BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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Deputy Manager and Chief Engineer

February 3, 2017

17 FEB -8 A11 :36

OFC. OF ENVIRONMENTAL
QUALITY CONTROL

Mr. Scott Glenn, Director
State of Hawaii
Department of Health
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Mr. Glenn:

Subject: Final Environmental Assessment – Finding of No Significant Impact Publication Request for Honolulu Board of Water Supply's Honolulu Water System Improvements Project, TMKs: 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6, Honolulu, Oahu, Hawaii

The Honolulu Board of Water Supply (BWS) transmits the Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the Honolulu Water System Improvements project situated at (1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6 in the Honolulu District on the island of Oahu for publication in the next available edition of the Environmental Notice.

The Honolulu BWS has included copies of comments and responses that it received during the 30-day public comment period of the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI).

Enclosed is a completed Office of Environmental Quality Control Publication Form, a copy of the FEA-FONSI, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of the Water Resources Division at 748-5946 or via email at ioda@hbws.org.

Very truly yours,

for ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

Enclosures

cc: Sheryl Nojima, Gray Hong Nojima & Associates

17-336

AGENCY
PUBLICATION FORM

Project Name:	Honolulu Water System Improvements Environmental Assesment
Project Short Name:	Honolulu Water System Improvements
HRS §343-5 Trigger(s):	Use of county lands and funds
Island(s):	Oahu
Judicial District(s):	Honolulu
TMK(s):	(1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6
Permit(s)/Approval(s):	Department of the Army Permit, Coastal Zone Management Consistency Determination, Community Noise Permit and Variance, National Pollutant Discharge Elimination System (NPDES) Permits, Permit to Discharge into the State Highways Drainage System, Permit to Perform Work Upon State Highways, Permit to Transport Oversize/Overweight Equipment/ Loads on State Highways, Section 401 Water Quality Certification, Stream Channel Alteration Permit, Construction Dewatering Permit, Permit to Excavate (Trenching), Special Management Area, Street Usage Permit, Surface Runoff from Construction Activities
Proposing/Determining Agency:	Board of Water Supply
Contact Name, Email, Telephone, Address	Ms. Iris Oda, IODA@hbws.org, (808) 748-5946 630 South Beretania Street, Honolulu, Hawaii 96843
Accepting Authority:	(for EIS submittals only)
Contact Name, Email, Telephone, Address	
Consultant:	Gray, Hong, Nojima & Associates, Inc.
Contact Name, Email, Telephone, Address	Ms. Sheryl Nojima, snojima@grayhongnojima.com, (808) 521-0306, 201 Merchant Street, Ste 1900, Honolulu, HI 96813

Status (select one)	**Submittal Requirements**
____ DEA-AFNSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
_X__ FEA-FONSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the proposing agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
____ FEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The accepting authority simultaneously transmits to both the OEQC and the proposing agency a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.

FEIS Statutory Acceptance	Timely statutory acceptance of the FEIS under Section 343-5(c), HRS, is not applicable to agency actions.
____ Supplemental EIS Determination	The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice.
____ Withdrawal	Identify the specific document(s) to withdraw and explain in the project summary section.
____ Other	Contact the OEQC if your action is not one of the above items.

Project Summary
Provide a description of the proposed action and purpose and need in 200 words or less.

The Honolulu Board of Water Supply (BWS) is proposing to undertake the replacement and upgrade (increase in size) of various water mains within Honolulu. The proposed improvements will be designed and constructed in several projects. The projects will entail work within various State and City road right-of-ways in the Iwilei, Downtown, Kakaako, Ala Moana, Waikiki and Makiki neighborhoods of Honolulu.

Direct impacts resulting from construction activities include increased traffic congestion, disruption of residential/business activities, noise, dust, and utility interruptions due to possible relocations. With the prescribed mitigation measures, no long-term adverse indirect, secondary and cumulative impacts to environmental, natural, social, cultural, archeological and economic resources are anticipated. Beneficial long-term impacts include reduction in water main break occurrences and improvement in the reliability of the Honolulu Water System in meeting future increases in demands and fire suppression capabilities.

The rough order of magnitude construction cost estimate is $43.6 M and will be funded by the BWS operating funds, and possibly Water System Facility Charges and the State of Hawaii's Drinking Water State Revolving Fund. The various water main improvement projects are expected to be released for construction over several years with the first project anticipated to commence approximately in 2017-2018.

HONOLULU WATER SYSTEM IMPROVEMENTS

FINAL ENVIRONMENTAL ASSESSMENT

TMK (1) 1-5, 1-7, 2-1, 2-3, 2-4, and 2-6
Honolulu, Oahu, Hawaii

February 2017

Prepared for:
Board of Water Supply
City and County of Honolulu

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS
201 Merchant Street, Suite 1900 / Honolulu, HI 96813 / Phone: (808) 521-0306 / Fax: (808) 531-8018

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APPENDICES (Refer to Volume 2 in the Hard Copy Edition)

Appendix A: Pre-Assessment Consultation Public Comments

Appendix B: Final Letter Report, Geotechnical Consultation, Honolulu Water System Improvements Environmental Assessment, Honolulu, Oahu, Hawaii

Appendix C: Biological Survey for Board of Water Supply Improvements to Various Water Mains in Central Honolulu

Appendix D: Final Archaeological Literature Review and Field Inspection Report for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu Ahupua‘a, Honolulu (Kona) District, O`ahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2,-4, and 2-6: Various Plats and Parcels

Appendix E: Final Cultural Impact Assessment for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu and Waikiki Ahupua`a, Honolulu (Kona) District O`ahu TMKs: (1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6: Various Plats and Parcels

Appendix F: Traffic Information Report for Proposed Waterline Projects, Various Locations Honolulu, Hawaii

Appendix G: Draft Environmental Assessment Public Comments

LIST OF ACRONYMS

ºF	Degrees Fahrenheit
A-2	Apartment-Medium Density
AADT	Average Annual Daily Traffic
ACOE	U.S. Army Corps of Engineers
AIS	Archaeological Inventory Survey
AMP	Archaeological Monitoring Plan
AMSL	Above Mean Sea Level
B-2	Business-Community
BCH	Belt Collins Hawaii, LLC
BMP	Best Management Practices
BMX-3	Business Mixed Use - Community
BMX-4	Business Mixed Use - Central
BVLD	Boulevard
BWS	Honolulu Board of Water Supply
CIA	Cultural Impact Assessment
City	City and County of Honolulu
CLSM	Controlled Low Strength Material
CSH	Cultural Surveys Hawaii, Inc.
CWRM	Commission on Water Resource Management
CZM	Hawaii Coastal Zone Management Program
CZMA	1972 Coastal Zone Management Act
DA	U.S. Department of the Army
DBEDT	State Department of Business, Economic Development and Tourism
DDC	City Department of Design and Construction
DEA	Draft Environmental Assessment
DHHL	State Department of Hawaiian Home Lands
DIP	Ductile Iron Pipe
DLNR	State Department of Land and Natural Resources
DOH	State Department of Health
DOT-HAR	State Department of Transportation Harbors Division
DOT-HWY	State Department of Transportation Highways Division
DPP	City Department of Planning and Permitting
DR	Drive
DTS	City Department of Transportation Services
EA	Environmental Assessment
EmA	Ewa Silty Clay Loam
EIS	Environmental Impact Statement
ENV	City Department of Environmental Services
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEA	Final Environmental Assessment
FEMA	U.S. Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FL	Fill Land, Mixed
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Act
ft	Foot or Feet
FY	Fiscal Year

GIS	Geographic Information System
HAR	Hawaii Administrative Rules
HART	Honolulu Authority for Rapid Transit
HCDA	Hawaii Community Development Authority
HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene
HECO	Hawaiian Electric Company
HHG	Howard Hughes Group Corporation
HRS	Hawaii Revised Statutes
IMX-1	Industrial Mixed Use
JaC	Jaucas Sand
KCDD	Kakaako Community Development District
LCA	Land Commission Award
LRFI	Archaeological Literature Review and Field Investigation Report
LUO	Land Use Ordinance
m	Meter
M	Million
MG	Million Gallons
MkA	Makiki Clay Loam
N	North
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NOAA	U.S. National Oceanic and Atmospheric Administration
NOI C	Notice of Intent Form C
NOI F	Notice of Intent Form F
NOI G	Notice of Intent Form G
NPDES	National Pollutants Discharge Elimination Systems
NRCS	U.S. National Resource Conservation Service
OEQC	Office of Environmental Quality Control
OTS	Oahu Transit Services
P-2	Preservation - General
PGE	Pacific Geotechnical Engineer’s Inc.
PIM	Public Infrastructure Map
PTMT	Pilot Tube Microtunneling
PUCDP	Primary Urban Center Development Plan
PVC	Polyvinyl Chloride
ROH	Revised Ordinances of Honolulu
ROW	Right-of-Way
ROM	Rough Order of Magnitude
S	South
SCAP	Stream Channel Alteration Permit
SCS	U.S. Soils Conservation Service
SHPD	State Historic Preservation Division
SIHP	State Inventory of Historic Properties
SMA	Special Management Area
SRF	State Revolving Fund
SSA	Sole Source Aquifer
State	State of Hawaii
SWAC	Sea Water Air Conditioning
TCC	Tantatus Silty Clay Loam
TCP	Traffic Control Plan

TIR	Traffic Information Report
TMDL	Total Maximum Daily Load
TMK	Tax Map Key
TOD	Transit Oriented Development
UIC	Underground Injection Control
U.S.	United States of America
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
vpd	Vehicles Per Day
WSFC	Water System Facility Charges
WSI	Water System Improvements
WWPS	Wastewater Pump Station

Chapter 1 – PROJECT PROFILE

Name of Project	Honolulu Water System Improvements
Applicable Law	Hawaii Revised Statutes - Chapter 343 Hawaii Administrative Rules - Title 11, Chapter 200 (Use of county lands and funds)
Type of Document	Final Environmental Assessment/ Finding of No Significant Impact
Island	Oahu
District	Honolulu
Location	Iwilei, Chinatown, Downtown, Kakaako, Ala Moana, Makiki, Waikiki
TMK	(1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6
Landowner	City and County of Honolulu Road Right-of-Way State of Hawaii Road Right-of-Way
Existing Use	Roadway and on-street parking
State Land Use District	Urban District
Land Use Ordinance Zoning	A-2 Apartment, Medium Density B-2 Business, Community BMX-3 Business Mixed Use, Community BMX-4 Business Mixed Use, Central IMX-1 Industrial Mixed Use P-2 Preservation, General
Special Districts	Chinatown Special District Hawaii Capital Special District Punchbowl Special District Waikiki Special District • Apartment Mixed Use Subprecinct • Public Precinct • Resort mixed Use Precinct Kakaako Special Design District • Mixed Use Precinct • Waterfront Industrial Transit Oriented Development Zones • Ala Moana Neighborhood TOD • Downtown Neighborhood TOD
Other Districts	Aloha Tower Project Kakaako Community Development District

Special Designations

Special Management Area

Flood Zone

Based on Flood Insurance Rate Map (FIRM)
January 19, 2011

- AE (areas inundated by 100-year flood, base flood elevations determined)
- AO (areas inundated by 100-year flood, flood depths of 1 to 3 feet)
- VE (coastal flood zone with wave action, base flood elevations determined)
- X (areas outside the 500-year floodplain)

Potential Permits

Federal

- Department of the Army Permit

State of Hawaii

- Coastal Zone Management Consistency Determination
- Community Noise Permit and Variance
- National Pollutant Discharge Elimination System (NPDES) Permits
- Permit to Discharge into the State Highways Drainage System
- Permit to Perform Work Upon State Highways
- Permit to Transport Oversize/Overweight Equipment/ Loads on State Highways
- Section 401 Water Quality Certification
- Special Management Area (For Development within the Kakaako Community Development District).
- Stream Channel Alteration Permit

City and County of Honolulu

- Construction Dewatering Permit
- Permit to Excavate (Trenching)
- Special Management Area
- Street Usage Permit
- Surface Runoff from Construction Activities entering into City's Storm Sewer System

Proposing Agency
Address
City, State, Zip

City and County of Honolulu, Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Accepting Authority

Board of Water Supply
For Mayor, City and County of Honolulu

Consultant
Address
City, State, Zip

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Project Summary

The Honolulu Board of Water Supply (BWS) is proposing to undertake the replacement and upgrade (increase in size) of various water mains within Honolulu. The proposed improvements will be designed and constructed in several projects. The projects will entail work within various State and City road right-of-ways in the Iwilei, Downtown, Kakaako, Ala Moana, Waikiki and Makiki neighborhoods of Honolulu.

Direct impacts resulting from construction activities include increased traffic congestion, disruption of residential/business activities, noise, dust, and utility interruptions due to possible relocations. With the prescribed mitigation measures, no long-term adverse indirect, secondary and cumulative impacts to environmental, natural, social, cultural, archeological and economic resources are anticipated. Beneficial long-term impacts include reduction in water main break occurrences and improvement in the reliability of the Honolulu Water System in meeting future increases in demands and fire suppression capabilities.

The rough order of magnitude construction cost estimate is $43.6 M and will be funded by the BWS operating funds, and possibly Water System Facility Charges and the State of Hawaii's Drinking Water State Revolving Fund. The various water main improvement projects are expected to be released for construction over several years with the first project anticipated to commence approximately in 2017-2018.

Chapter 2 – GENERAL DESCRIPTION OF PROPOSED ACTION

2.1 BACKGROUND

The provisions of Chapter 343 of the Hawaii Revised Statutes (HRS), which require an Environmental Assessment (EA), apply to the proposed Honolulu Water System Improvements due to: (1) the use of Honolulu Board of Water Supply (BWS) funds and (2) work within State or County lands including road right-of-ways (ROWs) and (3) increase in system capacity. A Draft Environmental Assessment (DEA), prepared in accordance with Chapter 343, HRS and Chapter 11-200, Hawaii Administrative Rules (HAR), addressed short-term, long-term, cumulative, positive and negative impacts of the proposed water system improvements on environmental, natural, social (including cultural and archeological aspects), and economic resources. The DEA was circulated for review to affected government agencies, utility companies and community groups in January 2016. The project details were published in the Department of Health Office of Environmental Quality Control's (OEQC) *The Environmental Notice* on January 8, 2016, thereby commencing the 30-day comment period. Based on the comments received during the 30-day period (refer to Appendix G), this Final Environmental Assessment (FEA) was prepared with a Finding of No Significant Impact (FONSI). Therefore, it is anticipated that the proposed water system improvements will not have significant impacts on the environment, and an Environmental Impact Statement will not be required.

2.2 LOCATION

The proposed water system improvements are being planned within existing State and City road ROWs in the Iwilei, Chinatown, Downtown, Kakaako, Ala Moana, Waikiki and Makiki neighborhoods of Honolulu (refer to Figures 1 to 12). The affected roads include Nimitz Highway, Aloha Tower Drive, Ala Moana Boulevard, North King Street, River Street, Nuuanu Avenue, Richards Street, Cooke Street, Pensacola Street, and Piikoi Street. The BWS is planning to construct the proposed water system improvements in separate projects, thus the various roadways will be affected at different times (refer to Figure 13 and Section 2.4 - Proposed Action). As with all large complex projects, the exact limits and connection points will be better defined as the design phases are undertaken. There is a possibility the project's extent may actually be reduced or scaled back when the engineering details are worked out and the construction plans are finalized.

2.3 NEED AND PURPOSE

At present, sections of the existing water systems have long passed the typical design life of 50 years (some mains installed before 1930), thus corrosion, lack of capacity and to some extent, high pressure conditions have caused breaks in certain sections of the existing mains. This has resulted in disruptions to existing businesses and residents as well as inconveniences to pedestrians and motorists during water main repairs. According to the BWS, the proposed projects are required in order to provide a higher level of water system reliability and to improve the distribution system network in meeting peak hour demands. The proposed improvements take into account future water demands in these areas and will be designed to meet current BWS water system standards.

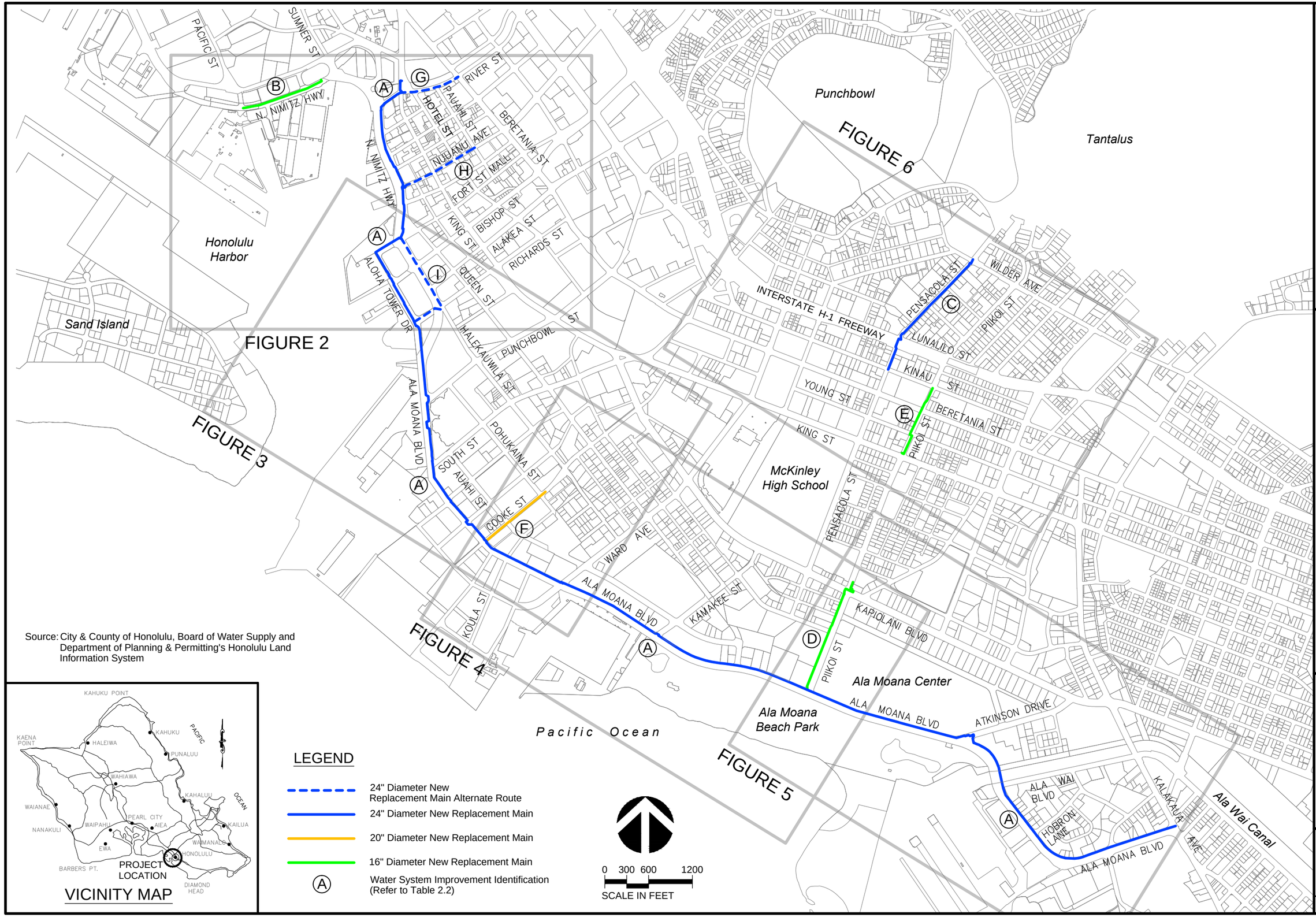
2.4 PROPOSED ACTION

The proposed water system improvements will consist of several different capital improvement projects, A – I (refer to Table 2.1). The approximate construction start date and rough order of magnitude (ROM) cost estimate for each project is provided in Table 2.1 and Figures 1-6.

TABLE 2.1 - PROPOSED WATER SYSTEM IMPROVEMENTS

Project ID	Proposed Main Size	Existing Main Size	Construction Boundaries		Affected Roads	Approx. Pipe Length	Construction	
			Start	End			Approx. Start Year	ROM Cost Estimate
BWS Six-Year Capital Improvement Program Ending Fiscal Year 2020								
A	24-inch	• 8-inch • 12-inch • 16-inch	Existing 24-inch main on North King Street	Existing 30-inch main at the intersection with Kalakaua Avenue	• N. King Street, • River Street, • Nimitz Highway, • Fort Street Mall • Aloha Tower Dr., • Ala Moana Blvd • Kalakaua Avenue	20,000 ft	Various FY 2019, FY 2020, & Portions Beyond 6 Years	$24.7M
B	16-inch	• 12-inch	Existing 16-inch main near Pacific Street	Existing 16-inch main near Sumner Street	• Nimitz Highway	1,355 ft	FY 2020	$2.0M
C	24-inch	• 6-inch • 8-inch • 12-inch	Existing 42-inch and 6-inch main near Kinau Street	Existing 12-inch main near Wilder Street	• Pensacola Street	1,900 ft	FY 2018	$2.0M
BWS Capital Improvement Program After Fiscal Year 2020								
D	16-inch	• 12-inch	Ala Moana Blvd	Existing 16-inch main near Kapiolani Boulevard	• Piikoi Street	1,510 ft	Beyond 6 Years	$2.5M
E	16-inch	• 8-inch • 12-inch	Existing 16-inch main near S. King Street	Existing 42-inch main near Kinau Street	• Piikoi Street	1,028 ft	Beyond 6 Years	$2.0M
F	20-inch	• 12-inch	Ala Moana Blvd	Existing 20-inch main near Pohukaina Street	• Cooke Street	1,038 ft	Beyond 6 Years	$2.5M
G*	24-inch	• 12-inch	North King Street	Existing 12-inch main near North Beretania Street	• River Street	820 ft	Beyond 6 Years	$2.0M
H*	24-inch	• 12-inch	North Nimitz Highway	Existing 24-inch main near North Pauahi Street	• Nuuanu Avenue	1,150 ft	Beyond 6 Years	$2.5M
I*	24-inch	• 12-inch • 16-inch	Fort Street Mall	Aloha Tower Drive	• Nimitz Highway • Richards Street	1,600 ft	Beyond 6 Years	$3.4M

* Denotes alternative routes which are discussed in Section 3.3 - Alternative Alignments



Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

VICINITY MAP

LEGEND

- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main
- (A) Water System Improvement Identification (Refer to Table 2.2)

0 300 600 1200
SCALE IN FEET

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CONSULTING ENGINEERS Telephone: (808) 521-0306

OVERALL SITE PLAN AND VICINITY MAP

CAD DRAWING: 3094-00-EA Figures
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE 1

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA Figures.dwg May 02, 2016 - 9:49am

Connect 16" Diameter Replacement Main to Exist 16" Diameter Main at N. Nimitz Highway Near Sumner Street

Connect 16" Diameter Replacement Main to Exist 16" Diameter Main at N. Nimitz Highway Near Pacific Street

Existing 12" Diameter Main (1952 Cast Iron)

Existing 12" Diameter Main (1900 Cast Iron)

Existing 8" Diameter Main (1900 Cast Iron)

Existing 8" Diameter Main (2005 Ductile Iron)

Connect 24" Diameter Replacement Main to Exist 24" Diameter Main at N. King Street

Connect 24" Diameter Replacement Main to Exist 12" Diameter Main at N. Beretania Street

Connect 24" Diameter Replacement Main to Exist 24" Diameter Main at N. Pauahi Street

Existing 12" Diameter Main (1931 Cast Iron)

Existing 16" Diameter Main (2005 Ductile Iron)

Connect 24" Diameter Replacement Main to 24" Diameter Replacement Main at N. Nimitz Highway

Connect 24" Diameter Replacement Main to Exist 24" Diameter Main at N. Pauahi Street

Existing 12" Diameter Main (1930 & 1931 Cast Iron)

Existing 16" Diameter Main (2005 Ductile Iron)

Existing 12" Diameter Main (1900 Cast Iron)

Existing 12" Diameter Main (1900 Cast Iron)

Existing 12" Diameter Main (1951 Cast Iron)

Lowe's
Kmart
Flora-Dec
Aala Park
City Mill
Hilo Hattie
Honolulu Harbor
Aloha Tower Market Place
Iolani Palace

PACIFIC ST
SUMNER ST
N. NIMITZ HWY
RIVER ST
N. BERETANIA ST
KEKAULIKE ST
N. HOTEL ST
SMITH ST
PAUAHI ST
MAUNAKEA ST
N. KING ST
NUUANU AVE
BETHEL ST
N. NIMITZ HWY
MERCHANT ST
FORT ST MALL
S. HOTEL ST
BISHOP ST
ALAKEA ST
BERETANIA ST
QUEEN ST
RICHARDS ST
ALOHA TOWER DR
S. KING ST

LEGEND

- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main
- Existing Water Main
- (A) Water System Improvement Identification (Refer to Table 2.2)
- 24 Replacement Water Main Size (Inches)
- (1990 Cast Iron) Approximate Existing Main Installation Date & Material

0 100 200 400
SCALE IN FEET

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

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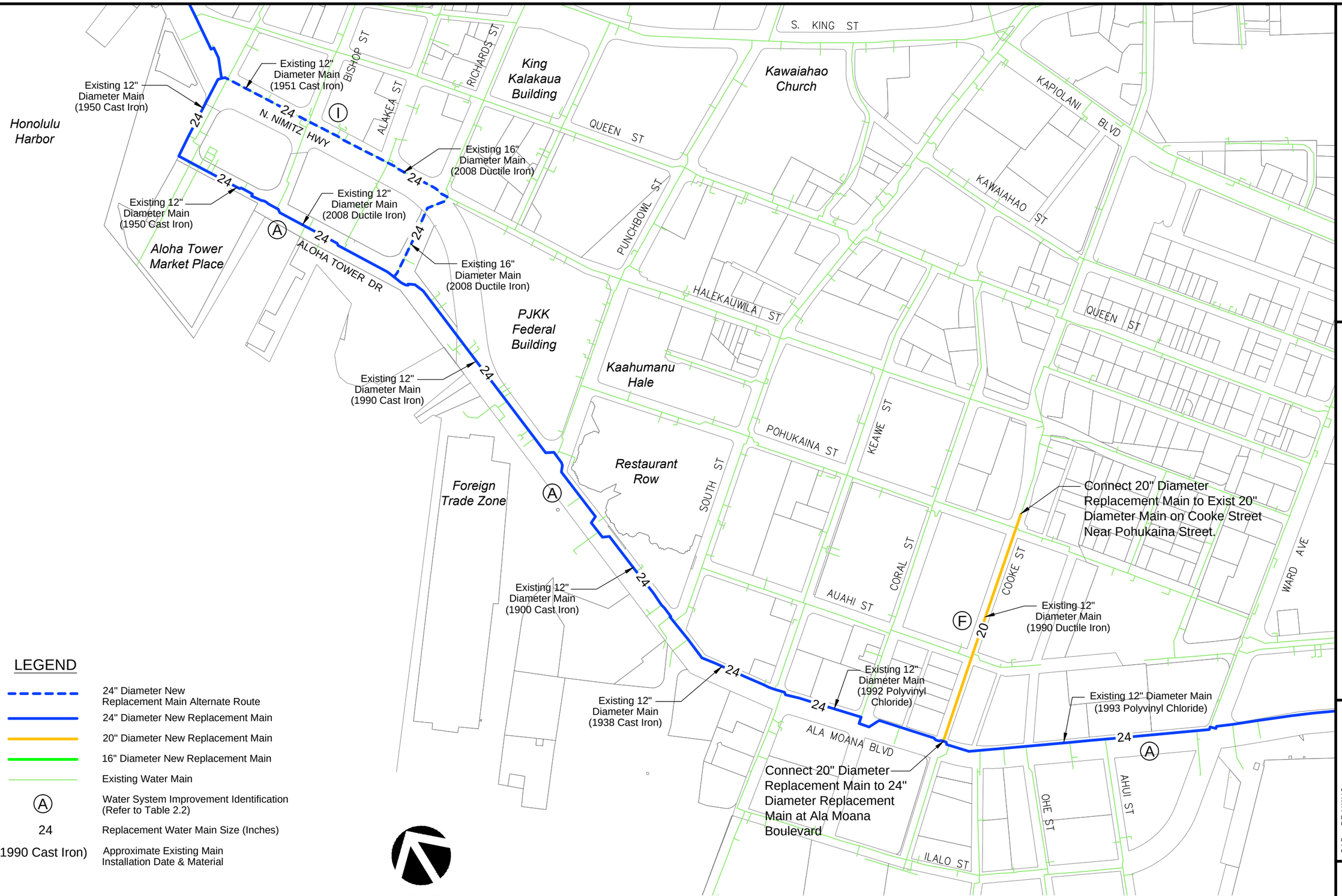
SITE PLAN: IWILEI - CHINATOWN

CAD DRAWING: 3094-00-EA Figures
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE 2

Drawing name: C:\Users\gavin\appdata\local\temp\AcPublish_5536\3094-00-EA Figures.dwg May 02, 2016 - 9:48am

SITE PLAN: DOWNTOWN - KAKAAKO



LEGEND

24" Diameter New Replacement Main Alternate Route	
24" Diameter New Replacement Main	
20" Diameter New Replacement Main	
16" Diameter New Replacement Main	
Existing Water Main	
A	Water System Improvement Identification (Refer to Table 2.2)
24	Replacement Water Main Size (Inches)
(1990 Cast Iron)	Approximate Existing Main Installation Date & Material

0 100 200 400
SCALE IN FEET

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

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CAD DRAWING: 3094-00-EA Figures
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE
3

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA Figures.dwg May 02, 2016 - 9:47am

Neal Blaisdell Center

McKinley High School

PENSACOLA ST

KAPIOLANI BLVD

QUEEN ST

KAWAIAHAO ST

WAIMANU ST

Connect 16" Diameter Replacement Main to Exist 16" Diameter Main at Piikoi Street Near Kapiolani Boulevard

KAPIOLANI BLVD

KONA ST

PIIKOI ST

16

D

CORAL ST

HALEKAUWILA ST

Connect 20" Diameter Replacement Main to Exist 20" Diameter Main on Cooke Street Near Pohukaina Street

WARD AVE

Existing 12" Diameter Main (1947 Cast Iron)

Ala Moana Center

POHUKAINA ST

COOKE ST

Existing 12" Diameter Main (1990 Ductile Iron)

20

F

Ward Entertainment Center

KAMAKEE ST

Existing 12" Diameter Main (1934 Cast Iron)

24

ALA MOANA BLVD

AUAHI ST

KOULA ST

AUAHI ST

QUEEN ST

24

A

Existing 12" Diameter Main (1934 Cast Iron)

Connect 16" Diameter Replacement Main to 24" Diameter Replacement Main at Ala Moana Boulevard

Ward Warehouse

Ward Center

Existing 12" Diameter Main (1934 Cast Iron)

24

A

ALA MOANA BLVD

Existing 12" Diameter Main (1992 Polyvinyl Chloride)

24

Ala Moana Beach Park

Connect 20" Diameter Replacement Main to 24" Diameter Replacement Main at Ala Moana Boulevard

Kewalo Boat Harbor

ILALO ST

OHE ST

AHUI ST

Pacific Ocean

LEGEND

	24" Diameter New Replacement Main Alternate Route
	24" Diameter New Replacement Main
	20" Diameter New Replacement Main
	16" Diameter New Replacement Main
	Existing Water Main
A	Water System Improvement Identification (Refer to Table 2.2)
24	Replacement Water Main Size (Inches)
(1990 Cast Iron)	Approximate Existing Main Installation Date & Material

0 100 200 400

SCALE IN FEET

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

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SITE PLAN: WARD

CAD DRAWING: 3094-00-EA Figures

SCALE: AS NOTED

DATE: MAY 2016

PROJECT #: 3094-00

FIGURE 4

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA Figures.dwg May 02, 2016 - 9:46am

SITE PLAN: ALA MOANA - WAIKIKI

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Connect 16" Diameter Replacement Main to Exist 16" Diameter Main at Piikoi Street Near Kapiolani Boulevard

Connect 24" Diameter Replacement Main to Exist 30" Diameter Main on Kalakaua Avenue

Existing 12" Diameter Main (1947 Cast Iron)

Existing 12" Diameter Main (2008 Ductile Iron & Polyvinyl Chloride)

Existing 12" Diameter Main (1934 Cast Iron)

Existing 12" Diameter Main (1992 Polyvinyl Chloride)

Existing 12" Diameter Main (1970 Cast Iron)

Existing 12" Diameter Main (1949 Cast Iron)

Existing 12" Diameter Main (1949 Cast Iron)

Connect 16" Diameter Replacement Main to 24" Diameter Replacement Main at Ala Moana Boulevard

Don Quijote
Walmart
Hawaii Convention Center
Ala Moana Center
Ala Moana Beach Park
Ala Wai Canal
Ala Wai Yacht Harbor
Fort DeRussy
Hilton Hawaiian Village

KAPIOLANI BLVD
KALAKAUA AVE
KONA ST
ATKINSON DR
KEEAUMOKU ST
SHERIDAN ST
PIIKOI ST
McCULLY ST
HOBRON LN
ENA RD
ALA WAI BLVD
ALA MOANA BLVD
KALIA RD

LEGEND

- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main
- Existing Water Main
- (A) Water System Improvement Identification (Refer to Table 2.2)
- 24 Replacement Water Main Size (Inches)
- (1990 Cast Iron) Approximate Existing Main Installation Date & Material

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

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SCALE IN FEET

CAD DRAWING:	3094-00-EA Figures
SCALE:	AS NOTED
DATE:	MAY 2016
PROJECT #:	3094-00

FIGURE 5

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA Figures.dwg May 02, 2016 - 9:45am

Punchbowl

Makiki Cemetary

Connect 24" Diameter Replacement Main to Exist 12" Diameter Main at Wilder Avenue with Provision for Future 24" Diameter Main Connection

Existing 6" Diameter Main (1931 Cast Iron)

Existing 6" Diameter Main (1931 Cast Iron)

Existing 12" Diameter Main (2001 Ductile Iron)

Existing 8" Diameter Main (2001 Ductile Iron)

Existing 6" Diameter Main (1931 & 1974 Cast Iron)

Connect 24" Diameter Replacement Main to Exist 42" and 6" Diameter Mains at Kinau Street

Connect 16" Diameter Replacement Main to Exist 42" Diameter Main at Kinau Street

Existing 12" Diameter Main (1935 Cast Iron)

Existing 8" Diameter Main (1990 Cast Iron)

Connect 16" Diameter Replacement Main to Exist 16" Diameter Main at King Street

Queen Kaahumanu Elementary School

Honolulu Museum of Art

McKinley High School

PROSPECT ST
SPENCER ST
THURSTON AVE
PENSACOLA ST
PIIKOI ST
LIHOLIHO ST
KEWALO ST
KEEAUMOKU ST
MAKIKI ST
WILDER AVE
ALAPAI ST
WARD AVE
INTERSTATE H-1 FREEWAY
LUNALILO ST
KINAU ST
BERETANIA ST
YOUNG ST
KING ST
ELM ST

LEGEND

	24" Diameter New Replacement Main Alternate Route
	24" Diameter New Replacement Main
	20" Diameter New Replacement Main
	16" Diameter New Replacement Main
	Existing Water Main
Ⓐ	Water System Improvement Identification (Refer to Table 2.2)
24	Replacement Water Main Size (Inches)
(1990 Cast Iron)	Approximate Existing Main Installation Date & Material

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

0 100 200 400
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SITE PLAN: MAKIKI

CAD DRAWING: 3094-00-EA Figures
SCALE: AS NOTED
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PROJECT #: 3094-00

FIGURE 6

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LEGEND

- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main

0 300 600 1200

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AERIAL MAP

CAD DRAWING: 3094-00-EA Aerial
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE 7

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA Aerial.dwg May 02, 2016 - 8:48am



PHOTO 8-1:
N. NIMITZ HIGHWAY
IN IWILEI



PHOTO 8-2:
NUUANU AVENUE NEAR
N. HOTEL STREET



PHOTO 8-3:
NIMITZ HIGHWAY NEAR
KEKAULIKE STREET

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CAD DRAWING:	Gray • Hong • Nojima & Associates, Inc.	PHOTOS: IWILEI-CHINATOWN	FIGURE 8
DATE: MAY 2016			
SCALE: NO SCALE			
PROJECT #: 3094-00	CONSULTING ENGINEERS		Page 13

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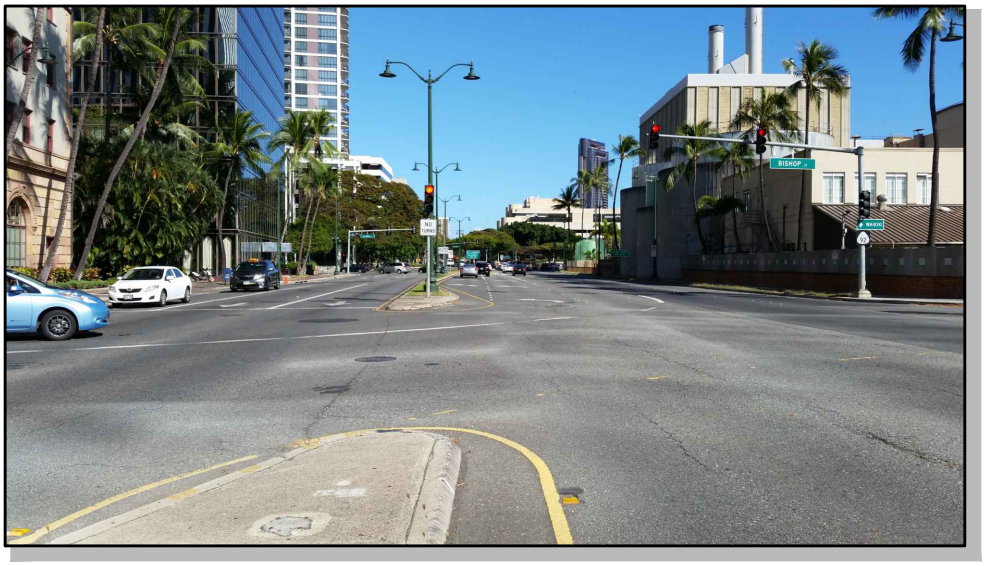
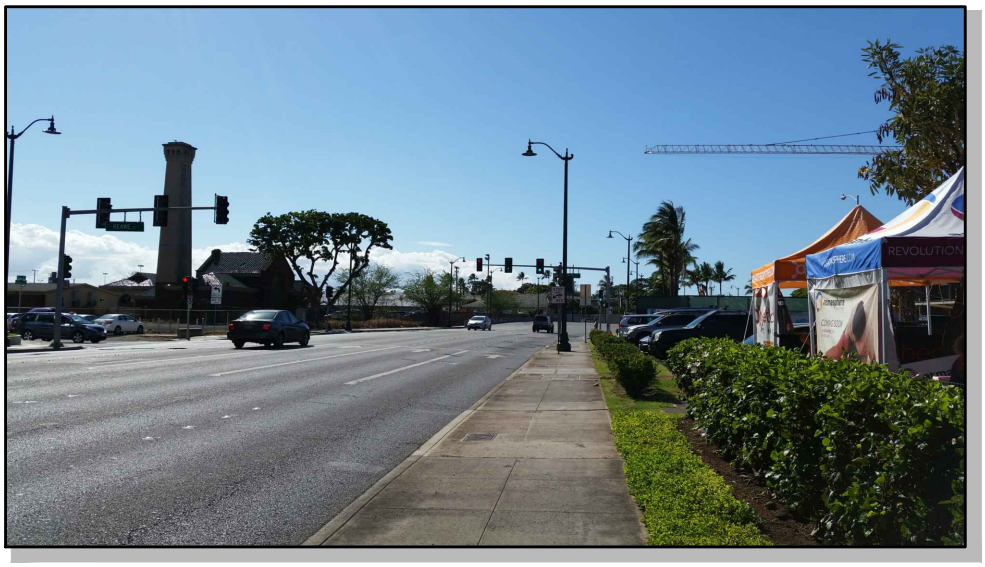


PHOTO 9-1:
INTERSECTION OF
ALA MOANA
BOULEVARD AND
BISHOP STREET

PHOTO 9-2:
ALA MOANA BOULEVARD
NEAR KEAWE STREET



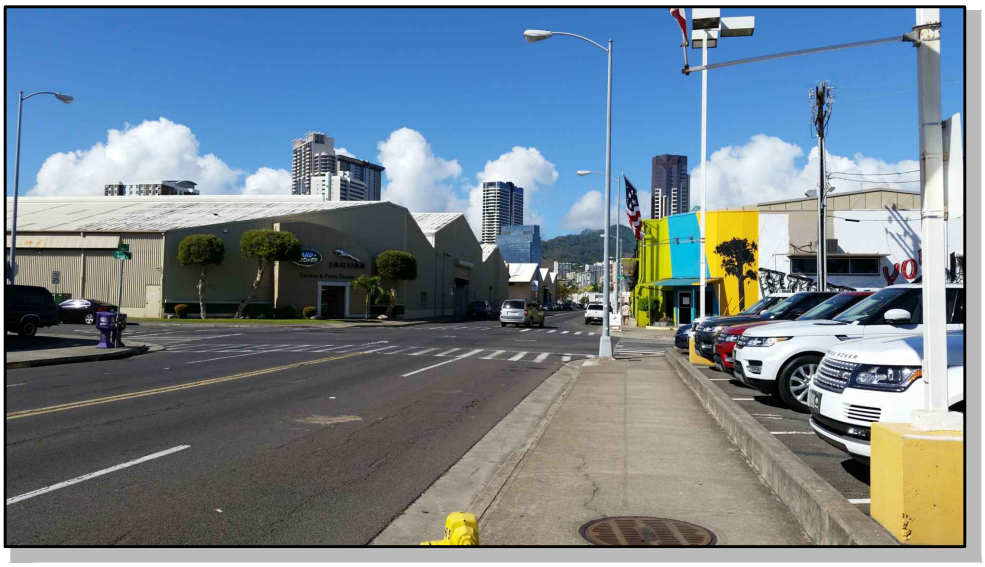


PHOTO 9-3:
COOKE STREET NEAR
AUAHI STREET

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CAD DRAWING:	Gray • Hong • Nojima & Associates, Inc.	PHOTOS: DOWNTOWN - KAKAAKO	FIGURE 9
DATE: MAY 2016	CONSULTING ENGINEERS		
SCALE: NO SCALE	201 Merchant Street, Suite 1900 Honolulu, Hawaii 96813 Fax: (808) 531-8018 Telephone: (808) 521-0306		
PROJECT #: 3094-00			Page 14



PHOTO 10-1:
INTERSECTION OF ALA MOANA BOULEVARD AND WARD AVENUE

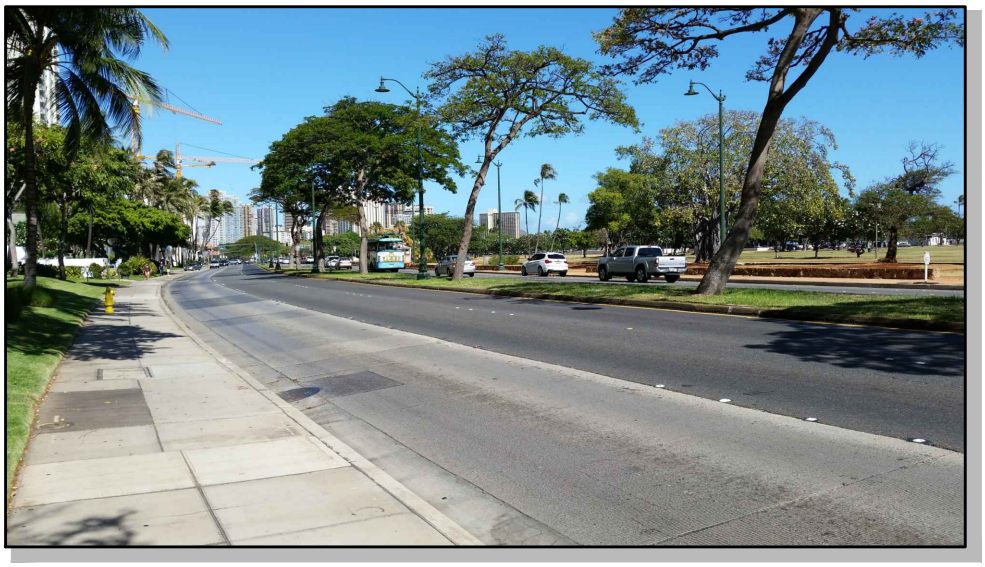

PHOTO 10-2:
ALA MOANA BOULEVARD NEAR QUEEN STREET



PHOTO 10-3:
INTERSECTION OF PIIKOI STREET AND KONA STREET

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CAD DRAWING:	Gray • Hong • Nojima & Associates, Inc.	PHOTOS: WARD	FIGURE 10
DATE: MAY 2016			
SCALE: NO SCALE			
PROJECT #: 3094-00	CONSULTING ENGINEERS		Page 15

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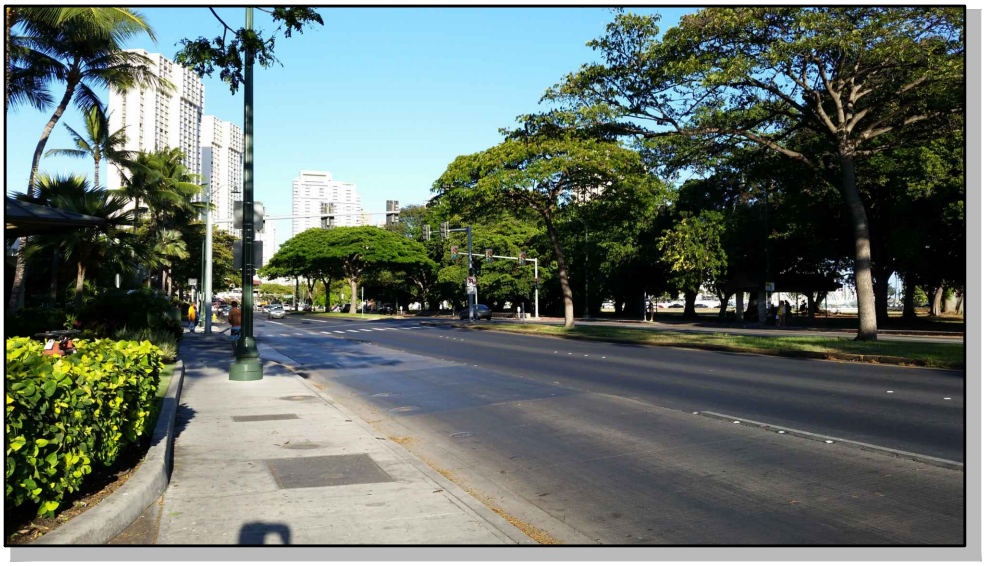


PHOTO 11-1:
ALA MOANA BOULEVARD
AT ALA MOANA CENTER



PHOTO 11-2:
INTERSECTION OF ALA
MOANA BOULEVARD
AND ATKINSON DRIVE



PHOTO 11-3:
ALA MOANA BOULEVARD
NEAR KALAKAUA AVENUE

P:\3094-00 BWS Honolulu WSI Environmental Assesment\3094-00 DWGS_5Exhibits\Draft EA

CAD DRAWING:	Gray • Hong • Nojima & Associates, Inc.	PHOTOS: ALA MOANA - WAIKIKI	FIGURE 11
DATE: MAY 2016			
SCALE: NO SCALE			
PROJECT #: 3094-00	CONSULTING ENGINEERS 201 Merchant Street, Suite 1900 Honolulu, Hawaii 96813 Fax: (808) 531-8018 Telephone: (808) 521-0306		Page 16



PHOTO 12-1:
PENSACOLA STREET
NEAR KINAU STREET



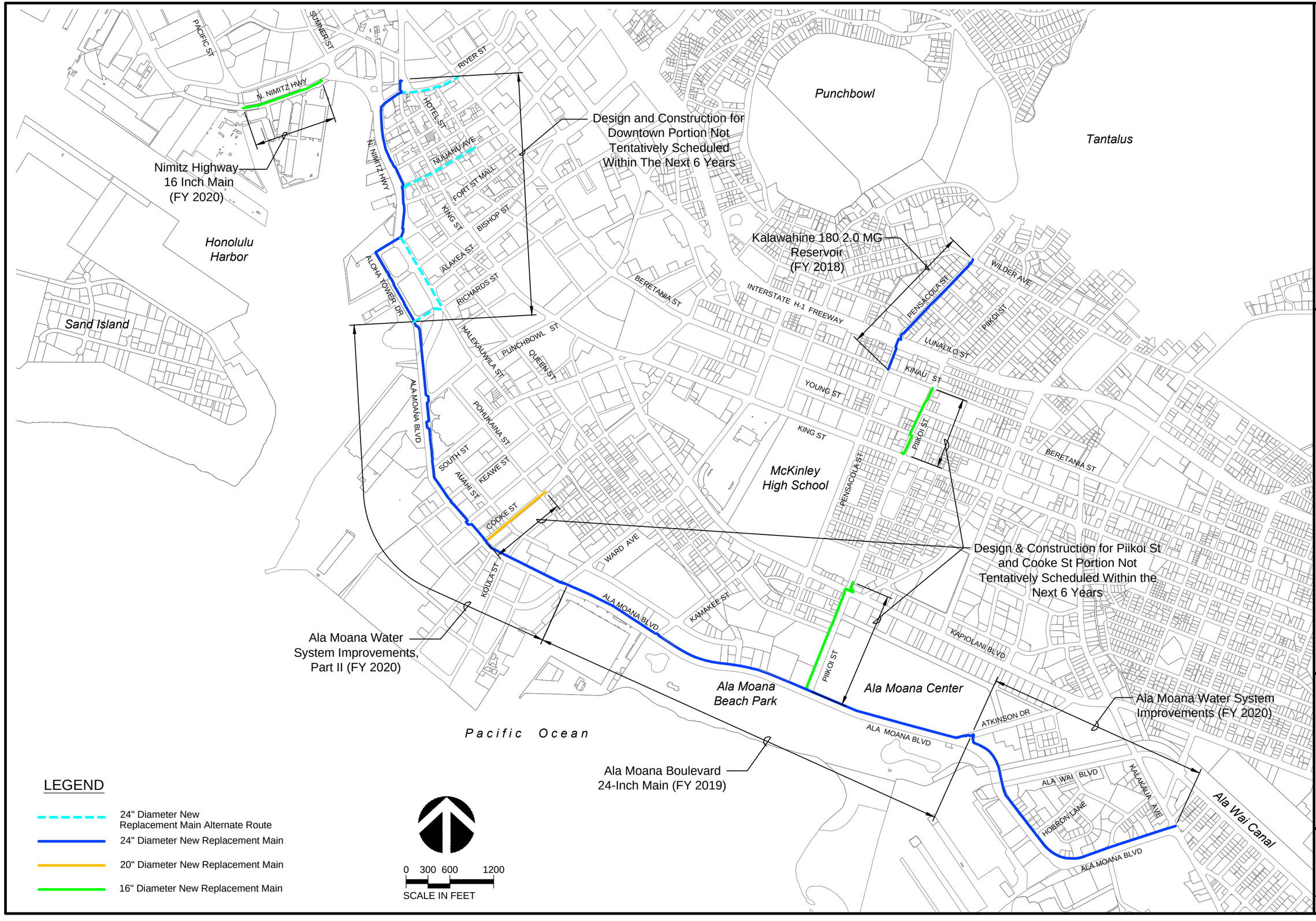
PHOTO 12-2:
PENSACOLA STREET
AND WILDER AVENUE



PHOTO 12-3:
INTERSECTION OF
PIIKOI STREET AND
BERETANIA STREET

P:\3094-00 BWS Honolulu WSI Environmental Assesment\3094-00 DWGS_5Exhibits\Draft EA

CAD DRAWING:	Gray • Hong • Nojima & Associates, Inc.	PHOTOS: MAKIKI	FIGURE 12
DATE: MAY 2016			
SCALE: NO SCALE			
PROJECT #: 3094-00	CONSULTING ENGINEERS 201 Merchant Street, Suite 1900 Honolulu, Hawaii 96813 Fax: (808) 531-8018 Telephone: (808) 521-0306		Page 17



TENTATIVE PROJECT SCHEDULE

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CAD DRAWING: 3094-00-EA Schedule
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE
13

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA Schedule.dwg May 02, 2016 - 9:26am

Projects A, B, and C have already been programmed into the BWS Six-Year Capital Improvement Program (CIP) ending in 2020. The remaining projects are still subject to approval in future BWS CIP budgets.

It should be noted that some of the proposed projects may result in relocation (temporary or permanent) of existing utilities and restoration of the disturbed area due to construction activities (road, sidewalks, etc.) to original or better condition.

2.5 FUNDING AND PROPOSING AGENCY

The proposing agency, BWS, is a semi-autonomous agency within the City and County of Honolulu that manages Oahu's municipal water supply and distribution system. The proposed Honolulu Water System Improvements (Projects A - I) will be funded by the BWS operating funds, and possibly Water System Facility Charges and the State of Hawaii's Drinking Water State Revolving Fund. The total ROM cost estimate for construction of the projects is $43.6 M. It should be noted that this estimate will be refined during the design phase of each individual project when more detailed analysis is done. The State of Hawaii's Drinking Water State Revolving Fund (SRF), which is administered by State Department of Health, provides low interest loans to assist counties for construction of water infrastructure. Water System Facility Charge (WSFC) are charges assessed for all developments requiring new or additional water service from the existing water distribution system.

2.6 PERMITS, APPROVALS, AND CONSULTATION

Each individual water line improvement project will be subject to various permits and approvals to be obtained from City, State and Federal agencies. The potential permits and approvals shown below is not an exhaustive list, and each will not be applicable to every water line project (A - I). Thus, the specific requirements will need to be determined by the BWS and its consultants during the planning phase of each project. Applicable permits and approvals will be obtained in a timely manner prior to the start of any construction activities.

2.6.1 FEDERAL

Department of the Army	Jurisdictional Determination Clean Water Act Section 404 Permit Rivers and Harbor Act of 1899 Section 10 Permit

2.6.2 STATE OF HAWAII

Department of Health	Chapter 343 Environmental Review Process Clean Water Act Section 401 Water Quality Certification Clean Water Act Section 402 National Pollutant Discharge Elimination System (NPDES) Permit (Construction Storm Water Discharge, Dewatering, Hydrotesting) Community Noise Control Permit Community Noise Control Permit Variance Disability Communication and Access Board Review for Conformance with Accessibility Guidelines

Department of Land and Natural Resources	Stream Channel Alteration Permit State Historic Preservation Division Review for Compliance with HRS Chapter 6E
Department of Transportation	Permit to Discharge to the State of Hawaii Highways Division Storm Drain System Permit to Perform Work upon State Highways Permit to Transport Oversize and Overweight Equipment/Loads on State Highways Review of Construction Plans
State Office of Planning	Coastal Zone Management Federal Consistency Review Special Management Area (for activities in the makai area of the Kakaako Community Development District)

2.6.3 CITY AND COUNTY OF HONOLULU

Dept. of Planning and Permitting	Construction Dewatering Permit One-Time Review (including construction plan review and coordination with other City agencies) Permit to Excavate Public Right-of-Way (Trenching) Special Management Area Surface Runoff from Construction Activities entering into City's Storm Sewer System
Dept. of Transportation Services	Street Usage Permit

2.6.4 EARLY CONSULTATION EFFORTS

During planning and design phase of each the water line improvement projects, the BWS and its consultants will need to plan for coordination of construction activities and schedules. This will involve early consultation with various entities including government agencies, utility companies, commercial/business entities, property owners, and developers with ongoing or future construction projects in the vicinity of the respective project site. Some of these entities are identified in Chapter 4 - Description of the Affected Environment and Proposed Mitigation Measures; however, others may be identified during the planning and design phases of individual projects. The level of coordination and/or consultation, which may vary from advanced notification of construction activities to actual coordination of construction activities and schedules, will be determined by the BWS and its consultants as the individual projects develop in greater detail.

Chapter 3 – ALTERNATIVES

3.1 OVERVEIW

The need for the proposed water system improvements was previously discussed in detail in Section 2.3 - Need and Purpose. This chapter presents a summary of the alternatives considered during the formulation of the recommended project per HAR §11-200-10(6) relating to contents of an environmental assessment. This chapter includes:

- Discussion of potential alternative actions.
- Discussion of alternative configurations.
- Discussion of the different pipe material types that may be considered.
- Discussion of different construction methods that may be employed.

The ultimate decision of actions, replacement main configuration, material type and installation method(s) lies with BWS and/or its design consultants.

3.2 NO ACTION AND/OR DELAYED ACTION

"No action" means continued reliance on the existing water systems in the project areas for the foreseeable future. This action had no environmental impacts or direct costs to the BWS. "Delayed action" will mean the reliance on the existing water systems until the proposed projects are completed at a later date. Delaying the project will not significantly alter the environmental impacts of the project but construction costs are likely to increase due to inflation.

The "no action" or "delayed action" alternatives were not considered to be a viable options due to aged and undersized water mains in the project areas. There will be a continued risk of water main breaks that can disrupt service and cause inconveniences to surrounding residents and businesses. Furthermore, proposed developments in Kakaako and Transit Oriented Development (TOD) zones could be delayed until the affected portions of the projects are completed.

3.3 ALTERNATIVE ALIGNMENTS

There are three alternative alignments that the BWS is exploring in the Downtown-Chinatown area that were previously discussed in Section 2.4 – Proposed Action and are indicated by a dashed line on Figures 1 thru 3 on pages 6-8. These alternative alignments are due to uncertainties in the final configuration of the 24-inch replacement main in the Downtown-Chinatown area. During the design phase, BWS and its consultants will research available information, consult appropriate affected parties and investigate each street before finalizing the alignment. The alternative alignments are as followed:

- Description: Alternate replacement of an existing 12-inch main along River Street between an existing 12-inch main near North Beretania Street to North King Street with a 24-inch replacement water main.

  Discussion: The proposed action is to connect the replacement main to the existing 24-inch water main on N. King Street near its intersection with N. Hotel Street (refer to Figure 2 on page 7) and cross Nuuanu Stream to River Street. In lieu of crossing Nuuanu Stream, BWS and its design consultant may decide to connect the replacement main to an existing 24-inch main on N. Pauahi Street and possibly a 12-inch main on N. Beretania Street, then continue the along River Street to N. King Street.

- Description: Alternate replacement of an existing 12-inch main along Nuuanu Avenue between North Nimitz Highway and an existing 24-inch main near Pauahi Street with a 24-inch replacement water main.

  Discussion: The proposed action is to connect the replacement main to the existing 24-inch water main on N. King Street, to River Street, then on River Street to Nimitz Highway, then on Nimitz Highway to Fort Street Mall. BWS and its consultants may decide to connect the replacement main to an existing 24-inch main on Pauahi Street, then continue along Nuuanu Avenue to N. Nimitz Highway, thus removing the proposed water system improvements between N. King Street and Nuuanu Avenue and the crossing of Nuuanu Stream from the project.

- Description: Alternate replacement of the existing 12-inch and 16-inch mains along S. Nimitz Highway and Richards Street between Fort Street Mall and Aloha Tower Drive with a 24-inch replacement water main.

  Discussion: The proposed action is to continue the water system improvements from Nimitz Highway near Fort Street Mall to Aloha Tower Drive and along Aloha Tower Drive to Ala Moana Boulevard. BWS and its consultants may decide to avoid Aloha Tower Drive and instead continue the project along S. Nimitz Highway then install the replacement main along Richards Street to Ala Moana Boulevard.

3.4 MATERIALS

The pipe materials that are considered for the proposed water system improvements include ductile iron pipe (DIP), polyvinyl chloride (PVC), and High-Density Polyethylene (HDPE). DIP is strong, durable and easy to join and install. Some limitations of DIP are its weight and its susceptibility to corrosion both internally and externally. PVC, made from unplasticized polyvinyl chloride, is the most common plastic material used for plastic pipe. Its basic properties are corrosion resistance, high strength to weight ratio, and ease of installation and repair. Care should be taken not to subject PVC pipe to ultra-violet degradation, impact damage and areas contaminated with hydro-carbons. HDPE is also a plastic pipe but it is manufactured using a heat extrusion process and polyethylene resins. HDPE is light weight, flexible, corrosion resistant and its joints can be welded together. However, due to an increased pipe wall thickness as compared to the other pipe materials, there is the possibility that a larger diameter pipe size will be required to achieve the same flow characteristics. HDPE is not an approved material in the BWS Water System Standards, but it may be approved in the future. The choice of pipe material(s) will be decided by BWS and its consultants after research of available information and site and subsurface investigations.

3.5 CONSTRUCTION METHODS

To determine viable construction methods a preliminary engineering analysis was done based on site visits and review of readily available information (refer to Appendix B). The preliminary analysis included various construction methods including: open cut trenching, pilot tube microtunneling (PTMT), horizontal directional drilling (HDD). According to the analysis open-cut trenching may be difficult in areas where there is a shallow groundwater table and where weak and compressible soils are present. It is anticipated the water mains may be installed using a combination of two or more methods, such as open cut trenching and PTMT in select areas. HDD may be considered where deep utility crossings are needed. Ultimately BWS and its consultants/contractors will be responsible for determining which construction method(s) to use,

therefore prior to design, a site specific detailed geotechnical investigation of the project sites should be performed.

3.5.1 OPEN CUT TRENCHING

Table 3.1 compares the advantages and disadvantages of open cut trenching (PGE, 2015) and preliminary potential geotechnical considerations:

"Construction Methodology

Open cut trenching generally involves excavating a trench, installing temporary shoring to support the sidewalls of the trench or sloping its sides, laying the piping within the excavation, and backfilling the trench. Geotechnical considerations relating to open cut trenching include excavation, shoring, dewatering, pipe subgrade preparation, pipe installation, bedding installation, trench backfilling, and pavement or surface restoration.

Shoring systems include steel sheet piles, trench boxes, and steel plates with internal bracing. Other methods, such as soil improvement using jet grouted cofferdams, have been utilized with open-cut excavations on other similar projects. The choice of a system may be dependent upon such factors as the depth of the excavation, subsurface and groundwater conditions, and proximity to surrounding structures. For this project, dewatering may be needed along sections of water mains where their inverts are at or below the groundwater table.

Because of relatively shallow groundwater conditions anticipated along most of the water main alignments for this project, trench shields and steel plates with internal bracing may not be suitable where water main inverts are below the groundwater table because they do not provide positive groundwater control. Use of these systems may increase potential risk of ground settlement and movements in the vicinity of the trench. Large drawdown of the groundwater table outside of trenches and excavations from dewatering operations may result in ground settlement and distress to on-grade supported structures, utilities, pavements, and slabs where weak and compressible soils are present.

TABLE 3.1 - OPEN CUT TRENCHING

Advantages and Disadvantages to Open Cut Trenching	
Advantages	Disadvantages
• Conventional and locally available method; • May be an economical method of construction for pipelines with relatively shallow invert depths; • Allows for testing of pressure pipes, such as water mains, before backfilling; and • Lateral connections may be done in open cut trenches.	• More inherent surface disruption than trenchless construction methods. This method generally results in a greater amount of ground disturbance than trenchless installations and may have a greater risk of ground settlement and movements in the vicinity of the trench or excavation; • Inconvenience to neighboring residences and businesses due to excavation and dewatering operations; • Traffic disruption; • Noise, vibrations, and dust from trenching operations; • Existing underground utilities that could become obstructions to trench excavation shoring systems, such as steel sheet piling. This may lead to discontinuities in the sheet

Advantages and Disadvantages to Open Cut Trenching	
Advantages	Disadvantages
	piles, and reduce the effectiveness of sheet pile cofferdams. Pre-grouting of the utility crossings and discontinuities in the sheet piles may need to be performed to reduce groundwater inflows; and • A larger amount of excavated soil and dewatering effluent may need to be handled and disposed of with open cut trenching compared to trenchless installations. • Construction dewatering of open cut trenches and excavations may result in drawdown of the groundwater table outside the excavation, and potential ground subsidence.

Source: Pacific Geotechnical Engineers (2015)

Preliminary Geotechnical Recommendations

Preliminary potential geotechnical considerations associated with open cut trenching include:

- Possible need for pipeline subgrade treatment where weak and compressible deposits are encountered. This may consist of over excavating a portion of the subsurface materials below the pipeline bedding, and replacing the excavated material with crushed rock sub-bedding wrapped in a geotextile fabric or Controlled Low Strength Material (CLSM). Based on readily available subsurface information, a large amount of the planned water mains along Ala Moana Boulevard, Nimitz Highway, and Piikoi Street between Kapiolani Boulevard and Ala Moana Boulevard may have inverts in weak and compressible soils;

- Need to select appropriate shoring and dewatering methods suited for the anticipated subsurface conditions to reduce the amount of settlements, ground movements, and drawdown of the groundwater table in the vicinity of the trenches, and potential distress to existing on-grade supported buildings, structures, utilities, pavements, and slabs to remain. Areas that may have a higher potential for ground settlement and movement from open cut trenching include areas where weak and compressible materials may be present, such as along Ala Moana Boulevard, Nimitz Highway, and Piikoi Street mapped as man-made fill and/or where buried alluvial channels are present;

- Need to check and determine as-built conditions of existing underground utilities and subsurface structures at utility crossings. This information is needed to plan appropriate trench shoring, sheeting, and/or dewatering systems which may be needed at the crossings;

- A greater amount of dewatering will probably be needed with open cut trenching compared to trenchless installation methods discussed herein. Dewatering amounts may be reduced by installing fully interlocked steel sheeting into less permeable deposits, if present, or installing a tremie plug at the bottom of a sheeted trench or excavation using materials such as CLSM or concrete;

- Disposal of construction dewatering effluent will be challenging for this project due to limited construction staging areas along the alignments. Further contaminated water may be encountered which will require treatment prior to disposal. Temporary holding tanks may need to be provided to transport dewatering discharges to suitable disposal sites. Pumping dewatering discharge into trenches or pits which have not yet been backfilled may also need to be utilized where feasible."

3.5.2 PILOT TUBE MICROTUNNELING

Table 3.2 compares the advantages and disadvantages of pilot tube microtunneling (PTMT) and preliminary potential geotechnical considerations (PGE, 2015):

"Construction Methodology

PTMT is a specialized form of pipe jacking used to install pipe lines without the need for trenching and personnel entering a trench. Pilot tubes are first installed on line and grade from a jacking shaft to a receiving shaft. The pilot tube hole is then reamed with a reaming head and/or a bearing swivel joint to match the diameter of the product pipe. Finally, the product pipe is installed in the reamed hole.

TABLE 3.2 - PILOT TUBE MIRCOTUNNELING

Advantages and Disadvantages to Pilot Tube Mircotunneling	
Advantages	Disadvantages
• Less ground surface disruption and social and environmental impacts that would normally be associated with open cut trenching; • Accurate guidance system allowing for relatively high accuracy in line and grade; • Narrow easement to install a replacement line would be less of a concern with PTMT when compared to HDD; • Employs augers for soil removal instead of pressurized drilling fluid so frac-out potential should be reduced; • Does not require a large laydown area for pipe assembly since the pipe is installed in short sections. • Open excavations are required only for jacking and receiving shafts, to clear obstructions , and to repair sections of the pipe which are damaged or installed out of tolerance; • Reducing the need for a manned entry because of its remote controlled capability resulting in a safer working conditions compared to open cut trenching; and • Reducing the amount of excavated materials that would be normally generated with open cut trenching.	• Need to construct jacking and receiving shafts; • Less feasible when pipeline inverts are below the water table; • Possible need to perform grouting of the jacking and receiving shafts and along the entry and exit points to reduce groundwater inflow into the shafts; • Shafts need to be dewatered; • Underground utilities at shaft sites may need to be relocated; • Possible higher cost than HDD. • Loss of slurry if highly permeable materials, such as solution cavities, lava tubes, cobble/boulder layers, or permeable crushed rock bedding are encountered; • Because PTMT does not allow for man-entry and direct observation of the installed pipe except at jacking and receiving pits, pressure testing of an installed section of water main and repairing defects/leaks during and after construction may be more difficult; • Depending on pipe invert depths, pipelines installed by trenchless methods may be more difficult to service in the future; and • Work areas are required at jacking pits for a control room, pipe handling, and other equipment.

Source: Pacific Geotechnical Engineers (2015)

Preliminary Geotechnical Recommendations

Preliminary potential geotechnical considerations for new replacement water mains installed by PTMT include:

- Drive lengths between jacking and receiving pits may depend on such factors as pit sizes, pipe size, pipe material, and subsurface and groundwater conditions. For 16-, 20-, and 24-inch diameter pipes, we anticipate drive lengths on the order of 200 to 300 feet may be possible. This would result in numerous pits. Most jacking and receiving pits are about 6 to 8 feet in diameter. Pipe type and pipe section length will need to be considered.

- Jacking and receiving pits may not be feasible deeper than about 10 feet or so below the groundwater table.

- Installation of a steel casing first, followed by the installation of the carrier pipe may be utilized where flexible pipe material, such as PVC, are used. The carrier pipe could be blocked inside the casing to the specified grade. After this, the annulus between the carrier pipe and casing is backfilled with a sand/cement grout. The main disadvantages associated with installing a steel casing and backfilling with grout are additional cost, and longer installation time;

- Potentially lower total constructions costs using direct installation of the carrier pipe by PTMT compared to installing a carrier pipe within a casing. However, once the pipe is installed, it is impractical to modify the as-built condition of the carrier pipe without an excavation;

- Depending on the location of the pits, temporary lane closures and/or detours around the pits may be needed during construction;

- The use of interlocking steel sheet piles or concrete shafts for the jacking and receiving pit construction. Because of potential space limitations, rectangular jacking pits using steel sheet piles may be more practical than circular pits. Circular pits, however, would allow for more flexibility in jacking in different directions than rectangular pits;

- A possible need for soil improvement in areas where relatively poor subsurface conditions are anticipated at the pipe inverts. Jet grouting may be used to provide a zone of improved soil to support a PTMT machine. Jet grouting of cobbles and boulders may be difficult; and

- Construction dewatering of the jacking and receiving pits could be reduced by initially excavating the pits in the wet and placing a tremie concrete plug at the bottom of the pits."

3.5.3 HORIZONTAL DIRECTIONAL DRILLING

Table 3.3 compares the advantages and disadvantages of Horizontal directional drilling (HDD) and preliminary potential geotechnical considerations (PGE, 2015):

"Construction Methodology

HDD is a trenchless construction method utilizing a steerable system for installing pipes using a surface launched drilling rig. It is commonly referred to as directional boring or guided horizontal boring.

This technique involves three general phases starting with drilling of a small diameter pilot hole in a shallow arc from the surface. A rotating wash over drill pipe slightly larger than the pilot tube follows the drill string. The wash over pipe provides stiffness to the drilling pipe in order to maintain steering control, and provides a method of reducing friction along the drill string prior to enlargement. It also facilitates drilling mud circulation. Steering of the pilot boring is provided by positioning of a bent sub. Tracking of the drill string is achieved by the use of a down hole survey tool.

After completing the pilot bore, the second phase of HDD involves enlarging the pilot hole by back reaming to a sufficiently large diameter to accept the product pipe. The larger reamed hole is supported through the use of bentonite or polymer slurry. The final phase of HDD involves pulling the product pipe or conduit into the enlarged hole with a drill rig.

Important determining factors that may affect a HDD installation include the geologic formation and subsurface materials through which the drilling is accomplished. Rock, cobbles, boulders, and debris present greater difficulties than firm silt and clay. The bending radius of a directionally drilled bore hole is normally limited by the bending characteristics of the pipe and increases with pipe diameter.

An HDD installation uses drilling mud that is injected under relatively high pressures. The drilling mud could be lost in the existing gravel bedding of other lines during the drilling. This may cause hydraulic fracturing of the subsurface materials (generally referred to as "frac-out") to occur. New lines installed at sufficient depths would also help to reduce the potential for frac-out.

TABLE 3.3 - HORIZONTAL DIRECTIONAL DRILLING

Advantages and Disadvantages to Horizontal Directional Drilling	
Advantages	Disadvantages
• Less environmental impact compared to open cut trenching because operations are limited to areas at each end, as opposed to the complete length of the pipeline; • Drilling that is performed using a drill rig normally operated at the ground surface; • Little surface preparation, except for shallow slurry containment entry and exit pits; • Steerable capability that generally allows drilling between vertical and horizontal obstructions like buried pipelines or utility lines, provided these lines are well defined; • Safety concerns are minimized compared to open cut trenching; and • Bore lengths that can range from a few tens of feet to several hundred feet. Parameters that may affect potential lengths include pipe invert	• Typically 20 feet or more of cover may be required to prevent blowout or frac-out. Access to a main installed at these depths would likely be more difficult or not practical compared to a main that is installed at shallower depths; • A required standoff distance from the start of the target horizontal invert elevation to the launch area. Typical entry angles of 8 to 12 degrees would require relatively long setbacks for deep crossings. A similar standoff distance is needed at the borehole exit; • A reamed hole size that typically needs to be 40 to 50 percent larger than the outside diameter of the product pipe; • A required staging area for drilling that could vary from 10 feet by 20 feet in plan dimensions for smaller rigs to areas as large as 150 feet by

Advantages and Disadvantages to Horizontal Directional Drilling	
Advantages	Disadvantages
depth, subsurface materials, product type and weight, drill rig power, and borehole configuration.	150 feet for larger rigs; • Possible alignment control both horizontally and vertically that is typically within 3 to 5 percent of the depth to the pipe line per 100 feet of line; • Drilling or installation difficulty that may be caused by rocks, cobbles, boulders, and debris along the alignment; • Difficulty in accommodating short radius bends of less than about 700 feet or so; • Multiple drilling passes that may be required to accommodate the product pipe; • A drilling process that requires a slurry containment pit and slurry disposal; and • An extensive lay down area required for final pipe string installation. This will be difficult along existing business district and residential streets with numerous driveways.

Source: Pacific Geotechnical Engineers (2015)

Preliminary Geotechnical Recommendations

Potential geotechnical considerations for HDD include:

- Although the accuracy of a HDD borehole can be improved with the use of wire line steering tool systems instead of walkover systems, the overall accuracy of these installations may not be able to satisfy the tolerances required for new replacement water mains in this project;

- Invert depths along most of the planned water main alignments will probably be less than 10 feet below existing grades. This may make HDD less feasible for most of the planned water mains due to concerns with potential frac-out, except where deep utility crossings are needed;

- Because HDD does not allow for man-entry and direct observation of the installed pipe, pressure testing of an installed section of water main and repairing defects/leaks during and after construction may be more difficult;

- Depending on pipe invert depths, pipelines installed by trenchless methods may be more difficult to service in the future; and

- Numerous driveways that may make it difficult to assemble long pipe strings for product pipe installation. Shorter pipe strings may be possible, but would likely increase overall installation time and costs."

Chapter 4 – DESCRIPTION OF THE AFFECTED ENVIRONMENT AND PROPOSED MITIGATION MEAUSRES

4.1 NATURAL PHYSICAL ENVIRONMENT

This section describes the existing conditions of the natural physical environment, potential impacts of the proposed water system improvements, and mitigation measures to minimize the impacts. The natural physical environment includes the natural settings of the project areas such as climate, topography, water, air, etc. Most impacts will be short-term and associated with construction related activities and will be mitigated through the use of Best Management Practices (BMP), permits and consultation with appropriate agencies. After construction activities are completed and the disturbed area restored to original or better conditions, the natural physical environment will remain essentially identical to current levels, thus, no significant long-term effects are expected.

4.1.1 TOPOGRAPHY

Existing Conditions

Based on construction record drawings (as-builts), City street monument benchmark maps, Google Earth, and the United States Geological Survey quadrangle maps (refer to Figure 14), the majority of the project is located in low lying and generally flat areas with elevations varying from 4 to 8 feet above mean sea level (AMSL). Exceptions to the low lying areas include the Makiki area with elevations ranging from 25 to 84 feet AMSL on Pensacola Street (between Kinau Street and Wilder Avenue) and 12 to 24 feet AMSL on Piikoi Street (between King and Kinau Street).

Impacts and Mitigation Measures

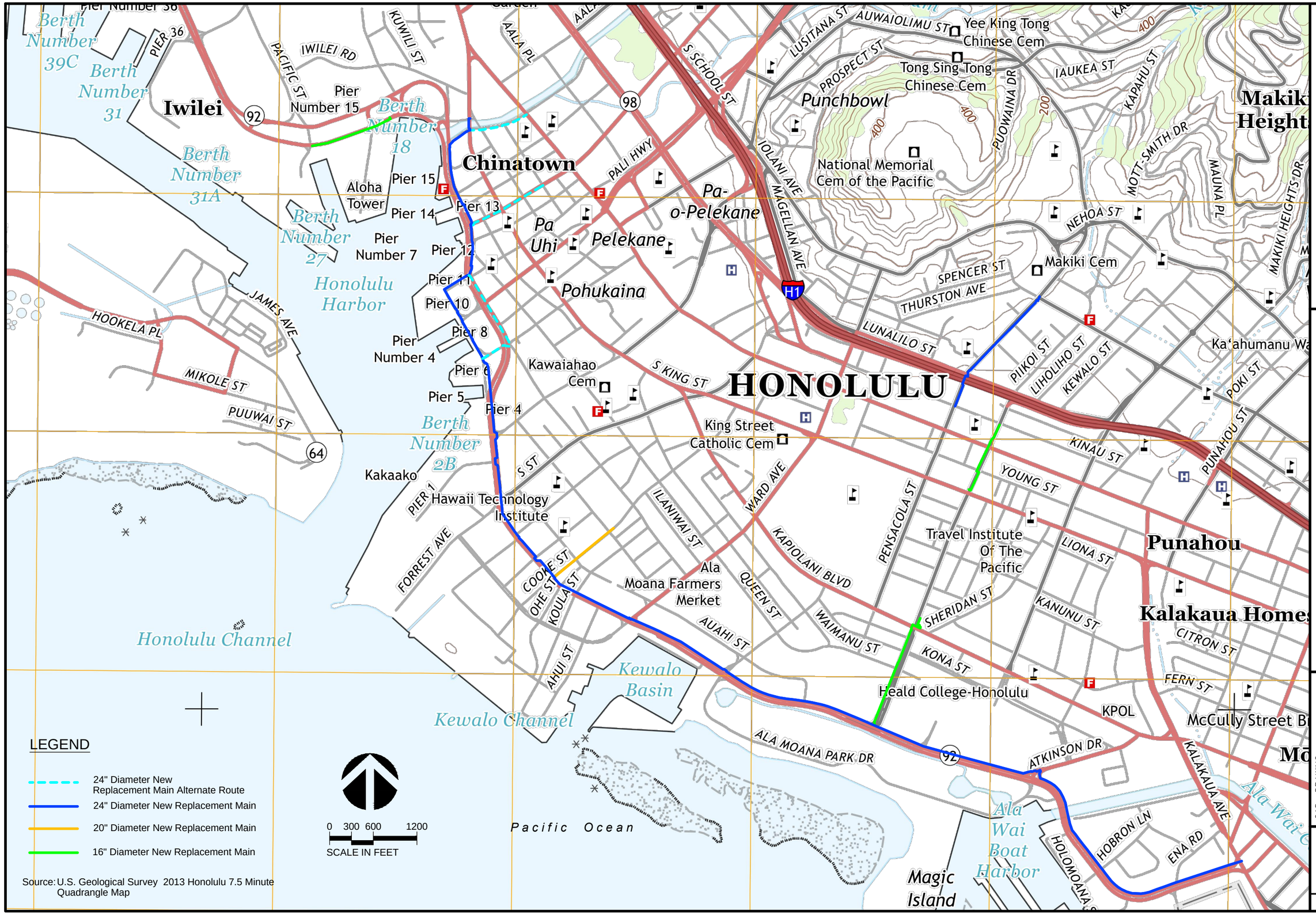
The projects will involve surface disturbance and underground work within the City and State road right-of-ways. After construction activities are completed, the disturbed area will be restored to original or better condition without noticeable changes in elevation. Therefore, the proposed water system improvements are not anticipated to have any long-term impact on the existing topography.

4.1.2 SOILS

Existing Conditions

The U.S. National Resource Conservation Service (NRCS, formally U.S. Soil Conservation Service, SCS) has designated several different soil types at the project sites (refer to Figure 15), including Fill land, mixed (FL), Ewa silty clay loam (EmA), Jaucas sand (JaC), Makiki clay loam (MkA), and Tantalus silty clay loam (TCC). Based on the NCRS web soil survey and SCS 1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii*, the soils are defined as follows:

- Ewa silty clay loam “consists of well-drained soils in basins and on alluvial fans on the islands of Maui and Oahu. These soils developed in alluvium derived from basic igneous rock.” EmA is found along the proposed water system alignment at River Street, Nuuanu Avenue, and S. Nimitz Highway near Aloha Tower.



LEGEND

- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main

0 300 600 1200

SCALE IN FEET

Source: U.S. Geological Survey 2013 Honolulu 7.5 Minute Quadrangle Map

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813
Fax: (808) 531-8018
Telephone: (808) 521-0306
CONSULTING ENGINEERS

USGS QUADRANGLE MAP

CAD DRAWING: 3094-00-EA USGS
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE 14

Drawing name: C:\Users\gjavinm\appdata\local\temp\AcPublish_5536\3094-00-EA USGS.dwg May 02, 2016 - 9:08am

GENERAL SOILS MAP

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813
Fax: (808) 531-8018
CONSULTING ENGINEERS Telephone: (808) 521-0306

PUNCHBOWL
HONOLULU HARBOR
SAND ISLAND
MAGIC ISLAND
ALA MOANA BEACH PARK

NORTH

Legend:

New Replacement Mains (diameter):

- 24-inch Replacement
- 24-inch Replacement (Alternate)
- 20-inch Replacement
- 16-inch Replacement

Natural Resources Conservation Service Designations

- EmA - Ewa silty clay loam, moderately shallow, 0 to 2 percent slopes (alluvium underlain by coral limestone)
- JaC - Jaucus sand, 0 to 15 percent slopes (calcareous wind- and water-deposited sand derived from coral and sea shells)
- MkA - Makiki clay loam, 0 to 2 percent slopes (alluvium mixed with volcanic ash and cinders)
- TCC - Tantalus silty clay loam, 8 to 15 percent slopes (volcanic ash and material weathered from cinders)
- FL - Fill land, mixed (area filled with dredged or hauled material)
- KIA - Kawaihapai clay loam, 0 to 2 percent slopes (alluvium)
- Ph - Pearl Harbor clay, level to nearly level (alluvium over organic matter)

0 600 1200 2400
Scale Feet

Source: Natural Resources Conservation Services
Soil Map, Island of Oahu, Hawaii
Web Soil Survey
August 13, 2014

Pacific Geotechnical Engineering, Inc.
2015

CAD DRAWING: 3094-00-EA General Soils Map
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE
15

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA General Soils Map.dwg May 02, 2016 - 9:36am

- Jaucas sand "consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. They developed in wind and water deposited sand from coral and seashells." JaC is found along the proposed water system alignment near the intersection of Kalia Road and Ala Moana Boulevard.

- Filled land, mixed is described as "material dredged from the ocean or hauled from nearby areas, garbage, and general material from other sources. This land type is used for urban development including airports, housing arena, and industrial facilities." Majority of the proposed water system alignment is along soils classified as filled land, mixed.

- Makiki clay loam consists "of well-drained soils on alluvial fans and terraces in the city of Honolulu on the island of Oahu. These soils formed in alluvium mixed with volcanic ash and cinders." MkA is found along the proposed water system alignment at Piikoi and Pensacola Street north of King Street.

- Tantalus silty clay loam "consists of well-drained soils on uplands on the island of Oahu. These soils developed in volcanic ash and material weathered from cinders. They are moderately sloping to very steep." TCC is found along the proposed water system alignment near the intersection of Pensacola Street and Wilder Avenue.

Impacts and Mitigation Measures

In support of the environmental assessment, a preliminary engineering analysis was done (refer to Appendix B) to provide anticipated subsurface conditions and offer preliminary geotechnical concerns and considerations. The preliminary geotechnical investigation consisted of a review of readily available information and site observations. The preliminary geotechnical investigation does not include any subsurface investigations along the proposed water system improvement alignment, therefore, a detailed site-specific geotechnical investigation should be performed prior to design and construction.

Background research revealed that the new replacement water mains may encounter highly variable subsurface and groundwater conditions that will probably affect the design and installation of the new mains. Subsurface conditions may consist of variable fill materials, weak and compressible lagoonal deposits, firm alluvium, well-cemented coral reef rock, variably cemented coralline detritus, loose to dense volcanic cinder sand, and possible basaltic rock. Portions of the alignments may cross over buried alluvial channels, where soft and loose sediments may be relatively deep. The groundwater table is anticipated to be found at variable depths depending on existing grades. The following preliminary concerns and recommendations are provided that shall be verified by a detailed geotechnical report by BWS or its consultants for each separate water line project:

- *"Possible presence of highly variable subsurface conditions.*
  Subsurface conditions along the new replacement water main alignments may vary from soft and loose alluvial and lagoonal deposits to well-cemented coral reef rock. Variability in subsurface conditions may result in varying pipeline support conditions and potential differential settlement in the new water mains. It may also impact trenchless installations due to steering difficulty in mixed-face conditions.

- *Possible presence of weak and compressible deposits.*
  Readily available subsurface information indicates that weak and compressible deposits may be encountered along most of the new replacement water main alignments along Nimitz Highway, Ala Moana Boulevard, River Street, a short segment along King Street near Aala Park, Cooke Street, and Piikoi Street. It is anticipated that subgrade treatment, consisting of over excavating a portion of the weak and compressible deposits below the water main bedding, and replacing the excavated material with suitable crush rock subbedding or Controlled Low Strength Material (CLSM) wrapped in a woven geotextile fabric, may be needed.

  Large drawdown of the groundwater table outside of trenches and excavations during dewatering operations may result in ground settlement, and movements and distress to on-grade supported buildings, structures, utilities, pavements, and slabs where weak and compressible soils are present.

- *Potential for seismic instability in the site deposits.*
  Readily available subsurface information indicates that loose submerged granular deposits may be present in fill or reclaimed areas where most of the new water mains are planned. These deposits may be subject to seismic instability due to conditions such as soil liquefaction, lateral spreading, and/or lateral flow. Soil liquefaction may result in loss of soil strength, settlement, lateral movements, and development of high buoyant forces and high lateral earth pressures on manholes or vaults which extend below the water table and into potentially liquefiable deposits. Performing soil improvement to reduce potential risks associated with soil liquefaction would require treatment on a regional basis which is beyond the scope of this project. Use of more flexible pipe materials, such as PVC, and localized soil improvement, may be needed where potentially liquefiable deposits are present. Site specific subsurface exploration and testing is needed to further assess this concern.

- *Presence of relatively shallow groundwater table and potentially highly permeable coral reef deposits.*
  The inverts of the new replacement water mains may extend below the groundwater table. Coral reef deposits that may be present along most of the water main alignment generally below fill and/or weak and compressible deposits are anticipated to be highly permeable. Dewatering of trenches and excavations that extend below the groundwater table and into permeable deposits is anticipated to be difficult. To reduce the amount of water inflow to the trenches and excavations and dewatering requirements, excavating in the wet as much as practical and providing positive groundwater control measures will likely be needed. This may include the use of fully interlocked steel sheet piles with tremie concrete plugs at the bottom of trenches.

- *Need to install the new water mains along busy and congested streets and roads with numerous underground utilities.*
  Nearby structures may include buildings, shopping centers, residential towers, industrial areas, piers and wharves, and power poles with overhead lines. Trenches and excavations needed for the water main installations will need to be carefully selected and planned to reduce the amount of ground settlement, movements, and potential distress to existing buildings, structures, and improvements along the various water main alignments. Existing underground utilities, such as sewer, water, gas, electrical, traffic signal cables, drain lines, and other known lines and underground structures will need to

be thoroughly researched and located to check that they do not become obstructions during the installation of the new water mains.

- *Need for sheeting, shoring, bracing, and dewatering of trenches and excavations.*
  Open cut trenches and excavations for new replacement water mains will likely require temporary sheeting, shoring, bracing, and/or dewatering. These excavations will need to be carefully planned and constructed to reduce the potential for ground settlement, movements, and distress to existing nearby buildings, structures, roads, underground utilities to remain, and the new mains.

- *Potential for vibration-induced settlement and/or distress.*
  Steel sheet piles will probably need to be used for trenches and excavations that extend below the groundwater table. Because of the possible presence of loose deposits, non-vibratory equipment, such as impact or press-in hammers, may need to be used for installation and removal of sheet piles to reduce the potential vibration induced settlement and distress.

- *Potential for soil and groundwater contamination.*
  Sections of new water main may cross industrial areas where soil and groundwater contamination may be present. If contaminated materials are encountered during construction, more stringent requirements may need to be followed regarding items such as handling and/or disposal of the excavated soils and dewatering effluent. The Nimitz Highway corridor is highly suspected of containing contamination. Further assessment of this area is required to determine proper handling procedures when these conditions are discovered. Coordination with the State Department of Transportation will be initiated for mitigative measures."

4.1.3 CLIMATE

Existing Conditions

Hawaii's climate include mild temperatures throughout the year, moderate humidity, persistence of northeasterly trade winds, significant differences in rainfall within short distances, and infrequent severe storms. According to the Western Regional Climate Center, the nearest climate recording station with sufficient data is Waikiki 717.2, which is located near the Honolulu Zoo about 1¾-miles east of the project site. Waikiki 717.2, operated by the U.S. National Oceanic and Atmospheric Administration (NOAA), recorded 50 years of rainfall and temperature data. The average annual rainfall is 23.44 inches with the majority occurring between October and March. The average high temperature is 84.5˚F with the warmest month in August and September with 88.1˚F. The average low temperature is 69.2˚F with the coolest month in January 64.7˚F.

Impacts and Mitigation Measures

The proposed water system improvements are not anticipated to have any impact on climatic conditions, thus no mitigation measures are planned.

4.1.4 AIR QUALITY

Existing Conditions

Air quality is generally good due to the effects of the tradewinds and lack of stationary source of pollutants. According to the Department of Health's Annual Summary of Hawaii Air Quality Data (2013), Honolulu was in attainment for all federal ambient air quality standards.

Impacts and Mitigation Measures

Air quality can be impacted by increasing traffic volume generated during construction-related activities along the pipeline routes. These impacts, if any, will be temporary and limited to working hours. In addition, the contractors will be required to maintain construction equipment in proper working order. The contractors are also required to control the generation of dust from debris being hauled away from the project sites and provide adequate dust control measures. Activities associated with the construction phase of the project will comply with HAR Chapter 60 of Title 11, Air Pollution Control. Since post-construction air quality will remain essentially identical to current levels, no significant long-term effects are expected.

4.1.5 FLOOD AND TSUNAMI HAZARD

Existing Conditions

Based on information from the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM) 15003C0353G, 15003C0354G, 15003C0362G, and 15003C0366G (Effective Date January 19, 2011), the project sites are located in areas designated as Zones X, AO, AE and VE (refer to Figure 16).

FEMA defines these regions as:

- *Zone AE* regions are high risk areas where flooding has a 1% chance annually (100 year flood). Base flood elevations have been determined within these zones from previous detailed analyses. Flood insurance is mandatory and City development codes apply. Project areas in Zone AE include Cooke Street, portions of King Street, portions of Aloha Tower Drive, Piikoi Street between Ala Moana Boulevard and Kapiolani Boulevard, and a section of Ala Moana Boulevard between Coral Street and Fort DeRussy.

- *Zone AO* regions are high risk areas which has a 1% chance annually (100 year flood) of shallow flooding each year, usually in the form of sheet flow, with an average depth or one to three feet. Flood insurance is mandatory and City development codes apply. Project areas in Zone AO include portions of Ala Moana Boulevard near Fort DeRussy in Waikiki.

- *Zone VE* is considered a coastal high hazard area which means a special flood hazard area subject to high velocity wave action from storms or seismic sources. Flood insurance is mandatory and City development codes apply. Project areas in Zone VE include portions of Aloha Tower Drive.

- *Zone X* regions are areas determined to be outside the 0.2% annual chance (500-year) flood plain. Zone X regions are considered to be in a non-special flood hazard areas (low to moderate risk flood zone) where no mandatory flood insurance purchase requirements apply. Project areas in Zone X include the Makiki segments (Pensacola and Piikoi Street), Nuuanu Avenue, Richard Street, River Street, the Nimitz Highway segments, and the Ala Moana Boulevard portion of the project west of Coral Street.

Impacts and Mitigation Measures

The project will not result in changes to the existing elevations in any high risk flood zones (AO, AE and VE). During construction, the contractor will be prohibited from erecting temporary structures and the storage of fill, excavated material, or equipment within streams or high risk flood zones. Equipment that may be used in streams and high risk flood zones will be portable

FLOOD INSURANCE RATE MAP AND TSUNAMI EVACUATION ZONES

Gray, Hong, Nojima & Associates, Inc.
CONSULTING ENGINEERS
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813
Fax: (808) 531-8018
Telephone: (808) 521-0306

CAD DRAWING: 3094-00-EA FIRM_TSU
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE
16

LEGEND

A	No Base Flood Elevations Determined
AE	Base Flood Elevations Determined
AO	Flood Depths of 1 to 3 Feet
VE	Coastal Flood Zone With Velocity Hazard (Wave Action)
X	Areas Determined To Be Outside The 0.2% Annual Chance Floodplan
	Tsunami Evacuation Boundary
6	Flood Elevation Labels 2011
	Flood Elevation Lines 2011
	24" Diameter New Replacement Main Alternate Route
	24" Diameter New Replacement Main
	20" Diameter New Replacement Main
	16" Diameter New Replacement Main

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

0 300 600 1200
SCALE IN FEET

Drawing name: C:\Users\gavinn\appdata\local\temp\AcPublish_5536\3094-00-EA FIRM_TSU.dwg May 02, 2016 - 9:18am

and capable of being readily moved when large storm events are forecasted. The BWS and its contractors will monitor weather conditions and prepare the work area to prevent flood damage.

Most of the project sites will be located within the tsunami evacuation zone based on Civil Defense Tsunami Evacuation Zone maps from the Pacific Disaster Center (refer to Figure 16). These maps were developed by the City with data from the State Civil Defense and display the evacuation area impacted by the worst-case tsunami. The BWS and its contractors will monitor bulletins from the Pacific Tsunami Warning Center, and remove any construction related obstructions caused by the water system improvements as to not impede evacuation. The BWS and its contractors will also cooperate with the appropriate authorities.

After construction activities are completed, the disturbed area will be restored to original or better condition which will cause no increase of flood regulatory elevations. Therefore, the proposed water system improvements are not anticipated to have any long-term impact on flooding and tsunami evacuation.

4.1.6 SURFACE WATER QUALITY

Existing Conditions

Surface water on Oahu is important to residents, visitors and business alike with diverse uses such as recreational, fishing, agriculture and research. Oahu's surface water is also home to numerous species of marine aquatic life. To protect this important resource, the State developed Water Quality Standards (HAR Chapter 54 of Title 11), which is administered by the State Department of Health (DOH). The State Water Quality Standards contains: (1) Rules to protect and maintain existing uses of the receiving State Water and prevent degradation of water quality (anti-degradation policy); (2) Designated use of State Waters; and (3) Water Quality Criteria.

According to the State Water Quality Standards Map for the Island of Oahu, the inland waters in the vicinity the project areas are classified as Class 2 while the marine waters near the project sites are classified as Class A. According to the DOH Water Quality Standards, "The objective of Class 2 waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation." While Class A is defined as "It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters." Since surface water quality can be adversely affected by construction activities, discharges into Cass 2 inland and Class A marine State Waters requires coverage under the State's National Pollutant Discharge Elimination System (NPDES) general permit. NPDES general permit calls for the application of permanent and construction BMPs to regulate sources that discharge pollutants into State Waters. For the proposed water system improvements, disposal of construction storm water, dewatering effluent and water line hydrotesting into State Waters will require coverage under NPDES General Permit.

Impacts and Mitigation Measures

As stated in Section 2.4 – Proposed Action, the water system improvements are anticipated to be separated into several different projects. Should any of the individual projects disturb one (1) acre or more during construction activities, it would require a Notice of Intent Form C (NOI C) - Discharge of Storm Water Associated with construction activities, to be covered by the State's NPDES General Permit (HAR Chapter 55 of Title 11 Appendix C). NOI C will include a Storm

Water Pollution Prevention Plan, which is a site-specific, written document that addresses all pollutants and their sources through the implementation of BMPs. Construction activities are likely to result in runoff from the project sites which may include soils from trenching, asphalt, fuel, and silt. BMPs such as installing sediment barriers at storm drain inlets, keeping the construction site as clean as possible, complying with conditions of the project's NPDES permit, and offsite fueling of construction equipment/vehicles will be applied to ensure that runoff from construction does not degrade State Waters.

The water system improvements will require hydrotesting in accordance with the BWS specifications. Hydrotesting involves testing for water main strength and leaks by filling a new section of the main with water then pressurizing the water. To dispose of the test effluent into State Waters, a Notice of Intent Form F (NOI F) - Discharges of Hydrotesting Waters, to be covered by NPDES General Permit (HAR Chapter 55 of Title 11 Appendix F), is required. The NOI F will include field sampling and laboratory data on the hydrotesting effluent for water quality and toxicity. In addition a hydrotesting BMP plan will be initiated to: (1) prevent the introduction of pollutants to the effluent and (2) specify mitigative measures to prevent pollutant in the effluent from adversely affecting State Waters.

Due to the low elevations along most of the project sites, groundwater is expected to be encountered during excavation. To install the proposed water system improvements, trenches would need to be properly dewatered. Discharging of the dewatering effluent into State Waters requires a Notice of Intent Form G (NOI G) - Construction Activity Dewatering Effluent, to be covered by NPDES General Permit HAR (Chapter 55 of Title 11 Appendix G). The NOI G will include a dewatering plan, dewatering system maintenance plan, field sampling and specified analyses for water quality and toxicity data of the dewatering effluent. The contractors will be required to treat the dewatering effluent using appropriate BMP methods, such as sedimentation, chemical pretreatment, and filtration prior to discharge. Discharge pollution controls will be monitored and maintained by the contractors on a routine basis and after each significant rain event.

In addition to the State surface water classifications, DOH develops a list of impaired waters that do not or are not expected to attain or maintain applicable water quality criteria. In accordance with the Clean Water Act §303(d), the State must submit this list, plus a priority ranking of the impaired waters for Total Maximum Daily Load (TMDL) to the U.S. Environmental Protection Agency (EPA). TDML represents the maximum amount of pollutants that a water body can receive and still meet water quality standards. TDMLs have been developed for Ala Wai Canal for nitrogen and phosphorus, therefore, there is a limited amount of nutrient waste load allocation that can discharged into the Ala Wai Canal. The following waters in the vicinity of the project sites that are included in the Clean Water Act Section 303(d) list of impaired waters by DOH are as follows: Nuuanu Stream, Ala Wai Canal, Ala Moana Beach, Honolulu Waterfront - Aloha Tower, Kewalo Basin, Kahanamoku Lagoon, Magic Island, and Mamala Bay. Since no additional runoff will be introduced to the impaired waters, no significant long-term effects are expected.

Construction of the water system improvements may affect inland waters in the project area, namely Nuuanu Stream and Ala Wai Canal. Work in and around Nuuanu Stream and Ala Wai Canal may be subject to the Army Corps of Engineers (ACOE) jurisdiction under Section 10 of the Rivers and Harbors Act of 1899 or Section 404 of the Clean Water Act. Section 10 requires that a Department of the Army (DA permit) be obtained for structures or work in or affecting navigable waters of the U.S. Section 404 requires that a DA permit be obtained for the placement or discharge of dredged and/or fill material into waters of the U.S. Should a Section

404 permit be required, ACOE will require a Clean Water Act Section 401 water quality certification from the DOH. Section 401 of the Clean Water Act mandates that no federal permit or license can be issued that may result in a discharge to waters of the United States unless the State certifies that the discharge complies with State Water Quality Standards. As the planning and design of the water system improvements proceeds, the BWS and its consultants will submit a formal request for jurisdictional determination to ACOE for the respective water line projects.

In addition to DA permits, work in and around Nuuanu Stream and Ala Wai Canal may be subject to the State Department of Land and Natural Resources (DLNR) Commission on Water Resource Management (CWRM) Stream Channel Alteration Permit (SCAP) in accordance with HAR Chapter 169 of Title 13. As indicated on the DLNR CWRM website, a SCAP is required "for any temporary or permanent activity within the stream bed or banks that may: 1) Obstruct, diminish, destroy, modify, or relocate a stream channel; 2) Change the direction of flow of water in a stream channel; 3) Place any materials or structures in a stream channel; or 4) Remove any material or structure from a stream channel." As the planning and design of the water system improvements proceeds, the BWS and its consultant will consult with DLNR CWRM regarding the applicability of a SCAP for the proposed water system improvements.

The impact on surface and impaired waters is expected to be minimal and short-term and will not compromise recreational activities for the following reasons: (1) The construction plans and permit applications will be reviewed by pertinent government agencies for comments and approval prior to construction; (2) BWS and its contractors shall obtain required permits; (3) BWS and its contractors will be responsible for conformance with applicable provisions of HAR Chapter 54 (Water Quality Standards) and 55 (Water Pollution Control) of Title 11; and (4) BMPs measures will be applied to minimize or prevent the discharge of sediment, debris, and other pollutants to State Waters. Since post-construction water quality will remain essentially identical to current levels, no significant long-term effects are expected.

4.1.7 GROUNDWATER QUALITY

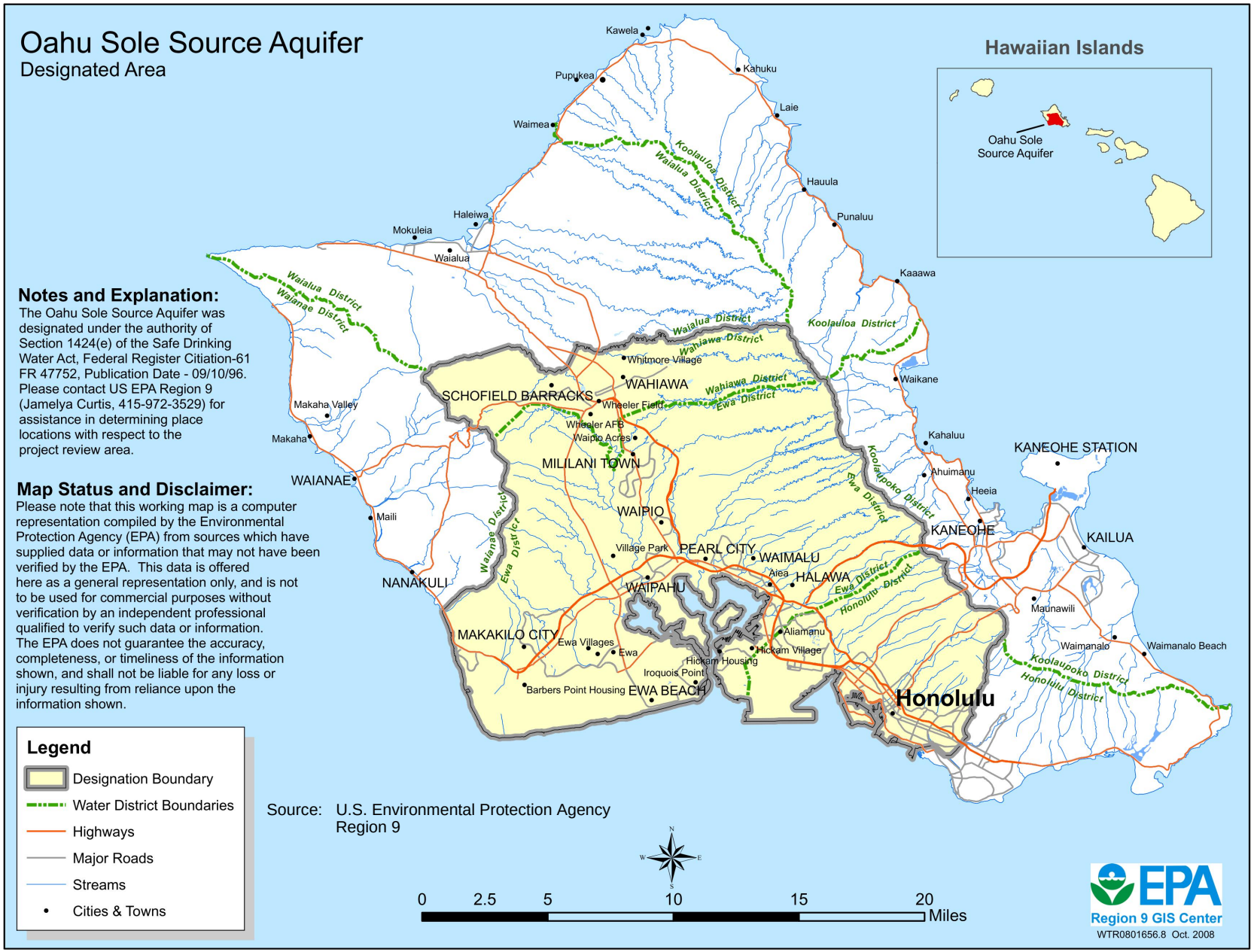
Existing Conditions

The BWS uses wells, shafts and tunnels to draw the majority of Oahu's potable water from underground aquifers. The Southern Oahu Basal Aquifer, located in central Oahu and Honolulu, have been designated by the EPA as a Sole Source Aquifer (refer to Figure 17). Under this designation, the aquifer must supply at least 50% of the community water supply. The proposed water system improvements except for the portion in Waikiki lie within the Sole Source Drinking Water Aquifer boundary.

In addition to the Sole Source Drinking Water Aquifer, the project area straddles the underground injection control (UIC) line and encompasses the Kalihi, Nuuanu and Palolo aquifers. The UIC line is the boundary between "exempted" aquifers (i.e. underlying aquifer portions not considered drinking water source) and underground sources of potable water. The UIC line boundary, as defined by the DOH, runs through the project along King Street then to Kapiolani Boulevard and Kalakaua Avenue until the Ala Wai Canal. The majority of the project is below the underground injection control (UIC) line except for the Makiki Sections and portions of Nuuanu and River Street. Therefore, the underlying aquifers below most of the project area are not considered drinking water sources. According to DLNR CWRM, the project area encompasses the Kalihi aquifer (with a sustainable yield of 9 million gallons per day), Nuuanu aquifer (with a sustainable yield of 14 million gallons per day), and the Palolo aquifer (with a sustainable yield of 6 million gallons per day).

Oahu Sole Source Aquifer

Designated Area



Notes and Explanation:

The Oahu Sole Source Aquifer was designated under the authority of Section 1424(e) of the Safe Drinking Water Act, Federal Register Citiation-61 FR 47752, Publication Date - 09/10/96. Please contact US EPA Region 9 (Jamelya Curtis, 415-972-3529) for assistance in determining place locations with respect to the project review area.

Map Status and Disclaimer:

Please note that this working map is a computer representation compiled by the Environmental Protection Agency (EPA) from sources which have supplied data or information that may not have been verified by the EPA. This data is offered here as a general representation only, and is not to be used for commercial purposes without verification by an independent professional qualified to verify such data or information. The EPA does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any loss or injury resulting from reliance upon the information shown.

Legend

- Designation Boundary
- Water District Boundaries
- Highways
- Major Roads
- Streams
- Cities & Towns

Source: U.S. Environmental Protection Agency Region 9

0 2.5 5 10 15 20 Miles

EPA Region 9 GIS Center

WTR0801656.8 Oct. 2008

CAD DRAWING:	Gray • Hong • Nojima & Associates, Inc.	OAHU SOLE SOURCE AQUIFER
DATE: MAY 2016	CONSULTING ENGINEERS	FIGURE 17
SCALE: AS SHOWN	201 Merchant Street, Suite 1900 Honolulu, Hawaii 96813 Fax: (808) 531-8018 Telephone: (808) 521-0306	
PROJECT #: 3094-00		Page 40

Impacts and Mitigation Measures

Because construction activities occur near sewer lines, the BWS and its contractors would be required protect the existing sewer lines and develop contingency plans to prevent spillage or overflow of sewage onto the streets and potential surface and groundwater contamination. In the event of a sewage spill or overflow from a City sewer line or manhole, contractors will be required to immediately contact the Department of Environmental Services.

Since the proposed water system improvements are located within important sources of potable water, the underlying aquifers are susceptible to contamination from chemicals in the soil and those spilled on the surface. To prevent contamination the contractor shall develop a spill prevention, control, and countermeasure plans, erosion and sedimentation BMP plans, and plans for handling and disposal of contaminated materials. Contaminated material uncovered as a result of construction activities shall not be allowed for reuse and will be removed from the site and properly disposed. Contaminated groundwater uncovered during dewatering operations shall be treated according to NPDES general permit requirements prior to disposal into State Waters. Should any hazardous material be released onto the project sites as the result of construction activities, the BWS and its contractors shall notify and cooperate with DOH and other appropriate agencies. Since the contractor will apply appropriate BMPs and comply with all applicable City, State, and Federal laws, no long-term impacts are expected.

4.2 BIOLOGICAL ENVIRONMENT

A biological survey of the project sites was conducted on January 13, 2015, by AECOS, Inc. (refer to Appendix C). AECOS investigated all roads subject to the replacement mains to determine if any federally listed endangered or threatened plants, birds, or mammals use resources at the project sites.

4.2.1 POTENTIAL IMPACTS TO PROTECTED SPECIES AND HABITATS

The following summarizes the potential impacts to protected species and habitats and provides recommendations during construction (AECOS, 2016):

“No plants currently protected or proposed for protection under either the federal or State of Hawai‘i endangered species programs (DLNR, 1998; USFWS; 2014) were detected during the course of our survey. The only listed animal species recorded was the White Tern, a species listed by state statute but not the federal ESA. Although not detected during the survey, the potential presence of the following species may require consideration:

White Tern - The principal potential impact that the Project poses to White Terns is construction activities during the breeding and nesting season. White Terns do not construct nests, but rather perch their single egg in a tree, bush or other convenient location. The removal of a tree in which a pair of terns have a “nest”, or chick will result in the loss of that egg or chick. The white terns that nest in the general area are clearly well adapted to the hustle and bustle of this extremely busy part of Honolulu. As very few if any suitable nest trees are planned to be removed as part of this project, the potential risk of harming a tern egg or chick is small.

Shearwaters - The only potential impact the Project poses to nocturnally flying seabirds is the increased threat that birds will be downed after becoming disoriented by lights associated with night-time construction activities. It should be borne in mind that there is currently no documented record of any species of seabirds being downed in the general area of the project, so any such possibility of such a light attraction is likely to be remote.

Other Hawaiian seabirds – specifically, the endangered Hawaiian petrel (Pterodroma phaeopygia sandwichensis), threatened Newell's shearwater (*Puffinus auricularis newelii*), and the proposed for listing, band-rumped storm-petrel (*Oceanodroma castro*) – although rare on O'ahu, can also become disoriented and put at risk of death or injury by lights associated with the project.

Hawaiian hoary bat - The only potential impact that the project poses to bats is if large trees are felled or trimmed. The trimming or removal of foliage and/or trees within the construction area may temporarily displace individual bats from a roosting location. As bats use multiple roosts within their home territories, this is likely to be minimal except during the pupping season. Female bats carrying pups may be less able to rapidly vacate a roost site as vegetation is cleared; additionally adult females sometimes leave their pups in the roost tree while they themselves forage, and very small pups may be unable to flee a tree that is being felled. Potential adverse effects from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 15 feet (4.6 m) in the pupping season between June 1 and September 15. With that said, very few if any trees will be removed as part of this Project, and the environment present is not typically where Hawaiian hoary bats would roost."

4.2.2 BIOLOGICAL RESOURCES RECOMMENDATIONS

Based on the information gathered form the biological survey, the proposed project may have potential impacts to protected species and their habitats. To mitigate these impacts, AECOS recommends the following (AECOS 2016):

- "If night-time construction activity or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly downward at the ground. Construction workers and supervisors should be provided information on the potential for downing seabirds and report any injured or killed seabirds to the proper authority at BWS.

- Prior to removal or trimming, a tree should be inspected by a qualified biologist to determine if White Tern nesting activity is underway within the tree. If a pair of terns, eggs, or chicks is found, the tree should be left in place until the chicks fledge and the birds leave the tree, or the nesting attempt fails."

4.3 ARCHAEOLOGICAL AND CULTURAL RESOURCES

An archaeological literature review and field investigation report (LRFI) and cultural impact assessment (CIA) was conducted by Cultural Surveys Hawaii, Inc. (CSH). The LRFI consisted of field investigation, review of previous archeological projects, and historical/archival research of the project area (refer to Appendix D). The purpose of the LRFI was to determine the likelihood that historic properties may be affected by the project and provide recommendations. The CIA consisted of archival research of cultural and historic resources, review of previous archaeological work in the project area and interviews with persons and groups knowledgeable about the past and present cultural practices in the project area and its surrounding area. The purpose of the CIA is to identify and assess the potential effects of the water system improvements on cultural beliefs, practices and resources of the project area (refer to Appendix E for assessment).

4.3.1 RESULTS OF BACKGROUND RESEARCH

Background research yielded the following results which are presented in approximate chronological order (CSH, June 2016):

1. "SIHP # 50-80-14-02918 was found during excavations at the former Honolulu Ironworks site and was later documented in the archaeological inventory survey for the Honolulu High-Capacity Transit Corridor Project (Hammatt 2013; Yent 1985). SIHP # -02918 consists of a subsurface cultural deposit and six human burials. The burials were to be from pre- and post-Contact era.

2. In 1846, Honolulu was the capitol of the Hawaiian Kingdom and was on its way to becoming the commercial and political hub of the Islands. During this time there was an obvious increase in population, land use, and urbanization. The waterfront area changed dramatically to accommodate trading and whaling vessels.

3. A rich Chinese cultural landscape was just mauka (towards the mountain) of the waterfront in an area called Kapukolo (also known as Kapuʻukolo). For nearly a century, Chinese patriots practiced disinterring their fellow countrymen's bones to prepare them for shipment back to China. It is logical to assume that many of these bones passed through Honolulu's Chinatown, but details are not well-known. An 1896 article in the Hawaiian Gazette discusses a "Chinese club house" in or near Nuʻuanu Stream that processed these bones.

4. Kakaʻako is located within Honolulu Ahupuaʻa. Kakaʻako is located between two of the most intensely populated and cultivated areas in southeastern Oʻahu during the pre-Contact period, Waikīkī and Honolulu. Marshes and wetlands were utilized for salt production, farming of fishponds, and some wetland agriculture.

5. A trail once traversed the Kakaʻako area, connecting Waikīkī to Honolulu. John Papa ʻĪʻī (1959:89) described the middle trail (close to the current alignment of Queen Street), extending from Kālia to Kukuluāeʻo as passing "along the graves of those who died in the smallpox epidemic of 1853."

6. Several burials have been documented within and in the vicinity of the project area including SIHP # -06376, a single cranial vault, discovered at the intersection of Ala Moana Boulevard and Kamakeʻe Street (Souza et al. 2002); and SIHP # -07656, a previously identified, isolated human cranial fragment, at the Ward Warehouse, fronting Ala Moana Boulevard (Pammer et al. 2014).

7. LCA testimonies express that much of the land in Kaʻākaukukui ʻIli was used for salt production. Native Hawaiians used salt for a variety of purposes including to flavor food, preserve fish, medicinal practice, and ceremonial purposes. Salt was traded, reaching its peak by 1870. By 1883, traditional Native Hawaiian salt production was on the decline and was replaced by the labor intensive Chinese method. By 1901, the majority of fishponds and salt pans makai of King Street were abandoned.

8. By the 1880s, the Kakaʻako area was being filled in for the construction of new roads and improvement of older roads. The justification for filling former mud flats, marshes, and fishponds was that low-lying areas were frequently being cited for unsanitary conditions and contributing to cholera outbreaks and breeding areas for rats and

mosquitoes. By February 1914, the land from South Street to Ward Avenue and from Ala Moana Boulevard to Queen Street had been filled in.

9. One burial was documented in the Waikīkī segment of the current project area. SIHP # -07087, a previously disturbed human burial, which consisted of a nearly complete human cranium and cranial fragments, was found near the intersection of Kālia Road and Ala Moana Boulevard (Mooney et al. 2009:i). The burial was left in situ".

4.3.2 RESULTS OF COMMUNITY CONSULTATION

CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants of Waikiki in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. A summary of the consultation is as followed (CSH, November 2015):

- "State of Hawai'i recognized lineal descendant, Paulette Ka`anohi Kaleikini stated the proposed project "will be taking place in very, very sensitive areas." She continued, stating that the 'Ewa portion of the project area has a lot of subsurface disturbance, however, there are also areas that have not been disturbed. The areas that have not been previously disturbed could be impacted by the current project's activities.

- Ms. Kaleikini's primary concern regarding the proposed project is pre- and post-Contact land use within the project area. She stated that thousands of Native Hawaiians lived within the current urban corridor. Bones that are found within the urban corridor are proof that habitation occurred in these areas.

- According to Ms. Kaleikini, the project area consisted of ali'i (chiefly class) and maka'āinana (commoner) habitation. She notes heiau, fishponds, lo'i (terraced fields), and salt beds once sustained a community.

- Ms. Kaleikini recommended an archaeological inventory survey plan. She added that cultural monitoring should be considered alongside archaeological monitoring for this "culturally sensitive area."

- Ms. Megan Borthwick of Historic Hawai'i Foundation stated the project area is on a major route and bypasses many historic properties and districts. Historic Hawai'i Foundation recommended an architectural resource survey be conducted to identify potential impacts to historic resources. In addition, an architectural inventory survey may identify additional historic properties that are eligible for the historic register but have not been previously nominated or designated. Properties that have been listed on the State and/or National Register of Historic Places, including historic districts such as Chinatown and the Capitol District, should be evaluated for potential adverse effects.

- The Historic Hawai'i Foundation is also concerned about underground cultural deposits, iwi kūpuna (ancestral bones), and/or other cultural resources that should be identified and treated appropriately in the event of being found.

- Mr. Iwami and Mr. Iwai's, representing Friends of Kewalos, main concerns regarding the project are focused on parking and accessibility for park and boat patrons. Road work in the area may further displace parking and accessibility."

4.3.3 ARCHAEOLOGICAL RESOURCES IMPACTS AND RECOMMENDATIONS

Archaeological Potential

Based on the detailed historical, cultural, and archaeological background research and field inspection, CSH developed a "sensitivity" map of archaeological potential within the project areas. This map depicts a preliminary overview of the archaeological potential along the various proposed water main routes (refer to Figure 18). The concept of archaeological potential is really an effort to evaluate the potential for subsurface historic properties to become a factor in a given area primarily in terms of potential to cause project delay or re-design or to elicit concerns by the Native Hawaiian community and/or State Historic Preservation Division. Under HAR 13-275-2 any tangible non-living object "which is over fifty years old" can be considered "historic property." As a generalization, older and more intact subsurface historic properties, relating to habitation or burial, are "more significant" in terms of scientific and/or cultural value. Archaeological potential is an evaluation originating in historic and archaeological evidence of a probability of encountering finds that may require additional investigation and/or mitigation. The preliminary archaeological potential of the proposed water main routes has been evaluated in terms of low, medium, and high potential areas as summarized below.

Low Potential Areas

In the western portion of the project area, there are three substantial sections that were salt water well into historic times. These areas could potentially yield finds post-dating the fill episodes that effectively reclaimed the land from the sea. They constitute the three areas evaluated as of relatively "low" archaeological potential.

- North Nimitz Highway between Pacific Street and Sumner Street
- Portion of River Street (Makai of North King Street) into North Nimitz Highway up to Smith Street
- Makai of Fort Street Mall, Aloha Tower Drive, and North Nimitz Highway up to Foreign Trade Zone

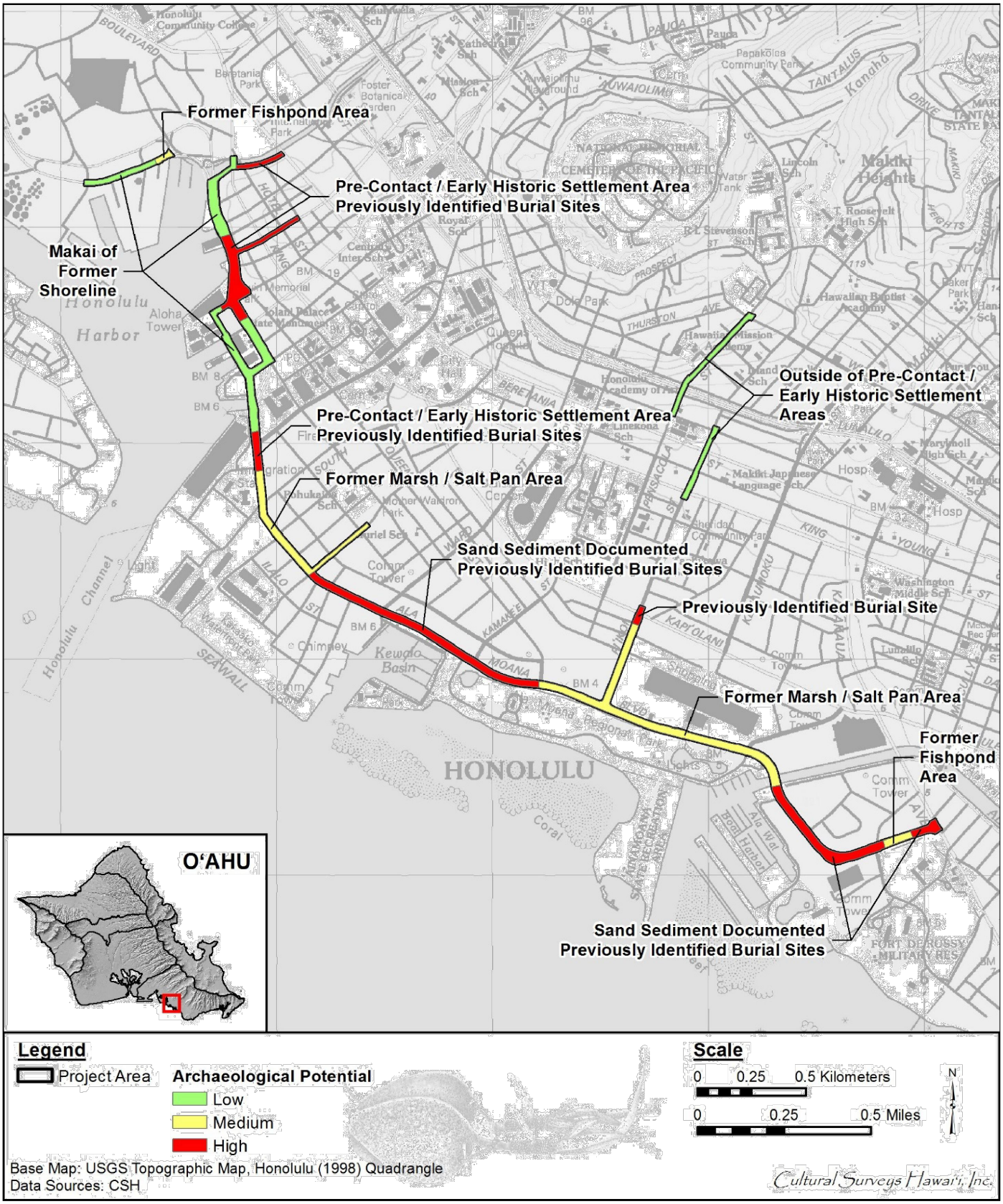
Other low potential sites are likely to occur in the Makiki area. These have been identified outside of pre-contact/early historic settlement areas:

- Pensacola Street from Kinau Street to Wilder Avenue
- Piikoi Street from Kinau Street to South King Street

Medium Potential Areas

There are a few areas which have been preliminarily evaluated as of "medium" archaeological potential. These areas may have fewer finds for a variety of reasons as described below.

