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OCT 0 8 2011

DEPARTMENT OF COMMUNITY SERVICES
CITY AND COUNTY OF HONOLULU
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PETER B. CARLISLE
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DIRECTOR

BRIDGET HOLTHUS
DEPUTY DIRECTOR

September 27, 2011

Mr. Gary Hooser, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

RECEIVED
'11 SEP 28 A11:15
OFC. OF ENVIRONMENTAL QUALITY CONTROL

Dear Mr. Hooser:

Subject: Draft Environmental Assessment (DEA)
Hale Kipa Residential Shelter
Tax Map Key (1) 9-1-017: 082
Ewa, Island of O'ahu, Hawai'i

The Department of Community Services has reviewed the Draft Environmental Assessment (DEA) for the subject project, and anticipates a Finding of No Significant Impact (FONSI) determination. Please publish the notice of availability of the DEA as a joint Chapter 343 (HRS) and National Environmental Policy Act (NEPA) document for this project in the next OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form, one (1) copy of the DEA in pdf format on a CD, and one (1) copy of the DEA. The project summary is included on the CD. Should you or your staff have any questions, please contact Michael Shiroma at 768-7751, or consultant, Chester Koga, at R. M. Towill Corporation at 842-1133.

Sincerely,

Samuel E. H. Moku
Director

SEHM:rg

Enclosures: OEQC Publication Form
Draft EA on CD
Hardcopy of Draft EA

Project Name: Hale Kipa Residential Shelter

Publication Form
The Environmental Notice
Office of Environmental Quality Control

Instructions: Please submit one hardcopy of the document along a with determination letter from the agency. On a compact disk, put an electronic copy of this publication form in MS Word and a PDF of the EA or EIS. Please make sure that your PDF documents are ADA compliant. Mahalo.

Applicable Law:	**Chapter 343 and NEPA**
Type of Document:	**Draft Environmental Assessment**
Island:	**O'ahu**
District:	**Ewa**
TMK:	**(1) 9-1-017:082**
Permits Required:	**NPDES, Grading Permit, Building Permit, Conditional Use Permit**
Applicant or Proposing Agency:	**Hale Kipa, Inc.**
Address	615 Pi'ikoi Street, Suite 203 Honolulu, Hawai'i 96814
Contact & Phone	Ernest Pletan-Cross, 589-1829
Approving Agency/ Accepting Authority:	**Department of Community Services**
Address	715 South King Street, Suite 315 Honolulu, Hawai'i 96813
Contact & Phone	Samuel E. M. Moku, Director, 768-7762
Consultant:	**R. M. Towill Corporation**
Address	2024 North King Street, Suite 200 Honolulu, Hawai'i 96819
Contact & Phone	Chester Koga, AICP, 842-1133 Email: chesterk@rmtowill.com

Project Summary: Summary of the direct, indirect, secondary, and cumulative impacts of the proposed action (less than 200 words). Please keep the summary brief and on this one page.

The applicant, Hale Kipa, Inc., provides opportunities and environments that strengthen and encourage youth, their families and communities to actualize their potential and social responsibility. Hale Kipa has been the "House of Friendliness" to thousands of Hawai'i's runaways and homeless youth who have needed a place to stay and someone to talk to while they work out their problems. The proposed project will provide a facility in the West O'ahu region to serve at-risk youth.

The site comprises 4.26 acres abutting old Fort Weaver Road. The project involves the construction of three 2,450 square foot, eight-bed, ADA-compliant residential shelters that will replace existing facilities, a 4,000 square foot educational facility, and a 12,600 square foot services center consolidating programs, services and administration. This project will enhance services to clients, provide an integrative and collaborative environment for staff/volunteers, include a training center for staff/foster families, and significantly reduce overhead relating to leases and maintenance. Consolidation of services will create economies of scale for the organization.

This EA addresses the potential for anticipated environmental impacts and considers the alternatives to the proposed action with appropriate mitigation measures to address and minimize the potential for impacts. The Department of Community Services has preliminarily determined that the project will not have a significant environmental impact and is prepared to issue a Finding of No Significant Impact (FONSI) in accordance with NEPA and Chapter 343, HRS.

DRAFT ENVIRONMENTAL ASSESSMENT

HALE KIPA RESIDENTIAL SHELTER

Honouliuli, O‘ahu, Hawai‘i

Tax Map Key (1) 9-1-017: 082

October 2011

Hale Kipa Inc.
615 Pi‘ikoi Street
Honolulu, Hawai‘i 96814

DRAFT ENVIRONMENTAL ASSESSMENT

FOR

HALE KIPA RESIDENTIAL SHELTER
Honouliuli, O‘ahu, Hawai‘i
Tax Map Key (1) 9-1-017: 082

October 2011

Accepting Agency:
Department of Community Services
715 South King Street
Honolulu, Hawai‘i 96813

Prepared for:

Hale Kipa Inc.
615 Pi‘ikoi Street
Honolulu, Hawai‘i 96814

Prepared By:
R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawai‘i 96819
20910-0P

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PROJECT SUMMARY

Project:	Hale Kipa Complex
Landowner/Applicant:	Hale Kipa, Inc. 615 Piʻikoi Street, Suite 203 Honolulu, Hawaiʻi 96814 Contact: Ernest Pletan-Cross
Accepting Agency:	C&C of Honolulu, Department of Community Services
Agent:	R.M. Towill Corporation 2024 North King Street, Suite 200 Honolulu, Hawaiʻi 96819 Contact: Chester Koga, AICP
Location:	Old Fort Weaver Road Honouliuli, Oʻahu, Hawaiʻi
Tax Map Key:	Tax Map Key (1) 9-1-17: 082
Proposed Action:	Construction of three (3) residential shelters at 2,450 s.f. each, one (1) 12,600 s.f. services center and one (1) 4,000 s.f. education center
Land Area:	4.26 acres
Present Use:	Vacant and bus parking (an interim use)
State Land Use District:	Urban
Ewa Development Plan Land Use Designation:	Low and Medium Density Residential
Present Zoning:	Residential R-5 (5,000 s.f. minimum lot size)
Special Management Area (SMA):	Not located in the SMA
Permits Required:	Building Permit, Grading Permit, National Pollutant Discharge Elimination System, Conditional Use Permit-Major (group living facility) and Conditional Use Permit-Minor (school and meeting facility)
Anticipated Determination:	Finding of No Significant Impact (FONSI)

SECTION 1
INTRODUCTION

1.1 INTRODUCTION

Hale Kipa, Inc. (Applicant) proposes the construction of three (3) 2,450 square foot (s.f.), eight bed, ADA-compliant residential shelters that will replace existing facilities, a 4,000 s.f. educational facility, and a 12,600 s.f. services center consolidating programs, services and administration. The project will enhance services to clients, provide an integrative and collaborative environment for staff/volunteers, include a training center for staff/foster families, and significantly reduce overhead relating to leases and maintenance. Consolidation of services will create economies of scale for the organization.

1.2 PROJECT LOCATION

The proposed project is located on the ‘Ewa Plain in the district of Honouliuli of the Island of O‘ahu. **See Figure 1, Project Location**. The property is accessed from Old Fort Weaver Road. **See Figure 2, Tax Map Key.**

The project site is identified as Tax Map Key (TMK): (1) 9-1-017: Parcel 082 (4.26 ac.) and is owned by the Applicant. The project site is bordered to the west by Old Fort Weaver Road, residential uses to the north, a business and vacant land to the south, and a large residential lot and a portion of the West Loch Golf Course to the east.

1.3 Mission

“Hale Kipa provides opportunities and environments that strengthen and encourage youth, their families and communities to actualize their potential and social responsibility.”

1.4 History

For over 3 decades, Hale Kipa has been "the House of Friendliness" to thousands of Hawaii's runaways and homeless youth who have needed a place to stay and someone to talk to while they work out their problems. During this time, Hale Kipa has provided shelter and other services to more than 30,000 youth.

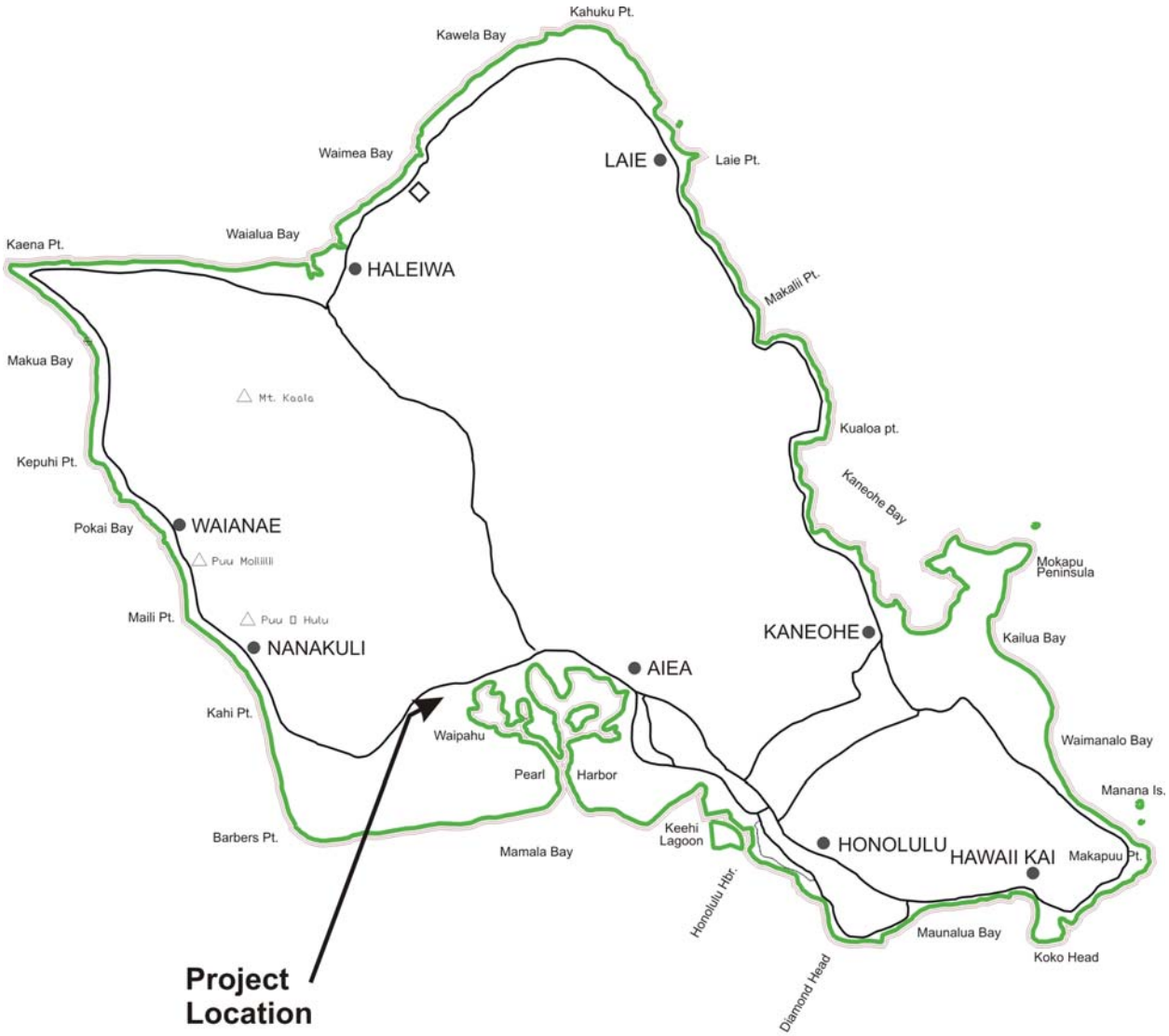
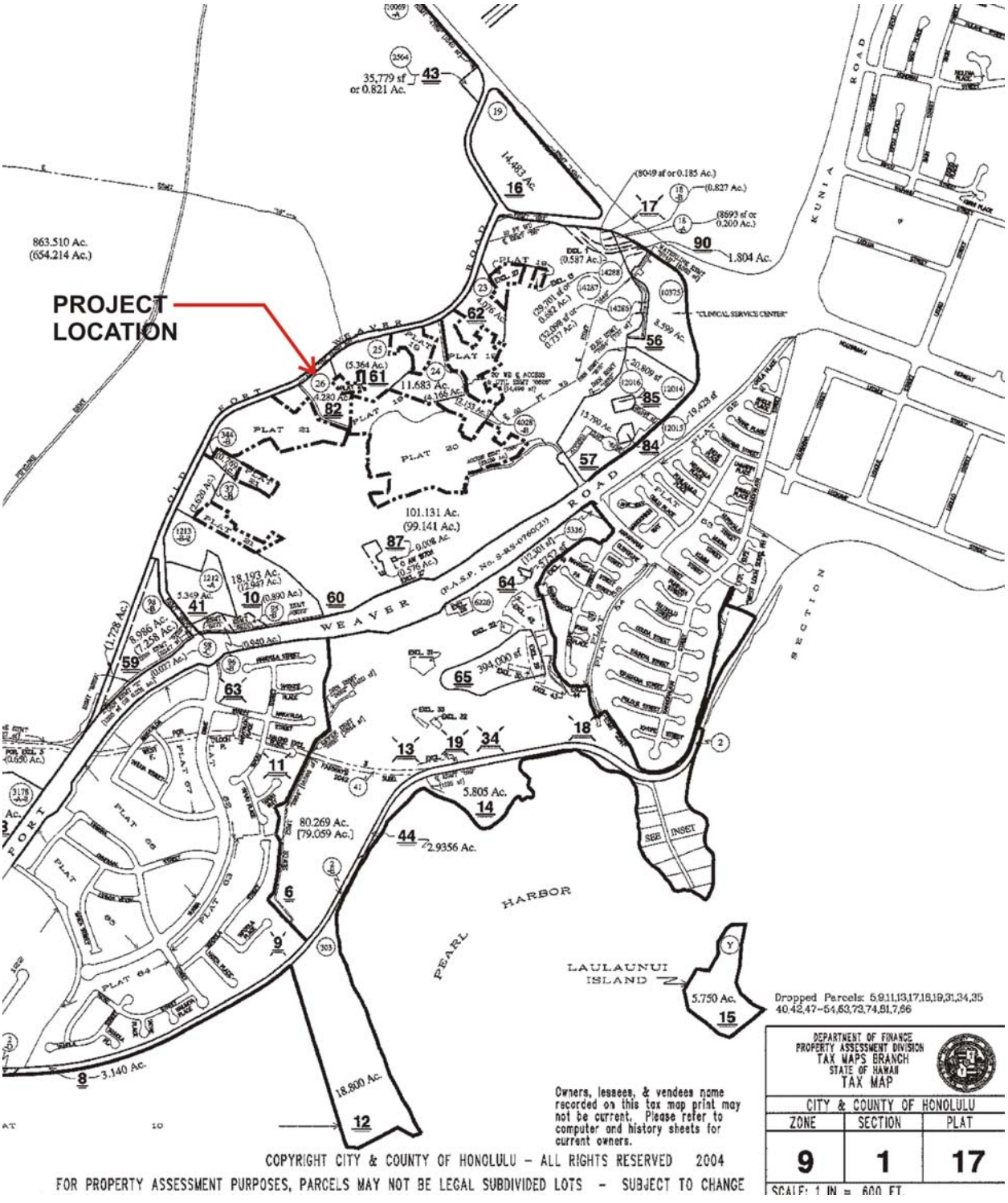


FIGURE 1
PROJECT LOCATION
HALE KIPA RESIDENTIAL CENTER
Kawailoa, O'ahu, Hawai'i

0 2 4 6 Miles 12

R. M. TOWILL CORPORATION December 2006

Figure 2 Tax Map Key



1970 A group of concerned community citizens, including the Junior League, police, and area churches, observes an alarming number of distressed teenagers, who for one reason or another had left home. In response to these and other identified community needs, these groups gather together to help form Hale Kipa to operate a single group shelter for adolescents in need.

1979 After nearly a decade of experience in youth services, Hale Kipa realizes that some youth, particularly the younger and abused, would be better served in foster home settings. Hale Kipa develops the Kamala Home program to complement their group home. Licensed foster homes are also developed to care for more difficult youth in a structured foster home setting with experienced foster parents.

1980 Hale Kipa initiates the first of its non-residential services: A Family Counseling Unit is created to help keep youth in their own homes and prevent unnecessary shelter placements. The program provides follow-up studies on youth and families that have been reunited after having received Hale Kipa's residential services.

1989 Collaborating with other community agencies, Hale Kipa responds to a need for serving street-identified homeless youth by developing the Youth Outreach (YO!) Project. Hale Kipa and the Waikiki Health Center provide material, social and medical services to street youth in Waikiki. Hale Kipa identifies a need to assist older youth in foster care to better prepare for adulthood. With the help of a Hughes Grant, Hale Kipa begins its Independent Living Program, supplemented a few years later by ILP Training Apartments, which provide intensive residential, independent living support for youth transitioning out of foster care.

1991 Hale Kipa joins forces with Marimed and the Kokokahi YWCA to provide intensive therapeutic services to emotionally challenged teens. The Kailana Program offers day and residential services.

1993 In its efforts to provide early intervention to high-risk youth, Hale Kipa initiates the Ho'okala Program. Receiving referrals from the police, Ho'okala provides diversion (intake and assessment) for youth picked up for status offenses and non-violent minor law violations.

1994 Hale Kipa enters into additional collaborations, including Hui Malama Ohana with the KEY Project, PACT and Susannah Wesley Community Center. This venture

provides school, community, and family outreach to help families resolve differences and stay intact. These services were formally offered in the Puuwai Momi Public Housing area through the Holo Mua Project.

In partnership with the Consuelo Alger Foundation, Hale Kipa develops an outreach, counseling, and skill-building program targeted for young men and women who had experienced sexual exploitation or homelessness. This program no longer exists.

1994 Hale Kipa expands its residential program to include Hanai Homes, transitional foster care whose services focus on youth needing more time and social skill building before returning home or to a long term placement.

1997 In collaboration with Catholic Charities Family Services, the Marimed Foundation and PACT, Hale Kipa forms the Oahu Provider's Group. The Group offers a full continuum of outpatient services on a fee-for-service basis through contract with the Child & Adolescent Mental Health Division of the Department of Health. The intent of this collaboration is to provide high-quality outpatient services to adolescents and families referred by Family Guidance Centers.

1999 Hale Kipa opens Residential Treatment Programs as part of an integrated continuum of Therapeutic Living Programs under contract with the Child & Adolescent Mental Health Division. These programs, serving 12-19 year olds, are a natural outgrowth of the organization's collaboration with the Marimed Foundation and Kailana, which ended in June. Hale Kipa has since added an Emergency Shelter for CAMHD youth.

Hale Kipa begins providing an Outreach Tracking Program under contract with the Office of Youth Services to extend outreach services to youth being discharged from the Hawaii Youth Correctional Facility in an attempt to ensure their successful return to the community and to reduce recidivism.

Hale Kipa expands its Foster Care Services, adding Foster Care with Therapeutic Service. Also expanded is the Family Counseling Unit that adds Intensive In-home Services through the Oahu Providers Group. Intensive Out patient services have been phased out.

The Hapai Program for pregnant and parenting young mothers is opened. This program is an essential piece of the continuum of adolescent services, insuring a safe and therapeutic place for young moms to begin the experience of raising their families.

2000 Hale Kipa adds a specialized treatment facility for young boys, Hale Kupono, and responds to the community's needs by opening individualized programs for special needs youth.

2000 Hale Kipa has been able to start and build on its Transitional Living Program that focuses on assisting young homeless persons transition into adulthood and out of homelessness. Starting with a residence for young adult men, we were able to add a residence for young women and also one for young pregnant and parenting young women.

2002 The Valid Court Order program is founded: an advocacy program for youth that violate court orders.

Hale Kupono for young girls is opened.

Hale Kipa opens Haloa House that provides a supportive and skill-building residence for young females transitioning out of foster care.

2004 Hale Kipa received a non-competitive bid to provide Advocate services on a much larger scale. It began to provide statewide, comprehensive, community-based care for child welfare children and youths as well as youths at risk of juvenile delinquency, and their families, using an expanded replication of the nationally successful Youth Advocate Programs (YAP), Inc. model.

2005 Hale Kipa added Pregnancy Prevention and Family Strengthening Services to its Hui Malama Ohana Youth Service Center.

2006 Hale Kipa began outreach services for Child and Adolescent Mental Health (CAMHD) and initiated Intensive In-Home services to support family strengthening.

2006 The agency’s foster home program was expanded to include Therapeutic Foster Homes on the Island of Hawaii.

Through the years, the Relief and Volunteer Program have supported all Hale Kipa's youth services by providing training, relief/temporary staff and volunteer opportunities.

Today, Hale Kipa is very much involved in the efforts of the Hawaii Youth Services Network, Partners in Care, Weed and Seed, Foster Care Initiatives and other partnerships. Hale Kipa also provides practicum placement for students. Hale Kipa is currently licensed as a child-

placing agency by the Department of Human Services and maintains approximately 25 private foster homes. At full capacity, Hale Kipa has approximately 50 youth in foster care placement.

The organization continues to demonstrate expertise in the areas of outreach, family counseling, emergency shelter, residential treatment, foster care and independent living, flexibility to individualize placement and services, strong and effective working partnerships and collaborations with other community agencies.

1.5 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT (EA)

This Environmental Assessment is prepared to address the requirements of Federal and State of Hawai‘i laws that include:

1. The National Environmental Policy Act (NEPA): The applicant, Hale Kipa, Inc. is applying for Community Development Block Grant funds through the City and County of Honolulu Department of Community Services. The planned use of Federal funds for development requires the preparation of a NEPA compliant Environmental Assessment.

2 Hawai‘i Revised Statutes (HRS), Chapter 343, Environmental Impact Statements, and Hawai‘i Administrative Rules (HAR), Chapter 11-200, Environmental Impact Statement Rules: The proposed project will involve the use of Federal funding disbursed through the City and County of Honolulu thereby requiring the preparation and review of an Environmental Assessment for the proposed action.

The purpose of this EA is 1) to inform interested parties of the proposed project, 2) disclose the potential for adverse environmental impacts, 3) identify measures proposed to sufficiently mitigate or ameliorate potential impacts, and 4) seek public comment on subject project. This EA further describes existing conditions at the project site and proposes mitigation measures to address potential adverse environmental impacts resulting from the proposed action.

SECTION 2
PROJECT DESCRIPTION

2.1 PROPOSED ACTION

Hale Kipa, Inc. proposes the construction of three (3) one story residential shelters each approximately 2,450 s.f. to be used as shelters for youth at risk. See **Figure 3, Site Plan**. Each shelter will house eight (8) youths and two (2) staff, and will have 4-bedrooms with (2) bathrooms, a staff room with bathroom, and a central dining and living room area. A one story 4,000 s.f. education center will be constructed to include three (3) small and three (3) large classrooms with a large multipurpose room that can be subdivided into classrooms in the future. Also included in the construction plans is a separate one story 12,600 s.f. services center with counseling rooms, administrative offices, and storage-equipment rooms.

2.2 EXISTING SITE CONDITIONS

The proposed residential shelters will be constructed on the back portion of the parcel which is fairly flat. See **Figure 4**. The land slopes from Old Fort Weaver Road toward the West Loch Golf Course. A portion of the site is currently used as a parking area for a bus operator. **See Figure 4 and Figure 5**. The remainder of the site is in wild vegetation. Three entry points to the site are currently provided from Old Fort Weaver Road.

Water service will be provided via an 8-inch water main along Old Fort Weaver Road from which one water line will be conveyed to the site and split to two (2) meters, one for water and one for fire protection. Requirements for additional water meter(s), hydrants, and facility charges will be addressed during the project development and permitting phases. The Board of Water Supply has indicated that the present water system is adequate to serve the proposed project. Power and communications are provided via overhead lines along Old Fort Weaver Road.

Access for a parcel located to the east of the project site, is provided along the southern edge of the property. Access to a parcel located to the north of the subject parcel is also granted access through the project area.

Figure 3 Site Plan

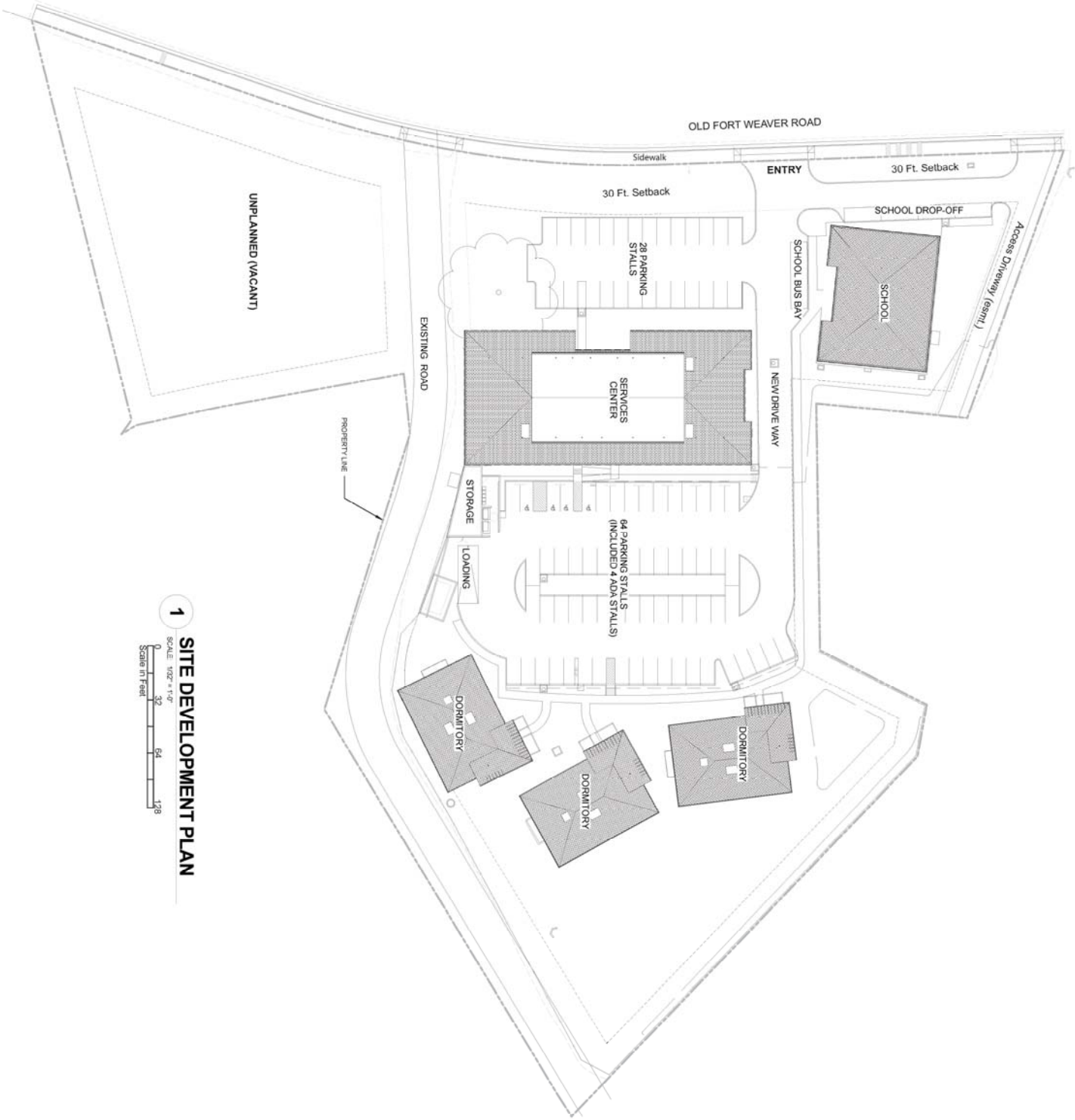


Figure 4 Topographic Map

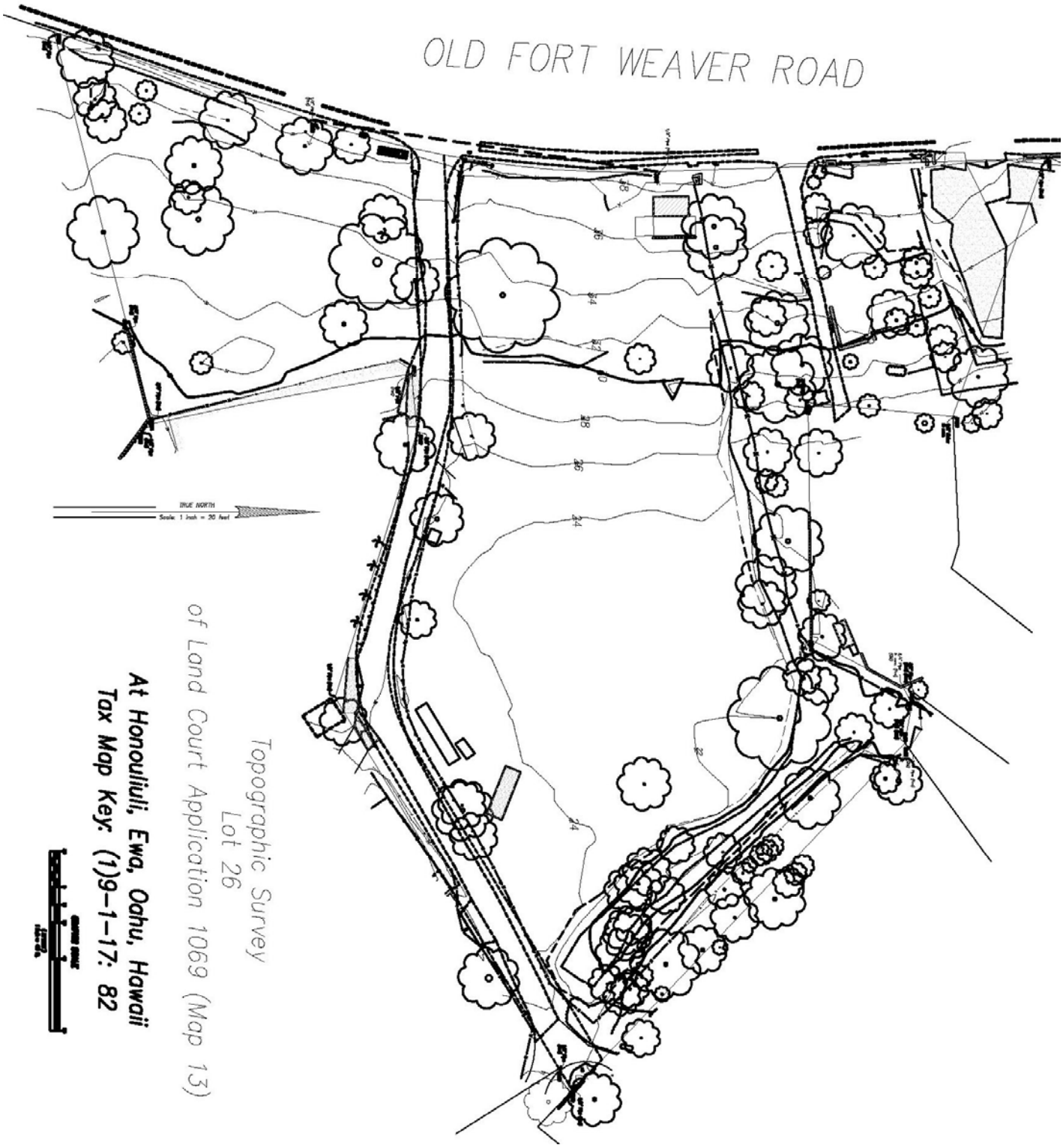


Figure 5 Photographs of Existing Site Conditions

2.3 HALE KIPA – PROGRAM AND SERVICES

SERVICES

- Individual, group and family counseling
- Coordinating services with schools, therapists, and other social service providers
- "Time Out" for youth and family
- Social and independent living skills
- Structured and supervised living environment
- Recreational Activities

POPULATION

- Male and females ages 7-17
- Youth in need of temporary shelter because of potential for abuse and/or neglect
- Runaways in need of shelter
- Youth having significant difficulties with their families
- Youth transitioning out of HYCF
- Youth & family seeking services to prevent Out of Home Placement
- Youth currently involved in the "system" (Child Protective Services, CAMHD or Family Court) and awaiting an alternative placement

ADMISSION CRITERIA

- Youth and parent willingness to comply with program expectations
- Meet respective age requirement
- Parental/legal guardian consent for services unless the youth is referred by Child Protective Services
- Persons with urgent needs or in emergency situations are given priority for services
- Capable of functioning in a community setting.

YOUTH RESPONSIBILITIES

- Participation in program activities
- Following program rules
- Participation in counseling
- Attending a school program/employed

DISCHARGE CRITERIA

- Individual and family goals completed
- Youth and families demonstrate unwillingness to comply with program expectations
- Another setting or level of care is deemed more appropriate

2.4 SITE PLAN

The proposed site plan for the 4.26 acres is shown in **Figure 3**. The site plan locates the education center to the front and north side of the property. The services center is located in the center of the property with the residential shelters located behind. Parking for staff, visitors and volunteers are located on the west and east sides of the services center. Ninety-six (96) parking stalls, including handicap and loading stalls, will be provided on the east and west sides

of the services center. A single entry is proposed from Old Fort Weaver Road. The site will be landscaped.

The existing driveway located along the southern boundary will remain as-is. The front yard setback is 30 feet. The southern portion of the property (35,776 s.f.) will not be developed as part of the shelter-education-service center complex. An access driveway easement is provided along the northern boundary of the property to service a lot to the east.

2.4.1 RESIDENTIAL SHELTERS, EDUCATION CENTER AND SERVICES CENTER

Residential shelters

Three (3) residential shelters will be developed on site. Each shelter is approximately 2,450 s.f. and will have 4 bedrooms sharing 2-bathrooms; staff room with bathroom, and a common dining and living room. Each shelter will accommodate eight (8) youths, and will be staffed by two (2) full-time (24-7) staff members. The staff will rotate on a shift basis. Each shelter will be self-contained and operate as a household unit.

A typical floor plan for the residential shelter is shown in **Figure 6, Residential Shelter Floor Plan**. Each of the dorms will share a common area outdoors. The exterior elevations of the shelters are shown in **Figure 7 and Figure 8.** The residential shelters will all be below 18'-2" tall from finish grade to the roof gable.

Education Center

A one-story 4,000 s.f. education center will be developed and will provide the 6 classrooms and a large multipurpose room (see **Figure 9, Education Center Floor Plan**). The multipurpose room may be subdivided in the future to provide classrooms. The teachers of the school will be certified by the Department of Education. The long range goal is to transform this transition school into a licensed Charter School in the future. Offices for the teachers will be located in the services center. The school elevations are shown in **Figures 10 and 11**. The height of the school is 22 ft. 3-inches from finish grade to the ridge.

Services Center

A one-story 12,600 s.f. services center ("Center") will be developed and will provide for the following functions (**see Figure 12, Services Center Floor Plan)**:

- counseling rooms
- program and administrative offices
- storage-equipment rooms

The building elevations are shown in **Figure 13**. The height of the building is 25-ft from finish grade. The center will provide staff space in support of the dorms and school and will be staffed by trained professions who will be able to service their clientele.

Figure 6 Residential Shelter Floor Plan

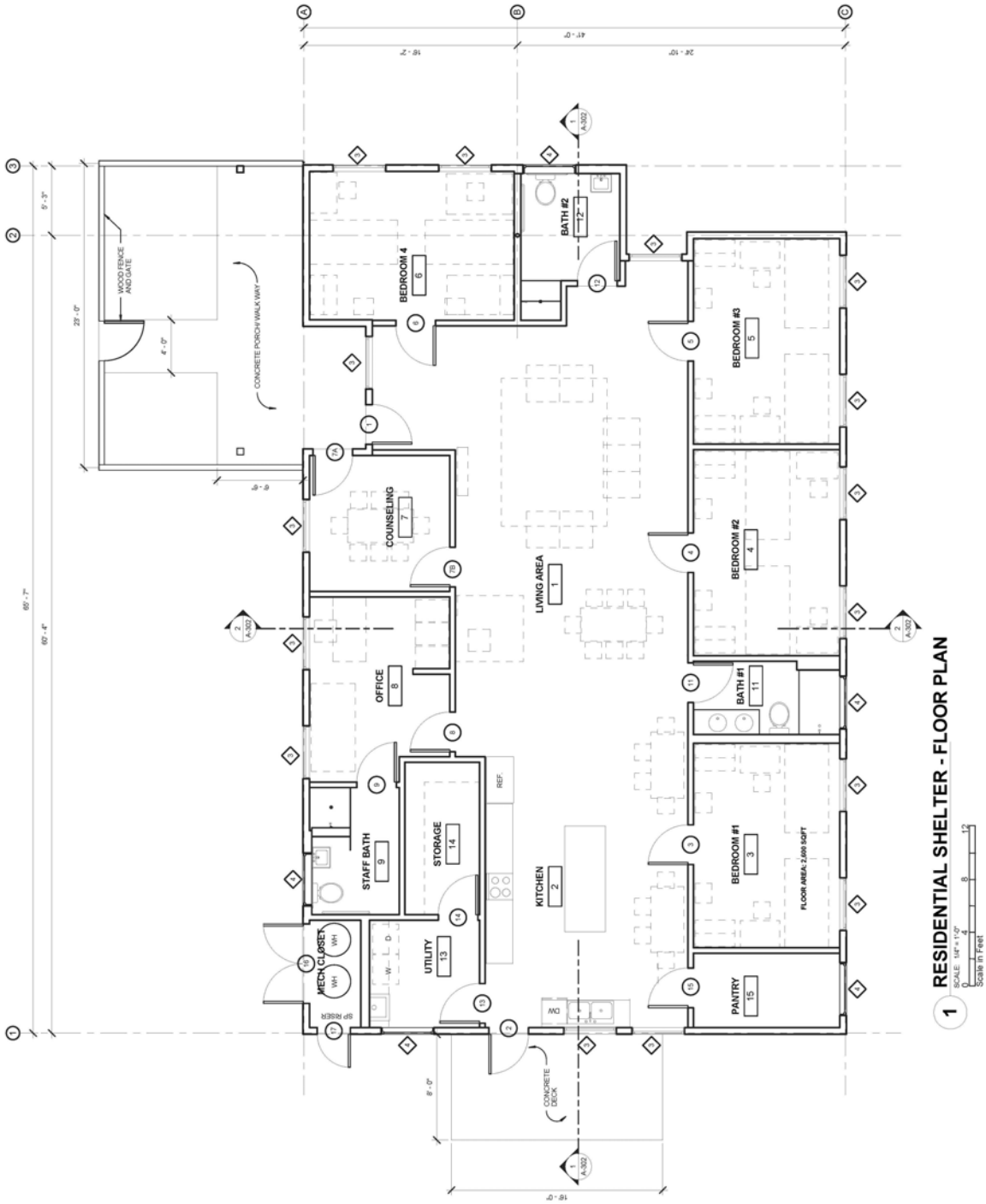


Figure 7 Residential Shelter Exterior Left and Right Elevations

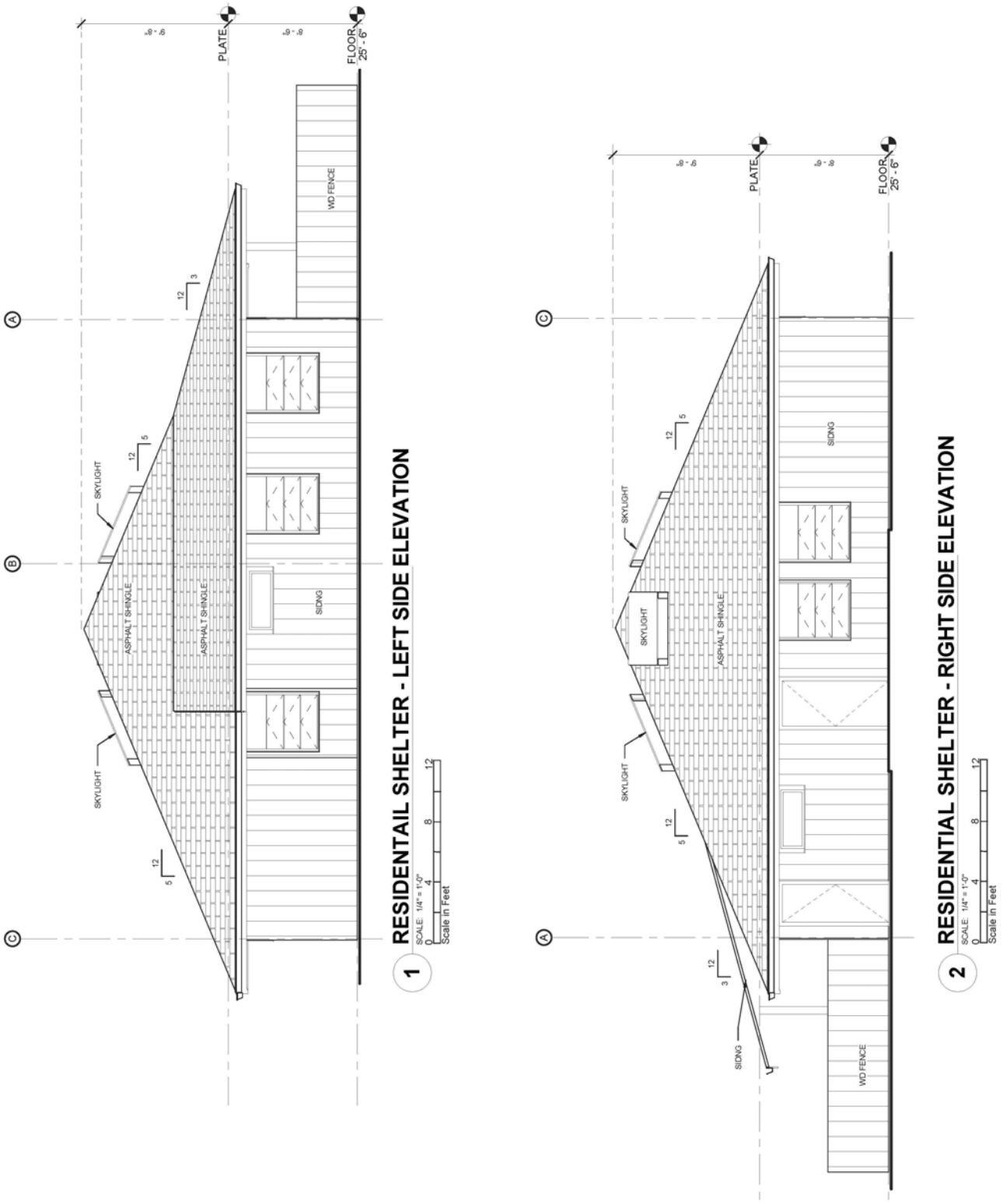


Figure 8 Residential Shelter Exterior Front and Rear Elevations

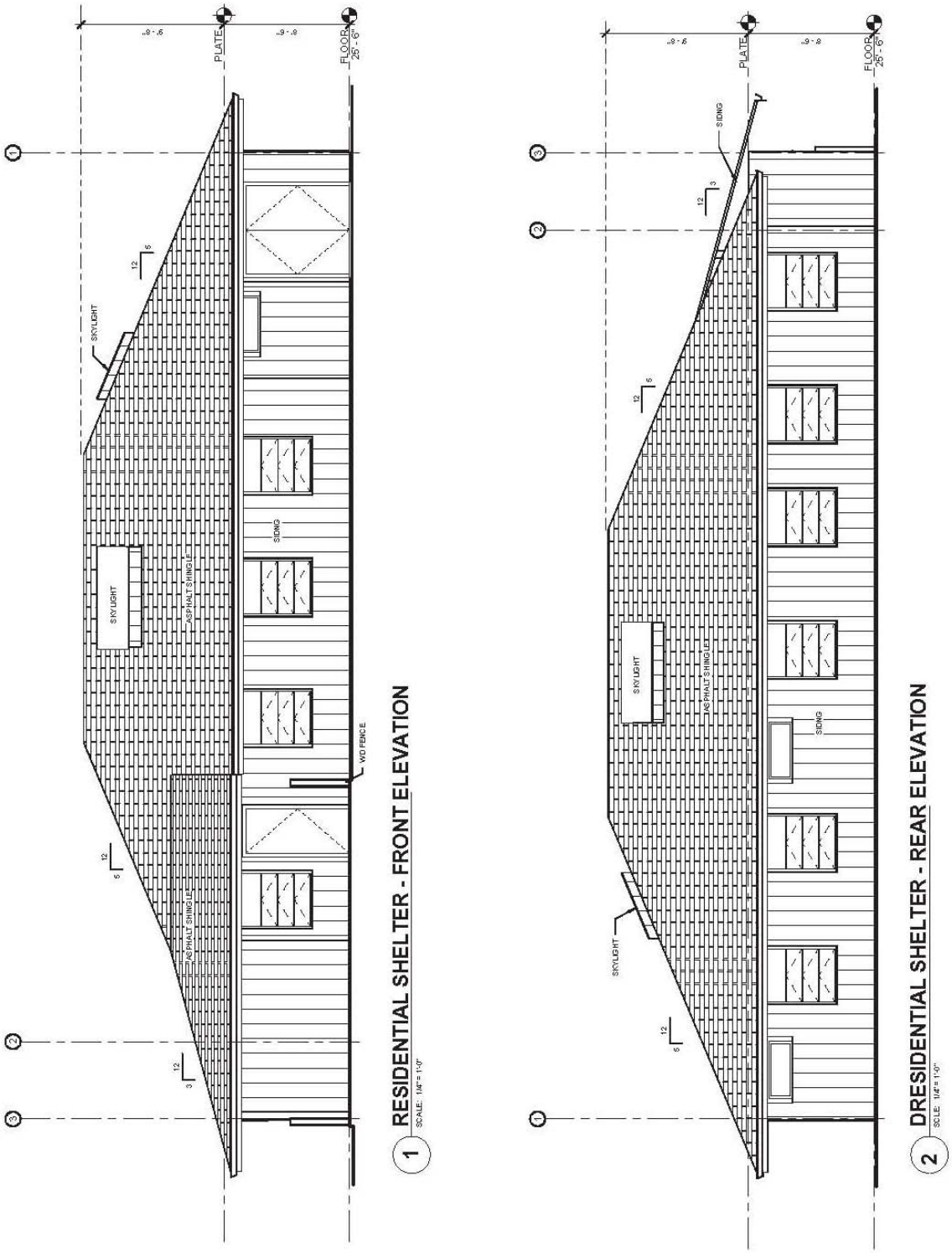


Figure 9 Education Center Floor Plan

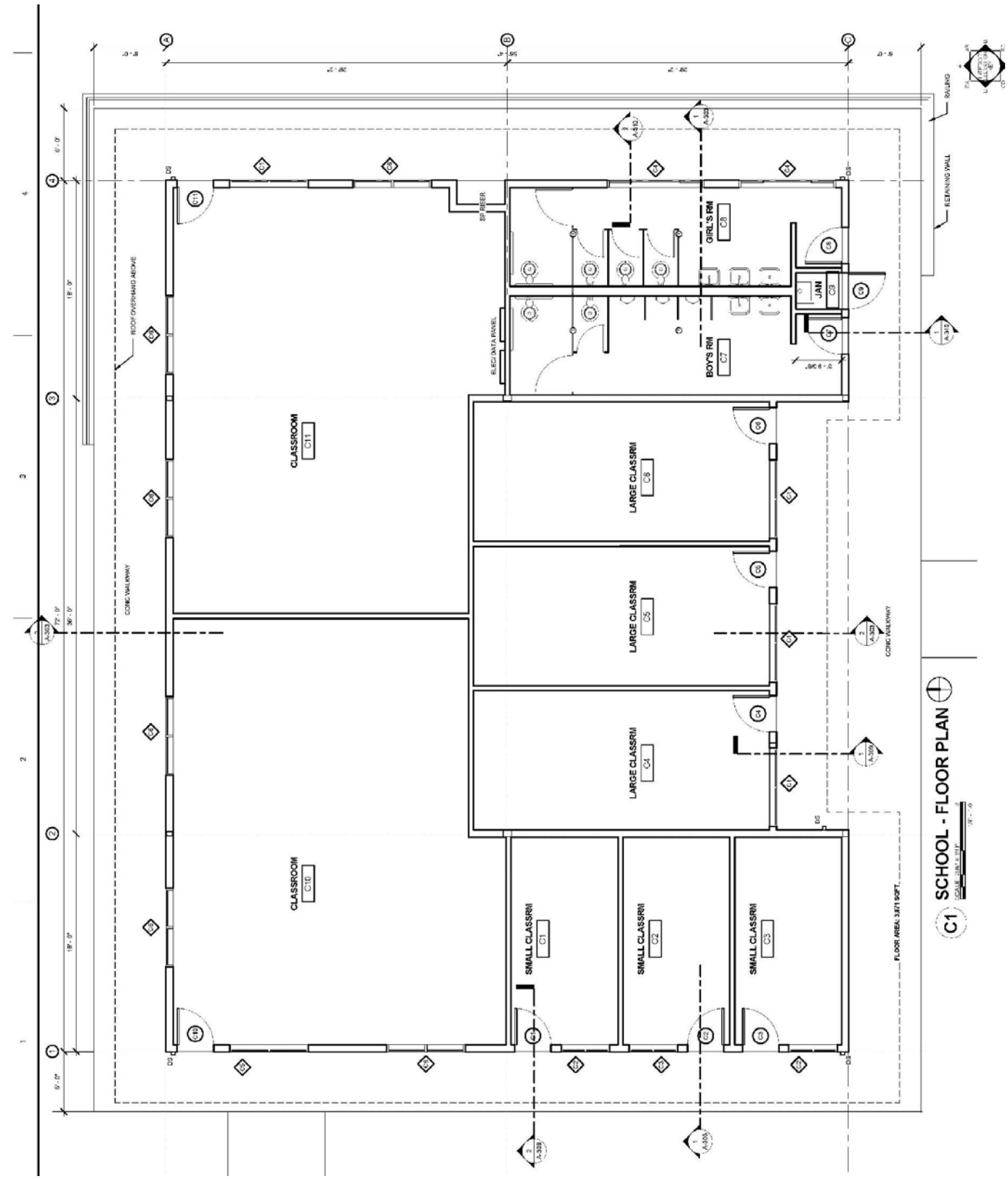


Figure 10 Education Center North and South Elevations

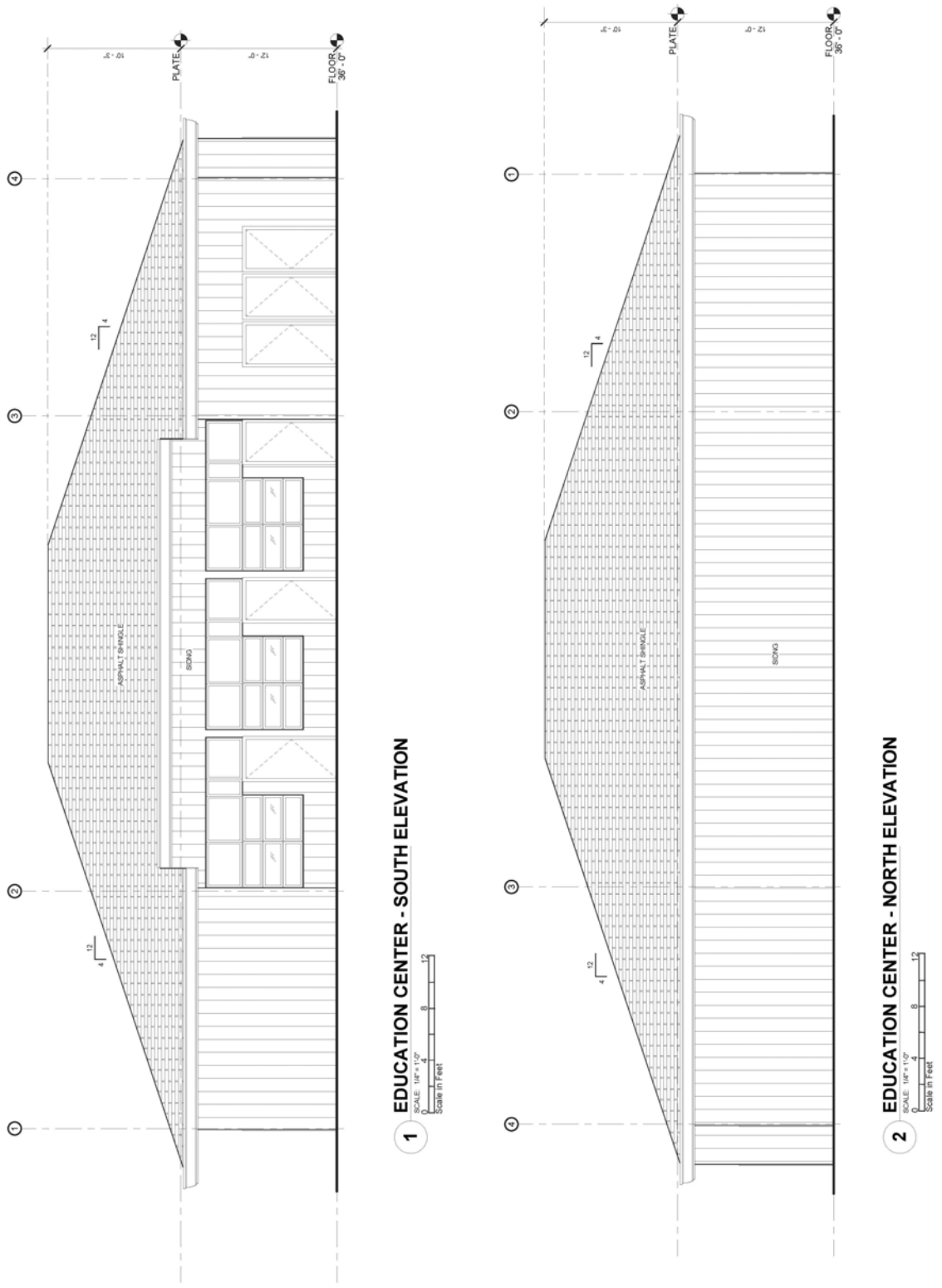


Figure 11 Education Center West and East Elevations

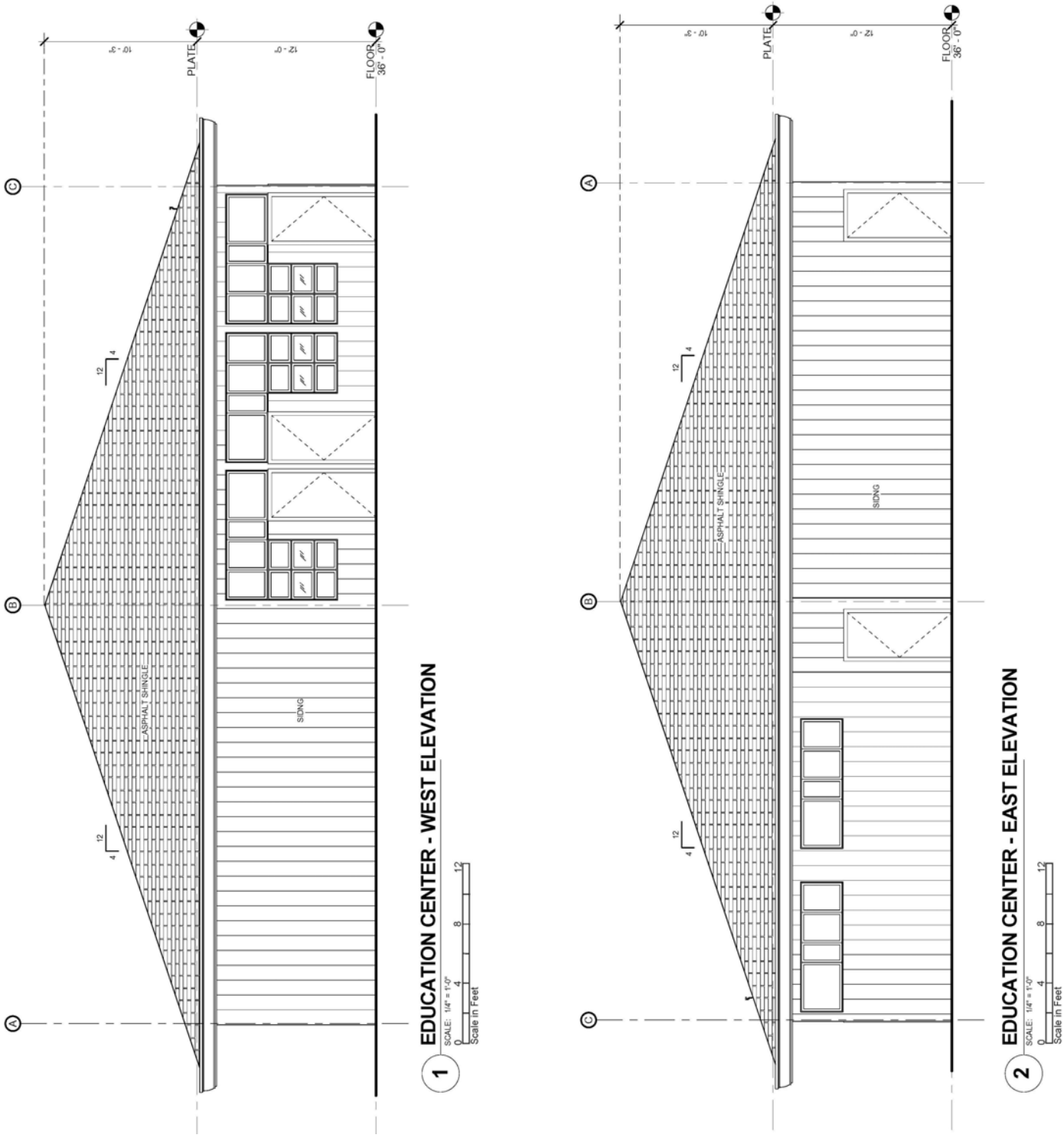
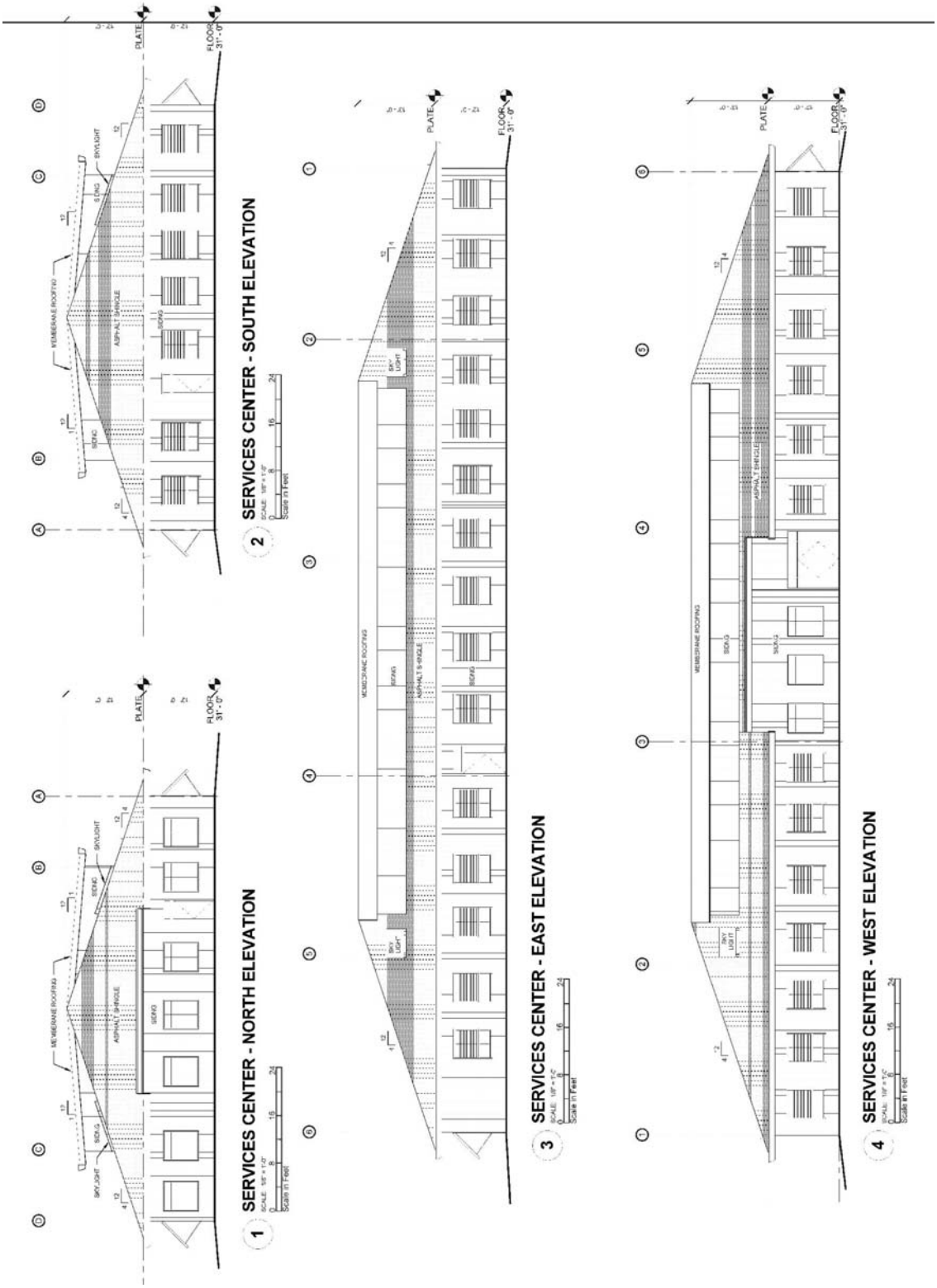


Figure 12 Services Center Floor Plan

Figure 13 Services Center Elevations



The building's design features are focused to obtain LEED "Silver" certification. The building design is directed toward energy efficiency by reducing the need for mechanical air conditioning and by maximizing "day-lighting" opportunities. The higher pitch of the building promotes cooling during the summer and allows light to enter into the building.

2.4.2 LANDSCAPING

The entire project site will be landscaped, both along the perimeter of the property and in the interior of the property. Canopy trees will be planted along the perimeter, and smaller shade trees within the interior of the property. A concept of the landscaping is shown in **Figure 14, Landscape Concept Plan**.

Buffering on the property will include features such as a six-foot high chain-link fence lined with a six-foot high hedge. The services building and residential shelters will be surrounded with a screening hedge and the education center will have a screening hedge on the south and east facing walls.

