Lualualei Valley on the Wai'anae Coast for the past 25 years.

Vince presently works with the youth and families in the Wai'anae community around the cultural practices of *kalo* and *poi* making, *lo'i* restoration, farming, production of organic food and all aspects of youth training and entrepreneurship.

Vince Dodge specifically commented:

> I am a little bit acquainted with the area of Mauna Lahilahi Beach Park basically through diving and fishing more offshore. I am not intimately acquainted with the area though.
>
> I am not familiar with any traditional trails within the project area. I think that Mauna Lahilahi itself there is ancient petroglyph site and there is a trail up to the top of the *mauna*. The trail is still used today.
>
> As far as burials go I do not know of any other than what I have heard from other people. Traditional practices in the area would include shoreline fishing. I know that people fish there today. As we look on the reef, we can see that these were grounds for gathering of *limu*. Practices would be limited to marines resources. Today I notice that there are native trees such as the *hau* bush and coconuts, which the city probably planted.
>
> There was a small cultural village site located in the area east of the restroom area of the park. I remember it was there in the 80s. I think it was between the bathhouse and the Makaha Surfside Apartments. It was a cultural learning center basically they had nice trees and stuff and then it was left uncared for. There might have been a little *halau* there.
>
> When I think of traditional legends the thing that comes to mind is stories of the large sharks that frequent the waters of Lahilahi Beach. I was told that there are also very large caves that are right at the front or the *maikai* end of Lahilahi. We dove there and sure enough, there is some big caves not far off shore.
>
> When you asked me of my concerns I have this to say. As long as it involves restoration of native plants, planting, and irrigation. So long as they are not moving a bunch of earth and what not, a bunch of the sand and stuff. Then I don't have any trouble with it. It sounds like a good way to stabilize the beach and beautify it.

C. Aunty Hannah K. Kaneaiakala

CSH met with Aunty Hannah K. Kaneaiakala on February 3, 2004 at Mauna Lahilahi Beach Park in Wai'anae on the island of O'ahu for an informal interview.

Aunty Hannah was born in 1925 in Honolulu on the island of O'ahu. Aunty Hannah was raised in Paoa and as a child, she, and her family would visit their cousins, the Keawekanes.

Aunty Hannah specifically commented:

> The Keawekane family once lived on the beach in front of the Makaha Surfside Apartments. Aunty Hannah used to play there with her cousins on the beach. They often gathered *limu* to eat with there meals right in front of her cousins house and along the shores where the park is today.".

D. Mr. Glen Kila

CSH met with a met with Mr. Glen Kila on February 2, 2004 at Kamaile Elementary School in Wai'anae on the island of O'ahu for an informal interview.

Mr. Glen Kila is the principal of Kamaile Elementry School and a lineal descendant to the *moku* or district of Wai'anae on the island of O'ahu.

Mr. Kila specifically commented:

> I Glen Kila and the organizntion of Koa Mana has submitted their genealogy and genealogical connections to the area of Mauna Lahilahi Beach Park. I have also submitted information on the National Historic Register Sites in the general area.
>
> The above information was submitted to the former director of SHPD/DLNR Dr. Don Hibbard, Archaeologist, Dr. Ross Cordy, Mr. Kai Markell and Mr. Kana'i Kapeliela. Mr. Glen Kila wants all applicable state and federal laws, such as NAGPRA, 6E-Chaper 13-300 followed to protect previously identified sites; which he indicated is in an existing MOA with the SHPD.

E. Aunty Nettie Pualani Tiffany

Interview Summary:

Nettie Tiffany participated in a telephone interview with Cultural Surveys Hawai'i on March 15, 2004. Ms. Tiffany is employed by the Campbell Estate as the supervisor for the Lanikūhonua cultural center located on the grounds of the resort complex at Ko'olina. Ms. Tiffany is known amongst the community as the *kahu* or caretaker of the *'āina* or the lands in the vicinity of Ko'olina, of the past, present and the future. Prior to Ms. Tiffany's taking responsibility her mother, Leilani Fernandez was *kahu* going back to the days when Mrs. Alice Kamokila Campbell was living.