- The west Kaka'ako portion of the project area crosses an area of formerly low-lying marsh and salt pans in which habitation is believed to have been less dense into modern times because of higher ground water levels. Based on previous studies there may have been small localized areas of slightly higher sand dunes (perhaps only higher by two feet or so) that stood above the extensive surrounding marsh and salt pans and were foci of traditional Hawaiian habitation and salt manufacture (mirco-environments). Since the salt pan areas tend to be low-lying they are unlikely to have burials.



Source: Cultural Surveys Hawaii, Inc
June, 2016

CAD DRAWING:	Gray • Hong • Nojima & Associates, Inc.	OVERVIEW OF ARCHAEOLOGICAL POTENTIAL	FIGURE 18
DATE: JAN 2017	CONSULTING ENGINEERS 201 Merchant Street, Suite 1900 Honolulu, Hawaii 96813 Fax: (808) 531-8018 Telephone: (808) 521-0306		
SCALE: AS SHOWN			
PROJECT #: 3094-00			Page 46

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- Based on previous finds, it appears that the natural ground surface fronting the Ala Moana Shopping Center adjacent to the project area was historically low-lying and close to the water table and thus fewer finds have been reported from this area.

- A short segment of the proposed alignment along Fort DeRussy (Ala Moana Blvd.) is an area of former fishponds that were filled in the early twentieth century that should have no in situ deposits (other than deposits relating to the fishponds) predating the fill.

High Potential Areas

There are several areas of high archaeological potential based on evidence of dense habitation and burials.

- A *mauka* portion of River Street, a central downtown portion of Nimitz Highway, Nu'uanu Avenue, and a stretch of Nimitz Highway near Punchbowl Street are evaluated as of "high" archaeological potential based on the evidence of dense Hawaiian habitation (including high status habitation and ritual activity), extensive early historic use, and prior archaeological finds.

- A large stretch of the project area through central Kaka'ako was the locus of a coastal trail from time immemorial and a number of burials and other sites have been identified in this immediate area.

- Previous finds of burials and other historic properties increase near the margins of the former Pi'inaio Stream in the area along Ala Moana Boulevard past Ala Wai Canal up to Kalākaua Avenue.

Recommendations

As mentioned previously, the specific vertical and horizontal alignments along the proposed water main routes and methods of construction will be determined during the planning phase of each project. Because water service must remain active throughout construction, it is unlikely that new mains will be installed in the same location as the existing mains. Thus, excavation of the new trench will not disturb the exact same area that was previously excavated during the original installation. Therefore, the LRFI was submitted to the State Historic Preservation Division (SHPD) for review and comment. According to SHPD, an archaeological inventory survey (AIS) will be required. An AIS Plan will be submitted for their review and approval prior to the start of any field work associated with the AIS. CSH (June, 2016) has identified some of the difficulties that may be encountered which would also require clarification from SHPD:

> "Subsurface testing in any other portions of the project area would be highly problematic because of the need for saw-cutting, excavation, recordation and street reconstruction in areas of heavy traffic with an anticipated high density of utility lines (and often apartments in the immediate vicinity making the noise of trying to work at night problematic). Further clarification of the specific locations anticipated for ground disturbance within the indicated project area will be very useful in determining specific areas for archaeological inventory survey testing in consultation with the State Historic Preservation Division (SHPD). It is likely that an archaeological inventory survey plan for SHPD review and approval will be appropriate but this should be informed by greater clarity on the specifics of project-related subsurface impacts."

It is anticipated that archaeological monitoring will be required for all subsurface construction activities. An Archaeological Monitoring Plan (AMP) would be prepared and submitted for review and approval by SHPD during the planning or preliminary engineering phase of the specific water line project. The AMP will contain information concerning archaeological sites known to exist within the near vicinity of the specific water line alignment and cover the methodology of the archaeological monitoring. As part of the AMP, archaeological monitors shall be present during ground disturbing activities. The archaeological monitor shall have the expertise and qualification to implement controlled excavation methodology during construction when approaching in-situ or naturally occurring sand deposits and/or cultural deposit layers that have a high likelihood of containing either disturbed or intact iwi kūpuna.

4.3.4 CULTURAL RESOURCES IMPACTS AND RECOMMENDATIONS

Based on the information gathered for the cultural and historic background and community consultation detailed in the CIA report, the proposed project may have potential impacts. To mitigate these impacts, CSH recommends the following (CSH, November 2015):

1. Personnel involved in the construction activities should exercise caution due to the culturally sensitive nature of the proposed project areas as indicated by two community participants.

2. Personnel involved in the construction activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. Should burials (or other cultural finds) be encountered during ground disturbance, the construction contractor should immediately cease all work and the appropriate agencies should be notified pursuant to applicable law.

3. If any iwi kūpuna or other inadvertent cultural finds are found during ground disturbance, the BWS will consult with lineal and cultural descendants of Honolulu (including Kaka‘ako) and Waikīkī, SHPD, and other appropriate agencies including the Oahu Burial Council and the Office of Hawaiian Affairs to develop a reinternment plan and cultural preservation plan.

4.4 BUILT ENVIRONMENT

This section describes the project’s probable impacts to areas where man has fundamentally transformed landscapes. This includes utilities, infrastructure, and transportation facilities serving the project sites and surrounding areas. Most of the impacts will be associated with short-term construction-related activities that will be mitigated through proper coordination of the water system improvements with various government agencies, utility companies, surrounding community, and ongoing/potential construction projects. All utility relocation and work within the road right-of-way will follow applicable Federal, State, City and utility company standards, rules, and regulations. The contractors shall provide the necessary excavation and backfill, obtain traffic permits, and restore pavement, sidewalks, and other facilities to original or better condition. Once construction is completed, no long-term consequences directly related to the new water mains themselves are expected to negatively impact the surrounding built environment.

4.4.1 WATER SYSTEMS

Existing Conditions

The existing water system in the project area is maintained by the BWS. The existing water distribution system includes the mains, valves, fittings, manholes, service laterals, fire hydrants, and meters. Prior to the start of construction at each of the sites, the contractor will contact Hawaii's One Call Center to arrange for field location of the existing water lines. During construction, the contractors will protect the existing water lines and notify the BWS construction representative and the appropriate authorities should any water main breaks occur from construction activities. Design, construction, testing and disinfection of the new water improvements will follow the BWS Water System Standards. Applicable provisions of any NPDES General Permit and construction BMP conditions shall also be followed (refer to Section 4.1.6 – Surface Water Quality).

Impacts and Mitigation Measures

Should the construction of the water system improvements require water service shutdown in any of the project areas, the BWS and its contractors will notify the affected businesses and residents and coordinate its construction schedule to minimize impacts. In most instances water service shut down will be limited to six hours and be scheduled for normal working hours. Should water service interruption occur next to child care facilities, schools and healthcare facilities, the BWS and its contractor will work with the appropriate personnel of these facilities to minimize the health and safety issues. Such efforts may include minimizing water service disruption duration and/or providing a temporary water service connection to a nearby main. All emergency first responders shall also be notified of water outages.

The BWS is also planning and constructing other projects in the vicinity of the proposed water system improvements. The BWS will work with its design consultants and construction contractors to coordinate the various construction schedules and water system design. The concurrent projects are as follows:

- Honolulu District 42-inch Mains – Liliha to Moiliili (Phase 1 and 2). This involves work from Liliha Street, along Beretania Street to Richards Street to King Street extending to Isenberg Street also Victoria Street.

- Kalakaua Ave Water System Improvements (Phases 2, 3, and 4): This involves work on Kalakaua Ave between Beretania Street and Kapiolani Boulevard, from Ala Wai Bridge to Kaiulani Avenue, and from Monsarrat Avenue to Dillingham Fountain.

- Kalawahine 180 Reservoir: Install water reservoir in Papakolea above Roosevelt High School. Supporting infrastructure includes work on Auwaiolimu and Pensacola Street.

- Pensacola Street Water System Improvements. This involves work on Pensacola Street between Kinau Street and Kapiolani Boulevard.

The proposed water system improvements may also have a short-term interruption of the water service to the residences and businesses in the project areas. This will be mitigated by coordination of construction schedules and notification of affected businesses and residents. Provision of water wagons will also be considered. Since the project is not adding population or development, the proposed water system improvements will not directly generate an increase in demand for water service within the project area. All applicable BWS, City, State, and Federal laws and standards will be followed, thus, no long-term impacts are expected.

4.4.2 WASTEWATER COLLECTION SYSTEMS

Existing Conditions

The project area's existing wastewater collection system, maintained by the City and County of Honolulu, conveys wastewater via various sewer mains, force mains and pump stations to the Sand Island Wastewater Treatment Plant. The majority of the existing sewer main sizes in the project area are between 6 and 16-inches in diameter. Along the streets impacted by the BWS projects are also major large trunk sewers which collect and convey wastewater to the major wastewater pump stations.

Impacts and Mitigation Measures

The proposed water system improvements will be designed to maintain the required vertical and horizontal clearances from the existing sewer infrastructure. Construction drawings will be submitted to the Departments of Planning and Permitting (DPP) and Environmental Services (ENV) for review and approval. Prior to the start of construction at each of the sites, the contractor will be required to research and obtain as-built drawings from DPP to locate existing sewers and force mains. Should a conflict between the proposed water system improvements and the existing sewer or force main arise, the BWS and its consultant will work with DPP and ENV to resolve such conflict prior to the start of construction.

In addition to the existing sewer infrastructure, the City is planning or currently constructing several other wastewater improvement projects in the upcoming years. The BWS and its consultants will coordinate with the City Department of Design and Construction (DDC) to resolve construction schedule and design conflicts. As of February 2016, DDC identified the following planned or ongoing wastewater projects in the vicinity of the proposed water system improvements:

- Awa Street Wastewater Pump Station (WWPS) and Force Main (FM) Improvements Phase 1: Construction of relief sewer on Houghtailing Street/Waiakamilo Road from School Street to Nimitz Highway to address capacity deficiencies. Re-routing of flows from the surrounding area to the relief sewer by constructing sewers on side streets.

- Chinatown Sewer Rehabilitation: Planning, design, and construction of cured-in-place rehabilitation, replacement, and point repair work on various sewers in Chinatown.

- Fort DeRussy WWPS FM Emergency Repair: Rehabilitation, repair and possible replacement of the header, manifold, venturi chamber and the force main.

- Fort DeRussy WWPS, Force Main, and University Avenue/McCully Sewer Relief: Provide improvements to address future peak flows of the Fort DeRussy WWPS Force Main and Sewer System. Evaluate relief line alternatives in Kuhio Avenue, University Avenue and possibly other locations.

- Sewer I/I Relief and Rehabilitation Projects - Ala Moana Tributary Basin: Various sewer relief and rehabilitation segments within the Ala Moana WWPS tributary area to prevent and reduce sanitary sewer overflows.

The contractor shall be responsible for maintaining continuous sewer service to all affected areas and provide access to adjacent wastewater pump stations. Should any sewer spills result from the construction of the proposed water system improvements, the contractor shall implement spill mitigation procedures, notify the proper authorities, utilize appropriate sampling

and analyzing procedures, and be responsible for all press releases and public notifications. Since the project is not adding population or development, the proposed water system improvements will not directly generate an increase in demand for sewer service or require the construction of additional sewer infrastructure within the project area. All applicable City, State, and Federal laws and standards will be followed, thus, no long-term impacts are expected.

4.4.3 DRAINAGE SYSTEMS

Existing Conditions

The existing drainage systems in the project areas are owned and maintained by the City and County of Honolulu or the State Department of Transportation Highways Division (DOT-HWY) depending on jurisdiction of the ROW. There are drain lines of various sizes on all of the affected roads including large box culverts crossing Aloha Tower Drive near the Hawaiian Electric Company Power Plant and Ala Moana Boulevard.

Impacts and Mitigation Measures

The water system improvements will be designed to maintain required vertical and horizontal clearances from existing drainage infrastructure. Construction drawings will be submitted to DPP and/or DOT-HWY for review and approval. Contractors will need to obtain necessary permits should dewatering into any drainage facility be required.

Since the entire project area is covered by impervious surfaces, the proposed water system improvements will not generate additional runoff or require additional drainage infrastructure. All applicable City, State, and Federal laws and standards will be followed, thus, no long-term impacts are expected.

4.4.4 ELECTRIC/TELEPHONE/CABLE UTILITIES

Existing Conditions

Traffic signal, manholes/handholes/boxes, ductlines, utility poles, overhead lines, signal corps, and street lighting within the project sites are served by various agencies and utility companies including but not limited to: AT&T, Hawaiian Electric Company (HECO), Hawaiian Telcom, Oceanic Time Warner Cable, City, State and the U.S. Army.

Impacts and Mitigation Measures

Construction plans will be submitted to the various agencies and utility companies and required clearance between the proposed water system improvements and the utilities will be maintained. The contractors will obtain written clearance prior to excavation and coordinate any necessary relocation and utility outage with the agencies/utility companies, business and the residents to minimize the impact to the electrical/telecom/CATV infrastructure. Prior to construction at each of the sites, the contractor will tone and contact Hawaii's One Call Center to arrange for field location of the existing utilities. All work involving the utilities will be done in the presence of the agencies/utility companies representatives and follow its standards. BWS and its contractor will provide access to existing agencies/utility company's easement and facilities in the project area during construction. The appropriate agency/utility company will be notified immediately should any damage be caused to its existing infrastructure. As of February 2016, HECO identified the following areas of potential conflict between the water system improvements and existing/proposed electrical infrastructure:

- Existing fiber cables and electrical transmission lines at Ala Moana Blvd. between River Street and Fort Street Mall.

- Future planned fiber cables and existing electrical transmission lines at the vicinity of intersection of Nimitz Highway and Sumner Street.

- Existing fiber cables and electrical transmission lines at the vicinity of intersection of Piikoi Street and Kona Street/Kapiolani Blvd.

- Future planned fiber cables and existing electrical transmission lines at the vicinity of intersection of Piikoi Street and Beretania Street.

- Future planned and existing fiber cables at Ala Moana Blvd. between Fort Street Mall and Richards Street.

DDC also identified the following street light project in the proposed water improvements vicinity:

- Kapiolani Boulevard Street Light Improvements - Ward Avenue to Piikoi Street.

Construction around overhead lines will follow all applicable utility company, State and Federal Occupational Safety and Health Laws. If the construction should encroach in close proximity to underground lines or within the radial clearance to the overhead lines, the appropriate utility companies will be notified and necessary precaution such as de-energizing the line might be necessary. Should trenching operation encroach within 10 feet of existing poles, adequate support (approved by utility companies) will be provided to the poles. Since the project is not adding population or development, the proposed water system improvements will not directly generate an increase in demand of electrical, cable, and telephone system service or construction of supporting infrastructure within the project area. All applicable utility company, City, State, and Federal laws and standards will be followed, thus, no long-term impacts are expected.

4.4.5 GAS UTILITIES AND FUEL LINES

Impacts and Mitigation Measures

Hawaii Gas maintains gas lines of various sizes in the project area. During the design phase, construction drawings will be submitted to Hawaii Gas for review and comment. At each of the project sites, the contractor will also contact Hawaii's One Call Center to arrange for field location of the existing gas pipelines. During construction some gas lines will be exposed during trenching activities and may conflict with the proposed improvements. The contractor will obtain written clearance prior to excavation and coordinate any necessary relocation with Hawaii Gas, affected business and residents to minimize the impact to the gas system. All excavation and backfill around gas lines will be done in the presence of the Hawaii Gas representatives and follow its standards. Adequate support and protection to gas line exposed in the trench will be approved by Hawaii Gas. Hawaii Gas will be notified immediately should any damage be caused to existing gas pipelines, coatings, or its catholic protection devices. Since the project is not adding population or development, the proposed water system improvements will not directly generate an increase in demand of gas service or require the construction of additional gas infrastructure within the project area. All applicable Hawaii Gas, City, State, and Federal laws and standards will be followed, thus, no long-term impacts are expected.

During design, BWS and its consultant shall consult with fuel suppliers to determine and address conflicts with fuel lines near the harbor areas.

4.4.6 ROADWAYS

Existing Conditions

The proposed project will take place within State and City road right-of-ways (refer to Table 4.1). DOT-HWY maintains jurisdiction over Nimitz Highway, Ala Moana Boulevard (except for its intersection with Kalakaua Avenue), and Richards Street (Ala Moana Boulevard to Halekauwila Street). The City maintains jurisdiction over River Street, King Street, Pensacola Street, Piikoi Street, Nuuanu Avenue, Cooke Street, and Ala Moana Boulevard at its intersection with Kalakaua Avenue. Aloha Tower Drive is under the jurisdiction of the State Department of Transportation Harbors Division (DOT-HAR).

TABLE 4.1 - AFFECTED ROADS

Affected Road	Construction Boundaries	Approximate Length of Disturbance	Affected Jurisdiction
N. Nimitz Highway	Pacific Street to Sumner Street	1,355 feet	State
N. Nimitz Highway	River Street to Richards Street	3,100 feet	State
Aloha Tower Drive	Fort Street Mall to Ala Moana Boulevard	2,000 feet	State
Richards Street	Ala Moana Boulevard to Halekauwila Street	350 feet	State
Ala Moana Boulevard	Aloha Tower Drive to Kalakaua Avenue	14,500 feet	State/City
N. King Street	N. Hotel Street to River Street	180 feet	City
River Street	N. Nimitz Highway to N. Beretania Street	1,160 feet	City
Nuuanu Avenue	N. Nimitz Highway to N. Pauahi Street	1,150 feet	City
Cooke Street	Ala Moana Boulevard to Pohukaina Street	1,038 feet	City
Pensacola Street	Kinau Street to Wilder Avenue	1,900 feet	City
Piikoi Street	Ala Moana Boulevard to Kapiolani Bouleavrd	1,510 feet	City
Piikoi Street	S. King Street to Kinau Street	1,028 feet	City

Impacts and Mitigation Measures

The BWS and its consultants will coordinate its work with the State and/or City and follow all applicable standards. Coordination is crucial as both the State and City currently implement a one-year moratorium on utility trenching in newly paved roadways. As of February 2016, DDC identified the following upcoming resurfacing projects that may be subject to the one-year repaving moratorium:

- Rehabilitation of Streets, Unit 67 (King Street and Punchbowl Street): The project extends along King Street from Bethel Street to Alapai Street and along Punchbowl Street, from Vineyard Boulevard to King Street.

- Rehabilitation of Streets, Unit 76 (Kalakaua Avenue): The project will extend along Kalakaua Avenue, from Beretania Street to Ala Wai Boulevard.

- Rehabilitation of Streets, Unit 77 (Pensacola Street): The project will extend along Pensacola Street from mauka of the Kapiolani Boulevard intersection to the State right-of-way makai of the Lunalilo Street intersection.

- Rehabilitation of Beretania Street, Unit 64-R (Beretania Street from University Avenue to Alapai Street).

- Rehabilitation of Localized Streets, Phase 12D (Iwilei, Chinatown): The project extends along Nuuanu Avenue from Nimitz Highway to Vineyard Boulevard and along River Street from Nimitz Highway to Beretania Street and Kukui Street to Vineyard Boulevard.

- Rehabilitation of Streets, Unit 66 (Oahu Avenue, Kapahulu Avenue, Atkinson Drive): The project extends along Oahu Avenue from East Manoa Road to Manoa Road, along Kapahulu Avenue from Ala Wai Boulevard to Harding Avenue, and along Atkinson Drive from Ala Moana Boulevard to Kapiolani Boulevard.

Other DDC projects that are in the same vicinity as the proposed water system improvements that will require coordination include, but are not limited to the following:

- Ala Moana Regional Park Improvements along Ala Moana Boulevard (Makai side Kamakee Street to Atkinson Drive): Plant trees along Ala Moana Blvd and provide irrigation.

- North King Street Bridge (No. 150) Rehabilitation: Rehabilitate North King Street Bridge, crossing Nuuanu Stream, to retrofit load carrying capacity of bridge and upgrade the railings. Work is anticipated to include replacement of existing asphalt overlay and fill with reinforced concrete topping.

During design and construction, the proposed water system improvements on the existing roadways will be installed with a minimum cover as required by the State and/or City. This depth will be measured from the top of the proposed water main to the finished grade of the pavement. Trenching and pavement restoration in the existing roadway will comply with the City Trenching Permits and Repaving of Street policy dated September 30, 2004, or other applicable City and/or State policies.

After completion of the project the affected areas in the State and City road ROW will be restored to original or better condition (subject to approval from the State and/or City), including pavements, driveways, curbs, sidewalks, gutters, landscaping, signage, pavement markings, etc., using the using the same or other approved material(s). The contractor will notify appropriate City and State agencies of planned and unplanned impacts to traffic signals. Construction drawings will be submitted to the City, DOT-HAR, and DOT-HWY for review and approval of roadway work and restoration. Drawings will also be submitted to DOH Disability Communication and Access Board Review for conformance with accessibility guidelines.

Construction of the water system improvements on existing roads will have short-term impacts to vehicular and pedestrian traffic due to construction related activities. Completion of the water system improvements are not expected to generate additional traffic or road infrastructure. Since the project is not adding population or development, the proposed water system improvements will not directly generate an increase of additional traffic or require the

construction of additional road infrastructure within the project area. Since all applicable City, State, and Federal laws and standards will be followed, no long-term impacts are expected.

4.4.7 HARBOR FACILITIES

Existing Conditions

Due to Hawaii's geographic isolation, nearly all consumer goods are imported via the State's ports, including Honolulu Harbor which is under the jurisdiction of the State Department of Transportation Harbors Division (DOT-HAR). It is the State's largest port which handles container traffic, barges, cruise ships, fishing boats, passenger vessels, etc. As of 2013, Honolulu Harbor ranked 39th in the United States and 245th in the world with a total trade of over 14 million tons of cargo (ACOE, Waterborne Commerce Statistics Center). According to DOT-HAR, the project area may impact harbor facilities such as: cruise ship passenger terminals at Piers 2 and 11, the DOT-HAR Administrative offices (located near the intersection of Nimitz Highway and Fort Street Mall), and planned construction projects at Piers 12 and 15.

Impacts and Mitigation Measures

To prevent any delays in the construction of the water system improvements or Harbor construction projects, the BWS and its consultant(s) will work closely with DOT-HAR to coordinate construction schedules so as to minimize/prevent conflicts. To the extent possible, the BWS will schedule construction around Honolulu Harbor during the summer months (mid-May to mid-September) to minimize impacts to cruise ship operations, passengers, and related vehicles (buses, shuttles, taxies). The construction plans will include traffic control plans to allow safe and timely circulation of buses, shuttles, taxis around passenger terminals. The traffic control plans will also include measures to provide access for employees, clients, construction workers and vehicles to DOT-HAR facilities and construction sites. The contractor(s) will also coordinate construction activities with Honolulu Harbor tenants in the project area including, but not limited to, passenger cruise ships, Hawaii Pacific University, Aloha Tower Market Place and the Foreign Trade Zone, to minimize water service disruptions and traffic impacts. Early coordination by the BWS and its consultant/contractor should mitigate short-term impacts to DOT-HAR and other users.

4.4.8 THEBUS

Existing Conditions

The City and County of Honolulu bus system (known as TheBus) is an island wide public transit system privately managed by Oahu Transit Services (OTS) and overseen by the Department of Transportation Services (DTS). TheBus serves over 100 routes, 4,000 bus stops and 22,000 daily passengers. Several City bus routes (refer to Table 4.2) travel on Ala Moana Boulevard, Nimitz Highway, and other streets involved in the project area.

TABLE 4.2 - POTENTIAL AFFECTED BUS ROUTES

Route A: CityExpress! Waipahu/ Kalihi/UH	Route E: CountryExpress! Waipahu/Ewa Beach	Route 1: Kaimuki/Kalihi
Route 1L: School St/Hawaii Kai Limited	Route 2: Waikiki/School/Middle	Route 2L: Waikiki/School/Middle
Route 3: Kaimuki/Salt Lake	Route 4: Nuuanu/Punahou	Route 6: Pauoa/Woodlawn
Route 8: Waikiki/Ala Moana	Route 9: Kaimuki/Pearl Harbor	Route 11: Makalapa/Halawa/Aiea Heights

TABLE 4.2 - POTENTIAL AFFECTED BUS ROUTES (continued)

Route 13: Liliha/Waikiki/University	Route 17: Makiki/Ala Moana	Route 18: University/Ala Moana
Route 19: Waikiki/Airport/Hickam	Route 20: Waikiki/Airport/Pearlridge	Route 23: Hawaii Kai/Sea Life Park
Route 40: Honolulu/Makaha	Route 42: Waikiki/Honolulu/Ewa Beach	Route 43: Waipahu/Honolulu/Alapai
Route 52: Honolulu/Mililani/Haleiwa	Route 53: Honolulu/Pacific Palisades	Route 54: Honolulu/Pearl City
Route 55: Honolulu/Kaneohe/ Haleiwa	Route 56: Honolulu/Kailua/Kaneohe	Route 57/57A: Honolulu/Kailua/ Waimanalo/Sea Life Park/Enchanted Lakes
Route 62: Honolulu/Wahiawa	Route 80/80A: Hawaii Kai Park & Ride Express	Route 80B: Upper Aina Haina Express
Route 81: Waipahu Express	Route 82: Hawaii Kai Park & Ride Express	Route 83: Wahiawa Town Express
Route 84: Mililani Express/	Route 88A: North Shore Express	Route 90: Pearl City Express
Route 91: Ewa Beach Express	Route 92: Makakilo City Express	Route 93: Waianae Coast Express
Route 94: Villages of Kapolei/ Kaupea Express	Route 96: Waipio Gentry Express	Route 97: Village Park Express
Route 98: Wahiawa/Mililani Park & Ride Exp	Route 98A: Kunia/Wahiawa/Mililani Express	Route 101: Ewa Gentry Express
Route 102: Villages of Kapolei Express	Route 103: Paiwa/Waikele Express	Route W1: Ewa Beach/Waipahu/ Waikiki Express
Route W2: Waipahu/Waikiki Express	Route W3: Kalihi/Waikiki Express	Route PH6: Hawaii Kai/Pearl Harbor Express

Source: TheBus System Map: http://www.thebus.org/SystemMap/TheBusSystemMap.pdf

Impacts and Mitigation Measures

The majority of the impacts will be associated with short-term construction-related activities. To mitigate the short term impacts, the BWS and its consultants/contractors will coordinate with DTS and OTS. Furthermore, at least 2 weeks prior to the start of construction, the contractor will be required to notify DTS and OTS of the scope of work, location, proposed closure of any street, traffic lane, sidewalk, or bus stop. It is anticipated that all routes and stops will be restored to original location and frequency after construction, thus, long-term impacts are not expected.

4.4.9 HONOLULU RAIL TRANSIT PROJECT

Existing Conditions

The Honolulu High-Capacity Transit Corridor Project (Honolulu Rail Transit Project) is a fixed guideway rail system that extends approximately 23 miles from Kapolei in the west to Ala Moana in the east with 21 transit stations. The Honolulu Rail Transit Project is intended to provide a reliable alternative mode of transportation for travelers who face severe traffic congestion between Kapolei and Ala Moana. Currently construction of the Honolulu Rail Transit Project is underway with the system planned to be fully operational in the year 2019.

Impacts and Mitigation Measures

To oversee the planning, design, construction and extension of the Honolulu Rail Transit Project, the Honolulu Authority for Rapid Transit (HART) was created. As part of pre-

assessment consultation, HART and its consultant, AECOM, identified the following areas of potential conflict between the water system improvements and Honolulu Rail Project:

- Utility work at the Kona - Piikoi Street intersection near Ala Moana Center
- Electrical work at the Cooke and Pohukaina Street Intersection in Kakaako
- Utility work on Nimitz Highway between River Street and Halekauwila Street
- Electrical work on Ala Moana Boulevard near the Prince Jonah Kuhio Kalanianaole Federal Building and Punchbowl Street

To prevent any delays in the construction of the water system improvements and the Honolulu Rail Transit Project, the BWS and its consultants will work closely with HART and coordinate construction schedules and areas of construction activities.

4.4.10 HONOLULU SEAWATER AIR CONDITIONING

Honolulu Seawater Air Conditioning will be constructing a seawater air conditioning (SWAC) system to provide 25,000 tons of centralized air conditioning for downtown Honolulu. SWAC uses cold seawater to maintain the low temperature of chilled water used in buildings air conditioning systems. The process begins by pumping cold seawater (which is discharged back into the ocean after use) into a proposed cooling station in Kaakako to lower the temperature of chilled water. The cold chilled water will be pumped to the buildings, provide comfortable temperatures to its users, then looped back to the cooling station where the process repeats.

The proposed alignment of the chilled water loop may cross the proposed water main route at Keawe Street and South Street near its intersection with Ala Moana Boulevard. Other SWAC work near the project sites occur at Richards Street, Bishop Street, Alakea Street and Halekauwila Street near its intersection with Nimitz Highway. To prevent any delays in the construction of the water system improvements and chilled water loop, the BWS and its consultants will coordinate with Honolulu Seawater Air Conditioning during the planning and design phases. Construction activities and schedules will also be coordinated as needed.

4.4.11 CONSTRUCTION ACTIVITIES

During construction, normal requirements for mitigation of construction impacts will be utilized. These requirements include traffic control, compliance with BMPs, compliance with hours prescribed for construction to minimize noise impacts, and coordination with adjacent businesses and residents. All BMPs are to be in place prior to the commencement of any construction activities. Proposed BMPs include but not limited to the following:

1. All loose material, small tools and equipment will be removed from the construction site after each work day is completed.

2. City/State-approved area(s) to store or stockpile construction related materials and equipment will be designated prior to the start of construction. Stockpiling construction material in the roadway, sidewalk, and areas in close proximity to State Waters will be prohibited. Stockpiled construction materials will be protected from erosion, to prevent materials from being carried into waters by wind, rain, or high surf.

3. Solid waste, removed vegetation, debris and unsuitable excavated materials will be properly disposed at a site approved by the City/State.

4. All hazardous or toxic waste will be disposed of in the manner specified by federal, state or City regulations or the manufacturer.

5. All sanitary waste from portables will be collected and disposed of properly.

6. Any debris and other deleterious material will be contained and prevented from entering adjoining properties and State Waters.

7. Materials to be placed in State Waters, if any, will be free of waste metal products, organic materials, objectionable debris and any other pollutants at concentrations toxic or potentially hazardous to aquatic life.

8. Sediment control filters shall be installed on catch basins in and around the site. Sediment control filters will be removed during times of above normal rainfall events and replaced after the event has passed.

9. Visual monitoring will be performed by the contractor on a daily basis or following any storm event of 0.25 inch or greater. The contractor will inspect all control measures to ensure that they are maintained in good working condition. Necessary repairs will be initiated by the contractor within 24 hours of notification or observation.

10. To the extent possible, construction will be done during dry weather so that there is low or no construction-related runoff. The contractor will be required to temporarily suspend work during periods of heavy rain.

11. Equipment shall be inspected daily to ensure that oil leaks do not occur. Equipment shall be stored away from State Waters. Fueling and lubricating of equipment and motor vehicles will be conducted away from State Waters and in a manner to protect against spills and evaporation. Lubricants and excess oils will be disposed of in accordance with applicable Federal, State and City regulations. Absorbent pads will be stored on-site to facilitate the clean-up.

12. Any existing improvements in the project sites, and in adjacent areas, that are not to be removed, shall be preserved and protected. Any and all damages resulting from construction activities shall be restored to original, or better condition.

13. The roadway (including sidewalk and gutters) shall be cleaned on a daily basis to be free of debris and sediment resulting from construction operations (flushing into the catch basins are prohibited).

14. If applicable, any project construction-related materials and equipment placed in an aquatic environment should be inspected for pollutants and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of nonnative pests to the affected or adjacent aquatic or terrestrial habitats.

15. All other requirements per applicable NPDES General Permit conditions and construction related BMP requirements.

4.5 HUMAN ENVIRONMENT

This section describes the proposed water system improvements effects on the human environment including human social systems, population size, economy, education, and way of life. Most impacts will be short-term and associated with construction related activities and will be mitigated through the use of permits, advanced notification, and cooperation with government agencies and affected neighborhoods/businesses. All applicable City, State, and Federal laws and standards will be followed, thus, no negative long-term impacts are expected.

4.5.1 NOISE

Noise related to construction activities are primarily controlled by hours of operation. All construction along the pipeline routes will be limited to daytime and/or non-peak traffic hours and the contractor would be required to obtain a Community Noise Permit from the DOH as required. Activities associated with the construction phase of the project will comply with HAR Chapter 46 of Title 11, Community Noise Control. Since noise levels in the project area are anticipated to be identical prior to and after project implementation, no long-term impacts are expected.

4.5.2 TRAFFIC

Existing Conditions

A Traffic Information Report (TIR) was prepared by Julian Ng (2015) in conjunction with the proposed Honolulu Water System Improvements (refer to Appendix F). Existing conditions at key thoroughfares, including traffic data related to time-of-day are presented in the TIR. General traffic conditions were summarized for the central Honolulu area (Ng, 2015):

> "Daily traffic volumes in central Honolulu typically do not vary too much throughout the year, with weekly totals ranging from about 85% to 115% of those of an average week. Higher peak hour volumes usually occur for a period of several weeks in August, when high visitor totals combine with the return to school for most public and private school students; the higher peaks are more noticeable near schools.
>
> While extensive traffic data is not available for most street segments, there is a continuous count station (counts are taken every day of the year) on Ala Moana Boulevard north of Punchbowl Street, which is maintained by the State Highways Division. At that location, Average Annual Daily Traffic (AADT) was 60,000 vehicles per day (vpd), total in two directions, in 2012 and 60,700 vehicles per day in 2013. The data suggest that traffic volumes are increasing at a rate of about 1% per year.
>
> Variation in traffic by day of week was greater than the variation by month. Traffic volumes were highest on Fridays (about 10% higher than an average weekday), with weekend volumes being lower than average weekdays (Saturday about 10% lower, Sunday about 30% lower)."

Impacts and Mitigation Measures

According to the TIR, potential traffic impacts associated with the water system improvement projects will depend primarily on lane and sidewalk closures as well as other interferences with pedestrian or vehicular traffic during construction. Key mitigation measures include: (1) consideration of trenchless construction methods, (2) night work, (3) prohibiting on-street

parking during lane closures, and (4) prohibiting lane closures during periods of heavy traffic. The TIR summarizes the potential traffic impacts and mitigation measures below (Ng, 2015).

> "The impact to traffic of the various waterline projects will depend on the lane and sidewalk closures required. The locations of the lane closures will be affected by the location of the new waterline within the street right-of-ways, and may be affected by other existing or planned utilities, drainage systems, or other uses within the street rights-of-way. Once the locations of the new waterlines are determined, construction methods to minimize impacts to traffic and access can be considered. These methods could include tunneling instead of trenching, and the selection of pit locations for tunneling should include consideration of possible traffic impacts (in general, locations away from intersections would have less impact).
>
> Lane closures and impacts to access, both vehicular and pedestrian, will also be affected by other construction work in the area. The scheduling of work should be coordinated with other projects that are planned for the same or parallel corridors; these projects include the Honolulu Area Rapid Transit project, which would affect portions of Nimitz Highway and could affect any work on Piikoi Street near Kona Street, development projects in Kakaako (which may affect work on Ala Moana Boulevard, Cooke Street, or Piikoi Street), and waterfront projects (which would affect work along Nimitz Highway).
>
> For the projects that are expected to start within five years, the recent traffic data provide information on the possible impacts of any lane closures for construction, and the times of day that any lane closures would have less impact to traffic. In general, any construction activity that would affect traffic would not occur during weekday peak commuting times (before 8:30 AM and after 3:00 PM); however, review of the traffic data shows that any lane closures on many of the affected roadways could have significant traffic impacts (note that the discussion below does not account for concurrent construction activity)."

- Nimitz Highway

  "On Nimitz Highway between Pacific and Sumner Streets, the inbound lanes carry high volumes (1,500 vehicles per hour and higher) of traffic during most of the weekday daylight hours (6 AM to 7 PM), with peak flows greater than 2,000 vehicles per hour during not only the morning (6 AM to 9 AM) but also the afternoon (3 PM to 6 PM) commuting times. The count data suggests that closure of one of the four lanes between 9 AM and 3 PM may not create significant impacts to traffic. Any closure of multiple lanes, however, should be scheduled for other times (since there are limited residential uses near this segment, night work should be considered to mitigate possible impacts to traffic)."

- Ala Moana Boulevard

  "On Ala Moana Boulevard west of Piikoi Street, the traffic data indicate that volumes during the day (between the morning and afternoon peak periods) are about 75% of the peak hour volumes, which indicates that congested conditions could be expected if a 33% reduction in the number of available traffic lanes were

to occur. Therefore, any lane closure would result in conditions that are worse than existing conditions during peak hours.

East of Piikoi Street, traffic flow rates on Ala Moana Boulevard during the middle of the day (after 9:30 AM and before 2:30 PM) are about 60%-65% of the highest rates measured during the peak periods. Therefore, on Ala Moana Boulevard east of Piikoi Street, a single-lane closure may have a tolerable impact."

- Pensacola Street

  "On Pensacola Street, two lanes of traffic should be maintained to accommodate the volumes that would occur during the day. Prohibiting on-street parking to allow one or both curb lanes to be used to move traffic if a regular lane needs to be closed would be necessary to provide two lanes for traffic. There are also areas along Pensacola Street where access to properties are through very wide, or continuous, driveways, and any trenching that affects this access should be mitigated."

- Other Affected Uses

  "Construction activities will also affect (or be affected by) other uses of the affected streets. Portions of Nimitz Highway and Ala Moana Boulevard are used for events such as the annual Great Aloha Run (February) and parades (various times of the year). Monthly events are held in downtown Honolulu include closure of Nuuanu Avenue."

In addition, normal construction practices will allow for the following mitigation measures:

- Restricted Hours of Construction

  As indicated above, trenching activities, installation of water system improvements and movement of construction equipment in the roadway could block traffic lanes, interfere with pedestrians and restrict on-street parking. Therefore, construction work and any transfer of construction materials and equipment within the roadway will occur during non-peak traffic hours (8:30 am to 3:30 pm and after 7:30 p.m.) to minimize disruption to traffic. Most past major projects were done during the night as this reduces impacts to construction and traffic.

- Coordination of Construction Schedules of Other Projects in Adjacent Areas

  BWS and its contractors shall coordinate its construction schedules with various entities and government agencies regarding planned and ongoing construction projects in the vicinity of the proposed water line project sites. This is crucial in minimizing impacts to the travelling public and reducing temporary inconveniences. The business/commercial entities in the area include but are not limited to: Ala Moana Center, Honolulu High-Capacity Transit Corridor Project, Honolulu Harbor, Hawaii Community Development Authority (HCDA), Bernice Pauahi Bishop Estate Trust, Howard Hughes Group Corp (HHG), and Honolulu Seawater Air Conditioning, LLC. BWS will attend all affected Neighborhood Board Meetings to keep the public informed as well as obtain valuable public input. BWS will also meet periodically with the hotel and visitor industry, and the Convention Center Authority to receive their input.

- Public Notification

  The City departments including Emergency Services Police, Fire, Transportation Services, Environmental Services, Facilities Maintenance, and OTS (TheBus and TheHandi-Van) will also be notified of any construction activities that could impact respective public services at least two weeks prior to the start of construction. To the extent possible, construction-related information will also be provided on the Department of Transportation's GoAkamai website, including dates, times, and locations of roadwork and lane closures associated with the individual water line projects. The use of social media has proven effective in providing up to date road closure information and suggested alternate routes. Notice to Motorists will also be published in the daily news publications.

- Preparation of Site-Specific Traffic Control Plans

  Traffic control plans (TCPs) for each project site will be developed by a registered civil engineer and conform to the latest State and City rules and comply with current Federal Highways Manual of Uniform Traffic Control Devices. TCPs will be submitted to the City and State for review and approval prior to the start of construction. The contractors will implement, install and maintain all necessary traffic control measures (e.g., signs, lights, barricades, cones, flagmen, special duty police officers and other safety equipment) to facilitate the flow of construction equipment, motor vehicle and pedestrian traffic in the area(s) during construction. During non-working hours all open trenches will be covered with a safe non-skid bridging material and all lanes will be open to the public. The various contractors will work closely with government construction representatives and onsite law officers to make necessary adjustments to traffic control plans as warranted by traffic and work conditions to alleviate congestion.

- Maintenance of Traffic Flow and Access

  To the best of their ability, contractors will be expected to keep driveways accessible. Similarly, it is expected that traffic along busy streets including but not limited to River Street between North Beretania Street and flow along Nimitz Highway and Hobron Lane at Ala Moana Boulevard will be maintained to minimize impacts and inconveniences to motorists, pedestrians, and businesses. In addition, the various contractors will be required to obtain applicable permits for street usage, transport of overweight loads, and trenching.

4.5.3 ECONOMIC AND SOCIAL FACTORS

Existing Conditions

The cost of the proposed water system improvements is estimated to be approximately $43.6 M and will be funded by the BWS operating funds, and possibly WSFC and Federal Funds through the Hawaii's SRF. This will translate into economic benefits for contractors, their employees, material suppliers, and other service providers. Projects will also reduce water main breaks that impacts businesses and inconveniences to the public.

Impacts and Mitigation Measures

However, there will also be undesirable short-term socio-economic impacts associated with the proposed water system improvements, all of which are related to construction activities. These impacts include the following inconveniences to residents, motorists, pedestrians and businesses:

- Noise
- Dust
- Reduction in the number customers
- Interruption of pedestrian and vehicular traffic
- Restriction of on-street parking
- Possible utility disruptions
- Disturbances to users and employees of public facilities (parks, harbors, government facilities, police, fire stations etc.)
- Disturbance to users and employees of child care and educational facilities

Advance communication will be essential in each of the water line projects. At minimum, the affected residents, businesses and public facilities will be notified in writing by the BWS or by its contractors about project's scope, schedule and impacts prior to the commencement of construction. If desired, the BWS or its contractors will be available to meet in person.

Other mitigation measures will include the following:

- Application of appropriate site-specific BMPs
- Scheduling construction activities during non-peak traffic hours (or in the case of schools, during summer months)
- Locating and securing construction equipment within the project area to minimize interference with nighttime residential and business activities
- Providing traffic control procedures throughout the project area to minimize traffic disruptions
- Maintaining access to all affected public facilities throughout construction
    - The DTS, OTS, Emergency Medical Service, Police and the Fire Department will be notified of any construction activities that could affect its respective services at least two weeks prior to the start of construction.
    - Access to fire apparatus will be maintained throughout each of the construction site. Any interruption to existing fire hydrants during construction will be reported to the Honolulu Fire Department by the contractor.

Since the project areas are fully developed, the proposed water system improvements are not expected to change nor have a significant impact on the urbanized land uses. Existing business or residential activities will not be directly displaced by the proposed project. As mentioned previously, construction of the proposed water system improvements will also provide economic benefit for construction companies, their employees, material suppliers, and other service-providers during the anticipated construction period.

Because the proposed water system improvements will result in improved reliability while meeting existing and future demands, the proposed projects will have somewhat of an indirect effect on population growth by allowing development in the Primary Urban Center. However, this is viewed as a positive benefit in which growth will be appropriately managed and controlled and in a manner that is consistent with the City's General Plan (refer to Section 5.3 - City and County of Honolulu General Plan). In the long-term, surrounding residents and businesses will benefit by the improvement of the reliability of service, reduction in the frequency of water main breaks, and increased fire suppression capabilities. All applicable City, State, and Federal laws and standards will be followed, thus, no negative long-term impacts are expected.

Chapter 5 – RELATIONSHIP TO LAND USE POLICIES AND CONTROLS

5.1 HAWAII STATE PLAN

The purpose of the Hawaii State Plan, adopted in 1978 (amended in 1986), is to "improve the planning process in this state, to increase the effectiveness of government and private actions, to improve coordination among different agencies and levels of government, to provide for wise use of Hawaii's resources and to guide the future development of the state" (HRS §226-1). The Hawaii State Plan serves as a guide for the future long-range development of the State. The Plan consists of objectives, and policies for the State to provide a basis for determining priorities and allocating limited resources. The Plan establishes a State-wide planning system to coordinate and guide all major state and county activities. The State Plan promotes the growth and diversification of the State's economy, the protection of the physical environment, the provision of public facilities, and the promotion of and assistance to socio-cultural advancement. The proposed water system improvements are consistent with the following Hawaii State Plan objectives for facility systems - water:

- "Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities" (§226-16.a).

- "Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use" (§226-16.b.4).

In 2011 the Hawaii State Planning Act was amended to provide the policy framework establishing sustainability as a State priority to ensure a coordinated and coherent approach to fulfilling the long-range vision for a sustainable Hawaii (Act 181, SB 283, SD 1, July 5, 2011). As a result a new section on priority guidelines and principles to promote sustainability was added to the Hawaii State Planning Act (HRS §226-108). The proposed water system improvements is consistent with this section by "encouraging planning that respects and promotes living within the natural resources and limits of the State" (HRS §226-108(2)) by incorporated design measures that will result in an increase reliability and efficiency of the water system. One of the purposes of the proposed water system improvements is to replace existing older mains such that there is an overall reduction in main breaks and loss of drinking water. In addition, the proposed water system improvements will be designed to current Water System Standards and tested for leakage prior to use.

The Hawaii State Planning Act was amended again in 2012 as part of Act 286 to create a climate change adaptation policy for the State of Hawaii. The purpose of Act 286 is to "….encourage collaboration and cooperation among county, state, and federal agencies, policy makers, businesses, and other community partners to plan for the impacts of climate change and avoid, minimize, or mitigate loss of life, land, and property of future generations" (Act 286, SB 2745, SD 1, July 9, 2012). As a result, a new section on priority guidelines to prepare the State to address the impacts of climate change was added to the Hawaii State Planning Act (HRS §226-109). The proposed water system improvements are consistent with this section by promoting sector resilience in areas such as water, roads, airports, and public health (HRS §226-109(7)) by improving system reliability through the addition of multiple feeds to the urban core, thus providing BWS increased ability to serve its customers during adverse conditions including sea level rise due to climate change.

5.2 STATE LAND USE PLAN

The purpose of the State Land Use Plan is to establish a state-wide zoning law where all land in the State is classified into four districts (urban, rural, agricultural and preservation). The plan was enacted to prevent haphazard development which will be detrimental to the States long-term growth and income potential. According to the State of Hawaii - Land Use Commission maps, the project area is located within an Urban State Land Use District (refer to Figure 19). The Land Use Commission Website indicates that an urban district "generally includes lands characterized by "city-like" concentrations of people, structures and services." Jurisdiction of this district lies primarily with the respective counties; therefore, the proposed water system improvements are consistent with the "urban" designation and are regulated by City and County of Honolulu's ordinances and regulations.

5.3 CITY AND COUNTY OF HONOLULU GENERAL PLAN

Oahu's General Plan is a written commitment by the City and County of Honolulu to a future for the Island of Oahu which it considers desirable and attainable (DPP, 1992). The general plan consists of various objectives of desirable conditions for the welfare and benefit of the people of Oahu. To obtain the objectives, the plan includes broad policies used to develop planning documents, programs and legislation to guide Oahu's future. The proposed water system improvements are consistent with the following objectives and policies:

- Population Objective B - To plan for future population growth.
    - Policy 1 - Allocate efficiently the money and resources of the City and County in order to meet the needs of Oahu's anticipated future population.
    - Policy 2 - Provide adequate support facilities to accommodate future growth in the number of visitors to Oahu.
- Population Objective C - To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.
    - Policy 1 - Facilitate the full development of the primary urban center.
- Economic Activity Objective F - Increase the amount of Federal programs and grants which will contribute to the economic and social well-being of Oahu's residents.
    - Policy 1 - Take full advantage of Federal programs and grants which will contribute to the economic and social well-being of Oahu's residents.
- Economic Activity Objective G - To bring about orderly economic growth on Oahu.
    - Policy 1 - Direct major economic activity and government services to the primary urban center and the secondary urban center at Kapolei.
- Transportation and Utilities Objective B - To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.

STATE LAND USE DISTRICTS

Gray, Hong, Nojima & Associates, Inc.
CONSULTING ENGINEERS
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813
Fax: (808) 531-8018
Telephone: (808) 521-0306

PACIFIC ST
SUMNER ST
N. NIMITZ HWY
RIVER ST
BERETANIA ST
NUUANU AVE
FORT ST MALL
BISHOP ST
KING ST
ALAKEA ST
RICHARDS ST
QUEEN ST
HALEKAUWILA ST
PUNCHBOWL ST
ALOHA TOWER DR
ALA MOANA BLVD
SOUTH ST
POHUKAINA ST
AUAHI ST
COOKE ST
WARD AVE
KOULA ST
KAMAKEE ST
PENSACOLA ST
WILDER AVE
PIIKOI ST
LUNALILO ST
INTERSTATE H-1 FREEWAY
KINAU ST
YOUNG ST
KING ST
BERETANIA ST
KAPIOLANI BLVD
KALAKAUA AVE
ATKINSON DRIVE
ALA WAI BLVD
HOBRON LANE
ALA MOANA BLVD
ALA WAI CANAL

Honolulu Harbor
Sand Island
Punchbowl
Tantalus
McKinley High School
Ala Moana Center
Ala Moana Beach Park
Waikiki Special District
Pacific Ocean

LEGEND

- Conservation
- Urban
- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main

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SCALE IN FEET

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

CAD DRAWING: 3094-00-EA State Land Use
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE
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  - Policy 1 - Develop and maintain an adequate supply of water for both residents and visitors.

- Transportation and Utilities Objective C - To maintain a high level of service for all utilities.

  - Policy 1 - Maintain existing utility systems in order to avoid major breakdowns.

  - Policy 2 - Provide improvements to utilities in existing neighborhoods to reduce substandard conditions.

- Transportation and Utilities Objective D - To maintain transportation and utility systems which will help Oahu continue to be a desirable place to live and visit.

  - Policy 4 - Evaluate the social, economic, and environmental impact of additions to the transportation and utility systems before they are constructed.

- Physical Development and Urban Design Objective A - To coordinate changes in the physical environment of Oahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.

  - Policy 1 - Plan for the construction of new public facilities and utilities in the various parts of the Island according to the following order of priority: first, in the primary urban center; second, in the secondary urban center at Kapolei; and third, in the urban- fringe and rural areas.

  - Policy 2 - Coordinate the location and timing of new development with the availability of adequate water supply, sewage treatment, drainage, transportation, and public safety facilities.

- Physical Development and Urban Design Objective B - To develop Honolulu (Waialae-Kahala to Halawa), Aiea, and Pearl City as the Island's primary urban center.

  - Policy 1 - Stimulate development in the primary urban center by means of the City and County's capital improvement program and State and Federal grant and loan programs.

- Public Safety Objective B - To protect the people of Oahu and their property against natural disasters and other emergencies, traffic and fire hazards, and unsafe conditions.

  - Policy 7 - Provide adequate fire protection and effective fire prevention programs.

5.4 CITY AND COUNTY OF HONOLULU PRIMARY URBAN CENTER DEVELOPMENT PLAN

To assist in the implementation of the policies and objectives of the General Plan, the City developed eight regional development or sustainable community plans (Ewa, Primary Urban Center, Central, East, Koolau Poko, Koolau Loa, North Shore and Waianae). The proposed water system improvement is located within the Primary Urban Center Development Plan's (PUCDP) boundary (encompassing the area from Pearl City in the west and Waialae-Kahala in the east). The PUCDP establishes policies to shape the growth and development of the primary

urban center of Oahu. The PUCDP recognizes that while the secondary urban center in Ewa will have the greatest growth, the role of the primary urban center will continue to be a central focus as home to almost half of Oahu's population and three-fourths of its jobs. Thus, the focus of planning goals for this mature urban center will be to "enhance its livability and accommodating a moderate amount of growth" (City and County of Honolulu, 2004). The proposed water system improvements recognize the following sections of PUCDP:

- Section 3.3.1.2 – In-Town Housing Choices Development of New Housing: Infrastructure deficiencies are found in most of the older, in-town neighborhoods. Some affect broad areas and are costly to correct. In such cases development cannot occur until the City makes improvements to expand capacity.

- Section 3.3.2 - In-Town Housing Choices Polices: Expand the capacity of infrastructure, including water supply, sewers, and storm drains. Government needs to lead both planning and investment in renewing and expanding infrastructure.

- Section 4.1.2 - Water Allocation and System Development Policies: Implement upgrades and capacity improvements to serve projected population increases.

5.5 CITY AND COUNTY OF HONOLULU ZONING

The City's Land Use Ordinance (LUO), Chapter 21 of the Revised Ordinances of Honolulu (ROH), was established to implement the land use policy of the City, as established by the General Plan and the eight regional development or sustainable community plans. The purpose of the LUO is to provide development and design standards to preserve natural/historic/scenic resources, protect public health and safety, and promote development in accordance with adopted land use polices. The LUO established several zoning districts each with its own set of permitted land uses and development standards. The proposed water system improvements are located in Apartment-Medium Density (A-2), Business-Community (B-2), Business Mixed Use - Community (BMX-3), Business Mixed Use - Central (BMX-4), Industrial Mixed Use (IMX-1), and Preservation - General(P-2) zoning districts (refer to Figure 20). According to the LUO, A-2, B-2, BMX-3, BMX-4, IMX-1 and P-2 are defined as follows:

- "The intent of the A-2 medium density apartment district is to provide areas for medium density, multifamily dwellings. It is intended primarily for concentrated urban areas where public services are centrally located and infrastructure capacities are adequate."

- "The intent of the B-2 community business district is to provide areas for community-wide business establishments, serving several neighborhoods and offering a wider range of uses than is permitted in the B-1 district. The intent is to apply this district to areas conveniently accessible by vehicular and pedestrian modes and served by adequate public facilities. Typically, this district would be applied to lots along major streets and in centrally located areas in urban and urban fringe areas."

- "The intent of the BMX-3 community business mixed use districts is to provide areas for both commercial and residential uses outside of the central business mixed use district and at a lower intensity than the central business mixed use district. Typically, this district would be applied to areas along major thoroughfares adjacent to B-2, BMX-4, A-3, AMX-2 and AMX-3 zoning districts. It is also intended that it be applied to areas where the existing land use pattern is already a mixture of commercial and residential uses, occurring horizontally, vertically or both."

ZONING MAP AND OTHER DISTRICTS

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813
Fax: (808) 531-8018
CONSULTING ENGINEERS Telephone: (808) 521-0306

LEGEND

- A-1
- A-2
- A-3
- Aloha Tower Project
- AMX-2
- AMX-3
- Apt Mixed Use Subprecinct
- Apt Precinct
- B-1
- B-2
- BMX-3
- BMX-4
- F-1
- I-2
- I-3
- Kakaako Comm Dev District
- Mixed Use
- P-1
- P-2
- Public Precinct
- Public Use
- R-3.5
- R-5
- R-7.5
- R-10
- Resort Mixed Use Precinct
- Waterfront Industrial

- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

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DATE:	MAY 2016
PROJECT #:	3094-00

FIGURE
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- "The intent of the BMX-4 central business mixed use district is to set apart that portion of Honolulu which forms the city's center for financial, office and governmental activities and housing. It is intended for the downtown area and not intended for general application. It provides the highest land use intensity for commerce, business and housing."

- "The purpose of the IMX-1 industrial-commercial mixed use district is to allow mixing of some industrial uses with other uses. The intent of this district is to provide for areas of diversified businesses and employment opportunities by permitting a broad range of uses, without exposing nonindustrial uses to unsafe and unhealthy environments."

- "It is also the intent that lands designated urban by the state, but well suited to the functions of providing visual relief and contrast to the city's built environment or serving as outdoor space for the public's use and enjoyment be zoned P-2 general preservation district. Areas unsuitable for other uses because of topographical considerations related to public health, safety and welfare concerns shall also be placed in this district."

The LUO permits the use of these zoning districts for public facilities such as waters systems, therefore the proposed action will be in compliance with the policies and objectives of the City Zoning Districts regulations.

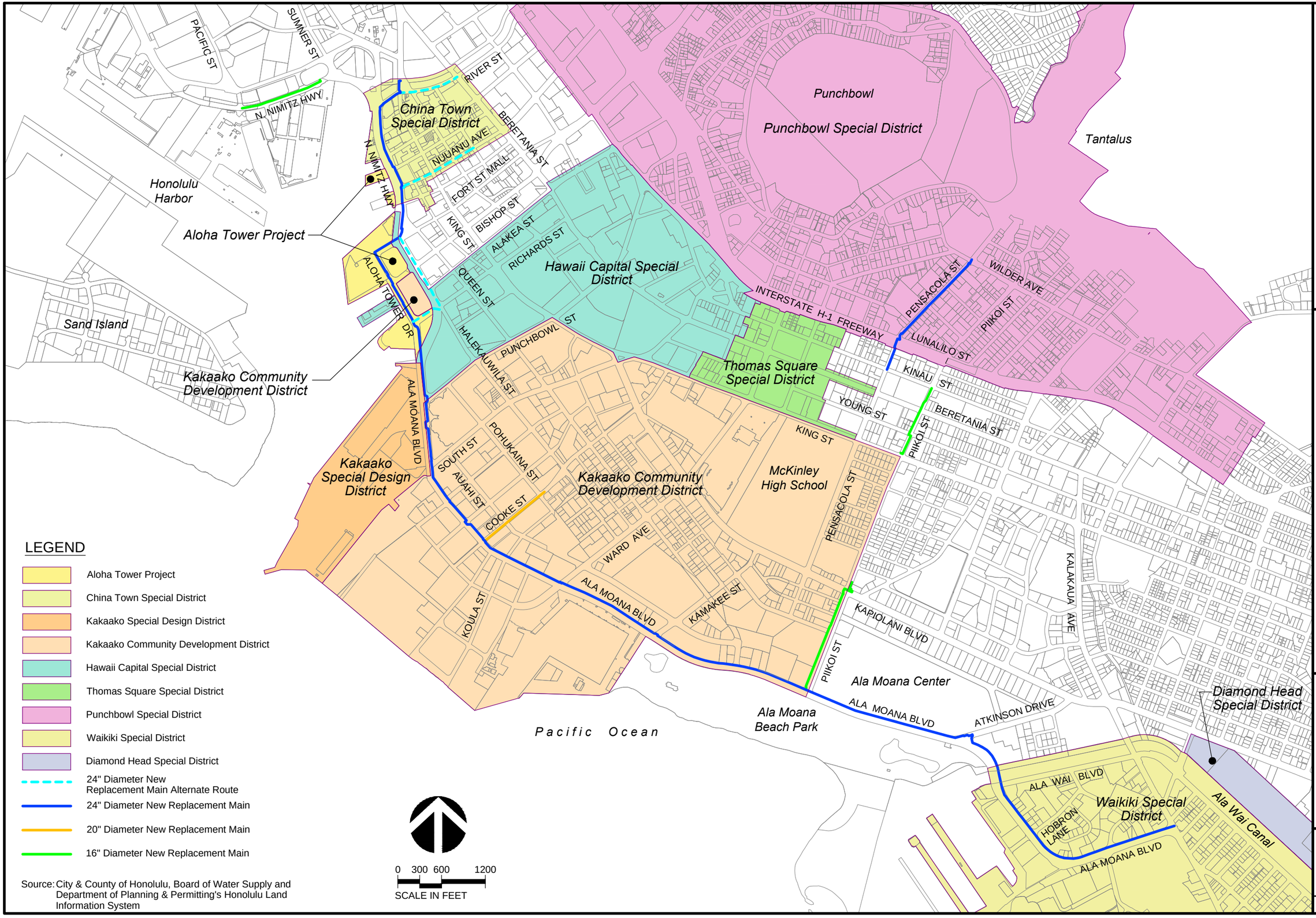
5.6 CITY AND COUNTY OF HONOLULU SPECIAL DISTRICTS

According to the LUO, certain areas of Oahu are designated as Special Districts to protect and/or enhance the physical and visual characteristic for the benefit of the community by guiding development in the area through permits. Portions of the project sites are located within the following special districts: Hawaii Capital Special District, Chinatown Special District, Waikiki Special District, Kakaako Special Design District and Punchbowl Special District (refer to Figure 21). Since the proposed water improvements consists of below grade infrastructure installation and minor streetscape improvements (paving, curb ramps, sidewalks), a special district permit is not required.

5.7 CITY AND COUNTY OF HONOLULU TRANSIT ORIENTED DEVELOPMENT (TOD) SPECIAL DISTRICTS

As stated in Section 4.4.9 - Honolulu Rail Transit Project, the proposed water system improvements will be situated near several transit stations at Iwilei, Chinatown, Downtown, Civic Center, Kakaako, and Ala Moana. The LUO establishes procedures for creating special districts known as Transit Oriented Development (TOD) zones around the stations. These procedures are intended to facilitate orderly growth and redevelopment by regulating uses, structures and development within the TOD boundary (approximately ¼ to ½ mile radius around a transit station). The TOD zone regulations will modify or supplement the existing zoning/special district regulations in order to encourage transit.

Recognizing the unique needs of needs of different neighborhoods, the LUO allows for each community to determine the particular requirements that will apply by preparing neighborhood TOD plans. Any neighborhood that desires to create a TOD zone is required to create a neighborhood TOD plan (ROH Chapter 21, §9.100-2) that must be submitted to the City Council for approval. Development of the Downtown Neighborhood TOD (areas around the Iwilei, Chinatown and Downtown stations) and Ala Moana Neighborhood TOD (area around Ala Moana station) is under City jurisdiction. The Civic Center Station and Kakaako Station TODs



LEGEND

- Aloha Tower Project
- China Town Special District
- Kakaako Special Design District
- Kakaako Community Development District
- Hawaii Capital Special District
- Thomas Square Special District
- Punchbowl Special District
- Waikiki Special District
- Diamond Head Special District
- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

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SPECIAL AND OTHER DISTRICTS

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813
Fax: (808) 531-8018
CONSULTING ENGINEERS Telephone: (808) 521-0306

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DATE: MAY 2016
PROJECT #: 3094-00

FIGURE
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are under the jurisdiction of the Hawaii Community Development Authority (HCDA) and will be discussed in Section 5.10 - Kakaako Community Development District.

The Downtown Neighborhood TOD plan has been approved by the Planning Committee of the Honolulu City Council and is currently being prepared for submittal to the full Council. BWS has determined that the existing water system is adequate to accommodate the water requirements of the Downtown, Chinatown and lwilei station areas. However, as part of their normal practice, BWS will confirm the availability of water when building permit applications are submitted for approval.

The Ala Moana Neighborhood TOD plan is currently in the process of being finalized. It is anticipated that BWS will work with the appropriate parties and review proposed water demands for the Ala Moana Neighborhood TOD.

5.8 CITY AND COUNTY OF HONOLULU PUBLIC INFRASTRUCTURE MAP

Provisions of the Public Infrastructure Map (PIM) are set forth in ROH Chapter 4 Article 8. PIM includes symbols showing the general location of major public infrastructure projects that have a significant impact on surrounding land uses or environment, establishes a new facility, substantially changes the function of an existing facility, or modifies an existing facility which would permit significant new development or redevelopment. Examples of projects shown on the PIM include: major roads, wastewater treatment plants, and water reservoirs. There is no "symbol" for water mains on the PIM for the Primary Urban Center, therefore, the PIM will not need to be revised for the proposed water system improvements.

5.9 CITY AND COUNTY OF HONOLULU FLOOD HAZARD DISTRICTS

The purpose of a Flood Hazard Districts is to regulate development in flood/tsunami prone areas to reduce property damage, loss of life, health/safety hazards and cost related to flood control and damage. Flood Hazard Districts are districts consisting of the general floodplain district (Zone A), floodway district (floodway in Zone AE), flood fringe district (Zones AE, AO, AH), and coastal high hazard district (Zone VE). As mentioned in Section 4.1.5 - Flood and Tsunami Hazard, portions of the water system improvements are in an areas designated as Zones AO, AE & VE (refer to Figure 16 on page 36). As such, the projects will occur within the Flood Hazard District and is regulated by ROH Chapter 21A and Title 44 of the Federal Code of Regulations. The proposed water system improvements will comply with development standards as described in ROH Chapter 21A, particularly:

- For new or replacement potable water system and facilities, be designed to minimize or eliminate infiltration of flood waters into the system (§21A-1.6(f)).

If required, hydrologic and hydraulic analyses will be performed, and a licensed engineer will certify that the proposed water system improvement encroachment on the flood hazard district will not cause any increase above regulatory flood elevations during the occurrence of a flood.

5.10 KAKAAKO COMMUNITY DEVELOPMENT DISTRICT

In 1976 the State Legislature established the Hawaii Community Development Authority (HCDA) to plan and revitalize underutilized urban areas of Hawaii by promoting and coordinating public and private sector community development. The Kakaako Community Development District (KCDD) was designated as HCDA's first development district (refer to Figure 21 for KCDD boundaries). According to the HCDA's 2014 annual report, "HCDA serves

as an infrastructure developer, landowner, city planner, regulator, and property manager to expeditiously implement the Kakaako's master plan". Portions of the proposed Honolulu Water System improvements within KCDD include the following:

- 24-inch replacement main along Ala Moana Boulevard between Punchbowl and Piikoi Street (Project ID A).
- 16-inch replacement main along Piikoi Street between Ala Moana and Kapiolani Boulevard (Project ID D).
- 20-inch replacement main along Cooke Street between Ala Moana Boulevard and Pohukaina Street (Project ID F).

There are several projects that are currently under construction or permitted by HCDA that are in the vicinity of the project area. These include The Collection, Vida, Gateway, and Waiea which are along Ala Moana Boulevard. To mitigate potential traffic issues in Kakaako and construction delays, BWS and its contractors will coordinate the proposed water system improvements within the KCDD with HCDA.

KCDD is separated into two areas - Mauka and Makai. Ala Moana Boulevard is the dividing line; therefore, the proposed water system improvements are likely to fall within the KCDD Mauka Area. In the 2011 Mauka Area Plan, HCDA estimates the need for 16,000 feet of new or larger replacement mains to meet fire flow requirements and future water demands. Included in the masterplan were proposed upgrades to the water mains on Ala Moana Boulevard and Cooke Street. In support of TOD in KCDD, Belt Collins Hawaii (BCH) analyzed the Kakaako Mauka area including portions of Project IDs A and F of the proposed water system improvements along with planned upgrades from HHG development as part of Water Master Plan Update HCDA Kakaako Mauka District dated 2014. The analysis determined that with the proposed improvements, the water system will adequately meet estimated peak hour future domestic demand for the KCDD Mauka Area including the TOD. As part of the analysis, BCH recommended increasing various existing 6-inch and 8-inch water mains within KCDD to 12-inch mains in order to meet current fire flow requirements. According to the KCDD TOD Overlay Plan EIS (Sichter, 2015), "Since the replacement of all the 6-inch and 8-inch diameter water mains with 12-inch diameter mains is not a BWS or HHG planned improvements, the cost of the approximately 37,600 linear feet replacement needs to be borne by the developments within the KCDD."

5.11 STATE COASTAL ZONE MANAGEMENT PROGRAM

The 1972 Coastal Zone Management Act (CZMA), administered by NOAA, was established to provide the basis for protecting, restoring, and responsibly developing the nation's diverse coastal communities and resources. A provision of the CZMA was to provide funding for states to develop their own Coastal Zone Management (CZM) programs. Hawaii's CZM program was approved by NOAA in 1977 (HRS §205A). The lead agency to manage the state's coastal zone is the Department of Business, Economic Development and Tourism (DBEDT) State Office of Planning. The Hawaii CZM area encompasses the entire State (including its land area), as problems that occur on land will eventually impact/influence the quality of the coastal waters and marine resources.

One of the key components of the CZMA is known as the federal consistency provision. Federal consistency requires that federal actions be consistent with State's CZM. This federal consistency provision gives the State input into federal decision making for activities that affect the State's coastal use or resources. Should any portion of the water system improvements

require federal agency actions (licenses, permits or financial assistance), the BWS and its consultants will coordinate with the State Office of Planning to determine if the project is consistent with Hawaii CZM Program's objectives and policies (refer to Table 5.1).

TABLE 5.1 - HAWAII CZM OBJECTIVES AND POLICIES HRS §205A-2(b, c)

Sec	CZM Objectives and Policies	Comment
1	Recreational resources objective: Provide coastal recreational opportunities accessible to the public. A. Policy A: Improve coordination and funding of coastal recreational planning and management. B. Policy B: Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by: (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas; (ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable; (iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value; (iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation; (v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources; (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; (vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; (viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and	The proposed water system improvements are located underground in existing roads that are inland and away from the shoreline, therefore the proposed project does not obstruct access or prevent recreational opportunities to coastal areas. Adequate traffic control plans will be implemented to maintain pedestrian and vehicular access to coastal recreational areas including but not limited to Aloha Tower, Hawaiian Maritime Museum, Honolulu Harbor passenger cruise terminals, Kakaako Waterfront Park, Kewalo Basin, Ala Moana Beach Park, Ala Wai Canal and Yacht Harbor, and Duke Kahanamoku Beach Park. After completion of the proposed water system improvements, access and opportunities for coastal use may be slightly improved due to less frequent water main breaks. During construction the BWS and its contractor will obtain applicable NPDES permits and implement BMPs to preserve the water quality of the adjacent coastal areas and streams. Therefore adverse effects to coastal recreational areas will be minimized.

Sec	CZM Objectives and Policies	Comment
	crediting such dedication against the requirements of section 46-6.	
2	Historic resources objective: Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture. A. Policy A: Identify and analyze significant archaeological resources; B. Policy 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.	The environmental assessment for the proposed project includes an archaeological literature review and field investigation report (LRFI) and cultural impact assessment (CIA). The purpose of the LRFI is to determine the likelihood that historic properties may be affected by the project and provide recommendations. The purpose of the CIA is to identify and assess the potential effects of the water system improvements on cultural beliefs, practices and resources of the project area. Recommendations include working with SHPD to determine the scope of AIS. In addition, should burials (or other cultural finds) be encountered during ground disturbance, the construction contractor shall immediately cease all work and notify the appropriate agencies pursuant to applicable law.
3	Scenic and open space resources objective: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources. A. Policy A: Identify valued scenic resources in the coastal zone management area; B. Policy B: Ensure 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; C. Policy C: Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; D. Policy D: Encourage those developments that are not coastal dependent to locate in inland areas.	The proposed water system improvements are located underground in existing roads that are inland and away from the shoreline, therefore the proposed project preserves both open space and the coastal scenic properties of this location. BMPs will be employed during construction to reduce noise, dust, pollution concerns that may affect any adjacent scenic and open space such as Ala Moana Beach Park.
4	Coastal ecosystems objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems. A. Policy A: Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources; B. Policy B: Improve the technical basis for natural resource management; C. Policy C: Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;	The proposed water system improvements are located in existing roads that are inland and away from the shoreline. If applicable, an NPDES permit will be obtained prior to any construction storm water, dewatering or hydro testing effluent project related discharge that could affect the coastal ecosystem. Should work within any streams be involved, ACOE, DLNR CWRM and DOH will be consulted for permit applicability and BMP measures. The proposed water system improvements will reduce the frequency of water main breaks, thus reducing the amount of related runoff into streams and coastal water.

Sec	CZM Objectives and Policies	Comment
	D. Policy D: 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; E. Policy E: Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.	
5	Economic uses objective: Provide public or private facilities and improvements important to the State's economy in suitable locations. A. Policy A: Concentrate coastal dependent development in appropriate areas; B. Policy B: Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; C. Policy 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 dependent development outside of presently designated areas when: (i) Use of presently designated locations is not feasible; (ii) Adverse environmental effects are minimized; (iii) The development is important to the State's economy.	The proposed water system improvements are located underground in existing roads that are inland and away from the shoreline, therefore the proposed project should not be considered a coastal development. During construction BWS and its contractor will coordinate with adjacent business and implement traffic control plans to minimize any adverse economic effect. The project will have a positive impact on the local economy temporarily by providing jobs for contractors and construction workers. The proposed water system improvements will reduce the frequency of water main breaks thus requiring fewer service and traffic disruptions for repairs. This would ensure the economic well-being of Honolulu and provide access to coastal resources.
6	Coastal hazards objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution. A. Policy A: Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards; B. Policy B: Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;	The proposed water system improvements are located underground in existing roads that are inland and away from the shoreline, therefore the proposed project should not be considered a coastal development. Although the proposed project is located in a tsunami evacuation zone and flood inundation area, it may not be subject to the requirements of the Federal Flood Insurance Program. During construction, the contractor will be prohibited from erecting temporary structures and storage of fill, excavated material, or equipment within streams or high risk flood zones. After construction activities are completed, the disturbed area will be restored to original condition and elevations, therefore, the proposed water system improvements are not anticipated to have any long-term impact on flooding and tsunami evacuation.

Sec	CZM Objectives and Policies	Comment
	C. Policy C: Ensure that developments comply with requirements of the Federal Flood Insurance Program; D. Policy D: Prevent coastal flooding from inland projects.	
7	Managing development objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards. A. Policy A: Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development; B. Policy B: Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; C. Policy 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 public to facilitate public participation in the planning and review process.	The proposed water system improvements are located underground in existing roads that are inland and away from the shoreline, therefore the proposed project should not be considered a coastal development. The proposed water system improvements conform to State and City land use designations for the project area. The proposed project includes applications for several permits and approvals which will include a variety of public information and review opportunities. The BWS and its consultant will work with the appropriate regulatory agency to process permit applications and approvals in a timely manner. As part of the environmental assessment processes, a pre-assessment consultation letter describing the proposed water system improvements and requesting input was mailed to various government agencies, landowners and neighborhood boards. In addition, copies of the DEA was distributed to interested parties and public presentations were scheduled at neighborhood board meetings in the project area.
8	Public participation objective: Stimulate public awareness, education, and participation in coastal management. A. Policy A: Promote public involvement in coastal zone management processes; B. Policy B: Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; C. Policy C: Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.	As part of the environmental assessment processes, a pre-assessment consultation letter describing the proposed water system improvements and requesting input was mailed to various government agencies, landowners and neighborhood boards. In addition, copies of the DEA was distributed to interested parties and public presentations were scheduled at neighborhood board meetings in the project area.
9	Beach protection objective: Protect beaches for public use and recreation. A. Policy A: Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of	The proposed water system improvements are located underground in existing roads that are inland and away from any beaches. If applicable, an NPDES permit will be obtained prior to any construction storm water, dewatering or hydrotesting effluent project related discharge that could affect

Sec	CZM Objectives and Policies	Comment
	improvements due to erosion; B. Policy B: Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; C. Policy C: Minimize the construction of public erosion-protection structures seaward of the shoreline; D. Policy D: Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor; E. Policy E: Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.	adjacent beaches. After construction of the proposed water system improvements, erosion and runoff into beach areas from broken water mains would be reduced.
10	Marine resources objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability. A. Policy A: Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial; B. Policy B: Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency; C. Policy C: Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone; D. Policy D: Promote research, study, and understanding of ocean processes, marine life, and other ocean resources to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; E. Policy E: Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.	The proposed water system improvements are located underground in existing roads that are inland and away from the shoreline, therefore the proposed project should not impact marine resources.

5.12 SPECIAL MANAGEMENT AREA

A method that the State and City uses to implement provisions of the CZM is by controlling development within designated areas along the shoreline called Special Management Areas (SMA). According to HRS §205A-28, no development shall be allowed in any county within the SMA without obtaining an SMA use permit (except for emergency repairs to existing public utilities and actions during a disaster declaration). In the project area, the SMA boundary starts at the U.S. Coast Guard facility at Pier 4 across from the Prince Jonah Kuhio Kalanianaole Federal Building and continues along the center median of Ala Moana Boulevard till Kalia Road in Waikiki (refer to Figure 22 on page 80). The City's Department of Planning and Permitting (DPP) administers the SMA permits in the project area except for activities in the makai area of the KCDD (refer to Figure 21 on page 71) where the authority is the State Office of Planning. It should be noted that it is likely that the proposed water system improvements will not fall under the definition of "development" as indicated by ROH Chapter 25, §25-1.3(2N) and HRS §205A-22:

- Installation of underground utility lines and appurtenant aboveground fixtures less than four feet in height along existing corridors.

If the particular water line project does not fall under the definition of "development", it project may not be subject to regulatory procedures and permit requirements described in ROH Chapter 25 and HRS §205A. During the planning and design phase of the project, the BWS and its consultant will confirm applicability of the project with the City DPP and the State Office of Planning should the proposed water system improvements encroach within the SMA boundary.

5.13 DEPARTMENT OF HAWAIIAN HOME LANDS

The 1920 Hawaiian Homes Commission Act was established to provide financial support, technical assistance, land, adequate water and supporting infrastructure to native Hawaiians. As part of Hawaii's admission to statehood, the Hawaiian Homes Commission Act was incorporated as a provision in the State Constitution in 1959. The state agency responsible in administering provisions of the Act is the Department of Hawaiian Home Lands (DHHL). According to its February 26, 2002 General Plan, DHHL's mission statement is to "…manage the Hawaiian Home Lands trust effectively and to develop and deliver lands to native Hawaiians. We will partner with others towards developing self-sufficient and healthy communities." To date, DHHL manages over 200,000 acres throughout the state. The proposed water improvements will be constructed in the vicinity of DHHL's Papakolea, Kewalo and Kalawahine residential homesteads and the Puowaina Parcel.

DHHL developed a three-tiered system to guide planning of its land holdings and policies for resource management, for the benefit of current and future beneficiaries. At Tier 1 is the General Plan, approved in 2002, which consists of seven categories of long-term goals and objectives to meet DHHL's mission. The seven categories are: Land Use Planning, Residential Uses, Agricultural and Pastoral Uses, Water Resource, Land Resource Management; Economic Development, and Building Healthy Communities. The following water resources goals and objectives are relevant to the proposed water system improvements:

- Provide access to quality water in the most cost-effective and efficient manner.

- Ensure the availability of sufficient water to carry out Hawaiian Home Lands' mission.

PACIFIC ST
SUMNER ST
N. NIMITZ HWY
RIVER ST
HOTEL ST
NUUANU AVE
BERETANIA ST
FORT ST MALL
N. NIMITZ HWY
BISHOP ST
KING ST
ALAKEA ST
RICHARDS ST
ALOHA TOWER DR
QUEEN ST
HALEKAUWILA ST
PUNCHBOWL ST
ALA MOANA BLVD
SOUTH ST
POHUKAINA ST
AUAHI ST
COOKE ST
WARD AVE
KOULA ST
KAMAKEE ST
ALA MOANA BLVD
PIIKOI ST
KAPIOLANI BLVD
ALA MOANA BLVD
ATKINSON DRIVE
ALA WAI BLVD
HOBRON LANE
KALAKAUA AVE
ALA MOANA BLVD
PENSACOLA ST
WILDER AVE
INTERSTATE H-1 FREEWAY
PIIKOI ST
LUNALILO ST
KINAU ST
YOUNG ST
BERETANIA ST
PIIKOI ST
KING ST
PENSACOLA ST

Punchbowl

Tantalus

Honolulu Harbor

Sand Island

McKinley High School

Ala Moana Center

Ala Moana Beach Park

Pacific Ocean

Ala Wai Canal

LEGEND

- 24" Diameter New Replacement Main Alternate Route
- 24" Diameter New Replacement Main
- 20" Diameter New Replacement Main
- 16" Diameter New Replacement Main
- Special Management Area

Source: City & County of Honolulu, Board of Water Supply and Department of Planning & Permitting's Honolulu Land Information System

0 300 600 1200
SCALE IN FEET

Drawing name: C:\Users\gavinm\appdata\local\temp\AcPublish_5536\3094-00-EA SMA.dwg May 02, 2016 - 9:30am

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813
Fax: (808) 531-8018
CONSULTING ENGINEERS Telephone: (808) 521-0306

SPECIAL MANAGEMENT AREA

CAD DRAWING: 3094-00-EA SMA
SCALE: AS NOTED
DATE: MAY 2016
PROJECT #: 3094-00

FIGURE
22

Tier 2 consists of Strategic Program Plans and Island Plans, while Tier 3 contains Regional Plans. The Strategic Program Plans are statewide in focus, covering specific topic areas such as the native Hawaiian development, energy, water and agriculture for a 3 to 6 year period. Island Plans provides recommendations for the future uses of DHHL's land holdings to meet beneficiary and DHHL needs over the next 20 years. Island Plans have been developed for Hawaii, Maui, Molokai, Oahu and Kauai. Tier 3 Regional Plans have a short-term focus of two to four years and help DHHL identify priority projects and issues in those regions.

The proposed water system improvements are relevant to the Water Policy Plan (Strategic Program Plan), Oahu Island Plan and Papakolea Regional Plan by increasing the security and reliability for DHHL water users. This is accomplished through the proposed water system improvements in the Makiki area (Project ID C) which are to be constructed as part of the Kalawahine 180 Reservoir project which will:

- Provide BWS increased flexibility to convey water to the 405' system which serves DHHL's Papakolea, Kewalo residential homesteads and the Puowaina Parcel areas.

- Improve water system performance and reliability in meeting domestic fire protection needs. It will also provide greater flexibility in emergency situations for the BWS Metro Low West (180') service area. The Metro Low West (180') service area consists of the area below the 180 foot elevation from Salt Lake to Diamond Head, which includes DHHL property in Moiliili.

Chapter 6 – COMPLIANCE WITH STATE OF HAWAII, DRINKING WATER REVOLVING FUND

6.1 BACKGROUND

This project may be funded by Federal Funds through the State of Hawaii's Drinking Water State Revolving Fund (SRF) Program, which would constitute a federal action, and will require the project to meet all National Environmental Policy Act (NEPA) and Hawaii SRF program requirements. The following sub-sections address the proposed project's relationship to Federal "Cross-Cutting" authorities.

6.2 ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACT & NATIONAL HISTORIC PRESERVATION ACT

An Archaeological Literature Review and Field Inspection (LRFI) Report was prepared in conjunction with the draft environmental assessment (refer to Appendix D and Section 4.3 - Archaeological and Cultural Resources) and submitted to SHPD for review and comment. According to SHPD, an archaeological inventory survey (AIS) will be required. Prior to conducting the AIS, the BWS or its consultants will consult with SHPD to develop an archaeological inventory survey plan in accordance with HAR §13-276-4.

Should burials (or other cultural finds) be encountered during ground disturbance, the construction contractor will immediately cease all work and notify the appropriate agencies pursuant to applicable statutes, rules, and/or regulations.

6.3 COASTAL BARRIER RESOURCES ACT

Located at the interface of land and sea, coastal barriers provide protection for diverse aquatic habitats and serve as the first line of defense against the impacts of severe coastal storms and erosion. The enactment of the Coastal Barrier Resources Act (1982) and the Coastal Barrier Improvement Act (1990) establishes the Coastal Barrier Resources System restricting the development of coastal barriers.

The proposed project's water line alignments are not located on current maps of the Coastal Barrier Resources System. Therefore, the project would not be subject to provisions of the Coastal Barrier Resources Act and the Coastal Barrier Improvement Act.

6.4 CLEAN AIR ACT

Air quality is generally good due to the effects of the tradewinds and lack of stationary source of pollutants. According to the Department of Health's Annual Summary of Hawaii Air Quality Data (2013), Honolulu was in attainment for all federal ambient air quality standards.

Construction activities associated with the project will produce emissions primarily from two sources: (1) fugitive dust from trenching operations and (2) exhaust from construction vehicles and equipment. These emissions are temporary or short-term and will cease upon completion of construction. Key human receptors are the construction workers and residents along the pipeline routes. Pedestrians and motorists temporarily using or commuting through the project area and immediate surroundings may also be exposed to short-term construction related emissions and dust. Contractors will be required to comply with HAR Title 11 Chapter 60.1 Air Pollution Control.

6.5 COASTAL ZONE MANAGEMENT ACT

The Hawaii Coastal Zone Management (CZM) Program, enacted as Chapter 205A of the Hawaii Revised Statutes, was promulgated in 1977 in response to the Federal Coastal Zone Management Act of 1972. It is administered by the Office of Planning at the State of Hawaii Department of Business, Economic Development & Tourism (DBEDT). The program's ten policy areas are as follows (refer to Section 5.11 - State Coastal Zone Management Program):

- *Recreational Resources*
  To provide coastal recreational opportunities accessible to the public.

- *Historic Resources*
  To protect, preserve, and where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

- *Scenic and Open Space Resources*
  To protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.

- *Coastal Ecosystems*
  To protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.

- *Economic Uses*
  To provide public or private facilities and improvements important to the State's economy in suitable locations.

- *Coastal Hazards*
  To reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence.

- *Managing Development*
  To improve the development review process, communication, and public participation in the management of coastal resources and hazards.

- *Public Participation*
  To stimulate public awareness, education, and participation in coastal management.

- *Beach Protection*
  To protect beaches for public use and recreation.

- *Marine Resources*
  To implement the State's ocean resources management plan.

Some of the proposed water line alignments may be located in the City's Special Management Area (SMA). In such cases, a SMA Minor or Major Permit will be obtained for any project that is considered a development as defined in ROH Chapter 25 (refer to Section 5.12 - Special Management Area).

6.6 ENDANGERED SPECIES ACT & FISH AND WILDLIFE COORDINATION ACT

A biological review was conducted by AECOS (2016) in conjunction with the draft environmental assessment for this project (refer to Appendix C and Section 4.2 - Biological Environment). The review concluded that there are no federally designated or proposed Critical Habitats occurring in the project area. In addition, no plants currently protected or proposed for protection under either federal or State of Hawaii endangered species programs were detected during the course of the survey. The only listed animal species recorded was the White Tern, a species listed by state statute but not the federal ESA.

The Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS) also participated in the project's pre-assessment consultation and draft environmental assessment review process. USFWS commended that the endangered Hawaiian hoary bat, wedge-tailed shearwater, Hawaiian petrel, Newell's shearwater, and a species proposed for listing as endangered, the band-rumped storm petrel, may also occur in the proposed project area. According to AECOS (2016) although not detected during the survey, the potential presence of these endangered species may require special consideration such as downward shielding of lights during night-time construction.

6.7 FARMLAND PROTECTION POLICY ACT

The Farmland Protection Act (FPPA) is administered by the U.S. Department of Agriculture. The FPPA's stated purpose is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and assure that Federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland. FPPA's definition of farmland is inclusive of prime farmland, unique farmland, and land of statewide or local importance. Furthermore, farmlands subject to FPPA requirements do not have to be currently used for crop land.

The proposed water main projects will not require that these lands be taken out of production. The mains will be underground and generally within existing road and highway ROWs.

6.8 FLOODPLAIN MANAGEMENT

The alignments of the proposed water system improvements are located in the following Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM) for the City and County of Honolulu (Effective Date January 19, 2011): 15003C0353G, 15003C0354G, 15003C0362G, and 15003C0366G (refer to Section 4.1.5 - Flood and Tsunami Hazard). The proposed alignments in the upper areas of Pensacola Street, Piikoi Street, Nuuanu Avenue, River Street, North Nimitz Highway and portions of Ala Moana Boulevard are outside of the 0.2% annual chance floodplain. Whereas proposed alignments within the Waikiki and Ala Moana Beach Park and up through Cooke Street will be located in areas with base flood elevations ranging from 5 to 9 feet (Zones AE and AO). Portions of the proposed alignment in Aloha Tower Drive are located in Zones VE and AE. The water mains will be located underground, and thus, there will not be long-term impacts due to flood events.

The proposed water mains are to be constructed underground, with the possible exception of a bridge crossings at Nuuanu Stream and Ala Wai Canal. The water main would be strapped under the bridge deck, mitigating potential damage to the main in the event of a flood. While negative impacts to the system related to flooding are improbable, all of the water main project

sites located in Zones AE, AO and VE will comply with applicable rules and regulations of the National Flood Insurance Program (NFIP) and the City and County of Honolulu.

6.9 SAFE DRINKING WATER ACT

This EPA Sole Source Aquifer (SSA) Program is aimed at protecting our nation's drinking water supplies in areas where there are few or no alternative sources to the ground water resource and where, if contamination occurred, using an alternative source would be extremely expensive. The Southern Oahu Basal Aquifer is a designated SSA on the island of Oahu. The majority of the proposed water system improvements will be located in the lower coastal areas of this SSA as indicated on the EPA's designation map (refer to Figure 17 on page 40). Since the proposed transmission mains will be conveying potable water, there would not be any contamination of the basal aquifer even in the rare occurrence of a water main break.

6.10 PROTECTION OF WETLANDS

National wetlands policy covers the protection of marshes, swamps, bogs ponds and other areas that are regularly inundated with water. Both the ACOE and DLNR participated in the pre-assessment consultation and received copies of the Draft Environmental Assessment to ensure adequate consideration during various stages of the environmental review process. It is anticipated that the proposed water system improvement alignments will not be located in existing wetland areas.

6.11 WILD AND SCENIC RIVERS ACT

The proposed water system improvement projects do not involve streams or rivers which are presently designated under the Wild and Scenic Rivers System or have been listed by the U.S. National Park Service for designation as candidates. The project is therefore not subject to the provisions of the Wild and Scenic Rivers Act.

6.12 WILDERNESS ACT

The proposed water system improvement projects will not be located in wilderness areas which are presently designated under the National Wilderness Preservation System. The project is therefore not subject to the provisions of the Wilderness Act.

6.13 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The proposed water system improvement projects will not affect any essential fish habitat areas. The project is therefore not subject to the provisions of the Magnuson-Stevens Fishery Conservation and Management Act.

6.14 ENVIRONMENTAL JUSTICE

In accordance with Executive Order 12898, the proposed water system improvements will not lead towards any disadvantages to low income or minority groups.

Chapter 7 – COMPLIANCE WITH CHAPTER 343, HAWAII REVISED STATUTES

7.1 DETERMINATION

The proposed water system improvements will have no potential significant short-term, long-term, or cumulative adverse impacts on the environment, and therefore, the preparation and processing of an Environmental Impact Statement is not required. Based on the information and analysis presented in this document, BWS has determined that a Finding of No Significant Impact (FONSI) for the proposed water improvements will be filed with OEQC.

7.2 FINDINGS AND REASONS SUPPORTING THE DETERMINATION

The FONSI was based on evaluating the proposed water system improvements with Section 11-200-12 HAR, which states, "In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action. In most instances, an action shall be determined to have a significant effect on the environment if it….:" meets any of the following criteria:

1. The project involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

The proposed water system improvements would not involve irrevocable commitment to loss or destruction of any natural resource. The project sites lies within existing State and City roadways that has been subject to substantial construction and development. The proposed water system improvements call for modification and replacement of existing man-made infrastructure with no disturbance of lands which were previously undisturbed.

However, there are areas in which construction activities may encounter potentially significant historic/cultural resources. To protect mitigate the area's historic/cultural resources, the BWS and its consultants will work with SHPD to determine the scope of AIS and any construction-related archaeological monitoring requirements. Should burials (or other cultural finds) be encountered during ground disturbance, the construction contractor should immediately cease all work and notify the appropriate agencies pursuant to applicable statutes, rules, and/or regulations.

2. The project curtails the range of beneficial uses of the environment.

The proposed water system improvements will not curtail the range of beneficial uses of the environment. The project sites are located within existing State and City road right-of-ways which have already been subject to substantial construction and development.

3. The project conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

The proposed water system improvements will not conflict with the State's long-term environmental policies or goals and guidelines of the State of Hawaii specified in HRS Chapter 344, as demonstrated by the discussion in this chapter and Chapters 4, 5 and 6. The purpose of Chapter 344 HRS is to establish a state environmental policy that will conserve natural resources and enhance the quality of life.

The project will conserve the natural resources in the area and enhancing the long-term quality of life for residents adjacent and surrounding the project area by providing an improved reliability of water service, reduction of water main breaks, and increased fire suppression capability by improving fire flow.

4. The project substantially affects the economic welfare, social welfare, and cultural practices of the community or State.

The proposed water system improvements would not substantially affect the economic or social welfare of the community or the State. There may be some short-term positive and negative economic and social impacts as related to construction. Short-term negative impacts include traffic congestion, blockage of street frontage, reduction of on-street parking and noise, etc. which would be minimized by the appropriate mitigation measures. Short-term positive economic impacts include hiring of construction workers and the purchasing of materials.

In the long-term, the project would have positive economic effects through the improvement of the reliability of service, reduction in the frequency of water main breaks, and increased fire suppression capabilities. After construction, the affected roads will be restored to original or better condition, thus, there will be no negative impact or change to the overall character of the community or the State.

5. The project substantially affects public health.

Public health would not be adversely affected by the proposed water system improvements. Short-term impacts to public health associated with construction activities (water quality, air quality, noise, and traffic) will be minimized by obtaining applicable permits, applying BMPs, and complying with the rules and regulations of all appropriate City, State, and Federal laws. The proposed water system improvements would provide positive, long-term public health benefits to residents and businesses by improved the reliability of service, reduction of water main breaks, and increased fire suppression capability.

6. The project involves substantial secondary impacts, such as population changes or effects on public facilities.

The proposed water system improvements in itself would not directly result in population changes, additional vehicle traffic, or affect demand for public facilities or utilities. However, it will have somewhat of an indirect effect on population growth by allowing development in the Primary Urban Center. This is viewed as a positive benefit in which growth will be appropriately managed and controlled and in a manner that is consistent with the City's General Plan (Section 5.3 - City and County of Honolulu General Plan).

7. The project involves a substantial degradation of environmental quality.

The proposed water system improvements are not anticipated to involve a substantial degradation of environmental quality as the project area has been repeatedly disturbed in the past. Short-term impacts such as traffic, noise, and air quality are related to construction and would be mitigated through applicable permits, traffic control, and the use of BMPs. Once completed, the project would contribute to increased environmental quality by increasing the reliability of service, reduction in the frequency of water main breaks, and increased fire suppression capabilities. Any disturbances to existing road right-of-ways as a result of construction activities will be temporary in nature and will be restored to original or better condition at the end of construction.

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

The proposed action is generally limited in terms of short- and long-term impacts. However, numerous other construction efforts are expected to occur concurrently but independently (TOD, Ala Moana, Kakaako developments, etc.). Coordination with various existing business and commercial entities, government agencies, and private developers will mitigate short-term effects related to construction. Long-term or cumulative impacts are not anticipated.

9. The project substantially affects a rare, threatened, or endangered species, or its habitat.

In Section 4.2 - Biological Environment, AECOS Inc. observed the occurrence of the White Tern, a State listed endangered species, in the project sites. Mitigation measures have been recommended for the White Tern, wedge-tailed shearwater, Hawaiian petrel, Newell's shearwater, band-rumped storm petrel, and the Hawaiian Hoary Bat. During construction, the BWS and/or its contractors shall comply with recommendations provided by AECOS if night construction activity or work on existing trees are proposed.

10. The project detrimentally affects air or water quality or ambient noise levels.

The proposed water system improvements will not have detrimental long-term impacts on air or water quality, or ambient noise levels. Short-term impacts may occur during the construction of the projects. However, the contractors will be required to obtain applicable permits, comply with current State and City regulations, and provide appropriate BMPs.

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

The proposed water system improvements are located in a flood plain and a tsunami evacuation zone. Furthermore, the water system improvements will cross Nuuanu stream and Ala Wai Canal. Short-term impacts may occur during the construction of the project which will be mitigated by BMPs, permits, and compliance with government laws and regulations.

12. The project substantially affects scenic vistas and view planes identified in county or state plans or studies.

Since the water mains will be located in low-lying roadways, construction activities will not block scenic vistas and view planes. There will not be any long-term effects since the proposed water system improvements will be constructed underground within an existing roadway.

13. The project requires substantial energy consumption.

The only energy consumption involved with proposed water system improvements are related to operation of construction equipment and vehicles. After construction is completed, energy consumption will essentially return to that which existed prior to construction.

Chapter 8 – LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED

8.1 PRE-ASSESSMENT CONSULTATION

The following Federal, State and City agencies, elected officials, utility companies, and large land owners were contacted for any comments and concerns associated with the Honolulu Water System Improvements. Letters providing project information along with scope map were sent for their review. Copies of response letters were received from parties marked below with a check (✓). A copy of those responses and subsequent acknowledgements are provided in Appendix A.

Federal Government Agencies

- U.S. Army 30th Signal Battalion
- ✓ U.S. Army Corps of Engineers, Honolulu District
- ✓ U.S. Fish and Wildlife Service

State of Hawaii Agencies

- ✓ Department of Accounting and General Services
- Department of Agriculture
- Department of Business, Economic Development and Tourism
  - ✓ Hawaii Community Development Authority
  - Hawaii Housing Finance and Development Corporation
  - ✓ Office of Planning
- Department of Defense
- Department of Education
- ✓ Department of Hawaiian Home Lands
- ✓ Department of Health
- Department of Human Services
  - ✓ Benefit, Employment & Support Services Division
  - ✓ Hawaii Public Housing Authority
- Department of Labor and Industrial Relations
- Department of Land and Natural Resources
  - ✓ Division of Aquatic Resources
  - ✓ Division of Forestry and Wildlife
  - ✓ Division of State Parks
  - ✓ Engineering Division
  - ✓ Land Division - Oahu District
- ✓ Department of Transportation
- ✓ Office of Hawaiian Affairs
- University of Hawaii Environmental Center

City and County of Honolulu Agencies

- Board of Water Supply
- ✓ Department of Community Services
- ✓ Department of Design and Construction
- ✓ Department of Environmental Services
- ✓ Department of Facility Maintenance

- ✓ Department of Parks and Recreation
  Department of Planning and Permitting
- ✓ Department of Transportation Services
- ✓ Honolulu Authority for Rapid Transportation
- ✓ Honolulu Fire Department
- ✓ Honolulu Police Department

Elected Officials

State Senator
- Senate District 11
- Senate District 12
- Senate District 13

State Representative
- House District 22
- House District 29

Honolulu City Council
- City Council District 4
- City Council District 5
- City Council District 6
- City Council District 7

Waikiki Neighborhood Board No. 9
Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10
Ala Moana/Kakaako Neighborhood Board No. 11
Downtown Neighborhood Board No. 13
Kalihi/Palama Neighborhood Board No. 15

Other Organizations and Large Land Owners

Ala Moana Center
Aloha Tower Development Corporation
AT&T
Bernice Pauahi Bishop Estate Trust
Hawaiian Electric Company
Hawaii Gas
Hawaiian Telcom
- ✓ Oceanic Time Warner Cable

Victoria Ward Center

8.2 DRAFT ENVIRONMENTAL ASSESSMENT

Notification on the availability of the DEA was provided in the January 8, 2016 issue of OEQC's *The Environmental Notice*. The DEA was sent to various Federal, State and City agencies, elected officials, utility companies, large land owners below and was also publicly available online through the OEQC website. Copies of response letters were received from parties marked below with a check (✓). A copy of those responses and subsequent acknowledgements are provided in Appendix G.

Federal Government Agencies

- ✓ U.S. Army 30th Signal Battalion
- ✓ U.S. Army Corps of Engineers, Honolulu District
- ✓ U.S. Fish and Wildlife Service

State of Hawaii Agencies

- ✓ Department of Accounting and General Services
  Department of Agriculture
  Department of Business, Economic Development and Tourism
  Hawaii Community Development Authority
- ✓ Hawaii Housing Finance and Development Corporation
- ✓ Office of Planning
- ✓ Department of Defense
- ✓ Department of Education
- ✓ Department of Hawaiian Home Lands
- ✓ Department of Health
  Department of Human Services
- ✓ Benefit, Employment & Support Services Division
  Hawaii Public Housing Authority
  Department of Labor and Industrial Relations
  Department of Land and Natural Resources
  Department of Transportation
  Hawaii State Library
- ✓ Office of Hawaiian Affairs
- ✓ State Historic Preservation Division
  University of Hawaii Environmental Center
  University of Hawaii Water Resources Research Center

City and County of Honolulu Agencies

Board of Water Supply
Department of Community Services
- ✓ Department of Design and Construction
  Department of Environmental Services
- ✓ Department of Facility Maintenance
- ✓ Department of Parks and Recreation
- ✓ Department of Planning and Permitting
- ✓ Department of Transportation Services
- ✓ Honolulu Authority for Rapid Transportation
- ✓ Honolulu Fire Department
- ✓ Honolulu Police Department

Elected Officials

State Senator
- Senate District 11
- Senate District 12
- Senate District 13

State Representative
- House District 22
- House District 24
- House District 26
- House District 29

Honolulu City Council
- City Council District 4
- City Council District 5

City Council District 6
City Council District 7
Waikiki Neighborhood Board No. 9
Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10
Ala Moana/Kakaako Neighborhood Board No. 11
Downtown Neighborhood Board No. 13
Kalihi/Palama Neighborhood Board No. 15

Other Organizations and Large Land Owners

Ala Moana Center
Aloha Tower Market Place
AT&T
Bernice Pauahi Bishop Estate Trust
✓ Hawaiian Electric Company
Hawaii Foreign Trade Zone
Hawaii Mission Academy
Hawaii Pacific University
✓ Hawaii Gas
Hawaiian Telcom
Honolulu Seawater Air Conditioning
Howard Hughes Corporation
Oceanic Time Warner Cable

8.3 NEIGHBORHOOD BOARD MEETINGS

As part of the public review process, an overview of the DEA and the proposed water system improvements were presented to the affected communities at their local Neighborhood Board Meetings (see list below). The presentation included handouts, a short discussion of the proposed water system improvements, and a time to respond to any questions from the board members and the community.

- Waikiki Neighborhood Board No. 9 Meeting
  Tuesday, February 9th, 2016
  Waikiki Community Center

- Ala Moana/Kakaako Neighborhood Board No. 11 Meeting
  Tuesday, February 23rd, 2016
  Makiki Christian Church

- Downtown Neighborhood Board No. 13 Meeting
  Thursday, March 3rd, 2016
  Pauahi Community Center

- Kalihi/Palama Neighborhood Board No. 15 Meeting
  Wednesday, March 16th, 2016
  Kalihi Union Church Library

- Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10 Meeting
  Thursday, March 17th, 2016
  Makiki District Park

Chapter 9 – LIST OF PREPARERS

The following list identifies the persons, firms, and government agency involved with the preparation of the environmental assessment for the proposed action.

1. Sheryl Nojima and Gavin Masaki Gray, Hong, Nojima & Associates, Inc.	Project Management and Civil Engineering
2. Kristine Pascua and Glen Lau Pacific Geotechnical Engineers, Inc.	Geotechnical Consultation
3. Eric Guinther and Reginald David AECOS, Inc.	Biological Survey
4. Constance O'Hare, David Shideler, and Hallet Hammatt Cultural Surveys Hawaii, Inc.	Archaeological Field Investigation and Literature Review
5. Nicole Ishihara, S. Mahealani Liborio, and Hallet Hammatt Cultural Surveys Hawaii, Inc.	Cultural Impact Assessment
6. Julian Ng Julian Ng Incorporated	Traffic Information Report
7. Scott Muraoka, Iris Oda, and Rian Adachi Board of Water Supply City and County of Honolulu	Project Coordinator

Chapter 10 – REFERENCES

AECOS Inc., *Biological Survey for the Board of Water Supply Improvements to Various Water Mains in Central Honolulu,* April 11, 2016.

Belt Collins Hawaii LLC., *Water Master Plan Update, HCDA Kaka`ako Mauka District, Kaka`ako, O`ahu, Hawai`I*, prepared for the Hawaii Community Development Authority and Lee Sichter LLC., December 2014.

Cultural Surveys Hawaii Inc, *Final Archaeological Literature Review and Field Inspection Report for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu Ahupua'a, Honolulu (Kona) District, O'ahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2,-4, and 2-6: Various Plats and Parcels*, June 2016.

Cultural Surveys Hawaii Inc, *Final Cultural Impact Assessment for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu and Waikiki Ahupua`a, Honolulu (Kona) District, Island of Oahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2-4, and 2-6: Various Plats and Parcels*, November 2015.

City and County of Honolulu, Department of Planning and Permitting, *General Plan*, 1992 & amended 2002.

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Julian Ng Inc., *Traffic Information Report for Proposed Waterline projects, Various Locations Honolulu, Hawaii*, prepared for the City and County of Honolulu Board of Water Supply, dated July 2015.

Lee Sichter LLC., *Kakaako Community Development District, TOD Overlay Plan, Final Environmental Impact Statement,* prepared for the Hawaii Community Development Authority, Volume 1, June 10, 2015.

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prepared for the Hawaii Community Development Authority and EDAW, Inc., March 2009.

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RTKL Associates, Inc., *Ala Moana Neighborhood Transit-Oriented Development Plan, Existing Conditions Report*, prepared for the City and County of Honolulu, August 2012.

SEY Engineers, Inc., *Final Environmental Assessment for the Kalawahine 180 Reservoir, Honolulu, Oahu, Hawaii*, prepared for the Board of Water Supply, August 2002.

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Web Sites Used in Preparation of this Report:

City and County of Honolulu: Board of Water Supply
http://www.hbws.org/cssweb/

City and County of Honolulu: Department of Environmental Services
Wastewater - http://www.honolulu.gov/envwwm.html

City and County of Honolulu: Department of Planning and Permitting
Interactive GIS Maps and Data - http://gis.hicentral.com
Planning Division - http://www.honoluludpp.org/Planning.aspx
Transit Oriented Development - http://www.honolulu.gov/Tod

City and County of Honolulu: Department of Transportation Services
http://www.honolulu.gov/dts.html

City and County of Honolulu: Honolulu Rail Transit
http://www.honolulutransit.org/

City and County of Honolulu: Revised Ordinances of Honolulu
http://www1.honolulu.gov/council/ocs/roh/

City and County of Honolulu: TheBus
http://www.thebus.org/

Honolulu Seawater Air Conditioning
http://honoluluswac.com/

State of Hawaii: Department of Hawaiian Home Lands
http://dhhl.hawaii.gov/

State of Hawaii: Department of Health
Clean Air Branch - http://health.hawaii.gov/cab/
Clean Water Branch - http://health.hawaii.gov/cwb/
e-Permitting Portal - https://eha-cloud.doh.hawaii.gov/epermit/
Environmental Planning Office, Land Use Planning Review -
http://health.hawaii.gov/epo/home/landuse-planning-review-program/
Hazard Evaluation and Emergency Response Office
http://eha-web.doh.hawaii.gov/eha-cma/Org/HEER/
Safe Drinking Water Branch - http://health.hawaii.gov/sdwb/
Office of Environmental Quality Control - http://health.hawaii.gov/oegc/

State of Hawaii: Department of Land and Natural Resources
- Commission on Water Resource Management - http://dlnr.hawaii.gov/cwrm/
- Engineering Division, National Flood Insurance Program - http://dlnreng.hawaii.gov/nfip/
- Flood Hazard Assessment Tool - http://gis.hawaiinfip.org/fhat/

State of Hawaii: Department of Transportation
- Harbors Division - http://hidot.hawaii.gov/harbors/
- Highways Division - http://hidot.hawaii.gov/highways/

State of Hawaii: Hawaii Administrative Rules
- http://hawaii.gov/lrb/desk/hi3.html

State of Hawaii: Hawaii Community Development Authority
- http://dbedt.hawaii.gov/hcda/

State of Hawaii: House Revised Statutes
- http://www.capitol.hawaii.gov/hrscurrent/

State of Hawaii: Land Use Commission
- http://luc.state.hi.us/about.htm
- http://luc.state.hi.us/luc_maps.htm

State of Hawaii: Office of Planning
- Hawaii Statewide GIS Program - http://planning.hawaii.gov/gis/
- Hawaii State Planning Act - http://planning.hawaii.gov/hawaii-state-planning-act/
- State CZM Program - http://planning.hawaii.gov/czm/

United States: Army Corps of Engineers
- Honolulu District Regulatory Branch - http://www.poh.usace.army.mil/Missions/Regulatory.aspx
- Waterborne Commerce Statistics Center - http://www.iwr.usace.army.mil/About/TechnicalCenters/WCSCWaterborneCommerceStatisticsCenter.aspx

United States: Environmental Protection Agency
- EPA Pacific Region 9 - http://www2.epa.gov/aboutepa/epa-region-9-pacific-southwest
- Water Quality Assessment and Total Maximum Daily Loads Information - http://www.epa.gov/waters/ir/index.html

United States: National Oceanic and Atmospheric Administration
- National Climate Date Center - http://www.ncdc.noaa.gov/
- National Weather Service Hawaiian Forecast Office - http://www.prh.noaa.gov/hnl/
- Western Regional Climate Center - http://www.wrcc.dri.edu/

United States: National Resource Conservation Service
- Web Soil Survey - http://websoilsurvey.nrcs.usda.gov/app/

APPENDICES

Appendix A: Pre-Assessment Consultation Public Comments

Appendix B: Final Letter Report, Geotechnical Consultation, Honolulu Water System Improvements Environmental Assessment, Honolulu, Oahu, Hawaii

Appendix C: Biological Survey for Board of Water Supply Improvements to Various Water Mains in Central Honolulu

Appendix D: Final Archaeological Literature Review and Field Inspection Report for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu Ahupua‘a, Honolulu (Kona) District, O`ahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2,-4, and 2-6: Various Plats and Parcels

Appendix E: Final Cultural Impact Assessment for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu and Waikiki Ahupua`a, Honolulu (Kona) District O`ahu TMKs: (1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6: Various Plats and Parcels

Appendix F: Traffic Information Report for Proposed Waterline Projects, Various Locations Honolulu, Hawaii

Appendix G: Draft Environmental Assessment Public Comments

APPENDIX A

Pre-Assessment Consultation Public Comments

DEPARTMENT OF THE ARMY
HONOLULU DISTRICT, U.S. ARMY CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

October 22, 2014

SUBJECT: Comments for Pre-Assessment Consultation for the Proposed Replacement and Upgrade of Various Pipelines within Honolulu, Island of Oahu, Hawaii; Department of the Army File No. POH-2014-00182

Mr. Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

The U.S. Army Corps of Engineers (Corps) has reviewed the letter dated September 12, 2014, provided on behalf of the Honolulu Board of Water Supply, for the proposed replacement and upgrade of various pipelines within Honolulu, Island of Oahu, Hawaii. This proposed project has been assigned Corps File No. **POH-2014-00182**. Please refer to this number in all correspondence with this office.

The Corps has determined that Nuuanu Stream and the Ala Wai Canal at the project locations shown in the figure provided may be waters of the United States by review under a preliminary jurisdictional determination (PJD) under Section 10 of the Rivers and Harbors Act of 1899 (RHA) and Section 404 of the Clean Water Act (CWA). If Nuuanu Stream and the Ala Wai Canal are considered navigable waters under Section 10 of the RHA, a Department of the Army permit is required for any work or structures in or affecting those navigable waters. The placement of dredged or fill material into these waters may require a Department of the Army permit under our regulatory authorities found in Section 404 of the CWA.

Enclosed is a permit application form for your use if needed (Enclosure 1). When we receive the completed permit application we can further assess your permit needs.

If you have any questions regarding our regulatory authority or need additional information, please contact the Regulatory Office at the letterhead address, by telephone at (808) 835-4303, or email at CEPOH-RO@usace.army.mil.

Sincerely,

Michelle Lynch

Michelle R. Lynch
Chief, Regulatory Office

Enclosure

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y. T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Ms. Michelle R. Lynch
Chief, Regulatory Branch
Department of the Army
U.S. Army Corps of Engineers, Honolulu District
CEPOH-EC-R, Bldg. 230
Fort Shafter, Hawaii 96858-5440

SUBJECT: Ref. No. POH-2014-00182
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Ms. Lynch:

Thank you for your correspondence dated October 22, 2014 regarding the subject project. We acknowledge that based on your review of the information provided, that Nuuanu Stream and the Ala Wai Canal at the project locations may be waters of the United States by review under a preliminary jurisdictional determination (PJD) under Section 10 of the Rivers and Harbors Act of 1899 (RHA) and Section 404 of the Clean Water Act (CWA).

We further acknowledge that if Nuuanu Stream and the Ala Wai Canal are considered navigable waters under Section 10 of the RHA, a Department of the Army permit is required for any work or structures in or affecting those navigable waters. In addition, the placement of dredged or fill material into these waters may require a Department of the Army permit under the Corps regulatory authorities found in Section 404 of the CWA.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM
GM:SN:cn
cc: Scot Muraoka, Honolulu Board of Water Supply
3094-00

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
2014-TA-0429

OCT 0 1 2014

Ms. Sheryl E. Nojima, PE, PhD
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926

Subject: Technical Assistance for the Proposed Honolulu Water Systems Improvements Project, Oahu

Dear Ms. Nojima:

The U.S. Fish and Wildlife Service (Service) received your letter, dated September 12, 2014, in which you requested our comments on the proposed Honolulu Water Systems Improvements project as a pre-consultation for the associated Draft Environmental Assessment (DEA). The proposed project involves the replacement of waterlines along Nimitz Highway, Ala Moana Boulevard, and several other streets in the general vicinity. The below comments are provided in accordance with section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*), as amended (ESA); the Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661 *et seq.*; 48 Stat. 401); and the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as amended (MBTA).

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity Mapping Program. There is no federally designated or proposed critical habitat, or National Wildlife Refuges, wilderness areas, or wildlife preserves in the vicinity of the proposed project. However, our records indicate the federally endangered Hawaiian hoary bat (*Lasirus cinereus semotus*) may occur within the project vicinity. The wedge-tailed shearwater (*Puffinus pacificus*)) and the White fairy terns (*Gygis alba*), protected under the MBTA, may also occur in the project area. We offer the following recommendations to assist you with the preparation of your DEA:

The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

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Outdoor lighting, such as street lights, can adversely impact listed and migratory seabird species found in the vicinity of the proposed project. Seabirds fly at night and are attracted to artificially lighted areas which can result in disorientation and subsequent fallout due to exhaustion or collision with objects such as utility lines, guy wires, and towers that protrude above the vegetation layer. Once grounded, they are vulnerable to predators or often struck by vehicles along roadways. Wedge-tailed shearwater nesting colonies are located nearby on offshore islets and every year many young shearwaters are downed and struck along Oahu roadways. Any increase in the use of night-time lighting, particularly during each year's peak fallout period could result in additional seabird injury or mortality. Please be aware that the fallout dates for the wedge-tailed shearwater are from approximately November 1 until December 21. Impacts to seabirds can be minimized by shielding outdoor lights associated with the project to the maximum extent possible, eliminating night-time construction, and providing all project staff and residents with information about seabird fallout. All lights, including street lights, should be shielded so the bulb can only be seen from below and use the lowest wattage bulbs possible.

White fairy terns often nest in urban parks and residential areas from Hawaii Kai to Hickam Air Force Base. White fairy terns do not build nests, instead they lay a single egg directly on a ledge, tree branch, or other suitable location. The egg will hatch after approximately 35 days, after which it takes 45 days for the chick to be mature enough to leave the nest on its own. If tree trimming becomes part of your project, please examine all trees slated to be cut to determine if there are white fairy terns nesting in them. Similarly, we recommend examining any structures slated for demolition. Signs that white fairy terns are present include accumulation of white feathers or white droppings underneath the tree or structure.

Because the proposed activities may cause soil erosion and sedimentation into the marine environment in project areas directly adjacent the ocean, we are attaching the Service's recommended Best Management Practices regarding sedimentation and erosion in aquatic environments. We encourage you to incorporate the relevant practices into your project design.

We appreciate the opportunity to provide recommendations to inform your DEA and look forward to reviewing the DEA upon its completion. Thank you for your efforts to conserve federally protected resources. If you have any questions concerning these recommendations please contact Carrie Harrington, Fish and Wildlife Biologist (phone: 808-792-9400; fax: 808-792-9581).

Sincerely,

Aaron Nadig
Assistant Field Supervisor
Oahu, Kauai, NWHI, and American Samoa

Enclosure: Service BMPs for erosion and sediment control

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see *http://www.haccp-nrm.org/Wizard/default.asp*) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.



Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Rusty B. Bungcayao
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com

December 12, 2014

Mr. Aaron Nadig
Assistant Field Supervisor
Pacific Island Fish and Wildlife Office
United States Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Attn: Ms. Carrie Harrington

SUBJECT: Ref. No. 2014-TA-0429
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Nadig:

Thank you for your correspondence of October 1, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project. The following are offered in response to the comments provided:

1. We acknowledge that the Hawaiian hoary bat may occur within the project vicinity. We understand that if trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. The Board of Water Supply and their consultants will be advised to minimize impacts to the endangered Hawaiian hoary bat by not disturbing, removing, or trimming woody plants greater than 15 feet (4.6 meters) tall during the bat birthing and pup rearing season (June 1 through September 15). We further acknowledge that site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

2. We acknowledge that wedge-tailed shearwater nesting colonies are located nearby on offshore islets and every year many young shearwaters are downed and struck along Oahu roadways. We understand that any increase in the use of night-time lighting, particularly during each year's peak fallout period (November 1 until December 21), could result in additional seabird injury or mortality. The Board of Water Supply and their consultants will be advised to minimize impacts to seabirds by shielding outdoor lights associated with the project to the maximum extent possible, eliminating night-time construction, and providing all project staff and residents with information about seabird fallout. We further acknowledge that all lights should be shielded so the bulb can only be seen from below and use the lowest wattage bulbs possible.

3. We acknowledge that the white fairy terns often nest in urban parks and residential areas from Hawaii Kai to Hickam Air Force Base. The Board of Water Supply and their consultants will be advised to examine all trees slated to be cut and any structures slated for demolition to determine if there are white fairy terns nesting in them.

4. During the design phase, the Board of Water Supply will be advised to incorporate relevant sections of the U.S. Fish and Wildlife Service Recommended Standard Best Management Practices provided in your correspondence regarding sedimentation and erosion in aquatic environments.

It should be noted that the DEA will include a flora and fauna field survey and report prepared by a biological consultant. The biologist will survey the project area and prepare a listing of any plants and animals, including the species listed above, that may be of concern and propose mitigative actions as needed.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

NEIL ABERCROMBIE
GOVERNOR

Dean H. Seki
Comptroller

Maria E. Zielinski
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

SEP 22 2014

(P)1298.4

Mr. Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

Subject: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK (1) 1-5, 1-7, 2-1, 2-3, and 2-6
Honolulu, Oahu, Hawaii

Thank you for the opportunity to provide comments for the subject project. As the subject project is construction in public roadways and not in any of the Department of Accounting and General Services' existing facilities, we have no comments to offer at this time.

If you have any questions, your staff may call Ms. Gayle Takasaki of the Public Works Division at 586-0584.

Sincerely,

DEAN H. SEKI
Comptroller

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y. T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Dean H. Seki
Comptroller
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96810-0119

Attn: Ms. Gayle Takasaki

SUBJECT: Ref. No. (P)1298.4
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Seki,

Thank you for your correspondence dated September 22, 2014 regarding the subject project. We acknowledge that based on your review of the information provided, the project is not in any of the Department of Accounting and General Services' existing facilities.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

HAWAII COMMUNITY DEVELOPMENT AUTHORITY

KAKAAKO KALAELOA

Neil Abercrombie
Governor

Brian Lee
Chairperson

Anthony J. H. Ching
Executive Director

461 Cooke Street
Honolulu, Hawaii
96813

Telephone
(808) 594-0300

Facsimile
(808) 594-0299

E-Mail
contact@hcdaweb.org

Web site
www.hcdaweb.org

Ref. No.: ENGR 2.1.5

September 15, 2014

Mr. Gavin Masaki, P.E.
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

Re: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
Tax Map Keys: (1)1-5, 1-7, 2-1, 2-3 and 2-6 Honolulu, Oahu, Hawaii

Thank you for allowing us the opportunity to review the subject project. We would like to clarify one segment of the proposed improvements. The plan shows a 16" water main, approximately 1,510 feet, along Piikoi Street, between Ala Moana and Kapiolani Boulevards; however, this is not mentioned in the letter. Will this main be included in the project? We request that the Board of Water Supply coordinate all the projects within the Kakaako Community Development District with the Hawaii Community Development Authority. We have no other questions or comments. Please continue to keep us updated on the status of this project.

We appreciate you're keeping us informed and should you have any questions or concerns, please contact Mr. Neal Imada at either 594-0316 or neal@hcdaweb.org.

Sincerely,

Anthony J. H. Ching
Executive Director

AJHC/DN/NII:ak

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Anthony J. H. Ching
Executive Director
Hawaii Community Development Authority
State of Hawaii
461 Cooke Street
Honolulu, Hawaii 96813

Attn: Mr. Neal Imada

SUBJECT: Ref. No. ENGR 2.1.5
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Ching:

Thank you for your correspondence of September 15, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project. The following are offered in response to the comments provided:

1. We apologize for the confusion. The 16" water main, approximately 1,510 feet along Piikoi Street between Ala Moana and Kapiolani Boulevards is included in the project and was inadvertently omitted from the letter. Please advise us if your office has any concerns regarding this portion of the project.

2. We acknowledge that the Board of Water Supply should coordinate all the projects within the Kakaako Community Development District with the Hawaii Community Development Authority.

3. We will include your office in the DEA distribution list.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

OFFICE OF PLANNING
STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

NEIL ABERCROMBIE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Ref. No. P-14534

October 9, 2014

Mr. Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

Subject: Early Consultation for a Draft Environmental Assessment for Honolulu Water System Improvements; TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6

Thank you for the opportunity to provide early consultation comments on these Honolulu Water Main System Improvements. Based on the documents that were sent to us by letter dated September 12, 2014, the project calls for the installation of a new replacement water mains at: 1) River Street to Kalakaua Avenue running along Ala Moana Boulevard, 2) Nimitz Highway between Pacific Street and Sumner Street, 3) Cooke Street from Ala Moana Boulevard to Pohukaina Street, 4) Piikoi Street from S. King to Kinau Street, 5) Pensacola Street from Kinau to Wilder Avenue, and 6) alternate water main project areas include River Street between N. King and N. Beretania Street, Nuuanu Avenue, and S. Nimitz Highway to Aloha Tower Drive.

Based on review of the documents provided to our office, we have the following comments to offer:

1. The Office of Planning (OP) provides technical assistance to state and county agencies in administering the statewide planning system in Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Plan. The Hawaii State Planning Act provides goals, objectives, priorities, and priority guidelines for growth, development, and the allocation of resources throughout the State. The Hawaii State Plan includes diverse policies and objectives of state interest including but not limited to the economy, agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, and socio-cultural advancement.

   The Draft Environmental Assessment (Draft EA) should include an analysis of the project's consistency with Hawaii State Plan, HRS Chapter 226, in a section addressing state and county plans, policies, and controls.

2. OP is the lead agency for the Hawaii Coastal Zone Management (CZM) Program. The coastal zone management area is defined as "all lands of the State and the area

extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" see HRS § 205A-1 (definition of "coastal zone management area").

In a section that addresses the project's conformance with state and county plans, policies, and controls, the Draft EA should include a discussion of the project's ability to meet the objectives and policies set forth in HRS § 205A-2. These objectives and policies include: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

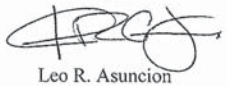
3. The Draft EA should include a list of any Federal, State, or county permits required for this project. A listing of required permits will allow the Office of Planning to verify the necessity of conducting a Coastal Zone Management Federal Consistency evaluation.

4. Pursuant to HRS § 205A-28, no development shall be allowed in any county within the special management area (SMA) without obtaining an SMA permit. Please consult with Department of Planning and Permitting, City and County of Honolulu to confirm whether any part of the proposed action is located within their SMAs.