2.5 CENTER PERSONNEL

Center personnel include the following:

Services Center

- Placement Services 45
- Business/Finance Staff 35
- Administrative Staff 2

Residential Shelters

- Residential Staff 6

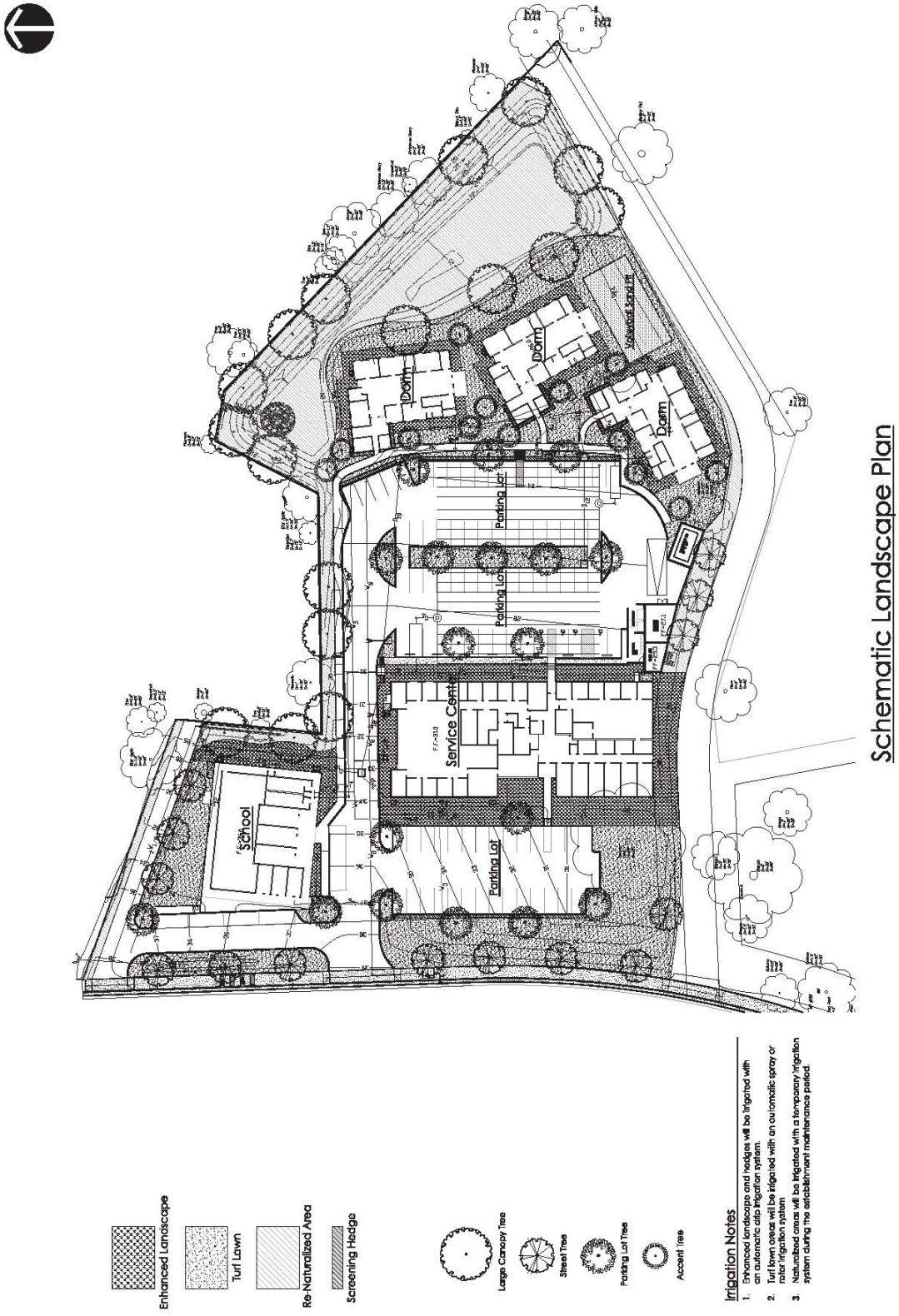
Education Center

- Teachers 10
- Administrative Staff 3

2.6 ACCESS

Access into the project site will be attained via Old Fort Weaver Road and will provide access to the building and adjacent parking lots. 101 Center staff personnel will be accommodated on the site and will be accommodated by the 96 planned parking stalls (regular and handicapped accessible stalls are provided). Approximately 10% of the staff will arrive to the site by bus or carpool. Loading space is provided along the south side of the building. Access driveways for adjoining properties to the east are provided on the north and south boundaries and will remain.

Figure 14 Landscaping Concept Plan



2.7 UTILITIES AND SERVICES

All utilities will be placed underground in accordance with City and County of Honolulu regulations**.**

2.7.1 Water Service

Water service will be obtained from the Honolulu Board of Water Supply via an existing 8-inch main which runs along Old Fort Weaver Road. Existing water meters for the subject property are located along the existing south driveway. New water meters will be located in the center of the property.

2.7.2 Sewer System

The project site is currently is not served by municipal sewer service and is located in the Critical Wastewater Disposal Area where no new cesspools will be allowed. Existing residences and commercial uses in the area are currently served by private cesspools or septic systems. A septic system with a leaching field is proposed to serve as the individual wastewater system (IWS) for the project site consisting of the three (3) shelters, one (1) education center, and one (1) services center in accordance with Chapter 11-62 (HAR). The plans for the proposed septic system with a leach field have been submitted to DOH for approval. The wastewater plan is shown in **Figure 15, Utility Plan**.

Engineer Concepts, Inc., the consulting engineers for the project, has met with the Department of Health (DOH) Waste Water Branch for input on the proposed septic system's demands and design. This consultation addressed the creation of the three (3) shelters, one (1) office building and one (1) education center which, for the purposes of this discussion, was recognized as a "school". Because the kitchens in the shelters will be utilized by the occupants for the preparation of their own food, and not considered commercial food preparation areas, the kitchens do not need to be certified by the DOH Health & Sanitation Branch. Regarding the septic system, Engineering Concepts, Inc. summarizes the DOH Wastewater Branch comments as follows:

a. In this setting, living quarters can be viewed as Buildings other than Dwelling (rather than residences) since they are part of the overall Social Services complex where occupants are primarily overnight (short stay) transients. Further, because the occupants will be attending onsite classroom sessions, DOH can treat the quarters as a "School". Thus, there is no limit of 1000 gallons per day for an IWS as it applies to dwellings.

b. It is acceptable to centrally collect the sewage in a septic tank and/or pump station and convey the wastes to a large leach disposal field in the parking area.

c. When calculating design flows, do not “double count” the flows of occupants in the quarters and those attending classroom sessions. Doing so will make the septic tank and leach field excessively large. Use 20 gallons per person per day for transients.

d. It is permissible to install the leach field(s) in the paved roads and parking areas. Prime consideration is for maintenance access to the septic tank and pump station.

e. DOH does not recommend constructing any leach field in the sand volleyball courts. When posed with the acceptability of installing an impermeable liner as a “cap” atop the leach field, they opined that it may be acceptable.

f. Look at the landscaping plan when selecting candidate sites for the leach field(s). Large deep rooted trees are a threat to the O&M [operation and maintenance] of the system.

By the determination of the engineers, from this consultation and in accordance with HAR Chapter 11-62-31.1, the flow is highly variable and therefore has no size limit. Construction of this system will provide 10,000 square feet of usable land for each 1000 gallons per day of the IWS. Design of the Landscape Plan did consider the leaching field in placement of the trees and species selection. Root barriers will be installed around the trees as appropriate.

2.7.3 Power and Communications

Electrical services will be provided by Hawaiian Electric Company. Telephone services will be provided by Hawaiian Telcom. Service is available via overhead lines located on Old Fort Weaver Road.

2.7.4 Solid Waste

Solid waste disposal will be via a private company. The collected waste will be disposed at the City and County of Honolulu’s garbage to energy plant or at the Waimanalo Gulch Sanitary Landfill.

2.7.5 Police, Fire and Medical

Police protection is provided to the project area by District 3, Pearl City Police Station, which serves the Waipahu, ‘‘Ewa and Wai‘anae areas.

The ‘Ewa and Waipahu Fire Stations provide emergency service for the project area.

The St. Francis West Medical Center provides full-service medical care and is located in close proximity to the project site.

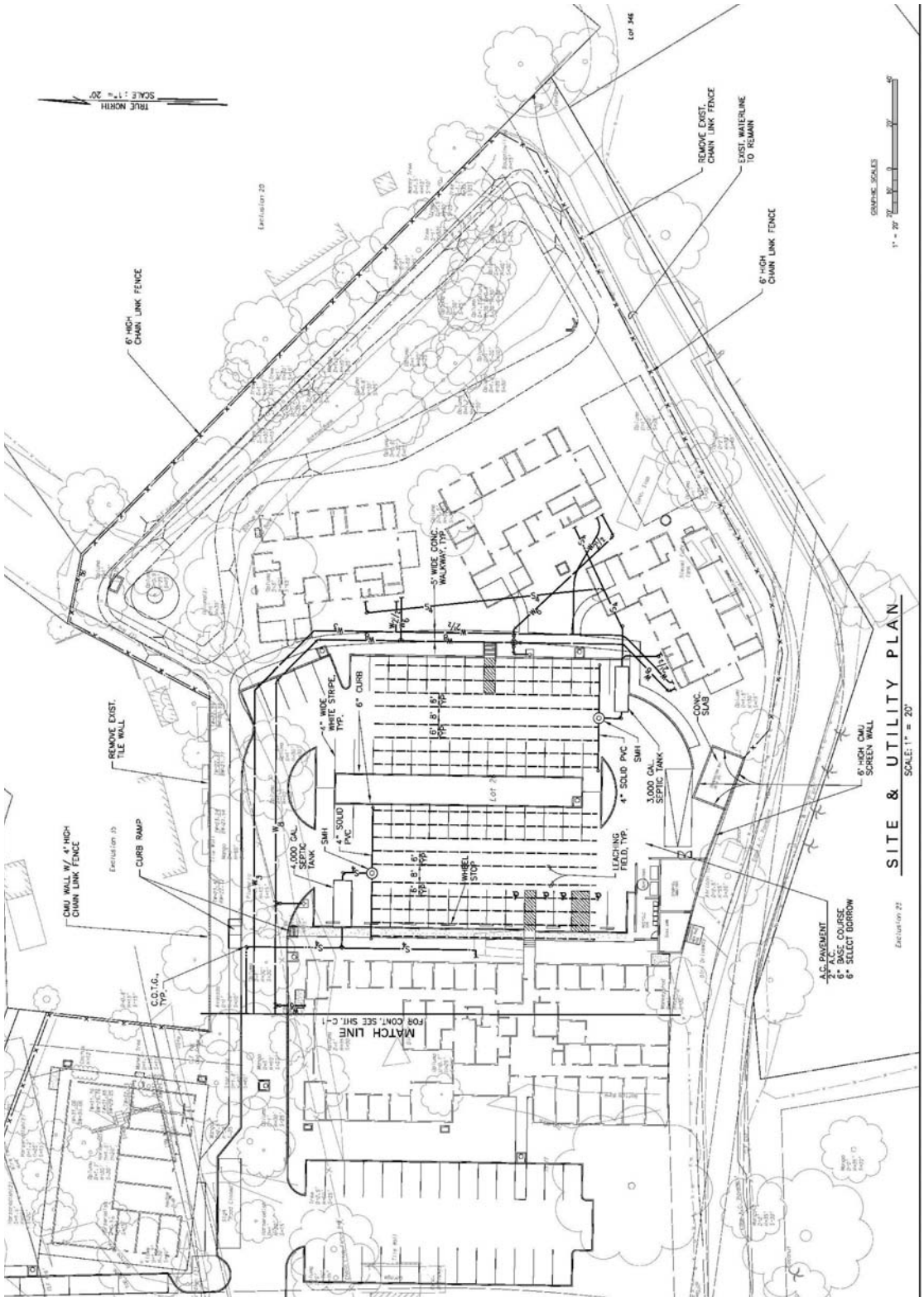
2.7.6 Parks

There are several public parks in the general area: ‘Ewa Beach Community Park (13.25 acres), ‘Ewa Beach Park ((4.88 acres), and West Loch Shoreline Park (6.36 acres). In neighboring Waipahu Town, there are Hans L’Orange Neighborhood Park (6.93 acres), Hoaeae Community Park (10.10 acres), and Waipahu Cultural Garden Park (48.88 acres).

2.8 PROPOSED SCHEDULE

The applicant proposes to proceed with the development of the project upon receipt of all required development and building permits. Construction is proposed to start in the 3rd Quarter 2012.

Figure 15 Utility Plan



2.9 COST SUMMARY

The total project cost is estimated at $19,793,364.

SECTION 3
ALTERNATIVES

3.1 ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the proposed project that were considered include: (1) the No Action Alternative; (2) the Delayed Action Alternative; and (3) the Preferred Alternative. A description and assessment of each of these alternatives is provided below. An alternative site was not considered because the subject property is owned by Hale Kipa.

3.2 NO ACTION ALTERNATIVE

The No Action Alternative proposes maintaining the status quo leaving the site unchanged. The No Action Alternative would preclude the potential for environmental impacts given that there would be no new buildings and no demand placed on additional municipal services. Taking no action would result in not meeting the desired objective of Hale Kipa to "… provide opportunities and environments that strengthen and encourage youth, their families and communities to actualize their potential and social responsibility." Because the No Action Alternative does not address the objectives of Hale Kipa, it was rejected from further consideration.

3.3 DELAYED ALTERNATIVE

This alternative proposes that construction of the residential shelters and education center be postponed to a later time. Construction expenditures for the proposed project would be averted in the short-term but would eventually be required at a future date when the project is undertaken. Project costs at this future period in time are expected to be higher due to inflation and price escalation of labor and materials. The potential for environmental impacts associated with delay of the project are expected to be similar to the preferred alternative and would involve no significant adverse impacts. However, like the No Action Alternative, further delay would fail to address the objectives of Hale Kipa. For these reasons, the Delayed Alternative is also rejected from further consideration.

3.4 PREFERRED ALTERNATIVE

The Preferred Alternative is to proceed with the proposed development of the three residential shelters, services center and the education center as shown in **Figure 3**. This alternative is the only alternative that meets the objectives of Hale Kipa. The proposed action also conforms with existing zoning regulations.

SECTION 4
DESCRIPTION OF THE AFFECTED ENVIRONMENT, IMPACTS AND MITIGATION

4.1 PHYSICAL ENVIRONMENT

4.1.1 CLIMATE

The ‘Ewa Plains of O‘ahu has a mild subtropical climate which is characterized by abundant sunshine, persistent northeast tradewinds, relatively constant temperatures and moderate humidity. Mean monthly temperatures range from a high of 80° Fahrenheit (F) in the summer months, to a high of 70° F during the winter. The average annual rainfall for the area is approximately 24 inches, with most of the rainfall occurring between the months of October and March.

The proposed project is not expected to have any effect on the existing climatic conditions.

Anticipated Impacts and Proposed Mitigation

No impact is anticipated and therefore no mitigation is proposed.

4.1.2 TOPOGRAPHY AND SOILS

The project site is located on the ‘Ewa Plains of O‘ahu. Elevations at the site range from approximately 38 feet above mean sea level (msl) near the old Fort Weaver Road to 24 feet above mean sea level near the eastern boundary of the site. The average cross slope is approximately 3 percent. On average, the site can be considered relatively flat. See Figure 4.

Soils information at the project site was obtained from the *Soil Survey of Islands of Kaua‘i, O‘ahu, Maui, Moloka‘i, and Lana‘i, State of Hawai‘i*, as prepared by the U.S. Department of Agriculture, 1972. According to the Soil Survey, the soil association at the project site is classified as “Waialua Silty Clay” (WkA) and Waialua Silty Clay (WkB) which are described as moderately well drained soils on alluvial fans on the island of O‘ahu. They are nearly level to steep with moderate permeability, slow runoff and slight erosion hazard.

The proposed project is expected to have no significant impact on the topography and soil conditions of the project site. The topography of the project area is sloped and soil disturbance will be initially limited to construction associated grading for the new residential shelters, services center and education center. Preparation of the site for establishment of the building foundations and landscaping of the areas immediately surrounding the buildings lot will be the extent of ground disturbing activities. Construction plans and project activities will be subject to

review and approval by the City DPP. This will include the preparation of an Erosion Control Plan (ECP) as part of the construction plans for the project. Erosion controls will be in accordance with the Rules Relating to Soil Erosion Standards and Guidelines, DPP, April 1999.

Protection from construction stormwater runoff will be addressed through the filing of a National Pollutant Discharge Elimination System, Notice of Intent Form C (NPDES NOI Form C) Construction Stormwater permit application is administered by the State Department of Health (DOH). The NPDES permit application will include a Best Management Practices (BMPs) Plan to govern the site grading, driveway construction and utility installation phases of work to ensure proper treatment of storm water runoff to waters of the State. This will include use of silt fences, berms, or retention basin, as required, to prevent untreated construction storm water runoff from entering State waters via Honouliuli Stream. The NPDES permit application will be prepared in accordance with DOH regulations governing the protection of state waters in Chapter 11-54, Water Quality Standards, and Chapter 11-55, Water Pollution Control, Hawai'i Administrative Rules (HAR).

Anticipated Impacts and Proposed Mitigation

No further mitigation measures beyond the use of specified erosion control measures and the BMPs Plan are anticipated to be required to address erosion.

4.1.3 SURFACE WATER

There are no surface water bodies at the project site. Honouliuli Stream is located to the northeast of the project site. **See Figure 3, Topographic Map**.

Given the limited scope and scale of the project there is little to no potential for adverse impacts to surface water. The only potential source of impact is expected to be in the form of stormwater runoff during periods of inclement weather. As indicated in Section 4.1.2, above, mitigation measures to address stormwater runoff during construction and utility installation will be practiced to address the potential for adverse impacts.

Anticipated Impacts and Proposed Mitigation

No impact is anticipated and therefore no mitigation is proposed.

4.1.4 FLORA/FAUNA

The project site is within an existing urbanized residential area that has been in use for several decades. A *Botanical Resources Assessment for the Hale Kipa Services Center* was conducted

by Maya LeGrande, LeGrande Biological Surveys Inc. She noted that no threatened or endangered flora are known to inhabit the site and the site was previously cleared. See **Appendix A.**

Several species of introduced avifauna are expected to be present at the project site and the surrounding region. These species include, but are not limited to the following:

Common Name	Scientific Latin
Common Indian Mynah	*Acridotheres tristis*
House Sparrow	*Passer domesticus*
Spotted or Lace-necked Dove	*Streptopelia chinensis*
Zebra Dove	*Geopelia striata*
Northern Cardinal	*Cardinalis cardinalis*
Red-crested Cardinal	*Paroaria coronata*
Red Vented Bulbul	*Pycnonotus cafer*
House Finch	*Carpodacus mexicanus*
Java Sparrow	*Padda oryzivora*

Seasonal visits by migratory avifauna that may occur in the region include the Pacific Golden-Plover (*Pluvalis fulva*) and Wandering Tattler (*Heteroscelus incanus*). Plovers are associated with open habitats such as lawns and fields. Tattler's commonly forage along streams, even in the interior of the island. However, no streams are present at the project site and the occasional presence of Tattlers would be transient and temporary. Plover are the most abundant migrant in Hawai'i and much has been learned of their behavior as a consequence of intensive research over the past 20 years (Bruner 2001 and Johnson et al. 1981, 1989 and 2001). Neither the Plover or Tattler is designated rare or endangered.

Other mammal species present at the project site may include domestic cats, dogs, rats, and mice.

Plants at the project site are limited to common landscape plants and shade trees and introduced shrubs and ground cover.

Anticipated Impacts and Proposed Mitigation

No impact is anticipated and therefore no mitigation is proposed.

4.1.5 SCENIC AND VISUAL RESOURCES

The project area is located in an area zoned for residential uses. The proposed site improvements will be consistent with the surrounding use of the land for the area which is low and medium density residential (‘Ewa Development Plan (1997) and Draft ‘Ewa Development Plan (Fall 2008)).

The proposed construction of residential shelters (single family residences) will not significantly impact views as identified in the ‘Ewa Development Plan. Significant mountain views are identified from Fort Weaver Road. Building heights are currently limited to 30 feet in accordance with the Land Use Ordinance. The proposed service center, however, will have a maximum height of 25 feet from finish grade. The height limits imposed by the LUO will continue to afford views of the Ko‘olau and Waianae Mountain Ranges.

The proposed project is anticipated to have no visual impacts due to the residential nature of the project. The building height, as observed from Old Fort Weaver Road will be limited to 25 feet. The retention of the mature trees on the property will further help to mitigate views of the shelters.

Anticipated Impacts and Proposed Mitigation

No impact is anticipated and no further mitigation measures are anticipated or proposed.

4.1.6 HISTORIC/ARCHAEOLOGICAL RESOURCES

An *Archaeological Inventory Survey for the Proposed Hale Kipa Project* was conducted by Cultural Surveys Hawaii, Inc. for the subject project. See **Appendix B**. Two historic properties were found. The first (SIHP No. 50-80-12-7084), is the remnant of a mid-twentieth century residential complex, and is interpreted as associated with plantation-era housing.

The second (SIHP No 50-80-12-7085) is a pre-contact culturally modified land surface interpreted as associated with wetland agricultural practices.

Both sites were assessed as significant under Criterion D (have yielded, or may be likely to yield information important in prehistory or history) of the Hawai‘i Register of Historic Places evaluation criteria.

Anticipated Impacts and Proposed Mitigation

Based on review by the State Historic Preservation Division, archaeological monitoring will be required. A qualified archaeologist will be on-site for all ground altering activities during the early phases of the project, and for all excavations that are planned to

proceed below 1 meter in depth. However, if the excavation proves to be entirely contained within sterile fill, then monitoring activities may be switched to an on-call basis following direct consultation with SHPD. See **Appendix C**.

4.1.7 NOISE

The project site is located in an area comprised of residential and agricultural lots. Although the project will involve the generation of construction associated noise resulting from building and driveway construction, utility installation, and building construction, it is expected to be temporary and short-term in duration. The predominant noise source is traffic along Fort Weaver Road.

Construction equipment is expected to include, but not be limited to, excavators, loaders, flatbed trucks, concrete mixers, concrete delivery trucks, cranes, welders and powered hand tools.

Anticipated Impacts and Proposed Mitigation

All internal combustion equipment will be muffled in accordance with standard engine operating practices. No further mitigation measures beyond the use of properly muffled engine equipment and limiting the hours of work are anticipated to be required. If equipment used during construction generates noise higher than allowed by the Noise Code, a Noise Permit from the Department Health will be obtained. No work during nights and weekends are anticipated, and a Noise Variance will not be required.

4.1.8 AIR QUALITY

Because the area is considered a non-attainment area, a request for comment has been transmitted to the State Department of Health.

Construction activities are expected to have little to no potential for air quality impacts since the project will be of limited duration and where engine exhausts may be a source of potential air pollution, all internal combustion equipment will be governed in accordance with applicable state and county regulations.

After construction, the project will not adversely affect air quality.

Anticipated Impacts and Proposed Mitigation

During construction, fugitive dust could be generated that would be a nuisance source of air pollution. Where applicable, fugitive dust will be controlled with dust fencing and

regular wetting of disturbed areas by the contractor. No further mitigation measures with regards to air quality are anticipated to be required. Exposed earth will be planted at the earliest opportunity to reduce soil erosion.

4.1.9 WATER QUALITY

Water resources that may be potentially impacted by the project during construction activities are limited to the nearby Honouliuli Stream that flows into West Loch of Pearl Harbor.

Work activities will involve earthwork to prepare the ground for the construction of the buildings (education center, service center and shelters), driveway, parking and related landscaping. During this period, unprotected open ground and locations used for the stockpiling of excavated soils may be subject to erosion from storm water runoff.

As indicated in Section 4.1.2, protection from erosion and untreated storm water runoff will be addressed through the filing of an Erosion Control Plan (ECP) in accordance with the Rules Relating to Soil Erosion Standards and Guidelines, DPP, April 1999. A drainage report will be prepared for this project and submitted to DPP.

Protection from construction stormwater runoff will be addressed through the filing of a NPDES NOI Form C Construction Stormwater permit application administered by the DOH in accordance with Chapter 11-54, Water Quality Standards, and Chapter 11-55, Water Pollution Control, HAR. Best Management Practices (BMPs) Plan to govern the road construction and utility installation phases of work to ensure proper treatment of storm water runoff to waters of the State. This will include use of silt fences, berms, or retention basin, as required, to prevent untreated construction storm water runoff from entering State waters.

Anticipated Impacts and Proposed Mitigation

With the stated mitigation measures above, the proposed project is not anticipated to result in potential for adverse impacts to water quality.

4.1.10 FLOOD HAZARD

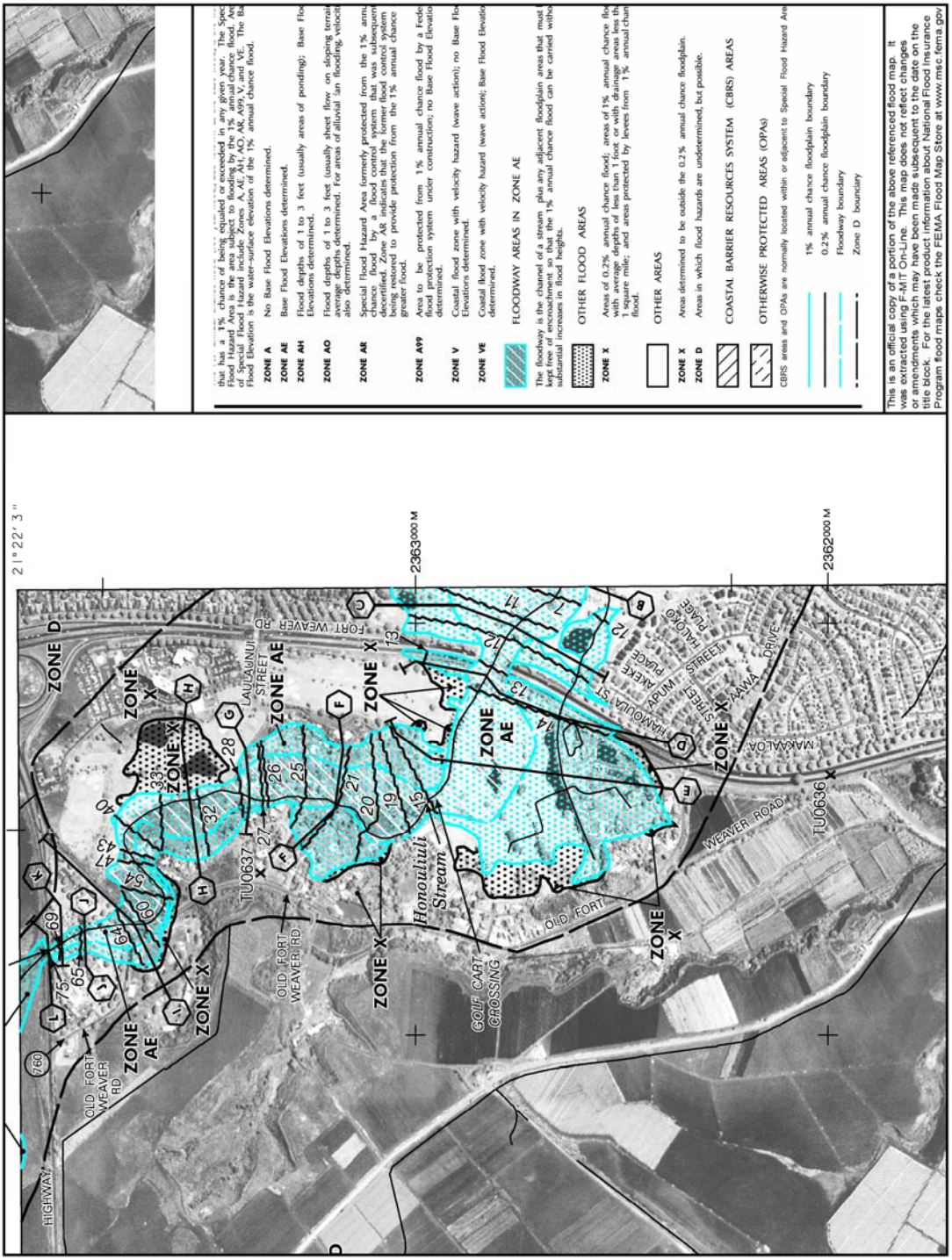
The subject property is located mauka (north) of the Fort Weaver Road and is approximately 500 feet west of Honouliuli Stream. According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Map No. 15003C00310F, dated September 30, 2004, the project site is located in an area designated as Zone X (**see Figure 16 Flood Map**). The Zone X designation is used for areas located outside the 100-year floodplain.

The proposed residential shelters are not expected to be impacted based on its location within the Zone X designation. No further mitigation measures are anticipated or are proposed to be required.

Anticipated Impacts and Proposed Mitigation

No impact is anticipated and therefore no mitigation is proposed.

Figure 16 Flood Insurance Rate Map



4.2 PUBLIC FACILITIES

4.2.1 ACCESS

Vehicular access to the subject property will be provided by a driveway off of Old Fort Weaver Road (**see Figure 3, Site Plan**). The right-of-way for Old Fort Weaver Road fronting the subject project is 50 feet and currently accommodates 2-12 foot travel lanes and unpaved shoulders. The design of the access driveway is being coordinated with the Department of Transportation Services (City and County of Honolulu).

Anticipated Impacts and Proposed Mitigation

During construction, there will be temporary periods when access on Old Fort Weaver Road may be restricted to maintain public safety. It is expected that this period of restricted through traffic will be limited to the construction period when clearing and grubbing activities are being carried out. This work will be done during non-peak periods. Furthermore, during the construction of the driveway, warning signs and barriers will be installed. In the event that a lane closure is required, flagmen will be provided to facilitate traffic through the area.

4.2.2 TRAFFIC AND ROADWAYS

A *Traffic Impact Assessment Report, Hale Kipa Residential Treatment and Educational Center* was prepared by Wilson Okamoto Corporation. See **Appendix D**. The report noted that traffic operations under Year 2012 with project conditions are expected to remain similar to Year 2012 without project conditions during both the AM and PM peak periods. The total traffic volumes entering the study intersections are expected to increase by 1% or less during both peak hours of traffic with the proposed project. These increases in total traffic volumes are in the range of daily volume fluctuations along Fort Weaver Road and Farrington Highway, and represent a minimal increase in overall traffic volumes.

Construction of the proposed project is not expected to significantly impact the flow of traffic on Old Fort Weaver Road. Effects on transportation are expected to be short-term and will be experienced primarily during the initial and final stages of the project when construction equipment is moved to and from the project site. Occasional increases in construction traffic may result from the periodic movement of construction materials and when vehicles leave the site to remove debris. Construction activity is planned during the weekday daytime non-peak hours with no night or weekend work anticipated to be required.

Anticipated Impacts and Proposed Mitigation

The Traffic Impact Assessment Report recommended the following:

1. Maintain sufficient sight distance for motorists to safely enter and exit all project driveways.

2. Provide adequate on-site loading and off-loading service areas and prohibit off-site loading operations.

3. Provide adequate turn-around areas for service, delivery, and refuse collection vehicles to maneuver on the project site, and avoid vehicle-reversing maneuvers onto public roadways.

4. Provide sufficient turning radii at all project driveways to avoid or minimize vehicle encroachments to oncoming traffic lanes.

The applicant intends to implement the foregoing recommendations.

During construction there will be temporary periods when access on Old Fort Weaver Road may be restricted to maintain public safety. This work will be done during non-peak periods. Furthermore, during the construction of the driveway, warning signs and barriers will be installed. In the event that a lane closure is required, flagmen will be provided to facilitate traffic through the area.

SECTION 5
RELATIONSHIP TO LAND USE PLANS, POLICIES AND CONTROLS

5.1 ENVIRONMENTAL JUSTICE

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. The goal of the Environmental Protection Agency EPA), which administers these provisions, is to provide an environment where all people enjoy the same degree of protection from environmental and health hazards and equal access to the decision making process to maintain a healthy environment in which to live, learn and work.

On February 11, 1994, President Bill Clinton signed Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”, to focus Federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities.

Anticipated Impacts and Proposed Mitigation

This environmental assessment is part of a process to engage broad and meaningful input from a wide range of the community to provide input to the project. The initial step in the planning for this project involved presenting the project to the ‘Ewa Neighborhood Board at its meeting of August 9, 2007. After presenting the project and fielding questions on the project, the Board voted to unanimously support the project.

As part of the environmental assessment process, initial consultations were done with interested organizations, groups and individuals. A public comment period will also be provided prior to doing the final environmental assessment.

The proposed project also complies with the ‘fair treatment’ clause of environmental justice. The project intends to provide a wide array of services for at-risk youth. The proposed project would provide services that can serve youth within the region. The project site is suitable for the proposed use and is compatible with the surrounding uses. The project will not be adversely affected by hazardous materials, unacceptable levels of noise, nor dangers to life and property from flooding. The project will comply with all applicable environmental regulations during construction and operations.

5.2 CLEAN WATER ACT

The EPA is responsible for administering the Clean Water Act. States can use their water quality standards in Section 401 certifications to review and approve, condition, or deny all federal permits or licenses that might result in a discharge to State waters, including wetlands. States and Tribes make their decisions to deny, certify, or condition permits or licenses primarily by ensuring the activity will comply with State water quality standards. In addition, States and Tribes look at whether the activity will violate effluent limitations, new source performance standards, toxic pollutants, and other water resource requirements of State/Tribal law or regulation.

National Pollutant Discharge Elimination System (NPDES) permits are regulated under Section 402 of the Clean Water Act. In Hawai‘i, the approval and enforcement of such permits are the responsibility of the State of Hawai‘i, Department of Health, Clean Water Branch (DOH-CWB).

The DOH-CWB Guidelines for Notice of Intent, Form C, differentiate between land to be disturbed “for the sole purpose of growing crops” and land to be used for construction of “buildings and roads of agricultural or agriculture-related operations”.

> *1. Construction Site Area*
>
> *b. Disturbance Area is the area of the project that is expected to undergo any disturbance, including, but not limited to excavation, grading, clearing, demolition, uprooting of vegetation, equipment staging, and storage areas. Clarification of disturbed areas is as follows…*
>
> *vii. Areas which are cleared, graded, and/or excavated for the sole purpose of growing crops are considered to be agricultural and are therefore not included in the disturbed area quantity. This exemption does not extend to the construction of buildings and roads of agricultural or agriculture-related operations that disturb one (1) acre or more.*

Anticipated Impacts and Proposed Mitigation

A NPDES permit application will be filed with the DOH-CWB to address stormwater runoff associated with construction of roadways, infrastructure and utilities.

5.3 STATE LAND USE DISTRICT

The project site and the surrounding area are within the State Urban District. No change in the State Land Use District is required to accommodate the proposed project.

5.4 COASTAL ZONE MANAGEMENT

HRS, Chapter 205A, sets forth the state's Coastal Zone Management Program. This project will be consistent with the objectives identified under Section 205A-2. Chapter 205A policies relevant to the project are discussed below.

Section 205A-2(c)

(1) Recreational resources;

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

Discussion:

Planned drainage improvements will be designed to control runoff, where feasible, and thus comply with policies protecting the recreational value of coastal waters.

Section 205A-2(c) - continued

(2) Historic resources;

(A) Identify and analyze significant archaeological resources;

(B) Maximize information retention through preservation of remains and artifacts or salvage operations;

(C) Support State goals for protection, restoration, interpretation, and display of historic resources.

Discussion:

An archaeological inventory survey was conducted for the subject project. Two historic properties were found. The first (SIHP No. 50-80-12-7084), is the remnant of a mid-twentieth century residential complex, and is interpreted as associated with plantation-era housing.

The second (SIHP No 50-80-12-7085) is a pre-contact culturally modified land surface interpreted as associated with wetland agricultural practices.

Both sites were assessed as significant under Criterion D (have yielded, or may be likely to yield information important in prehistory or history) of the Hawai‘i Register of Historic Places evaluation criteria.

Based on review by the SHPD, a qualified archaeologist will be on-site for all ground altering activities during the early phases of the project, and for all excavations that are planned to proceed below 1 meter in depth. However, if the excavation proves to be entirely contained within sterile fill, then monitoring activities may be switched to an on-call basis following direct consultation with SHPD.

Section 205A-2(c) - continued

(3) Scenic and open space resources

(A) Identify valued scenic resources in the coastal zone management area;

(B) Insure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

(D) Encourage those developments that are not coast-dependent to locate in inland areas.

Discussion:

The project will comply with policies on scenic and open space resources. The proposed project is located in a single family residential zone and proposed structures in the project will not exceed 25 feet in height. Scenic and open space values in the region are not expected to be adversely affected.

Section 205A-2(c)

(4) Coastal ecosystems;

(B) Preserve valuable coastal ecosystems of significant biological or economic importance;

(C) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs;

(D) Promote water quantity and quality planning and management practices which reflect tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Discussion:

The project will comply with coastal ecosystem policies since there are none present on the site or in its immediate vicinity. Drainage improvements will be designed to control runoff, and help preserve valuable coastal ecosystems.

Section 205A-2(c) - continued

(5) Economic uses;

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal development outside of presently designated areas when:

(i) Utilization of presently designated locations is not feasible;

(ii) Adverse environmental effects are minimized; and

(iii) Important to the State's economy.

Discussion:

The project will not conflict with policies regarding economic use because it is not a coastally-dependent development and is located inland. Further, the proposed residential shelter is located in a designated residentially-zoned area.

Section 205A-2(c) - continued

(6) Coastal hazards;

(B) Control development in areas subject to storm wave, tsunami, flood, erosion, and subsidence hazard;

(C) Ensure that developments comply with requirements of the Federal Flood Insurance Rate Program; and

(D) Prevent coastal flooding from inland projects.

Discussion:

The project will comply with coastal hazard policies because it will not be located in flood designated areas nor be subject to hazards along the coastline. Drainage and other infrastructure improvements will not have an effect on coastal flooding issues.

Section 205A-2(c) - continued

(7) Managing development;

(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the general public to facilitate public participation in the planning and review process.

Discussion:

This Environmental Assessment has been prepared under the procedural provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508) and Chapter 343, HRS, and Title 11, Chapter 200 of DOH Hawai'i Administrative Rules which allow for public review and participation. Consequently, the preparation of this Environmental Assessment, and disclosure of anticipated effects of the project comply with the policy on managing development.

5.5 'EWA DEVELOPMENT PLAN (DP)

The project site's land use designation is for low and medium density residential uses in the 'Ewa Development Plan (October 2008 draft). The proposed project corresponds to this designation and will maintain the existing residential land use of the site. As stated in the 'Ewa DP, the subject project is within the Rural Community Boundary land use "is intended to contain the spread of development into significant agriculture and preservation areas. . . .the need for additional housing will be met primarily by "infill" development of existing vacant lands." The subject property is currently zoned R-5 and based on the zoning designation would potentially be allowed to 37 lots (186,436 s.f. divided by 5,000). Within the residential provision of the 'Ewa Development Plan overall density for rural designation is between 5-8 units per acre or lots sizes between 5,000 to 20,000 square foot lots. The proposed project has an average overall density of 2.1 units per acre. This lower density will continue the residential pattern observed along Fort Weaver Road.

The principal transportation corridor is Fort Weaver Road. Improvements are currently planned by the Department of Transportation on Fort Weaver Road as it intersects Old Fort Weaver Road. Old Fort Weaver Road is a two-laned facility without paved shoulders fronting the subject project. Old Fort Weaver Road is considered a Bike Route, however, only on Fort Weaver Road is there an improved bike facility separated from the highway.

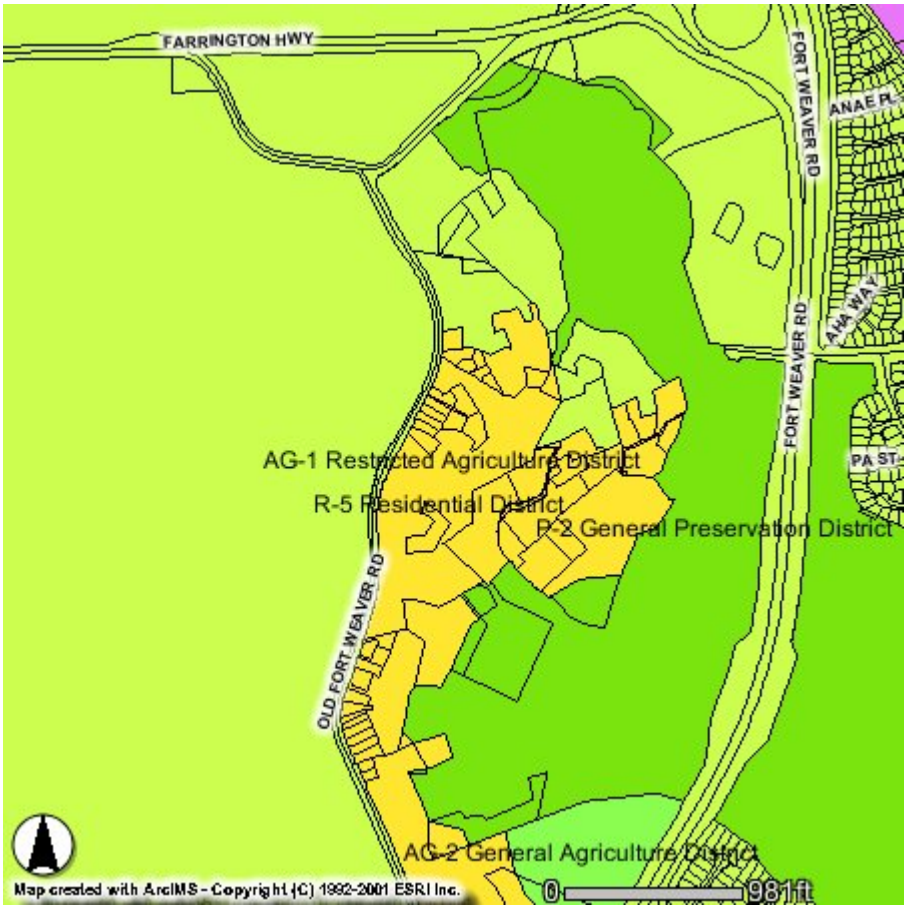
Municipal bus service is provided on Fort Weaver Road which requires bus users to walk to the intersection of Old Fort Weaver and Fort Weaver Road.

5.6 CITY AND COUNTY OF HONOLULU - ZONING

The project site is designated R-5 (Residential District). **See Figure 17, Zoning**. The purpose of the residential district is to "allow for a range of residential densities. The primary use shall be detached residences." "The intent of the R-7.5, R-5 and R-3.5 districts is to provide areas for urban residential development." (Chapter 21, Sec. 21-3.70, Revised Ordinances of Honolulu (ROH)).

The proposed project is consistent with the R-5 zoning of the district which allows development on lots with a minimum of 5,000 s.f.. Within the zoning district not more than 50 percent of the lot can be covered with buildings. Building heights in the district are 25-30 feet.

Figure 17 Zoning



Anticipated Impacts and Proposed Mitigation

No land use changes are anticipated and therefore no mitigation proposed.

Development of the shelters and the school will require conditional use permits (CUP).

5.7 SPECIAL MANAGEMENT AREA

The City and County of Honolulu has designated the shoreline and certain inland areas of Oʻahu as being within the Special Management Area (SMA). SMA areas are designated sensitive environments that should be protected in accordance with the State's Coastal Zone Management policies, as set forth in Chapter 25, ROH, Shoreline Management, and in Section 205A, HRS, Coastal Zone Management. The proposed residential shelters, service center and education center is not located in the Special Management Area.

Anticipated Impacts and Proposed Mitigation

The project is not within the SMA and therefore impacts to coastal resources are not anticipated and therefore no mitigation is proposed.

SECTION 6
NECESSARY PERMITS AND APPROVALS

6.1 CITY AND COUNTY OF HONOLULU

Department of Planning and Permitting

Conditional Use Permit - Major (group living facilities) Approved January 2010

Conditional Use Permit – Minor (school and meeting facility) Approved January 2010

Building Permit Application

Grading Permit Application

6.2 STATE OF HAWAIʻI

Department of Health

National Pollutant Discharge Elimination System Notice of Intent Form C (NPDES NOI Form C) Construction Stormwater Permit Application (if construction project site activities are equal to or greater than 1 acre)

Individual Wastewater System Approval

SECTION 7
CULTURAL IMPACT ASSESSMENT

The potential for adverse impacts to traditional/cultural resources or practices at the proposed site are not anticipated. The proposed project involves the development of three residential shelters, services center and an education center on a 4.26 acre parcel.

Previous construction and development activities on the site have resulted in extensive ground disturbance and alteration of the existing landforms. There are no known traditional or contemporary cultural sites or practices in use by individuals outside of the landowners.

There are no known plants on the property that are of significant importance for traditional or cultural uses.

The project site is located approximately 1000 feet mauka of Fort Weaver Road. Public access to the site is via Old Fort Weaver Road located on the western border of the project site.

Further consultation to preempt the potential for adverse cultural impacts will also be provided with the distribution of this EA to agencies and the community for review in accordance with the parties identified in Section 8, Agencies and Organizations Consulted, of this document.

SECTION 8
AGENCIES AND ORGANIZATIONS CONSULTED

The following agencies, organizations, and individuals will be contacted during the environmental review process to disclose the environmental conditions of the site, the proposed undertaking, and the potential impacts and mitigation measures that will be applied.

8.1 CITY AND COUNTY OF HONOLULU

Department of Planning and Permitting
Honolulu Fire Department
Board of Water Supply
Honolulu Police Department
Department of Design and Construction
Department of Transportation Services
Department of Parks and Recreation
Department of Enterprise Services

8.2 STATE OF HAWAIʻI

Department of Land and Natural Resources
Department of Transportation – Highways Division
Department of Health
Office of Hawaiian Affairs

8.3 FEDERAL GOVERNMENT

U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Department of Agriculture

8.4 ELECTED OFFICIALS, ORGANIZATIONS AND INDIVIDUALS

ʻEwa Neighborhood Board
State Representative Rida Cabanila
State Senator Will Espero

8.5 ORGANIZATIONS AND INDIVIDUALS

Hawaiian Electric Company
Hawaiian Telcom, Inc.
Oceanic Cable
Kahi Mohala

SECTION 9
SUMMARY OF IMPACTS AND SIGNIFICANCE DETERMINATION

9.1 SHORT TERM IMPACTS

The construction contractor will enter and exit the project site from Old Fort Weaver Road. Potential for significant traffic impacts during construction are not expected based on the limited nature of work along the highway. As required, the contractor shall post signs and/or signal personnel to maintain safe traffic conditions at the entrance to the project site.

Short term generation of noise is expected during building construction activities and to a lesser extent from mobilization of vehicles and equipment. Construction equipment is expected to include, but not be limited to, an excavator, loader, flatbed trucks, concrete delivery trucks, cranes, welders and powered hand tools. All equipment will be muffled in accordance with general practice and regulations governing the use of such equipment. The period of construction will be limited to daytime hours. No construction is anticipated during nighttime hours, weekends, and/or holidays. Noise associated with construction will end upon completion of the project.

Dust and nuisance related problems are expected to be slight to insignificant because of the limited nature of work. The generation of any fugitive dust will be controlled with regular wetting of the soil by the contractor and dust fencing, as required.

Construction activities (clearing, grubbing, and grading) will temporarily expose soils on the property. Potential for soil erosion will be mitigated through use of silt fences, berms and/or other applicable erosion control measures and provided by Chapter 11-55, Hawai‘i Administrative Rules.

9.2 LONG TERM IMPACTS

No long term adverse impacts are anticipated. Upon completion of individual construction work, all equipment used on-site will be demobilized and all debris and waste materials disposed of at an approved County refuse facility. The proposed project will change the density of development in the area by increasing the number of structures in the area. The overall change, however, will be within the prescribed limits of the ‘Ewa Development Plan. The visual character of the area will also be altered with the introduction of the new buildings. Additional traffic from the project will slightly increase the total volume of traffic along the roadway corridors in the area.

9.3 SIGNIFICANCE CRITERIA

Based on significance criteria set forth in Hawai'i Administrative Rules, Title 11, Department of Health, Chapter 200, "Environmental Impact Statement Rules," the proposed project is not expected to have a significant impact on the environment. The recommended preliminary determination for the proposed project is a Finding of No Significant Impact (FONSI). The findings and reasons supporting this determination are summarized below.

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource

A qualified archaeologist will be on-site for all ground altering activities during the early phases of the project, and for all excavations that are planned to proceed below 1 meter in depth. If archaeological materials may be affected, appropriate mitigation will be worked out with SHPD. There are no threatened or endangered flora or fauna species or habitat that are known to be present at the project site.

2. Curtails the range of beneficial uses of the environment

Presently, the subject parcel is zoned for residential purposes. The proposed action does not curtail beneficial uses of the environment.

3. Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders

The proposed project is consistent with the environmental policies, goals and guidelines expressed in NEPA and Chapter 343, HRS. Potential sources of adverse impacts have been identified and appropriate measures have been developed to either mitigate or minimize potential impacts to negligible levels.

4. Substantially affects the economic and social welfare of the community or state

The proposed project consists of the development of three (3) residential shelters, services center and education center. Economic benefits will accrue to the construction material suppliers and construction contractors in the short-term. There will be a net increase to the economy of the area because of the need to supply the shelters with food, clothing and other essentials. The project will also provide employment opportunities to shelter managers and educational support staff.

The proposed action will result in temporary short-term employment by the construction contractor. This is not expected to substantially affect the economic welfare of the community or State.

5. Substantially affects public health

Factors affecting public health, including air quality, water quality, and noise levels, are expected to be only minimally affected, or unaffected by the proposed construction activity. Potential impacts will be mitigated in accordance with regulations of the State of Hawai‘i, and City and County of Honolulu.

6. Involves substantial secondary impacts, such as population changes or effects on public facilities

The proposed project will create three (3) new residential shelters for youth, a services center, and an education center. The proposed action, based on the limited scale of work, is expected to have little to no substantial secondary or indirect impacts to the area population and public facilities. Existing utilities can accommodate the proposed use.

7. Involves a substantial degradation of environmental quality

Impacts to air and water quality, noise levels, natural resources, and land use associated with the planned improvements are anticipated to be minimal. Mitigation measures will be employed as practicable to further minimize potentially detrimental effects to the environment resulting from project activities. The proposed project does not involve substantial degradation of environmental quality.

8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions

The proposed project is not expected to cause adverse cumulative impacts to the environment nor involve a commitment for larger actions. The project is limited to the development described in Section 2.

9. Substantially affects a rare, threatened or endangered species

There are no known rare, threatened or endangered plants or animal species on the subject property. Substantial impacts to rare, threatened or endangered species are not anticipated.

10. Detrimentally affects air or water quality or ambient noise levels

On a short-term basis, ambient air and noise conditions will be influenced by construction activities related to the proposed roadway improvements. The potential for adverse impacts will be short-term in duration and will be controlled by mitigation measures as described in this EA. Once the project is completed, air and noise in the project vicinity will be allowed to return to preconstruction conditions. Erosion control measures and other BMPs will be employed to prevent any storm water runoff associated with construction activities from entering State waters.

11. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters

The subject property is located approximately 3,400 feet from the shoreline of Pearl Harbor. The majority of the project area is located outside of an area determined by the Federal Emergency Management Agency to be outside of the 1-percent annual chance floodplain. The proposed action is not expected to be impacted by flood conditions.

The project site is also outside the tsunami evacuation zone as determined by the O'ahu Civil Defense Agency.

12. Substantially affects scenic vistas and view planes identified in county or state plans or studies

The proposed project will comply with applicable zoning height limits within the residential district. Structures within the project will not exceed 25 feet in height. The site improvements will not substantially affect any existing views from surrounding areas.

13. Requires substantial energy consumption

The proposed project will require the use of energy primarily in the form of petroleum-based fuels for construction vehicles and equipment. Electricity will also be required and may be provided by a generator or by direct connection to outlets provided on-site during construction. Other uses of energy use will be in the form of labor to complete the project. Upon completion of the project there will be no further requirement for use of construction associated energy.

Energy uses to support the new buildings will be provided by existing electrical supply lines provided by the Hawaiian Electric Company (HECO). The project will be constructed in accordance with the City and County of Honolulu Energy Conservation Code.

SECTION 10
FINDINGS

In accordance with the provisions set forth in 40 CFR Parts 1500-1508; Chapter 343, HRS, and the significance criteria in Section 11-200-12 of Title 11, Chapter 200, HAR, it is anticipated that the project will have no significant long term adverse impact to water quality, air quality, existing utilities, noise levels, social welfare, archaeological sites, or wildlife habitat. All anticipated construction impacts will be temporary and will not adversely impact the environmental quality of the area. It is expected that an Environmental Impact Statement (EIS) will not be required, and that a Finding of No Significant Impact (FONSI) will be issued for this project.

REFERENCES

Department of Geography, University of Hawai‘i, 1983. Atlas of Hawai‘i, University of Hawai‘i Press, Honolulu.

Department of Planning and Permitting, 2008. ‘Ewa Development Plan (draft). City and County of Honolulu. State of Hawai‘i.

Federal Emergency Management Agency (FEMA), 2000. Federal Insurance Rate Map (FIRM), City and County of Honolulu. Map No. 15003C0310F.

U.S. Department of Agriculture, 1972. Soil Survey of Islands of Kaua‘i, O‘ahu, Maui, Moloka‘i, and Lana‘i, State of Hawai‘i. U.S. Department of Agriculture, Soil Conservation Service and University of Hawai‘i Agriculture Experiment Station, Washington, D.C.

APPENDICES

Appendix A

Botanical Resources Assessment for the
Hale Kipa Services Center

Prepared by Maya LeGrande,
LeGrande Biological Surveys Inc.
February 2007

BOTANICAL RESOURCES ASSESSMENT FOR THE HALE KIPA SERVICES CENTER HONOULIULI, OAHU, HAWAII

Prepared by:

Maya LeGrande
LeGrande Biological Surveys Inc
68-310 Kikou Street
Waialua HI 96791

Prepared for:

R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

TABLE OF CONTENTS

INTRODUCTION

This report includes the findings of a botanical study conducted at TMK (1) 9-1-017:082, Honouliuli, Oahu. LeGrande Biological Surveys Inc. carried out a botanical field survey of the above location on the 27th of February 2007 for R.M. Towill Corporation. The primary objectives of the field studies were to:

1) provide a general description of the vegetation on the project site;
2) inventory the flora; and
3) search for threatened and endangered species as well as species of concern

Federal and State of Hawaii listed species status follows U.S. Fish and Wildlife (USFWS) (1999a and 1999b, 2004) and Federal Register (2002).

GENERAL SITE DESCRIPTION

The area proposed for the Hale Kipa Services Center includes TMK (1) 9-1-017:082, with an area of 4.280 acres. The property is located on the east side of Old Fort Weaver Road. The parcel is roughly triangular in shape with the widest part running alongside Old Fort Weaver Road. Most of the property is currently being used for a bus storage lot. The substrate in this area is mainly gravel fill. The property's highest elevation is at the Old Fort Weaver Road and gradually slopes to the east end of the property where a small drainage ditch runs along the parcel boundary.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps were examined to determine terrain characteristics, access, boundaries, and reference points.

A walk-through survey method was used. Notes were made on plant associations and distribution, disturbances, topography, substrate types, exposure, drainage, etc. Plant identifications were made in the field; plants that could not be positively identified were collected for later determination in the herbarium, and for comparison with the recent taxonomic literature.

DESCRIPTION OF THE VEGETATION

The entire site is dominated by non-native plant species. The majority of the area is dominated by a buffelgrass (*Cenchrus ciliaris*)/Koa haole (*Leucaena leucocephala*) matrix. There are a total of 64 plant species observed within the survey site. 63 are alien (introduced) and one is indigenous (native to the Hawaiian Islands and elsewhere). Therefore, over 98% of the plant species observed are alien. An inventory of all the plants observed within the three survey sites is presented in the species list at the end of the report.

The middle of the property is mostly devoid of plants as it is gravel fill, currently being used for a bus maintenance yard. The perimeter of the gravel lot is dominated by short weedy species such as buffelgrass, *Sida ciliaris*, coat buttons (*Tridax procumbens*), spiny amaranth (*Amaranthus spinosa*), false mallow (*Malvastrum coromandelianum*), boerhavia (*Boerhavia coccinea*), manienie grass (*Cynodon dactylon*), slender mimosa (*Desmanthus pernambucans*), and heliotrope (*Heliotropium procumbens* var. *depressum*). A few larger shrubs can be found mixed in with the shorter weeds including, kolomona (*Senna surattensis*), sourbush (*pluchea carolinensis*), tree tobacco (*Nicotiana glauca*), and koa haole.

There are several large trees on the property including; Chinese banyan (*Ficus microcarpa*), Christmas berry (*Schinus terebinthifololius*), kiawe (*Prosopis pallida*), opiuma (*Pithecellobium dulce*), monkeypod (*Samanea saman*), and Java plum (*Syzygium cumini*).

A southern section of the property is separated from the main area described above by an existing access road. This area is also dominated by non-native plant species. Several large trees including coconut (*Cocos nucifera*), Chinese banyan, rubber tree (*Ficus elastica*), opiuma, kiawe, mango (*Mangifera indica*), and European olive (*Olea europaea* ssp. *europaea*) compose the taller vegetation with an understory of Guinea grass (*Panicum maximum*) and buffelgrass.

The northern section of the property encompasses an existing driveway access for "Tony's Fruits and Vegetables". There are several types of fruit trees lining the drive including horseradish tree (*Moringa oleifera*), papaya (*Carica papaya*), and soursop (*Annona muricata*).

The only indigenous plant species observed infrequently within the survey site is kipukai (*Heliotropium curassavicum*).

DISCUSSION AND RECOMMENDATIONS

None of the plants observed on the project site is a threatened or endangered species or a species of concern (U.S. Fish and Wildlife Service, 1999a, 1999b, 2004; Wagner et. al., 1999). The development of the proposed Hale Kipa Services Center is not expected to have significant negative impacts on the botanical resources of the site or the general region.

Literature Cited

Evehuis, N.L. and L.G. Eldredge, editors. 1999-2002. Records of the Hawaii Biological Survey. Bishop Museum Occasional Papers Nos. 58-70.

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Staples G. W. and D. R. Herbst. 2005. A Tropical Garden Flora: Plants cultivated in the Hawaiian Islands and other tropical places. Bishop Museum Press.

U.S. Fish and Wildlife Service. 1999a. U.S. Fish and Wildlife Service species list, plants. March 23, 1999. Pacific Islands Office, Honolulu, HI.

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U.S. Fish and Wildlife Service. 2004. Hawaiian Islands Plants: Updated June 15, 2004, Listed and Candidate Species, as Designated under the U.S. Endangered Species Act. 17pp.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawaii. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Museum Special Publication 83.

Wagner, W.L. and D.R. Herbst. 1999. Supplement to the Manual of the flowering plants of Hawaii, pp. 1855-1918. In: Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawaii. Revised Edition. 2 vols. University of Hawaii Press and Bishop Museum Press, Honolulu.

PLANTS SPECIES LIST – TMK (1) 9-1-017:082 Oahu, Hawaii

The following checklist is an inventory of all the plant species observed within the above TMK parcel for the proposed Hale Kipa Services Center. The plant names are arranged alphabetically by family and then by species into each of two groups: Monocots, and Dicots. The taxonomy and nomenclature of the flowering plants (Monocots and Dicots) are in accordance with Wagner *et al*. (1990), Wagner and Herbst (1999) and Staples and Herbst (2005). Recent name changes are those recorded in the Hawaii Biological Survey series (Evehuis and Eldredge, eds., 1999-2002).

For each species, the following name is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:

   I= indigenous= native to the Hawaiian Islands and elsewhere.

   X=introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is Cook's arrival in the islands in 1778.

TMK (1) 9-1-017:082 PLANT SPECIES LIST
FEBRUARY 2007

SCIENTIFIC NAME	COMMON NAME	STATUS
MONOCOTS		
ARECACEAE		
Cocos nucifera L.	coconut	X
POACEAE		
Cenchrus ciliaris L.	Buffelgrass	X
Chloris barbata (L.) Sw.	Swollen fingergrass	X
Cynodon dactylon (L.) Pers	manienie	X
Digitaria insularis (L.) Mez ex Ekman	sourgrass	X
Eleusine indica (L.) Gaertn.	wiregrass	X
Eragrostis tenella (L.) P.Beauv. Ex Roem.&Schult.		X
Melinus repens (Willd.) Zizka	Natal redtop	X
Panicum maximum L.	Guinea grass	X
DICOTS		
ACANTHACEAE		
Asystasia gangetica (L.) T. Anderson	Chinese violet	X
AMARANTHACEAE		
Achyranthes aspera L.		X
Alternanthera pungens Kunth	Khaki weed	X
Amaranthus spinosus L.	Spiny amaranth	X
ANACARDIACEAE		
Mangifera indica L.	mango	X
Schinus terebinthifolius Raddi	Christmas berry	X
ANNONACEAE		
Annona muricata L.	soursop	X
ASTERACEAE		
Bidens pilosa L.	Spanish needle	X
Calyptocarpus vialis Less.	nodeweed	X
Conyza bonariensis (L.) Cronq.	Hairy horseweed	X
Crassocephalum crepidioides (Benth.) S.Moore	crassocephalum	X
Eclipta alba (L.) Hassk.	False daisy	X
Emilia fosbergii Nicolson	Red pualele	X

SCIENTIFIC NAME	COMMON NAME	STATUS
ASTERACEAE (cont.)		
Lactuca serriola L.	Prickly lettuce	X
Pluchea carolinensis (Jacq.) G. Don	sourbush	X
Sonchus oleraceus L.	pualele	X
Tridax procumbens (L.)	Coat buttons	X
Verbesina encelioides (Cav.) Benth. & Hook	Golden crown-beard	X
BIGNONIACEAE		
Pandorea jasminoides (Lindley) K.Schumann	Bower plant	X
Spathodea campanulata P. Beauv.	African tulip	X
BORAGINACEAE		
Heliotropium curassavicum L.	kipukai	I
Heliotropium procumbens Mill. var. *depressum* (Cham.) Fosberg		X
CARICACEAE		
Carica papaya L.	papaya	X
CONVOLVULACEAE		
Ipomoea obscura (L.) Ker Gawl.		X
CUCURBITACEAE		
Coccinea grandis (L.) Voigt	Ivy gourd	X
Cucumis dipsaceus ehrenb. Ex Spach	Hedgehog gourd	X
EUPHORBIACEAE		
Chamaesyce hirta (L.) Millsp.	hairy spurge, garden spurge	X
Euphorbia heterophylla L.	kaliko	X
Ricinus communis L.	Castor bean	X
FABACEAE		
Desmanthus pernambucanus (L.) Thell.	Slender or virgate mimosa	X
Indigofera hendecaphylla Jacq.	Creeping indigo	X
Leucaena leucocephala (Lam.) de Wit	Koa haole	X
Macroptilium atropurpureum (DC.) Urb.		X
Pithecellobium dulce (Roxb.) Benth.	opiuma	X
Prosopis pallida (Humb. & Bonpl. Ex Willd.) Kunth	Kiawe, algaroba	X
Samanea saman (Jacq.) Merr.	monkeypod	X
Senna surattensis (Burm.f.) H.S.Irwin&Barneby	kolomona	X

SCIENTIFIC NAME	COMMON NAME	STATUS
LAMIACEAE		
Hyptis pectinata (L.) Poit.	Comb hyptis	X
Leonotis nepetifolia (L.) R.Br.	Lion's ear	X
MALVACEAE		
Abutilon grandifolium (Willd.) Sweet	Hairy abutilon	X
Hibiscus sp. L.	Cultivated hibiscus	X
Malachra alceifolia Jacq.		X
Malvastrum coromandelianum (L.) Garcke	False mallow	X
Sida ciliaris L.		X
Sida rhombifolia L.		X
MORACEAE		
Ficus elastica Roxb. Ex Hornem.	Rubber tree	X
Ficus microcarpa L.f.	Chinese banyan	X
MORINGACEAE		
Moringa oleifera Lamark	Horseradish tree	X
MYRTACEAE		
Syzygium cumini (L.) Skeels	Java plum	X
NYCTAGINACEAE		
Boerhavia coccinea Mill.		X
Bougainvillea sp. A.L. Jussieu	bougainvillea	X
OLEACEAE		
Olea europaea L. ssp. *europaea* L.	European olive	X
SOLANACEAE		
Nicotiana glauca R.C. Graham	Tree tobacco	X
Solanum lycopersicum L. var. *cerasiforme* (Dunal) Spooner, G.J. Anderson & R.K. Jansen	Cherry tomato	X
Solanum torvum Sw.		X

Appendix B

Archaeological Inventory Survey for the
Proposed Hale Kipa Project
Prepared by Cultural Surveys Hawai‘i, Inc.
August 2009

DRAFT
Archaeological Inventory Survey
For the Proposed Hale Kipa Project,
Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu
TMK: (1) 9-1-017:082

Prepared for
RM Towill Corporation

Prepared by
Kendy Altizer, B.A.,
Constance O’Hare, B.A.,
Douglas Borthwick, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
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(Job Code: HONOULIULI 10)

August 2009

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Management Summary

Reference	Archaeological Inventory Survey for the Proposed Hale Kipa Project, Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu, TMK: (1) 9-1-017:082 (Altizer et al. 2009).
Date	August 2009
Project Number (s)	Cultural Surveys Hawai‘i Inc. (CSH) Job Code: HONOULIULI 10
Investigation Permit Number	The fieldwork for this investigation was carried out under archaeological permit number 09-20 issued by the Hawai‘i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR)
Project Location	East side of Old Fort Weaver Road, Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu, TMK 1-9-1-017:082
Project Land Jurisdiction	Private land, Hale Kipa LLC.
Agencies	SHPD/DLNR
Project Description	Plans for the project area include construction of a new service center building and three group living units for the Hale Kipa Organization, which provides shelter and other services to homeless and runaway youth.
Project Acreage	4.28 acres
Area of Potential Effect (APE) and Survey Acreage	Based on available information, the proposed project will not impose adverse visual, auditory or other environmental impacts to any historic properties, including standing architecture, located in the project area’s vicinity. Accordingly, the project’s APE extends no further than the proposed project’s 4.28-acre footprint. The survey area for the current investigation included the entire 4.28-acre APE.
Historic Preservation Regulatory Context and Document Purpose	The project is subject to Hawai‘i State environmental and historic preservation review legislation [Hawai‘i Revised Statutes (HRS) Chapter 343 and HRS 6E-42/Hawai‘i Administrative Rules (HAR) Chapter 13-284, respectively]. This investigation fulfills the requirements of an archaeological inventory survey investigation (per HAR Chapter 13-276). The document is intended to facilitate the project’s planning and support the project’s historic preservation review compliance. Based on findings, cultural resource management recommendations are presented.
Fieldwork Effort	Fieldwork was conducted on June 15 and 16, 2009 by Douglas Borthwick, B.A., Mindy Simonson, M.A., and Jeff Fong, M.A, under the general supervision of Hallett Hammatt, PhD. (principal investigator).