Aunty Nettie specifically commented:

As a young child, we went all over the present project area with my mother. She showed us where the *puka* caves were. When she was young a hook was made for her by a fisherman also a *kahuna*. In her youth she was taught to dive and enter the cave. One could stand and breath inside the cave. At the other end of the cave you could come up by the sugar cane fields. I never was told the names of those caves. We used to take *ho'okupu* (offering), in a *pū'olo* (bundle) to the ocean and the current would suck it right in the cave.

I assume the trails we took were traditional trails. The terrain has changed much of that today. A Mr. Glen Kila spent a lot of time with my mother. With time there is going to be change. The pathways we took were the old pathways. My mother directed us the way to go if we taking *ho'okupu* and for the gathering of medicine plants.

There was cultural practicing going on in the late 70s or 80s at Mauna Lahilahi Beach Park. There used to be a cultural center on the beach. The community built a *pili* (native grass) grass *hale* (house) it was really nice. Then later the state or the city, I forget which one it was, took the moneys away and the state condemned that land. There were many people involved.

We used to go with our mother to gather *limu kohu* along these shores. Today there is less *limu* than before. Many species are no longer found along these shores due to the diversion of springs *mauka* of the project area. People still do gather for personal needs today. Today there is still fishing practiced by the young people. They use spear gun, and a few throw net. Our family practiced fishing. We would call the mullet and *moi* by *pa'i pa'i* (beating) on top of the water. They would come in schools. We had to stop that practice because others were copying our family and abusing the privilege of fishing. We stopped that in 1984.

Pōka'ī Bay was often used to set sail to the island of Kaua'i in old days. Nainoa Thompson has made that journey in today's time. He would be a good one to talk to about that. My *kūpuna* told us it was like the highway in the sky. You get on the channel and you go straight out and you ride all the way to Kaua'i.

We need to keep in mind when it comes to our burials in Hawai'i that whenever you have thousands of Hawaiians living along the coastlines, you have to have burials. There is not much you can do about it. Some are not exposed and some are. My concerns today are as long as someone keeps their eyes open for the *iwi* (bone) and they are treated respectfully. For an example; many sewer lines are put in the ground today, I would rather them remove my bones and put me in a better location. Sometimes things should be left in place rather than being moved.

VII. TRADITIONAL CULTURAL PRACTICES

Traditional cultural practices are based on profound awareness concerning harmony between man and their natural resources. The Hawaiians of old depended on these cultural practices for survival. Based on their familiarity with specific places and through much trial and error, Hawaiians communities were able to devise systems that fostered sustainable use of nature's resources. Many of these cultural practices have been passed down from generation to generation and are still practiced in some of Hawaii's communities today.

This project seeks to assess traditional cultural practices as well as resources pertaining to the project area within Honouliuli Ahupua'a. This section will convey the different types of traditional practices, cultural resources associated with the vicinity. Excerpts from interviews are incorporated in sections where applicable.

A. Gathering for Plant Resources

Hawaiians utilized upland resources for a multitude of purposes. Forest resources were gathered, for not only the basic needs of food and clothing, but for tools, weapons, canoe building, house construction, dyes, adornments, hula, medicinal and religious purposes. Within the project area itself no specific documentation was found in regards to gathering of plants during traditional Hawaiian times. During this assessment there were no ongoing practices related to traditional gathering of plant resources identified in the present project area. None of the individuals contacted or interviewed for this assessment identified any native plant gathering practices within the project area. Based on the information it is likely that there was far greater emphasis on gathering plant resources further inland.