   Pursuant to HRS § 206E-8.5, if any of the proposed trenching and construction activity falls within the makai area of the Kakaako Community Development District, the subject proposed action shall be submitted to and reviewed by OP for the requirements of SMA use. The Draft EA should clarify whether or not the proposed installations of water main are along the existing corridors.

If you have any questions regarding this comment letter, please contact Josh Hekekia of our office at 587-2845.

Sincerely,



Leo R. Asuncion
Acting Director

cc: Scot Muraoka, Honolulu Board of Water Supply

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Leo R. Asuncion
Acting Director
Office of Planning
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

Attn: Mr. Josh Hekekia

SUBJECT: Ref. No. P-14534
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Asuncion:

Thank you for your correspondence dated October 9, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project. The following are offered in response to the comments provided:

1. The DEA will include an analysis of the proposed project's consistency with Hawaii State Plan in Hawaii Revised Statutes (HRS) Chapter 226 in a section addressing state and county plans, policies, and controls.

2. We acknowledge that the State Office of Planning (OP) is the lead agency for the Hawaii Coastal Zone Management (CZM) Program. The DEA will include a discussion of the project's ability to meet the applicable objectives and policies set forth in HRS § 205A-2 in a section addressing state and county plans, policies, and controls. These objectives and policies include: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

3. The DEA will include a list of applicable Federal, State and County permits. We understand that this list will allow the OP to verify the necessity of conducting a Coastal Zone Management Federal Consistency evaluation.

4. We acknowledge the Department of Planning and Permitting (DPP), City and County of Honolulu should be consulted to confirm whether any part of the proposed action is located within their special management area (SMA). For your information, "Pre-Assessment Consultation" documents were submitted to DPP on September 12, 2014.

5. We understand that pursuant to HRS § 206E-8.5, if any of the proposed trenching and construction activity falls within the makai area of the Kakaako Community Development District, the subject proposed action shall be submitted to and reviewed by OP for the requirements of SMA use. We further acknowledge the DEA should clarify whether or not the proposed installations of water mains are along the existing corridors.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM
GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

NEIL ABERCROMBIE
GOVERNOR
STATE OF HAWAII

JOBIE M. K. MASAGATANI
CHAIRMAN
HAWAIIAN HOMES COMMISSION

DARRELL T. YOUNG
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

October 9, 2014

Gray, Hong, Nojima & Associates, Inc.
Attn: Gavin Masaki, PE
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

Subject: Pre-Assessment Consultation Request, Honolulu Water System Improvements Draft Environmental Assessment, TMKs (1)1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii

Based on the information provided in your letter dated September 12, 2014, in preparation of a Draft Environmental Assessment, the Department of Hawaiian Home Lands has the following pre-consultation comments to offer:

1. The Hawaiian homestead areas of Papakolea, Kewalo, and Kalawahine are located mauka of the 24-inch water main upgrade on Pensacola Street. We have concerns about the impacts to traffic and circulation for our beneficiaries in those areas. Please note the locations of these homestead areas in the Draft EA (see Exhibit 'A'), and describe how traffic impacts will be mitigated in the Makiki/Punchbowl/Tantalus areas.

2. DHHL supports the project as it will improve the capacity and reliability of the water system that services our properties. In the EA, please describe how the upgrades will benefit the Makiki/Punchbowl/Tantalus area, including our lessees in the Papakolea, Kewalo and Kalawahine homesteads.

If you have any questions or need more information, please contact Nancy McPherson, Staff Planner of the Planning Office, at (808) 620-9519, or via email at Nancy.M.McPherson@hawaii.gov.

Aloha,

Jobie M. K. Masagatani, Chairman
Hawaiian Homes Commission

Enc.



Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Rusty B. Bungcayao
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com

December 12, 2014

Ms. Jobie M. K. Masagatani
Chairman
Hawaiian Homes Commission
State of Hawaii
P.O. Box 1879
Honolulu, Hawaii 96805

Attn: Ms. Nancy McPherson

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Ms. Magasatani:

Thank you for your correspondence dated October 9, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project. The following are offered in response to the comments provided:

1. We acknowledge your concerns about the impacts to traffic and circulation for your beneficiaries in the Papakolea, Kewalo, and Kalawahine areas. The DEA will note the location of the homestead areas and include a discussion on how traffic impacts will be mitigated in the Makiki/Punchbowl/Tantalus areas.

2. Your support of the project is much appreciated. The DEA will include a general discussion of the anticipated benefits of the water system improvements and upgrades not only to your lessees and beneficiaries, but to the entire community as well.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM
GM:SN:cn
cc: Scot Muraoka, Honolulu Board of Water Supply
3094-00

Gavin Masaki

From: McIntyre, Laura [Laura.McIntyre@doh.hawaii.gov]
Sent: Friday, October 03, 2014 1:00 PM
To: Gavin Masaki
Cc: joanna.seto@doh.hawaii.gov; Wong, Alec Y; Grange, Fenix; Yamada, Stuart H
Subject: Pre-Assessment Consultation on EA for HNL BWS Honolulu Water System Improvements (EPO# 14-217)
Attachments: 14-217 PAC for HNL Water System Improvements EA .docx; PAC on EA for HNL BWS Honoulu Water Sy[illegible]nts (Consultant letter 9

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

LINDA ROSEN, M.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:
EPO 14-217

October 3, 2014

Gavin Masaki
Gray, Hong, Nojima & Associates, Inc
Email: gmasaki@grayhongnojima.com

Dear Mr. Masaki:

SUBJECT: Pre-Assessment Consultation for EA for Honolulu Water System Improvements

The Department of Health (DOH), Environmental Health Administration (EHA), Environmental Planning Office (EPO), acknowledges receipt of your letter to the Director dated September 12, 2014. Thank you for allowing us to review the letter and map detailing the proposed new replacement mains. EPO recommends that you review the standard comments at: http://health.hawaii.gov/epo/home/landuse-planning-review-program/. You are required to adhere to all applicable standard comments.

We encourage you to examine and utilize the Hawaii Environmental Health Portal. The portal provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings. The Portal is continually updated. Please visit it regularly at: https://eha-cloud.doh.hawaii.gov

You may also wish to review the recently revised Water Quality Standards Maps that have been updated for all islands. The new Water Quality Standards Maps can be found at:
http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/water-quality-standards/.

The EPO suggests that you examine the new digital FEMA maps for Honolulu and Sea Level Rise projects available on the SOEST website: http://www.soest.hawaii.edu/coasts/sealevel
I find the Honolulu fly-through with 3 foot sea level rise (projected for 2100) very interesting.

EPO recommends that you contact the Safe Drinking Water Branch, Clean Water Branch and the Hazard Evaluation and Emergency Response Office (regarding soil issues). Please reply via email to laura.mcintyre@doh.hawaii.gov confirming receipt of this emailed letter.

Mahalo,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

C. via email: SDWB, CWB, HEER with attachment of letter and map received by DOH 9.12.2014

Laura Leialoha Phillips McIntyre AICP
Program Manager, Environmental Planning Office
Hawaii State Department of Health
919 Ala Moana Blvd. Rm. 312
Honolulu, Hawaii 96814
Direct Phone: (808) 586-4338
Email: laura.mcintyre@doh.hawaii.gov
Website: http://health.hawaii.gov/epo
Ua mau ke ea o ka aina I ka pono

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Ms. Laura Leialoha Philips McIntyre, AICP
Manager, Environmental Planning Office
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: Ref. No. EPO 14-217
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Ms. McIntyre:

Thank you for your correspondence dated October 3, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project. The following are offered in response to the comments provided:

1. As requested, the following website information will be reviewed throughout the project:

    a. Standard comments relating to Environmental Health found at http://health.hawaii.gov/epo/home/landuse - planning - review - program/. We acknowledge that we are required to adhere to all applicable standard comments.

    b. Various links found that the Hawaii Environmental Health Portal https://ehacloud.doh.hawaii.gov.

    c. Recently revised Water Quality Standards Maps found at: http://health.hawaii.gov/cwb/site - map/clean - water - branch - home - page/water - quality - standards/.

    d. New digital FEMA maps for Honolulu and Sea Level Rise projects available on the SOEST website: http://www.soest.hawaii.edu/coasts/sealevel.

2. As recommended, the Departments of Health's (DOH) Safe Drinking Water, Clean Water Branch, and Hazard Evaluation and Emergency Reponses Office will be included on the DEA distribution list during the public review process.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

NEIL ABERCROMBIE
GOVERNOR

PATRICIA McMANAMAN
DIRECTOR

BARBARA A. YAMASHITA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF HUMAN SERVICES
Benefit, Employment & Support Services Division
820 Mililani Street, Suite 606
Honolulu, Hawaii 96813

September 22, 2014

Refer to 14-0570

Gray, Hong, Nojima & Associates, Inc.
Attn: Gavin Masaki, PE
201 Merchant St., Suite 1900
Honolulu, Hawaii 96813

Subject: Pre-Assessment Consultation for the Honolulu Water System Improvements Environmental Assessment for various pipelines within the Honolulu area, Oahu Island TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6

Dear Mr. Masaki:

Thank you for your letter dated September 12, 2014 that requests the Department of Human Services (DHS) review the Pre-Assessment Consultation for the replacement and upgrade of water main pipelines in the Honolulu area which are identified in the letter and map that we received.

The DHS has reviewed the Pre-Assessment Consultation of the proposed project. As there are currently three (3) child care facilities in or around the immediate vicinities of the proposed replacement water main pipelines, the DHS has concerns for possible water main shut offs during child care operating hours which shall affect the health and safety of the children and staff at these child care facilities. Therefore, as stated in the Pre-Assessment Consultation letter dated September 12, 2014, we understand that an Environmental Assessment (EA) will be prepared and address the project's potential environmental, economic and social impacts. Upon receipt of the EA, the DHS shall review the EA, and at that time, if applicable, shall provide additional concerns or comments.

If you have any questions or need further information, please contact Ms. Dayna Luka, Child Care Program Specialist, at (808) 586-7058.

Sincerely,

Pankaj Bhanot
Scott Nakasone
Assistant Division Administrator
for

c: Patricia McManaman, DHS Director

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Scott Nakasone
Assistant Division Administrator
Benefits, Employment & Support Service Division
Department of Human Services
State of Hawaii
820 Mililani Street, Suite 606
Honolulu, Hawaii 96813

Attn: Ms. Dayna Luka

SUBJECT: Ref. No. 14-0570
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Nakasone:

Thank you for your correspondence of September 22, 2014 regarding the subject project. We acknowledge that based on your review of the information provided, there may be three (3) child care facilities in or around the immediate vicinities of the proposed replacement water main pipelines. We further acknowledge that DHS has concerns for possible water main shutoffs during child care operating hours which shall affect the health and safety of the children and staff at these child care facilities.

Per a subsequent phone conversation with Ms. Dayna Luka of your staff, we understand that the following child care facilities may be affected:

- Strode Montessori
  1041 Nuuanu Avenue, Unit E
  Honolulu HI, 96817

- The Cole Academy
  36 Merchant Street
  Honolulu HI, 96813

- Ke Aloha Hookahi
  670 Auahi St
  Honolulu, HI 96813

In addition, as requested, your office will be included in the distribution list for the project's Draft Environmental Assessment review. At that time, if applicable, additional concerns or comments will be provided.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM
GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

NEIL ABERCROMBIE
GOVERNOR

HAKIM OUANSAFI
EXECUTIVE DIRECTOR

BARBARA E. ARASHIRO
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HUMAN SERVICES
HAWAII PUBLIC HOUSING AUTHORITY
1002 NORTH SCHOOL STREET
POST OFFICE BOX 17907
HONOLULU, HAWAII 96817

IN REPLY PLEASE REFER TO:
14:OED/0172

October 14, 2014

Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant St., Suite 1900
Honolulu, HI 96813

RE: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6 Honolulu, Oahu, Hawaii

Dear Mr. Masaki:

We are in receipt of your letter dated September 12, 2014, via State Representative Karl Rhoads, with regard to the above-referenced subject matter. Based on the location of the proposed Board of Water Supply (BWS) water system improvements, we believe the Hawaii Public Housing Authority's (HPHA) planned future redevelopment of the Mayor Wright Homes (MWH), located at 606 N. Kukui St., TMK (1) 1-7-029:003, may be of concern.

The 14.85 acre MWH site is currently developed with 364 residential low-income housing units. The redevelopment, which has recently gone out for bid by the HPHA and may break ground as soon as next year, may include as much as 1500 residential units, as well as other commercial uses due in part to its location within the City and County of Honolulu's Transit-Oriented Development zone. We believe that the MWH redevelopment and its significant increases in uses and densities should be evaluated and considered for any water system improvements in the area by the BWS.

Thank you for your consideration of this matter. Please contact our Chief Planner Dawn Takeuchi Apuna at 832-4676 for additional information.

Sincerely,

Hakim Ouansafi
Executive Director

AN EQUAL OPPORTUNITY AGENCY

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Rusty B. Bungcayao
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com

December 19, 2014

Mr. Hakim Ouansafi
Executive Director
Hawaii Public Housing Authority
Department of Human Services
State of Hawaii
P.O. Box 17907
Honolulu, Hawaii 96817

Attn: Ms. Dawn Takeuchi Apuna

SUBJECT: Ref. No. 14:OED/0172
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Ouansafi:

Thank you for your correspondence dated October 14, 2014 regarding the subject project. We acknowledge your department's planned future redevelopment of the 14.85 acre Mayor Wright Homes (MWH) which may include as much as 1,500 residential units, as well as other commercial uses due in part to its location within the City and County of Honolulu's Transit-Oriented Development (TOD) zone. Per a subsequent phone conversation with Dawn Takeuchi Apuna of your staff, we understand that the Hawaii Public Housing Authority is negotiating with Hunt Development to design, construct, and maintain the MWH redevelopment.

We sent your letter to the Board of Water Supply and according to their database they have not received a water availability request for the MWH redevelopment. The Board of Water Supply understands that MWH is located in the TOD zone. The proposed Honolulu Water System Improvements were based on estimated water demands from the Department of Planning and Permitting TOD report. The Board of Water Supply notes that generally the existing water system is adequate to accommodate the water requirements of the Downtown, Chinatown and Iwilei Transit Station areas. However, individual developments may be required to make infrastructure improvements due to aged and undersized water mains. The sizing of pipelines will be determined at the time the development is submitted for approval.

The Board of Water Supply offers the following standard comments for developments (or redevelopments) within TOD:

1. A Water Master Plan (WMP) shall be submitted for the TOD areas subject to new roadway and water system infrastructure, including supporting hydraulic analysis and development phasing. The WMP is required to determine the adequacy of the water system to provide domestic water and fire protection in accordance with our Water System Standards. Approval of construction plans will be contingent on an approved WMP.

2. The proposed water demands within the subject TOD should be explained in more detail to support the demand calculations. The height limits for construction should be indicated to support the projected water usage of 400 gallons per day (gpd)/unit for multi-family low-rise and 300 gpd for multi-family high-rise. The analysis should indicate whether the demands are based on existing or proposed zoning.

3. The availability of water will be determined when the Building Permit Applications are submitted for our review and approval. When water is made available, the applicant will be required to pay the prevailing Water System Facilities Charges for resource development, transmission and daily storage.

4. High-rise buildings with booster pumps will be required to install water hammer arrestors or expansion tanks to reduce pressure spikes and potential main breaks in our water system.

5. The developers will be required to meet the Board of Water Supply cross-connection control and backflow prevention requirements. The requirements will be determined when the Building Permit Applications are submitted for our review and approval.

6. Water conservation measures are required for all proposed developments. These measures include low flow plumbing fixtures, utilization of nonpotable water for irrigation using rain catchment and chiller/air handler condensate, cooling tower conductivity meters and water softening recycling systems, drought tolerant plants, xeriscape landscaping, efficient irrigation systems and the use of Water Sense labeled ultra-low-flow water fixtures and toilets.

7. The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

8. Board of Water Supply reserve further comments on the adequacy of our system until the development plans are formalized

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Representative Karl Rhodes, State House District 29
Scot Muraoka, Honolulu Board of Water Supply

3094-00

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 14, 2014

Gray, Hong, Nojima & Associates, Inc. via email: gmasaki@grayhongnojima.com
Attn: Gavin Masaki, P.E.
201 Merchant Street, Suite 1900
Honolulu, HI 96813

Dear Mr. Masaki,

SUBJECT: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from (1) Land Division – Oahu District; and (2) Division of State Parks; (3) Division of Forestry & Wildlife; and (4) Division of Aquatic Resources. No other comments were received as of our suspense date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

(5) and Engineering Division

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 16, 2014

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources
X Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: fr Russell Y. Tsuji, Land Administrator KET
SUBJECT: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment
LOCATION: TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii
APPLICANT: Honolulu Board of Water Supply by its consultant Gray, Hong, Nojima & Associates, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by October 13, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed: TChee
Print Name: Tom Chee
Date: 9/19/2014

56307

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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2014 SEP 18 PM

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STATE PARKS DIV
14 SEP 17 A10:06

DEPT OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

DEPT OF LAND & NATURAL RESOURCES

September 16, 2014

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources
X Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment
LOCATION: TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii
APPLICANT: Honolulu Board of Water Supply by its consultant Gray, Hong, Nojima & Associates, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by October 13, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed:
Print Name: Daniel S. Quinn
Date: 9/18/14

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 16, 2014

MEMORANDUM

From TO:

DLNR Agencies:
X Div. of Aquatic Resources
X Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII
2014 SEP 22 PM 2:37
RECEIVED
LAND DIVISION

To: ~~FROM:~~ Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment
LOCATION: TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii
APPLICANT: Honolulu Board of Water Supply by its consultant Gray, Hong, Nojima & Associates, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by October 13, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed:
Print Name: LISA HADWAY
Date: 9/18/14

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
SEP 16 2014
AQUATIC RESOURCES

DAR # 5020

September 16, 2014

MEMORANDUM

TO: **DLNR Agencies:**
X Div. of Aquatic Resources
X Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII
2014 OCT -7 PM 2:41
RECEIVED
LAND DIVISION

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment
LOCATION: TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii
APPLICANT: Honolulu Board of Water Supply by its consultant Gray, Hong, Nojima & Associates, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by October 13, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed: _____
Print Name: MCGILVRAY
Date: _____
OCT 0 6 2014

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

JESSE K. SOUKI
FIRST DEPUTY

WILLIAM M. TAM
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

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Date: Oct. 2, 2014
DAR # 5020

MEMORANDUM
TO: Frazer McGilvray, Administrator
DATE: October 2, 2014
FROM: Annette Tagawa, Aquatic Biologist
SUBJECT: Pre-Assessment Consultation for an Environmental Assessment

Comment	Date Request	Receipt	Referral	Due Date
	Sept. 16, 2014	Sept. 16, 2014	Sept. 16, 2014	Oct. 13, 2014

Requested by: Russell Y. Tsuji, Land Administrator

Summary of Proposed Project

Title: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment

Project by: Honolulu Board of Water Supply by its consultant Gray, Hong, Nojima & Associates, Inc.

Location: TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii

Brief Description: The Honolulu Board of Water Supply (BWS) is proposing to undertake the replacement and upgrade (increase in size) of various pipelines within Honolulu. The improvements would provide an improved level of reliability to the water system and meet future increases in demands.

Comments: The Division has no objections to the proposed project. However, as part of the Environmental Assessment, the Division would like see Best Management Practices addressed toward mitigation measures that include preventing any contaminants such as sediments, pollutants, petroleum products and other debris from possibly entering the aquatic environment during project activities.

Thank you for providing DAR the opportunity to review and comment on the proposed project. Should there be any changes to the project plans, DAR requests the opportunity to review and comment on those changes.

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

2014 OCT 14 PM 2:13
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

RECEIVED
SEP 16 PM 02:55 ENGINEERING
LAND DIVISION

September 16, 2014

MEMORANDUM

~~TO:~~ From: **DLNR Agencies:**
X Div. of Aquatic Resources
X Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
X Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Oahu District
X Historic Preservation

~~FROM:~~ TO: Russell Y. Tsuji, Land Administrator
SUBJECT: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment
LOCATION: TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii
APPLICANT: Honolulu Board of Water Supply by its consultant Gray, Hong, Nojima & Associates, Inc.

Transmitted for your review and comment on the above-referenced document. We would appreciate your comments on this document.

Please submit any comments by October 13, 2014. If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Supervising Land Agent Steve Molmen at (808) 587-0439. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: _____
Print Name: Carty S. Chang, Chief Engineer
Date: 10/13/14

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
REF: Pre-Assessment Consultation for Honolulu Water System Improvements EA
Oahu.060

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.
( ) Please take note that the project site according to the Flood Insurance Rate Map (FIRM), is located in Zone ___.
( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.
(X) Please note that the project(s) located in the Flood Hazard Zones (A, AO, AH, AE, AEF, V, VE, and XS) must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:
(X) Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.
( ) Mr. Frank DeMarco at (808) 961-8042 of the County of Hawaii, Department of Public Works.
( ) Ms. Carolyn Cortez at (808) 270-7253 of the County of Maui, Department of Planning.
( ) Mr. Stanford Iwamoto at (808) 241-4896 of the County of Kauai, Department of Public Works.

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.
( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments: _____

( ) Other: _____

Should you have any questions, please call Mr. Dennis Imada of the Planning Branch at 587-0257.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER
Date: 10/13/14

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Russell Y. Tsuji
Land Administrator
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Attn: Mr. Steve Molmen

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Tsuji:

Thank you for your correspondence dated October 14, 2014 regarding the subject project. We understand that the various divisions of the Department of Land and Natural Resources were given the opportunity to review the pre-assessment consultation letter. As of this time, we acknowledge your transmittal of comments from the following Divisions:

1. Land Division – Oahu District has no comments.
2. Division of State Parks has no comments.
3. Division of Forestry and Wildlife has no comments.
4. Division of Aquatic Resources
    a. Recommended that Best Management Practices address mitigation measures that include preventing any contaminants such as sediments, pollutants, petroleum products and other debris from possibly entering the aquatic environment during project activities.

5. Engineering Division has the following comments:
    a. If the proposed project site is located in the Flood Hazard Zones (A, AO, AH, AE, AEF, V, VE, and XS), the project must comply with the rules and regulations of the National Flood Insurance (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR) whenever development is undertaken within a Special Flood Hazard Area.
    b. 44CFR indicates the minimum standards set forth by the NFIP; however, the City and County of Honolulu's flood ordinance may take precedence over the minimum NFIP standards if proven to be more restrictive.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

NEIL ABERCROMBIE
GOVERNOR

FORD N. FUCHIGAMI
INTERIM DIRECTOR

Deputy Directors
RANDY GRUNE
AUDREY HIDANO
ROSS M. HIGASHI
JADINE URASAKI
IN REPLY REFER TO:
DIR 1336
HWY-PS 2.8323

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

October 24, 2014

Ms. Sheryl E. Nojima
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Ms. Nojima:

Subject: Pre-Assessment Consulation
Honolulu Water System Improvements
Honolulu, Oahu, TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6

The Honolulu Board of Water Supply proposes to improve its water delivery system with new waterlines that may reside within the Department of Transportation's (DOT) right-of-way for various State roadways.

The improvements are not expected to impact our State highway facilities; however, the installation of the waterlines and any ancillary actions related to the project must be coordinated, as appropriate, with the DOT and adequate traffic control plans utilized.

If there are any questions, please contact Ken Tatsuguchi, Engineering Program Manager, Highways Planning Branch, at 587-1830. Please reference file review number 2014-180 in all contacts and correspondence regarding these comments.

Very truly yours,

FORD N. FUCHIGAMI
Interim Director of Transportation

NEIL ABERCROMBIE
GOVERNOR

FORD N. FUCHIGAMI
INTERIM DIRECTOR

Deputy Directors
RANDY GRUNE
AUDREY HIDANO
ROSS M. HIGASHI
JADINE URASAKI

IN REPLY REFER TO:
STP 8.1698

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

October 31, 2014

Ms. Sheryl E. Nojima, P. E., Ph. D.
Gray, Hong, Nojima and Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Ms. Nojima:

Subject: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6

Our Department of Transportation (DOT) has the following comments:

Harbors Division (DOT-HAR)

1. DOT-HAR has a number of facilities located on the Makai (southern) side of the water pipeline alignment that could be impacted during the installation of the waterlines. First, the Pier 11 Passenger Cruise Terminal is located at the Nimitz Highway and Fort Street Mall. Second, DOT-HAR Administrative Offices are located on 79 South Nimitz Highway and 700 Fort Street Mall. Finally, the Pier 2 Passenger Cruise Terminal is located at the Ala Moana Boulevard and Channel Street junction.

2. In addition, DOT-HAR is planning to start a construction project at the Piers 12 and 15 area. For your reference, we are providing the locations of the facilities and construction project as discussed above (attached).

3. DOT-HAR is concerned with potential traffic impacts to the above facilities caused by Board of Water Supply's (BWS) construction activities, especially during any open trench activities along the pipeline alignment. In the case of the passenger terminals, a number of large buses, passenger shuttles and vehicles such as taxis circulate around these terminals to transport passengers and staff. In order to minimize the impact, we recommend that trench work in this area be done during the summer months (mid-May to mid-September). In addition, a number of DOT-HAR employees and its clients park at the administrative offices on a daily basis. Finally, construction workers and their vehicles for the DOT-HAR projects will need access to the Piers 12 and 15 construction sites.

Also related to BWS construction activities, the Draft Environmental Assessment should disclose any estimated timeline for the construction and whether work at night or on the weekend is anticipated. DOT-HAR is in operation 24 hours per day/7 days a week, and ingress and egress to the administrative offices must be allowed.

We request that BWS coordinate with DOT-HAR and relevant users (i.e., passenger cruise and construction vendors) to develop and discuss traffic management controls to minimize traffic impacts.

4. DOT-HAR is concerned with the potential disruption of water service to both the cruise terminals and the administrative offices as both facilities service a large number of people. We request that BWS coordinate with DOT-HAR to minimize water service disruptions.

5. We recommend that adjoining neighbors that could be impacted like Hawaii Pacific University, the Aloha Tower Marketplace, the Department of Business, Economic Development, and Tourism Foreign Trade Zone, and other affected groups be consulted as well.

6. The site map provided as an attachment along with your letter is difficult to read because of the vague property boundaries. We recommend the Draft Environmental Assessment provide an updated figure showing accurate property boundaries.

Highways Division (DOT-HWY)

As stated in a recent DOT-HWY letter to you (HWY-PS 2.8323), the subject improvements is not expected to impact our State highway facilities. However, the installation of the waterlines and any ancillary actions related to the project must be coordinated, as appropriate with the DOT and adequate traffic control plans utilized.

If there are any questions, please contact Mr. Norren Kato of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

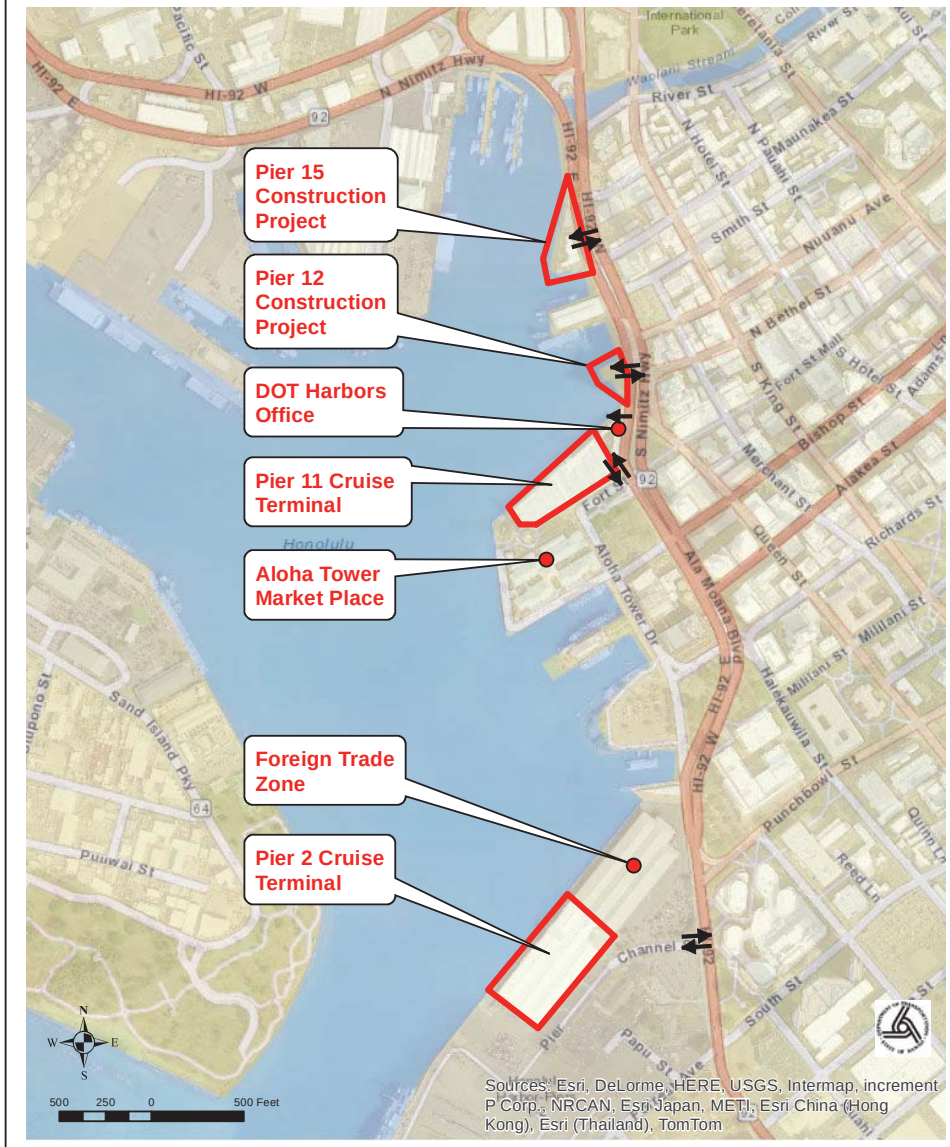
Very truly yours,

11/7/14

FORD N. FUCHIGAMI
Interim Director of Transportation

c: Scot Muraoka, Honolulu Board of Water Supply

Exhibit A
Department of Transportation - Harbors Facilities



Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Rusty B. Bungcayao
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com

December 12, 2014

Mr. Ford N. Fuchigami
Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Attn: Mr. Norren Kato

SUBJECT: Ref. No. 2014-180, DIR 1336, HWY-PS 2.8323, STP 8.1698
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Fuchigami:

Thank you for your correspondence dated October 24th and 31st, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project:

1. Thank you for the figure displaying the locations of the State Department of Transportation (DOT) Harbors (HAR) facilities and construction projects. We acknowledge the following facilities and planned construction projects:
    a. Pier II Passenger Cruise Terminal located at the Nimitz Highway and Fort Street Mall.
    b. DOT-HAR Administrative Offices located on 79 South Nimitz Highway and 700 Fort Street Mall.
    c. Pier 2 Passenger Cruise Terminal located at the Ala Moana Boulevard and Channel Street junction.
    d. Planned construction projects at Piers 12 and 15 area.

2. We acknowledge your concerns with potential traffic impacts to the above facilities caused by Board of Water Supply's (BWS) construction activities, especially during any open trench activities along the pipeline alignment. We further acknowledge that, in the case of the passenger terminals, a number of large buses, passenger shuttles and vehicles such as taxis circulate around these terminals to transport passengers and staff. The DEA will include a discussion of the traffic impacts and propose any mitigative measures.
3. The Board of Water Supply will be informed of your recommendation that trenching work near DOT-HAR facilities and construction site be done during the summer months (mid May to mid-September). We further acknowledge that DOT-HAR employees and clients park at the administrative offices on a daily basis and construction workers and their vehicles will need access to the Piers 12 and 15 construction sites.

4. We acknowledge that the DEA should disclose any estimated timeline for the construction and whether work at night or on the weekend is anticipated. We further acknowledge that DOT-HAR is in operation 24 hours per day/7 days a week, and ingress and egress to the administrative offices must be allowed.

5. The Board of Water Supply will be advised to coordinate with DOT-HAR and relevant users (i.e., passenger cruise and construction vendors) to develop and discuss traffic management controls to minimize traffic impacts.

6. We acknowledge your concerns with the potential disruption of water service to both the cruise terminals and the administrative offices. The Board of Water Supply will be advised to coordinate its projects with DOT-HAR to minimize water service disruptions.

7. As recommended, Hawaii Pacific University, the Aloha Tower Marketplace, the Department of Business, Economic Development, and Tourism Foreign Trade Zone will be included on the DEA distribution list during the public review process.

8. As recommended, the DEA will include updated figures showing property boundaries. It should be noted that the property boundaries will be obtained from available City and County of Honolulu's GIS data.

9. We acknowledge that the proposed improvements are not expected to impact the State highway facilities. We further acknowledge that the installation of the waterlines and any ancillary actions related to the project must be coordinated as appropriate with the Department of Transportation and adequate traffic control plans utilized.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

PHONE (808) 594-1888 FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
560 N. NIMITZ HWY., SUITE 200
HONOLULU, HAWAI'I 96817

HRD14/7247B

October 29, 2014

Gray, Hong, Nojima & Associates, Inc.
201 Merchant St., Suite 1900
Honolulu, HI 96813
Attn: Gavin Masaki, PE

Re: Pre-Assessment Consultation Honolulu Water System Improvements Environmental Assessment
TMK (1) 1-5, 1-7, 2-1, 2-3 and 2-6

Aloha Mr. Masaki:

The Office of Hawaiian Affairs (OHA) is in receipt of your September 12, 2014 letter requesting a pre-assessment consultation on the Honolulu water system improvements.

The Honolulu Board of Water Supply (BWS) is proposing to undertake the replacement and upgrade of various pipelines within urban Honolulu. The improvements will provide an increased level of reliability to the water system and meet future increases in demand. The work area stretches from Nimitz Highway to Kalakaua Avenue, for an approximate distance of 20,000 feet.

OHA is aware that an environmental assessment (EA) will be prepared in accordance with Chapter 343 of Hawai'i Revised Statutes, and that the EA will address the project's potential environmental, economic, and social impacts. To this end, we would like to remind BWS that the project's area is among known burial grounds, as many have been found and documented in past projects. OHA asks that a burial plan and archaeological monitors be provided for the project.

In addition, as with all excavations in known burial ground OHA does request assurances that should iwi kūpuna or Native Hawaiian cultural deposits be identified during any ground

altering activities, all work will immediately cease and the appropriate agencies, including OHA, will be contacted pursuant to applicable law.

Thank you for the opportunity to submit comments, and we look forward to receiving the EA for further review and comment. Should you have any questions, please contact Jeannin Jeremiah at 594-1790 or by email at jeanninj@oha.org.

'O wau iho nō me ka 'oia 'i'o,

Kamana'opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer

KC:jj

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Rusty B. Bungcayao
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com

December 12, 2014

Mr. Kamana`opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer
Office of Hawaiian Affairs
State of Hawai`i
560 N. Nimitz Highway, Suite 200
Honolulu, Hawai`i 96817

Attn: Ms. Jeannin Jeremiah

SUBJECT: Ref. No. HRD14/7247B
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Dr. Crabbe:

Thank you for your correspondence dated October 29, 2014 regarding the subject project. We acknowledge that based on your review of the information provided, that numerous burials in the project area have been found and documented in the past. Based on this information, the Board of Water Supply and their consultants will be advised that if iwi kiipuna or Native Hawaiian cultural deposits are identified during any ground altering activities, all work will immediately cease and a burial plan will be prepared in coordination with the affected descendants, State Historic Preservation Division (SHPD), and other appropriate agencies including the Office of Hawaiian Affairs.

It should be noted that an archaeological literature review and field investigation of the proposed project will be prepared in conjunction with the DEA. The report will provide recommendations and mitigative measures to be performed prior to and during construction. The report will be submitted to SHPD for review and determination and included in the DEA for public comment.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

DEPARTMENT OF COMMUNITY SERVICES
CITY AND COUNTY OF HONOLULU
715 SOUTH KING STREET, SUITE 311 • HONOLULU, HAWAII 96813 • AREA CODE 808 • PHONE: 768-7762 • FAX: 768-7792

KIRK CALDWELL
MAYOR

GARY K. NAKATA
ACTING DIRECTOR

October 3, 2014

Sheryl E. Nojima, PE, PhD
President
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Dr. Nojima:

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6 Honolulu, Oahu, Hawaii

We have reviewed your letter dated September 12, 2014, and the information and map provided regarding the Pre-Assessment Consultation for the Honolulu Water System Improvements Environmental Assessment.

Our review of the information provided indicates that the proposed Honolulu Water Systems Improvements, Environmental Assessment, will have no adverse impacts on any Department of Community Services' activities or projects at this time.

Thank you for providing us with the opportunity to comment on this matter.

Sincerely,

Gary K. Nakata
Acting Director

GKN:sgk

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Gary K. Nakata
Acting Director
Department of Community Services
City and County of Honolulu
715 South King Street, Suite 311
Honolulu, Hawaii 96813

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Nakata:

Thank you for your correspondence dated October 3, 2014 regarding the subject project. We acknowledge that based on your review of the information provided, the proposed project will have no adverse impacts on any Department of Community Services' activities or projects at this time.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROBERT J. KRONING, P.E.
DIRECTOR DESIGNATE

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

September 25, 2014

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Attn: Gavin Masaki

Dear Mr. Masaki:

Subject: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6 Honolulu, Oahu, Hawaii

The Department of Design and Construction has the following comment to offer on the pre-assessment consultation.

We have an upcoming resurfacing project entitled, Rehabilitation of Streets, Unit 77, along Pensacola Street, from Lunalilo Street to Waimanu Street. It is currently in the early stages of the design phase with advertisement for bids anticipated early 2016.

Thank you for the opportunity to review and comment. Should there be any questions, please contact Pam Noguchi of our Civil division at 768-8814.

Sincerely,

Robert J. Kroning, P.E.
Director Designate

RJK: cf (579847)

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Robert J. Kroning, P.E.
Director
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Attn: Ms. Pam Noguchi

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Kroning:

Thank you for your correspondence dated September 25, 2014 regarding the subject project. We acknowledge that your department has an upcoming resurfacing project entitled, "Rehabilitation of Streets, Unit 77, along Pensacola Street." Per a subsequent phone conversation with Ms. Pam Noguchi of your staff, we understand the following:

- The project will extend along Pensacola Street from mauka of the Kapiolani Boulevard intersection to the State right-of-way makai of the Lunalilo Street intersection.
- The project is currently in the design stage with construction anticipated to commence in 2016.
- The City currently has a one-year moratorium on utility trenching newly paved roadways.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

DEPARTMENT OF ENVIRONMENTAL SERVICES

CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 308, KAPOLEI, HAWAII 96707
TELEPHONE: (808) 768-3486 • FAX: (808) 768-3487 • WEBSITE: http://envhonolulu.org

KIRK CALDWELL
MAYOR

LORI M.K. KAHIKINA, P.E.
DIRECTOR

TIMOTHY A. HOUGHTON
DEPUTY DIRECTOR

ROSS S. TANIMOTO, P.E.
DEPUTY DIRECTOR

IN REPLY REFER TO
PRO 14-140

October 10, 2014

Mr. Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

SUBJECT: Pre-Assessment Consultation, Honolulu Water System Improvements Environmental Assessment, (TMK: 1-5, 1-7, 2-1, 2-3 and 2-6)

We have reviewed the subject document as transmitted to us by your letter dated September 12, 2014. We have the following comments:

1. The Department of Planning and Permitting (DPP), Wastewater Branch has the lead role in issuing sewer connection permits and review of all construction plans that may impact the City's wastewater system.

2. We would like to be included in the review of the construction plans for the proposed improvements.

Should you have any questions, please call Lisa Kimura, Civil Engineer, at 768-3455.

Sincerely,

Lori M.K. Kahikina, P.E.
Director

cc: Department of Planning and Permitting, SDD, WWB
Department of Design and Construction, WWD, CSEB

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
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201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Ms. Lori M. K. Kahikina, P.E.
Director, Department of Environmental Services
City and County of Honolulu
1000 Uluohia Street, Suite 308
Kapolei, Hawaii 96707

Attn: Ms. Lisa Kimura

SUBJECT: Ref. No. PRO 14-140
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Ms. Kahikina:

Thank you for your correspondence dated October 10, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project:

1. The Department of Planning and Permitting (DPP), Wastewater Branch has the lead role in issuing sewer connection permits and review of all construction plans that may impact the City's wastewater system.

2. Your department will be included in the review of the construction plans for the proposed improvements.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn
cc: Scot Muraoka, Honolulu Board of Water Supply
3094-00

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu'ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 14-894

October 9, 2014

Mr. Gavin Y. Masaki, PE, LEED AP
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926

Dear Mr. Masaki:

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5, 1-7, 2-1, 2-3 and 2-6 Honolulu, Oahu, Hawaii

Thank you for the opportunity to review and comment on your letter dated September 12, 2014, on the above subject matter.

Our comments are as follows:

1. Provide all necessary Best Management Practices for the project.
2. All work performed within affected City roadway's right-of-way, shall require proper City permits (Street Usage Permit and Grading/Trenching Permit).
3. All work within City roads right-of-way shall be constructed to City Standards.
4. All damages during the construction phase within City roads right-of-way shall be repaired or replaced in-kind, using the same or approved material(s) and accepted by the City at the owner's/developer's expense.

5. The "Pre-Assessment Consultation" documents should be reviewed by:
   a. City Department of Planning and Permitting, as they have numerous upcoming projects in the Kakaako area.
   b. City Department of Design and Construction, as they have multiple rehabilitation of street projects programmed for the Downtown Honolulu area.
   c. State Department of Transportation, Highways Division, as they have jurisdiction of Nimitz Highway and Ala Moana Boulevard.

If you have any questions, please call Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross S. Sasamura, P.E.
Director and Chief Engineer

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Ross S. Sasamura, P.E.
Director and Chief Engineer
Department of Facilities Maintenance
City and County of Honolulu
1000 Uluohia Street, Suite 215
Kapolei, Hawaii 96707

Attn: Mr. Kyle Oyasato

SUBJECT: Ref. No. DRM 14-894
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Sasamura:

Thank you for your correspondence dated October 9, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project:

1. Best Management Practices will be incorporated in the project's construction plans and specifications.

2. All work within the affected City roadway's right-of-way shall require proper City permits (Street Usage Permit and Grading/Trenching Permit).

3. To the extent possible, all work within existing City roads right-of-way shall be constructed to City Standards.

4. The Contractor shall be required to restore City road right-of-ways to original condition or use the same or approved material(s) and accepted by the City at no additional cost to the City.

5. The "Pre-Assessment Consultation" documents were submitted to the City Department of Planning and Permitting, City Department of Design and Construction, and the State Department of Transportation Highways Division on September 12, 2014.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

DEPARTMENT OF PARKS & RECREATION
CITY AND COUNTY OF HONOLULU
1000 Uluohia Street, Suite 309, Kapolei, Hawaii 96707
Phone: (808) 768-3003 • Fax: (808) 768-3053
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHELE K. NEKOTA
DIRECTOR

JEANNE C. ISHIKAWA
DEPUTY DIRECTOR

September 26, 2014

Mr. Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6 Honolulu, Hawaii

Thank you for the opportunity to review and comment at the Pre-Consultation stage of the Environmental Assessment for the proposed Board of Water Supply replacement and upgrade of various pipelines within Honolulu.

The Department of Parks and Recreation has no comment at this time.

Should you have any questions, please contact Mr. John Reid, Planner, at 768-3017.

Sincerely,

Michele K. Nekota

Michele K, Nekota
Director

MKN:jr
(579954)

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Ms. Michele K. Nekota
Director
Department of Parks and Recreation
City and County of Honolulu
1000 Uluohia Street, Suite 309
Kapolei, Hawaii 96707

Attn: Mr. John Reid

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Ms. Nekota:

Thank you for your correspondence dated September 26, 2014 regarding the subject project. We acknowledge that the Department of Parks and Recreation has no comment at this time.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP9/14-580097R

October 10, 2014

Mr. Gavin Masaki, P.E.
Project Manager
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

SUBJECT: Pre-Consultation for Draft Environmental Assessment (DEA)
Honolulu Water System Improvements; Tax Map Key: (1) 1-5, 1-7, 2-1, 2-3 and 2-6 Honolulu, Oahu, Hawaii

In response to your letter dated September 12, 2014, we have the following comments:

1. The DEA should discuss traffic impacts on the surrounding City streets as a result of the project, including the short-term impacts during construction. The DEA should also develop short- and long-term proposed transportation mitigating measures.

2. Construction work, to every extent possible, should be done during non-peak hours (8:30 a.m. – 3:30 p.m., or approved night work after 7:30 p.m.).

3. For your information, Nimitz Highway and Ala Moana Boulevard are under the jurisdiction of the Hawaii State Department of Transportation and should also be consulted.

4. The affected Neighborhood Boards, as well as the area residents, businesses, etc., should be kept apprised of the details of the proposed project and the impacts, particularly during construction, the project may have on the adjoining local street area network.

5. A street usage permit from the City's Department of Transportation Services shall be obtained for any construction-related work that may require the temporary closure of any traffic lane on a City street.

6. The DEA should include a description of Public Transit and the impact of your project on Public Transit bus and paratransit operations during construction. Several City bus transit routes use Ala Moana Boulevard, Nimitz Highway, and other streets involved in the project and several bus stops are located along them. Basic information is available on our websites: www.thebus.org and www.honolulu.gov/dts. Because your project may affect bus routes and services, you should contact our staff at 768-8370 to coordinate your planned activities.

7. Construction notes should include the following note regarding transit services: "This project may affect bus routes, bus stops, and paratransit operations, therefore, the Contractor shall notify the Department of Transportation Services, Public Transit Division at 768-8396 and Oahu Transit Services, Inc. (bus operations: 848-4578 or 852-6016 and paratransit operations: 454-5041 or 454-5020) of the scope of work, location, proposed closure of any street, traffic lane, sidewalk, or bus stop and duration of project at least two weeks prior to construction."

8. Any construction materials and equipment should be transferred to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets.

We reserve further comment pending submission of the DEA.

Thank you for the opportunity to review this matter. Should you have any further questions, please contact Michael Murphy of my staff at 768-8359.

Very truly yours,

Michael D. Formby
Director

cc: Scot Muraoka,
Board of Water Supply

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Rusty B. Bungcayao
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com

December 12, 2014

Mr. Michael D. Formby
Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Attn: Mr. Michael Murphy

SUBJECT: Ref. No. TP9/14-580097R
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Formby:

Thank you for your correspondence dated October 10, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project:

1. The DEA will include a discussion of the traffic impacts on the surrounding City streets as a result of the project, including the short-term impacts during construction, and develop short- and long-term proposed transportation mitigating measures.

2. Construction work, to every extent possible, will be done during non-peak hours (8:30 a.m. - 3:30 p.m. or approved night work after 7:30 p.m.).

3. Thank you for the information regarding the jurisdiction of Nimitz Highway and Ala Moana Boulevard. For your information, "Pre-Assessment Consultation" documents were submitted to the Hawaii State Department of Transportation on September 12, 2014.

4. The area Neighborhood Board, as well as the area residents, businesses, etc., will be kept apprised of the details of the proposed project and the impacts, particularly during construction. We further acknowledge that project may have impacts on the adjoining local street area network. After the DEA is published for public review, the Board of Water Supply and our office will contact the affected neighborhood boards to schedule a presentation during an upcoming monthly meeting.

5. The contractor will be required to obtain appropriate street usage permits from the City's Department of Transportation Services for any construction-related work that may require the temporary closure of any traffic lane on a City street.

6. The DEA will include a description of Public Transit and the impact of the proposed project on Public Transit bus and paratransit operations during construction. We understand that there are several City bus transit routes and bus stops along Ala Moana Boulevard, Nimitz Highway, and other streets involved in the project area. The Board of Water Supply and their consultants will be advised to coordinate with your department if the proposed project affects bus routes and services.

7. The Board of Water Supply and their consultants will be advised to include the following note regarding transit services in the construction plans: "This project may affect bus routes, bus stops, and paratransit operations, therefore, the Contractor shall notify the Department of Transportation Services, Public Transit Division at 768-8396 and Oahu Transit Services, Inc. (bus operations: 848-4578 or 852-6016 and paratransit operations: 454-5041 or 454-5020) of the scope of work, location, proposed closure of any street, traffic lane, sidewalk, or bus stop and duration of project at least two weeks prior to construction."

8. We acknowledge that any construction materials and equipment should be transferred to and from the project site during off-peak traffic hours (8:30 a.m. to 3:30 p.m.) to minimize any possible disruption to traffic on the local streets.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

HART

HONOLULU AUTHORITY for RAPID TRANSPORTATION

IN REPLY REFER TO:
CMS-AP00ENV-00446

Daniel A. Grabauskas
EXECUTIVE DIRECTOR AND CEO

December 18, 2014

Date Received _____
File: _____
To: JN GM
Action: _____

Ms. Sheryl E. Nojima, Ph.D., P.E., President
Gary, Hong, Nojima & Associates, Inc.
City Financial Tower
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Ms. Nojima:

Subject: Pre-Assessment Consultation
Honolulu Water System Improvement Environmental Assessment
Tax Map Key (TMK): (1) 1-5, 1-7, 2-1, 2-3, and 2-6 Honolulu, Oahu, Hawaii

Thank you for providing the Honolulu Authority for Rapid Transportation (HART) the opportunity to comment on the Honolulu Board of Water Supply (BWS) proposed replacement and upgrades within Honolulu along the enclosed list of TMKs. HART requests that BWS:

1. Works closely with HART to coordinate the BWS construction schedule and design plans at these locations.

2. Provides any available planned construction dates for the various improvements that could assist in this effort.

Enclosed for your reference is an exhibit prepared by AECOM, our Airport and City Center Guideway Final Designers, that identifies areas of potential conflict that will require further coordination between agencies.

If you have any questions, please contact Mr. Greg Rapp, Airport/City Center Guideway Project Manager, at grapp@honolulu.gov or 768-6243.

Sincerely,

Daniel A. Grabauskas
Executive Director and CEO

Enclosure: Adjacent TMKs
AECOM Exhibit

cc: Mr. Gregory Rapp, HART
Mr. Scot Muraoka, BWS

BOARD OF DIRECTORS
Ivan M. Lui-Kwan, Esq.
CHAIR
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Robert Bunda
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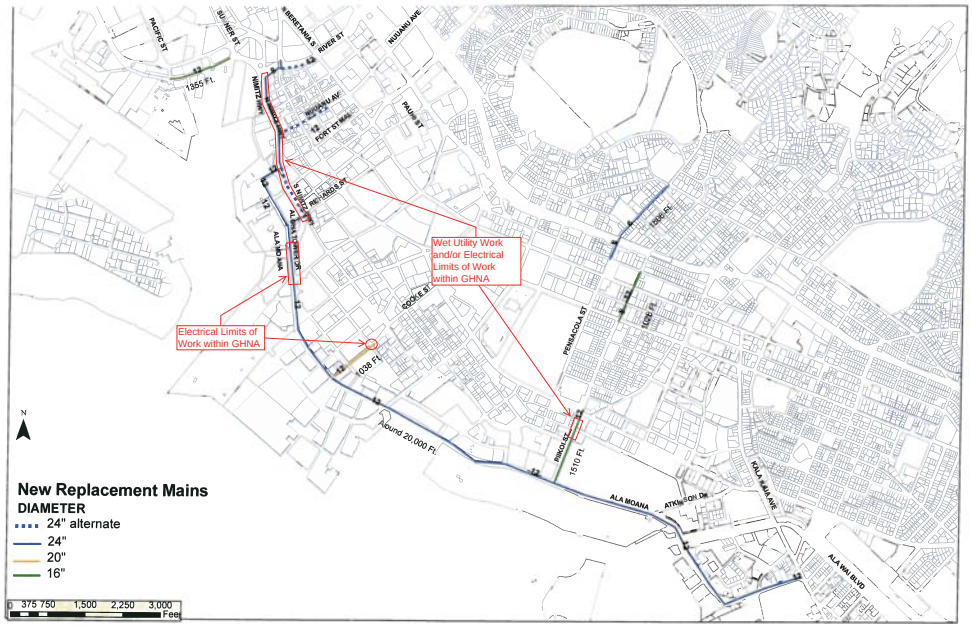
William "Buzz" Hong
Keslie W.K. Hui
Damien T.K. Kim
Carrie K.S. Okinaga, Esq.

CITY AND COUNTY OF HONOLULU, Alii Place, Suite 1700, 1099 Alakea Street, Honolulu, Hawaii 96813
Phone: (808)768-6159 Fax: (808)768-5110 www.honolulutransit.org



Adjacent TMKS

24" line along River Street, Nimitz and Ala Moana Blvd from River Street to Kalakaua Blvd
1-5-008
1-7-002
1-7-003
1-7-027
2-1-001
2-1-013
2-1-015
2-1-027
2-1-029
2-1-055
2-1-056
2-1-058
2-1-059
2-3-001
2-3-005
2-3-006
2-3-036
2-3-037
2-3-038
2-6-005
2-6-007
2-6-009
2-6-010
2-6-011
2-6-012
2-6-014
2-6-015

16" line along Nimitz Highway from Pacific Street to Sumner Street
1-5-008
1-5-013
1-5-038
1-5-039
1-5-040

20" line along Cooke Street from Ala Moana Blvd to Pohukaina Street
2-1-051
2-1-052
2-1-053
2-1-054
2-1-055
2-1-056

24" line along Pensacola Street from Kinau Street to Wider Street
2-4-012
2-4-013
2-4-017
2-4-018
2-4-019
2-4-030
2-4-031

16" line along Piikoi Street from Ala Moana Blvd to Kapiolani Blvd
2-3-006
2-3-007
2-3-010
2-3-015
2-3-038
2-3-039

16" line along Piikoi Street from King Street to Kinau Street
2-4-003
2-4-004
2-4-011
2-4-012

Alternate 24" line South Nimitz Highway from Fort Street Mall to Aloha Tower Drive
2-1-001
2-1-002
2-1-013
2-1-014
2-1-016
2-1-026

Alternate 24" line Nuuanu Ave from North Nimitz Highway to Pauahi Street
1-7-002
1-7-003
1-7-004
2-1-001
2-1-002
2-1-003

Alternate 24" line River Street from King to North Beretania Street
1-7-002
1-7-003
1-7-004
1-7-005

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Rusty B. Bungcayao
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com

January 7, 2015

Mr. Daniel A. Grabauskas
Executive Director and CEO
Honolulu Authority for Rapid Transportation
City and County of Honolulu
1099 Alakea Street, Suite 1700
Honolulu, Hawaii 96813

Attn: Mr. Gregory Rapp

SUBJECT: Ref. No. CMS-AP00ENV-00446
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Grabauskas:

Thank you for your correspondence dated December 18, 2014 regarding the subject project and the exhibit identifying areas of potential conflict. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project:

1. The Board of Water Supply should work closely with Honolulu Authority for Rapid Transportation (HART) to coordinate its construction schedule and design plans.

2. Provide any available planned construction dates for the various improvements.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn
cc: Scot Muraoka, Honolulu Board of Water Supply
3094-00

HONOLULU FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

September 23, 2014

Mr. Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

Subject: Preassessment Consultation
Honolulu Water System Improvements Environmental Assessment
Tax Map Key: 1-5, 1-7, 2-1, 2-3, and 2-6

In response to your letter dated September 12, 2014, regarding the above-mentioned subject, the Honolulu Fire Department determined that there will be no significant impact to fire department services.

Should you have questions, please contact Battalion Chief Terry Seelig of our Fire Prevention Bureau at 723-7151 or tseelig@honolulu.gov.

Sincerely,

Socrates D. Bratakos

SOCRATES D. BRATAKOS
Assistant Chief

SDB/SY:bh

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Socrates D. Bratakos
Assistant Chief
Honolulu Fire Department
City and County of Honolulu
636 South Street
Honolulu, Hawaii 96813-5007

Attn: Battalion Chief Terry Seelig

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Assistant Chief Bratakos:

Thank you for your correspondence of September 23, 2014, regarding the subject project. We acknowledge that based on your review of the information provided, the project will not have significant impact to fire department services.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

KIRK CALDWELL
MAYOR

LOUIS M. KEALOHA
CHIEF

DAVE M. KAJIHIRO
MARIE A. McCAULEY
DEPUTY CHIEFS

OUR REFERENCE EO-WS

October 1, 2014

Mr. Gavin Y. Masaki, P.E., LEED AP
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

This is in response to a letter dated September 12, 2014, requesting comments on the Pre-Assessment Consultation, Environmental Assessment, for the proposed Honolulu Water System Improvements project.

The Honolulu Police Department has the following concerns:

- Piikoi Street and Ala Moana Boulevard (District 1): Recommend coordination with the Ala Moana Center to maintain the flow of traffic as they currently have construction at the center;
- River Street between North Beretania Street and Nimitz Highway (District 1): Maintain the flow of traffic in the area as those roadways are heavily travelled by motorists and pedestrians;
- Ala Moana Boulevard and Aloha Tower Drive (District 1): Assess the ingress and egress of traffic along the roadway of the Aloha Tower Marketplace; and
- Holbron Lane at Ala Moana Boulevard (District 6): Maintain the flow of traffic on Holbron Lane as you approach Ala Moana Boulevard due to the large delivery trucks from the surrounding stores and construction in the area.

Throughout the project, we recommend that the contractor provide sufficient traffic control. Furthermore, we suggest that all necessary signs, lights, barricades, cones, and other safety equipment be installed and maintained by the contractor to facilitate the flow of motor vehicle and pedestrian traffic in the area(s) during construction.

If there are any questions, please contact Major Roy Sugimoto of District 1 (Central Honolulu) at 723-3327 or via e-mail at rsugimoto1@honolulu.gov or Acting Major Lisa Mann of District 6 (Waikiki) at 723-3345 or via e-mail at lmann@honolulu.gov.

Sincerely,

LOUIS M. KEALOHA
Chief of Police

By Randal K. Macadangdang
RANDAL K. MACADANGDANG
Assistant Chief
Support Services Bureau

Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
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Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
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201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 12, 2014

Mr. Louis M. Kealoha
Chief of Police
Honolulu Police Department
City and County of Honolulu
801 South Beretainia Street
Honolulu, Hawaii 96813

Atten: Assistant Chief Randal K. Macadangdang

SUBJECT: Ref. No. EO-WS
Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Chief Kealoha:

Thank you for your correspondence dated October 1, 2014 regarding the subject project. We acknowledge your comments relating to the preparation of the Draft Environmental Assessment (DEA) for the proposed project. The following project concerns will be addressed by the Board of Water Supply and their engineering consultants during the planning/pre-design phases:

1. The project should be coordinated with the Ala Moana Center to maintain the flow of traffic as they currently have construction at the center. For your information, the "Pre-Assessment Consultation" documents were submitted to Ala Moana Center on September 12, 2014.

2. To the extent possible, the flow of traffic along River Street between North Beretania Street and Nimitz Highway and Hobron Lane at Ala Moana Boulevard will be maintained to minimize impacts and inconveniences to motorists and pedestrians;

3. The project should maintain the flow of traffic on Hobron Lane at Ala Moana Boulevard due to the large delivery trucks from the surrounding stores and construction in the area.

4. The contractor will be required to provide sufficient traffic control. We further acknowledge that all necessary signs, lights, barricades, cones, and other safety equipment be installed and maintained by the contractor to facilitate the flow of motor vehicle and pedestrian traffic in the area(s) during construction.

It should be noted that the DEA will include a traffic discussion which will include the assessment of the ingress and egress of traffic along the roadway of the Aloha Tower Marketplace in the vicinity of Ala Moana Boulevard and Aloha Tower Drive.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

Oceanic
Time Warner Cable

October 1, 2014

Gary. Hong. Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926

Attn: Sheryl Nojima

Project: Honolulu Water System Improvements

Subject: CATV locations

Dear Miss/ Mrs. Sheryl:

Attached are drawings showing CATV facilities locations. Oceanic Time Warner Cable does not give out as built drawings. Hope you will find these drawings helpful. Most of our facilities are in Hawaiian Telcom infrastructure. If you have any questions, contact me at #625-8576.

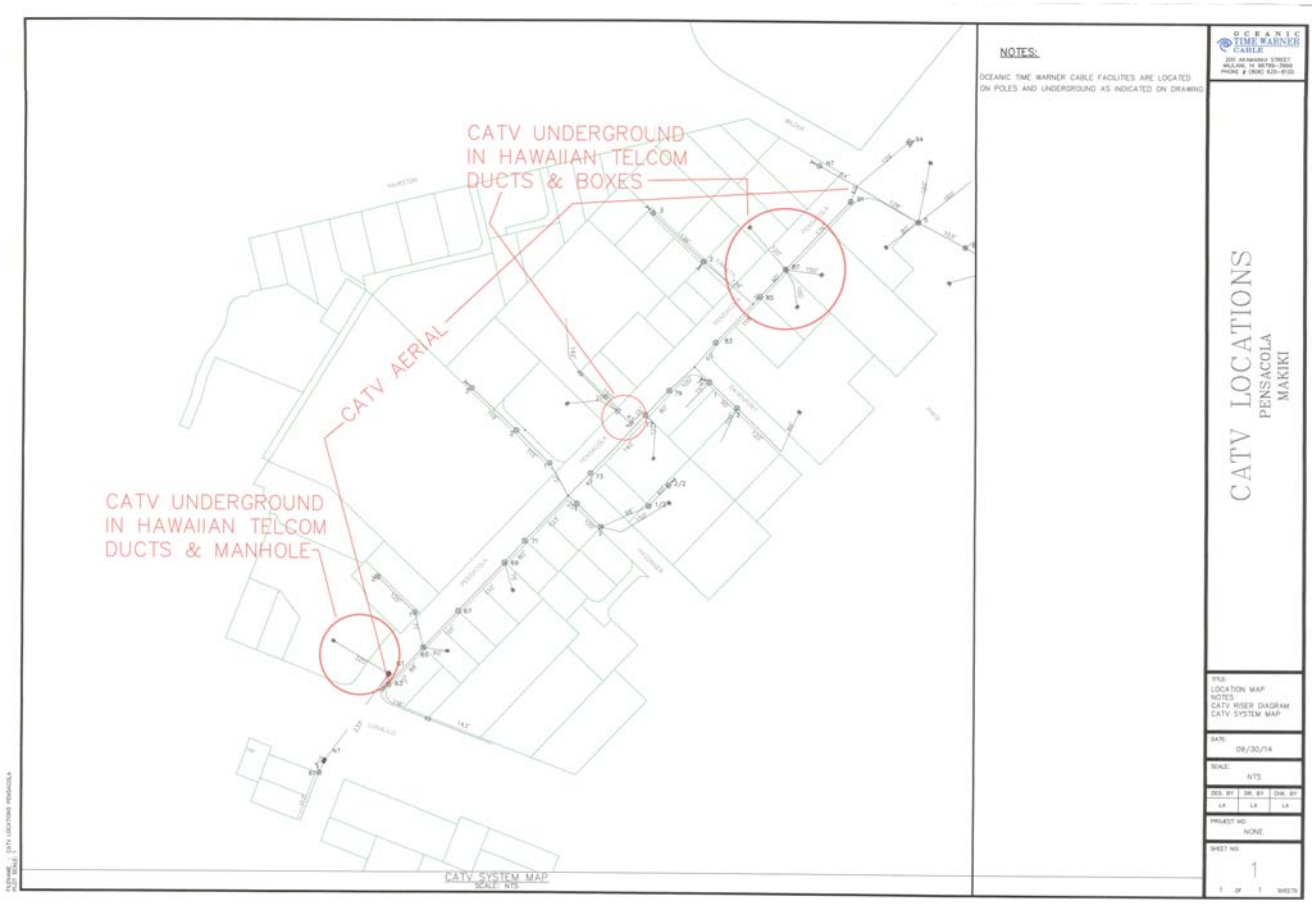
Sincerely,

Lionel Aguiar
Oceanic Time Warner Cable
OSP Engineer

200 Akamainui Street
Mililani, Hawaii 96789-3999

Tel (808) 625-2100
Fax (808) 625-8888





NOTES:

OCEANIC TIME WARNER CABLE FACILITIES ARE LOCATED ON POLES AND UNDERGROUND AS INDICATED ON DRAWING.

OCEANIC TIME WARNER CABLE
200 AKAMAINUI STREET
MILILANI, HI 96789-3999
PHONE # (808) 625-8100

CATV LOCATIONS
PENSACOLA
MAKIKI

TITLE:
LOCATION MAP
NOTES
CATV RISER DIAGRAM
CATV SYSTEM MAP

DATE: 09/30/14

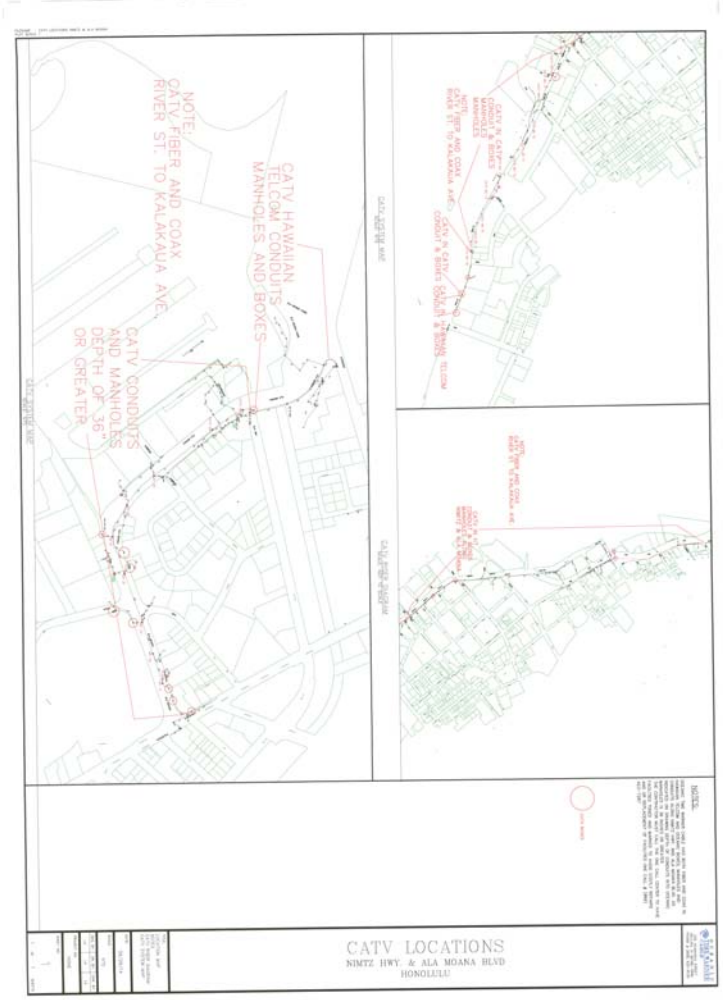
SCALE: NTS

DES. BY	DR. BY	CHK. BY
LA	LA	LA

PROJECT NO: NONE

SHEET NO: 1

1 OF 1 SHEETS



Gray • Hong • Nojima & Associates, Inc.
CONSULTING ENGINEERS

Daniel S.C. Hong, PE
Sheryl E. Nojima, PhD, PE
Michael H. Nojima, PE, LEED AP
Audrey Y.T. Yokota, PE
Toby T. Hanzawa, PE, LEED AP
Gavin Y. Masaki, PE, LEED AP
Winston M. Taniguchi, PE

201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926
Telephone: (808) 521-0306
Fax: (808) 531-8018
email@grayhongnojima.com
www.grayhongnojima.com

December 5, 2014

Mr. Lionel Aguiar
OSP Engineer
Oceanic Time Warner Cable
200 Akamainui Street
Mililani, Hawaii 96789-3999

SUBJECT: Pre-Assessment Consultation
Honolulu Water System Improvements Environmental Assessment
TMK: (1) 1-5 , 1-7, 2-1, 2-3, 2-4 and 2-6 Honolulu, Oahu Hawaii

Dear Mr. Aguiar:

Thank you for your correspondence dated October 1, 2014 regarding the subject project. We will review the location of CATV facilities on the drawings provided by your office.

Should there be any questions, please contact Gavin Masaki of our office at 521-0306 or email at gmasaki@grayhongnojima.com. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, NOJIMA & ASSOC., INC.

Sheryl E. Nojima, PhD, PE
President

GM:SN:cn

cc: Scot Muraoka, Honolulu Board of Water Supply

3094-00

APPENDIX B

Final Letter Report, Geotechnical Consultation, Honolulu Water System Improvements Environmental Assessment, Honolulu, Oahu, Hawaii

FINAL LETTER REPORT

GEOTECHNICAL CONSULTATION

PGE Job No. 0306-003

for

GRAY, HONG, NOJIMA & ASSOCIATES, INC.

HONOLULU WATER SYSTEM IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT
HONOLULU, OAHU, HAWAII

December 28, 2015

Submitted by:

Pacific Geotechnical Engineers, Inc.
Soils & Foundation Engineering Consultants
94-417 Akoki Street
Waipahu, Hawaii 96797
(808) 678-8024 Fax: (808) 678-8722
email: pge@pacificgeotechnical.com

Pacific Geotechnical Engineers, Inc.
Soils & Foundation Engineering Consultants

94-417 Akoki Street
Waipahu, Hawaii 96797
Telephone: (808) 678-8024
Facsimile: (808) 678-8722
Email: pge@pacificgeotechnical.com

December 28, 2015
Job No. 0306-003

Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Attention: Ms. Sheryl E. Nojima, Ph.D., P.E.

Subject: Final Letter Report
Geotechnical Consultation
Honolulu Water System Improvements
Environmental Assessment
Honolulu, Oahu, Hawaii

Dear Ms. Nojima:

1.0 INTRODUCTION

This final letter report summarizes the results of the geotechnical consultation services we performed for an Environmental Assessment (EA) for the Honolulu Water System Improvements Project at Honolulu, Oahu, Hawaii. Our services were performed in general accordance with the basic services of our May 27, 2014 proposal. We previously submitted an August 4, 2015 pre-final version of this letter report. This final letter report incorporates your review comments regarding our pre-final letter report.

The approximate location of the site is shown on the Map of Area, Plate 1.

2.0 PROJECT CONSIDERATIONS

The Honolulu Board of Water Supply (BWS) plans to undertake the replacement and upgrade (increase in size) of critical water mains within Honolulu. The existing mains are 6, 8, 12, and 16 inches in diameter. The new replacement mains will be 16, 20, and 24 inches in diameter. The alignments for the replacement mains are located along busy streets of Honolulu, from Iwilei to Waikiki. The majority of the lines are sited along Ala Moana Boulevard, a major thoroughfare lined with high-rise condominiums, businesses, industrial areas, and retail shopping centers. The approximate locations of the subject lines are shown in blue on Plate 2.

We understand that pipe materials for the new mains may consist of polyvinyl chloride (PVC), ductile iron (DI), or other materials. Based on information provided by Gray, Hong, Nojima and Associates, Inc. (GHNA), we understand that the new pipe inverts will range from about 4.5 to 18 feet below existing grades. We further understand that installation methods being considered include open cut trenching and trenchless methods such as horizontal directional drilling (HDD), pilot tube microtunneling, and pipe bursting.

Our scope of services for the EA is to provide geotechnical consultation to preliminarily assess anticipated subsurface conditions and potential main geotechnical concerns and considerations for the new water mains based on a desktop review of readily available information and site visit observations. Conducting subsurface exploration and testing is beyond the scope of our services for the EA. Checking on as-built conditions of the water mains is also beyond the scope of our services.

3.0 SCOPE OF SERVICES

Based on the above project considerations, the following scope of services was performed for the EA:

1. *Review of Readily Available Information* – Readily available information on subsurface and geologic conditions near the site were reviewed. The sources of this review included information in our files, previous reports by others, record drawings provided by GHNA, and other available information.

2. *Site Visits* – After the completion of the information review, our engineering personnel visited the site to observe general surface conditions, general topography, existing structures, and other major surface features that may affect the installation of the replacement water mains from a geotechnical engineering viewpoint. Our observations were limited to readily accessible areas within public right of ways and on public property.

3. *Preliminary Engineering Analysis and Letter Report Preparation* – Based on the results of the information review and site visits, preliminary engineering analysis was performed and initial planning level feedback was developed regarding a prognostication of anticipated subsurface conditions, preliminary main potential geotechnical concerns, preliminary considerations for water main replacement using methods such as open cut trenching, microtunneling, directional drilling, or pipe bursting, as appropriate, and recommendations for a detailed geotechnical exploration during design.

   The results of the geotechnical consultation services outlined herein are summarized in this letter report. The comments and feedback for the EA are preliminary in nature for planning purposes, and are not intended for design and construction. A detailed and site-specific geotechnical exploration should be performed for design.

4.0 REVIEW OF AVAILABLE INFORMATION

Information regarding pipe diameters, type, invert depths, invert elevations, year installed, and subsurface conditions encountered during the installation of the various existing water mains to be replaced in this project is summarized in the following table below. We understand that these lines were installed by open-cut trenching. This information was obtained from record drawings provided by GHNA and Board of Water Supply GIS data. Elevations in the table and in this letter report are based on Mean Sea Level datum. The subsurface conditions at the pipe invert are generally based on inspector annotations of profile drawings and/or logs of borings included in select project drawings.

Location	Existing Pipe Diameter (inches)	Existing Pipe Type	Estimated Invert Depths (feet)	Estimated Invert Elevations (feet MSL)	Year Installed	Subsurface Conditions at Pipe Invert
Nimitz Highway, between Pacific St. and Sumner St.	12	Cast Iron	4 to 6	+1 to +3.5	1952	Fill underlain by clay
King Street	12 24	Cast Iron Ductile Iron	Not Available 5 to 6	Not Available -0.5 to +1	1900 2002	Fill underlain by alluvium and soft estuarine deposits
River Street, between Beretania St. and King St.	12	Cast Iron	5 to 7	+1 to +3	1931	Fill underlain by silt and clay
River Street, between King Street and Nimitz Highway	8 8	Cast Iron Ductile Iron	5 to 7 5 to 7	+1 to +3 0 to +2	1900 2005	Fill underlain by silt and clay
Nimitz Highway, between River St. and Aloha Tower Dr.	16	Ductile Iron	5 to 10	-2 to +3	2005	Coral reef deposits
Nuuanu Avenue	12	Cast Iron	4 to 5	0 to +2	1931	Coral reef deposits
South Nimitz Highway and Richards Street	16 12	Ductile Iron Cast Iron	4 to 7 4 to 7	-1 to +2 -1 to +2	2008 1951	Coral reef deposits
Aloha Tower Drive	12 12	Ductile Iron Cast Iron	4 to 5 3 to 5	0 to +2 +1 to +2.5	2008 1950	Coral reef deposits
Ala Moana Boulevard, between Richards Street and South Street	12 12	Cast Iron Cast Iron	5 to 7 Not Available	-2 to +1 Not Available	1960 1900	Fill and lagoonal deposits
Ala Moana Boulevard, between South Street and Ward Avenue	12 12	PVC Cast Iron	3 to 5 Not Available	-0.5 to +1 Not Available	1992 1938	Fill underlain by soft and loose lagoonal deposits
Ala Moana Boulevard, between Ward Avenue and Atkinson Drive	12	Cast Iron	3 to 5	-0.5 to +1	1934	Fill underlain by soft and loose lagoonal deposits
Ala Moana Boulevard, between Atkinson Drive and Kalakaua Avenue	12 12	PVC Cast Iron	3 to 5 5 to 8	-0.5 to +1 -2 to +1	1992 1949	Fill underlain by soft and loose lagoonal deposits
Cooke Street	12	Ductile Iron	5	-1 to +1	1990	Soft and loose lagoonal deposits
Piikoi Street, between Ala Moana Boulevard and Kapiolani Boulevard	12 12	Cast Iron PVC	4 to 5 4 to 5	-2.5 to +1 -1 to +1	1947 2008	"Mud," with areas of dirt and boulder fill
Piikoi Street, between King Street and Kinau Street	8 12	Cast Iron	4 to 7	+4 to +18	1900 1935	Black cinder sand
Pensacola Street, between Kinau St. and Wilder Ave.	6 8 12	Cast Iron Ductile Iron Ductile Iron	Not Available 5.5 to 8 5 to 6	Not available +30 to +33 +30 to +33	1931 2001 2001	Compact clay and sand or mudrock

Please note that the table on the preceding page includes typical water line sizes, invert depths and elevations, installation year, and anticipated subsurface conditions at pipe inverts based on readily available record drawings. Smaller segments of pipe with different sizes and inverts may be present in the subject areas. Invert depths and invert elevations indicated in the table do not reflect depths or invert elevations at utility crossings. According to available record drawings, water main depths and inverts were installed to deeper depths generally below the groundwater table at most utility crossings.

Nimitz Highway, between Pacific Street and Sumner Street

Based on a BWS plan for this project, the existing water main alignment along Nimitz Highway, between Pacific Street and Sumner Street is about 1,355 feet long, and consists of 12-inch diameter cast iron dated 1952. Based on record drawings dated 1953 and 2001 showing the profile for this alignment, the main invert was shown at about Elevations +1 to +3.5 feet and about 4 to 6 feet deep below existing grades. Where the main passed under drain lines, the invert was about Elevation -2.5 feet and about 9 feet below existing grades. The record drawings showed fill material to the invert or deeper, underlain by clay.

King Street (vicinity of Aala Park)

Record drawings for the existing 12-inch water main along King Street were not readily available. Available record drawings dated 1962 for the River Street Reconstructed Sewer project show the 12-inch water main invert at about Elevation +2.5 feet where it crosses River Street. The record drawings showed fill material to the invert or deeper, underlain by medium dense alluvium and soft estuarine deposits.

River Street

Based on a BWS plan for this project, the existing water main consists of 12-inch diameter cast iron dated 1931 from Beretania Street to about King Street, and 8-inch diameter cast iron dated 1900 and 8-inch diameter ductile iron dated 2005 from about King Street to Nimitz Highway. Based on record drawings dated 1962 and 2001 and other available information, the water main invert was shown at about Elevation 0 to +3 feet. Along River Street, the record drawings showed fill material to roughly the invert, underlain by silt and clay and further underlain by river bed rocks.

Nimitz Highway, between River Street and Aloha Tower Drive

Based on record drawings showing waterline profiles (BWS, 2001), the existing main along Nimitz Highway from about River Street to Aloha Tower Drive may consist of mainly 16-inch diameter ductile iron. This main was shown about 2 feet below a former 12-inch diameter water main. Based on record drawings dated 1962 and 2001, the water main invert was shown at about Elevation -2 to +3 feet. Invert depths are estimated to range from about 5 to 10 feet. Where the main passed under drain and duct lines, the invert was as deep as about Elevation -6 feet and about 14 feet below existing grades. Along Nimitz Highway from roughly south of Nuuanu Avenue to Aloha Tower Drive, subsurface information shown on the record drawings generally indicated coral reef deposits at the invert depths.

Nuuanu Avenue, South Nimitz Highway, Aloha Tower Drive, and Richards Street

Based on a BWS plan for this project, the existing water main segments along these streets consist of 12-inch diameter cast iron, with dates of 1931 along Nuuanu Avenue, 1950 and 1963 along Aloha Tower Drive, and 1951 along South Nimitz Highway. A record drawing dated 1951 shows a new 16-inch diameter main installed by trenching along Richards Street. Record drawings dated 2005 showing plans and profiles indicated new 12-inch diameter water mains along Aloha Tower Drive and new 16-inch mains along South Nimitz Highway and Richards Street. These drawings indicated new mains consisting of ductile iron and were to be installed by trenching. Available information indicates that 12-inch diameter cast iron mains were installed along South Nimitz Highway and Richards Street in 1951, and 12-inch diameter cast iron mains were installed along Aloha Tower Drive in 1950. Available information indicates water main inverts ranging from about Elevation -1 to +2 feet and about 4 to 7 feet below existing grades, and a few feet deeper under drain line crossings. Subsurface information on the record drawings generally indicated coral reef deposits at the invert depths.

Ala Moana Boulevard, between Richards Street and South Street

Based on a BWS plan for this project, the existing water main along Ala Moana Boulevard roughly between Richards Street and South Street consists of 12-inch diameter cast iron dated 1900 and 1960. Record drawings dated 1985 showing plans and profiles indicate water main inverts ranging from about Elevation -2 to +1 feet and about 5 to 7 feet below existing grades. Subsurface information on the record drawings generally indicated fill and lagoonal deposits at the invert depths.

Ala Moana Boulevard, between South Street and Kalakaua Avenue

Based on a BWS plan for this project, the existing water main along Ala Moana Boulevard roughly between South Street and Ward Avenue and between Atkinson Drive and the Ala Wai Canal consists of 12-inch diameter cast iron dated 1938 and 1949, and 12-inch diameter polyvinyl chloride dated 1992; and along Ala Moana Boulevard roughly between Ward Avenue and Atkinson Drive consists of 12-inch diameter cast iron dated 1934. Record drawings showing plans and profiles indicate water main inverts ranging from about Elevation -0.5 to +1 feet and about 2 to 5 feet below existing grades, with inverts a few feet deeper under drain line crossings. Subsurface information on the record drawings generally indicated fill underlain by a thin cemented coral ledge at about the water table, underlain by soft and loose lagoonal deposits.

Cooke Street, between Ala Moana Boulevard and Pohukaina Street

Based on a BWS plan for this project, the existing water main alignment along Cooke Street roughly from Ala Moana Boulevard to Pohukaina Street is about 1,038 feet long, and the main consists of 12-inch diameter ductile iron dated 1990. Based on record drawings dated 1989 showing the plan and profile for this alignment, the main invert was shown at about Elevations -1 to +1 feet and about 5 feet deep below existing grades. Where the main passes under drain lines, the main invert was about Elevation -5 to -3 feet and about 10 feet below existing grades. Record drawings show soft and loose lagoonal deposits at and below the main invert.

Piikoi Street, between Ala Moana Boulevard and Kapiolani Boulevard

Based on a BWS plan for this project, the existing water mains along Piikoi Street, between Ala Moana Boulevard and Kapiolani Boulevard are about 1,510 feet long, and the consist of 12-inch diameter cast iron dated 1947 and 12-inch diameter PVC dated 2008. Based on record drawings dated 1947, showing the plan and profile for this alignment, the cast iron main invert was shown at about Elevations -2.5 feet to +1 foot and about 4 to 5 feet below existing grades. Available information indicates that the PVC main invert is at about Elevation -1 to +1 foot, and about 4 to 5 feet below existing grades. According to the profiles, subsurface material at and under the main invert was indicated as mud, with areas of dirt and boulder fill.

Piikoi Street, between King Street and Kinau Street

Based on a BWS plan for this project, the existing water main alignment along Piikoi Street, between King Street and Kinau Street is about 1,028 feet long and consists of 8-inch diameter cast iron dated 1900 connected to 12-inch diameter cast iron dated 1935. Available information indicates the main invert at about Elevation +4 to +18 feet, and about 4 to 7 feet below grades. Based on record drawings for a sewer tunnel project in the area of this alignment dated 1985, the main invert near the intersection of Piikoi Street and Kinau Street was shown at about Elevation +19 feet and about 4 to 5 feet below existing grades. According to these drawings, subsurface material at and under the main invert was indicated as medium dense to very dense black cinder sand.

Pensacola Street, between Kinau Street and Wilder Avenue

Based on a BWS plan for this project, the existing water main alignment along Pensacola Street, between Kinau Street and Wilder Avenue is about 1,806 feet long and consists of 8-inch diameter ductile iron dated 2001, 12-inch diameter ductile iron dated 2001, and 6-inch diameter cast iron dated 1931. Information provided by GHNA suggests that the water main inverts are at about Elevation +30 to +33 feet and about 5.5 to 8 feet below existing grades.

5.0 SITE CONDITIONS

5.1 REGIONAL GEOLOGY

The planned water mains are located on the Honolulu coastal plain which skirts the lower southern slopes of the Koolau Mountains from Diamond Head in the east to Pearl Harbor in the west. This coastal plain was built during the Pleistocene to the early Holocene and its size and shape were influenced by eustatic, or worldwide, changes in sea level on the order of hundreds of feet (Stearns, 1978). Periods of high sea level were accompanied by vertical and lateral growth of the coastal plain by alluvial and marine calcareous sediment deposition. Periods of low sea level were accompanied by erosion of coastal plain sediments, especially along the channels of streams originating in the Koolau Mountains.

The shape of the Honolulu coastal plain was also influenced by rejuvenated-stage volcanic eruptions of the Honolulu Volcanic Series (Stearns and Vaksvik, 1935). These eruptions created present-day landmarks such as Diamond Head and Punchbowl tuff cones. The

volcanic ejecta and lava flows produced by these eruptions are referred to as the Honolulu Volcanics (Sherrod and others, 2007). In addition to adding to the coastal plain, the Honolulu Volcanics, in many cases, altered the course of streams, such as Manoa Stream and Palolo Stream (Macdonald and others, 1986).

Abandoned portions of re-routed streams are referred to as buried alluvial channels (Ferrall, 1977). These channels have been filled with volcanic material, alluvium, and marine calcareous sediment. Channel fills, such as volcanic cinder and Holocene-aged deposits including younger alluvium and lagoonal deposits tend to be soft and loose (HCDA, 2005). Available subsurface information suggests that the channels and channel fills have been covered by layers of younger sediment and manmade fill, and no longer have surface expressions. Buried alluvial channels that may underlie sections of the alignment for the new mains include the Kaheka Channel near the Ala Wai Canal, the HIC Channel near Ala Moana Park, and the Alakea Channel near Aloha Tower (Finstick, 1998).

In addition to younger alluvium and lagoonal deposits, other Holocene-aged deposits present on the coastal plain include marine calcareous sediment such as beach sand along the former shoreline (Stearns,1939), and marsh deposits in low-lying areas inland of the former shoreline. Manmade fill presently covers low-lying areas and comprises reclaimed areas offshore of the former shoreline (Sherrod and others, 2007).

5.2 GENERAL SITE GEOLOGY

The following discussion of the general geology along the alignment for the new replacement mains is generally based on readily available geologic maps of Oahu (Stearns, 1939 and Sherrod and others, 2007). These maps identify geologic units at or near the ground surface. Surface geologic units anticipated along the various water main alignments is presented on Plate 2. Please note that site areas located just north of Nimitz Highway and Ala Moana Boulevard which are shown as fill on Plate 2 had been previously mapped as marsh on a historical map of Oahu from the 1800s (Lyons and others, 1881). Based on available subsurface information, these fill areas appear to be reclaimed lands that largely overlie marsh deposits, younger alluvium, and lagoonal deposits.

Subsurface geology anticipated at the various sites is presented on Plate 3. The subsurface geology is generally based on maps of the subsurface geology of downtown Honolulu (Finstick, 1998) and Waikiki (Ferrall, 1976). These maps identify coral ledges at approximate Elevations -30 feet, -15 feet, +5 feet, and +20 feet. Based on available subsurface information, coral ledges at Elevations -30 feet and -15 feet are generally overlain by lagoonal deposits, younger alluvium, and marsh deposits. The subsurface geologic maps also identify the locations of possible buried alluvial channels.

New 24-inch replacement mains along Nuuanu Avenue, Richards Street, Aloha Tower Drive, Nimitz Highway between Nuuanu Avenue and Richards Street, and Ala Moana Boulevard between Punchbowl and South Streets are located in areas mapped as calcareous reef rock and marine sediment of Pleistocene age (Sherrod and others, 2007). The Alakea Channel may underlie portions of Nimitz Highway and Aloha Tower Drive (Finstick, 1998).

New 16-inch and 24-inch diameter replacement mains along Pensacola and Piikoi Streets north of King Street are located in an area mapped as black cindery ash and lapilli of the Honolulu Volcanics of Pleistocene age (Sherrod and others, 2007). The ash and lapilli erupted from vents at Tantalus and Sugarloaf, and were carried by tradewinds southwestward where they blanketed the area from roughly Makiki ridge to Nuuanu Stream (Sherrod and others, 2007). The ash and lapilli may have been reworked by streams and surface runoff and deposited as alluvium (Stearns and Vaksvik, 1935). The ash and lapilli may be underlain by basalt along the Piikoi Street segment and by Punchbowl tuff or basalt along the Pensacola Street segment (Finstick, 1998).

A new 24-inch diameter replacement main along Ala Moana Boulevard from about South Street in the west to Ena Road in the east is located in an area mapped as beach deposits of Holocene age (Sherrod and others, 2007). New mains along Cooke Street, Piikoi Street south of Kapiolani Boulevard, and near the east end of Ala Moana Boulevard are located in areas mapped as manmade fill (Sherrod and others, 2007).

Based on available subsurface information, beach deposits and fill anticipated along the water main alignments may be underlain by lagoonal deposits. Readily available subsurface information indicates that the lagoonal deposits in Waikiki may be locally cemented at or near the groundwater table and soft or loose below this zone.

A majority of the new 24-inch diameter main alignment overlies coral ledges at about Elevations -15 and -30 feet (Finstick, 1998). East of the Ala Wai Canal, the new main alignment overlies alluvium deposited within an area referred to as the old Ala Wai Drainage (Finstick, 1998), and a coral ledge at about Elevation -30 feet (Ferrall, 1976). Portions of the new main alignment may overlie the Kaheka Channel roughly between Atkinson Drive and Ala Wai Boulevard and the HIC Channel near the Queen Street intersection (Finstick, 1998), and an un-named alluvial channel roughly between Keawe and Cooke Streets (Ferrall, 1976).

A new 16-inch diameter replacement main along the east-bound lanes of Nimitz Highway between Pacific and Sumner Streets and a new 24-inch main along Ala Moana Boulevard between Richards and Punchbowl Streets are located in areas mapped as fill (Sherrod and others, 2007). These fill areas are located offshore of the 1881 shoreline (Lyons, 1881).

The east end of the new main near Sumner Street may extend across coral reef rock (Stearns, 1939). The elevation +5 feet, -15 feet, and -30 feet coral ledges may underlie portions of these areas (Finstick, 1998).

New 24-inch diameter replacement mains along River Street, Nimitz Highway between River Street and Nuuanu Avenue, and Ala Moana Boulevard at its intersection with Kalakaua Avenue are located in areas mapped as younger alluvium (Stearns, 1939). The younger alluvium at River Street consists of Nuuanu Stream sediments, and these sediments may be underlain by lagoonal deposits and further underlain by Nuuanu basalt (Finstick, 1998). The younger alluvium at Kalakaua Avenue consists of Makiki Stream sediments, and these sediments may be underlain by alluvium deposited within the old Ala Wai drainage (Finstick, 1998).

Based on soil maps by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), the surface soils and land type along the alignment for the new

replacement mains include Fill land, mixed (FL) in most areas, Ewa silty clay loam (EmA) along River Street, Nuuanu Avenue, and Ala Moana Boulevard near Aloha Tower, Jaucas sand (JaC) near the intersection of Kalia Road and Ala Moana Boulevard, Makiki clay loam (MkA) along Piikoi and Pensacola Street north of King Street, and Tantalus silty clay loam (TCC). These surface soil types are shown on the proposed water main alignment (see Plate 4).

According to the NRCS, FL consists of areas filled with material dredged from the ocean or hauled from nearby areas. EmA consists of alluvial soil deposited on limestone or gravelly alluvium. JaC consists of wind- and water-deposited sand derived from coral and shells. MkA is a soil that formed in alluvium mixed with volcanic ash and cinder. TCC is a soil that developed in volcanic ash and cinder. The NRCS also indicates that shrink and swell tendencies are moderate for Ewa silty clay and Makiki clay loam and low for Jaucas sand. Shrink tendency is high and the swell tendency is low for Tantalus silty clay loam.

5.3 SURFACE CONDITIONS

Based on readily available topographic information, the new replacement mains are sited along existing streets and roads where existing grades are generally level to slightly sloping. Ground surface elevations along these streets and roads may range from roughly 4 to 8 feet above Mean Sea Level (MSL) except for the mains along Piikoi and Pensacola Streets where the ground surface ranges from about Elevation +12 to +24 feet and +25 to +84 feet, respectively.

The new replacement main alignments follow existing streets and roads that are paved mainly with asphaltic concrete (AC). Select areas, such as at bus stops, are paved with concrete. The streets have one and two way traffic. Grass medians are present along some stretches of roads, such as Ala Moana Boulevard and Nimitz Highway. Other two-way traffic sections are separated by pavement markings.

The streets and roads where the water main alignments will run are lined with office buildings, shopping centers, residential condominium buildings, industrial areas, parks, some parking lots, and overhead power lines in some areas.

5.4 ANTICIPATED SUBSURFACE CONDITIONS

The following discussion of anticipated subsurface conditions along the proposed replacement water mains is based on readily available subsurface information from record drawings and logs of borings drilled at and in the vicinity of these mains and published geologic maps. For this discussion, the proposed new replacement water mains were separated into various alignments along existing roadways based on surface geology (Sherrod and others, 2007), subsurface geology (Finstick, 1998 and Ferrall, 1976), and geographic location.

Nimitz Highway, between Pacific Street and Sumner Street

The new 16-inch diameter water main along Nimitz Highway between Pacific Street and Sumner Street is located in an area that was mapped as manmade fill at the ground surface (Sherrod and others, 2007), and as a +5-foot coral ledge in the (Finstick, 1998). The eastern end

of this water main may extend into an area that was mapped as alluvium underlain by basalt (Finstick, 1998). Based on available subsurface information, the site may consist of variable fill material from the ground surface to roughly sea level at a depth of about 8 feet underlain by lagoonal deposits and further underlain by coral reef rock and coralline debris.

River Street, between Beretania Street and Nimitz Highway and Nimitz Highway, between River Street and Nuuanu Avenue

The new 24-inch diameter water main, including an alternate main, along River Street and Nimitz Highway between Beretania Street and Nuuanu Avenue is located in an area that was mapped as manmade fill and younger alluvium at the ground surface (Sherrod and others, 2007), and as younger alluvium in the subsurface (Finstick, 1998). Based on available subsurface information, the portion of the alignment along River Street and along Nimitz Highway from River Street to roughly Kekaulike Street may consist of variable fill material from the ground surface to roughly sea level at a depth of about 5 feet underlain by soft recent alluvium and estuarine deposits. Based on a record drawing showing a River Street relief sewer profile, a soil layer labeled "River Bed Rocks" were shown at a depth of roughly 15 feet. The portion of the alignment from roughly Kekaulike Street to Nuuanu Avenue may consist of variable fill material at the ground surface underlain by coral reef rock and detritus.

Nuuanu Avenue, Nimitz Highway, Aloha Tower Drive, and Richards Street

The proposed new alternate 24-inch diameter water main along Nuuanu Avenue and new 24-inch diameter water mains along Nimitz Highway, Aloha Tower Drive, and Richards Street are located in an area that was mapped as calcareous reef rock at the ground surface (Sherrod and others, 2007), and as a +5 foot coral ledge over Nuuanu basalt in the subsurface (Finstick, 1998). A buried alluvial channel was identified near Bishop Street (Finstick, 1998). Based on available subsurface information, the majority of the site may consist of variable fill material underlain by thin layers of cinder sand and soft clayey soil to roughly sea level at a depth of about 7 feet, and further underlain by coral reef rock and detritus. In the vicinity the buried alluvial channel, subsurface conditions may consist of variable fill material at the ground surface underlain by alluvium intermixed with cinder and coralline debris (Finstick, 1998).

Ala Moana Boulevard, between Richards Street and Punchbowl Street

The proposed new 24-inch diameter water main along Ala Moana Boulevard between Richards Street and Punchbowl Street is located in an area that was mapped as manmade fill at the ground surface (Sherrod and others, 2007), and as a +5 foot coral ledge in the north and as a -15 foot coral ledge in the south in the subsurface (Finstick, 1998). Based on available subsurface information, subsurface conditions may consist of variable fill material from the ground surface to roughly sea level underlain by soft and loose lagoonal silt, clay, sand, and gravel, and a possible layer of cinder sand to roughly 15 feet, and further underlain by coral reef rock and detritus.

Ala Moana Boulevard, between Punchbowl Street and South Street

The proposed new 24-inch diameter water main along Ala Moana Boulevard between Punchbowl Street and South Street is located in an area that was mapped as calcareous reef rock

at the ground surface (Sherrod and others, 2007), and as a -15 foot coral ledge in the north and as a -30 foot coral ledge in the south in the subsurface (Finstick, 1998). Based on available subsurface information, subsurface conditions may consist of variable fill material at the ground surface underlain by coralline beach sand to a few feet below sea level at a depth of about 6 to 7 feet, very dense cinder sand to a depth of roughly 20 to 25 feet, and coral reef rock and detritus to depths greater than 50 feet.

Ala Moana Boulevard, between South Street and the Ala Wai Canal

The proposed new 24-inch diameter water main along Ala Moana Boulevard between South Street and the Ala Wai Canal is located in an area that was mapped as beach deposits at the ground surface (Sherrod and others, 2007), and as a -15 foot and a -30 foot coral ledge in the subsurface (Finstick, 1998). Subsurface buried alluvial channels were identified between Keawe and Cooke Streets (Ferrall, 1976), near Queen Street (Ferrall, 1976 and Finstick, 1998), and between Atkinson Drive and the Ala Wai Canal (Ferrall, 1976 and Finstick, 1998). Based on available subsurface information, subsurface conditions over the majority of the alignment may consist of variable fill material to roughly sea level at a depth of about 5 feet underlain by weak and compressible lagoonal silt, clay, sand, and gravel to depths of roughly 25 to 45 feet, and further underlain by coral reef rock. A thin cemented crust may be present in the lagoonal deposits near the water table. In the vicinity of alluvial channels, subsurface conditions may consist of variable fill material at the ground surface underlain by alluvium intermixed with cinder and coralline debris (Ferrall, 1976 and Finstick, 1998).

Ala Moana Boulevard, between the Ala Wai Canal and Kalakaua Avenue

The new 24-inch diameter water main along Ala Moana Boulevard between the Ala Wai Canal and Kalakaua Avenue is located in an area that was mapped mostly as beach sand and manmade fill at the ground surface in the western part of the alignment and as alluvium in the eastern part of the alignment (Sherrod and others, 2007). Subsurface conditions were mapped as alluvium that was part of the old Ala Wai drainage (Ferrall, 1976 and Finstick, 1998). Based on available subsurface information, subsurface conditions in the portion of the alignment west of Ena Road may consist of variable fill material from the ground surface to roughly sea level at a depth of about 5 feet, underlain by weak and compressible lagoonal silt, clay, sand, and gravel and soft alluvial clay to a depth of roughly 40 feet or deeper, and further underlain by coral reef rock and detritus. According to an undated record drawing for an Ena Road relief drain, the area between Ena Road and Kalakaua Avenue included streams and a fishpond. Subsurface conditions east of Ena Road may consist of variable fill material from the ground surface to roughly sea level at a depth of about 5 feet underlain by soft alluvial silt and clay with cinder and coralline debris to depths greater than 40 feet.

Cooke Street, between Ala Moana Boulevard and Pohukaina Street

The new 20-inch diameter water main along Cooke Street between Ala Moana Boulevard and Pohukaina Street is located in an area that was mapped mostly as fill at the ground surface and beach deposits in the southern end of the alignment (Sherrod and others, 2007). The subsurface was mapped as a -15 foot coral ledge (Finstick, 1998). Based on available subsurface information, subsurface conditions may consist of variable fill material to roughly sea level at a

depth of about 4 feet underlain by mostly loose lagoonal sand and gravel to a depth of roughly 20 to 30 feet, and further underlain by coral reef rock. A thin cemented layer of lagoonal deposits may be present at about the groundwater level.

Piikoi Street, between Ala Moana Boulevard and Kapiolani Boulevard

The new 16-inch diameter water main along Piikoi Street between Ala Moana Boulevard and Kapiolani Boulevard is located in an area that was mapped mostly as manmade fill at the ground surface with beach deposits in the southern end of the alignment (Sherrod and others, 2007). The subsurface was mapped mostly as the -15 foot coral ledge, and as the -30 foot coral ledge in the southern and as the +5 foot coral ledge in the northern parts of the alignment (Finstick, 1998). Based on available subsurface information, subsurface conditions may consist of variable fill material to roughly sea level at a depth of about 5 feet underlain by weak and compressible lagoonal silt, clay, sand, and gravel to a depth of roughly 20 feet, and further underlain by coral reef rock and detritus. Near Ala Moana Boulevard, lagoonal deposits may be encountered to a depth of roughly 35 feet and underlain by coral reef rock and detritus.

Piikoi Street, between King Street and Kinau Street

The new 16-inch diameter water main along Piikoi Street between King Street and Kinau Street is located in an area that was mapped as Tantalus and Sugarloaf Tuff consisting of cinder and lapilli at the ground surface (Sherrod and others, 2007), and as alluvium over basalt in the subsurface (Finstick, 1998). Based on available subsurface information, subsurface conditions may consist of fill at the ground surface underlain by dense volcanic cinder sand to depths ranging from roughly 10 to 20 feet, and further underlain by coral reef rock.

Pensacola Street, between Kinau Street and Wilder Avenue

The proposed new 24-inch diameter water main along Pensacola Street between Kinau Street and Wilder Avenue is located in an area that was mapped as Tantalus and Sugarloaf Tuff at the ground surface (Sherrod and others, 2007), and mostly as alluvium over Punchbowl Tuff and basalt in the subsurface with +5 foot coral ledge in the southern part of the alignment (Finstick, 1998). Based on available subsurface information, subsurface conditions may consist of fill at the ground surface underlain by loose to dense volcanic cinder sand.

6.0 DISCUSSION

6.1 GENERAL

This geotechnical consultation has revealed that the new replacement water mains may encounter highly variable subsurface and groundwater conditions that will probably affect the design and installation of the new mains. Subsurface conditions may consist of variable fill materials, weak and compressible lagoonal deposits, firm alluvium, well-cemented coral reef rock, variably cemented coralline detritus, loose to dense volcanic cinder sand, and possible basaltic rock. Portions of the alignments may cross over buried alluvial channels, where soft and loose sediments may be relatively deep. The groundwater table is anticipated to be found at variable depths depending on existing grades.

A detailed and site specific geotechnical investigation should be performed for design. The feedback presented herein is is preliminary in nature and intended for the purposes of the EA only. It should not be used for design and construction.

6.2 PRELIMINARY GEOTECHNICAL CONCERNS

Preliminary main potential geotechnical concerns associated with the subsurface conditions that may be present along the new replacement water main alignments include:

- *Possible presence of highly variable subsurface conditions.* Subsurface conditions along the new replacement water main alignments may vary from soft and loose alluvial and lagoonal deposits to well-cemented coral reef rock. Variability in subsurface conditions may result in varying pipeline support conditions and potential differential settlement in the new water mains. It may also impact trenchless installations due to steering difficulty in mixed-face conditions.

- *Possible presence of weak and compressible deposits.* Readily available subsurface information indicates that weak and compressible deposits may be encountered along most of the new replacement water main alignments along Nimitz Highway, Ala Moana Boulevard, River Street, a short segment along King Street near Aala Park, Cooke Street, and Piikoi Street. It is anticipated that subgrade treatment, consisting of over excavating a portion of the weak and compressible deposits below the water main bedding, and replacing the excavated material with suitable crush rock subbedding or Controlled Low Strength Material (CLSM) wrapped in a woven geotextile fabric, may be needed.

  Large drawdown of the groundwater table outside of trenches and excavations during dewatering operations may result in ground settlement, and movements and distress to on-grade supported buildings, structures, utilities, pavements, and slabs where weak and compressible soils are present.

- *Potential for seismic instability in the site deposits.* Readily available subsurface information indicates that loose submerged granular deposits may be present in fill or reclaimed areas where most of the new water mains are planned. These deposits may be subject to seismic instability due to conditions such as soil liquefaction, lateral spreading, and/or lateral flow. Soil liquefaction may result in loss of soil strength, settlement, lateral movements, and development of high buoyant forces and high lateral earth pressures on manholes or vaults which extend below the water table and into potentially liquefiable deposits. Performing soil improvement to reduce potential risks associated with soil liquefaction would require treatment on a regional basis which is beyond the scope of this project. Use of more flexible pipe materials, such as PVC, and localized soil improvement, may be needed where potentially liquefiable deposits are present. Site specific subsurface exploration and testing is needed to further assess this concern.

- *Presence of relatively shallow groundwater table and potentially highly permeable coral reef deposits.* The inverts of the new replacement water mains may extend below the groundwater table. Coral reef deposits that may be present along most of the water main alignment generally below fill and/or weak and compressible deposits are anticipated to be highly permeable. Dewatering of trenches and excavations that extend below the groundwater table and into permeable deposits is anticipated to be difficult. To reduce the amount of water inflow to the trenches and excavations and dewatering requirements, excavating in the wet as much as practical and providing positive groundwater control measures will likely be needed. This may include the use of fully interlocked steel sheet piles with tremie concrete plugs at the bottom of trenches.

- *Need to install the new water mains along busy and congested streets and roads with numerous underground utilities.* Nearby structures may include buildings, shopping centers, residential towers, industrial areas, piers and wharves, and power poles with overhead lines. Trenches and excavations needed for the water main installations will need to be carefully selected and planned to reduce the amount of ground settlement, movements, and potential distress to existing buildings, structures, and improvements along the various water main alignments. Existing underground utilities, such as sewer, water, gas, electrical, traffic signal cables, drain lines, and other known lines and underground structures will need to be thoroughly researched and located to check that they do not become obstructions during the installation of the new water mains.

- *Need for sheeting, shoring, bracing, and dewatering of trenches and excavations.* Open cut trenches and excavations for new replacement water mains will likely require temporary sheeting, shoring, bracing, and/or dewatering. These excavations will need to be carefully planned and constructed to reduce the potential for ground settlement, movements, and distress to existing nearby buildings, structures, roads, underground utilities to remain, and the new mains.

- *Potential for vibration-induced settlement and/or distress.* Steel sheet piles will probably need to be used for trenches and excavations that extend below the groundwater table. Because of the possible presence of loose deposits, non-vibratory equipment, such as impact or press-in hammers, may need to be used for installation and removal of sheet piles to reduce the potential vibration induced settlement and distress.

- *Potential for soil and groundwater contamination.* Sections of new water main may cross industrial areas where soil and groundwater contamination may be present. If contaminated materials are encountered during construction, more stringent requirements may need to be followed regarding items such as handling and/or disposal of the excavated soils and dewatering effluent. Assessing a potential for soil and groundwater contamination and potential impacts on the water main installations is beyond the scope of our services for this project.

7.0 PRELIMINARY GEOTECHNICAL CONSIDERATIONS

The comments and preliminary geotechnical considerations presented herein are for the purposes of the EA for the Honolulu Water System Improvements project. The discussions and preliminary recommendations were developed based on a desktop review of readily available subsurface and geologic information and should not be used for design. As discussed earlier in this letter report, a detailed and site-specific geotechnical investigation should be performed for design.

This geotechnical consultation has revealed that subsurface conditions along the new water main alignments may consist of variable fill materials, weak and compressible lagoonal deposits, firm alluvium, well-cemented coral reef rock, variably cemented coralline detritus, loose to dense volcanic cinder sand, and possible basaltic rock. Ground water is anticipated to be found at variable depths depending on existing grades.

Several construction methods may be used to install the new water mains. The installations could be performed using open cut trenching, pilot tube microtunneling (PTMT), horizontal directional drilling (HDD), and/or pipe bursting. Open-cut trenching may be difficult in areas where there is a shallow groundwater table and where weak and compressible soils are present. It may also be more disruptive than trench less methods. It is anticipated the water mains may be installed using a combination of two or more methods, such as open cut trenching and PTMT in select areas. HDD may be considered where deep utility crossings are needed. Pipe bursting appears to be less feasible than open cut trenching, PTMT, and HDD due to a need for large pipe up-sizing and anticipated subsurface and groundwater conditions.

7.1 POTENTIAL INSTALLATION METHODS

The following methods are being considered to install the new water mains:

- Open cut trenching
- Pilot tube microtunneling (PTMT)
- Horizontal directional drilling (HDD)
- Pipe bursting

A description of these methods, potential advantages and disadvantages, and preliminary potential geotechnical considerations of each are discussed in the following sections. Water main rehabilitation by cured-in-place pipe (CIPP) and slip lining are beyond the scope of this consultation. We understand that these methods are not being considered since larger diameter water mains are planned than the existing mains. Conventional microtunneling may also be a possible installation method. For this EA, PTMT is assumed based on anticipated pipe size, invert elevations, and anticipated subsurface conditions.

7.2 OPEN CUT TRENCHING

7.2.1 Construction Methodology

Open cut trenching generally involves excavating a trench, installing temporary shoring to support the sidewalls of the trench or sloping its sides, laying the piping within the excavation, and backfilling the trench. Geotechnical considerations relating to open cut trenching include excavation, shoring, dewatering, pipe subgrade preparation, pipe installation, bedding installation, trench backfilling, and pavement or surface restoration.

In open cut trenching, the subsurface material in the trench is progressively removed, and internal bracing is installed between the trench sidewalls to support the excavation. In sheeted trenches, temporary steel sheet piles are installed before trenching. Once the desired invert elevation is reached, the pipe is placed in the excavation, followed by backfilling the trench and restoring the ground surface.

Possible retaining systems include steel sheet piles, trench boxes, and steel plates with internal bracing. Other methods, such as soil improvement using jet grouted cofferdams, have been utilized with open-cut excavations on other similar projects. The choice of a system may be dependent upon such factors as the depth of the excavation, subsurface and groundwater conditions,, and proximity to surrounding structures. For this project, dewatering may be needed along sections of water mains where their inverts are at or below the groundwater table.

Because of relatively shallow groundwater conditions anticipated along most of the water main alignments for this project, trench shields and steel plates with internal bracing may not be suitable where water main inverts are below the groundwater table because they do not provide positive groundwater control. Use of these systems may increase potential risk of ground settlement and movements in the vicinity of the trench. Large drawdown of the groundwater table outside of trenches and excavations from dewatering operations may result in ground settlement and distress to on-grade supported structures, utilities, pavements, and slabs where weak and compressible soils are present.

7.2.2 Major Advantages and Disadvantages

Some major advantages of open cut trenching include:

- Conventional and locally available method;
- May be an economical method of construction for pipelines with relatively shallow invert depths;
- Allows for testing of pressure pipes, such as water mains, before backfilling; and
- Lateral connections may be done in open cut trenches.

Some major disadvantages of open cut trenching include:

- More inherent surface disruption than trenchless construction methods. This method generally results in a greater amount of ground disturbance than trenchless installations and may have a greater risk of ground settlement and movements in the vicinity of the trench or excavation;
- Inconvenience to neighboring residences and businesses due to excavation and dewatering operations;
- Traffic disruption;
- Noise, vibrations, and dust from trenching operations;
- Existing underground utilities that could become obstructions to trench excavation shoring systems, such as steel sheet piling. This may lead to discontinuities in the sheet piles, and reduce the effectiveness of sheet pile cofferdams. Pre-grouting of the utility crossings and discontinuities in the sheet piles may need to be performed to reduce groundwater inflows; and
- A larger amount of excavated soil and dewatering effluent may need to be handled and disposed of with open cut trenching compared to trenchless installations.
- Construction dewatering of open cut trenches and excavations may result in drawdown of the groundwater table outside the excavation, and potential ground subsidence.

7.2.3 Preliminary Geotechnical Considerations

Preliminary potential geotechnical considerations associated with open cut trenching include:

- Possible need for pipeline subgrade treatment where weak and compressible deposits are encountered. This may consist of over excavating a portion of the subsurface materials below the pipeline bedding, and replacing the excavated material with crushed rock subbedding wrapped in a geotextile fabric or Controlled Low Strength Material (CLSM). Based on readily available subsurface information, a large amount of the planned water mains along Ala Moana Boulevard, Nimitz Highway, and Piikoi Street between Kapiolani Boulevard and Ala Moana Boulevard may have inverts in weak and compressible soils;
- Need to select appropriate shoring and dewatering methods suited for the anticipated subsurface conditions to reduce the amount of settlements, ground movements, and drawdown of the groundwater table in the vicinity of the trenches, and potential distress to existing on-grade supported buildings, structures, utilities, pavements, and slabs to remain. Areas that may have a higher potential for ground settlement and movement from open cut trenching include areas where weak and compressible materials may be present, such as along Ala Moana Boulevard, Nimitz Highway, and

Piikoi Street mapped as man-made fill and/or where buried alluvial channels are present (see Plates 2 and 4);

- Need to check and determine as-built conditions of existing underground utilities and subsurface structures at utility crossings. This information is needed to plan appropriate trench shoring, sheeting, and/or dewatering systems which may be needed at the crossings;

- A greater amount of dewatering will probably be needed with open cut trenching compared to trenchless installation methods discussed herein. Dewatering amounts may be reduced by installing fully interlocked steel sheeting into less permeable deposits, if present, or installing a tremie plug at the bottom of a sheeted trench or excavation using materials such as CLSM or concrete;

  Disposal of construction dewatering effluent will be challenging for this project due to limited construction staging areas along the alignments. Temporary holding tanks may need to be provided to transport dewatering discharges to suitable disposal sites. Pumping dewatering discharge into trenches or pits which have not yet been backfilled may also need to be utilized where feasible.

7.3 PILOT TUBE MICROTUNNELING

7.3.1 Construction Methodology

Pilot tube microtunneling (PTMT) is a specialized form of pipe jacking used to install pipe lines without the need for trenching and personnel entering a trench. Pilot tubes are first installed on line and grade from a jacking shaft to a receiving shaft. The pilot tube hole is then reamed with a reaming head and/or a bearing swivel joint to match the diameter of the product pipe. Finally, the product pipe is installed in the reamed hole.

7.3.2 Major Advantages and Disadvantages

Some major advantages of a new replacement water main installed by PTMT include:

- Less ground surface disruption and social and environmental impacts that would normally be associated with open cut trenching;

- Accurate guidance system allowing for relatively high accuracy in line and grade;

- Narrow easement to install a replacement line would be less of a concern with PTMT when compared to HDD;

- Employs augers for soil removal instead of pressurized drilling fluid so frac-out potential should be reduced; and

- Does not require a large laydown area for pipe assembly since the pipe is installed in short sections.

- Open excavations are required only for jacking and receiving shafts, to clear obstructions , and to repair sections of the pipe which are damaged or installed out of tolerance;

- Reducing the need for a manned entry because of its remote controlled capability resulting in a safer working conditions compared to open cut trenching; and

- Reducing the amount of excavated materials that would be normally generated with open cut trenching.

Some major disadvantages associated with PTMT include:

- Need to construct jacking and receiving shafts;

- Less feasible when pipeline inverts are below the water table;

- Possible need to perform grouting of the jacking and receiving shafts and along the entry and exit points to reduce groundwater inflow into the shafts;

- Shafts need to be dewatered;

- Underground utilities at shaft sites may need to be relocated; and

- Possible higher cost than HDD.

- Loss of slurry if highly permeable materials, such as solution cavities, lava tubes, cobble/boulder layers, or permeable crushed rock bedding are encountered;

- Because PTMT does not allow for man-entry and direct observation of the installed pipe except at jacking and receiving pits, pressure testing of an installed section of water main and repairing defects/leaks during and after construction may be more difficult;

- Depending on pipe invert depths, pipelines installed by trenchless methods may be more difficult to service in the future; and

- Work areas are required at jacking pits for a control room, pipe handling, and other equipment.

7.3.3 Preliminary Geotechnical Considerations

Preliminary potential geotechnical considerations for new replacement water mains installed by PTMT include:

- Drive lengths between jacking and receiving pits may depend on such factors as pit sizes, pipe size, pipe material, and subsurface and groundwater conditions. For 16-, 20-, and 24-inch diameter pipes, we anticipate drive lengths on the order of 200 to

300 feet may be possible. This would result in numerous pits. Most jacking and receiving pits are about 6 to 8 feet in diameter.

- Jacking and receiving pits may not be feasible deeper than about 10 feet or so below the groundwater table.

- Installation of a steel casing first, followed by the installation of the carrier pipe may be utilized where flexible pipe material, such as PVC, are used. The carrier pipe could be blocked inside the casing to the specified grade. After this, the annulus between the carrier pipe and casing is backfilled with a sand/cement grout. The main disadvantages associated with installing a steel casing and backfilling with grout are additional cost, and longer installation time;

- Potentially lower total constructions costs using direct installation of the carrier pipe by PTMT compared to installing a carrier pipe within a casing. However, once the pipe is installed, it is impractical to modify the as-built condition of the carrier pipe without an excavation;

- Depending on the location of the pits, temporary lane closures and/or detours around the pits may be needed during construction;

- The use of interlocking steel sheet piles or concrete shafts for the jacking and receiving pit construction. Because of potential space limitations, rectangular jacking pits using steel sheet piles may be more practical than circular pits. Circular pits, however, would allow for more flexibility in jacking in different directions than rectangular pits;

- A possible need for soil improvement in areas where relatively poor subsurface conditions are anticipated at the pipe inverts. Jet grouting may be used to provide a zone of improved soil to support a PTMT machine. Jet grouting of cobbles and boulders may be difficult; and

- Construction dewatering of the jacking and receiving pits could be reduced by initially excavating the pits in the wet and placing a tremie concrete plug at the bottom of the pits.

7.4 HORIZONTAL DIRECTIONAL DRILLING

7.4.1 Construction Methodology

Horizontal directional drilling is a steerable system for installing pipes, conduits and cables in a shallow arc using a surface launched drilling rig. It is commonly referred to as directional boring or guided horizontal boring. It was developed in the 1970s by combining techniques employed by conventional road boring and horizontal directional drilling from the petroleum industry.

This technique involves three general phases starting with drilling of a small diameter pilot hole in a shallow arc from the surface. A rotating wash over drill pipe slightly larger than the pilot tube follows the drill string. The wash over pipe provides stiffness to the drilling pipe in order to maintain steering control, and provides a method of reducing friction along the drill string prior to enlargement. It also facilitates drilling mud circulation. Steering of the pilot boring is provided by positioning of a bent sub. Tracking of the drill string is achieved by the use of a down hole survey tool.

After completing the pilot bore, the second phase of HDD involves enlarging the pilot hole by back reaming to a sufficiently large diameter to accept the product pipe. The larger reamed hole is supported through the use of bentonite or polymer slurry. The final phase of HDD involves pulling the product pipe or conduit into the enlarged hole with a drill rig.

Important determining factors that may affect a HDD installation include the geologic formation and subsurface materials through which the drilling is accomplished. Rock, cobbles, boulders, and debris present greater difficulties than firm silt and clay. The bending radius of a directionally drilled bore hole is normally limited by the bending characteristics of the pipe and increases with pipe diameter.

An HDD installation uses drilling mud that is injected under relatively high pressures. The drilling mud could be lost in the existing gravel bedding of other lines during the drilling. This may cause hydraulic fracturing of the subsurface materials (generally referred to as “frac-out”) to occur. New lines installed at sufficient depths would also help to reduce the potential for frac-out.

7.4.2 Major Advantages and Disadvantages

Some main advantages of HDD include:

- Less environmental impact compared to open cut trenching because operations are limited to areas at each end, as opposed to the complete length of the pipeline;

- Drilling that is performed using a drill rig normally operated at the ground surface;

- Little surface preparation, except for shallow slurry containment entry and exit pits;

- Steerable capability that generally allows drilling between vertical and horizontal obstructions like buried pipelines or utility lines, provided these lines are well defined;
- Safety concerns are minimized compared to open cut trenching; and

- Bore lengths that can range from a few tens of feet to several hundred feet. Parameters that may affect potential lengths include pipe invert depth, subsurface materials, product type and weight, drill rig power, and borehole configuration.

Some main disadvantages associated with HDD include:

- Typically 20 feet or more of cover may be required to prevent blowout or frac-out. Access to a main installed at these depths would likely be more difficult or not practical compared to a main that is installed at shallower depths;

- A required standoff distance from the start of the target horizontal invert elevation to the launch area. Typical entry angles of 8 to 12 degrees would require relatively long setbacks for deep crossings. A similar standoff distance is needed at the borehole exit;

- A reamed hole size that typically needs to be 40 to 50 percent larger than the outside diameter of the product pipe;

- A required staging area for drilling that could vary from 10 feet by 20 feet in plan dimensions for smaller rigs to areas as large as 150 feet by 150 feet for larger rigs;

- Possible alignment control both horizontally and vertically that is typically within 3 to 5 percent of the depth to the pipe line per 100 feet of line;
- Drilling or installation difficulty that may be caused by rocks, cobbles, boulders, and debris along the alignment;

- Difficulty in accommodating short radius bends of less than about 700 feet or so;

- Multiple drilling passes that may be required to accommodate the product pipe;

- A drilling process that requires a slurry containment pit and slurry disposal; and

- An extensive lay down area required for final pipe string installation. This will be difficult along existing business district and residential streets with numerous driveways.

7.4.3 Preliminary Geotechnical Considerations

Potential geotechnical considerations for HDD include:

- Although the accuracy of a HDD borehole can be improved with the use of wire line steering tool systems instead of walkover systems, the overall accuracy of these installations may not be able to satisfy the tolerances required for new replacement water mains in this project;

- Invert depths along most of the planned water main alignments will probably be less than 10 feet below existing grades. This may make HDD less feasible for most of the planned water mains due to concerns with potential frac-out, except where deep utility crossings are needed;

- Because HDD does not allow for man-entry and direct observation of the installed pipe, pressure testing of an installed section of water main and repairing defects/leaks during and after construction may be more difficult;

- Depending on pipe invert depths, pipelines installed by trenchless methods may be more difficult to service in the future; and

- Numerous driveways that may make it difficult to assemble long pipe strings for product pipe installation. Shorter pipe strings may be possible, but would likely increase overall installation time and costs.

7.5 PIPE BURSTING

7.5.1 Construction Methodology

Pipe bursting is a trenchless installation method for replacing a host pipe by fragmenting the existing pipe and installing a completely new pipe of equal diameter or larger in its place. The process involves initial cracking, followed by fragmenting the host pipe, creation of a new tunnel and simultaneous installation of a new replacement pipe. It is typically carried out in 300 to 400 feet lengths. Pipes suitable for pipe bursting are typically made of brittle materials, such as vitrified clay, cast iron, plain concrete, asbestos, or some plastics. Ductile iron and steel pipes are not suitable for pipe bursting, and can only be replaced with pipe splitting. The most common pipe bursting methods are static, pneumatic, and hydraulic. It consists of the following main components:

- Bursting head;
- Pulling rods, cable, or chain;
- Compressed air (pneumatic) or hydraulic power system;
- Insertion and receiving pits

More common pipe bursting is on a size-for-size, or upsizing the diameter of an existing pipe up to three sizes (e.g. 8-inch to 12-inch). Large upsizing requires more energy during the bursting operations which may cause more ground disturbance. Most of the existing water mains in this project require upsizing much more than three pipe sizes. Only select sections, such as along Nimitz Highway between Pacific Street and Sumner Street, and Piikoi Street, between Ala Moana and Kapiolani Boulevard, require upsizing the diameter of the existing mains three pipe sizes. The pipe upsizing required for most of the water mains planned in this project may make this method of pipe installation not feasible for most of the new lines. The feasibility of pipe bursting can be further assessed as part of a geotechnical investigation during the design phase.

7.5.2 Major Advantages and Disadvantages

Some major advantages of a new replacement main installed by pipe bursting include:

- Less ground surface disruption, and social and environmental impacts that would normally be associated with open cut trenching;

- Open excavations are required only for insertion and receiving pits, to retrieve a stuck bursting head, and to repair sections of the pipe which are damaged or installed out of tolerance;

- Follows the path of the existing utility, reducing risks of utility conflicts;
- Dewatering generally not required along the water main sections. Groundwater ingress is controlled by the use of pipes with special sealed flexible joints;
- Reduces the need for a manned entry because of its remote controlled capability resulting in a safer working conditions compared to open cut trenching;
- Reduces the amount of excavated materials that would be normally generated with open cut trenching; and
- Increases in pipe diameter can be achieved under certain conditions.