Number of Historic Properties Identified	A total of two historic properties were recorded as a result of the inventory survey. Site 50-80-12-7084 is a historic series of features including house foundations, a cesspool, and water control features. Site 50-80-12-7085 is a subsurface cultural layer consisting of the remains of a *lo‘i* terrace that has been radio carbon dated between 1270 and 1400 AD.
Historic Properties Recommended Eligible to the Hawai‘i Register of Historic Places (Hawai‘i Register)	Both sites are recommended eligible for the Hawai‘i Register: Site 50-80-12-7084, a historic series of features including house foundations, a cesspool, and water control features is recommended eligible under Criterion D. Site 50-80-12-7085, a pre-contact subsurface agricultural layer, is recommended eligible under Criterion D.
Effect Recommendation	CSH’s project specific effect recommendation is “effect, with proposed mitigation measures.” The recommended mitigation measures will reduce the project's potentially adverse effect on these significant historic properties.
Mitigation Recommendation	Recommended significant historic properties will potentially be adversely affected by the proposed project. The recommended mitigation measures listed below are intended to alleviate this adverse effect. The scope and methods for these mitigation measures should be developed in consultation with SHPD/DLNR. Site 50-80-12-7084, a historic series of features including house foundations, a cesspool, and water control features; no further work. Site 50-80-12-7085, a pre-contact subsurface agricultural layer; monitoring program. Because of the presence of eligible historic properties in the project area for which information can still be gained, an archaeological monitoring program is recommended with a combination of on-site and on-call monitoring during all ground disturbing activities related to this project.

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Section 1 Introduction

1.1 Project Background

At the request of R. M. Towill Corporation (420 Waiakamilo Road, Suite 411, Honolulu, Hawai‘i, 96817-4941), Cultural Surveys Hawai‘i, Inc. (CSH) has completed this Archaeological Inventory Survey for a 4.28-acre parcel on the east side of Old Fort Weaver Road, Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu, TMK: (1) 9-1-017:082 (Figure 1 to Figure 4).

In 1970, several churches, community groups, and other concerned citizens worked together to found Hale Kipa, “the House of Friendliness,” which provides shelter and other services to homeless and runaway youth. Plans for the project area included construction of a new service center building and three group living units for the Hale Kipa organization.

1.2 Scope of Work

The following archaeological inventory survey scope of work will satisfy the state and county requirements:

1. Appropriate consultation with knowledgeable members of the community, requesting information on historic properties in the project area.
2. A complete ground survey of the entire project area for the purpose of historic property identification and documentation. All historic properties would be located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation will include photographs and scale drawings of selected historic properties. All historic properties will be assigned Inventory of Historic Properties numbers by the State and located with a Trimble GPS. This GPS data will be in the report in ArcGIS format and be sufficient for planning purposes.
3. Given the size and location of the parcel, subsurface testing with a backhoe is needed during the inventory survey. Backhoe testing will focus on locating and evaluating subsurface deposits, such as buried cultural layers and/or deposits with significant paleo-environmental data, which could not be located by surface pedestrian inspection. Testing in sensitive areas will be conducted by hand after the initial backhoe work. If appropriate samples from these excavations are found, they will be analyzed for chronological and paleo-environmental information.
4. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research will focus on the specific area with general background on the *ahupua‘a* and district and will emphasize settlement patterns.
5. Preparation of a survey report which will include the following:
    a. A topographic map of the survey area showing all historic properties;
    b. Results of consultation with knowledgeable community members about the property’s past land use and historic properties.

c. Description of all historic properties with selected photographs, scale drawings, and discussions of function;

d. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the project area's historic properties;

e. A summary of historic property categories and their significance in an archaeological and historic context;

f. Recommendations based on all information generated that will specify what steps should be taken to mitigate impact of development on the project area's significant historic properties - such as data recovery (excavation) and preservation of specific areas. These recommendations will be developed in consultation with the client and the state agencies.

1.3 Environmental Setting

1.3.1 Natural Environment

Honouliuli Ahupua‘a is the largest traditional land unit on O‘ahu, extending from the West Loch of Pearl Harbor in the east, to the border of Nānākuli Ahupua‘a at Pili o Kahe in the west. Honouliuli Ahupua‘a includes approximately 19 km (kilometers), or 12 mi (miles) of open coastline from One‘ula westward to Pili o Kahe. The *ahupua‘a* (land division) extends *mauka* (inland) from West Loch nearly to Schofield Barracks in Wahiawā. The western boundary is the Wai‘anae Mountain crest running north as far as Pu‘u Hāpapa (or to the top of Ka‘ala Mountain, according to some).

Lying in the lee of the Wai‘anae mountain range, the project area is one of the driest areas of O‘ahu with most of the area averaging approximately 18 inches of rainfall annually (Juvik and Juvik 1998:56). Temperatures range between 60° to 90°F through the year; the highest temperatures are in August and September (Armstrong 1973). Elevation in the project area ranges from 20 to 40 ft (feet), or 12-24 m (meters) AMSL.

The project area is located on the ‘Ewa Plain, which is a Pleistocene (>38,000 years old) reef platform overlain by alluvium from the southern end of the Wai‘anae Mountain Range. This alluvium supported commercial sugar cane cultivation for over a century. Honouliuli Stream extends (roughly north to south) to the east of the project area.

In pre-contact Hawai‘i, the project area would have been mostly lowland dry shrub and grassland, dominated by species such as *wiliwili* (*Erythrina sandwicensis*), *lama* (*Diospyros ferrea*), sandalwood (*Santalum* sp.), *‘a‘ali‘i* (*Dodonea eriocarpa*), scrub *‘ōhi‘a* (*Metrosideros collina*) and *pili* grass (*Heteropogon contortus*). In contrast, the non-paved portions of the project area are currently dominated by introduced species such as *kiawe* (*Prosopis pallida*) and *koa haole* (*Leucaena leucocephala*). Understory plants include *‘ilima ku kula* (*Sida cordifola*), cayenne vervain (*Stachytarpheta urticaefolia*), *ko‘oko‘olau* (*Bidens pilosa*), and morning glory (*Ipomoea indica*) (Moore and Kennedy 2002:3).

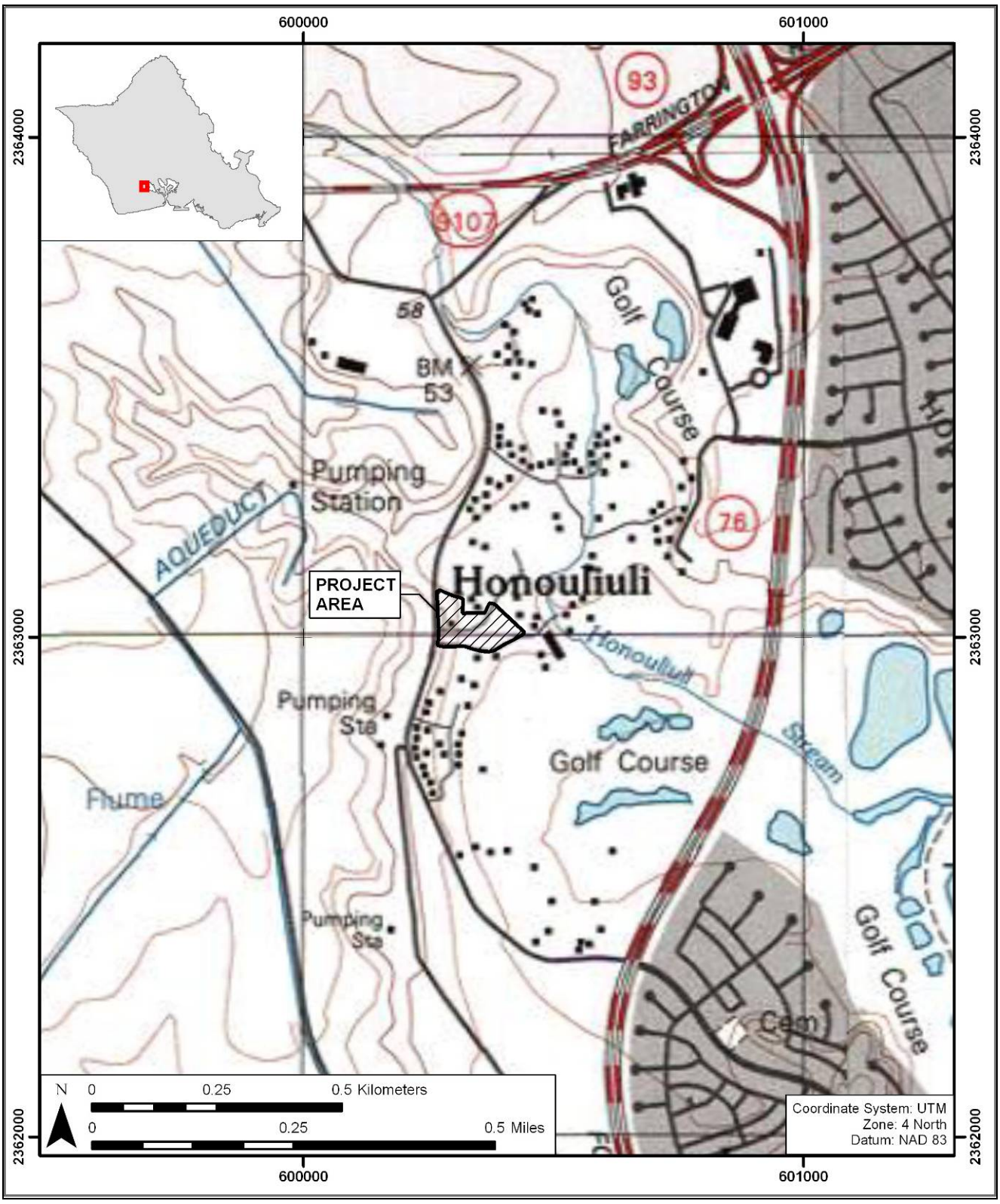

Figure 1. U. S. Geological Survey (USGS) map, ‘Ewa Quad, showing project area location

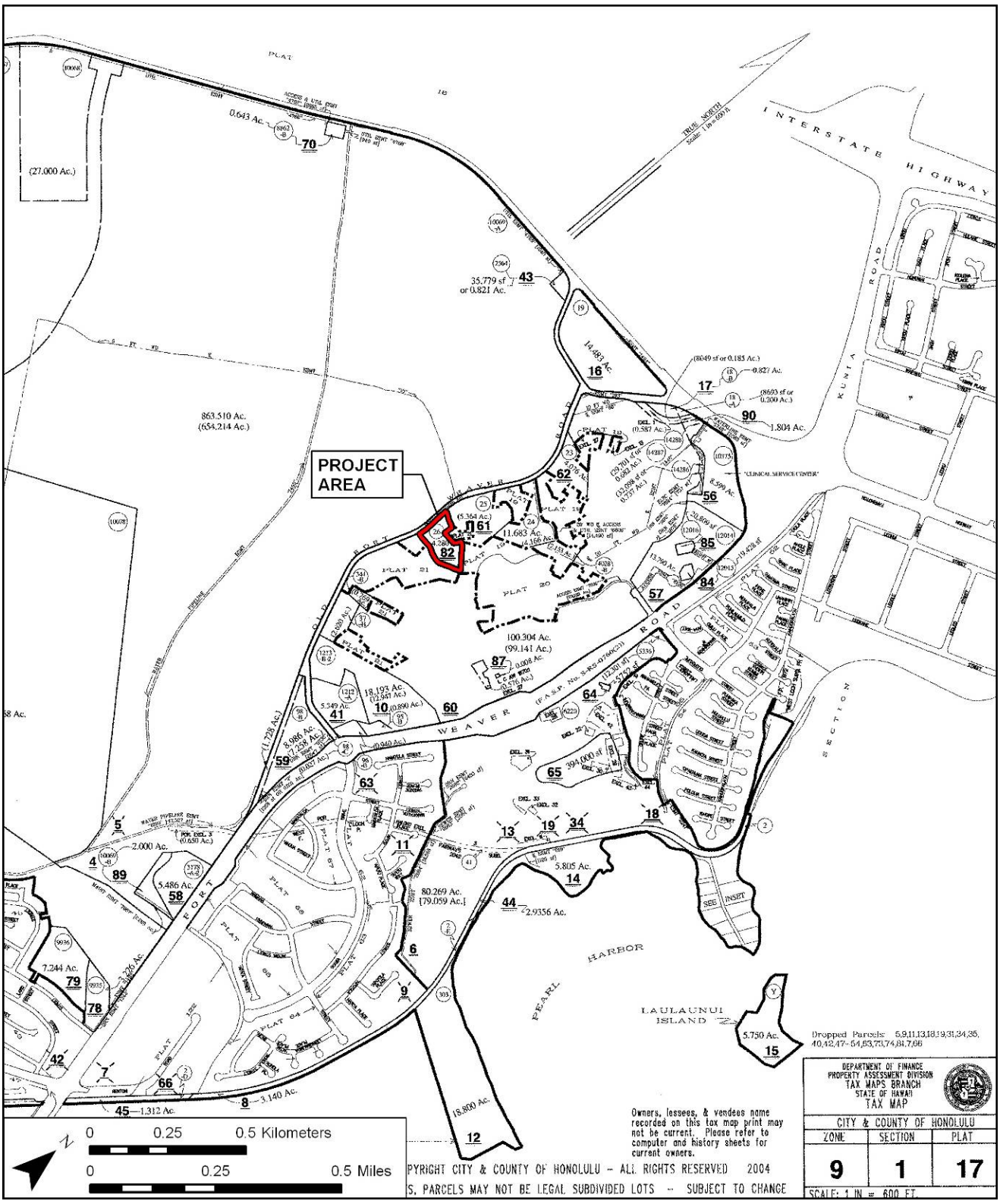

Figure 2. Tax Map 9-1-17, showing project area in Lot 82

Figure 3. Aerial photograph of Honouliuli Taro Lands area; project area outlined in red.

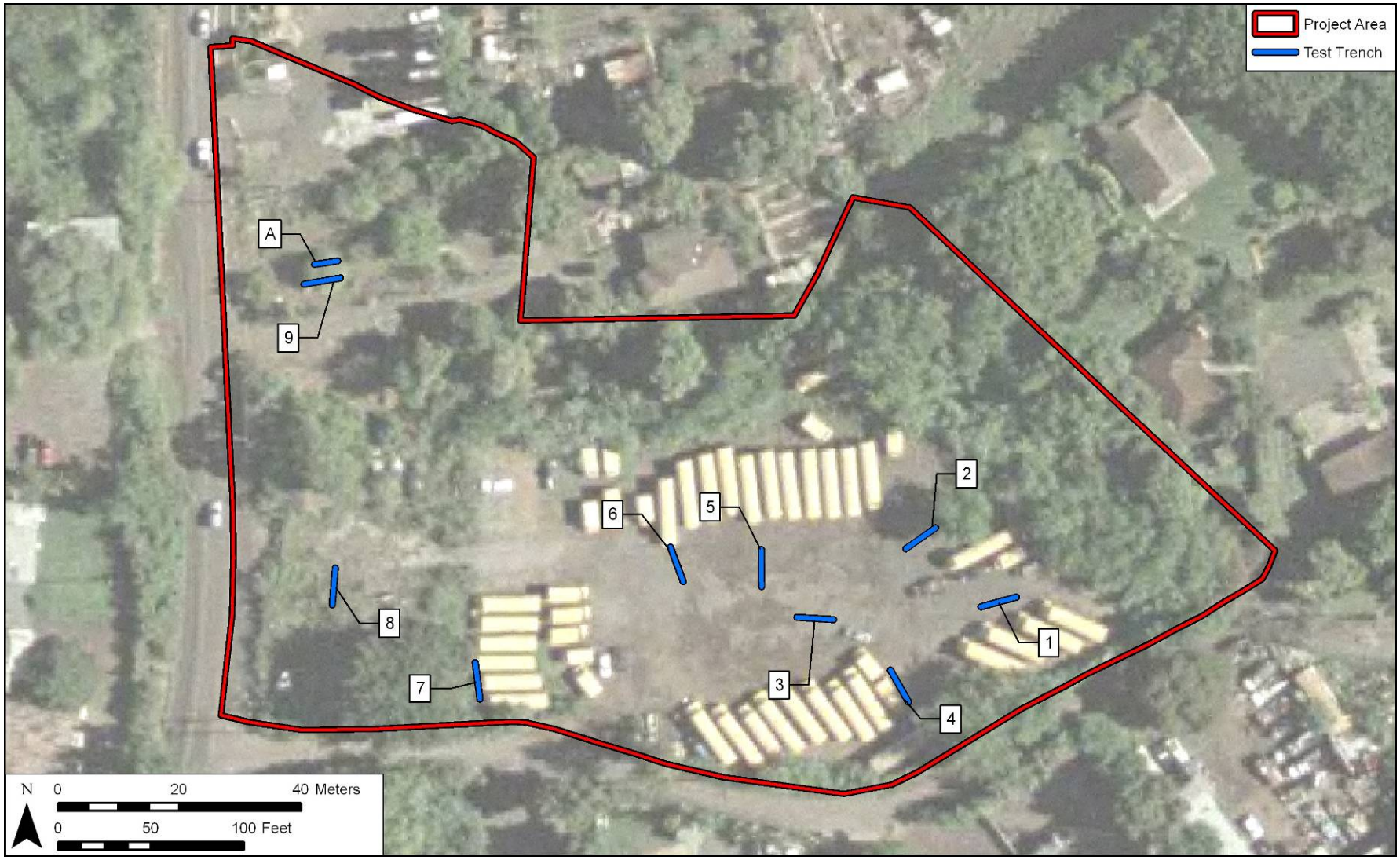

Figure 4. Close-up aerial photo of project area, showing relatively open nature of the parcel.

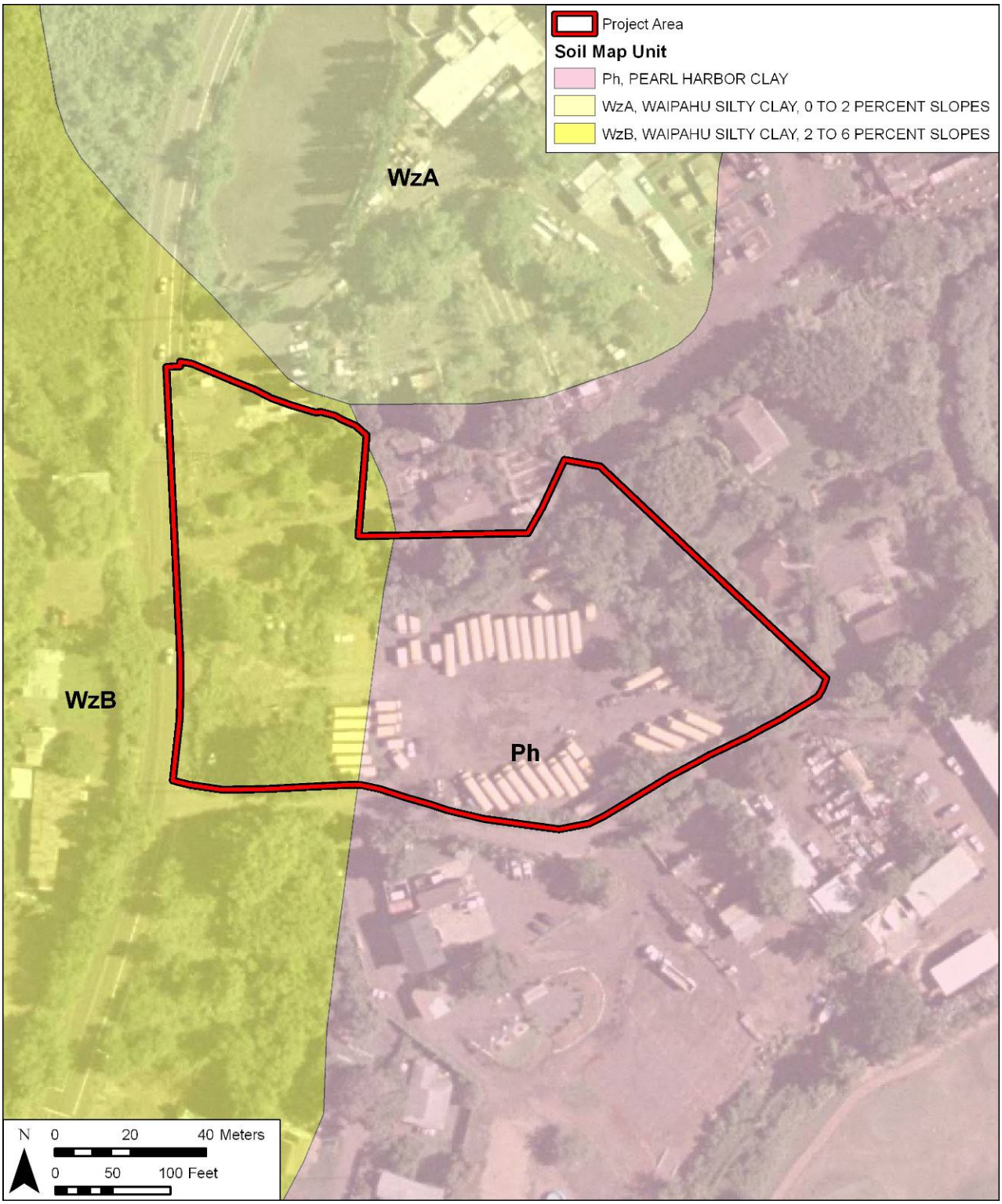

Figure 5. Overlay of soils in the project area (U.S. Geological Survey Orthoimagery 2005; Foote et al. 1972; U.S. Department of Agriculture 2001).

The project area is covered by soils of the Pearl Harbor and Waipahu series. The Pearl Harbor Series consists of very poorly drained soils on nearly level coastal plains, which developed in alluvium overlying organic material. The natural vegetation consists of cattails, mangrove trees, californiagrass, and sedges. Pearl Harbor clay (Ph) is found on low coastal plains adjacent to the ocean. This soil is used for sugarcane, taro, bananas, and pasture. This soil type is found on the eastern side of the project area. The Waipahu Series consists of well-drained soils on marine terraces, which developed in old alluvium derived from basic igneous rock. They are nearly level to moderately sloping. The natural vegetation is fingergrass, bermudagrass, bristly foxtail, and kiawe. Waipahu silty clay, 0 to 2 percent slopes (WzA) occurs on nearly level dissected terraces adjacent to the ocean. Waipahu silty clay, 2 to 6 percent slopes (WzB) is slow and the erosion hazard is slight. This soil is used for sugarcane and homesites (Foote et al. 1972). WzB occurs in the western section of the project area. WzA is not within the current project area, but occurs in adjacent property along the northwestern border of the project area.

1.3.2 Built Environment

Currently, the project area is used for school bus parking. Some areas are paved with asphalt and other areas are compact dirt. There are no residences in the project area.

1.4 Methods

1.4.1 Field Methods

Inventory survey fieldwork was conducted by Douglas Borthwick, B.A., Mindy Simonson, B.A., and Jeff Fong, B.A., on June 15 and 16, 2009, under the general supervision of Hallett Hammatt, Ph.D (principal investigator). Fieldwork required 6 person-days to complete. The survey consisted of 100% pedestrian inspection by systematic sweeps of the entire area to examine for surface structures. A total of nine test trenches were excavated to explore for subsurface material. Trenches were placed in areas where future construction activities will take place. All historic properties encountered were recorded and documented with a written field description, site maps, photographs, and scale drawings, and each site was located using Garmin GPS map 60CSx GPS survey technology (accuracy 5-10 m).

1.4.2 Document Review

For this report, CSH reviewed previous archaeological studies on file at the State Historic Preservation Division. CSH also reviewed geology and cultural history documents at Hamilton Library at the University of Hawai‘i, the Hawai‘i State Archives, the Hawai‘i Public Library, and the Archives of the Bishop Museum. Additional research included a study of historic photographs at the Archives of the Bishop Museum and a study of historic maps at the Survey Office of the Department of Accounting and General Services. Information regarding LCA parcels was obtained from the Waihona ‘Āina Corporation’s *Māhele* Database (www.waihona.āina.com).

Section 2 Mythological and Traditional Accounts

2.1 ‘Ewa and Honouliuli

2.1.1 Traditions of Hawaiian Gods and Demi-gods

The traditions of Honouliuli Ahupua‘a have been compiled by several authors, in studies by Sterling and Summers (1978), Hammatt and Folk (1981), Kelly (1991), Charvet-Pond and Davis (1992), Maly (1992), and Tuggle and Tomonari-Tuggle (1997). Some of the traditional themes associated with this area include connections with Kahiki, the traditional homeland of Hawaiians in central Polynesia. There are several versions of the chief Kaha‘i leaving from Kalaeloa for a trip to Kahiki; on his return to the Hawaiian Islands he brought back the first breadfruit (Kamakau 1991a:110) and planted it at Pu‘uloa, near Pearl Harbor in ‘Ewa (Beckwith 1940:97). Several stories associate places in Honouliuli to the gods Kāne and Kanaloa, with the Hawaiian pig god Kamapua‘a and the Hina family, and with the sisters of Pele, the Hawaiian volcano goddess, all of who have strong connections with Kahiki (Kamakau 1991a:111; Pukui et al. 1974:200). The locations of traditional places names for Honouliuli are illustrated in Figure 12.

2.1.2 The Naming of ‘Ewa and Honouliuli

Honouliuli is the largest *ahupua‘a* in the *moku* (district) of ‘Ewa. One translation of the name for this district is given as “unequal” (*Saturday Press* Aug. 11, 1883). Others translate the word as “strayed” and associate it with the legends of the gods, Kāne and Kanaloa.

> When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of the land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere, in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by the name. The stone that strayed [Told to E.S. by Simeon Nawaa, March 22, 1954; cited in Sterling and Summers 1978:1].

Honouliuli means “dark water,” “dark bay,” or “blue harbor” and was named for the waters of Pearl Harbor (Jarrett 1930:22), which marks the eastern boundary of the *ahupua‘a*. The Hawaiians called Pearl Harbor, Pu‘uloa (*lit*. long hill). Another explanation for the names comes from the “Legend of Lepeamoa”, the chicken-girl of Pālama. In this legend, Honouliuli is the name of the husband of the chiefess Kapālama and grandfather of Lepeamoa (Thrum 1923:164-184). “Her grandfather gave his name, Honouliuli to a land district west of Honolulu . . .” (Thrum 1923:170). Westervelt (1963:209) gives an almost identical account.

It seems likely the boundaries of the western-most *ahupua‘a* of ‘Ewa were often contested with Wai‘anae people. The ‘Ewa people could cite divine sanction that the dividing point was between two hills at Pili o Kahe:

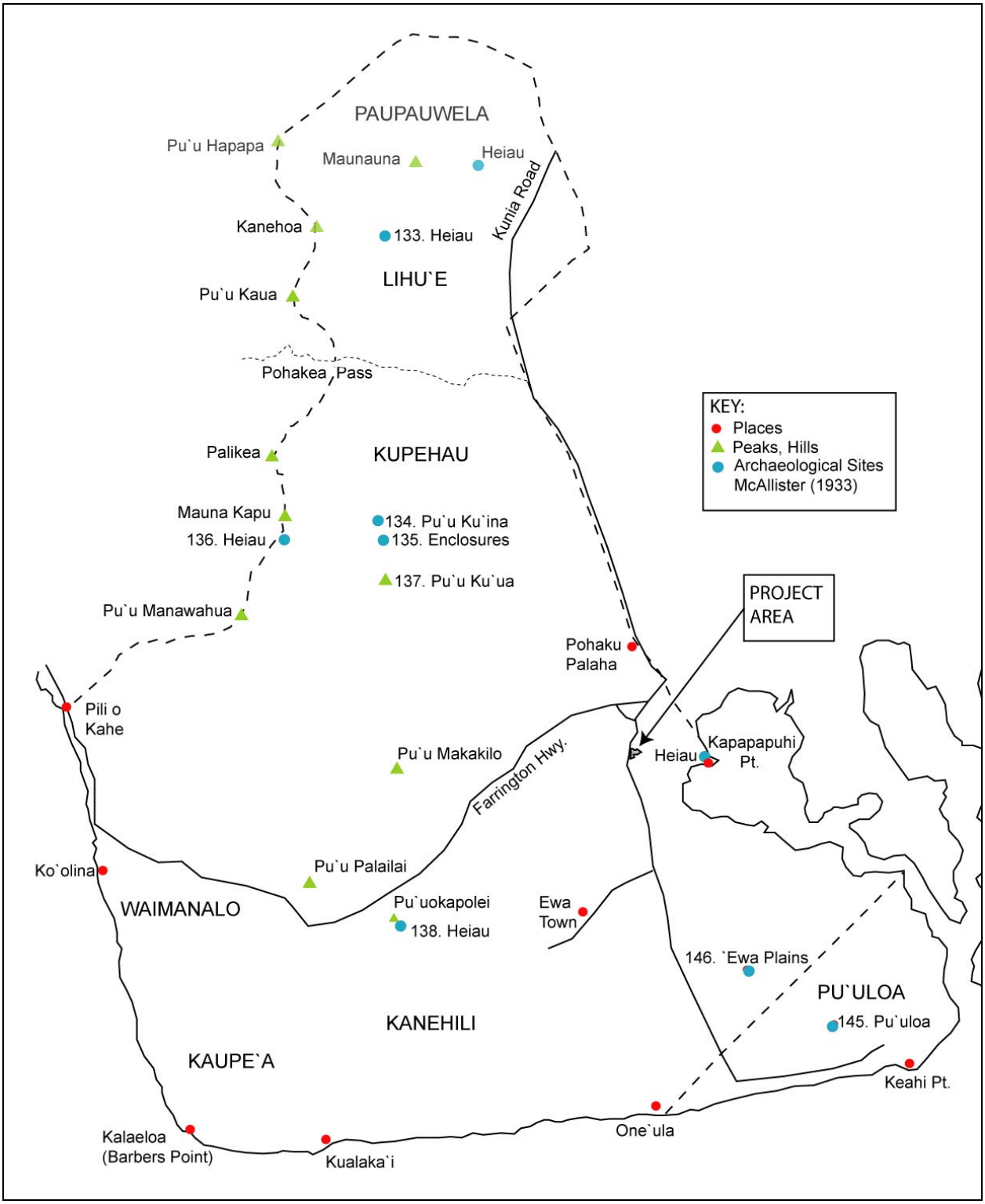

Figure 6. Place Names of Honouliuli (map adapted from Sterling and Summers 1978)

Eventually the stone was found at Pili o Kahe. This is a spot where two small hills of the Wai‘anae Range come down parallel on the boundary between Honouliuli and Nānākuli (‘Ewa and Wai‘anae). The ancient Hawaiians said the hill on the ‘Ewa side was the male and the hill on the Wai‘anae side was female. The stone was found on the Waianae side hill and the place is known as Pili o Kahe.

> (Pili=cling to, Kahe=flow). The name refers, therefore, to the female or Waianae side hill. And that is where the boundary between the two districts runs [Told to E.S. by Simeon Nawaa, March 22, 1954; cited in Sterling and Summers 1978:1].

2.2 Pearl Harbor (Pu‘uloa) and West Loch (Kaihu o pala‘ai)

The project area is approximately 1.2 kilometers (0.7 miles) west of Pearl Harbor. Honouliuli Stream, which was used to water the abundant taro patches once surrounding the project area, emptied into the Pearl River to the east. The proximity of the harbor waters to the inhabitants of Honouliuli must have provided an easy access to the abundant food resources present in the shallow waters.

2.2.1 The “Silent Fish” of Pearl Harbor

Pearl Harbor was called Pu‘uloa or *ke-awa-lau-o-Pu‘uloa*, the many harbored-sea of Pu‘uloa (Pukui 1983:#1686) by the Hawaiians. An alternate name was Awawa-lei, or “garland (*lei*) of harbors” (Handy and Handy 1972:469). Pukui (1983:#1126] also uses the name *Awalau* for Pearl Harbor, as in the saying “*Huhui na ‘ōpua i Awalau*, The clouds met at Pearl Harbor. Said of the mating of two people.” Emerson (1915:167) interprets Awalau as “leaf-shaped lagoon.”

John Clark (1977:70) says that its English name came from the name Waimomi, or “water of the pearl,” an alternate name for the Pearl River (Pearl Harbor). The harbor was named Pearl Harbor after the pearl oysters of the family Pteriidae (mainly *Pinctada radiata*), which were once abundant on the harbor reefs, but were later decimated by over-harvesting. This oyster was supposedly brought from Kahiki, the Hawaiian ancestral lands, by a *mo‘o* (lizard or water spirit) named Kane-kua‘ana (Handy and Handy 1972:470).

Kanekua‘ana was the *kia‘i* (food guardian) for ‘Ewa. When food was scarce, the descendants of Kanekua‘ana built *waihau heiau* (a *heiau* for *mo‘o*) for her and lit fires to plead for her blessings. For ‘Ewa, the chief *i‘a* (marine food) blessing was the famous *pipi*, or pearl oyster. Samuel Kamakau describes the *pipi* of Honouliuli.

> That was the oyster that came in from deep water to the mussel beds near shore, from the channel entrance of Pu‘uloa to the rocks along the edges of the fishponds. They grew right on the *nahawele* mussels and thus was this *i‘a* obtained. Not six months after the *hau* branches [that placed a *kapu* on these waters until the *pipi* should come up] were set up, the *pipi* were found in abundance-enough for all ‘Ewa-and fat with flesh. Within the oyster was a jewel (*daimana*) called a pearl (*momi*), beautiful as the eyeball of a fish, white and shining; white as the cuttle fish, and shining with the colors of the rainbow-reds and yellow and blues, and some pinkish white, ranging in size from small to large.

> They were of great bargaining value (*he waiwai kumuku‘ai nui*) in the ancient days, but were just “rubbish” (‘*opala*) in ‘Ewa [Kamakau 1991a:83].

This oyster, the *pipi*, was sometimes called “the silent fish,” or *i‘a hamau leo o ‘Ewa*, ‘Ewa’s silent sea creature (Handy and Handy 1972:471), since the collectors were supposed to stay quiet while harvesting the shells, as in the sayings:

> The fish of ‘Ewa that silences the voice. *Ka ka‘a hāmau leo o ‘Ewa*.
>
> The pearl oyster, which has to be gathered in silence [Pukui 1983:#1331].
>
> ‘Ewa is disturbed by the Moa‘e wind. *Haunāele ‘Ewa i ka Moa‘e*.
>
> Used about something disturbing, like a violet argument. When the people of ‘Ewa went to gather the *pipi* (pearl oyster), they did so in silence, for if they spoke, a Moa‘e breeze would suddenly blow across the water, rippling it, and the oysters would disappear [Pukui 1983:5#493].
>
> Hush, lest the wind rise. *E hāmau o makani mai auane‘i*.
>
> Hold your silence or trouble will come to us. When the people went to gather pearl oysters at Pu‘uloa, they did so in silence, for they believed that if they spoke, a gust of wind would ripple the water and the oysters would vanish [Pukui 1983:#274].
>
> The gesturing fish of ‘Ewa. *Ka i‘a kuhi lima o ‘Ewa*.
>
> The *pipi*, or pearl oyster. Fishermen did not speak when fishing for them but gestured to each other like deaf-mutes [Pukui 1983:#1357].

Sereno Bishop, an early resident of O‘ahu, wrote, of his time in the area around 1836, of the pearl oyster, the *pipi*, and another edible clam, identified by Margaret Titcomb (1979:351) as probably the species, *Lioconcha heiroglyphica.*

> The lochs or lagoons of Pearl River were not then as shoal as now. The subsequent occupation of the uplands by cattle denuded the country of herbage, and caused vast quantities of earth to be washed down by storms into the lagoons, shoaling the water for a long distance seaward. No doubt the area of deepwater and anchorage has been greatly diminished. In the thirties, the small oyster was quite abundant, and common on our table. Small pearls were frequently found in them. No doubt the copious inflow of fresh water favored their presence. I think they have become almost entire extinct, drowned out by the mud. There was also at Pearl River a handsome speckled clam, of a delicate flavor which contained milk white pearls of exquisite luster and perfectly spherical. I think the clam is still found in the Ewa Lochs [Bishop 1901:87].

Older Hawaiians believed that the *pipi* disappeared around the time of the smallpox epidemic of 1850-1853, because Kanekua‘ana became displeased at the greed of some *konohiki* (overseer).

> The people of the place believe that the lizard was angry because the konohikis imposed kapus [bans], were cross with the women and seized their catch of oysters. So this “fish” was removed to Tahiti and other lands. When it vanished a

> white, toothed thing grew everywhere in the sea, of Ewa, which the natives of Ewa had named the pahikaua (sword). It is sharp edged and had come from Kauai-helanai, according to this legend [Manu 1885:50].

Pahikaua is the Hawaiian name for the mussel, *Brachidontes crebristriatus* (Mytilidae), which was also a popular clam eaten by the residents of Pearl Harbor.

A clarification of the story of Kanekua‘ana and the pearl oysters of Pearl Harbor is given, in which it seems an overseer had set a ban on the *pipi* for several months a year so that they could increase. A poor widow, a relation of the *mo‘o*, took some of the *pipi* and hid them in a basket. The *konohiki* found the hidden shells, and took them from her, emptying them back into the sea, which was proper. However, after this he followed the woman home and also demanded that she pay a stiff fine in cash, which she did not have. The *mo‘o* thought this was unjust and the next night she took possession of a neighbor who was a medium.

> . . . After the overseer had gone back to Palea the lizard goddess possessed her aged keeper [a woman of ‘Ewa] and said to those in the house, “I am taking the pipi back to Kahiki and they will not return until all the descendants of this man are dead. I go to sleep. Do not awaken my medium until she wakes of her own accord.” The command was obeyed and she slept four days and four nights before she awoke. During the time that she slept the pearl oysters vanished from the places where they were found in great numbers, as far as the shore . . . .The few found today are merely nothing . . . [*Ka Loea Kālai‘āina*, June 3, 1899, translation in Sterling and Summers 1978:49-50].

2.2.2 Ka‘ahupāhau, the Queen Shark of O‘ahu

Pearl Harbor in legendary traditions is closely associated with shark ‘*aumakua*, guardian spirits for specific Hawaiian families or clans. Pukui (1943:56) and others (Sheldon 1883) claim that the sharks of Pearl Harbor were so tame that people used to ride on their backs, and that their human relatives would feed them with ‘*awa*. The most famous guardian shark was Ka‘ahupāhau, the queen shark of O‘ahu, who lived in Pu‘uloa, now called Pearl Harbor. Her name means “cloak well cared for” (Pukui 1943:56), or “well cared-for feather cloak”; the feather cloak was a symbol of royalty.

Ka‘ahupāhau and her brother, Kahi‘uka, had been born as humans and were turned into sharks (Mary Kawena Pukui, March 29, 1954, from Sterling and Summers 1978:56).

> The mother, who was a chiefess, of Ka‘ahupahau was gathering limu [seaweed] in the waters of Pearl Harbor when she had a miscarriage. Thinking the baby dead she left it in the water to be washed away. Later she went again to gather limu and was bitten by a shark. She went to a kahuna [priest] who told her that the shark was Ka‘ahupahau who was her own daughter, the baby she thought was dead. The kahuna advised her to go to the place and build and ahu (heap) of hau a sort of landing from which she could feed the shark and care for it. It was from that time by command of the mother that all people of Ewa were to be always be protected from sharks whether in Pearl Harbor or outside [E.S. as told by Simeon Nawaa, Mar. 22, 1954, from Sterling and Summers 1978:56].

This explains the meaning of the shark's name Ka‘ahupāhau, "the mound (*ahu*) of *hau*" (*Hibiscus tiliaceus*). The grandmother of Ka‘ahupāhau and her brother, Koihala, lived in Honouliuli and one day was making *lei* for her shark grandchildren. A young girl named Pāpio rudely begged for one of the *lei*, but Koihala refused. On her way to her favorite surfing spot at Keahi Point, Pāpio snatched up one of the *lei*, and laughingly went surfing. Koihala angrily told Ka‘ahupāhau about the stolen *lei*, and the shark killed the girl, grabbing her from a rock in the sea where she was resting.

> Ka‘ahupahau soon recovered from her anger and became very sorry. She declared that from hence forth all sharks in her domain should not destroy, but protect the people round about. As flowers were the cause of the trouble she forbade their being carried or worn on the water of Pu‘uloa. From that time all the people of that locality and the sharks in the lochs were the best of friends . . . . [Pukui 1943:56].

In a second version of this story, the shark gods Kanehunamoku and Kamohoali‘i were the ones that had placed a *kanawai* (decree) against the attack of men by all sharks around O‘ahu. As the result of the attack of the chiefess Pāpio, Ka‘ahupāhau was put on trial at Uluka‘a [the realm of the gods]. She escaped the punishment of death, but was placed in confinement. In his writing of 1870 (Kamakau, *Ke Au ‘Oko‘a* April 7, 1870), Samuel Kamakau asserted:

> After her confinement ended several years later Ka‘ahupahau was very weak. She went on a sightseeing trip, got into trouble, and was almost killed. But she received great help from Kupiapia and Laukahi‘u, sons of Kuhaimoana, when their enemies were all slain the *kanawai* was firmly established. This law-that no shark must bite or attempt to eat a person in Oahu waters-is well known from Pu‘uloa to the Ewa. Anyone who doubts my work must be a *malihini* [recent resident] there. Only in recent times have sharks been known to bite people in Oahu waters or to have devoured them; it was not so in old times [Kamakau 1991b:73].

This information on the protective nature of Ka‘ahupāhau is somewhat contradicted by the writings of the Russian explorer Otto Von Kotzebue, who walked to Pearl Harbor in 1821, but was unable to actually sail on the waters. He was told that people were thrown into the water as sacrifices to the sharks; however, it is uncertain if the person who told him this was an actual resident of ‘Ewa, who would know the real truth. Kotzebue's account is:

> In the Pearl River there are sharks of remarkable size, and they have made on the banks an artificial pond of coral stones, in which a large shark is kept, to which, I was told, they often threw grown-up people, but more frequently children, as victims [Kotzebue 1821:338-348].

The protection of Ka‘ahupāhau is emphasized in many other Hawaiian traditions. One time, a man-eating shark called Mikololou from the Ka‘ū district of the island of Hawai‘i, came visiting at Pearl Harbor with other sharks, some man-eating, some not. Mikololou remarked "What fine, fat crabs you have here," from which Ka‘ahupāhau knew that some of the sharks were man-eaters, since sharks referred to fishermen as "fat crabs." She directed the fishermen to place a

barrier of nets across the entrance to the harbor, and when the sharks left her home, they could not get back out to the ocean.

> The sharks of the lochs attacked the man-eaters from outside and beat them unmercifully. A shark from Ka‘u, Hawaii, who was not a man-eater, threw his weight over the nets and pressed them down. His sons changed themselves into pao‘o [blennies] fishes and leaped where the net was forced down, thus escaping from the place where the battle of shark was raging. Mikololou was caught fast in the nets and dragged ashore where his head was cut off and his body burned [Pukui 1943:56].

In another version of this story, Mikololou is accompanied to Pearl Harbor with his shark friends Kua, Keali‘ikauaoka‘ū, Pākaiea, and Kalani; Mikololou was the only man-eater. To escape the nets:

> Keali‘ikauaoka‘ū changed himself into a pao‘o fish, which lives among the rocks, and leapt out of the net. Kua changed into a lupe, as the spotted stingray is called, and weighted down the net on one side, helping his son Kalani and nephew Pākaiea, who were half human, to escape [Pukui and Green 1995:40].

Only Mikololou was caught in the nets, and his body was tossed on shore to rot, until only the tongue was left. In some versions of this story, the tongue immediately jumps into the water and then becomes a shark again (Pukui and Green 1995:41). In other versions (Pukui 1943:56), the tongue is eaten by a dog, which then jumps into the water, turns into a shark, and escapes. In both versions, Mikololou returns to Ka‘ū, never to bother Ka‘ahupāhau again.

In Thrum’s (1923:308) version, Mikololou went back to his home island of Hawai‘i and organized an army of sharks to return to Pearl Harbor, but he was again defeated by the fishermen of ‘Ewa under the command of Ka‘ahupāhau, who slaughtered so many of the sharks that from then on “the sea of Pu‘uloa is safe and peaceful through her law that sharks shall not attack man. That is why these waters are safe for people to swim from shore to shore without fear” (Thrum 1923:308). The watchful eye of Ka‘ahupāhau led to these Hawaiian sayings:

Everywhere in Pu‘uloa is the trail of Ka‘ahupāhau	*Alahula Pu‘uloa, he alahele na Ka‘ahupāhau*

> Said of a person who goes everywhere, looking, peering, seeing all, or of a person familiar with every nook and corner of a place. Ka‘ahupāhau is the shark goddess of Pu‘uloa (Pearl Harbor) who guarded the people from being molested by sharks. She moved about, constantly watching [Pukui 1983:#105].

The man-eating sharks blamed Ka‘ahupāhau.	*Ho‘ahewa na niuhi ia Ka‘ahupāhau*.

> Evil-doers blame the person who safeguards the rights of others. Ka‘ahupāhau was the guardian shark goddess of Pu‘uloa (Pearl Harbor) who drove out or destroyed all the man-eating sharks [Pukui 1983:#1014].

Pu‘uloa became lonely when Ka‘ahupāhau went away.	*Mehameha wale no o Pu‘uloa, i ka hele a Ka‘ahupāhau*.

The home is lonely when a loved one has gone. Ka‘ahuāhau, guardian shark of Pu‘uloa (Pearl Harbor), was dearly loved by the people [Pukui 1983:#2152].

> Mikololou died and came to life again through his tongue. *Make o Mikololou a ola i ke ale lo*.

Said of one who talks himself out of a predicament [Pukui 1983:#2111].

There were other guardian sharks in Pearl Harbor, including a brother of Ka‘ahupāhau’s named Kahi‘ukā (the smiting tail), and a son name Kūpīpī (Pukui 1943:57), or, in some versions, twin sons, named Kūpīpī and Kūmaninini (Pukui and Green 1995:41). In one version of the Story of Pāpio, recounted above, it is said the Ka‘ahupāhau later turned into a stone, although the people of Pu‘uloa continued to feed her (Martha Beckwith notes to Samuel Kamakau n.d., *Mo‘olelo Hawaii*, vol. II:23, from Sterling and Summers 1978:56).

> Kahi‘ukā was the brother of Ka‘ahupahau. The name means “smiting tail.” This shark was called by this name because it was his duty to warn the people of Ewa of the presence of strange and unfriendly sharks in these waters and he did so by nudging them or striking at them with his tail When ever anyone was fishing and felt a nudge they would know it was Kahi‘uka, warning them and they would leave the water immediately [E.S. as told by Simeon Nawaa, Mar. 22, 1954, from Sterling and Summers 1978:56].

There are two different accounts of the home of this shark brother. The above reference says that Kahi‘uka lived at the site of the old dry dock. Mary Pukui disagrees, and says the site of the old dry dock was the home of the son, not the brother of Ka‘ahupāhau. Mary Pukui says Kahi‘ukā lived in a cavern under water off Moku‘ume‘ume (Ford Island) near Keanapua‘a Point; he had a stone form in deep water some distance from the cave that could be seen from the surface (Mary Kawena Pukui, Mar. 29, 1954, from Sterling and Summers 1978:56). J. S. Emerson (1892) wrote in the late nineteenth century that Kahi‘uka’s keeper, Kimona, would often find fish nets missing and knew that Kahi‘ukā had carried them up shore to a place of safety. Pukui also relates that the shark was named “smiting tail” because one side was longer than the other, and the shark would use his tail to smite unfriendly sharks.

2.2.3 Story of Ka‘ehu-iki-manō-o-Pu‘uloa, the Little Yellow Shark

One of the shark ‘*aumakua* associated with Pearl Harbor was the little yellow shark called Ka‘ehu, who was born on the Big Island, but later traveled to O‘ahu and settled at Pu‘uloa. His ancestor was Kama‘ili‘ili, the Hawaiian shark god, brother of the Hawaiian volcano goddess, Pele. Ka‘ehu was a guardian of the Hawaiian people and once saved several surf riders at Waikīkī from a man-eating shark called Pehu (Knudsen 1946:9-13; Westervelt 1963:55-58).

In Thrum’s version of this legend, the shark’s name is Ka-ehu-iki-mano-o-Puuloa, meaning “the small, blonde shark of Pu‘uloa.” He was born in Puna, Hawai‘i, but soon left on a tour of all of the islands, so that he could call and pay respects to all of the king-sharks of Hawai‘i.

> . . . Puuloa, Oahu, was the next objective. Reaching its entrance they visited the pit of Komoawa, where Kaahupahua’s watcher lived. Here the young shark made

> himself known, as usual; the object of the journey, and the desire to meet the famous queen-shark protector of Oahu‘s water. . . . Welcome greetings were sent by the messenger, who was bid entertain the visitors in the outer cave, and on the morrow the party could come up the lochs to meet the queen. . . . The company then repaired to the royal cave at Honouliuli, where the visitors were supplied with soft coconut and *awa*, their home food and beverage [Thrum 1923:301-302].

The cave of Komoawa may be the Hawaiian words for “channel” or harbor” entrance (Pukui and Elbert 1986). In another version of this story, the shark watcher himself is named Komoawa and the cave that he lives in is called Keaali‘i. Keaali‘i guards the entrance to Pearl Harbor, while the home of Ka‘ahupāhau is deeper into Honouliuli lagoon (*Saturday Press*, Dec. 29, 1883).

In 1823, the missionary Hiram Bingham accompanied Liholiho (King Kamehameha II) and his company to the royal compound at Pu‘uloa, where he was shown a cave that was home to a shark god.

> I one day accompanied the king and others by boat to see the reputed habitation of an Hawaiian deity, on the bank of the lagoon of Ewa. It was a cavern or fissure in a rock, chiefly under water, where, as the traditions teach, and as some then affirmed, a god, once in human form, taking the form of a shark, had his subterraqueous abode. Sharks were regarded by the Hawaiians as gods capable of being influenced by prayers and sacrifices, either to kill those who hate and despise them, or to spare those who respect and worship them . . . [Bingham 1847:177].

Although Bingham stated in this year that no one any longer believed these stories, there were some who kept the beliefs of the guardian sharks alive. In 1912, dredging in Pearl Harbor was completed and a large dry-dock was completed, but collapsed the very next year. The native Hawaiians believed that the dock had collapsed because it had been built over the home of Kūpipi the shark son of Ka‘ahupāhau’s, who lived in a cavern near the harbor entrance at Pu‘uloa. “Angered by the violation of his home, the shark prince destroyed the imposing structure” (Clark 1977:69-70). The dock was rebuilt in the same year, but this time only after a blessing on the construction was made by Hawaiian traditional practioners.

In other versions of this story, the name of the shark is interpreted as “the little ruddy shark” (Emerson n.d.), or the “little reddish-haired shark,” named for the reddish (‘*ehu*) hair of Ka‘ehu. In this version, the cave of Ka‘ehu is called Pānau, and the human mother and father of the little shark are Kapukapu and Holei of Pānau, in Puna, Hawai‘i (Emory et al. 1959:63).

2.2.4 Kāne and Kanalao and the Fish Ponds of West Loch

According to an account in the Hawaiian newspaper *Ka Loea Kālai‘āina* (June 10, 1899), several of the fishponds in the Pu‘uloa area were made by the brother gods, Kāne and Kanaloa. A fisherman living in Pu‘uloa, named Hanakahi, prayed to unknown gods, until one day two men came to his house. They revealed to him that they were the gods to whom he should pray. Kāne and Kanaloa then built fishponds at Ke‘ana-pua‘a, but were not satisfied. Then they built the fishpond, Kepo‘okala, but were still not satisfied. Finally they made the pond Kapākule, which

they stocked with all manner of fish. They gifted all of these fishponds to Hanakahi and his descendants (Handy and Handy 1972:473; *Ka Loea Kālai‘āina*, July 8, 1899).

According to Mary Pukui (1943:56-57), who visited Kapākule fishpond when she was young, the pond was built by the legendary little people of Hawai‘i, the *menehune*, under the direction of the gods Kāne and Kanaloa. The fishpond contained many fish, especially the *akule* (scad fish, *Trachurops crumenophthalmus*), thus its name, "the enclosure for *akule* fish" (Pukui 1943:56-57). Pukui describes several unique aspects of this pond:

> On the left side of the pond stood the stone called Hina, which represented a goddess of the sea by that by that name. Each time the sea ebbed, the rock became gradually visible, vanishing again under water at high tide. Ku, another stone on the right, was never seen above sea level. This stone represented Ku‘ula, Red Ku, a god for fish and fishermen. From one side of the pond a long wall composed of driven stakes of hard wood, ran toward the island [Laulaunui] in the lochs. When the fish swam up the channel and then inside of this wall, they invariably found themselves in the pond. A short distance from the spot where the pond touched the shore was a small koa or altar composed of coral rock. It was here that the first fish caught in the pond was laid as an offering to the gods [Pukui 1943:56].

The pond was destroyed when the channel to Pearl Harbor was dredged in the early twentieth century. The caretaker of the pond took the stones Kū and Hina to a deep place in the ocean and sunk them so "none would harm or defile them." Cobb (1903:733) says it was used to catch the larger *akule* (goggler), *opelu* (mackeral scad), *weke* (goat fish), *kawakawa* (bonito), and sharks; it was unusual for having walls made of coral. This contradicts much of the legendary material that says that sharks were not killed within Pearl Harbor; however, Kamakau does relate that Kekuamanoha and Kauhiwawaeono, two conspirators against Kamehameha I, lived at Pu‘uloa. The chief Kauhiwawaeono was known to murder people and use their bodies as shark bait (Kamakau 1961:182, 232).

Samuel Kamakau adds more information on the pond Kapākule, and a second one called Kepo‘okala.

> At Pu‘uloa on Oahu were two unusual ponds [fish traps]—Kapakule and Kepoolala. Kapakule was the better one. The rocks of its walls, *kuapa*, could be seen protruding at high tide, but the interlocking stone walls (*pae niho pohaku*) of the other pond were still under water at high tide. . . . It [Kapakule] was said to have been built by the *‘e‘epa* people [mysterious people] at the command of Kane ma [ma=and others, company] . . .
>
> This is how the fish entered the pond. At high tide many fish would go past the mauka side of the pond, and when they returned they would become frightened by the projecting shadows of the trunks, and would go into the opening. The fish that went along the edge of the sand reached the seaward wall, then turned back toward the middle and entered the *anapuna* (the arched portion of the trap) A man ran out and placed a "cut-off" seine net (‘*omuku lau*) in the opening, and the fish shoved and crowded into it. The fish that were caught in the net were dumped out,

> and those not caught in the net were attacked with sharp sticks and tossed out, or were seized by those who were strong [Kamakau 1976:88].

2.2.5 The Story of Kaihuopala‘ai Pond, Honouliuli *(*Ka‘ao no Maikohā*)*

In the Legend of Maikohā (Fornander 1919, Vol. V, Part 2:270-271), a sister of Maikohā, a deified hairy man who became the god of *tapa* makers, named Kaihuopala‘ai, journeys to O‘ahu:

> Kaihuopala‘ai saw a goodly man by the name of Kapapaapuhi who was living at Honouliuli, ‘Ewa; she fell in love with him and they were united, so Kaihuopala‘ai has remained in ‘Ewa to this day. She was changed into that fishpond in which mullet are kept and fattened, and that fish pond is used for that purpose to this day
>
> *‘Ike aku la o Kaihuopala‘ai i ka maikai o Kapapaapuhi, he kāne e noho ana ma Honouliuli ma ‘Ewa. Moe iho la lāua, a noho iho la o Kaihuopala‘ai i laila a hiki i kēia lā. ‘Oia kēlā loko kai e ho‘opuni ia nei i ka ‘anae, nona nā i‘a he nui loa, a hiki i kēia kākau ana* [Fornander 1919, Vol. V, Part 2:270].

The name of Maikohā’s sister, Kaihuopala‘ai, which means “the nose of Pala‘ai” (Pukui et al. 1974:68) is also the name the Hawaiians used for the west loch of Pearl Harbor, adjacent to the current study area. McAllister recorded that other Hawaiians say there never was a fishpond by that name. Beckwith (1918) says that Kaihuopala‘ai changed into the fishpond near Kapapapūhi Point, which means “the eel flats.” This is identified on old maps as the point northeast of the current study area (sometimes called Kapapa‘apūhi, Papapūhi, or Hō‘ae‘ae Point) that juts into the loch; early Hawaiian settlement was focused on this area.

There is also a famous *pōhaku*, or rock, associated with the traveling mullet of Pearl Harbor.

> . . . I . . . asked the person sitting on my left, “What place is this?” Answer – “This is Pearl City.” It was here that mullets were bred in the ancient times and that flat stone there was called Mullet Rock or Pōhaku Anae. It lies near the beach by Ewa mill [*Ka Nūpepa Kū‘oko‘a*, Oct. 2, 1908, from Sterling and Summers 1978:53].

2.2.6 The Traveling Mullet of Honouliuli *(*Fish Stories and Superstitions*)*

The story of Kaihuopala‘ai, or Ihuopala‘ai, is also associated with the tradition of the *anae-holo,* the traveling mullet of Pearl Harbor (Thrum 1998:270-272):

> The home of the ‘*anae-holo* is at Honouliuli, Pearl Harbor, at a place called Ihuopala‘ai. They make periodical journeys around to the opposite side of the island, starting from Pu‘uloa and going to windward, passing successively Kumumanu, Kalihi, Kou, Kālia, Waikīkī, Ka‘alāwai, and so on, around to the Ko‘olau side, ending at Lā‘ie, and then returning by the same course to their starting point [Thrum 1998:271].

In Thrum’s account, Ihuopala‘ai is a male who possesses a Kū‘ula or fish god that supplied the large mullet known as “*anae.*” His sister lived in Lā‘ie, and there came a time when there

were no fish to be had. She sent her husband to visit Ihuopala‘ai, who was kind enough to send the fish following his brother-in-law on his trip back to Lā‘ie.

This story is associated with a proverb or poetical saying identified with Honouliuli:

The fish fetched by the wind. *Ka i‘a hali a ka makani*

> The ‘*anaeholo*, a fish that travels from Honouliuli, where it breeds, to Kaipāpa‘u, on the windward side of O‘ahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong [Pukui 1983:#1330].

Pukui et al. (1974:68) gives the name of the husband in this story as Lā‘ie and the name of the wife as Pala‘ai, which ties into the name of the west loch of Pearl Harbor, called Ka-ihu o Pala‘ai, “the nose of Pala‘ai.” Another version has a woman named Awawalei (an alternate version for the name of Pearl Harbor), who had a brother named Laniloa (the point on Lā‘ie at which the mullet stops its migration and makes its way back to Pearl Harbor), and another brother (a mullet) who lived with an eel named Papa-pūhi, which relates to the name of the fishpond in the tale called Kapapapūhi (*Ka Loea Kālai‘āina*, Oct. 21, 1899). On historic maps, Kapapapūhi is a point of land that juts into West Loch and was a focus for habitation, taro cultivation, and fishpond maintenance in the early post-Contact (and probably earlier) period.

2.3 The Caves of Pu‘uloa

‘Ewa was famous for the many limestone caves formed in the uplifted coral. Some of these caves, called *ka-lua-ōlohe* were inhabited by the *ōlohe*, a type of people that looked like other humans but had tails like dogs (Beckwith 1940:343). These people were skilled in wrestling and bone-breaking and often hid along narrow passes to rob travelers; they were also reputed to be cannibals. The famous cannibal king, Kaupe, who lived in Līhu‘e in upland Honouliuli, was an *ōlohe*.

There was once a cave named Kapuna on Waipi‘o peninsula that was associated with a famous riddle. *No Kapuna kane hale noho ia e ke kai*, or “To Kapuna belongs the house, the sea dwells in it.”

> This cave is on the Waipio side and a sea passage separates Waipio and Waikele and Waikele and Honouliuli. The passage is obstructed by three small islands, a middle one and Manana and Laulaunui. These small islands in the middle of the passage to Honouliuli and inside and outside of these small islands is the sea of Kaihuopalaai [Hawaiian name for West Loch] where mullet lived till they whitened with age [*Ka Loea Kālai‘āina*, Oct. 7, 1899, translation in Sterling and Summers 1978:24].

Another famous cave of the area was Keanapua‘a [in Halawa opposite Waipi‘o peninsula], which means “the pig’s cave,” so named because Kamapua‘a once slept there (Pukui et al. 1974:103). This cave was one of the places where the high king of O‘ahu, Kahahana, hid after he had killed the priest Kaopulupulu, thus angering the high chief of Maui, Kahekili (Kahahana’s father).

> Upon the arrival here at Oahu of Kahekili, Kahahana fled, with his wife Kekuapoi, and friend Alapai, and hid in the shrubbery of the hills. They went to Aliomanu, Moanalua, to a place called Kinimakalehua; then moved along to Keanapuaa and Kepookala, at the lochs of Puuloa, and then from there to upper Waipio; thence to Wahiawa, Helemano, and on to Lihue; thence they came to Poohilo, at Honouliuli, where they first showed themselves to the people and submitted themselves to their care.
>
> Through treachery, Kahahana was induced to leave Po‘ohilo, Honouliuli and was killed on the plains of Hoaeae [Thrum 1906:213-214].