B. Marine Resources

The sea is a rich resource and the Hawaiian people were traditionally expert fishermen. Fish of all types supplied the Hawaiian diet with a rich source of protein. Hawaiian women practiced the gathering of seaweeds and salt. Informants were quick to talk about coastal and offshore resources. Mr. Vince Dodge mentioned in his interview with CSH, "Traditional practices in the area would include shoreline fishing. I know that people fish there today. As we look on the reef, we can see that these were grounds for gathering of *limu*." Mr. William Āila mentions in a telephone interview, "Cultural practices may have been impacted by previous industries like sugar. Impact on shore ecosystems and certain types of *limu* may no longer be available due to the changing of the flow of waters from upland streams." Mrs. Hannah Kaneaiakala confirms in here interview, "They often gathered *limu* to eat with their meals right in front of her cousins house and along the shores where the park is today." Today many people continue to fish along the shoreline south of the project area. Various native *limu* can still be seen in the coral beds along the shore of the project area.

C. Historic Properties

During this assessment historic properties identified near the proposed project area included he old O.R.&L. alignment and human burials (see discussion below). The exception to this is Mauna Lahilahi area itself, situated west of the project area, which is known for petroglyphs and human burials.

D. Burials

Previous archaeological research in the current project area was limited to studies of human burials eroding from the sand fronting the Mākaha Surfside Apartments (Figure 9). Four studies were conducted documenting at least seven burials. These include one male, ~48 years old, located *makai* of 85-175 Farrington Highway, that was removed (Douglas and Peitrusewsky 1988); one child and one middle-aged male (both incomplete) (Douglas 1991); one male and one female disinterred Oct. 1979 (Kawachi 1991); a separate pit burial (#50-80-07-6592-1) that was relocated (Jourdane 1995) and 2 burials exposed in the wave cut banks (50-80-07-6592-2&3) (Cordy 1997). Burial –6592- 2 is believed to have eroded out of the bank prior to September, 2001, burial 6592- 3 is presently in situ until final disposition is agreed upon. Mr. William Āila mentions in a telephone interview, "There has been at least one re-internment of *iwi* from behind the Makaha Surfside Apartments. The *iwi* were re-buried *makai* of the apartments by Mr. Badayos and Koa Mana. Currently there is one burial where the *iwi* has been eroding. The O'ahu Burial Council has possession of the *iwi*." Thus confirming the issues of past and present burials and the probability of future burials discovered along the shoreline of the present project area.

E. Trails

Trails served to connect the various settlements throughout the leeward districts. Based on nineteenth and twentieth century maps the primary transportation routes *mauka/makai* correlated closely to the existing major roadways. Mr. Vince Dodge mentions in a interview with CSH, "I am not familiar with any traditional trails within the project area. I think that Mauna Lahilahi itself there is ancient petroglyph site and there is a trail up to the top of the Mauna Lahilahi. The trail is still used today."

It seems clear that a major east/west artery from 'Ewa and Kona O'ahu to Wai'anae ran just upslope of Pu'u Kapolei roughly along the Farrington Highway alignment. To our knowledge, no clear remnant of this trail or associated site has been identified in the vicinity. It seems likely that there would have been a spur trail off of this artery descending down to the sea near Kalaeloa approximating modern Kalaeloa Blvd. but again there are no clear remnants of this trail or clearly associated sites.

F. *Wahi pana* (Storied Places)

Pōka'ī Bay, Kū'īlioloa Heiau, and Mauna Lahilahi were storied places (*wahi pana*) associated with a number of Hawaiian traditions in the vicinity of the project area. Aunty Nettie Tiffany mentions in a telephone interview with CSH, "Pōka'ī Bay was often used to set sail to the island of Kaua'i in old days. Nainoa Thompson has made that journey in today's time. He would be a good one to talk to about that. My *kūpuna* told us it was like the highway in the sky. You get on the channel and you go straight out and you ride all the way to Kaua'i."

Kū'īlioloa Heiau, associated with Kāne'iloa (dog kupua), is located southeast of the project area at Pōka'ī Bay. Petroglyph images of Kāne'iloa are said to be located on Mauna Lahilahi.

Mauna Lahilahi, the coastal promitory at the western end of the beach park, contains petroglyphs and human burials. It was also said to be the location where the Kaua'i Prophet Hulumaniani 'stood and saw a rainbow arched on the upland of Kukaniloko, when he was seeking Laiekawai' (Nupepa Kuokoa, August 11, 1899: in Sterling and Summers 1978:73)

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