Some major disadvantages associated with by pipe bursting include:

- Ground settlement or heave that may occur due to shallow inverts, natural conditions, or operator error. Settlement or heave could result in damage to existing underground utilities, pavements, slabs, and adjacent structures;
- Soil and ground improvement that may be needed around jacking pits and the pipe if the subsurface soils do not provide sufficient passive resistance for reaction walls or long-term support for the pipe;
- No access to the bursting head if it becomes stuck. A rescue pit would generally be required to free the machine;
- Potential problems include disturbance to adjacent utility lines typically within 2 to 3 diameters of the pipe being replaced, when significant upsizing of a particular pipe is needed, pavement cracking from surface heave, damage to laterals from bursting a mainline, and damage to new pipe from sharp fragments or existing pipe being burst;
- Pipe bursting may create noise concerns and noticeable vibrations on the surface above the bursting operation; and
- Work areas that are required at jacking pits for the control room, pipe handling, and other equipment.

7.5.3 Preliminary Geotechnical Considerations

Possible geotechnical considerations for new replacement mains installed by pipe bursting include:

- Favorable if the soil surrounding the pipe will allow the expanded hole to remain open while the replacement pipe is being installed, lowering the drag on the replacement pipe. Based on available subsurface information, it appears that most of the existing mains were installed in weak deposits that would probably not remain open after the existing pipe has been burst;

- Probably not feasible where ductile iron and PVC pipes are present, such as along Nimitz Highway between River and Nuuanu Streets, Ala Moana Boulevard between South Street and Ward Avenue, Ala Moana Boulevard between Atkinson Drive and Kalakaua Avenue;
- Other less favorable ground conditions for pipe bursting involve densely compacted soils and backfills, cemented deposits, rock, highly expansive soils, soils below the water table and dilatant soils (soils that expand in volume as they are sheared);
- High-density polyethylene (HDPE) and medium-density polyethylene (MDPE) are the most common new pipe materials due to their continuity, flexibility, and versatility;
- In water main replacements, the burst length is usually between service valves or spaced at the intersection of main distribution branches;
- Depending on the location of the pits, temporary lane closures and detours around the insertion and receiving pits may be needed;
- Typical pneumatic pipe bursting may cause quite noticeable vibrations on the ground surface above the bursting operation;
- The need for work areas at the ground surface at each insertion pit location for power equipment and pipe storage and handling. In areas, existing trees and landscaping in medians or sidewalks may need to be temporarily removed at the pit locations. Space needed for work areas may be limited by driveways;
- Since the new pipe is installed through an existing pipe, there are not many permitting issues related to pipe bursting projects. However, noise could be a potential problem when employing the pneumatic method near residences, hospitals, or schools.

7.6 WATER LATERALS

We understand that conventional BWS-type laterals installed by open cut trenching are being considered for the new replacement water mains. Alternatively, laterals could be installed using PTMT equipment operated from the jacking or receiving pits, or with mini-directional drilling equipment. The feasibility of these methods may need to be further evaluated during a detailed geotechnical exploration that will need to be performed during design of this project. Fire hydrant connections would probably need to be installed by open cut trenching.

7.7 OTHER CONSIDERATIONS

Prior to the start of construction, we recommend that a photographic and/or video survey be made of existing nearby buildings, structures, slabs-on-grade, and pavements along the new replacement water main alignments to document existing conditions. Any existing damage

should be noted. The preconstruction survey should also include establishing settlement points on existing structures, slabs, and pavements.

The preconstruction survey would provide valuable records in the event movements and/or damages arise as a result of the construction. The settlement information would also be useful during construction to alert the Contractor of potential ground movements, and the possible need to modify their excavation, dewatering, and/or trenchless installation operations.

Dewatering effluent from installation of the new mains will need to properly filtered and treated before disposal. Contaminated ground water, if encountered, may need special handling and treatment prior to disposal.

The final installation methods selected are dependent on the design of the new waterline, surface and subsurface conditions encountered, and methods selected by the Contractor. For preliminary planning, it is anticipated that open cut and PTMT methods may be used for the waterline installation. Open cut is more attractive in areas where numerous underground utilities make trenchless methods very difficult. PTMT using an outer steel casing with flexible pipe inside allows for pressure testing of the inner product pipe before grouting the annulus.

8.0 DETAILED GEOTECHNICAL EXPLORATION

It is recommended that a detailed geotechnical exploration be performed during the design phase for the water system improvements. The detailed geotechnical exploration should include soil borings and testing to sufficient depths along the new replacement water main alignments. The borings are needed to explore site-specific subsurface and groundwater conditions, evaluate anticipated ground behavior, design the new replacement water mains, and further assess requirements for the different installation methods.

9.0 LIMITATIONS

This letter report has been prepared for the use of Gray, Hong, Nojima & Associates, Inc. in accordance with generally accepted soils and foundation engineering practices subject to the limitations of our scope, schedule, and budget. No warranty or guarantee, expressed or implied, or other representation is made as to the professional advice included in this report and none should be inferred.

This letter report has been developed for the use of Gray, Hong, Nojima & Associates, Inc. for the Honolulu Water System Improvements Environmental Assessment on Oahu, Hawaii as described herein. It does not contain sufficient information for the purposes of other parties or for other uses.

This letter report does not reflect variations which may occur in the subsurface and groundwater conditions between borings referenced herein. The nature and extent of variations of the subsurface and groundwater conditions may not become evident until construction. Fluctuations in the groundwater level may occur due to variations in tides, rainfall, stream levels,

temperature, and other factors that may be different from the conditions that existed at the time of our measurements.

The comments and recommendations presented in this letter report are preliminary in nature and should not be used for design. A detailed geotechnical exploration should be undertaken for final design after replacement methods have been selected.

This consultation may not have disclosed the presence of underground structures such as cesspools, drywells, storage tanks, landfills, etc., that may be present at the site. Should these items be encountered during construction, the Board of Water Supply and its Designer of Record should be notified to provide appropriate recommendations for their disposal and/or treatment. Assessment of the presence or absence of these structures was not included in the scope of this consultation.

The scope of our services for this project was limited to conventional geotechnical engineering services and did not include any environmental assessment or evaluation of potential subsurface and groundwater contamination. Silence in this report regarding any environmental aspect of the site does not indicate the absence of potential environmental problems.

Our scope of services specifically excluded the investigation, detection, or assessment of the presence of Biological Pollutants in or around any existing or planned structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

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The following plates and references are attached and complete this letter report.

Plate 1 - Map of Area
Plate 2 - General Surface Geologic Plan
Plate 3 - General Subsurface Geologic Plan
Plate 4 - General Soil Map

References

List of Record Drawings

Yours very truly,

PACIFIC GEOTECHNICAL ENGINEERS, INC.

Kristine A. Pascua, P.E.
Project Manager

Glen Y.F. Lau, P.E.
President

GLEN Y. F. LAU
LICENSED PROFESSIONAL ENGINEER
No. 6095-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

EXP. April 30, 2016

GL/KP/LO:ev(0306-003 Final Letter Report)
(Electronic copy submitted)

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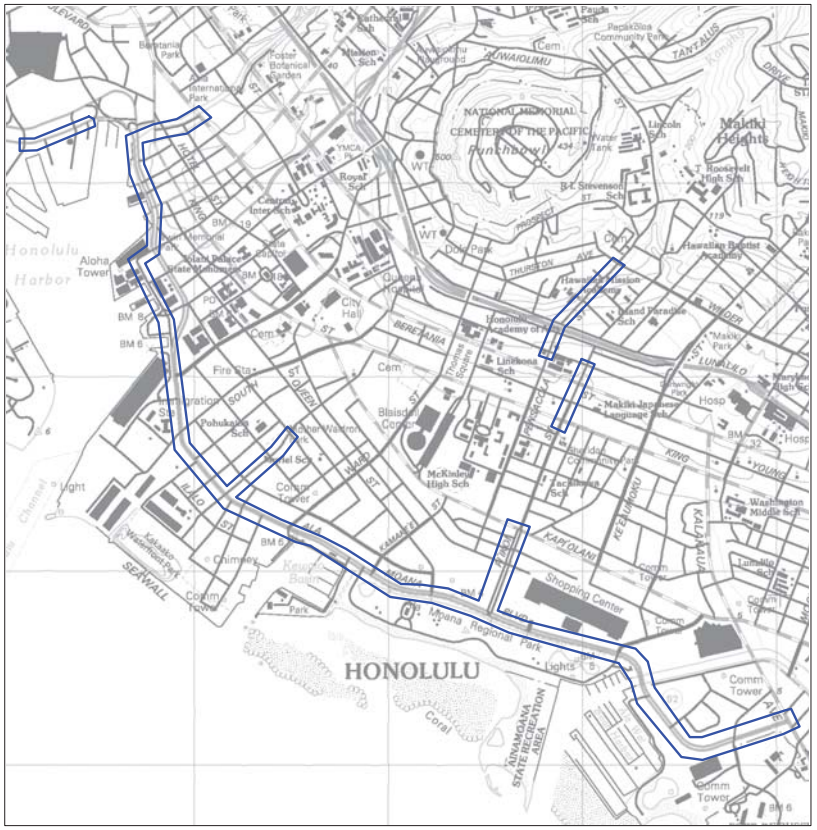
0306-003 map of area.dwg (01-07-15)

General Location of Project Sites



Contour Interval 40 Feet
Datum is Mean Sea Level
Depth Curves in Feet - Datum is Mean Lower Low Water

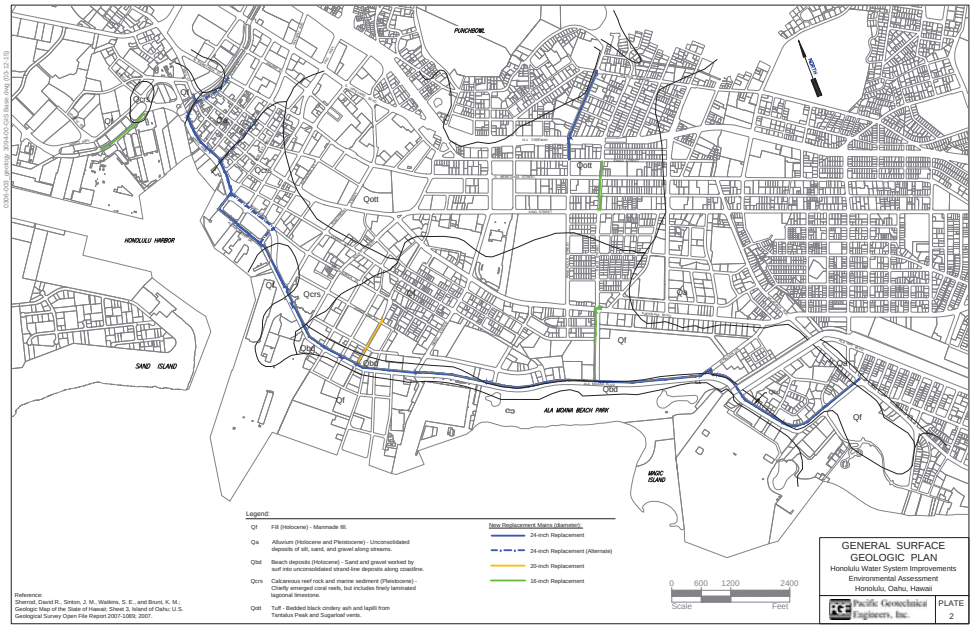
Reference:
U.S.G.S. Topographic Map
Honolulu, Oahu, Hawaii
Dated: 1998

MAP OF AREA

Honolulu Water System Improvements
Environmental Assessment
Honolulu, Oahu, Hawaii

Pacific Geotechnical Engineers, Inc.

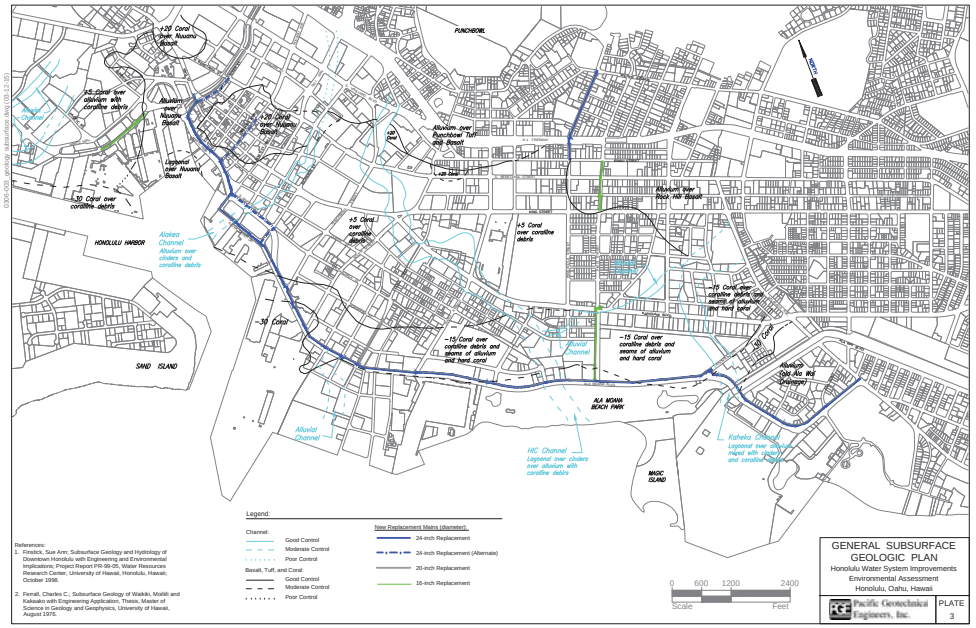
PLATE 1



GENERAL SURFACE GEOLOGIC PLAN
Honolulu Water System Improvements
Environmental Assessment
Honolulu, Oahu, Hawaii

Pacific Geotechnical Engineers, Inc.

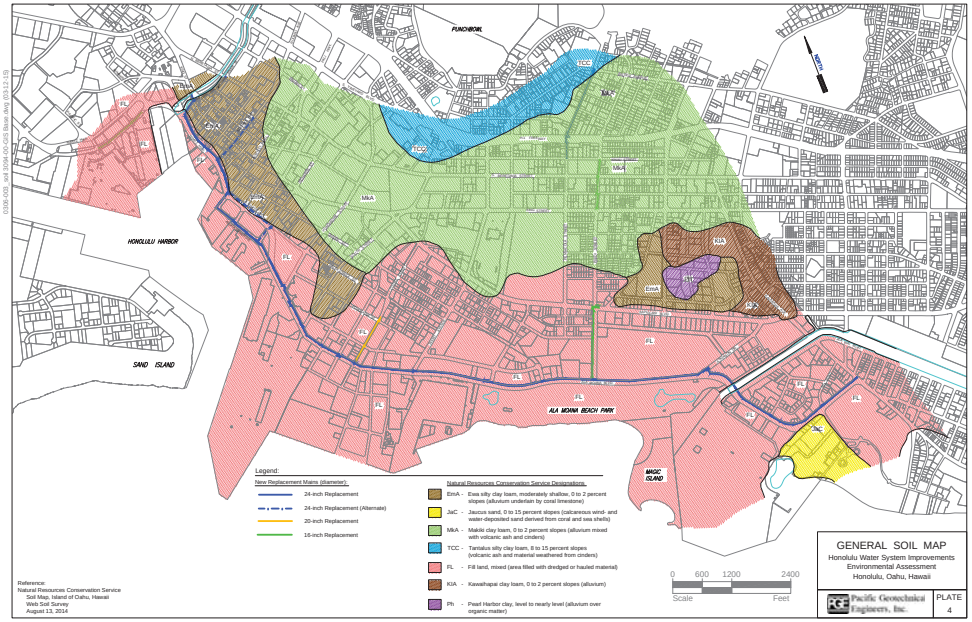
PLATE 2



GENERAL SUBSURFACE GEOLOGIC PLAN
Honolulu Water System Improvements
Environmental Assessment
Honolulu, Oahu, Hawaii

Pacific Geotechnical Engineers, Inc.

PLATE 3



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12. United States Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, Island of Oahu, Hawaii (HI990), available online at http://websoilsurvey.nrcs.usda.gov, accessed on July 23, 2014.

LIST OF RECORD DRAWINGS

1. *10" Sewer Relief for 1015 Wilder Avenue Condominium, Pensacola Street to Piikoi Street,* by Construction Engineering Services, Inc., August 21, 1991.

2. *Ala Moana – Atkinson Bld 12" Water Main, Board of Water Supply, Honolulu, T.H.,* undated.

3. *Ala Moana Boulevard: 12-inch Water Mains, Honolulu, Oahu, Hawaii, Board of Water Supply, City and County of Honolulu, Job No. 91-13,* by Smith, Young & Associates, Inc., February 14, 1992.

4. *Ala Moana Interceptor Sewer Section I, Department of Public Works, City and County of Honolulu, Division of Sewers, Job No. 15-62,* October 17, 1963.

5. *Ala Moana Boulevard Sewer Reconstruction (Emergency) Street Lighting & Resurfacing Joint Project, Wastewater Division, Department of Design & Construction, City and County of Honolulu,* July 14, 2009.

6. *Ala Moana Sewers, Department of Public Works, City and County of Honolulu Bureau of Plans, Job No. 46-37,* February 1, 1938.

7. *Cooke Street Relief Sewer, Department of Public Works, City and County of Honolulu, Division of Sewers, Job No. 5-65,* October 10, 1966.

8. *East End Relief Sewer from Ala Moana Pumping Station to Ward Ave., Revised 1953, Department of Public Works, City and County of Honolulu, Honolulu, T.H., Job No. 62-53,* by Austin & Towill, February 8, 1954.

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11. *Frontage Improvement No. 96, Piikoi Street, Young Street to Kapiolani Boulevard, Department of Public Works, City and County of Honolulu, Job No. 19-56,* by Austin & Towill, September 2, 1957.

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14. *Honolulu Pearl Harbor Road, Iwilei Section, Federal Aid Urban Project No. FU44(3) 2nd Unit, District of Honolulu, Island of Oahu,* April 6, 1953.

LIST OF RECORD DRAWINGS

15. *Kaka'ako Community Development District, Improvement District 1 – Package A & D, Portion of Ala Moana Boulevard, Auahi Street, Punchbowl Street, South King Street, Pohukaina Street, Halekauwila Street, Queen Street and Mission Lan*e, by Belt, Collins & Associates, August 3, 1988.

16. *Kaka'ako Community Development District, Improvement District 2 – Package B, Portion of Ala Moana Boulevard, Auahi Street and Drain Line "A" Along Coral & Ilalo Streets,* by Wilson Okamoto & Associates, Engineers Surveyors Hawaii, Inc., and Nakamura, Oyama & Associates, Inc., December 12, 1990.

17. *Kaka'ako Community Development District, Improvement District 2 – Package C, Cooke Street (Ala Moana Blvd. to Pohukaina St.), Drain Line "B" Along Ilalo Street and Cooke Street, Honolulu, Hawaii,* by Wilson, Okamoto & Assoc, Austin, Tsutsumi & Associates, Inc., and Nakamura, Oyama & Assoc., Inc., July 31, 1990.

18. *Kapiolani Area Revised Sewer System (KARSS), Wastewater Division, Department of Design and Construction, City and County of Honolulu,* by HDR | Hawaii Pacific Engineers, Inc., October 11, 2007.

19. *Nimitz Highway Water System Improvements, Part 1, Board of Water Supply Job No. 01-87A, City and County of Honolulu, District of Honolulu, Island of Oahu,* by R.M. Towill Corporation, December 3, 2001.

20. *Pensacola Street Relief Drain Unit I, Honolulu, Oahu, Hawaii, Department of Public Works, Division of Engineering, City & County of Honolulu, Job No. 08-71,* December 26, 1972.

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23. *Sewer Tunnel Relief Increment 1-B, Beretania Street to Makiki Park, Department of Public Works, City and County of Honolulu, Division of Wastewater Management, Job No. W7-85,* October 22, 1985.

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Honolulu Water System Improvements
PGE Job No. 0306-003
Pacific Geotechnical Engineers, Inc.

APPENDIX C

Biological Survey for Board of Water Supply Improvements
to Various Water Mains in Central Honolulu

Biological surveys for Board of Water Supply improvements to various water mains in central Honolulu

April 11, 2016 *AECOS* No. 1414

Eric Guinther and Reginald David[1]
AECOS, Inc.
45-939 Kamehameha Hwy, Suite 104
Kāne'ohe , Hawai'i 96744
Phone: (808) 234-7770 Fax: (808) 234-7775 Email: aecos@aecos.com

Introduction

The Honolulu Board of Water Supply (BWS) is planning to upgrade (increase pipe size) various water mains within central Honolulu (the "Project"). *AECOS* Inc. was hired by Gray, Hong, Nojima and Associates to evaluate the Project in terms of its potential impacts to flora and fauna in the affected areas as a contribution to an Environmental Assessment for the Project being prepared under requirements of Hawaii Revised Statutes, Chapter 343.

As shown in Figure 1, the replacement water mains are located mostly along Ala Moana Boulevard from Kalakaua Avenue in the east to Nimitz Highway ending at River Street in the west. Other replacement mains are proposed for various cross streets running in the *mauka* direction: specifically Piikoi St., Pensacola St., Cooke St., Richards St. (*makai* direction off Ala Moana), Nuuanu Avenue, and River St (and turning west across the King St. viaduct over Nu'uanu Stream). Finally, a portion of the west bound lanes of Nimitz Highway was surveyed between Summer St. and Pacific St.

Replacement along Ala Moana and a portion of Nimitz Highway would be approximately 20,000 ft long, continuous between the described end points. An exception is in the vicinity of the Hawaiian Electric (HE), Honolulu Generating Station (Leslie A. Hicks Power Plant), where the water main would diverge onto Aloha Tower Drive and then take one of two alternative routes back to Nimitz

[1] Rana Biological Consulting, Inc., Kailua-Kona, Hawai'i.

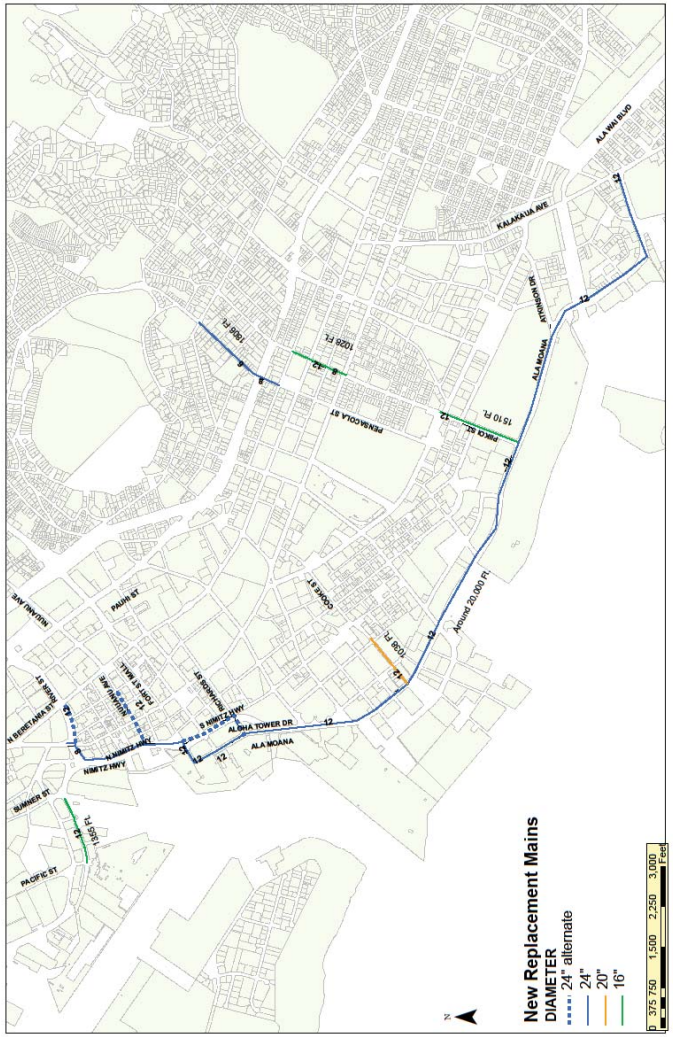

Figure 1. Central Honolulu showing planned replacement mains. Numbers on map are existing pipe diameters in inches.

Hwy. (either the south side of the Honolulu Power Plant or the north side of Irwin Park). Replacement mains on all the named cross streets would be short segments of one to several blocks (the longest at 1806 ft).

Methods

All of the streets proposed for replacement mains were investigated for significant biological resources either by traversing in a vehicle or on foot on January 13, 2015. Since in all cases, the replacement mains would be located within the roadway or very close to the roadway, the only potential impacts to such resources would seem to involve trees planted in the median or along the margins of the roadway; trees that might need to be trimmed or removed. While other vegetation may also be subject to removal, these other plants (herbs such as grasses and ruderal weeds, and shrubs) are without special value and, in the urban core, exclusively non-native or ornamental plantings. Consequently, no attempt was made to identify all plants occurring in the survey area.

A list was made of all avian and terrestrial mammalian species seen or heard while driving and walking the proposed water main routes. Field observations were aided using Leica 8 X 42 binoculars and by listening for vocalizations. Weather conditions were ideal, with no rain, unlimited visibility, and winds of between 3 and 8 kilometers an hour.

Results

Botanical Resources

The surveyed streets (Project sites) range from broad avenues or boulevards[2] in dense urban settings to side streets in commercial and light industrial areas, and main streets through residential apartment districts. Plants (trees) are described generally for each of the street or roadway areas surveyed.

Ala Moana Boulevard – The eastern end of Ala Moana Blvd. begins at Kalakaua Ave. within the dense resort and commercial district of Waikīkī. The boulevard runs west past Ala Moana Center and Ala Moana Park through mostly dense urban commercial properties and into the lower end of the downtown district,

[2] The terms "boulevard" and "avenue" are descriptive of broad roadways within a city and typically lined with trees.

ending at about Richards St.[3] For much of this distance, Ala Moana is lined with trees and there is a median with planted trees (Figure 2). Typically, the trees are coconut (*Cocos nucifera*) and monkeypod or rain tree (*Albizia saman*). Except in Waikīkī and along the Honolulu Harbor frontage, coconuts are not planted in the median. Between Ward Street and Bethel St., the median does not exist as a planted strip or is grassed but lacks plantings of trees.



Figure 2. Unrelated construction (April 2014) in the median of Ala Moana Blvd. *mauka* of Kewalo Basin, showing area typical vegetation: monkeypod and coconut trees with various ornamental shrubs and small trees on property beyond.

Other trees observed close to the street at the Waikiki end of the Project are: shower (*Casia* x*nealiae*), banyan (*Ficus* sp.), be-still (*Thevetia peruviana*), and Manila palm (*Veitchia merrilli*). Hedges of native *naupaka kahakai* (*Scaevola taccada*) are planted in this area.

[3] Various map sources put the transition to Nimitz Highway somewhere between Richards St. and Fort Street in downtown Honolulu.

A variety of unusual, mature tree species is a hallmark of Ala Moana Beach Park. However, few of these trees are located near the roadway; most are separated by a canal from the Project area. Exceptional trees in Ala Moana Beach Park comprise 78 *Ficus* spp. (banyan, rubber trees) and 4 other species (8 trees total; C&C, DPR, 2014). Most of these trees have identifying plaques. Several of the *Ficus* trees marked as exceptional trees at the east end of the Park are close to Ala Moana Blvd.

Additional species noted along Ala Moana Blvd. are *'opiuma* (*Pithecellobium dulce*) and poinciana (*Delonix regia*). A survey of the vegetated boundary between Ala Moana Blvd. and Kewalo Basin frontage road, and including the boulevard median in this area (see Fig. 2) lists 44 species (Guinther, 2014). Only three are native indigenous plants: *naupaka kahakai*, *milo* (*Thespesia populnea*), and *hala* (*Pandanus tectorius*).

Nimitz Highway and River Street – South Nimitz Highway is essentially a continuation of Ala Moana Blvd. north from downtown. A grassed median with tall coconut trees occurs between about Kekaulike St. and River St. River Street has mostly newly planted trees along the promenade bordering Nu'uanu Stream, and somewhat more mature trees bordering the street up to N. Beretania Street and at the Pacific St. end of the Nimitz west bound lanes (project end) where shower trees are planted close to the roadway. Trees here are mostly banyan and Formosan *koa* (*Acacia confusa*), with monkeypod at the west end of the King St. viaduct.

Piikoi Street – Piikoi St. between Ala Moana Blvd. and Kapiolani Blvd. is a proper avenue with a median planted in trees. Most are small trees; larger trees are planted on properties to either side of the avenue. Trees occurring here are: shower, orchid (*Bauhinia* sp.), *kamani* (*Calophyllum inophyllum*), *kukui* (*Aleurites moluccana*), and royal palm (*Roystonia regia*). Piikoi between South King St. and Kinau St. has very little vegetation near the street, but many of the the same species in adjacent yards.

Pensacola Street – Pensacola St. between Kinau St. and Wilder Ave. (Makiki District) is an area of low apartment buildings with modest tree resources associated with private properties, and few close to the roadway itself. Trees observed are: Chinese banyan (*Ficus microcarpa*), poinciana, shower, plumeria (*Plumeria* sp.), and various small palms.

Cooke Street – Cooke St. from Ala Moana Blvd. to just beyond Pohukaina St. is a light industrial area with no trees along the street, except at the corner of Cooke and Pohukaina streets at Mother Waldron Park.

Aloha Tower Drive – The water main route going northwest along Aloha Tower Drive would turn up Richard Street to Ala Moana Blvd. or continue around Irwin Park, and turn up to Ala Moana Blvd. Coconut trees line the street in several places, and parks adjacent sport numerous monkeypod, coconut, and shower trees.

Nuuanu Avenue – An alternate replacement is indicated for Nuuanu Ave. from South Nimitz to Pauahi St. This older downtown street supports only few small trees at the *makai* end.

Vertebrate Resources

We recorded 20 avian species representing 14 separate families (Table 1). Three of these species—Black-Crowned Night-Heron (*Nycticorax nycticorax hoactli*), Pacific Golden-Plover (*Pluvialis fulva*), and White Tern (*Gygis alba*)—are indigenous (native to Hawai'i and elsewhere) species. The remaining 11 species recorded are alien to the Hawaiian Islands.

Table 1. Listing of birds observed on January 13, 2015.

Common name	Scientific name	Status
	ANSERIFORMES	
	ANATIDAE - Ducks, Geese & Swans	
	Anatinae - Ducks	
Mallard x hybrid	*Anas platyrhynchos x* ?	A
	PELECANIFORMES	
	ARDEIDAE - Herons, Bitterns & Allies	
Cattle Egret	*Bubulcus ibis*	A
Black-Crowned Night-Heron	*Nycticorax nycticorax hoactli*	**IB**
	CHARADRIIFORMES	
	CHARADRIIDAE - Lapwings & Plovers	
	Charadriinae - Plovers	
Pacific Golden-Plover	*Pluvialis fulva*	**IM**
	LARIDAE - Gulls, Terns & Skimmers	
	Sterninae - Terns	
White Tern	*Gygis alba*	**IB**
	COLUMBIFORMES	
	COLUMBIDAE - Pigeons & Doves	
Rock Pigeon	*Columba livia*	A
Spotted Dove	*Streptopelia chinensis*	A
Zebra Dove	*Geopelia striata*	A

Table 1 (continued).

Common name	Scientific name	Status
	PSITTACIFORMES	
	PSITTACIDAE - Lories Parakeets, Macaws & Parrots	
	Psittacinae - Typical Parrots	
Rose-ringed Parakeet	*Psittacula krameri*	A
	PASSERIFORMES	
	PYCNONOTIDAE - Bulbuls	
Red-vented Bulbul	*Pycnonotus cafer*	A
	ZOSTEROPIDAE - White-eyes	
Japanese White-eye	*Zosterops japonicus*	A
	STURNIDAE - Starlings	
Common Myna	*Acridotheres tristis*	A
	THRAUPIDAE - Tanagers	
Red-crested Cardinal	*Paroaria coronata*	A
	CARDINALIDAE - Cardinals Saltators & Allies	
Northern Cardinal	*Cardinalis cardinalis*	A
	FRINGILLIDAE - Fringilline and Carduline Finches & Allies	
	Carduelinae - Carduline Finches and Hawaiian Honeycreepers	
House Finch	*Haemorhous mexicanus*	A
Yellow-fronted Canary	*Serinus mozambicus*	A
	PASSERIDAE - Old World Sparrows	
House Sparrow	*Passer domesticus*	A
	ESTRILDIDAE - Estrildid Finches	
Common Waxbill	*Estrilda astrild*	A
Java Sparrow	*Lonchura oryzivora*	A
Scaly-breasted Munia	*Lonchura punctulata*	A

Legend to Table 1

A – Alien Species – introduced to the Hawaiian Islands by humans
IM – Indigenous Migratory Species – Native migratory species not unique to the Hawaiian Islands
IB - Indigenous Breeding Species – Native resident breeding species, not unique to the Hawaiian Islands

We recorded three mammalian species while within survey corridors. Numerous dogs (*Canis familiaris*) were seen along the route, especially in the Ala Moana Beach Park stretch of the survey corridor. Cats (*Felis catus*) were seen at multiple locations, as were several small Indian mongooses (*Herpestes auropunctatus*).

Conclusions and Recommendations

Plants

No plant species of any conservation concern occur in the Project area. The listing of exceptional trees maintained by the City & County of Honolulu (C&C, DPR, 2014) has numerous specimens located in Ala Moana Beach Park, but none in any other vicinity of the Project. Although a few of the trees at Ala Moana Beach Park are near Ala Moana Blvd., all are well back from the sidewalk and not anticipated to be impacted by the Project.

Any plants at risk of damage or removal from the proposed water main replacements are naturalized (non-native) or ornamentals (non-native or early Polynesian introductions, such as the coconut palm). These are species that would not be considered for listing as threatened or endangered (see below).

Birds

The findings of the avian survey are consistent with the location of the project in the highly developed urban center of Honolulu. Three native bird species were observed: Black-Crowned Night-Heron, Pacific Golden-Plover, and White Tern. The heron is an indigenous resident breeding species common throughout the state in locations with standing water, streams, and ponds (seen at Ala Moana Beach Park). The plover is an indigenous migratory shorebird species which nests in the high Arctic during the late spring and summer months, returning to Hawai'i and the tropical Pacific to spend the fall and winter months each year.

The White Tern is an indigenous breeding seabird species, commonly encountered around Waikīkī and parts of downtown Honolulu (VanderWerf 2003; David, 2014). The O'ahu population of this species is listed as an endangered species by the State of Hawai'i (DLNR, 1998). It is not listed, nor is it currently a species proposed for listing, under the federal Endangered Species Act. This species nests in the Waikīkī area, with successful breeding regularly occurring on several resort properties and within Ala Moana Beach Park.

Although not detected and not expected in the project area, two seabird species, Wedge-tailed Shearwater (*Puffinus pacificus*) and Newell's Shearwater (*Puffinus auricularis newelli*), have been downed on O'ahu due to attraction to lights during the annual seabird fledging season. The primary cause of mortality in resident seabirds is thought to be predation by alien mammalian species at the

nesting colonies (USFWS 1983; Simons and Hodges 1998; Ainley et al., 2001). Collision with man-made structures is considered to be the second most significant cause of mortality in locally nesting seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by man-made lights. When disoriented, seabirds may collide with man-made structures and, if not killed outright, the dazed or injured birds become easy targets of opportunity for feral mammals (Hadley, 1961; Telfer, 1979; Sincock, 1981; Reed et al., 1985; Telfer et al., 1987; Cooper and Day, 1998; Podolsky et al., 1998; Ainley et al., 2001; Hue et al., 2001; Day et al., 2003).

Mammals

The findings of the mammalian survey are consistent with the location of the Project. Although no rodents were observed during the course of our survey, it is probable that one or more of the four established alien Muridae found on O'ahu—European house mouse (*Mus musculus domesticus*), roof rat (*Rattus rattus*), brown rat (*Rattus norvegicus*), and possibly black rat (*Rattus exulans hawaiiensis*)—use various resources found within the general project area on a seasonal basis. Hawaiian hoary bat (*Lasiurus cinereus semotus*) or *'ōpe'ape'a* was not detected during the course of this survey. Only in recent years has this species been recorded on a regular basis on the Island of O'ahu. Thus, it is within the realm of possibility that this species may forage within the Project area on a seasonal basis (USFWS, 1998; David, 2014,). With that said, downtown urban Honolulu is not a location where bats have been recorded and the level of ongoing disturbance makes it highly unlikely that this species would roost within the Project vicinity.

Critical Habitat

No federally designated Critical Habitat occurs in the Project area. No equivalent statute exists under state law. Therefore, replacement of the water mains as proposed will not result in modification to federal designated critical habitat.

Potential Impacts to Protected Species and Habitats

No plants currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs (DLNR, 1998; USFWS; 2014) were detected during the course of our survey. The only listed animal species recorded, was the White Tern, a species listed by state statute but not

the federal ESA. Although not detected during the survey, the potential presence of the following species may require consideration:

White Tern - The principal potential impact that the Project poses to White Terns is construction activities during the breeding and nesting season. White Terns do not construct nests, but rather perch their single egg in a tree, bush or other convenient location. The removal of a tree in which a pair of terns have a "nest", or chick will result in the loss of that egg or chick. The white terns that nest in the general area are clearly well adapted to the hustle and bustle of this extremely busy part of Honolulu. As very few if any suitable nest trees are planned to be removed as part of this project, the potential risk of harming a tern egg or chick is small.

Shearwaters - The only potential impact the Project poses to nocturnally flying seabirds is the increased threat that birds will be downed after becoming disoriented by lights associated with construction if it is deemed expedient or necessary to conduct night-time construction activities. It should be borne in mind that there is currently no documented record of any species of seabirds being downed in the general area of the project, so any such possibility of such a light attraction is likely to be remote.

Other Hawaiian seabirds – Other Hawaiian seabirds—specifically, the endangered Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*), threatened Newell's shearwater (*Puffinus auricularis newelii*), and the proposed for listing, band-rumped storm-petrel (*Oceanodroma castro*)—although rare on O'ahu, can also become disoriented and put at riskof death or injury by lights associated with the project.

Hawaiian hoary bat - The only potential impact that the Project poses to bats is if large trees are felled or trimmed. The trimming or removal of foliage and/or trees within the construction area may temporarily displace individual bats from a roosting location. As bats use multiple roosts within their home territories, this is likely to be minimal except during the pupping season. Female bats carrying pups may be less able to rapidly vacate a roost site as vegetation is cleared; additionally adult females sometimes leave their pups in the roost tree while they themselves forage, and very small pups may be unable to flee a tree that is being felled. Potential adverse effects from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 15 ft (4.6 m) in the pupping season between June 1 and September 15. With that said, very few if any trees will be removed as part of this Project, and the environment present is not typically where Hawaiian hoary bats would roost.

Recommendations

- If night-time construction activity or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly downward at the ground. Construction workers and supervisors should be provided information on the potential for downing seabirds and report any injured or killed seabirds to the proper authority at BWS.
- Prior to removal or trimming, a tree should be inspected by a qualified biologist to determine if White Tern nesting activity is underway within the tree. If a pair of terns, eggs, or chicks is found, the tree should be left in place until the chicks fledge and the birds leave the tree, or the nesting attempt fails.

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APPENDIX D

Final Archaeological Literature Review and Field Inspection Report for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu Ahupua‘a, Honolulu (Kona) District, O`ahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2,-4, and 2-6: Various Plats and Parcels

Final

Archaeological Literature Review and Field Inspection Report for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment Honolulu Ahupuaʻa, Honolulu (Kona) District, Oʻahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2,-4, and 2-6: Various Plats and Parcels

Prepared for
Gray Hong Nojima & Associates, Inc.

Prepared by
Constance R. O'Hare, B.A.,
David W. Shideler, M.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.
Kailua, Hawaiʻi
(Job Code: HONOLULU 52)

June 2016

Oʻahu Office
P.O. Box 1114
Kailua, Hawaiʻi 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
1860 Main St.
Wailuku, Hawaiʻi 96793
Ph.: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Archaeological Literature Review and Field Inspection Report for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment Honolulu Ahupuaʻa, Honolulu (Kona) District, Oʻahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2-4, and 2-6: Various Plats and Parcels (O'Hare et al. 2015)
Date	June 2016
Project Number(s)	Cultural Surveys Hawaiʻi, Inc. (CSH) Job Code: HONOLULU 52
Investigation Permit Number	CSH completed the fieldwork component of this study under archaeological permit number 14-04, issued by the Hawaiʻi State Historic Preservation Division (SHPD) per Hawaiʻi Administrative Rules (HAR) §13-13-282.
Agencies	State Historic Preservation Division
Land Jurisdiction	State of Hawaiʻi, City and County of Honolulu
Project Location	The main portion of the project area extends parallel along the coast on Nimitz Highway from the junction with Pacific Street in Iwilei to the highway's eastern terminus at Richards Street, the lower section of Richards Street to the western end of Ala Moana Boulevard through Kakaʻako and Kālia, across the Ala Moana Canal to the boulevard's terminus at Kalākaua Avenue in Waikīkī. The project area also includes a small eastern portion of N. King Street at Nuʻuanu Stream and several *mauka-makai* (inland to seaward) portions, on River Street in Honolulu and on Nuʻuanu Avenue in Honolulu, a portion of Cooke Street in Kakaʻako, a lower portion of Piʻikoi Street in Kakaʻako, an upper portion of Piʻikoi Street in Kewalo, and a portion of Pensacola Street in Kewalo.
Project Description	The Honolulu Water System Improvements project includes the following: 1. The main work entails installation of a new 24-inch replacement water main from the vicinity of the intersection of River Street and North King Street, then southwest or *makai* (seaward) on River Street to Nimitz Highway, southeast on Nimitz Highway to Fort Street Mall, southwest to Aloha Tower Drive, along Aloha Tower Drive to Ala Moana Boulevard, and then along Ala Moana Boulevard to the intersection with Kalākaua Avenue for a total distance of approximately 20,000 ft. 2. Excavation for the installation of a new 16-inch replacement water main along Nimitz Highway between Pacific Street and Sumner Street for approximately 1,355 ft.

	3. Excavation for the installation of a new 20-inch replacement water main along Cooke Street from Ala Moana Boulevard to Pohukaina Street for approximately 1,038 ft. 4. Excavation for the installation of a new 16” replacement water main along P‘iikoi St. from Ala Moana Blvd. to Kapi‘olani Blvd. for approximately 1,510 ft. 5. Excavation for the installation of a new 16-inch replacement water main along Pi‘ikoi Street from South King Street to Kīna‘u Street for approximately 1,028 ft. 6. Excavation for the installation of a new 24-inch replacement water main along Pensacola Street from Kīna‘u Street to Wilder Street for approximately 1,806 ft. 7. Alternate 24-inch water main project areas include River Street between North King Street and North Beretania Street, Nu‘uanu Avenue from Nimitz Highway to Pauahi Street, and S. Nimitz Highway between Fort Street Mall and Richards Street, and thence *makai* to Aloha Tower Drive. These excavations will typically be within a 12 foot (3.7 m) depth but in some locations (especially below existing drain boxes) may be up to 20 feet (6.1 m) below the ground surface and in trenches typically 6 to 8 feet wide (1.8 to 2.4 m) but some locations may require wider trenches.
Project Acreage	25,227 feet (4.7 miles) of road, or 7,689 m (7.6 km)
Document Purpose	This investigation was designed—through detailed historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that historic properties may be affected by the project, and based on findings, consider cultural resource management recommendations. This document is intended to facilitate the project’s planning and support the project’s historic preservation and environmental review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey investigation, per HAR §13-13-276. Consequently, this report cannot be used to make formal recommendations for SHPD review and acceptance.
Results Summary	A survey of aerial photographs of the project area indicate that almost the entire project area is covered by asphalt paving and is on or adjacent to highly trafficked streets and highways.

Recommendations	A sensitivity map of archaeological potential within the project area is provided. Only one small area of the project area is an open green space, Walker Park in downtown Honolulu at the foot of Fort Street, at the intersection with Nimitz Highway. This area has a rich history as a royal court area in the early post-contact period, site of the Honolulu Fort, near buildings used by the early merchant company Hackfeld and Co. up to the 1950s and within a lot used by other businesses, such as the Inter-island Steam Navigation Co. The lot could contain subsurface pre-contact cultural deposits, burials, early post-contact deposits related to the royal compound of Kamehameha II (Liholiho), deposits and structural material related to the Honolulu Fort, and trash and structural remains related to late nineteenth century and twentieth century structures. Should there be project-related subsurface impacts in the Walker Park portion of the project area this would be a logical area for archaeological inventory survey testing. Subsurface testing in any other portions of the project area would be highly problematic because of the need for saw-cutting, excavation, recordation and street reconstruction in areas of heavy traffic with an anticipated high density of utility lines (and often apartments in the immediate vicinity making the noise of trying to work at night problematic). Further clarification of the specific locations anticipated for ground disturbance within the indicated project area will be very useful in determining specific areas for archaeological inventory survey testing in consultation with the SHPD. It is likely that an archaeological inventory survey plan for SHPD review and approval will be appropriate but this should be informed by greater clarity on the specifics of project-related subsurface impacts.

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Section 1 Introduction

1.1 Project Background

At the request of Gray Hong Nojima & Associates, Inc., Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this literature review and field inspection report (LRFI) for Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu Ahupua‘a, Honolulu (Kona) District, O‘ahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6. The project area is depicted on a portion of the 1998 U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), 2013 aerial photographs (Figure 2 through Figure 4), and Hawai‘i State tax map key (TMK) plats (Figure 5 through Figure 10).

The main portion of the project area extends parallel along the coast on Nimitz Highway and Ala Moana Boulevard. For ease in discussion, the background information in this report has been divided into three sections: the Honolulu section, the Kaka‘ako/Kewalo section, and the Kālia section in Waikīkī. The Honolulu section extends along Nimitz Highway from Sumner Street to Pacific Street in Iwilei. It then starts again on Nimitz Highway from the junction with River Street and extends east to the highway’s eastern terminus at Richards Street and to the lower portion of Richards Street. The Kaka‘ako (lower)/Kewalo (upper) section extends from the western end of Ala Moana Boulevard at the junction with Richards Street through Kaka‘ako to Pi‘ikoi, which is the traditional boundary between Honolulu and Waikīkī. The Kālia section extends along Ala Moana Boulevard from Pi‘ikoi Street, across the Ala Wai Canal, to the boulevard’s terminus at Kalākaua Street in Waikīkī. The project area also includes several *mauka-makai* (inland to seaward) portions, a portion of River Street (including the King Street Bridge) in Honolulu and a portion of Nu‘uanu Avenue in Honolulu, a portion of Cooke Street in Kaka‘ako, a lower portion of Pi‘ikoi Street in Kaka‘ako, an upper portion of Pi‘ikoi Street in Kewalo, and a portion of Pensacola Street in Kewalo.

The Honolulu Water System Improvements project includes the following:

1. The main work entails installation of a new 24-inch replacement water main from the vicinity of the intersection of River Street and North King Street, then southwest or *makai* (seaward) on River Street to Nimitz Highway, southeast on Nimitz Highway to Fort Street Mall, southwest to Aloha Tower Drive, along Aloha Tower Drive to Ala Moana Boulevard, and then along Ala Moana Boulevard to the intersection with Kalākaua Avenue for a total distance of approximately 20,000 feet (ft).
2. Excavation for the installation of a new 16-inch replacement water main along Nimitz Highway between Pacific Street and Sumner Street for approximately 1,355 ft.
3. Excavation for the installation of a new 20-inch replacement water main along Cooke Street from Ala Moana Boulevard to Pohukaina Street for approximately 1,038 ft.
4. Excavation for the installation of a new 16” replacement water main along Pi‘ikoi St. from Ala Moana Blvd. to Kapi‘olani Blvd. for approximately 1,510 ft.
5. Excavation for the installation of a new 16-inch replacement water main along Pi‘ikoi Street from South King Street to Kīna‘u Street for approximately 1,028 ft.
6. Excavation for the installation of a new 24-inch replacement water main along Pensacola Street from Kīna‘u Street to Wilder Street for approximately 1,806 ft.

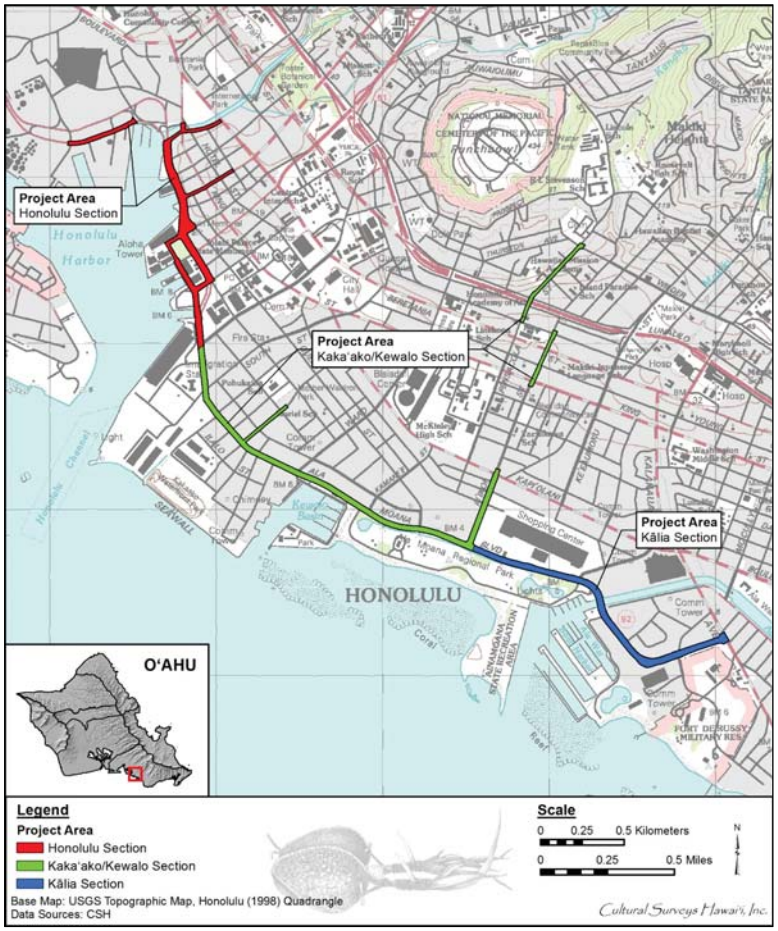


Figure 1. Portion of the 1998 USGS 7.5-minute topographic map of O‘ahu (Honolulu quadrangle), showing the location of the project area

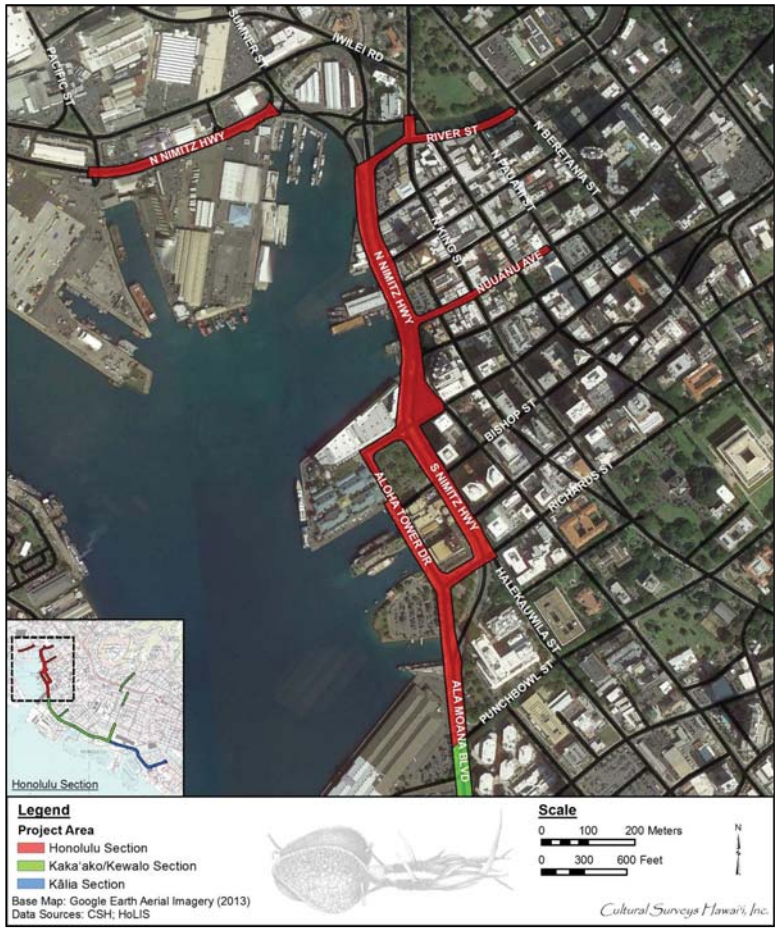
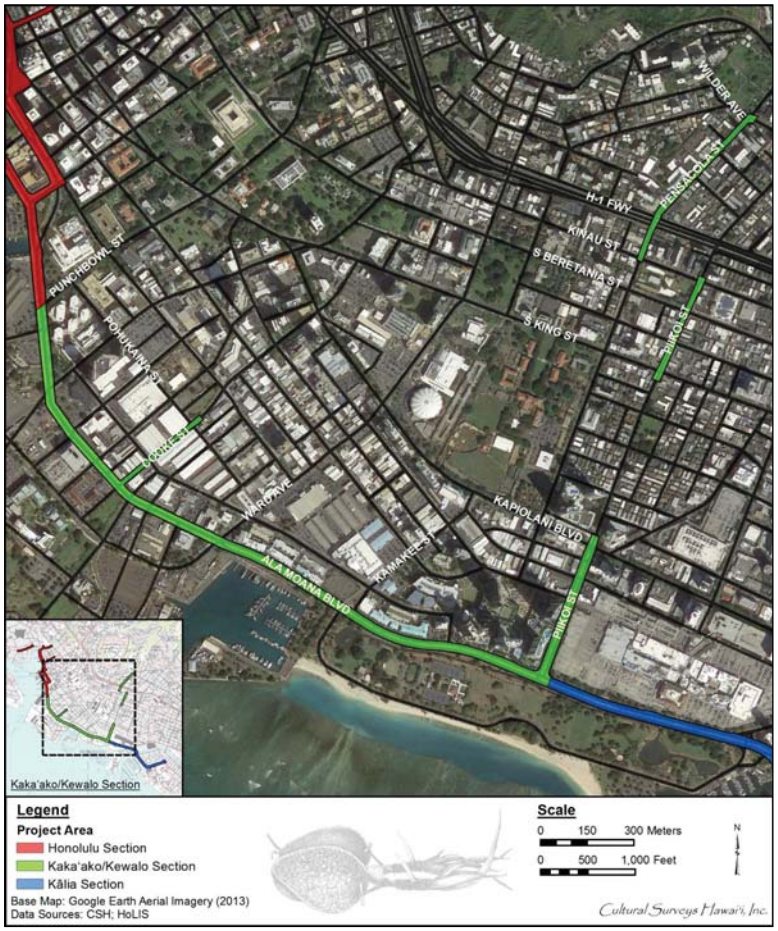


Figure 2. Aerial photograph (Google Earth 2013) of west end of project area within Honolulu



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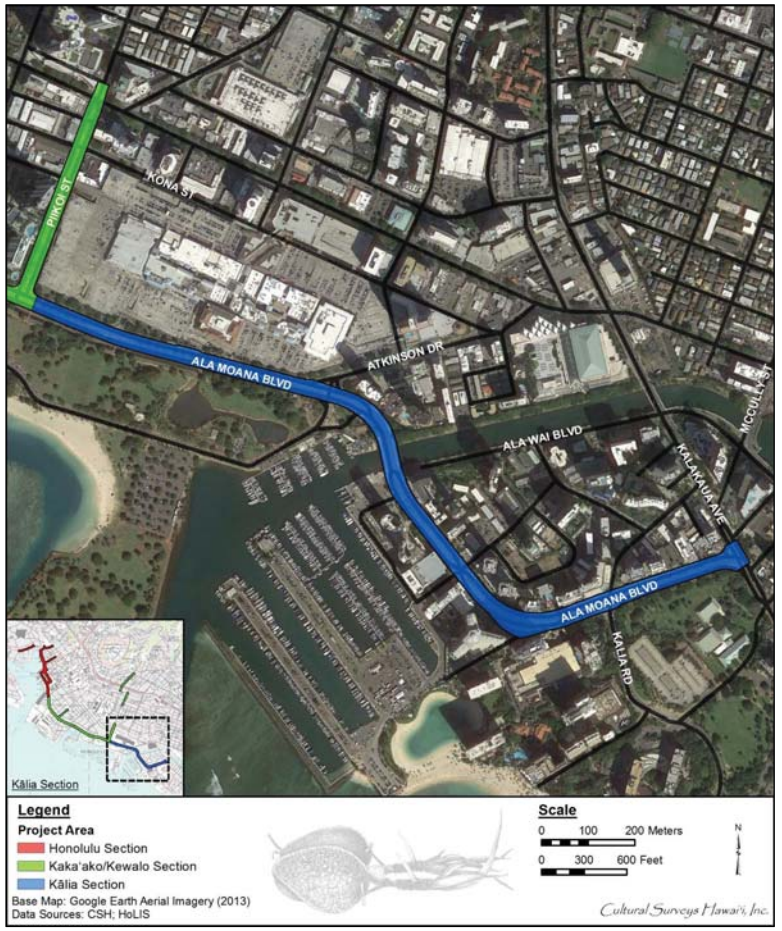

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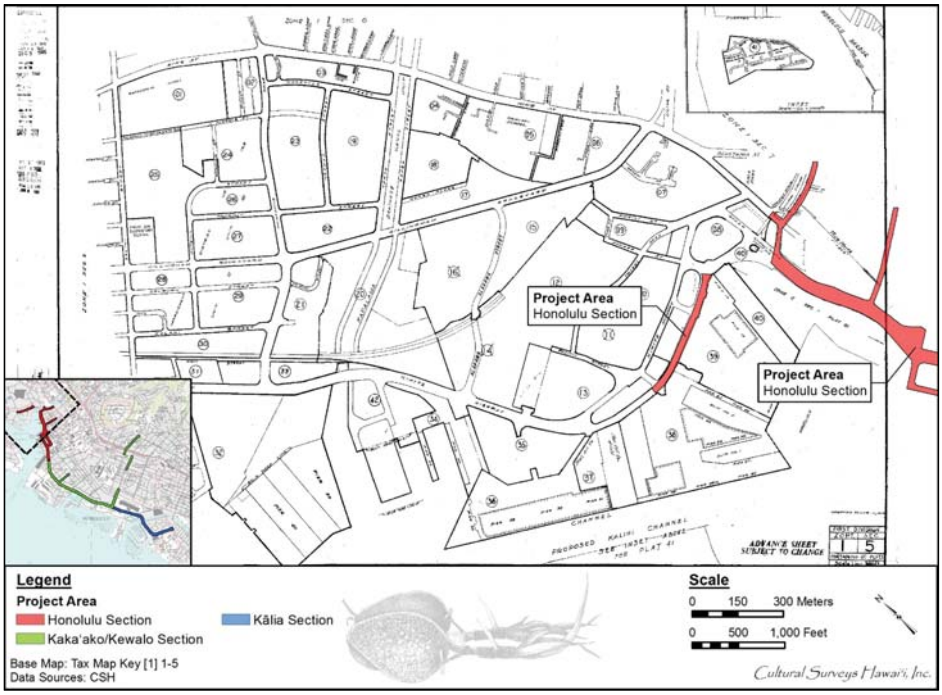

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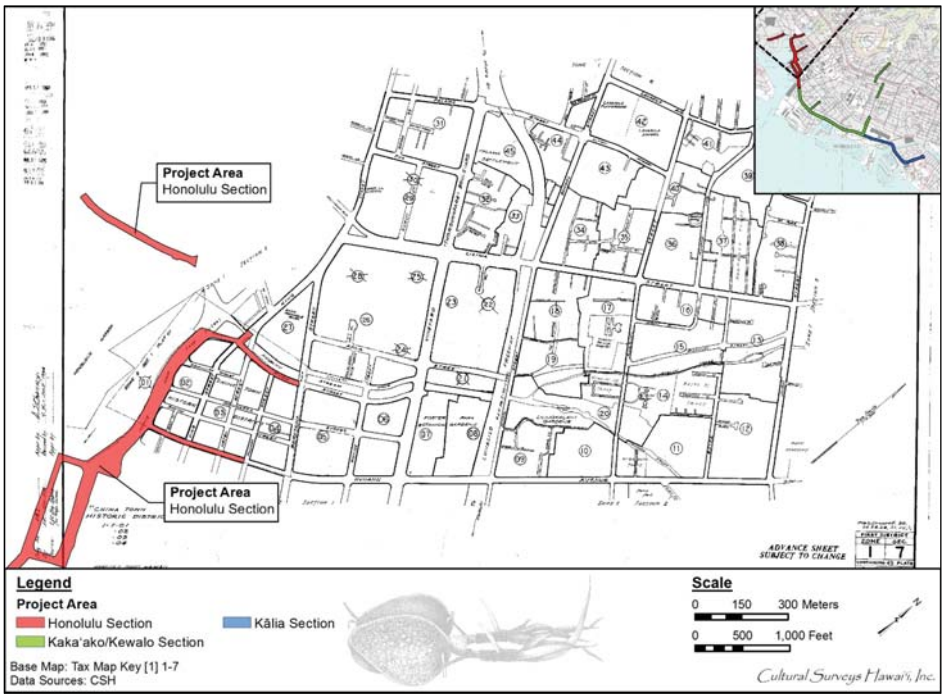
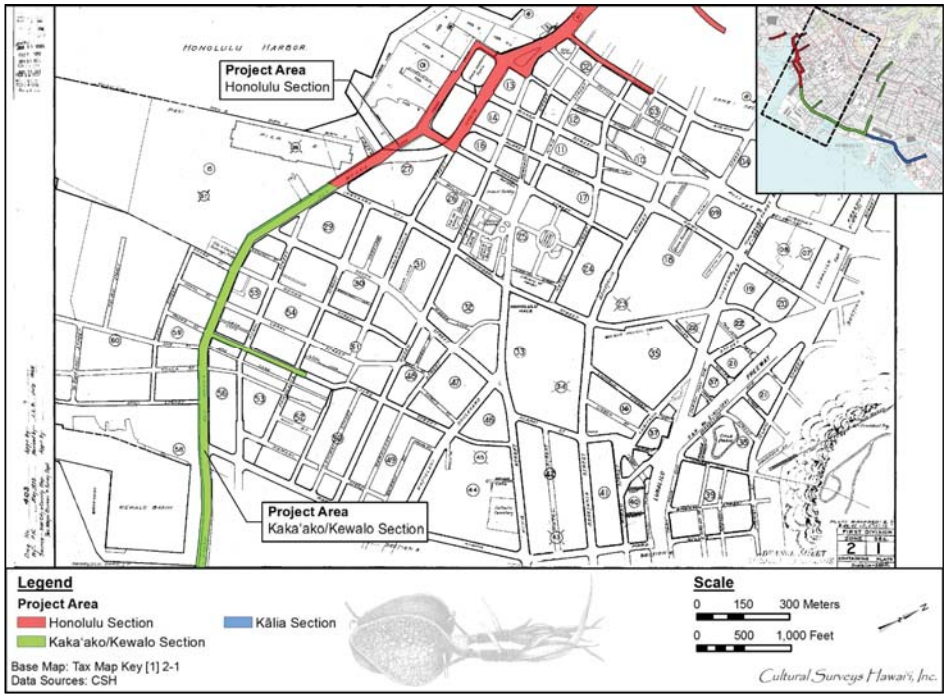


Figure 6. TMK: [1] 1-7, showing western section of project area in Honolulu (Hawai‘i TMK Service 2013)



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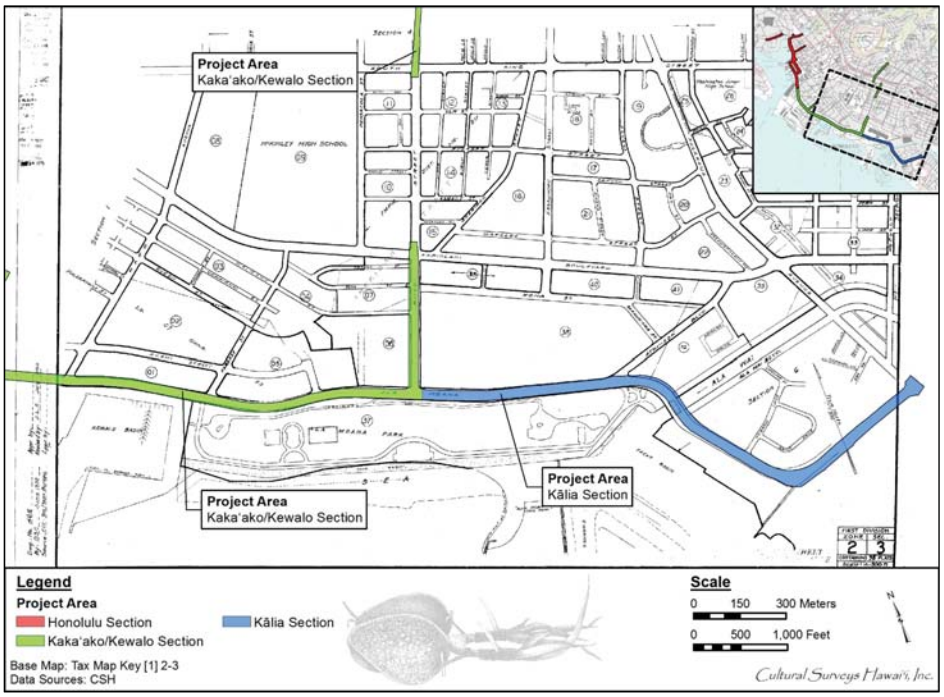

Figure 8. TMK: [1] 2-3, showing central section of project area in Kaka‘ako/Kewalo (Hawai‘i TMK Service 2013)

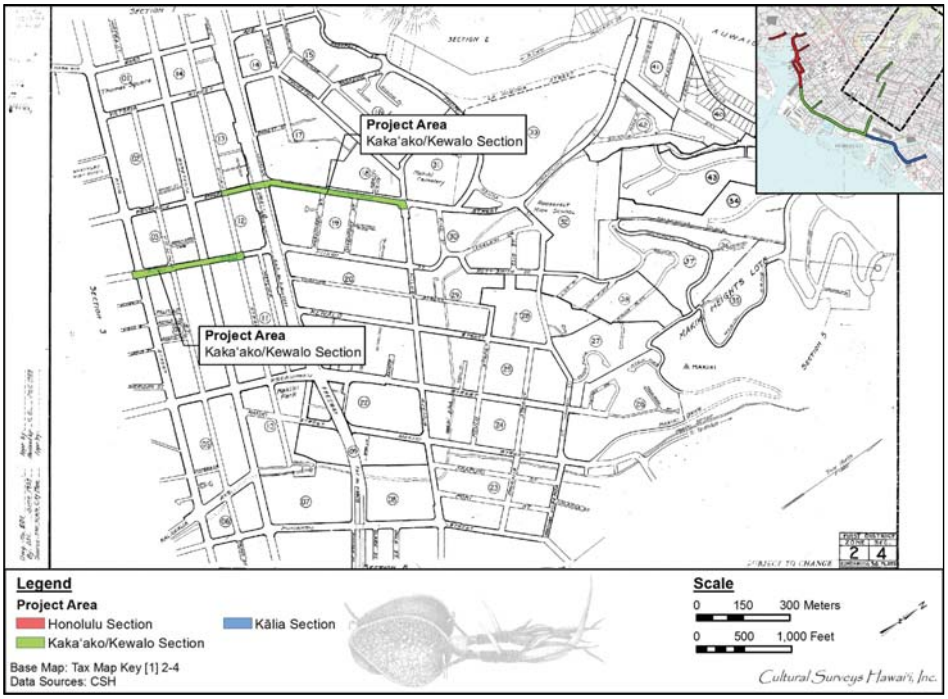

Figure 9. TMK: [1] 2-4, showing central section of project area in Kaka‘ako/Kewalo (Hawai‘i TMK Service 2013)

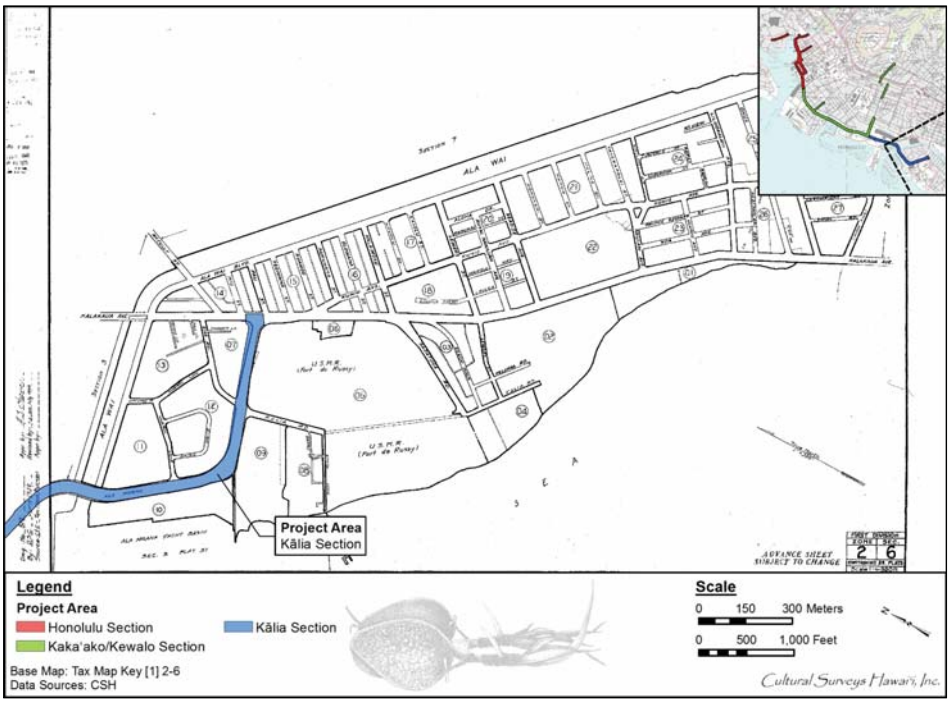

Figure 10. TMK: [1] 2-6, showing eastern end of project area in Kālia (Hawai‘i TMK Service 2013)

7. Alternate 24-inch water main project areas include River Street between North King Street and North Beretania Street, Nu‘uanu Avenue from Nimitz Highway to Pauahi Street, and S. Nimitz Highway between Fort Street Mall and Richards Street, and thence *makai* to Aloha Tower Drive.

These excavations will typically be within a 12 foot (3.7 m) depth but in some locations (especially below existing drain boxes) may be up to 20 feet (6.1 m) below the ground surface and in trenches typically 6 to 8 feet wide (1.8 to 2.4 m) but some locations may require wider trenches.

1.2 Document Purpose

The proposed project is subject to Hawai‘i State environmental and historic preservation review legislation (Hawai‘i Revised Statutes [HRS] §343 and §6E-8/Hawai‘i Administrative Rules [HAR] §13-275, respectively).

This LRFI provides an overview document that synthesizes the work previously performed in this project area. This study includes an analysis of previous work, available information, and limited site inspections. This LRFI is intended to facilitate planning and budgeting considerations, and to convey any possible archaeological constraints to proposed development(s) or improvements. Although the primary purpose of this investigation is planning, the investigation and its associated report can, in some instances, be used by project proponents to consult with the State Historic Preservation Division/Department of Land and Natural Resources (SHPD) regarding the need for an archaeological inventory survey of the proposed project area.

Please be advised that the proposed literature review and field inspection will not meet the requirements of an archaeological inventory-level survey per the rules and regulations of the SHPD (HAR §13-276). Additionally, based on background research and field inspection results, the report may recommend that an archaeological inventory survey be completed for the proposed project. Based on their review of the project’s potential impacts, SHPD can independently determine that an archaeological inventory survey is required for the project, regardless of CSH’s recommendations.

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is located within the Honolulu Plain, underlain by a broad elevated coral reef, partly covered by alluvium carried out from the Ko‘olau mountain range. The fossils found in the reef indicate the reef is not older than the late Pleistocene. However, fossil associations also indicate these creatures lived in waters warmer than the present, which means the reef likely formed in one of the interglacial periods when the sea level was higher than it is at present (Macdonald and Abbott 1974:420-421). The elevation of the project area is approximately is 1 m above mean sea level (AMSL) along the main Nimitz Highway/Ala Moana corridor throughout the project area. The River Street section in Honolulu ranges from 0 to 4 m AMSL and the Pi‘ikoi to Pensacola sections in Kaka‘ako extend from 1 to 24 m AMSL. Temperatures around Honolulu range from 52 to 95°F, with the warmest temperatures in September and the coolest temperatures in January. Average annual rainfall ranges between 20 and 30 inches with 15 to 20 inches between November and March and 0 to 5 inches between June and August (Armstrong 1983:62-64).

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area’s soils along the Nimitz/Ala Moana corridor (Figure 11 through Figure 13) consist of Fill Land (FL) and Ewa silty clay loam, moderately shallow, 0 to 2% slopes (EmA). The project area crosses or is adjacent to current or former Water (W) areas, and at the east end is adjacent to an area of Jaucas Sand, 0 to 15% slopes (JaC). The upper Pi‘ikoi Street and Pensacola Street sections within Kaka‘ako/Kewalo are covered with the soil Makiki clay loam, 0 to 2% slopes (MkA).

Fill Land, mixed (FL) is described as a land type occurring mostly near Pearl Harbor and in Honolulu, adjacent to the ocean. It consists of areas filled with material dredged from the ocean or soils and other materials, such as garbage, hauled from other areas. Areas with this soil are most often used for urban development (Foote et al. 1972:31).

The Ewa series consists of well-drained soils in basins and on alluvial fans that developed in alluvium derived from basic igneous rock. Ewa silty clam loams occur on alluvial fans and terraces with a substratum or coral limestone or gravelly alluvium. Areas with this soil have generally been used for agriculture (Foote et al. 1972:29-30).

The Jaucas Sand series consists of excessively drained calcareous soils that developed in wind- and water-deposited sand from coral and seashells. They occur as narrow strips on coastal plains, adjacent to the ocean and are used for a variety of purposes, including agriculture and urban development (Foote et al. 1972:48).

The Makiki Series consists of well-drained soils that developed in alluvium mixed with volcanic ash and cinders. They are found on alluvial fans and terraces within and near the city of Honolulu. Makiki clay loam is located on fans and terraces and contains cinders and rock fragments. These soils are used for urban development (Foote et al. 1972:91).

1.3.2 Built Environment

The project area is located in downtown Honolulu, in residential and commercial areas of Kaka‘ako and Kewalo, and within the tourist area of Waikīkī in the Kālia section. There are few open spaces, and most of the project area is surrounded by commercial or high-rise office or condominium/hotel buildings. Only landscaping plants are found near the road corridors.

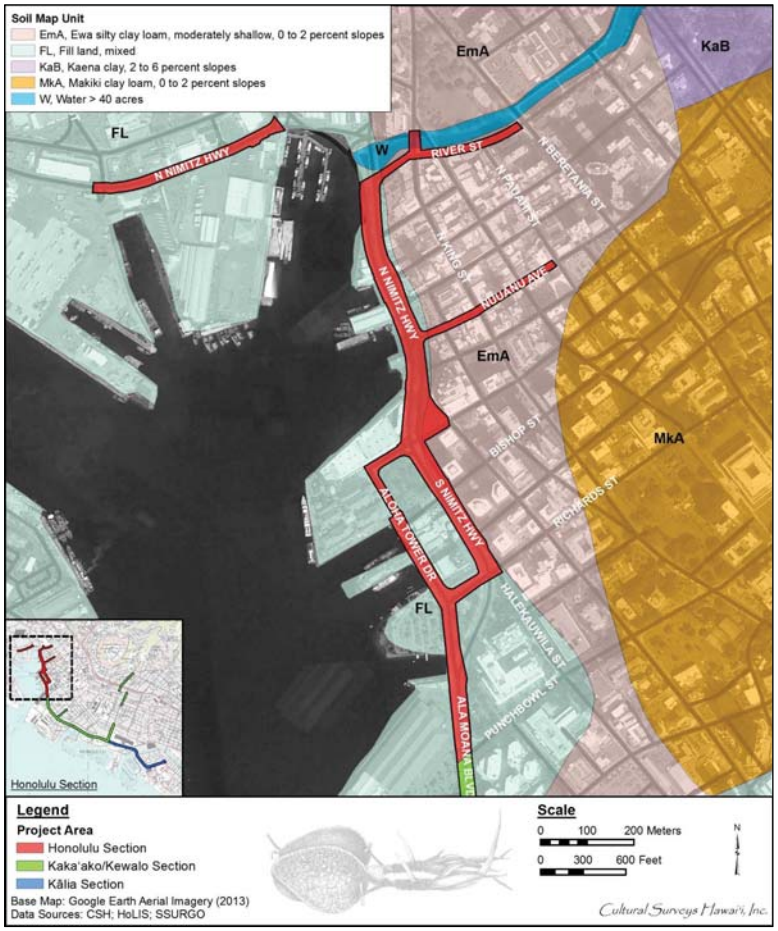

Figure 11. Soil series boundaries in the Honolulu section of the project area (soil information from USDA Soil Survey Geographic SSURGO database [2001] and Foote et al. [1972] overlain on 2013 aerial photograph) (Google Earth 2013)

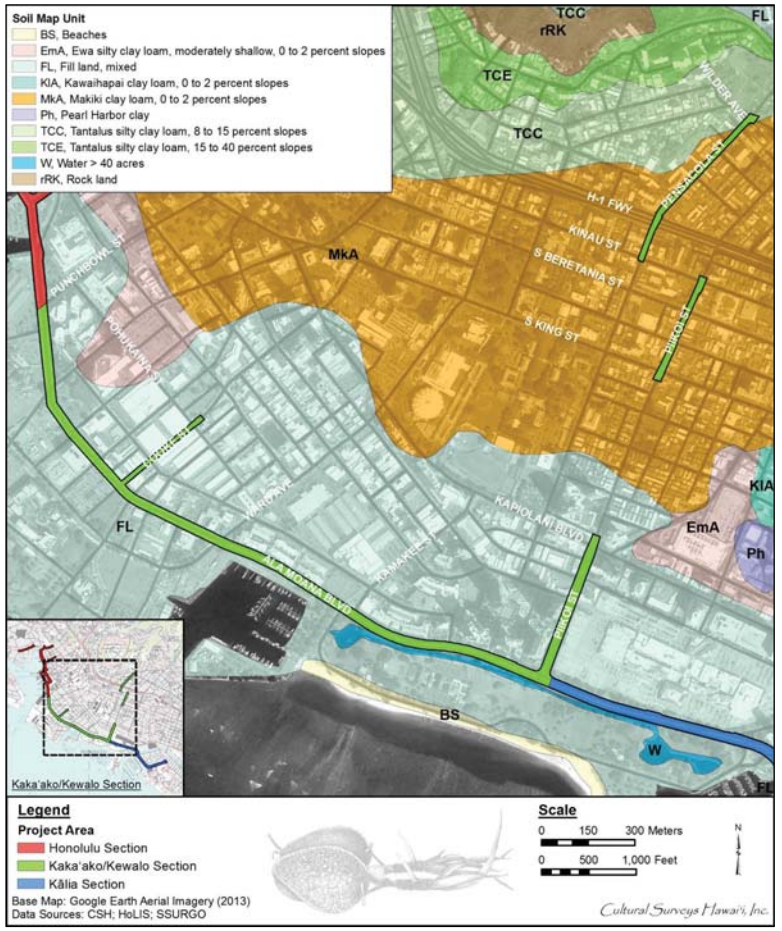

Figure 12. Soil series boundaries in the Kaka‘ako section of the project area (soil information from USDA Soil Survey Geographic SSURGO database [2001] and Foote et al. [1972] overlain on 2013 aerial photograph) (Google Earth 2013)

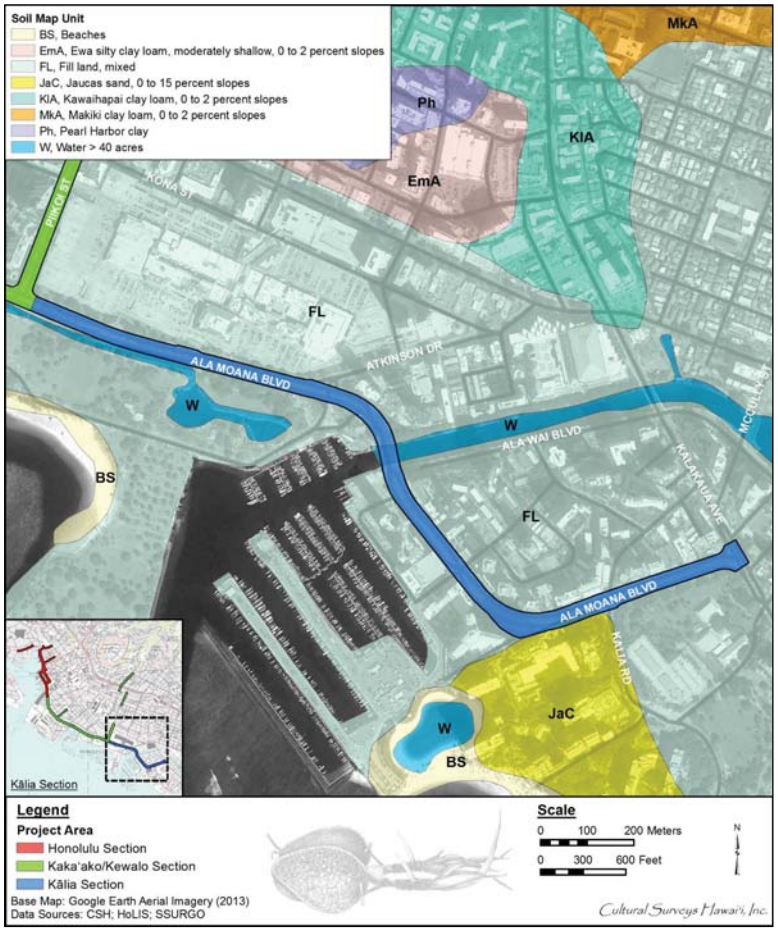

Figure 13. Soil series boundaries in the Kālia section of the project area (soil information from USDA Soil Survey Geographic SSURGO database [2001] and Foote et al. [1972] overlain on 2013 aerial photograph) (Google Earth 2013)

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this study under archaeological permit number 15-03, issued by the SHPD pursuant to HAR §13-13-282. Fieldwork was conducted on February 16, 2015 by CSH archaeologist David W. Shideler, M.A. under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 1/2 day to complete.

2.2 Document Review

Historic and archival research included information obtained from the University of Hawai‘i at Mānoa Hamilton Library, the State Historic Preservation Division Library, the Hawai‘i State Archives, the State Land Survey Division, and the Bishop Museum Archives. Previous archaeological reports for the area were reviewed, as were historic maps and primary and secondary historical sources. Information on Land Commission Awards was accessed through the Waihona ‘Aina (2000) database.

Section 3 Traditional Background

3.1 Honolulu

3.1.1 *Wahi Pana*–Place Names

A Hawaiian *wahi pana*, also referred to as a place name (or *lit*. "a storied place"), "physically and poetically describes an area while revealing its historical or legendary significance" (Landgraf 1994:v). *Wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, and offshore islands and reefs, or they can refer to Hawaiian divisions such as *ahupua'a* and *'ili*, and man-made structures, such as fishponds. An *'ōlelo no'eau* is a proverb, wise saying, or poetical saying. *Wahi pana* and *'ōlelo no'eau* tangibly link the *kama'āina* (residents) of Hawai'i to their past.

The area that today comprises the portion of Downtown Honolulu that surrounds Honolulu Harbor was known to Hawaiians as "Kou," a center of population and activity similar to Waikīkī, its preeminent neighbor to the southeast. Kou stretched from "Nu'uanu to Alakea Streets and from Hotel Street to the sea" (McAllister 1933:80) and possessed shoreward fishponds and irrigated fields fed by streams descending from the Nu'uanu and Pauoa valleys.

Kou was "noted for *kōnane* (pebble game, like checkers) and for *ulu maika* (bowling), and is said to be named for the executive officer (*ilāmuku*) of Chief Kākuhihewa of O'ahu" (Pukui et al. 1974). Pukui (1983: saying # 1128) relates the poetical saying, *Hui aka nā maka i Kou* ("the faces will meet at Kou") in reference to Kou as a place where chiefs gathered to play games and sport, and where the people gathered to watch them. In the accounts of the Pele and Hi'iaka saga (Emerson 1915:168; Nogelmeier 2006:402-420), Hi'iaka from Hawai'i Island and Lohi'au, chief of Kaua'i, joined with Pele'ula, chiefess of O'ahu, for pleasure at Kou. This vignette probably was based on a long tradition of Kou as a royal center where the *ali'i* (chiefly class) would meet and entertain.

The project corridor cuts a narrow swath across the lower portion of Honolulu Ahupua'a. Much of the project corridor lies on reclaimed land that was open sea until near the end of the 1800s. Undoubtedly, many traditional place names were lost owing to early replacement with new place names (see "Nihoa" below) and western street names (Figure 14).

3.1.2 *'Ōlelo No'eau*–Traditional Sayings

There are many *'ōlelo no'eau* for Māmala, which refers to the entrance to Honolulu Harbor, also called Kuloloia:

> ***He kai hele kohana ko Māmala.***
> **A sea for going naked is at Māmala.**
> The entrance to Honolulu Harbor was known as Māmala. In time of war the people took off their clothes and traveled along the reef to avoid meeting the enemy on land. [Pukui 1983:74]

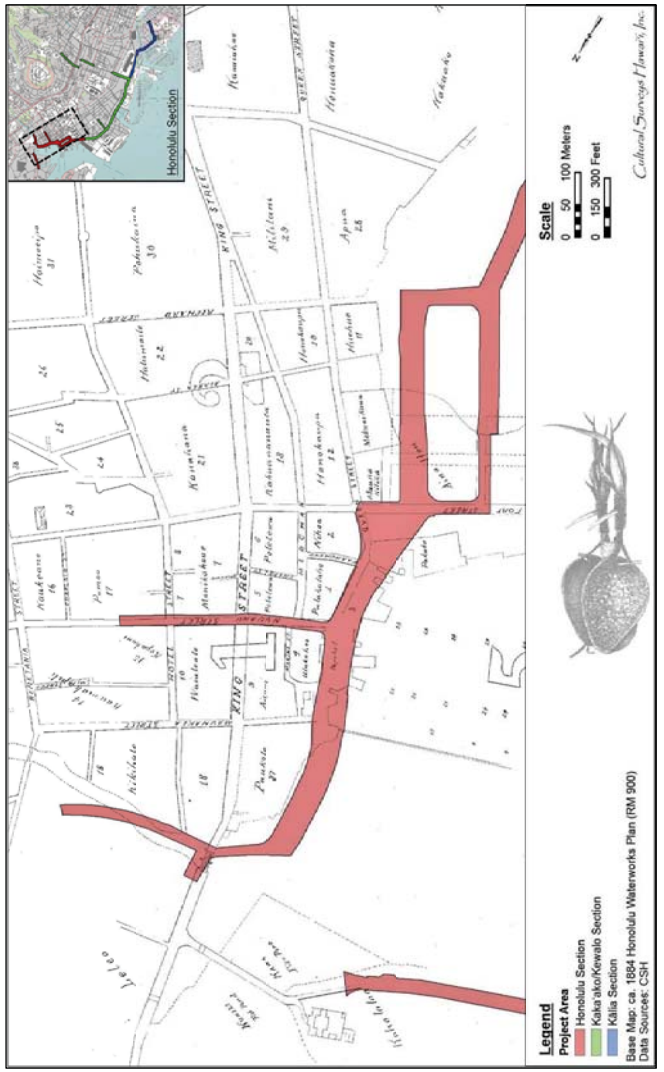

Figure 14. 1884 map by E.D. Baldwin showing *'ili* names of the *makai* section of Honolulu, labeled "Plan of Honolulu Traced from Waterworks Map"

Ka nuku o Māmala.
The mouth of Māmala.
The entrance to Honolulu Harbor, named for a shark goddess who once lived in the vicinity. [Pukui 1983:163]

Ke kai ‘au umauma o Māmala.
The sea of Māmala, where one swims at the surface.
Māmala is the entrance to Honolulu Harbor. [Pukui 1983:185]

Na ‘ale kuehu o Māmala.
The billows of Māmala with wind-blown sprays.
Māmala is the entrance to Honolulu Harbor. [Pukui 1983:241]

Ka i‘a maunu lima o Kuloloia.
The hand-baited fish of Kuloloia.
Small eels (*pūhi ‘ōilo*) that were caught by placing bait on the open palm of one hand with the fingers held wide apart. When the eels came up to take the bait, the fingers were clenched into a tight fist, grabbing the eels tightly by the heads. [Pukui 1983:149]

The weather (*au*) of Honolulu was called Kūkalahale, according to the chants of the winds in the story “The Wind Gourd of La‘amaomao” (Nakuina 1992:50). This name was incorporated into an early Hawaiian song, *He Aloha nō ‘O Honolulu* (Goodbye to Honolulu), written by the Hawaiian composer Lot Kauwe, after a trip on the interisland steamer, *Maunaloa*.

He aloha nō ‘o Honolulu	Goodbye Honolulu
I ka ua Kūkalahale	In the Kūkalahale rain
Ka nuku a‘o Māmala	Māmala, the entrance of Honolulu Harbor
‘Au a‘e nei mahope	Lies behind
Kau mai ana mamua	Ahead
Ka malu ‘ulu a‘o Lele	The shady groves of Lele
Kukui ‘a‘ā mau	Lighthouse is always burning
Pio ‘ole i ke Kaua‘ula	And not extinguished by the Kaua‘ula rain

[Kauwe 2011]

In the chant for the wind gourd of La‘amaomao, the name for the wind of Māmala is ‘Ao‘aoa (Nakuina 1992:50), which Pukui and Elbert (1986:27) identify as a sea breeze. Other wind names are *Mooaea*, a north wind of Honolulu, *Muuluu* (possibly *mū‘ululū*, meaning “chilled” [Bishop Museum Archives n.d.:1342]), and *Kūkalahale* (Pukui and Elbert 1986:560).

There are also several *‘ōlelo no‘eau* of Kou (Honolulu) that refer to the coastal area:

Hāhā pō‘ele ka pāpa‘i o Kou.
The crabs of Kou are groped for in the dark.
Applied to one who goes groping in the dark. The chiefs held kōnane and other games at the shore of Kou (now central Honolulu), and people came from everywhere to watch. Very often they remained until it was too dark to see and had to grope for their companions. [Pukui 1983:50–51]

Hui aku nā maka i Kou.
The faces will meet in Kou.
We will all meet there. Kou (now central Honolulu) was the place where the chiefs played games, and people came from everywhere to watch. [Pukui 1983:120]

Ke awa la‘i lulu o Kou.
The peaceful harbor of Kou.
Honolulu Harbor. [Pukui 1983:182]

Ola ke awa o Kou i ka ua Wa‘ahila.
Life comes to the harbor of Kou because of the Wa‘ahila rain.
It is the rain of Nu‘uanu that gives water to Kou (now central Honolulu). [Pukui 1983:272]

3.1.3 *Mo‘olelo*–Stories

3.1.3.1 Hi‘iaka’s Travels to Kou

Kou was known as a place where chiefs gathered to play and where the people gathered to watch them. Pukui (1983:1128) relates the poetical saying *“Hui aka nā maka i Kou”* (“the faces will meet at Kou”) in reference to just such gatherings. It is briefly mentioned in the legend of Hi‘iaka, beloved sister of the Hawaiian volcano goddess, Pele. Hi‘iaka and her companions have been traveling around O‘ahu on the land trails, but decide to travel from Pu‘uloa (on Pearl Harbor in ‘Ewa) to Waikīkī by canoe. At Pu‘uloa, Hi‘iaka met a party who were planning to travel to the house of the chiefess Pele‘ula in Waikīkī. Hi‘iaka recited a chant, telling the people that although they were going by land and she was going by sea, they would meet again in Kou:

‘O Kou ka papa	Kou is the coral flat
‘O Ka‘ākaukukui ka loko	Ka‘ākaukukui is the pool
‘O ka ‘alamihi a‘e nō	Some *‘alamihi* [a black crab], indeed
‘O ka lā a pō iho	Wait all day until night
Hui aku i Kou nā maka.	Friends shall meet in Kou.

[Ho‘oulumāhiehie 2006a:277; Ho‘oulumāhiehie 2006b:297]

3.1.3.2 The Legend of ‘Ai‘ai and Puniaiki in Kou

The *ahupua‘a* of Kou was subdivided into several smaller land divisions known as *‘ili.* The area between Maunakea Street and Nu‘uanu Stream and *makai* of King Street was known as Kapu‘ukolo. The area between Maunakea and Nu‘uanu Stream *mauka* of King Street to Beretania Street was called Kīkīhale. In *Place Names of Hawaii* by Pukui et al. (1974:110), no meanings are given for these names, but they do state that Kīkīhale was named for the daughter of the chief, Kou, for whom the district was named. Many of these names are mentioned in the legend of ‘Ai‘ai (Thrum 1998:230-254).

Kū‘ula, the god presiding over the fish of the sea had a son named ‘Ai‘ai. He was the first to teach the Hawaiians how to make various fishing lines and nets, the first to set up a *ko‘a kū‘ula*, a rock shrine on which the fishermen would place their first catch as an offering to Kū‘ula, and the first to set up *ko‘a ia*, fishing stations where certain fish were known to gather. Leaving his birthplace in Maui, ‘Ai‘ai traveled around the Islands, establishing *ko‘a kū‘ula* and *ko‘a ia*.

He landed first at Ka‘ena Point, then traveled around the island of O‘ahu, stopping in Kaka‘ako (an *‘ili* now covered by One Waterfront Plaza) to visit his friend, Apua. Here he met the famed O‘ahu chief, Kou, a skilled fisherman who caught the large *aku* (*Katsuwonus pelamis*; bonito) in the bay of Māmala (ancient name for a part of Honolulu Harbor). ‘Ai‘ai soon met a young woman named Puiwa, married her, and had a son named Puniaiki. One day the family went to a dam on Nu‘uanu Stream to catch *‘o‘opu* (gobies) and *‘ōpae* (shrimp). Puiwa left her newborn son on the bank of the river to catch the *‘o‘opu* and *‘ōpae*, when the baby started to cry. ‘Ai‘ai told his wife to tend to the child but she answered him back saucily, so ‘Ai‘ai called on his ancestors and a storm came up, flooding the dam and sweeping the child into the stream. Leaving his wife, he went downstream to the *‘ili* of Kaumakapili (in the area of Beretania and Maunakea streets; labeled as “Smith’s church” on an 1847 map). Here he saw Kīkīhale gather a large *‘o‘opu* from the stream. Her guardian advised her to put it in a calabash with water and keep it as a pet. ‘Ai‘ai realized that the *‘o‘opu* was his transformed child, swept downstream to Kīkīhale (to the person and also to the *‘ili* named Kīkīhale). The next day the chiefesses’ guardian saw that the *‘o‘opu* had turned back into a child, and Kīkīhale instructed her to raise the child until it was an adult, so that she could take the young man for a husband. This came to pass, but the chiefess was not satisfied with her husband since he did not bring fish home as the other men did. Puniaiki was annoyed with her complaints and took the pearl fishhook, Kahuai, given to him by his father ‘Ai‘ai, and went out with the men of Kou to fish for the *aku*. When Puniaiki held the pearl fishhook in his hand:

> . . . the akus, unprecedented in number, fairly leaped into the canoes. They became so filled with the fish, without labor, that they sank in the water as they reached **Kapuukolo**, and the men jumped overboard to float them to the beach. [Thrum 1998:247-248]

This suggests that not only was Kapu‘ukolo an *‘ili* name, but also a canoe landing, a place to come ashore after *aku* fishing.

3.2 Kaka‘ako

3.2.1 *Wahi Pana*–Place Names

Place name translations presented without attribution in this subsection are from *Place Names of Hawaii* (Pukui et al. 1974), unless otherwise indicated. The project area extends through portions of the *‘ili* (small land division within an *ahupua‘a*) of Kewalo, Kaka‘ako ‘Ili and Kukuluāe‘o ‘Ili.

Kewalo literally means “the calling (as an echo).” Land Commission Award and other historic-era documents identify it as the area between Cooke and Sheridan streets, *mauka* of Queen Street. According to Pukui et al. (1974:109), “outcasts (*kauwā*) intended for sacrifice were drowned here.” Kekahuna (1958:4) said that at one time, Kewalo also had an area of sand beach, where various sports such as surfing were performed. According to Pukui et al. (1974:145), a Honolulu section in Pawa‘a (east of the project area) is called Mānalo (meaning “potable”) after a spring once located near McKinley High School. No other information on this spring or its location is given by the authors.

Kaka‘ako is not translated in *Hawaii Place Name*s by Pukui et al. (1974), but the Hawaiian word *kākā‘āko* is translated as “dull, slow” in the *Hawaiian Dictionary* (Pukui and Elbert 1986:110). It is possible this place name refers to the abundant standing water characteristic of this

once marshy place. Thrum (1922:639) translated the word as “prepare the thatching” (*kākā* = to chop, beat, or thresh; *ako* = thatch). If Thrum’s translation is correct, it could be related to the fact that salt marshes, such as areas like Kaka‘ako, were excellent places to gather tall *pili* grass, which the Hawaiians traditionally used to thatch their houses.

Kukuluāe‘o translates literally as the “Hawaiian stilt (bird),” *Himantopus himantopus*, and comes from the word *kukuluāe‘o*, which means “to walk on stilts.” Pukui et al. (1974:123) describe the area as “formerly fronting Ke-walo Basin” and “containing marshes, salt ponds, and small fishponds,” an environment well suited for this type of bird (Griffin et al. 1987:36). The ethnographer Henry Kekahuna (1958:4) described Kukuluāe‘o as an area where salt was formerly made.

3.2.2 *Mo‘olelo*–Stories

On modern maps, the entire project area is within the Kaka‘ako District. The name Kukuluāe‘o does not appear in any legends in the *Hawaiian Island Legends Index* (Gotanda 1989) or in the index to *Fornander’s Collection of Hawaiian Antiquities and Folklore, Volumes IV, V, and VI* (Fornander 1916-1920). There are several mentions of the area known as Kewalo and one mention of Kaka‘ako in various legends, and Kaka‘ako and Kukuluāe‘o are mentioned in some post-Contact chants.

3.2.2.1 Kewalo

Kewalo once had a freshwater spring located in its central portion (current location unknown), as recorded in the proverb “*Ka wai huahua‘i o Kewalo*,” which translates as “the bubbling water of Kewalo.” Two springs are mentioned in a traditional story of the Waters of Ha‘o. This legend tells of two children of the chief Ha‘o who ran away from their cruel stepmother. They stayed for a time with the caretakers of Kewalo Spring, which may have been located close to the trail that connected Waikīkī and Honolulu. The children left when they heard that the chiefess had sent men to look for them. The two children followed the moonlit trail across the plain toward Kou (Honolulu), but finally collapsed from weariness and thirst. In a dream, the boy’s mother told him to pull up a plant close to his feet. When he did, he found a spring under the plant, which was called the Water of Ha‘o, or Kawaiaha‘o. This spring is located at the western end of the trail, near Kawaiaha‘o Church (Pukui and Curtis 1988:87-89).

The Kewalo area once had a famous fishpond used to drown members of a pariah caste (*kauwā*) or *kapu* (taboo) breakers as the first step in a sacrificial ritual known as *Kānāwai Kaihehe‘e* (Kamakau 1991:6) or *Ke-kai-he‘ehe‘e*, which translates as “sea sliding along,” suggesting that the victims were slid under the sea (Westervelt 1991:16). Kewalo is described as follows:

> A fishpond and surrounding land on the plains below King Street, and beyond Koula. It contains a spring rather famous in the times previous to the conversion to Christianity, as the place where victims designed for the Heiau of Kanelaau on Punchbowl slopes, was [*sic*] first drowned. The priest holding the victim’s head under water would say to her or him on any signs of struggling, ‘Moe malie i ke kai o ko haku.’ ‘Lie still in the waters of your superiors.’ From this it was called Kawailumalumai, ‘Drowning waters.’ [Sterling and Summers 1978:292]

Kō‘ula (meaning “red sugar cane”) is the area around Thomas Square and the *mauka* portion of the Ward estate, suggesting the Kawailumalumai Pond may have been east (“beyond Kō‘ula”) of

the Ward estate. It may be part of the pond complex (five ponds) awarded to Koalele as LCA 3169, north of the project area.

Kewalo is mentioned in a legend as a marsh near the beach where tall *pili* grass was growing. A man named Kapoi went to this area to get thatching for his house. While there, Kapoi found seven owl eggs and took them home to cook for his supper. An owl perched on the fence surrounding his house and cried out “O Kapoi, give me my eggs!” After several such pleas, Kapoi returned the eggs. In return, the owl became his *‘aumakua* (family god) and instructed him to build a *heiau* (pre-Christian place of worship) named Mānoa. Kapoi built the *heiau*, placed some bananas on the altar as a sacrifice, and set the *kapu* days for its dedication. The king of O‘ahu, Kākuhihewa, who was building his own *heiau* in Waikīkī, had made a law that if any man among his people erected a *heiau* and set the *kapu* before him, that man should die. Kapoi was seized and taken to the *heiau* of Kūpalaha, at Waikīkī. Kapoi’s *‘aumakua* owl asked for aid from the king of the owls at Owl’s Hill (Pu‘u Pu‘eo) in Mānoa, who gathered all of the owls of the islands. They flew to Kūpalaha and battled the king’s men, who finally surrendered. From this time, the owl was considered a powerful *akua* (god). The battle area was known as Kukaeunahio-ka-pueo, which means “the confused noise of owls rising in masses” (Thrum 1998:200-202; Westervelt 1991:135-137).

Kewalo was the birthplace of the great chief Hua-nui-ka-la-la‘ila‘i, as mentioned in this *mele* (story) chanted by Kamakau (1991:24):

‘O Hua-a-Kamapau ke ‘li‘i	Hua-a-Kamapau the chief
O Honolulu o Waikīkī	O Honolulu, of Waikīkī
I hanau no la i kahua la i Kewalo,	Was born at Kewalo,
‘O Kālia la kahua	Kālia was the place [the site]
O Makiki la ke ēwe,	At Makiki the placenta,
I Kānelā‘au i Kahehuna ke piko,	At Kānelā‘au at Kahehuna the navel cord,
I Kalo i Pauoa ka ‘a‘a;	At Kalo at Pauoa the caul;
I uka i Kaho‘iwai i Kanaloaho‘okau . . .	Upland at Kaho‘iwai, at Kanaloaho‘okau . . .

3.2.2.2 Kaka‘ako

Kaka‘ako is mentioned in Moke Manu’s (1998:230-249) version of the legend of Kū‘ula, the god presiding over the fish, and his son ‘Ai‘ai. Leaving his birthplace on Maui, ‘Ai‘ai traveled around the islands, establishing *ko‘a kū‘ula* and *ko‘a ia*. On O‘ahu, he landed first at Ka‘ena Point, then traveled around the island.

> Aiai came to Kalia [Waikīkī] and so on to Kakaako. Here he was befriended by a man named Apua, with whom he remained several days, observing and listening to the murmurs of the chief named Kou. This chief was a skillful haiku [*Katsuwonus pelamis*; bonito] fisherman, his grounds being outside of Mamala until you came to Moanalua. There was none so skilled as he, and generous withal, giving akus to the people throughout the district.
>
> As Aiai was dwelling with his friend Apua at Kakaako, he meandered off one day along the shore of Kulolia [Kuloloia] and so on to Pakaka and Kapapoko. [Manu 1998:242]

This story mentions several place names near the Kaka‘ako area, including the Kuloloia shore, Pākākā, an *‘ili* or *heiau* at Honolulu Harbor, and Kapapoko, an eating house near the harbor used by Ka‘ahumanu, wife of Kamehameha I (‘Ī‘ī 1959:66). In Hawaiian legends, the names of people often point to the place where they resided. Thus, the friend Apua may have lived at ‘Āpua, a small *‘ili* near the western boundary of the Kaka‘ako area.

3.2.2.3 Kukuluāe‘o

The chief Hua, born in Kewalo, was famous for his love of cultivation and his care for the people. His *heiau*, called Pu‘ukea, was in Kukuluāe‘o in Honolulu; it is mentioned in a traditional *wānana* (prophecy) recorded by Kamakau (1991:24-25):

[*Ka makaua ua kahi o ‘Ewa*]	[The increasing ‘first rain’ of ‘Ewa]
Ua puni ka i‘a o Mokumoa,	Overcomes the fish of Mokumoa,
Ua kau i‘a ka nene;	Washes up fish to the *nene* plants;
Ua ha‘a kalo ha‘a nu;	Lays low the taro as it patters down;
Ha‘a ka i‘a o kewalo,	Lays low the fish of Kewalo,
Ha‘a na ‘ualu o Pahua,	Lays low the sweet potatoes of Pahua,
Ha‘a ka mahiki i Pu‘ukea,	Lays low the *mahiki* grass at Pu‘ukea,
Ha‘a ka unuunu i Pele‘ula,	Lays low the growing things at Pele‘ula
Ha‘a Makaaho i ke ala.	Lays low Makaaho [Makāho] in its path
E Kū e, ma ke kaha ka ua, e Kū,	O Kū, the rain goes along the edge [of the island], O Kū
[*I ‘ai ‘na ka i‘a o Maunalua*] . . .	[Eating the fish of Maunalua] . . .

The chant mentions the *mahiki* grass of Pu‘ukea Heiau. The Hawaiian term *mahiki* means “to peel off” (Andrews 2003:369). The word was also used to describe a rite to exorcise an evil spirit, as the skilled *kahuna* (priest) “peeled” the malicious spirit from the afflicted. Used in the ritual was a shrimp called *mahiki* or a native grass called *mahiki*. *Mahiki*, or *‘aki‘aki*, is a tufted rush (*Sporobolos* sp.) found near the seashore. The ethnologist Mary Pukui states that even during her youth, parents put “*tī* leaves, or *hala*, or *‘aki‘aki* grass, in a little sea-salt water and [would] have the child drink it” to rid them of badly-behaving spirits (Pukui et al. 1972:163). The use of this grass in a ritual may explain its association with a ceremonial *heiau*, or it may simply be that the Kukuluāe‘o coast was a good habitat and thus a favored place for healers to collect this type of grass.

The literal meaning of Pu‘ukea is “white hill” (although it may have alternate meanings). Pu‘ukea is also the name of a small land division within the *‘ili* of Kukuluāe‘o, mentioned in at least two Land Commission Awards (LCA 1502 and 1504). LCA 1504 was located near the junction of Halekauwila and Cooke streets. It is fairly common for a *heiau* to have the same name as the *‘ili* it is located within, so it is possible Pu‘ukea Heiau was also near the junction of Halekauwila and Cooke streets. The majority of the house sites in the mid-nineteenth century in Kukuluāe‘o were located near Halekauwila and Queen streets, *mauka* of the low-lying coastal swamplands on higher, dry ground. It is possible the *heiau* platform, or the area that it was built on, was one of the few “high spots” in the flat, low-lying swamp that surrounded it, and thus gained the name *pu‘u kea* (white hill).

Thomas Thrum (1906:37-47), who made several lists and surveys of *heiau*, does not mention Pu‘ukea Heiau. In his report on O‘ahu sites in the early 1930s, McAllister (1933:80) says of

Honolulu: “Information regarding former sites within the present limits of Honolulu must come entirely from literary sources.” He does mention Pākākā Heiau, once the main royal temple in Honolulu. This *heiau* would have been located around the foot (*makai* end) of Fort Street. He does not list Pu‘ukea Heiau, which Kamakau placed in Kukuluāe‘o, but he does note that Peter Corney, a visitor to the island in 1819, saw several *heiau* (*morai*) along the Honolulu shore:

> There are several morais, or churches in the village, and at new moon the priests, chiefs and hikanees (aikane) [counselors] enter them with offerings of hogs, plantains, and cocoanuts, which they set before the wooden images. The place is fenced in, and have pieces of white flags flying on the fences [Corney 1896:101].

The *heiau* of Pu‘ukea and an area called Kaka‘ako are mentioned in the chant “The Battle of Nu‘uanu,” which concerns the 1795 invasion and conquest of O‘ahu by Kamehameha I. One section of the chant describes locations in Honolulu, possibly listing them from east to west:

75 *Lauwili i Pūkē (Pu‘ukea) i Ka-imu-hai-kanaka,*
76 *I Kai-kua, i Kakaako, i Mamala,*
77 *I ke kai o Kuloloia, Pakaka,*
78 *I ka-imu-hai-kanaka, i ka-wai-apuka-Kāne.* [Kala‘ikuahulu 1880:131]

3.2.3 Summary of Legendary and Traditional Accounts

From the legendary accounts, it can be seen that Kukuluāe‘o, Kaka‘ako, and Kewalo were traditionally noted for their fishponds and salt pans, for the marsh lands where *pili* grass and other plants could be collected, for ceremonial sites such as Pu‘ukea Heiau, Kewalo Spring, and Kawailumalumai Pond where sacrifices were made, and for the trails that allowed transport between the more populated areas of Waikīkī and Honolulu. Important chiefs were born in the area and conducted religious rites, and commoners traveled to the area to procure food and other resources. Some commoners probably also lived in the area, possibly adjacent to the ponds and the trails.

3.3 Waikīkī and Kālia

Waikīkī was the name of the younger sister of the Chiefess Pele‘ula, who lived in Honolulu on the seaward side of Nu‘uanu and Vineyard streets, as told in the story of Hi‘iaka. It means “water spurting from several sources,” as this area was a wetland where water from upland valleys would gush from under the ground (Frank 1958:2).

3.3.1 *Wahi Pana* and *‘Ōlelo No‘eau*

Waikīkī Kai (coastal Waikīkī) was once divided into smaller *‘ili* lands including, from west to east, Kālia, Keōmuku, Helumoa, Hamohamo, Kaluaokau, Uluniu, Kapuni, Kekio, Ulukou, Kāneloa, Kapua, and Kaluāhole.

In *Fragments of Hawaiian History*, John Papa ‘Ī‘ī described the “Honolulu trails of about 1810” (‘Ī‘ī 1959: 89), including the trail from Honolulu to Waikīkī:

> The trail from Kawaiahao which led to lower Waikiki went along Kaananiau, into the coconut grove at Pawaa, the coconut grove of Kuakuaka, then down to Pi’inaio [stream in Kālia]; along the upper side of Kahanaumaikai’s coconut grove, along the border of Kaihikapu pond, into Kawehewehe; then through the center of Helumoa of Puaaliilii, down to the mouth of the Apuakehau stream; along the sandy beach of Ulukou to Kapuni, where the surfs roll in; thence to the stream of Kuekaunahi; to Waiaula . . . [‘Ī‘ī 1959:92]

The marshland of Waikīkī was watered from streams in the Makiki, Mānoa, and Pālolo valleys, and from springs in Mānoa, such as Punahou and Kānewai. The name Waikīkī, which means “water spurting from many sources” (Pukui et al. 1974:223), was well adapted to the character of the swampy land of ancient Waikīkī, where water from the upland valleys of Mānoa and Pālolo gushed forth from underground. Before the construction of the Ala Wai Canal, the Mānoa and Pālolo streams did not merge until deep within Waikīkī. As they entered the flat Waikīkī Plain, the names of the streams changed; the Mānoa became the Kālia and the Pālolo became the Pāhoa. They joined near Hamohamo (now an area *mauka* of the Kapahulu Library) and then divided into three new streams, the Kuekaunahi, ‘Āpuakēhau, and Pi‘inaio. The Kuekaunahi once emptied into the sea at Hamohamo (near the intersection of ‘Ōhua and Kalākaua avenues). The ‘Āpuakēhau, also referred to on some maps as the Muliwai o Kawehewehe, or “the stream that opens the way” (Kanahele 1995:7), emptied into the ocean at Helumoa, between the Royal Hawaiian and Moana hotels. The Pi‘inaio entered the sea in a wide delta at Kālia. The land between these three streams was called Waikolu, meaning “three waters” (Kanahele 1995:7-8).

Pi‘inaio Stream extends through the center of Kālia ‘Ili. The meaning of Pi‘inaio is uncertain but it could be an allusion to going inland (*pi‘i*) to the location of a *naio* tree (bastard sandalwood; *Myoporum sandwicense*) near a stream crossing. The name of the area, “Kālia,” translated as “waited for,” (Pukui et al. 1974:77) provides a sense of “waiting,” “loitering,” or “hesitating.” While the nuance is uncertain, the mouth of the Pi‘inaio Stream would be a logical place for travelers to stop. According to one source, Kālia means “waited for.” Others believe the place was named after the native tree *kālia (Elaeocarpus bifudus*) (Clark 2011:437), which the Hawaiians used as thatching rods for their house roofs (Thrum 1891:95).

Kālia had rich fishing grounds and reefs, beaches and tide pools for collecting mollusks, crabs, and seaweed, and a swampy area well-suited for salt pans. It was famous for one type of edible *limu* (seaweed) called *limu ‘ele‘ele* (*Enteromorpha prolifera*), or black seaweed. *Limu ‘ele‘ele* was common along coastlines with freshwater intrusions, such as the Pi‘inaio Stream or at inland fishponds (Abbott 1984:17). The offshore waters of Kālia were also used for surfing; many of these areas no longer exist, as dredging and land-filling have destroyed the ancient breaks.

There are several *‘ōlelo* (poetical sayings) referring to Kālia, its lands, and resources. Mary Kawena Pukui (1983) collected several in her book, *‘Ōlelo No‘eau. Hawaiian Proverbs & Poetical Sayings.* In addition, John Clark (2011) has recently collected and translated sayings from old Hawaiian language newspapers, which are printed in his book *Hawaiian Surfing*. Several sayings reference the sea, the surf, the wind, or the rain of Kālia.

> *E ho-i, E ho-i e Kilopu ka wai hale i* ***Kalia****. He wai na ka ua Naulu mai luna.*
>
> Return, return, o Kili‘opu, the fresh waters that fill **Kalia**. These are the waters of the Nāulu rains from the uplands. [*Ka Nupepa Kuokoa*, 23 April 1864:2; Clark 2011:438]

E Kalia i ke kai nehe i ka pu-eone, ame wai limu nii o Piinaio.

Oh, Kalia in the gentle rustling of the waves on the sand dunes and the plentiful fresh water seaweed of Pi‘inaio stream. [*Ka Nupepa Kuokoa*, 9 April 1925:5; Clark 2011:438]

*Ke kai wawalo leo le‘a o **Kālia*** The pleasing, echoing sea of Kālia
[Pukui 1983:186]

*Ke haaheo ae la i ke kai o **Kalia*** We are proud of the sea of **Kalia**
[*Ka Nupepa Kuokoa*, 22 March 1862:3; Clark 2011:437]

E hoi ka nanai i Ulukou la, Beauty rests in Ulukou.
I ka nalu hoi muku i Kapuna la, In the waves that break at Kapuni.
Punihei ho au ia la la la, I am taken by him,
I ka leo o ke kai leo nui la. By the great voice of the sea,
*Ke wa mai la i **Kalia** la.* It makes a thundering noise at **Kalia**
[*Ka Hoku o ka Pakipika*, 10 April 1862:4; Clark 2011:438]

There is one reference to salt collection at Kālia.

Kāhunahuna pa‘akai o Kālia. *Fine-grained salt of Kālia.*
A derogatory expression for the dried, viscid material in the corners of the eyes of an unwashed face. Kālia was a place for gathering salt, although any place name might be used. [Pukui 1983:144]

Many other sayings refer to the abundant fishing resources of Kālia.

*Ho‘i i **Kālia** i ka ‘ai ‘alamihi.* Gone to **Kālia** to eat *‘alamihi* crabs.

Kālia was a place where *‘alamihi* crabs were once plentiful, leading to a play on the word *‘alamihi* (path of repentance), indicating someone who is in a repentant mood (Pukui 1983:110).

*Ka i‘a pīkoi kānaka o **Kālia**;* The fish caught by the men of **Kālia**;
He kānaka ka pīkoi, he kānaka ka pōhaku. men are the floaters, men are the sinkers
[Pukui 1983:150]

Kālia was also known for a certain type of fishing technique used to catch schools of mullet. When a school of mullet appeared, a bag net was set and the men swam out in a row. They surrounded the fish, slapped the water and kicked their feet, thus driving the frightened fish into the opening of their bag net. The fishermen of Kālia became known as human fishnets (Pukui 1983:150). This particular type of net was used because the water off Kālia was very shallow (Pukui 1983:74).

*Kuu hoa o ka i-a lauahi lima o **Kalia*** My companion who holds the fishnet at **Kalia**
[*Ka Nupepa Kuokoa*, 12 April 1862:4; Clark 2011:438]

*He kai hopuni ko **Kalia**.* A sea for surround [nets] is at **Kalia.**
[*Ka Nupepa Kuokoa*, 19 January 1867:1; Clark 2011:438]

In a song for the O‘ahu chief Kuali‘i, the net fishermen of Kālia are also mentioned.

He kai heenalu ko Kahaloa, The sea for surf-riding is at Kahaloa,
*He kai hului ko **Kalia**,* The sea for casting the [bag] net is at **Kalia**,

He kai hele kohana ko Mamala, A sea for going naked is at Mamala,
He kai au ko Kapueone, A sea for swimming is at Kapuuone,
He kai kaha-nalu ko Makaiwa, A sea for surf-riding sideways is at Makaiwa,
He kai ka anea ko Keehi, A sea for kicking up mullet is at Keehi,
He kai elemihi ko Leleiwi, The sea for small crabs is at Leleiwi,
He Kai awalau ko Puuloa, . . . The sea of many harbors is at Puuloa . . .
[Fornander 1917:378-379]

The mullet were caught on their annual migration from their home in Pearl Harbor as they traveled around the island of O‘ahu:

. . . starting from Puuloa and going windward, passing successively Kumumanu, Kalihi, Kou, **Kalia**, Waikiki, Kaalawai and so on, around to the Koolau side, ending at Laie, and then return by the same course to their starting point. [Keliipio 1900: 112]

Kālia was one of eight important fisheries along the Waikīkī coast. The fishing grounds from the reef to the shore were so rich that they were *kapu* (restricted) to anyone but the king and his representatives during certain seasons (Maly and Maly 2003:244).

Kalia is one of eight fishing grounds (also called fisheries) on the shoreline of Waikīkī. From east to west they are: Ka‘alāwai, Kuilei, Kea‘ua‘u, Kaluāhole, Kapua, Kāneloa, Hamohamo, and **Kalia.** [*Honolulu Advertiser*, 11 March 1923:12; map of the fisheries of O‘ahu in Clark 2011:438]

*Penei kana, ‘E hoomaka ana ke kapu ma ka muliwai o Piinaio, a hiki i ke kai o **Kalia**. Aole loa kekahi e lawaia malaila.’*

This is what he said, ‘The restriction will commence at the stream of Pi’inaio to the sea at **Kālia**. No one is allowed to fish there.’ [*Ka Hoku o ka Pakipika*, 10 April 1862:4; Clark 2011:438)]

3.3.2 *Mo‘olele* (Stories)

3.3.2.1 The Goddess Hi‘iaka and Kālia

Honolulu was once called Kou, named for the most beautiful woman on O‘ahu. Kou composed a *mele* (chant) to her husband ‘Ouha, which includes some of the place names of coastal Honolulu and Waikīkī.

Kū ka nalu kai a ke Ko‘olau
Pūhā ka nalu i kai mā‘oki‘oki
Pī kai pua lana awa
A ku‘u kāne aloha, ‘o ‘Ouha
. . .
Pā pae (papa pae) a kāua
I ka‘u aloha lā, ua hala
Ka hōkū papa nemonemo ō
*Aloha ka makani lihi kao o **Kālia***
Ke kali nei au ‘o kō ho‘i mai
. . .

‘O ka lā a pō iho
Hui aku i Kou nā maka. [Ho‘oulumāhiehie 2006a:296-297]

Translation:

The surf rises, stirred up by the Ko‘olau wind
Waves burst in the hue-streaked sea
Sprinkling the flowers drifting in the harbor
Of my beloved husband, ‘Ouha
. . .
On the waves our boards have mounted
To my love who has gone
The star of that smooth strata, oh
Beloved is the shoreline breeze at **Kālia**
I await your return
. . .
Wait all day until night
Friends shall meet in Kou [Ho‘oulumāhiehie 2006b:277]

The chant ends with the phrase, “Friends shall meet in Kou [Honolulu].” In her journey around the island of O‘ahu with her traveling companions Lohi‘au and Wahine-‘oma‘o, the goddess Hi‘iaka stopped at Pu‘uloa (Pearl Harbor) and met some people who were about to travel to Honolulu for the festival of a great chiefess. Hi‘iaka decided to attend the festival and departed on a canoe, bidding her friends at Pu‘uloa that “Kou is where we will meet again,” thus echoing a saying first pronounced by the chiefess Kou.

3.3.2.2 The Snatching Wind in Kālia

Kālia is mentioned in a story about a woman who left her husband and children on Kīpahulu, Maui and absconded with a man from O‘ahu. Her husband missed her and went to see a *kahuna* (priest) who was skilled in *hana aloha* (love magic) sorcery. The *kahuna* told the man to find a container with a lid and to speak into it of his love for his wife. The *kahuna* then uttered an incantation into the container, closed it, and threw it into the sea. The wife was fishing one morning at Kālia, O‘ahu, and saw the container. She opened the lid, and was possessed by a great longing to return to her husband. She walked until she found a canoe to take her home. This story led to the saying:

Ka makani kā‘ili aloha o Kīpahulu. The love-snatching wind of Kīpahulu
[Pukui 1983:158]

Section 4 Historical Background

4.1 Honolulu

4.1.1 Pre-Contact to Early 1800s

The area that today comprises the portion of downtown Honolulu surrounding Honolulu Harbor and extends to the mouth of Nu‘uanu Stream was known to Hawaiians as “Kou,” a center of population and activity similar to Waikīkī, its preeminent neighbor to the southeast. As stated earlier, Kou stretched from “Nu‘uanu to Alakea streets and from Hotel Street to the sea” (McAllister 1933:80) and possessed shoreward fishponds and irrigated fields fed by streams descending from Nu‘uanu and Pauoa valleys. Kou was known as a place where chiefs gathered to play and where the people gathered to watch them.

Kou was somewhat slow to catch on as a major destination for foreigners visiting the archipelago. The only stop of Cook’s ships on O‘ahu was at Waimea Bay (1779), not viable as a significant port owing to the famous winter swell that breaks there. A discouraging factor for early trade at O‘ahu was political instability. The ruling chief Peleiōhōlani died around 1780, and his heir, Kumuhana, was almost immediately deposed in a *coup d’etat*. A period of political unrest followed including the successful invasion of Maui by Kahekili in 1783, the bloody crushing of the O‘ahu rebellion in 1786, the invasion by the Kaua‘i ruler Ka‘eokūlani in 1791, the passing of rule following Kahekili’s death in 1794 to Kalanikūpule, and finally, his defeat by Kamehameha I in 1795 (Beechert 1991:12-14).