The place Pō‘ohilo was somewhere on the border between Honouliuli and Hō‘ae‘ae (north of the current study area). In the “Legend of the Sacred Spear-point” (Kalākaua 1990:209-225) is a reference to the Hawai‘i Island chief, Hilo-a-Lakapu. Following his unsuccessful raid against O‘ahu “he was slain at Waimano, and his head was placed upon a pole near Honouliuli for the birds to feed upon”(Kalākaua 1990:224). This place was called Pō‘o Hilo, which literally means “the head of Hilo.”

The caves of Pu‘uloa were sometimes used as burial caves. In 1849, Keali‘iahonui, son of Kaua‘i’s last king, Kaumuali‘i, died. He had once been married to the chiefess Kekau‘ōnohi, who had stayed with him until 1849. She wanted to bury her ex-husband at sea.

> It seems that by Kekauonohi’s orders, the coffin containing her late husband’s remains was removed to Puuloa, Ewa, with the view of having it afterwards taken out to sea and there sunk. It was temporarily deposited in a cavern in the coral limestone back of Puuloa, which has long been used for a burial place, and has lately been closed up [Alexander 1907:27].

After some initial objections by the niece of Kealai‘iahonui, the body was removed from the outer coffin, the rest was sunk, and the coffin was later buried somewhere in Pu‘uloa.

Section 3 Historical Background

3.1 Pre-Contact and Early Post-Contact Periods

3.1.1 Political Control and Resources

By ca. A.D. 1320, ‘Ewa, along with Kona, and Ko‘olaupoko were the dominant polities, ruled by the sons of a chief named Māweke (Cordy 2002:21). ‘Ewa at this time included the traditional districts of ‘Ewa, Wai‘anae, and Waialua (Fornander 1880:48). Around A.D. 1400, the entire island was ruled by King La‘akona; chiefs within his line, the Māweke-Kumuhonua line, reigned until about A.D. 1520-1540, with their major royal center in Līhu‘e, in ‘Ewa. (Cordy 2002:24). Haka was the last chief of the Māweke-Kumuhonua line; he was slain by his men at the fortress of Waewae near Līhu‘e (Kamakau 1991b:54-54; Fornander 1880:88). Power shifted between the chiefs of different districts from the 1500s until the early 1700s, when Kūali‘i achieved control of all of O‘ahu by defeating the Kona chiefs, then the ‘Ewa chiefs, and then expanding his control on windward Kaua‘i. Peleiholani, the heir of Kūali‘i, gained control of O‘ahu ca. 1740, and later conquered parts of Moloka‘i. He was ruler of O‘ahu until his death in ca. 1778 when Kahahana, of the ‘Ewa line of chiefs was selected as the ruler of O‘ahu (Cordy 2002:24-41).

After Kamehameha’s O‘ahu victory, he gave the *ahupua‘a* of Honouliuli to Kalanimōkū as part of the *panalā‘au*, or conquered lands, with the right to pass the land on to his heirs rather than having it revert to Kamehameha (Kame‘eleihiwa 1992:58, 112). Kalanimōkū subsequently gave the *ahupua‘a* to his sister, Wahinepi‘o.

Various Hawaiian legends and early historical accounts indicate that the *ahupua‘a* (land division) of Honouliuli was once widely inhabited by pre-Contact populations, including the Hawaiian *ali‘i* (chiefly class). This would be attributable for the most part to the plentiful marine and estuarine resources available at the coast, along which several sites interpreted as permanent habitations and fishing shrines have been located. Other attractive subsistence-related features of the *ahupua‘a* include irrigated lowlands suitable for wetland taro cultivation, as well as the lower forest area of the mountain slopes for the procurement of forest resources.

> The lowlands, bisected by ample streams, were ideal terrain for the cultivation of irrigated taro. The hinterland consisted of deep valleys running far back into the Ko‘olau range. Between the valleys were ridges, with steep sides, but a very gradual increase of altitude. The lower part of the valley sides were excellent for the cultivation of yams and bananas. Farther inland grew the ‘awa for which the area was famous [Handy and Handy 1972:429].

In addition, breadfruit, coconuts, *wauke* (paper mulberry; *Broussonetia papyrifera*), bananas, *olonā* (*Touchardia latifolia*) and other plants were grown in the interior. ‘Ewa was known as one of the best areas to grow gourds and was famous for its *mamaki* (*Pipturus albidus*), which the Hawaiians used to make their *kapa* (*tapa*). It was also famous for a rare taro called the *kai o ‘Ewa*, which was grown in mounds in marshy locations (Handy and Handy 1972:471). The cultivation of this prized and delicious taro led to the saying:

He has eaten the Kāī-koi taro of ‘Ewa. *Ua ‘ai i ke kāī-koi o ‘Ewa*.

Kāī is O‘ahu’s best eating taro; one who has eaten it will always like it. Said of a youth of a maiden of ‘Ewa, who, like the Kāī taro, is not easily forgotten [Pukui 1983:#2770].

The lochs of Pearl Harbor were ideal for the construction of fishponds and fish-traps. Forest resources along the slopes of the Wai‘anae Range probably acted as a viable subsistence alternative during times of famine and/or low rainfall (Handy 1940:211; Handy and Handy 1972:469-470). The upper valley slopes may have also been a resource for sporadic quarrying of basalt used in the manufacturing of stone tools. At least one probable quarrying site (SIHP site 50-80-12-4322) is present in Maka‘īwa Gulch at 152 m (500 ft) above mean sea level (Hammatt et al. 1990).

John Papa ‘Ī‘ī described a network of Leeward O‘ahu trails (Figure 7), which in historic times encircled and crossed the Wai‘anae Range, allowing passage from Lualualei to Honouliuli by three different trails (‘Ī‘ī 1959:96-98). The coastal trail skirted Pearl Harbor, passing by Pu‘uokapolei; this would have been the nearest of three cross-*ahupua‘a* Honouliuli trails to the current project area. Following ‘Ī‘ī's description, a portion of the coastal trail would have passed close to the existing Farrington Highway, near the northern border of the project area, as seen in an 1825 map (Figure 8) map of the south coast of O‘ahu by Charles Malden of the British ship the *Blonde*. This map also shows a *mauka-makai* trail extending from the major trail to Pearl Harbor, which would later be covered by the alignment of Old Fort Weaver Road.

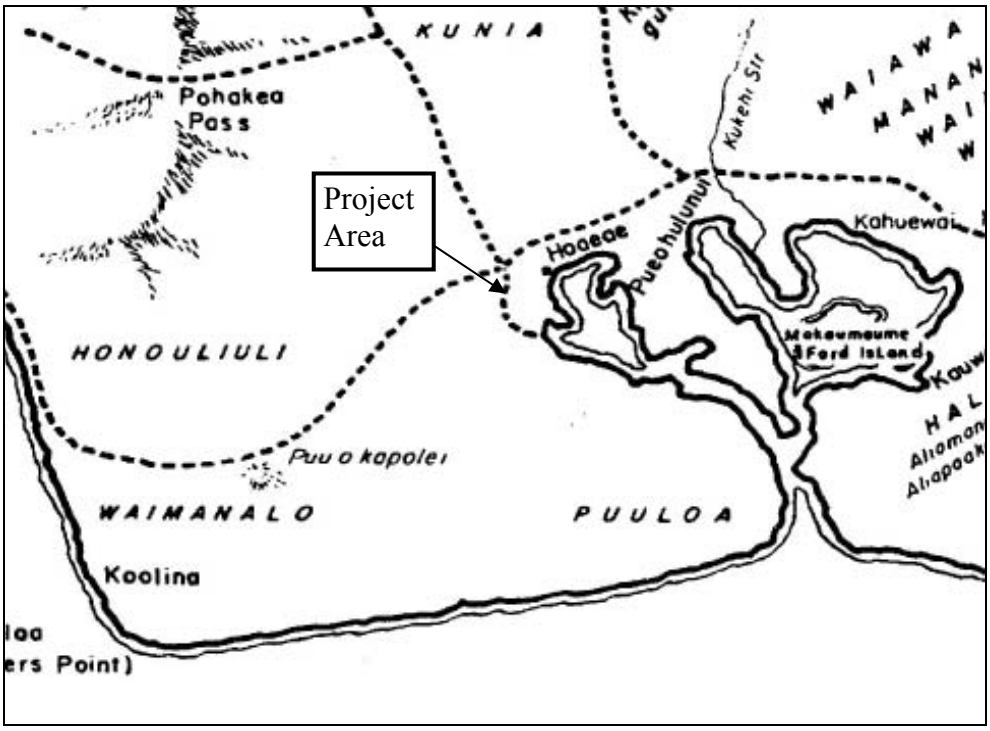

Figure 7. Trails (dashed lines) of Leeward Oahu. Map by Paul Rockwood. (‘Ī‘ī 1959:96) Mid- to late-1800s

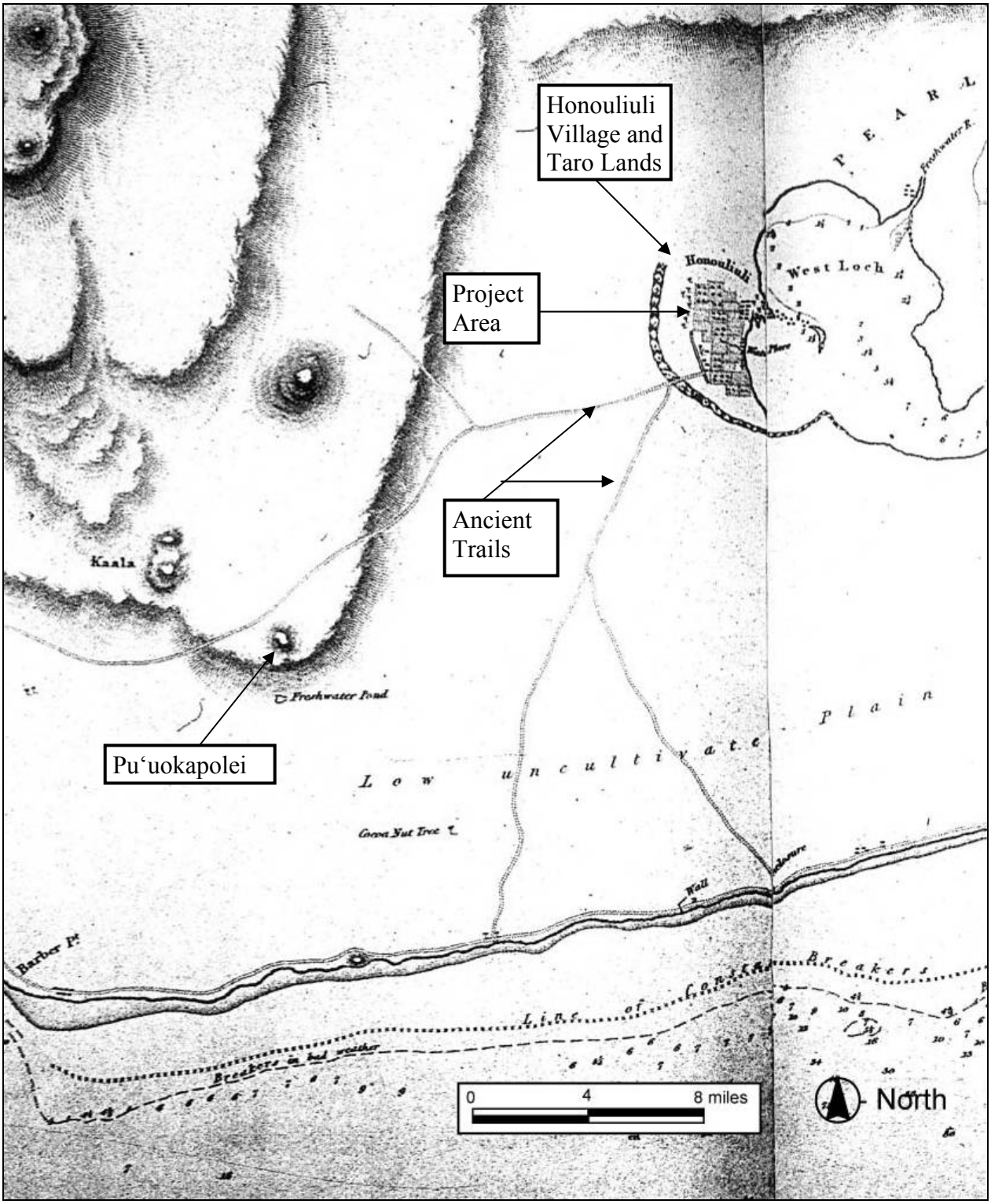

Figure 8. Portion of 1825 Map of the South Coast of Woahoo (O‘ahu) and Honolulu by Lieut. C. R. Malden from the British ship the *Blonde.*

The cross *ahupua‘a* trail is described by ‘Ī‘ī as:

> The trail went down to the stream and up again, then went above the taro patches of Waiau, up to a *maika* (stone disc rolled on a prepared playing field) field, to Waimano, to Manana, and to Waiawa; then to the stream of Kukehi and up to two other *maika* fields, Pueohulunui and Haupuu. At Pueohulunui was the place where a trail branched off to go to Waialua and down to Honouliuli and on to Waianae. As mentioned before, there were three trails to Waianae, one by way of Pu‘u o Kapolei, another by way of Pohakea, and the third by way of Kolekole [‘Ī‘ī 1959:97].

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

3.1.2 Observations of Early Explorers and Foreign Residents

Captain Vancouver sailed by Kalaeloa (Barbers Point) in 1792, and recorded his impression of the small coastal village of Kualaka‘i and the arid Honouliuli coast.

> The point is low flat land, with a reef round it . . . Not far from the S.W. point is a small grove of shabby cocoa-nut trees, and along these shores are a few struggling fishermen’s huts [Vancouver 1798, Vol. I:167].

> . . . from the commencement of the high land to the westward of Opooroah [Pu‘uloa], was composed of one very barren rocky waste, nearly destitute of verdure, cultivation or inhabitants, with little variation all the way to the west point of the island . . . [Vancouver 1798, Vol. II:217].

> . . . This tract of land was of some extent but did not seem to be populous, nor to possess any great degree of fertility; although we were told that at a little distance from the sea, the soil is rich, and all necessaries of life are abundantly produced . . . [Vancouver 1798, Vol. III:361-363].

Archibald Campbell, an English seamen who was given some land in Waimano Ahupua‘a by King Kamehameha in 1809, described his land around Pearl Harbor:

> In the month of November the king was pleased to grant me about sixty acres of land, situated upon the Wymummee [traditional Hawaiian name for Pearl River], or Pearl-water, an inlet of the sea about twelve miles to the west of Hanaroora [Honolulu]. . . . We passed by footpaths, winding through an extensive and fertile plain, the whole of which is in the highest state of cultivation. Every stream was carefully embanked, to supply water for the taro beds. Where there was not water, the land was under crops of yams and sweet potatoes [Campbell 1967:103-104].

> Pearl and mother of-pearl shells are found here in considerable quantity. Since the king has learned of their value, he has kept the fishing to himself, and employs divers for the purpose [Campbell 1967:114-115].

Subsequent to western contact in the area, the landscape of the ‘Ewa plains and Wai‘anae slopes was adversely affected by the removal of the sandalwood forest, and the introduction of domesticated animals and new vegetation species. Domesticated animals, including goats, sheep and cattle, were brought to the Hawaiian Islands by Vancouver in the early 1790s, and allowed to graze freely about the land for some time after. It is unclear when the domesticated animals were brought to O‘ahu; however, L.A. Henke reports the existence of a longhorn cattle ranch in Wai‘anae by at least 1840 (Frierson 1972:10). During this same time, perhaps as early as 1790, exotic vegetation species were introduced to the area. These typically included vegetation best suited to a terrain disturbed by the logging of sandalwood forest and eroded by animal grazing.

At contact, the most populous *ahupua‘a* on the island was Honouliuli, with the majority of the population centered on Pearl Harbor. In 1832, a missionary census of Honouliuli recorded the population as 1,026. Within four years, the population was down to 870 (Schmitt 1973:19, 22). In 1835, there were eight to ten deaths for every birth (Kelly 1991:157-158). Between 1848 and 1853, there was a series of epidemics of measles, influenza, and whooping cough that often wiped out whole villages. In 1853, the population of ‘Ewa and Wai‘anae combined was 2,451 people. In 1872, it was 1,671 (Schmitt 1968:71). The inland area of ‘Ewa was probably abandoned by the mid-nineteenth century, due to population decline and consolidation of the remaining people in the town of Honouliuli (at Kapapapūhi Point). A detailed discussion of the historic population counts in the ‘Ewa District has been presented by Charvet-Pond and Davis (1992).

3.1.3 Protestant Missionaries in ‘Ewa

Sereno Bishop, recollecting his life at the mission station in ‘Ewa in the mid-eighteenth century commented on the population decline.

> Throughout the district of Ewa the common people were generally well fed. Owing to the decay of population great breadths of taro marsh had fallen into disuse, and there was a surplus of soil and water for raising food [Bishop 1916:44].

Schools were established early by Christian missionaries. In 1828, the missionary Levi Chamberlain toured the island of O‘ahu, traveling counter-clockwise around the coast, visiting the schools, and stopping at the more populous villages to preach sermons. Traveling from Waimānalo (the western section of Honouliuli Ahupua‘a) along the inland trail that passes Pu‘uokapolei, he stopped in the village of Honouliuli.

> At 10 minutes before 8 o’ck, after thanking our king host [in Waimānalo] for his attention to us, we set out for the next district. In consequence of the recent heavy rains the roads were very muddy, & the traveling very bad. We had met with nothing like it in any part of our previous traveling. After walking three hours & most of the time in mud we reached Honouliuli in the district of Ewa. A school of 22 scholars had assembled which I examined. The head man Kawaa very kindly

> entertained me, caused a fowl to be cooked and some kalo to be nicely prepared; and furnished the natives with a liberal supply of fish and poi [Chamberlain 1956:39].

The first mission station in ‘Ewa was established in 1834 near Pearl Harbor, in the *ahupua‘a* of Wai‘awa (east of Honouliuli Ahupua‘a). Sereno Bishop, son of the missionary Artemas Bishop, pastor of the first ‘Ewa church, describes the early efforts of the missionaries.

> Our predecessors at Ewa were Rev. and Mrs. Lowell Smith, specially capable and devoted missionaries who had been only two years in the field. Mr. Smith had built a comfortable house of adobe bricks, thatched with grass and well plastered inside and out. He had also erected the adobe walls of a church, capable of holding an audience of about one thousand people. . . . The architecture of . . . the Ewa church was simple and homely. The adobe walls fifteen feet high were covered by a steeply pitched roof, which extended out in a verandah on all four sides, in order to protect the base of the mud walls from being destroyed by raindrip. The timbers of the roof were long beams dragged from the mountains entirely by human strength, the labor being secured by volunteering, under the leadership of the chiefs.
>
> The mission house was located on the west bank of the Waiawa creek, about one-fourth mile northwest of the present railway station at Pearl City. There was nearly an acre of ground enclosed in an adobe wall [Bishop 1916:41-42].

Charles Wilkes, of the U.S. Exploring Expedition visited this missionary enclave in 1840.

> At Ewa, Mr. Bishop has a large congregation. The village comprises about fifty houses, and the country around is dotted with them. The village presents an appearance o health and cleanliness, clearly indicating the influence Mr. Bishop has exerted over his flock, in managing which he is much aided by his lady.
>
> The church is a large adobe building, situated on the top of a small hill, and will accommodate a great number of persons. Mr. Bishop sometimes preaches to two thousand persons.
>
> The natives have made some advance in the arts of civilized life; there is a sugar-mill which, in the season, makes two hundred pounds of sugar a day. . . . In 1840, the church contained nine hundred members, seven hundred and sixty of whom belonged to Ewa, the remainder to Waianae; but the Catholics have now established themselves at both these places, and it is understood are drawing off many from their attendance on Mr. Bishop’s church [Wilkes 1970:80-81].

The earliest maps of Honouliuli show a cluster of habitations at the western edge of West Loch, in the vicinity of Kapapapūhi Point. This area later became Honouliuli Village, with the agricultural lands, the “taro lands” west of the village along Honouliuli Gulch. A Monsarrat survey map of 1878 documents substantial settlement at the “Honouliuli Taro Lands” in the Kapapapūhi Point area, and it seems clear that in early historic times, this was the focus of the

population of Honouliuli. The amenities of the area - including fishponds, taro *lo‘i*, abundant shellfish, and salt pans - would have focused population there in pre-Contact times as well.

3.1.4 The Catholic Church

An 1881 Hawai‘i Government Survey map of O‘ahu (Figure 9) shows a “Church” south of the project parcel. This church was the Kapalani Catholic Church. This church and associated schoolhouse is believed to have been the site of the ministry of a particularly notable person, Kepelino Keauokalani.

There are two Land Court Application (LCA) documents that make reference to a Catholic Church near the town of Honouliuli. Kaohai in April of 1850 (LCA 5670B) claimed a house site in the ‘*ili* of Polapola “adjoining the Catholic Chapel yard.” Hilinae (LCA 1720) in November of 1847 made a houselot claim in the ‘*ili* of Polapola bounded on the west by the Kapalani Church. Little is known about the Kapalani Roman Catholic Church. It is the lone “church” pictured on an 1881 map showing Honouliuli Ahupua‘a (see Figure 15). Even the name is uncertain, as Kapalani probably means “the Frenchmen’s” church.

Efforts to found a Catholic Mission in Hawai‘i were initially met with hostility until the issuing of an edict of toleration in 1839. The establishment of the Catholic Mission in Hawai‘i in May of 1849 initiated an active period of building churches and schools. The Kapalani church (and school house) cited in the Land Court Application of Hilinae in November of 1847 must have been constructed within the previous seven years. Father Raymond Delande was pastor of the Leeward District of the church from 1857-1885 and, operating out of Honouliuli, he covered an area extending as far as Makaha and Waialua. “Up to 1877, he had baptized 600 children and adults, all living along the SW coast of Oahu” (Schoofs 1978:110).

Of particular interest is the association with this church of Kahoali‘ikumaieiwakamoku Kepelino (Zepherino) Keauokalani, whose name means “to-be-the-chief-of-the-nine-districts” (Beckwith 1978:4). His father was Namiki, of the lineage of the high priest Pa‘ao and his mother, Kahiwa Kaneikopulei, was a daughter of Kamehameha I. They had two children, the son Kepelino, and a daughter named Puahau. Namiki was the “old savage” whose narratives were collected by Jules Remy as “Contributions of a Venerable Savage to the Ancient History of the Hawaiian Islands” during his travels in the islands between 1851 and 1855. In a note on a section concerning the priest Pā’ao, the author talks about Namiki’s son, who he met in 1853.

> The old historian Namiki, an intelligent man, and well versed in the secrets of Hawaiian antiquity, has left precious unedited documents, which have fallen into our hands. His son, Kuikauai, a school-master at Kailua, one of the true historico-sacerdotal race, has given us a genealogy of his ancestors which ascends without break to Paao [Remy 1859, in Nordhoff 1874:253].

The family was of Kailua, Kona, Hawai‘i and converted to Catholicism very quickly after the arrival of Fathers Walsh and Ernest Herutel of the Catholic Mission to Kona in 1840. His parents sent him to Catholic school in Honolulu in 1845 to become a teacher. Father Ernest writes:

> Father Martial writes me about our little Zepherin, telling me that he has been received as teacher but that because they have no school to give him as yet, he has

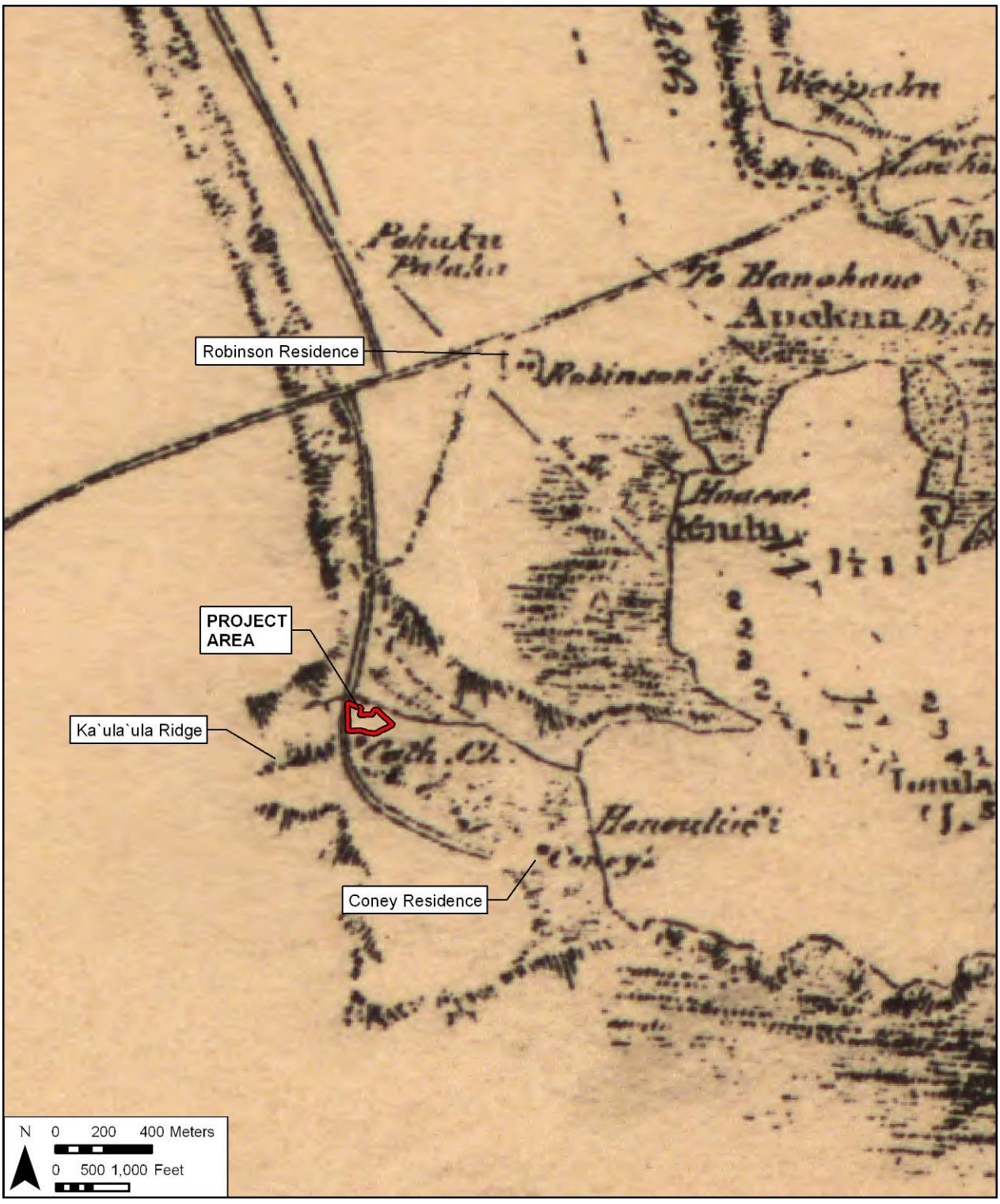

Figure 9. 1881 Hawai‘i Government Survey map of O‘ahu, showing the “cliff of Kaulaula” along the southern border of LCA 749 to Mahina, location of Robinson residence, Catholic Church, and Coney residence

> not received his diploma. Father Desire wants to keep him to send to the High School; but when will you have a High School? Perhaps not so soon. I think therefore that Zepherin would be more useful here as we lack teachers [cited in Beckwith 1978:4].

As noted above, Remy claims that at some point, Kepelino was a school teacher in Kailua; although Remy is believed to have met Kepelino in 1853, his teaching position at Kailua could have dated to an earlier period, possibly around 1845, when Father Ernst suggested that he return to the island of Hawai‘i from Honolulu. At some point he attended the Catholic High School at ‘Āhuimanu (established in 1846), where he is said "to have acquired English, French, Latin, and Greek" (Beckwith 1978:5). In 1847, at the age of 17, he was sent briefly with Father Ernest to Tahiti to help establish a Catholic mission. He developed a reputation for his pranks and was sent back to his parents (Beckwith 1978:5).

Controversial letters under the name of Z. Kahoali‘i, addressed from the town of Honouliuli on O‘ahu, were published in Catholic newspapers from 1860-1869. A letter in the Public Instruction Correspondence filed and dated 11/26/1851, written by a school teacher name Naheona to the Minister of Public Education, state his reasons for the rejection of a teacher "Kepilina" and accuses Kepilina of "dancing and thieving while employed as teacher of Honouliuli School and of general improper conduct." The letter also mentions "Catholic priests in the area who have been among the people for a while who do not recommend retaining Kepilina" (In Silva 1987:A8). It seems quite probable that Kepelino lived at Honouliuli from 1851 into the 1870s, and that as a devout Catholic and teacher, he taught at the school house next to Kapalani Church.

Detailed biographic information on Kepelino is not readily available, which is probably due in part to the fact that he was "controversial" for the Catholics and for the government. He went on to become Queen Emma's secretary (by at least 1874) and was one of the most important documenters about Hawaiian beliefs and traditions. He supported Queen Emma as the heir of King Lunalilo over David Kalākaua, and wrote letters to the king of Italy and the queen of England, asking for warships to support Queen Emma's cause. In 1874, the newly elected King Kālakaua had him tried for high treason and sentenced him to hanging, but the sentence was commuted and he was released from prison in 1876; he died in 1878 (Day 1984:77).

"The Honouliuli church . . . had by the 1880s outlived its usefulness and become dilapidated. It was therefore abandoned and replaced by a simple structure close, too close to the mill" [at ‘Ewa Village, south of the project area] (Schoofs 1978:111). However, "in 1891 Honouliuli was still important enough to acquire its own Catholic cemetery" (Schoofs 1978:110). Whether this cemetery or any other Catholic cemetery was on the grounds of the Kapalani Church is unknown. In the late 1920s, Bishop Alencastre exchanged land at Honouliuli with Campbell Estate for land at ‘Ewa Village to establish a new church.

3.2 Mid-Nineteenth Century and the Māhele

The Organic Acts of 1845 and 1846 initiated the process of the *māhele* - the division of Hawaiian lands, which introduced private property into Hawaiian society. In 1848, the crown

and the *ali‘i* (chiefly class) received their land titles. The common people received their *kuleana* (individual parcels) in 1850.

In 1855, the Land Commission awarded all of the unclaimed lands in Honouliuli, 43,250 acres, to Miriam Ke‘ahikuni Kekau‘ōnohi (Royal Patent #6971 in 1877; Parcel #1069 in the Land Court office), a granddaughter of Kamehameha I, and the heir of Kalanimōkū, who had been given the land by Kamehameha after the conquest of O‘ahu (Indices of Awards 1929; Kame‘eleihiwa 1992). Kekau‘ōnohi was also awarded the *ahupua‘a* of Pu‘uloa, but she sold this land in 1849 to Isaac Montgomery, a British lawyer.

Kekau‘ōnohi was one of Liholiho’s (Kamehameha II’s) wives, and after his death, she lived with her half-brother, Luanu‘u Kahalai‘a, who was governor of Kaua‘i. Subsequently, Kekau‘ōnohi ran away with Queen Ka‘ahumanu’s stepson, Keli‘iahonui, and then became the wife of Chief Levi Ha‘alelea. Upon her death on June 2, 1851, all her property was passed on to her husband and his heirs. A lawsuit (Civil Court Case No. 348) was brought by Ha‘alelea in 1858, to reclaim the fishing rights of the Pu‘uloa fisheries from Isaac Montgomery, and the court ruled in Ha‘alaea’s favor. In 1863, the owners of the *kuleana* lands deeded their lands back to Ha‘alelea to pay off debts owed to him (Frierson 1972:12). In 1864, Ha‘alelea died, and his second wife, Anadelia Amoe, transferred ownership of the land to her sister’s husband John Coney (Yoklavich et al 1995:16). Coney’s residence can be seen south of the project area on an 1881 map of O‘ahu (see Figure 9).

During the *Māhele* of 1848, 72 individual land claims in the *ahupua‘a* of Honouliuli were registered and awarded by King Kamehameha III (data from waihona.com). The 72 *kuleana* awards given to commoners, were almost all made adjacent to Honouliuli Gulch, which contained fishponds and irrigated taro fields. An 1878 map of the “Taro Lands” by Monsarrat shows the pattern of these claims. Figure 10 is a reproduction of this map, with the *‘ili* (land divisions within the *ahupua‘a*) names mentioned in the Land Court Award testimonies. This map shows that the project area was within the *‘ili* of Ka‘ula‘ula, which is also used as the name of ridge on the southern edge of the *‘ili.* The land use for the LCA parcels in each *‘ili* is given in Table 1.

The 1878 Monsarrat map, which labels parcels by the awardee, was used as the basis for Figure 11, an outline map of the LCA parcels. Information from a 1937 Land Court Application map (LCAp 1069), which designates the parcels by LCA number, was added to this outline map. LCA parcels which are within, or adjacent to, the project area are listed in Table 2.

According to Figure 11, the project area overlaps LCA 947 to Ka‘ōpala and LCA 749 to Mahina. The entire text of these two LCA parcels is presented in Appendix A. Ka‘ōpala received five lots, with 22 *kalo lo‘i,* according to the LCA testimony, although there are 8 numbered lots on the 1878 map. The lot labeled 6 on the map seems to be the house lot, ‘Āpana (lot) 1, described in the testimony. Ka‘ōpala stated:

> The President of the Land Commissioners, Greetings: I hereby tell you of my land claim which is at Loloulu, Honouliuli, ‘Ewa, Island of Oahu. It is bounded on the north by the *pō‘alima* [land worked by tenants] of Kihewa, on the east by the land of Mahae, on the south by the land of Kāneaola, on the west by the land of Keli‘i‘a‘a and the houses of Po‘opu‘u. **Kapoli also has a claim at this place**

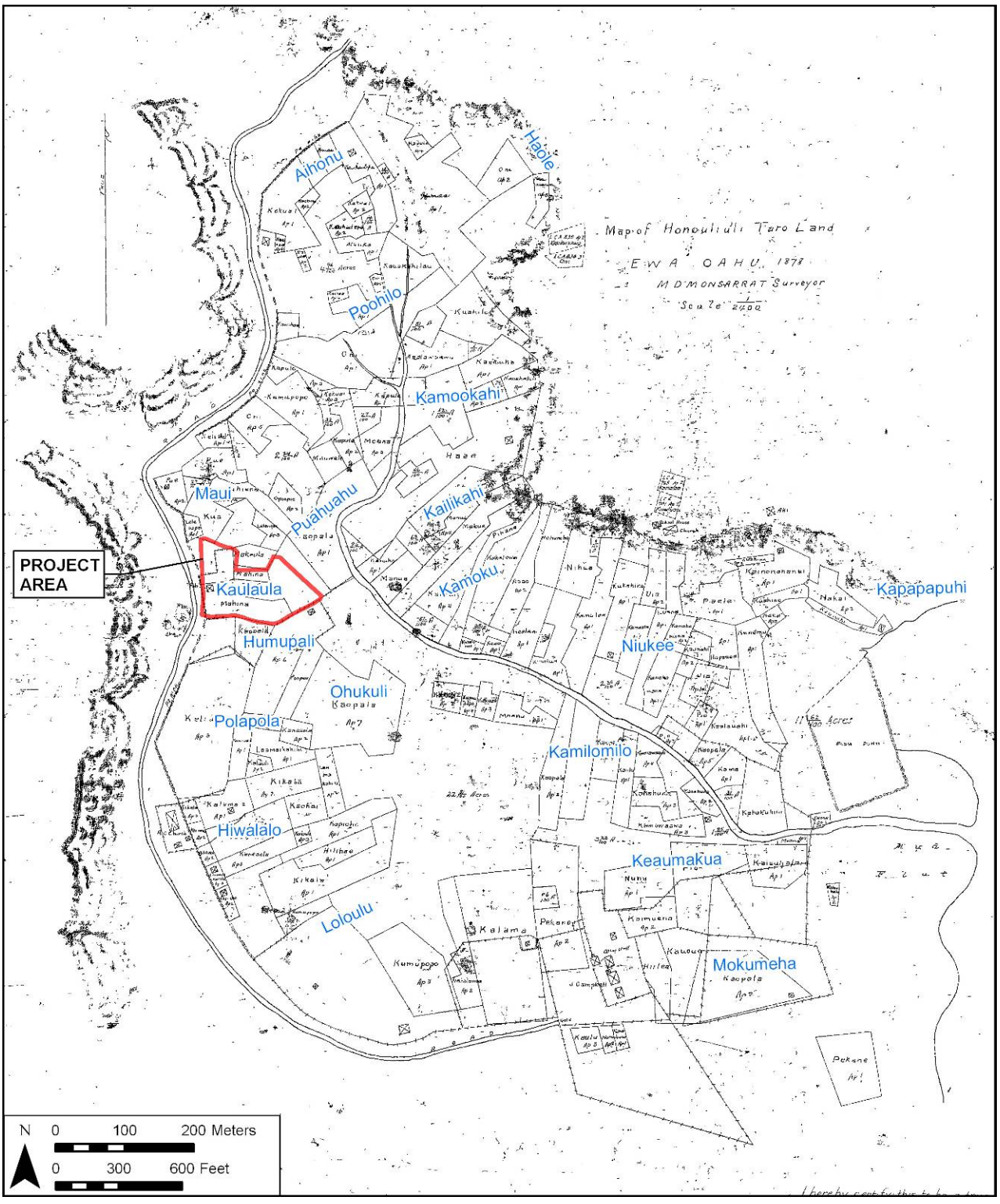

Figure 10. 1878 Hawaiian Government Survey map of Honouliuli “Taro Lands” by M. E. Monsarrat, showing location of project area in the ‘*ili* of Ka‘ula‘ula; *‘ili* names have been added to the map

Table 1. Land use and boundary marks recorded in Honouliuli Taro Lands LCA testimony

‘Ili	**Land Use and Boundary Landmarks**
Ka‘aumakua	Houselots, *kalo* (taro) patches; *kula* (pasture/dryland agriculture), two fishponds called Mokumeha; *kula ālialia* (salt plains), land division wall, Pānāhāhā *loko* (fishpond), Kalahu fishpond, Naholowaa pond, Honouliuli Stream (called Makai‘i Stream), or *‘aka‘akai* (bulrushes) of Kamo‘okahi
Kaihuopala‘ai	*Mo‘o* (arable land in a long strip); on lot bounded by ‘*auwai* (irrigation ditch) called Panaenui
Ka‘ilikahi	Houselot and *kalo* patches; landmarks – highway, Kauhipuna *pali* (cliff), *lapalapa* (*panax*) thickets, meeting house
Kamilomilo	Houselot and *kalo* patches
Kamoku	Fenced *mo‘o kalo*, *lo‘i* (irrigated fields) *kalo*, houselot; landmarks – Kauhipuna *pali*
Kamo‘okahi	Bulrushes
Kapapapūhi	Houselots, vineyard, *kula*, pond, trails, hog pens, and salt beds
Ka‘ula‘ula	*Mo‘o* next to Kaulaula (cliff) with a houselot and a wall
Kumupali [Humupali]	Houselot, *kalo* patches
Loloulu/ Pua‘alu‘u	*Kalo* patches, 1/3 of a fishpond (in land of Kahakuli‘ili‘i), *hala* (pandanus) grove, pig pens, breadfruit, bulrushes; *lo‘i,* houselot
Maui	*Kalo* patches, *kula*, houselots, bounded by *pā‘āina a ke Aupuni* (land division wall of the government)
Mokumeha	Two fishponds, salt beds (western one called Kohumakahou)
Niuke‘e/ Kapāpahi/ Maka‘u	*Kalo* patches, *kula*, potato field, houselots; landmarks - *loko kalo* (taro/ fishpond) of Nihola, Loko‘eli pond, Kehewanakawalu pond, Kalokoiki pond, *pali* of Kihewamakawela; Ka‘akau *pali*; Ka‘akau community, meeting house, prison plot, cattle fences
Polapola/ Hiwalalo	*Kalo* patches; houselots, school house, prison plot; some bounded by *pā‘āina a ke Aupini,* or high road from the sea, or Catholic Chapel yard
Pō‘ohilo/ Aihonu/ Haole	*Kula*, *kalo* patches, *loko kalo*, houselots; landmarks - *pā‘āina,* Ka‘aimanō fishpond, *kula* of Kahakai, *loko kalo* of Kalokoloa, Aimea Pond, Waianu pond, Kahui pond, Ka‘aimano fishpond, *pupulu* cave (wet cave?), prison plot, Makaakua *pali*, Puehuehu Stream, Puehuehu road

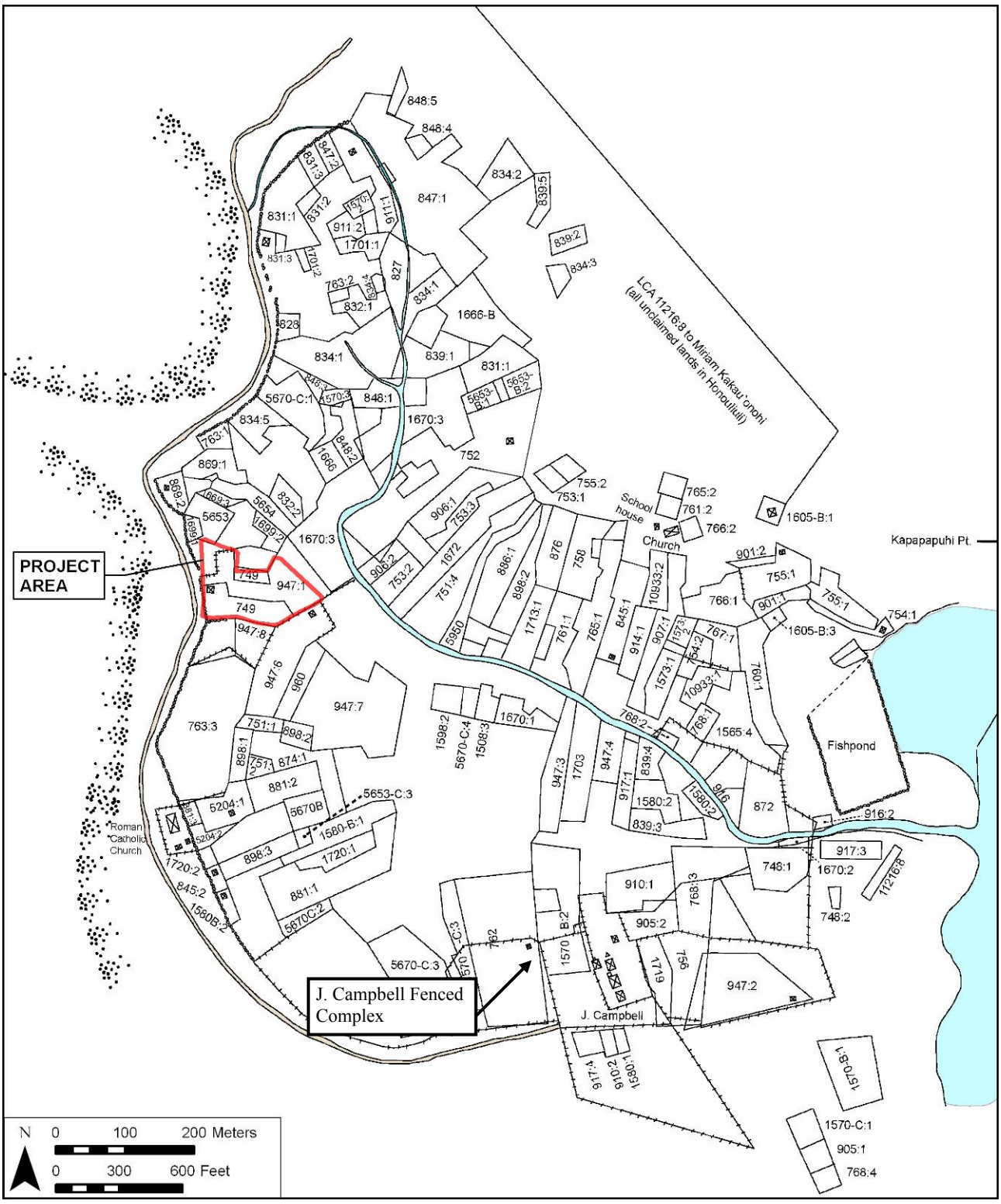

Figure 11. Outline of 1878 Monsarrat map (with additional information from Land Court Application Map 1069) showing location and number designations of LCA parcels

Table 2. Land Court Awards (LCA) for parcels within and adjacent to project area

LCA	Awardee	‘Ili	Land Use for ‘*āpana*
749	Mahina	Ka‘ula‘ula	‘Āpana 1. a *mo‘o* (long stretch of land), bounded on the Wai‘anae side by a *pali* (cliff) with a wall on top of it. There is one house in the enclosed lot.
947:1 947:6	Ka‘ōpala	Loloulu [?]	‘Āpana 1. a houselot with one *kalo* patch with belongs to Nāmau‘u. Āpana 6. *kalo* patches
763:1 763:3	Keli‘i‘a‘a	Maui	‘Āpana 1. a houselot, with four houses, bounded on the Wai‘anae side by a ravine. ‘Āpana 3. land planted with approximately thirteen *kalo* (taro) patches.
832:2	‘Ōpiopio	Po‘ohilo	‘Āpana 2. a *kula* (pasture or dryland agriculture) patch
869:1 869:2	Pu‘e	Maui	‘Āpana 1. a house lot with two houses, one for Pu‘e and the other for Pū‘ali, Pue’s father-in-law ‘Āpana 2. *kula* land, bounded on the *makai* side by the *pā‘āina* (wall or fence)
947:1 947:6	Ka‘ōpala	Loloulu [?]	‘Āpana 1. a houselot with one *kalo* patch with belongs to Nāmau‘u. Āpana 6. *kalo* patches
960	Po‘opu‘u	Loloulu	‘Āpana 1. a houselot with one house, bounded entirely by the land of Ka‘ōpala (LCA 947)
1699:1 1699:2 1699:3	Leleiaupa	Maui	No description of the land provided in the Native Register [3:217]
5653:5	Kua	Maui	‘Āpana 1. a *mo‘oāina* (narrow strip of land within an ‘*ili*) with two *lo‘i* (irrigated fields) and a *kula*

which is called Kumupali which I am taking care of [Āpana 6 on map]. The second of my claims is bounded on the north by the stream of Makai‘i, on the east by a *pō‘alima*, on the south and west also, by a *pō‘alima*. My third claim is bounded on the north by a *pō‘alima*, on the east by the land of Kekua and Kumupopo, on the south by bulrushes, on the west by the land of Koakanu. The third /*sic*/ of my claims is at Ka‘aumakua, Honouliuli and is bounded on the north by the Pond of Kauhimakahou, on the east by the land fence, on the south by the

> land fence, on the west by the land of Keoneo. **My house claim is at Ka‘ula‘ula in Honouliuli, standing by the houses of Mahine** [*sic*].
>
> KAOPALA X
>
> Kama, sworn, and confirmed the entire testimony about the *kalo* lands but knew nothing about **the house lot**. Note. There is one kalo patch in the **house lot** as it has been defined, belonging to Namauu.

LCA 749 was awarded to Mahina. There were two lots, although they are not numbered separately on Figure 11. The land was used to grow taro and had one house. Mahina stated:

> To the Honorable Land Commissioners of the Hawaiian Islands, Greetings: I hereby tell you of my claim. This land is at **Ka‘ula‘ula,** Honouliuli, Ewa, Island of O‘ahu. It is bounded on the north by the irrigated terraces of Ha‘ae *ma*, on the east by the land of Puehu, on the south by the houses of Opo‘opu, on the west by the **fenced land of Ka‘ula‘ula and the cliff of Ka‘ula‘ula** and also some houses of mine which stand there.
>
> Here is the second: bounded on the north by the land of Koi, on the east by the land of Puehu, on the south by the irrigated land of Ha‘ae, on the west the houses of Kauhika‘ula and Koakanu. My **residence** there has been continuous; it was from Ha‘ae.
>
> MAHINA

3.3 Late Nineteenth Century

3.3.1 Early Ranching on the ‘Ewa Plain

John Coney rented the land to James Dowsett and John Meek in 1871, who used the land for cattle grazing. In 1877, the land, except for the ‘*ili* of Pu‘uloa, was sold to James Campbell. He drove off 32,237 head of stock belonging to Dowsett, Meek, and James Robinson and constructed a fence around the outer boundary of his property (Bordner and Silva 1983:C-12). The residence of Robinson was located north of the project area, shown on an 1881 map of O‘ahu (see Figure 9). A large fenced-in complex labeled “J. Campbell” is shown on an 1878 map, southeast of the project area. Campbell let the land rest for one year and then began to restock the ranch, so that he had a head of 5,500 head after a few years (Dillingham 1885, cited in Frierson 1972:14)

In 1880-81, the Honouliuli ranch was described as:

> . . . Acreage, 43,250, all in pasture, but possessing fertile soils suitable for agriculture; affords grazing for such valuable stock. The length of this estate is no less than 18 miles. It extends to within less than a mile of the sea coast, to the westward of the Pearl River inlet. . . . There are valuable fisheries attached to this estate . . . . [Bowser 1880:489].

> From Mr. Campbell’s veranda, looking eastward, you have one of the most splendid sights imaginable. Below the house there are two lochs, or lagoons, covered with water fowl, and celebrated for their plentiful supply of fish, chiefly mullet. . . . Besides Mr. Campbell’s residence, which is pleasantly situated and surrounded with ornamental and shade trees, there are at Honouliuli two churches and a school house, with a little village of native huts [Bowser 1880:495].

The two churches are illustrated on the 1878 Taro Lands map (see Figure 11), the Catholic Church south and a Protestant Church east (near Pearl Harbor) of the project area. In 1881, a medical student, touring the island to provide smallpox vaccinations to the population, viewed Campbell’s property, called the Honouliuli Ranch:

> I took a ride over the Honouliuli Ranch which is quite romantic. The soil is a deep, reddish loam, up to the highest peaks, and the country is well-grassed. Springs of water abound. The ilima, which grows in endless quantities on the plains of this ranch, is considered excellent for feeding cattle; beside it grows the indigo plant, whose young shoots are also good fodder, of which the cattle are fond. Beneath these grows the manieizie grass, and Spanish clover and native grasses grow in the open; so there is abundant pasturage of various kinds here. As I rode, to the left were towering mountains and gaping gorges; ahead, undulating plains, and to the right, creeks and indentations from the sea. A wide valley of fertile land extends between the Nuuanu Range and the Waianae Mountains and thence to the coast of Waialua. There are many wild goats in this valley, which are left more or less undisturbed because they kill the growth of mimosa bushes,

> which would otherwise overrun the country and destroy the pasturage for cattle [Briggs 1926:62-63].

Most of Campbell's lands in Honouliuli were used exclusively for cattle ranching. At that time, one planter remarked "the country was so dry and full of bottomless cracks and fissures that water would all be lost and irrigation impracticable" (Ewa Plantation Co. 1923:6-7). In 1879, Campbell brought in a well-driller from California to search the ‘Ewa plains for water, and the well, drilled to a depth of 240 feet near Campbell's home in ‘Ewa, resulted in ". . . a sheet of pure water flowing like a dome of glass from all sides of the well casing" (The Legacy of James Campbell n.d., cited in Pagliaro 1987:3). Following this discovery, plantation developers and ranchers drilled numerous wells in search of the valuable resource.

Campbell set up several other enterprises in the *ahupua'a*, including a rice farm, a lime quarry, commercial *kiawe* cutting, and fisheries. Some sugar cane was grown in the area above the main pasturelands and the mountains.

3.3.2 History of the Ewa Sugar Plantation

In 1886, Campbell and B. F. Dillingham put together the "Great Land Colonization Scheme," which was an attempt to sell Honouliuli land to homesteaders (Thrum 1886:74). This homestead idea failed, but with the water problem solved by the drilling of artesian wells, Dillingham decided that the area could be used instead for large-scale cultivation (Pagliaro 1987:4). During the last decade of the nineteenth century, Dillingham built the lines for the Oahu Land and Railway Co. (OR&L), in part to transport the new sugar cane products. The railroad would reach from Honolulu to Pearl City in 1890, to Wai‘anae in 1895, to Waialua Plantation in 1898, and to Kahuku in 1899 (Kuykendall 1967:III, 100). This railroad line eventually ran across the center of the ‘Ewa Plain at the lower boundary of the sugar fields.

To attract business to his new railroad system, Dillingham subleased all land below 200 ft to William Castle, who in turn sublet the area to the newly-formed Ewa Plantation Company (Frierson 1972:15). Dillingham's Honouliuli lands above 200 ft that were suitable for sugar cane cultivation were sublet to the Oahu Sugar Company. Throughout this time, and continuing into modern times, cattle ranching continued in the area, and Honouliuli Ranch - established by Dillingham was - the "fattening" area for the other ranches (Frierson 1972:15).

Ewa Plantation Company was incorporated in 1890 for sugar cane cultivation. The project area in relation to the numbered sugar cane fields is shown in Figure 12. The first crop, 2,849 tons of sugar, was harvested in 1892 at the Ewa Plantation. Ewa was the first all-artesian plantation, and it gave an impressive demonstration of the part artesian wells were to play in the later history of the Hawaiian sugar industry (Kuykendall 1967:III, 69). As a means to generate soil deposition on the coral plain and increase arable land in the lowlands, the Ewa Plantation Company installed ditches running from the lower slopes of the mountain range to the lowlands. When the rainy season began, they plowed ground perpendicular to the slope so that

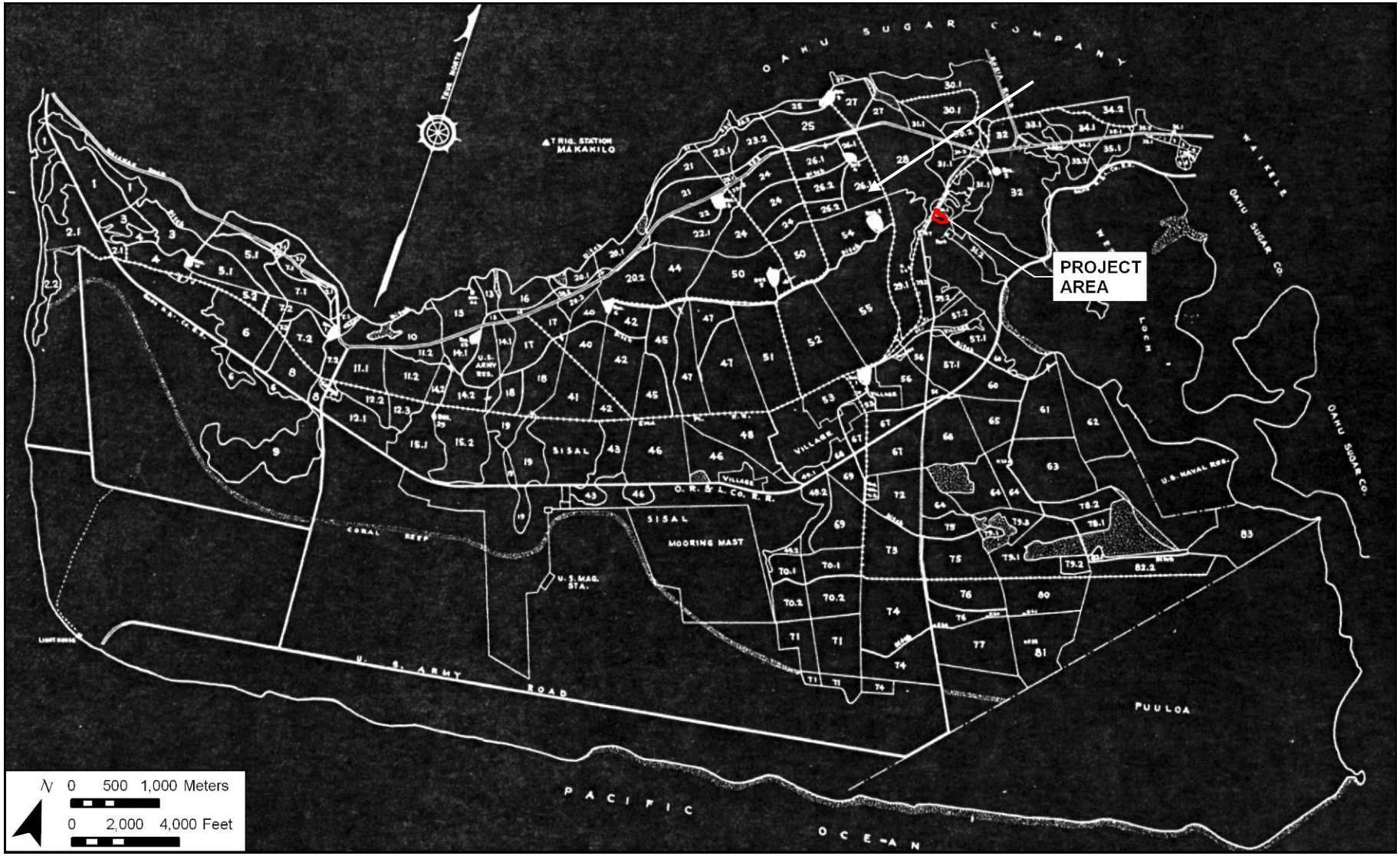

Figure 12. 1939 map of the Ewa Plantation Co. lands, showing project area (outlined in red).

soil would be carried down the drainage ditches into the lower coral plain. After a few years, approximately 373 acres of coral wasteland were reclaimed in this manner (Immisch 1964). It is uncertain if there was also a deliberate effort to induce erosion on the scarp (Ka‘ula‘ula cliff, which was called Evans Bluff by the Campbell Estate), near the southern boundary of the project area, but it would have been easy to do and probably very effective. By the 1920s, Ewa Plantation was generating large profits and was the "richest sugar plantation in the world" (*Paradise of the Pacific,* Dec. 1902:19-22, cited in Kelly 1985:171).

Just north of ‘Ewa Plantation was the equally sprawling O‘ahu Sugar Company which "covered some 20 square miles . . . ranging in elevation from 10 feet at the Waipio Peninsula . . . to 700 feet at the Waiahole Ditch" (Condé and Best 1973:313). The Oahu Sugar Company was incorporated in 1897. Prior to commercial sugar cultivation, the lands occupied by the Oahu Sugar Company were described as being "of near desert proportion until water was supplied from drilled artesian wells and the Waiahole Water project" (Condé and Best 1973:313). The Oahu Sugar Company took control of the Ewa Plantation lands in 1970 and continued operations until 1995, when they decided to shut down sugar cane production in the combined plantation area (Dorrance and Morgan 2000:45, 50).

3.3.3 Other Enterprises in Honouliuli

One of the first enterprises in Honouliuli in the post-Contact period was the making of salt. Soon after Kekau‘ōnohi sold the land of Pu‘uloa to Isaac Montgomery in 1849, the king (Kamehameha III) and Montgomery entered into a partnership to run the salt works in Pu‘uloa. Kamakau (1961:409) reported "The king and Isaac of Pu‘uloa are getting rich by running the salt water into patches and trading salt with other islands." The salt was also sent to Russian settlements in the Pacific Northwest, where it was used to pack salmon (*Hawaiian Gazette,* January 29, 1897).

Salt pans are shown near Honouliuli town on the 1897 U.S. Navy map of the Pearl Lochs (Figure 13), east of the project area. Carol Silva (1987:A-4) referenced the following 1861 newspaper account, to describe the salt works on the West Loch of Pearl Harbor near the project area:

> An extensive and antiquated system of salt works operated on the shore of the Honouliuli lobe of West Loch. Another salt works was situated further seaward at Puuloa. The Puuloa Salt Works had beginnings that were traceable to the 1820's and possibly even much earlier. By 1861, 100 acres had been devoted to the production of salt [*Pacific Commercial Advertiser* 4/18/1861:1].

The Chinese were involved in salt production around Pearl Harbor, usually in concert with their management of fishponds. One son of a Chinese resident of the area, Mau Yung Kui, the groundkeeper of the John ‘I‘ī estate in Waipi‘o, remembered [for ca. 1900] the Chinese form of salt production from salt pans bordering the sea, which were fed continually with seawater by the tides.

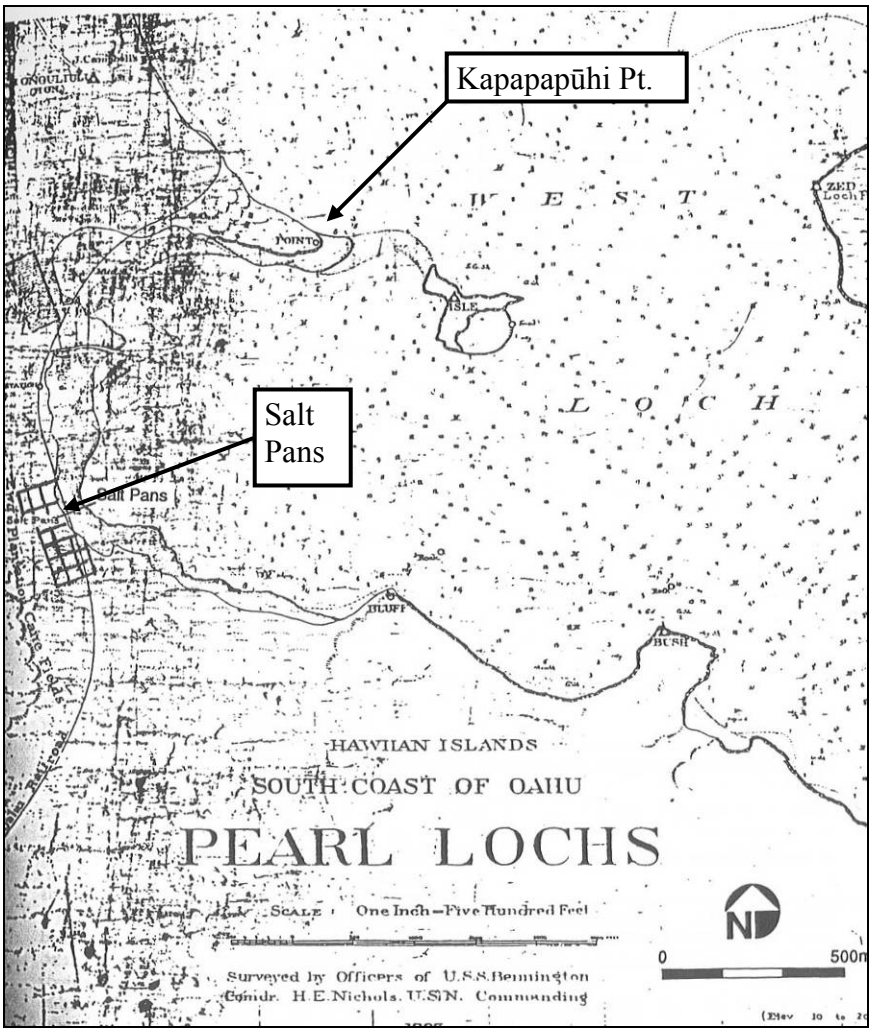

Figure 13. 1897 U.S. Navy map of the Pearl Lochs, showing “salt pans” south of Kapapapūhi Point on the West Loch of Pearl Harbor

> Both the natural tides and the Chinese method of peddling a wooden wheel that transported water upward, helped to keep the salt beds damp with about three inches of water. After a few months, the senior Mau would drain off the remaining water and use a wooden rake with deep prongs to break up the salt. When the bed was dry a flat rake was used to flatten and smooth out the salt. Later it was raked into piles, packed in cloth bags and distributed. . . . Past the rice fields of Hō‘ae‘ae and the beginning of Honouliuli were a number of productive salt flats adjacent to the ancient fishponds operated by Chinese at the turn of the century [Chong 1988:108].

As noted above, part of Mr. Campbell’s lands were also used to grow rice. By 1885, 200 acres in Honouliuli were used for rice and 50 acres were used to grow bananas (article in *Pacific Commercial Advertiser*, August 15, 1885, summarized in Silva 1987:A-12). These rice fields were planted in former taro fields or in undeveloped swamps, such as those near the project area

adjacent to Pearl Harbor, as can be seen in a 1899 Hawaiian Government Survey map (Figure 14). In 1882, the rice fields were described by Frank Damon during a tour of the area.

> . . . Towards evening we reached Honouliuli, where the whole valley is leased to rice planters . . . This was one of the largest rice plantations we visited. Sometimes two or three men only, have a few fields which they cultivate for themselves, and we often too came upon houses where there were eight or ten men working their own land. But the larger plantations are owned by merchants in Honolulu, who have a manager acting for them. . . . [Damon 1882:37].

Although many of the fishponds at Pearl Harbor deteriorated from lack of care and lack of people to maintain them in the early nineteenth century, there was some action to reclaim these areas in the later part of the century. Some were converted to rice fields, but others were maintained as fish ponds or duck ponds. Records of the Minister of Public Instruction (1848) show that some ponds were maintained by local teachers and students, with the funds generated used for the upkeep of the school system. Some ponds as early as 1848 were also maintained by prisoners, possibly from the women's prison located at Honouliuli. In 1852, however, Levi Ha‘alelea reasserted his claims to these neglected lands, when he claimed all of the mullet from this area should be reserved to him (Hawaii Kingdom files, cited in Silva 1987:A-7 to A-9). During James Campbell's tenure of the land, fish ponds and Pu‘uloa fishing rights were leased out to various entrepreneurs (Kelly 1985:175).

3.3.4 Twentieth Century

Into the early twentieth century, some Hawaiian families continued to live in Honouliuli and preserve the traditional lifestyle, including at the fishing village of Kualaka‘i. One resident, Mrs. Eli Williamson, recalled:

> In the Honouliuli area the train stopped among the *kiawe* (algaraboa) trees and *malina* (sisal) thickets. We disembarked with the assorted food bundles and water containers. Some of the Kualaka‘i ‘*ohana* (family) met us to help carry the ‘*ukana* (bundles) along a sandstone pathway through the *kiawe* and *malina*. The distance to the frame house near the shore seemed long. When we departed our ‘*ukana* contained fresh lobsters, *limu* (algae), fish and *i‘a malo‘o* (dried fish) . . . [Williamson, in Kelly 1985:160].

The series of historic maps on the following pages give a good indication of land use from the early 1900s through the 1970s. A portion of a 1902 survey map by Wall shows the current project area as partially within lands used for wetland taro and rice farming within Ewa Plantation (Figure 15). At the time this map was produced, there appeared to be no structures in the project area. A 1919 War Department map indicates development of the project area and vicinity near Fort Weaver Road (Figure 16); while a 1927-1928 U.S. Geological Survey map indicates further development of the area near the road (Figure 17). A 1943 War Department map shows reduced development of Honouliuli, however the project area remains unchanged (Figure 18). The 1953 Army Map Service map indicates a decline in the number of structures in the project area, however there is a significant increase in development in the immediate vicinity (Figure 19). An aerial photo of the project area and vicinity indicates further decline of

development in the project area by 1977 (Figure 20). Development of the project area over time takes place near Old Fort Weaver Road, in the upland portion of the parcel on higher ground, with *makai* portions apparently still utilized as agricultural fields in association with Ewa Plantation and later the Oahu Sugar Company. Note in the 1977 aerial photo, the *makai* portion of the project area is still sugar cane field. Currently, the project area is used for bus parking. Remnants of mid-twentieth century house foundations and related infrastructure are still visible, and the sugar cane field is now a mixed use of light industrial businesses and residential parcels.

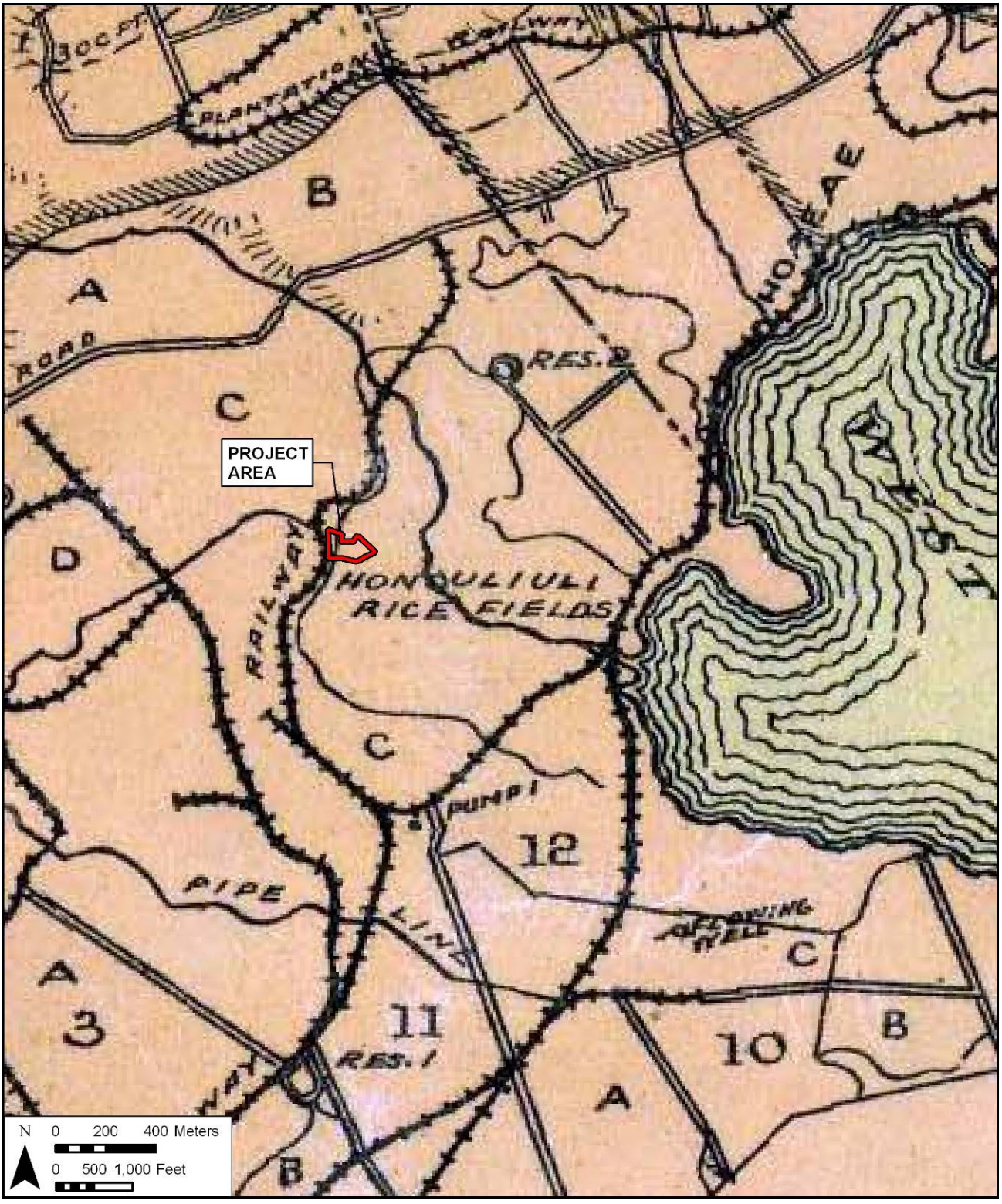

Figure 14. 1899 Hawaiian Government Survey map of O‘ahu, showing project area within the “Honouliuli Rice Fields”

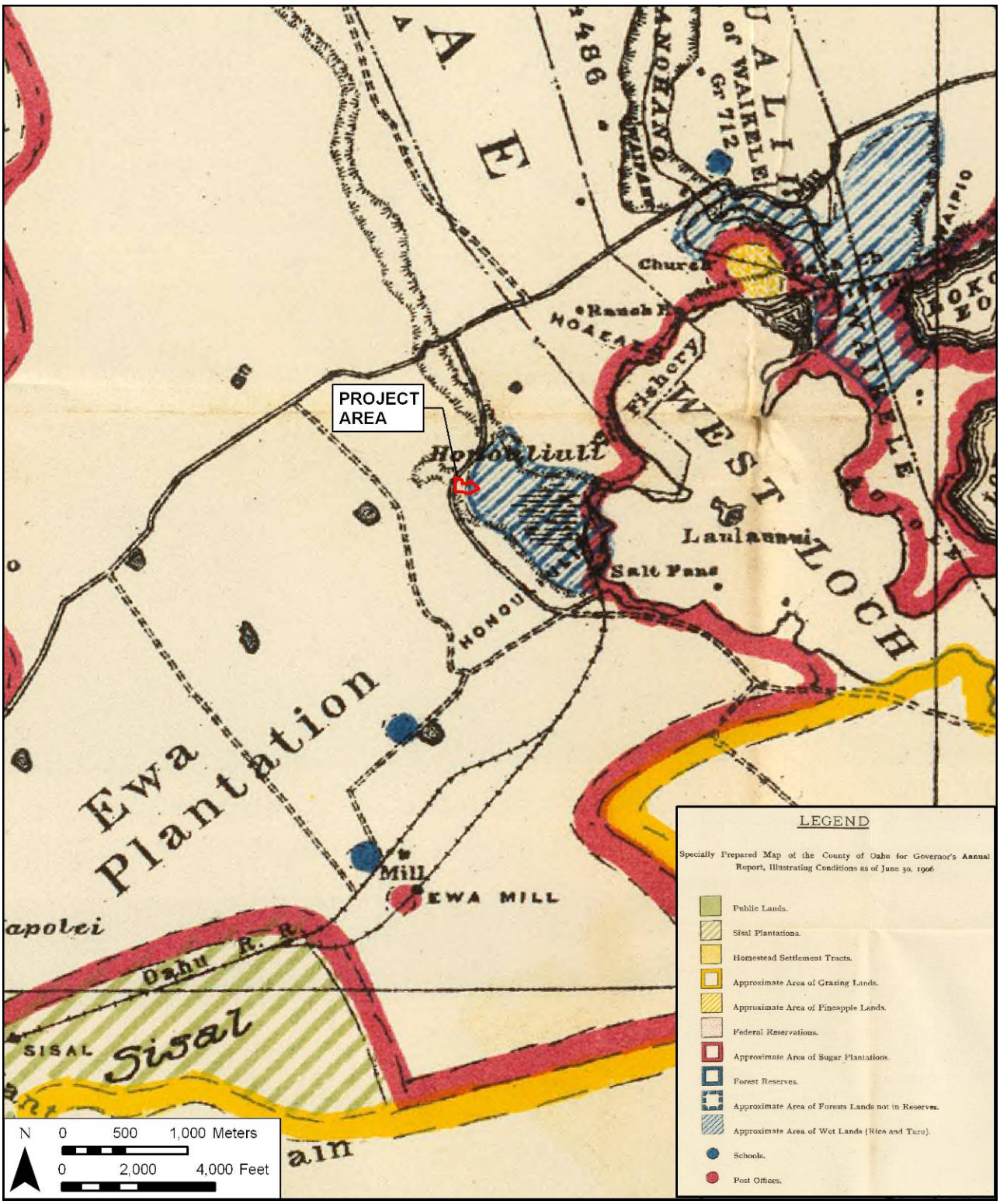

Figure 15. Portion of W.E. Wall 1902 Survey Map showing the project area in Ewa Plantation. Note the presence of wetland cultivation in the eastern portion of the project area.

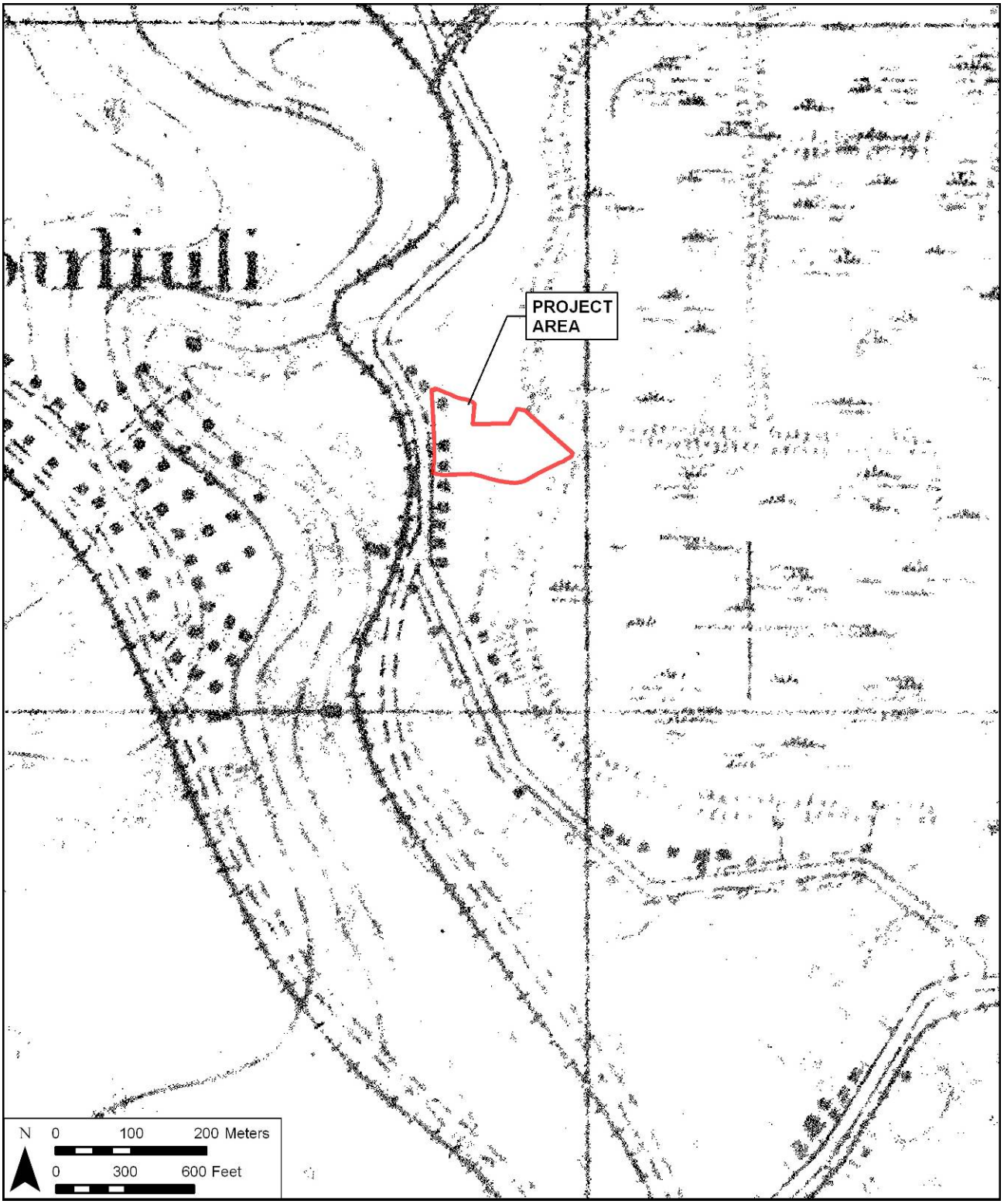

Figure 16. Portion of a 1919 War Department map of the project area. Note the houses depicted in the western portion of the project area.

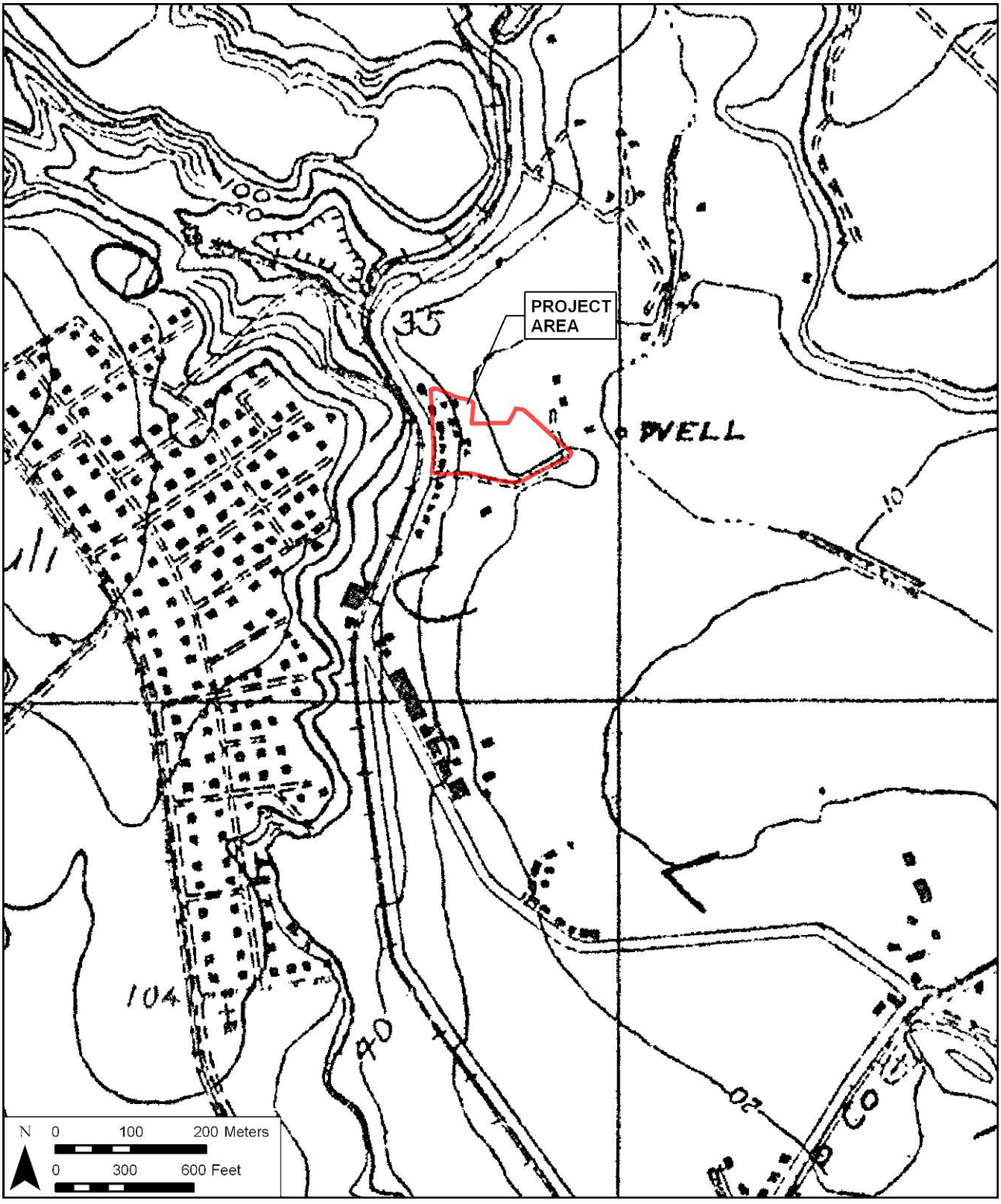

Figure 17. Portion of the 1927-1928 U.S. Geological Survey Waipahu topographic quadrangle. Note urban development in the area.

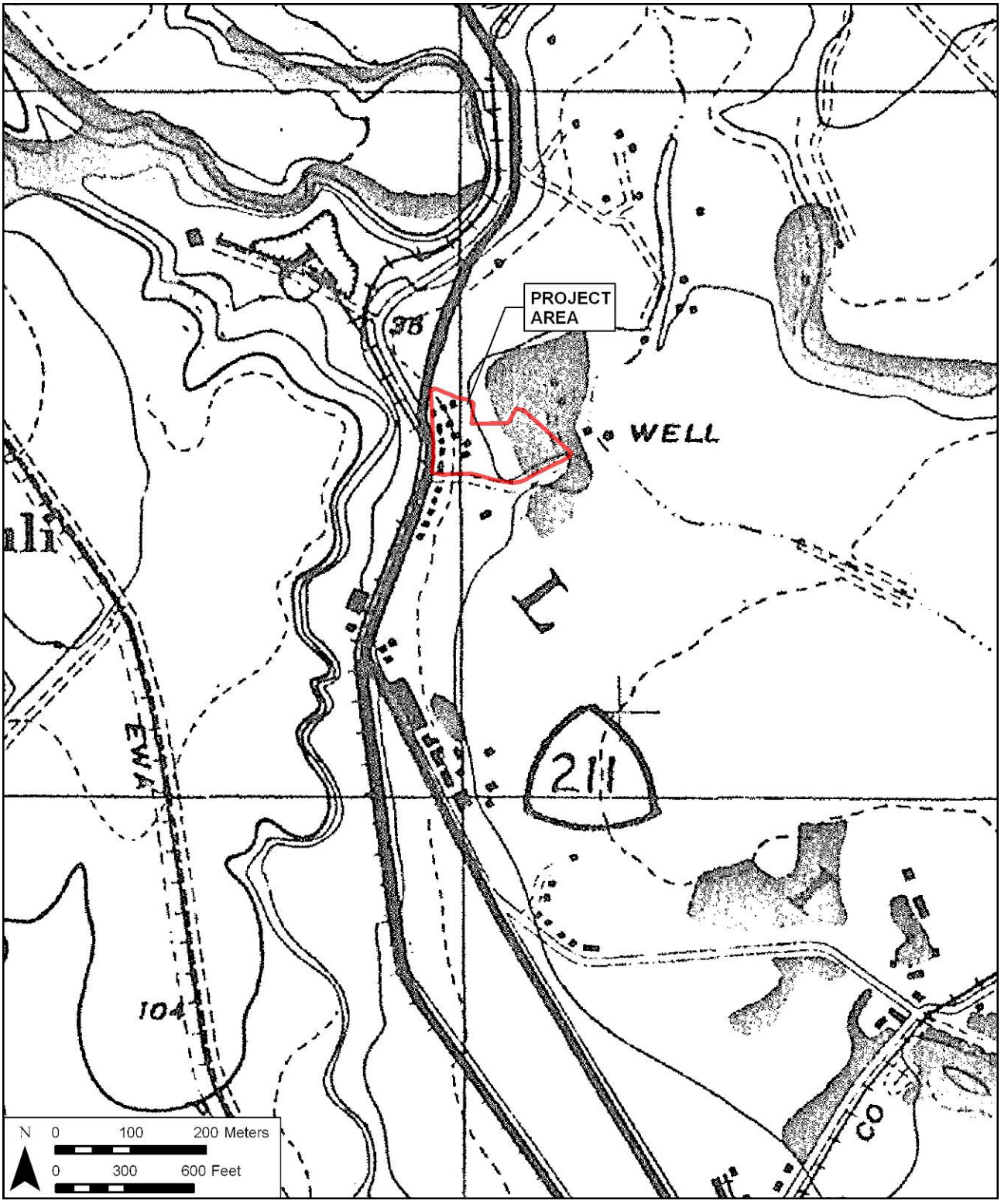

Figure 18. A portion of a 1943 War Department map. Note the presence of housing in the project area.

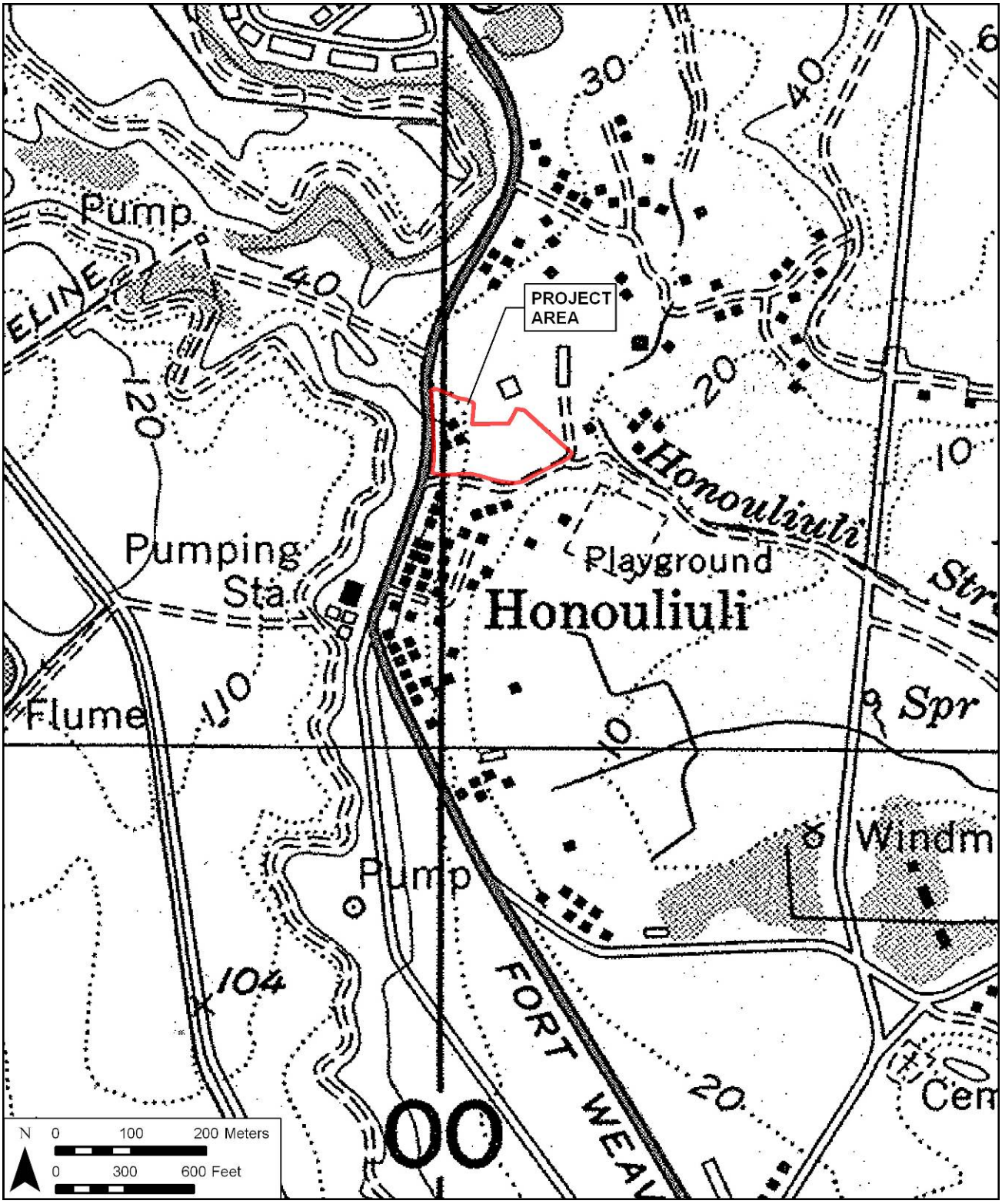

Figure 19. A portion of a 1953 Army Map Service map showing the project area. Note there are fewer houses within the project area.

Figure 20. This 1977 orthoimagery photo of the project area shows the project area development has declined in use. While some houses are still present, it appears the majority that are present in earlier maps have been demolished.

Section 4 Previous Archaeological Research

4.1 Early Archaeological Surveys

Two archaeological features, a boundary *pōhaku* or rock and a *hōlua*, or sledding site, are recorded only in the Boundary Commission Reports establishing the division lines between the *ahupua‘a* of Honouliuli and Hō‘ae‘ae (to the east). The surveyor wrote of the southern point of this boundary:

> In regard to Hoaeae . . . the point of commencement is Pōhaku Palahalaha, a well known rock, now marked by an arrow and the name “Honouliuli” on one side and “Hoaeae” on the other, which I have made the initial point of the survey . . . [Commission on Boundaries, Vol. 1:243].

This rock is shown on the Sterling and Summer map (see Figure 12; also shown on Figure 9) as Pōhaku Palaha. In another boundary survey, the *pōhaku* is called a “large, flat rock” (Boundary Commission Vol. 1:249), which may indicate the origin of the name from the Hawaiian word *pālaha*, which means “flattened, wide” (Pukui and Elbert 1986:307). As the surveyor continued to walk the Honouliuli/Hō‘ae‘ae boundary, he marked the northern point of the division as:

> The Kamaaaina took me to the corner of Pauhala (?)-Hoaeae and Honouliuli – there is an ancient holua or sleding [*sic*] place near this – which is agreed for the ancient corner. . . [Commission on Boundaries Vol. 1:243].

The earliest attempt to record archaeological remains in Honouliuli Ahupua‘a was made by Thrum (1906:46). He reported the existence of a *heiau* located on Pu‘uokapolei, west of the present project area. In a second monograph on *heiau*, Thrum (1917) called this *heiau* Palole‘i (Kapolei). Emory (1933 field notes) mapped and photographed these structures, but they were dismantled and destroyed sometime before McAllister’s survey of the islands in the 1930s. According to legend, Pu‘uokapolei was the location on which Kamapua‘a, the pig-god, resided with his grandmother, Kamaunuahihio (McAllister 1933:108).

In his surface survey of the 1930s, archaeologist J. Gilbert McAllister recorded the specific locations of important sites, and the general locations of less important sites (at least at Honouliuli). McAllister recorded 14 specific sites at Honouliuli, numbered Sites 133-146 (McAllister 1933:107-108) (see Figure 12). Site 146, which McAllister used to denote the entire ‘Ewa coral plains, is the only one of these sites in the project area. This “site,” which is more of a general area covering all the coastal flatlands of ‘Ewa would include portions of the current project area (all area outside the Honouliuli Gulch). Within Site 146, McAllister noted old ranching walls, salt work remains, and coral pits used by the Hawaiians for cultivation of certain plants, such as bananas and sugar cane. The other thirteen sites are all outside of the project area.

The first six sites are in the upland section of Honouliuli, *mauka* of the ‘Ewa coral plain and Pu‘uokapolei. Site 133 is a possible *heiau*, a small enclosure at the foot of Pu‘u Kānehoa. It was still standing during McAllister’s day, and local residents informed him of its sacred nature. Site 134 is Pu‘u Kuina Heiau, located in a gulch at the foot of Mauna Kapu. Only traces of a large

terrace remained. Site 135 is a series of enclosures *makai* of Pu‘u Kuina Heiau. McAllister believed that the walls marked *kuleana* lots. Site 136 is a small platform near Mauna Kapu, a sacred site, possibly an altar. Site 137 is Pu‘u Ku‘ua Heiau, plotted on a ridge near Pu‘u Ku‘ua; it had been modified for use as a cattle pen; some areas had been cleared for pineapple cultivation or planted with ironwoods. Site 138 is Pu‘uokapolei Heiau, which had been on the *makai* side of the hill before it was destroyed. The stones of the structure had been crushed in a nearby rock crusher. McAllister was also told that there was once a cave on the hill, in which Kamapua‘a and his grandmother lived (McAllister 1933:107-108).

The last eight sites recorded by McAllister are adjacent to Pearl Harbor or the coast. Site 139 is Kalanamaihiki Ko‘a (fishing shrine) at Kapapapūhi Point (east of the current study area). McAllister described it as “two large rough stones about 2.5 feet in size, with six or seven smooth stones averaging 1 foot in size in a small pile adjoining the larger stones.” Site 140 is a 4-5 acre fishpond on Laulaunui Island in West Loch, opposite Kapapapūhi Point. McAllister recorded the entire West Loch of Pearl Harbor as Site 141, Kaihuopala‘ai. Although some versions of the legend of the traveling mullet (see Chapter 2, Mythological and Traditional Accounts) say that there was a fishpond called Kaihuopala‘ai, McAllister recorded that local informants said there was never a fishpond by that name here; rather it was the name for the entire loch. Site 142 is Kapamuku, or Pamoku fishpond, a 3-acre fishpond, located south of the current study area, opposite the tip of Waipi‘o peninsula. Site 143 is ‘Oki‘okiolepe fishpond, south of Loko Pamoku. The walls of this 6-acre fishpond were made of coral. As mentioned, Site 146 was used to represent the entire ‘Ewa Plain.

McAllister records Site 144 as the location of fish traps and a fishing shrine described by Stokes in his study of the fishtraps of Pearl Harbor. This is the location of the fishtraps Kapākule (Pākule) and Kepo‘okala, as described by Samuel Kamakau (1976:88). McAllister listed Site 145 as Pu‘uloa, a legendary site where the first breadfruit was planted. It is not known whether Pu‘uloa referred to is the *‘ili* of Pu‘uloa or the harbor of Pu‘uloa, or an area within the *‘ili* near the harbor. Site 146 covers the entire ‘Ewa coral plain. This includes historic features, such as cattle walls and the walls near the Pu‘uloa Salt Works, pre-Contact sites such as habitation, agricultural, and fishpond sites recorded by early European explorers, and paleontological sites, where in recent years many fossil bird bones have been discovered (McAllister 1933:108-110).

Between McAllister's 1930s study and the flurry of work that began in 1969, there are only a few sporadic pieces of research, which are not well documented. In 1933, Dr. Kenneth P. Emory recorded a well-preserved house site and a possible *heiau* (later destroyed by sugar cane cultivation) in the western part of the coral plains (Sinoto 1976:1). In 1959, William Kikuchi removed a number of burials from a burial cave site (Bishop Museum Site OA-B6-10) at the Standard Oil Refinery, which was subsequently destroyed (Barrera 1975:1). Kikuchi recovered 12-16 incomplete primary and/or secondary burials cached in a sinkhole or crevice exposed during construction activities near the big bend in Malakole Road (Kikuchi 1959; Davis 1990a: 146, 147). In 1960, Yoshi Sinoto and Elspeth Sterling visited a house site (BPBM. Site OA-B6-8) within ‘Ēkaha Nui Gulch. “Around this elevation (1200 feet), along the sides of the stream, were seen remains of many terraces and some house sites” (Sterling and Summers 1978:37). In 1962, Lloyd Soehren recorded another secondary human burial in a sinkhole at the Barbers Point Naval Air Station (Davis 1990b:147). In 1966, Lloyd Soehren carried out salvage excavations at a possible fishing shrine (BPBM. Site # 50-OA-B6-13). The site was reported as destroyed by

construction (Barrera 1975:1), but Davis relocated the shrine and performed additional excavations in 1982 (Davis 1990b:148).

4.2 Previous Archaeological Work near Honouliuli town

Since the late 1970s, archaeological research has been conducted in Honouliuli in the general vicinity of the project area (Figure 21 and Table 3). Work has focused on the West Loch Estates (east of the current project area within the Honouliuli Taro Lands), Pearl Harbor Naval Magazine (NAVMAG) – West Loch (southeast of the current project area), the ‘Ewa Gentry project (south of the current project area), and ‘Ewa Villages (south of the project area).

4.2.1 West Loch Estates

An archaeological reconnaissance survey (Rosendahl 1987) was conducted in association with the development of the 232-acre “West Loch Estates” Residential Increments I and II (including golf course and parks) project, which lies to the east of the present project area, in the section of the Honouliuli Taro lands adjacent to Pearl Harbor. This project covered portions of the old town of Honouliuli, the focus of population in the early historic period (and possibly earlier). This study identified a modern cemetery (Site 3319) with a remnant pre-Contact deposit, two historic sites of minimal integrity with some possible pre-Contact deposits (Site 3318 and 3320) at Kapapapūhi Point, a significant pre-Contact deposit with trash pits, fire pits and at least one human burial (Site 3321), a buried fishpond (Site 3322), an historic fishpond (Site 3323) built in the 1890s during the construction of the OR& L railroad, and a buried pond field system (Site 3324) (Rosendahl 1987c:7, 9). It was noted that some artifacts “indicate the possibility of pre-1900 occupation” (Rosendahl. 1987:8). In the final reconnaissance survey report (Dicks et al. 1987:28) for the surface and subsurface reconnaissance survey, an effort was also made to relocate McAllister’s Site 139, Kalanamaihiki Ko‘a (fishing shrine). The archaeologists found a small boathouse and dock in the area and concluded that the shrine had been destroyed since McAllister’s survey in the 1930s.

A total of 21 radiocarbon dates were determined; at Site 3321, the cultural deposit, the age of a lower cultural deposit was dated to A.D. 540-880, while an upper deposit was dated to A.D. 1327-1640. For the buried fishpond (Site 3322), ages ranged from A.D. 70-610 in the lowest layer to A.D. 1160-1410 in the upper layer. For the buried pond field systems (Site 3324), ages ranged from B.C. 400-A.D. 240 (interpreted as the original surface of the upper valley) in the lowest layers to A.D. 1430-1952 in the upper layers of upper valley area and A.D. 1020-1280 in lower valley area. In summary, the authors (Dicks et al. 1987:78-79) concluded that agricultural use of the Honouliuli Stream floodplain for pond-field cultivation of taro may have begun in the lower valley segment as early as A.D. 1000, while cultivation of the upper valley pond-fields may have begun as early as the thirteenth and fourteenth centuries. Site 3321 in the upper valley may have been a habitation locus established as early as the mid-sixth to mid-ninth century (Wolforth and Wulzen 1997).

In 1989, a burial was found on Hō‘ae‘ae Point (a recent name for Kapapapūhi Point), when someone was digging under a mango tree on a residential property. There is no follow-up report (Bath 1989) to whether the bones were left in place or disinterred. The burial was given the site designation 50-80-13-4816.

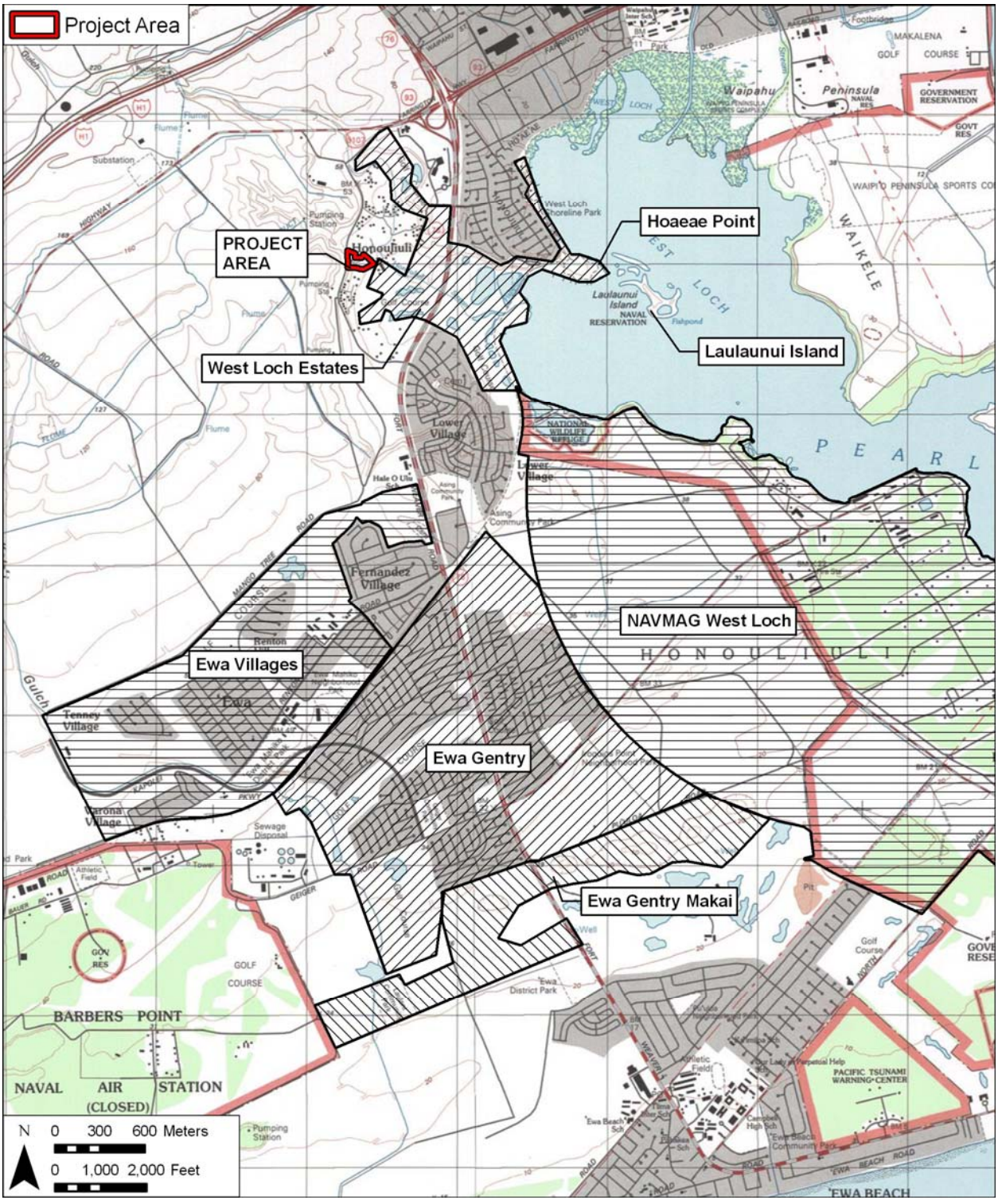

Figure 21. U.S. Geological Survey topographic map, showing previous archaeological survey areas near the current project area

Table 3. Summary of previous archaeological work near the project area

Reference	Nature of Study	Location	Findings
McAllister 1933	Archaeological Survey	Island-wide	Site 146. ‘Ewa coral plains; sinkholes and ranching walls
Rosendahl 1987; Dicks et al. 1987	Reconnaissance Survey with subsurface testing	West Loch Estates	A modern cemetery (Site 3319) with a pre-Contact deposit, two historic sites with pre-Contact deposits (Site 3318, 3320), a pre-Contact deposit with a burial (Site 3321), a buried fishpond (Site 3322), an 1890s fishpond (Site 3323), and a buried pond field system (Site 3324)
Bath 1989	Burial Find	West Loch	One inadvertent burial found at Ho‘ae‘ae Point (Site 4816)
Sinoto 1978	Reconnaissance Survey	NAVMAG-West Loch	Ten burials, at least some historic, were found in a sinkhole used as a crypt
Davis & Burtchard 1991	Inventory Survey	NAVMAG-West Loch	No sites found, probably due to extensive ground disturbance.
Kennedy et al. 1992	Inventory Survey with subsurface testing	NAVMAG-West Loch	Recorded 25 sites associated with ranching, military training, and modern quarrying
Landrum et al. 1997	Overview Study	NAVMAG-West Loch	Overview of previous archaeological work at West Loch
Jensen & Head 1997	Reconnaissance Survey	NAVMAG-West Loch	Seven military features and one cave with a blocked entrance were found in the Outleased Area
Corbin et al. 1996	Reconnaissance Survey	Laulaului Island	Noted Laulaunui Fishpond (McAllister's Site 140) and four concrete structures, probably military
Hammatt et al. 1990b	Reconnaissance Survey	‘Ewa Villages	No pre-contact surface features were noted.
Spear 1996	Reconnaissance Survey	West of Tenney & Varona Villages	No pre-contact surface features were noted.
Kennedy 1988	Reconnaissance Survey	‘Ewa Gentry Project	No-pre-contact surface features found. The OR&L railroad bed (Site 9714) formed the mauka boundary of the project area.
Davis 1988	Subsurface Excavation	‘Ewa Gentry Project	No pre-contact subsurface features were noted.
Pantaleo & Sinoto 1993	Inventory Survey	‘Ewa Gentry Off-Site Drainage System	A portion of the OR&L railroad bed (Site 9714) was found.
McIntosh & Cleghorn 2003	Archaeological Survey	‘Ewa Gentry Makai	No pre-contact surface features were noted.

4.2.2 NAVMAG – West Loch

In 1978, Sinoto conducted an archaeological reconnaissance survey on a 32-acre portion of NAVMAG-West Loch. A sinkhole 200 m inland and northwest of ‘Oki‘okiolepe Fishpond was found, containing ten human burials (Site 50-80-13-2310). The historic artifacts found in the pit, indicated that the pit was probably used by the Chinese in the historic period as a family crypt (Sinoto 1978).

Davis and Burtchard (1991) conducted an archaeological inventory survey of a 36-acre lot for a proposed housing area in the Pu‘uloa portion of NAVMAG-West Loch in 1991. No archaeological sites were found. They concluded that extensive alteration to the landscape due to military land disturbance had erased all surface traces of pre-contact habitation.

In 1992, a crew from Archaeological Consultants of Hawai‘i, Inc. (ARCH) conducted an archaeological inventory survey with subsurface testing, and later data recovery at the proposed Pu‘uloa Golf Course (Kennedy et al. 1992). A total of 72 sites were identified, 47 from the pre-Contact/early historic period and 25 sites associated with ranching, military training, and modern quarrying. Radiocarbon dates of these habitation, agricultural, and ceremonial sites indicate that traditional Hawaiian use extended from A.D. 1090 to 1695.

An overview survey of the NAVMAG Lualualei was completed by Ogden Environmental and Energy Services in 1977 (Landrum et al. 1977). A total of ten sites had been previously recorded during the West Loch project area, three in the Honouliuli section, one within Pearl Harbor (Site 140, Laulaunui Island), five on Waipi‘o peninsula, one in both (salt works), and one encompassing all lands (Pearl Harbor Navy Base). In Honouliuli, the sites were Site 141, Kaihuopala‘ai (West Loch), Site 142, Loko Pamoku or Kapamuku, Site 143, ‘Oki‘okiolepe Fishpond, and salt works at Honouliuli (no site designation). NAVMAG-West Loch is considered part of the Pearl Harbor Navy Base (Site 50-80-13-9992) due to its importance during World War II. The site was listed as a National Historic Landmark in 1966, on the National Register of Historic Places (NRHP) in 1966, on the State Inventory of Historic Places (SIHP), in 1971, and on the State Register of Historic Places in 1971 (Landrum et al. 1977:160).

In 1996, a crew from Paul H. Rosendahl, Ph.D., Inc. (PHRI) completed a Phase I archaeological reconnaissance survey of the 1,483 acres of land at the U.S. Naval Magazine – West Loch Branch (Jensen and Head 1997). This survey covered the southern section of Waipi‘o peninsula on the east side of West Loch, Laulaunui Island, the Naval Reservation on the west side of West Loch, and the West Loch Outleased Cultivated Lands, which included the National Wildlife Refuge. Only 25% of the outleased lands were actually surveyed. The PHRI crew found that most of the outleased area had been bulldozed for sugarcane cultivation. Only a small strip adjacent to West Loch was unmodified. In the West Loch Outleased Lands, eight features were recorded; all but one was associated with military use of the area. The seven military sites consisted of six concrete slabs (Sites 50-80-13-5040, 5080, 5081, 5133, 5134), a metal container (5080), and a pressure tank (5133). The one non-military site (4971) was a cave with a partially blocked (blocked with roof fall) entrance that the crew members believed should be investigated in the future to see if it at one time was used as a pre-Contact or historic burial site (Jensen and Head 1997:85).

In 1996, a field reconnaissance of Laulaunui Island and fishpond was conducted by the State Historic Preservation Division (Corbin et al. 1996) to determine if restoration of the fishpond was possible and if the site would be a good candidate to be used as an educational tool. The crew simply walked to the island from the West Loch Waterfront Park; water depth varied from one to four feet. Five concrete structures, probably built by the military, were observed. The fishpond was surrounded by mangroves and was silted in; portions of a coral wall (approximately 500 ft long) around the pond were still intact, and a concrete gate allowed water to circulate into the pond.

4.2.3 ‘Ewa Villages

In 1990, Cultural Surveys Hawai‘i conducted an archaeological reconnaissance survey of a 616-acre area, which included three extant plantation villages, (Renton, Tenney, and Varona Village), the sites of three former plantation villages (C Village, Mill Village, Middle Village), and other sites associated with the ‘Ewa Plantation infrastructure (Hammatt, Shideler, et al. 1990:i). The survey found no evidence of any pre-Contact activity within the subject area and recommended further documentation of some of the ruined plantation structure sites.

In 1996, Scientific Consultant Services (Spear 1996) conducted an archaeological survey in an area west of the Tenney and Varona plantation villages and north of the Honouliuli Treatment Plant. No archaeological sites were identified.

4.2.4 ‘Ewa Gentry Project

In the initial reconnaissance (Kennedy 1988) of the 1,016 acre ‘Ewa Gentry survey area, no surface evidence of potentially significant pre-Contact remains was found. The old OR&L railroad bed/right of way (Site 50-80-12-9714) did form a portion of the *mauka* boundary. According to historic maps, a Filipino Camp for sugarcane workers once existed near the intersection of the OR&L bed and a cane road near Ft. Weaver Road, but the archaeologists did not find any surface remains for this camp.

A subsequent subsurface exploration was undertaken. Eighteen backhoe trenches were excavated; however, “no evidence of past in situ cultural activity was found anywhere in the Ewa Gentry project area” (Davis 1988).

An inventory survey was conducted in 1993 by Aki Sinoto Consulting (ASC) (Pantaleo and Sinoto 1993) for the ‘Ewa Gentry Off-Site Drainage System. This proposed drainage project area is a narrow strip that extends along the western boundary of NAVMAG West Loch. An 1897 map of Pearl Harbor indicated that the OR&L railroad, salt pans, and a fishpond were within this project area; only the railroad bed was found during the ASC survey. Iron flumes and concrete culverts (one with an inscribed date of July 1935) used for sugarcane irrigation were found bulldozed to the edge of the sugar cane fields near the drop-off to the shoreline of Pearl Harbor. These were not considered historically significant due to the absence of structural and locational integrity. No further archaeological work was recommended for this project prior to commencement of construction of the drainage system.

In 2003, Pacific Legacy (McIntosh and Cleghorn 2003) conducted an archaeological survey of the proposed ‘Ewa Gentry Makai Development project area, which is adjacent to the southern

(*makai*) boundary of the ‘Ewa Gentry project area for the 1988 surface and subsurface inventory surveys (Kennedy 1988; Davis 1988).

4.2.5 Previous Archaeological Work in the Project Area

In 2007, Cultural Surveys Hawai‘i conducted a literature review and field inspection of the current project area (O’Hare and Hammatt 2007). Features associated with water control and building foundations were observed as a result of the field inspection. They are addressed as a site in Section 7 of this report.

4.3 Background Summary and Predictive Model

4.3.1 Background Summary

The *ahupua‘a* of Honouliuli is the largest traditional land unit on the island of O‘ahu. Honouliuli includes all the land from the western boundary of Pearl Harbor (West Loch) westward to the ‘Ewa/Wai‘anae District Boundary with the exception of the west side of the harbor entrance, which is in the *ahupua‘a* of Pu‘uloa (the ‘Ewa Beach/Iroquois Point area). This comprises approximately 12 miles of open coastline from One‘ula westward to Pili O Kahe. The *ahupua‘a* extends *mauka* (almost pie-shaped) from West Loch nearly to Schofield Barracks, and the western boundary is the Wai‘anae Mountain crest running *makai* to the east ridge of Nānākuli Valley. Within this natural setting, archaeological and traditional sources show a general pattern of three main areas of settlement within the *ahupua‘a*: a coastal zone, the Honouliuli taro lands, and inland settlement at Pu‘u Ku‘ua.

The current project area is within the Honouliuli taro lands, which are centered around the west side of Pearl Harbor at Honouliuli Stream and its broad outlet into the West Loch. These are the rich irrigated lands of the *‘ili* of Honouliuli, which give the *ahupua‘a* its name. The major archaeological reference to this area is Dicks et al. (1987) who documented remnants of a once-widespread wetland system (*lo‘i* and fishponds) as well as dryland cultivation of the adjacent slopes in the West Loch Estates project area.

The area bordering West Loch was clearly a major focus of population within the Hawaiian Islands, and this was a logical response to the abundance of fish and shellfish resources in close proximity to a wide expanse of well-irrigated bottomland suitable for wetland taro cultivation. The earliest detailed map (Malden 1825; see Figure 8) shows all the roads of southwest O‘ahu coalescing and descending the *pali* (cliff) as they funnel into the locality (i.e. Honouliuli Village). Dicks et al. (1987:78-79) conclude, on the basis of 19 carbon isotope dates and 3 volcanic glass dates that “Agricultural use of the area spans over 1,000 years.” Undoubtedly, Honouliuli was a locus of habitation for thousands of Hawaiians.

In the project area, there is a trend in development and agriculture that can be seen through the series of historic maps presented in this report. The LCA maps of the 1850s indicate the project area was used for house lots on the *mauka* side, toward the cliffs, and as wetland agricultural fields *makai* of those house lots in lower lying areas. We can assume this land was used in much the same fashion in pre-contact times. The trend continues through the historic period with the exception of the 1899 Government Survey map and the 1902 Wall map, which show the entire project area as wetland cultivation (Figure 14 and Figure 15). After 1902, the

area is again developed in much the same way as in pre-contact use. The series of War Department and U.S. Geological Survey maps indicate houses were built near Fort Weaver Road and the *makai* portion of the project area was used for agriculture up until the Oahu Sugar Company closed (Figure 16 - Figure 20). The western portion of the project area has been filled in using construction debris and remnants of residential foundations are still present near Old Fort Weaver Road. The eastern portion of the project area is currently used for bus parking.

4.3.2 Predictive Model

Based on previous historic document and archaeological research, and the previous field inspection in the project area, two types of cultural deposits are expected. The remains of historic house foundations and water control features related to commercial agricultural practices during the plantation era, which have been previously identified, should be fully documented. There is a distinct possibility for evidence of pre-contact wetland agricultural practices in the eastern portion of the project area, based on previous research and documentation of similar culturally modified subsurface layers documented in adjacent parcels by Dicks et al. (1987). Evidence of historic agricultural and ranching activities may also be encountered in this portion of the project area. Other types of cultural material that may be encountered in the western portion of the project area toward the cliffs include additional plantation-era infrastructure and historic trash deposits, as well as pre-contact shell midden, artifacts, and architecture related to habitation terraces.

Section 5 Results of Fieldwork

The fieldwork component of this archaeological inventory survey was conducted on June 15 and 16, 2009 by Douglas Borthwick, B.A., Mindy Simonson, M.A., and Jeff Fong, M.A, under the general supervision of Hallett Hammatt, PhD. (principal investigator). Field work required 6 person days to complete.

During the pedestrian survey, several surface features were observed relating to the historic housing units that were present in the area during the early to mid-1900s. These were all remnants of previous structures and displayed very poor integrity. A total of six features including a post support, two building foundations, a cesspool, and two water control features were observed during pedestrian survey of the project area. Because of their association, the remnants were recorded as a single site. An additional concrete building foundation was not recorded, as it was clearly modern construction.

A total of 10 trenches were excavated in the project area. Trench locations were determined based on the future location of construction activities planned for the area, and the possibility of encountering cultural material layers. The stratigraphy in each trench was documented and samples of all natural non-fill sediments were collected. Subsurface investigation revealed several layers of fill material, including an expansive landfill deposit, overlying the natural sediments. A layer of natural clay loam was also observed and is likely associated with traditional Hawaiian agricultural activity.

5.1 Stratigraphic Summary

A total of 10 trenches were excavated during the archaeological inventory survey. Trenches 1-7 were excavated within the existing bus parking area. Trenches 8, 9 and 10 were excavated in the west and northwestern parts of the project area near Old Fort Weaver Road. Each trench contained layers of fill deposits, designated as Stratum I, with different types of fill which were designated as Ia through Ie. Material found within these layers included large pieces of concrete, asphalt, carpeting, plastic film, scrap metal, and broken glass. The majority of the material appeared to be related to the construction, or demolition, of buildings and structures. Imported soils observed in these fill layers ranged from light yellowish-brown silt loam to dark grayish-brown clay loam. Trench 6 was terminated at the fill layers because of a large concrete slab obstruction.

The soil overlay map (Figure 5) indicates types of natural soils present in the project area and subsequent subsurface testing indicates the soils in the project area follow the general pattern of the soils mapped by Foote et al. (1972). Therefore, Trenches 1-7 have similar stratigraphy and contain Pearl Harbor Clay (Ph), while trenches 8-10 have similar stratigraphy and contain Waipahu Silty Clay, 2 to 6 percent slopes (WzB). No artifacts, midden, or human remains were encountered during trench excavations.

Trench 1 is representative of the stratigraphic sequence present in the Pearl Harbor Clay portion of the project area where Stratum I was construction fill, Stratum II was naturally occurring silt loam, Stratum III was a culturally modified wetland agricultural layer, and Strata IV and V were natural wetland sediments. It is likely that the natural loam found in Stratum II is

the remnants of historic sugar cane agriculture. This natural loam layer is notably absent in Trenches 4 and 5 where Stratum II is the modified pre-contact layer. More than likely, the natural loam layer was disturbed in these trenches by the construction fill of Stratum I. In Trenches 5 and 7 Stratum III was a naturally occurring former wetland layer and is the same layer present as Stratum IV in Trench 1. These naturally occurring wetland strata appear to be older layers of the culturally modified agricultural wetland layer present as Stratum III in the majority of the Pearl Harbor Clay portion of the project area. The Pearl Harbor Series soils have been used to grow sugar cane, taro, and bananas, and have also been used for pasture lands.

Trenches 8, 9, and 10 were terminated in Stratum II, which was natural silt-to-clay loam of the Waipahu Clay Series. In Trench 9, Stratum II also contained decomposing bedrock overlying the coral shelf. Waipahu Clay Series soils are indicative of house lots and small areas of sugar cane (USDA 1978).

Remnants of mid-twentieth century house foundations and related infrastructure are still visible on the surface in the western portion of the project area. Subsurface testing supports the historical record of land use in this portion of Honouliuli. Evidence of pre-contact wetland agriculture is present in subsurface strata of the eastern portion of the project area, while the western portion was historically used for residential housing.

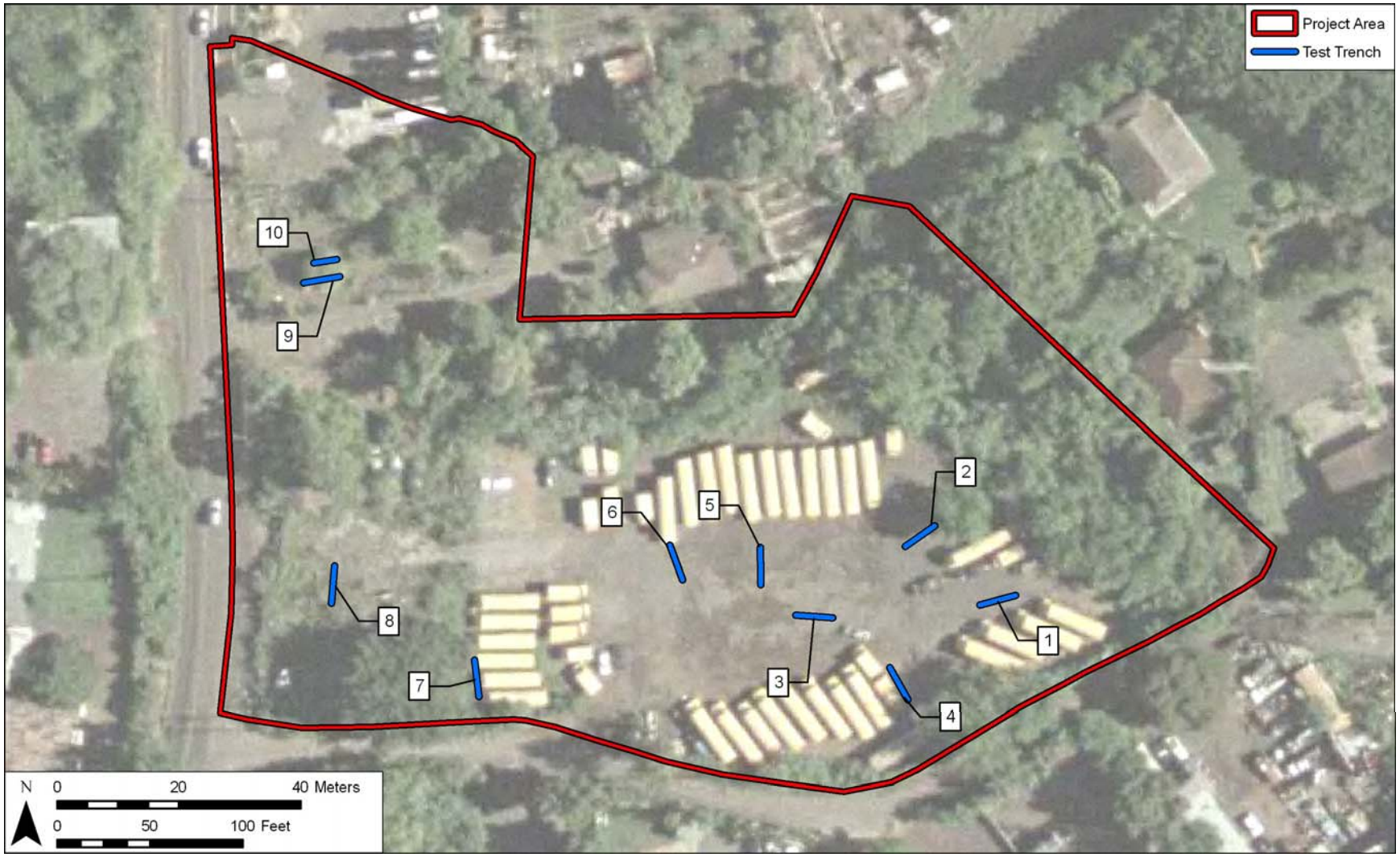

Figure 22. Aerial photo showing the location of Trenches 1-10 in the project area.

5.1.1 Trench 1

Trench 1 was located in the eastern-most portion of the project area and was oriented east-west (Figure 22). The stratigraphic sequence includes Strata I-V. Strata I had four layers of fill consisting of modern construction debris and asphalt (Strata Ia-Id). Stratum II was a natural silty loam sediment layer and Stratum III was a mottled dark brown clay loam layer that was the former pre-contact agricultural layer. Strata IV and V were natural wetland sediments (Table 4,Figure 23, and Figure 24).

Table 4. Stratigraphy of Trench 1

Stratum	Depth (cmbs)	Description
Ia	0-13	10 YR 5/2, grayish-brown; silt loam with gravel; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill; modern surface for bus parking lot.
Ib	13-61	2.5 YR 3/6 dark red; clay loam; strong, fine crumb structure; dry loose consistency; slightly plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill material.
Ic	60-90	10 YR 2/1, black, and 10 YR 8/1 white; asphalt and crushed coral; construction fill.
Id	90-190	7.5 YR 5/3, brown fill; silty clay loam; structureless; moist firm consistency. Fill material containing modern garbage including pipe, cable and plastic.
II	188-220	10 YR 3/3 dark brown; silt loam; moist firm to wet sticky consistency; slightly plastic; very abrupt boundary; smooth topography; natural silt loam.
III	220-246	10 YR 4/1 dark gray with 5 YR 4/4 dark reddish brown mottling; clay loam; moist firm to wet non-sticky consistency; slightly plastic; no cementation. *Lo‘i*/ agricultural layer mottled with iron staining and charcoal flecking.
IV	246-266	10 YR 3/1 very dark gray clay; strong , fine, crumb structure; moist firm to wet sticky consistency; plastic; no cementation; natural wetland sediments.
V	266-298	10 YR 3/1 very dark gray clay; strong, fine, crumb structure; moist very firm to wet sticky consistency; plastic; natural wetland sediments*.