These events all contributed to political and economic instability, and in turn delayed the development of Honolulu as a major port. In addition, such events as the *Daedalus* killings in 1792, the mysterious death of Captain Kendrick in 1794, the seizure of the *Jackal* and *Prince Lee Boo* ships with the killing of Captains Brown and Gordon in 1795, and the wreck of the *Arthur* under Captain Henry Barber in 1796 did not enhance O‘ahu’s reputation as a good port of call. The earliest accounts of the south shore of O‘ahu relate the fear of attack and the difficulty of getting water and food, particularly yams (Portlock 1789:75), and in one instance, the efforts of natives to seize a whaleboat (Dixon 1789:161). Another factor in the delay in developing Kou as a major port was the relatively late discovery of Honolulu harbor, attributed to Captain William Brown in early 1793.

Honolulu’s prominence had to await the peace established by Kamehameha I and his encouragement of trade there. Kamehameha defeated Kalanikūpule at the battle of Nu‘uanu in 1795, and in 1809 moved his court, government, and residence from Waikīkī to Honolulu. Kamehameha I was known to have taken a special interest in farming and he worked in the fields alongside the commoners to demonstrate the importance of agriculture. Crops such as yams were developed under Kamehameha and were often sold to the captains of foreign ships in need of provisions at Honolulu Harbor (‘Ī‘ī 1959:69).

> Increasing commerce and association with newly arrived foreigners altered the traditional patterns of Hawaiian life on O‘ahu, and by the first decade of the nineteenth century, Honolulu was becoming a place of some importance commercially. It is situated in a rich and productive island and its protected harbor, the only accessible one in the entire group, caused foreign ships to go there in

> preference to other places. To the Hawaiians themselves, Honolulu and its snug harbor had been of very little importance compared with the nearby reef-protected beach and town of Waikiki. But the foreigners rendezvous at Honolulu caused the natives to congregate in that place. [Kuykendall 1938:27]

An early visitor to Honolulu in 1809, Archibald Campbell, described Honolulu.

> The village of Hanaroora [Honolulu], which consisted of several hundred houses, is well shaded with large cocoa-nut trees. The king's [Kamehameha I] residence, built close upon the shore, and surrounded by a pallisade [*sic*] upon the land side, was distinguished by the British colours and a battery of sixteen carriage-guns, belonging to his ship, the Lily Bird, which at this time lay unrigged in the harbor. This palace consisted merely of a range of huts, viz. The king's eating-house, a store, powder magazine, and guard-house, with a few huts for the attendants, all constructed after the fashion of the county.
>
> At a short distance were two extensive storehouses, built of stone, which contained the European articles belonging to the king. [Campbell 1817:88-89]

Francisco de Paula Marín, a Spaniard who had arrived in the Hawaiian Islands in 1793 or 1794 and become a confidante of Kamehameha, recorded in his journal, "In the end of 1809 and beginning of 1810 I was employed building a stone house for the King" (Gast and Conrad 1973:200). This was the first stone structure in Honolulu, a town that by 1810, according to Marín, was

> a village of several hundred native dwellings centered around the grass houses of Kamehameha on Pākākā Point near the foot of what is now Fort Street. Of the 60 white residents on O‘ahu, nearly all lived in the village, and many were in the service of the king. [Gast and Conrad 1973:29]

It is unclear whether Kamehameha himself ever resided in the completed house, as in 1810 he returned to Hawai‘i Island where he lived the remainder of his life, traveling intermittently to O‘ahu. Building in Honolulu, however, continued apace with Marín and other foreign residents building their own stone houses and other structures during the ensuing decade.

Pākāka was the name of a coastal point, a canoe landing, the name of a wharf built off the point in 1827, and the name of a *heiau* (religious structure) built on the point. The name literally means "to skim, as stones over the water" (Pukui et al. 1974:175). In 1816, the Honolulu Fort (*pāpū*) called Kekuanohu, was also built in this area. Pākāka was not one of the *heiau* destroyed when the *kapu* (tabu) system was abolished by order of Kamehameha II in 1819, but became part of the chiefly compound. Liholiho, Kamehameha II, built a palace complex in this area in 1821, possibly on the old Pākākā Heiau platform. The wharf at Pākākā may also have been part of the original *heiau* complex. P. Christiaan Klieger (1997:15-16) has suggested the Pākākā Palace complex may have lasted until around 1826 when Ka‘ahumanu, wife of Kamehameha I, moved from this complex to a site nearer Kawaiaha‘o Church to be near the houses of the new American missionaries (Kamakau 1992:265) and when Kamehameha III moved to a new palace within the town of Honolulu, near the modern junction of Alakea and Beretania streets (Klieger 1997:15-16).

In 1816, the Honolulu Fort had been built to the east of the complex. According to John Papa ‘Ī‘ī (1959:64-66), at this time the chiefs were living along the beach of the harbor of Kou. In the

same area, located at the end of Fort Street, a large fort was constructed. A Russian adventurer named Dr. Georg Anton Scheffer, an agent of the Russian-American Company, landed at Honolulu Harbor sometime in 1816. He instructed the men from Russian ships to build a trading blockhouse with a wooden palisade at Honolulu Harbor, where they raised the Russian flag. They also desecrated a *heiau*, possibly Hale o Lono (Barratt 1988:202), by entering it without permission, and they laid out plans to build a fort at the site. When Kamehameha I, on the island of Hawai‘i, heard of this, he dispatched the *ali‘i* Kalanimōkū with several warriors to investigate the matter and drive the Russians away if the report was true. The Hawaiians outnumbered the foreigners, and the Russians withdrew. After this successful foray, Kamehameha decided the harbor needed some protection and he ordered a stone fort built at the same place as the wooden palisade, west of Pākākā Heiau (Dukas 2004:101-102]

The following is from Judd's (1975) *Palaces and Forts of the Hawaiian Kingdom*, regarding Honolulu Fort:

> After a small contingent of Russians awoke one morning and found themselves surrounded by a large number of armed and hostile warriors, they left Honolulu and the island of O‘ahu in a hurry. Once he had evicted the Russians, Kalanimoku began to build a fort to protect the harbor on the same location as the partially constructed [Russian] blockhouse. This fort was variously known to the Hawaiians as Kekuanohu (the Thorny Back, because of the bristling guns on the walls) or Kepapu (the Gun Wall). The location of Honolulu Fort was just *makai* of the present location of Fort St. Mall and Queen St. Fort St. at the time the fort was constructed was only a trail to the Pākāka canoe landing at the water's edge; in time it grew to a road known as Alanui Papu (street to the Gun Enclosure), and in more modern times received its present name. Queen St. was a path along the shore at the time of the fort's construction. [Judd 1975:42]

Honolulu Fort served as a military post, as well as a government center, prison, and asylum. The first capital punishment administered in the fort was on 20 October 1840, when chief Kamanawa was hanged for poisoning his wife Kamoku‘iki. The gallows were set up on the parapet just east of the main gate and the execution was attended by some 10,000 viewers (Judd 1975:50). The original fort was 103.6 by 91.4 m (340 by 300 feet) in size with walls 3.7 m (12 ft) high made of large coral blocks on each side of a wall section 6.1 m (20 ft) wide, with coral rubble fill between the blocks (Alexander 1908:13). The fort was dismantled in 1857, and between this time and 1870, the coral blocks of the walls were used to build a 609.6 m (2,000 ft) retaining wall out from the existing shoreline; the rubble from the core fill of the wall was used to fill the interior of this new land extension, which was called the Esplanade, or ‘Āinahau (Judd 1975:59). Today, this area is the Aloha Tower Marketplace (Pukui et al. 1974:30).

For the 1959 publication of the book *Fragments of Hawaiian History*, Dorothy Barrère and Paul Rockwood drew a map of Honolulu (‘Ī‘ī 1959:65) as it would have appeared in 1810, based on descriptions by the early Hawaiian scholar John Papa ‘Ī‘ī who lived in the royal compound at Pākākā Point. This map (Figure 15) shows a *heiau* at Pākākā Point, around the modern location of Pier 11 off Aloha Tower Marketplace. North of this was the location of the compound of Kamehameha and his wives, with a second religious structure, Hale o Lono, to the east. To the west was the beach area called Nihoa, where native canoes could land. *Mauka* of the beach was a

Figure 15. Honolulu in 1810, map by Paul Rockwood, based on descriptions by John Papa ʻĪʻī (1959:65-90)

maika (rolling stone) playing field where athletic competitions could be held, and to the west additional houses for high chiefs. Adjacent to Nu'uanu Stream were the complexes of taro fields and native houses. A portion of the Honolulu section of the project area overlaps Kamehameha's compound and Pākāka Point.

4.1.2 1815 to 1850: Honolulu in Transition

The development of Honolulu during the nineteenth century was inevitably a rapid replacement of the traditional patterns that had once shaped the land by new responses to the pressures of a burgeoning western presence. Into the 1820s, Honolulu remained more notable for its native culture than for any western urbanization imposed on that culture.

A Russian exploratory expedition commanded by Otto Von Kotzebue sailed to the Islands in 1817, recording that Honolulu was "remarkable. Artificial ponds support, even on the mountains, the taro plantations, which are at the same time fish-ponds; and all kinds of useful plants are cultivated on the intervening dams" (Kotzebue 1821:236).

The map (Figure 16) of southern O'ahu drawn by Kotzebue ca. 1816 shows taro fields (rectangles with solid lines), salt ponds (squares with dotted lines), and fishponds (wavy lines around irregular ovals), with the taro fields located along Nu'unau Stream in Honolulu, the salt pans in the arid plain to the east (now called Kaka'ako), and more taro fields and fishponds in Waikīkī. The map also shows a large portion of the Honolulu section was then offshore or in Nu'uanu Stream and not on solid land. Portions of the Waikīkī section may have also been offshore or on high reef lands rather than on solid land.

In 1818, an early trader, Peter Corney, described the village:

> The village consists of about 300 houses regularly built, those of the chiefs being larger and fenced in. Each family must have three houses, one to sleep in, one for the men to eat in, and one for the women, the sexes not being allowed to eat together. . . .
>
> The ground is laid out in beautiful square patches, where the tarrow grows, round which they plant sugar canes and Indian corn. They also have a number of fine fish ponds, in which the keep mullet and a fish they called awa. [Corney 1896:98-99]

A visitor to Honolulu in 1819 (de Freycinet 1978) wrote,

> The port of Onorourou, generally frequented today by all the European vessels that come to the islands, is without doubt the most favorable location with respect to shelter, commerce, and resources for the supply of ships. The town of Onorourou is located on a large, flat plain. It is on the shores of a bay of the same name. The houses, similar to the most part to those of Owhyhi [Hawai'i] and of Mowi [Maui], are however interspersed with a certain number of houses built of stone that belong for the most part to Europeans or to Anglo-Americans. [de Freycinet 1978:42]

The separation of the densely habituated Honolulu, with a fairly arid plain to the east, leading to the cocoanut groves and taro farms of Waikīkī is also illustrated on an 1825 map (Figure 17), drawn by Charles Malden, a lieutenant on the HMS *Blonde*, the British ship captained by Lord Byron. During a visit to London in 1824, Kamehameha II and his favorite wife Kamāmalu died of smallpox, and their bodies were brought back to the Islands of the *Blonde*. This map also shows

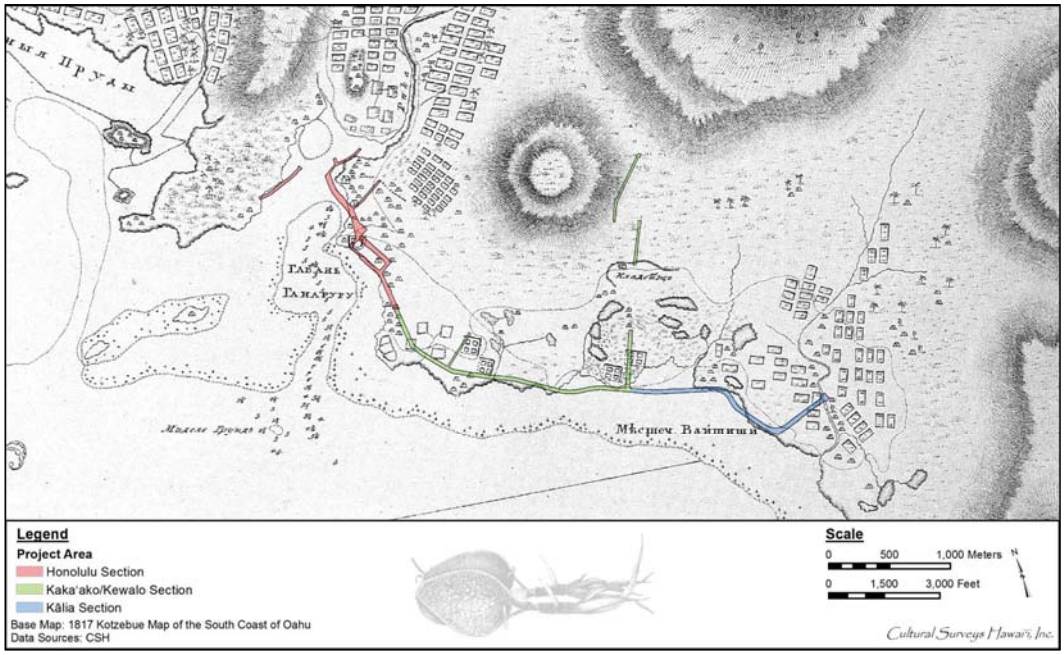

Figure 16. 1817 map (portion) by Otto von Kotzebue, commander of the Russian ship *Rurick*, showing trails (dotted lines), streams (solid lines), taro patches (rectangles), fishponds (jagged outlines), and saltpans (dotted square outlines) in Honolulu, Kaka'ako, and western Waikīkī (map reprinted in Fitzpatrick 1986:48–49)

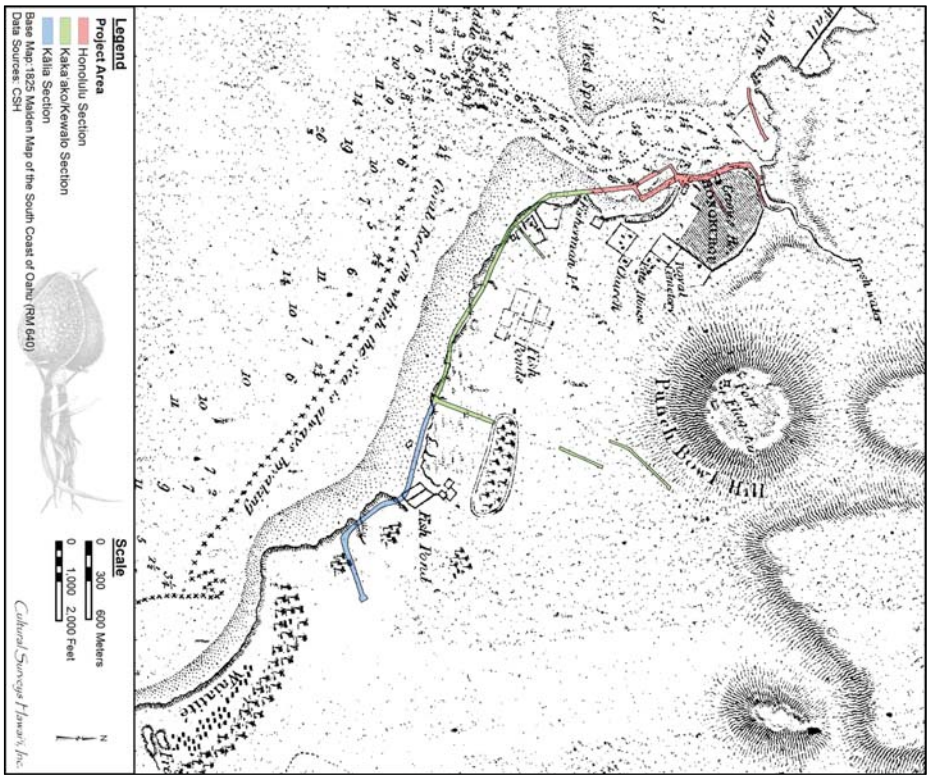

Figure 17. 1825 map (portion) of Honolulu and the South Coast of O'ahu, by Lieutenant C.R. Malden, showing the locations of structures, coconut groves, and fishponds in the Honolulu, Kaka'ako, and Kālia (Waikīkī) areas

a coconut grove in the plain area (now upper Pi‘ikoi/Pensacola Street area) and scattered fishponds. Byron described the village.

> Honoruru is a considerable town, in general very irregular, each house having a small enclosure secured by stakes or wicker work around it; there are, however, two or three tolerably regular streets, and what may be called the public place, where Karaimoku's [Chief Kalanimoku, governor of O‘ahu] house is situated, and near it the Christian church [Kawaiaha‘o Church]. [Byron 1826:119]
>
> The town appears to great advantage from the anchoring ground. Besides the houses and huts of the natives, there are several good stone dwellings built by Europeans, and timber houses, the frames of which have been brought from America and finished here. [Byron 1826:110]

An 1855 map (Figure 18) by Lt. Joseph de La Passe of the French ship *L'Eurydice* shows the growth of the town of Honolulu to the mid-nineteenth century. The map by La Passe seems to show many more salt ponds and fishponds between Honolulu and Waikīkī (in the Kaka‘ako area), suggesting that although the area was not a focus for habitation or agriculture, it was an area for important resource collection from the sea, the shoreline, from salt ponds near the coast, and inland fishponds.

The presence of the Protestant missionary church and habitation area (Kawaiaha‘o Church and the Mission Houses) in the area now known as Kaka‘ako, and the establishment of the royal court in Honolulu appear to have been major factors pulling the development of Honolulu towards the east, away from Nu‘uanu Stream into an area that had been relatively minimally used in pre-Contact times. In 1820, the American Board of Commissioners for the Foreign Missions Sandwich Islands arrived in Hawai‘i and quickly made Honolulu its headquarters. As a member of that mission, Reverend Hiram Bingham, writing in 1847, describes Honolulu as viewed from "Punchbowl Hill" in 1820:

> From the highest part of the rim we had a beautiful view of the village and valley of Honolulu, the harbor and the ocean, and of the principal mountains of the island . . . Below us, on the south and west, spread the plain of Honolulu, having its fishponds and salt making pools along the seashore, the village and fort between us and the harbor, and the valley stretching a few miles north into the interior, which presented its scattered habitations and numerous beds of *kalo* (*Arum esculentum*) in its various stages of growth, with its large green leaves, beautifully embossed on the silvery water, in which it flourishes . . . Through this valley, several streams descending from the mountains in the interior, wind their way, some six or seven miles, watering and overflowing by means of numerous artificial canals, the bottoms of kalo patches, and then, by one mouth, fall into the peaceful harbor. [Bingham 1947:92-93]

Another visitor to Honolulu in the 1820s, Jacobus Boelen (1988), described the early post-Contact character of Honolulu:

> It would be difficult to say much about Honoruru. On its southern side is the harbor or the basin of that name. . . . The landlocked side in the northwest consists mostly of tarro fields. More to the north there are some sugar plantations and a sugar mill,

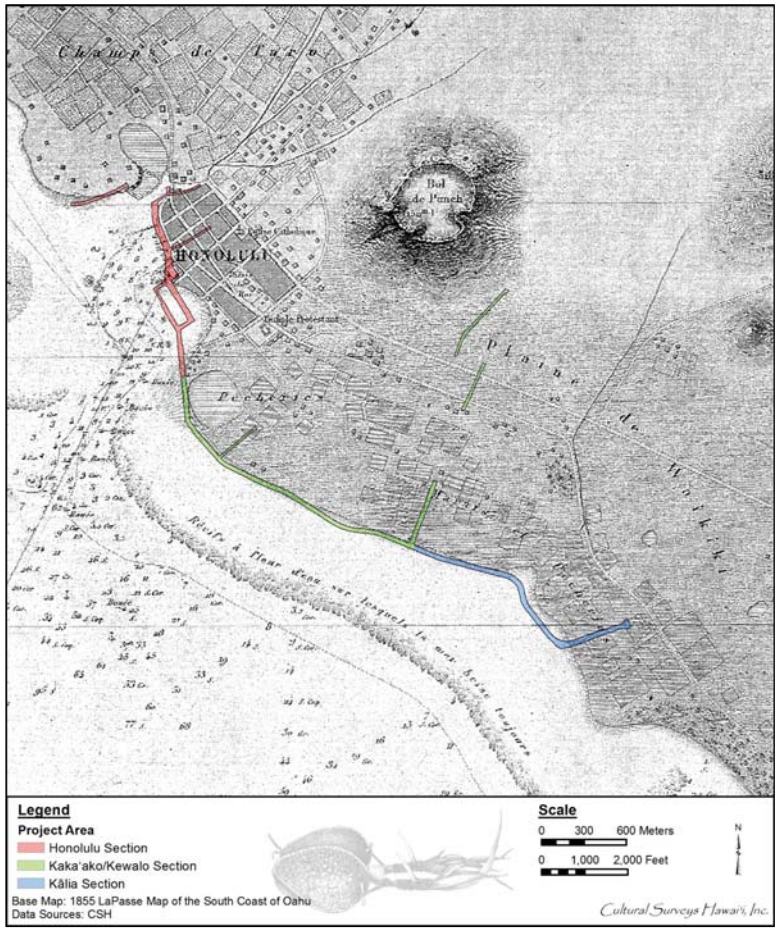

Figure 18. 1855 map of Honolulu by Lt. Joseph de La Passe of the French vessel, *L'Eurydice*; taro patches and salt pan are marked with rectangles, and fishponds are labeled as "*Pecheries*" (map reprinted in Fitzpatrick 1986:82–83)

> worked by a team of mules. From the north toward the east, where the beach forms the bight of Whytetee [Waikīkī] the soil around the village is less fertile, or at least not as greatly cultivated. [Boelen 1988:62]

As retold by Gavan Daws, Stephen Reynolds, an early merchant in Honolulu, recalled the early dirt roads of Honolulu.

> Stephen Reynolds recalled how in 1823, when he had come to the islands to stay, not many house lots had been fenced and very few indeed enjoyed the privacy of adobe walls. There had been no streets, but only pathways leading to the main trails quartering Honolulu. The city began at the waterfront and straggled to an end less than a mile inland, considerably short of a stone wall, built about 1830 part way across the entrance of Manoa and Nuuanu valleys with the idea of restraining grazing cattle. Late in the eighteen-thirties, before the property issue in Honolulu was anywhere near resolution, the local chiefs were seized by a fit of energy for road and bridge-building around the town, and for a few weeks crews of natives labored, straightening and widening streets, and often clipping slips of land from lots which had encroached upon thoroughfares. [Daws 1967:343]

The 1830s marked a profound shift in the character of the Honolulu area as perceived by its western inhabitants. Western and urban ideals propelled Honolulu's growth. Such ideals found expression in practices such as the formal naming of streets that commenced in September 1836. It was then that the *Sandwich Island Gazette* began soliciting suggestions for street names from its readers. Among those accepted were King Street, Beretania Street, and Garden Lane. In 1850, Honolulu was officially named the capital of the kingdom and 29 streets were named, including the streets running up from the waterfront (Maunakea, Nu‘uanu and Fort) and the cross streets running parallel to the harbor (Merchant, King, Hotel, and Beretania) (Daws 1967:343).

By the end of the mid-nineteenth century, Honolulu was an active port of call and the former village of 100 houses had become a busy town. A newspaper article in 1840 described recent changes in the town:

> The past twelve months have been full of activity. Streets have been widened, straightened and opened, houses and stores built, others demolished; public works commenced and everything now wears the appearance of progressive improvement. In comparison with preceding years, quite a spirit of enterprise seems to be awakened both among foreigners and Hawaiians, which we surmise, is the result of a general prosperity. To a stranger all may still appear rude and semi-civilized, but to the resident many cheering alterations are to be seen, which indicate that the means rather than the will is wanting, for still more rapid improvements. The broad avenues which now intersect in the town, will become eventually fine streets. . . .
>
> Then we have . . . a new and substantial bridge, with a causeway, crossing the river [Nu‘unau Stream] and low ground in that vicinity. Its expense exceeded $1200, and it has proved of great utility, being a great thoroughfare, and affording a pleasant road for Ewa, instead of the long ridge through the water as was formerly the case. [*The Polynesian,* 17 October 1840:74-75]

In 1841, only a few of the main streets which now end at Nimitz Highway were present. G. Gilman (1903), arriving in Honolulu in 1841, described the limits of the town of Honolulu during the early 1840s:

> The boundaries of the old town may be said to have been, on the *makai* side, the waters of the harbor; on the mauka side, Beretania Street; on the Waikīkī side [i.e., the area just beyond Punchbowl Street], the barren and dusty plain, and on the ewa [west] side, the Nu‘uanu stream. [Gilman 1903:97]

Gilman mentions the Kaumakapili church, a few stores and saloons, and native houses between the area now between River Street and Nu‘uanu Avenue. The area along the waterfront was used as a fish market (Gilman 1903:90). Beginning at Nu‘uanu Avenue, he describes the prominent streets.

> What is now known as Queen street was then only a pathway along the water's edge, the water coming up most of the way between what are now Nuuanu and Kaahumanu streets. Along the mauka side of the street was a collection of straw houses with lanais. There was not a frame building at this time in this distance between the two streets. [Gilman 1903:75]
>
> The lot next mauka brings us to the corner of Nuuanu and King streets. My recollection is that King street did not receive its distinctive name till some time later than that of which I am writing. Quite a number of the streets waited several years after they were laid out before they received names, and it would be hard to tell now who named them. Like Topsy, 'they just growed.' [Gilman 1903:76]
>
> Passing Hotel street there were scarcely any houses except a few of the natives, until we come to Beretania street. [Gilman 1903:78]
>
> Returning to the water side, we will pass along the water front to the next short street—now known as Kaahumanu running mauka from the water to what was afterwards known as Merchant street. The space between this street and Nuuanu was mostly occupied by native straw houses with lanais in front of them and used principally as a fish market. The water of the harbor ebbed and flowed on the makai side of the street. There were one or two low story shed like buildings on the Waikiki side of Kaahumanu street, which were afterwards utilized as stores. [Gilman 1903:78-79]
>
> Before describing Fort street we will take a look at the famous premises of James Robinson & Co., at that time the only ship builders and repairers on the islands and in fact in the Pacific. It was a rather peculiar partnership in the make up of the firm which began in 1822, though the shipyard at the point, 'Pakaka,' was not established till 1827. . . . Proceeding along Queen street on the makai side, we come to the old fort. This is so historically well known that it needs no description from me. Its walls extended along the street to some distance past Fort street, at the foot of which the large gateway served for entrance and exit. [Gilman 1903:81-82]
>
> On the Waikiki side of the fort was a short street running from Queen street to the water. Near Queen street was Halekauwila, one of the largest and finest thatched houses on the island, the town residence of the king and queen and also at times the

place of meeting of the council. Makai at the water's edge, was a small cottage of plastered adobe, with a veranda extending all around it, called Mauna Kilika, also used for government purposes, and later by the English Admiral Thomas who came to the islands to restore the flag and the government to the rightful authorities. Beyond this towards Waikiki were the premises occupied by Governor Kekuanoa, and beyond these the residence of the high chiefess Kekauonohi and her husband, Kealiiahonui, son of the former king of Kauai, who was brought as a hostage from that island and married to his royal companion. These were the only buildings of any importance on the whole length of the street from Fort street to the mission premises, with the single exception of the Oahu Charity School, a coral building which was erected for the education of the half white children of the place. [Gilman 1903:83-84]

4.1.3 Mid-Nineteenth Century and the Māhele

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. In 1848, the Crown and the *ali'i* began to receive their land titles as *konohiki* (land manager) awards. *Kuleana* (native land rights) awards to commoners for individual parcels began in 1850. The Crown Lands were considered the private lands of the monarch, and many lands were sold or mortgaged during the reigns of Kamehameha III and Kamehameha IV to settle debts to foreigners. To end this practice, the Crown Lands were made inalienable in 1865, and their dispensation was regulated by a Board of Commissioners of Crown Lands, which effectively put them under the administrative control of foreign-born residents (Kame'eleihiwa 1992:310).

The Kuleana Act of 1850 confirmed and protected the rights of native tenants. Under this act, the claimant was required to have two witnesses who knew the claimant and the boundaries of the land, knew that the claimant had lived on the land for a minimum of two years, and knew that no one had challenged the claim. The land also had to be surveyed (Chinen 1958:31).

These awards were presented to tenants, Native Hawaiians, naturalized foreigners, non-Hawaiians born in the Islands, or long-term resident foreigners who could prove occupancy on the parcels before 1845. Land Commission Award (LCA) documents indicate these parcels were awards to Native Hawaiians and foreign settlers who had moved into Honolulu as the city developed.

On 8 March 1848, Kamehameha III divided the property reserved for him through the Māhele into two parts; the smaller portion he retained for himself and his heirs, while the larger portion was given "to his Chiefs and People." The latter became known as "Government Lands" (Chinen 1958:26). Most of the LCA parcels in Honolulu were house lots and store lots *mauka* of Queen Street.

The western portion of the project area is offshore of Iwilei (Figure 19) and in Kali'u, an *'ili* of Honolulu (Figure 20). The seaward portion of Kali'u was claimed by Kekualoa as a Konohiki award, LCA 11225. One witness (see Appendix A:LCA 11225) described the land as bounded:

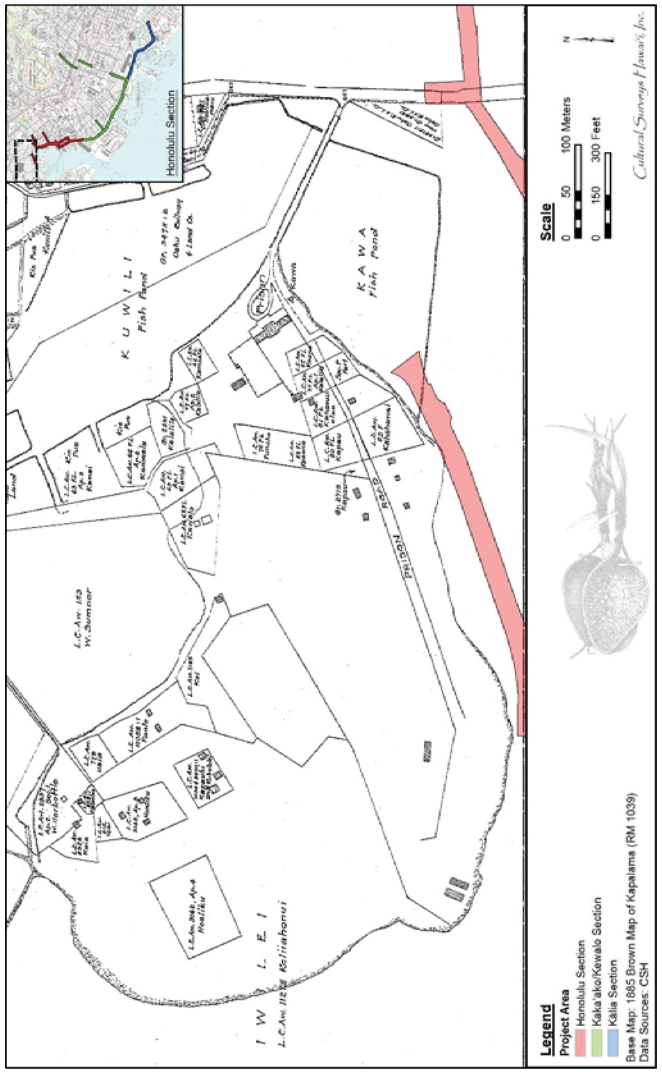

Figure 19. 1885 map (portion) of Kapālama and Iwilei (Brown 1885), showing western portion of the Honolulu section; project area is in former reef areas (later filled in) and within an offshore fishpond, Kawa Pond

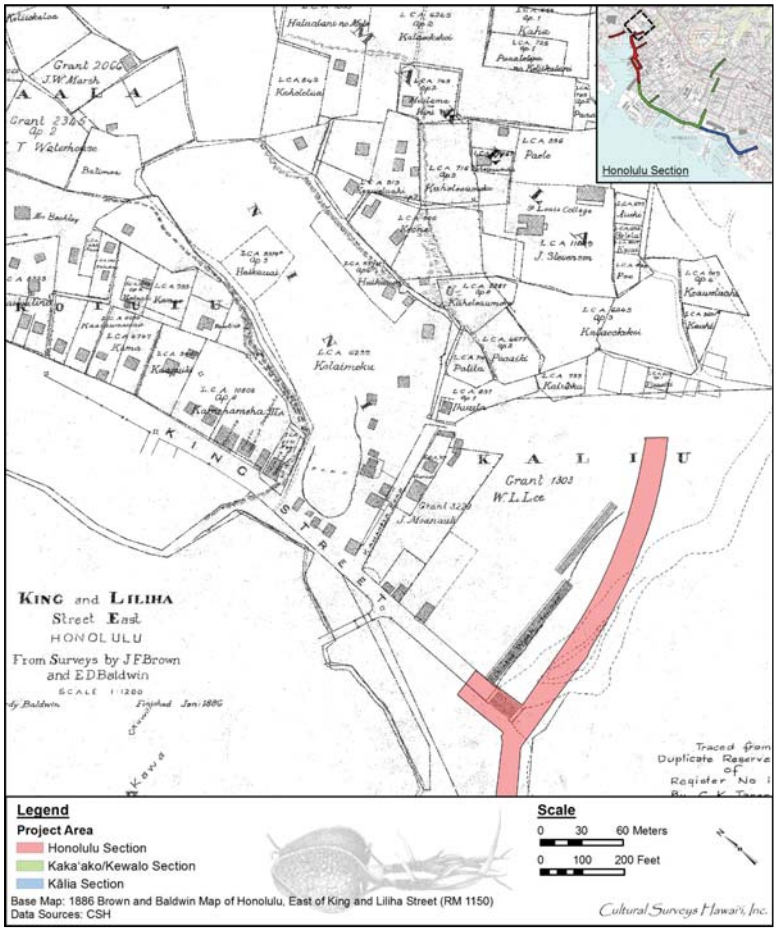

Figure 20. 1886 map (portion) of the western portion of the Honolulu section in Kaliu ‘Ili, west of Nu‘uanu Stream; map indicates project area overlaps road, part of Nu‘uanu Stream (dotted line on lower right) and the *‘ili* of Kaliu (Brown and Baldwin 1886)

> by the bank of Pauoa & Nuuanu [streams]; Kaumakapili side [east] down to the sea and then following high water mark to Akaukukui [‘Ākaukukui; reef area, later part of Sand Island] and then running seaward to the reef of the Sumner family called Koholaloa [in Iwilei]. On the Makai side by Koholaloa, on the Ewa Side by the fishponds of Kawa and Kuilei, and the lands of Aala and Kamakela.

This award was generally for the western part of the harbor. It included a slaughterhouse built before 1854 on “reclaimed from the bed of the river [Nu‘uanu Stream] which belongs to Kaliu.” Kekualoa probably also had the fishing rights to this area, although the award does not explicitly state this right. As the project area was close to the mouth of Nu‘uanu Stream, it may have been prone to flooding, and not fit for agriculture or habitation. It would have been convenient for a slaughterhouse, as it was common in that day to put these structures near a stream or the ocean so that the owners could conveniently dump waste material in water for disposal.

Pukui et al. (1974:77) do not give a meaning for the place name Kali‘u for this Honolulu land section, but a place called Kali‘u in Kalapana, Hawai‘i is interpreted as “well-salted” suggesting a marshy area with salt beds. Ka‘ākaukukui and Kaka‘ako were well-known areas for making salt, and the low-lying Kali‘u area may also have been a salt-producing area.

This area of Iwilei had two large ponds, Kūwili and Kawa. Kawa Pond can be seen on a ca. 1883 photograph (Figure 21) of the Oahu Prison, which was built in 1857. The prison was built from cut coral blocks and subsequently became known as “The Reef.” A new road was constructed between Kūwili and Kawa Fishponds that connected the prison to North King Street. The new road, a causeway between the two fishponds, was first identified on earlier maps simply as “Prison Road.” By the end of the nineteenth century, maps identified it as Iwilei Street. Between 1916 and 1918, the O‘ahu Prison was relocated to Kalihi and renamed the Oahu Jail (O`Hare et al. 2003:12).

A consortium of businessmen led by Benjamin Dillingham created the OR&L in February 1889. The railroad officially opened on November 16, 1889. A railroad track was built across Kūwili Fishpond, and the company’s Honolulu depot was constructed on land between Kūwili Fishpond and North King Street, just west of the intersection of North King Street and Iwilei Road (Figure 22). In 1896, an outbreak of cholera caused the infilling of Kawa Fishpond. Kūwili Fishpond was filled between 1895 and 1901. The new passenger and cargo station was located on the former Kūwili Fishpond, immediately north of Iwilei Road (McGerty et al. 1997:21-23). The expansion of the OR&L transportation and cargo routes, with the associated harbor traffic, was one of the primary factors behind the industrial development of the Iwilei area of Honolulu.

The banks of Nu‘uanu Stream must also have been very prone to flooding in this time period. Gavan Daws (2006:272) notes:

> Denuded hillsides gave up water as fast as it fell, and millions of gallons flowed quickly, uselessly, and sometime dangerously to the sea. Lakes formed at street corners in Honolulu, houses leaked, adobe walls crumbled; and down Nuuanu valley to the harbor, borne on rushing waters, came spars, abutments or even complete wooden bridges, big logs from timber-yards, flimsy bathing houses and laundries from the sides of the stream, occasional drowned livestock, and–most bizarre–coffins of natives buried in houseyards fronting on Nuuanu stream.



Figure 21. Oahu Prison, built in 1857, across the causeway of Kāwā Pond (later Iwilei Street) (Hawai‘i State Archives n.d.)

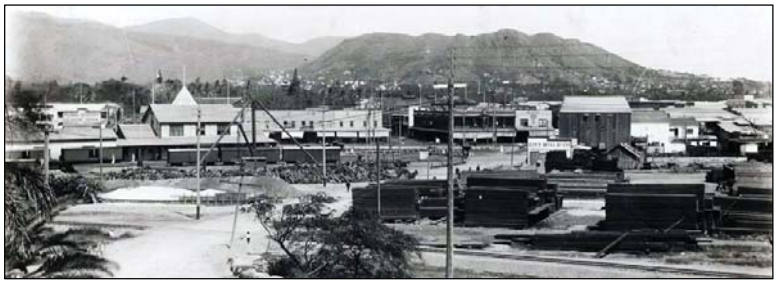

Figure 22. 1890s photograph of the Oahu Railway and Land Co. (OR&L) depot and rail yard in Iwilei, view toward downtown Honolulu (Hawai‘i State Archives 1890s)

This danger of flooding probably explains why no houses are shown in the project area until the late nineteenth century.

In the downtown portion of the Honolulu section, the project area follows the old alignment of the coastal road, which later became Queen Street, and then Nimitz Highway and Ala Moana Boulevard, but does not overlap the cluster of Land Commission Awards with house lots (Figure 23). It does overlap several LCA lots awarded for harbor piers and wharf warehouses. The project area overlaps LCA 626 to Stephen Reynolds, LCA 4882 to William French, and LCA 784 to Robinson and Company (see Appendix A for complete LCA records). LCA 626 is the area of Pier 12, also called Reynolds Wharf or Brewer’s Wharf, and LCAs 4882 and 784 are now in the general area of Piers 10 and 11. Pier 12 still exists as a separate wharf, but the area of Piers 9, 10, 11, and the Charlton/French Wharf have all been merged into the Aloha Tower Complex.

Stephen Reynolds was awarded three parcels, two on the *mauka* side and one on the *makai* side of Queen Street, *‘Āpana* (lot) 2. Around 1823, a small landing was built aligned with the foot of Nu‘uanu Street (now the southeast side) *makai* of Queen Street (Greer 1998:42). The *makai* parcel corresponds to Reynolds’ wharf, the Pier 12 area.. Around 1826, George Marín, son of a noted early Spanish resident, Francisco de Paula Marín, built a wharf at the Pier 12 location (Greer 1998:42). Between 1832 and 1838, the businessman Stephen Reynolds bought the property (Greer 1994:50-51). In 1851, Reynolds became ill and soon after a committee of trustees were appointed to handle his estate. Due to debts, the firm of Bates and Pittman liquidated his estate, including his Honolulu lots (King 1989:xi), which probably included the wharf. Charles Brewer established C. Brewer and Company in 1843 (Stone 1991:23-47). From 1859 to 1899, the company leased the Market House, a large two-story stone structure originally built in 1851 by the Hawaiian Government (Scott 1968:105, 150). They also took over the old Reynolds’ Wharf just *makai* of the structure. From ca. 1859, the wharf is usually labeled on historic maps as “Brewer’s Wharf,” instead of Reynolds’ Wharf. This pier was lengthened in 1907, but then shortened to its present size in 1963. It is now mainly used as a parking structure.

In 1827, Richard Charlton, the British Consul to the Hawaiian Islands, was given permission to build a wharf but he could not obstruct the old Robinson pier at Pākākā Point. This may be why the French/Charlton Wharf (around LCA 4882) was built somewhat diagonal to the shore, between Reynolds Wharf and Robinson’s Wharf. The Hawai‘i Bureau of Land Conveyances report the wharf was completed by 1838 (Hurst and Allen 1992:17). Charlton transferred the property to Robert C. Janion in 1845 and in 1846 another businessman, William French, owned a part of the land. This man may have had an earlier interest in the wharf, as it was called the Charlton-French wharf as early as the 1830s (Greer 1998:54-55). The wharf seems to have been shortened or demolished by 1893.

As early as 1812, there was a primitive wharf in the Pier 11 area (within LCA 784) on Pākākā Point, used by Kamehameha I to offload cargo from ships and to repair western-style ships purchased by Kamehameha I. In 1816, the old Honolulu Fort on Pākākā Point was built in this area. In 1827, the *ali‘i* Kalanimōkū, premier councilor to Kamehameha I and his successors, deeded the reef land at Pākākā and one-half of the King’s Wharf to John Robinson, who set up a shipyard in this area (Greer 1998:59). Honolulu Fort was demolished in 1857 and stones from the walls were used to create a seawall (Pukui et al. 1974:30), which was then filled to create new land called the Esplanade or ‘Āinahau, *hau* tree land (Pukui et al. 1974:7) within and surrounding

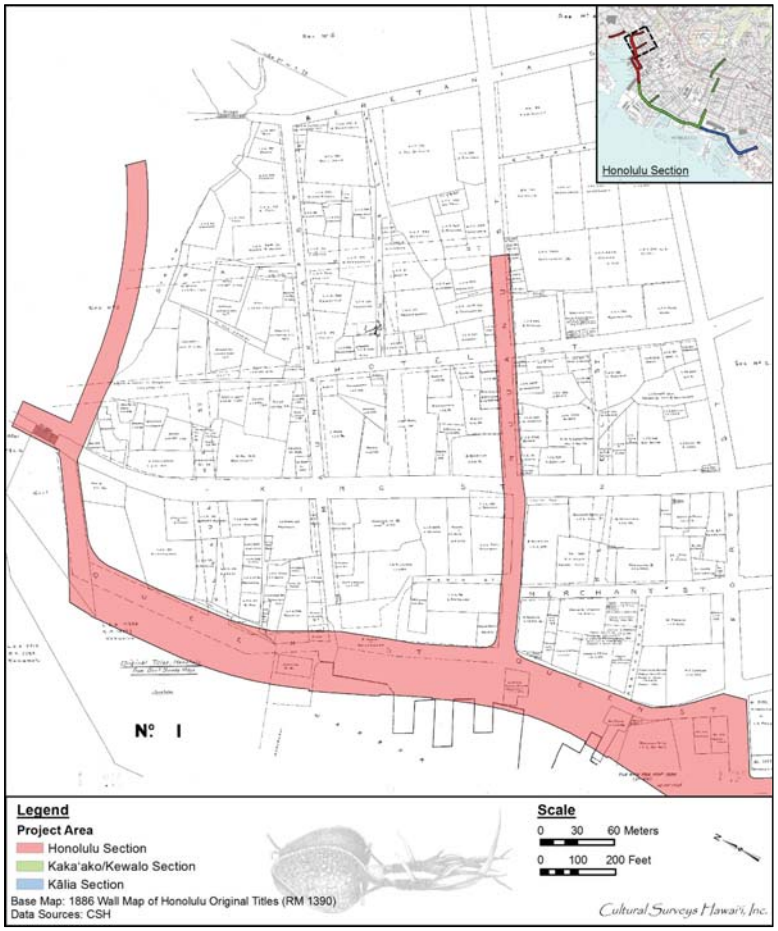

Figure 23. 1886 map (portion) of the downtown section of the project area, showing the Nimitz Highway/Ala Moana Boulevard, River Street, and Nu‘uanu Street portions (Wall 1886)

Robinson’s shipyard and wharf. As the harbor was dredged over the years, more fill land was added to the area of Piers 9–11. Aloha Tower was completed in 1926, gradually changing the former Esplanade warehouse area into the modern Aloha Tower Marketplace, completed in 1994 (Hawai‘i DOT 2008).

4.1.4 Late 1800s to 1900

In 1846, Honolulu was made the capitol of the Hawaiian Kingdom and was well on its way to becoming the commercial and political hub of the Islands. Charles Wilkes, commander of the U.S. Exploring Expedition, visited Hawai‘i in 1841 and related that Honolulu was “very conspicuous from the sea and has more the appearance of a civilized land, with its churches and spires, than any other island in Polynesia” (Wilkes 1856:373).

During this period there was an obvious increase in density of land use and urbanization. The waterfront of Honolulu changed significantly. During the peak of the whaling industry around 1850, the harbor area became crowded with trading and whaling vessels and required additional wharfs to accommodate them.

Along King Street were numerous storehouses such as the one owned by Isaac Montgomery, boarding houses like the one owned by Francisco de Paula Marín, where visitors could stay and sea captains could take their meals, and grog shops such as John Meek’s, which the common sailors frequented. At this time the town proper ended at the west side at Maunakea Street. The waterfront was still dominated by the Honolulu Fort and several small wharfs between the Esplanade and Maunakea Street. The Pier 12 area was south of the foot of Nu‘uanu Street, adjacent to the Ladd & Company wharf on the north side of the foot of the street.

Honolulu was in a period of rapid change. Reverend Sereno Bishop offers a unique perspective on the changes in the layout of Honolulu and the structures that lined the streets:

> When I returned to Honolulu in 1853, after an absence of thirteen years, I was struck by the many changes. . . . [In 1840] The major portion of the residents of Honolulu still lived in thatched houses. In fact the town was almost entirely composed of this kind of dwellings . . . When I went away there were only Punchbowl Road, Beretania Street, King Street and Merchant Street. This was the condition of the city in 1840. [Bishop 1916:58]

Beginning at the start of the whaling era (1820) and extending into the 1840s and 1850s when seamen came ashore for “rest and relaxation,” the downtown area from Nu‘uanu Street west to Nu‘uanu Stream was a district of “dilapidated native huts and tenements, tiny bar-rooms, coffee-shops, and run-down ‘boarding houses,’ all turning to the harbor for their opportunities and income” (Daws 2006:239).

In the 1840s, water was first brought down by pipe from upper Nu‘uanu Stream to the harbor. In the 1860s, some improvements were made to the downtown area of Honolulu, when street lighting and numbering were introduced (Daws 2006:268-269). Insufficient water was still a problem in the 1860s, and when a fire broke out in 1866 at a Chinese cook-house at the corner of Smith and Hotel streets, “Later, it was generally agreed that the blaze could have been controlled at its beginning. But two policemen nearby couldn’t get water, and flames soon drove them away” (Greer 1976:33). The ships at the piers from the Fish Market on Maunakea Street to Brewer’s Wharf (Pier 12) were moved to Nu‘uanu Stream. In the end, an area from River Street to Bethel

(west to east) and King Street to Pauahi Street (south to north) was burned in the fire. Government workers took the opportunity of the destruction to widen and straighten old streets and construct new streets. Although many burned wooden buildings were replaced with new brick structures, by the 1890s, the Chinatown portion of Honolulu was again a jumble of wooden structures and blocked alleys, as unsanitary and as much a fire hazard as in the 1860s (Greer 1976:47-48).

4.1.4.1 Honolulu Harbor

Honolulu Harbor was discovered by westerners in November 1798 by Captain Brown of the British ship *Butterworth*. Only a few native fishermen lived in scattered houses around the shoreline. The harbor was 60.96 m (200 ft) wide, 1.2 km (three-fourths of a mile long), and about 0.9 to 9.1 m (3 to 30 ft) deep (Hawai‘i DOT 2008). Ships could not simply sail into the harbor, but had to be towed due to the narrow passage. In 1815, Otto von Kotzebue visited the harbor; his ship was towed in by eight double-hulled canoes (Alexander 1908:13); later teams of oxen, men, or whale boats were used for this purpose. In 1809, Kamehameha I had made Honolulu his capitol and had several coral and wood buildings used as stores and storage sheds. By 1825, the population had grown to 6,000 (Hawai‘i DOT 2008).

The first dredging of the harbor took place around 1840. The dredged material was used to fill the coastal tidelands “for industry in the harbor area” (Stindt 1982:13). Surveys of the depth of the harbor and the bar that prevented large vessels from sailing easily into the bay were made throughout the 1800s.

A major problem for the harbor in the early to mid-nineteenth century was siltation from Nu‘uanu Stream, which had increased as the shores were cleared, farmed, and used for laundries. In addition, foreign ships often used the harbor as a convenient dumping ground for their ballast and trash. To prevent the siltation problem, a breakwater was built in 1848 out from Emme’s Wharf (at the foot of Maunakea Street) perpendicular to the mouth of the stream, enclosing the western section of the harbor, and new ordinances and laws were passed to address the dumping problems (Hawai‘i DOT 2008).

Trade increased in the 1850s, the peak period for the whaling industry, and steamships entered the harbor as early as 1846. The government decided Honolulu Fort had to be demolished to make way for new and larger wharfs to handle the new trade (Thrum 1896:97). Following the demolition of the fort in 1857 (Judd 1975:50), its walls became a 610 m (2,000 ft) retaining wall used to extend the land out onto the shallow reef in the harbor. The remaining fort materials were used as fill to create what came to be known as the Esplanade (Judd 1975:50). Between 1857 and 1870, 8.9 ha (22 acres) of reef land between Fort Street and Alakea Street was filled in with material dredged from the harbor to create the Esplanade (Bush 1957:14).

In 1893, the harbor was deepened to allow new steam vessels to dock (Thrum 1893:133). Dredging of the harbor continued into the twentieth century. Following annexation of the Hawaiian Islands in 1898 and the establishment of the Honolulu Engineer District in 1905, federally funded dredging of the harbor was initiated and completed in December 1908 (Van Hoften 1970:3). In 1912, the first piers with concrete pilings and concrete decks were constructed. Aloha Tower was completed in 1926, gradually changing the former Esplanade warehouse area into the modern Aloha Tower Marketplace, completed in 1994. The harbor was widened again in 1935, a second entrance to the harbor was dredged through Ke‘ehi Lagoon to the west in 1962, and the harbor was dredged an additional 1.5 m (5 ft) in depth in 1980-81 (Hawai‘i DOT 2008).

4.1.4.2 Cholera Epidemic of 1895

In 1895, a cholera epidemic struck the Islands, its spread in Honolulu largely due to the unsanitary conditions of the harbor and Nu‘uanu Stream. Many laundries were situated near the King Street bridges. This area was called *‘A‘ala* (meaning fragrant) by the Hawaiians, an ironic statement on the odors of the area. The cholera:

> . . . came in the form of active cases among Chinese steerage passengers on the *Belgic*, which arrived August 9. The harbor waters—stagnant, alkaline, and heavily contaminated with sewage and refuse became infected and crabs feeding upon this infected material were believed to have been the means through which it spread, first to a native woman, and then to guests at a luau in her house. One of these secondary cases washed his clothing at the Aala laundries and infected the Nuuanu stream, and various rice and taro patches became contaminated in a similar manner. [Arnold 1956:317]

A total of 88 cases, 76 of them afflicted Hawaiians, were reported between the start of the epidemic in August to its end in October 1895. A total of 64 people died in the Honolulu area (Arnold 1956:317; Schmitt 1970:363). Early historic maps indicate that the River Street segment of the project area was once on the west bank of Nu‘uanu Stream or actually within the streambed or mouth of the stream. In its natural state, the mouth of the stream was probably a wide, fan-shaped area without well-defined banks, rather the stream mouth gradually changed into a marshland, which could be inundated during times of flooding. In the late nineteenth century, spurred by the deaths of the recent cholera epidemic, the government began to plan and institute public improvements to the roads, bridges, sewer systems, and streams in the western Honolulu area. Thomas Thrum, editor of the *Hawaiian Almanac and Annual*, reported on these improvements in his annual retrospect of the preceding year.

In the Retrospect for 1895, Thrum noted,

> The new spirit of public improvements . . . has been pushed with vigor. The relaying of larger water mains through a number of streets and completion of the new pumping plant, auxiliary to the reservoir system, was effected in time to do valuable service during the cholera period by shutting off the reservoir supply with its possible contamination, and flushing the mains with artesian water . . . the enlargement of the inner harbor by dredging, with contemplated increased wharfage facilities along the extension of Queen street toward the King street bridge has already been entered upon. The dredging serves the further beneficial purpose of filling in the low land partly occupied, till recently, by the old wash houses, on the northern side of Nuuanu stream which is to be assigned to park [‘A‘ala Park] purposes for the benefit of the residents in that part of the city and the improvement of its sanitary condition. [Thrum 1895:144]

In the Retrospect for 1897, the *Hawaiian Annual* gave an update on the project:

> The dredging of Honolulu harbor and rock cutting to deepen the site at the Waikiki end of the Pacific—Mail Wharf selected for the special needs of the big steamers of the Orient line, has been pushed, and considerable progress made in filling in the Aala and other tracts adjacent to the Nuuanu stream. There remains much yet to be

> done to complete the extensive channelization contemplated by this river and harbor improvement. [Thrum 1898:158]

Beginning in 1896, Nu‘uanu Stream was dredged, the water course was changed, and a stone wall was built on both sides of the steam (Hurst 1992:i, 8). Dredged material was used as fill to create River Street, on new land created with a top layer of dredged harbor fill over a natural marsh/lagoon stratum.

4.1.4.3 The 1900 Chinatown Fire

In 1852, there were only 71 Chinese living around Honolulu, most of whom had come to the Islands as merchants and who continued to carry out this trade. In 1852, sugar planters began to import large numbers of Chinese to work on their sugar plantations. Once their contracts were filled, some of these workers moved to Honolulu to open their own businesses in the area that soon became known as Chinatown. The unsanitary and over-populated area alarmed the white business class who noted that “Most Chinese businesses were housed in decaying buildings on the depressed lower blocks of Nu‘uanu and Maunakea Street, and in Chinatown the womanless coolies congregated to gamble, smoke opium or simply pass the time” (Daws 2006:300). By the 1870s, a sizeable population of Chinese immigrants had settled in Honolulu. An 1878 census recorded 1,299 Chinese in Honolulu; the total city population numbered 14,114.

On 11 December 1899, the first case of bubonic plague was identified in Hawai‘i, in a Chinese bookkeeper named You Chong. After an examination by Dr. G.H. Herbert, who noted a high temperature and swelling in the groin, the patient died the next morning. After an autopsy, the diagnosis of bubonic plague was determined (Iwamoto 1967:379).

Since the disease had broken out in the immigrants’ area of Honolulu, all Chinese and Japanese were barred from leaving Honolulu for other ports. Two other cases were reported on 12 December, and the Board of Health laid down a strict quarantine for Chinatown, the area of Honolulu bound by Nu‘uanu, Kukui, River, and Queen streets. Within this area, about 7,000 people, primarily Chinese and Japanese immigrants, lived and worked (Iwamoto 1967:379-380). A third ethnic group who inhabited the area were about 1,000 Hawaiians who lived in areas their families had occupied for generations (Mohr 2005:63). An 18 year old Hawaiian, named Noah Kinapu, “was found dead in a shack on Queen Street where it turns into River Street. . . . The first floor of the shack was the living quarters of eight Hawaiians . . . Upstairs the Board found a completely arranged opium joint in full blast” (Mohr 2005:63).

From 12 December 1899 to 31 March 1900, 71 cases of plague were reported with 61 deaths; 41 of the victims lived within the established Chinatown quarantine area. The Board of Health concluded they could not contain the plague and decided the best remedy was to set “sanitary fires” to infected wooden buildings. A total of 41 controlled fires were set between 31 December 1899 and 13 August 1900.

> Therefore, on December 30, after careful deliberation, the Board of Health chose fire as the ‘surest, most thorough, and most expeditious’ method. Fire would destroy the plague germs, kill rats, cleanse the soil and open it up to the purifying influence of sun and air, and would prevent any occupancy of the premises until a safe period of time had elapsed. [Iwamoto 1967:381]

Infected patients were moved to a quarantine camp in Kaka‘ako. Some people, not necessarily patients, whose houses were burned were housed at the barracks of the Kaka‘ako Rifle Range. Their belongings were stored in the cellars of Kaumakapili Church (Iwamoto 1967:385-386).

On 20 January 1900, a fire was set between Kaumakapili Church and Nu‘uanu Avenue that quickly got out of control. Rising winds swept burning embers to the roof of the church; the fire then jumped to several other blocks and then to the wharfs:

> By 1:30 p.m. the fire began making its way from Beretania Street along Achi Lane toward Kukui Street. People feared that the *mauka* section of the city would be destroyed. Chinatown refugees rushed back to save belongings, but were driven back by fire and smoke; they formed a seething mob near the bridge and Kukui Street. . . . The Chinese consul and vice consul also circulated among the people and tried to pacify them, since at this time the Chinese believed that the Board of Heath had purposely burned their homes. [Iwamoto 1967:385-386]

No one was killed in the fire, but Chinatown was destroyed. Many people were homeless and bereft of all belongings, which were lost when Kaumakapili Church burned to the ground. No additional patients were identified with the disease in April 1900, and the Hawaiian Islands were declared free of plague (Iwamoto 1967:381, 386).

4.1.5 Twentieth Century Development

A series of U.S. Army War Department and USGS topographic maps (Figure 24 through Figure 27) show the progression of urban development and road construction in the twentieth century. Early historic photographs (Figure 28 and Figure 29) also depict the area around River Street, Queen Street, and Nu‘uanu Avenue before or after the turn of the century.

The first efforts to deepen Honolulu Harbor were made in the 1840s. The idea to use the dredged material, composed of sand and crushed coral, to fill in low-lying lands was quickly adopted. From 1857 to 1870, the “Esplanade” between Fort Street and Alakea Street was created on 22 acres of former reef and tideland. By 1874, Sand (Quarantine) Island, site of the first immigration station, had been created over “reclaimed” land on reefs.

The 1919 map shows additional land has been made in Iwilei, Kawa Pond has been filled, and material from the dredging of Honolulu Harbor will soon to be used to form Sand Island, which now consists of Quarantine Island and high reef areas. A spur of the OR&L railroad extends from the main depot area to a wharf opposite the junction of Queen and River streets. The Esplanade area (Piers 9–11) extends from Bethel to Bishop Street, but the construction of Aloha Tower will not be completed until 1927. Queen Street is still the main coastal road and there are three bridges over Nu‘unau Stream, at Queen, King, and Beretania streets connecting College Walk along the west side of the stream and River Street on the east side. The 1927, 1933, and 1943 maps show increasing commercial development in Iwilei with additional railroad spurs and wharf development along Nimitz Highway. The location of Aloha Tower is now shown within the Aloha Tower Complex on the 1927 map. The present outlines of Sand Island can be seen in areas marked for dredging and filling on the 1927 and 1933 maps and the final outline for Sand Island is shown on a 1953 map. The 1953 map also shows the completion of Nimitz Highway (marked 4 LANE), which led to the loss of several piers in the River Street area around the mouth of Nu‘uanu Stream. The 1953 map shows a park around Aloha Tower in the Aloha Tower complex.

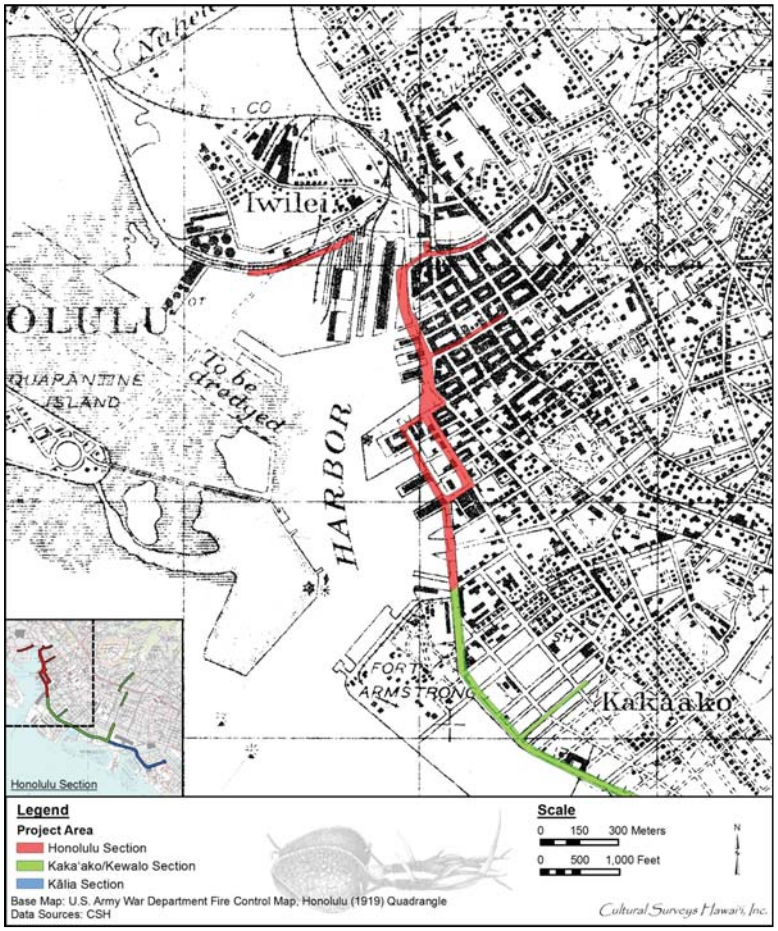

Figure 24. 1919 U.S. Army War Department Fire Control map of O'ahu, Honolulu quadrangle, showing location of the Honolulu section of the project area (shaded in red)

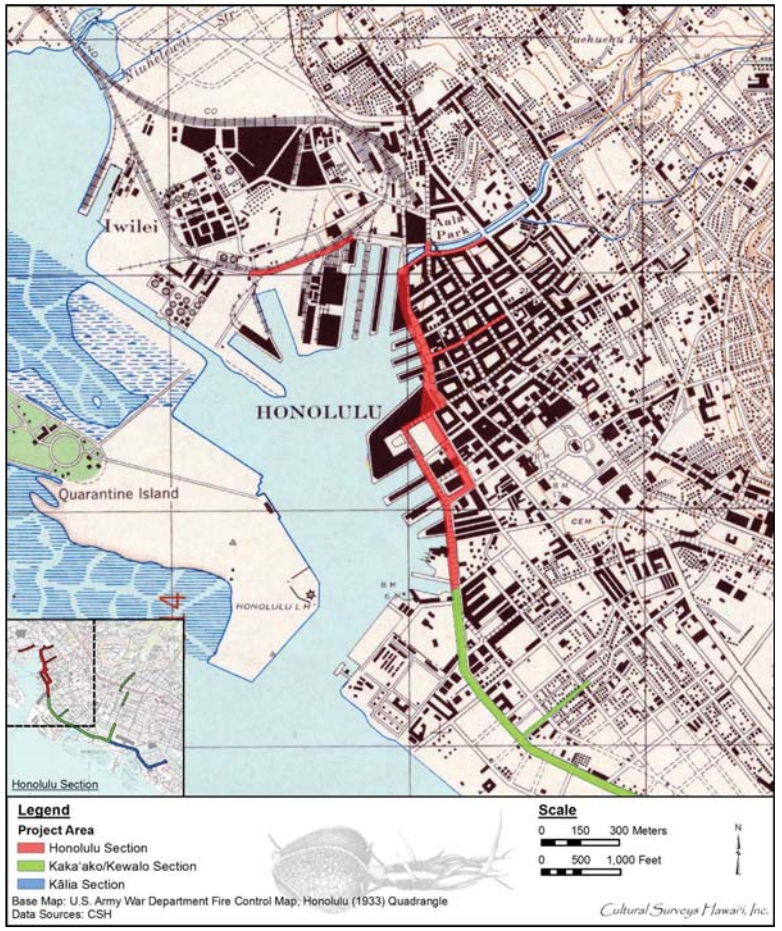

Figure 25. 1933 U.S. Army War Department Fire Control map of O'ahu, Honolulu quadrangle, showing location of the Honolulu section of the project area (shaded in red)

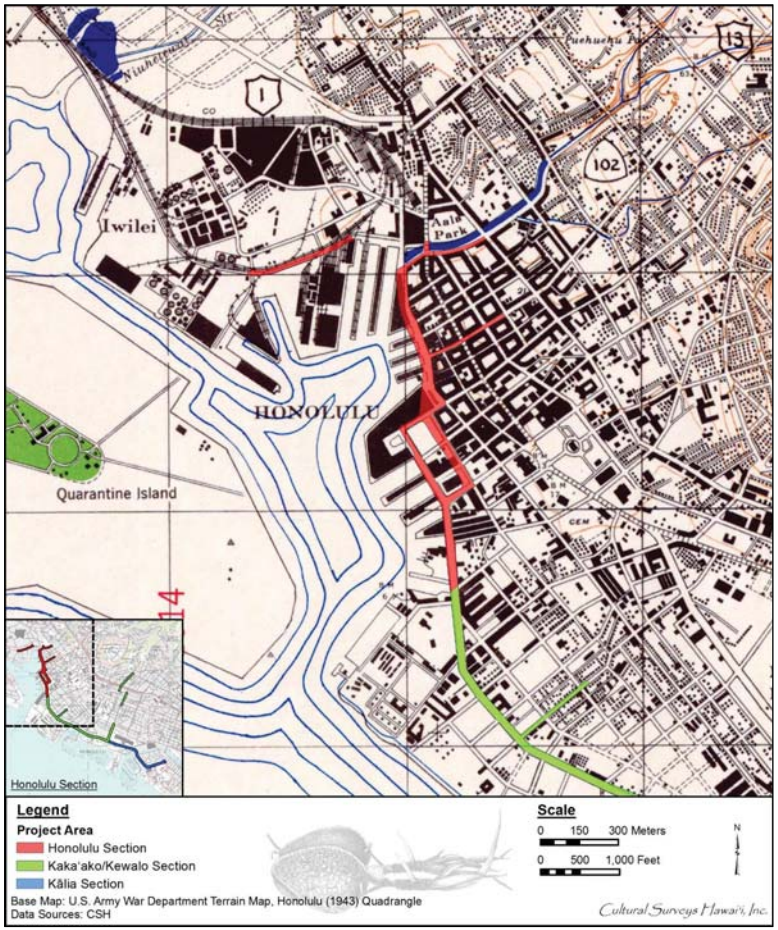

Figure 26. 1943 U.S. Army War Department Terrain map of O‘ahu, Honolulu quadrangle, showing location of the Honolulu section of the project area (shaded in red)

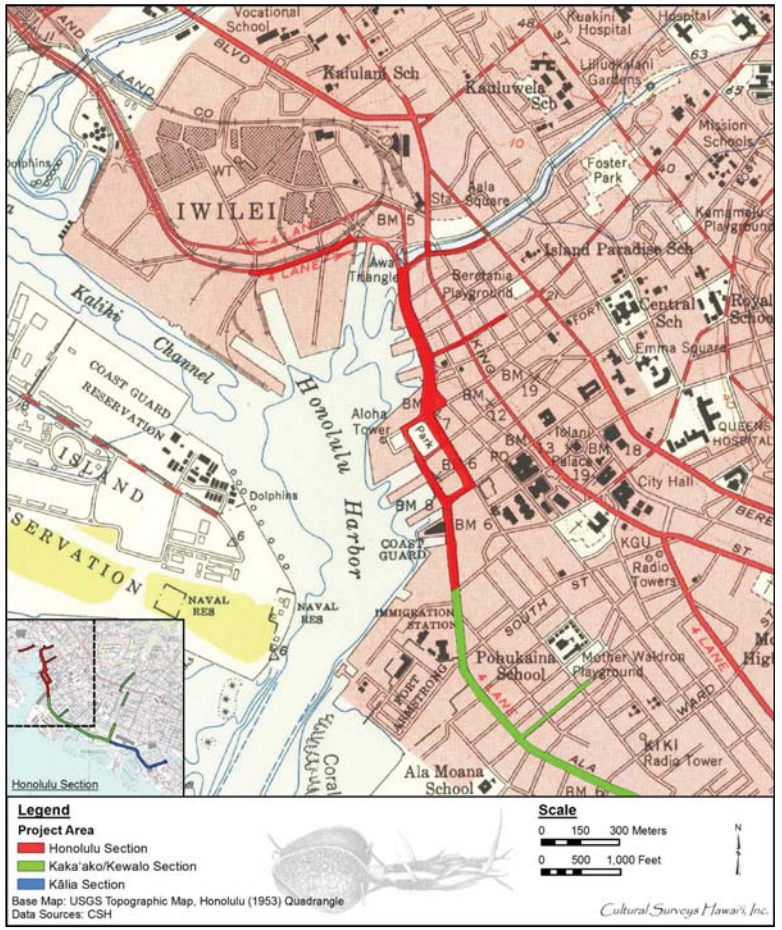

Figure 27. 1953 Honolulu USGS 7.5-Minute Series topographic quadrangle, showing location of the Honolulu section of the project area (shaded in red)



Figure 28. Nu‘uanu Stream mouth ca. 1883, before major work on Nu‘uanu Stream banks in 1886 and construction of River Street on the east bank, (former) Kaumakapili Church in background (Hawai‘i State Archives 1883)



Figure 29. Nu‘uanu Avenue 1880s, from harbor, view *mauka* (Hawai‘i State Archives)

4.2 Kaka‘ako

4.2.1 Early Historic Period

The modern urban area known as Kaka‘ako is located between two longtime centers of population: Honolulu, known as Kou in ancient times, and Waikīkī. In Waikīkī, a system of *taro lo‘i* (irrigated terraces) fed by streams descending from Makiki, Mānoa, and Pālolo valleys covered the coastal plain, and networks of fishponds dotted the shoreline. Similarly, Kou previously had fishponds and irrigated fields watered by streams descending from Nu‘uanu and Pauoa valleys. The pre-Contact population and land use patterns of the Kaka‘ako area may have derived from its relationship to these two densely populated areas. Thus, the attempt to reconstruct the region as it existed for the Hawaiians during the centuries before western Contact must begin with accounts of Kou.

The Pu‘unui and Ka‘ākaukukui area would have been in Hiram Bingham’s view as he stood atop “Punchbowl Hill” looking toward Waikīkī to the south; it would have comprised part of the area he describes as the “plain of Honolulu” with its “fishponds and salt making pools along the seashore.”

Another visitor to Honolulu in the 1820s, Captain Jacobus Boelen, hints at the possible pre-Contact character of Honolulu and its environs, including the Ka‘ākaukukui area:

> It would be difficult to say much about Honoruru. On its southern side is the harbor or the basin of that name (which as a result of variations in pronunciation [*sic*] is also written as Honolulu, and on some maps, Honoonoono). The landlocked side in the northwest consists mostly of taro fields. More to the north there are some sugar plantations and a sugar mill, worked by a team of mules. From the north toward the east, where the beach forms the bight of Whytetee, the soil around the village is less fertile, or at least not greatly cultivated. [Boelen 1988:62]

Boelen’s description implies that the Pu‘unui and Ka‘ākaukukui area is within a “not greatly cultivated” region of Honolulu, perhaps extending from Pūowaina (Punchbowl Crater) at the north, through Kaka‘ako, to the Kālia portion of Waikīkī in the west.

An early, somewhat generalized, depiction of the pre-Contact Native Hawaiian shaping of Waikīkī, Honolulu, and the Kaka‘ako areas was made by Otto von Kotzebue (1821), commander of the Russian ship *Rurick*, who had visited O‘ahu the previous year. His descriptions and map show *taro lo‘i* massed around the streams descending from Nu‘uanu and Mānoa valleys. Early historic population patterns were influenced by the post-Contact shift of the population to the area around Honolulu harbor—the only sheltered landing for large western-sized vessels on O‘ahu and the center of increasing trade with visiting foreign vessels. Kamehameha himself had moved from Waikīkī to Honolulu in 1809.

A clearer picture of Pu‘unui and Ka‘ākaukukui develops with accounts of other visitors and settlers in Honolulu during the first half of the nineteenth century. Gorman D. Gilman, who arrived in Honolulu in 1841, recalled in a memoir the limits of Honolulu during the early 1840s:

> The boundaries of the old town may be said to have been, on the makai [seaward] side, the waters of the harbor; on the mauka [inland] side, Beretania street; on the

> Waikīkī [east] side, the barren and dusty plain [i.e., the area just beyond Punchbowl Street], and on the Ewa [west] side, the Nuuanu Stream. [Gilman 1903:97]

Gilman further describes the "barren and dusty plain" beyond (east of) Punchbowl Street:

> The next and last street running parallel [he had been describing the streets running *mauka-makai*, or from the mountains to the shore] was that known as Punchbowl Street. There was on the entire length of this street, from the makai side to the slopes of Punchbowl, but one residence, the two-story house of Mr. Henry Diamond, mauka of King Street. Beyond the street was the old Kawaiahao church and burying ground. A more forsaken, desolate looking place than the latter can scarcely be imagined. One, to see it in its present attractiveness of fences, trees and shrubbery, can hardly believe its former desolation, when without enclosure, horses and cattle had free access to the whole place. [Gilman 1903:89]

That the environs of the missionary enclave and Kawaiaha'o Church were indeed "forsaken" and "desolate looking" in the 1820s when the missionaries first settled there is also noted in the memoirs of the American missionary C.S. Stewart. Arriving on Maui after living at the mission, Stewart declared Lahaina to be "like the delights of an Eden" after "four weeks residence on the dreary plain of Honoruru" (Stewart 1970:177).

4.2.2 Mid-Nineteenth Century and the Māhele

Among the first descriptions of Kukuluāe'o, Kewalo, and Ka'ākaukukui by the Hawaiians themselves are testimonies recorded during the 1840s in documents associated with land awards and awardees of the Great Māhele. A portion of a modern tracing of an 1884 map by S.E. Bishop shows the disposition of LCAs granted in the environs of the study area. The tracing includes some modern streets not present in 1884. These additions, however, permit an accurate positioning of the study area on the 1884 map. This general depiction is believed to be quite accurate, with the annotated "Beach Road," that runs along the edge of the sea becoming the present Ala Moana Boulevard/Nimitz Highway alignment.

The *'ili* of Kukuluāe'o (LCA 387) was awarded to the American Board of Commissioners for Foreign Missions (ABCFM). Initially this land was associated with Punahou School in Mānoa Valley, as Chief Boki gave the Punahou lands to Hiram Bingham, pastor of Kawaiaha'o Church in 1829 (DeLeon 1978:3). In the Māhele, however, this sea land became "detached" from the Mānoa award and was instead given to the pastor of Kawaiaha'o Church, as noted in a history of the Punahou School (Punahou School and Oahu College 1866). Curtis Perry Ward, a native of Kentucky, came to the Hawaiian Islands in 1853, and soon established a livery and draying business. In 1865, he bought a large 12-acre estate *mauka* (toward the mountain) of King Street.

Sometime before 1875, Ward added to his property with the purchase of 77 acres and 3,000 ft of ocean frontage in the *'ili* of Kukuluāe'o, *makai* of Queen Street.

The *'ili* of Kewalo (LCA 10605) was awarded to Kamake'e Pi'ikoi, wife of Jonah Pi'ikoi (awardee of Pualoalo 'Ili), as part of LCA 10605, *'Āpana* 7. The award was shared between husband and wife (Kame'eleihiwa 1992:269). Kewalo was a large 270.84-acre land section extending from Kawaiaha'o Church to Sheridan Street. This land section had numerous large fishponds, awarded as part of the claim to Pi'ikoi.

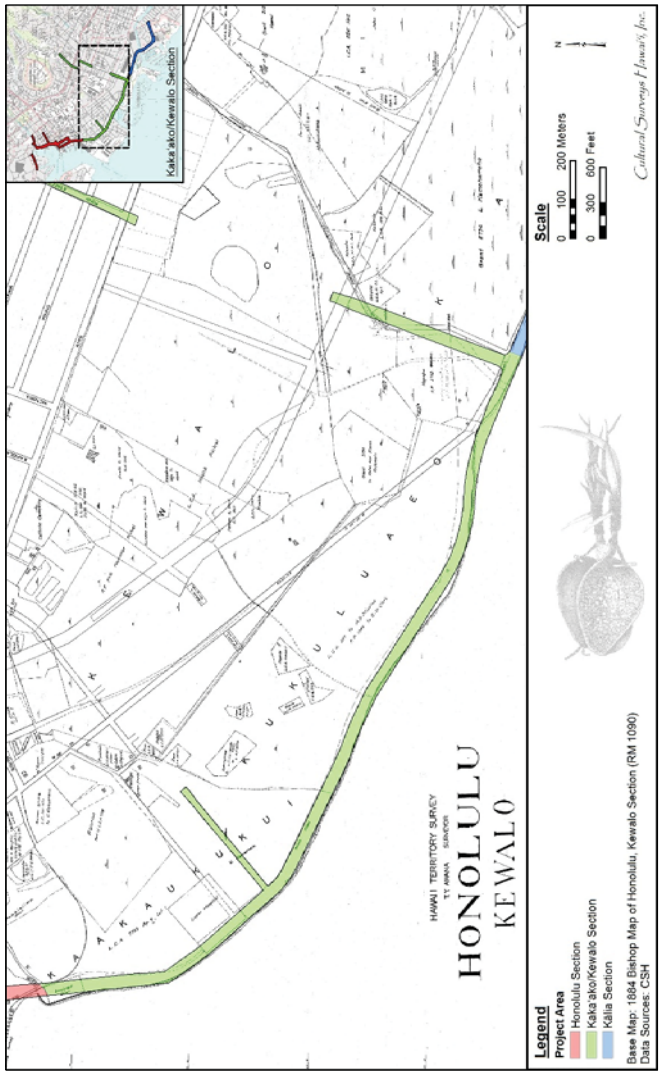

Figure 30. 1884 map (portion) of the Kaka'ako (Kewalo) section of the project area along Ala Moana Boulevard, Pi'ikoi Street, and Pensacola Street (Bishop 1884)

The *‘ili* of Ka‘ākaukukui (LCA 7713) was awarded to Victoria Kamāmalu, sister of Kamehameha IV and Kamehameha V. There were no awards to *maka‘āinana* in this *‘ili*, which seems to have consisted entirely of land used for salt making. No residences are shown in this area until the twentieth century. Ka‘ākaukukui consisted of three non-contiguous sections, a type of *‘āina* (land) called a *lele* (jump). An early surveyor for the Hawaiian Government Survey office explains about *lele* in general, and Ka‘ākaukukui in particular:

> There were two features of the ili, referred to by the terms lele . . . the ili often consisted of several distinct sections of land—one, for instance, on the seashore, another on dry, open land, or kula, another in the regularly terraced and watered kalo patch or aina loi district, and another still in the forest, thus again carrying out the equable division system which we have seen in the ahupuaa.
>
> These separate pieces were called, lele, i.e., ‘jumps,’ and were most common on O‘ahu . . . Kaakaukukui held Fisherman’s Point and the present harbor of Honolulu; then kalo land near the present Kukui street, and also a large tract of forest at the head of Pouoa [Pauoa] Valley . . .
>
> These different pieces were called variously, either by their own individual name or by that of the whole ili, thus puzzling one sadly when attempting to obtain information with respect to them. [Lyons 1894:1697]

The LCA records thus help clarify both the pre-Contact and mid-nineteenth century pictures of the study area vicinity. They suggest the traditional Hawaiian usage of the Kewalo region and its environs may have been confined to salt making and farming of fishponds, with minimal wetland agriculture in those areas *mauka* or toward Waikīkī at the very limits of the field system descending from Makiki and Mānoa. The characterization by a Native Hawaiian of the expanse within the present study area as the “salt plains of Honolulu” itself suggests the environmental limitations that would have made the general region less desirable for long-term permanent habitation by any sizeable population. However, the testimonies do indicate the area was lived on and was shaped by Hawaiians before the nineteenth century.

4.2.3 Mid- to Late 1800s

4.2.3.1 Kaka‘ako Salt Works and the Salt Pans of Kewalo and Kukuluāe‘o

As noted in the Land Commission Award testimony, much of the land in Ka‘ākaukukui was used to produce salt. The Hawaiians used *pa‘akai* (salt) for a variety of purposes: to flavor food, to preserve fish by salting, for medicines, and for ceremonial purposes. David Malo described the traditional method of making salt:

> *O ka paakai kekahi mea e pono ai, he mea e ono ai, ka ia, a me ke koekoe o ka paina ana, he mea hana ia ka paakai, ma kekahi aina, aole i hana a ma kekahi aina, o ke kai makai, e kii aku no ka wahine, a lawe mai ma ke poi, a ke kai hooholo ia mai kekahi ma kauwahi mai.*
>
> *E waiho kela kai ma kekahi poho paha, he ekaha paha, he kahe ka paha, a liu malaila, alaila lawe ana kauwahi e, a paakai iho la no ia, o ka papa laau ka mea kui poi.* [Malo 2006:73]

Translation

> *Pa‘akai* (salt) is another beneficial item. It is used to make fish delicious and tasteless foods edible. *Pa‘akai* is made at a particular place, [but] it [salt] is not actually made from this spot, rather it [salt water] came from the sea. A woman went to get some when the sea crashed [upon the rocks] and she ran back [the salt water] to this particular spot.
>
> That salt water (*kai*) is placed in, perhaps, a depression (*poho*) or a ‘Bird’s nest’ (*ēkeha*) or rock basin (*kāheka*) and allowed to evaporate (*liu*). Then it is taken to another spot and is formed into *pa‘akai*. Wooden boards (*papa lā‘au*) are used to pound poi (mashed cooked *kalo* corms) on. [Malo 2006:95]

In 1903, Nathaniel Emerson translated David Malo’s articles on early Hawaiian life. In his publication, the translations are not literal, but include information that Emerson added to clarify the accounts. In Emerson’s translation:

> Salt was one of the necessities and was a condiment used with fish and meat, also as a relish with fresh food. Salt was manufactured in certain places. The women brought sea-water in calabashes, or conducted it in ditches to natural holes, hollows and shallow ponds (kekaha) on the sea-coast, where it soon became strong brine from evaporation. Thence it was transferred to another hollow or shallow vat, where crystallization into salt was completed. [Malo 1951:123]

Captain Cook was the first to note the method of making salt in prepared “saltpans”:

> Amongst their arts, we must not forget that of making salt, with which we were amply supplied, during our stay at these islands, and which was perfectly good of its kind. Their saltpans are made of earth, lined with clay; being generally six or eight feet square, and about eight inches deep. They are raised upon a bank of stones near the high-water mark, from whence the salt water is conducted to the foot of them, in small trenches, out of which they are filled, and the sun quickly performs the necessary process of evaporation . . . Besides the quantity we used in salting pork, we filled all our empty casks, amounting to sixteen puncheons, in the Resolution only. [Cook 1784:151]

The export of salt declined in the late nineteenth century. Thrum (1924:116) states that the apex of the trade was in 1870, but by 1883 he noted that “pulu, salt and oil have disappeared entirely” from the list of yearly exports (Thrum 1884:68). By 1916, only one salt works, the Honolulu Salt Company, was still in operation. However, salt continued to be manufactured for local use. The Kaka‘ako Salt Works appears on maps as late as 1891 and a page in Victoria Ward’s ledger for 1883 notes a yearly income of $651.50 received from her “Salt Lands” in Kukuluāe‘o (Hustace 2000:50). As noted above, Thrum (1924:116) said the Honolulu Salt Company was the only salt producer on O‘ahu in 1916. A 1916 Commerce Report (Taylor 1916:723) states that the Honolulu Salt Company operates “salt beds at Puuloa, Kalihi, and Waikiki, on the island of O‘ahu . . . ” No mention is made of Kaka‘ako, suggesting the Kaka‘ako salt works had closed before 1916.

The traditional method of salt production was gradually replaced by the more labor intensive Chinese method, as the Chinese immigrants began to take over the traditional salt and fishponds of Honolulu in order to grow rice, to raise ducks, and to make salt. In a 1906 article, Rev.

Westervelt (1906:43-46) explained the Chinese method of salt evaporation for the Honolulu salt beds. The Chinese worker first used a water pump to draw the seawater from the larger ditch below to the salt evaporation beds above. The man moved the two handles back and forth to work the pump. The evaporation beds were lined with clay, wet with sea water, and tramped and pounded down. Each pan was about 20 ft square, covered with about 2 inches of water, and bound by an earth dyke. On early historic maps, the area of salt pans is often marked out as a large grid of contiguous squares.

After allowing the sun to evaporate some of the water, the worker stepped into the evaporation pan and scraped the salt into a pile in the center with a simple wooden scraper. The worker then threw a large basket-shaped scoop into the brine and used a tin dipper to move the salt to the basket. Two baskets, one on each side of a pole, were then carried on a worker's back across the thin earth dykes between the salt pans. The baskets were dumped into large drying piles, where the remaining water seeped out into the ground. The salt was then sewn into gunny sacks and sent to the market for sale.

By 1901, most of the fishponds and salt pans *makai* of King Street were reported as abandoned. In that year, the Hawai‘i Legislature proposed to build a ditch to drain away the "foul and filthy water that overflows that district at the present time."

> The district makai of King St. and the Catholic Cemetery, Ewa of Mrs. Ward's (the Old Plantation), mauka of Clayton St., and Waikiki of the land from King St., leading to the Hoomananaauao Church, consists of six large abandoned fish ponds and a large number of smaller ones, all in filthy condition, fed by springs and flowing into Peck's ditches. Just makai of these ponds, at the end of Clayton street, The rear portion of Mrs. Ward's property down to Waimanu St. used to be fish ponds all connecting to the sea by a ditch which is fed by an artesian well. These ponds, with the exception of three, are abandoned next to Mr. Ward's, is Peck's place. An artesian well flushing the wash houses flows into two foul ditches, thence to the big pond which is Waikiki of what used to be Cyclomere and next to Mrs. Ward's line [ditch] extending down to Waimanu St. [Hawai‘i Legislature 1901:185].

4.2.3.2 Honolulu Iron Works

In the 1850s, Hawaiian sugar planters became interested in a type of centrifugal machine that could separate sugar from molasses. An engineer named David Weston installed his version of this machine in a Maui sugar mill in 1851. With backing from Hawaiian businessmen, Weston returned to the Islands in 1853 and founded the Honolulu Iron Works, which he set up in a building already occupied by a flour mill (Kuykendall 1938:326-327). The flour mill was at first the most successful part of the business, where wheat from Maui and as far away as Chile was ground into flour and then exported to California. However, as the sugar industry became more prominent in the Hawai‘i economy, the Iron Works began to build the machinery needed to operate the new sugar mills, not only in Hawai‘i but all over the world. At one point, the Iron Works employed 1,500 workers, many of them living in the Kaka‘ako area (Nicol 1998:510).

Business began to decline in the 1950s, and in 1973 the works closed (Nicol 1998:510). At first the old buildings were converted to retail space, but eventually all were torn down; the last

warehouse was demolished in 1982 (Kawasaki 2005:2). The main lot for this complex is now covered by One Waterfront Plaza, west of the current project area.

4.2.3.3 Curtis and Victoria Ward and the "Old Plantation"

The Ward Estate once covered a large portion of the Kaka‘ako Mauka District. The area north of Queen Street was within the *‘ili* of Kewalo and was part of LCA 272 to Joseph Booth. Joseph Booth was an early English resident of the Hawaiian Islands who operated a saloon and hotel in Honolulu, known at the time of the Māhele as the Eagle Tavern. He was granted lands in downtown Honolulu (where the tavern was located), in Kewalo Uka (Pacific Heights area), in the *‘ili* of Kapuni, and in an area with "three fish ponds, and a part of the plain near the road leading to Waikiki." Little information on these three fishponds is given in the LCA testimony, but the Royal Patent No. 306 for these lands mentions one known as "the large fishpond" or "long fishpond" (*loko ia nui*), which had two huts beside it. This pond would later be modified into the "lagoon" on the Ward estate.

Curtis Perry Ward, a native of Kentucky, came to the Hawaiian Islands in 1853 and soon established a livery and draying business, moving goods from the harbor to Honolulu town and loading goods at the docks for the whaling and shipping industries. In 1865, he married Victoria Robinson, who was descended from the Hawaiian *ali‘i* and early French and British residents. For his new family, Ward purchased at auction the 12-acre estate of Joseph Booth, Royal Patent 306, and additional contiguous lands in the Kō‘ula area in 1870 (Hustace 2000:21-25). This constituted the *mauka* portion of "Old Plantation" from Thomas Square on King Street to the *makai* border at Waimanu Street. A few years later (before 1875), Ward added to his property with the purchase of 77 acres and 3,000 ft of ocean frontage in the *‘ili* of Kukuluāe‘o, *makai* of Queen Street. The Wards had a permanent easement for the *‘auwai* (ditch) that extended from the long fishpond to the sea through the Kukuluāe‘o section. Makaloa grass, used to make mats and hats, grew along this *‘auwai* and was one source of income for the family.

4.2.4 1900s

4.2.4.1 Kaka‘ako Reclamation

By the 1880s, filling-in of the mud flats, marshes, and salt ponds in the Kaka‘ako and Kewalo areas had begun. This filling-in was pushed by three separate but overlapping improvement justifications. The first directive or justification was for the construction of new roads and the improvement of older roads by raising the grade so the improvements would not be washed away by flooding during heavy rains.

Although public health and safety were prominently cited according to Nakamura (1979:113), the main focus for filling in Honolulu, Kewalo, and then Waikīkī lands was to provide more room for residential subdivisions, industrial areas, and finally tourist resorts. In the early part of the twentieth century, Kaka‘ako was becoming a prime spot for large industrial complexes, such as iron works, lumber yards, and draying companies, which needed large spaces for their stables, feed lots, and wagon sheds.

In 1904, the area around South Street from King to Queen streets was filled in. The Hawaii Department of Public Works (1904:117) reported that "considerable filling [was] required" for the extension of Queen Street, from South Street to Ward Avenue, which would "greatly relieve the district of Kewalo in the wet season."

4.2.4.2 Kewalo Reclamation Project

Although the Board of Health could condemn a property and the Department of Public Works could then fill in the land, the process was rather arbitrary and piecemeal. In 1910, after an epidemic of bubonic plague, the Board of Health condemned a large section of Kewalo, consisting of 140 land parcels (including areas once known as Kukuluāe‘o and Ka‘ākaukukui), which had numerous ponds (Hawai‘i Department of Public Works 1914:196).

In 1914, the entire

> . . . locality bounded by King street, Ward avenue, Ala Moana and South street, comprising a total area of about two hundred acres, had been found by the board of health of the Territory to be deleterious to the public health in consequence of being low and below ‘the established grades of the street nearest thereto’ and at times covered or partly covered by water and improperly drained and incapable by reasonable expenditure of effectual drainage, and that said lands were in an insanitary and dangerous condition [Hawaii Reports 1915:329].

The first land to be filled in was the portion of the Ward Estate Kukuluāe‘o property west of Ward Avenue; it was completely filled in by June 1913. By August, the rest of the Ward Kukuluāe‘o lands west of Ward Avenue had been completely filled, and by February 1914, all of the land from South to Ward streets, and from Ala Moana Boulevard to Queen Street had been filled.

The expense of the suit did manage to shut down operations planned for the area from Ward Street to Waikīkī (Thrum 1916:159-160), an area that includes the present project area. This land was mainly owned by the Bishop Estate, who leased the land to small farmers growing taro and rice and raising ducks in the ponds. In 1916, the Bishop Estate announced that as soon as their present tenant leases expired they planned to fill the lands and divide them into residence and business lots (Larrison 1917:148-149). In 1919, a portion of the coastal section of the Bishop Estate lands was secured by the government in order to expand the Kewalo Basin (Thrum 1920:148).

4.2.4.3 Kewalo Basin Dredging

Prior to dredging, Kewalo Basin was a natural deep pocket in the reef seaward of Ala Moana Boulevard between Ward Avenue and Kamake‘e Street. It had been used as a canoe landing in pre-Contact times. In 1919, the Hawai‘i Government appropriated $130,000 to improve the small harbor of Kewalo for the aim of “harbor extension, in that it will be made to serve the fishing and other small craft, to the relief of Honolulu harbor proper” (Thrum 1920:147). As the area chosen for the harbor was adjacent to several lumber yards such as the Lewers & Cooke yards, the basin was initially made to provide docking for lumber schooners, but by the time the wharf was completed in 1926, this import business had faded, so the harbor was used mainly by commercial fishermen. The dredged material from the basin was used to fill a portion of the Bishop Estate on the western edge of Waikīkī and some of the Ward Estate in the coastal area east of Ward Avenue (U.S. Department of the Interior 1920:52). In 1941, the basin was dredged and expanded to its current 55 acres. In 1955, dredged material was placed along the *makai* side to form an 8-acre land section protected by a revetment, now part of the Kewalo Basin Park (Kewalo Basin Harbor 2013).

In the case of Kewalo Basin, most of the land between it and Fort Armstrong to the northwest had been previously filled (ca. 1900-1920). The area between Kewalo Basin and Fort Armstrong

makai of Ala Moana became a part of Kaka‘ako called “Squattersville.” “All Squattersville, like Gaul, is divided into three parts. There is the original settlement at Kewalo Basin Point, there is a tiny offshoot of this and there is the later settlement along Ala Moana” (Johnson 1991:111). The later (ca. 1925-1930) dredging and filling created Ala Moana Beach Park and commercial dock space at the Ala Wai and Kewalo Basins.

4.2.4.4 Fort Armstrong

After the U.S. occupation of the Islands in 1898, the U.S. Congress began to plan for the coastal defenses of their new territory. Major batteries were placed at Pearl Harbor and in Waikīkī. The United States government also claimed 76 acres of former Crown Lands on Fisherman’s Point at a place called “Emmes Wharf Site” (U.S. House of Representatives 1906:33). The reservation was built on new land that had been dredged from the harbor and dumped behind a large seawall seaward of the Immigration Station. The Ka‘ākaukukui Reef Military Reservation was established as a station for the storage of underwater mines, which would be placed at the outer entrance to Honolulu Harbor as a last resort before an attack. Early, the reservation was called “Camp Very,” named possibly after the Rear Admiral Samuel W. Very who complained in 1908 in a letter to the Medical Office that as only six officers were assigned to permanent duty at the reservation, he acted not only as the Commandant of the reservation but also as the Acting Civil Engineer, Head of Department, Captain of the Yard, and Ordnance Officer (Naval History and Heritage Command 2010).

In 1909, the reservation was expanded and renamed Fort Armstrong, after General Samuel Chapman Armstrong (1839–1893), who was born on Maui, graduated from Punahou and was a hero of the Union defense of Cemetery Ridge at Gettysburg. Battery Tiernon, with two M1903 3-inch guns, was built at this site in 1911, and took over the job of saluting visiting naval vessels once performed by the Kaka‘ako battery (Williford and McGovern 2003:15).

The early fort does not seem to have been very impressive. William Castle in 1917 noted the following:

> Fort Armstrong is the saluting station for the port of Honolulu. It is built on the Kaakaukukui Reef, one mile from the centre of the city and at the entrance of the harbour. Its area is 64 acres, and it has as garrison the 104th Company (mine) of the Coast Artillery Corps. Both officers and men are wretchedly housed in temporary board and batten shacks, although the fort has been in use for three years. [Castle 1917:90]

The fort saw some small action during World War I. The military authorities closed Honolulu Harbor between sunset and sunrise in October 1917. The steamer *Claudine*, which was sailing from Maui when the edict went into effect, sailed into Honolulu Harbor unknowingly after twilight. The coast artillery at Fort Armstrong shot a few shells across her bow, and the steamer quickly reversed her engines and went back out to sea until the following morning when she could safely and legally come to shore (Thomas 1983:147).

During the Japanese attack on 7 December 1941, the fort escaped relatively unscathed; only one motor pool structure was hit. Antiaircraft shells were fired from the fort, but were ineffective; at least one hit the town rather than any aircraft (Richardson 2005:34). During World War II Fort Armstrong served as a vital trans-shipment point for supplies sent to the Western Pacific, and

Battery Tiernon’s guns were once again manned by coast artillery crews. After the war, Army shipping dwindled and the batteries were deactivated and the guns were scrapped. Fort Armstrong became the headquarters of the Corps of Engineers. In 1948 the City and County of Honolulu constructed a new seawall 500 ft south of the old shoreline, filling the space with debris from the nearby Kewalo Incinerator, and covering the last remnants of the Ka‘ākaukukui Reef (Dorrance 1997:16).

By 1968, most of Fort Armstrong had been transferred to the State of Hawai’i, which used the area to expand the shipping piers of the harbor and continued to use the land near the ocean as a rubbish landfill. By 1982, all of the former Fort Armstrong buildings in the project area had been demolished and the lands paved over. In 1992, the municipal landfill was landscaped to create the 35-acre Kaka‘ako Waterfront Park (Dorrance 1997:16).

4.2.4.5 Kaka‘ako Reclamation

By the 1880s, infilling of the mud flats, marshes, and salt ponds in the Kaka‘ako area had begun. This infilling was driven by three separate, but overlapping, improvement justifications. The first directive was for the construction of new roads and improving older roads by raising the grade so the improvements would not be washed away by flooding during heavy rains. A report by the Hawaii Board of Health noted the following:

> I beg to call attention to the built-up section of Kewalo, ‘Kaka‘ako,’ where extensive street improvements, filling and grading have been done. This, no doubt, is greatly appreciated and desirable to the property owners of that locality, but from a sanitary point of view is dangerous, inasmuch as no provision has been made to drain the improved section, on which have been erected neat cottages occupied for the greater part by Hawaiian and Portuguese families, now being from one to three feet below the street surface, and which will be entirely flooded during the rainy season. Unless this is remedied this locality will be susceptible to an outbreak [of cholera) such as we experienced in the past. [Hawaii Board of Health 1908:80]

As mentioned in the above section, the justification for infilling of low-lying areas most frequently cited was public health and sanitation: the desire to clean up rivers and ponds that were reservoirs for diseases such as cholera and acted as breeding places for rats and mosquitoes. Thus, as early as 1902, it is reported that

> The Board has paid a great deal of attention to low-lying stagnant ponds in different parts of the city, and has condemned a number of them. The Superintendent of Public Works has given great assistance to seeing that the ponds condemned by the Board are filled. In September a pond on South Street was condemned as deleterious to the public health. [Hawaii Board of Health 1902:80]

The first areas to be filled were those closest to Honolulu, then moving outwards to Kaka‘ako (Griffin et al. 1987:13). The first fill material may have been set down in 1881 for the Kaka‘ako Leper Branch Hospital, which had been built on a salt marsh. Laborers were hired to “haul in wagonloads of rubble and earth to fill up that end of the marsh” (Hanley and Bushnell 1980:113). In 1903, five more lots in Kewalo on Ilaniwai, Queen, and Cooke streets were condemned and ordered to be filled (Hawaii Board of Health 1903:6).

Although public health and safety were prominently cited, according to Nakamura (1979:43), the main aim for infilling Honolulu, Kewalo, and then Waikīkī lands was to provide more room for residential subdivisions, industrial areas, and finally tourist resorts. In the early part of the twentieth century, Kaka‘ako was becoming a prime spot for large industrial complexes, such as iron works, lumber yards, and draying companies, which needed large spaces for their stables, feed lots, and wagon sheds. In 1900 (Thrum 1900:172), the Honolulu Iron Works, which produced most of the large equipment for the Hawaiian plantation sugar mills, moved from their old location at Queen and Merchant Street near downtown Honolulu to the shore at Kaka‘ako, on land that had been filled from dredged material during the deepening of Honolulu Harbor. Other businesses soon followed. Thrum (1901:168) noted the following:

> The Union Feed Co. is another concern whose business has outgrown the limits of its old location, corner of Queen and Edinburgh streets. Like the Iron Works Co. they have secured spacious premises at Kakaako, erecting buildings specially adapted to the needs of their extensive business at the corner of Ala Moana (Ocean Road) and South Street. [Thrum 1901:168]

Private enterprises were not the only new occupants of Kaka‘ako. A sewer pumping station, an immigrant station, and a garbage incinerator were also built on “reclaimed land.” Thrum noted,

> The dredging of Honolulu harbor and its channel is completed as far as planned for the present . . . the material there from being used to fill in a large area of Kakaako and the flats in the vicinity of the sewer pumping station and garbage crematory. [Thrum 1907:148-149]

For the incinerator, Thrum noted,

> The new station is built on piles on reclaimed land that is being filled in from the coral dredgings that is going on, and is gradually taking on a tropical appearance. . . . Adjoining its premises on the mauka side is the new building designed for the Planters’s Association for their labor bureau. [Thrum 1907:148-149]

4.2.4.6 Kewalo Reclamation Project

Although the Board of Health could condemn a property and the Department of Public Works could then fill in the land, the process was rather arbitrary and piecemeal. In 1910, after an epidemic of bubonic plague, the Board of Health condemned a large section of Kewalo (including areas in Pu‘unui and Ka‘ākaukukui), consisting of 140 land parcels that had numerous ponds (Hawaii Department of Public Works 1914:196).

In 1914, the entire

> . . . locality bounded by King street, Ward avenue, Ala Moana and South street, comprising a total area of about two hundred acres, had been found by the board of health of the Territory to be deleterious to the public health in consequence of being low and below ‘the established grades of the street nearest thereto’ and at times covered or partly covered by water and improperly drained and incapable by reasonable expenditure of effectual drainage, and that said lands were in an insanitary and dangerous condition. [Hawaii Supreme Court 1915:329]

The superintendent then sent a letter to all the property owners, informing them that they must fill in the lands to the grade of the street level within 60 days. Only a few of the landowners complied, using a variety of materials for the task. Most of the landowners did not comply with the notice and in 1912 the bid was given to Lord-Young Engineering Company to fill in the land with “sand, coral, and material dredged from the harbor or reef and the depositing of the same upon the land by the hydraulic method” (Hawaii Supreme Court 1915:331). The affected landowners sued to stop the work and in the suit the method of hydraulic filling is described.

> By this [hydraulic] method the material dredged is carried in suspension or by the influence of water which is forced through large pipes and laid upon the lands and intervening streets, and afterwards is distributed and leveled, the water having drained off through ditches provided for the purpose. The work is done in large sections around which bulkheads have been constructed. A section can be filled in about thirty days, the dredger working about fifteen hours per day. And in about two months after a section has been filled the ground will have dried out so as to be fit for use as before . . . The character of the material varies from very fine sand to coarse bits of coral . . .
>
> It appears in evidence that though the method employed the finest of the material which is carried upon the land settles when the water which transports it becomes quiet and as the water runs off a sludge or mud remains which forms a strata more or less impervious to water. This strata, however, is covered by the coarser and more porous material . . . it appears that by mixing in to a depth of a few inches ordinary soil small plants will grow without difficulty . . . The character of the locality must be considered. It is not adapted to agriculture, but is suited more particularly to such business purposes as it now partly used for, such as stables, laundries, warehouses, mills, etc., and for cottages with small yards for the accommodation of laborers engaged in connection therewith. Upon the whole, we are of the opinion that the material proposed to be used in the fill-in of the lands of the complainants is not of a character as should be held to be improper for any of the reasons urged. [Hawaii Supreme Court 1914:351]

The first land to be filled in was the portion of the Ward Estate property west of Ward Avenue, which was completely filled in by June 1913. In July, “25,000 cubic yards of sand and ground-up coral were deposited on the Bishop Estate property in the vicinity of Ala Moana and Keawe Street, the reason for shifting operations to this part of the district being that the Hawaiian Sugar Planter’s Association had erected a reinforced concrete building there and wished to have the lot brought to grade” (Hawaii Department of Public Works 1914:198). By August, the remaining Ward Estate lands west of Ward Avenue had been completely filled in. By February 1914, all of the land from South Street to Ward Avenue and from Ala Moana Boulevard to Queen Street had been filled, including the current project area.

4.2.5 Twentieth Century Development of Kaka‘ako

Late nineteenth century maps show the emerging traces of the future development in Kaka‘ako as a grid of roads extending southeast from Honolulu toward Waikīkī. Queen Street, which was planned to connect to the beach road near Waikīkī, appears to follow the route of the traditional trail from Honolulu to Waikīkī as described by John Papa ‘Ī‘ī (1959:93). This trail likely traversed

a sand berm raised above the surrounding marshlands and coral flats, probably near Queen Street. The late nineteenth century maps indicate the vicinity of the current project area remained marshland with fishponds and salt ponds. An 1848 sketch and a 1888 photograph (Figure 31 and Figure 32) of the Ward estate shows the pre-twentieth century landscape of Kaka‘ako with its barren shore and scattered fishponds.

Kaka‘ako and Kewalo were considered outside the Honolulu town boundary and were used in the mid- to late nineteenth century as a place for cemeteries, burial grounds, and for the quarantine of contagious patients. Then in the beginning of the twentieth century, the area was used as a place for sewage treatment and garbage burning, finally becoming an area for cheap housing and commercial industries (Griffin et al. 1987:13).

A series of U.S. Army War Department and USGS topographic maps and aerial photographs (Figure 33 through Figure 37) show the development of urban development and road construction in the twentieth century.

A 1919 U.S. War Department map of O’ahu shows residences clustered around Queen Street and Ward Avenue. There were still many ponds east of Ward Avenue, especially at the future site of McKinley High School, and the area east along the coast, which would be developed into the Ala Moana Shopping Center and Park. There is a trail along the eastern boundary of the project area that aligns with the *makai* end of Victoria Street, which connects the residential areas around King Street to the residential areas along Queen Street. The area east of Fort Armstrong has only recently been filled, but is not yet developed. Kewalo Harbor does not as yet exist.

A 1927 aerial photograph shows areas still marshland, fishponds, and recently filled wetlands (white areas on the photo showing surface coral fill) (Figure 34). Kewalo Basin has been dredged by this time but the east side is still in reef flats. Whereas much of the fill in the northwest portion of Kaka‘ako Makai is understood to have been relatively clean coral and sand dredge material, much of the fill in the southeast portion of Kaka‘ako Makai is understood to have been from decades of open trash burning. McKinley High School, completed in 1923, appears on the upper right of the photograph, but the *makai* portion of the campus is till undeveloped.

The 1933 U.S. Army War Department map indicates development of Kaka’ako focused in the area from Punchbowl to South Street and north of Queen Street. The land was inhabited more than is evident from this map. The Ward family leased to the Japanese lands for camps, schools, playgrounds, temples, and shrines. Kaka‘ako was one of the first residential areas for working class families, housing people working at the laundries, the harbor, the Honolulu Iron Works, the Honolulu Brewery, and truck drivers, seamen, and fishermen. In 1940, Kaka‘ako had a population of over 5,000 residents. Hawaiians, Portuguese, Chinese, and Japanese settled in camps based on their ethnic origins, but they came together for social and community functions. Most of the streets east of South Street are in the planning stages only or undeveloped (dirt roads), as they are marked on the map by dashed rather than solid lines. The map shows the completion of part of the east side of Kewalo Basin as a result of the creation of Ala Moana Park. Barely discernable on the west side of Kewalo Basin is the City & County incinerator built in 1930 (and replaced in 1946; the surf break is still called “Incinerators”). It is understood that the products from incineration were generally used right there as land fill.

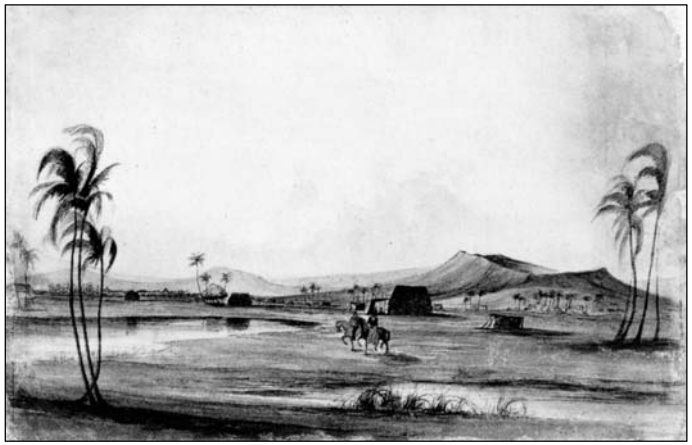

Figure 31. 1848 watercolor, “Looking toward Honolulu from Waikiki,” of Kaka‘ako-Kālia area by John Mix Stanley, private collection (Forbes 1992:93)



Figure 32. Ward Estate 1888, looking *makai* down lagoon to Kaka‘ako shore (Hustace 2000:20)

After World War II, the Kaka‘ako area became increasingly industrialized and residents moved out to the newer subdivisions away from the central Honolulu area. A 1943 U.S. War Department map (see Figure 36) is the first to show the newly developed Kewalo Basin. The Kewalo Channel had been dredged in 1924 and the McFarlane Tuna Company (now Hawaiian Tuna Packers) built a shipyard there in 1929 for their fishermen’s “sampan fleet.” The 1943 map shows the northern and western areas of Kaka‘ako developed for commercial and residential purposes, but the eastern section is still relatively empty, with only planned or undeveloped streets (marked by dashed rather than solid lines). Much of this area is filled only with large warehouses or open lumber yards. Completed and planned dredging offshore is shown by the blue lines and the proposed new shoreline made of fill and dredged material is denoted by a dashed blue line.

By 1953, Kewalo Basin has been completely excavated, the area from Fort Armstrong to Ward Street has been filled to make new land, and Ala Moana Park has been formed from new dredged and filled land *makai* of Ala Moana Boulevard. The 1953 map (see Figure 37) shows a fully developed Kaka‘ako with neighborhoods, schools, and numerous streets with governmental, commercial, and industrial areas. By this time, the entire area *makai* of Ala Moana Boulevard had been dredged and the area *makai* of the boulevard filled to create Ala Moana Park.

4.2.6 Pi‘ikoi and Pensacola Segments

The Kaka‘ako project area includes three non-continuous segments, one upper and one lower segment on Pi‘ikoi Street and one segment on Pensacola Street. The Pi‘ikoi segments would be within the traditional *‘ili* of Kewalo, but the Pensacola Street segment extends into the *ahupua‘a* of Makiki. The lower segment of Pi‘ikoi is at the traditional boundary between the *‘ili* of Kukuluāe‘o and Kālia, and thus also the boundary between the *ahupua‘a* of Honolulu and Waikīkī (see Figure 30), which was marked by a high sand berm, used as a *mauka/makai* trail. The upper Pi‘ikoi segment and the Pensacola segment are in an area once known as “The Plains.” This seems to have consisted of area in the lands of Kaka‘ako, Kewalo, Makiki, Pāwa‘a, and Mō‘ili‘ili (Fitzpatrick 1989:25). A survey of this area was mapped by a government surveyor, Theophilus Metcalf, in 1846, who labeled the area as Kulaokahu‘a, which translates as “the plain of the boundary” (Pukui et al. 1974:123). The flat plains were perfect for horse racing, and the area between present-day Pi‘ikoi and Makiki Streets was a well-known racing track (Peterson 1984:371).

A cemetery is associated with Kulaokahu‘a, which was located close to the upper Pi‘ikoi and Pensacola segments of the project area, although the exact location of this cemetery is unknown. The first interment at this cemetery may have been as early as 1794. In this year, Mr. Kendrick, captain of the American ship *Lady Washington*, was accidentally killed by a shot fired in salute by the British ship *Jackal*, as both ships were anchored in Honolulu Harbor (Cartwright 1922:23).

In 1802, Captain Charles Derby, commander of the ship *Caroline*, died at Honolulu and was buried “somewhere on the plains east of Kawaiaha‘o where the prostrate stone was found, but not the grave” (Mellen 1940:5). The “prostate stone” is now in the Kawaiaha‘o Church Cemetery at the corner of King Street and Punchbowl. The church was on a major cross-*ahupua‘a* trail that extended from Honolulu Harbor to Wai‘alae past Diamond Head. This trail is now covered by the present alignment of King Street and Wai‘alae Avenue. This means that the true burial spot for Captain Derby must have been further east of Kawaiaha‘o Church, in Kewalo or the dusty plains

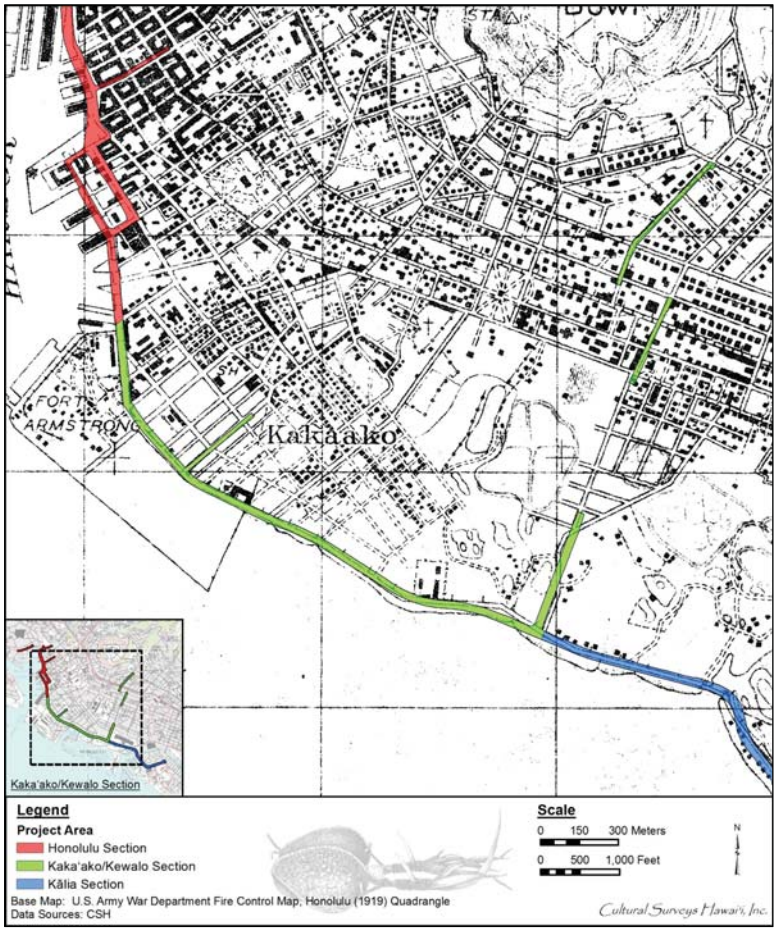

Figure 33. 1919 U.S. Army War Department Fire Control map of O'ahu, Honolulu quadrangle, showing location of the Kaka'ako section of the project area (shaded in green)

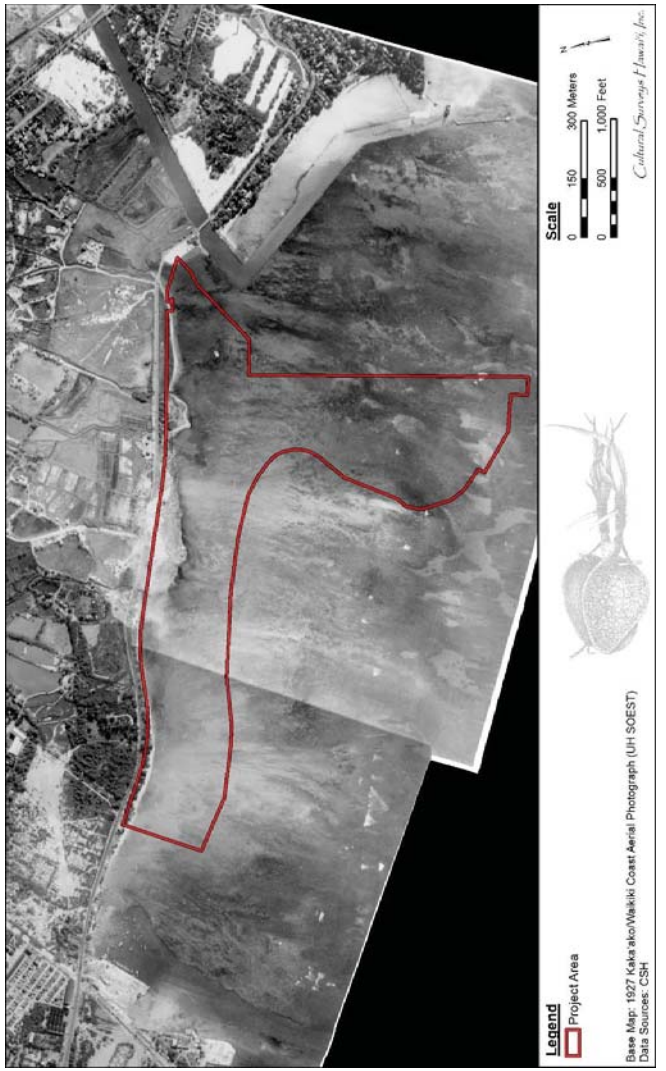

Figure 34. 1927 aerial photograph

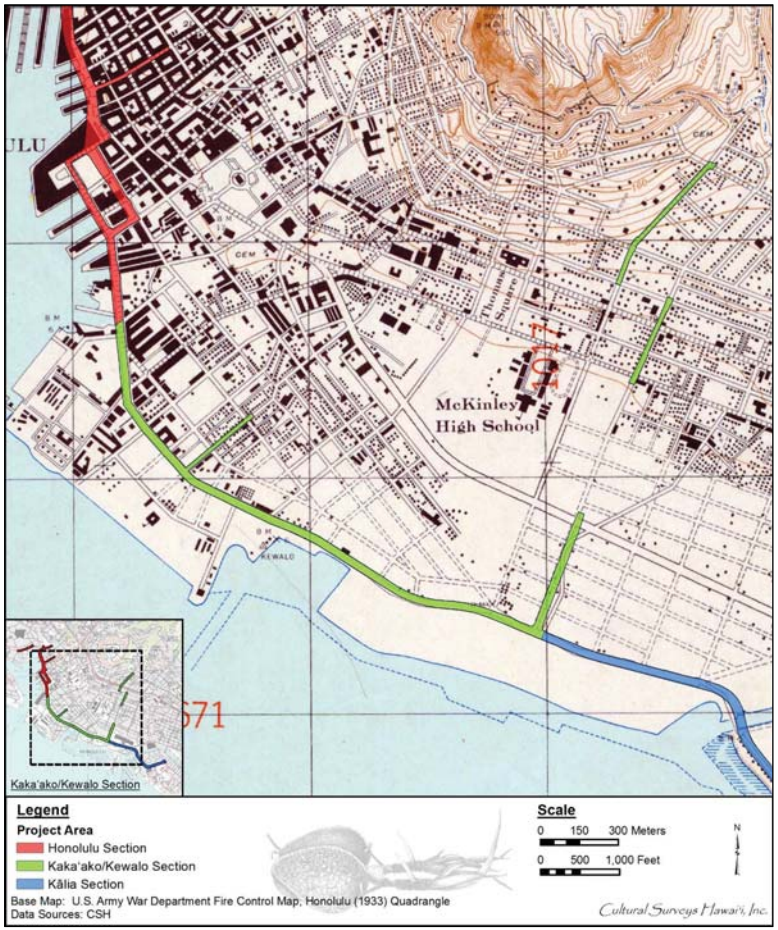

Figure 35. 1933 U.S. Army War Department Fire Control map of O‘ahu, Honolulu quadrangle, showing location of the Kaka‘ako section of the project area (shaded in green)

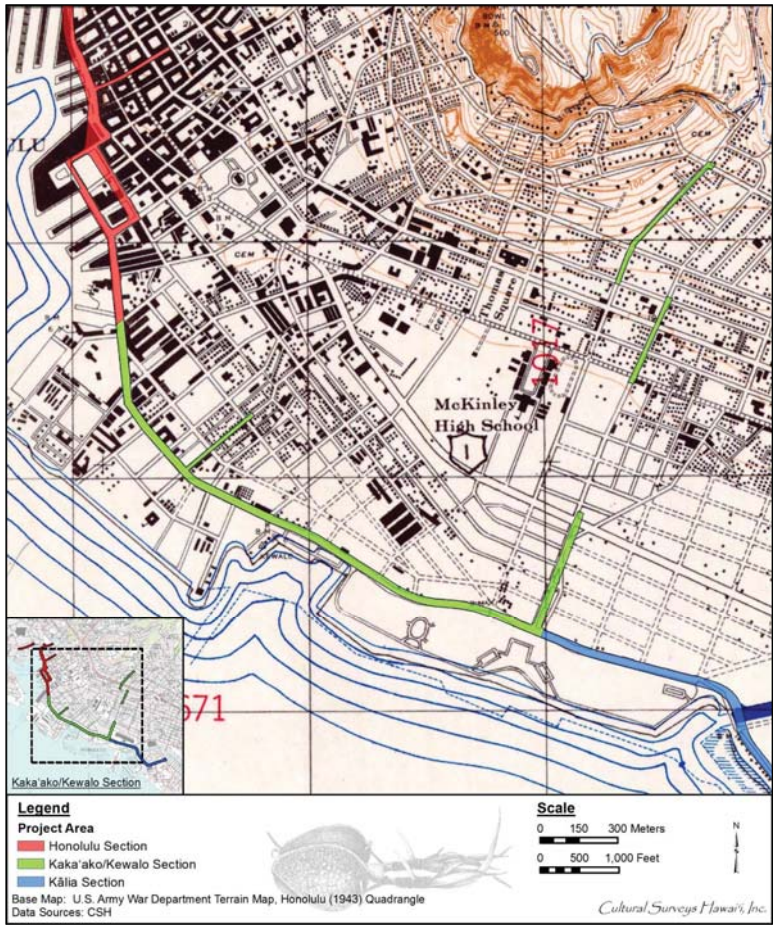

Figure 36. 1943 U.S. Army War Department Terrain map of O‘ahu, Honolulu quadrangle, showing location of the Kaka‘ako section of the project area (shaded in green)

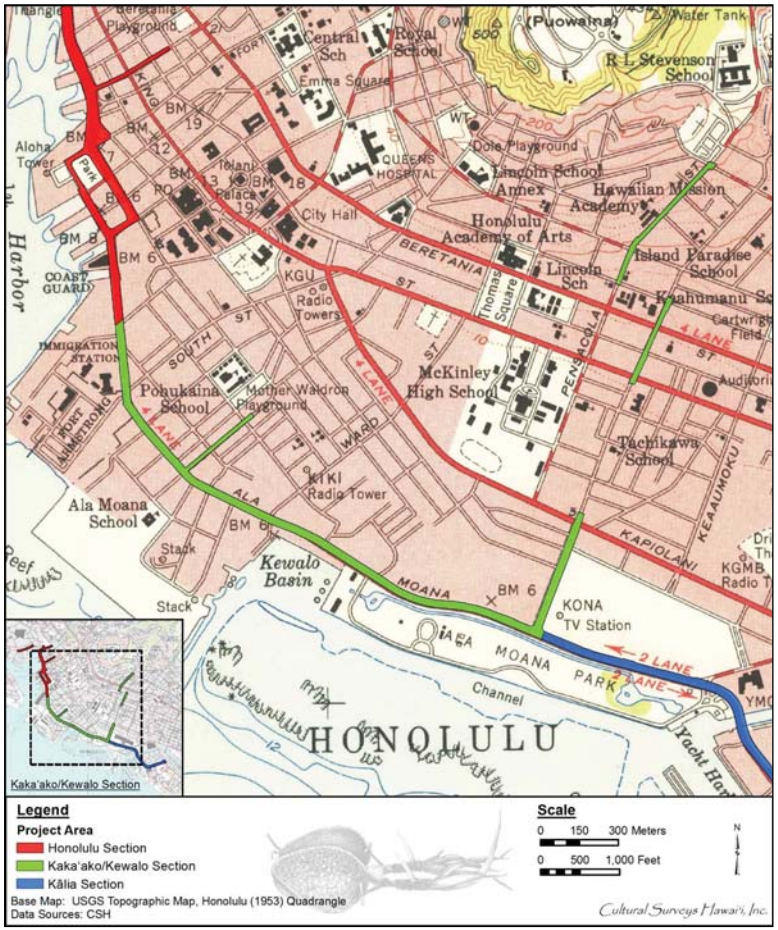

Figure 37. 1953 Honolulu USGS 7.5-Minute Series topographic quadrangle, showing location of the Kaka'ako section of the project area (shaded in green)

of Honolulu. Richard Cleveland visited the burial spot in 1803, describing it as in a verdant spot.