* Base of Excavation

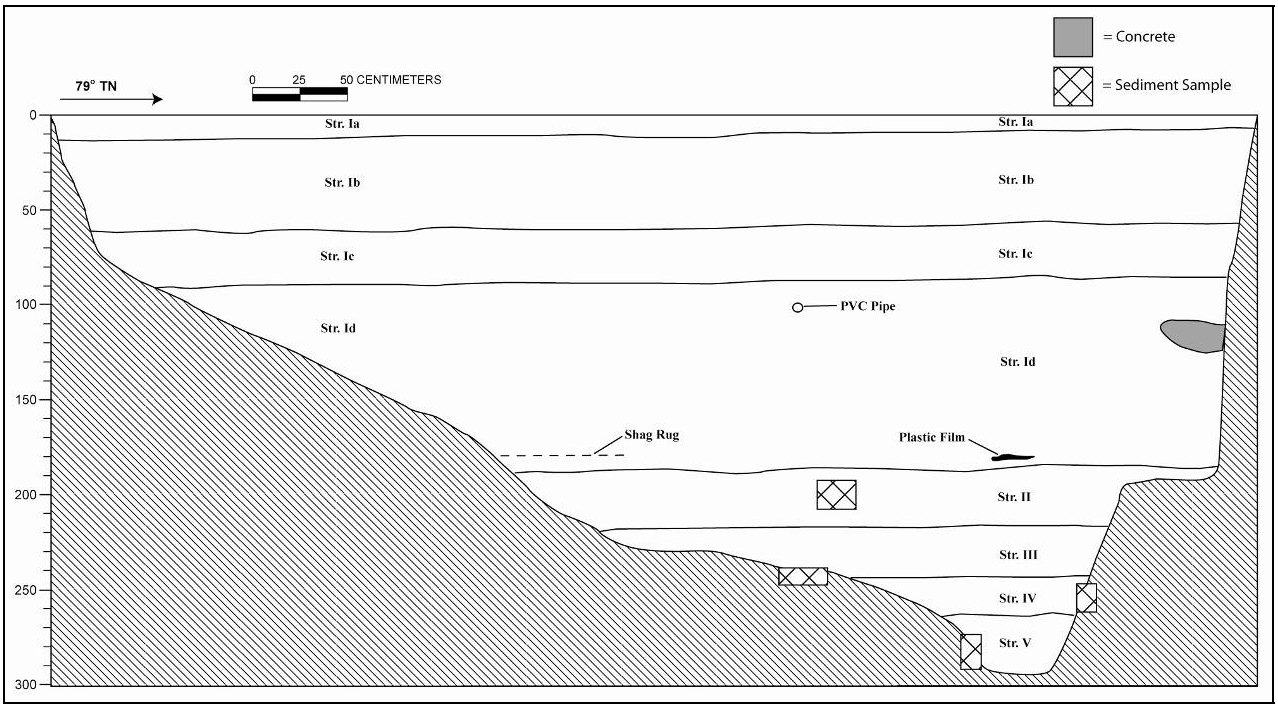

Figure 23. Trench 1 profile of north wall.

Figure 24. Trench 1, view northeast.

5.1.2 Trench 2

Trench 2 was located approximately 20 m northwest of Trench 1 and is oriented southwest-northeast (Figure 22). The stratigraphic sequence includes Strata I-IV. Stratum I had four layers of fill consisting of modern construction debris and asphalt (Strata Ia-Id). Stratum II was a natural silty loam sediment layer and Stratum III was a mottled dark brown clay loam layer that was the former pre-contact agricultural layer. Stratum IV was natural wetland sediments (Table 5, Figure 25, and Figure 26).

Table 5. Stratigraphy of Trench 2

Stratum	Depth (cmbs)	Description
Ia	0-11	10 YR 5/2, grayish-brown silt loam with gravel; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill; modern land surface.
Ib	5-45	2.5 YR 3/6 dark red; clay loam; strong, fine, crumb structure; dry loose consistency; slightly plastic; no cementation; terrestrial in origin; smooth topography. Fill.
Ic	30-80	10 YR 2/1 black with 10 YR 8/1 white; asphalt and crushed coral; fill material, possible building foundation or old road surfacing.
Id	65-181	7.5 YR 5/3, brown; silty clay loam; structureless; moist firm consistency. Fill material containing modern garbage including large concrete slabs, asphalt, and pipe.
II	175-201	10 YR 3/3 dark brown; silt loam; strong, fine, crumb structure; moist firm to wet sticky consistency; slightly plastic; very abrupt boundary; natural silt loam.
III	195-270	10 YR 4/1 dark gray with 5 YR 4/4 dark reddish brown mottling; clay loam; moist firm to wet very sticky consistency; plastic; no cementation. *Lo‘i*/ agricultural layer mottled with iron staining and charcoal flecking.
IV	268-294	10 YR 3/1 very dark gray; clay; strong, fine, crumb structure; moist firm to wet sticky; plastic; no cementation; natural wetland sediments.*

* Base of excavation

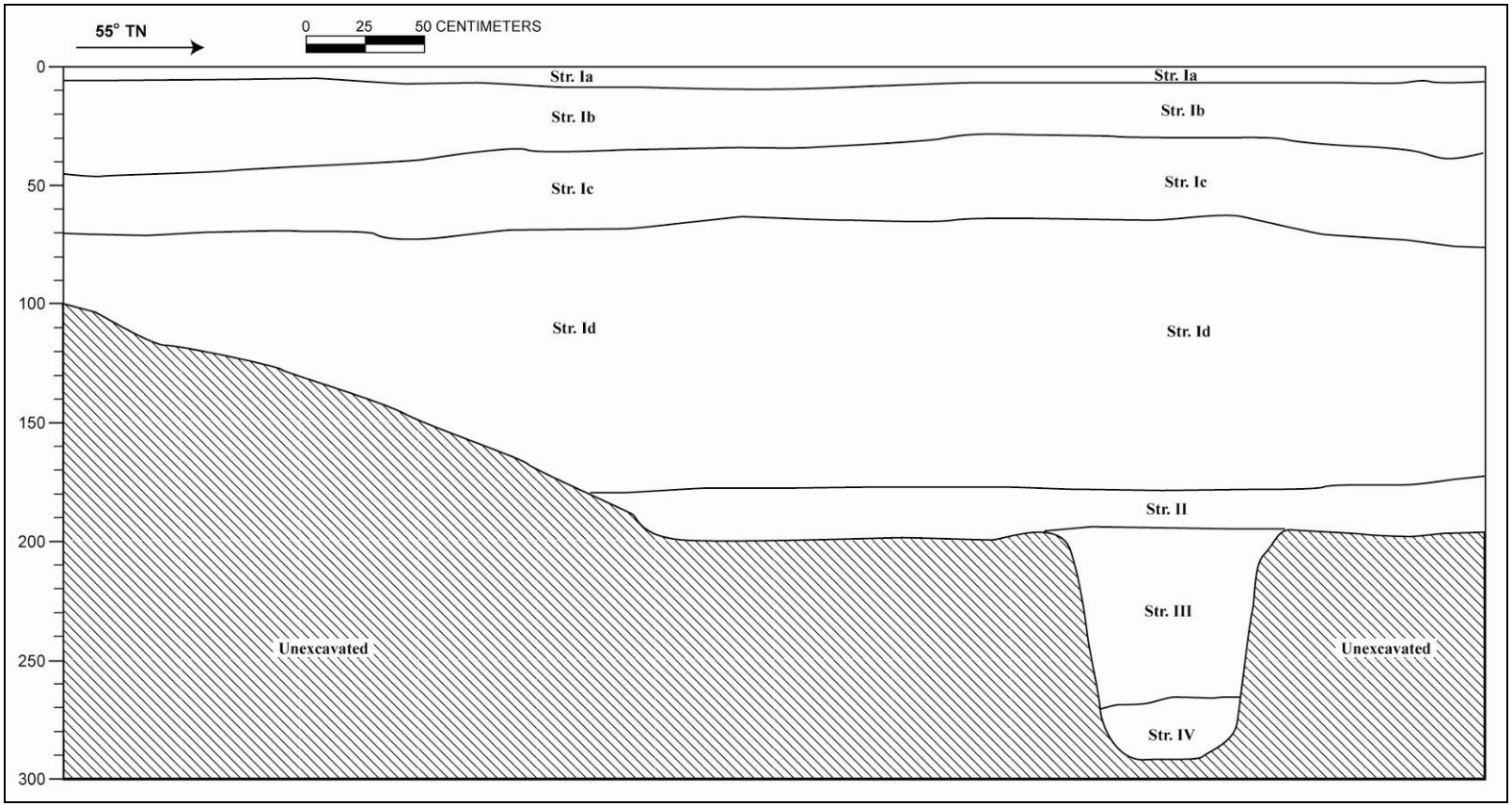

Figure 25. Trench 2 profile of northwest wall.

Figure 26. Trench 2, view east.

5.1.3 Trench 3

Trench 3 was located approximately 40 m west of Trench 1 and was oriented east-west (Figure 22). The stratigraphic sequence includes Strata I and II. Stratum I had 3 layers of modern construction debris and fill (Strata Ia-Ic). Stratum II was similar to Stratum II of Trenches 1 and 2, and was a natural silt loam layer that likely represents pre-contact to modern agricultural sediments (Table 6, Figure 27, and Figure 28).

Table 6. Stratigraphy of Trench 3

Stratum	Depth (cmbs)	Description
Ia	0-30	10 YR 5/2, grayish-brown; silt loam with gravel; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill; gravel and silt surfacing material for bus parking.
Ib	29-65	2.5 YR 4/8 red; clay loam; strong, fine, crumb structure; dry loose consistency; slightly plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill material overlying land fill/ trash deposit.
Ic	64-181	10 YR 5/3 brown; silty clay loam; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Fill/trash deposit containing some historic material, concrete, asphalt, cut basalt, piping, and scrap metal.
II	180-245	10 YR 3/2 very dark grayish-brown; natural silt loam; moderate, fine, crumb structure; moist very friable to wet non-sticky; non-plastic; no cementation.*

*Base of excavation

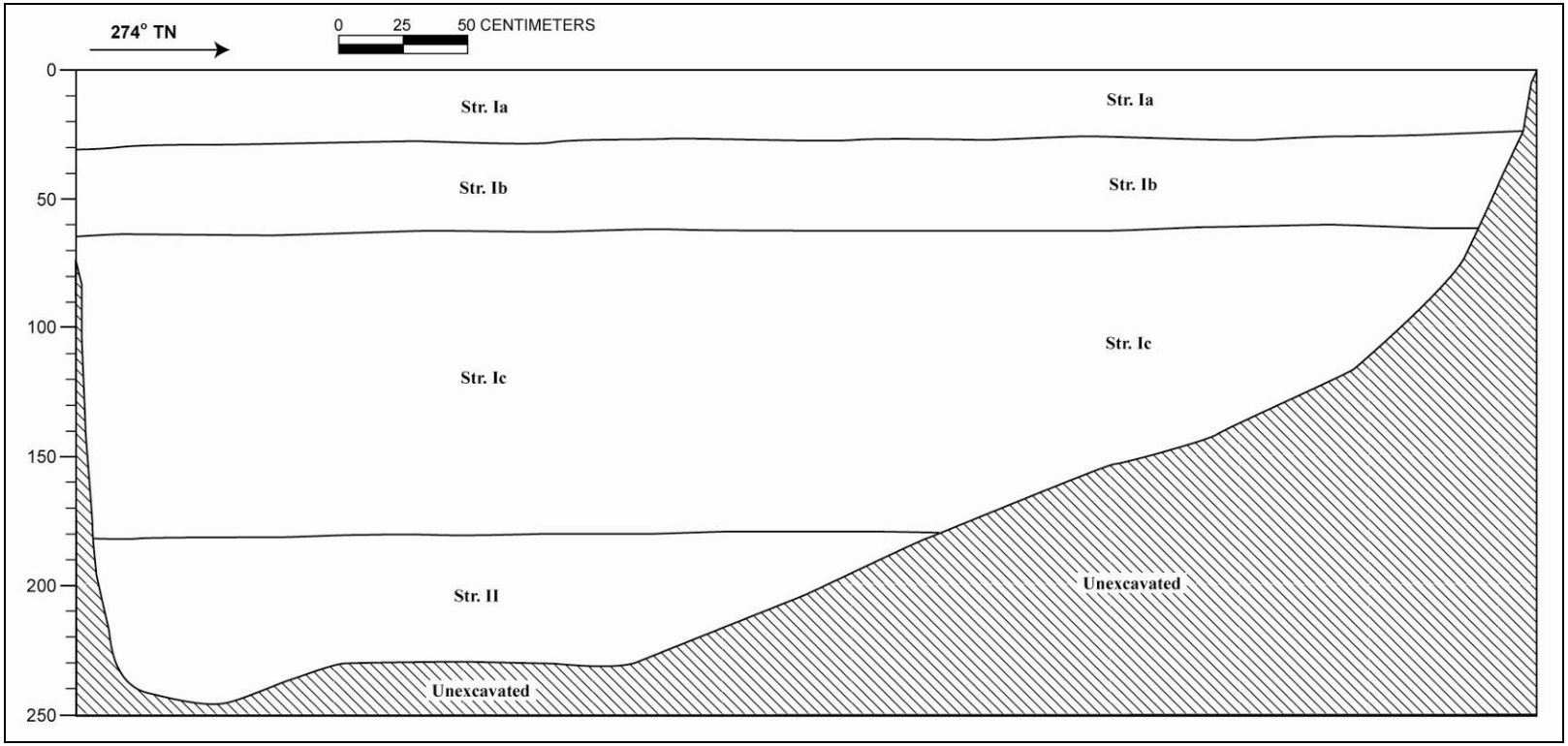

Figure 27. Trench 3 profile of south wall.

Figure 28. Trench 3, view southeast.

5.1.4 Trench 4

Trench 4 was located approximately 30 m southwest of Trench 1 and was oriented northwest-southeast (Figure 22). The stratigraphic sequence includes Strata I-IV. Stratum I had 3 layers of modern construction debris and fill (Strata Ia-Ic). Stratum II was a mottled dark brown clay loam layer that was the former pre-contact agricultural layer. Stratum III was natural wetland sediments and Stratum IV was coral shelf (Table 7, Figure 29, and Figure 30).

Table 7. Stratigraphy of Trench 4

Stratum	Depth (cmbs)	Description
Ia	0-14	10 YR 5/2, grayish-brown; silt loam with gravel; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill; gravel and silt surfacing material for bus parking.
Ib	13-64	2.5 YR 4/8 red; clay loam; strong, fine, crumb structure; dry loose consistency; slightly plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill material overlying land fill/ trash deposit.
Ic	61-185	10 YR 5/3 brown to 10 YR 2/1 black; asphalt and concrete; dry loose consistency; non-plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Fill deposit containing small plastic bags, concrete and asphalt chunks.
II	183-292	10 YR 4/1 dark gray A horizon; clay; strong, fine, crumb structure; moist firm to wet sticky; slightly plastic; no cementation; abrupt boundary; smooth topography. *Lo‘i*/ agricultural layer, contains rocks and iron staining and charcoal flecking.
III	291-315	10 YR 3/1 very dark gray; clay loam; strong, fine, crumb structure; moist firm to wet sticky; plastic; no cementation; terrestrial2 in origin; abrupt boundary; smooth topography. wetland clay sediments.
IV	315-316	10 YR 8/1 white; coral; structureless; extremely hard; non-plastic; indurated; coral shelf.*

*Base of excavation

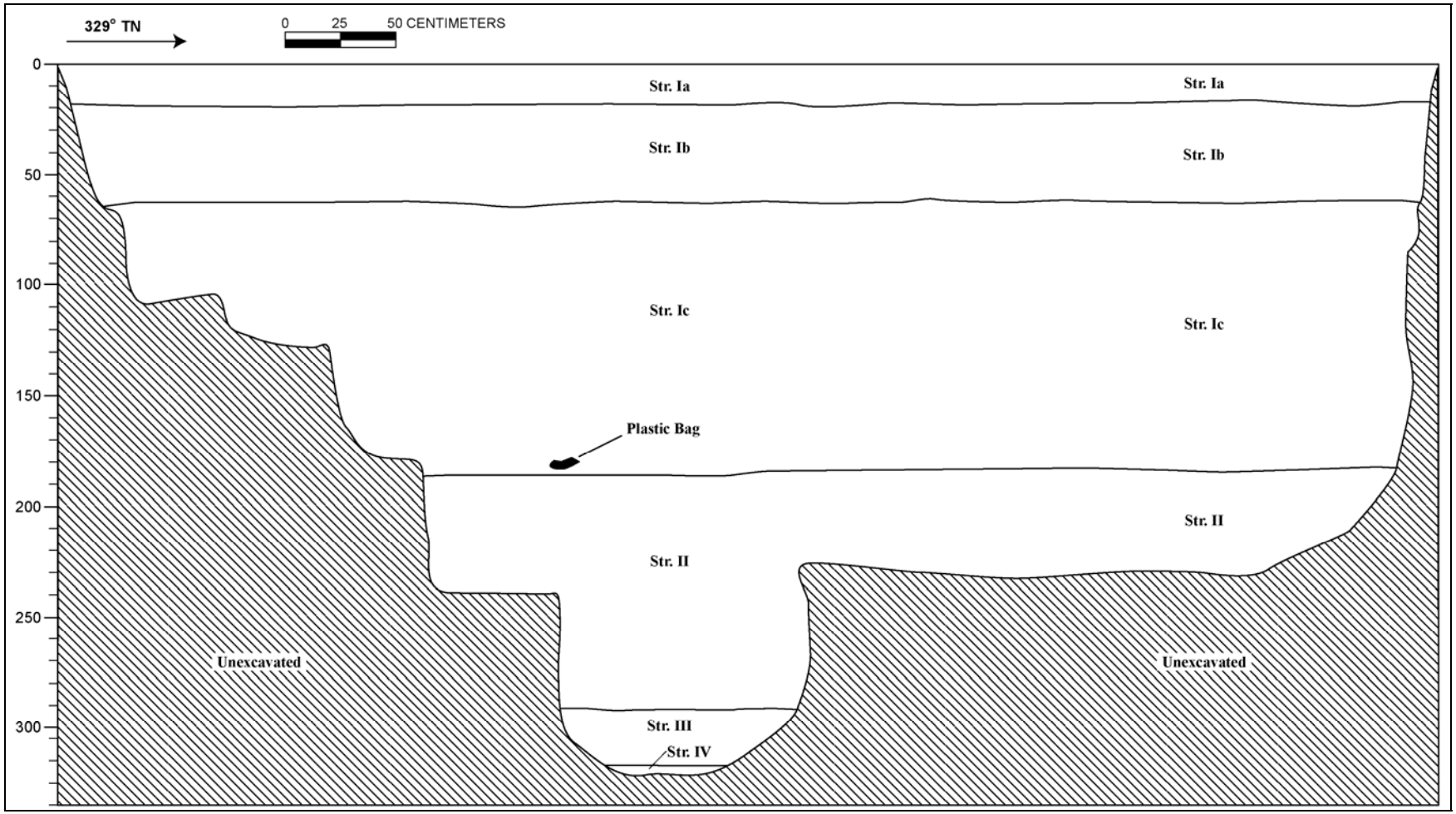

Figure 29. Trench 4 profile of southwest wall.

Figure 30. Trench 4, view southwest.

5.1.5 Trench 5

Trench 5 was located approximately 50 m northwest of Trench 1 and was oriented north-south (Figure 22). The stratigraphic sequence includes Strata I-III. Stratum I had 3 layers of modern construction debris and fill (Strata Ia-Ic). Stratum II was a mottled dark brown clay loam layer that was the former pre-contact agricultural layer. Stratum III was natural wetland sediments(Table 8, Figure 31, and Figure 32).

Table 8. Stratigraphy of Trench 5

Stratum	Depth (cmbs)	Description
Ia	0-13	10 YR 5/2, grayish-brown; silt loam with gravel; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill; gravel and silt surfacing material for bus parking.
Ib	11-65	2.5 YR 4/8 red; clay loam; dry loose consistency; slightly plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill material overlying land fill/ trash deposit.
Ic	63-157	7.5 YR 5/3 brown; silty clay loam; dry loose consistency; non-plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Fill/construction debris deposit.
II	155-240	10 YR 3/3 dark brown; silt loam; strong, fine, crumb structure; moist friable to wet non-sticky; slightly plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Terrigenous natural sediments; p agricultural layer.
III	233-302	10 YR 3/1 dark gray; clay; strong, fine, crumb structure; moist friable to wet sticky; plastic; terrestrial in origin; wetland sediments.*

* Base of excavation

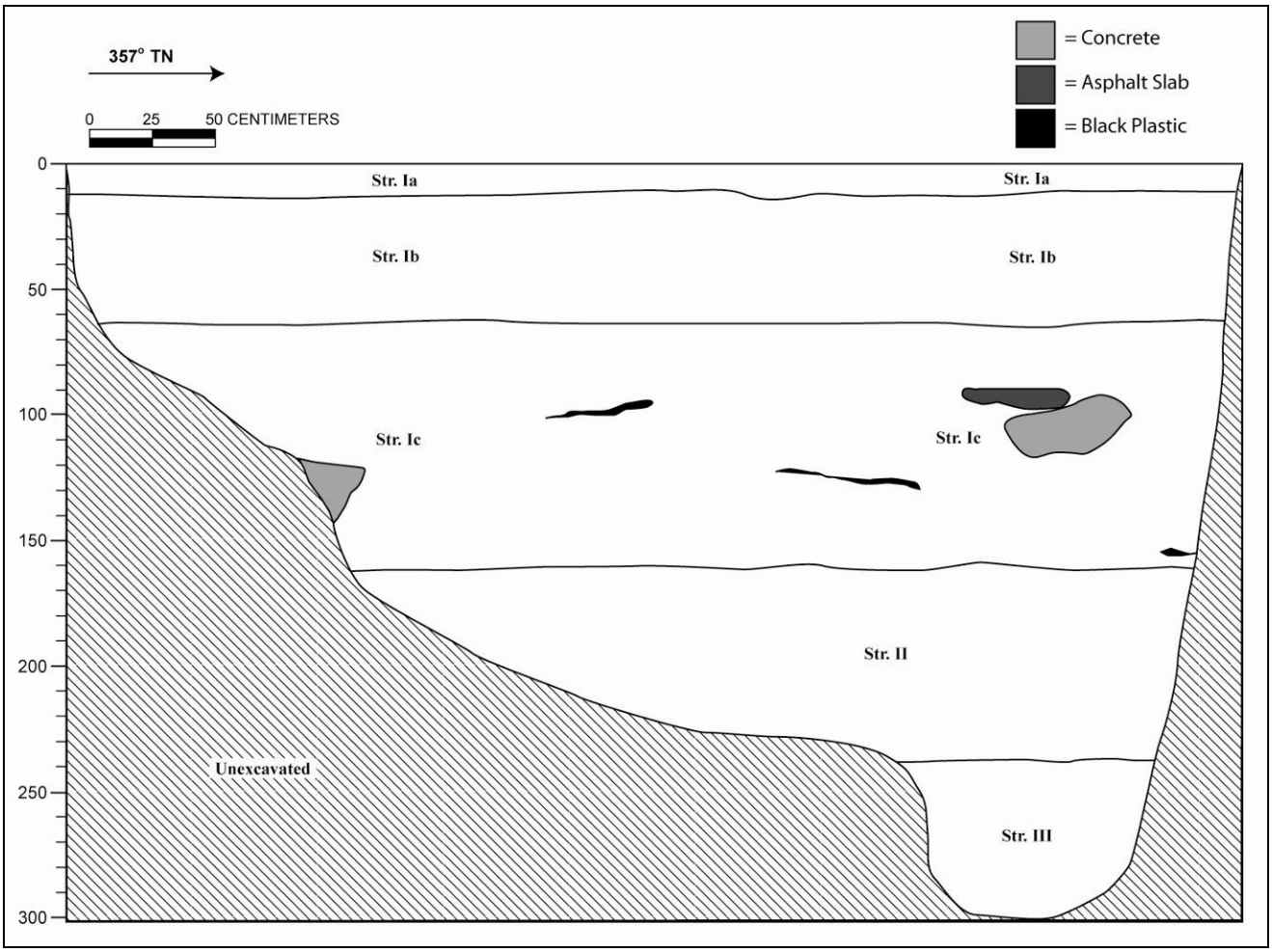

Figure 31. Trench 5 profile of west wall.

Figure 32. Trench 5, view west.

5.1.6 Trench 6

Trench 6 was located approximately 15 m west of Trench 5 and was oriented north-south (Figure 22). The stratigraphic sequence includes Stratum I which had 3 layers of modern construction debris and fill (Strata Ia-Ic; see Table 9, Figure 33, and Figure 34).

Table 9. Stratigraphy of Trench 6

Stratum	Depth (cmbs)	Description
Ia	0-19	10 YR 5/2, grayish-brown; silt loam with gravel; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill; gravel and silt surfacing material for bus parking.
Ib	14-55	2.5 YR 3/6 dark red, clay loam; strong, fine, crumb structure; dry loose consistency; slightly plastic; no cementation; terrestrial in origin; very abrupt boundary; smooth topography. Fill material
Ic	46-131	10 YR 6/2 light brownish-gray; silty clay loam; structureless; weakly coherent in consistency; slight plastic; no cementation; terrestrial in origin Fill; asphalt, crushed coral, modern trash and concrete slabs.*

* Trench terminated because if the presence of large concrete slabs.

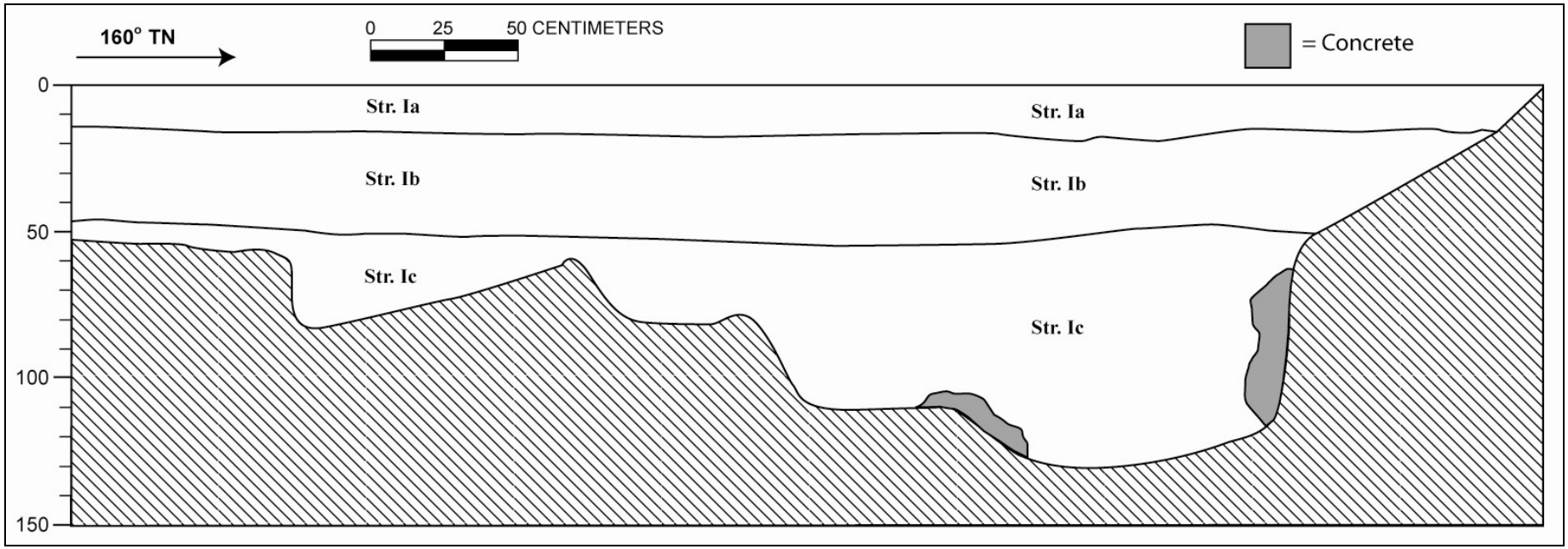

Figure 33. Trench 6 profile of east wall.

Figure 34. Trench 6, view north.

5.1.7 Trench 7

Trench 7 was located approximately 50 m southwest of Trench 6 and 50 m east of Fort Weaver Road (Figure 22). It was oriented north-south. The stratigraphic sequence includes Strata I-III. Stratum I had 1 layer of modern construction debris and fill (Strata Ia). Stratum II was a mottled dark brown silt loam layer that was the former agricultural layer. Stratum III was a clay loam layer that was the former pre-contact agricultural layer (Table 10, Figure 35, and Figure 36).

Table 10. Stratigraphy of Trench 7

Stratum	Depth (cmbs)	Description
Ia	0-120	10 YR 6/2 light grayish-brown; silt loam with gravel and debris; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Fill layer containing debris including concrete slabs, bottles, wire, and faunal (chicken) remains.
II	118-203	10 YR 3/3 dark brown; natural silt loam; moderate, fine, crumb structure; dry loose consistency; moist very friable; slightly plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Natural silt sediments, probable agricultural layer.
III	201-290	10 YR 4/1 dark gray; clay loam; probably *lo‘i*/ agricultural layer.*

* Base of excavation

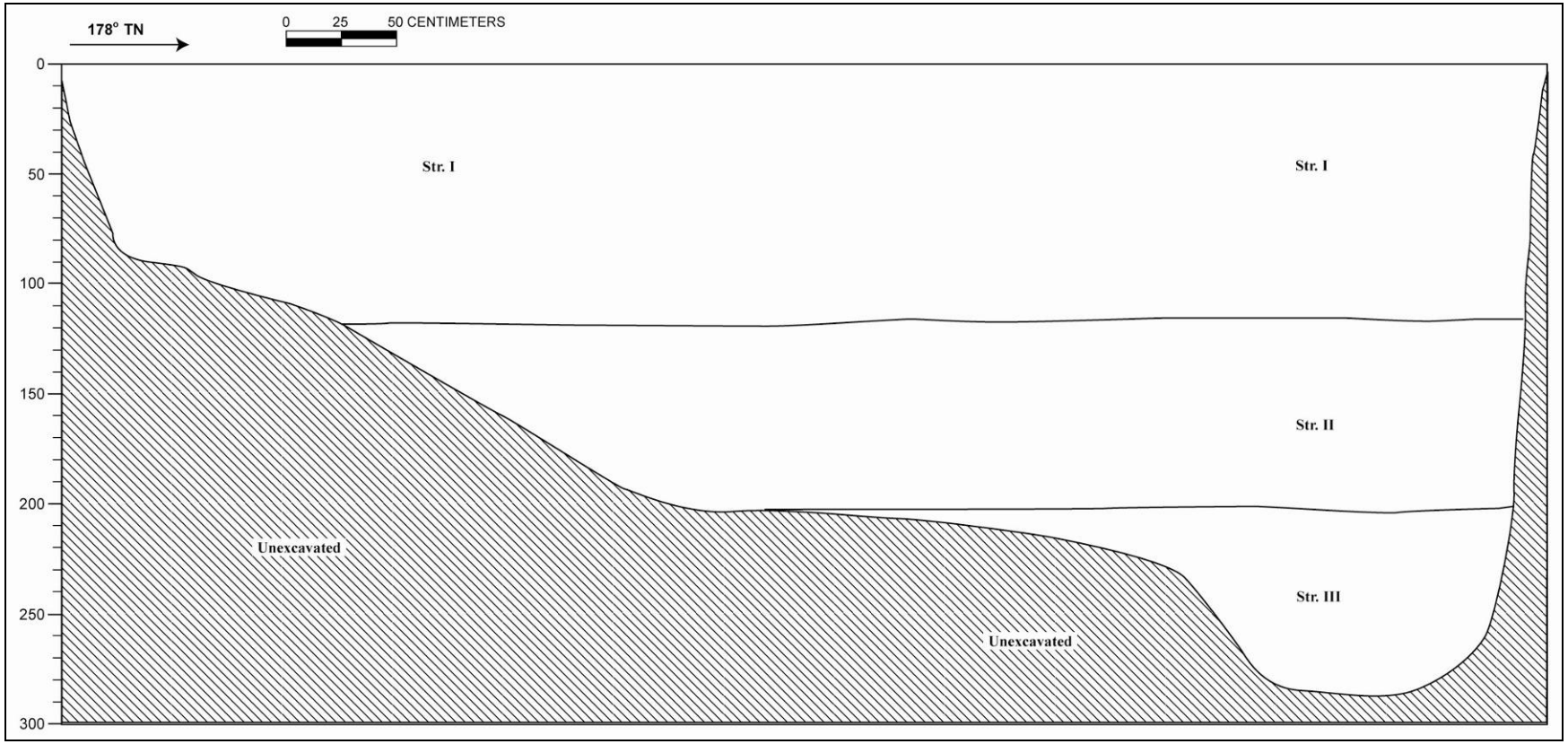

Figure 35. Trench 7 profile of east wall.

Figure 36. Trench 7, view east.

5.1.8 Trench 8

Trench 8 was located approximately 30 m northwest of Trench 7 and approximately 20 m east of Fort Weaver Road (Figure 22). It was oriented north-south. The stratigraphic sequence includes Strata I and II. Stratum I had 2 layers of modern construction debris and fill (Strata Ia and Ib). Stratum II was natural clay loam sediments (Table 11, Figure 37, and Figure 38).

Table 11. Stratigraphy of Trench 8

Stratum	Depth (cmbs)	Description
Ia	0-44	10 YR 6/2 light grayish-brown; silt loam with gravel and debris; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Fill deposit containing a high amount of rocks.
Ib	41-113	10 YR 4/3 brown; silty clay loam; terrigenous fill containing pieces of concrete.
II	111-123	7.5 YR 3/3 dark brown; clay loam; strong, fine, crumb structure; slightly hard to very firm consistency; plastic; terrestrial in origin; abrupt boundary; smooth topography. Natural sediments.*

* Base of excavation

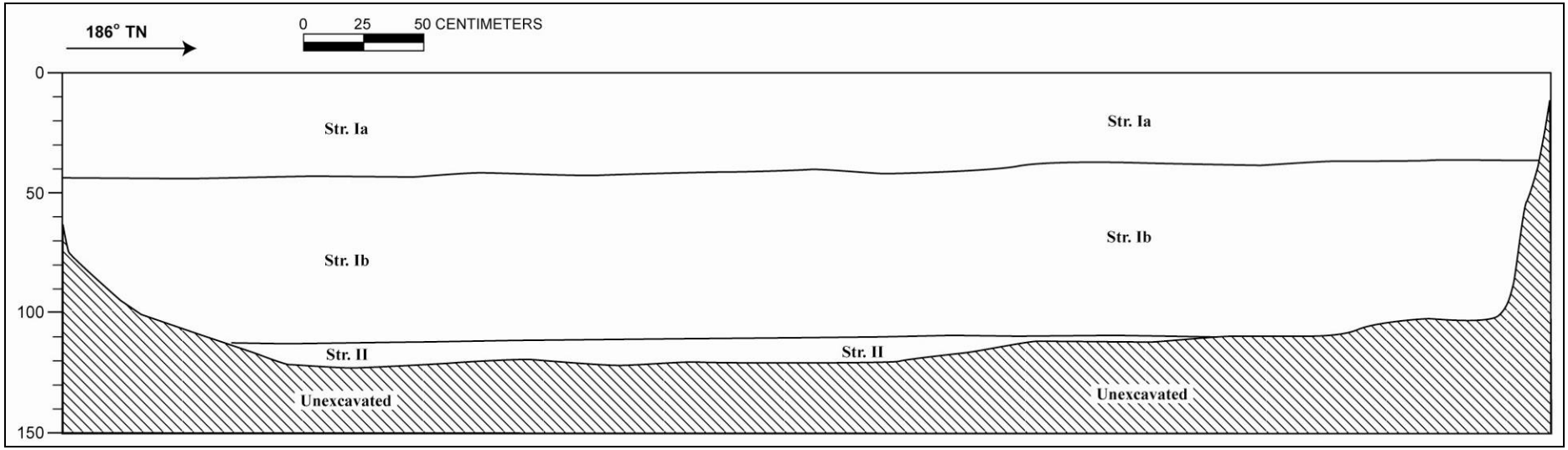

Figure 37. Trench 8 profile of east wall.

Figure 38. Trench 8, view south.

5.1.9 Trench 9

Trench 9 was located approximately 60 m north of Trench 8 and approximately 20 m east of Fort Weaver Road (Figure 22). It was oriented east-west. The stratigraphic sequence includes Strata I and II. Stratum I had 2 layers of modern construction debris and fill (Strata Ia and Ib). Stratum II was coral shelf (Table 12, Figure 39, and Figure 40).

Table 12. Stratigraphy of Trench 9

Stratum	Depth (cmbs)	Description
Ia	0-120	10 YR 6/2 light brownish-gray; silt; structureless; dry loose consistency; non-plastic; no cementation; terrestrial in origin; abrupt boundary; smooth topography. Fill layer deposited as grading during development.
Ib	75-167	10 YR 3/4 dark yellowish-brown; silt loam; weak, fine, crumb structure; dry hard consistency; non-plastic; strong cementation; marine in origin; abrupt boundary; smooth topography. Fill layer laid to raise ground elevation for housing development; likely marine and terrestrial dredge material.
II	84-289	10 YR 4/3 brown; bedrock; structureless; dry hard consistency; non-plastic; strong cementation; terrestrial in origin; abrupt boundary; irregular topography. Decomposing bedrock overlying hard bedrock shelf.*

* Base of excavation

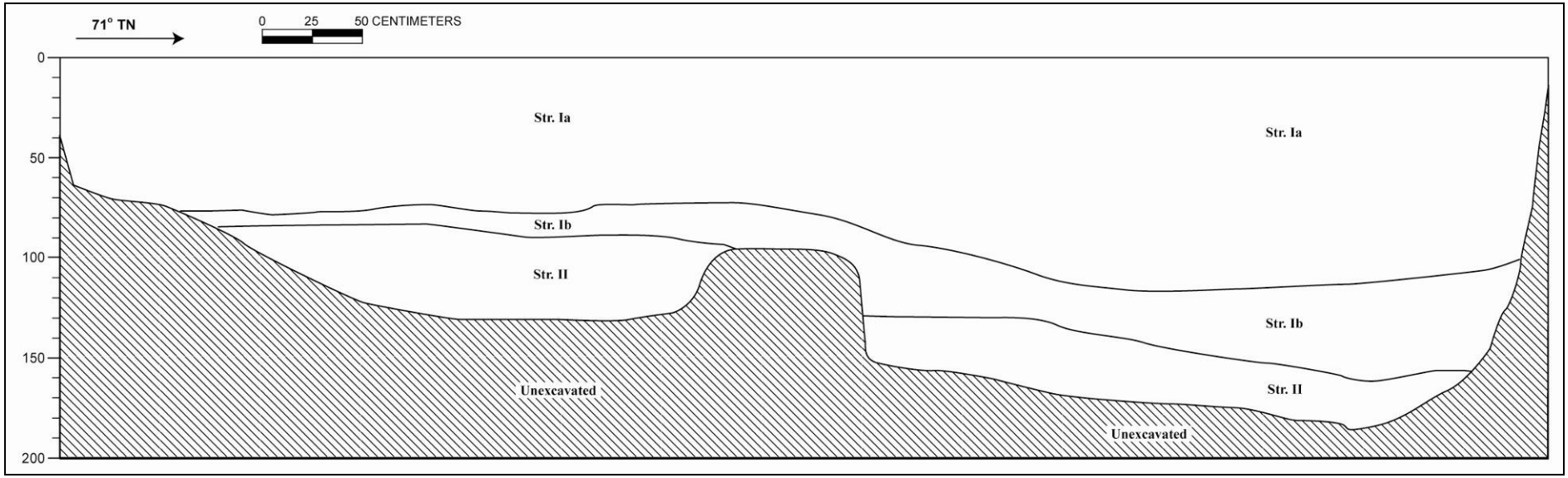

Figure 39. Trench 9 profile of north wall.

Figure 40. Trench 9, view north.

5.1.10 Trench 10

Trench 10 was located just north of Trench 9 (Figure 22). It was excavated to determine the function of Feature A of Site 50-80-12-7084, a mound observed in association with surface foundation features. Feature A was a terrace constructed of small coral and basalt boulders and stacked basalt and coralline rock mound. The base of the mound consisted of a coralline slab on top of chicken wire. Pieces of lumber, concrete, and red bricks were also observed in association with the mound.

The stratigraphic sequence of Trench 10 includes Strata I and II. Stratum I had 2 layers of modern construction debris and fill (Strata Ia and Ib). Stratum II was natural silt loam (Table 13, Figure 41, and Figure 42).

Table 13. Stratigraphy of Trench 10

Stratum	Depth (cmbs)	Description
Ia	0-51	10 YR 6/2 light brownish-gray; silt; structureless; dry loose consistency; non-plastic; no cementation; abrupt boundary; smooth topography. Surface grading fill.
Ib	50-135	10 YR 3/4 dark yellowish-brown; silt loam; weak, fine, crumb structure; dry, weakly coherent consistency; non-plastic; marine origins; abrupt boundary; smooth topography. Fill; various types of marine shell present including mollusk, clam, and mussel.
II	132-160	10 YR 4/3, brown; silt loam; structureless; dry hard consistency; non-plastic; strong cementation; terrestrial origin.*

* Base of excavation

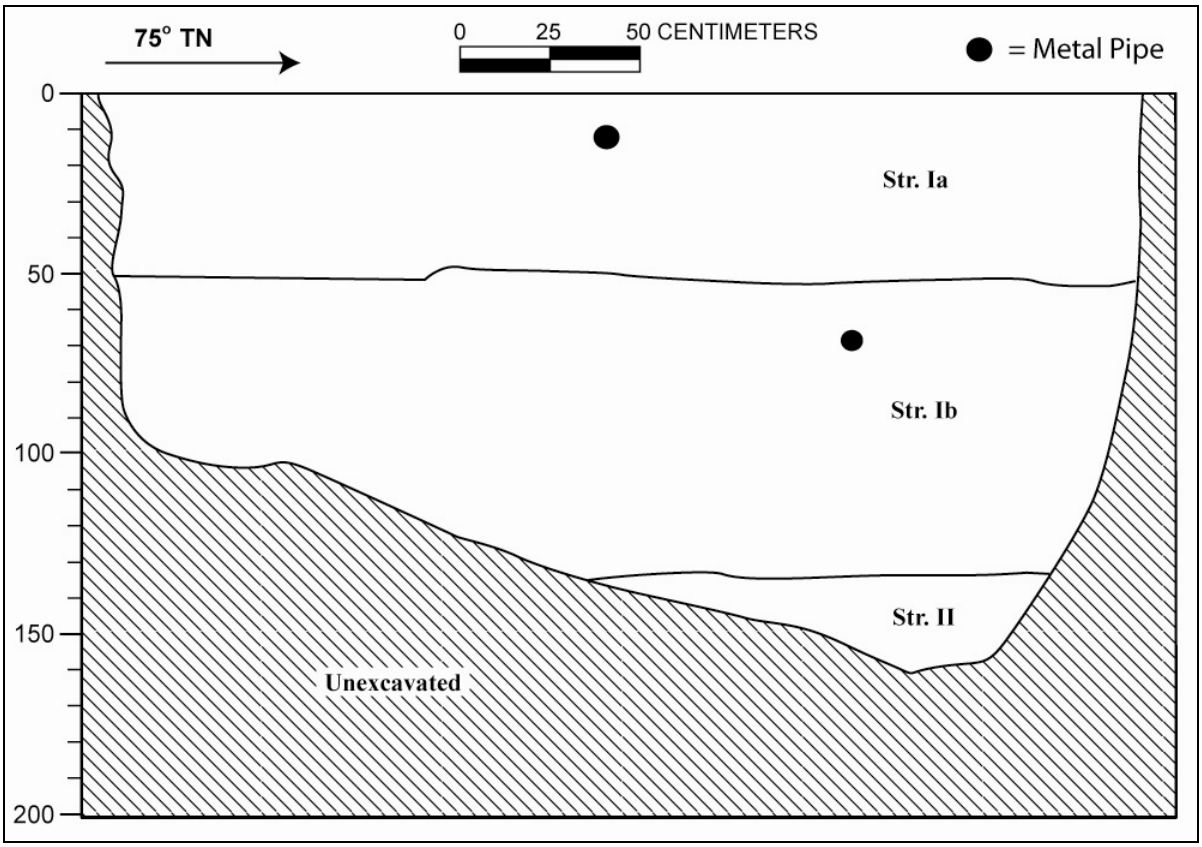

Figure 41. Trench 10 profile of north wall.

Figure 42. Trench 10, view northeast.

Section 6 Results of Laboratory Analysis

6.1 Radiocarbon Analysis

One sample from Trench 2, Stratum III, was submitted to Beta Analytic, Inc for radiocarbon dating analysis. The accelerator mass spectrometry (AMS) method was used to better establish dates of occupation for the portion of the subsurface cultural layer encountered during excavations. The sample (Beta-261624) yielded a date range, with a calibrated 2-sigma date of 1270 AD to 1400 AD (95%). This date range falls within the pre-contact time period indicating Site 50-80-12-7085 is likely a pre-contact *lo‘i* layer.

Table 14. Results of radiocarbon analysis of organic sediment collected from Stratum III of Trench 2.

Trench/ Stratum	Beta Analytic ID #	Sample Material / Analytic Technique	Provenience	Conventional Radiocarbon Age	C13/C12 Ratio	Oxcal Calibrated Calendar Age (2 sigma)
Trench 2, Stratum III	Beta-261624	Sediment and charcoal / AMS	Stratum III, 195-270 cmbs	660 +/- 40 BP	-20: lab. mult = 1	1270 AD-1400 AD (95%)

Section 7 Site Descriptions

7.1.1 Site 50-80-12-7084

SITE TYPE: Structure remnants
FUNCTION: Residential housing
FEATURES: 6
CONDITION: poor
AGE: Historic
TAX MAP KEY: 1-9-1-017:082

A total of six features including a post support, two building foundations, a cesspool, a previously identified water control feature, and the remnants of a water control ditch were observed and documented during pedestrian survey of the project area. Because of their close proximity, the remnants were recorded as a single site. An additional concrete building foundation present in the vicinity was not recorded, as it was clearly modern construction.

Site 50-8-12-7085 represents the remnants of at least three residential houses and their associated infrastructure, as well as two water control features. Based on available historical data, it is likely this residential complex was built during the plantation era to support commercial agricultural activities in the vicinity. The water control features present on site were likely used to divert water into the lower agricultural fields, however the residential complex may have benefited from it as well.

Feature A consists of a terrace constructed of small coral and basalt boulders with a mound of basalt, coral, and concrete on top of the terrace (Figure 43 and Figure 44). The terrace is defined by a discontinuous alignment of small boulders, both coral and basalt, on the downslope side. The terrace measures 6 m northwest by southeast and is approximately 30 cm high. The mound on the terrace surface measured approximately 1.58 m east-west by 2.0 m north-south with a maximum height of 35 cm. The mound was constructed of small coral and basalt boulders with chunks of concrete and a few red rocks. A decaying wooden post and a piece of lumber lay across the top of the mound. Feature A is located in the northwestern corner of the project area.

Nearby neighbors thought the feature might be a burial or a former cesspool. To aid in properly identifying the function of the feature, CSH archaeologists dismantled the mound. A 2.75 m backhoe trench extending across the feature was dug to the underlying decomposing basalt bedrock. Mixed marine and terrestrial dredge fill containing marine shell, which had been deposited as grading fill on top of the bedrock, was observed. No diagnostic artifacts, human or faunal remains were recovered from this feature.

Because no evidence was observed to support the neighbor’s claims of a burial or a cesspool, the feature is thought to be a minor ancillary feature (ie post support) to the former residence at this location. The feature was dismantled as part of the excavation process and, as a result, is no longer standing.

Figure 43. Feature A, pre-excavation, view west.

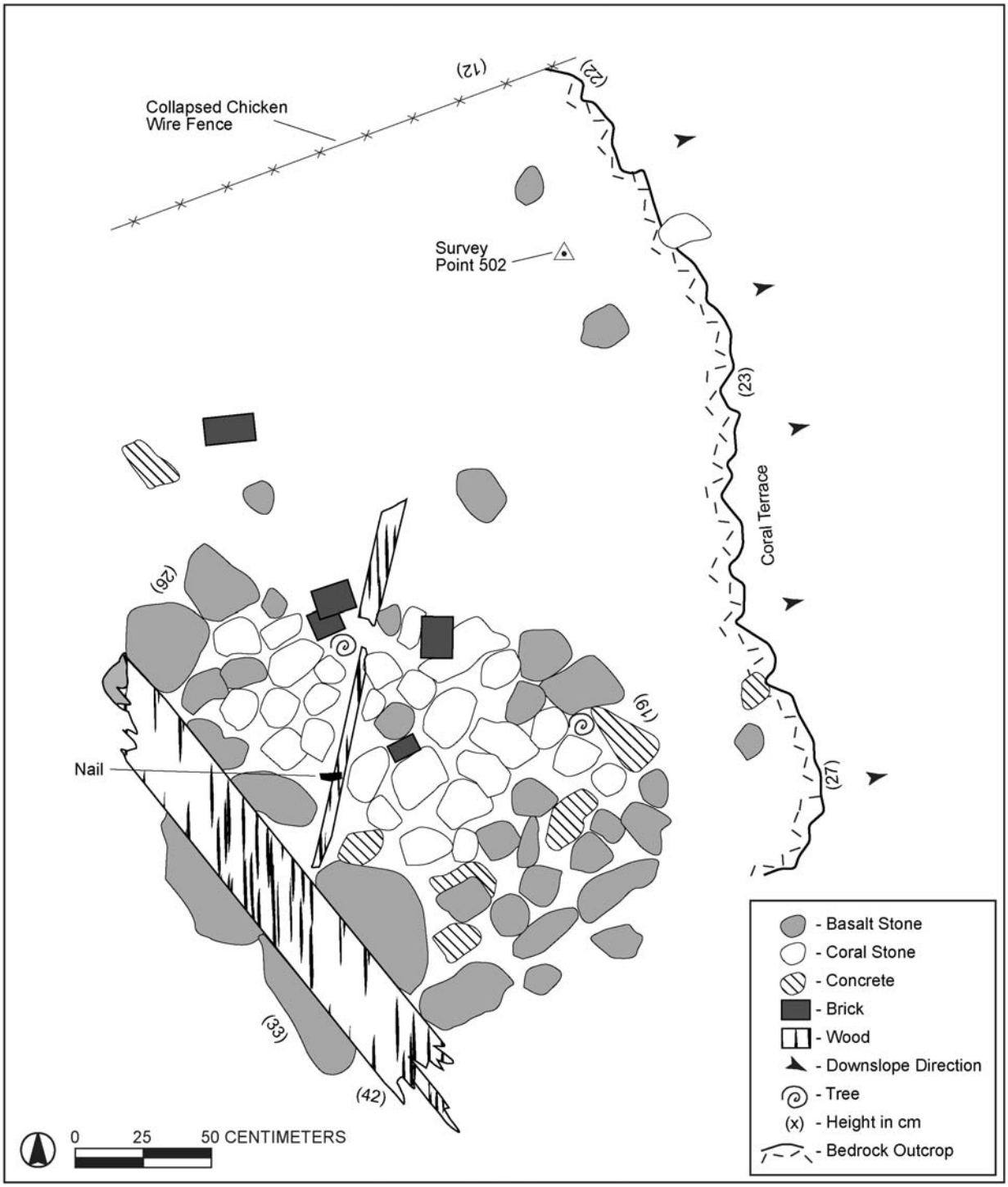

Figure 44. Plan view of Feature A.

Feature B is a cesspool constructed of basalt and mortar which is approximately 70 cm below current ground surface (Figure 45 and Figure 46). The top of the cesspool is 2.4 cm in diameter and rises approximately 60 cm above the current ground surface. Several rusted metal pipes are also present in the vicinity. Rubbish observed within the cesspool included a rusted metal pale, as well as rusted metal rings and bands. Rusted corrugated metal sheeting, chicken wire, pieces of mortar/concrete, and a broken plywood circle (possibly a cover) are present on top of the cesspool opening. Basalt and coralline rocks, fragments of mortar, lumber, and other building debris are also scattered around the perimeter. Metal pipes, embossed with *C ALA.PIPE Co.4 STD*, are present between the cesspool and Feature E, a house foundation, and appear to connect them. The pipes are buried close to the cesspool, but are exposed by the house foundation. Feature B appears to be the sewage disposal system for Feature E. The overall condition of the cesspool is poor.

Figure 45. Overview of Feature B, view north.

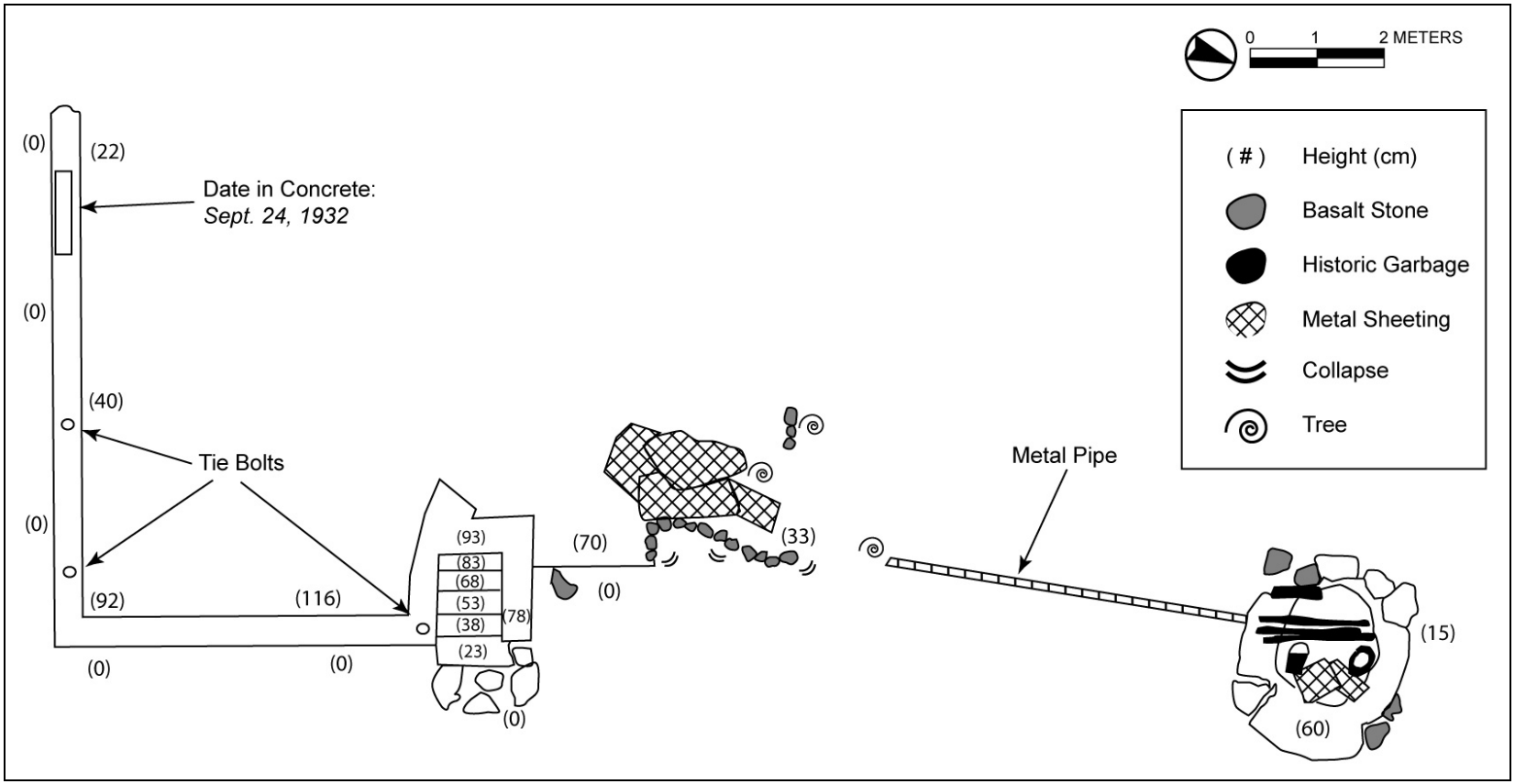

Figure 46. Plan view of Features B and E.

Feature C is the remnants of a house foundation/wall, located approximately 6 meters east of Old Fort Weaver Road, in the northwestern portion of the current project area (Figure 48 and Figure 48). It was constructed of rock and mortar and was likely comparable in size to Feature E, a more intact rock and mortar housing foundation. Feature C extends 5.80 m east and is less than 50 cm wide. Much of the feature appears to have been dismantled as push piles of rock, mortar, and other construction debris have been placed alongside the chain link fence, approximately 15 m south of this feature.

The structural integrity of this feature is very poor, less than 10 cm above the existing ground surface, and is barely visible. There is no indication of that the structure extends below the current ground surface.

Figure 47. Overview of Feature C, view southwest.

Figure 48. Plan view of Feature C.

Feature D is present along the eastern side of Old Fort Weaver Road, approximately 1.80 meters east of the asphalt sidewalk, and consists of the remains of a former water control structure which was observed during the field inspection of this project area (O'Hare and Hammatt 2007; Figure 49 and Figure 50). The feature measures 2.10 m by 2.18 m and is constructed of basalt rock encased by mortar. Inscribed in the mortar surface of the north side of the structure is the date, '*MAR 1941*', which is likely the construction date of this feature. A total of two sets of notches have been cut in the mortar, and were likely used for gates to re-direct the flow of water from north-south along the roadway to east into agricultural fields and/or residential areas. A flume has been constructed on the east side of the structure in accordance to the slope of the land.

The water control feature is in poor condition; much of it has cracked and sections are separating from the main structure. Pieces of mortar and basalt rock are also present on the ground surface surrounding the feature.

Figure 49. Overview of Feature D, view east.

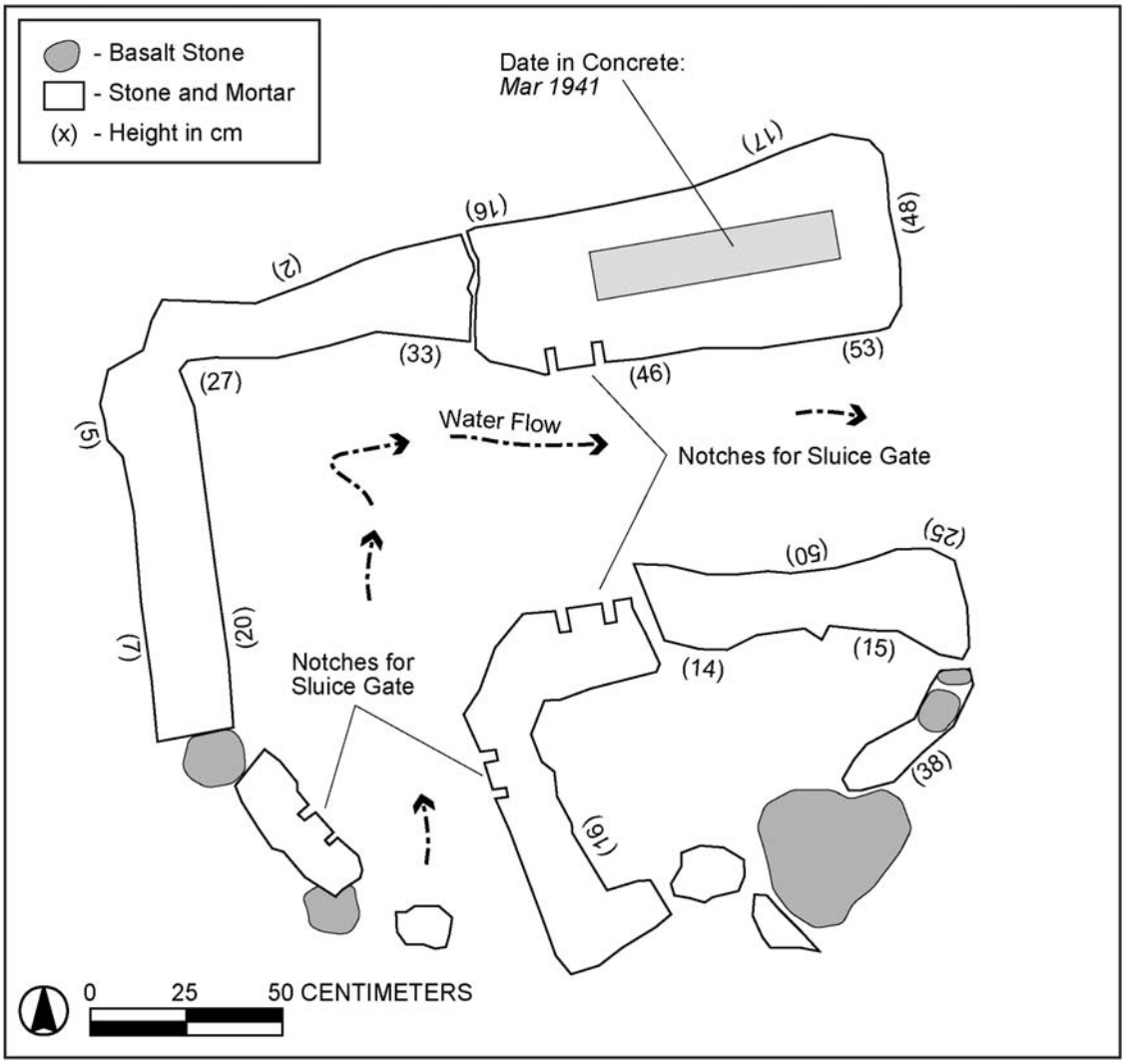

Figure 50. Plan view of Feature D.

Feature E is the remnants of a house foundation which sits just above existing residential homes in the northwestern portion of the project area (Figure 46, Figure 51 to Figure 53). The feature includes an intact rock and mortar foundation, a set of stairs, and a pile of corrugated sheet metal. The foundation wall measures 8 m southwest-northeast to form a corner, then measures 5.30 m northwest to a staircase with 5 steps. The foundation then extends approximately 5 m further northwest. The sections that remain along the southeastern side, including the stairs, are in good condition with the exception of the bottom landing, which has begun to crumble and separate from the foundation. Several building tie-in bolts are present on top of the foundation. A pile of building debris was located just east of the stairs, on top of the foundation. Metal sewage pipes extend from the foundation approximately 6 m north to the cesspool (Feature B).

Feature E is in overall poor condition.

Figure 51. Overview of Feature E, view southeast

Figure 52. Feature E, stairs and a portion of the structure foundation, view north.

Figure 53. Feature E, structure foundation, view east.

Feature F is a water control feature consisting of the remains of a ditch and terrace wall likely used to divert the flow of water along existing topographic features (Figure 54 to Figure 56). The wall is present in the eastern portion of the project area and is likely associated with Feature D, the water control feature present on the east side of Old Fort Weaver Road. Feature F follows the topographic drainage area present in this portion of the project area. An approximately 25 m section of the wall is all that remains, however it may have originally extended all the way to Feature D. Feature E is approximately 1.25-1.5 m high. Its thickness is unknown as the west side has been filled in and is currently used for bus parking. Modern trash and construction material including concrete and metal are present along the entire length of the wall. The northwestern portion contains smaller basalt cobbles and boulders and is less defined than the southeast portion, which consists of large basalt boulders loosely aligned along the current topography.