> . . . I made a long excursion on shore, among the beautiful rural scenery in the neighbourhood of the [Whyteete] bay. In a retired spot, clothed with verdure and surrounded by cocoanut trees, my guide pointed to the grave of my old friend and former shipmate, Charles Derby, who died here last year, on board a Boston ship, which he commanded, from the Northwest Coast. [Cleveland 1842, Volume 1:232]

An anonymous note in the *Papers of the Hawaiian Historical Society* (1929:6) asserts that this cemetery was at the corner of King and Pi'ikoi Streets.

> In 1802, Captain Charles Derby, of the well-known Derby family of Salem, Mass., died in Honolulu and was buried in a lot set apart for the interment of foreigners, situated at what is now near the corner of Piikoi and King Streets. When this burying ground was abandoned the tombstone at the head of the Derby grave was removed to the Kawaiahao churchyard. It was lately discovered to be face downward in the rear of the Mission cemetery. [Hawaiian Historical Society 1929:6]

John Papa 'Ī'ī's gave an account of the death in 1810 of Isaac Davis, an American sailor who had settled in the Hawaiian Islands, becoming a confidant of Kamehameha I:

> Many chiefs and notables mourned Davis, including Kamehameha and the company of warriors who watched over him. The funeral procession went from Davis' dwelling at Aienui to Kewalo, where his body was deposited on the land of Alexander, a haole who had died earlier. At the time of his death, Davis was an old man with white hair and other signs of age. ['Ī'ī 1959: 85]

An article about Davis in *The Friend* (1862:16) of February 1862 mentions only that his grave was "in the burying place of the Europeans, near Hana-rura," suggesting that the Kewalo region and the "burying place" were outside the limits of Honolulu both at the time of Davis' death and 42 years later when the article was written.

In 1923, Bishop Henry B. Restarick, asserted that "Kendrick was buried at the place where Captain Derby was interred in 1802 and Isaac Davis in 1810" (Restarick 1923:58-59), concluding that they were probably all buried close to each other, or in the same place, a lot set aside by the Hawaiian chiefs for the interment of foreigners. Restarick had been the first to publish that the graveyard was on the *makai* corner of Pi'ikoi and King Street, and that the graveyard was abandoned in 1900. In 1923, he stated that:

> Many now living remember seeing the grave stones of Derby and Davis at the place named until they were removed in 1900. They state that there were a number of sunken unmarked graves near by. [Restarick 1923:58-29]

When the graveyard was abandoned the gravestones were removed, however, Davis' original headstone of Chinese granite was later lost (Restarick 1924:20). Although Restarick stated that the graveyard was at the corner of King and Pi'ikoi, other authors have suggested other locations. Glynn Barratt (1988:235) placed the graveyard at Pensacola and Pi'ikoi Street (at the *mauka* end Pi'ikoi Street abuts an east-west street called Pi'ikoi Place that ends at Pensacola Street), although Schmitt thinks he was confusing this cemetery with the mid-nineteenth Makiki Cemetery on

Pensacola and Prospect Street. Edwin McClellan (1928a:12, 1928b:14) placed the cemetery at the junction of King and Kewalo Streets, however the present Kewalo Street ends at Lunalilo Street not at King Street. An overlay of the project area labeled on the 1817 Kotzebue map (see Figure 16) places the cemetery (кладбище) at the junction of Pensacola and King streets, west of the upper Pi‘ikoi segment and *mauka* of the Pensacola segment of the project area. As previously noted, all of the burials from this cemetery were removed in 1900.

4.3 Waikīkī and Kālia Pre-Contact to 1800s

4.3.1 Early Historic Period

By the time of the arrival of Europeans in the Hawaiian Islands during the late eighteenth century, Waikīkī had long been a center of population and political power on O‘ahu. According to Martha Beckwith (1940), by the end of the fourteenth century Waikīkī had become “the ruling seat of the chiefs of Oahu.” The preeminence of Waikīkī continued into the eighteenth century, evidenced by Kamehameha’s decision to reside there upon winning control of O‘ahu by defeating the island’s chief, Kalanikūpule. The nineteenth century Hawaiian historian John Papa ‘Ī‘ī (1959:17), himself a member of the *ali‘i*, described the king’s Waikīkī residence:

> Kamehameha’s houses were at Puaaliilii, *makai* (towards the ocean) of the old road, and extended as far as the west side of the sands of ‘Apuakehau. Within it was Helumoa where Ka‘ahumanu *mā* (and company) went to while away the time. The king built a stone house there, enclosed by a fence . . . [‘Ī‘ī 1959:17]

‘Ī‘ī further noted that the “place had long been a residence of chiefs. It is said that it had been Kekuapoi’s home, through her husband Kahahana, since the time of Kahekili” (‘Ī‘ī 1959:17).

Chiefly residences, however, were only one element of a complex of features that characterized Waikīkī during the pre-Contact period. Beginning in the fifteenth century, a vast system of irrigated taro fields was constructed, extending across the littoral plain from Waikīkī to lower Mānoa and Pālolo valleys. This field system—an impressive engineering design traditionally attributed to the chief Kalamakua —took advantage of streams descending from Makiki, Mānoa and Pālolo valleys that also provided ample fresh water for the Hawaiians living in the *ahupua‘a* (land division). Water was also available from springs in nearby Mō‘ili‘ili and Punahou. Closer to the Waikīkī shoreline, coconut groves and fishponds dotted the landscape. A sizeable population developed amidst this Hawaiian-engineered abundance. Captain George Vancouver (1798), arriving at “Whyteete” in 1792, captured something of this profusion in his journals:

> On shores, the villages appeared numerous, large, and in good repair; and the surrounding country pleasingly interspersed with deep, though not extensive valleys; which, with the plains near the sea-side, presented a high degree of cultivation and fertility.
>
> [Our] guides led us to the northward through the village, to an exceedingly well-made causeway, about twelve feet broad, with a ditch on each side.
>
> This opened our view to a spacious plain, which, in the immediate vicinity of the village, had the appearance of the open common fields in England; but, on advancing, the major part appeared to be divided into fields of irregular shape and figure, which were separated from each other by low stone walls, and were in a very high state of cultivation. These several portions of land were planted with the eddo or taro root, in different stages of inundation; none being perfectly dry, and some from three to six or seven inches under water. The causeway led us near a mile from the beach, at the end of which was the water we were in quest of. It was a rivulet five or six feet wide, and about two or three feet deep, well banked up, and nearly motionless; some small rills only, finding a passage through the dams that checked the sluggish stream, by which a constant supply was afforded to the taro plantations.
>
> [We] found the plain in a high state of cultivation, mostly under immediate crops of taro; and abounding with a variety of wild fowl, chiefly of the duck kind . . . The sides of the hills, which were at some distance, seemed rocky and barren; the intermediate vallies, which were all inhabited, produced some large trees, and made a pleasing appearance. The plain, however, if we may judge from the labour bestowed on their cultivation, seemed to afford the principal proportion of the different vegetable productions on which the inhabitants depend for their subsistence. [Vancouver 1798:161-164]

Further details of the exuberant life that must have characterized the Hawaiian use of lands including the *ahupua‘a* of Waikīkī are given by Archibald Menzies (1920), a naturalist accompanying Vancouver’s expedition:

> The verge of the shore was planted with a large grove of cocoanut palms, affording a delightful shade to the scattered habitations of the natives. Some of those near the beach were raised a few feet from the ground upon a kind of stage, so as to admit the surf to wash underneath them. We pursued a pleasing path back to the plantation, which was nearly level and very extensive, and laid out with great neatness into little fields planted with taro, yams, sweet potatoes and the cloth plant. These, in many cases, were divided by little banks on which grew the sugar cane and a species of Draecena [ti or *kī*] without the aid of much cultivation, and the whole was watered in a most ingenious manner by dividing the general stream into little aqueducts leading in various directions so as to be able to supply the most distant fields at pleasure, and the soil seemed to repay the labour and industry of these people by the luxuriancy of its productions. Here and there we met with ponds of considerable size, and besides being well stocked with fish, they swarmed with water fowl of various kinds such as ducks, coots, water hens, bitterns, plovers and curlews. [Menzies 1920:23-24]

However, the traditional Hawaiian focus on Waikīkī as a center of chiefly and agricultural activities in southeastern O‘ahu was soon to change—disrupted by the same Western Contact that produced the first documentation (including the records cited above) of that traditional life. The *ahupua‘a* of Honolulu—with the only sheltered harbor on O‘ahu—became the center for trade with visiting foreign vessels, drawing increasing numbers of Hawaiians away from their traditional environments. Kamehameha himself moved his residence from Waikīkī to the coast near Honolulu harbor, likely in order to maintain his control of the lucrative trade in sandalwood that had developed. By 1828, the missionary Levi Chamberlain (1957) described a journey into Waikīkī and noted the following:

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> Our path led us along the borders of extensive plats of marshy ground, having raised banks on one or more sides, and which were once filled with water, and replenished abundantly with esculent fish; but now overgrown with tall rushes waving in the wind. The land all around for several miles has the appearance of having once been under cultivation. I entered into conversation with the natives respecting this present neglected state. They ascribed it to the decrease of population. [Chamberlain 1957:26]

Tragically, the depopulation of Waikīkī was not simply a result of the attractions of Honolulu (where, by the 1820s, the population was estimated at 6,000 to 7,000) but also of the Western diseases that had devastating effects upon the Hawaiian population.

4.3.2 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, Kamehameha III divided the land into four divisions: certain lands to be reserved for himself and the royal house were known as Crown Lands; lands set aside to generate revenue for the government were known as Government Lands; lands claimed by *ali‘i* and their *konohiki* (supervisors) were called Konohiki Lands; and habitation and agricultural plots claimed by the common people were called *kuleana* (Chinen 1958:8-15).

The project area is in the land of Kālia (Figure 38) as the area mainly on the *mauka* side of Kalākaua Avenue. The corridor passes through LCA 101. F.L. (Fort Land) to Kaluaoku at the western edge of Waīkīkī, and LCA 1775 to Pawa, though Loko Kaipuni (shown as three ponds on the 1881 map), and LCA 2083 to Kahiloaku at the eastern end of the Waikīkī section. Kaluaoku claimed two *‘āpana* (lots), one with two fry ponds (ponds for young fish) and one tenant’s lot. The project area passes through the pond lot. Pawa claimed two *‘āpana*, one a houselot and the other for growing taro. His lots contained five *hau* and four *hala* (pandanus) treess a well, and an *‘auwai* (irrigation ditch). A witness noted that taro was grown along this *‘auwai.* The parcel within the project area was the houselot.

All of the land on the *makai* side of the project area, including all of the fishponds, was awarded as a Konohiki Award to Mataio Kekūanāoa, the father of Kamehameha IV and Kamehameha V. Unlike *kuleana* awards, which often have details on boundary, land use, topographical features, and neighbor lots, the *ali‘i* were not required to provide any description or information on land use for their awarded lands. Thus it is unknown if this land was used for habitation, agriculture, or another purpose.

4.3.3 1900s to the Present–Residential and Agricultural Growth

As the nineteenth century progressed, Waikīkī was becoming a popular site among foreigners—mostly American—who had settled on O‘ahu. An 1865 article in the *Pacific Commercial Advertiser* mentioned a small community that had developed along the beach. The area continued to be popular with the *ali‘i* and several notables had residences there. A visitor to O‘ahu in 1873 described Waikīkī as “a hamlet of plain cottages, whither the people of Honolulu go to revel in bathing clothes, mosquitoes, and solitude, at odd times of the year” (Bliss 1873:195-196).

Other developments during the second half of the nineteenth century that preceded changes that dramatically altered the landscape of Waikīkī during the twentieth century include the

improvement of the road connecting Waikīkī to Honolulu (Waikīkī Road, the route of the present Kalākaua Avenue), the building of a tram line between the two areas, and the opening of Kapi‘olani Park on 11 June 1877. Traditional land uses in Waikīkī were abandoned or modified. By the end of the nineteenth century most of the fishponds that had previously proliferated had been neglected and allowed to deteriorate. The remaining taro fields were planted in rice to supply the growing numbers of immigrant laborers imported from China and Japan, and for shipment to the west coast of the United States (Coulter and Chun 1937).

As the sugar industry throughout the Hawaiian kingdom expanded in the second half of the nineteenth century, the need for increased numbers of field laborers prompted passage of contract labor laws. In 1852, the first Chinese contract laborers arrived in the Islands. Upon completion of their contracts, a number of the immigrants remained in the Islands, many becoming merchants or rice farmers. As was happening in other locales, in the 1880s, groups of Chinese began leasing and buying (from the Hawaiians of Waikīkī) former taro lands for conversion to rice farming (Coulter and Chun 1937). By 1892, Waikīkī had 542 acres planted in rice, representing almost 12% of the total 4,659 acres planted in rice on O‘ahu.

Development of Waikīkī rapidly gained momentum in the twentieth century. In particular, the development of Fort DeRussy military reservation, the Ala Wai Canal, major vehicular thoroughfares, and ultimately resort development, dramatically changed the landscape of the survey area. The fishponds of Kālia remained largely intact up through the late 1800s and early 1900s, as shown on an 1884 map (Figure 39). However, by 1928 the last of the Kālia fishponds had been filled in and by 1953, Ala Moana Boulevard had been extended along the previous Pi‘inaio Stream and connected to Kalākaua Avenue. The project area is one of the few places with structures and tall trees, suggesting this area was a naturally higher and did not need coral fill to bring it up to the grade of the roads.

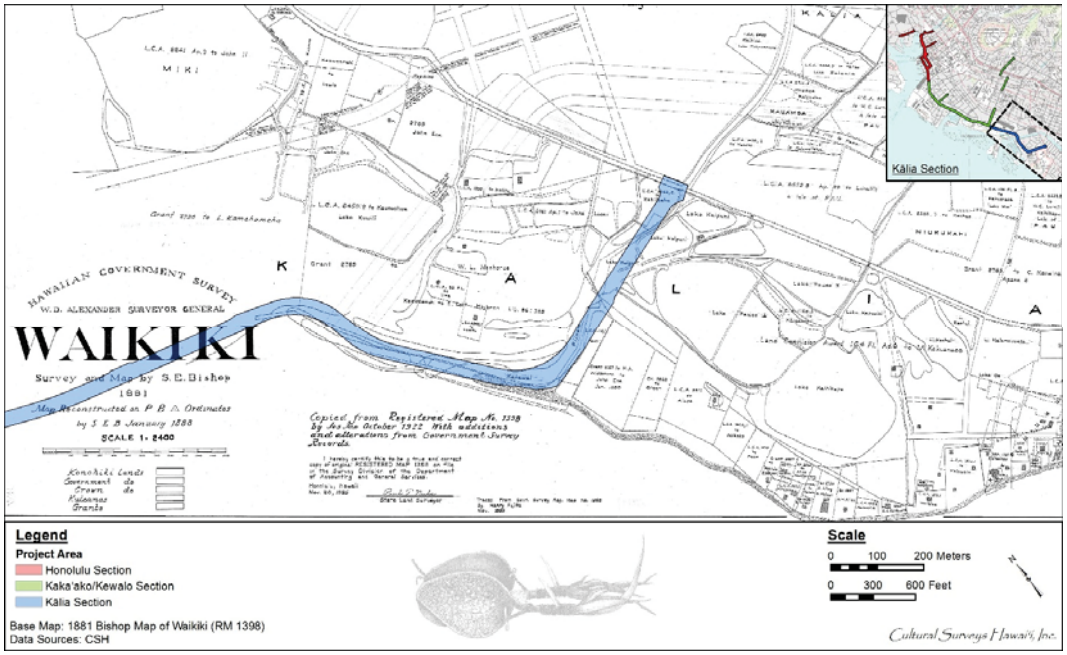

Figure 38. 1881 map (portion) showing the Waikīkī section (east half) of the project area (shaded in blue), along Ala Moana Boulevard (Bishop 1881, Registered Map No. 1398)

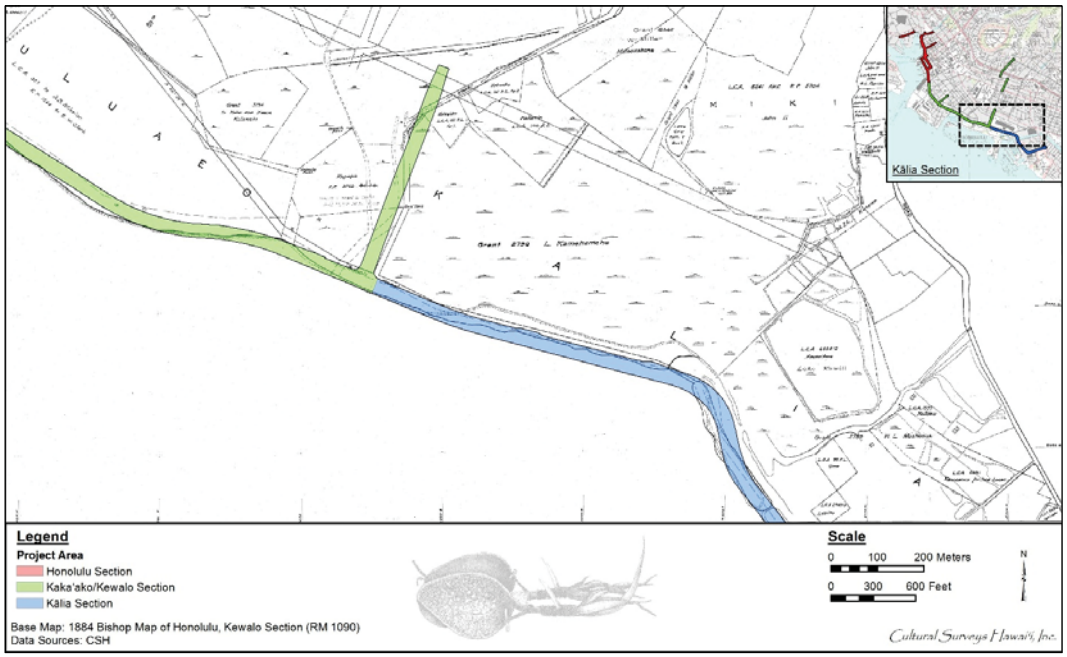

Figure 39. 1884 map (portion) showing the Waikīkī section (west half) of the project area (shaded in blue), along Ala Moana Boulevard (Bishop 1884)

4.3.4 Fort DeRussy

During the first decade of the twentieth century, the U.S. War Department acquired more than 70 acres in the Kālia portion of Waikīkī (to the south, southwest, west, and northwest of the project area) for the establishment of a military reservation called Fort DeRussy, named in honor of Brigadier General R.E. DeRussy of the Army Corps of Engineers. The development of Fort DeRussy significantly transformed the landscape.

On 12 November 1908, a detachment of the 1st Battalion of Engineers from Fort Mason, California, occupied the new post . . .

> Between 1909 and 1911 the engineers were primarily occupied with mapping the island of O‘ahu. At DeRussy other activities also had to be attended to—especially the filling of a portion of the fishponds which covered most of the Fort. This task fell to the Quartermaster Corps, and they accomplished it through the use of an hydraulic dredger which pumped fill from the ocean continuously for nearly a year in order to build up an area on which permanent structures could be built. Thus the Army began the transformation of Waikīkī from wetlands to solid ground. [Hibbard and Franzen 1986:79]

4.3.5 Ala Wai Drainage Canal

During the 1920s the Waikīkī landscape was transformed when construction of the Ala Wai Drainage Canal—begun in 1921 and completed in 1928—resulted in the draining and filling in of the remaining ponds and irrigated fields of Waikīkī. Dredging for the project was performed by Hawaiian Dredging Company, owned by Walter F. Dillingham, who then sold the dredged sediments to Waikīkī developers. The dredge produced fill for the reclamation of over 600 acres of land in the Waikīkī vicinity, the Waikīkī Land Reclamation project.

The canal was one element of a plan to urbanize Waikīkī and the surrounding districts:

> The [Honolulu city] planning commission began by submitting street layout plans for a Waikīkī reclamation district. In January 1922 a Waikīkī improvement commission resubmitted these plans to the board of supervisors, which, in turn, approved them a year later. From this grew a wider plan that eventually reached the Kapahulu, Mō‘ili‘ili, and McCully districts, as well as lower Makiki and Mānoa.
>
> The standard plan for new neighborhoods, with allowances for local terrain, was to be that of a grid, with 80-foot-wide streets crossing 70-foot-wide avenues at right angles so as to leave blocks of house lots about 260 by 620 feet. Allowing for a 10-foot-wide sidewalk and a 10-foot right-of-way [alley] down the center of each block, there would be twenty house lots, each about 60 by 120 feet, in each block. [Johnson 1991:311]

Within the Kālia area—where the study area is located—the dredge from construction of the Ala Wai Canal was used to fill in Pi‘inaio Stream, the surrounding wetlands, and areas of the coast. Local resident Fred Paoa, interviewed by the University of Hawai‘i Social Science Research Institute regarding the area of Kālia in the early twentieth century, described the changes to Kālia:

> Well, after they reclaimed all that land, all the ponds were filled with part of the [dredged] coral . . . including the strip that they dredged outside the DeRussy and [where] the Hilton Hawaiian Village and ‘Ilikai [are now]. They used all to fill the [land on which] Ala Moana Center now [stands]. All that [was] swamp land. And the Hobron Estate which was across from where we lived, all of that was filled in. Even the stream, Pi‘ināi‘o River, was filled in. [UHCOH 1985:2:550-1]

4.3.6 Twentieth Century Urban Development of Waikīkī

Newly created land tracts following the Ala Wai Canal’s construction spurred a rush to development in the 1930s. Pre Ala Wai Canal (ca. 1920) and post-Ala Wai Canal photographs (1961) (Figure 40 and Figure 41) show the changes made to the landscape of Waikīkī in the early twentieth century. An article in the *Honolulu Star-Bulletin* in 1938 extolled the area’s progress:

> The expansion of apartment and private residence construction is no secret. Examination of building permits will show that more projects have been completed during the past year, and more are now underway in this area, than in any other section of the territory. [Newton 1939:10]

The entrance of the United States into World War II following the Japanese bombing of Pearl Harbor on 7 December 1941 put on hold plans for the development of Waikīkī as a tourist destination. Until the war’s end in 1945, the tourist trade was non-existent “since the Navy controlled travel to and from Hawai‘i and did not allow pleasure trips” (Brown 1989:141). For the duration of the war, Waikīkī was transformed into a recreation area for military personnel.

> It was not the same Waikīkī as before the war, though; barbed wire barricades now lined its sands, and there were other changes too. Fort DeRussy became a huge recreation center, with a dance hall called Maluhia that attracted thousands of men at a time. The Moana Hotel continued to function, but many other establishments and private homes in the area were taken over by the military. [Brown 1989:141]

Initial development of Fort DeRussy focused on the filling in of fishponds near the coast (Loko Kaihikapu, Loko Kapu‘uiki, a portion of Loko Paweo I, and possibly Loko Waiku‘apu‘u) (Davis 1989:19). Filling and development proceeded at a rapid pace; a 1919 War Department map shows a network of roads and buildings on Fort DeRussy, with only a portion of the Kaipuni fishponds still remaining (Figure 42). This map also shows the inland boundary of Fort DeRussy, where the project area is a rectangular area on the *makai* side of Kalākaua Avenue, surrounded by Fort DeRussy on three sides and Kalākaua Avenue on the *mauka* side. There are no residential areas adjacent to the project area. The area on the *mauka* side of Kalākaua Avenue is noticeably undeveloped. In 1928, the last of the fishponds (a portion of the Kaipuni complex) at Fort DeRussy were filled with coral spoil from the reef areas at the mouth of the Ala Wai Canal (Nakamura 1979:107).

By 1933 (Figure 43), new subdivision streets have been laid out, but the density of homes and stores is still low. Between 1943 and 1953 the northern portion of Fort DeRussy was further developed and Ala Moana Boulevard (previously known as Beach Road) was extended from Kālia Road to Kalākaua Avenue (Figure 44 and Figure 45). By the mid-1950s there were more than 50 hotels and apartment buildings from the Kālia area to the Diamond Head end of Kapi‘olani Park. The Waikīkī population by the mid-1950s was not limited to transient tourists but included 11,000 permanent residents living in 4,000 single dwellings and apartments in stucco or frame buildings. The intensification of urban dwellings and tourist infrastructure has continued to the present day.



Figure 40. 1920 photograph of the Waikīkī coast, before completion of the Ala Wai Canal in 1928; Ala Moana Avenue, Waikīkī Road, parallels the coast, with taro grown on the *makai* side and rice fields inland of the road (Grant 1996:93)



Figure 41. 1961 photograph of Waikīkī Coast after construction of the Ala Wai Canal, including termination of Ala Moana Avenue at Kalākaua Avenue in Waikīkī (Honolulu Advertiser Archives)

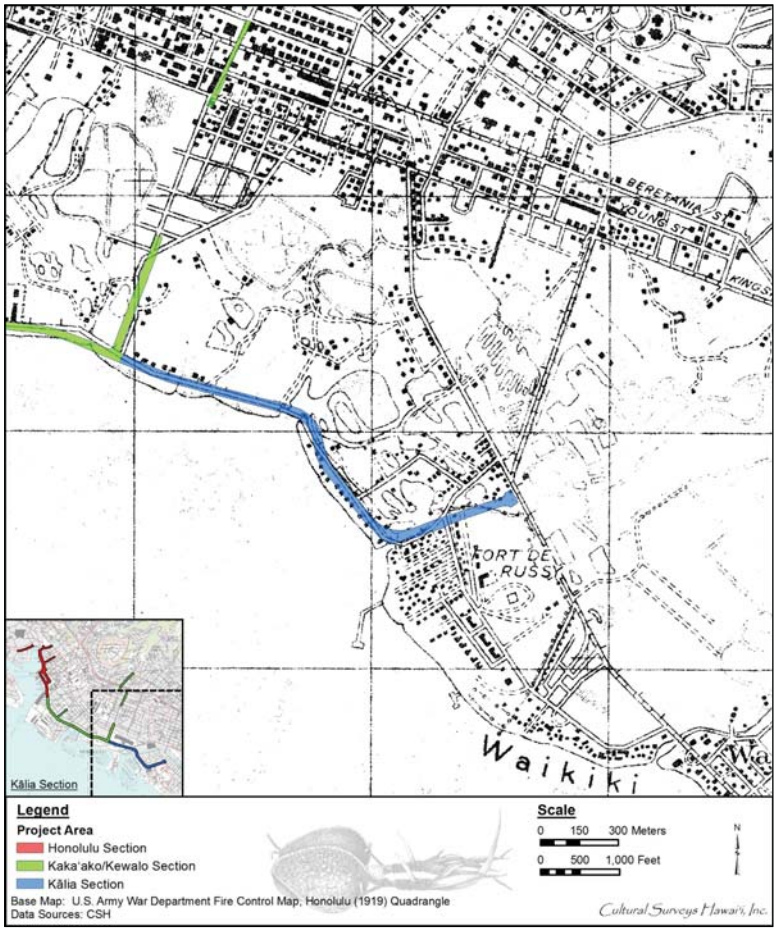

Figure 42. 1919 U.S. Army War Department Fire Control map of O‘ahu, Honolulu quadrangle, showing location of the Kālia section of the project area (shaded in blue)

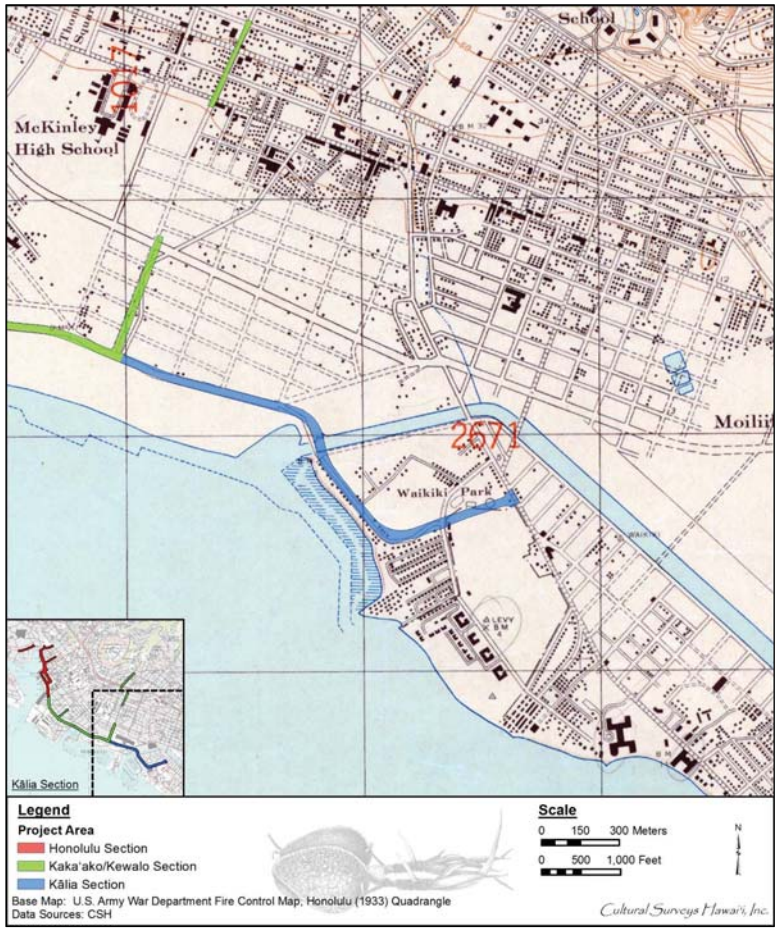

Figure 43. 1933 U.S. Army War Department Fire Control map of O‘ahu, Honolulu quadrangle, showing location of the Kālia section of the project area (shaded in blue)

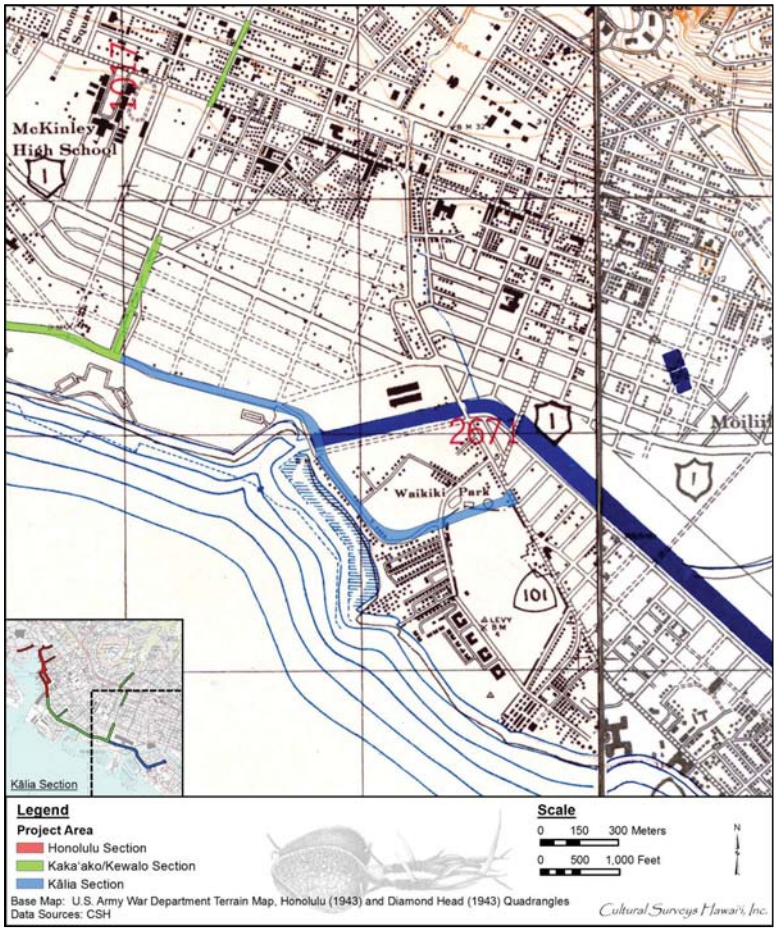

Figure 44. 1943 U.S. Army War Department Terrain map of O'ahu, Honolulu and Diamond Head quadrangles, showing location of the Kālia section of the project area (shaded in blue)

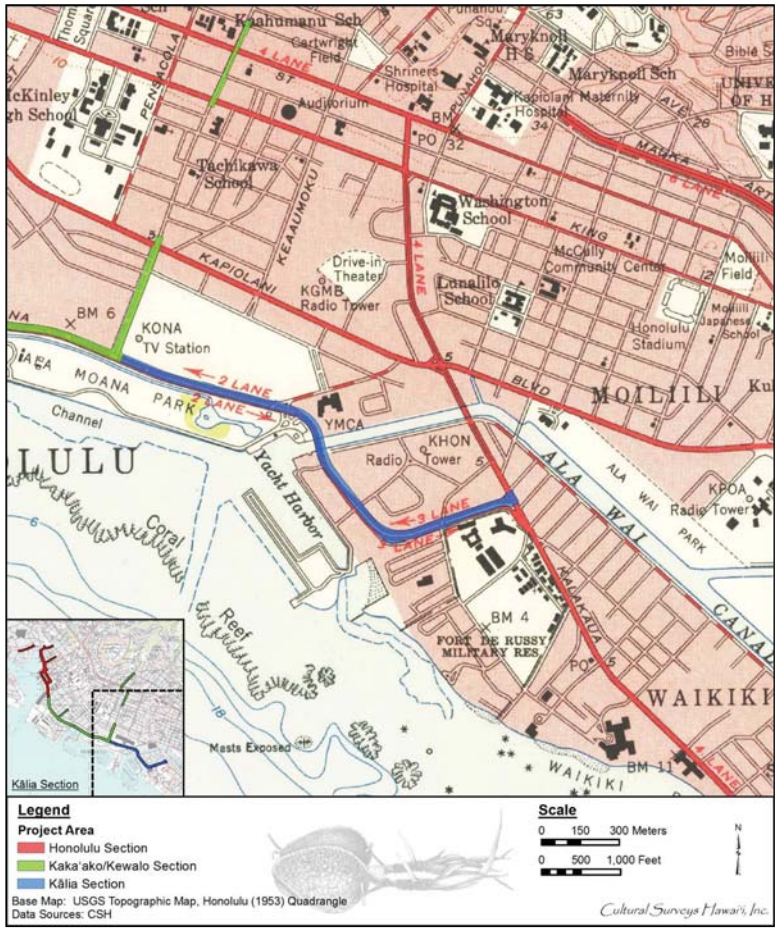

Figure 45. 1953 Honolulu USGS 7.5-Minute Series topographic quadrangle, showing location of the Kālia section of the project area (shaded in blue)

Section 5 Previous Archaeological Research

5.1 Previous Archaeological Studies in the Honolulu Section

Archaeological monitoring and data recovery work has followed the incessant construction and road/sewer improvements in the Honolulu section. Figure 46 shows the location of previous archaeological studies and Figure 47 shows the location of recorded archaeological sites. Some of the sites reported in the archaeological studies discussed are at a distance from the project area and are not depicted in Figure 47. The results of these studies are summarized in Table 1, and each study is presented in more detail in the following pages.

5.1.1 Ota and Kam 1982

In 1982, Ota and Kam preformed the osteological analysis of burial remains unearthed at the construction site of the State Office Building #2 on the corner of Punchbowl and Halekauwila streets. A total of six burials were discovered, but unfortunately were not disinterred under controlled archaeological conditions. Because of this, the remains were incomplete, fragile and not in situ, making skeletal measurements and cultural and chronological conclusions regarding the individuals buried difficult and inaccurate. The SIHP number assigned to this site is -2963.

5.1.2 Kennedy 1984

Kennedy (1984) conducted subsurface test excavations at the corner of Hotel and Bethel streets at a parking lot. Archival research and informant interviews also were conducted, to illuminate the history of the site. Project stratigraphy was simple; approximately 15 cm (6 inches) of asphaltic concrete and coral, underlain by 2.4 to 3.7 m (8 to 12 ft) of fill mixed with construction debris, resting on sterile coral reef material. In the 1930s, a large structure, a Pool Room, was built on this lot, which was destroyed by fire in 1968/1969. The structure was then razed and the parking lot was built. Based on informant testimony and the results of the excavations, it became clear the basement of the structure had also been demolished in the 1960s and the lot had been filled (down to the coral reef) with imported materials to the ground surface under the parking lot (Kennedy 1984:15-16).

5.1.3 Charvet-Pond and Pantaleo 1989

In 1988, Bishop Museum archaeologists completed a literature review, monitored demolition of existing buildings on the lot, and conducted limited excavations for a proposed park (later the Chinatown Gateway Plaza) at the corner of Bethel and Hotel streets (Charvet and Pantaleo 1989). The literature review indicated the land was probably agricultural in the pre-Contact and early post-Contact period, but had native houses in the 1848 Māhele. Western-style houses and commercial structures were built in the late nineteenth century, including the four buildings on the lot in 1989, which were built in 1891, 1924, 1925, and 1933. The testing consisted of the excavation of four backhoe trenches. A trash deposit of glass bottles ceramics, metal, and a slate fragment was designated SIHP # 50-80-14-2142. Most of the bottles dated from ca. 1880–1920, which matches the period of construction of the four buildings on the lot.

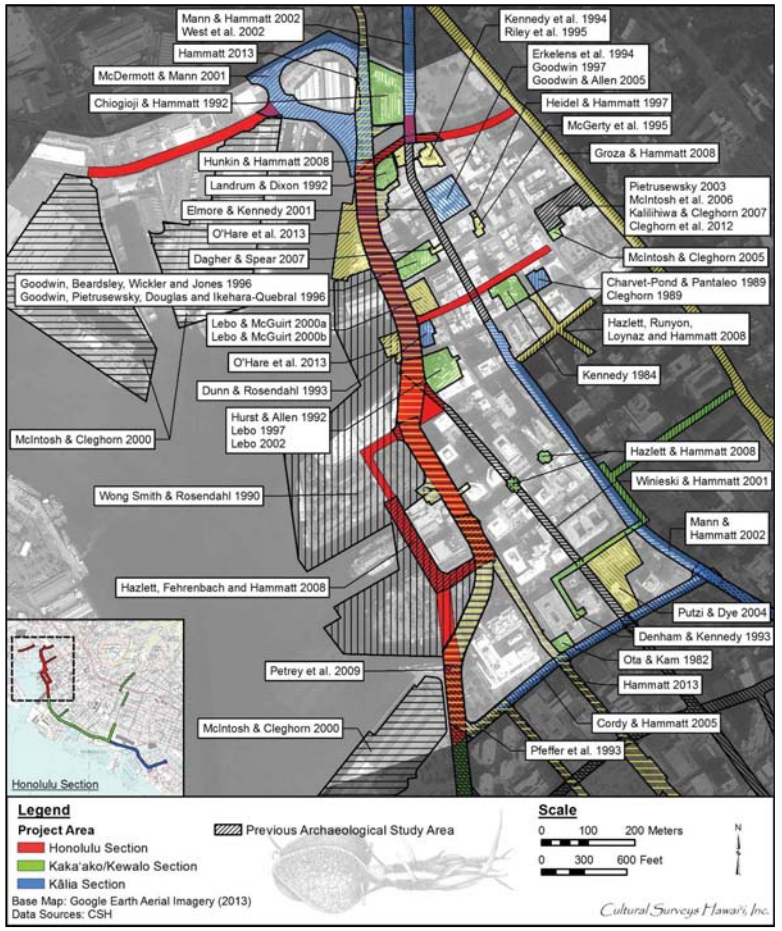

Figure 46. Previous archaeological study areas in the Honolulu section of the project area (Google Earth 2013)

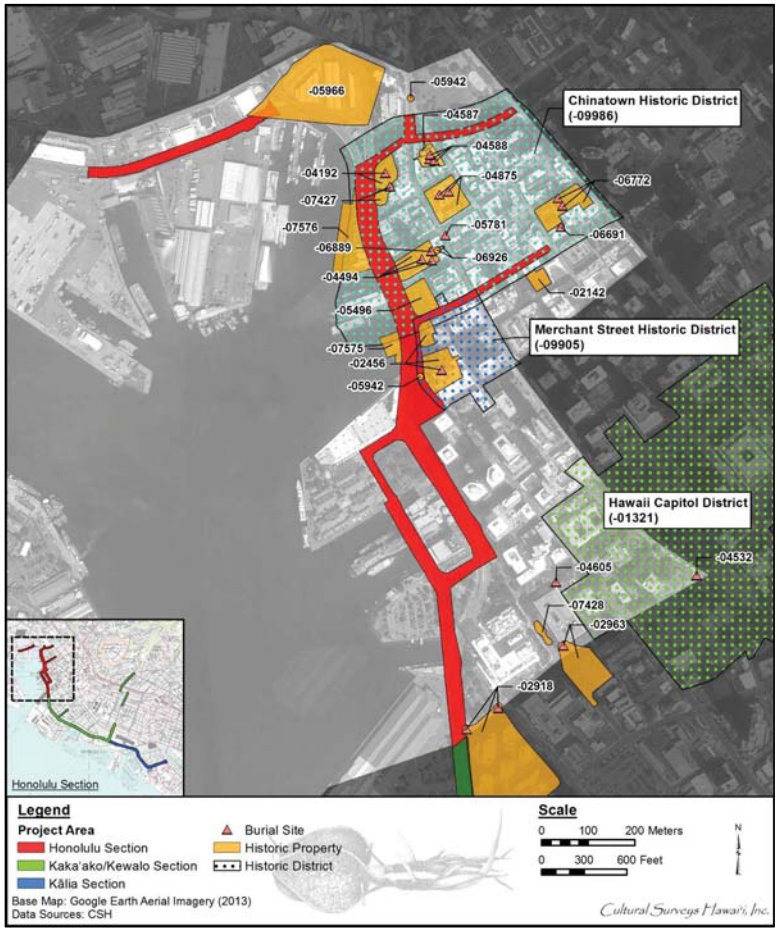

Figure 47. Previously identified archaeological sites in the Honolulu section of the project area (Google Earth 2013)

Table 1. Archaeological Studies in the Honolulu Section in Chronological Order

Reference	Type of Study	Location	Results
Ota and Kam 1982	Osteological analysis of human remains	At the corner of Punchbowl and Halekauwila, State Office Building	Six partial burial sets found, SIHP # 50-80-14-2963; tooth evulsions indicated; probable pre-Contact to 1850 date
Kennedy 1984	Data recovery	Parking lot on the corner of Hotel and Bethel Streets	Excavations revealed imported fill placed all the way to coral bedrock
Charvet-Pond and Pantaleo 1989	Archaeological monitoring	Four lots between Hotel, Bethel, Hawai'i Theater, and Perry Building	Trash deposit of glass bottle ceramics, metal, and a slate fragment designated as SIHP # 50-80-14-2142; most of the bottles dated ca. 1880-1920
Cleghorn 1989	Archaeological test excavations	Chinatown Gateway Plaza	Area extensively disturbed; cultural remains present not in situ
Wong-Smith and Rosendahl 1990	Historical assessment	Aloha Tower Drive	Determined entire project area sits on historic period landfill
Chiogioji and Hammatt 1992	Archaeological assessment	Iwilei	Research findings indicated the study area originally consisted of a portion of Kawa Fishpond and marsh lands filled between 1880s and 1890s for operation of Oahu Railway and Land Company
Hurst and Allen 1992	Archaeological monitoring and archaeological inventory survey	Ka'ahumanu Parking Lot/Harbor Court, Bethel, Fort, Merchant, and Queen Streets	Identified SIHP # 50-80-14-2456, a subsurface cultural layer containing both pre- and post-Contact elements. The cultural layer contained primarily post-Contact features (i.e., building foundation ruins) associated with nineteenth century urban development; however, both pre- and post-Contact artifacts were also observed. Pre-Contact traditional Hawaiian artifacts included basalt and volcanic glass flakes and modified marine shell; post-Contact artifacts included nineteenth century bottles and ceramics.

Reference	Type of Study	Location	Results
Landrum and Dixon 1992	Data recovery for River Nimitz Redevelopment project	Corner of River Street and Nimitz Hwy	Documented four post-Contact trash pits, brick and mortar building foundation, and a single pre-Contact human burial in a supine, flexed position (not in situ); all documented archaeological features designated part of SIHP # 50-80-14-4192
Denham and Kennedy 1993	Archaeological monitoring	Along portions of Hotel, King, and Mililani Streets, and portions of State Capitol Complex	Recorded multi-component subsurface cultural deposit with a fire pit dated to AD 1390-1700, part of SIHP #50-80-14-4605 (designation used for entire State Capitol Complex); nine historic trash pits, one with a drilled marine shell, recorded separately under SIHP # -4606
Dunn and Rosendahl 1993	Archaeological inventory survey	Nu‘uanu Court, area bounded by Bethel and Fort Streets, Nu‘uanu Ave and Nimitz Hwy	One historic property, SIHP # 50-80-14-2456, consisting of cultural layer roughly 10,000 sq ft containing both pre- and post-Contact features
Pfeffer et al. 1993	Archaeological summary for Kaka‘ako Improvement District 1,	Area bounded by Punchbowl Street, South Street, King Street, and Ala Moana Boulevard	Recorded 149 burials; 31 burials from 1853-1854 Honuakaha Smallpox Cemetery (SIHP # 50-80-14-3712/-4531) at Quinn Lane; one historic burial from Punchbowl Street (SIHP # 50-80-14-4532); one possibly pre-Contact burial from Halekauwila Street (SIHP # -4533); and 116 historic burials from Kawaiaha‘o Cemetery (SIHP # -4534) at Queen Street (used from 1825-1920)
Erkelens et al. 1994	Burial assessment	Kekaulike Revitilization project, Diamond Head Block	Report on three (of four) burials from SIHP # 50-80-14-4875; remains in a disturbed secondary context too fragmentary to date

Reference	Type of Study	Location	Results
Kennedy et al. 1994	Archaeological inventory survey for the Kekaulike Revitilization project, ‘Ewa Block		Two historic properties: SIHP # 50-80-14-4587, subsurface remnants of a small fishpond; and SIHP # -4588, subsurface cultural layer with both pre- and post-Contact components; noted two post-Contact and one pre-Contact burial, part of SIHP # -4588
McGerty et al. 1995	Archaeological assessment	Hotel Street between Maunakea and Smith Streets	Historic background and brief field check revealed project area was near the *maika* field of Kalanikahua during the pre-Contact period and part of Chinatown in the post-Contact period
Riley et al. 1995	Archaeological inventory survey for Kekaulike Revitilization project, ‘Ewa Block	Area bounded by Hotel, River, King and Kekaulike Streets	Further testing at SIHP #s 50-80-14-4587, a fishpond, and -4588, a multi-component site with burials (see Kennedy et al. 1994) resulted in collection of pre- and post-Contact artifacts, faunal remains, and midden, indicative of transition from early Honolulu village to modern Chinatown; radiocarbon dating of SIHP # -4587 yielded an early tenth century date, reflecting a renovation of the fishpond, and it was used until the 1860s when it was filled; SIHP # -4588 yielded a date range from the tenth/eleventh century to the twentieth century
Goodwin et al. 1996a	Data recovery	Marin Tower property on *makai* corner of Smith and Maunakea Streets	Discovered pre-Contact fire pits, and early post-Contact structural foundations associated with the Marín family residence dated to 1810 to 1850; documented artifacts associated with the use of the Honolulu Ironworks from 1850 to 1900 as well as the use of shops of Chinese merchants during the same period; collected and analyzed artifacts related to the commercial development of downtown Honolulu

Reference	Type of Study	Location	Results
Goodwin et al. 1996b	Burial assessment	Marin Tower property on *makai* corner of Smith and Maunakea Streets	Separate report (Vol II) of the same study addressing the burial component of SIHP # 50-80-14-4494; discusses 15 burials and additional skeletal remains associated with historic artifacts and coffin nails, probably all historic burials associated with Marín family
Goodwin 1997	Archaeological inventory survey	Kekaulike Revitilization project, Diamond Head Block, area bounded by Hotel, River, King and Kekaulike Streets	One historic property identified, SIHP # 50-80-14-4875, subsurface cultural layer with evidence of both pre- and post-Contact occupation with 105 features; majority of features identified as Native Hawaiian from early post-Contact period, but included later historic and modern features and structural remnants; a single burial documented
Heidel and Hammatt 1997	Data recovery	Corner of Hotel and Maunakea Streets	No cultural deposits found in four backhoe trenches
Lebo 1997	Data recovery	Harbor Court, area bounded by Bethel, Fort, Merchant and Queen Streets	Data recovery excavations identified 35 new features associated with SIHP # 50-80-14-2456 post-Contact deposits; these included fire pits, pavements, building foundations, post molds, and trash pits; documented artifacts included bottles, ceramics, glass beads, buttons (wood, shell, and bone), metal nails, adzes (stone and shell), flakes (basalt, quartz, chert, flint, jasper, and volcanic glass), modified, manufactured glass, fishhook blanks, bone awls, hammer stones, and grinding stones
Lebo and McGuirt 2000a	Archaeological inventory survey	800 Nu‘uanu Avenue	Six trenches excavated and a pre-Contact to twentieth century cultural layer identified and designated SIHP # 50-80-14-5496

Reference	Type of Study	Location	Results
Lebo and McGuirt 2000b	Data recovery	800 Nu‘uanu Block; Diamond Head portion of the block bounded by Nu’uanu Avenue and Nimitz, Marin and Smith Streets	Ten additional trenches excavated to further document SIHP # 50-80-14-5496, subsurface cultural layer
McIntosh and Cleghorn 2000	Archival research and surface archaeological survey	Oahu Commercial Harbors; Pier 2, Piers 12–16, 18–223, 24–29; Pier 32 and Lagoon Drive (adjacent to Honolulu International Airport)	No significant cultural or archaeological deposits present or likely to be present within project area because researched area on reclaimed land formed by dredging beginning in early 1900s
Elmore and Kennedy 2001	Archaeological monitoring	King Street between Maunakea and Smith Streets	One traditional Hawaiian burial (SIHP # 50-80-14-5781) disinterred and handed over to SHPD office for reinterment
McDermott and Mann 2001	Archaeological Inventory survey	Nimitz Hwy between Queen and Awa Streets	Recorded one historic property, SIHP # 50-80-14-5966, Kawa Fishpond, west of River Street
Winieski and Hammatt 2001	Archaeological monitoring	Area along Nimitz Hwy, from River Street to Bethel Street until the end of Queen Street; from Queen to South Street and terminated at the Ala Moana Blvd Wastewater pump station	Historic remains and remnants of light gauge rail system (SIHP # 50-80-14-5942) at intersection of Queen Street and Nimitz Hwy, associated with historic Honolulu Rapid Transit System
Lebo 2002	Data recovery	Harbor Court, Bethel Street	Some 113 features identified within pre-Contact deposits included 86 post molds, 25 in-filled pits, and two fire pits; traditional Hawaiian artifacts collected from pre-Contact deposits consisted of primarily basalt tools and flakes, collected from non-feature contexts; radiocarbon analysis of SIHP # 50-80-14-2456, a pre-Contact deposit, indicated occupation at site began between AD 1000 and AD 1200

Reference	Type of Study	Location	Results
Mann and Hammatt 2002	Archaeological monitoring	Intersection of Punchbowl and King Streets	SIHP # 50-80-14-6371, human burial thought to be Native Hawaiian, found at *mauka*/‘Ewa corner of South King and Punchbowl Streets
West et al. 2002	Archaeological monitoring	Along King Street, between Liliha and River Streets	Identified previously recorded Honolulu Rapid Transit & Land Company Trolley (HRT&L), SIHP # 50-80-14-5942, along with numerous artifacts in association
Putzi and Dye 2004	Archaeological monitoring	Ali‘iolani Hale, Downtown Honolulu	One historic property documented, but not considered significant; collected material included ceramic fragments and an intact rifle cartridge dating form late nineteenth to mid-twentieth century
Cordy and Hammatt 2005	Archaeological monitoring	Punchbowl Street, Downtown Honolulu	No significant finds; excavations mainly within fill layers
Goodwin and Allen 2005	Date recovery, Kekaulike Revitalization project	Diamond Head Block, area bounded by Hotel, River, King and Kekaulike Streets	Multi-component site (SIHP # 50-80-14-4875) dating to thirteenth century identified; four burials in a secondary context also present and part of SIHP # -4875
McIntosh and Cleghorn 2005	Archaeological inventory survey,	Pearl Street One Building, Corner of Nu’uanu Avenue and Pauahi Street	Identified SIHP # 50-80-14-6691, a four-component site comprised of two disturbed human remains, two historic trash pits, charred remains of a Chinatown structure destroyed in the 1900 Chinatown fire, and remnant of a historic building that partially collapsed in 2001
McIntosh et al. 2006	Archaeological inventory survey	Beretania parking lot, Downtown Honolulu	Six trenches exposed 68 subsurface features (trash pits, cooking features, building structural foundations); assigned SHIP #50-80-14-6772; most structures date to 1850-1900, possibly associated with early nineteenth century Hawaiian settlement

Reference	Type of Study	Location	Results
Dagher and Spear 2007	Archaeological monitoring	*Makai* side of King Street between Maunakea and Smith Streets	SIHP # 50-80-14-6889, human burial with two individuals, likely Native Hawaiian, and SIHP # 50-80-14-6926, wall and cache of historic artifacts
Kailihiwa and Cleghorn 2007	Archaeological monitoring	Smith-Beretania parking lot, Chinatown Downtown Honolulu	Recovered 22 sets of human remains (SIHP # 50-80-14-6772); all remains reburied at site
Pietrusewsky (2003) Appendix A of Kailihiwa and Cleghorn 2007	Osteological report	Beretania parking lot in Chinatown	Detailed osteological report on 21 burials (SIHP # 50-80-14-6772)
Groza and Hammatt 2008	Archaeological monitoring	Beretania Street between North King and Alapa‘i Streets	No archaeological cultural deposits identified
Hazlett and Hammatt 2008	Archaeological monitoring	Alakea, Merchant, and Queen Streets	No cultural resources identified
Hazlett, Fehrenbach, and Hammatt 2008	Archaeological monitoring	Aloha Tower Drive	No historic properties encountered during project construction; observed stratigraphy consisted entirely of fill associated with modern road and utility construction, as well as historic land filling activities, associated with expansion of Honolulu Harbor
Hazlett, Runyon, Loynaz, and Hammatt 2008	Archaeological monitoring	Fort Street Mall and Hotel Street	No archaeological cultural deposits identified
Hunkin and Hammatt 2008	Archaeological monitoring	Armstrong Building, corner of River and King Streets	No cultural deposits found during renovations to outside courtyard
Petrey et al. 2009	Archaeological monitoring	Nimitz Hwy from/Ala Wai Blvd to Magic Island	No historic properties or burials encountered in project excavations; project excavations generally to depths of 0.6 m or less below existing surface

Reference	Type of Study	Location	Results
Cleghorn et al. 2012	Data recovery	Beretania parking lot, Chinatown, Downtown Honolulu	Expanded upon earlier investigation of SIHP # 50-80-14-6772, a subsurface deposit with two burials; identified materials including traditional Hawaiian poi pounders, adzes, and *‘ulu maika*; identified 2,700 historic artifacts (glass bottles and fragments, ceramics, misc. metal)
Hammatt 2013	Archaeological nventory survey	Middle Street to Ala Moana Center, Kalihi to Kaka‘ako	Of 19 sites recorded in entire corridor, four sites near project area: SIHP # 50-80-14-2918 pre- and post Contact-deposit and two burials; SIHP # -2963 pre- and post-Contact deposit; SIHP # -7427 post-Contact deposit and burial, SIHP # -7428 pre- and post-Contact deposit
O’Hare et al. 2013	Literature review and field inspection	Piers 12 and 15, Honolulu Harbor	Literature review indicated Pier 12 was one of the first piers built for ships in Honolulu Harbor (SIHP # 50-80-14-7575); Pier 15 was built in 1900 on land fill and modified in the 1950s (SIHP # 50-80-14-7576)

5.1.4 Cleghorn 1989

In 1989, Bishop Museum archaeologists monitored the excavation of two backhoe trenches at the lot for the proposed Chinatown Gateway Plaza (Cleghorn 1989). The archaeologists noted the subsurface was extensively disturbed and that the nineteenth and twentieth century artifacts in the trenches were scattered in the fill layers of the trenches. Further work at this lot was conducted by the Bishop Museum later in the same year (Charvet-Pond and Pantaleo 1989).

5.1.5 Wong-Smith and Rosendahl 1990

Wong-Smith and Rosendahl (1990) conducted a historic assessment and an archaeological field inspection of the proposed Aloha Tower Complex site, south of Ala Moana Boulevard/Nimitz Highway, from Pier 5 to Pier 14. They reported no previous archaeological work within their study area (1990:1). They concluded the entire project area had been submerged (the one small area that had been shoreline land in 1810 was subsequently removed during channel dredging). The only historically significant structures in their study area were Piers 8 to 12 and Aloha Tower with its associated grounds (1990:25).

5.1.6 Chiogioji and Hammatt 1992

In 1992, CSH conducted an assessment of a parcel in Iwilei, formerly part of the submerged reef and marshlands west of Nu‘uanu Stream. The literature review indicated a portion of the offshore Kawa Pond was probably demolished between 1880 and ca. 1900, when this land was filled in to make new lots *makai* of King Street. Excavations in another portion of Kawa Pond were conducted by CSH in 2001 (McDermot and Mann 2001).

5.1.7 Hurst and Allen 1992

In 1992, the Applied Research Group of the Bishop Museum completed archaeological monitoring and an archaeological inventory survey of the Harbor Court Tower site (formerly called the Ka‘ahumanu Parking Garage). One historic property was documented, SIHP # -2456, a subsurface cultural layer containing both pre- and post-Contact elements. The cultural layer contained primarily post-Contact features (i.e., building foundation ruins) associated with nineteenth century urban development. Pre-Contact traditional Hawaiian artifacts included basalt and volcanic glass flakes and modified marine shell; post-Contact artifacts included nineteenth century bottles and ceramics. Six human burials were also identified (SIHP #-2456). Although a description of the burials was not provided in Hurst and Allen 1992, Appendix B of Lebo 2002 (see below) provides a complete osteological report of these findings. The burials were determined to likely be of Polynesian ancestry and consisted of four adult females (varying between 18-25 and 25-35 years of age), an adult male (25-35 years of age), and a subadult (8-12 years of age). The subadult skeletal remains were notable in the absence of the skull and leg bones believed to have been later recovered by the family as keepsakes, a traditional Hawaiian practice. One of the female skeletons evidenced tooth evulsion, the late Hawaiian practice of removing teeth as an expression grief.

5.1.8 Landrum and Dixon 1992

In 1989, Bishop Museum archaeologists conducted emergency data recovery in response to the inadvertent discovery of subsurface archaeological features during River-Nimitz Redevelopment work on the corner of River Street and Nimitz Highway. Documented archaeological features

consisted of four post-Contact trash pits, a brick and motor building foundation, and a single pre-Contact human burial. The numerous artifacts discovered in the trash pits appeared to be deposited in the early nineteenth century through the early twentieth century. The pre-Contact burial was found within inundated marsh sediments, which preserved some soft-tissue remains, as well as burial goods consisting of braided cordage and matted *pandanus*. All of the documented archaeological features were designated SIHP # -4192.

5.1.9 Denham and Kennedy 1993

Archaeological Consultants of Hawai‘i (ARCH) produced an AMR for excavations within the State Capitol Complex in 1993 (Denham and Kennedy 1993). Two sites were identified, SIHP #s -4605 and -4606. SIHP # -4605 is a multi-component site with a historic trash pit, a ditch, a pit, a fire pit, six postholes, and a burial; the fire pit was dated to AD 1390-1700, and the posthole was dated to AD 830-1330. SIHP # -4606 consisted of nine historic trash pits. Only one traditional artifact, a drilled *Nerita* shell, was found; the rest of the artifacts were all historic, dating to the late nineteenth and twentieth century.

5.1.10 Dunn and Rosendahl 1993

In 1993, Paul H. Rosendahl, PhD., Inch (PHRI) conducted an archaeological inventory survey at Nu‘uanu Court in an area bounded by Bethel and Merchant streets, Nu‘uanu Avenue, and Nimitz Highway (the former Ka‘ahumanu parking lot described in Hurst 1990) (Dunn and Rosendahl 1993). Six backhoe trenches revealed the presence of a single large (roughly 929 square meters or 10,000 square feet) cultural deposit underlying the project area, SIHP # -2456, consisting of pre-Contact and early post-Contact layers, overlain by a layer of late historic fill. Nineteen features were identified; 11 pre-Contact and early-historic postholes, a pit originating in the pre-Contact layer, a historic ash lens, foundation wall, pipe trench, and two historic floors. Based on radiocarbon dating, the site was initially occupied as early as AD 1250.

5.1.11 Pfeffer et al. 1993

Between 1986 and 1988, CSH conducted archaeological monitoring, data recovery, and burial disinterment in the Hawai‘i Community Development Authority’s Kaka‘ako Improvement District 1 (ID-1), which was bounded by Punchbowl Street (west), South Street (east), King Street (north), and Ala Moana Boulevard (south), including extensions east for Kawaiaha‘o Lane, Queen Street, and Auahi Street (Pfeffer, Borthwick, and Hammatt 1993). Portions of Pohukaina Street, Quinn Lane, and Reed Lane are also within this district. The observed stratigraphy generally consisted of imported construction fill material overlying naturally deposited Jaucas sand or black cinder deposits. In many cases, these Jaucas sand or black cinder deposits were culturally enriched with pre- and post-Contact deposits including human burials, building foundations, trash pits, midden concentrations, and various pre- and post-Contact artifacts.

During the course of archaeological monitoring and data recovery activities, 149 human burials were identified and disinterred: 31 burials from the 1853-1854 Honuakaha Smallpox Cemetery (SIHP # -3712 / -4531) at Quinn Lane, one historic burial from Punchbowl Street (SIHP # -4532), one possibly pre-Contact burial from Halekauwila Street (SIHP # -4533), and 116 historic burials from Kawaiaha‘o Cemetery (SIHP # -4534) at Queen Street (used from 1825–1920).

5.1.12 Erkelens et al. 1994

In tandem with an inventory survey and data recovery investigations of the Kekaulike project, Diamond Head Block, an interim report on human skeletal remains found in the project area was produced (Erkelens et al. 1994). The human skeletal remains documented during inventory survey investigations were found to consist of three individuals within a single pit feature representing a secondary burial context. The remains were incomplete and not articulated while the secondary burial pit contained historic artifacts. Osteological examination identified a young adult male (either Hawaiian or Asian, or mixed Hawaiian/Asian), a late adolescent female (likely Hawaiian), and a young child 3-4 years of age. During data recovery human fetal remains were recovered from samples of a large refuse deposit. Osteological analysis placed the age at 6-7 months. All human skeletal remains were disinterred. These humans remains were designated SIHP # 50-80-14-4875.

5.1.13 Kennedy et al. 1994

In 1994, ARCH completed an AIS for the Kekaulike Revitilization project ‘Ewa Block, an area bounded by Hotel, River, King, and Kekaulike streets (Kennedy et al. 1994**)**. Subsurface testing identified two historic properties, SIHP #s -4587 and -4588. SIHP # -4587 consists of an earthern berm fishpond wall and pond sediment of a small fishpond. SIHP # -4588 consists of a subsurface cultural layer with both pre- and post-Contact components. Fifty-two features were identified: three human burials, three historic stone walls, seven historic coral foundations, one historic burn layer, 20 postholes, probably for traditional Hawaiian thatched houses, eight historic trash pits, three pits (unknown age), five fire pits (unknown age), and two indeterminate features; the burials were too fragmentary to determine ethnicity or age. Post-Contact elements associated with SIHP # -4588 consist of crushed coral building foundations, trash pits, a burn layer, and two human burials in strata with historic artifacts. Pre-Contact elements associated with SIHP # -4588 consist of postholes, possibly one or more fire pits, and a human burial in a flexed position. All three burials were in situ.

5.1.14 McGerty et al. 1995

In 1995, Scientific Consultant Services, Inc., conducted an archaeological assessment on two parcels of land in the Chinatown area on Hotel Street between Maunakea and Smith streets (McGerty et al. 1995). This work included background research and a brief field check. Documentary research indicated the project area was near the *maika* field of Kalanikahua in the *‘ili* of Kīkīhale in the pre-Contact period and early post-Contact period. In the later post-Contact period, it was part of Chinatown and was within the burn area of the 1900 fire. Several stone structures were built on the properties in the early 1900s.

5.1.15 Riley et al. 1995

In 1993, ARCH conducted a data recovery program at the ‘Ewa Block of the Kekaulike Revitalization project, further investigating the two historic properties documented by Kennedy et al. 1994 (Riley et al. 1995). A total of 64 test units were excavated and 55 features were documented, including three additional human burials. Radiocarbon dating of charcoal from SIHP # -4587 yielded a much earlier date than expected, within the tenth century. As the dated charcoal was obtained from behind the pond wall, the radiocarbon date was believed to represent the construction or renovation of the pond. Investigations indicated use of the pond continued up until

the 1860s when it was filled. Analysis of the documented features of SIHP # -4588 showed an extensive timeline of occupation for the project area. Features ranged from the tenth and eleventh centuries (as evidenced by the pond and a coral reef-stone platform with the remnants of a possible human burial), up through the pre-Contact 1600s and 1700s (as evidenced by a hard packed living surface with associated traditional cultural artifacts), through the 1800s (as evidenced by a latrine pit, a Kaua‘i poi pounder and traditional style fishhooks made from copper), and up through the twentieth century. Osteological analysis of the three human burials, as well as the three burials documented during the inventory survey, identified five of the six individuals as of Chinese ancestry.

5.1.16 Goodwin et al. 1996a

In 1992, International Archaeological Research Institute, Inc. (IARII) conducted data recovery at the Marin Tower property (with preliminary reporting by Goodwin in 1992 and complete reporting in Goodwin et al. 1996a and b). Documented archaeological features consisted of pre-Contact and early post-Contact pits and fire pits and early post-Contact structural foundations associated with the residence of the Marín family from about 1810 to 1850. Also documented were artifacts associated with use of the *makai* portion of the property as part of the Honolulu Ironworks from 1850 to 1900, as well as use of the *mauka* portion for shops and families of Chinese merchants during the same period. Artifacts and structures related to the commercial development of the property as part of downtown Honolulu from 1900 to 1950 were collected and analyzed.

5.1.17 Goodwin et al. 1996b

In 1992, IARII completed data recovery for the Marin Tower property on the *makai* corner of Smith and King Streets (Goodwin et al. 1996b). The personal diary of Francisco de Paula Marín (interred in a tomb on his property 7 November 1837) and other accounts indicate Marín and a number of his wives and children were most likely buried on this property in a family cemetery. Fifteen burial features and several isolated, displaced human skeletal remains were found during the data recovery effort. Many iron coffin nails (both for adult and child coffins) were collected and a large variety of associated grave goods were also collected, including small glass beads (0.20 cm [0.08 in] in diameter), large glass beads, a copper ring, bone discs, and buttons, an iron and wood smoking pipe, a glass bead necklace, copper alloy buttons, shell buttons, ceramics, an iron-blade kitchen knife, and a copper cross necklace. A memorandum of agreement was drawn up with the present Marín family relatives and the skeletal remains were disinterred then reinterred elsewhere on the property on 3 March 1994. The entire Marin Tower property was designated SIHP # -4494.

5.1.18 Goodwin 1997

In 1994, IARII completed an AIS of the Kekaulike Diamond Head project, an area bounded by King, Maunakea, Hotel, and Kekaulike streets. Investigations consisted of 21 test trenches. A multi-component site (SIHP # -4875) consisting of 105 features along with six culturally enriched sediment strata was documented. The features ranged from the pre-Contact period to the twentieth century and included pre-Contact and post-Contact fire pits, pit features, historic structural foundations, masonry walls, postholes (possible pre-Contact and/or post-Contact), privies, historic trash pits, and human skeletal remains within a pit feature. Charcoal from one fire pit feature yielded a date range of AD 1184-1394. The majority of the features were identified as Native Hawaiian from the early post-Contact period.

5.1.19 Heidel and Hammatt 1997

In 1997, CSH conducted data recovery in a 1,700-sq-ft parcel at the corner of Hotel and Maunakea streets (Heidel and Hammatt 1997). Four test trenches were excavated by backhoe, resulting in negative findings. The trenches revealed only the presence of an historic basement filled with modern debris and sediment.

5.1.20 Lebo 1997

The Bishop Museum (Lebo 1997) reported on the archaeological data recovery results for the Harbor Court redevelopment project (the area bounded by Fort, Merchant, Bethel, and Queen streets) initially identified by Hurst (1990) and Hurst and Allen (1992). Fifty-three pre-Contact and historic-era features were recorded, providing information on Hawaiian occupation from the late eighteenth to mid-nineteenth centuries, and on commercial development in Honolulu in the nineteenth and twentieth century. All data recovery excavations were stopped upon encountering the pre-Contact deposits of the site. The pre-Contact deposits were investigated later by PHRI (Lebo 2002). Data recovery excavations identified 35 new features associated with SIHP # -2456, including fire pits, pavements, building foundations, post molds, and trash pits. All observed artifacts were of post-Contact origin, but as noted above, represent the influence of Western material culture upon the traditional Hawaiian lifestyle. Documented artifacts included bottles, ceramics, glass beads, buttons (wood, shell, and bone), metal nails, adzes (stone and shell), flakes (basalt, quartz, chert, flint, jasper, and volcanic glass), modified manufactured glass, fishhook blanks, bone awls, hammer stones, and grinding stones. The report includes extensive information on historic artifact analysis techniques and dating.

5.1.21 Lebo and McGuirt 2000a

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

5.1.22 Lebo and McGuirt 2000b

In 1997, the Bishop Museum conducted data recovery in the 800 Nu‘uanu Block (TMK: [1] 1-7-002:002) (Lebo and McGuirt 2000b). Ten backhoe trenches were excavated within the parking lot on the Diamond Head portion of the block bounded by Nu‘uanu Avenue and Nimitz, Marin, and Smith streets. A total of 76 features were identified, including building foundations, post molds, coral block floors and walls, fire pits, trash deposits, and cast-iron sewer pipes. All features within the project area were designated as part of SIHP # -5496, previously identified by Lebo and McGuirt (2000a). The earliest cultural remains were believed to date to earlier than AD 1810.

Numerous historic artifacts were collected dating to the early post-Contact period when the area was used for storehouses, to the later historic periods when the lot was used for industrial structures, for small businesses, and then as a parking lot.

5.1.23 McIntosh and Cleghorn 2000

In 2000, Pacific Legacy, Inc., conducted archival research and surface archaeological survey for the Oahu Commercial Harbors 2020 Master Plan–Immediate Phase Environmental Impact Statement (McIntosh and Cleghorn 2000). The researched area comprised a large portion of the Honolulu Harbor area within the State Historic Downtown and Chinatown Districts, including Pier 2, Piers 12–16, 18–2, 24–29; Pier 32, and Lagoon Drive (adjacent to the Honolulu International Airport). The results of the document and literature research, as well as the surface archaeological survey, indicated no significant cultural or archaeological deposits were present or likely to be present within the project area, most prominently because the researched area is situated on reclaimed land formed by dredging and filling operations beginning in the early 1900s.

5.1.24 Elmore and Kennedy 2001

Archaeological monitoring was conducted by ARCH during miscellaneous sidewalk improvements in Chinatown on King Street between Maunakea and Smith streets (Elmore and Kennedy 2001). One in situ human burial (SIHP # -5781) was identified between Maunakea Street and Smith Street. The burial was believed to be pre-Contact traditional Hawaiian based on its flexed position and lack of historic artifacts. The remains were disinterred. A small number of artifacts were recovered from the back dirt (ceramic fragments, glass, a shark tooth, possible drilled shell fragment, possible shark tooth tool, and one fishhook), however none could be positively associated with the burial.

5.1.25 McDermott and Mann 2001

CSH conducted an inventory survey along Nimitz Highway from Queen Street to Awa Street for Nimitz Highway water system improvements (McDermott and Mann 2001). Although several historic buildings and properties were identified outside their project area, only one historic property (SIHP # -5966, Kawa Fishpond) was identified within the project area. Five boring cores were extracted to determine the boundaries of the pond, and three backhoe trenches were excavated near cores with positive results for fishpond sediments. Radiocarbon dating results of fishpond samples did not provide a clear date of construction for Kawa Fishpond but, based on the samples it appears fishpond sediments were accumulating since at least AD 1150-1350.

5.1.26 Winieski and Hammatt 2001

In 2001, CSH conducted archaeological monitoring of the Nimitz Highway Reconstructed Sewer project (Winieski and Hammatt 2001). The sewer work began on River Street, at the intersection of River and Hotel streets, ran to Nimitz Highway, and extended to Bethel Street, where it merged with the ‘Ewa end of Queen Street. The route then extended along Queen Street to South Street, along South Street to Ala Moana Boulevard, and terminated at the Ala Moana Wastewater Pump Station. The sewer line was installed employing a micro-tunneling technique, which limited the extent of open-cut trenching, requiring instead the excavation of 24 jacking and receiving pits (measuring up to 8 square meters) in order to accommodate tunneling machinery. No traditional Hawaiian cultural materials or features and no pre-Contact or historical burials were observed during archaeological monitoring. The few historic-period cultural materials observed

during monitoring included a glass bottle at South and Auahi streets, a mortared brick alignment at Queen and Punchbowl streets, a brick-lined manhole, and scattered historic rubbish at Maunakea Street and Nimitz Highway. Only one historic property was encountered, a remnant of a light-gauge rail associated with the historic Honolulu Rapid Transit trolley system (SIHP # -5942) at the intersection of Queen Street and Nimitz Highway (Winieski and Hammatt 2001:19).

5.1.27 Lebo 2002

In 2002, PHRI completed a data recovery report for SIHP # -2456, located at the Harbor Court Tower site (formerly called the Ka‘ahumanu Parking Garage). The data recovery excavations, conducted by PHRI from October 1991 to late January 1992, completed work initially begun by the Bishop Museum (Lebo 1997). Radiocarbon analysis of the SIHP # -2456 pre-Contact deposits indicated occupation at the site began between AD 1000 and AD 1200 (Lebo 2002:14-1). The trench and area block excavations were excavated to reveal features in the late pre-Contact period (ca. 1650–1795), and early transitional period (ca. 1795–1820), the late transitional period (1820–1850) and the Historic period (post-1850). Areal excavations for four large blocks (A–D) focused on research for the pre-1850 deposits.

Of the 280 features in Block A, 98% of the features consisted of pits associated with traditional Hawaiian structures (post molds for thatched houses) and household (fire pits, etc.), dating from the late pre-Contact to the transitional periods. In Block B, pits also dominated among the 104 identified features. Most of these date to the time of the occupation of the village of Pulaholaho in the late pre-Contact to transitional periods. The 205 features in Block C were dominated by pits dating to the Transitional Period (84%) with less than 2% dating to the Pre-Contact period. Eighty features were uncovered in Block D. Again these features mainly dated to the transitional period (89%) while only 3% dated to the Late Pre-/Contact-Transitional Period.

Traditional Hawaiian artifacts collected from the pre-Contact deposits consisted of primarily basalt tools and flakes. Historic artifacts were dominated by bottle glass and ceramics, found in both late pre-Contact-Transitional and Transitional features. Observed midden consisted primarily of fish, bird, sea turtle, and marine mollusks. Dog and pig were also documented, but to a lesser extent.

5.1.28 Mann and Hammatt 2002

Between August 2001 and June 2002, CSH, carried out an AMP associated with the King Street Rehabilitation project (Mann and Hammatt 2002). The rehabilitation project was carried out along South King Street from Alapa‘i Street north to Dillingham Boulevard. A historic trash pit containing mostly butchered faunal bone was documented at the corner of Richards and South King streets. Additionally, human skeletal remains of one individual (SIHP # -6371) were documented beneath King Street in front of Honolulu Hale, immediately Diamond Head of Punchbowl Street, which is located . The human remains were poorly preserved and had been previously disturbed by prior utility excavations beneath King Street. The most common type of artifact was bottles or bottle glass fragments. The bottles were typically for medicine and perfume and most of the bottles date from 1900 to around 1920.

5.1.29 West et al. 2002

In 2002, Garcia and Associates completed archaeological monitoring for the installation of water mains along King Street between Liliha and River streets (West et al. 2002). One previously

recorded archaeological site, the Honolulu Rapid Transit & Land Company Trolley (SIHP # -5942) was identified in multiple locations of the project area. Documented Honolulu Rapid Transit trolley system remnants consisted of railroad ties, metal hardware, and brick construction. Small sections of the trolley track were exposed on top of fill material, which contained concentrations of historic artifacts. The historic artifacts associated with the Trolley system included glass bottles and jars, handmade leather shoes, ceramics, faunal bone (pig, cow, and chicken), shell, wood, charcoal, Belgian Block cobblestones, and metal hardware within the fill layers that overlie a coral bedrock. Documented stratigraphy consists primarily of imported fill material overlying limestone bedrock. In some instances, naturally deposited marine clay was observed approximately 1.5 m below the existing ground surface.

5.1.30 Putzi and Dye 2004

In 2003, T.S. Dye and Colleagues, Archaeologists, Inc. conducted archaeological monitoring for architectural barrier removal work at Ali‘iōlani Hale (Putzi and Dye 2004). A deposit of remnant materials from unidentified structures in place prior to the construction of the Kapuāiwa Building was documented during monitoring, but the deposit was not considered significant. The deposit contained materials including ceramic fragment and an intact rifle cartridge dating for the late nineteenth century to the mid-twentieth century.

5.1.31 Cordy and Hammatt 2005

In 2005, CSH conducted archaeological monitoring for the Punchbowl Street Improvements, Phase 2 project. During the excavations for this project no historic properties were observed. However, based on previous research in and around the project area, there remains a distinct possibility that in situ and/or previously disturbed human burials associated with the Kawaiaha‘o Church Cemetery or other pre-Contact or early historic burials not associated with the cemetery could be unearthed. Such finds are occasionally encountered in the greater Kaka‘ako area and have been reported from a number of projects along Punchbowl Street. Based on the stratigraphy recorded, two natural soil series were present, pale coralline based sands representative of the old coastline and darker sands weathered from ash and cinders in the more inland areas of the project area. There was no evidence of pre-Contact or early historic land use, although the majority of the soils encountered were fill soils suggesting a significant amount of the natural ground surface had been altered or displaced.

5.1.32 Goodwin and Allen 2005

In 1994, IARII conducted a data recovery program further investigating SIHP # -4875 for the Kekaulike Revitalization project, Diamond Head Block (Goodwin and Allen 2005). Investigations recovered artifacts and dated charcoal layers that indicate the area was in use as early as the thirteenth century, with heavy occupation occurring from the early to mid-nineteenth century. Four house compounds and a blacksmith’s shop, dating partly to the early nineteenth century, were excavated. A total of 8,552 artifacts were collected, associated with a variety of ethnic origins (traditional Hawaiian, Euro-American, and Asian). Multiple features, such as post molds, living floors, fire pits, refuse pits, and fence lines were all recorded in association with each of the four house compounds. Large amounts of bone midden were also recovered, which included faunal remains present before Contact (such as pig, dog, turtle, chicken, shark, fish, and Pacific rat). Historically introduced animals such as cow, horse, goat, sheep, cat, and the Norwegian rat were also present. The remains of a human fetus were identified during faunal analysis.

5.1.33 McIntosh and Cleghorn 2005

An archaeological inventory survey for the proposed Pearl Street One building was conducted at the corner of Nu‘uanu Avenue and Pauahi Street. One multi-component site was identified and designated SIHP # -6691. The site consisted of two historic trash pits and two heavily disturbed human burials. The authors consider these burials to be pre-Contact in origin, but later disturbed by construction related excavation (McIntosh and Cleghorn 2005).

5.1.34 McIntosh et al. 2006

In 2006, Pacific Legacy conducted an archaeological inventory survey for Block 10: Smith-Beretania Parking Lot in Chinatown, downtown Honolulu (McIntosh et al. 2006). A total of six backhoe trench excavations yielded abundant historic structural materials and artifacts, SIHP #50-80-12-6772, including 68 subsurface features. These features included trash pits, cooking features, building structural foundations, European and Asian historic artifacts, Native Hawaiian artifacts, and abundant midden deposits. The majority of the building structural deposits dated between 1850 and 1900 most likely associated with the 1900 Chinatown fire. Additionally, a possible pre-Contact deposit, dating pre-AD 1778, was identified. The historic artifacts consisted of glass, metal, ceramic, and bone indicating a wide variety of usage. Fewer Native Hawaiian artifacts were recovered including poi pounder fragments, an *‘ulumaika*, cowrie shell lures, a complete stone adze, and a complete conch shell trumpet. Due to the significant association with important events in the development of downtown Honolulu, data recovery was suggested as mitigation.

5.1.35 Dagher and Spear 2007

In 2006, Scientific Consultant Services, Inc. archaeologists monitored construction during interior renovations for an existing historic building for the Pacific Gateway Center project. The property lot is on the *makai* side of King Street, between Maunakea and Smith streets. The crew found two sites (Dagher and Spear 2007). SIHP # -6889 was a burial with two individuals in close proximity to each other. Burial 1 was a flexed or partially flexed in situ burial with no discernible burial pit identified as a young adult male at least 25-30 years of age. Similarly, Burial 2 was a flexed in situ burial with no discernible burial pit identified as an adult female. Based on the burial contexts the individuals were believed to be of Native Hawaiian ancestry, both identified as probably pre-Contact Hawaiians. SIHP # -6926 consisted of two historic features. Feature 1 was a stacked and faced foundation wall of mortared basalt cobbles and boulders capped with concrete. Feature 2 was a collapsed molded ceramic storm drain which contained a cache of intact Ing Ka Py ceramic vases. Monitoring also identified fill materials from the adjacent Marin Tower project which contained glass bottles, porcelain fragments, metal nails and spikes, marine shell, faunal remains, including butchered cow and pig, and two traditional artifacts, a basalt *‘ulumaika* and a smaller coral *‘ulumaika*.

5.1.36 Kailihiwa and Cleghorn 2007; Pietrusewsky (2003, Osteological Appendix A to Kailihiwa and Cleghorn 2007)

In 2001 and 2002, Pacific Legacy conducted archaeological monitoring for Block 10: Smith-Beretania Parking Lot in Chinatown, downtown Honolulu (Kailihiwa and Cleghorn 2007). Subsurface deposits were identified as SIHP #-6772 from the previous archaeological inventory survey. During archaeological monitoring, a total of 22 sets of human remains were recovered throughout the study area, heavily concentrated near the south wall of the Smith-Beretania

apartment structure. All burials were inventoried, excavated, mapped, and reburied on property according to SHPD standards. A detailed osteological report on the burials by Dr. Pietrusewsky (2003) was included as an Appendix in the report.

5.1.37 Groza and Hammatt 2008

In 2008, CSH completed an AMR for the Beretania Street Rehabilitation project, a portion of which is located adjacent and south of the project area (Groza and Hammatt 2008). No archaeological cultural deposits were identified as a result of the project's AMP. No evidence of pre-Contact land use was present, although the majority of the soils encountered directly beneath the asphalt road surface or the concrete sidewalk were fill soils indicating a significant amount of the natural ground surface had been altered or displaced. Those areas excavated beneath the fill contained volcanic cinder.

5.1.38 Hazlett and Hammatt 2008

In 2006, CSH monitored street improvements in Honolulu, focusing on two intersections, the first at Alakea and Queen streets, and the second at Alakea and Merchant streets (Hazlett and Hammatt 2008). Although the excavations at both intersections uncovered historic trash, building materials, and animal bones, no prehistoric or historic burials or cultural properties were identified. The majority of the observed excavations took place entirely within fill or previously disturbed sediments.

5.1.39 Hazlett, Fehrenbach, and Hammatt 2008

Between 2006 and 2007, CSH completed archaeological monitoring for the Water Main Installation project on Aloha Tower Drive (Hazlett, Fehrenbach, and Hammatt). The most significant result of the fieldwork for this project was that the documented stratigraphy is consistent with the predictive model developed in the monitoring plan. This model suggested that subsurface sediments throughout the project area would consist of landfill deposited off the coast of the original Honolulu shoreline beginning in the second half of the nineteenth century during the development of Honolulu Harbor. The model suggested these sediments were likely to be composed of marine sediments and materials dredged from the harbor, as well as terrestrial sediments imported from other land areas of O‘ahu. No cultural or historic properties were identified.

5.1.40 Hazlett, Runyon, Loynaz, and Hammatt 2008

CSH monitored the Fort Street Mall/ Hotel Street sewer replacement from July to October 2006 (Hazlett, Runyon, Loynaz, and Hammatt 2008). The work in the Fort Street Mall corridor involved replacing and upsizing the sewer pipes from a manhole on the *mauka* side of the existing King Street pedestrian underpass stairs to another manhole where Pauahi Street connects with the mall. The Hotel Street work involved CIPP lining of the existing sewer pipes beginning at a manhole. Ground disturbance for the majority of the improvements did not exceed the existing base course or soils previously disturbed during installation of the existing sewer, water, and drain lines. Although the excavations at the intersection of Fort and Hotel streets uncovered building materials and historic trash (bricks, concrete tiles, and broken glass bottles) mixed into the disturbed sediments, no pre-Contact or historic burials or historic properties were identified in the project area.

5.1.41 Hunkin and Hammatt 2008

In 2008, CSH archaeologists monitored the renovation of the courtyard behind the Armstrong Building in the Chinatown Historic District (SIHP # -9986). This structure was built in 1905. It is a masonry brick building faced on the exterior with a bluestone rock. It replaced an older structure built in the 1890s and destroyed by the 1900 Chinatown Fire (Hunkin and Hammatt 2008:30). Only shallow trenching was conducted to remove and renovate the concrete pavement in the courtyard. No cultural deposits or materials were encountered.

5.1.42 Petrey et al. 2009

In 2007, CSH completed archaeological monitoring for the resurfacing of portions of Nimitz Highway and Ala Moana Boulevard along with the installation of streetlights, replacement of concrete bus pads, and limited drainage installation (Petrey et al. 2009). The majority of ground disturbance consisted of very shallow excavations with the exception of traffic signal installations. In the area of Fort Street and Nimitz Highway fill deposits containing historic and modern building debris were documented. In the area of Bishop Street and Nimitz Highway fill deposits containing building rubble were observed. In the area along Ala Moana Boulevard between Channel and Pi‘ikoi streets natural coralline sand was documented beneath fill material. No archaeological cultural resources were documented.

5.1.43 Cleghorn 2012

In 2012, Pacific Legacy conducted data recovery for Block 10: Smith-Beretania Parking Lot in Chinatown, downtown Honolulu (Cleghorn et al. 2012). Excavation was based upon previous archaeological research carried out by McIntosh et al. (2006) in which certain areas were suggested for excavation significant to mitigate the impacts for proposed construction subsurface areas. Previous archaeological investigations identified abundant cultural material and subsurface deposits dating from the pre-Contact period through the early 1900s. The data recovery performed (SIHP # -6772) expanded upon existing work in an attempt to further document the specific area. Excavations identified numerous pits, privies, and miscellaneous features including traditional Hawaiian artifacts to historic artifacts. Two human burials, one adult and one child, were documented. Archaeological monitoring was suggested for the remainder of subsurface activities within the study area.

5.1.44 Hammatt 2013

In 2013, CSH completed an AIS for the City Center (Section 4) of the Honolulu High-Capacity Transit Corridor Project (HHCTCP). The City Center, or Section 4 portion, extends from Middle Street to Ala Moana Center. Nineteen archaeological cultural resources were identified within, or immediately adjacent to, the City Center AIS study area. Of these, SIHP # -7427 was adjacent to the downtown waterfront section of the corridor. It was located at the corner of Nimitz Highway and the Kekaulike Street intersection, near the Pier 15 location. SIHP # -7427 consists of 12 buried subsurface structural remnants (mainly concrete foundations), one historic refuse pit with late nineteenth-early twentieth century artifacts, a cultural stratum with faunal remains, charcoal, and both historic and traditional Hawaiian artifacts and one isolated human talus (heel) bone.

5.1.45 O’Hare et al. 2013

Background research and a field inspection was conducted on Piers 12 and 15 and Honolulu Harbor. The first structure used for a landing in the Pier 12 area was built as early as 1823. The pier was rebuilt of different materials over the years and modified in length, width, and orientation. During the field inspection, photographs of the bricks and large coral blocks on the makai side of the Pier 12 were taken. These older building materials were exposed when the pier was shortened in 1963. The coral blocks may be remnants of the coral blocks used to build the Honolulu Fort in 1816. The fort was dismantled in 1857 and the blocks were reused to build a seawall around newly filled land in the harbor. This filled land later became part of the Aloha Marketplace. Pier 15 was built in 1900 on land fill in the harbor and was modified in the 1950s when Queen Street was widened to form Nimitz Highway. Pier 12 was designated SIHP # 50-80-14-7575 and Pier 15, SIHP # 50-80-14-7576.

5.1.46 Background Summary and Settlement Model for the Honolulu Section

The area that, today, comprises the portion of downtown Honolulu surrounding the mouth of Nu‘uanu Stream was known to the Hawaiians as “Kou,” a center of population and activity, similar to Waikīkī, its preeminent neighbor to the southeast. Kou stretched from “Nu‘uanu to Alakea streets and from Hotel Street to the sea” (McAllister 1933:80).

In 1846, Honolulu was made the capitol of the Hawaiian Kingdom and was well on its way to becoming the commercial and political hub of the islands. An early alignment of Queen Street (Nimitz Highway/ Ala Moana Boulevard) appears on historic maps as early as 1847 along with the development of the modern city street grid and early residences. By 1850, Honolulu was, as described by Charles Wilkes, “very conspicuous from the sea and has more the appearance of a civilized land, with its churches and spires, than any other island in Polynesia” (Wilkes 1845:373). During this period there was an obvious increase in density of land use and urbanization.

As Honolulu became more populated throughout the twentieth century, the areas surrounding the harbor became increasingly important for commercial construction. A review of historic maps spanning from 1919 to 1953 indicates that major development in the Downtown Honolulu area was focused around Honolulu Harbor and streets inland to Vineyard Avenue. The harbor was dredged and filled and the banks of Nu‘uanu Stream were walled.

Previous archaeological studies conducted in the vicinity of the current project area have documented pre- and post-Contact historic properties related to land use activities including habitation, agriculture, aquaculture, and burial. While ground disturbance associated with the current project has the potential to encounter similar subsurface historic properties, the project area is located within corridor of Nimitz Highway/Ala Moana Boulevard, which was developed early on as a city street and may be largely devoid of subsurface archaeological features and deposits. The Nimitz Highway/Ala Moana Boulevard corridor is also likely to be significantly disturbed by subsurface utility line excavations and pipes.

5.2 Previous Archaeological Studies in the Kaka‘ako Section

Archaeological monitoring and data recovery work has followed the increasing urbanization of the Kaka‘ako area as an extension of Honolulu to the east. Figure 48 shows the location of previous archaeological studies and Figure 49 shows the location of recorded archaeological sites. Some of the sites reported in the archaeological studies discussed are at a distance from the project area and are not depicted in Figure 49. The results of these studies are summarized in Table 2, and each study is presented in more detail in the following pages.

5.2.1 Yent 1985

In 1985, five burials were uncovered at the former Honolulu Ironworks lot (Yent 1985), which is the block at the corner of Punchbowl and Pohukaina Street. The burials were found in burial pits in the sand deposit that lies under at least a meter of the ironworks fill. Two of the individuals were in an extended position. A crew from the Division of State Parks disinterred the five burials, which were later designated SIHP #50-80-14-2918. Yent’s report does not contain a map, so the locations of the burials disinterred by the Division of State Parks are unknown.

5.2.2 Douglas 1991

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

5.2.3 Pfeffer et al. 1993

Between 1986 and 1988, CSH (Pfeffer, Borthwick, and Hammatt 1993) conducted archaeological monitoring, data recovery, and burial disinterment in the Hawai‘i Community Development Authority’s Kaka‘ako Improvement District 1 (ID-1), which was bounded by Punchbowl Street (west), South Street (east), King Street (north), and Ala Moana Boulevard (south), including extensions east for Kawaiaha‘o Lane, Queen Street, and Auahi Street. Portions of Pohukaina Street, Quinn Lane, and Reed Lane are also within this district. The observed stratigraphy generally consisted of imported construction fill material overlying naturally deposited Jaucas sand or black cinder deposits. In many cases, these Jaucas sand or black cinder deposits were culturally enriched with pre- and post-Contact deposits including: human burials, building foundations, trash pits, midden concentrations, and various pre- and post-Contact artifacts.

During the course of archaeological monitoring and data recovery activities, 149 human burials were identified and disinterred: 31 burials from the 1853-1854 Honuakaha Smallpox Cemetery (SIHP #50-80-14-3712 / -4531) at Quinn Lane, one historic burial from Punchbowl Street (SIHP #50-80-14-4532), one possibly pre-Contact burial from Halekauwila St. (SIHP #50-80-14-4533), and 116 historic burials from Kawaiaha‘o Cemetery (SIHP #50-80-14-4534) at Queen Street (used from 1825-1920).

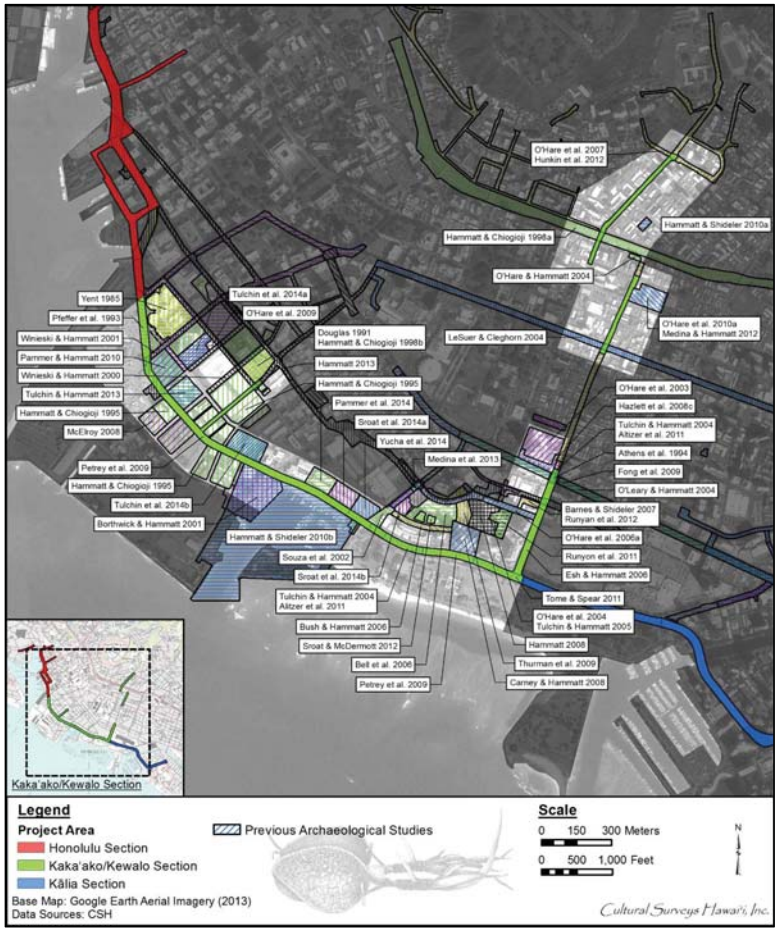

Figure 48. Previous archaeological study areas in the Kaka'ako section of the project area (Google Earth 2013)

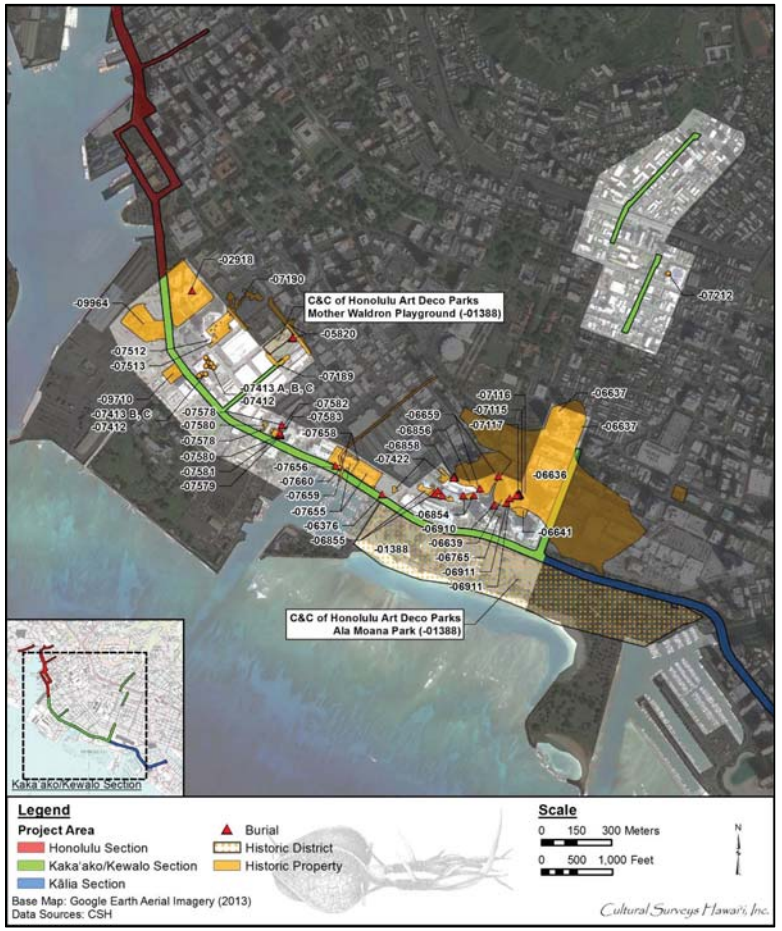

Figure 49. Previously identified archaeological sites in the Kaka'ako section of the project area (Google Earth 2013)

Table 2. Archaeological Studies in the Kaka‘ako Section in Chronological Order

Reference	Type of Study	Location	Results
Yent 1985	Burial excavations	Ka‘ākaukukui Cemetery, corner of Punchbowl and Pohukaina	Five burials (SIHP # 50-80-14-2918) recorded
Douglas 1991	Osteological analysis	Mother Waldron Park, between Coral and Queen Streets	One burial of Hawaiian ancestry, with a pig burial possibly associated with the burial; these burials considered part of SIHP # 50-80-14-4380
Pfeffer et al. 1993	Archaeological monitoring, data recovery	Monitoring for Kaka‘ako ID-1, bounded by Punchbowl, South, King Streets and Ala Moana Blvd	31 burials from 1853-1854 Honuakaha Smallpox Cemetery (SIHP # 50-80-14-3712/-4531) at Quinn Lane; one historic burial from Punchbowl Street (SIHP # -4532); one possibly pre-Contact burial from Halekauwila Street (SIHP # -4533); and 116 historic burials from Kawaiaha‘o Cemetery (SIHP # -4534) at Queen Street (used from 1825-1920)
Athens et al. 1994	Osteological analysis	Pi‘ikoi St and Kapi‘olani Blvd intersection	One set of human remains documented within a wetland environment, believed to represent a pre-Contact unattended death (SIHP # 50-80-14-4847)
Hammatt and Chiogioji 1995	Field inspection, literature review	Twenty parcels in the Kaka‘ako district	No surface features found during field check
Hammatt and Chiogioji 1998a	Field inspection	H-1 Highway Punahou Street Overpass to Vineyard	No archaeological sites or historic strucures noted during the field inspection
Hammatt and Chiogioji 1998b	Field insepction, literature review	Mother Waldron Playground	No surface structures noted during the field inspcetion; the park is a portion of SIHP # 50-80-14-1388, an Art Deco park on the National Register of Historic Places

Reference	Type of Study	Location	Results
Winieski and Hammatt 2000	Archaeological monitoring	Kaka‘ako Improvement District 4	Two isolated historic coffin burials (SIHP # 50-80-14-5598) documented on Kamake‘e Street, between the intersections of Kawaiaha‘o and Waimanu Streets
Borthwick and Hammatt 2001	Archaeological monitoring	Ward Avenue	Fill material with coral and dredged material recorded below concrete pavement; no cultural layers noted
Winieski and Hammatt 2001	Archaeological monitoring	Ward Theaters	Ward Theatres documented pockets of a sandy loam buried A horizon; no archaeological cultural resources identified
Souza et al. 2002	Archaeological monitoring	Kaka‘ako Improvement District 7	Three disturbed, pre-Contact burials recorded (SIHP #s 50-80-14-6376, -6377, -6378; location of SIHP # -6378 unknown); old A horizon in seven of ten profiles
O’Hare et al. 2003	Archaeological inventory survey	Kapi‘olani Blvd and Pi‘ikoi Street	Original wetland surface of Kewalo (SIHP # 50-80-14-6636) and a trash layer (SIHP # -6637) observed
LeSeur and Cleghorn 2004	Archival research	East O‘ahu	Archival reseach indicated three sites on the National Register were near the project, a Catholic Cemetery and two buried Hawaiian fishponds. These three properties are not near the current project area.
O’Hare and Hammatt 2004	Reconnaissance survey	Pi‘ikoi Vista Elderly Housing	No archaeological features noted during the field inspection
O’Hare et al. 2004	Archaeological inventory survey	Ko‘olani Condominium, Kewalo area	Original wetland surface of Kewalo (SIHP # 50-80-14-6636), three historic trash pits (SIHP # -6639), and a historic fill layer (SIHP # -6641) reported
O’Leary and Hammatt 2004	Archaeological monitoring	Kapi‘olani Blvd from Kalākaua Avenue to Kamake‘e	No cultural material observed

Reference	Type of Study	Location	Results
Tulchin and Hammatt 2004	Literature review and field inspection	Kapiolani Area Revised Sewer System	No archaeological or historic features identified
Tulchin and Hammatt 2005	Addendum to an archaeological inventory survey	Ko‘olani Condominium, Kewalo Area	Eight backhoe test trenches excavated; SIHP # 50-80-14-6636, original wetland surface of Kewalo area; SIHP # -6641, historic garbage layer
Bell et al. 2006	Archaeological inventory survey	Victoria Ward Village Shops	Eleven burials (SIHP #s 50-80-14-6854 and -6855) found during AIS and additional 50+ burials found during monitoring; historic privy/activity area (SIHP #s -6854 and -6855); and fishpond sediments (Kolowalu Pond, SIHP # -6856) recorded
Bush and Hammatt 2006	Archaeological monitoring	Hokua Tower, Auahi Street	No burials or cultural deposits observed; old A horizon found at eastern end of Auahi Street
Esh and Hammatt 2006	Archaeological monitoring	Pi‘ikoi Street between Ala Moana Blvd to Matlock Street	No cultural material observed
Hammatt 2006	Archaeological inventory survey	Ala Moana Expansion project	One historic property (SIHP # 50-80-14-6847) identified consisting of a wooden box containing a mix of historic artifacts including printed material, wooden chopsticks, pig bone, and a horse brush
O’Hare et al. 2006	Archaeological monitoring	Kaka‘ako Improvement District 10, Queen Street Extension project	Cluster of 28 historic burials (SIHP # 50-80-14-6658), two isolated disturbed burials (SIHP # -6659), and a historic trash dump (SIHP # -6660); weak A horizon; some fishpond sediments observed
Barnes and Shideler 2007	Literature review and field inspection	1235 Kona St/1226 Waimanu Street	No surface historic properties identified
O’Hare et al. 2007	Field inspection and literature review	Pauoa-Makiki Portion of the Kalihi/Nu‘uanu Sewer Rehabilitation project	No new archaeological sites noted

Reference	Type of Study	Location	Results
Carney and Hammatt 2008	Archaeological monitoring	Hokua Tower Project, Auahi Street	Isolated human mandible fragment and a historic trash pit (SIHP # 50-80-14-6765) observed
Hammatt 2008	Archaeological monitoring	Ko‘olani Condominium, Waimanu Street	Two isolated burials (SIHP #s 50-80-14-6910, -6912) and a cluster of 16 coffin burials (SIHP # -6911) found
Hazlett Carney and Hammatt 2008	Archaeological monitoring	Honolulu Design Center Phase III Project, TMKs: [1] 2-3-010:048, 050, 052, 053, 054, 055, 056	No cultural deposits identified
McElroy 2008	Archaeological assessment	TMKs: [1] 2-10-059:011 and 012, Kaka‘ako	No cultural material observed
Fong et al. 2009	Archaeological monitoring	Kapi‘olani Blvd from Kalakaua Avenue to Ward Avenue, Kamake‘e Street from Kapiolani Blvd to Auahi Street	No cultural material observed
O’Hare et al. 2009	Archaeological inventory survey	Kamehameha Schools Kaka‘ako Mauka parcels	Preliminary testing identified extensive fill layers overlying naturally deposited sandy clay and marsh/pond sediments; no cultural resources identified
Petrey et al. 2009	Archaeological monitoring	Portions of Nimitz Hwy and Ala Moana Blvd	No cultural deposits identified
Thurman et al. 2009	Archaeological inventory survey	Queen Street Parks	Identified one previously documented historic fishpond remnant (SIHP # 50-80-14-6856)
Hammatt and Shideler 2010a	Cultural anthropology and archaeology summary	Kewalo Basin, TMK: [1] 2-1-058	Concluded no pre-twentieth century in situ deposits present within the majority of the project area
Hammatt and Shideler 2010b	Archaeological literature review and field inspection	HECO projects involving installation of underground telecommunication lines at TMK: [1] 2-4-019:045 (Pi‘ikoi Substation)	No historic properties identified
O’Hare et al. 2010	Archaeological literature review and field inspection	Safeway/ Schuman Carriage property project, TMKs: [1] 2-4-011:008, 009, 010, 011	No historic properties identified

Reference	Type of Study	Location	Results
Pammer and Hammatt 2010	Archaeological assessment	Moana Vista Project, Kapi‘olani Blvd	Four test trenches excavated; no cultural material observed
Altizer et al. 2011	Archaeological monitoring	Kapi‘olani Area Revised Sewer System, located throughout Kaka‘ako, Kewalo, and Kalia	One site documented: previously identified SIHP # 50-80-14-6636, a wetland deposit with signs of historic modification for rice cultivation
Runyon et al. 2011	Archaeological inventory survey	Ko‘olani Phase II Project	Five sites documented: two previously identified sites (SIHP # 50-80-14-6641), an historic trash layer and a wetland sediment (SIHP # -6636); three newly identified sites: a buried pre-Contact and post-Contact cultural layer (SIHP # -7115), an alluvial layer (SIHP # -7116), and a concentration of 27 post-Contact burials (SIHP # -7117)
Tome and Spear 2011	Archaeological monitoring	Ala Moana, TMKs: [1] 2-3-006 and 038	No cultural materials or subsurface features identified
Hunkin et al. 2012	Archaeological monitoring	Phase 1 of the Kalihi/Nu‘uanu Sewer Rehabilitation Project, TMKs: [1] 1-2-001 through 003, 009 through 011; 1-3-001, 003 through 005, 007	No cultural deposits identified
Medina and Hammatt 2012	Archaeological monitoring	Safeway, Inc. Development Project, TMKs: [1] 2-4-011:008, 009, 010, 011	One historic property observed (SHIP # 50-80-14-7212), a post-Contact trash pit containing historic era refuse
Runyon et al. 2012	Archaeological inventory survey	Corner of Pi‘ikoi Street and Kona Street	Identified Kewalo wetland sediments (SIHP # 50-80-14-6636) in all 13 test excavations
Sroat and McDermott 2012	Supplemental archaeological inventory survey	Ward Village	Further documented SIHP # 50-80-14-6855, a subsurface cultural layer/activity area comprised of a traditional Hawaiian cultural layer that included numerous pit features and six previously identified human burials

Reference	Type of Study	Location	Results
Hammatt 2013	Archaeological inventory survey	Between Middle Street and Ala Moana Center	Within the vicinity of the current project area, identified the Kewalo wetland land surface (SIHP # 50-80-14-6636), Kolowalu Fishpond (SIHP # -6856), a pre- to post-Contact cultural layer containing an isolated human bone fragment (SIHP # -7429), and a subsurface privy remnant (SIHP # -7430)
Medina et al. 2013	Archaeological monitoring	Intersection of Kamake‘e and Queen Streets, TMKs: [1] 2-3-002:001; 2-3-003:087, 103, and 2-3-004:080 (por.)	Identified multiple fill layers and a truncated sand A horizon
Tulchin and Hammatt 2013	Archaeological inventory survey	Kamehameha Schools Block F	Twenty test units excavated and two sites found, SIHP #s 50-80-14-7412, a layer of historic cultural material, and -7413, material related to the Hawaiian Sugar Planation Immigration Station
Pammer et al. 2014	Archaeological inventory survey	Ward Block B, Ala Moana Blvd and Auahi Street	During excavations of 35 test trenches, two sites identified, SIHP # 50-80-14-7655, salt pan remnants, SIHP # -7656, one human cranial fragment; SIHP # -7658, twentieth century artifact and structural remains, SIHP # -7659, an historic drainage ditch, and SIHP # -7660, an historic trash fill layer
Sroat et al. 2014a	Archaeological inventory survey	Ward Block C, Ala Moana Blvd and Auahi Street	During excavations of 35 test trenches, two sites identified, SIHP #s 50-80-14-7655, salt pan remnants, and -7658, twentieth century artifact and structural remains

Reference	Type of Study	Location	Results
Sroat et al. 2014b	Archaeological inventory survey	Ward Block K, Kamake‘e and Auahi Streets	During excavation of 35 trenches, identified components of two previously identified sites, SIHP #s 50-80-14-6855, a pre to post-Contact cultural deposit, and -7422, an historic trash deposit
Tulchin et al. 2014a	Archaeological inventory survey	Kamehameha Schools Block B	Excavated 39 test trenches; buried concrete slabs designated SIHP # 50-80-14-7512 and an historic trash layer designated SIHP # -7513
Tulchin et al. 2014b	Archaeological inventory survey	Kamehameha Schools Block I	Six archaeological properties identified: SIHP #s 50-80-14-7578, twentieth century cultural layer; -7579, a twentieth century fill deposit and building foundations; -7580, pre-Contact to post-Contact cultural layer with a historic burial cluster; and -7581, a pre-Contact traditional Hawaiian bundle burial; SIHP # -7582, disarticulated human skeletal remains within a non-burial context; SIHP # -7583, disarticulated human skeletal remains within a non-burial context
Yucha et al. 2014	Archaeological inventory survey	Ward Block D	Forty-one test trenches excavated; a buried trash deposit with many bottles dating to the mid-1920s, recorded as SIHP # 50-80-14-7422

5.2.4 Athens et al. 1994

During the 1994 excavation of a trench for an underground telephone line near the northeast corner of Pi‘ikoi Street and Kapi‘olani Boulevard, the remains of a single individual were inadvertently discovered and later disinterred (SIHP # -4847) (Athens et al. 1994). Osteologicalanalysis revealed that the skeletal remains were of a 12 to 15-year-old female. Radiocarbon analysis of a sample of bone collagen yielded a death date between AD 1295 and AD 1473, supporting the osteological determination of Hawaiian/Polynesian ancestry. The remains were found within a brackish water marsh environment (based on malacological findings) at a shallow depth of 50-80 cm below surface. A lack of burial goods and the presence of the remains within an unusual wetlands context strongly suggested that the location of the remains did not reflect an intentional burial. Osteological analysis revealed a severe bone infection of the right pubis as the probable cause of death. The individual may have passed away at the very spot of interment and remained undiscovered. Alternatively, the individual may have been interred in an elevated sand berm. Several burials in Kaka‘ako have been found in similar sand berms located around fishponds.

5.2.5 Hammatt and Chiogioji 1995

In 1995, CSH (Hammatt and Chiogioji 1995) conducted a brief field inspection of twenty parcels (blocks) in Kaka‘ako. No surface features were noted. A literature review and archival review is presented in the report on Kaka‘ako in general.

5.2.6 Hammatt and Chiogioji 1998a

Archival research and a field inspection of the area around the Punahou Street Overpass of the H-1 Highway was conducted by CSH in 1998. No surface archaeological sites were evident and there are no structures in the immediate vicinity.

5.2.7 Hammatt and Chiogioji 1998b

A field inspection and literature search was conducted by CSH in 1998 at Mother Waldron Park. No surface were recorded during the field inspection. The park is SIHP #1388, an Art Deco park on the National Register of Historic Places.

5.2.8 Winieski and Hammatt 2000

In 2000, archaeological monitoring for the Kaka‘ako Improvement District (ID) 4 project was conducted by CSH (Winieski and Hammatt 2000). The project documented two isolated historic coffin burials (SIHP # -5598) on Kamake‘e Street, between Kawaiaha‘o and Waimanu streets. The two adjacent burials were within an undisturbed beach sand deposit, directly underlying an A horizon, which itself was beneath approximately 50 cm of construction fill and pavement. Well-defined burial pits were present, as well as staining from the deteriorated coffin wood. Apart from the coffins, no associated artifacts were discovered during disinterment. During a nearby excavation on Waimanu Street, approximately 2 m west of Kamake‘e Street, a horse or mule skeleton was discovered within an undisturbed sand layer, approximately 1 m below the surface. No other materials were observed during the Kaka‘ako ID 4 project, apart from several modern bottles and bottle fragments discovered within fill materials. One “Star Soda Works” bottle was dated to ca. 1900.

5.2.9 Borthwick and Hammatt 2001

In 1999, CSH monitored excavations in Kaka‘ako Improvements District 6. During all monitoring work, the types of material observed included varies of fill and natural tidal flats material. No burials, traditional Hawaiian, or early historic cultural layers were noted.

5.2.10 Winieski and Hammatt 2001

In 2000, CSH performed archaeological monitoring for Victoria Ward Ltd. at the site of the Ward Village Phase II (Ward Theaters) construction project in Kaka‘ako (Winieski and Hammatt 2001). No pre-Contact materials, historic cultural materials, or human burials were encountered. Stratigraphic profiles within the project area revealed that fill materials were placed over a pre-existing marsh surface. In the northwest corner of the project area, an old A horizon, naturally deposited pond sediments, and calcareous sand were observed. Similarly, an old A horizon and naturally deposited calcareous sand were observed in the southwest corner of the project area.

5.2.11 Souza et al. 2002

In 2000, CSH completed a monitoring program for the Kaka‘ako ID-7 construction project, encountering three human burials that had been severely disturbed by excavation activities (Souza et al. 2002). The ages and ancestries of the individuals could not be identified; however, the lack of grave goods may indicate they were pre-Contact or early post-Contact. Burial 1 (SIHP # -6376), a single cranium, was inadvertently discovered by construction personnel in the back dirt pile at the base yard. Burial 2 (SIHP # -6377), an adult individual, was encountered by a CSH archaeologist during backhoe excavations for a box drain. The burial was within an undisturbed beach sand deposit. Burial 3 (SIHP # -6378), consisting of a femur and several rib fragments, was also recovered in the base yard.

5.2.12 O’Hare et al. 2003

In July 2003, CSH (O’Hare et al. 2003) conducted an archaeological inventory survey for Evershine X in an approximately 6-acre project area bounded by Pensacola Street, Kamaile Street, Pi‘ikoi Street, and Kapi‘olani Boulevard (TMKs: [1] 2-3-010:028, 048, 050, and 052–056). The AIS identified a pre-Contact to early twentieth century wetland surface with an associated sand berm (SIHP # -6636). A trash dump that contained wood, brick, tires, ceramic dinnerware, insulators, rusted metal, and glass bottles (SIHP # -6637) was discovered in the northeast corner of the project area. Many of the glass bottles were dated to between the 1920s and 1940s. No human remains were found in the project area.

5.2.13 LeSeur and Cleghorn 2004

Archival research was conducted to determine the potential for archaeological resources within the project area. The authors concluded that three sites on the National Register were near their project area, a Catholic Cemetery and two buried fishponds. These three sites are not near the current project area.

5.2.14 O’Hare and Hammatt 2004

Archival research and a field inspection were conducted by CSH for the proposed Pi‘ikoi Vista Elderly Housing project in a lot bounded by Papakū Place, Lunalilo Street, on Kīna‘u Street, and Pi‘ikoi Street. No archaeological sites were noted during the field inspection. Archival research

focused on an early on researching the possible location of an early cemetery in the area, called the Foreigner’s Cemetery that was used from ca. 1794 to 1900.

5.2.15 O’Hare et al. 2004

In 2003, CSH conducted the Phase I portion of the archaeological inventory survey for the Ko‘olani Condominium project in the Kewalo area (O’Hare et al. 2004). A total of 13 trenches were excavated in the project area. Two previously unrecorded historic properties were newly identified, SIHP #s -6639 and -6641, both historic trash pits dated to the early twentieth century. In addition, one previously recorded historic property, the original wetland surface of Kewalo (SIHP # -6636), was documented.

5.2.16 O’Leary and Hammatt 2004

Between August and October 2004, CSH conducted archaeological monitoring along Kapi‘olani Boulevard for sewer line repairs (O’Leary and Hammatt 2004). A total of five 0.6 m deep trenches were excavated. The stratigraphy of these trenches consisted of fill materials associated with the original placement of the sewer pipes. No cultural materials were observed.

5.2.17 Tulchin and Hammatt 2004

In 2004, CSH completed a literature review and field inspection for the Kapi‘olani Area Revised Sewer System project (Tulchin and Hammatt 2004). No subsurface testing was conducted as part of the archaeological assessment. No archaeological or historical features were observed within the project area.

5.2.18 Tulchin and Hammatt 2005

In 2005, CSH conducted Phase II of the archaeological inventory survey for the Ko‘olani Condominium project (Tulchin and Hammatt 2005). Two historic properties previously recorded by O’Hare et al. (2004) historic properties were identified, SIHP #s -6636 (an original wetland surface of Kewalo) and -6641 (a historic trash fill layer).

5.2.19 Bell et al. 2006

In 2006, CSH completed an archaeological inventory survey for the Victoria Ward Village Shops project (Bell et al. 2006). A total of 86 trenches were excavated within the project area. Three historic properties were identified: 1) SIHP # -6854, a subsurface cultural layer/activity area that contained an immature pig skeleton, remnants of a historic privy, remnants of a culturally enriched A horizon (containing both historic and prehistoric cultural material), and five previously identified human burials; 2) SIHP # -6855, a subsurface cultural layer/activity area comprised of a traditional Hawaiian cultural layer that included numerous pit features and six previously identified human burials; and 3) SIHP # -6856, a historic fishpond that is part of Land Commission Grant 3194, “Kolowalu,” awarded to Kalae and Kaaua. Subsequent archaeological monitoring associated with the project documented approximately 50 additional pre-Contact or early post-Contact burials associated with SIHP #s -6854 and -6855 (see Thurman et al. 2009). All burials were found in Jaucas sand deposits. Of historic interest in the monitoring results are the frequent discoveries of late nineteenth century ammunition and animal burials. The Ward Village Shops project area correlates to areas shown on historic maps as a rifle range (1893) and an animal quarantine station (1911), which likely explains these findings.

5.2.20 Bush and Hammatt 2006

Between 2003 and 2005, CSH conducted archaeological monitoring along Auahi Street for the Hokua Tower project (Bush and Hammatt 2006). Excavations took place using a backhoe with a 3-ft-wide bucket, as well as by hand shoveling. Excavations included 350 m of electrical line trenching and two associated manholes. No archaeological finds were encountered during monitoring.

5.2.21 Esh and Hammatt 2006

In 2004, CSH conducted archaeological monitoring for the Rehabilitation of Streets, Unit 5 B project on Pi‘ikoi Street between Ala Moana Boulevard and Matlock Street (Esh and Hammatt 2006). Construction activities in the area primarily consisted of the resurfacing of Pi‘ikoi Street. This activity did not extend deeper than 30 cm below base course, and it did not require archaeological monitoring. Construction activity requiring monitoring was limited to excavation at the intersection of Pi‘ikoi and Young Streets for traffic signal improvements. No cultural materials were encountered.

5.2.22 Hammatt 2006

In late 2005 and early 2006, CSH conducted an archaeological inventory survey of the Ala Moana Expansion project (Hammatt 2006). The investigation’s 30 backhoe trenches revealed no Jaucas sand deposits within the project area. The natural land surface, prior to historic/modern fill episodes, was either a sandy clay or a highly organically enriched peaty layer. This natural surface was largely removed by prior construction-related disturbances within portions of the project area. One historic property (SIHP # -6847) was identified. It consisted of a wooden box placed in a pit that had been cut into the former land surface. The box contained a mix of historic artifacts including, among other things, printed material, wooden chopsticks, pig bone, and a horse brush. It was tentatively dated to the late nineteenth or early twentieth century.

5.2.23 O’Hare et al. 2006

In 2004, CSH completed archaeological monitoring for the Queen Street Extension project, part of the Kaka‘ako Improvement District 10. Three historic properties were documented: SIHP #s -6658, -6659, and -6660. SIHP # -6658 is a cluster of 28 burials within the Queen Street extension. Seventeen of the 28 burials were determined to be of Hawaiian ethnicity, based on the types of grave goods, the presence of tooth ablation, and a traditional burial position (flexed vs. extended). The ethnicity of the remaining 11 could not be definitively determined, but it is assumed that most of these were also Hawaiian since this area of Kaka‘ako was not inhabited by other ethnic groups until the twentieth century. All grave goods were historic; most were dated to the mid-to-late nineteenth century. It is possible many of these individuals were victims of the 1853 smallpox epidemic or one of the other epidemics that decimated the Hawaiian population in the last half of the nineteenth century. SIHP # -6658 constituted a cemetery, possibly used between the 1840s and the 1880s. The cemetery was located on an elevated sandbar that formed the margin of Kolowalu Pond (SIHP # -6856).

SIHP # -6659 consists of two isolated burials in a previously disturbed stratigraphic context. The age or ethnicity of these burials could not be determined. SIHP # -6660 is a discrete historic dump area containing bottles dated to the early twentieth century (O’Hare, Bush, and Hammatt 2006). The burials were typically encountered at depths of 88-118 cmbs (inference from reported

stratigraphy—see O’Hare, Bush, and Hammatt 2006:73 and 76). The burials and associated grave goods were reinterred in a reburial vault in the immediate vicinity on the *mauka* side of Queen Street.

5.2.24 Barnes and Shideler 2007

In 2007, CSH completed a literature review and field inspection for the 1235 Kona Street/1226 Waimanu Street Reserved Housing project (Barnes and Shideler 2007). No surface historic properties were identified within the project area.

5.2.25 **O’Hare et al. 2007**

In 2007, CSH completed a literature review and field inspection report on the Kalihi – Nu‘uanu Sewer Rehabilitation project. The Pauoa section of this project is near the current project area. Archival research identified sensitive areas, especially areas near Land Commission lots. No surface archaeological sites or historic properties were noted during the field inspection.