The wall is in poor condition and has been heavily impacted by recent filling and grading activities associated with the eastern portion of the project area.

Figure 54. Northwest portion of Feature F, view south.

Figure 55. Southeast portion of Feature F, view north.

Figure 56. Southeast portion of Feature F, view west

7.1.2 Site 50-80-12-7085

SITE TYPE: Agricultural layer (*Lo‘i* terrace)
FUNCTION: wetland agriculture
FEATURES: 1
CONDITION: fair
AGE: pre-contact
TAX MAP KEY: 1-9-1-017:082

Trenches 1, 2, and 4, excavated along the eastern side of the project area, revealed a dark clay loam layer with charcoal flecking and iron staining from decomposing basaltic pebbles and cobbles. Iron staining is indicative of waterlogged agricultural soils typical of taro cultivation in ponded fields. Trenches 3, 5, and 7 contained a similar layer. The layer is present in Strata II and III between 183 and 292 cmbs. LCAs that were present within the parcel (LCA 947 to Ka‘ōpala and LCA 749 to Mahina) indicate the land was used for *kalo* and house lots at the time of the *Māhele*. Radio carbon analysis (Beta 261324) indicates this layer dates between 1270 AD and 1400 AD and is firmly pre-contact in origin.

PHRI identified a pond field system located southwest of the current project area (Dicks et al. 1987) Radio carbon dates indicate a long period of use between 1430 and 1952 AD. It is likely that Site 50-80-12-7085 is associated with this pond field system, however because it is not in close proximity to the previously identified site, it was recommended for a separate site number.

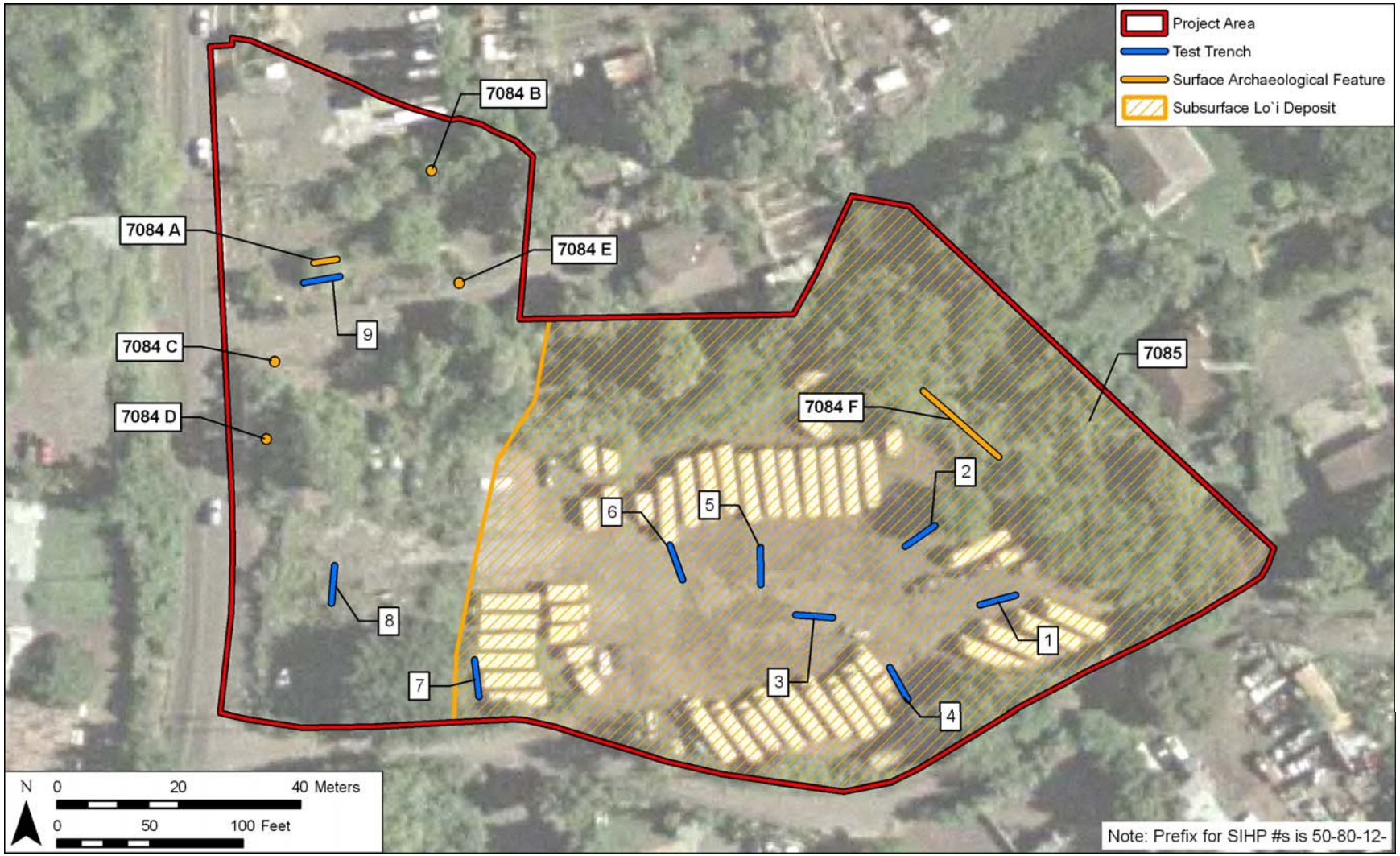

Figure 57. Site locations in the current project area.

Section 8 Significance Assessments

The two historic properties identified by the current study were evaluated for significance according to the broad criteria established for the Hawai‘i Register of Historic Places. The five criteria are:

A Associated with events that have made an important contribution to the broad patterns of our history;

B Associated with the lives of persons important in our past;

C Embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, or possesses high artistic value;

D Have yielded, or is likely to yield information important for research on prehistory or history;

E Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property, or due to associations with traditional beliefs, events or oral history accounts – these associations being important to the group's history and cultural identity.

Significance Assessment for SIHP No. 50-80-12-7084

SIHP No. 50-80-12-7084, is the remnants of a mid-twentieth century residential complex, and is interpreted as associated with plantation-era housing. Site 50-80-12-7084 is assessed as significant under Criterion D (have yielded, or may be likely to yield information important in prehistory or history) of the Hawai‘i Register of Historic Places evaluation criteria.

SIHP No 50-80-12-7085 is a pre-contact culturally modified land surface interpreted as ssociated with wetland agricultural practices. Site 50-80-12-7085 is assessed as significant under Criterion D (have yielded, or may be likely to yield information important in prehistory or history) of the Hawai‘i Register of Historic Places evaluation criteria.

Section 9 Project Effect and Mitigation Recommendations

The following project effect discussion and cultural resource management recommendations are intended to facilitate project planning and support the proposed project's required historic preservation consultation.

9.1 Project Effect

The historic properties, Sites 50-80-12-7084 and 50-80-12-7085, identified within the project area will potentially be affected during limited subsurface impacts associated with the current project. CSH's project specific effect recommendation is "effect, with proposed mitigation commitments." The recommended mitigation measures will reduce the project's potentially adverse effect on these significant historic properties.

9.2 Recommendations

Sufficient information regarding the location, function, age, and construction methods of Site 50-80-12-7084 has been generated by the current inventory survey investigation to mitigate any adverse effect caused by proposed development activities. Therefore, no further work is necessary for this property.

The results of this archaeological inventory survey indicate that subsurface deposits within the project area consist of several Strata of modern construction fill overlying a culturally modified wetland ground surface, Site 50-80-12-7085, at a depth in excess of 2 m below the current ground surface. Site 50-80-12-7085 was documented with a detailed written description, photographed in profile, analyzed, and radiocarbon dated. Because additional information can still be gained from this site, including but not limited to, additional soil profiles, radio carbon dating, and possibly identifying the extent of the cultural modification, an archaeological monitoring program is recommended for this site. This monitoring program will facilitate the identification of any additional historic properties that might be discovered during project construction, and will gather additional information regarding Site 50-80-12-7085 within the project area.

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Appendix A LCA Documents

Land Court Application No. 749 to Mahina

No. 749, Mahina, Honouliuli, September 18, 1847
N.R. 408-409v2

To the Honorable Land Commissioners of the Hawaiian Islands, Greetings: I hereby tell you of my claim. This land is at Kaulaula, Honouliuli, Ewa, Island of Oahu. It is bounded on the north by the irrigated terraces of Haae ma, on the east by the land of Puehu, on the south by the houses of Opoopu, on the west by the fenced land of Kaulaula and the cliff of Kaulaula and also some houses of mine which stand there.

Here is the second: bounded on the north by the land of Koi, on the east by the land of Puehu, on the south by the irrigated land of Haae, on the west the houses of Kauhikaula and Koakanu. My residence there has been continuous; it was from Haae.
MAHINA

F.T. 272v2
Claim 745!, Mahine, April 17 [1848]
[should be 749]

Maakuia, sworn, I know this place. It is kalo land in Honouliuli in the district of Ewa, a moo, a long strip and bounded:

Honolulu side by Kapoli's
Mauka by Haae's and Pulehu's lands
Waianae by a pali with a wall on its top
Makai by Opala's place.

Claimant got this place from Haae. I know him to have lived on it from 1838 to the present time wihtout any opposition or dispute. There is one house of claimant's and the place is within the general fence. No other person lives on it.

Kinalua, sworn and confirmed the previous statement in the several particulars. I know claimmant got the place from Haae about the time mentioned. It was a gift of friendship.

N.T. 3-4v3
No. 749, Mahina, April 10, [1848]

Maakuia, sworn and stated, "I have seen Mahina's place at Kaulaula in Honouliuli at Ewa. He has a (moo) land for cultivation purposes only. The boundaries are:

Kapali's land is toward the Honolulu direction
Kapuehu's land and Haae's land, toward the mountain
a cliff, Waianae and
a pasture for Kaopala is in the direction of the sea.

Mahina had received this land from Haae and I had first seen it in the year 1838. No one has objected to it so this day. There is one house there.

Kinolua, sworn and said, "I have seen this property exactly as Maakuia has just stated here. This land was acquired without any cost."

[Award 749; R.P. 2867; Kaulaula Honouliuli Ewa; 1 ap.; .94 Ac.]

Land Court Application No. 947 to Kaopala

No. 947, Kaopala, Honouliuli, Ewa, Oahu, November 1, 1847
N.R. 553-554v2

The President of the Land Commissioners, Greetings: I hereby tell you of my land claim which is at Loloulu, Honouliuli, Ewa, Island of Oahu. It is bounded on the north by the poalima of Kihewa, on the east by the land of Mahae, on the south by the land of Kaneaola, on the west by the land of Keliiaa and the houses of Poopuu. Kapoli also has a claim at this place which is called Kumupali which I am taking care of. The second of my claims is bounded on the north by the stream of Makaii, on the east by a po`alima, on the south and west also, by a poalima. My third claim is bounded on the north by a poalima, on the east by the land of Kekua and Kumupopo, on the south by bulrushes, on the west by the land of Koakanu. The third /sic/ of my claims is at Kaaumakua, Honouliuli and is bounded on the north by the Pond of Kauhimakahou, on the east by the land fence, on the south by the land fence, on the west by the land of Keoneo. My house claim is at Kaulaula in Honouliuli, standing by the houses of Mahine.
KAOPALA X

F.T. 397-398v2
Cl. 947, Kaopala, 26 July 1848

Poopuu, sworn, This land is in Honouliuli, Ewa, consisting of 5 seperate [sic] pieces.

1. house lot, bounded:
Mauka by Paehu's land
Honolulu by Nika's
Makai by Kalaoa's
Waianae by Nika's land.

2. Second lot- 14 kalo patches, not fenced, bounded:
Mauka by Nika
Honolulu by Kauhi's land
Makai by Kaneaola's
Waianae, Poopuu's.

3. Third - 3 patches, bounded:
Mauka by Kaope's land
Honolulu by Keakua's
Makai by Government land
Waianae by Kauhi's land.

4. fourth, 2 patches, bounded:
Mauka by stream between Kaneaola's land
Honolulu by Nika's

Makai also, Waianae also.

5. Fifth, bounded:
Mauka by Lauauhalo's land
Honolulu by Nika
Makai, Government fence
Waianae by Kanuouo's land.

3 kalo patches.

Claimant has held these lands from his ancestors down. Kaope is a konohiki & luna and claimant's elder brother, and he gave him these kalo lots in 1841. None have disputed his right to this time.

He got the house lot from Napahi, his father in 1841. It has been transmitted from ancestors down without any disputing the right to this time.

Kama, sworn, and confirmed the entire testimony about the kalo lands but knew nothing about the house lot.

Note. There is one kalo patch in the house lot as it has been defined, belonging to Namauu.

N.T. 166-167v3
No. 947, Kaopala, July 26 [1848]

Poopuu, sworn and stated, "I have seen Kaopala's land at Honouliuli in Eva in five sections and the boundaries of the first section are:

Puehu's land, mauka
Nika's land, Honolulu here
Kalaoa's land, makai
Nika's land, Waianae.

2. Section two, 14 patches:
Nika's land, mauka
Kauhi's land, Honolulu here
Kaneaola's land, makai
my property, Waianae.

There is no fence and no house there.

3. Section three,
Kaope's land, mauka
Kekua's land, Honolulu here

government patch, makai
Kauhi's land, Waianae.

There are three patches in this section; however, there is no fence and no house.

4. Section 4, two patches:
Kaneaola's land, mauka
Nika's land, Honolulu here, makai and Eva also.

There is no house and no fence.

Section 5,
Lauhala's land, mauka
a land lot, makai
Kanono's land, Waianae.

Kaopala's land is from his father, Napahi, and Napahi's land is from his father, Panaewa. He had received this during Kamehameha I's reign and Kaopala had acquired it in 1841; no one has objected."

Kama, sworn and stated, "I have seen this property and it is similar to Poopuni's land with the exception that Namauu's land is in the center of the first section."

[Award 947; R.P. 3090; Honouliuli Ewa; 3 ap.; 5.76 Acs; R.P. 3091; Honouliuli Ewa; 5 ap.; 9.39 Acs]

Appendix B Radiocarbon Analysis

BETA

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Fax: 305 663 0964
Beta@radiocarbon.com
www.radiocarbon.com

Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

July 21, 2009

Dr. Hallett H. Hammatt/Kendy Altizer
Cultural Surveys Hawaii
P.O. Box 1114
Kailua, HI 96734
USA

RE: Radiocarbon Dating Result For Sample HONOUTR2.III

Dear Hallett and Kendy:

Enclosed is the radiocarbon dating result for one sample recently sent to us. It provided plenty of carbon for an accurate measurement and the analysis proceeded normally. As usual, the method of analysis is listed on the report sheet and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analysis. It was analyzed with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

The cost of the analysis was charged to the MASTERCARD card provided. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood
Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Dr. Hallett H. Hammatt/Kendy Altizer — Report Date: 7/21/2009

Cultural Surveys Hawaii — Material Received: 7/6/2009

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 261624	580 +/- 40 BP	-20.0 o/oo	660 +/- 40 BP

SAMPLE : HONOUTR2.III
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (organic sediment): acid washes
2 SIGMA CALIBRATION : Cal AD 1270 to 1400 (Cal BP 680 to 550)

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-20:lab. mult=1)

Laboratory number: **Beta-261624**

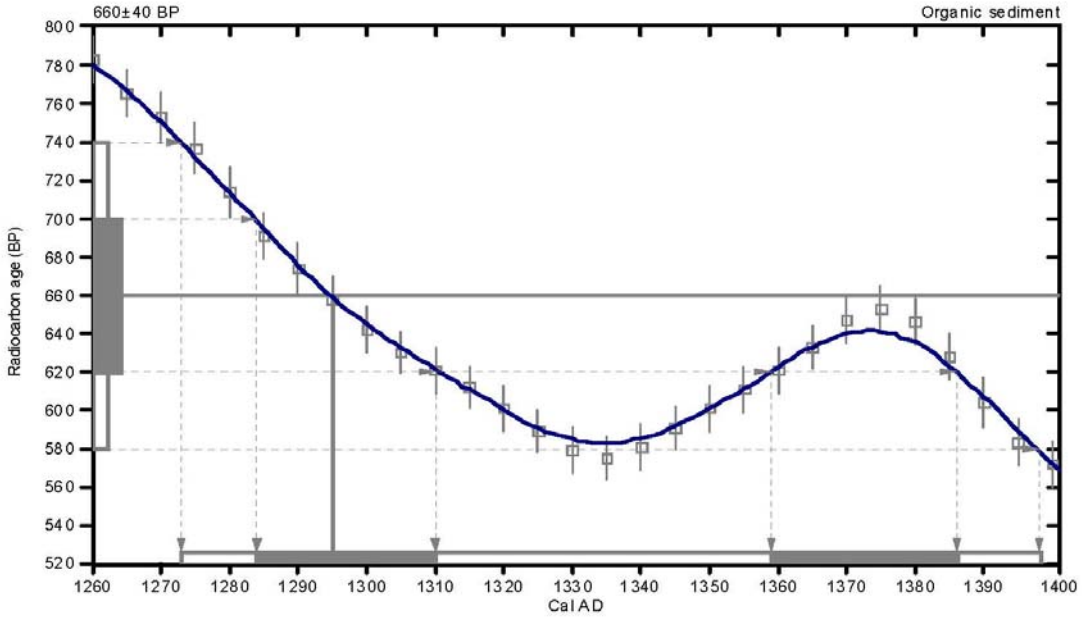
Conventional radiocarbon age: **660±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 1270 to 1400 (Cal BP 680 to 550)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1300 (Cal BP 660)

1 Sigma calibrated results: (68% probability) Cal AD 1280 to 1310 (Cal BP 670 to 640) and Cal AD 1360 to 1390 (Cal BP 590 to 560)



References:

Database used

INTCAL04

Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: beta@radiocarbon.com

Appendix C

Letter from State Historic Preservation Division to Cultural Surveys Hawai‘i

June 21, 2010

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

June 21, 2010

Dr. Hallet Hammatt
Cultural Surveys Hawaii
P.O. Box 1114
Kailua, Hawaii 96734

LOG NO: 2010.2377
DOC NO: 1006MV39
Archaeology

Dear Dr. Hammatt:

SUBJECT: **HAR § 13-13-279 Review –**
Archaeological Monitoring Plan for Proposed Hale Kipa Project, Honouliuli Ahupua'a, Ewa District, Island of Oahu. TMK: [1] 9-1-017:082 (DRAFT)

Thank you for the opportunity to review this revised draft of an Archaeological Monitoring Plan (AMP) that was received by our office on June 17, 2010. As mentioned in our previous correspondence, the background research for this project was particularly well done, and indicates that this area was previously utilized for agricultural cultivation (among other things). In addition, the previous Archeological Inventory Survey of this property (Altizer et. al. 2009) revealed subsurface agricultural deposits and a subsurface agricultural feature. According to this AMP the ground disturbing activities associated with the Hale Kipa Project will potentially affect 4.28 acres. Figure 22 on pg. 60 indicates that the majority of this project area is underlain with agricultural deposits. The revisions that have been added to this AMP provide an adequate description of the ground altering activities and indicate how information could potentially be yielded that would mitigate the potential destruction of archeological sites significant under criterion "D."

In addition, we agree with your recommendation that a qualified archaeologist should be on site for all ground altering activities during the early phases of this project, and for all excavations that are planned to proceed below 1m in depth. However, if the excavation proves to be entirely contained within sterile fill, then monitoring activities may be switched to an on call basis following direct consultation with SHPD. Please resubmit a copy of this report, marked "**FINAL**," along with a copy of this review letter and a text-searchable PDF version on CD to the attention of the "**SHPD Library**" at the Kapolei SHPD office. Please call Mike Vitousek at (808) 692-8024 if you have any questions or concerns regarding this letter.

Aloha,

Nancy A. McMahon

Nancy McMahon, Deputy SHPO/State Archaeologist
and Historic Preservation Manager

Appendix D

Traffic Impact Assessment Report
Hale Kipa Residential Treatment
and Educational Center

Wilson Okamoto Associates

May 15, 2007

WILSON OKAMOTO
CORPORATION
ENGINEERS PLANNERS CONSULTANTS

1907 South Beretania Street
Artesian Plaza, Suite 400
Honolulu, Hawaii, 96826 USA
Phone: 808.946.2277
Fax: 808.946.2253
www.wilsonokamoto.com

7696-01
May 15, 2007

Mr. Chester Koga
R.M. Towill Corporation
420 Waiakamilo Rd., Suite 411
Honolulu, HI 96817

Subject: Hale Kipa Residential Treatment and Educational Center
Honouliuli, Oahu

Dear Mr. Koga:

As requested, we assessed the traffic impacts resulting from the proposed Hale Kipa Residential Treatment and Educational Center in Honouliuli on the island of Oahu. The following is a summary of our assessment and conclusions.

Project Description

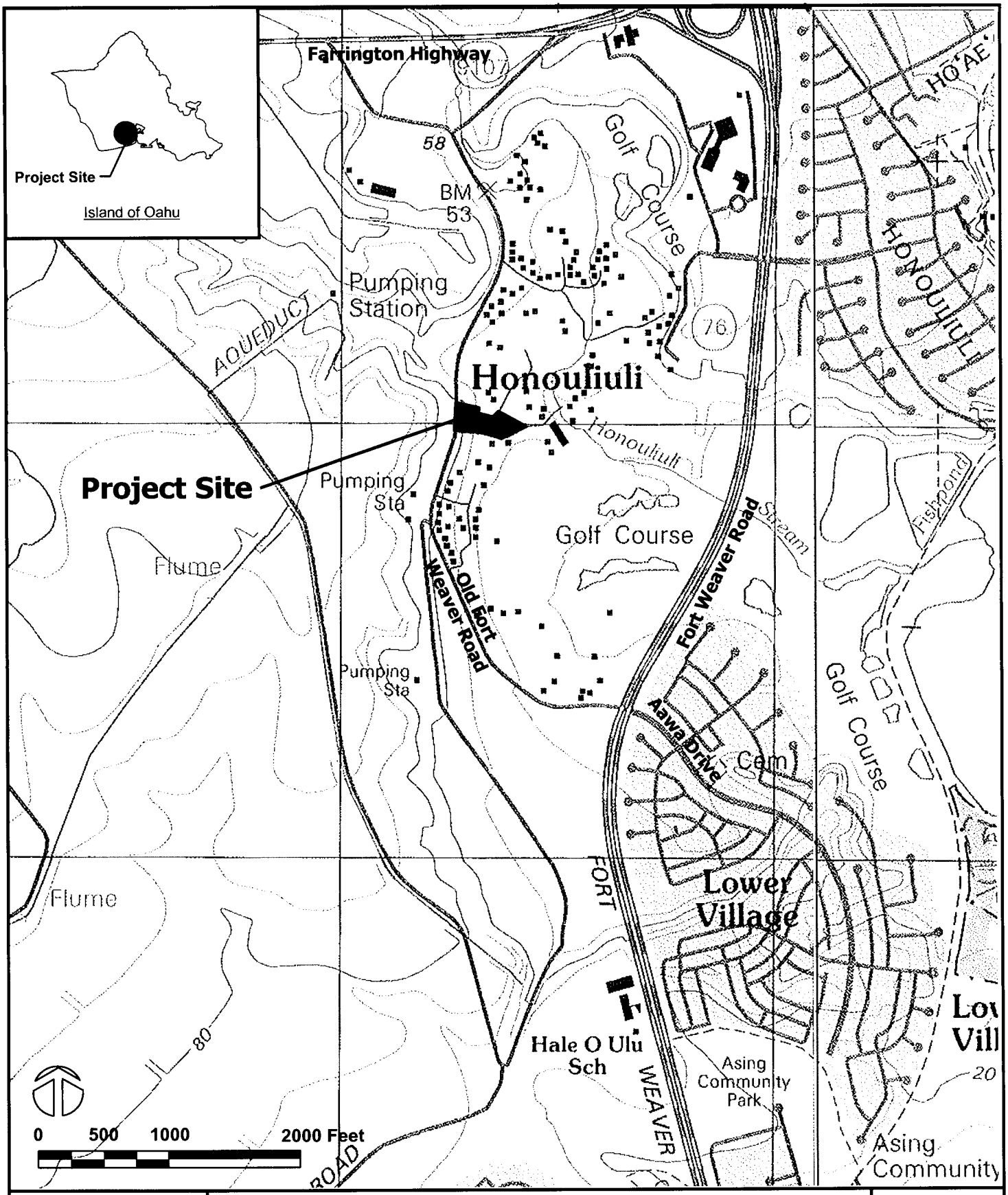
The proposed Hale Kipa Residential Treatment and Educational Center will be located on a 4.28-acre site adjacent to Old Fort Weaver Road in Honouliuli on the island of Oahu (See Figure 1). The project site is further identified as Tax Map Key: 9-1-17: 82. The proposed project entails the construction of a two-story service center building (~32,000 square feet) and nine group living units with four bedrooms each (~27,000 square feet) with on-site parking and loading areas. The project is expected to be completed by the Year 2012 with access provided via a driveway off Old Fort Weaver Road. Figure 2 shows the proposed project site plan.

Field Investigation

A field investigation was conducted on April 11-13, 2007 which consisted of manual turning movement and 24-hour mechanical count surveys along Old Fort Weaver Road. The manual turning movement count surveys were conducted during the morning peak hours of 5:30 AM and 8:30 AM, and between the afternoon peak hours of 3:00 PM and 6:00 PM at the intersections of Old Fort Weaver Road with Fort Weaver Road/Aawa Drive and Farrington Highway. Appendix A includes the existing traffic count data.

Existing Peak Hour Traffic

Figure 3 shows the existing AM and PM peak hour traffic volumes and operating traffic conditions. Although the peak hours of traffic generally occur around the same time periods at each of the study intersections, the absolute commuter peak hour time periods for each intersection may differ slightly as shown in Table 1.



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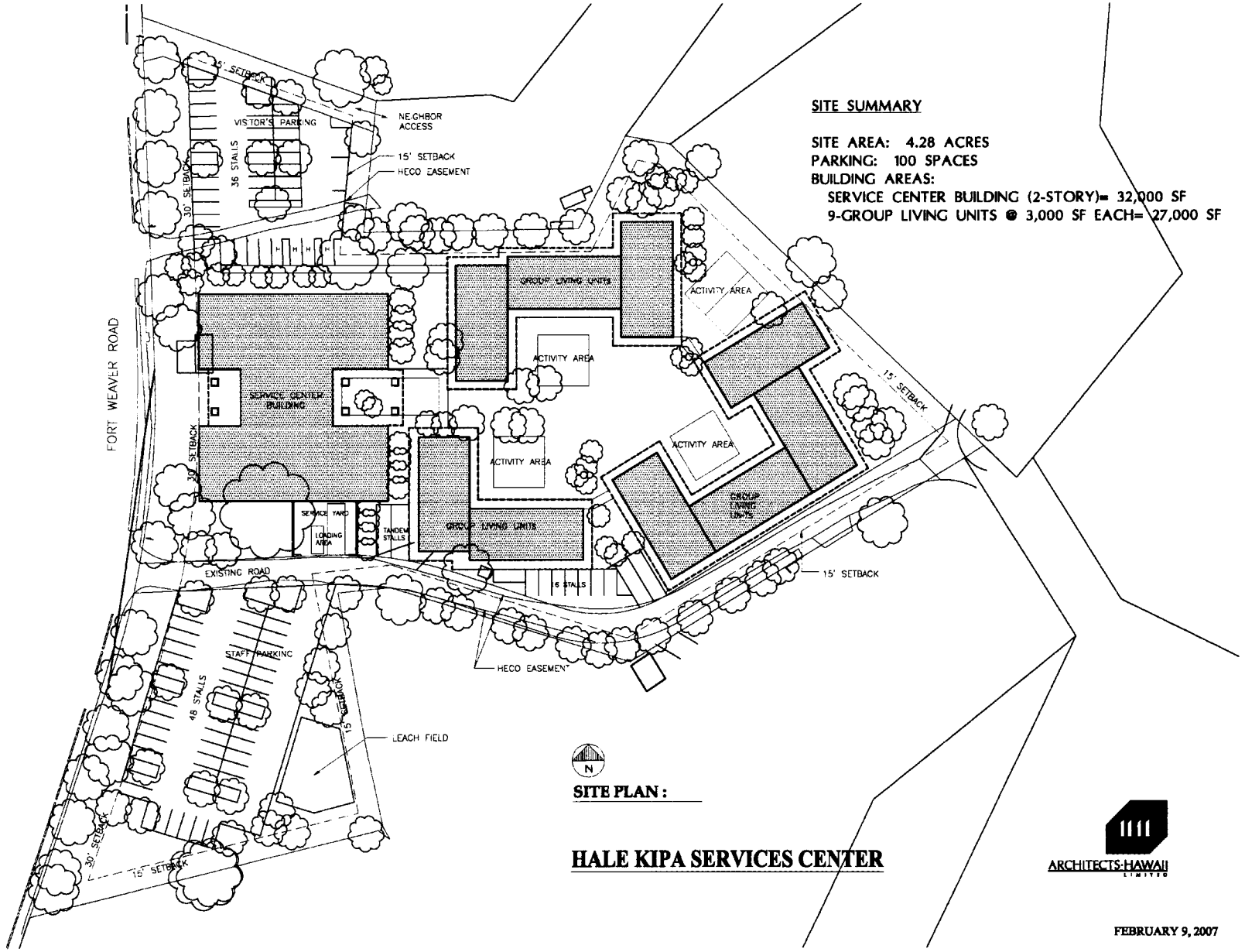
HALE KIPA RESIDENTIAL TREATMENT AND EDUCATION CENTER

LOCATION MAP AND VICINITY MAP

FIGURE 1



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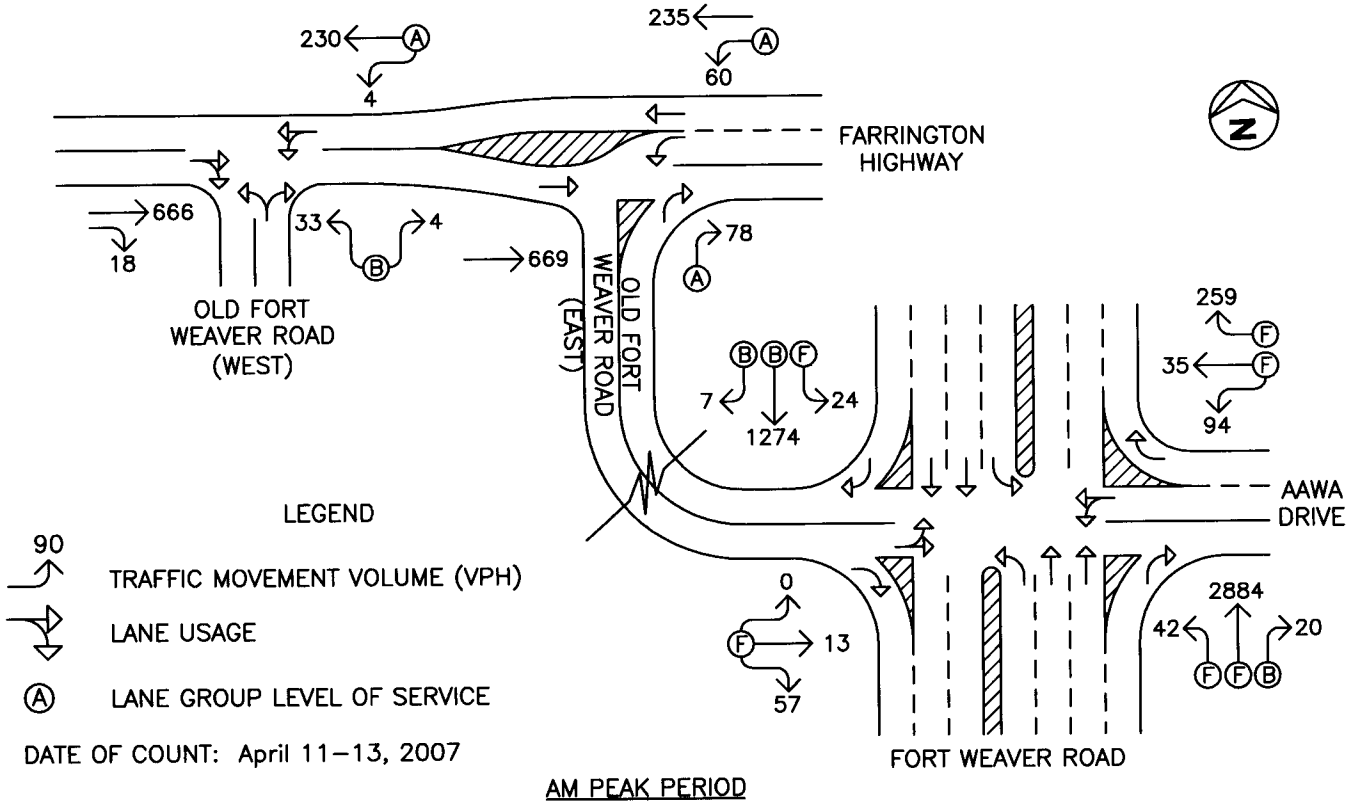
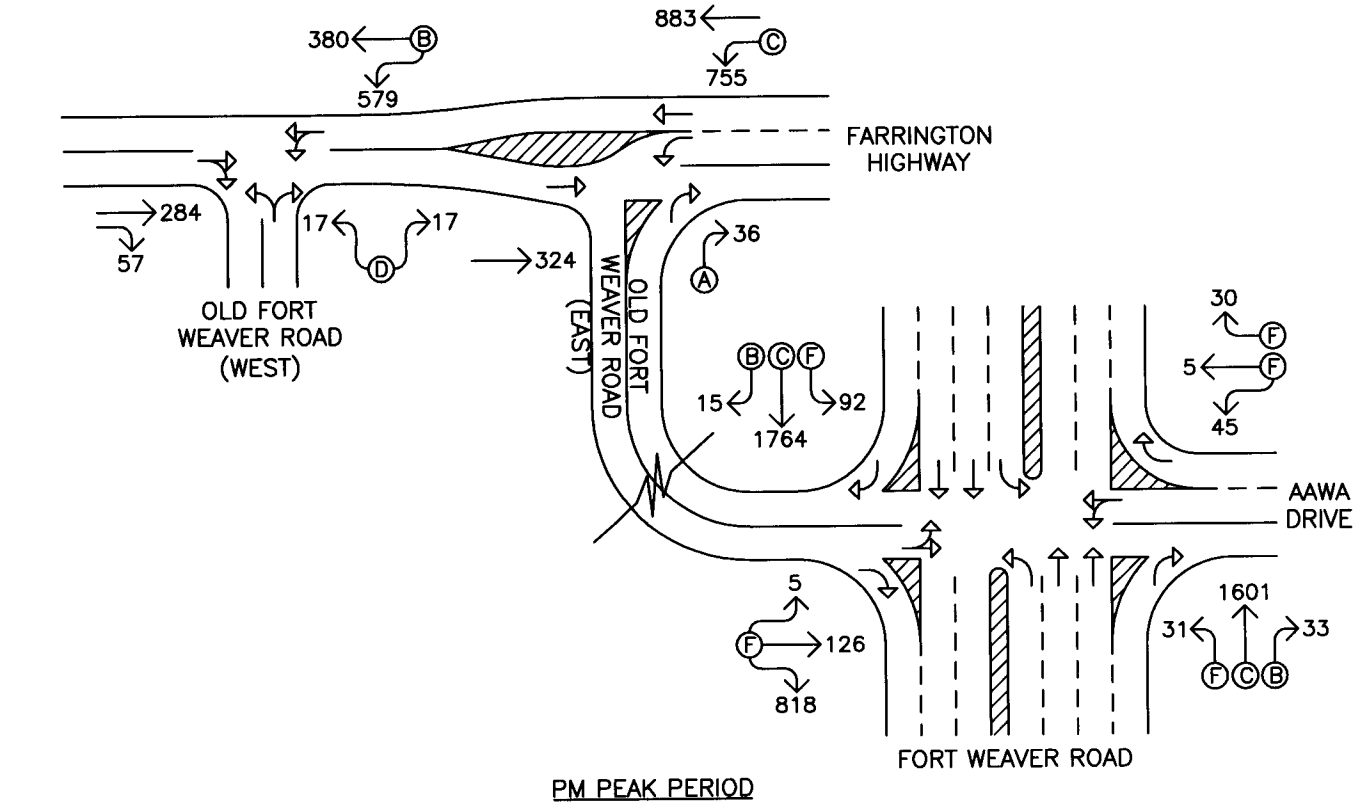
HALE KIPA RESIDENTIAL TREATMENT AND EDUCATION CENTER

PROJECT SITE PLAN

FIGURE 2



AM PEAK PERIOD



PM PEAK PERIOD

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HALE KIPA RESIDENTIAL TREATMENT AND EDUCATION CENTER

EXISTING PEAK HOURS OF TRAFFIC

FIGURE 3

Table 1: Peak Hours of Traffic

Intersection	AM Peak	PM Peak
Fort Weaver Rd/Old Fort Weaver Rd/Aawa Dr	6:30 AM-7:30 AM	3:15 PM-4:15 PM
Old Fort Weaver Rd (East)/ Farrington Hwy	6:00 AM-7:00 AM	3:45 PM-4:45 PM
Old Fort Weaver Rd (West)/ Farrington Hwy	6:00 AM-7:00 AM	4:00 PM-5:00 PM

The analysis is based on these absolute commuter peak hour time periods for each intersection to identify the traffic impacts resulting from the proposed project. LOS calculations are included in Appendix B.

At the intersection with Old Fort Weaver Road and Aawa Drive, Fort Weaver Road carries 2,946 vehicles northbound and 1,305 vehicles southbound during the AM peak period. During the PM peak period, the overall traffic volume is lower with 1,665 vehicles traveling northbound and 1,871 vehicles traveling southbound. The critical movement on the highway approaches are the northbound through traffic movement which operates at LOS "F" and LOS "C" during the AM and PM peak periods, respectively, and the southbound through traffic movement which operates at LOS "B" and LOS "C" during the AM and PM peak periods, respectively. The Old Fort Weaver Road approach of the intersection carries 70 vehicles and 949 vehicles eastbound during the AM and PM peak periods, respectively, while the Aawa Drive approach carries 388 vehicles and 80 vehicles westbound during the AM and PM peak periods, respectively. The traffic movements on both of these approaches operate at LOS "F" during both peak periods. Traffic queues periodically formed on the approaches of the intersection with the most significant queuing occurring during the PM peak period. Queue on the eastbound approach of this intersection extended through the upstream intersections with Farrington Highway during this peak period. In addition, southbound queues from downstream intersections along Fort Weaver Road consistently extended through this intersection with vehicular queues in excess of 30 vehicles observed during this time period.

At the east intersection with Farrington Highway, Old Fort Weaver Road carries 78 vehicles and 36 vehicles during the AM and PM peak periods, respectively, and operates at LOS "A" during both peak periods. Farrington Highway carries 669 vehicles eastbound and 295 vehicles westbound during the AM peak period at this intersection. During the PM peak period, the overall

traffic volume is higher with 324 vehicles traveling eastbound and 1,638 vehicles traveling westbound. The critical traffic movement on the highway approaches of the intersection is the westbound left-turn traffic movement which operates at LOS "A" and LOS "C" during the AM and PM peak periods, respectively. Traffic queues periodically formed on the westbound approach of the intersection with the most significant queuing occurring during the PM peak period. Queues along Farrington Highway from the west intersection with Old Fort Weaver Road and along Old Fort Weaver Road from Fort Weaver Road extended through this intersection with vehicular queues in excess of 30 vehicles observed during this time period.

At the west intersection with Farrington Highway, Old Fort Weaver Road carries 37 vehicles and 34 vehicles during the AM and PM peak periods, respectively, and operates at LOS "B" and LOS "D" during the AM and PM peak periods, respectively. Farrington Highway carries 684 vehicles eastbound and 234 vehicles westbound during the AM peak period at this intersection. During the PM peak period, the overall traffic volume is higher with 341 vehicles traveling eastbound and 959 vehicles traveling westbound. The critical traffic movement on the highway approaches of the intersection is the westbound left-turn and through traffic movement which operates at LOS "A" and LOS "B" during the AM and PM peak periods, respectively. Traffic queues periodically formed on the westbound approach of the intersection with the most significant queuing occurring during the PM peak period. Queues along Old Fort Weaver Road from Fort Weaver Road extended through this intersection and, as previously indicated, vehicular queues from this intersection extended through the upstream east intersection with Old Fort Weaver Road.

Site-Generated Traffic

The trip generation used in this study is based upon the anticipated number of employees at the proposed Hale Kipa Residential Treatment and Educational Center since visiting hours and deliveries to the center are assumed to occur during off-peak periods. Table 2 summarizes of the anticipated number of employees.

Table 2: Employee Summary

Group Living Units	3 shifts/day with 18 employees per shift
Education Center	8 teachers
Support Personnel (Nurses, Psychologist, office personnel)	12 employees
Management, Accounting, and Maintenance	8 employees
Volunteers	4 volunteers

Only those employees associated with the Education Center, Support Personnel, Management, Accounting, and Maintenance were assumed to arrive and depart during peak periods. Of these, approximately 10% were assumed to be dropped off and picked up from the center. Table 3 summarizes the project site trip generation characteristics applied to the AM and PM peak periods of traffic.

Table 3: Peak Hour Trip Generation

		PROJECTED TRIP ENDS
AM PEAK	ENTER	28
	EXIT	3
	TOTAL	31
PM PEAK	ENTER	3
	EXIT	28
	TOTAL	31

Access to the project site will be provided via a driveway off Old Fort Weaver Road. The directional distribution of site-generated traffic at this driveway was based upon the prevalent directional distribution of traffic along Old Fort Weaver Road. As such, 58.2% of the vehicles were assumed to be traveling northbound and 41.8% were assumed to be traveling southbound during the AM peak period. Similarly, during the PM peak period, 9.9% were assumed to be traveling northbound and 90.1% were assumed to be traveling southbound. At the study intersection along Fort Weaver Road, the directional distribution of traffic was based upon the prevalent directional distribution of traffic along Fort Weaver Road. As such, 70.7% of the vehicles were assumed to be traveling northbound and 29.3% were assumed to be traveling southbound during the AM peak period. Similarly, during the PM peak period, 46.6% were assumed to be traveling northbound and 53.4% were assumed to be traveling southbound. At the study intersections along Farrington Highway, the

directional distribution of traffic was based upon the prevalent directional distribution of traffic along the highway. As such, 71.7% of the vehicles were assumed to be traveling eastbound and 28.3% were assumed to be traveling westbound during the AM peak period. Similarly, during the PM peak period, 18.0% were assumed to be traveling eastbound and 82.0% were assumed to be traveling westbound.

Through Traffic Forecasting Methodology

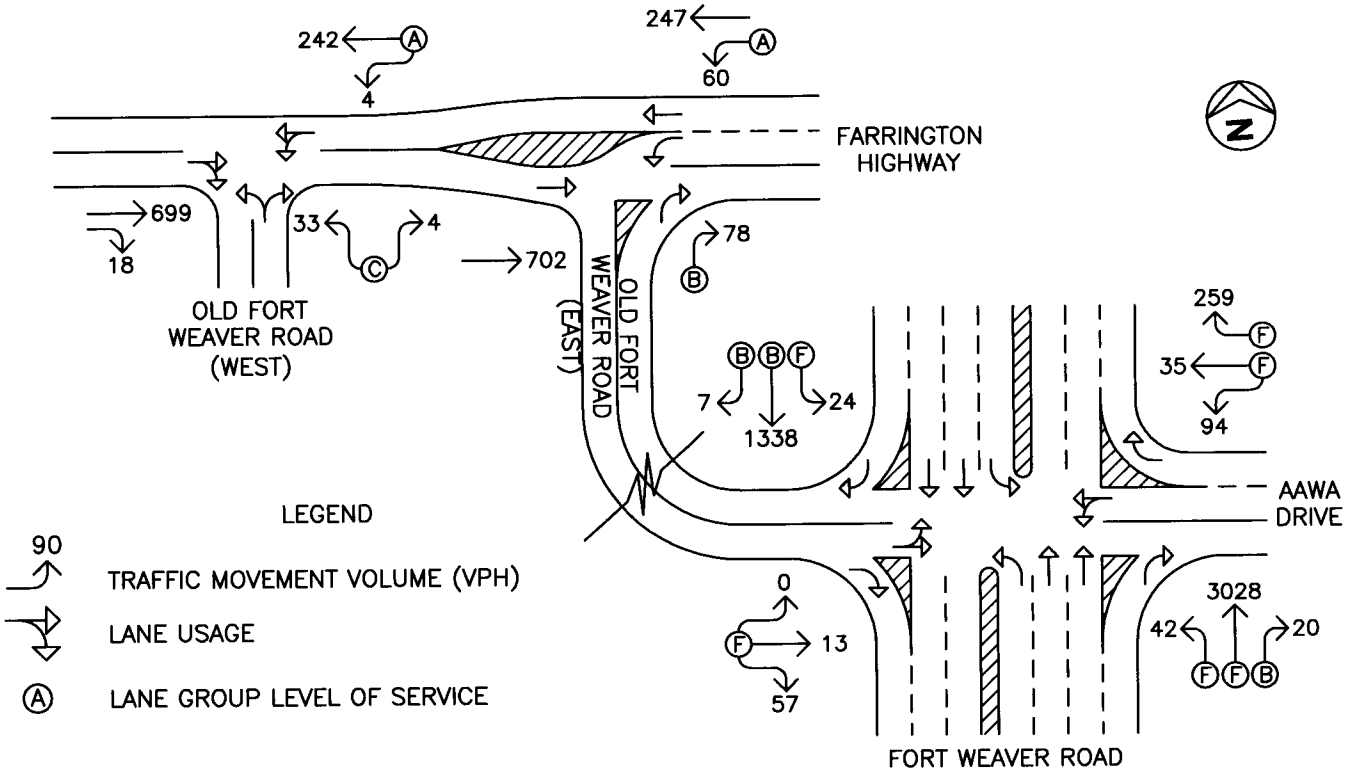
The travel forecast is based upon historical traffic count data obtained from the State DOT, Highways Division. The historical data were analyzed by linear regression analyses techniques to obtain an average traffic growth rate of approximately 1.0% per year in the project vicinity. As such, using the Year 2007 as the Base Year, a growth rate factor of 1.05 was applied to the existing through traffic demands along Fort Weaver Road and Farrington Highway to simulate projected Year 2012 traffic demands.

Total Traffic Volumes Without Project

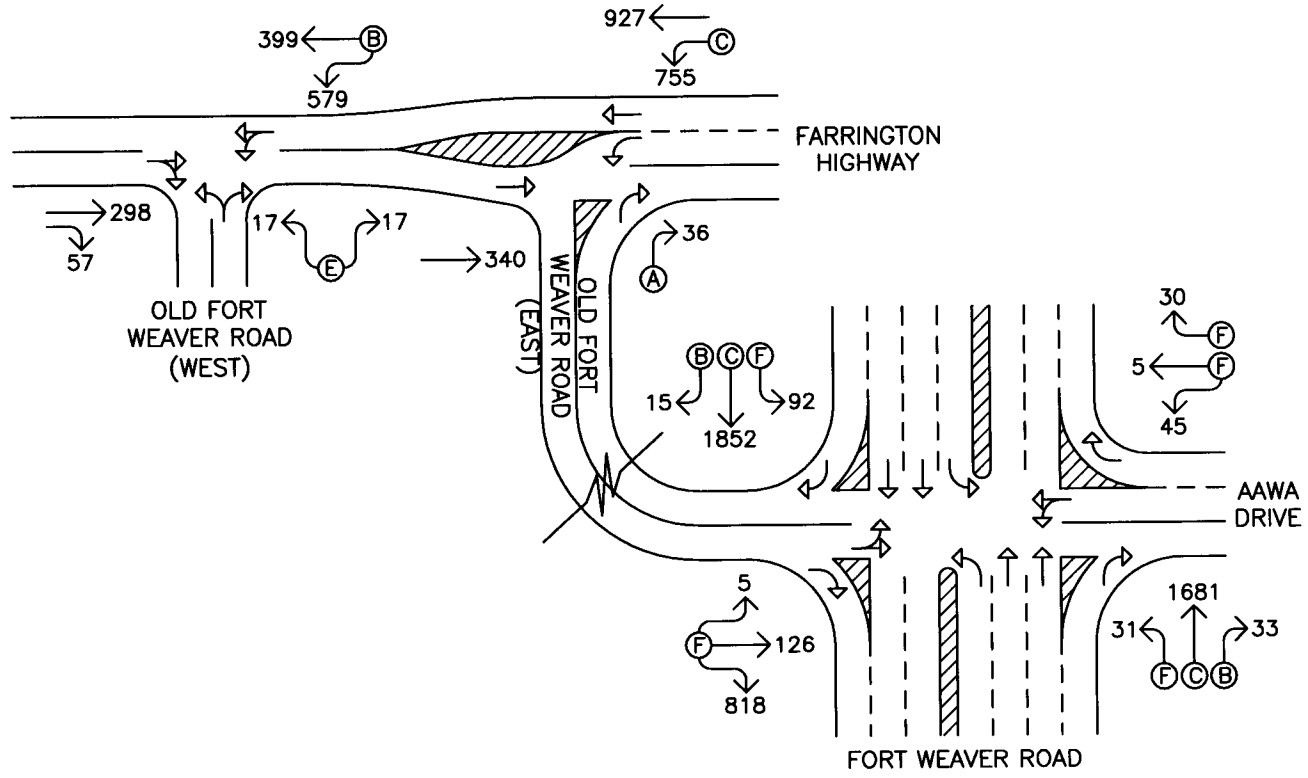
The projected year 2012 AM and PM peak period traffic volumes and operating conditions without the proposed Hale Kipa development are shown in Figure 4 and summarized in Table 4. The existing levels of service are included for comparison purposes. LOS calculations are included in Appendix C.

Table 4: Existing and Projected (Without Project) LOS Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM		PM	
			Exist	Year 2012 w/out Proj	Exist	Year 2012 w/out Proj
Fort Weaver Rd/ Old Fort Weaver Rd/Aawa Dr	Eastbound	LT-TH-RT	F	F	F	F
	Westbound	LT-TH	F	F	F	F
		RT	F	F	F	F
	Northbound	TH	F	F	C	C
	Southbound	TH	B	B	C	C
Old Fort Weaver Rd (East)/ Farrington Hwy	Westbound	LT	A	A	C	C
	Northbound	RT	A	B	A	A



AM PEAK PERIOD



PM PEAK PERIOD

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HALE KIPA RESIDENTIAL TREATMENT AND EDUCATION CENTER

YEAR 2012 PEAK HOURS OF TRAFFIC WITHOUT PROJECT

FIGURE 4

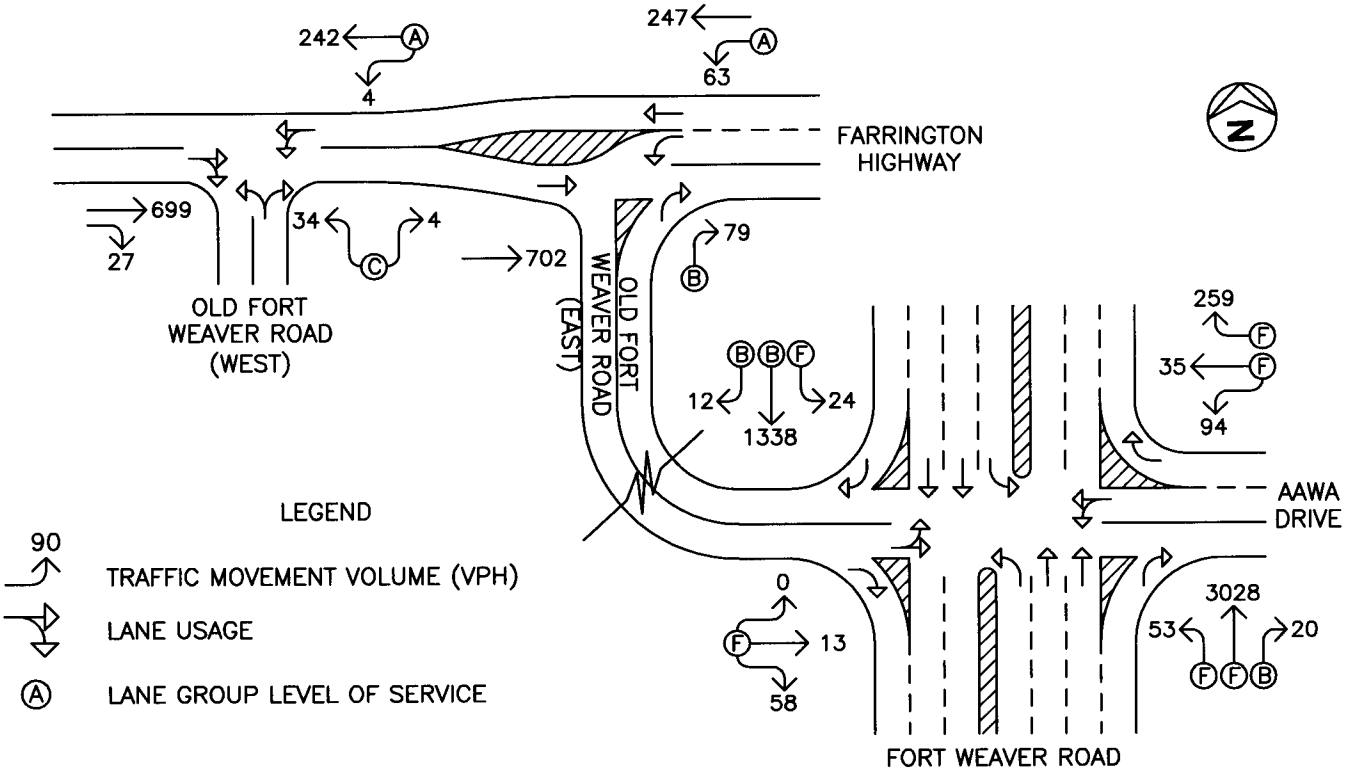
Table 4: Existing and Projected (Without Project) LOS Traffic Operating Conditions (Cont'd)

Intersection	Critical Traffic Movement		AM		PM	
			Exist	Year 2012 w/out Proj	Exist	Year 2012 w/out Proj
Old Fort Weaver Rd (West)/ Farrington Hwy	Westbound	LT-TH	A	A	B	B
	Northbound	LT-RT	B	C	D	E

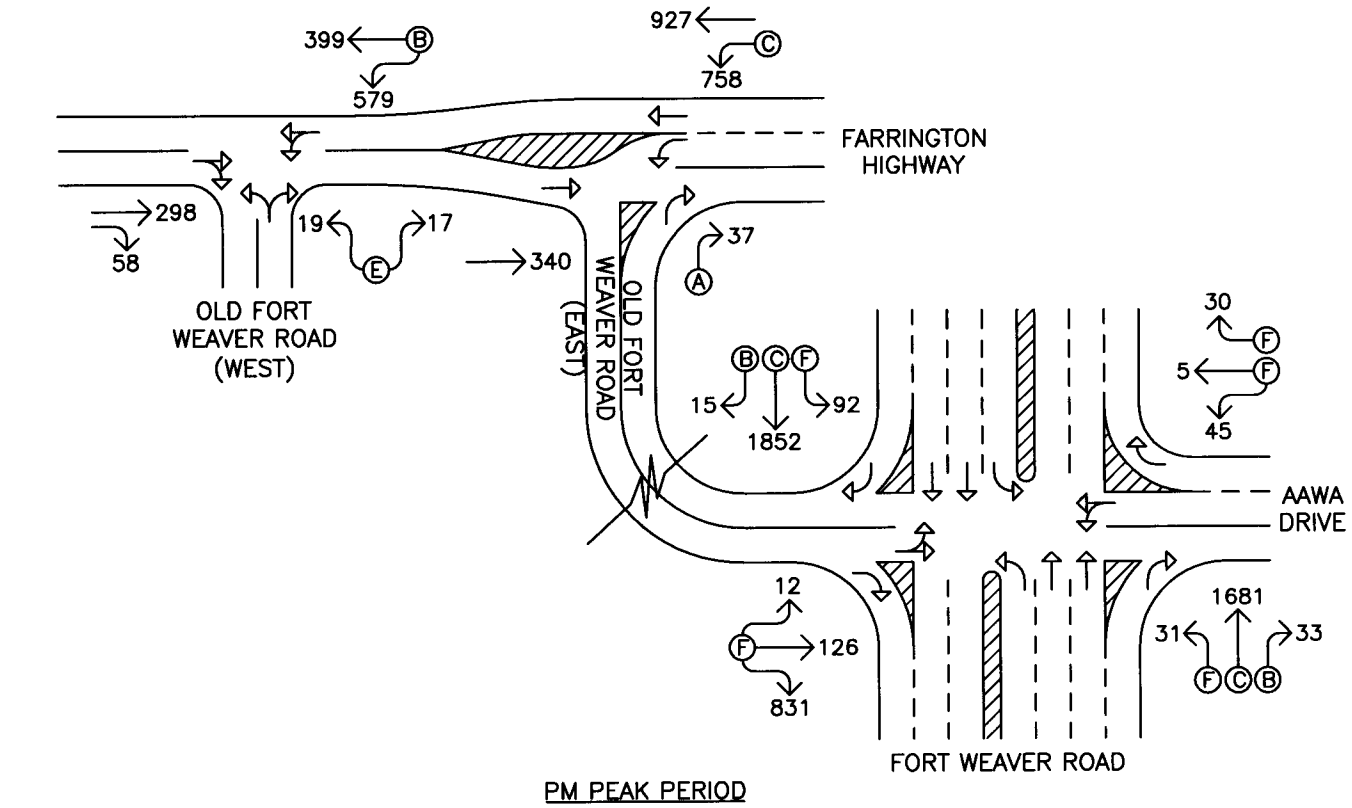
Under Year 2012 without project conditions, traffic operations are generally expected to deteriorate from existing conditions. The northbound approach of Old Fort Weaver Road at the east intersection with Farrington Highway is expected to deteriorate from LOS "A" to LOS "B" while the northbound approach Old Fort Weaver Road at the west intersection with Farrington Highway is expected to deteriorate from LOS "B" to LOS "C" during the AM peak period and LOS "D" to LOS "E" during the PM peak period. The remaining critical movements at these intersections, as well as, the other study intersection are expected to operate at levels of service similar to existing traffic conditions during both peak hours of traffic.

Total Traffic Volumes With Project

The Year 2012 cumulative AM and PM peak hour traffic conditions with the proposed development are shown in Figure 5 and summarized in Table 5. The cumulative volumes consist of site-generated traffic superimposed over Year 2012 projected traffic demands. The projected Year 2012 (Without Project) operating conditions are provided for comparison purposes. LOS calculations are included in Appendix D.



AM PEAK PERIOD



PM PEAK PERIOD

WILSON OKAMOTO CORPORATION
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HALE KIPA RESIDENTIAL TREATMENT AND EDUCATION CENTER

YEAR 2012 PEAK HOURS OF TRAFFIC WITH PROJECT

FIGURE 5

Table 5: Existing and Projected (With and Without Project) Traffic Operating Conditions

Intersection	Critical Traffic Movement		AM		PM	
			Year 2012 w/out Proj	Year 2012 w/ Proj	Year 2012 w/out Proj	Year 2012 w/ Proj
Fort Weaver Rd/ Old Fort Weaver Rd/Aawa Dr	Eastbound	LT-TH-RT	F	F	F	F
	Westbound	LT-TH	F	F	F	F
		RT	F	F	F	F
	Northbound	TH	F	F	C	C
	Southbound	TH	B	B	C	C
Old Fort Weaver Rd (East)/ Farrington Hwy	Westbound	LT	A	A	C	C
	Northbound	RT	B	B	A	A
Old Fort Weaver Rd (West)/ Farrington Hwy	Westbound	LT-TH	A	A	B	B
	Northbound	LT-RT	C	C	E	E

Traffic operations under Year 2012 with project conditions are expected to remain similar to Year 2012 without project conditions during both peak periods. The total traffic volumes entering the study intersections are expected to increase by 1% or less during both peak hours of traffic with proposed project. These increases in the total traffic volumes are in the range of daily volume fluctuations along Fort Weaver Road and Farrington Highway, and represent a minimal increase in the overall traffic volumes.

Recommendations and Conclusion

Based on the analysis of the traffic data, the following are the recommendations of this assessment associated with the project implementation:

1. Maintain sufficient sight distance for motorists to safely enter and exit all project driveways.

2. Provide adequate on-site loading and off-loading service areas and prohibit off-site loading operations.

3. Provide adequate turn-around area for service, delivery, and refuse collection vehicles to maneuver on the project site, and avoid vehicle-reversing maneuvers onto public roadways.

4. Provide sufficient turning radii at all project driveways to avoid or minimize vehicle encroachments to oncoming traffic lanes.

With the implementation of the aforementioned recommendations, the proposed Hale Kipa Residential Treatment and Education Center is not expected to have a significant impact on traffic operations in the project vicinity. Traffic operations under Year 2012 with project conditions are expected to remain similar to Year 2012 without project conditions during both peak periods. In addition, the increases in total traffic volumes entering the study intersections are expected to be in the range of daily volume fluctuations along Old Fort Weaver Road and Farrington Highway and, as such, represent a minimal increase in the overall traffic volumes.

Should you have any questions or require additional information, please contact Mr. Pete Pascua or myself at 946-2277.

Sincerely,

Cathy Leong, P.E.