5.2.26 Carney and Hammatt 2008

From 2003 to 2005, CSH conducted archaeological monitoring for the Hokua Tower project (Carney and Hammatt 2008). One historic property was documented (SIHP # -6765) consisting of a historic trash layer containing rusted metal, broken glass, and various bottles dating to the mid-1900s. In addition, a human mandible fragment was found in a displaced secondary context. It was thought that the mandible may have been exposed by coring activities (over 200 cores were drilled); however, the exact origin of the find was unknown.

5.2.27 Hammatt 2008

In 2008, CSH completed archaeological monitoring for the Ko‘olani Condominium project (Hammatt 2008). Three new historic properties were identified, SIHP # -6910, a single pre-Contact burial; SIHP # -6911, a cluster of 16 historic coffin burials believed to comprise a discrete cemetery; and SIHP # -6912, a single burial. The burials were associated with Jaucas sand deposits buried beneath historic and modern fill. Additionally, various historic trash deposits were observed throughout the project area but were not considered eligible for the Hawai‘i Register of Historic Places.

5.2.28 Hazlett Carney and Hammatt 2008

In 2008, CSH completed a monitoring project at the Honolulu Design Center, in the block bounded by Pensacola, Kamaile, Pi‘ikoi streets and Kapi‘olani Boulevard. In general, the stratigraphy consisted for several fill layers overlying naturally deposited marine sediments.

5.2.29 McElroy 2008

In 2008, completed an assessment of two lots in the makai portion of Kaka‘ako. Four test pits were excavated by backhoe. The stratigraphy consisted of several fill layers with modern refuse over a waterlogged clay deposit. No cultural material or features were recorded.

5.2.30 **Fong et al. 2009**

In 2009, CSH completed archaeological monitoring of construction associated with upgrading existing drainage, water, and sewer systems. The project area included Kapi‘olani Boulevard from Kalākaua Avenue to Ward Avenue, Kamake‘e Street from Kapi‘olani Boulevard to Auahi Street,

and Atkinson Drive from Kapi‘olani Boulevard to Ala Moana Boulevard (Fong et al. 2009). No historic properties were observed. The stratigraphy consisted primarily of imported fill material associated with the installation of utilities and road construction. In some instances, pockets of naturally deposited sediment (Jaucas sand and wetland clays) were observed beneath fill deposits.

5.2.31 O’Hare et al. 2009

In 2009, CSH (O’Hare, Tulchin, T., Borthwick, and Hammatt 2009) prepared an archaeological inventory survey plan for three Kamehameha Schools Kaka‘ako *mauka* parcels. One of the *mauka* parcels encompasses the *makai* half of the proposed Civic Center transit station. To formulate a strategy for testing, preliminary archaeological work, in the form of subsurface testing, was conducted. Preliminary testing identified the following stratigraphic sequence: 1) fill layers consisting of mixed marine/terrigenous soil strata; layers of incinerated and un-burnt garbage with metal, glass, and ceramic fragments; crushed coral layers; volcanic cinders; and pumped/dredged marine clay layers; 2) a naturally deposited sandy clay or sandy loam; and 3) a very dark gray sandy clay with organic material representing former marsh/pond sediments of the pre-Contact and pre-Hawaiian occupation of the islands.

5.2.32 Petrey et al. 2009

In 2007, CSH (Petry, Hazlett, Borthwick, and Hammatt 2009) completed archaeological monitoring for the resurfacing of portions of Nimitz Highway and Ala Moana Boulevard along with the installation of streetlights, replacement of concrete bus pads, and limited drainage installation. The majority of ground disturbance consisted of very shallow excavations with the exception of traffic signal installations. In the area of Fort Street and Nimitz Highway fill deposits containing historic and modern building debris were documented. In the area of Bishop Street and Nimitz Highway fill deposits containing building rubble were observed. In the area along Ala Moana Boulevard between Channel Street and Pi‘ikoi Street natural coralline sand was documented beneath fill material. No archaeological cultural resources were documented.

5.2.33 Thurman et al. 2009

In 2009, CSH completed an archaeological inventory survey for the Queen Street Parks project. Fieldwork involved the excavation of 29 backhoe trenches. One previously identified historic property was recorded, SIHP # -6856, remnants of a historic fishpond, originally identified by Bell et al. (2006). Documented stratigraphy consisted of varying layers of fill, overlying various naturally deposited sediments atop the coral shelf. The fill consisted of imported terrigenous sediment, incinerator material containing burnt historic refuse, crushed coral, and hydraulic pump dredge sediment. Natural sediments consisted primarily of backshore marsh or pond sediments associated with SIHP # -6856 (Kolowalu fishpond). Naturally deposited Jaucas sand deposits were also observed.

5.2.34 **Hammatt and Shideler 2010a**

In 2010, CSH completed a summary report on the cultural anthropology and archaeology of the Kewalo Basin area to document potential cultural resources (Hammatt and Shideler 2010). The study concluded that no pre-twentieth century in situ deposits are located within the majority of the project area. Potential early twentieth century in situ deposits may be located in the extreme inland portion of the project area. No human burials are expected in the project area with the possible exception of the vicinity of the seaward curb of the Ala Moana/Nimitz alignment.

5.2.35 Hammatt and Shideler 2010b

In 2010, CSH completed an archaeological literature review and field inspection for HECO projects Involving the installation of underground telecommunication lines including a Pi‘ikoi T Substation (TMK: [1] 2-4-019:045). No historic properties were identified.

5.2.36 O’Hare et al. 2010a

In 2010, CSH completed an archaeological literature review and field inspection report for a proposed Safeway at a lot once used by Schuman Carriages as a car display room and office. In the early twentieth century a lodging house called “The Donna” and other housing units were present on the site. CSH crew excavated five backhoe trenches at the property. The stratigraphy consisted of surface asphalt, and fill layers over volcanic cinders. One fire pit, a modern feature, was noted.

5.2.37 Pammer and Hammatt 2010

In 2010, CSH conducted an archaeological assessment for a 0.26-acre parcel for the Moana Vista project (Pammer and Hammatt 2010). Four trenches were excavated, but no cultural materials were observed. The study found layers of imported fill over an organic A horizon. The organic A horizon consisted of brown clay loam (peat) containing compressed roots.

5.2.38 Altizer et al. 2011

From 2008 to 2009, CSH conducted archaeological monitoring for the Kapi‘olani Area Revised Sewer System project (Altizer et al. 2011). The project comprised multiple sewer line segments located throughout Kaka‘ako, Kewalo, and Kālia. The study documented two layers of former wetland sediments, identified as SIHP # -6636. The portion of SIHP # -6636 observed during monitoring was located in an easement off Pensacola Street, between Ho‘olai and Kamaile streets, and extended between two low-rise apartment buildings. The location of SIHP # -6636 was consistent with the 1884 Bishop Waikiki Survey Map (RM 1090) and the 1897 Monsarrat map (RM 1910), both of which show a pond present in the vicinity of the Kapi‘olani Area Revised Sewer System project area. The pond is not named on either map, but is present within former rice fields. The sediments encountered during project-related sewer line excavation are described as a black clay loam, potentially related to rice cultivation. Abundant quantities of freshwater snail shells may indicate the former wetland deposits were modified for rice cultivation.

5.2.39 Runyon et al. 2011

Between 2009 and 2010, CSH conducted an archaeological inventory survey for the 1.73-acre Ko‘olani Phase II project in Kaka‘ako (Runyon et al. 2011). A total of 29 test trenches were excavated. Five historic properties were identified, two of which had been previously identified. SIHP # -6636 consists of portions of the former wetland surface of the Kewalo area. SIHP # -6641 is an historic burnt trash layer that was used as fill material to raise the original ground surface. Diagnostic artifacts provided a date range between the 1880s and 1940s. SIHP # -7115 is a subsurface culturally enriched sandy A horizon (cultural layer) containing multiple pit features, and pre- and post-Contact artifacts. Traditional Hawaiian artifacts included two basalt adzes. The historic artifacts dated to the early twentieth century. SIHP # -7116 is a subsurface low-energy alluvial layer characterized as pond sediment. Remnants of the site were found in four trenches whose location corresponds with a pond depicted on historic maps. SIHP # -7116 is a concentration

of 27 human burials, 20 of which were found in wooden coffins. The burials were found in sand deposits below historic and modern fill layers. The presence of a glass bottle dated to between 1879 and 1907 suggests the burials were interred before ca. 1900. The SHPD determined the burials were of Native Hawaiian ancestry.

5.2.40 Tome and Spear 2011

In 2011, Scientific Consultant Services, Inc. conducted archaeological monitoring for the Ala Moana Sewer Reconstruction project (Tome and Spear 2011). No cultural materials or subsurface features were identified. In general, the observed stratigraphy consisted of multiple fill deposits overlying natural sediments (i.e., sand and silty sand).

5.2.41 Hunkin et al. 2012

In 2012, CSH completed a report for monitoring conducted for the Kalihi/Nu‘uanu sewer project, extending from Middle Street in Kalihi to Pi‘ikoi Street in Kaka‘ako. No cultural deposits were identified as a result of the project’s monitoring program. The project area’s subsurface deposits appear to have been disturbed by past land use, which likely included extensive earthmoving activity and importation of fill sediments into the project area. However, a single isolated human bone fragment was discovered in fill material during excavation in Area 6. The custody of this skeletal fragment was transferred to the SHPD/DLNR office.

5.2.42 Medina and Hammatt 2012

In 2010, CSH completed an archaeological monitoring report for a proposed Safeway at a lot once used by Schuman Carriages as a car display room and office (see O’Hare et al. 2010b). Five test trenches were excavated at the property. The majority of subsurface deposits consisted of natural, undisturbed sediment. Four locations had historic trash deposits, with artifacts dating from the 1860s to the 1920s. These deposits were designated SIHP #50-80-14-7212.

5.2.43 Runyon et al. 2012

In 2012, CSH completed an archaeological inventory survey for The Senior Residence at Pi‘ikoi at the corner of Pi‘ikoi and Kona Streets (Runyon et al. 2012). Subsurface Kewalo wetland sediments (SIHP # -6636) were observed in all 13 test excavations within the project area. In general, the wetland deposits consisted of very dark brown silty clay loam containing abundant decomposing organic materials (peat), snail shells, rootlets, and charcoal flecking. These sediments were found overlying gleyed sandy clay sediments over the coral shelf. Historic documentation suggests the site was capped with imported fill during early twentieth century land reclamation fill events. The site has been previously documented in nearby areas in Kaka‘ako (O’Hare et al. 2003; O’Hare et al. 2004; Tulchin and Hammatt 2005; and Runyon et al. 2011).

A sediment sample collected from SIHP # -6636 was analyzed by Dr. Carl Christensen, professional malacologist. The analysis also noted that the snail species represented in the samples were “little changed from those present there and in similar environments in pre-Contact times” (Christensen 2011:9). Of three snail species commonly found in these wetland environments (*T. porrecta*, *M. tuberculata*, and *T. granifera*), one species (*T. porrecta*) found within SIHP # -6636 is now virtually extinct.

5.2.44 Sroat and McDermott 2012

In 2012, CSH completed a supplemental archaeological inventory survey for the Ward Village Shops Phase 2 project (Sroat and McDermott 2012). No new historic properties were identified. However, further documentation of SIHP # -6855 was conducted.

5.2.45 Hammatt 2013

Hammatt (2013) performed AIS testing within numerous locations between Middle Street and Ala Moana Center. Testing revealed multiple sites, three of which were identified near the current project area—SIHP # -6636 (former wetland land surface), SIHP # -6856 (Kolowalu Fishpond), and SIHP # -7430 (subsurface privy remnant). These wetland sediments represent the natural wetland surface of the Kewalo wetland sediments were identified within 25 AIS test excavations in the East Kaka‘ako and Kālia Geographic Zones for the Honolulu High Capacity Transit Corridor project (T-186 through T-193, T-195, T-196, T-198 through T-200, T-202, T-202A, T-203, T-205, T-207, T-208, T-210 through T-212, T-214, T-219, and T-220). In general, the wetland sediments were documented as variations of brown and gray silty clays, sandy clays, clay loams, and, similar to the current AIS, black silt loam peat layers.

5.2.46 Medina et al. 2013

In 2010, CSH conducted archaeological monitoring for utility relocations, traffic signal installations, and road widening at the intersection of Kamake‘e and Queen Streets. Project area stratigraphy consisted of various fill layers overlying a remnant or truncated sand A horizon, beach (Jaucas) sand, and the coral shelf. No sites were designated.

5.2.47 Tulchin and Hammatt 2013

In 2013, CSH completed an archaeological inventory survey of Kamehameha Schools Kaka‘ako Block F. Twenty test trenches were excavated, resulting in the identification of two historic properties. SIHP #50-80-014-7412 is a discontinuous subsurface cultural layer containing post-Contact Western-introduced cultural material, including crushed red brick, cut faunal bone, glass fragments, slag, and metal fragments. SIHP #50-80-014-7413 is a surface and subsurface features predominantly associated with the property’s development and utilization as a Hawaiian Sugar Planters Immigration Station (i.e., a reinforced concrete building, buried concrete structural remnants, and subsurface trash layers).

5.2.48 Pammer and McDermott 2014

The Pammer and McDermott (2014) AIS for this project completed a total of eight backhoe-assisted test excavations in order to assess the stratigraphy within the project area footprints, determine the extent of undisturbed natural sediments (i.e., wetland sediments), and determine the likelihood of encountering significant cultural deposits within the project area. A total of two historic properties were encountered, an historic trash deposit (SIHP # -7596) and previously identified wetland sediments (SIHP # -6636). Testing concentrated on the *makai* boundary of the 7.23-acre project area, in an effort to target a potential sand berm and associated structures. A trench was also placed to locate the former Sheridan Street (Trench 1). Historic maps and photos place a portion of the former Sheridan Street within the western edge of the current project area. Sheridan Street was an irregular roadway that followed the natural high grounds between the various ponds and wetlands in the Kaka‘ako and Kālia area. The *makai* end

5.2.49 Sroat et al. 2014a

In 2014, CSH completed an inventory survey of Ward Block C project bounded by Auahi Street, to the southwest by Ala Moana Boulevard, to the southeast by a parking lot, and to the northwest by the Ward Warehouse complex. A total of 36 backhoe-assisted test excavations were completed, including both exterior (parking lot/courtyard) and interior (Ward Warehouse commercial space) test excavations. Significant findings of the inventory survey include identification of a large complex of buried historic salt pan structures and sediments within the central and *mauka* portions of the project area. The historic salt pan remnants, designated SIHP # -7655, consist of a grid-like system of man-made berms enclosing low-lying, level salt pan beds. Also identified within the project area, buried beneath modern fill episodes, are extensive remnants of previous twentieth century development of the Block C West and adjacent Block B East (Pammer et al. 2014) project areas, designated SIHP # -7658.

5.2.50 Sroat et al. 2014b

In 2014, CSH completed an inventory survey of Ward Block K, located at the *mauka* (inland)/Diamond Head (south) corner of the intersection of Kamake‘e and Auahi Streets. The subsurface testing program consisted of the excavation of 35 backhoe test excavations. Findings of the inventory survey included identification of a culturally enriched loamy sand A horizon with associated features overlying Jaucas sand within the *makai* portion of the project area. In some cases, the underlying Jaucas sand in this area also contained cultural material, the provenience of which was inconclusive but which may have been associated with the A horizon cultural layer. This cultural deposit was previously identified by Bell et al. (2006) designated as SIHP # 50-80-14-6855.Within the Block K project area, the SIHP # -6855 cultural layer contained 24 features, including possible midden deposits, postmolds, and indeterminate pits. A burned trash fill layer containing a large amount of historic artifacts was also identified. Artifact analysis of cultural material recovered from the backdirt of T-25 indicates a post-1935 age of deposition. The cultural material and mid-twentieth century date of the burned trash fill layer are similar to burned trash deposits documented within the immediate vicinity (at the intersection of Kamake‘e and Auahi Streets) by Yucha et al. (2014) and previously designated SIHP # 50-80-14-7422. Based on the proximity and similarity of artifact type and time period, the burned trash deposit identified within the Block K project area has been designated a component of SIHP # -7422.

5.2.51 Tulchin et al. 2014a

In 2014, CSH completed an inventory survey of Kamehameha Schools Block B, bounded by Pohukaina, Keawe, Auahi, and South streets. Thirty-nine test excavations (TE) were excavated, documented and sampled. Of note was the presence of a post-Contact trash layer (SIHP # -7513) beneath the crushed coral fill. The layer contained late nineteenth to early twentieth century artifacts including glass and ceramic bottles, ceramics, and metal fragments. Also documented was the presence of buried concrete slabs and foundations (SIHP # -7512, Features A to G) distributed throughout the project area as noncontiguous features.

5.2.52 Tulchin et al. 2014b

In 2014, CSH completed an inventory survey of Kamehameha Schools Block I, Auahi Street, Ward Avenue, Ala Moana Boulevard, and Koula Street. The subsurface testing program initially consisted of 46 machine-assisted test excavations. Observed stratigraphy from open trenching

indicates the project area had been subjected to intensive land reclamation via in-filling of low-lying areas.. Observed naturally deposited sediments were capped beneath historic land reclamation fill. Six historic properties were identified during subsurface testing, including a twentieth century cultural layer (SIHP # 50-80-14-7578); a twentieth century fill layer and associated building foundations (SIHP # -7579); a pre- to post-Contact cultural layer with a historic burial cluster (SIHP # -7580); a pre-Contact traditional Hawaiian bundle burial (SIHP # -7581); and two sets of disarticulated human skeletal remains within non-burial contexts (SIHP #s -7582 and -7583).

5.2.53 Yucha et al. 2014

In 2012, CSH conducted an inventory survey in Ward Block D, a parking lot at the corner of Auahi and Kamake‘e Streets. Forty-one test trenches were excavated. In general, the stratigraphic sequence, described from the present land surface to beneath the water table, included the modern asphalt parking lot surface, numerous and variable layers of imported fill, hydraulic fill, a remnant buried A-horizon (former land surface), natural Jaucas beach sand, gleyed sandy clay, and the coral shelf. A buried former land surface (A-horizon) was observed in 28 of the 41 trenches within the project area. A buried trash deposit with many bottles dating to the mid-1920s, was recorded as SIHP # 50-80-14-7422.

5.3 Previous Archaeological Studies in the Kālia Section

Archaeological monitoring and data recovery work has followed the increasing urbanization of the Kaka‘ako area as an extension of Honolulu to the east. Figure 50 shows the location of previous archaeological studies and Figure 51 shows the location of recorded archaeological sites. Some of the sites reported in the archaeological studies discussed are at a distance from the project area and are not depicted in Figure 51. The results of these studies are summarized in Table 3, and each study is presented in more detail in the following pages.

5.3.1 Kimble 1976

Denham and Pantaleo (1997a:9, citing Kimble 1976) relate that in 1976: “Five prehistoric or late-historic period bundle burials were recovered from a sand deposit” during construction of the Hale Koa Hotel on the beach at Fort DeRussy. The burials have been assigned SIHP # -9500 (BPBM # Oa-A4-25). A sixth burial also was reported, seemingly from a different context and possibly just pre-dating 1948. The Federal Register “Notice of Inventory Completion for Native American Human Remains and Associated Funerary Objects from the Island of Oahu” (Bishop Museum NAGPRA inventory) of January 28, 1998 makes no mention of these remains as being in the museum collection at that time, which is consistent with an account by Neller (1980:7) that “all were reburied near the hotel.” Denham and Pantaleo (1997a:33) indicate that the reburial site is north of the Hale Koa Hotel and is marked by a stand of red ti plants

5.3.2 Sinoto 1977

In 1977, Sinoto conducted an archaeological reconnaissance survey of the southeast corner of the Hilton Hawaiian Village grounds. The exact boundaries of the survey are unknown as no map indicating the specific study area was included in the report. No historic properties were identified during the surface reconnaissance. However, it was noted that subsurface cultural deposits in the form of human burials and filled-in fishponds were likely in the area (Sinoto 1977:1). Thus, it was recommended that all excavations conducted within the survey area be monitored by an archaeologist.

5.3.3 Neller 1980

In 1980, three partial sets of human remains were inadvertently discovered during construction activities for the new Tapa Tower building within the southeastern corner of the Hilton Hawaiian Village. All three sets of remains had been disturbed by construction activities and were removed from their primary burial context before SHPD archaeologists could document the stratigraphic proveniences. The burials were determined to be of Hawaiian ethnicity and post-1850 in age based on a reconstruction of historic period shorelines. The burials were designated SIHP # 50-80-14-2870.

In addition to the three burials, three subsurface features, consisting of pit features pre-dating the construction of the Ala Wai Canal, were also observed. Two of the features had an undetermined function; however, Neller (1980) suggested that they may have been related to former ‘*auwai* (irrigation ditches) and trenches. In regards to Feature 1, Neller (1980:12) remarked that “Whatever the feature may have been, it had been dug, used, and filled prior to the dredging of the Ala Wai Canal in the 1920s” and that the “dredged deposits from the canal covered this feature unbroken (Neller 1980:12).” A coffee bean sinker for an octopus lure was collected from

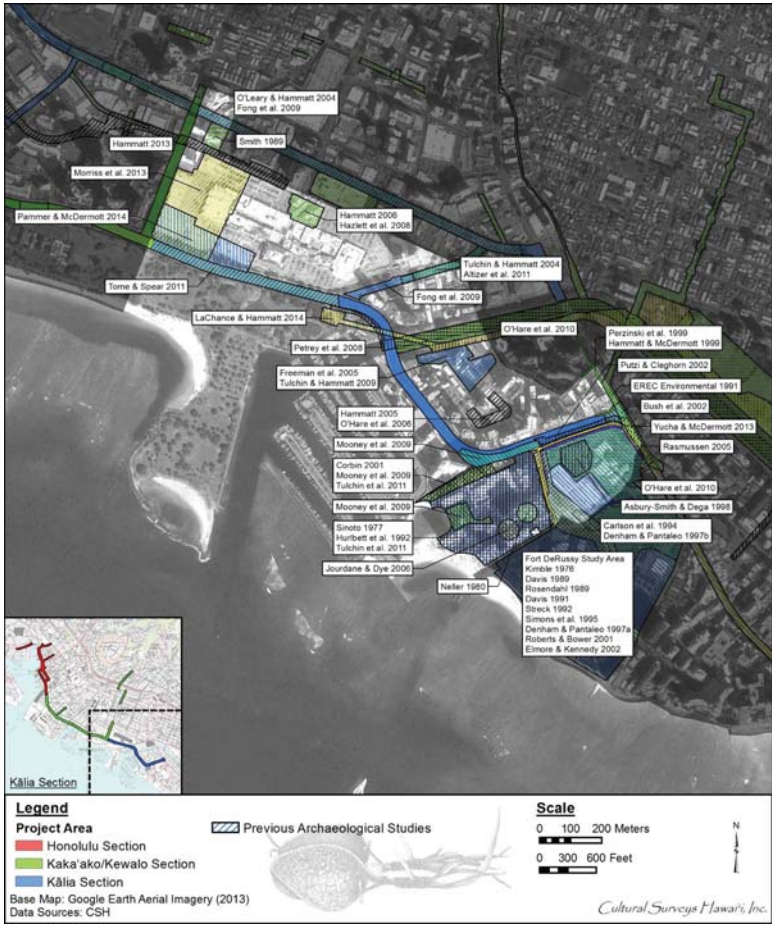

Figure 50. Previous archaeological study areas in the Kālia section of the project area (Google Earth 2013)

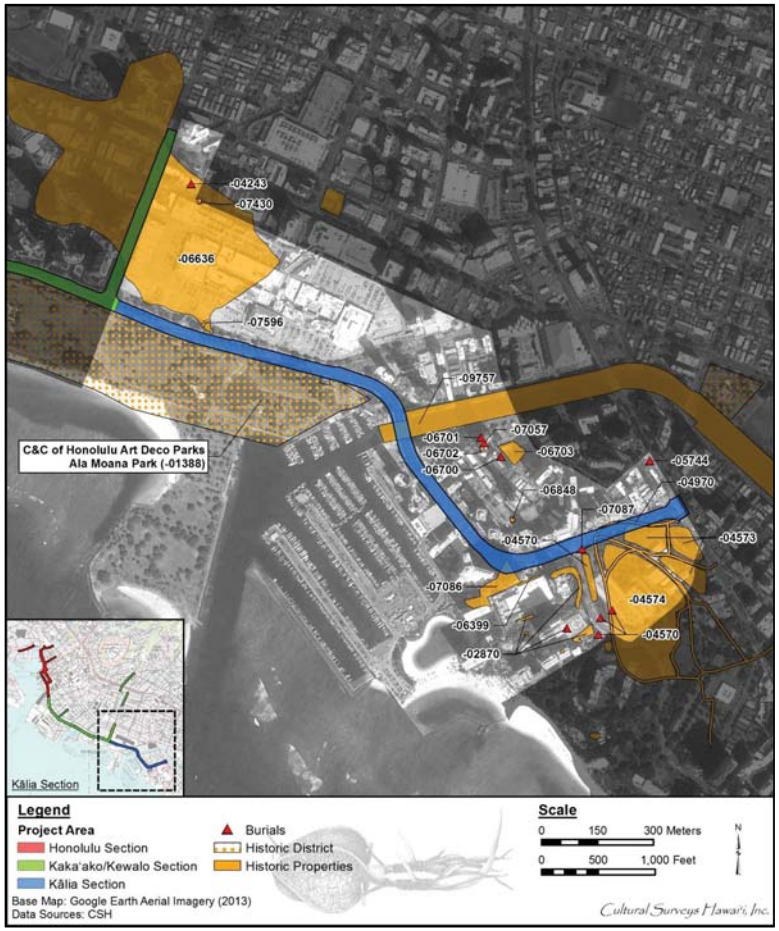

Figure 51. Previously identified archaeological sites in the Kālia section of the project area (Google Earth 2013)

Table 3. Archaeological Studies in the Kālia section in Chronological Order

Reference	Type of Study	Location	Results
Kimble 1976	Memo	North of the Hale Koa Hotel (exact location unknown)	Five prehistoric burials recovered; assigned SIHP # 50-80-14-9500
Sinto 1977	Archaeological reconnaissance survey	Grounds of Hilton Hawaiian Village Hotel	No surface features noted
Neller 1980	Archaeological monitoring	Kālia Burial Site, Hilton Hawaiian Village	Brief field inspection; partial recovery of three historic Hawaiian burials, and trash pit from 1890s; no prehistoric Hawaiian sites; burial site #50-OA-2870
Davis 1989	Reconnaissance survey and historical research	Fort DeRussy	Identified fishponds and other features; SIHP #s 50-80-14-4573 through -4577 are fishponds; SIHP # -4570 is a remnant cultural deposit
Rosendahl 1989	Archaeological inventory survey	Fort DeRussy, Hale Koa Hotel Site	A disturbed buried cultural layer encountered with a variety of historic material such as glass, ceramic fragments, milkglass and pearl shell buttons, a slate pencil, copper tacks, a brass bullet shell, saw-cut bone, and a possible worked basalt cobble
Smith 1989	State Parks response to inadvertent discovery of human remains	1341 Kapi‘olani Avenue	SIHP # 50-80-14-4243 (isolated long bone) found in a disturbed context
Davis 1991	Archaeological monitoring	Fort DeRussy	Subsurface features and material remains date to early post-Contact period (ca. 1780s to 1790s) through mid-nineteenth century (see also Davis 1989)
EREC Environmental 1991	Literature review	Mō‘ili‘ili and Waikīkī area along McCully, Young, King, Wiliwili, Kapi‘olani Blvd, Ala Wai Bridge, Ala Moana, Kalākaua, and Kūhiō Streets	Includes evaluations for the potential for buried archaeological resources

Reference	Type of Study	Location	Results
Hurlbett et al. 1992	Archaeological monitoring	TMK: [1] 2-6-008:001	SIHP # 50-80-14-2870 (three burials) found previously by Neller in 1980; additional subsurface features post-dating 1881 found
Streck 1992	Memorandum for record	Fort DeRussy	Documented human burial discovery of possible late prehistoric Hawaiian made during data recovery excavations (SIHP # 50-80-14-9550)
Carlson et al. 1994	Osteological analysis	Realignment of Kālia Road, Fort DeRussy	Recovered approximately 40 human burials, the majority in a large communal burial feature; excavations uncovered a cultural-enriched layer that contained post molds, SIHP # 50-80-14-4570:8
Simons et al. 1995	Data recovery excavations	Fort DeRussy	Collected prehistoric and historic artifacts and midden materials from seven occupation layers, and recorded six prehistoric cultural features including *‘auwai* bunds and channels (SIHP # 50-80-14-4970), fishpond walls and sediments (SIHP # -4574), a possible *lo‘i* (SIHP # -4576), and hearths (SIHP # -4579)
Denham and Pantaleo 1997a	Archaeological monitoring and excavations	Fort DeRussy	Three historic properties observed: SIHP # 50-80-14-4574, fishpond sediments (Loko Paweo I), three historic trash pits, and two burials; SIHP # -4570 a historic trash pit, four fire pits, an ash lens, and an unknown number of human burials; and SIHP # -4966, pre-Contact features and burials representing at least five individuals found in the Koko Head portion of Fort DeRussy

Reference	Type of Study	Location	Results
Denham and Pantaleo 1997b	Archaeological data recovery	Fort DeRussy	Investigated six previously identified sites: SIHP # 50-80-14-4570, a coastal area of pre-Contact to post-Contact occupation; SIHP # -4574, Loko Paweo I; SIHP # -4575, Loko Ka‘ihikapu; SIHP # -4576, Loko Paweo II; SIHP # -4579, LCA 1758:3, containing five fire pits, one pit, one human burial, and historic as well as possible pre-Contact midden deposits; and SIHP # -4970, an *‘auwai* and bund system; newly documented features included a fire pit, a coral rock concentration with associated posthole, and a cultural deposit
Asbury-Smith and Dega 1998	Archaeological monitoring	Fort DeRussy just south of Ala Moana Blvd, TMK: [1] 2-6-311	No historic properties observed
Hammatt and McDermott 1999	Burial disinterment	Kalākaua Avenue	Two human burials (SIHP #s 50-80-14-5744-1 and -5744-2) discovered by electrical contractor during excavation of utilities trench
Perzinski et al. 1999	Archaeological monitoring	Along Ala Wai Blvd, Kalākaua Avenue, Ala Moana Blvd, and Ena Road	Documents two human burials (SIHP #s 50-80-14-5744–1 and -5744–2) and pockets of undisturbed sand (located well north of project vicinity and not shown in Figure 25)
Corbin 2001	Archaeological inventory survey	Hilton Waikikian	No archaeological sites found during excavations
Roberts and Bower 2001	Archaeological monitoring	Fort DeRussy	No historic properties observed
Bush et al. 2002	Archaeological monitoring	Kalākaua Avenue, between Ala Moana Blvd and Kapahulu Avenue	Four human burials (SIHP #s 50-80-14-5856, -5860, and -5864) found, probably pre-Contact Native Hawaiians; several historic trash pits; entire pig within an *imu* pit (estimated date AD 1641-1671); gleyed muck associated with former ponds (SIHP # 4573)

Reference	Type of Study	Location	Results
Elmore and Kennedy 2002	Archaeological monitoring	Fort DeRussy	No findings
Putzi and Cleghorn 2002	Archaeological monitoring	Hilton Hawaiian Village	Pond sediments, organic sediments, and Jaucas sand documented beneath fill layers along Ala Moana Blvd and Kalākaua Avenue; identified a portion of Loko Kaipuni fishpond complex (SIHP # 50-80-14-4573), a basalt alignment of indeterminate date, and documented five post-Contact pit features (SIHP # -6399) within the Hilton Hawaiian Hotel grounds
O’Leary and Hammatt 2004	Archaeological monitoring	Kapi‘olani Blvd from Kalākaua Avenue to Kamake‘e Street, TMK: [1] 2-3-003	No cultural material observed
Tulchin and Hammatt 2004	Literature review and field inspection	Kapiolani area, bounded by Ala Moana Beach Park, Ward Avenue, Kalakaua Avenue, and King Street, TMKs:[1] 2-3-004, 005, 007, 009, 010, 013, 014, 017, 018, 022, 035, 036, and 038	No archaeological or historic features identified
Freeman et al. 2005	Archaeological inventory survey and cultural impact evaluation	4 acres bounded by Ala Wai and Ala Moana Blvds, Hobron Lane, Lipe‘epe‘e St, TMKs: [1] 2-6-011:001, 002, 004, 032, 037, and 040	Identified four sites: disturbed and incomplete human remains (SIHP # 50-80-14-6700), an in situ coffin burial with grave goods (SIHP # -6701), a culturally enriched A horizon (SIHP # -6702), and the remnants of a fishpond (SIHP # -6703; location outside of area shown on figures)
Hammatt 2005	Literature review and field inspection	Kaioo Drive	No surface archaeological sites noted during the field inspection
Rasmussen 2005	Archaeological monitoring	Fort DeRussy, TMK [1] 2-6-005:001	No historic properties observed

Reference	Type of Study	Location	Results
Hammatt 2006a	Archaeological literature review and field inspection	1391 Kapi‘olani Blvd, TMK: [1] 2-3-039:011	No surface historic properties identified
Hammatt 2006b	Archaeological inventory survey	6 acres bounded by Kapi‘olani Blvd, Keaumoku Street, Ala Moana Blvd, and Pi‘ikoi Street, TMKs: [1] 2-3-038:001, 2-3-040:005, 007, 009, 011, 014, 016, 018	Thirty test trenches excavated; SIHP # -6847, a small, subsurface feature (wooden box with chopsticks, brushes, a bead, animal bones) dating to late nineteenth/early twentieth century
Jourdane and Dye 2006	Archaeological monitoring	Just east of Duke Kahanamoku Lagoon near the intersection of Duke’s Lagoon Drive and Rainbow Drive, TMK: [1] 2-6-008:034	No historic properties observed
O’Hare et al. 2006b	Archaeological inventory survey	Bounded by Hobron Lane and Kaio‘o Drive	Twenty backhoe trenches excavated; one pre-Contact fire pit dated AD 1470-1660 designated SIHP # -6848
Hazlett Loynaz, and McDermott 2008	Archaeological monitoring	Ala Moana Center expansion project, TMKs: [1] 2-3-038:001, 2-3-040:005, 007, 009, 011, 014, 016, 018	No cultural material observed; monitoring results within current project area (Kona Street Block) indicate fill sediments to below water table; document research indicated Ala Moana Center Phase II project completed in 1960s completely removed prior natural sediments to below the water table and replaced them with fill
Petrey et al. 2008	Archaeological monitoring	Ala Wai to Magic Island, TMKs: [1] 2-3-034, 036, 037; 2-6-017, 018; 2-7-036	No cultural material observed

Reference	Type of Study	Location	Results
Fong et al. 2009	Archaeological monitoring	Kapi‘olani Blvd from Kalākaua to Ward Avenues, Kamake‘e Street from Kapi‘olani Blvd to Auahi Street and Atkinson Drive from Kapi‘olani to Ala Moana Blvds	No cultural material observed
Mooney et al. 2009	Archaeological monitoring	East of Ala Wai Boat Harbor, on what is now the intersection of Holomoana Street and Kahanamoku Street	Documented (SIHP # -7086), a large historic trash feature complex along the north side of the Hilton Hawaiian Village, and (SIHP # 50-80-14-7087), a previously disturbed burial near the intersection of Kālia Road and Ala Moana Blvd
Tulchin and Hammatt 2009	Archaeological monitoring	4-acre area bounded by Ala Wai Blvd, Hobron Lane, Lipe‘epe‘e Street, and Ala Moana Blvd, TMKs: [1] 2-6-011:001 and 037	Identified additional fragments of a previously identified disturbed human burial (SIHP # -6700), as well as a second set of human remains (SIHP # 50-80-14-7057)
O’Hare et al. 2010	Cultural resource assessment	Ala Wai Watershed, TMKs: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3 and 3-4	No archaeological features identified
Altizer et al. 2011	Archaeological monitoring	Kapi‘olani Area Revised Sewer System, TMKs: [1] 2-3-004, 005, 007, 009, 010, 013, 014, 017, 018, 022, 035, 036, 038, and 041	One site documented: previously identified SIHP # 50-80-14-6636, a wetland deposit with signs of historic modification for rice cultivation
Tome and Spear 2011	Archaeological monitoring	Ala Moana, TMKs: [1] 2-3-006 and [1] 2-3-038	No cultural materials or subsurface features identified

Reference	Type of Study	Location	Results
Tulchin et al. 2011	Archaeological inventory survey	Bounded by Kālia Road to the east, Paoa Place to the south, Duke Kahanamoku Lagoon to the west, and Ala Moana Blvd to the north	Identified portions of a discontinuous historic cultural layer (SIHP # 50-80-14-2870) in the southeastern corner of the Hilton Hawaiian Village, heavily disturbed by previous construction
Hammatt 2013	Archaeological inventory survey	Numerous locations between Middle Street and Ala Moana Center	Within the vicinity of the current project area, identified the Kewalo wetland land surface (SIHP # 50-80-14-6636), Kolowalu Fishpond (SIHP # -6856), a pre- to post-Contact cultural layer containing an isolated human bone fragment (SIHP # -7429), and a subsurface privy remnant (SIHP # -7430)
Morriss et al. 2013	Archaeological inventory survey	Ala Moana Center, TMK: [1] 2-3-038:001 (por.)	Identified potential salt pan signatures in nine trenches and further documented SIHP # 50-80-14-6636 (Kewalo wetland sediments)
Yucha and McDermott 2013	Archaeological inventory survey	Along Ala Moana Blvd, Paoa Place and Kalākaua Avenue bordering HHV	No historic properties observed
LaChance and Hammatt 2014	Archaeological monitoring	Ala Moana Sewer Project, from Ala Wai Park, along and across Ala Wai Blvd to Ala Moana Park	No cultural remains recorded
Pammer and McDermott 2014	Archaeological inventory survey	Park Lane Ala Moana Project, TMK: [1] 2-3-038:001 por. (present project)	Identified SIHP # 50-80-14-6636 (subsurface wetland deposit) and SIHP # -7596 (an historic trash deposit)

the pit fill of Feature 1. The sinker was constructed of pink granite, an imported material which dated the traditional Hawaiian artifact to the post-Contact period. The third documented pit feature consisted of a trash pit containing refuse (ceramic and glass artifacts) from the late 1890s.

5.3.4 Davis 1989

In 1989, the International Archaeological Research Institute, Inc. (IARII) conducted a reconnaissance survey at Fort DeRussy (Davis 1989). Eleven test trenches were excavated in widespread locations of inland Fort DeRussy and nine trenches were excavated in the south coastal portion. The testing documented prehistoric, historic, and modern subsurface archaeological deposits. Subsurface testing within the northern and inland portions of Fort DeRussy documented buried pre-Contact fishpond sediments, *‘auwai* (irrigation ditch/canal), and earthen embankment features. Deposits along the coastal portion included historic refuse pits and pre-Contact hearths, probable post molds, and midden (Davis 1989:v). No SIHP numbers were reported by Davis (1989), although, the test excavation locations are within SIHP # 50-80-14-4570, a remnant cultural deposit in the south coastal portion, and in SIHP # -4573 through -4577, the Kālia fishponds.

5.3.5 Rosendahl 1989

In February 1989, PHRI conducted a subsurface archaeological inventory survey for a new pool location at the Hale Koa Hotel (Rosendahl 1989a). Two rows of 15 backhoe test trenches were excavated at the site. The stratigraphy indicated that “a naturally prograded beach underlies the topsoil” (Rosendahl 1989a:2). Minimal historic artifacts were encountered, and they did not appear to relate to an intact primary cultural layer.

Between June 29 and 30, 1989, PHRI conducted a subsurface archaeological inventory survey for a proposed new *luau* facility at the Hale Koa Hotel (Rosendahl 1989b). A disturbed buried cultural layer was encountered with a variety of historic material such as glass, ceramic fragments, milkglass and pearl shell buttons, a slate pencil, copper tacks, a brass bullet shell, saw-cut bone, and a possible worked basalt cobble. The buttons were determined to date to the 1800s (Rosendahl 1989b:2-3). More recent material including a PVC irrigation pipe and electrical wire were closer to the ground surface.

5.3.6 Smith 1989

In 1989, construction workers discovered four bone fragments in a property located on the southeast corner of Kapi‘olani Boulevard and Pi‘ikoi Street (TMK: [1] 2-3-039:019). The find was reported to Marc Smith (1989), State Parks archaeologist. Smith examined the bones and determined that only one was human (SIHP # -4243); the remaining fragments were pig bones. The human bone was a right tibia shaft fragment. A 3 August 1989 memorandum to the “Historic Sites File” stated that “On 2 August 1989, Alan Yoshimoto, project supervisor for Nordic Construction . . . called our office to report ‘some bones’ found at a construction site at 1341 Kapi‘olani Boulevard.” A memorandum addressed to Dr. Ross Cordy (SHPD), dated 10 April 1991, mentioned a formal report for SHPD files with skeletal remains data collection forms appended. The bone was temporarily taken to the Honolulu SHPD office and the site was designated SIHP # -4243.

5.3.7 Davis 1991

In 1991, IARII monitored an environmental baseline survey for a Fort DeRussy Military Reservation. Twelve bore holes were monitored in two general areas, and no archaeological remains were recovered from the coring process. However, based on the excavations conducted in the extreme southern tip of Fort DeRussy lands where intact deposits and features (dating to the fifteenth century) previously were noted, it was concluded that nearly continuous, intact prehistoric and early historic cultural deposits underlie the entire area between Battery Randolph and the beach. Davis (1989:33) reports one burial find, seemingly from his “Burial Pit R” in “Grid 7” located in LCA 1515:2 which appears to have been located just south (*makai*/Diamond Head) of the Battery Randolph Army Museum. Davis (1991) thought this burial dated to circa 1840s–1850s.

5.3.8 EREC Environmental 1991

This report is a literature review and archival report on the Mō‘ili‘ili and Waikīkī area along a proposed water main along McCully, Young, King, Wiliwili, Kapi‘olani Boulevard, Ala Wai Bridge, Ala Moana, Kalākaua, and Kūhiō streets. No survey or excavations were conducted, but the report does present evaluations for the potential for buried archaeological resources in each area.

5.3.9 Hurlbett et al. 1992

From 1985 to 1987, Paul H. Rosendahl, Inc. (PHRI) conducted archaeological monitoring of mechanical loop excavations at the Hilton Hawaiian Village. The excavations included portions of the Tapa Pool area and new Louis Vuitton site of the current project. During the course of monitoring, 15 horizontal features were observed. Eleven of the features consisted of post-Contact trash pits, one was a pit feature of indeterminate function, and the remaining three features were historic-to-modern filled-in trenches. All of the artifacts collected from the trash pits dated to the late nineteenth and early twentieth centuries (Hurlbett et al. 1992). The pit features were incorporated into SIHP # -2870, which was previously identified by Neller (1980).

A total of 3,819 artifacts were collected within the study area. All artifacts, with the exception of those collected from the pit features, were situated within disturbed sediments. It was determined that all of the artifacts originated from either household refuse or from construction debris originating from successive periods of demolition and construction conducted within the study area. The artifact assemblage primarily consisted of late nineteenth and early twentieth century luxury items associated with health (medicine bottles) and food (beverage and sauce bottles).

In general, the documented stratigraphy for the Hilton Hawaiian Village property consisted of multiple fill layers (predominantly disturbed sand with smaller portions of Ala Wai dredge material and crushed coral) overlying a culturally sterile sand layer, which was determined to be associated with the historic filling of the coral reef for artificial shoreline/beach expansion. Naturally deposited sediments were observed near the eastern edge of the study area. Limestone bedrock, possibly associated with formerly exposed tidal flats, was observed in the western half of the study area.

5.3.10 Streck 1992

In May 1992, a human burial (SIHP # -9550) was discovered at the *mauka* end of the Kuroda Parade Ground at Fort DeRussy during archaeological data recovery excavations at Fort DeRussy conducted by Biosystems Analysis, Inc (Streck 1992). According to the report the burial was interred during late prehistoric times (AD 1600–1700s). Streck (1992:3) noted that "the location of the burial is somewhat unusual for the Waikīkī area" in being so far inland (well *mauka* of Kālia Road).

5.3.11 Carlson et al 1994

In 1993 Biosystems Analysis excavated human remains found during realignment of Kālia Road. Burial Area 6 included 27 – 34 individuals in a common pit feature located just SE of the intersection of Paoa Place and Kālia Rd. approximately 20 to 25 m east of the east corner of the Hilton Hawaiian Village campus. Denham and Pantaleo 1997a provide an SIHP citation of 50-80-14-4570:8 for what Carlson et al. 1994" call "Burial Area 6".

The study concludes this was a hasty, mass interment and "may well represent the remains of Hawaiian warriors who died in one of the battles of the interisland wars of conquest which occurred during the reign of King Kamehameha I." (Carlson et al. 1994:70). Burial Area 7 included 4 individuals in association with a cultural layer located in the vicinity of the Army Museum just southwest of the intersection of Kālia Road and Saratoga Road.

The Carlson et al. (1994) study includes a Figure (their Figure 5-1) indicating the location of a number of burials in the Fort De Russy area. These burials from the 1993 Biosystems Analysis monitoring operations are reported in the Denham and Pantaleo 1997a monitoring study.

5.3.12 Simons et al. 1995

In 1992, BioSystems Analysis, Inc. conducted data recovery excavations at Fort DeRussy in anticipation of new building construction. Three previously identified historic properties were encountered: Loko Paweo I (SIHP # 50-80-14-4574), Loko Paweo II (SIHP # -4576), and a subsurface cultural layer associated with LCA 1785 and containing one set of fragmented skeletal remains (SIHP # -4579). In addition, a newly identified *'auwai* system was discovered (SIHP # -4970). Prior to final submittal, there was a restructuring of BioSystems Analysis, Inc. and Garcia and Associates obtained the contract (Denham and Pantaleo 1997b).

5.3.13 Denham and Pantaleo 1997a

In 1993, BioSystems Analysis, Inc. conducted archaeological monitoring along the Kālia Road Realignment project at Fort DeRussy Military Reservation. These results were written up by Garcia and Associates nearly four years later (Denham and Pantaleo 1997a). Given the passage of time and the different companies involved, it is perhaps no surprise that the data provided are incomplete. It appears clear, however, that the descriptions of "Burial" designations in Denham and Pantaleo (1997a) correspond directly with the locations provided in the corresponding Carlson et al. (1994:72) report. During the monitoring of utility trenches, ten subsurface features and nine burials and/or burial areas were recorded. Denham and Pantaleo (1997a) grouped these into three sites which are discussed below:

Site #1 (SIHP # -4574): SIHP # -4574 consists of fishpond sediments (Loko Paweo I), three historic trash pits, and two burials. The two burials (designated as Feature 5) appear to have been

north of the intersection of Kālia Road and Saratoga Road and not in the immediate vicinity of the current study area (Denham and Pantaleo 1997a:19-20); no age determination was provided for the burials.

Site #2 (SIHP # -4570): SIHP # -4570 consists of a historic trash pit (Feature 1) dating from the late nineteenth to early twentieth century, four fire pits (Feature 2 and Features 4-6), an ash lens (Feature 3), and an unknown number of human burials (in six distinct features) found in the sand dunes on the *makai* side of Loko Paweo I near the current study area (Features 7-12). The burials were previously disturbed, incomplete, and some burial features appeared to represent multiple burials. One of these six burial features (Feature 8; a.k.a. "Burial Area 6") was the focus of the Carlson et al. (1994) study. No information was provided regarding SIHP # -4570:7 "Burials 3 & 4," but these are shown as just *mauka* of the Hilton Hawaiian Village complex across Kālia Road. SIHP # -4570:9 "Burial 8" is a pre-Contact or early historic interment which was left in situ and described as "just west of the newly constructed entrance driveway to the Hilton Hawaiian Village" (Denham and Pantaleo 1997a:36). SIHP # -4570:10 "Burial 9" is another pre-Contact or early historic interment also left in situ seemingly located on the other side of a trench profile "across from Feature 4570:9" (Denham and Pantaleo 1997a:38). SIHP # -4570:11 is another pre-Contact or early historic burial described as within "the west face of the trench" presumably within the same trench as SIHP # -4570:9 and 10. SIHP # -4570:12 "Burial 11" consisted of two long bones and a cranial fragment located in "the landscaped area between the new Paoa Place extension and the driveway for the Hilton Hawaiian Hotel" (Denham and Pantaleo 1997a:38). This burial discovery area presumably is located within the pathway of Kālia Road prior to its realignment in 1995. The disturbed remains of Burial 11 were reinterred in the base of the excavation.

Site #3 (SIHP #-4966): SIHP # -4966 consists of two features (4966:1 and 4966:2) in the eastern portion of Fort DeRussy. Feature 4966:1 contains a minimum of four individuals buried within an apparently permanently inhabited prehistoric cultural layer. Excavation of this layer revealed a pit, dense concentrations of marine shell, numerous artifacts, and seven post holes. Radiocarbon dating of two charcoal samples from the cultural layer indicates occupation during the fifteenth century. The human remains in this feature were treated in accordance with NAGPRA consultations with Native Hawaiian organizations (Denham and Pantaleo 1997a:41). The second feature in SIHP # -4966, Feature 4966:2, consists of human remains (cranial and long bone fragments) found near the intersection of Kālia and Saratoga Roads. These remains had been previously disturbed by construction activities during the laying of a gas line, storm drain, and manhole casing, and had been placed as a secondary burial in backfill between the gas line and the storm drain. The burial was left *in situ* (Denham and Pantaleo 1997a:41).

5.3.14 Denham and Pantaleo 1997b

In 1992, Garcia and Associates conducted an archaeological data recovery at Fort DeRussy. Six previously identified sites were investigated (SIHP # -4570, -4574, -4575, -4576, -4579, and -4970). One site (SIHP # -4570) was characterized by features such as a fire pit, coral rock concentration, and postholes. An *'auwai* and bund system (SIHP # -4970) revealed two channels, three bunds, and a charcoal stain. Another site (SIHP # -4579) revealed a number of features related to permanent historic occupation and possible intermittent prehistoric use, such as five fire pits, two historic midden deposits, and a human burial (the burial encountered in "Area A" well inland

of Kālia Road was designated SIHP # -4579:4). In addition, three fishponds, Loko Paweo I (SIHP # -4574), Loko Ka‘ihikapu (SIHP # -4575), and Loko Paweo II (SIHP # -4576), were identified.

5.3.15 Asbury-Smith and Dega 1998

Scientific Consultant Services conducted monitoring for a shallow water-sprinkler line (30 cmbs), concrete curbing (20 cmbs), and 19 tree holes (120–140 cmbs) within the northern portion of Fort DeRussy just south of Ala Moana Boulevard. Only varying fill layers were encountered within the tree hole excavations.

5.3.16 Hammatt and McDermott 1999

During the Anti-Crime Street Lighting Improvements project, two human burials (SIHP #s -5744-1 and -5744-2) were discovered by electrical contractor during excavation of utilities trench on Kalākaua Street. The burials were described by CSH in a burial treatment plan for the finds. Based on the position of the burials, and the lack of a coffin or historic artifacts, the burials were considered likely pre-Contact to early post-Contact Native Hawaiian. The burials were disinterred and taken by the SHPD.

5.3.17 Perzinski et al. 1999

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

5.3.18 Corbin 2001

In 2001, PHRI completed a subsurface archaeological inventory survey for the northern strip of the Hilton Hawaiian Village complex. The investigation consisted of the excavation of 21 backhoe trenches. In general, the stratigraphic sequence consisted of imported fill layers (i.e., asphalt, clay loam, and crushed coral fill) overlying disturbed sand deposits. The observed disturbances were associated with prior development of the area (i.e., subsurface utilities and prior building demolition and construction). No historic properties or significant cultural deposits were observed.

5.3.19 Roberts and Bower 2001

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

5.3.20 Bush et al. 2002

From July 1999 to October 2000, four sets of human remains were inadvertently encountered during excavation activities relating to the Waikīkī Anti-Crime Street Lighting Improvement project along portions of Kalākaua Avenue (Bush et al. 2002). The first burial was encountered on Kalākaua Avenue, just before Duke’s Lane and was assigned SIHP # 50-80-14-5864. The burial was left in place however, and the light post was repositioned. The second burial was encountered at the intersection of Kalākaua and Ka‘iulani Avenues. Earlier, during archaeological monitoring

for the water mains project, two burials were encountered in the immediate area of the second burial find; they were assigned SIHP # 50-80-14-5856 Features A and B. Due to the close proximity to the previously encountered burials, the second burial was assigned the same SIHP # 50-80-14-5856 and designated Feature C. Burials 3 and 4 were recovered at the intersection of Kalākaua Avenue and Kealohilani, near an area of concentrated burials assigned SIHP # 50-80-14-5860 during monitoring for the water mains project. Consequently, these additional burials were also assigned SIHP # 50-80-14-5860 Features U and V. In addition to human remains, pre-Contact deposits, historic and modern rubbish concentrations, and pond sediments were also encountered *makai* of the current project area.

CSH monitored the Waikīkī Anti-Crime Lighting Improvement project from July 1999 to October 2000; the project extended along Kalākaua Avenue between Ala Moana Boulevard and Kapahulu Avenue. Two more burials were found and identified as features of SIHP # 50-80-14-5860 (see above); both burials were located at the Diamond Head side of the intersection of Kealohilani Avenue and Kalākaua Avenue, approximately 100 meters *makai* of the current project area (Bush et al. 2002).

5.3.21 Elmore and Kennedy 2002

In 2002, Archaeological Consultants of the Pacific, Inc. conducted archaeological monitoring for the installation of a security fence at the Asia-Pacific Center at Fort DeRussy. Construction activities requiring monitoring consisted of the excavation of 90 postholes. The maximum depth of posthole excavation ranged between 41-90 cmbs. No natural sediments or historic properties were encountered during the project.

5.3.22 Putzi and Cleghorn 2002

From October 2000 to June 2001, Pacific Legacy, Inc. completed archaeological monitoring of sewer connections associated with Hilton Hawaiian Village improvements. Excavations were monitored within the northern portion of the Hilton Hawaiian Village complex for a force drain line and along Ala Moana Boulevard and Kalākaua Avenue for a 24-inch sewer relief line (Putzi and Cleghorn 2002). The changing stratigraphy along the sewer line excavation was extensively documented. Along the Ala Moana Boulevard portion of the sewer line, varying layers of fill deposits overlay extensive, but discontinuous, areas of fishpond sediments. Along the Kalākaua Avenue portion of the sewer line, an area of fishpond sediment (Feature 1) was documented in the central section (in the area of Manhole 6) (SIHP # -4573) as well as extensive areas of sand and a section of black organic silty clay containing ash and charcoal. A basalt cobble and boulder alignment of indeterminate age (Feature 2) was documented midway between Manholes 5 and 6. In addition to the sewer line excavation, a sump pit was excavated approximately 10 m south of the sewer line excavation, near Manhole 1 and the intersection of Kālia Road and Ala Moana Boulevard, in what was thought to be the interior of Loko Paweo I. The sump pit exposed a thick layer of fishpond sediment over coral bedrock. Significantly, the sump pit strata documented the complete absence of the varied layers evident within the sewer line excavation. This was believed to indicate the likelihood that the area excavated along Ala Moana Boulevard and Kalākaua Avenue represented the border of the Kaipuni fishpond complex and/or the area between Loko Kaipuni and Auwai Alanaio. The report authors also surmised that as the excavations appeared to be along the stream bank walls of the Loko Kaipuni complex, the area likely would not have been utilized for human burials. The areas of sand deposits and other soils were interpreted as

representative of the ends of *‘auwai* dikes and beds that flowed into Kahawai Alanaio (Putzi and Cleghorn 2002).

5.3.23 O’Leary and Hammatt 2004

Between August and October 2004, CSH conducted archaeological monitoring along Kapi‘olani Boulevard for sewer line repairs (O’Leary and Hammatt 2004). A total of five 0.6 m deep trenches were excavated. The stratigraphy of these trenches consisted of fill materials associated with the original placement of the sewer pipes. No cultural materials were observed.

5.3.24 Tulchin and Hammatt 2004

In 2004, CSH completed a literature review and field inspection for the Kapi‘olani Area Revised Sewer System project (Tulchin and Hammatt 2004). No subsurface testing was conducted as part of the archaeological assessment. No archaeological or historical features were observed within the project area.

5.3.25 Freeman et al. 2005

In 2004, CSH completed an archaeological inventory survey and cultural impact evaluation for the Ala Wai Gateway project site (Freeman et al. 2005). Twenty-two backhoe trenches were excavated within the project area. Four sites were identified during excavation: disturbed and incomplete human remains (SIHP # -6700), an in situ coffin burial with grave goods (SIHP # -6701), a culturally enriched A horizon (SIHP # -6702), and the remnants of a fishpond (SIHP # -6703). The buried A horizon was only observed in one trench (Trench 11). It contained cultural material, including marine shell midden, fishbone, charcoal, historic glass, and a large mammal bone. Radiocarbon analysis on charcoal samples collected from the A horizon indicate the cultural layer accumulated in the late pre-Contact or early historic period.

5.3.26 Hammatt 2005

In 2005, CSH completed a literature review and field inspection of the proposed Kaio‘o Drive multi-family development. No archaeological surface sites were noted during the field inspection. Based on archival research, before the construction of the Ala Wai Canal and the filling in of Waikīkī’s marshes and fishponds, the project area was comprised of dryland and portions of ponds. These features and their likely locations within the parcels were discussed in the report.

5.3.27 Rasmussen 2005

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

5.3.28 Hammatt 2006a

In 2006, CSH completed an archaeological literature review and field inspection of a 1.43-acre area proposed for development of a residential condominium (Hammatt 2006a). No surface historic properties were observed within the project area.

5.3.29 Hammatt 2006b

In late 2005 and early 2006, CSH conducted an archaeological inventory survey of the Ala Moana Expansion project (Hammatt 2006). The investigation’s 30 backhoe trenches revealed no Jaucas sand deposits within the project area. The natural land surface, prior to historic/modern fill episodes, was either a sandy clay or a highly organically enriched peaty layer. This natural surface was largely removed by prior construction-related disturbances within portions of the project area. One historic property (SIHP # -6847) was identified. It consisted of a wooden box placed in a pit that had been cut into the former land surface. The box contained a mix of historic artifacts including, among other things, printed material, wooden chopsticks, pig bone, and a horse brush. It was tentatively dated to the late nineteenth or early twentieth century.

5.3.30 Jourdane and Dye 2006

In 2006, T. S. Dye & Colleagues, Archaeologists, Inc. completed archaeological monitoring for the construction of the Best Bridal Wedding Chapel at the Hilton Hawaiian Village (Jourdane and Dye 2006). The chapel is directly west of the Tapa Pool area excavated during the current project. Monitoring was conducted for two pit excavations and two exploratory trenches. Two additional pits had been excavated prior to monitoring and assessed prior to backfilling. Both of the pits were in areas of previously disturbed fill and contained pipes, conduits, and building foundations (Jourdane and Dye 2006:14). Documented stratigraphy of the west and northwest pits consisted of fill deposits associated with previous development of the area overlying sterile basal sand (Jourdane and Dye 2006:15). Exploratory Trench 1 stopped at a drain line at 30 cmbs. Exploratory Trench 2 was in a landscaped area and consisted of coral sand fill to the base of excavation at 125 cmbs. No historic properties were observed during the project.

5.3.31 O’Hare et al. 2006b

In 2005 and 2006, CSH completed an inventory survey of lots for the proposed Kaio‘o Mulifamily Condominium Project, bound by Hobron Lane on the west side and by Kaio‘o Drive on all other sides. Twenty backhoe trenches were excavated. The stratigraphy consisted of fill layers over a light gray sands, wetland deposits associated with two former ponds, marine sediments, and the coral bedrock. A firepit, dated A.”D. 1470-1660, was designated SIHP # 50-80-14-6848.

5.3.32 Hazlett, Loynaz, and McDermott 2008

In 2008, CSH performed archaeological monitoring for the 6-acre Ala Moana Expansion project (Hazlett et al. 2008), within the same project area as an earlier archaeological inventory survey (Hammatt 2006b). Hazlett et al. (2008) reported no cultural materials were observed. Additionally, the monitoring results confirmed the prior inventory survey’s observation (Hammatt 2006) that the natural sediments were largely removed to below the water table in areas and replaced by various fill sediments.

5.3.33 Petrey et al. 2008

In 2008, CSH conducted archaeological monitoring for the City & County of Honolulu’s Emergency Sewer Bypass project, Ala Wai Canal to Magic Island (Petrey et al. 2008). No cultural deposits were identified. The project area’s subsurface deposits appeared to have been partially disturbed by importation of fill sediments into the project area that were observed at Kai‘olu Street

and at the Ala Wai Canal. Fill sediments were observed above the natural historic shoreline surface at Ala Moana Park Drive.

5.3.34 Fong et al. 2009

In 2009, CSH completed archaeological monitoring of construction associated with upgrading existing drainage, water, and sewer systems. The project area included Kapi‘olani Boulevard from Kalākaua Avenue to Ward Avenue, Kamake‘e Street from Kapi‘olani Boulevard to Auahi Street, and Atkinson Drive from Kapi‘olani Boulevard to Ala Moana Boulevard (Fong et al. 2009). No historic properties were observed. The stratigraphy consisted primarily of imported fill material associated with the installation of utilities and road construction. In some instances, pockets of naturally deposited sediment (Jaucas sand and wetland clays) were observed beneath fill deposits.

5.3.35 Mooney et al. 2009

Between 2005 and 2008, Pacific Legacy, Inc. conducted an archaeological monitoring program for the Hilton Hawaiian Village Grand Waikikian Development Project, including the construction of a new Grand Waikīkīan Tower, improvements to the Rainbow Tower loading dock and Lagoon Tower entrance, and excavations for utilities (Mooney et al. 2009). Two sites were identified during monitoring, SIHP # 50-80-14-7086 and -7087.

SIHP # -7086 is a large historic trash complex consisting of 42 features which extended into the *makai* portion of the elbow turn of Ala Moana Boulevard. The features included two architectural demolition/burn layers, three bottle dumps, a partial pig skeleton within clean beach sand, two remnant stone structures, two pit/trenches, six trash layers, 16 trash pits, six disturbed trash pits, four trash/burn layers, and a large, contiguous trash layer or scatter (Mooney et al 2009:i). The feature complex yielded nearly 800 representative artifacts dating from the mid-1800s to mid-1900. A large number of features contained historic East Asian ceramic fragments, which was speculated to have been associated with the Japanese Tea House of the early 1900s.

SIHP # -7087 is a previously disturbed human burial consisting of a near complete cranium and cranial fragments and reported as likely Native Hawaiian (Mooney et al. 2009:26). The burial was encountered outside of the Hilton Hawaiian Village on the southeast (*mauka*) side of the intersection of Ala Moana Boulevard and Kālia Road. The remains were reinterred and sealed in the utility trench near the original location of the inadvertent discovery. The burial location was in one of the peripheral excavation areas away from the main project area. As all work stopped after encountering the human remains, no burial map or stratigraphic profile of the area was reported. In addition, the stratigraphic provenience, as to whether the remains were encountered within a buried A-horizon, natural sand, or other sediment, is not known.

An analysis of observed stratigraphy and archival records suggest that the pre-1800 shoreline was only 20 to 30 m *makai* of Lagoon Drive (Mooney et al 2009:i), which places it 60 to 80 m closer to the present shoreline than was postulated by Neller (1980). Likewise, the pre-1880 shoreline was determined to be 10 to 20 m *makai* of Lagoon Drive. Further archaeological monitoring was recommended for all future ground disturbing activities in areas *mauka* of Lagoon Drive, where the pre-Contact shoreline is believed to have been located.

5.3.36 Tulchin and Hammatt 2009

During the initial inventory survey of the Ala Wai Watermark Project (Freeman et al. 2005), three historic properties were documented: State Inventory of Historic Properties (SIHP) #50-80-14-6700, a previously disturbed human burial; SIHP #50-80-14-6701, an undisturbed coffin burial; SIHP #50-80-14-6702, a subsurface cultural layer containing evidence of both a pre- and post-contact land use; and SIHP #50-80-14-6703, subsurface fish pond sediments. The inventory survey recommended an archaeological monitoring program to facilitate the identification and treatment of any additional burials that might be discovered during subsurface disturbance related to the project. An additional set of human skeletal remains, part of “SIHP -6700, was discovered during monitoring. In addition, an newly discovered burial, designated SIHP #-7057, was found. No coffins or burial goods were noted with either skeletal set, and both were reinterred at the site.

5.3.37 O’Hare et al 2010

In 2010, a cultural resources and ethnographic study was conducted for the Ala Wai Watershed Project. The study was conducted by CSH and expanded on a previous 2004 report (O’Hare et al. 2004) and contained research on the Ala Wai Canal and field reconnaissance of open spaces within the vicinity of the current study area, including Fort DeRussy, Ala Wai Park, and both banks of the Ala Wai Canal. No surface features were found.

5.3.38 Altizer et al. 2011

From 2008 to 2009, CSH conducted archaeological monitoring for the Kapi‘olani Area Revised Sewer System project (Altizer et al. 2011). The project comprised multiple sewer line segments located throughout Kaka‘ako, Kewalo, and Kālia. The study documented two layers of former wetland sediments, identified as SIHP # -6636. The portion of SIHP # -6636 observed during monitoring was located in an easement off Pensacola Street, between Ho‘olai and Kamaile streets, and extended between two low-rise apartment buildings. The location of SIHP # -6636 was consistent with the 1884 Bishop Waikiki Survey Map (RM 1090) and the 1897 Monsarrat map (RM 1910), both of which show a pond present in the vicinity of the Kapi‘olani Area Revised Sewer System project area. The pond is not named on either map, but is present within former rice fields. The sediments encountered during project-related sewer line excavation are described as a black clay loam, potentially related to rice cultivation. Abundant quantities of freshwater snail shells may indicate the former wetland deposits were modified for rice cultivation.

5.3.39 Tome and Spear 2011

In 2011, Scientific Consultant Services, Inc. conducted archaeological monitoring for the Ala Moana Sewer Reconstruction project (Tome and Spear 2011). No cultural materials or subsurface features were identified. In general, the observed stratigraphy consisted of multiple fill deposits overlying natural sediments (i.e., sand and silty sand).

5.3.40 Tulchin et al. 2011

In 2010, CSH conducted an archaeological inventory survey for the current Hilton Hawaiian Village Master Plan Improvements Project. Subsurface test excavations consisted of 20 linear trenches, clustered primarily in the southeastern corner of the bus depot lot and centrally along Rainbow Drive (Tulchin et al. 2011). In general, stratigraphy within the project area consisted of the present resort infrastructure-related ground surface overlying a variable series of relatively

thick, often compacted fill layers, a discontinuous, previously disturbed historic A horizon (SIHP # 50-80-14-2870), and a previously disturbed or *in situ* sand and sandy loam to the water table.

In the southeastern corner of the Hilton Hawaiian Village, thick layers of fill and a high water table sandwiched the presence of natural sediments. An A horizon was encountered in five of the 11 trenches excavated in this area. Bulk sediment samples collected from the A horizon documented the presence of fragmentary historic and modern debris. This discontinuous buried A horizon (SIHP # -2870) was found in eight of the 20 test excavations and determined to be the remnants of a stable post-Contact historic land surface that has been significantly disturbed by modern development.

The water table of the ten trenches in the eastern corner of the Hilton lands (Time Share Tower 1 location) was closer to the present ground surface than expected, with a range from 90 to 133 cmbs and a mean depth 116 cmbs. Whereas, according to Neller (1980), the water table was not encountered in an excavation approximately 5 ft (152 cmbs) thick (Tulchin et al. 2011:216). The natural sediment above the water table was thin or absent in this area, which likely attributed to the lack of *in situ* cultural finds in the eastern trenches.

Cultural material included 202.4 g of mostly butchered faunal remains from chicken, pig, and cow, and post-Contact artifacts consisting of glass bottles and fragments, ceramic fragments, stone fragments, a soapstone fragment and a plastic fragment. It was noted that the cultural material largely represented general residential refuse, and there was evidence for a widespread scatter of the trash as two tile fragments from two different trenches and two different strata refit (Tulchin et al. 2011:216).

As part of mitigation procedures, the study recommended a data recovery program within Improvement Area 2 and in the immediate vicinity of the proposed Timeshare Tower 2 (see Hammatt and Shideler 2014 – *draft* below) and on-site archaeological monitoring.

5.3.41 Hammatt 2013

Hammatt (2013) performed AIS testing within numerous locations between Middle Street and Ala Moana Center. Testing revealed multiple sites, of which only one was within the Kālia section of the project area, SIHP # -6636 (former wetland land surface. In general, the wetland sediments were documented as variations of brown and gray silty clays, sandy clays, clay loams, and, similar to the current AIS, black silt loam peat layers.

5.3.42 Morriss et al. 2013

In 2012, CSH conducted an archaeological inventory survey for the Ala Moana Center ‘Ewa Mall Expansion project (Morriss et al. 2013). The 15.7-acre project included the excavation of 26 test trenches within the western portion of Ala Moana Center, nine of which overlapped with the current project area (Trenches 4, 17, 18, 19, 20, 21, 22, 24, and 25). One previously identified site, SIHP # 50-80-14-6636 (Kewalo wetland sediments), was documented.

Possible salt pan signatures were observed in nine trenches (Trenches 3, 6, 8, 9, 13, 16, 18, 19, and 23) characterized by greenish-gray clays overlying natural wetland sediment. Seven samples of clay associated with potential salt pans and of natural wetland sediments were analyzed by the Paleo Research Institute for pollen, phytolith, and resistivity. Five samples were analyzed for pollen and phytoliths to determine their correlation with the nearby wetland surface. Resistivity

testing was completed on six samples to identify differences between potential salt pan lining clay, marsh, and hydraulic fill deposits. The results of the resistivity testing on the potential salt pan lining clay sediments were suggestive but inconclusive. It was determined that additional testing of the deposits was necessary as well as a more comparative analysis of potential salt pan lining clay and wetland deposit datasets would need to be undertaken.

5.3.43 Yucha and McDermott 2013

In 2012, CSH conducted an archaeological inventory survey for the proposed Kālia-Fort DeRussy Wastewater System Improvements Project. The project entailed improvements along Kālia Road and on Fort DeRussy lands adjacent to Ala Moana Boulevard and Kalākaua Avenue and at the Fort DeRussy Waste Water Pump Station (Yucha and McDermott 2013). Most of the project area previously had been investigated during the initial construction of the sewer line. Therefore, the survey consisted of a field inspection, archaeological monitoring of seven geotechnical bores, and a limited GPR survey and limited subsurface testing at the corner of Kālia Road and Paoa Place. An exploratory test trench covering a 28 square meter area in the landscaping near the Hilton Hawaiian Village bus depot driveway was pre-excavated along a section of the proposed sewer line alignment at the corner in order to potentially relocate a previously identified historic property; a partial human burial designated SIHP # 50-80-14-4570: Feature 12, Burial 11. The inadvertent discovery of Burial 11 was reported during archaeological monitoring and investigations of the Kālia Road realignment project by Garcia and Associates in 1993 (Denham and Pantaleo 1997:38). The exact location of the burial was uncertain. The burial find was described as being “exposed in the south profile of a drain box excavation in the center of old Kālia Road (presently the landscaped area between the new Paoa Place extension and the driveway for the Hilton Hawaiian Hotel)” (Denham and Pantaleo 1997:38).

The stratigraphy of the test excavation consisted of several fill layers overlying natural Jaucas sand. The area was heavily disturbed due to previous construction activities, as noted by the presence of utility jackets and abandoned utility lines throughout the majority of the excavation area (Yucha and McDermott 2013:78). The testing confirmed that this section of the project would have “no adverse effect” on the Burial 11 location.

5.3.44 LaChance and Hammatt 2014

In 2014, CSH completed monitoring for the Ala Moana Sewer Project, from Ala Wai Park, along and across Ala Wai Boulevard, to Ala Moana Park. Representative profiles show that stratigraphy consisted primarily of varying fill layers. These fill layers typically contained basalt and coral cobbles. No cultural deposits were identified during the monitoring.

5.3.45 Pammer and McDermott 2014

In 2014, CSH completed an inventory survey for the Park Lane Ala Moana Project. Eight backhoe-assisted test excavations were made in order to assess the stratigraphy within the project area footprints, determine the extent of undisturbed natural sediments (i.e., wetland sediments), and determine the likelihood of encountering significant cultural deposits within the project area. A total of two historic properties were encountered, an historic trash deposit (SIHP # 50-80-14-7596) and previously identified wetland sediments (SIHP # -6636). Testing concentrated on the *makai* boundary of the 7.23-acre project area, in an effort to target a potential sand berm and associated structures. A trench was also placed to locate the former Sheridan Street (Trench 1).

Historic maps and photos place a portion of the former Sheridan Street within the western edge of the current project area. Sheridan Street was an irregular roadway that followed the natural high grounds between the various ponds and wetlands in the Kaka‘ako and Kālia area.

5.4 Background Summary, Settlement Model, and Suggested Archaeological Potential

The project area is mainly within the area now covered by Nimitz Highway and Ala Moana Road. These roads cover the alignment of an ancient trail parallel to the coast. In the Honolulu section, this road was named Queen Street as early as 1916. The western section became Nimitz Highway in 1953, while the eastern section was called the Waikīkī Road and then Ala Moana Avenue. The Honolulu section of project also contains three non-contiguous segments, on western Nimitz Highway, River Street, and Nu‘uanu Street. The Nimitz Highway in the early historic period was still part of the ocean or part of the offshore Kawa Fishpond, which was filled in as the city grew. The present location of River Street was also covered by water in the nineteenth century; it was within the stream and floodplain of Nu‘uanu Stream until the late nineteenth century. Queen Street and Nu‘uanu Street were early Honolulu thoroughfares,

Previous archaeology in downtown Honolulu has documented numerous pre-Contact and early historic burials, pre-Contact and early post-Contact cultural deposits, and historic structural remains under fill layers, and fishpond sediments in areas of former small and large ponds.

In Kaka‘ako, Ala Moana Avenue follows the old Waikīkī beach road, although at the eastern end it was built on fill land, once part of the sea in the nineteenth century. Although Kaka‘ako was once considered an arid, unpopulated area between Honolulu and Waikīkī in the early post-Contact period, some pre-contact burials, numerous early post-Contact burials, some pre-Contact deposits, and numerous historic trash pits and trash layers have been documented during archaeological excavations.

The *ahupua‘a* of Waikīkī in the centuries before the arrival of Westerners was an intensely used locale with abundant natural and cultivated resources—including an expansive system of irrigated taro fields and fishponds—that supported a large population including the highest-ranking *ali‘i*. In the nineteenth century, following a period of depopulation, Waikīkī was revitalized by Hawaiian *ali‘i*, foreigners who resided there, and by farmers who worked the irrigated field system, which had been converted from taro to rice. The project area, was used specifically to cultivate bananas. This farming continued up until the first decades of the twentieth century when the Waikīkī reclamation projects drained the remaining ponds and irrigated fields.

Previous and on-going archaeological reports have documented the presence of subsurface cultural deposits of both pre- and post-Contact age, historic properties, and numerous pre- and post-Contact human burials throughout the Waikīkī area and within close proximity to the current project area. The beach road alignment (Ala Moana Avenue) extends into the Waikīkī section of the project area. The current road alignment extends through several former inland fishponds. During previous archaeological work, pre-Contact burials and cultural deposits have been recorded along the edges of these fishponds, in addition to areas along the beach itself.

Figure 52 (below) presents an overview of archaeological potential based on the preceding analysis of cultural history, prior archaeological studies and previous archaeological finds. For the

sake of simplicity and clarity the archaeological potential is evaluated in terms of “low”, “medium” and “high.”

In the eastern portion of the project area there are three substantial sections that were salt water well into historic times. While these could potentially yield finds post-dating the fill episodes that effectively reclaimed the land from the sea they constitute the three areas evaluated as of relatively “low” archaeological potential.

A *mauka* portion of River Street a central downtown portion of Nimitz Highway, Nu‘uanu Street, and a stretch of Nimitz Highway near Punchbowl Street are evaluated as of “high” archaeological potential based on the evidence of dense Hawaiian habitation (including high status habitation and ritual activity), extensive early historic use, and prior archaeological finds.

Continuing to the west the west Kaka‘ako portion of the project area crosses an area of formerly low-lying marsh and salt pans in which habitation is believed to have been less dense into modern times because of the high water table. Because of the traditional Hawaiian use of this area for salt manufacture and the possibility of former micro-environments of former slightly higher dunes this stretch is evaluated as of medium archaeological potential.

A large stretch of the project area through central Kaka‘ako was the locus of a coastal trail from time immemorial and a number of burials and other sites have been identified in this immediate area resulting in an evaluation of relatively high archaeological potential.

Based on previous finds it appears that the natural ground surface adjacent to the project area in the portion fronting the Ala Moana Shopping Center was lower or for whatever combination of reasons fewer finds have been reported from this area resulting in a “medium” potential assessment.

As the project area turns *mauka* along Ala Moana Boulevard approaching Kalākaua Avenue previous finds of burials and other historic properties increase near the margins of the former Pi‘inaio Stream. Just before the east end of the project alignment there is an area of former fishponds that were filled in the early twentieth century that should have no in situ deposits (other than deposits relating to the fishponds) predating the fill.

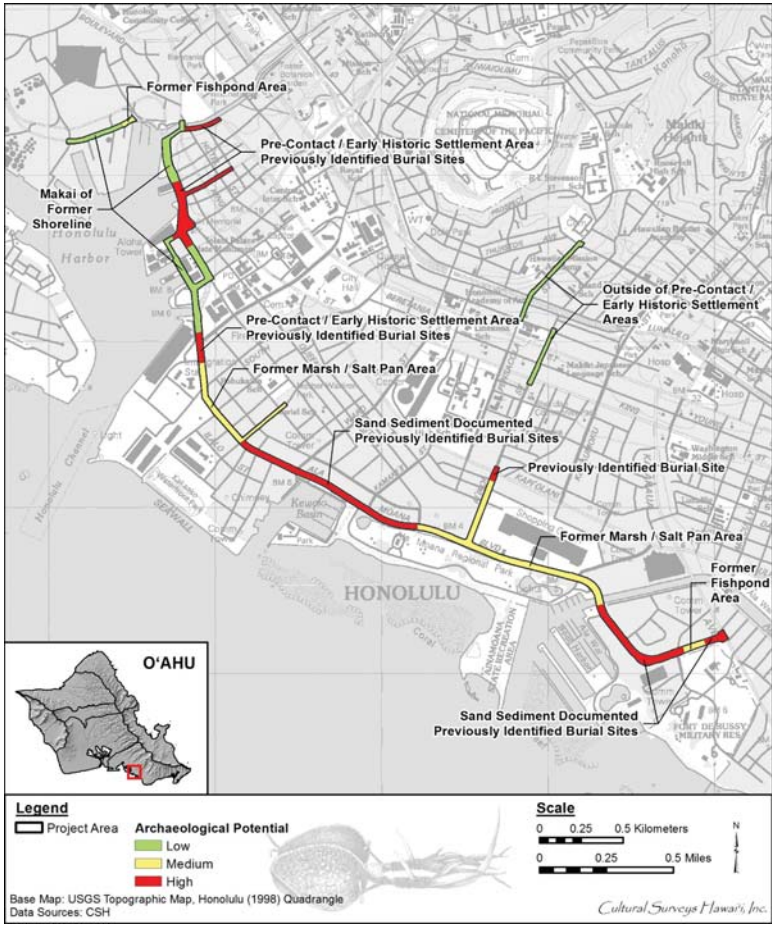

Figure 52. Overview of Archaeological Potential

Section 6 Overview of Present Conditions and Constraints

Virtually the entire project area is covered with asphalt along Nimitz Highway, Ala Moana Avenue, two major cross streets (River and Nu‘uanu) in the Chinatown and Business sections of downtown Honolulu, Cooke Street and two cross streets (Pi‘ikoi and Pensacola) in the Kaka‘ako section. All of these streets have heavy traffic flows and it would be very difficult to excavate safely in these areas without causing major traffic disruptions. While there are grassed medians in some areas these are believed to be intensively utilized as utility corridors. It is likely that much of the soil adjacent to these highways are fill as they follow nineteenth (and earlier) trail and road alignments and have been improved, paved, repaired and widened numerous times over the nineteenth and twentieth centuries. An overview of the present condition of the project area is shown in a series of 2015 photographs, beginning at the western end at Nimitz Highway in Iwilei to Ala Moana Highway in Kaka‘ako and is terminus at Kalākaua Avenue in Waikīkī (Figure 53 to Figure 70).

These photographs indicate that the project area is within busy highways and roads with little open green space. One exception is Walker Park, at the foot (*makai* end) of Fort Street in downtown Honolulu (Figure 60 through Figure 62). The park was created in 1951 when Queen Street and Nimitz Highway were widened. The park had been named in memory of H. Alexander Walker, Sr., long-time manager of American Factors, Inc. In 1968-70, his son, Henry A. Walker Jr. improved the park by donating coral stones from the Old Courthouse that once stood in this area, basalt stones from the original Hackfeld & Co. Building, benches, sculptures, a muzzle-loading cannon (possible one of the 40 cannon used at the Honolulu Fort), and the wrought iron sign and gateway that stood on the grounds of the historic Hackfeld & Co./Am Fac Building at the corner of Fort and Queen streets (now Fort and Nimitz Hwy.) from 1902 to 1972. A central fountain was added to the park in 1972 (Young 2014).

In the early post-contact period (ca. 1810; see Figure 71), this area part of Liholiho’s (Kamehameha II) royal’s compound near Pākākā Point. In 1816, the Honolulu Fort was built in this area (as shown in Figure 72) of large coral blocks, and was dismantled in 1857. Inside of the fort was a stone building used by the governor of O‘ahu, Kekūanāoa. In 1851, this building was replaced by the Honolulu Courthouse on Queen Street, which was constructed of coral blocks. The courthouse and the surrounding grounds were sold to the German mercantile company, Hackfeld and Co. in 1874. They used the lot and the buildings as an office and for storage. In 1901, they built a new headquarters, a large U-shaped cut basalt building with a large dome on the corner of Fort and Queen streets. The name of the company changed to American Factors (Am Fac) in 1918 and remained in this buildings until the 1969, when a new headquarters was built downtown and the old building was demolished he old courthouse was also demolished, in 1968 (Young 2012, 2013, 2014).

A 1906 map (Figure 73) indicates that this portion of the project area was adjacent to the east side of the Hackfeld and Co. complex, and contained buildings for other businesses, such as the Hawaiian American Paper Co., and the Inter-island Navigation Co.

It appears very likely the SHPD will require an archaeological inventory survey for this project. In the project area as presently defined the Walker Park area stands out in terms of archaeological interest and as a possible area for subsurface testing with relatively slight impact to heavy traffic.

It is unclear at this time, however, whether any project-related impacts would actually occur within Walker Park. Subsurface testing in any other portions of the project area would be highly problematic because of the need for saw-cutting, excavation, recordation and street reconstruction in areas of heavy traffic with an anticipated high density of utility lines (and often apartments in the immediate vicinity making the noise of trying to work at night problematic). Further clarification of the specific locations anticipated for ground disturbance within the indicated project area will be very useful in determining specific areas for archaeological inventory survey testing in consultation with the SHPD. It is likely that an archaeological inventory survey plan for SHPD review and approval will be appropriate but this should be informed by greater clarity on the specifics of project-related subsurface impacts.



Figure 53. Nimitz Highway at Pacific Street intersection, west end of the Honolulu section, view to northeast

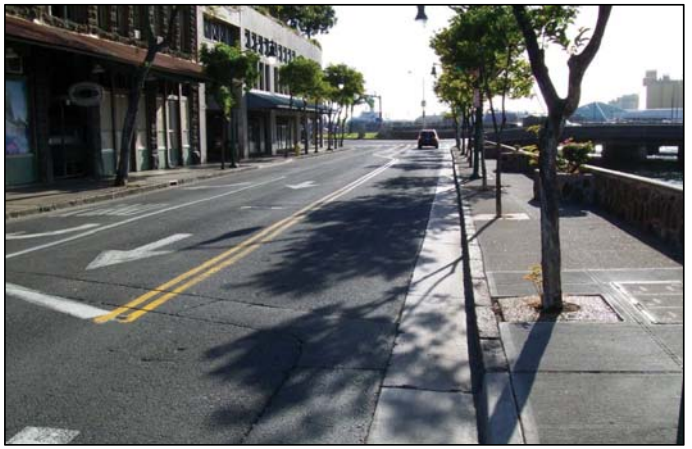

Figure 54. River Street, Honolulu section, view to southwest from King Street to Nimitz Highway



Figure 55. River Street, Honolulu section, view west from Beretania Street towards Nimitz Highway



Figure 56. Nimitz Highway, Honolulu section, view from intersection with River Street to the southeast



Figure 57. Nimitz Street, Honolulu section, at intesection with Nu‘uanu Street, View to south



Figure 58. Nu‘uanu Street, Honolulu section, view to northeast from Nimitz Highway)



Figure 59. Nimitz Highway, Honolulu section, at intersection with Fort Street, view to the southeast



Figure 60. Walker Park, Honolulu section, at the foot (*makai* end) of Fort Street, intersection with Nimitz Highway, view to east

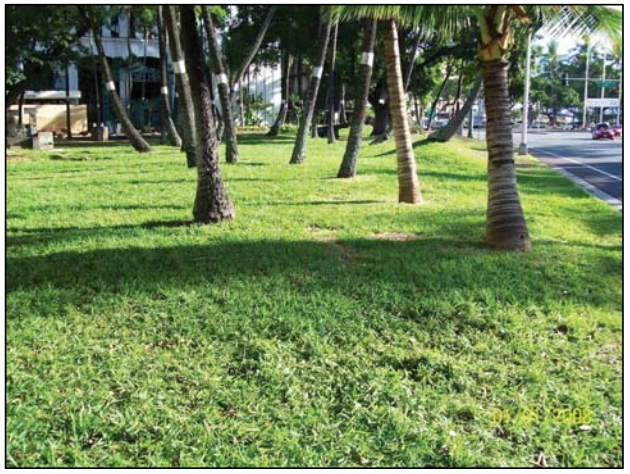

Figure 61. Walker Park, Honolulu section, view to south



Figure 62. Walker Park, Honolulu section, view to north



Figure 63. Aloha Tower Drive, Honolulu section, view to the southeast, Aloha Tower Market Place to the right

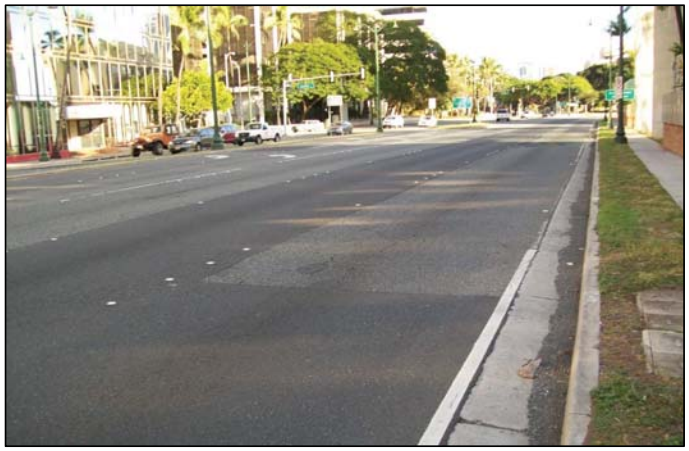

Figure 64. Nimitz Highway, Honolulu section, at intersection near Bishop Street, view to the southeast



Figure 65.Ala Moana Boulevard, Kaka‘ako section, near intersection with Punchbowl Street, view to the southeast



Figure 66. Ala Moana Boulevard, eastern end of Kaka‘ako section, at intersection with Pi‘ikoi Street, eastern end of the Kaka‘ako section, view to the southeast



Figure 67. Pi‘ikoi Street, intersection with Ala Moana Boulevard, view to northeast



Figure 68. Pi‘ikoi Street at intersection with King Street, view northeast



Figure 69. Pensacola Street at Kīna‘u Street, view northeast



Figure 70. Ala Moana Boulevard, at intersection of Kahanamoku, middle of the Waikīkī section, view to northeast

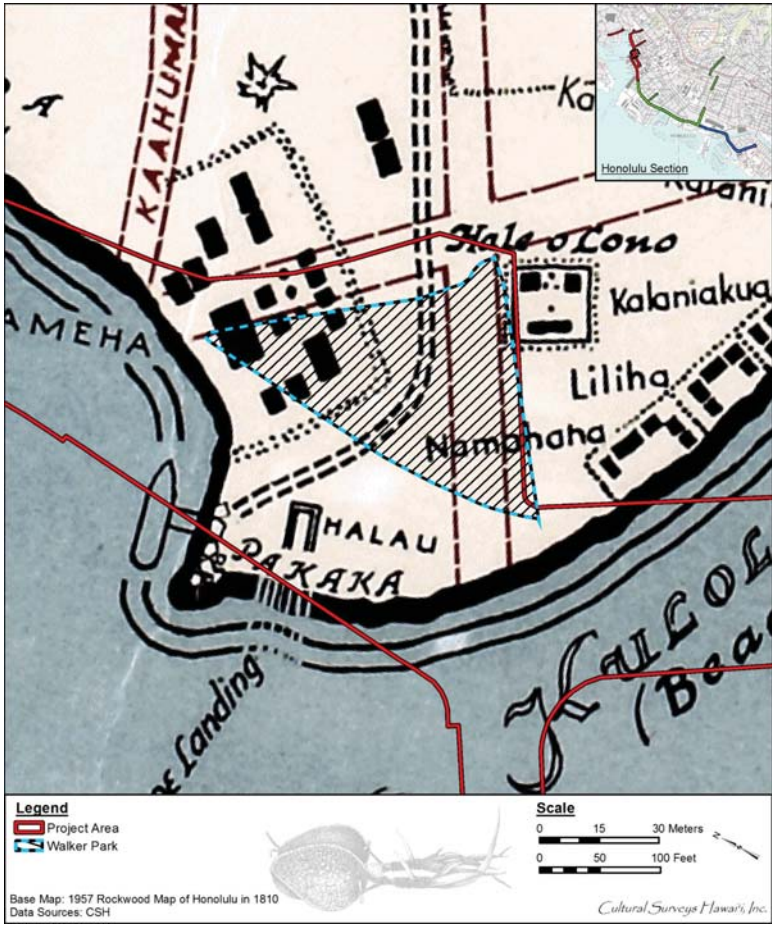

Figure 71. Overlay of Walker Park boundary on ca. 1810 map of Honolulu (Rockwood 1957), showing the area as part of the royal compound of Kamehameha II (Liholiho)

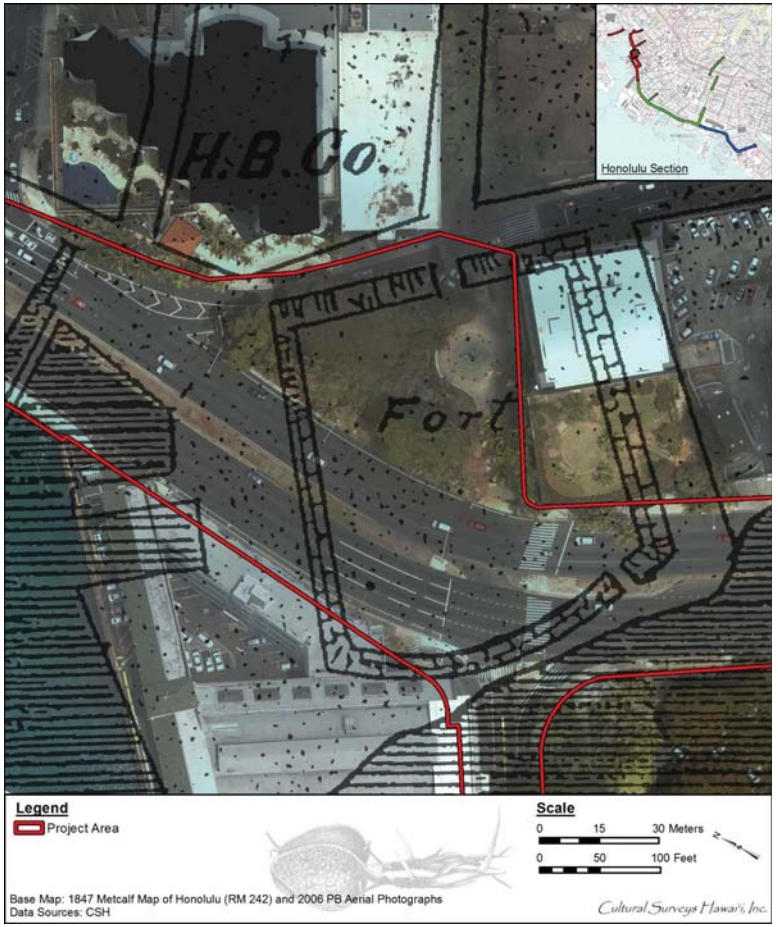

Figure 72. Overlay of 1847 map of Honolulu (Metcalf 1847) over a 2008 aerial photograph, showing Walker Park partially in area once occupied by the Honolulu Fort, built in 1816 and demolished in 1857

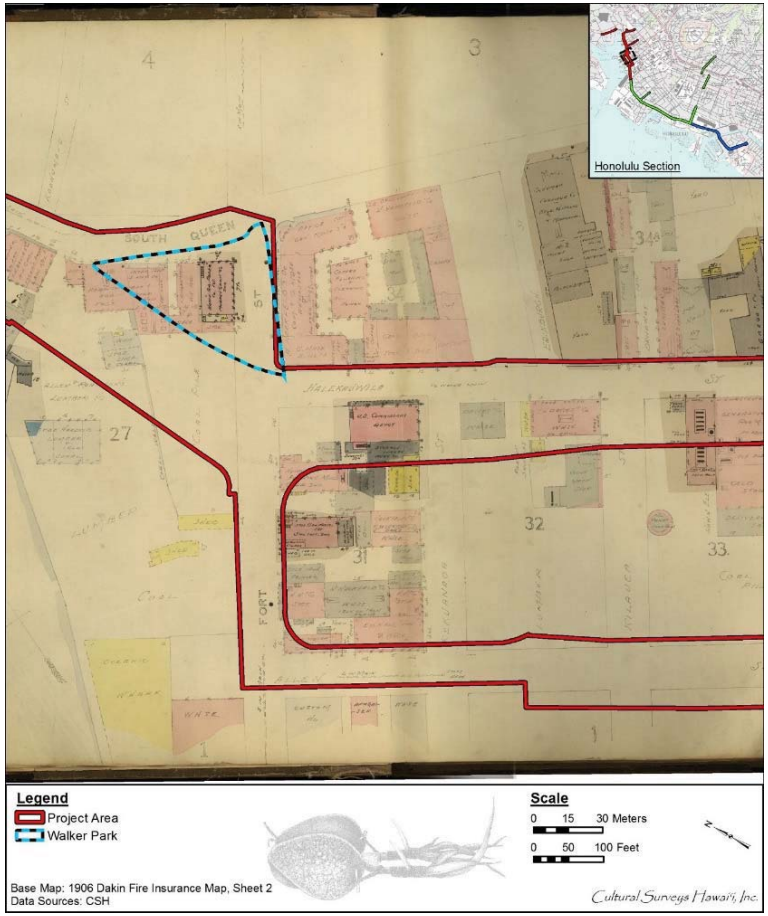

Figure 73. 1906 Dakin Publishing Co. fire insurance map, showing Walker Park area adjacent to the Hackfeld & Co. complex (built 1901) and within lots used by the Inter-Island Navigation Co. and other businesses

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Section 8 Appendix A: Land Commission Awards

LCA No. 101 F.L. to Kaluaoku

No. 101 F.L., Kaluaoku

N.R. 764v3

See the Testimony Page 339 V.10.N.T.

The Land Commissioners of the Hawaiian Islands, Greetings: I hereby /apply for/ quiet title of my land claim in Kalia kai. There are two ponds and three small ki‘opua pond /for young fish/ and one lo‘i. This is a very old right, from the makuas to the present, With thanks,
KALUAOKU X, his mark
Witness: S.P. Kalama, Honolulu 24 March 1852

N.T. 339v10

No. 101 FL, Kaluaoku, 21 February 1854

Paoo, sworn. Kaluaoku’s claim is in Kalia, Waikiki, Oahu of two ponds, three fry deposits (ponds), and one patch in two pieces.

Section 1 – Two ponds and three fry ponds.
Mauka, Kekaula’s land
Waialae, Government land
Makai and Honolulu, Government land.

Section 2 – One patch.
Mauka, Waialae, Makai, Kekaula’s land
Honolulu, the tenants’ group patch.

Land received at the time of Kamehameha I from his parents, they had received it from their parents long ago.

Kaluaoku died in 1853 of small pox, his daughter, Pale, has this land now.

Kuaoi, sworn, I have seen this claim just as Paoo has related here.

(Note: There are no awards for these two claims on the Books of the Commissioners, FL 101 and 97, but they have been patented in the Home Office.)

[Award 101 F.L.: (no award): R.P. 3781: Kalia Waikiki Kona: 2 ap.: 3.3 Acs: Royal Patent without award]

LCA No. 626, Stephen Reynolds

F.R. 91v2
[DIAGRAM] [See text in No. 619]

F.T. 95-96v2
No. 626, Stephen Reynolds, continued from page 85

George Wood, sworn, [18 December?

I came here [in 18]25. I recollect Mr. Reeves' blacksmith shop then stood on the sea side. I always understood Knight & Manini got the place from Boki as people reported. I knew Knight & Manini built a bowling alley and other houses. I recollect the small wood house on the sea side and [pig pen?] on north side of the cook house. I know the Hotel and premises having been sold by auction in 1832. (Mr. Reynolds added- the undivided half to settle Mr. Manini's estate) by the Executors: I bid them off and gave them up to Mr. Reynolds. The purchase money was something more than 1100$. The sleeping house stood where the market house now stands. I know of no other occupant of the premises till Mr. Punchard took the place. The market house was built in 1845.

(Note: copy of a protest was offered in evidence made before John Ricord. Notary Public, against Kekuanaoa, dated 12 August 1845 and witnessed [?]. Copy by Mr. Ricord on 13th August 1845 for which see page 110.

Resumed page 100

F.T. 100-103v2

Claim 626, Stephen Reynolds, continued from page 89. December 20 [1846]

John Meek, sworn, I have been acquainted with these premises ever since Knight and Manini owned them, and have been led by business nearly every day to frequent the wharf from that time; with the exception of different intervals of absence. I attended to the construction of the wharf of Ladd & Co. which is about 60 ft. apart from that of Mr. Reynolds. His wharf was built by Knight and Manini first; has been repaired several times, and afterwards rebuilt by Mr. Reynolds. The house of Punchard now stands on the boundary line of Mr. Reynolds' land. Nuuanu Street has been open ever since 1809. Punchard's store is where the old fence was. The line from that to the water has never been defined. The only fence that stood was where Punchard's store now stands; between that and the sea was open ground and on Nuuanu Street.

From Punchard's store up to Merchant Street Mr. Reynolds' premises are bounded by Nuuanu Street. On Ewa side I do not know who the land belonged to where the cook house is built, but to the westward of it, it never belonged to anyone but the Government. I remember Mr. Ladd had some posts up for a building where the Pilot's office now stands and Kekuanaoa soon came and pulled it down. This was several years previous to 1840. The hog pen north of the cook house was

made of sticks and I think stood there as long as the hotel. It might have been two fathoms long and I think its length was from the sea. I do not think I was there when the old fence was made. I never heard of Mr. Reynolds or any other person claiming that land north of the cook house before the present office was moved there.

The piece called Captain Meek's slip was [?put] up by Ladd and Co. I laid the string piece. Mr. Reynolds never occupied north of the cook house that I know of, and made no objection at the time when the wharf was built as Ladd & Company.

The fence Southeasterly extended to where the market now stands. The house belonging to the Hotel stood outside the fence; it was 18 or 20 ft. long by 13 or 15 wide.

There was a large beam which lay on the beach which constituted the Waititi boundary of Mr. Reynolds' sea line - up to which the canoes came. The tide came within 5 or 6 ft of the native houses then standing near it.

(Cross-examined by Mr. Reynolds). I know the governor pulled the house down by the people who did it, who I heard were sent by the governor. I know Knight and Manini never had any right in the land north of the cookhouse because they never used it or claimed it.

A stick fence bounded the Hotel premises on both sides Nuuanu and Waititi. That *makai* of Punchards was the boundary there. The thoroughfare between that and the wharf was always a public road.

I do not know whether the land on which the cookhouse stood, and the wharf were a part & parcel of the Oahu Hotel premises or not. I know they were used by them.

William Ladd, sworn, I think it was in 1838 I built the company's wharf. At the time we took possession of our place, the water came within about 20 ft of our *makai* fence. The slip was built at various times. I have possessed the store premises since 1833 and have never been disturbed. Mr. Reynolds claims from the corner of Ladd & Co's premises to Nuuanu St. in a line to the water, just to the north of the cookhouse.

Kekuanaoa, sworn, S. Reynolds boundary is in a line with the cookhouse; it runs from Ewa heads of the cookhouse to the Ewa heads of the wharf. I claim for the Government *mauka* of the cookhouse, Meek's slip as given on the chart belongs to the Government. Meek asked my permission to lay down the timber and construct it; and I gave it him. Mr. Ladd built out there and I told him he had no right. He commenced just *mauka* where the pilot's office stands, a foundation of stones. I enquired whose house is this? He said his own. I said take it away, and I ordered away two other long sheds which he after built and removed them. This was just *mauka* of where the pilot's office stands, and after the wood for wharf was built in 1838; or it might be in 1841 when the market was altered. Mr. Ladd admitted the correctness of my decision, and that was the reason of their not building again. Their line does not extend in that direction straight down to the sea.

There was a temporary hog pen put up as they put up cattle pens. I never considered it anything besides what might be put up or taken down as the case might be. I never knew Mr. Reynolds claimed anything beyond the cookhouse. The land between Punchard's store and the cookhouse is not within the claim. George Marini jumped out of his fence and built the cookhouse, and the wharf, his fence was where Punchard's store now stands, and all between that and the cookhouse was open, as was all to the sea of the *makai* fence. The long timber was the boundary of the Waititi side, and the *mauka* corner of the cookhouse was the boundary of that part. I filled up on the Waititi side of the timber.

Resumed below.

F.T. 103-107v2
Claim 626, S. Reynolds, continued from above, December 24 [1847]

Mr. Reynolds offered in evidence a deed from William S. Hinckley to P.A. Brinsmade, William Ladd & William Hooper dated, 4 March 1835 to show that their wharf lot and his own unite together.

P.A. Brinsmade, sworn, when I came here in July 1833 there was an enclosure to the north of the cookhouse between that and the land we after obtained, and it was used by Mr. Reynolds at that time for turkeys, pigs, &c. When that was removed he used the ground for some time in piling spars, firewood &c. I know nothing more than that I always considered him the owner of that land and respected his rights there as our neighbour. In 1840 that ground was used by the U.S. Exploring expedition with his consent. Some of his timber lying there the whole time till I left in December 1841.

I remember the old Government stone store house and a [sic] many small native buildings between that and the sea which have been removed. That land was used as a market place from that time till 1841.

Mr. Judd, offered in evidence three documents (see page 110) to shew the views of Ladd & Co. in 1841 of Mr. Brinsmade's boundary. Mr. Brinsmade admitted these documents to be genuine as signed by Ladd & Co. but he did not recognize them, nor had he any recollection of them. These letters were adduced to shew that they then considered the land on which the pilot's office now stands to be government property. See page 111.

William French, sworn, I came here in 1819. The hotel premises were not then commenced. I think they were enclosed and built on in 1825. I boarded there for a long time when Knight and Manini occupied them. I presume the stick fence was put up by them, but the wharf was never enclosed. The Nuuanu stone wall boundary was built when I was absent at China. I purchased the Sandalwood house from Boki. There was a house belonging to Hoaai on the land *makai* of that house which I purchased from the sister of Kaahumanu (Piia) for 200$. This land now stands as part of the market grounds. Then some native small houses also were there. She refused to interfere in the sale of the sandalwood house, which I bought of Boki for 300$ after the other purchase for

200$ which when I sent to Piia, she returned to me and reversed the bargain, because it was a smaller sum than the other. I know that Hoaai continued there with his dependents a long time.

(Mr. Reynolds here stated that he had withdrawn his claim to Piia's land and that he only put it in, in answer to Mr. Mudd's challenge at the time of the British Commission).

I think I could point out the boundaries on Mr. Janion's side if I were on the spot. The tide came close up [to?] high water mark to the piece I bought of Piia in 1828 and does so to this time. Occasionally Mr. Reynolds, I think, partly filled up the part in front. I think I could point out the sea boudnary. I only know there was a wharf built belonging to the Hotel premises, but I do not know on what grounds [or] under what circumstances. I considered the wharf to be 20 or 25 feet in width, when I made George Manini an offer of 2000 [$?] for the premises including it. I only expected to purchase the hotel premises and the wharf which was built, though I might have applied to government for an extension afterwards further in the sea. The wharf extended in my view about half the width of the hotel premises. It has been built on since that time on both sides; the thoroughfare crossed between that and the fence *mauka*. I took the Ewa line to be from Mr. Reynolds old premises in a straight direction to the sea, which would bring it to near the north side of the cookhouse. It has been the custom of Merchants for any person to 0put spars and lumber on the ground north of the cookhouse for their convenience. I did so myself in 1839 without any communication with Mr. Reynolds about it. Nor did I ever hear till lately that he made any claim there. I considered the part built up to have belonged to the hotel premises as a wharf but not the sides of it.

Piikoi, sworn, Kekuanaoa filled up the ground where the market now stands. The sea came up about half the width of the market. I and Kekuanaoa filled up jointly sough of the lumber lying on Waititi side, which spar [spot] was always considered the boundary on that side of the Oahu Hotel Premises. The wharf was first narrower and this log was put out to widen it. I and Kekuanaoa filled it up to meet it in 1846.

Kekuanaoa, sworn, a row of stones was the first boundary on the Waititi side and afterwards the timber was put in the same place when Mr. Reynolds got the premises. He has no claim on the Waititi side of that timber. I put in stones and dirt, and filled up on the market ground because the sea came into it. The market now stands below high water mark.

William French, sworn, I recollect there was a stick house north of the cookhouse where Mr. Reynolds kept turkeys, pigs, &c. It was merely a temporary thing.

Kealoha, sworn, I lived 17 years in the premises *mauka* of the market under Hoaai, who held his land under Keaumoku from luna[?], Piia, from him Kinau and now Kekuanaoa. I know Hoaai's boundary on all sides. I do not know that any encroachment was made on Mr. Reynolds' land when Kekuanaoa made the present market. He filled up the place under him. His sea boundary south is the timber; I and others built the wharf hired by G. Manini &c. He has no claim on Waititi side of that timber; it has always been the dividing line. The market now stands on what formerly was the highway and outside of the original hotel premises. I can point out where the native houses formerly stood on the sea side. I know of the water course from the pump to the casks; it was

carried through our yard at the request of G. Manini, but he never claimed the land. There was a stick fencd went along the premises in our Yard. Some stones lay at the bottom of the fence on the Waititi side, and also on the *makai* side. These stones are the present boundary. The old stick fence was the former mark.

Resumed page 111

F.T. 110-113v2
Claim 626, S. Reynolds, resumed, see page 96

Protest

Before the undersigned Notary Public in and for the village of Honolulu, Island of Oahu, Hawaii. On this 12th August 1845 personally appeared Stephen Reynolds, an American citizen, domiciledand residing in said village, who declared in substance that Mataio Kekuanaoa, Governor of said Island, either in his own name as an individual, or in his official capacity, had on that day taken possession adversely of a certain lot of ground situate in said village & belonging to the declarant, which lot of ground is near the waterside, and better known as portion of the Oahu Hotel premises, and further, that said Mataio Kekuanaoa is now erecting a native building thereon in opposition to the remonstrates of said declarant.

Wherefore the said Stephen Reynolds intending as soon as the laws will permit, to prove his right in said land before any tribunal created or to be created for that purpose by the Hawaiian legislature, requested the undersigned to note this, his protest against the unlawful invasion of his rights by the said Mataio Kekuanaoa in order that the same may not be obscured by adverse possession.

In witness whereof, I, the said notary in conjunction with the said declarant have hereto set my hand the day and year first above written.
Signed, Stephen Reynolds, John Ricord, Notarial Office, Honolulu
Hawaiian Islands, 13 August 1845

I certify the foregoing to be the correct copy of an original protest noted in this office before me.
Signed, John Ricord, Notary Public

Three documents referred to in page 104, claim 626
Honolulu, August 5, 1841
Sir, We wish to obtain permission of your Majesty to build a wharf north of the one now belonging to us & on land in front of the old stone building or market adjoining our premises, and we shall feel obliged to Your Majesty if You will inform us by first vessel for this place, on what terms You will lease us the privilege, and land on which we may build a wharf, the same to revert to Your Majesty's Government at expiration of 50 years from date of lease.

We enclose herewith a plan of said land & as it is now useless, and will require much money to build a wharf, we presume the rent will be merely nominal.

Respectfully, Your Obedient Servants
Ladd & Co.
To Kamehameha III, King of the Sandwich Islands

See plan referred to next pages

Cl. 627. S. Reynolds, continued from page 111, Second, paper referred to page 104.

[DIAGRAM]

[Plan is labeled as 627]

Cl. 626, S. Reynolds, Third paper referred to page 104.
Honolulu, August 5, 1841
Sir,
Under this date we have applied to his Majesty for a privilege for a wharf, and have enclosed to him a plan of the land required. At present the land is of no use except as a location for 3 or 4 native huts. The dots in red ink (in the preceding copy doubled in black) indicate the outline of what we wish. We should be disposed to build a good wharf. We have not measured the land, but judge the water frontage about 200 ft.

As we are disposed to pay a fair rent in shape of rent money, or in the reversion of the land & wharf to this government, at the expiration of the lease, we should feel obliged by an early answer. We presume that the subject can be decided upon without our application being known except to the parties concerned.

A (illegible) straw house belongs perhaps to Kikili & was not long since occupied by George, late Captain of Kinau.
We remain, truly yours,
Ladd & Co.
To Reverend William Richards, Lahaina

F.T. 113-115v2
Claim 626, S. Reynolds, continued

Know all men by these presents that I, William S. Hinckley, a citizen of the United States of America, residing at Oahu, for and in consideration of the sum of 1620 dollars to me in hand paid, have granted and sold unto Peter A. Brinsmade, William Ladd & William Hooper, also citizens of said states, residing at Oahu, all that piece or parcel of land now in occupancy of the said Brinsmade, Ladd & Hooper, and described & bounded as follows: Viz.

Commencing at a point bearing

South ten degrees East distant 24 feet from the Southeasterly corner of the Stone Store recently erected and now occupied by said Brinsmade, Ladd & Hooper, and running in a line with the public street,
North 57 degrees East ninety-one feet from the said point to land of William Hinckley; thence by [?] said land
North 36 degrees West 216 feet to land of Fransisco de Paula Marrin, thence by said land
South 52 degrees West 60 ft. to land in occupancy of the Government of the Sandwich Islands, thence
South 35 degrees, East 28 ft. thence
South 564 degrees West 21 ft. thence
South 38 degrees East 35 ft. 9 inches, thence
South 54 degrees West 13 ft, thence
South 38 degrees East 21 ft. thence
South 48 degrees West 11 ft. 10 inches and then
South 42 degrees East 128 ft. 6 inches by land owned and occupied by said Brinsmade, Ladd, Hooper & William S. Hinckley to the point above first mentioned, with all the privileges and appurtenances thereunto belonging, reserving a cart road through said land for my and their mutual benefit and convenience. Also one undivided half of the wharf and land included between the premises above described and the harbour bounded northerly by land in occupancy of Government of Sandwich Islands, and southerly by lands and wharf in the occupancy of Stephen Reynolds. To have and to hold the said piece or parcel of land with the privileges and appurtenances unto the said Peter A. Brinsmade, William Ladd & William Hooper, their heirs, executors or assigns forever. Subject - and further I, the said William S. Hinckley, do covenant and agree for myself, my heirs, executors, administrators or assigns, do hereby covenant and agree to warrant and defend the premises aforesaid against the lawful claims and demands of all persons whatever unto the said Peter A. Brinsmade, William Ladd and William Hooper, their heirs, executors, assigns or administrators forever, excepting only such claims as may be made by the Government of these Islands on said land. And I do further avouch that I possess full power, good right and lawful authority to dispose of the said premises in manner aforesaid. Witness my hand and seal at Honolulu, Oahu, this 14th March 1835.
Signed William S. Hinckley (seal)
Witness, Charles R. Smith

Indorsement
I have examined and compared the within and above written copy of an instrument with the original of which it purports to be a copy and hereby attest it to be a true & faithful copy.
Signed, P.A. Brinsmade, United States Consul.

Ke ae aku nei maua i keia hoolilo aina.
Signed Kamehameha III, Kekauluohi

F.T. 115-117v2
Relating to Claim 626

Know all men by these presents that I, William French, as surviving partner of the late firm of French & Co., at present residing at Oahu, one of the Sandwich Islands, for and in consideration of the sum of 500 dollars to me in hand at the signed of these presents paid by Stephen Reynolds of United States of America now residing at Oahu, the receipt whereof I do hereby acknowledge, have bargained, sold, and delivered by & with the consent of the Government of the Sandwich Islands and by these presents do bargain, sell and deliver unto said Stephen Reynolds all that piece of ground with the house erected thereon situated in the village of Honolulu, Island of Oahu and bounded:

on the Northeast by a road 30 ft.
On the Southwest by natives houses 30 ft.
on the southeast by native grounds 96 ft. and
on Northwest by Oahu Hotel 96 ft.

The said William French in manner aforesaid and for his heirs, executors, administrators & assigns do by these presents relinquish all claims to the said premises unto Stephen Reynolds, his heirs, executors, administrators and assigns forever.

In witness whereof, I have hereunto affixed my hand and seal at Honolulu, Island of Oahu, this 1st October 1838
William French
Witnesses: John Meek & G. Rhodes

Doc[?] Estate of Amos Knight in account with Stephen Reynolds, Surviving Executor

[two columns in original]
[Debts]
To 1833, To paid doctor's bills, funeral charges, fence & new grass houses, digging well, clothing for George M. Knight & his mother &c &c from July 9, 1830 to November 30 1833548.92

Passage for George M. Knight, son of Amos Knight from Oahu to United States in November 1833 - 70.

2 bills of exchange remitted in November 1833 for 125 each. - 250.

To bill of Exchange dated February 8, 1839 signed by Ladd & Co. at 30 days, sent to S.S. Reynolds to be delivered to the Guardian for George M. Knight - 2150.63
[total] 3019.55

[Assets]
1833, By amount received by Brig Griffin from Canton for tortoise shell shipped October 1830 - 566.45

due from settlement of Knight & Marini's partnership - 503.86

1838, Hotel establishment collected from March to September - 253.73

Sale of half of Hotel places, September 1838 belonging to said estate 1500
By exchange 195.51
[total] 3019.55

Charlestown, August 26, 1839
I, the undersigned Guardian of George Marini Knight, who is the son and sole heir of the late Amos Knight, hereby acknowledge that I have settled the above account with the said Stephen Reynolds, surviving executor of said estate, that I have received from him the several bills of exchange above charged, and also that I have collected the same of these respective draws in cash. And I hereby discharge the said Reynolds from all liability & responsibility of every name, kind, & nature, to the said estate and to my said ward, George M. Knight, its sole heir, unless further assets should hereafter come into his hands.
William Knight, Guardian of George Marini Knight
Witness. J.P. Healy

N.T. 436-441v2
No. 626, Lanai (S. Reynolds), Honolulu, Oahu December 24, 1847

Lanai has brought a land transfer document from William Hinkle transferring that land to him which he is demanding.

Barinamada (Brinsmade:), sworn by the Word of God and stated, "I had come to this archipelago in the year 1833. There was a small lot at that time on the north side of the kitchen. That place had been for Lanai and the hogs' sty was there. When the wall was broken down, Lanai stored the wood and timber of the ship there and we had thought the place was for Lanai and in the year 1840 that place probably had extended into the lots which had been built for Kapena Wipa (Captain Wilkes). This was of course with Lanai's approval.
I believe Lanai had the short timber [page 438] there until I had gone there in the year 1841.

G. P. Judd had brought some documents as a witness for the south side of Ladd's (property) and it is noted below here.

Mr. French, sworn by the Word of God and stated ' "I had arrived on this land in the year 1819 and in the year 1825 or 6 perhaps, the hotel was built and a fence surrounded it and I lived there sometime. The place was for Naiki (Knight) and Manini at that time. They had erected a wooden fence there separating the wharf and the lot, but I do not recall when the stonewall had been built because I was in a foreign country then.

I had a sale with Poki for a part of the sandalwood storage house and *makai* of that house is the house of Hoaai and toward the ocean of that sandalwood house is the place 1 had bought for $200.00 and I had asked for the place toward the mountain of the sandalwood house and Piia told me the place was for Poki. I had a talk with Poki about buying that place for $300 and Poki had

agreed. When Piia had heard this, he returned his two hundred dollars and demanded $300 as the price of his place. Therefore, the first selling price was nought but Hoaai has continued to live there with some other people until very recently. If I were to go there, I believe I can perhaps point out the place I had bought from Piia; however, it is not very clear because there have been many searchings and at the time of the high sea swelling, it had been just about impossible to go there. There was not enough space between the beach and the sea. I believe that place was 20 or probably 25 ft. wide from the pier to *makai* and in the year 1830, 1 had offered Manini the pier and the lot for $3000.00 but they refused; then I had wondered about leasing the --same. I think half of the width of the hotel was the width of the pier. It was customary to leave wood here and there and I had been one of them who has left wood there."

Jonah Piikoi, sworn by the Word of God and stated, "I have seen the boundary on the Waikiki side of Lanai's wharf. There is the boundary on the Ewa side of the house lying toward the mountain on the Waikiki side of the market. Kekuanaoa had that place with soil. Half of the market is standing there and seaward to the big timber lying on the way to the wharf. Kekuanaoa and I had filled that place with soil.

Komo had worked on that place to the cape which is sticking out assuming that place was for the government; later it was decreased and that huge and long log lying on the Waikiki side of Lanai's wharf was the boundary on Waikiki in ancient times. It was in the year 1826 that log was laid there and Kekuanaoa and I had filled the space between in the year 1846."

M. Kekuanaoa, sworn by the Word of God and stated, "The boundary on the Waikiki side is Lanai's pier to the large lumber lying to the pier, but formerly a nini (sic) rock had been the boundary leading seaward to the cooking house and to the sea.

I feel that Lanai has no interest where I had filled on the Waikiki side of that property. I had filled where the market now stands and had built a house. Later after this, Piikoi had said that he would work on that place and I had con-sented to what he had said he would do."

Keloha, sworn by the Word of God and stated, "I had lived by the market for 17 years under Hoaai and Hoaai under Keeumoku and under Piia. Upon his death living was under Kinau and under Kekuanaoa at this time. Kekuanaoa had built the market for he is Kinau's heir. I have seen the boundary of Hoaai's place, and I have $en the house built and part of Lanai's place did not extend into the market place, not in the least. We had filled the foundation of the market place believing it would be livable for someone. The boundary of Lanai's wharf on the Waikiki side is the huge timber there. Lanai has no right on the Waikiki side of that huge timber lying to the pier. The boundary of the lot of the market is toward the mountain of the market. The old stone wall is there just toward the mountain of the market, but the market is away from here. There is a street seaward of the boundary of the hotel. The small houses were ours originally where the market now stands. Lanai had no house there and I can point out where the hotel had stood. 'I have seen a little house where the house now sits toward the mountain of the market, named Kikila.

I have seen the ditch lying from the well to the wharf, yet inside of our place with our permission, water had flowed until it had ceased to flow, but that place was not possessed by Manini. The

corrugated edge of an old stone wall in the ground on the Waikiki side had been the boundary for the hotel before and the stone wall that is sitting there had been Naihekukui's boundary."

[Award 626; R.P. 1769; Hotel & Merchant Sts Honolulu Kona; 1 ap.; .24 Ac.; Merchant St. Honolulu Kona; 1 ap.; .05 Ac.; See Award 619 for Foreign Register and Foreign Testimony documents].

No. 11225, Kekualoa, 3d April 1854
F.T. 540v3

This is a claim for the ili of Kalui in Honolulu.

J. Kapena, sworn says, he was born on the adjoining land to Kalui & has a kuleana on that land now.

Knows the boundaries of the *makai* portion of this ili to be as follows: viz.

Mauka by the land called Kalawahine
Waikiki side by the bank of Eawoa [Pauoa] Stream & kuaanu [Nuuanu]
On the Kaumakapili side down to the sea & then following high water mark to the boundary of Akaukukui & then running seaward to the reef to the Sumner family, called Kohololoa
On the *Makai* side by Kohololoa
On the Ewa side by the fish ponds of Kawa and Kuili & the lands of Aala & Kamakela.

There are two or three other pieces of land farther *mauka* belonging to the ili of Kaliu, whose boundaries I cannot define.

Paauki, sworn says, the boundaries of Kaliu kai are as set forth by last witness, except that on the Ewa side this land called Koiniu touches this land as well as those named by Kapena.

The place where the slaughter house now stands was reclaimed from the bed of the river which belongs to Kaliu.

Kuapuu, sworn says, he is a kamaaina of Kaliu, knows the boundaries of Kaliu kai to be the same as set forth by last witness.

Knows that the place on which now stands the slaughter house belongs to Kaliu.

N.T. 340v10
No. 11225, Kekualoa, Claimant

Paki sworn, I know Kekualoa's claim - it is an ili in Honolulu, Oahu - a land division of the king. This has been registered in the grant Book of the Government in the Interior department. I had it

registered with the land commissioner's office in Kauwila Building, Honolulu in 1847, probably or may be 1846, I can't remember; however, I have kept that property since 1847 to the present time. It is a large property that land of Paty and Wyllie in the uplands was half of this land. Here were some other lands too, which were conveyed to Lee and another half of Dudoit Buildings in the uplands.
A. PAKI
Sworn in my presence on this 29th of March 1854
W.L. Lee, President of the Land Commissioners
N.T. 340v10
No. 11225, Kekualoa, 30 March 1854

COPY
Kekualoa's land distribution.
Kaliu ili of Honolulu, Kona, Oahu.
TRUE COPY
Interior Department, 27 March 1854
A.G. Thruston, Clerk

[Award 11225; R.P. 1879½; Kaliu Honolulu Kona; 1 ap.; 15.82 Acs]

LCA No. 784 to 790 inclusive to James Robinson & Co.

F.R. 108-109v

To the Board of Commissioners for quieting land titles, Gentlemen:

We beg leave to present you with the following claims for lands situated on this Island.

784. 1. The wharf, commonly called the point, and granted to James Robinson and William Pitt by Karaimoku.

785. 2. Land situated in Nuuanu Valley, near the lower falls, called Pakeokue; together with a land of the same name higher up [in] the valley, just above the cemetery, with the land on the opposite side of the wall called Pualoaloi; granted to James Robinson by Boki, (Received 2 surveys 8th November 1848).

786. 3. The land & premises called the Blonde; purchased from Samuel Dowsett, by James Robinson, Robert Lawrence and Joseph Elleott. (Received Survey 8, November 1848).