APPENDIX A

EXISTING TRAFFIC COUNT DATA

WILSON OKAMOTO CORPORATION

1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter:D4-3891, D4-3888
Counted:TO, Eric
Weather:Clear

File Name : WeaKawa AM
Site Code : 00000003
Start Date : 4/12/2007
Page No : 1

Groups Printed- Unshifted

	Ft. Weaver Road Southbound				Kawa Drive Westbound				Ft. Weaver Road Northbound				Old Ft. Weaver Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
05:30 AM	4	123	0	127	8	4	61	73	4	743	4	751	0	1	4	5	956
05:45 AM	1	164	0	165	7	5	99	111	2	766	2	770	0	1	5	6	1052
Total	5	287	0	292	15	9	160	184	6	1509	6	1521	0	2	9	11	2008
06:00 AM	7	227	1	235	7	3	63	73	6	807	2	815	0	0	5	5	1128
06:15 AM	5	322	1	328	8	8	79	95	16	696	4	716	0	2	4	6	1145
06:30 AM	6	334	2	342	14	7	63	84	14	709	5	728	0	6	9	15	1169
06:45 AM	4	311	1	316	18	10	54	82	5	745	3	753	0	3	13	16	1167
Total	22	1194	5	1221	47	28	259	334	41	2957	14	3012	0	11	31	42	4609
07:00 AM	10	296	2	308	16	13	76	105	8	732	6	746	0	2	15	17	1176
07:15 AM	4	333	2	339	46	5	66	117	15	698	6	719	0	2	20	22	1197
07:30 AM	9	298	2	309	36	1	58	95	24	656	9	689	1	6	21	28	1121
07:45 AM	11	322	1	334	13	5	33	51	42	629	24	695	1	3	21	25	1105
Total	34	1249	7	1290	111	24	233	368	89	2715	45	2849	2	13	77	92	4599
08:00 AM	17	285	2	304	6	4	48	58	30	547	12	589	1	4	18	23	974
08:15 AM	17	221	1	239	8	4	37	49	16	615	5	636	2	1	15	18	942
Grand Total	95	3236	15	3346	187	69	737	993	182	8343	82	8607	5	31	150	186	13132
Apprch %	2.8	96.7	0.4		18.8	6.9	74.2		2.1	96.9	1		2.7	16.7	80.6		
Total %	0.7	24.6	0.1	25.5	1.4	0.5	5.6	7.6	1.4	63.5	0.6	65.5	0	0.2	1.1	1.4	

	Ft. Weaver Road Southbound				Kawa Drive Westbound				Ft. Weaver Road Northbound				Old Ft. Weaver Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:30 AM																	
06:30 AM	6	**334**	**2**	**342**	14	7	63	84	14	709	5	728	0	**6**	9	15	1169
06:45 AM	4	311	1	316	18	10	54	82	5	**745**	3	**753**	0	3	13	16	1167
07:00 AM	**10**	296	2	308	16	**13**	**76**	105	8	732	**6**	746	0	2	15	17	1176
07:15 AM	4	333	2	339	**46**	5	66	**117**	**15**	698	6	719	0	2	**20**	**22**	**1197**
Total Volume	24	1274	7	1305	94	35	259	388	42	2884	20	2946	0	13	57	70	4709
% App. Total	1.8	97.6	0.5		24.2	9	66.8		1.4	97.9	0.7		0	18.6	81.4		
PHF	.600	.954	.875	.954	.511	.673	.852	.829	.700	.968	.833	.978	.000	.542	.713	.795	.984

WILSON OKAMOTO CORPORATION

1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter:D4-3891 D4-3888
Counted:TO, Eric
Weather:Clear

File Name : WeaKawa PM
Site Code : 00000003
Start Date : 4/12/2007
Page No : 1

Groups Printed- Unshifted

	Ft. Weaver Road Southbound				Kawa Drive Westbound				Ft. Weaver Road Northbound				Old Ft. Weaver Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:00 PM	27	386	3	416	8	2	8	18	12	390	28	430	0	85	77	162	1026
03:15 PM	31	480	8	519	4	1	7	12	7	377	12	396	1	28	159	188	1115
03:30 PM	22	441	1	464	19	2	10	31	9	475	11	495	3	27	166	196	1186
03:45 PM	21	428	2	451	15	2	2	19	11	405	5	421	0	29	238	267	1158
Total	101	1735	14	1850	46	7	27	80	39	1647	56	1742	4	169	640	813	4485
04:00 PM	18	415	4	437	7	0	11	18	4	344	5	353	1	42	255	298	1106
04:15 PM	11	322	4	337	19	2	4	25	8	321	6	335	0	41	229	270	967
04:30 PM	21	369	0	390	12	7	11	30	7	351	13	371	0	27	228	255	1046
04:45 PM	15	375	0	390	6	0	8	14	4	345	12	361	1	29	215	245	1010
Total	65	1481	8	1554	44	9	34	87	23	1361	36	1420	2	139	927	1068	4129
05:00 PM	28	392	1	421	10	1	6	17	19	323	6	348	0	50	275	325	1111
05:15 PM	34	399	1	434	7	3	4	14	3	321	9	333	0	54	233	287	1068
05:30 PM	16	394	1	411	12	0	6	18	6	316	11	333	0	29	223	252	1014
05:45 PM	13	338	0	351	12	0	2	14	4	291	5	300	1	41	223	265	930
Total	91	1523	3	1617	41	4	18	63	32	1251	31	1314	1	174	954	1129	4123
Grand Total	257	4739	25	5021	131	20	79	230	94	4259	123	4476	7	482	2521	3010	12737
Apprch %	5.1	94.4	0.5		57	8.7	34.3		2.1	95.2	2.7		0.2	16	83.8		
Total %	2	37.2	0.2	39.4	1	0.2	0.6	1.8	0.7	33.4	1	35.1	0.1	3.8	19.8	23.6	

	Ft. Weaver Road Southbound				Kawa Drive Westbound				Ft. Weaver Road Northbound				Old Ft. Weaver Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:15 PM																	
03:15 PM	**31**	**480**	**8**	**519**	4	1	7	12	7	377	**12**	396	1	28	159	188	1115
03:30 PM	22	441	1	464	**19**	**2**	10	**31**	9	**475**	11	**495**	**3**	27	166	196	**1186**
03:45 PM	21	428	2	451	15	2	2	19	**11**	405	5	421	0	29	238	267	1158
04:00 PM	18	415	4	437	7	0	**11**	18	4	344	5	353	1	**42**	**255**	**298**	1106
Total Volume	92	1764	15	1871	45	5	30	80	31	1601	33	1665	5	126	818	949	4565
% App. Total	4.9	94.3	0.8		56.2	6.2	37.5		1.9	96.2	2		0.5	13.3	86.2		
PHF	.742	.919	.469	.901	.592	.625	.682	.645	.705	.843	.688	.841	.417	.750	.802	.796	.962

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter:D4-3889
Counted:ER
Weather:Clear

File Name : WeaFarr(East) AM
Site Code : 00000002
Start Date : 4/12/2007
Page No : 1

Groups Printed- Unshifted

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
05:30 AM	0	9	29	0	38	0	0	16	16	0	91	0	91	145
05:45 AM	0	12	30	0	42	0	0	16	16	0	115	0	115	173
Total	0	21	59	0	80	0	0	32	32	0	206	0	206	318
06:00 AM	0	15	45	0	60	0	0	25	25	0	182	0	182	267
06:15 AM	0	22	62	0	84	0	0	14	14	0	162	0	162	260
06:30 AM	0	16	74	0	90	0	0	19	19	0	153	0	153	262
06:45 AM	0	7	54	0	61	0	0	20	20	0	172	0	172	253
Total	0	60	235	0	295	0	0	78	78	0	669	0	669	1042
07:00 AM	0	11	60	0	71	0	0	13	13	0	142	0	142	226
07:15 AM	0	23	64	0	87	0	0	19	19	0	112	0	112	218
07:30 AM	0	33	66	0	99	0	0	12	12	0	112	0	112	223
07:45 AM	0	24	52	0	76	0	0	26	26	0	89	0	89	191
Total	0	91	242	0	333	0	0	70	70	0	455	0	455	858
08:00 AM	0	23	45	0	68	0	0	13	13	0	79	0	79	160
08:15 AM	0	19	46	0	65	0	0	9	9	0	77	0	77	151
Grand Total	0	214	627	0	841	0	0	202	202	0	1486	0	1486	2529
Apprch %		25.4	74.6	0		0	0	100		0	100	0		
Total %	0	8.5	24.8	0	33.3	0	0	8	8	0	58.8	0	58.8	

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:30 AM to 08:15 AM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 06:00 AM														
06:00 AM	0	15	45	0	60	0	0	**25**	**25**	0	**182**	0	**182**	**267**
06:15 AM	0	**22**	62	0	84	0	0	14	14	0	162	0	162	260
06:30 AM	0	16	**74**	0	**90**	0	0	19	19	0	153	0	153	262
06:45 AM	0	7	54	0	61	0	0	20	20	0	172	0	172	253
Total Volume	0	60	235	0	295	0	0	78	78	0	669	0	669	1042
% App. Total		20.3	79.7	0		0	0	100		0	100	0		
PHF	.000	.682	.794	.000	.819	.000	.000	.780	.780	.000	.919	.000	.919	.976

WILSON OKAMOTO CORPORATION

1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter:D4-3889
Counted:ER
Weather:Clear

File Name : WeaFarr(East) PM
Site Code : 00000002
Start Date : 4/12/2007
Page No : 1

Groups Printed- Unshifted

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:00 PM	0	140	91	0	231	0	0	22	22	0	99	0	99	352
03:15 PM	0	196	94	0	290	0	0	15	15	0	54	0	54	359
03:30 PM	0	197	123	0	320	0	0	14	14	0	98	0	98	432
03:45 PM	0	240	167	0	407	0	0	10	10	0	102	0	102	519
Total	0	773	475	0	1248	0	0	61	61	0	353	0	353	1662
04:00 PM	0	202	212	0	414	0	0	8	8	0	74	0	74	496
04:15 PM	0	178	270	0	448	0	0	9	9	0	74	0	74	531
04:30 PM	0	135	234	0	369	0	0	9	9	0	74	1	75	453
04:45 PM	0	133	233	0	366	0	0	7	7	0	65	0	65	438
Total	0	648	949	0	1597	0	0	33	33	0	287	1	288	1918
05:00 PM	0	142	239	0	381	0	0	12	12	0	56	0	56	449
05:15 PM	0	164	252	0	416	0	0	11	11	0	50	1	51	478
05:30 PM	0	154	219	0	373	0	0	5	5	0	52	1	53	431
05:45 PM	0	167	156	0	323	0	0	8	8	0	57	0	57	388
Total	0	627	866	0	1493	0	0	36	36	0	215	2	217	1746
Grand Total	0	2048	2290	0	4338	0	0	130	130	0	855	3	858	5326
Apprch %		47.2	52.8	0		0	0	100		0	99.7	0.3		
Total %	0	38.5	43	0	81.4	0	0	2.4	2.4	0	16.1	0.1	16.1	

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 03:45 PM														
03:45 PM	0	**240**	167	0	407	0	0	**10**	**10**	0	**102**	0	**102**	519
04:00 PM	0	202	212	0	414	0	0	8	8	0	74	0	74	496
04:15 PM	0	178	**270**	0	**448**	0	0	9	9	0	74	0	74	**531**
04:30 PM	0	135	234	0	369	0	0	9	9	0	74	**1**	75	453
Total Volume	0	755	883	0	1638	0	0	36	36	0	324	1	325	1999
% App. Total		46.1	53.9	0		0	0	100		0	99.7	0.3		
PHF	.000	.786	.818	.000	.914	.000	.000	.900	.900	.000	.794	.250	.797	.941

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter:D4-3890
Counted:Steve
Weather:Clear

File Name : WeaFarr(West) AM
Site Code : 00000001
Start Date : 4/12/2007
Page No : 1

Groups Printed- Unshifted

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
05:30 AM	0	1	27	1	29	0	0	2	2	0	84	2	86	117
05:45 AM	0	0	32	0	32	7	0	0	7	0	115	9	124	163
Total	0	1	59	1	61	7	0	2	9	0	199	11	210	280
06:00 AM	0	1	42	0	43	2	0	0	2	0	187	1	188	233
06:15 AM	0	2	60	0	62	8	0	0	8	0	158	9	167	237
06:30 AM	0	1	69	0	70	11	0	1	12	0	156	3	159	241
06:45 AM	0	0	59	0	59	12	0	3	15	0	165	5	170	244
Total	0	4	230	0	234	33	0	4	37	0	666	18	684	955
07:00 AM	0	0	61	0	61	11	0	4	15	0	138	4	142	218
07:15 AM	0	0	62	0	62	7	0	3	10	0	114	9	123	195
07:30 AM	0	2	62	0	64	9	0	0	9	0	109	14	123	196
07:45 AM	0	7	45	0	52	6	0	1	7	0	91	9	100	159
Total	0	9	230	0	239	33	0	8	41	0	452	36	488	768
08:00 AM	0	3	44	0	47	6	0	0	6	0	80	10	90	143
08:15 AM	0	0	43	0	43	11	0	0	11	0	73	8	81	135
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	17	606	1	624	90	0	14	104	0	1470	83	1553	2281
Apprch %		2.7	97.1	0.2		86.5	0	13.5		0	94.7	5.3		
Total %	0	0.7	26.6	0	27.4	3.9	0	0.6	4.6	0	64.4	3.6	68.1	

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:30 AM to 08:30 AM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 06:00 AM														
06:00 AM	0	1	42	0	43	2	0	0	2	0	**187**	1	**188**	233
06:15 AM	0	**2**	60	0	62	8	0	0	8	0	158	**9**	167	237
06:30 AM	0	1	**69**	0	**70**	11	0	1	12	0	156	3	159	241
06:45 AM	0	0	59	0	59	**12**	0	**3**	**15**	0	165	5	170	**244**
Total Volume	0	4	230	0	234	33	0	4	37	0	666	18	684	955
% App. Total		1.7	98.3	0		89.2	0	10.8		0	97.4	2.6		
PHF	.000	.500	.833	.000	.836	.688	.000	.333	.617	.000	.890	.500	.910	.978

WILSON OKAMOTO CORPORATION
1907 S. Beretania Street, Suite 400
Honolulu, HI 96826

Counter:D4-3890
Counted:Steve
Weather:Clear

File Name : WeaFarr(West) PM
Site Code : 00000001
Start Date : 4/12/2007
Page No : 1

Groups Printed- Unshifted

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
03:00 PM	0	10	79	0	89	3	0	5	8	0	93	8	101	198
03:15 PM	0	20	78	0	98	10	0	2	12	0	52	14	66	176
03:30 PM	0	28	91	0	119	8	0	0	8	0	103	10	113	240
03:45 PM	0	85	81	0	166	3	0	3	6	0	98	16	114	286
Total	0	143	329	0	472	24	0	10	34	0	346	48	394	900
04:00 PM	0	119	98	0	217	4	0	3	7	0	76	20	96	320
04:15 PM	0	170	98	0	268	2	0	4	6	0	67	15	82	356
04:30 PM	0	148	92	0	240	9	0	6	15	0	77	14	91	346
04:45 PM	0	142	92	0	234	2	0	4	6	0	64	8	72	312
Total	0	579	380	0	959	17	0	17	34	0	284	57	341	1334
05:00 PM	0	137	109	0	246	5	0	2	7	0	54	7	61	314
05:15 PM	0	153	103	0	256	7	0	0	7	0	52	7	59	322
05:30 PM	0	158	86	0	244	4	0	4	8	0	58	1	59	311
05:45 PM	0	93	76	0	169	0	0	0	0	0	57	2	59	228
Total	0	541	374	0	915	16	0	6	22	0	221	17	238	1175
Grand Total	0	1263	1083	0	2346	57	0	33	90	0	851	122	973	3409
Apprch %		53.8	46.2	0		63.3	0	36.7		0	87.5	12.5		
Total %	0	37	31.8	0	68.8	1.7	0	1	2.6	0	25	3.6	28.5	

	Southbound	Farrington Highway Westbound				Old Ft. Weaver Road Northbound				Farrington Highway Eastbound				
Start Time	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 04:00 PM														
04:00 PM	0	119	**98**	0	217	4	0	3	7	0	76	**20**	**96**	320
04:15 PM	0	**170**	98	0	**268**	2	0	4	6	0	67	15	82	**356**
04:30 PM	0	148	92	0	240	**9**	0	**6**	**15**	0	**77**	14	91	346
04:45 PM	0	142	92	0	234	2	0	4	6	0	64	8	72	312
Total Volume	0	579	380	0	959	17	0	17	34	0	284	57	341	1334
% App. Total		60.4	39.6	0		50	0	50		0	83.3	16.7		
PHF	.000	.851	.969	.000	.895	.472	.000	.708	.567	.000	.922	.713	.888	.937

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : Near Project Sit

Site: 100000000000
Date: 04/11/07

Interval	SB				NB				Combined				Day: Wednesday
Begin	AM		PM		AM		PM		AM		PM		
12:00	*		24	135	*		14	57	*		38	192	
12:15	*		33		*		16		*		49		
12:30	*		27		*		16		*		43		
12:45	*		51		*		11		*		62		
01:00	*		31	144	*		12	39	*		43	183	
01:15	*		36		*		11		*		47		
01:30	*		35		*		10		*		45		
01:45	*		42		*		6		*		48		
02:00	*		50	228	*		12	43	*		62	271	
02:15	*		41		*		14		*		55		
02:30	*		63		*		9		*		72		
02:45	*		74		*		8		*		82		
03:00	*		103	658	*		12	49	*		115	707	
03:15	*		136		*		13		*		149		
03:30	*		186		*		8		*		194		
03:45	*		233		*		16		*		249		
04:00	*		276	1,126	*		19	141	*		295	1,267	
04:15	*		297		*		24		*		321		
04:30	*		284		*		52		*		336		
04:45	*		269		*		46		*		315		
05:00	*		338	1,242	*		24	146	*		362	1,388	
05:15	*		296		*		30		*		326		
05:30	*		294		*		50		*		344		
05:45	*		314		*		42		*		356		
06:00	*		300	1,094	*		38	155	*		338	1,249	
06:15	*		286		*		42		*		328		
06:30	*		262		*		49		*		311		
06:45	*		246		*		26		*		272		
07:00	*		134	379	*		21	66	*		155	445	
07:15	*		102		*		16		*		118		
07:30	*		87		*		12		*		99		
07:45	*		56		*		17		*		73		
08:00	*		40	126	*		6	22	*		46	148	
08:15	*		31		*		7		*		38		
08:30	*		28		*		4		*		32		
08:45	*		27		*		5		*		32		
09:00	*		33	86	*		2	17	*		35	103	
09:15	*		18		*		6		*		24		
09:30	*		20		*		5		*		25		
09:45	*		15		*		4		*		19		
10:00	*		13	46	*		6	17	*		19	63	
10:15	*		7		*		6		*		13		
10:30	*		12		*		2		*		14		
10:45	6		14		2		3		8		17		
11:00	28	107	7	21	19	59	1	12	47	166	8	33	
11:15	27		5		12		6		39		11		
11:30	26		5		14		4		40		9		
11:45	26		4		14		1		40		5		
Totals	113		5,285		61		764		174		6,049		
Split%	64.9		87.4		35.1		12.6						
Day Totals		5,398				825				6,223			
Day Splits		86.7				13.3							
Peak Hour	11:00		05:00		11:00		05:30		11:00		05:00		
Volume	107		1,242		59		172		166		1,388		
Factor	0.96		0.92		0.78		0.86		0.88		0.96		

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : Near Project Sit

Site: 100000000000
Date: 04/12/07

Day: Thursday

Interval	SB				NB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	4	10	29	142	0	2	11	47	4	12	40	189
12:15	2		37		0		14		2		51	
12:30	2		38		2		12		4		50	
12:45	2		38		0		10		2		48	
01:00	2	14	32	144	1	9	12	52	3	23	44	196
01:15	2		40		2		14		4		54	
01:30	2		36		2		16		4		52	
01:45	8		36		4		10		12		46	
02:00	1	3	59	263	1	3	16	65	2	6	75	328
02:15	0		62		0		15		0		77	
02:30	1		72		0		20		1		92	
02:45	1		70		2		14		3		84	
03:00	0	1	120	829	1	3	16	110	1	4	136	939
03:15	1		190		0		26		1		216	
03:30	0		232		1		32		1		264	
03:45	0		287		1		36		1		323	
04:00	0	5	306	1,194	4	12	40	125	4	17	346	1,319
04:15	2		318		2		37		4		355	
04:30	1		306		2		20		3		326	
04:45	2		264		4		28		6		292	
05:00	4	21	324	1,296	8	37	26	73	12	58	350	1,369
05:15	8		334		11		18		19		352	
05:30	3		324		6		11		9		335	
05:45	6		314		12		18		18		332	
06:00	5	51	276	866	15	71	30	92	20	122	306	958
06:15	11		240		14		22		25		262	
06:30	19		198		24		24		43		222	
06:45	16		152		18		16		34		168	
07:00	16	98	127	363	22	82	16	61	38	180	143	424
07:15	24		111		24		20		48		131	
07:30	30		78		18		11		48		89	
07:45	28		47		18		14		46		61	
08:00	22	73	40	119	22	69	6	29	44	142	46	148
08:15	15		29		25		10		40		39	
08:30	18		27		10		7		28		34	
08:45	18		23		12		6		30		29	
09:00	12	60	27	77	9	35	5	14	21	95	32	91
09:15	14		22		12		4		26		26	
09:30	12		8		8		3		20		11	
09:45	22		20		6		2		28		22	
10:00	15	64	8	44	8	35	5	21	23	99	13	65
10:15	14		11		13		5		27		16	
10:30	15		14		6		4		21		18	
10:45	20		11		8		7		28		18	
11:00	22	117	11	32	10	44	1	7	32	161	12	39
11:15	32		12		8		2		40		14	
11:30	30		6		14		3		44		9	
11:45	33		3		12		1		45		4	
Totals	517		5,369		402		696		919		6,065	
Split%	56.3		88.5		43.7		11.5					
Day Totals		5,886				1,098				6,984		
Day Splits		84.3				15.7						
Peak Hour	11:00		05:00		06:30		03:30		07:15		05:00	
Volume	117		1,296		88		145		186		1,369	
Factor	0.89		0.97		0.92		0.91		0.97		0.97	

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : Near Project Sit

Site: 100000000000
Date: 04/13/07

Interval	SB				NB				Combined				Day: Friday
Begin	AM		PM		AM		PM		AM		PM		
12:00	2	14	27	155	5	7	16	70	7	21	43	225	
12:15	4		37		1		16		5		53		
12:30	6		45		1		22		7		67		
12:45	2		46		0		16		2		62		
01:00	3	6	36	141	2	5	16	59	5	11	52	200	
01:15	1		38		1		15		2		53		
01:30	0		29		1		17		1		46		
01:45	2		38		1		11		3		49		
02:00	2	4	0		0	1	0		2	5	0		
02:15	1		*		0		*		1		*		
02:30	1		*		1		*		2		*		
02:45	0		*		0		*		0		*		
03:00	1	5	*		2	4	*		3	9	*		
03:15	1		*		0		*		1		*		
03:30	2		*		0		*		2		*		
03:45	1		*		2		*		3		*		
04:00	2	7	*		4	14	*		6	21	*		
04:15	0		*		1		*		1		*		
04:30	2		*		2		*		4		*		
04:45	3		*		7		*		10		*		
05:00	1	16	*		7	40	*		8	56	*		
05:15	6		*		8		*		14		*		
05:30	6		*		15		*		21		*		
05:45	3		*		10		*		13		*		
06:00	6	42	*		9	62	*		15	104	*		
06:15	8		*		17		*		25		*		
06:30	8		*		20		*		28		*		
06:45	20		*		16		*		36		*		
07:00	24	106	*		16	65	*		40	171	*		
07:15	28		*		17		*		45		*		
07:30	31		*		14		*		45		*		
07:45	23		*		18		*		41		*		
08:00	22	71	*		22	63	*		44	134	*		
08:15	21		*		17		*		38		*		
08:30	13		*		12		*		25		*		
08:45	15		*		12		*		27		*		
09:00	8	63	*		12	50	*		20	113	*		
09:15	18		*		10		*		28		*		
09:30	21		*		18		*		39		*		
09:45	16		*		10		*		26		*		
10:00	16	71	*		14	42	*		30	113	*		
10:15	18		*		9		*		27		*		
10:30	20		*		8		*		28		*		
10:45	17		*		11		*		28		*		
11:00	14	90	*		8	35	*		22	125	*		
11:15	30		*		8		*		38		*		
11:30	24		*		6		*		30		*		
11:45	22		*		13		*		35		*		
Totals	495		296		388		129		883		425		
Split%	56.1		69.6		43.9		30.4						
Day Totals		791				517				1,308			
Day Splits		60.5				39.5							
Peak Hour	07:00		12:30		07:15		12:00		07:15		12:15		
Volume	106		165		71		70		175		234		
Factor	0.85		0.90		0.81		0.80		0.97		0.87		

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : West Leg

Site:
Date: 04/11/07
Day: Wednesday

Interval	WB			EB			Combined		
Begin	AM	PM		AM	PM		AM	PM	
12:00	*	4	18	*	8	41	*	12	59
12:15	*	4		*	10		*	14	
12:30	*	3		*	9		*	12	
12:45	*	7		*	14		*	21	
01:00	*	9	33	*	8	35	*	17	68
01:15	*	3		*	6		*	9	
01:30	*	7		*	11		*	18	
01:45	*	14		*	10		*	24	
02:00	*	6	29	*	7	32	*	13	61
02:15	*	9		*	4		*	13	
02:30	*	7		*	14		*	21	
02:45	*	7		*	7		*	14	
03:00	*	13	66	*	6	29	*	19	95
03:15	*	11		*	4		*	15	
03:30	*	8		*	10		*	18	
03:45	*	34		*	9		*	43	
04:00	*	45	421	*	6		*	51	416
04:15	*	92		*	4		*	96	
04:30	*	116		*	*		*	114	
04:45	*	168		*	*		*	155	
05:00	*	354	1,561	*	*		*	313	1,387
05:15	*	438		*	*		*	403	
05:30	*	358		*	*		*	311	
05:45	*	411		*	*		*	360	
06:00	*	400	1,230	*	*		*	358	1,100
06:15	*	285		*	*		*	251	
06:30	*	330		*	*		*	294	
06:45	*	215		*	*		*	197	
07:00	*	16	33	*	5	15	*	21	48
07:15	*	4		*	3		*	7	
07:30	*	8		*	5		*	13	
07:45	*	5		*	2		*	7	
08:00	*	9	18	*	4	11	*	13	29
08:15	*	2		*	2		*	4	
08:30	*	4		*	5		*	9	
08:45	*	3		*	0		*	3	
09:00	*	10	16	*	1	11	*	11	27
09:15	*	1		*	4		*	5	
09:30	*	3		*	2		*	5	
09:45	*	2		*	4		*	6	
10:00	*	3	11	*	1	10	*	4	21
10:15	*	1		*	3		*	4	
10:30	*	5		*	4		*	9	
10:45	*	2		*	2		*	4	
11:00	*	12	13	*	1	4	*	13	17
11:15	*	1		*	1		*	2	
11:30	8	0		3	1		11	1	
11:45	6	0		10	1		16	1	
Totals	14	3,449		13	198		27	3,328	
Split%	51.9	103.6		48.1	5.9				
Day Totals		3,463			211			3,355	
Day Splits		103.2			6.3				
Peak Hour	*	05:15		*	*		*	05:15	
Volume	*	1,607		*	*		*	1,432	
Factor	*	0.92		*	*		*	0.89	

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : West Leg

Site:
Date: 04/12/07
Day: Thursday

Interval	WB				EB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	0	2	5	30	1	4	7	25	1	6	12	55
12:15	2		9		1		10		3		19	
12:30	0		6		1		4		1		10	
12:45	0		10		1		4		1		14	
01:00	0	1	7	31	0	2	8	40	0	3	15	71
01:15	0		6		1		8		1		14	
01:30	0		5		1		8		1		13	
01:45	1		13		0		16		1		29	
02:00	0	1	10	50	0	0	4	47	0	1	14	97
02:15	1		10		0		12		1		22	
02:30	0		12		0		20		0		32	
02:45	0		18		0		11		0		29	
03:00	0	0	12	118	0	1	6	31	0	1	18	149
03:15	0		27		0		5		0		32	
03:30	0		33		0		12		0		45	
03:45	0		46		1		8		1		54	
04:00	0	2	100	944	1	6	2		1	8	102	862
04:15	0		176		0		*		0		162	
04:30	0		273		0		*		0		240	
04:45	2		395		5		*		7		358	
05:00	1	6	330	1,545	1	11	*		2	17	291	1,393
05:15	1		404		3		*		4		362	
05:30	3		433		2		*		5		403	
05:45	1		378		5		*		6		337	
06:00	7	15	102	182	6	44	*	7	13	59	93	189
06:15	2		52		4		4		6		56	
06:30	3		14		22		6		25		20	
06:45	3		14		12		6		15		20	
07:00	11	39	8	30	12	42	2	18	23	81	10	48
07:15	6		8		11		6		17		14	
07:30	9		11		12		4		21		15	
07:45	13		3		7		6		20		9	
08:00	12	36	9	20	10	45	7	11	22	81	16	31
08:15	8		3		12		1		20		4	
08:30	10		3		14		1		24		4	
08:45	6		5		9		2		15		7	
09:00	10	19	1	9	10	31	1	8	20	50	2	17
09:15	2		3		9		1		11		4	
09:30	6		4		8		3		14		7	
09:45	1		1		4		3		5		4	
10:00	10	24	3	10	10	29	2	17	20	53	5	27
10:15	4		1		7		5		11		6	
10:30	6		4		8		6		14		10	
10:45	4		2		4		4		8		6	
11:00	12	34	14	23	6	24	2	3	18	58	16	26
11:15	6		5		7		1		13		6	
11:30	10		3		3		0		13		3	
11:45	6		1		8		0		14		1	
Totals	179		2,992		239		218		418		2,965	
Split%	42.8		100.9		57.2		7.4					
Day Totals		3,171				457				3,383		
Day Splits		93.7				13.5						
Peak Hour	07:45		04:45		06:30		*		07:45		04:45	
Volume	43		1,562		57		*		86		1,414	
Factor	0.83		0.90		0.65		*		0.90		0.88	

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : West Leg

Site:
Date: 04/13/07
Day: Friday

Interval	WB				EB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	0	1	5	27	0	4	10	37	0	5	15	64
12:15	0		8		3		10		3		18	
12:30	1		8		0		7		1		15	
12:45	0		6		1		10		1		16	
01:00	0	3	5	19	0	2	8	20	0	5	13	39
01:15	2		2		1		7		3		9	
01:30	0		12		0		5		0		17	
01:45	1		0		1		0		2		0	
02:00	0	1	*		0	0	*		0	1	*	
02:15	1		*		0		*		1		*	
02:30	0		*		0		*		0		*	
02:45	0		*		0		*		0		*	
03:00	0	0	*		0	1	*		0	1	*	
03:15	0		*		0		*		0		*	
03:30	0		*		0		*		0		*	
03:45	0		*		1		*		1		*	
04:00	1	3	*		0	5	*		1	8	*	
04:15	1		*		0		*		1		*	
04:30	1		*		1		*		2		*	
04:45	0		*		4		*		4		*	
05:00	0	9	*		1	16	*		1	25	*	
05:15	2		*		5		*		7		*	
05:30	3		*		4		*		7		*	
05:45	4		*		6		*		10		*	
06:00	2	15	*		3	42	*		5	57	*	
06:15	5		*		7		*		12		*	
06:30	4		*		16		*		20		*	
06:45	4		*		16		*		20		*	
07:00	10	54	*		9	40	*		19	94	*	
07:15	13		*		8		*		21		*	
07:30	9		*		11		*		20		*	
07:45	22		*		12		*		34		*	
08:00	10	35	*		16	38	*		26	73	*	
08:15	12		*		4		*		16		*	
08:30	6		*		12		*		18		*	
08:45	7		*		6		*		13		*	
09:00	4	16	*		10	39	*		14	55	*	
09:15	3		*		9		*		12		*	
09:30	5		*		10		*		15		*	
09:45	4		*		10		*		14		*	
10:00	6	23	*		8	20	*		14	43	*	
10:15	6		*		5		*		11		*	
10:30	5		*		6		*		11		*	
10:45	6		*		1		*		7		*	
11:00	4	11	*		10	25	*		14	36	*	
11:15	3		*		3		*		6		*	
11:30	3		*		8		*		11		*	
11:45	1		*		4		*		5		*	
Totals	171		46		232		57		403		103	
Split%	42.4		44.7		57.6		55.3					
Day Totals		217				289				506		
Day Splits		42.9				57.1						
Peak Hour	07:00		12:00		06:30		12:00		07:15		12:00	
Volume	54		27		49		37		101		64	
Factor	0.61		0.84		0.77		0.93		0.74		0.89	

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : East Leg

Site:
Date: 04/11/07

Interval	EB			WB			Combined			Day: Wednesday
Begin	AM	PM		AM	PM		AM	PM		
12:00	*	16	55	*	26	134	*	42	189	
12:15	*	14		*	34		*	48		
12:30	*	11		*	24		*	35		
12:45	*	14		*	50		*	64		
01:00	*	18	47	*	32	143	*	50	190	
01:15	*	8		*	38		*	46		
01:30	*	10		*	32		*	42		
01:45	*	11		*	41		*	52		
02:00	*	12	46	*	44	241	*	56	287	
02:15	*	13		*	43		*	56		
02:30	*	11		*	76		*	87		
02:45	*	10		*	78		*	88		
03:00	*	20	50	*	90	592	*	110	642	
03:15	*	16		*	132		*	148		
03:30	*	6		*	170		*	176		
03:45	*	8		*	200		*	208		
04:00	*	10	48	*	217	869	*	227	917	
04:15	*	8		*	218		*	226		
04:30	*	14		*	225		*	239		
04:45	*	16		*	209		*	225		
05:00	*	6	29	*	226	878	*	232	907	
05:15	*	9		*	207		*	216		
05:30	*	9		*	219		*	228		
05:45	*	5		*	226		*	231		
06:00	*	12	36	*	203	743	*	215	779	
06:15	*	4		*	191		*	195		
06:30	*	8		*	171		*	179		
06:45	*	12		*	178		*	190		
07:00	*	12	44	*	136	382	*	148	426	
07:15	*	12		*	110		*	122		
07:30	*	14		*	79		*	93		
07:45	*	6		*	57		*	63		
08:00	*	5	15	*	41	128	*	46	143	
08:15	*	6		*	30		*	36		
08:30	*	2		*	29		*	31		
08:45	*	2		*	28		*	30		
09:00	*	6	14	*	36	89	*	42	103	
09:15	*	2		*	18		*	20		
09:30	*	4		*	18		*	22		
09:45	*	2		*	17		*	19		
10:00	*	4	17	*	13	46	*	17	63	
10:15	*	6		*	8		*	14		
10:30	*	4		*	14		*	18		
10:45	*	3		*	11		*	14		
11:00	*	7	13	*	5	27	*	12	40	
11:15	10	2		22	10		32	12		
11:30	17	1		26	7		43	8		
11:45	12	3		30	5		42	8		
Totals	39	414		78	4,272		117	4,686		
Split%	33.3	8.8		66.7	91.2					
Day Totals		453			4,350			4,803		
Day Splits		9.4			90.6					
Peak Hour	*	12:15		*	04:15		*	04:15		
Volume	*	57		*	878		*	922		
Factor	*	0.79		*	0.97		*	0.96		

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : East Leg

Site:
Date: 04/12/07
Day: Thursday

Interval	EB				WB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	1	8	10	54	4	16	30	151	5	24	40	205
12:15	2		14		4		40		6		54	
12:30	2		16		5		42		7		58	
12:45	3		14		3		39		6		53	
01:00	1	3	15	56	2	12	33	137	3	15	48	193
01:15	1		15		3		36		4		51	
01:30	0		12		2		34		2		46	
01:45	1		14		5		34		6		48	
02:00	1	1	10	62	1	3	60	257	2	4	70	319
02:15	0		15		0		65		0		80	
02:30	0		17		1		64		1		81	
02:45	0		20		1		68		1		88	
03:00	3	6	21	65	0	3	115	705	3	9	136	770
03:15	0		22		2		178		2		200	
03:30	2		11		0		198		2		209	
03:45	1		11		1		214		2		225	
04:00	2	9	9	28	1	7	241	884	3	16	250	912
04:15	3		9		2		234		5		243	
04:30	2		4		2		217		4		221	
04:45	2		6		2		192		4		198	
05:00	4	48	9	35	8	33	180	759	12	81	189	794
05:15	12		10		7		188		19		198	
05:30	14		10		10		205		24		215	
05:45	18		6		8		186		26		192	
06:00	21	87	8	28	14	60	221	770	35	147	229	798
06:15	21		4		22		212		43		216	
06:30	18		8		16		190		34		198	
06:45	27		8		8		147		35		155	
07:00	14	74	10	41	8	72	117	368	22	146	127	409
07:15	14		11		14		124		28		135	
07:30	20		8		30		77		50		85	
07:45	26		12		20		50		46		62	
08:00	23	57	8	24	20	73	35	116	43	130	43	140
08:15	8		2		15		28		23		30	
08:30	10		10		14		28		24		38	
08:45	16		4		24		25		40		29	
09:00	13	43	9	20	13	68	28	83	26	111	37	103
09:15	10		4		16		21		26		25	
09:30	12		4		20		14		32		18	
09:45	8		3		19		20		27		23	
10:00	8	51	3	17	15	65	12	56	23	116	15	73
10:15	17		5		14		20		31		25	
10:30	12		4		14		16		26		20	
10:45	14		5		22		8		36		13	
11:00	8	48	4	7	18	106	9	27	26	154	13	34
11:15	17		2		24		10		41		12	
11:30	15		0		32		5		47		5	
11:45	8		1		32		3		40		4	
Totals	435		437		518		4,313		953		4,750	
Split%	45.6		9.2		54.4		90.8					
Day Totals		872				4,831				5,703		
Day Splits		15.3				84.7						
Peak Hour	06:00		02:30		11:00		03:45		07:15		03:45	
Volume	87		80		106		906		167		939	
Factor	0.81		0.91		0.83		0.94		0.83		0.94	

Wilson Okamoto Corporation

1907 S. Beretania Street #400

Honolulu, HI 96826

Title1 : Hale Kipa

Title2 : Old Ft. Weaver Road

Title3 : East Leg

Site:

Date: 04/13/07

Day: Friday

Interval	EB				WB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	5	8	14	60	3	16	30	161	8	24	44	221
12:15	0		16		4		45		4		61	
12:30	2		14		7		40		9		54	
12:45	1		16		2		46		3		62	
01:00	0	3	10	40	1	4	44	107	1	7	54	147
01:15	0		14		2		31		2		45	
01:30	1		16		0		32		1		48	
01:45	2		0		1		0		3		0	
02:00	1	4	*		4	6	*		5	10	*	
02:15	2		*		0		*		2		*	
02:30	0		*		2		*		2		*	
02:45	1		*		0		*		1		*	
03:00	1	7	*		1	8	*		2	15	*	
03:15	1		*		3		*		4		*	
03:30	2		*		2		*		4		*	
03:45	3		*		2		*		5		*	
04:00	2	9	*		2	10	*		4	19	*	
04:15	1		*		1		*		2		*	
04:30	4		*		4		*		8		*	
04:45	2		*		3		*		5		*	
05:00	8	54	*		3	28	*		11	82	*	
05:15	10		*		11		*		21		*	
05:30	16		*		4		*		20		*	
05:45	20		*		10		*		30		*	
06:00	18	78	*		19	63	*		37	141	*	
06:15	21		*		20		*		41		*	
06:30	20		*		10		*		30		*	
06:45	19		*		14		*		33		*	
07:00	20	69	*		10	78	*		30	147	*	
07:15	13		*		18		*		31		*	
07:30	14		*		22		*		36		*	
07:45	22		*		28		*		50		*	
08:00	24	78	*		21	65	*		45	143	*	
08:15	15		*		20		*		35		*	
08:30	20		*		12		*		32		*	
08:45	19		*		12		*		31		*	
09:00	5	48	*		9	60	*		14	108	*	
09:15	20		*		16		*		36		*	
09:30	16		*		20		*		36		*	
09:45	7		*		15		*		22		*	
10:00	14	61	*		17	76	*		31	137	*	
10:15	17		*		20		*		37		*	
10:30	22		*		19		*		41		*	
10:45	8		*		20		*		28		*	
11:00	8	49	*		14	108	*		22	157	*	
11:15	12		*		34		*		46		*	
11:30	12		*		28		*		40		*	
11:45	17		*		32		*		49		*	
Totals	468		100		522		268		990		368	
Split%	47.3		27.2		52.7		72.8					
Day Totals		568				790				1,358		
Day Splits		41.8				58.2						
Peak Hour	07:45		12:00		11:00		12:15		07:30		12:15	
Volume	81		60		108		175		166		231	
Factor	0.84		0.94		0.79		0.95		0.83		0.93	

Wilson Okamoto Corporation
1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : South Leg

Site: 100000000000
Date: 04/11/07

Interval	NB				SB				Combined				Day: Wednesday
Begin	AM		PM		AM		PM		AM		PM		
12:00	*		19	92	*		35	119	*		54	211	
12:15	*		19		*		30		*		49		
12:30	*		24		*		32		*		56		
12:45	*		30		*		22		*		52		
01:00	*		47	120	*		22	108	*		69	228	
01:15	*		34		*		16		*		50		
01:30	*		23		*		30		*		53		
01:45	*		16		*		40		*		56		
02:00	*		34	163	*		28	162	*		62	325	
02:15	*		38		*		39		*		77		
02:30	*		51		*		43		*		94		
02:45	*		40		*		52		*		92		
03:00	*		66	356	*		54	401	*		120	757	
03:15	*		88		*		84		*		172		
03:30	*		92		*		107		*		199		
03:45	*		110		*		156		*		266		
04:00	*		126	340	*		173	976	*		299	1,316	
04:15	*		108		*		216		*		324		
04:30	*		88		*		244		*		332		
04:45	*		18		*		343		*		361		
05:00	*		41	96	*		334	1,402	*		375	1,498	
05:15	*		18		*		345		*		363		
05:30	*		14		*		372		*		386		
05:45	*		23		*		351		*		374		
06:00	*		22	146	*		355	1,111	*		377	1,257	
06:15	*		19		*		328		*		347		
06:30	*		18		*		298		*		316		
06:45	*		87		*		130		*		217		
07:00	*		74	202	*		86	232	*		160	434	
07:15	*		52		*		64		*		116		
07:30	*		42		*		48		*		90		
07:45	*		34		*		34		*		68		
08:00	*		24	79	*		26	85	*		50	164	
08:15	*		24		*		16		*		40		
08:30	*		18		*		18		*		36		
08:45	*		13		*		25		*		38		
09:00	*		17	55	*		25	61	*		42	116	
09:15	*		16		*		6		*		22		
09:30	*		12		*		18		*		30		
09:45	*		10		*		12		*		22		
10:00	*		12	42	*		4	27	*		16	69	
10:15	*		9		*		3		*		12		
10:30	*		10		*		12		*		22		
10:45	*		11		*		8		*		19		
11:00	24	79	6	24	11	93	2	15	35	172	8	39	
11:15	22		6		25		6		47		12		
11:30	16		8		33		5		49		13		
11:45	17		4		24		2		41		6		
Totals	79		1,715		93		4,699		172		6,414		
Split%	45.9		26.7		54.1		73.3						
Day Totals		1,794				4,792				6,586			
Day Splits		27.2				72.8							
Peak Hour	11:00		03:30		11:00		05:15		11:00		05:15		
Volume	79		436		93		1,423		172		1,500		
Factor	0.82		0.87		0.70		0.96		0.88		0.97		

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : South Leg

Site: 100000000000
Date: 04/12/07

Interval	NB				SB				Combined				Day: Thursday
Begin	AM		PM		AM		PM		AM		PM		
12:00	2	13	28	130	6	15	28	116	8	28	56	246	
12:15	4		36		2		28		6		64		
12:30	7		32		3		26		10		58		
12:45	0		34		4		34		4		68		
01:00	2	12	38	148	2	5	20	92	4	17	58	240	
01:15	4		34		0		22		4		56		
01:30	2		44		1		23		3		67		
01:45	4		32		2		27		6		59		
02:00	0	4	41	189	2	4	40	176	2	8	81	365	
02:15	0		46		0		48		0		94		
02:30	0		48		2		50		2		98		
02:45	4		54		0		38		4		92		
03:00	0	6	55	397	0		100	567	0		155	964	
03:15	0		120		2		123		2		243		
03:30	4		100		*		142		*		242		
03:45	2		122		0		202		2		324		
04:00	6	18	104	209	1	8	230	1,161	7	26	334	1,370	
04:15	1		52		0		327		1		379		
04:30	5		37		4		312		9		349		
04:45	6		16		3		292		9		308		
05:00	12	80	39	169	4	21	350	1,327	16	101	389	1,496	
05:15	19		58		8		322		27		380		
05:30	16		26		4		359		20		385		
05:45	33		46		5		296		38		342		
06:00	33	146	110	386	7	35	160	480	40	181	270	866	
06:15	28		119		8		126		36		245		
06:30	47		95		10		114		57		209		
06:45	38		62		10		80		48		142		
07:00	28	149	66	199	9	69	83	233	37	218	149	432	
07:15	38		58		16		70		54		128		
07:30	42		38		22		52		64		90		
07:45	41		37		22		28		63		65		
08:00	32	118	23	72	18	61	22	73	50	179	45	145	
08:15	42		16		8		20		50		36		
08:30	20		19		14		14		34		33		
08:45	24		14		21		17		45		31		
09:00	18	78	19	57	8	57	21	58	26	135	40	115	
09:15	24		15		16		17		40		32		
09:30	18		10		15		8		33		18		
09:45	18		13		18		12		36		25		
10:00	18	63	13	49	20	80	6	36	38	143	19	85	
10:15	16		10		15		13		31		23		
10:30	14		9		19		9		33		18		
10:45	15		17		26		8		41		25		
11:00	10	75	7	20	23	100	8	21	33	175	15	41	
11:15	13		7		26		7		39		14		
11:30	28		4		29		4		57		8		
11:45	24		2		22		2		46		4		
Totals	762		2,025		457		4,340		1,215		6,365		
Split%	62.7		31.8		37.6		68.2						
Day Totals		2,787				4,797				7,580			
Day Splits		36.8				63.3							
Peak Hour	07:30		03:15		10:45		05:00		07:15		05:00		
Volume	157		446		104		1,327		231		1,496		
Factor	0.93		0.91		0.90		0.92		0.90		0.96		

Wilson Okamoto Corporation

1907 S. Beretania Street #400
Honolulu, HI 96826

Title1 : Hale Kipa
Title2 : Old Ft. Weaver Road
Title3 : South Leg

Site: 100000000000
Date: 04/13/07
Day: Friday

Interval	NB				SB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	6	14	14	73	2	12	37	183	8	26	51	256
12:15	2		19		2		50		4		69	
12:30	6		24		6		50		12		74	
12:45	0		16		2		46		2		62	
01:00	2	8	20	62	2	3	40	106	4	11	60	168
01:15	2		20		1		36		3		56	
01:30	2		22		0		30		2		52	
01:45	2		0		0		0		2		0	
02:00	2	6	*		4	6	*		6	12	*	
02:15	2		*		2		*		4		*	
02:30	1		*		0		*		1		*	
02:45	1		*		0		*		1		*	
03:00	0	8	*		1	7	*		1	15	*	
03:15	0		*		3		*		3		*	
03:30	5		*		2		*		7		*	
03:45	3		*		1		*		4		*	
04:00	2	23	*		2	7	*		4	30	*	
04:15	4		*		2		*		6		*	
04:30	8		*		2		*		10		*	
04:45	9		*		1		*		10		*	
05:00	14	78	*		1	19	*		15	97	*	
05:15	16		*		5		*		21		*	
05:30	26		*		5		*		31		*	
05:45	22		*		8		*		30		*	
06:00	28	132	*		4	33	*		32	165	*	
06:15	34		*		7		*		41		*	
06:30	30		*		8		*		38		*	
06:45	40		*		14		*		54		*	
07:00	26	152	*		15	69	*		41	221	*	
07:15	34		*		18		*		52		*	
07:30	47		*		17		*		64		*	
07:45	45		*		19		*		64		*	
08:00	40	133	*		12	45	*		52	178	*	
08:15	33		*		12		*		45		*	
08:30	30		*		15		*		45		*	
08:45	30		*		6		*		36		*	
09:00	16	91	*		10	47	*		26	138	*	
09:15	27		*		12		*		39		*	
09:30	28		*		15		*		43		*	
09:45	20		*		10		*		30		*	
10:00	17	81	*		13	64	*		30	145	*	
10:15	22		*		18		*		40		*	
10:30	20		*		23		*		43		*	
10:45	22		*		10		*		32		*	
11:00	19	69	*		11	100	*		30	169	*	
11:15	14		*		36		*		50		*	
11:30	14		*		25		*		39		*	
11:45	22		*		28		*		50		*	
Totals	795		135		412		289		1,207		424	
Split%	65.9		31.8		34.1		68.2					
Day Totals		930				701				1,631		
Day Splits		57.0				43.0						
Peak Hour	07:15		12:30		11:00		12:15		07:15		12:15	
Volume	166		80		100		186		232		265	
Factor	0.88		0.83		0.69		0.93		0.91		0.90	

APPENDIX B

CAPACITY ANALYSIS CALCULATIONS
EXISTING PEAK HOUR TRAFFIC ANALYSIS

HCS+: Signalized Intersections Release 5.21

Analyst: CL
Agency:
Date: 5/1/2007
Period: AM Peak
Project ID:
E/W St: Old Fort Weaver Rd/Kawa Dr

Inter.:
Area Type: All other areas
Jurisd:
Year : Existing
N/S St: Fort Weaver Rd

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	1	2	1	1	2	1
LGConfig		LTR			LT	R	L	T	R	L	T	R
Volume	0	13	57	94	35	259	42	2884	20	24	1274	7
Lane Width		12.0			12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			57			259			10			4

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A				NB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
WB	Left	A				SB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		30.0						25.0	170.0		
Yellow		4.0						4.0	4.0		
All Red		1.0						1.0	1.0		

Cycle Length: 240.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	233	1863	0.07	0.13	92.8	F	92.8	F
Westbound								
LT	180	1443	0.86	0.13	144.6	F	144.6	F
R	198	1583	0.00	0.13	91.9	F		
Northbound								
L	184	1770	0.23	0.10	99.4	F		
T	2512	3547	1.17	0.71	348.7	F	343.9	F
R	1121	1583	0.01	0.71	10.3	B		
Southbound								
L	184	1770	0.14	0.10	98.0	F		
T	2512	3547	0.53	0.71	16.6	B	18.1	B
R	1121	1583	0.00	0.71	10.2	B		

Intersection Delay = 237.9 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.21

Analyst: CL
Agency:
Date: 5/1/2007
Period: PM Peak
Project ID:
E/W St: Old Fort Weaver Rd/Kawa Dr

Inter.:
Area Type: All other areas
Jurisd:
Year : Existing
N/S St: Fort Weaver Rd

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	1	2	1	1	2	1
LGConfig		LTR			LT	R	L	T	R	L	T	R
Volume	5	126	818	45	5	30	31	1601	33	92	1764	15
Lane Width		12.0			12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			818			30			17			8

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru		A	
Right	A				Right		A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru		A	
Right	A				Right		A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	30.0					25.0	170.0	
Yellow	4.0					4.0	4.0	
All Red	1.0					1.0	1.0	

Cycle Length: 240.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	231	1845	0.71	0.13	110.7	F	110.7	F
Westbound								
LT	63	503	1.22	0.13	625.7	F	625.7	F
R	198	1583	0.00	0.13	91.9	F		
Northbound								
L	184	1770	0.20	0.10	98.9	F		
T	2512	3547	0.76	0.71	23.5	C	24.8	C
R	1121	1583	0.02	0.71	10.3	B		
Southbound								
L	184	1770	0.55	0.10	105.9	F		
T	2512	3547	0.78	0.71	24.5	C	28.4	C
R	1121	1583	0.01	0.71	10.3	B		

Intersection Delay = 40.7 (sec/veh) Intersection LOS = D

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: AM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (East)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		669		60	235	
Peak-Hour Factor, PHF		0.92		0.82	0.82	
Hourly Flow Rate, HFR		727		73	286	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1		1	1	
Configuration		T		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			78			
Peak Hour Factor, PHF			0.78			
Hourly Flow Rate, HFR			100			
Percent Heavy Vehicles			2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes			1			
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L			R			
v (vph)		73			100			
C(m) (vph)		876			829			
v/c		0.08			0.12			
95% queue length		0.27			0.41			
Control Delay		9.5			9.9			
LOS		A			A			
Approach Delay				9.9				
Approach LOS				A				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: PM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (East)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		324		755	883	
Peak-Hour Factor, PHF		0.80		0.91	0.91	
Hourly Flow Rate, HFR		404		829	970	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1		1	1	
Configuration		T		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			36			
Peak Hour Factor, PHF			0.90			
Hourly Flow Rate, HFR			40			
Percent Heavy Vehicles			2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes			1			
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L			R			
v (vph)		829			40			
C(m) (vph)		1155			1098			
v/c		0.72			0.04			
95% queue length		7.30			0.11			
Control Delay		15.9			8.4			
LOS		C			A			
Approach Delay				8.4				
Approach LOS				A				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: AM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (West)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		666	18	4	230	
Peak-Hour Factor, PHF		0.91	0.91	0.84	0.84	
Hourly Flow Rate, HFR		731	19	4	273	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration		TR		LT		
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	33		4			
Peak Hour Factor, PHF	0.62		0.62			
Hourly Flow Rate, HFR	53		6			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0		0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		4		59				
C(m) (vph)		859		586				
v/c		0.00		0.10				
95% queue length		0.01		0.34				
Control Delay		9.2		11.8				
LOS		A		B				
Approach Delay				11.8				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: PM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (West)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		284	57	579	380	
Peak-Hour Factor, PHF		0.89	0.89	0.90	0.90	
Hourly Flow Rate, HFR		319	64	643	422	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes		1	0	0	1	
Configuration		TR		LT		
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	17		17			
Peak Hour Factor, PHF	0.57		0.57			
Hourly Flow Rate, HFR	29		29			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0		0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		643		58				
C(m) (vph)		1175		179				
v/c		0.55		0.32				
95% queue length		3.58		1.41				
Control Delay		11.8		34.7				
LOS		B		D				
Approach Delay				34.7				
Approach LOS				D				

APPENDIX C

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2012 PEAK HOUR TRAFFIC
ANALYSIS WITHOUT PROJECT

HCS+: Signalized Intersections Release 5.21

Analyst: CL
Agency:
Date: 5/1/2007
Period: AM Peak
Project ID:
E/W St: Old Fort Weaver Rd/Kawa Dr

Inter.:
Area Type: All other areas
Jurisd:
Year : Year 2012 w/out project
N/S St: Fort Weaver Rd

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	1	2	1	1	2	1
LGConfig		LTR			LT	R	L	T	R	L	T	R
Volume	0	13	57	94	35	259	42	3028	20	24	1338	7
Lane Width		12.0			12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			57			259			10			4

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A				NB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
WB	Left	A				SB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		30.0						25.0	170.0		
Yellow		4.0						4.0	4.0		
All Red		1.0						1.0	1.0		

Cycle Length: 240.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	233	1863	0.07	0.13	92.8	F	92.8	F
Westbound								
LT	180	1443	0.86	0.13	144.6	F	144.6	F
R	198	1583	0.00	0.13	91.9	F		
Northbound								
L	184	1770	0.23	0.10	99.4	F		
T	2512	3547	1.23	0.71	453.0	F	446.7	F
R	1121	1583	0.01	0.71	10.3	B		
Southbound								
L	184	1770	0.14	0.10	98.0	F		
T	2512	3547	0.56	0.71	17.2	B	18.6	B
R	1121	1583	0.00	0.71	10.2	B		

Intersection Delay = 306.2 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.21

Analyst: CL
Agency:
Date: 5/1/2007
Period: PM Peak
Project ID:
E/W St: Old Fort Weaver Rd/Kawa Dr

Inter.:
Area Type: All other areas
Jurisd:
Year : Year 2012 w/out project
N/S St: Fort Weaver Rd

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	1	2	1	1	2	1
LGConfig		LTR			LT	R	L	T	R	L	T	R
Volume	5	126	818	45	5	30	31	1681	33	92	1852	15
Lane Width		12.0			12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			818			30			17			8

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A				NB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
WB	Left	A				SB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		30.0						25.0	170.0		
Yellow		4.0						4.0	4.0		
All Red		1.0						1.0	1.0		

Cycle Length: 240.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	231	1845	0.71	0.13	110.7	F	110.7	F
Westbound								
LT	63	503	1.22	0.13	625.7	F	625.7	F
R	198	1583	0.00	0.13	91.9	F		
Northbound								
L	184	1770	0.20	0.10	98.9	F		
T	2512	3547	0.80	0.71	25.3	C	26.5	C
R	1121	1583	0.02	0.71	10.3	B		
Southbound								
L	184	1770	0.55	0.10	105.9	F		
T	2512	3547	0.82	0.71	26.6	C	30.3	C
R	1121	1583	0.01	0.71	10.3	B		

Intersection Delay = 41.8 (sec/veh) Intersection LOS = D

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: AM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (East)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		702		60	247	
Peak-Hour Factor, PHF		0.92		0.82	0.82	
Hourly Flow Rate, HFR		763		73	301	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1		1	1	
Configuration		T		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			78			
Peak Hour Factor, PHF			0.78			
Hourly Flow Rate, HFR			100			
Percent Heavy Vehicles			2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes			1			
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L			R			
v (vph)		73			100			
C(m) (vph)		850			804			
v/c		0.09			0.12			
95% queue length		0.28			0.43			
Control Delay		9.6			10.1			
LOS		A			B			
Approach Delay				10.1				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst:
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: PM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (East)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		340		755	927	
Peak-Hour Factor, PHF		0.80		0.91	0.91	
Hourly Flow Rate, HFR		424		829	1018	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1		1	1	
Configuration		T		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			36			
Peak Hour Factor, PHF			0.90			
Hourly Flow Rate, HFR			40			
Percent Heavy Vehicles			2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes			1			
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L			R			
v (vph)		829			40			
C(m) (vph)		1135			1080			
v/c		0.73			0.04			
95% queue length		7.74			0.12			
Control Delay		16.6			8.5			
LOS		C			A			
Approach Delay				8.5				
Approach LOS				A				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: AM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (West)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		699	18	4	242	
Peak-Hour Factor, PHF		0.91	0.91	0.84	0.84	
Hourly Flow Rate, HFR		768	19	4	288	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration		TR		LT		
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	33		4			
Peak Hour Factor, PHF	0.62		0.62			
Hourly Flow Rate, HFR	53		6			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0		0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		4		59				
C(m) (vph)		832		319				
v/c		0.00		0.18				
95% queue length		0.01		0.68				
Control Delay		9.3		18.8				
LOS		A		C				
Approach Delay				18.8				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: PM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (West)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		298	57	579	399	
Peak-Hour Factor, PHF		0.89	0.89	0.90	0.90	
Hourly Flow Rate, HFR		334	64	643	443	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration		TR		LT		
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	17		17			
Peak Hour Factor, PHF	0.57		0.57			
Hourly Flow Rate, HFR	29		29			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0		0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		643		58				
C(m) (vph)		1161		172				
v/c		0.55		0.34				
95% queue length		3.67		1.49				
Control Delay		11.9		36.5				
LOS		B		E				
Approach Delay				36.5				
Approach LOS				E				

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS
PROJECTED YEAR 2012 PEAK HOUR TRAFFIC
ANALYSIS WITH PROJECT

HCS+: Signalized Intersections Release 5.21

Analyst: CL
Agency:
Date: 5/1/2007
Period: AM Peak
Project ID:
E/W St: Old Fort Weaver Rd/Kawa Dr

Inter.:
Area Type: All other areas
Jurisd:
Year : Year 2012 w/ project
N/S St: Fort Weaver Rd

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	1	2	1	1	2	1
LGConfig		LTR			LT	R	L	T	R	L	T	R
Volume	0	13	58	94	35	259	53	3028	20	24	1338	12
Lane Width		12.0			12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			58			259			10			6

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A				NB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
WB	Left	A				SB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		30.0						25.0	170.0		
Yellow		4.0						4.0	4.0		
All Red		1.0						1.0	1.0		

Cycle Length: 240.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	233	1863	0.07	0.13	92.8	F	92.8	F
Westbound								
LT	180	1443	0.86	0.13	144.6	F	144.6	F
R	198	1583	0.00	0.13	91.9	F		
Northbound								
L	184	1770	0.29	0.10	100.2	F		
T	2512	3547	1.23	0.71	453.0	F	445.5	F
R	1121	1583	0.01	0.71	10.3	B		
Southbound								
L	184	1770	0.14	0.10	98.0	F		
T	2512	3547	0.56	0.71	17.2	B	18.6	B
R	1121	1583	0.01	0.71	10.2	B		

Intersection Delay = 305.6 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.21

Analyst: CL
Agency:
Date: 5/1/2007
Period: PM Peak
Project ID:
E/W St: Old Fort Weaver Rd/Kawa Dr

Inter.:
Area Type: All other areas
Jurisd:
Year : Year 2012 w/ project
N/S St: Fort Weaver Rd

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	1	1	2	1	1	2	1
LGConfig		LTR			LT	R	L	T	R	L	T	R
Volume	17	126	831	45	5	30	31	1681	33	92	1852	15
Lane Width		12.0			12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			831			30			17			8

Duration 1.00 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A				NB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
WB	Left	A				SB	Left	A			
	Thru	A					Thru		A		
	Right	A					Right		A		
	Peds						Peds				
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		30.0						25.0	170.0		
Yellow		4.0						4.0	4.0		
All Red		1.0						1.0	1.0		

Cycle Length: 240.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LTR	184	1474	0.97	0.13	205.7	F	205.7	F
Westbound								
LT	63	506	1.22	0.13	625.7	F	625.7	F
R	198	1583	0.00	0.13	91.9	F		
Northbound								
L	184	1770	0.20	0.10	98.9	F		
T	2512	3547	0.80	0.71	25.3	C	26.5	C
R	1121	1583	0.02	0.71	10.3	B		
Southbound								
L	184	1770	0.55	0.10	105.9	F		
T	2512	3547	0.82	0.71	26.6	C	30.3	C
R	1121	1583	0.01	0.71	10.3	B		

Intersection Delay = 45.8 (sec/veh) Intersection LOS = D

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: AM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (East)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		702		63	247	
Peak-Hour Factor, PHF		0.92		0.82	0.82	
Hourly Flow Rate, HFR		763		76	301	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1		1	1	
Configuration		T		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			79			
Peak Hour Factor, PHF			0.78			
Hourly Flow Rate, HFR			101			
Percent Heavy Vehicles			2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes		1				
Configuration		R				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L			R			
v (vph)		76			101			
C(m) (vph)		850			804			
v/c		0.09			0.13			
95% queue length		0.29			0.43			
Control Delay		9.7			10.1			
LOS		A			B			
Approach Delay				10.1				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst:
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: PM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (East)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		340		758	927	
Peak-Hour Factor, PHF		0.80		0.91	0.91	
Hourly Flow Rate, HFR		424		832	1018	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1		1	1	
Configuration		T		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			37			
Peak Hour Factor, PHF			0.90			
Hourly Flow Rate, HFR			41			
Percent Heavy Vehicles			2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes			1			
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L			R			
v (vph)		832			41			
C(m) (vph)		1135			1080			
v/c		0.73			0.04			
95% queue length		7.83			0.12			
Control Delay		16.7			8.5			
LOS		C			A			
Approach Delay				8.5				
Approach LOS				A				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: AM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (West)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		699	27	4	242	
Peak-Hour Factor, PHF		0.91	0.91	0.84	0.84	
Hourly Flow Rate, HFR		768	29	4	288	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration		TR		LT		
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	34		4			
Peak Hour Factor, PHF	0.62		0.62			
Hourly Flow Rate, HFR	54		6			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0		0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		4		60				
C(m) (vph)		825		317				
v/c		0.00		0.19				
95% queue length		0.01		0.70				
Control Delay		9.4		19.0				
LOS		A		C				
Approach Delay				19.0				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: CL
Agency/Co.:
Date Performed: 5/1/2007
Analysis Time Period: PM Peak
Intersection:
Jurisdiction:
Units: U. S. Customary
Analysis Year:
Project ID:
East/West Street: Farrington Hwy
North/South Street: Old Fort Weaver Rd (West)
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		298	58	579	399	
Peak-Hour Factor, PHF		0.89	0.89	0.90	0.90	
Hourly Flow Rate, HFR		334	65	643	443	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration		TR		LT		
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	19		17			
Peak Hour Factor, PHF	0.57		0.57			
Hourly Flow Rate, HFR	33		29			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			No /			/
Lanes	0		0			
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		643		62				
C(m) (vph)		1160		163				
v/c		0.55		0.38				
95% queue length		3.68		1.78				
Control Delay		11.9		40.5				
LOS		B		E				
Approach Delay				40.5				
Approach LOS				E				