787. 4. The land and Premises now occupied by Samuel Thompson, opposite the Seamen's Chapel; and purchased from Alexander Smith by James Robinson, Robert Lawrence and Joseph Elleott (Received Survey of this lot, 8 November 18248)

788. 5. The land & premises nearly opposite the Residence of Dr. Rooke and Mr. Skinner; and purchased from John Kellett by James Robinson, Robert Lawrance & Robert W. Holts [sic] (Received Survey 8 November 1848).

789. 6. A land at Wailua purchased from Joseph Lovell by James Robinson, Robert W. Holt & Joseph Booth

[Margin note: withdrawn]

790. 7. The land & Premises called the Canton Hotel, formerly belonging to William French; and purchased by James Robinson, Robert Lawrence and Robert W. Holt (Received Survey 8 November 1848)

James Robinson & Co.

Honolulu, Oahu, October 14, 1849

[Footnote: Original Deed of claim 784, 878, 788 and 790 (deeds 3 [sic?]) this day certified to have been received form Dr. Lee at his Office about March last, brought here this day and taken away again by Mr. Holt at the same time. JHL. 15 November 1848]

F.T. 125-133v2

Claims 784 to 790, James Robinson & Co., January 5, [1847]

[Margin note: deed left and conveyed to Mr. Lee and by him to Robinson & Co. Essentially obtaining his information from J.R. and having been notified by W. Lee by and by him to Robinson & Co. See Cl. [illegible; personally?] obtaining his information for J.R. not having been notified by Mr. Lee or his client [?] who both [illegible] lost by me while [illegible] other taken at the same time & returned in the [illegible] to them, to the same without [illegible].

784. A wharf lot, commonly called the Point

Claimants offered in evidence the following deed:

Know all men by these presents that I, Karaimoku, commonly called William Pit, Esquire, do hereby assign unto James Robinson, his heirs, Executors, Administrators and assigns, one half of the wharf, commonly called the King's Wharf, situated near the southwest angle of the Fort, in the Town of Honolulu, extending on front one hundred yards or there abouts, and running back 100 yards or thereabouts, upon the following conditions.

First, the said James Robinson doth hereby bind himself, his heirs, executors, administrators and assigns to pay one half of all expenses incurred in altering, repairing or improving the said wharf, and to pay to Karaiomoku his heirs, executors, administrators and assigns one half of all monies received for the use of such wharf & premises. And I, Karaimoku, do hereby agree to pay one half of all expenses incurred in altering, repairing or improving the said wharf. And we do hereby bind ourselves, our heirs, executors, administrators and assigns to fulfill the above agreement.

Given under our respective hands and seals at Honolulu, this 11th day of January in the Year of our Lord, 1827.

Karaimoku (Seal), James Robinson (Seal)

Witness: Francisco de Paula Marin

(Indorsed by John R. Jasper, Registrar of Conveyances on 31 August 1847 notifying Mr. Robinson's acknowledgement and the registration of the deed.)

John Ii, sworn, I knew the witness of the above deed, Francisco Paula de Marin, and I know he is dead. I know the place described and I heard from Kalaimoku himself, much the same as what is described in the deed. I never heard of any counter claim or opposition.

Z. Kaauwai, sworn, I know the signature of Kalaimoku [illegible] to above deed to be his hand writing. I have received letters from him.

Continued page 264, volume III

787. Land and Premises now occupied by Samuel Thompson. Claimant offered in evidence a deed as follows; viz.

Know all men by these presents that I, Alexander Smith, a citizen of United States of America, a present residing at this place for and in consideration of the sum of two thousand six hundred dollars (2600$) to me in hand paid by James Robinson, Robert Lawrance, Joseph Elliott, residents on this Island, the receipt whereof I do hereby acknowledge, have bargained, sold and delivered, and by these presents do bargain, sell and deliver, unto the said James Robinson, Robert Lawrance and Joseph Elliott, those premises, situated in Honolulu, formerly the property of George W. Cole, Esquire, that is to say, the large wooden house formerly used as a billiard room, the bowling alley, the thatched house, the store house, the mud store house, stable and necessary, with all the fixtures thereunto belonging, also the wall, enclosed the premises to have and to hold the aforesaid bargained premises, for him, their heirs, executors, administrators and assigns for ever.

In witness hereof I have hereunto set my hand and seal this 16th day of September at Honolulu in the Island of Oahu, in the year of our Lord, 1833.

Alexander Smith

In presence of Henry G. Swinton, witness

Daniel P. True

(Indorsed by John R. Jasper, Commissioner to take acknowledgment, 22 December 1846 [?] with Alexander Smith's acknowledgement; and also by John Ricord, Registrar of Conveyances, dated same time.)

Alexander Smith, sworn, the signature of the above deed is of my name is my hand writing. I got these premises from Henry Pearce, who got them from Captain Cole. Claimants have had quiet and undisturbed possession ever since. I sold them the premises. They are fenced and are now occupied by Samuel Thompson.

Daniel P. True, sworn, I know of the transaction between the parties in the above deed, and was a witness to it; and the signature in my name is in my handwriting. I know of claimants being in undisputed possession ever since. Joseph Elliott is dead.

(Postponed to 7th Instant for proof of Elliott's transfer of his share by will of these premises to claimants). Resumed Page 140, volume III.

788. Land and premises now occupied by Luther Voight

Kekuanaoa, sworn, I gave permission to claimants to purchase this piece from Kellett.

Claimants put in the following deed of sale in evidence

[margin note: deed left & conveyed to Mr. Lee and by him to Robinson 16th. See claim]

Know all men by these presents, I, John Kellett, a subject of Great Britain, at present residing at Oahu one of the Sandwich Islands have in consideration of the sum of eleven hundred dollars paid [illegible; to me by?] Robert W. Holt, a citizen of the United States of America and James Robinson, and Robert Lawrence, subjects of Great Britain, presently & now residing at Honolulu on the Island of Oahu, the receipt of which I do hereby acknowledge, do hereby give, grant, sell and convey unto the said Robert W. Holt, James Robinson, and Robert Lawrance [sic] all that parcel of land and tenements situated in the northeastern part of the town of Honolulu, nearly opposite the house belonging to Henry Skinner and bounded on the street leading from the water side towards the chapel, known by the name of Mr. Smith's Church, extending on the north wall 150 feet; South wall 150 feet; East wall 81 feet; West wall 90 feet; to have and to hold the aforesaid land and all its appurtenances to their heirs, executors, administrators or assigns for ever.

And I, the said John Kellett, for myself, my heirs, executors, administrators shall and will by these presents warrant and defend the same unto the said Robert Wm. Holt, James Robinson and Robert Lawrence, their executors, administrators or assigns against all persons claiming by or under me.

In witness whereof I have hereunto set my hand and affixed my seal, this 15th June 1841.

John Kellett

Witnesses: Alexander Adams, George W. Mead

(Indorsed by John R. Jasper, 9 January 1847, dating the acknowledgement personally of Alexander Adams of having seen John Kellett sign the above instrument, heard him say it was for the purposes set forth and that he had become a signing witness at his instance and request.

Also by John Ricord stating registration of the above deed on the same day.

John Kellett, sworn on 26th November 1847. I sold this land to claimants about 4 or 5 years after I went to Kauai and gave them a deed in writing. It is situated on Ewa side of Nuuanu street, mauka and Ewa side of it are native houses. Makai is an old foreigner's house.

It is 12 years since I left the place and I do not remember the particulars of names. It is fenced. These were two houses on it. It is situated as described in the claim, and now occupied by Wright, the Painter. I sold it to claimants about 9 years ago for 1100 dollars.

It was given to me in 1826 or 7 by Governor Boki. I occupied it in peace and undisputed till I sold it to claimants. They are the only owners of the land as far as I know.

790. Land and premises known as the Canton Hotel.

Claimants offered in evidence the following deed

[Margin note: 3 deeds left & conveyed to Mr. Lee and by him to Robinson 16th Instant]

Know all men by these presents, that we, William French, George Pelly and William Paty, receivers of the assigned estate of William French and Francis, John Greenway with the cooperation of John Ricord, Esquire, curator of said estate by virtue of the express power conferred upon us by Governor Kekuanaoa's order No. 12

Inf [?] Chancery relative to said estate, for and in consideration of the sum of 4,620 dollars bid at auction and paid to said Estate by James Robinson, Robert Lawrence and Robert W. Holt, all of Honolulu, the receipt whereof is hereby acknowledged, have granted, bargained and sold and to grant, release and convey unto them the said James Robinson, Robert Lawrence and Robert W. Holt, jointly and severally, all that certain piece of parcel of land in Honolulu, Island of Oahu, Hawaiian Islands, known as the Canton Hotel and now occupied by Messers Hungwa and Ahung, Chinamen and described in a deed from William R. Warren through Stephen Reynolds, his agent to Edward Espener, dated 2nd December 1837 as then belonging to said William R. Warren and as bounded thus:

Beginning at the Gate of the East corner of the bowling alley, occupied by John Hobbs, running northerly by land of said Hobbs to land of natives and premises of Joseph Navaro, lane leading to the Blonde Race; thence southerly by said lane to the corner and land of Lei, a native woman; thence, westerly by said Lei's land and premises to the Gate first mentioned.

Together, with all and singular, the buildings, privileges and appurtenances thereto belonging or appertaining, and all the Estate, Right title & interest therein of the said William French as derived to him by deed from Edward Espener, dated 2 December 1841, subject to the leasehold interest of Hungtai [previously Hungwa], Chinaman in the premises under lease transferred to them on 15 June 1844.

To have and to hold the said described premises as above conveyed with the said James Robinson, Robert Lawrence and Robert W. Holt, their heirs, executors, administrators and assigns for ever.

In witness whereof we, the said receivers and the curator, have hereunto set our hands & seals, this 17, January 1846

William French (Seal), George Pelly (Seal), William Paty (Seal), John Ricord (Seal), Curator

Signed, sealed and delivered in Presence of James J. James, James Austin, John Ricord, Notary Public for Honolulu

(Indorsed by John R. Jasper [illegible] stating that the personal acknowledgment of the several parties before him, dated 17 November 1846.

Also by John Ricord, same time, notifying registration of the enclose[d] deeds

Postponed for back deeds to 7 Instant.

Claim 790, continued from previous page, January 7.

Know all men by this instrument that I, Edward Espener, a subject of great Britain, now residing in Honolulu, Oahu, do bargain, grant & sell to William French, Esquire, citizen of United States of America, now residing at Honolulu, Oahu, for and in consideration of the sum of ten thousand dollars to me paid, the receipt whereof I do hereby acknowledge, and by these presents have bargained, granted, & sold the premises, together with buildings, with all the privileges and appurtenances thereto belonging, owned, & belonging to me, the said Edward Espener, situated and bounded as follows: Beginning at the [big tear in page; illegible] the east corner of the Bowling Alley occupied by [illegible] Thompson, running another [illegible] [Thom]pson to lands of [illegible] land leading to the Blonde place, thence southerly [to] said lane to the corner and lands of Lei, a native woman, thence westerly by said Lei's lands and premises to the Gate first mentioned. To have and to hold the said premises to his use and behoof to himself, his heirs, executors and administrators and assigns for ever. And I do hereby warrant and defend the same against the legal claims of all persons, claiming by or under me, the said Edward Espener, only such as this Government claim and demand on them.

In witness whereof I have hereunto set my hand and seal, at Honolulu, this second day of December [illegible;1844?]

William French, Edward Espener

James Austin, James [illegible]

Acknowledged by William French, dated 1844 [illegible]

John Ricord, Notary Public and Recorded, 10 December 1844 by the same.

William French, sworn, the deed now offered in evidence is genuine from Edward Espener to me. I purchased those premises of him, formerly known as his, but now as the Canton Hotel. He purchased them from R.W. Warren on my arrival in 1819. I found Mr. Warren in possession of the place, kept as an hotel. He told me he got the place from Kaikioewa, who confirmed it to him, some other persons having been living there before. Warren left it for some time in charge of some friends while he went to the States, and on his return took possession again.

I a, [illegible] acknowledged his signature to the above [illegible; signature?] genuine as witness.

[Illegible] instrument that I, Stephen Reynolds, agent for William R. [?] Warren, citizen of the States of America now residing in California, to bargain, grant and sell to Edward Espener &

[illegible] a subject of Great Britain, resident at Honolulu, Island of Oahu, for and in consideration of the sum of 1600 dollars to me in hand paid, the Receipt whereof I do hereby acknowledge and by these presents have bargained, granted, & sold the premises together with buildings, with all the privileges and appurtenances thereto belonging, owned and belonging to the said William R. Warren, situated and bounded as follows:

Beginning at the Gate of east course of the Bowling alley occupied by John Hobbs running northeast by [illegible] of said Hobbs to land of natives and premises of Joseph Navarro lane [illegible] the Blonde place, thence southerly by the lane to the river and lands of Lei, a native woman. Thence westerly by said lands of Lei and her premises to the Gate first mentioned. To have and to hold the said premises to his use and behoof to himself, his heirs, executors and administrators and assigns for ever, and I do hereby warrant and defend the same against the legal claims of all persons, claiming by or under me as agent aforesaid, Only such as this Government claim and demand on them.

In witness whereof I have set my hand and seal at Honolulu, Oahu, this 21st day of December, 1837.

Stephen Reynolds

Signed, sealed & delivered in presence of William French

John G. Greenway

I hereby certify that I approve and make valid this sale of the within mentioned premises by Stephen Reynolds, my agent agreable [sic] to the tenor thereof. In witness whereof I have hereunto set my hand and seal at Honolulu, Oahu, this 18th day of January 1840.

William R. Warren

Signed in presence of us: A Charles Davis, George M. Punchard: Witnesses

Recorded 10 December 1844 by J. Ricord, Notary Public.

G. W. Punchard, sworn and acknowledged his own signature and knew that of WilliamR. Warren to be genuine in the confirming clause to the above deed, which witness saw him sign.

[Margin note: M. Kekuanaoa, Governor of Oahu, admitted to the President of the Board deputed to call upon [illegible] the right, title, and interest he possessed by the Canton Hotel premises claimed by James Robinson, & Robert Lawrence to said claimants for the sum of $260, said that he now had no interest in the same. 25th September 1849]

F.T. 140-141v3 [See No. 787]

F.T. 264v3

Claim No. 784, James Robinson & Co., Part II, 9 March [1850], Resumed from volume II, page 125, See page 330B for General Miller's letter for R. Charlton's claim

M. Kekuanaoa, sworn, counter claimant to a portion of the wharf mentioned in this claim, namely that part between the wall running from the Fort to the bathing house, and the makai street marked C in T. Metcalf's Survey, appeared and stated, that he relinquished all claim that he might have in this piece, that the Government might have a claim in it, but that he had not.

(Note: Mr. Lee, President, verbally states after this evidence that Government had no claim.)

F.T. 330B-331Bv3

Cl. 784, James Robinson, part II, from 264, May 12, 1851

Copy

Dear Sir:

I have amicably arranged matters with Mr. Robinson. Neither Mr. Charlton nor his attorney will now ever lay claim to any part of the slip of ground comprised in the accompanying little sketch with my initials, which is the slip of land alluded to in my memorandum of today.

Signed, William Miller, &c.

J.K. Smith, &c, as above

Note: The memorandum & slip alluded to are both included in their import in this claim as for Award rendered. The sketch certificates by General Miller as above with his initials is to Metcalf plan of the lot with notes - which has been stamped and delivered with the award, and included the adjoining sea beach to Charlton's & French's wharf, now abandoned by General Miller, as attorney for R. Charlton, in consideration of a satisfactory payment by J. Robinson for alleged rights.

It was also distinctly understood that Mr. French's right admitted in the first letter is as large as Charlton's in every sense in which he held it to one half of the lot.

N.T. 448v2

No. 784, James Robinson

This is a claim for Papaka in Honolulu here for Robinson and W.P. Leleiohoku.

Robinson has brought a land transfer document from Kalaimoku for him and for Leleihoku [sic]. The document had been drawn in the month of January 1820.

John Ii, sworn by the Word of God and stated, I have known Manini during his lifetime and he has died. I have seen Robinson living at this place and had heard from Kalaimoku that Robinson had taken possession of the place; however, half of the pier is for Kalaimoku and upon his death, it would be for his assistant and they have now merged. The chiefs have all heard about this.

Kaauwai, sworn by the Word of God and stated, I have seen Kalaimoku's signature, also his document which I have, and the r [sic; 1?] to us at that time is the 1 in his name.

Continued page 596, volume 3

N.T. 507-597v3

No. 784, J. Robinson & Co., March 9, 1850, from page 448, volume 2

Kekuanaoa, who had at one time protested James' place which is at Pakaka, makai of Queen Street, and at the sign C as indicated in Metcalf's surveying of the land, has come to withdraw his complain for that place, for he has seen Kalaimoku's deed to James and on this date, it has been conveyed to

James, but should there be any other interest there belonging to the government, I have not know. I no longer have any /interest/.

[Award 784; R.P. 4532; Queen St. Honolulu Kona; 2 ap.; .43 Ac.]

LCA No. 1775, Pawa

N.R. 150v3

To the Land Commissioners, Greetings: I hereby state my claim for a section of irrigation ditch. I do not know its length - perhaps it is two fathoms more or less. The length of my interest at th is place is from /the time of/ Kaahumanu I, which was when my people acquired this place, and until this day when I am telling you, no one has objected at this place where I live. The house lot where I live is on the north of the government fence al Kalia. Some planted trees grow there - five hau and four hala.

There is a well which is used jointly.

With thanks,

PAWA X, his mark

Waikiki, Oahu, December 16, 1847

M.K. Trut, witness

F.T. 181v3

No. 1775,Pawa

Kalaione, sworn, This land is in Pinaio, Waititi, house lot, 1 house, no fence.

Mauka, Government road
Waialae, Government yard
Makai, sea
Honolulu, Sir [stream).

Claimant received this land from Kaahumanu I and has ever since held it undisputed.

Alapai, sworn, confirmed the testimony above.

N.T. 509v3

No. 1775, Pawa, October30, 1849

Kalaeone, sworn, I have seen his land at Piinaio in Waikiki - 1 house lot

Mauka by government road
Waialae by government lot
Makai by stream
Honolulu by stream.

Kaahumanu I had given him his land and no one has ever objected to this day.

Alapai, sworn, Our testimonies are similar. No one has objected.

See pg. 75, Vol. X

N.T. 75v10

No. 1775, Pawa (from page 509, Vol. 3), 18November1851

Kalaeone, sworn, I have seen this section of Pawa in Kalia in Waikiki, a Pauku ditch of stream taro.

Mauka, Government land

Waialae, Nihopuu's land

Makai, S. Kuluwailehua‘s land, Keino’s land

Ewa, Nakoko’s land

Land to Pawa from his mother, Makuahine. Makuahine had received it fro Naliikipi after the death of Kinau in 1839, because Makuahine is Naliikipi‘s sister. Makuahine had bequested it permanently to Pawa, their son, Makuahine, Pawa’s parent has died and Pawa has been living there to the present time peacefully.

Section one claim has been done on 30 October 1849, it is the house lot. Wrk on the taro land section is being done today.

[Award 1775; R.P. 7033; Kalia Waikiki Kona; 2 ap.; 3.22 Acs. R.P. is to Paoa]

No. 4882*O, William French, Honolulu, January 15, 1848

F.R. 5v3
[Listed as 4882-4886]

To the Board of Land Commissioners, I hand you 6 surveys of real estate for which I claim titles: Viz.

4882, No. 1 Warehouse premises, known by the name of French's Honolulu premises, with the Butcher's shop and one half of the wharf known as Charlton's & French's wharf, and Blacksmith's shop.

4883, No. 2 Premises in Honolulu, where I now reside.

4884, No. 3 Warehouse & premises at Kawaihae, Hawaii.

4885, No. 4 Dwelling house and Premises at Waimea, Hawaii.

4886, No. 5 Slaughter house premises, and small enclosure adjoining, with grass houses and cookhouse thereon.

All the above named places have been surveyed by Mr. Metcalf, whose surveys please to find on file with this petition, and notify me when to lay them before you, with the necessary vouchers.
Signed, &c, William French

Understanding that a native woman, Kekai, has laid in a claim to house and premises now occupied by Mr. John Ladd in Honolulu, opposite my dwelling house. I have to state that said house was built by me, with the exception of the stone work which was done by John Ebbetts, deceased, during his absence on a voyage to Canton, in which he died. I have never been remunerated in full for my outlays, and have his written instructions how to appropriate his property in case of accident to him. The land was originally purchased from Richard Fort by said Jno Ebbets.
Signed, William French

See claim & testiony under No. 534

F.T. 167-168v2
Claim 4882 to 4886, Wm. French, February 2
4884

Samuel Rice, sworn, I know these houses situated at Pahonu in Hawaii, They [are enclosed] with a stone wall which I think is the boundary. I heard Governor Adams say he had given eh place to claimant in 1838 on condition of his building a wharf for the boats, and that it should be his. He built the stone house and wharf and has occupied the premises ever since in peace.

John Munn, sworn, I know the place and that the account of Mr. Rice is correct. I have often heard K[uakini?] say the same [blank section of page - illegible] know claimant has [blank section of page - illegible ?has held quiet possession of it?] since he obtained it in 1838 [blank section of page - illegible].

4885
Samuel Rice, I know [blank section of page - illegible] ..huli Waimea for his own [blank section of page - illegible] [I] always understood got the place from [blank section of page - illegible ?Kuakini?] for services as Bullock catcher in 1831 and [blank section of page - illegible] the place and the Governor [blank section of page - illegible] like only do not encroach on the main road? He then took the place and enclosed it with a stone wall. I never heard of any opposition to his occupation. Mr. French purchased it from him in 1840 and has held it in peace ever since. If the Governor had not approved of Hughes's right to it, he would have opposed the transfer to claimant, which he on the contrary approved, I believe. (See copy of Bill of Sale).

John Munn, I know Hughes built a stone house there but not the particulars of the acquisition. I should infer he would not have built a valuable stone house and wall on the premises without good authority from Kuakini. Both Hughes and claimant have always held the place undisputed during their successive terms of occupation, as far as I know.

4886 - Slaughter house premises
[Blank section - illegible ?Samuel Rice?] I heard Governor Adams sold claimant a place for a beautiful horse, which Mr. French would not sell for money. This was in 1838. The place is enclosed by a stone wall. There were two natives occupying houses on this land who were troublesome and Kuakini gave them some other place instead, and they were removed. I never [blank section of page - illegible] them he had given the place to Mr. French (Mr. French stated he gave them compensation on [blank - illegible] of about [blank -illegible]. Claimant [blank] [has held quiet] possession ever since. [blank section - illegible]

[Blank section - illegible ?John Munn?] I heard Kuakini say in 1841 or 2 that he had given the place formerly belonging to Mrs. Adams for the horse, this he said to me in his own house. I know the place was sold for the horse and that Mr. French has held quiet occupation since.

Resumed page 171. [Claim 4882 & 4883]

F.T. 171-176v2
Claim 4882, William French, from page 168. February 4. See page 330 volume 3 for final arrangement

Stone House Premises including the Wharf
Claimant produced two deeds and two accompanying papers relating to the present claim, as follows, viz.

Know all men by these presents that I, William French, surviving partner of the late firm of

French & Co. now residing at Oahu, one of the Sandwich Islands, for and in consideration of the sum of Six thousand dollars to me in hand paid at the signing of these presents by Francis John Greenway of Bristol England, now residing at Oahu, the Receipt whereof I do hereby acknowledge, have bargained, sold, and delivered, by and with the consent of the Government of the Sandwich islands, and by these presents, do bargain, sell and deliver unto the said Francis John Greenway, all that piece of ground, with the houses erected thereon, with half of the Wharf and privilege of Blacksmith shop and slaughter house, as per S. Reynolds auction bill of this date of possession to be given on 1ast of January 1839. The said premises being situated in the Village of Honolulu, Island of Oahu, and bounded:

On the northeast by a road 169 feet
On northwest by a road 136 feet
On the southwest by the premises of Richard Charlton & native grounds 186 feet
On the southeast by the premises of William Blossom 132 feet.

With half the wharf and privilege therein before named.

The said William French in manner aforesaid and for his heirs, executors, administrators & assigns, do by these presents relinquish all claims to the said premises unto Francis John Greenway, his heirs, executors, administrators, and assigns for ever.

In witness whereof, I have hereunto affixed my hand and seal at Honolulu, Island of Oahu, this 1st day of October 1838.
WILLIAM FRENCH
Witnesses: John Meek, G. Rhodes
Acknowledged 6 December 1844 before John Ricord, Notary Public
Recorded 3 December 1844
Recorded in U.S. Consulate by William Hooper (no date)

F.J. Greenway, October 1, 1838
Bo [Bought] at Auction

Premises, stores, shops, wharf & privilege Blacksmith's shop, Butcher's shop side and all things belonging to the store premises of William French, Possession 1 January 1839, $6,000

Terms: 1/4 on delivery January 1, 1839
3/8 six months after deliver
3/8 twelve months after delivery
Received Pay by Note to William French
Honolulu, October 1st 1838, Stephen Reynolds, Auctioneer

The enclosed bill of Sale being read to Messrs Henry Skinner & Alexander Simpson, was pronounced by them to be good.
William Hooper

Know all men by these presents that I, Ann Dudoit, of the village of Honolulu, with the consent

& approbation of my husband, Jules Dudoit, consul of France; and that I, the said Jules Dudoit, husband of the said Ann Dudoit, acting in conjunction with her & also in my own individual name, for and in consideration of the sum of $11,424 to us in hand paid by way of compromise, in liquidating the claim of said Dudoit against the Estate of William French & Francis John Greenway, the receipt whereof is hereby confessed & acknowledged, have granted, bargained & sold, released, conveyed & confirmed, and by these presents do jointly and severally, grant, bargain, sell, release, convey & confirm unto M. Kekuanaoa, Governor & Chancellor of Oahu for the use of the Creditors of the Estate of said French & Greenway, all our and each of our right, title, interest, claim, demand, possession, right of possession, dower & right of dower, in and to all that piece of ground with the houses erected thereon, with half of the wharf & privilege of blacksmiths shop & slaughterhouse, as per Reynolds auction bill, dated October 1st, 1838 by which said premises were sold to Francis John Greenway, and which auction bill was consummated by a deed of said premises of the same date from William French [&] Francis John Greenway for the consideration therein set forth of $6000, and in which deed the premises intended to be conveyed are bounded and particularly described as follows:

Situated in the village of Honolulu, Island of Oahu, and bounded
Northeast by a road 169 feet;
on Northwest by a road 136 feet
on the southwest by the premises of Richard Charlton and native grounds 186 feet
on Southeast by the premises of William Blossom 132 feet,

which said premises were by an indenture of mortgage bearing date 30th June 1841 given to the said Jules Dudoit, collateral to a promissory note of even date therewith for $14,846.00 bearing interest at 18 percent per annum, and which said mortgage, having been foreclosed, and said premises sold at auction by F.M. Thompson Auctioneer on 2d of December 1842, the said premises were purchased in the name of the said Ann Dudoit, wife of the said Jules Dudoit for the sum of $8,500 as appears from the auction bill of sale herewith concurrently assigned to Mr. Kekuanaoa by said Jules Dudoit and Ann Dudoit, his wife.

To have and to hold the said above described premises with the additions and repairs, wharf & blacksmith's shop, slaughter house. & all other the tenements, hereditaments, privileges & appurtenances thereunto belonging on in any wise appurtaining unto the said M. Kekuanaoa, Chancellor of Oahu, in trust for the payment of the debts of the said William French & Francis John Greenway and in opposition to us the said Ann Dudoit & Jules Dudoit, our heirs, executors, administrators, lessees, mortgagees, and assigns to the full extent of the title that we acquired therein by virtue of the auction sale made on foreclosure of the mortgage by said F.W. Thompson Auctioneer.

In witness whereof, we have hereunto severally set our hands and seals at Honolulu this 2d of December 1844.
Anne Dudoit, J. Dudoit
Signed, sealed & delivered in presence of Robert C. Wyllie, Thomas Baillie
(acknowledged recorded 2d December 1844 by John Ricord, Notary Public)

Mrs. Ann Dudoit
Bought at Auction by her agent, William Paty, all of that premises, stores, shed, wharf and privilege, blacksmith shop, butcher shop &c. and all things belonging to the premises lately owned and occupied by Francis F. Greenway (formerly owned and occupied by William French) as described in 3 bills of sale hereunto annexed:

Sale No. 1. S. Reynolds Auction bill to F.J. Greenway, dated October 1, 1838

Sale No. 2. William French's Bill of Sale to F.J. Greenway, dated October 1, 1838, witnessed by John Meek and G. Rhodes.

Sale No. 3. F.J. Greenway's bill of Sale to J. Dudoit, dated June 30, 1841. Witnessed by Thomas Cummins and Edward Stetson.
(Given as collateral security for the payment of a certain note of hand.)

the above mentioned premises were sold with the knowledge and consent of the Government and agreeable to the laws of the Sandwich Islands by order of J. Dudoit in default of payment of note as per bill of sale No. 3.
For dollars $8,500
Honolulu, Oahu, Sandwich Islands, December 2, 1842
Received payment in cash paid over to J. Dudoit
Signed, F.W. Thompson & Co. Auctioners
Resumed page 305, volume III.

I hereby assign unto Mr. Kekuanaoa, chancellor of Oahu for the use of the Estate of French & Greenway all my rights under the within auction sale.
Anne Dudoit
Dated 2d December 1844

I hereby give my free consent to the above assignment on the part of my wife, who has signed the same.
Jules Dudoit
Witnessed by Robert C. Wyllie, Thomas Baillie.

Acknowledged & recorded on 13 December 1844 before & by John Ricord, Notary Public.

Received on 1st January 1842 on account of the amount expressed in the within note, the sum of $3,395.39 cents in deduction of the principal. Interest on said principal up to the 1 January 1842 being also received.
Honolulu 19 May 1842
J. Dudoit
[margin note: Pay le Governeur la somme ci inclos. Honolulu 2 decembre 1844]

Received on account of the amount expressed in the within note the sum of $11,07.38 [1,107.38] cents, which sum is to bear interest from 1st June 1842

Jules Dudoit
Honolulu, 19 May 1842

14,846.66 dollars. Honolulu, Oahu, February 3, 1841
Two years from the 1st December 1840, I promise to pay to Jules Dudoit or [on?] his order, the sum of 14,846.66/100 dollars for value received with interest, eighteen per cent per annum
Interest due annually
F.J. Greenway

The settlement of accounts between us annual no charges of interest will be made on cash items for house use neither on small things for Clementine.
F.J. Greenway
Jules Dudoit Esquire

F.T. 305v3
Cl. 4882, W. French, Protest, Honolulu, 7 October 1850, from page 171 volume 2

To the Honorable Board of Land Commissioners: As the attorney [for?] William French, Esquire, who is the attorney of the late Mr. Greenway and a creditor of Mr. Greenway's to a large amount, I hereby protest against any action or judgement in regard to the property of the waterside premises known as Mr. Charlton's that may defeat Mr. French's intentions as made known to His British Consul General on 3rd April 1848, as his right as Mr. Greenway's attorney, founded on Mr. Charlton's letter to Mr. Greenway on 11 March 1841 to claim said premises if Mr. Charlton should ever sell them on payment to Mr. Charlton or his assigns of four thousand dollars, five hundred dollars.
George J. Kenway, Attorney for William French

F.T. 330Bv3
Cl. 4882, William French, Part II, May 13, 1851, from page 172v2, Beretania Cotteg [Cottage?]

Copy
Dear Sir
I have amicably arranged matters with Mr. French. It is agreed that Mr. Charlton and Mr. Trench [?] are to be equal owners of the wharf and of the buildings and shop thereon.
Yours very truly, Wm. Miller
J.K Smith, Esquire, Member & Secretary, Board Land Commissioners

[Award 4882; R.P. 107; Merchant St. Honolulu Kona; 1 ap.; .55 Ac.; no R.P.; Queen St. Honolulu Kona; 1 ap.; .12 Ac.; Awardee index and Patent index list 4882 R.P. 10

No. 11225, Kekualoa, 3d April 1854
F.T. 540v3

This is a claim for the ili of Kalui in Honolulu.

J. Kapena, sworn says, he was born on the adjoining land to Kalui & has a kuleana on that land now.

Knows the boundaries of the makai portion of this ili to be as follows: viz.

Mauka by the land called Kalawahine
Waikiki side by the bank of Eawoa [Pauoa] Stream & kuaanu [Nuuanu]
On the Kaumakapili side down to the sea & then following high water mark to the boundary of Akaukukui & then running seaward to the reef to the Sumner family, called Kohololoa
On the Makai side by Kohololoa
On the Ewa side by the fish ponds of Kawa and Kuili & the lands of Aala & Kamakela.

There are two or three other pieces of land farther mauka belonging to the ili of Kaliu, whose boundaries I cannot define.

Paauki, sworn says, the boundaries of Kaliu kai are as set forth by last witness, except that on the Ewa side this land called Koiniu touches this land as well as those named by Kapena.

The place where the slaughter house now stands was reclaimed from the bed of the river which belongs to Kaliu.

Kuapuu, sworn says, he is a kamaaina of Kaliu, knows the boundaries of Kaliu kai to be the same as set forth by last witness.

Knows that the place on which now stands the slaughter house belongs to Kaliu.

N.T. 340v10
No. 11225, Kekualoa, Claimant

Paki sworn, I know Kekualoa's claim - it is an ili in Honolulu, Oahu - a land division of the king. This has been registered in the grant Book of the Government in the Interior department. I had it registered with the land commissioner's office in Kauwila Building, Honolulu in 1847, probably or may be 1846, I can't remember; however, I have kept that property since 1847 to the present time. It is a large property that land of Paty and Wyllie in the uplands was half of this land. Here were some other lands too, which were conveyed to Lee and another half of Dudoit Buildings in the uplands.
A. PAKI
Sworn in my presence on this 29th of March 1854
W.L. Lee, President of the Land Commissioners

N.T. 340v10
No. 11225, Kekualoa, 30 March 1854

COPY
Kekualoa's land distribution.
Kaliu ili of Honolulu, Kona, Oahu.
TRUE COPY
Interior Department, 27 March 1854
A.G. Thruston, Clerk

[Award 11225; R.P. 1879½; Kaliu Honolulu Kona; 1 ap.; 15.82 Acs]

APPENDIX E

Final Cultural Impact Assessment for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu and Waikiki Ahupua`a, Honolulu (Kona) District O`ahu TMKs: (1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6: Various Plats and Parcels

Final

Cultural Impact Assessment for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu and Waikīkī Ahupuaʻa, Honolulu (Kona) District, Oʻahu TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2-4, and 2-6: Various Plats and Parcels

Prepared for

Gray Hong Nojima & Associates, Inc.

Prepared by

Nicole Ishihara, B.A.,

S. Māhealani Liborio, B.A.,

and

Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.

Kailua, Hawaiʻi

(Job Code: HONOLULU 54)

November 2015

Oʻahu Office
P.O. Box 1114
Kailua, Hawaiʻi 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
1860 Main St.
Wailuku, Hawaiʻi 96793
Ph.: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Cultural Impact Assessment (CIA) for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment (EA), Honolulu and Waikīkī Ahupuaʻa, Honolulu (Kona) District, Oʻahu, TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2-4, and 2-6: Various Plats and Parcels (Ishihara et al. 2015)
Date	November 2015
Project Number(s)	Cultural Surveys Hawaiʻi, Inc. (CSH) Job Code: HONOLULU 54
Agencies	State of Hawaiʻi Department of Health/Office of Environmental Quality Control (DOH/OEQC)
Project Location	The project area extends the surface of the Honolulu metropolitan coastal highway and a limited number of perpendicular street sections. The main portion of the project area extends parallel along the coast on Nimitz Highway from the Pacific Street junction in Iwilei to the highway's eastern terminus at Richards Street, the lower section of Richards Street to the western end of Ala Moana Boulevard through Kakaʻako and Kālia, across the Ala Wai Canal to the boulevard's terminus at Kalākaua Avenue in Waikīkī. The project area also includes six *mauka-makai* (inland to seaward) portions, one on River Street in Honolulu, another on Nuʻuanu Avenue in Honolulu, a portion of Cooke Street in Kakaʻako, a lower portion of Piʻikoi Street in Kakaʻako, an upper portion of Piʻikoi Street in Kewalo, and a portion of Pensacola Street in Kewalo.
Project Description	The project area extends the surface of the Honolulu metropolitan coastal highway and a limited number of street sections running perpendicular to the highway. The main portion of the project area runs parallel along the coast on Nimitz Highway from the Pacific Street junction in Iwilei to the highway's eastern terminus at Richards Street, the lower section of Richards Street to the western end of Ala Moana Boulevard through Kakaʻako and Kālia, across the Ala Wai Canal to the boulevard's terminus at Kalākaua Avenue in Waikīkī. The project area also includes six *mauka-makai* (inland to seaward) portions, one on River Street in Honolulu, another on Nuʻuanu Avenue in Honolulu, a portion of Cooke Street in Kakaʻako, a lower portion of Piʻikoi Street in Kakaʻako, an upper portion of Piʻikoi Street in Kewalo, and a portion of Pensacola Street in Kewalo. The Honolulu Water System Improvements project includes the following: 1. The main work entails installation of a new 24-inch replacement water main from the vicinity of the intersection of River Street and North King Street; then southwest, or *makai* (seaward) on River Street to Nimitz Highway; then along Aloha Tower Drive

	to Ala Moana Boulevard; and then along Ala Moana Boulevard to the intersection with Kalākaua Avenue for a distance of approximately 20,000 ft. 2. Excavation for the installation of a new 16-inch replacement water main along Nimitz Highway between Pacific Street and Sumner Street for approximately 1,355 ft. 3. Excavation for the installation of a new 20-inch replacement water main along Cooke Street from Ala Moana Boulevard to Pohukaina Street for approximately 1,308 ft. 4. Excavation for the installation of a new 16-inch replacement water main along Pi‘ikoi Street from Ala Moana Boulevard to Kapi‘olani Blvd. for approximately 1,510 ft. 5. Excavation for the installation of a new 16-inch replacement water main along Pi‘ikoi Street from S. King Street to Kinau Street for approximately 1,028 ft. 6. Excavation for the installation of a new 24-inch replacement water main along Pensacola Street from Kīna‘u Street to Wilder Street for approximately 1900 ft. 7. Alternate 24-inch water main project areas include River Street between N. King Street and N. Beretania Street, Nu‘uanu Avenue from Nimitz Highway to Pauahi Street and S. Nimitz Highway between Fort Street Mall and Richards Street, and thence *makai* to Aloha Tower Drive. These excavations may be up to 12 ft below the ground surface and in trenches 6 to 8 ft wide.
Project Acreage	Approximately 25, 227 ft (4.7 miles) of road or 7,689 m (7.6 km) for a total of 64.43 acres
Area of Potential Effect (APE)	The APE is defined as the approximately 64.43-acre project area in total. While this investigation focuses on the project APE, this study considered the whole *ahupua‘a* (land division extending from the mountain to the sea) of Waikīkī and Honolulu.
Document Purpose	This CIA was prepared to comply with the State of Hawai‘i’s environmental review process under Hawai‘i Revised Statutes (HRS) §343, which requires consideration of the proposed project’s potential effect on cultural beliefs, practices, and resources. Through document research and cultural consultation efforts, this report provides information compiled to date pertinent to the assessment of the proposed project’s potential impacts to cultural beliefs, practices, and resources (pursuant to the Office of Environmental Quality Control’s *Guidelines for Assessing Cultural Impacts*) which may include Traditional Cultural Properties (TCPs). These TCPs may be significant historic properties under State of Hawai‘i significance criterion “e,” pursuant to Hawai‘i Administrative Rules (HAR) §13-275-6 and §13-284-6. Significance criterion “e” refers to historic properties that “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 accounts—these associations being important to the group’s history and cultural identity” (HAR §13-275-6 and §13-284-6). The document will likely also support the project’s historic preservation review under HRS §6E and HAR §13-275 and §13-284. The document is intended to support the project’s environmental review and may also serve to support the project’s historic preservation review under HRS §6E-8 and HAR §13-284.
Results of Background Research	Background research for this study yielded the following results which are presented in approximate chronological order: 1. Honolulu literally translates to “protected bay,” which refers to Honolulu Harbor (Pukui et al. 1974:49-50). Older names for the harbor are Kou and Māmala. 2. Pākākā was the name of a coastal point, canoe landing, wharf built off the point in 1827, and *heiau* (pre-Christian place of worship, shrine). The name literally means “to skim, as stones over the water” (Pukui et al. 1974:175). Thrum (1906) mentions Pākākā Heiau being the main royal temple in Honolulu. This *heiau* would be located near the foot of Fort Street today. 3. *Kalo* (taro) was the sacred staple in the Hawaiian diet and way of life. According to Hawaiian mythology, man was born from the taro plant. In the Kumulipo, also known as the Hawaiian genesis, Wākea (Father Sky) and Papa (Mother Earth) had their first born child Hāloa-naka. This child was born prematurely and died shortly after his birth (Kanahele 1995:17). After burying Hāloa-naka, a taro plant sprouted at his grave and a second son, Hāloa, was born. Hāloa, a human child, symbolizes taro and man. Taro is a metaphor for life “because, like the taro plant, it needs to be rooted in good soil and to be constantly nourished with the waters of Kāne” (Kanahele 1995:18). 4. Honolulu Ahupua‘a was abundant in taro. The *ahupua‘a* (land division) was bountiful with streams flowing from upper Nu‘uanu Valley. Taro lands extended *makai* to at least half-way to upper Nu‘uanu Valley. The Pauoa area was ideal for sweet potatoes as well as taro cultivation. The Round Top (Tantulus) and Makiki areas were famous for their sweet potato production. The name for this area was ‘Ualaka‘a or “rolling sweet potato” due to the sloping hill. It was said, if a sweet potato was displaced, the *‘uala* (sweet potato; *Ipomea batatas*) would roll down the hill (Handy and Handy 1972:478). 5. SIHP # 50-80-14-02918 was found during excavations at the former Honolulu Ironworks site and was later documented in the

archaeological inventory survey for the Honolulu High-Capacity Transit Corridor Project (Hammatt 2013; Yent 1985). SIHP # -02918 consists of a subsurface cultural deposit and six human burials. The burials were to be from pre- and post-Contact era.

6. In 1846, Honolulu was the capitol of the Hawaiian Kingdom and was on its way to becoming the commercial and political hub of the Islands. During this time there was an obvious increase in population, land use, and urbanization. The waterfront area changed dramatically to accommodate trading and whaling vessels.
7. In 1895, a cholera epidemic struck the Islands and spread rapidly due to unsanitary conditions of the harbors and Nu‘uanu Stream. The epidemic broke out in August and ended in October. A total of 64 people died. Shortly after the end of the epidemic, the government began to plan and institute public improvements to roads, bridges, sewage systems, and streams.
8. A rich Chinese cultural landscape was just *mauka* of the waterfront in an area called Kapukolo (also known as Kapu‘ukolo). For nearly a century, Chinese patriots practiced disinterring their fellow countrymen’s bones to prepare them for shipment back to China. It is logical to assume that many of these bones passed through Honolulu’s Chinatown, but details are not well-known. An 1896 article in the *Hawaiian Gazette* discusses a “Chinese club house” in or near Nu‘uanu Stream that processed these bones.
9. Kaka‘ako is located within Honolulu Ahupua‘a. Kaka‘ako is located between two of the most intensely populated and cultivated areas in southeastern O‘ahu during the pre-Contact period, Waikīkī and Honolulu. Marshes and wetlands were utilized for salt production, farming of fishponds, and some wetland agriculture.
10. The Kaka‘ako area has been heavily modified over the 150 years due to historic filling of the area for land reclamation.
11. Members of the *kauwā*, an outcast caste, were drowned in the Kewalo area for sacrificial purposes.
12. Pu‘ukea Heiau was located in the *‘ili* (land division, smaller than an *ahupua‘a*) of Kukuluāe‘o according to Kamakau (1991:40). Pu‘ukea translates to “white hill” and was also the name of a smaller land division within Kukuluāe‘o ‘Ili. LCAs 1502 (not awarded) and 1504 mention Pu‘ukea. LCA 1504 is located near the junction of Halekauwila and Cooke streets. It is possible the *heiau* was built near this junction due to the slightly elevated location.
13. A trail once traversed the Kaka‘ako area, connecting Waikīkī to Honolulu. John Papa ‘Ī‘ī (1959:89) described the middle trail

(close to the current alignment of Queen Street), extending from Kālia to Kukuluāe‘o as passing “along the graves of those who died in the smallpox epidemic of 1853.”

14. Several burials have been documented within and in the vicinity of the project area including SIHP # -06376, a single cranial vault, discovered at the intersection of Ala Moana Boulevard and Kamake‘e Street (Souza et al. 2002); and SIHP # -07656, a previously identified, isolated human cranial fragment, at the Ward Warehouse, fronting Ala Moana Boulevard (Pammer et al. 2014).
15. LCA testimonies express that much of the land in Ka‘ākaukukui ‘Ili was used for salt production. Native Hawaiians used salt for a variety of purposes including to flavor food, preserve fish, medicinal practice, and ceremonial purposes. Salt was traded, reaching its peak by 1870. By 1883, traditional Native Hawaiian salt production was on the decline and was replaced by the labor intensive Chinese method. By 1901, the majority of fishponds and salt pans *makai* of King Street were abandoned.
16. By the 1880s, the Kaka‘ako area was being filled in for the construction of new roads and improvement of older roads. The justification for filling former mud flats, marshes, and fishponds was that low-lying areas were frequently being cited for unsanitary conditions and contributing to cholera outbreaks and breeding areas for rats and mosquitoes. By February 1914, the land from South Street to Ward Avenue and from Ala Moana Boulevard to Queen Street had been filled in.
17. The name Waikīkī translates to “water spurting from many sources” and reveals the character of the intact watershed system of Waikīkī prior to European Contact, where water from the valleys of Mānoa and Pālolo gushed forth from underground.
18. A vast system of irrigated taro fields was constructed across the littoral plain from Waikīkī Kai to the lower valleys of Mānoa and Pālolo in approximately AD 1400. This, in combination with coconut groves and fishponds along the shoreline, enabled the growth of a sizeable population, including the coastal village of Waikīkī, which most likely centered around the mouth of ‘Āpuakēhau Stream.
19. *‘Uala* and *ipu* (bottle gourd; *Lagenaria siceraria*) were abundant in the lower Waikīkī marshlands. The foothills of Mānoa and Pālolo contained *pili* (*Heteropogon contortus*) grass for thatching of homes and *hau* (beach hibiscus; *Hibiscus tiliaceus*), which was used for canoe frames and kite supports. Bark from the *hau* was used for the construction of nets, ropes, and *kapa* (bark cloth). *Kukui* (candlenut tree; *Aleurites moluccana*) trees could be found

	mid-way in Mānoa Valley. The kernels were used for *‘inamona* (relish) and the oily nuts were used for stone lamps. 20. Approximately 11 known fishponds were in the *‘ili* of Kālia, also the location of the current project area. In addition to the 11 known fishponds were several more with undocumented names. 21. Thomas G. Thrum reports that eight *heiau* were once located in Waikīkī as well as Nā Pōhaku ‘Ola Kapaemahu a Kupuni (commonly known as the Wizard Stones) (Paglinawan 1997; Thrum 1907:139-141). These sites are connected through *mo‘olelo* (stories) to ‘Āpuakēhau Stream. Four of these *heiau* were associated with human sacrifice including Helumoa Heiau. Sacrificial drownings of the *kauwā* (outcast) class were also perfomed in Waikīkī (Sterling and Summers 1978:33). 22. One burial was documented in the Waikīkī segment of the current project area. SIHP # -07087, a previously disturbed human burial, which consisted of a nearly complete human cranium and cranial fragments, was found near the intersecton of Kālia Road and Ala Moana Boulevard (Mooney et al. 2009:i). The burial was left in situ. 23. The construction of the Ala Wai Canal began in 1921 and was completed in 1928, resulting in draining and filling the remaining fishponds and irrigated fields of Waikīkī. The construction of the Ala Wai Canal was one element of a plan to urbanize Waikīkī and the surrounding districts. 24. The U.S. War Department acquired approximately 70 acres in Kālia ‘Īli to establish a military reservation, which was named Fort DeRussy in honor of Brigadier General R.E. DeRussy of the Army Corps of Engineers. The Waikīkī portion of the project runs through Kālia ‘Ili and borders the north portion of Fort DeRussy. 25. The present day Ala Moana Shopping Center is located in the *‘ili* of Kālia. Kālia ‘Ili was known for its numerous fishponds. The parcel where Ala Moana Shopping Center stands today was granted to Lot Kapuāiwa, also known as Kamehameha V (Land Grant 2790). The 50-acre swamp was deemed unproductive land and was put up for sale in 1884 in accordance with Princess Bernice Pauahi Bishop’s will. In 1912, Walter Dillingham bought the property for $25,000 and had his company fill in the swamp land with coral. In 1948, Lowell Dillingham, Walter Dillingham’s son, announced plans to construct a shopping center. Construction began in 1957. The shopping center opened for business on 13 August 1959.
Results of Community Consultation	CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descendants of

	Waikīkī in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. State of Hawai‘i recognized lineal descendant, Paulette Ka‘anohi Kaleikini stated the proposed project “will be taking place in very, very sensitive areas.” She continued, stating that the ‘Ewa portion of the project area has a lot of subsurface disturbance, however, there are also areas that have not been disturbed. The areas that have not been previously disturbed could be impacted by the current project’s activities. Ms. Kaleikini’s primary concern regarding the proposed project is pre- and post-Contact land use within the project area. She stated that thousands of Native Hawaiians lived within the current urban corridor. Bones that are found within the urban corridor are proof that habitation occurred in these areas. According to Ms. Kaleikini, the project area consisted of *ali‘i* (chiefly class) and *maka‘āinana* (commoner) habitation. She notes *heiau*, fishponds, *lo‘i* (terraced fields), and salt beds once sustained a community. Ms. Kaleikini recommended an archaeological inventory survey plan. She added that cultural monitoring should be considered alongside archaeological monitoring for this “culturally sensitive area.” Ms. Megan Borthwick of Historic Hawai‘i Foundation stated the project area is on a major route and bypasses many historic properties and districts. Historic Hawai‘i Foundation recommended an architectural resource survey be conducted to identify potential impacts to historic resources. In addition, an architectural inventory survey may identify additional historic properties that are eligible for the historic register but have not been previously nominated or designated. Properties that have been listed on the State and/or National Register of Historic Places, including historic districts such as Chinatown and the Capitol District, should be evaluated for potential adverse effects. The Historic Hawai‘i Foundation is also concerned about underground cultural deposits, *iwi kūpuna* (ancestral bones), and/or other cultural resources that should be identified and treated appropriately in the event of being found. Mr. Chester Lao, a former Board of Water Supply employee, described the water table in parts of Honolulu and Waikīkī Ahupua‘a. He noted the Missionary Homes and the Board of Water Supply office in Downtown Honolulu overlie cinders and coral that collect water. The Mission Homes has a hand-dug well that extends to 25 ft in depth. The water from this well was suitable for everyday drinking and cooking.

	However, the Board of Water Supply office a couple blocks *mauka* is fed by a slightly brackish well. The former Ward Estate (current site of the Neal S. Blaisdell Center) was once famous for its ponds and springs. Mr. Lao stated the Kaka‘ako area contains brackish water. During the construction of the Neal S. Blaisdell Center, two wells were drilled. The well farthest *makai* was considered very brackish and salt water fish were dropped into the pond. The *mauka* well was also brackish and utilized as a *koi* (carp; *Cryprinus carpio*) pond. The lower pond that surrounds the arena was artificially created and ocean fish such as *pāpio* (juvenile crevalle), tangs, tilapia, and *‘ōmilu* (variety of crevalle) can be seen. Ala Moana Shopping Center was constructed on former swamp land. To create the Ala Moana Shopping Center, the area needed to be filled in. Mr. Lao recalled Ala Moana Shopping Center being filled in with material from Ala Moana Beach Park and with debris dredged from the Ala Wai Canal. Mr. Lao recalled a small community of Native Hawaiian families who once lived on the land where the Ala Moana Shopping Center stands today. The families eventually made their way *mauka* towards Papakōlea and onto Board of Water Supply land. During Mr. Lao’s employment with the Board of Water Supply, he recalled the Land Division sector receiving many complaints of a piggery near the Board of Water Supply’s Papakōlea Shaft. The outcome of constant complaints led to the Board of Water Supply agreeing to give the Department of Hawaiian Homelands 10 acres of land to build more homesteads. The Board of Water Supply kept 1 acre of land for a needed reservoir. Mr. Lao described the cultural landscape of the Kapi‘olani Boulevard and Ke‘eaumoku Street area as swamp land where his mother-in-law purchased duck eggs, swamp cabbage, watercress, and taro. The Ala Wai Canal was originally conceived in 1927 by developers as the “Venice of the Pacific.” The original plan was to have an entrance and exit into the canal; buildings were to be constructed along the canal; and boats and gondolas were to navigate the canal waters. When the canal was dredged, however, the exit was never constructed. The proposed outlet was to extend from the current location of the Waikīkī-Kapahulu Public Library and turn *makai*, connecting to the sea so the canal could have better circulation. Due to the current construction of the canal without an outlet, the water tends to be very stagnant and filled with debris.

	Mr. Jan Becket, retired Kamehameha Schools teacher who is well-recognized for his photographic documentation of *wahi pana*, escorted CSH to multiple cultural sites from April 2012 to November 2014 within Waikīkī and Honolulu Ahupua‘a. A total of 16 sites within Waikīkī and Honolulu Ahupua‘a have been mentioned for the current study. Two of those 16 sites were once in the vicinity of the project area but have since been destroyed: Pākākā Heiau and the first location of Kaumakapili Church. Pākākā Heiau was once located near the foot of the *makai* end of Fort Street Mall. Mr. Becket assumes that some of the rubble from Pākākā Heiau was most likely used for the construction of roads in downtown Honolulu. Pākākā was the most important *heiau* in Honolulu Ahupua‘a. It was also near Kamehameha’s compound and was possibly the headquarters for Kahuna Kū. Mr. Becket states the original location of Kaumakapili Church was near the current alignment of Maunakea Street and North Beretania Street. The caretaker of Kaumakapili was Kahuoi. Mr. Becket shares that Kahuoi would fish with his pet bird named Kau-maka-pili (“perched with eyes closed”). The translation of Kau-maka-pili describes the way the bird would catch its prey by swooping down and closing one eye before grabbing a fish. Māhealani Cypher, former president of the Ko‘olaupoko Hawaiian Civic Club and former member of the Board of Directors for the Board of Water Supply, escorted CSH to Lulumahu Valley in Nu‘uanu. Ms. Cypher states the word *Lulumahu* has never been defined. After conducting research on the name, Ms. Cypher translates the word to “hidden curtain” or “hidden from view.” The translation is fitting as the valley is concealed. She offers two reasons why the valley is named *lulumahu*. A waterfall is at the end of the Lulumahu Valley trail. The water is supplied for the waterfall is supplied by the Ko‘olau Summit. The water from the falls gives the illusion of a curtain as it flows over one’s body. The second reason relates to a *mo‘olelo*. During the Battle of Nu‘uanu, women, *kūpuna*, and children hid in Lulumahu Valley. Kamehameha’s army spread throughout Nu‘uanu looking for the residents. Although the valley is somewhat hidden, it did not provide enough protection and those who were found in Lulumahu were killed. Ms. Cypher pointed out several large stone mounds along the Lulumahu Valley trail. The mounds are covered in tall ti leaves. Ms. Cypher shares that these mounds contain burials of those were killed when Kamehameha’s army invaded the valley. *Pōhaku kūpuna* (elder stone), *pōhaku kia‘i* (stone guard), and historic features were also observed.

	Several metal rods and concrete blocks were found on the side of the trail as well. Ms. Cypher explained that these remnants were part of a railroad track that traversed up the valley to carry water. CSH met with Ron Iwami, a local retired fireman for the City & County of Honolulu and Thomas Iwai Jr., a local retired Aquatic Biologist with the Department of Land and Natural Resources (DLNR) – Division of Aquatic Resources (DAR). Mr. Iwami and Mr. Iwai represent the group known as Friends of Kewalos. The group represents recreational users of the park and surrounding ocean, which includes surfers, fishermen, divers, swimmers, and joggers. Mr. Iwami has been surfing at Kewalo Basin for 45 years and has witnessed the many changes the harbor, land, and surrounding ocean. He recalls the harbor being blocked with a thick forest of *haole koa* (*Leucaena leucocephala*). Mr. Iwai recalls fishing in Kewalo Basin with his family and uncle who was a tug boat operator for tuna fishing boats. His uncle worked for the Coral tuna cannery located next to the former Fisherman’s Wharf restaurant. Today, fishing within the basin is not allowed for safety reasons. Mr. Iwami and Mr. Iwai recalls catching *tako* (Japanese for octopus), *menpachi* (soldierfish; *Myripristis spp.*), *aweoweo* (bigeye; *Priacancthus meeki*), *ulua* (bigeye jack; *Caranx sexfasciatus*), *papio* (juveniles), *akule* (bigeye scad; *Selar crumenophthalmus*), and *halalu* (juvenile *akule*). Mr. Iwami points out several memorials within the park including a statute of a *pueo* (Hawaiian short eared owl; *Asio fammeus sandwichensis*), which is the *‘aumakua* (family or personal gods) of Kewalo. A plaque on the statue relates the story of Kapoi who defeated an enemy with the help of the *pueo*. The logo for the Friends of Kewalos is also the *pueo* to commemorate the *mo‘olelo* (story). Another memorial is of Saint Mariana Pope, a nun who assisted leprosy patients within the Kaka‘ako area. During Saint Mariana Pope’s downtime, she would fish and relax in the Kewalo Basin area. Two plaques can also be found under the pavilion. One honors a Filipino fisherman who sailed from Hawai‘i to the Phillipines. The second plaque is dedicated to Save Our Surf, an organization comprised of John Kelly, Wally Froseith, Lord “Tally-Ho” Blears, and George Downing—all who fought to protect public parks and surf spots.

	Mr. Iwami and Mr. Iwai’s main concerns regarding the project are focused on parking and accessibility for park and boat patrons. Road work in the area may further displace parking and accessibility.
Impacts and Recommendations	Based on the information gathered for the cultural and historic background and community consultation detailed in this CIA report, the proposed project may have potential impacts. To avoid these, we suggest the following: 1. Personnel involved in the construction activities should exercise caution due to the culturally sensitive nature of the proposed project areas as indicated by two community participants. 2. Personnel involved in the construction activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. Should burials (or other cultural finds) be encountered during ground disturbance, the construction contractor should immediately cease all work and the appropriate agencies should be notified pursuant to applicable law. 3. If any *iwi kūpuna* or other inadvertent cultural finds are found during ground disturbance, the Honolulu Board of Water Supply in conjunction with the State Historic Preservation Division (SHPD) and the O‘ahu Island Burial Council (OIBC) should consult with lineal and cultural descendants of Honolulu (including Kaka‘ako) and Waikīkī to develop a reinterment plan and cultural preservation plan.

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Section 1 Introduction

1.1 Project Background

At the request of Gray Hong Nojima & Associates, Inc., Cultural Surveys Hawai‘i Inc. (CSH) has prepared this cultural impact assessment (CIA) document for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu and Waikīkī Ahupua‘a, Honolulu (Kona) District, O‘ahu, TMKs: [1] 1-5, 1-7, 2-1, 2-3, 2-4, and 2-6: various plats and parcels. The project area has been depicted in its entirety on a portion of a 1998 U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a series of aerial photographs (Figure 2, Figure 3, and Figure 4), and a series of tax map plats (Figure 5 through Figure 10).

The project area extends the surface of the Honolulu metropolitan coastal highway and a limited number of street sections running perpendicular to the highway. The main portion of the project area runs parallel along the coast on Nimitz Highway from the Pacific Street junction in Iwilei to the highway's eastern terminus at Richards Street, the lower section of Richards Street to the western end of Ala Moana Boulevard through Kaka‘ako and Kālia, across the Ala Wai Canal to the boulevard's terminus at Kalākaua Avenue in Waikīkī. The project area also includes six *mauka-makai* (inland to seaward) portions, one on River Street in Honolulu another on Nu‘uanu Avenue in Honolulu, a portion of Cooke Street in Kaka‘ako, a lower portion of Pi‘ikoi Street in Kaka‘ako, an upper portion of Pi‘ikoi Street in Kewalo, and a portion of Pensacola Street in Kewalo.

The Honolulu Water System Improvements project includes the following:

1. The main work entails installation of a new 24-inch replacement water main from the vicinity of the intersection of River Street and North King Street; then southwest, or *makai* (seaward) on River Street to Nimitz Highway; then southeast on Nimitz Highway to Fort Street Mall; then southwest to Aloha Tower Drive; then along Aloha Tower Drive to Ala Moana Boulevard; and, then along Ala Moana Boulevard to the intersection with Kalākaua Avenue, for a distance of approximately 20,000 ft.
2. Excavation for the installation of a new 16-inch replacement water main along Nimitz Highway between Pacific Street and Sumner Street for approximately 1,355 ft.
3. Excavation for the installation of a new 20-inch replacement water main along Cooke Street from Ala Moana Boulevard to Pohukaina Street for approximately 1,308 ft.
4. Excavation for the installation of a new 16-inch replacement water main along Pi‘ikoi Street from Ala Moana Boulevard to Kapiolani Bouleward for approximately 1,510 ft.
5. Excavation for the installation of a new 16-inch replacement water main along Pi‘ikoi Street from S. King Street to Kīna‘u Street for approximately 1,028 ft.
6. Excavation for the installation of a new 24-inch replacement water main along Pensacola Street from Kīna‘u Street to Wilder Street for approximately 1,900 ft.
7. Alternate 24-inch water main project areas include River Street between N. King Street and N. Beretania Street, Nu‘uanu Avenue from Nimitz Highway to North Pauahi Street and S. Nimitz Highway between Fort Street Mall and Richards Street, and thence *makai* to Aloha Tower Drive.

These excavations may be up to 12 ft below the ground surface and in trenches 6 to 8 ft wide. The entire project area is approximately 25,227 ft (4.7 miles) of road or 7,689 m (7.6 km) for a total of 64.43 acres.

The Area of Potential Effect (APE) for this CIA is defined as the approximately 64.43-acre project area in total. While this investigation focuses on the project APE, this study considered the whole *ahupua‘a* (land division usually from the mountain to the ocean) of Waikīkī and Honolulu.

1.2 Document Purpose

The purpose of this CIA is to comply with the State of Hawai‘i's environmental review process under Hawai‘i Revised Statutes (HRS) §343, which requires consideration of the project's potential effect on cultural beliefs, practices, and resources. Through document research and cultural consultation efforts, this report provides information compiled to date pertinent to the assessment of the proposed project's potential impacts on cultural beliefs, practices, and resources (pursuant to the Office of Environmental Quality Control's *Guidelines for Assessing Cultural Impacts*), which may include Traditional Cultural Properties (TCPs). These TCPs may be significant historic properties under State of Hawai‘i significance criterion "e," pursuant to Hawai‘i Administrative Rules (HAR) §13-275-6 and §13-284-6. Significance criterion "e" refers to historic properties that "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 accounts—these associations being important to the group's history and cultural identity" (HAR §13-275-6 and §13-284-6). The document will likely also support the project's historic preservation review under HRS §6E and HAR §13-275 and §13-284. The document is intended to support the project's environmental review and may also serve to support the project's historic preservation review under HRS §6E-8 and HAR §13-284.

1.3 Scope of Work

The scope of work for this CIA includes the following:

1. Examination of cultural and historical resources, including Land Commission documents, historic maps, and previous research reports with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal, and other resources or agricultural pursuits as may be indicated in the historic record.
2. Review of previous archaeological work at and near the subject parcel that may be relevant to reconstructions of traditional land use activities; and to the identification and description of cultural resources, practices, and beliefs associated with the parcel.
3. Consultation and interviews with knowledgeable parties regarding cultural and natural resources and practices at or near the parcel; present and past uses of the parcel; and/or other practices, uses, or traditions associated with the parcel and environs.
4. Preparation of a report that summarizes the results of these research activities and provides recommendations based on findings.

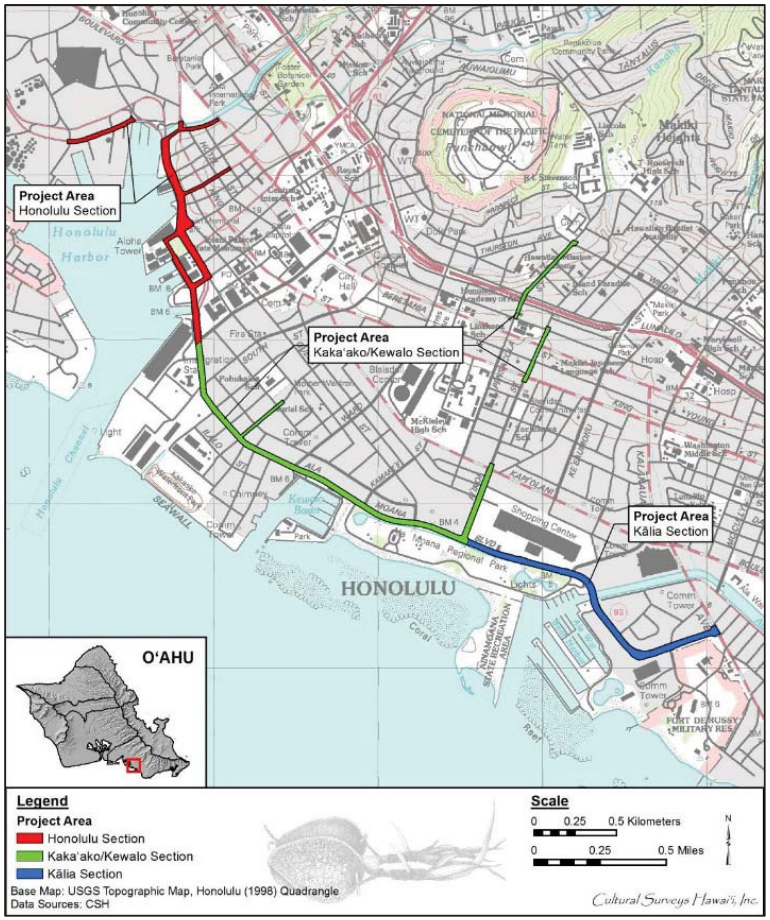

Figure 1. Portion of 1998 Honolulu USGS topographic quadrangle depicting the project area

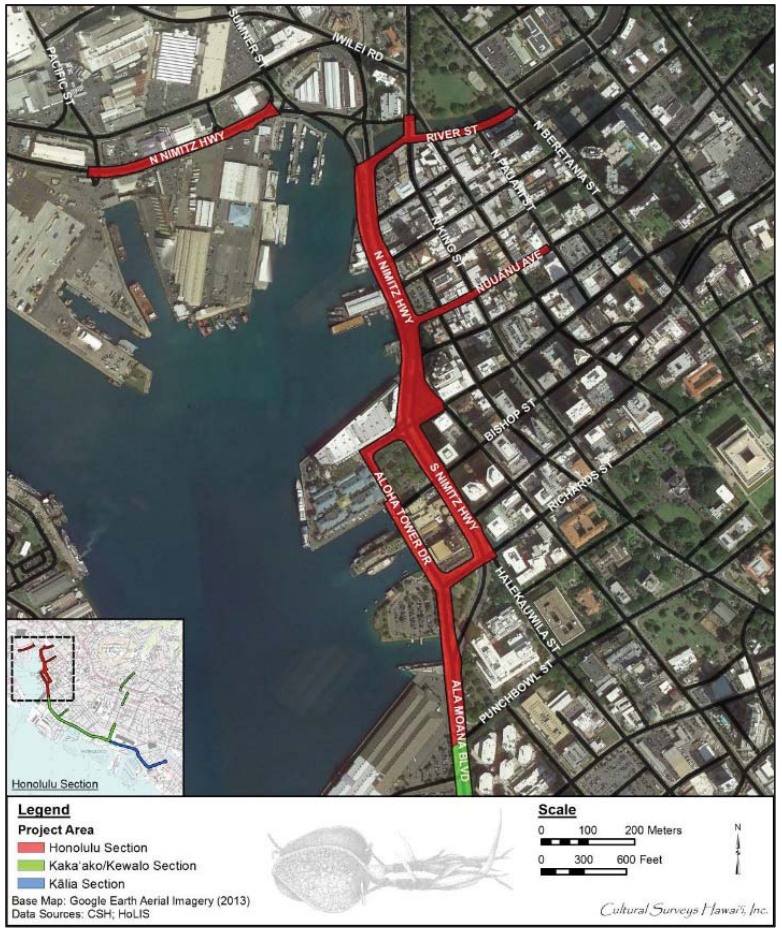

Figure 2. Aerial photograph depicting the Honolulu section of the project area (Google Earth 2013)

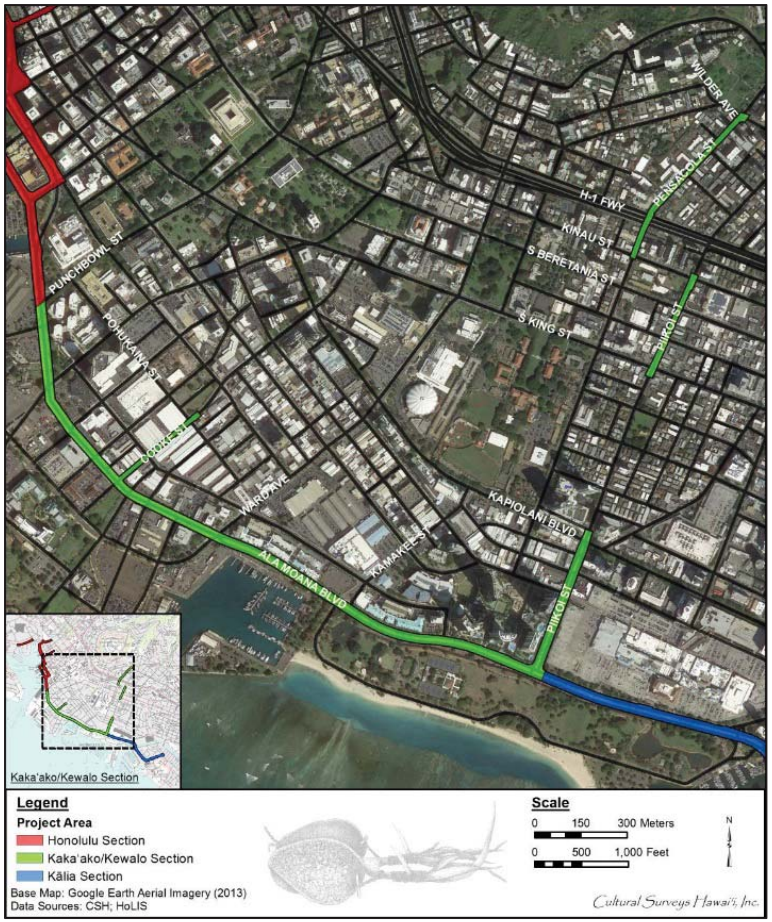

Figure 3. Aerial photograph depicting the Kaka‘ako/Kewalo section of the project area (Google Earth 2013)

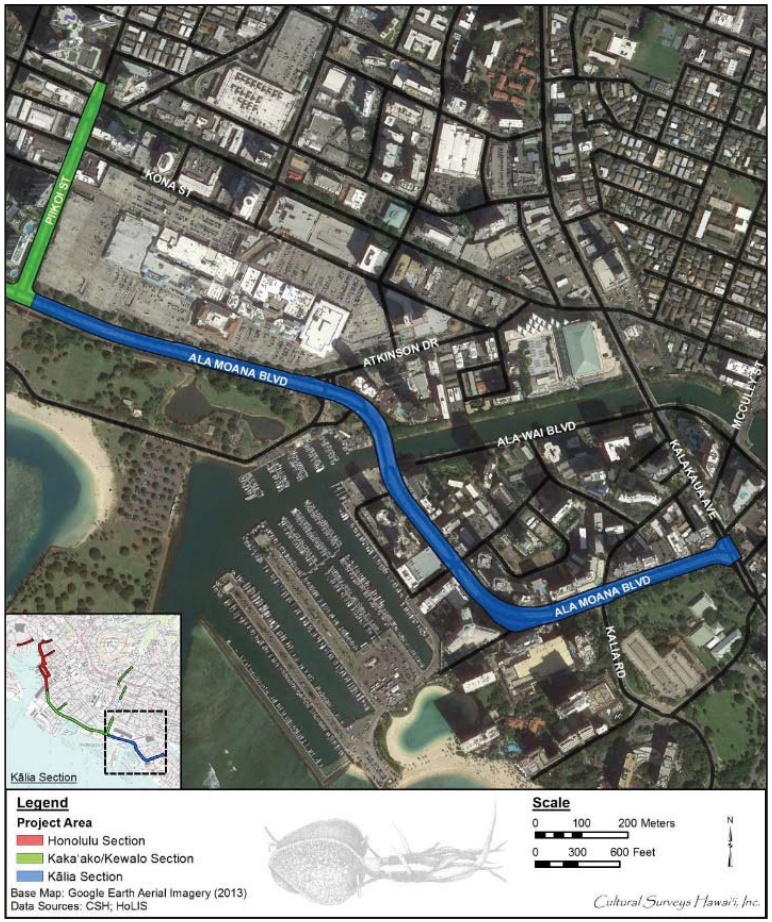

Figure 4. Aerial photograph depicting the Kālia section of the project area (Google Earth 2013)

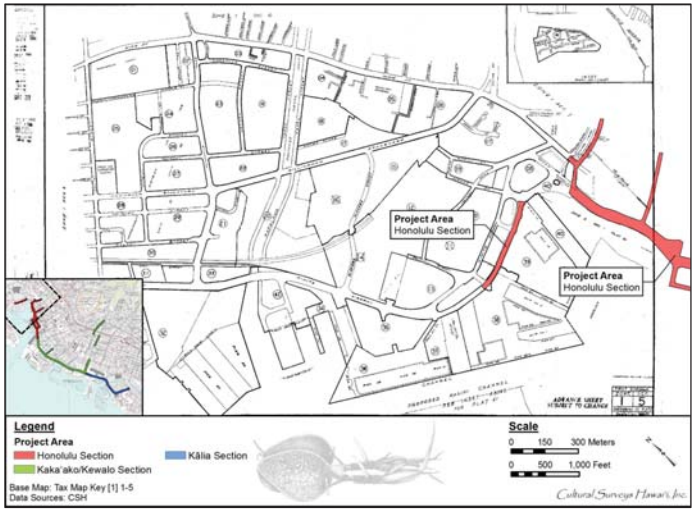

Figure 5. Tax Map Key (TMK) [1] 1-5 showing a portion of the Honolulu section of the project area (Hawai'i TMK Service 2014)

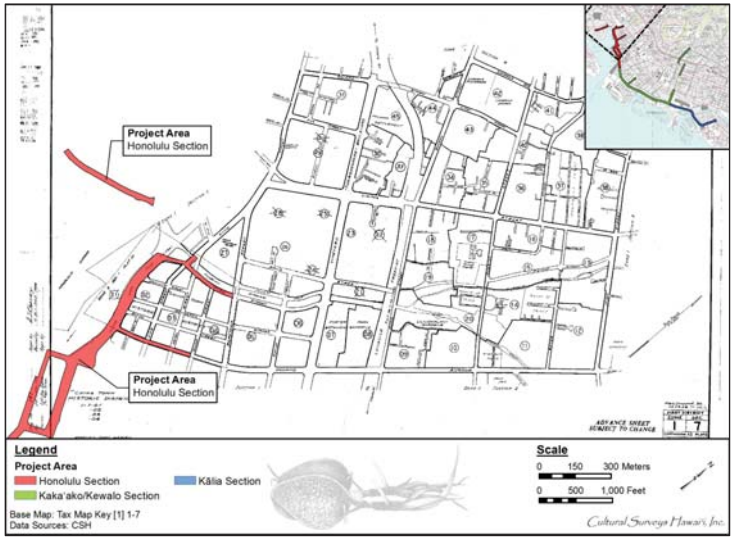

Figure 6. TMK: [1] 1-7 showing the Honolulu section of the project area (Hawai'i TMK Service 2014)

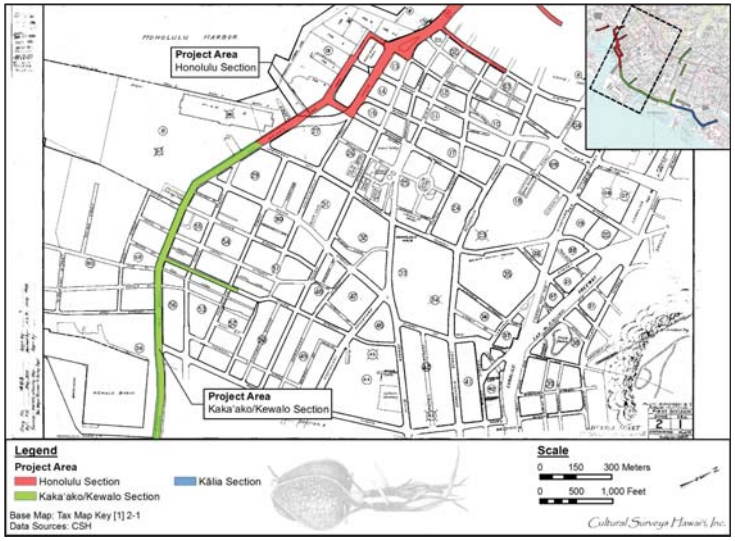

Figure 7. TMK: [1] 2-1 showing the Kaka‘ako section of the project area (Hawai‘i TMK Service 2014)

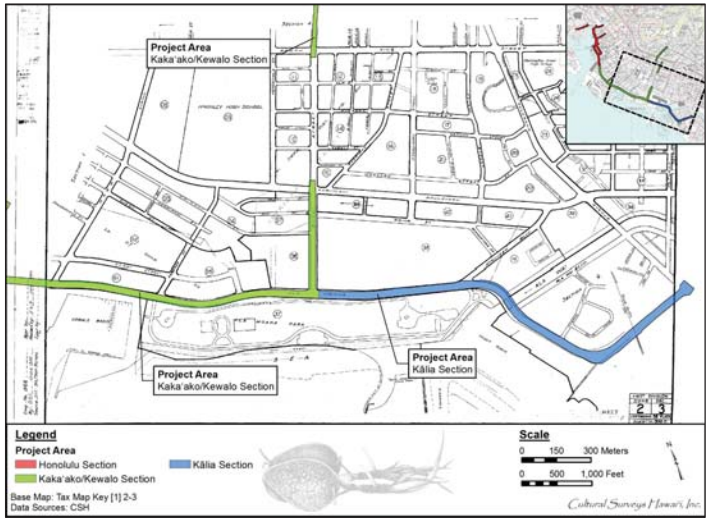

Figure 8. TMK: [1] 2-3 showing the Kaka‘ako and Kālia sections of the project area (Hawai‘i TMK Service 2014)

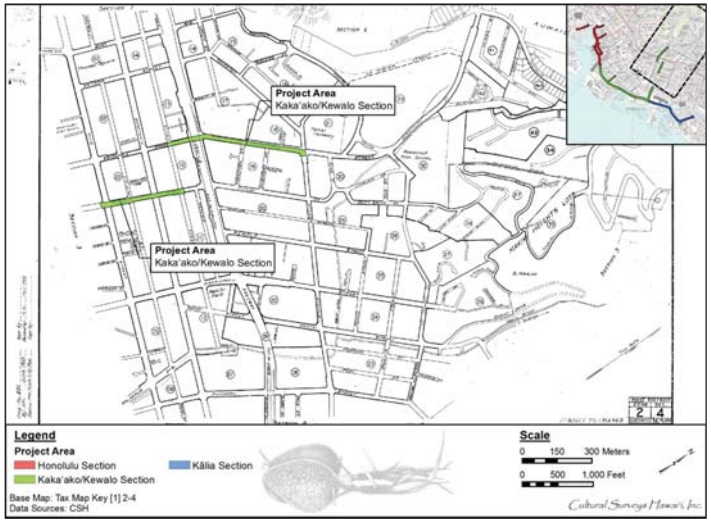

Figure 9. TMK: [1] 2-4 showing the *mauka* Kaka'ako/Kewalo section of the project area (Hawai'i TMK Service 2014)

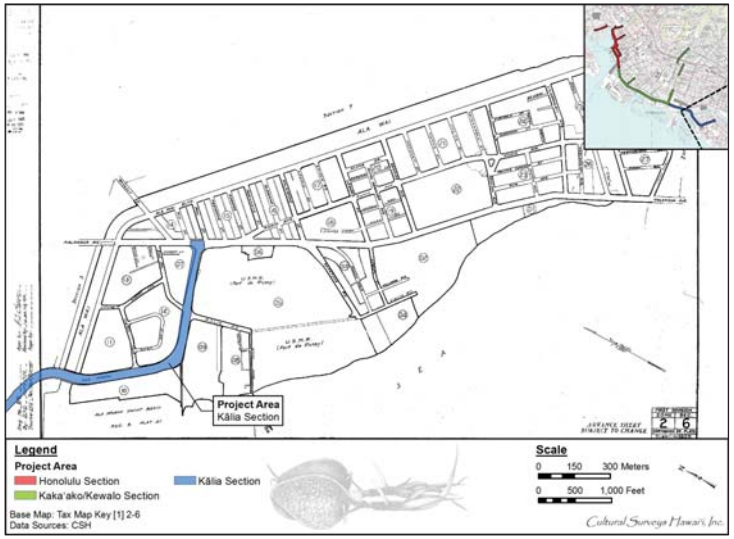

Figure 10. TMK: [1] 2-6 showing the Kālia section of the project area (Hawai'i TMK Service 2014)

Section 2 Methods

2.1 Archival Research

Research for the Traditional Background centers on Hawaiian activities including traditional subsistence land use and settlement patterns, Hawaiian *wahi pana* (storied places), *mo‘olelo* (story), *oli* (chant), *‘ōlelo no‘eau* (proverb), and *mele* (songs), as well as religious and ceremonial knowledge and practices, gathering practices and agricultural pursuits and more. The Historic Background research focuses on land transformation, development, and population changes beginning with the early post–Contact era to the present day (see Scope of Work above).

Historical documents, previous archaeological reports for the area, historic maps, and photographs, as well as primary and secondary historical sources were reviewed for information pertaining to the project area. Research was conducted at the CSH library and other archives including the University of Hawai‘i at Mānoa’s Hamilton Library, the State Historic Preservation Division (SHPD) library, the Hawai‘i State Archives, the State Land Survey Division, and the Bishop Museum Archives. Information on Land Commission Awards (LCAs) was accessed through Waihona ‘Aina Corporation’s Māhele database (Waihona ‘Aina 2000) and the Office of Hawaiian Affairs (OHA) Papakilo database (Office of Hawaiian Affairs 2014) as well as a selection of CSH library references.

2.2 Community Consultation

2.2.1 Sampling and Recruitment

A combination of qualitative methods including purposive, snowball, and expert (or judgment) sampling, was used to identify and invite potential participants to the study. These methods are used for intensive case studies such as CIAs to recruit people who are hard to identify, or are members of elite groups (Bernard 2006:190). Our purpose is not to establish a representative or random sample. It is to “identify specific groups of people who either possess characteristics or live in circumstances relevant to the social phenomenon being studied . . . This approach to sampling allows the researcher deliberately to include a wide range of types of informants and also to select key informants with access to important sources of knowledge” (Mays and Pope 1995:110).

We began with purposive sampling informed by referrals from known specialists and relevant agencies. For example, we contacted the SHPD, OHA, O‘ahu Island Burial Council (OIBC), and community and cultural organizations in the Honolulu (Kona) District for their brief response/review of the project and to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the study area and vicinity, cultural and lineal descendants of the study area, and other appropriate community representatives and members. Based on their in-depth knowledge and experiences, these key respondents then referred CSH to additional potential participants who were added to the pool of invited participants. This is snowball sampling, a chain referral method that entails asking a few key individuals (including agency and organization representatives) to provide their comments and referrals to other locally recognized experts or stakeholders who would be likely candidates for the study (Bernard 2006:192). CSH also employs expert or judgment sampling which involves assembling a group of people with recognized experience and expertise in a specific area (Bernard 2006:189–191). CSH maintains a database

that draws on over two decades of established relationships with community consultants. These are cultural practitioners and specialists, community representatives and cultural and lineal descendants. The names of new potential contacts were also provided by colleagues at CSH and from the researchers’ familiarity with people who live in or around the study area. Researchers often attend public forums (e.g., Neighborhood Board, Burial Council, and Civic Club meetings) in (or near) the study area to locate potential participants.

CSH focuses on obtaining in-depth information with a high level of validity from a targeted group of relevant stakeholders and local experts. Our qualitative methods do not aim to survey an entire population or subgroup. A depth of understanding about complex issues cannot be gained through comprehensive surveying. Our qualitative methodologies do not include quantitative (statistical) analyses, yet they are recognized as rigorous and thorough. Bernard (2006:25) describes the qualitative methods as “a kind of measurement, an integral part of the complex whole that comprises scientific research.” Depending on the size and complexity of the project, CSH reports include in-depth contributions from about one-third of all participating respondents. Typically this means three to 12 interviews.

2.2.2 Informed Consent Protocol

An informed consent process was conducted as follows: 1) before beginning the interview the CSH researcher explained to the participant how the consent process works, the project purpose, the intent of the study, and how his/her information will be used; 2) the researcher gave him/her a copy of the Authorization and Release Form to read and sign; 3) if the person agreed to participate by way of signing the consent form or providing oral consent, the researcher started the interview; 4) the interviewee received a copy of the Authorization and Release Form for his/her records, while the original was stored at CSH; 5) after the interview was summarized at CSH (and possibly transcribed in full), the study participant was afforded an opportunity to review the interview notes (or transcription) and summary and to make any corrections, deletions or additions to the substance of their testimony/oral history interview (accomplished either via phone, post or email or through a follow-up visit with the participant); 6) the participant received the final approved interview and any photographs taken for the study for their records. If the participant was interested in receiving a copy of the full transcript of the interview (if there is one, as not all interviews are audio-recorded and transcribed), a copy was provided. Participants were also given information on how to view the report on the OEQC website and were offered a hardcopy of the report once the report is a public document.

If an interviewee agreed to participate on the condition that his/her name is withheld, procedures were taken to maintain his/her confidentiality.

2.2.3 Interview Techniques

To assist in discussion of natural and cultural resources and cultural practices specific to the study area, CSH initiated semi-structured interviews (as described by Bernard 2006), asking questions from the following broad categories: gathering practices and *mauka* (towards the mountain) and *makai* (seaward) resources, burials, trails, historic properties, and *wahi pana* (storied places). The interview protocol is tailored to the specific natural and cultural features of the landscape in the study area, identified through archival research and community consultation. For example, for this study fishing, *ala hele* (trails), and salt gathering were emphasized over other categories less salient to the project area. These interviews and oral histories supplement and

provide depth to consultations with government agencies and community organizations that may provide brief responses, reviews and/or referrals gathered via phone, email, and occasional face-to-face commentary.

2.2.3.1 In-depth Interviews and Oral Histories

Interviews were conducted initially at a place of the study participant's choosing (usually at the participant's home or at a public meeting place) and/or—whenever feasible—during site visits to the project area. Generally, CSH's preference is to interview a participant individually or in small groups (two–four); occasionally participants are interviewed in focus groups (six–eight). Following the consent protocol outlined above, interviews may be recorded on tape and in handwritten notes, and the participant photographed. The interview typically lasts one to four hours, and records the who, what, when, and where of the interview. In addition to questions outlined above, the interviewee is asked to provide biographical information (e.g., connection to the study area, genealogy, professional and volunteer affiliations, etc.).

2.2.3.2 Field Interviews

Field interviews are conducted with individuals or in focus groups comprised of *kūpuna* (elders) and *kama‘āina* (native born) who have a similar experience or background (e.g., the members of an area club, elders, fishermen, *hula* [dancers]) who are physically able and interested in visiting the project area. In some cases, field visits are preceded with an off-site interview to gather basic biographical, affiliation, and other information about the participant. Initially, CSH researchers usually visit the project area to become familiar with the land and recognized (or potential) cultural places and historic properties in preparation for field interviews. All field activities are performed in a manner to minimize impact to the natural and cultural environment in the project area. Where appropriate, Hawaiian protocol may be used before going on to the study area and may include the *ho‘okupu* (offering) of *pule* (blessing), and *oli*. All participants on field visits are asked to respect the integrity of natural and cultural features of the landscape and not remove any cultural artifacts or other resources from the area.

2.2.4 Study Limitations

Cultural impact assessments are limited by the time frame and costs of the study as well as community participation. Often, researchers have little control over the time frame or budget available for a project but may have more discretion over study design and the methodologies employed to illicit public participation. Various factors may affect participation, such as the availability of contact information for community members during the recruitment process, the interest of the community in the project, and the commitment of participants through several phases of the interview process. For example, once an interview is scheduled and conducted, CSH engages the interviewee at least one more time (in person or by email or phone call) to gain their approval of the interview transcript or summary and to incorporate any changes they make. The voluntary nature of community participation in this process, combined with restraints on time and costs, often limits the number of interviews and the depth of information gathered during the interviews.

2.3 Compensation and Contributions to Community

Many individuals and communities have generously worked with CSH over the years to identify and document the rich natural and cultural resources of these Islands for cultural impact,

ethno-historical and, more recently, TCP studies. CSH makes every effort to provide some form of compensation to individuals and communities who contribute to cultural studies. This is done in a variety of ways. Individual interview participants are compensated for their time in the form of a small honorarium and/or other *makana* (gift). Community organization representatives (who may not be allowed to receive a gift) are asked if they would like a donation to a Hawaiian charter school or nonprofit of their choice to be made anonymously or in the name of the individual or organization participating in the study. Contributors are provided their transcripts, interview summaries, photographs and—when possible—a copy of the CIA report; CSH is working to identify a public repository for all cultural studies that will allow easy access to current and past reports. CSH staff do volunteer work for community initiatives that serve to preserve and protect historic and cultural resources (for example on Lāna‘i and Kaho‘olawe). Generally our goal is to provide educational opportunities to students through internships and sharing our knowledge of historic preservation and cultural resources and the State and Federal laws that guide the historic preservation process, and through involvement with an ongoing working group of public and private stakeholders collaborating to improve and strengthen the §343 environmental review process.

Section 3 Environmental Setting

This section draws from previous environmental surveys conducted in the Hawaiian archipelago beginning with a description of the two primary seasons characteristic of their tropical locale before describing the annual precipitation found in the project area. Focusing on the 1972 soil surveys conducted by the Foote et al. research team who describe the natural environment as a characteristic coral reef and alluvial sediment geology. The environmental section concludes with a description of the built environment, emphasizing the industrial change into modernity.

3.1 Natural Environment

3.1.1 Precipitation

Precipitation is a major component of the water cycle accountable for depositing fresh water on local flora. Pre-Contact *kānaka ʻōiwi* (Native Hawaiians) recognized two distinct annual seasons. The first, known as *kau* (period of time, especially summer), lasts typically from May to October and is a season marked by a high-sun period corresponding to warmer temperatures and steady trade winds. The second season, *hoʻoilo* (winter, rainy season), continues through the end of the year from November to April and is a much cooler period when trade winds are less frequent, and widespread storms and rainfall become more prevalent (Giambelluca et al. 1986:17). Typically the maximum rainfall occurs in January and the minimum in June (Giambelluca et al. 1986:17).

Annual rainfall in the project area varies between 25 and 125 inches, higher volumes occurring in the rainy season between November and April. The mean rainfall in the project area is 600 mm (23.625 inches) (Giambelluca et al. 1986: 138). In the Honolulu District, rainfall averages less than 30 inches per year (Armstrong 1983:62).

Kūkalahale is the Hawaiian name for some of the rain in Honolulu.

3.1.2 Prevailing Wind

Northeasterly trade winds prevail throughout the year, although their frequency varies from more than 90% during the summer months to 50% in January; the average annual wind velocity is approximately 10 miles per hour (Wilson Okamoto & Associates 1998:1-2).

The ancient Hawaiians recognized and named the different winds in such a way as to describe the direction and velocity. Some such winds found in the Honolulu section of the project area are ʻAoʻaoa, Mooaea, and Muuluu (possibly Mūʻulūlū, meaning chilly).

3.1.3 Soil Surveys

The U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972) have been overlaid onto a Google Earth aerial photograph with the project area outlined in their designated colors, red corresponding to the Honolulu section, green corresponding to the Kakaʻako/Kewalo section, and blue corresponding to the Kālia section (Figure 11 through Figure 13).

The archaeological record shows Oʻahu Island’s coastal areas formed from coral reefs and alluvial sediment and generally have smooth and gentle slopes. This land is used most often for farming and ranching or for urban development (Foote et al. 1972:6)

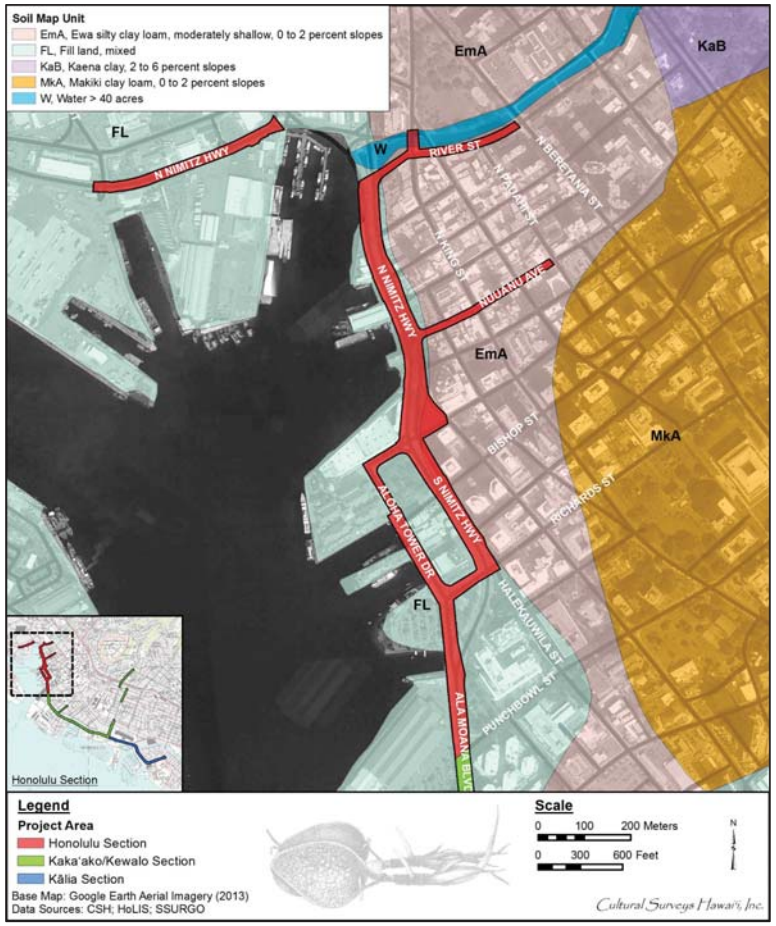

Figure 11. Soil series boundaries in the Honolulu section of the project area overlain on 2013 aerial photograph (soil information from USDA Soil Survey Geographic SSURGO database [2001] and Foote et al. [1972]; Google Earth 2013)

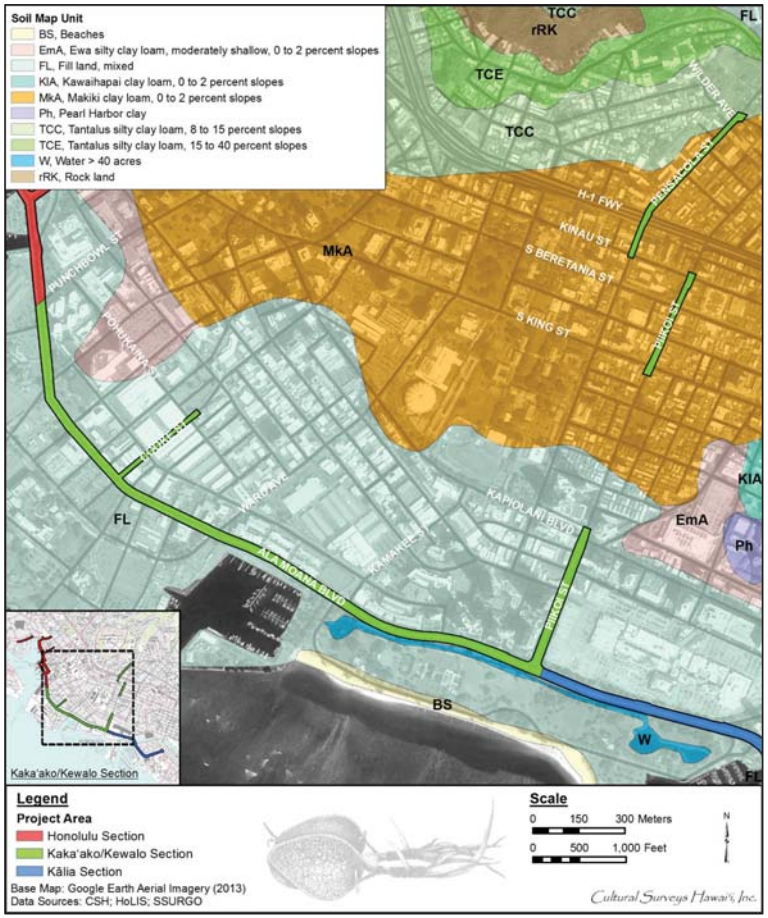

Figure 12. Soil series boundaries in the Kaka‘ako section of the project area overlain on 2013 aerial photograph (soil information from USDA Soil Survey Geographic SSURGO database [2001] and Foote et al. [1972]; Google Earth 2013)

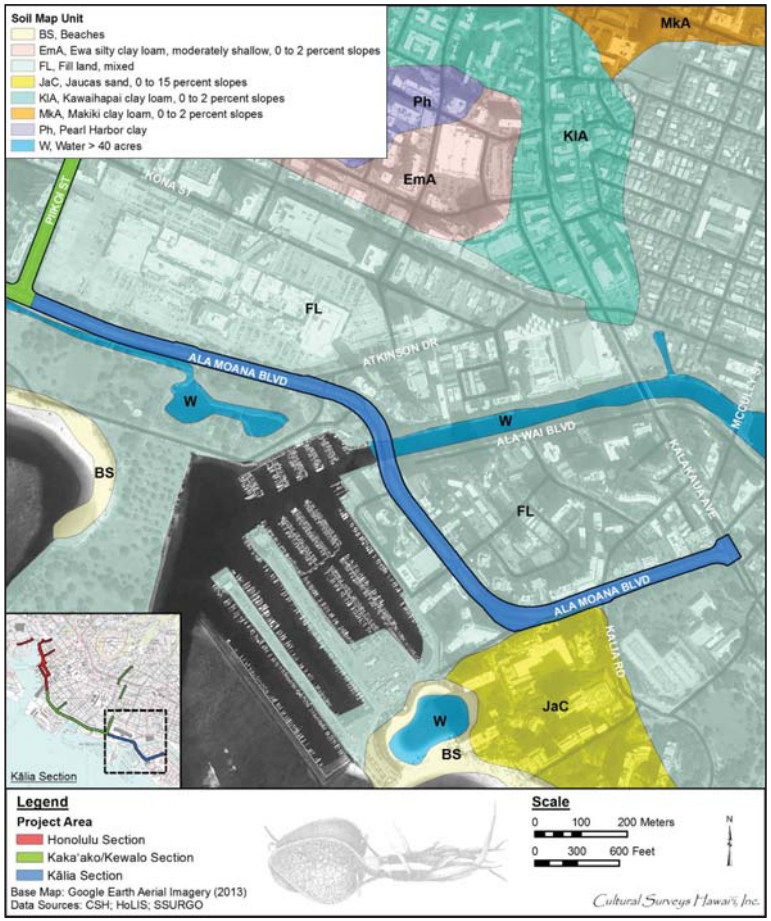

Figure 13. Soil series boundaries in the Kālia section of the project area overlain on 2013 aerial photograph (soil information from USDA Soil Survey Geographic SSURGO database [2001] and Foote et al. [1972]; Google Earth 2013)

The project area covers three types of soil series and crosses two water estuaries: Ewa silty clay (EmA), Fill Land (FL), Makiki clay (MkA), and Water (W) as shown in Figure 11, Figure 12, and Figure 13. The primary soil series in the area is Fill Land, described by Foote et al. as the following:

> Areas filled with material from dredging, excavation from adjacent uplands, garbage, and bagasse and slurry from sugar mills . . . Generally these materials are dumped and spread over marshes, low-lying areas along the coastal flats, coral sand, coral limestone, or areas shallow to bedrock. This land type is used for urban development including airports, housing areas, and industrial facilities. [Foote et al. 1972:31]

The second most prevailing soil series found by Foot et al. surveyors is the Ewa silty clay loam 0 to 2% slope. The soil profile is similar to that of (EmA) 3 to 6% slopes except the coral limestone runs to depths of 25 to 50 inches. Runoff is very slow, and erosion is less than slight (Foot et al. 1972:30).

A third soil series effected by the project in the Kaka‘ako/Kewalo section of the project area is composed of Makiki clay (MkA). Foote el al. describes this series as follows:

> These soils are used entirely for urban purpose. Makiki clay loam, 0 to 2 percent slopes (MkA). This soil is on smooth fans and terraces. Included in mapping were small, stony areas and small areas of Kaena soils.
>
> In a representative profile the surface layer is dark-brown clay loam about 20 inches thick. The subsoil, about 120 inches thick, is dark-brown clay loam that has rock fragments. The subsoil is underlain by similar material, about 24 inches thick, that is massive. Below thus are volcanic cinders. The soil is strong acid to medium acid.
>
> Permeability is moderately rapid. Runoff is slow, and erosion hazard is no more than slight. The available water capacity is about 1.7 inches per foot of soil. In places roots penetrate to a depth of 5 feet or more. [Foote et al. 1972:91-92]

3.2 Built Environment

The project area is located in the downtown Honolulu area amid residential and commercial establishments along the coast of central Honolulu. Surrounded by modern urban development, the project area is bordered by three commercial boat harbors, industrial buildings, commercial buildings, public beach access, paved streets, sidewalks, utility infrastructure, and landscaped road-way medians. The project area is confined to the public road ways the length of Ala Moana Boulevard, Aloha Tower Drive, sections of Nimitz Highway, River Street, Nu‘uanu Street, Pi‘ikoi Street, and Pensacola Street.

There are few open spaces, and most of the project area is surrounded by commercial or high-rise office or condominium/hotel buildings. Only landscaping flora are found near the road corridors.

Section 4 Traditional Background

The Board of Water Supply project is located on the Hawaiian *mokupuni* (island) of O‘ahu, in the *moku* (district) of Kona (Honolulu), in the modern *ahupua‘a* of Honolulu and Waikīkī, within the five *‘ili* (smaller land division) of Nihoa, Kukuluāe‘o, Kaka‘ako, Kewalo, and Kālia.

The research in the traditional background introduces Hawaiian knowledge as it emerged in the project area. First a broad overview of Hawaiian history is used through the introduction of key concepts in settlement patterns and Hawaiian terms such as *wahi pana*, *‘ōlelo no‘eau*, *‘oli* and *mele*, *mo‘olelo*, and particular cultural features are discussed such as *heiau* (pre-Christian place of worship), *ala hele*, subsistence patterns, and *ilina* (graves). Hawaiian names are indicative of the physical features and historical events found in the history of the landscape. The traditional background is divided into three subsections reflecting the Hawaiian division of land found in the project area. The *ahupua‘a* of Honolulu, the *‘ili* of Kaka‘ako/Kewalo, and the *ahupua‘a* of Waikīkī are discussed in regards to the earliest known settlement and subsistence patterns, and other relevant Hawaiian terms.

4.1 Settlement Patterns

Significant advances in radiocarbon dating in the past two decades suggest the initial settlement of Hawai‘i came from eastern Polynesia between approximately AD 1000 and 1200 (Kirch 2011:3). The early settlers of the Hawaiian archipelago would have been especially attracted to windward O‘ahu with its coral reefs, bays, and sheltered inlets for fishing, dense basalt dikes for the production of stone adzes and other tools, amphitheater-headed valleys and broad alluvial floodplains that contained fertile soils, numerous permanently flowing streams, and abundant rainfall for the cultivation of crops (Kirch 1985:69). Archaeological excavation data indicate the settlers’ descendants, like their east Polynesian ancestors, lived in pole-and-thatch dwellings, interred the dead beneath these structures, cooked in small hearths, and manufactured stone tools as well as bone and shell fishhooks, and supported themselves by cultivating inland crops, raising domesticated animals, hunting seabirds on offshore islets, fishing, and gathering shellfish (Kirch 1985:71–74). The archaeological record suggests early Hawaiians formed settlements of hamlets along the coast, and began to clear tracts of forest between AD 600 and 1100 (Kirch 2000:293).

As they adapted to local conditions, they invented distinctive Hawaiian artifacts, including two-piece fishhooks and the *lei niho palaoa* (ivory pendant, originally probably whale’s tooth, rarely of stone or wood, later also of walrus tusk), which, in addition to other ornaments interred with individuals, suggests a degree of social stratification among the early Hawaiians (Kirch 1985:71–74).

4.2 Kona Moku

‘Ōlelo no‘eau #1845 from the late Mary Kawena Pukui, Native Hawaiian scholar and educator, discusses the boundaries of Kona Moku:

> **Kona, mai ka pu‘u o Kapūkakī a ka pu‘u o Kawaihoa.**
>
> ***Kona, from Kapūkakī to Kawaihoa.***

> The extent of the Kona district on O‘ahu is from Kapūkakī (now Red Hill) to Kawaihoa (now Koko Head). [Pukui 1983:199]

By approximately AD 1310, *ali‘i* (chief) Māweke partitioned O‘ahu into three districts: the Kona region; the ‘Ewa, Wai‘anae, and Waialua region; and the windward Ko‘olau region. Then, in approximately AD 1490, the *‘aha ali‘i* (council of chiefs) chose Mā‘ilikūkahi, an *ali‘i kapu* (sacred chief) who was born at the sacred site of Kūkaniloko in the uplands of Waialua to be the new *ali‘i nui* (paramount chief) of O‘ahu. After his paramountship was installed, Mā‘ilikūkahi instituted an explicit land division and administrative structure. O‘ahu was further divided into six *moku*—Kona, ‘Ewa, Wai‘anae, Waialua, Ko‘olauloa, and Ko‘olaupoko—that were divided again into 86 *ahupua‘a* and smaller territorial units, such as *‘ili* or land section (Kirch 2010:84–90). Upon his ascent to *ali‘i nui*, Mā‘ilikūkahi shifted his residence from Waialua to Waikīkī, which may have initiated the pattern of royal residence at Waikīkī (Kamakau n.d. in McAllister 1933:74).

4.3 Honolulu Ahupua‘a

Pukui et al. (1974:49–50) literally translates Honolulu as “protected bay,” which refers to Honolulu Harbor. Older names for the harbor are Kou and Māmala. According to Westervelt, Honolulu is a name made by the union of the two words “Hono” and “lulu.” Westervelt explains as follows:

> Some say it means ‘Sheltered Hollow.’ The old Hawaiians say that ‘Hono’ means ‘abundance’ and ‘lulu’ means ‘calm,’ or ‘peace,’ or ‘abundance of peace.’ The navigator who gave the definition ‘Fair Haven’ was out of the way, inasmuch as the name does not belong to a harbor, but to a district having ‘abundant calm,’ or ‘a pleasant slope of restful land.’ ‘Honolulu’ was probably a name given to a very rich district of farm land near what is now known as the junction of Liliha and School Streets, because its chief was Honolulu, one of the high chiefs of the time of Kakuhihewa, according to the legends. [Westervelt 1915:14]

4.4 *Wahi Pana* of Honolulu

A Hawaiian *wahi pana*, also referred to as a place name, “physically and poetically describes an area while revealing its historical or legendary significance” (Landgraf 1994: v). *Wahi pana* can refer to natural geographic locations, such as streams, peaks, rock formations, ridges, offshore islands and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a*, or *‘ili*, and man-made structures, such as fishponds. In this way, the *wahi pana* of Honolulu and the study area tangibly link the *kama‘āina* (native born) of Honolulu to their past.

Many place names in this section appear in the online database compiled by Lloyd Soehren (2010) of Hawaiian Place Names. Soehren used names from mid-nineteenth century land documents such as Land Commission Awards (LCA) and Boundary Commission Testimony (BCT) reports. The BCT lists boundary points for many of the *ahupua‘a*. The names of *‘ili ‘āina* and *‘ili kū* (land units rewarded separately from a specific *ahupua‘a*) are compiled from the testimony in Māhele Land Commission Awards, from both awards successfully claimed and from those rejected. Place names found by the authors on USGS maps and Hawai‘i Survey Registered Maps (HSRM) were also added to the database. The Soehren database includes place name meanings from the definitive book on Hawaiian place names, *Place Names of Hawaii* (Pukui

et al. 1974). Sections 4.4.1 to 4.4.5 discuss *wahi pana* within or in the vicinity of the project area. Table 1 is a compilation of *wahi pana* within or in the vicinity of the project area.

4.4.1 Pākākā and the Honolulu Fort

Pākākā was the name of a coastal point, a canoe landing, the name of a wharf built off the point in 1827, and the name of a *heiau* built on the point. The name literally means “to skim, as stones over the water” (Pukui et al. 1974:175). In 1816, the Honolulu Fort called Kekuanohu, was also built in this area. The fort was demolished in 1857 and the stones from the wall were used to create

Table 1. *Wahi pana* Found in the Honolulu Section of the Proposed Project Area

Wahi Pana	**Translation (Pukui et al. 1974)**	**Description**
Honolulu	Sheltered bay	Modern name used for the *ahupua‘a*
Kou	A tree found on shores from East Africa to Polynesia (*Cordia subcordata*)	Old name for Honolulu
Kukuluāe‘o	Hawaiian stilt bird (*Himantopus himantopus*)	An *‘ili* in Honolulu
Māmala	Fragment, splinter	An *‘ili* in Honolulu
Nihoa	Toothed, serrated	An *‘ili* in Honolulu formerly owned by Ka‘ahumanu; once consisted of a sandy beach that was a canoe landing
Pākākā (*heiau*)	Low and broad, especially of a wooded bowl or door	A *heiau* as described by ‘Ī‘ī in the Honolulu area

a seawall (Pukui et al. 1974:30), which was then filled to create a new land, called the Esplanade or ‘Āinahau, *hau* tree land (Pukui et al. 1974:7). Liloliho, Kamehameha II, built a palace complex in this area in 1821, possibly on the former Pākākā Heiau platform. The wharf at Pākākā may have also been part of the original *heiau* complex. P. Christiaan Klieger (1997:15-16) has suggested the Pākākā Palace complex may have lasted until around 1826, when a new royal compound was built for Kamehameha III within the town of Honolulu, near the modern junction of Alakea and Beretania streets.

Thrum (1906) generated several lists and surveys of *heiau*. He mentions Pākākā Heiau as once being the main royal temple in Honolulu. This *heiau* would have been located around the foot (*makai*) of Fort Street (Figure 14). Thrum does note that Peter Corney, a visitor to the island in 1819, saw several *heiau* along the Honolulu shore:

> There are several morais [*heiau*], or churches in the village, and at new moon the priests, chiefs and hikanees (aikane) [friends] enter them with offerings of hogs, plantains, and cocoanuts, which they set before the wooden images. The place is fenced in, and have [*sic*] pieces of white flags flying on the fences. [Corney 1896:101]

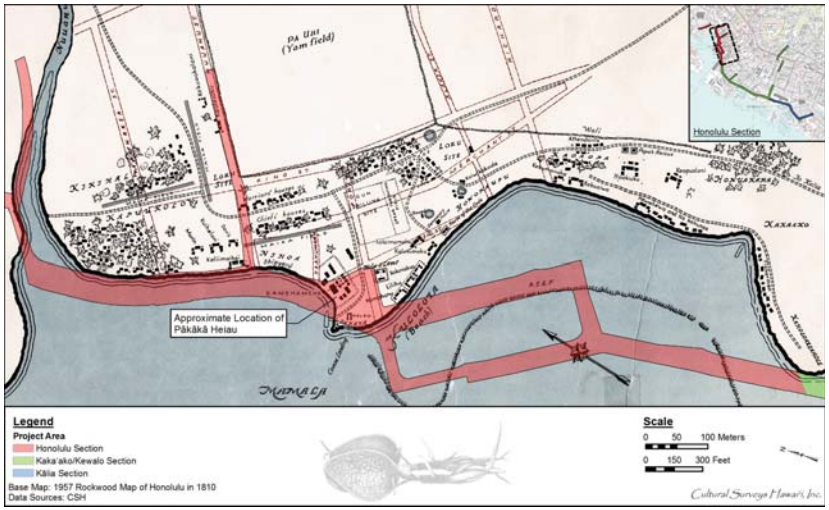

Figure 14. 1957 Rockwood Map of Honolulu in 1810 depicting approximate location of Pākākā Heiau

4.4.2 Kou 'Ili

The conflicting use of the name Kou traces its origins back to pre-Contact Hawai'i. Kou was the name of a chief officer who lived in the area, and the "old name, until 1800, for Honolulu Harbor and vicinity, including the area from Nu'uanu Avenue to Alakea Street and from Hotel Street to the sea, noted for *kōnane* [game similar to checkers] and for *ulu maika* (bowling), and said to be named for the executive officer of Chief Kākuhihewa of O'ahu" (Pukui et al. 1974:117–118). Named for the *kou* (*Cordia subcordata*) tree, a beautiful wood, soft, but lasting, was valuable to the early Hawaiians and was used for cups, dishes, and calabashes (Pukui and Elbert 1986:167).

4.4.3 Māmala 'Ili

Spanning from Honolulu Harbor to Pearl Harbor, Māmala was named for a shark woman who lived at the entrance of Honolulu Harbor and often played *kōnane*. Ke kai o Māmala is the surf in the outer entrance of Honolulu Harbor, named for the chiefess Māmala who loved to play *kōnane*, drink *'awa* (kava; *Piper methysticum*) and ride the surf (Pukui et al. 1974:106). Māmala left her shark husband, 'Ouha, for Honoka'upu. 'Ouha then became the shark god of Waikīkī and of Koko Head (Pukui et al. 1974:144).

4.4.4 Nihoa 'Ili

Nihoa was the Waterfront area in downtown Honolulu formerly owned by Ka'ahumanu and named by her in honor of her visit to Nihoa Island ('Ī'ī 1959:166). This area had a sandy beach where natives could land and pull up their canoes on shore. In the early nineteenth century, western ships were also beached here for mooring and repair. In the time of Kamehameha I, "the shore at Nihoa . . . was a shipyard where foreign style vessels were being made by Hawaiians under the tutelage of whites" ('Ī'ī 1959:64).

4.4.5 Kukuluāe'o 'Ili

Translated literally as the "Hawaiian stilt" (*Himantopus himantopus*), *kukuluāe'o* means "to walk on stilts." Pukui et al. goes on to describe the area as "formerly fronting Kewalo Basin" and "containing marshes, salt ponds, and small fishponds" (Pukui et al. 1974: 123), an environment well-suited for this type of bird (Griffin et al. 1987:36). The ethnographer Henry Kekahuna (1958:4) described Kukuluāe'o as an area where salt was formerly made.

4.5 *'Ōlelo No'eau* of Honolulu

Mary Kawena Pukui is known to many as one of the greatest contributors and sponsors of the preservation of the Hawaiian language, a scholar, and an ethnologist. Hawaiian knowledge was shared by way of oral history, and people would often compete in poetic battles of wit to see who could ascribe the most *kaona* (layered meaning) to the simplest of phrases. The following section draws from Pukui's knowledge of Hawaiian folktales, proverbs, and sayings to describe the *'āina* (land) in the project area. The *'ōlelo no'eau* is first described, then the Hawaiian is copied, then Pukui's English translation is given:

> In old Hawai'i, storytellers were accorded a position of honor. Storytelling served as a principal source of entertainment while simultaneously providing instruction in the many interwoven aspects of life—ancestry, history, religion, human relations, crafts, and the natural world. Throughout her life Pukui was an ardent

practitioner of the art of storytelling . . . She knew the importance in conveying information and values that remain meaningful and necessary for people in Hawai‘i today, whether of Polynesian ancestry or not. [Pukui and Green 1995: xii]

4.5.1 Honolulu

4.5.1.1 *‘Ōlelo No‘eau* #1016

The following *‘ōlelo no‘eau* describes the sustainable food source provided in the *mauka* area of Nu‘uanu Valley above Honolulu.

Ho‘ā ke ahi, kō‘ala ke ola.
O na hale wale no ka i Honolulu;
o ka ‘ai a me ka i‘a i Nu‘uanu.

Light the fire for there is life giving substance.
Only the houses stand in Honolulu;
the vegetable food and meat are in Nu‘uanu.

An expression of affection for Nu‘uanu. In olden days, much of the taro lands were found in Nu‘uanu, which supplied Honolulu with *poi* (the Hawaiian staff of life, made from cooked taro corms, pounded and thinned), taro greens, *‘o‘opu* (general name for fishes included in the families *Eleotridae*, *Gobiidae*, and *Blennidae*), and freshwater shrimp. So it is said that only houses stand in Honolulu. Food comes from Nu‘uanu. [Pukui 1983:109]

4.5.1.2 *‘Ōlelo No‘eau* #1423

The following *‘ōlelo no‘eau* describes the beautiful weather characteristic of the Honolulu area.

Ka lā ikiiki o Honolulu.

The intensely warm days of Honolulu.

People from the country often claim that Honolulu is excessively warm. [Pukui 1983:154]

4.5.1.3 *‘Ōlelo No‘eau* #1575

The following *‘ōlelo no‘eau* describes the sound of the rain that falls on the southern coast of O‘ahu, in the Honolulu area. To the Hawaiians, each and every valley possessed particular qualities of rain in the smell, the way if fell, the density of each drop, and based on these characteristics each rain had its own name, characteristic to the area.

Ka ua Kukalahale o Honolulu.

The Kukalahale rain of Honolulu.

The rain that announces itself to the homes by the pattering it makes on the roofs as it falls. Often mentioned in songs. [Pukui 1983:170]

4.5.2 Kou

4.5.2.1 *‘Ōlelo No‘eau* #407

There are also several *‘ōlelo no‘eau* of Honolulu that also refer to the coastal area:

Hāhā pō‘ele ka pāpa‘i o Kou.

The crabs of Kou are groped for in the dark.

Applied to one who goes groping in the dark. The chiefs held *kōnane* and other games at the shore of Kou (now central Honolulu), and people came from everywhere to watch. Very often they remained until it was too dark to see and had to grope for their companions. [Pukui 1983:50–51]

4.5.2.2 *‘Ōlelo No‘eau* #1128

Hui aku na maka i Kou.

The faces will meet in Kou.

We will all meet there. Kou (now central Honolulu) was the place where the chiefs played games, and people came from everywhere to watch [Pukui 1983:120].

4.5.2.3 *‘Ōlelo No‘eau* #2486

Ola ke awa o Kou i ka ua Wa‘ahila.

Life comes to the harbor of Kou because of the Wa‘ahila rain.

It is the rain of Nu‘uanu that gives water to Kou (now central Honolulu). [Pukui 1983:272]

4.5.3 Māmala

There are many *‘ōlelo no‘eau* for Māmala, which refers to the entrance to Honolulu Harbor, called Kuloloia:

4.5.3.1 *‘Ōlelo No‘eau* #656

He kai hele kohana ko Māmala.

A sea for going naked is at Māmala.

The entrance to Honolulu Harbor was known as Māmala. In time of war the people took off their clothes and traveled along the reef to avoid meeting the enemy on land. [Pukui 1983:74]

4.5.3.2 *‘Ōlelo No‘eau* #1510

Ka nuku o Māmala.

The mouth of Māmala.

The entrance to Honolulu Harbor, named for a shark goddess who once lived in the vicinity. [Pukui 1983:163]

4.5.3.3 *‘Ōlelo No‘eau* #1718

Ke kai ‘au umauma o Māmala.

The sea of Māmala, where one swims at the surface.

Māmala is the entrance to Honolulu Harbor. [Pukui 1983:185]

4.5.3.4 *‘Ōlelo No‘eau* #2202

Na ‘ale kuehu o Māmala.

The billows of Māmala with wind-blown sprays.

Māmala is the entrance to Honolulu Harbor. [Pukui 1983:241]

4.6 *Mele*

The rain of Honolulu was called Kūkalahale, according to the chants of the winds in the story “The Wind Gourd of La‘amaomao” (Nakuina 1992:50). This name was incorporated into an early Hawaiian song, *He Aloha nō ‘O Honolulu* (Goodbye to Honolulu), written by the Hawaiian composer Lot Kauwe after a trip on the interisland steamer, *Maunaloa*.

He aloha nō ‘o Honolulu	Goodbye Honolulu
I ka ua Kūkalahale	In the Kūkalahale rain
Ka nuku a‘o Māmala	Māmala, the entrance of Honolulu Harbor
‘Au a‘e nei mahope	Lies behind
Kau mai ana mamua	Ahead
Ka malu ‘ulu a‘o Lele	The shady groves of Lele
Kukui ‘a‘ā mau	Lighthouse is always burning
Pio ‘ole i ke Kaua‘ula	And not extinguished by the Kaua‘ula rain

[Kauwe 2011]

In the chant for the wind gourd of La‘amaomao, the name for the wind of Māmala is ‘Ao‘aoa (Nakuina 1992:50), which Pukui and Elbert (1986:27) identify as a sea breeze. Other winds are named Mooaea, a north wind of Honolulu, Muuluu (possibly *mū‘ululū*, meaning “chilled” (HEN n.d.:1:1342), and Kūkalahale (Pukui and Elbert 1986:560).

4.7 *Oli*

Kou was known as a place where chiefs gathered to play and where the people gathered to watch them. Pukui (1983:1128) relates the poetical saying “Hui aka nā maka i Kou” (“the faces will meet at Kou”) in reference to just such gatherings. It is briefly mentioned in the legend of Hi‘iaka, beloved sister of the Hawaiian volcano goddess Pele. Hi‘iaka and her companions had been traveling around O‘ahu on the land trails, but decided to travel from Pu‘uloa (on Pearl Harbor in ‘Ewa) to Waikīkī by canoe. At Pu‘uloa, Hi‘iaka met a party who were planning on traveling to the house of the chiefess Pele‘ula in Waikīkī. Hi‘iaka recited a chant, telling the people although they were going by land and she was going by sea they would meet again in Kou:

‘O Kou ka papa	Kou is the coral flat
‘O Ka‘ākaukukui ka loko	Ka‘ākaukukui is the pool
‘O ka ‘alamihi a‘e nō	Some ‘alamihi [a black crab], indeed
‘O ka lā a pō iho	Wait all day until night
Hui aku i Kou nā maka.	Friends shall meet in Kou.

[Ho‘oulumāhiehie 2006a:277; Ho‘oulumāhiehie 2006b:297]

4.8 *Mo‘olelo* of Honolulu

4.8.1 The Story of Haumea and Mulei‘ula’s Tree Named Kū-ho‘one‘e-nu‘u

Westervelt shares his account of the Polynesian deity Haumea and a young Hawaiian girl named Mulei‘ula who has traveled to Tahiti with her father and soon after goes into labor. The deity Haumea, on her own supernatural journey, passes by and offers to help successfully deliver the difficult labor in exchange for the girl’s beautiful tree named Kūho‘one‘enu‘u. In this version, the young princess in her stubbornness retracts the exchange and almost loses her life and that of her child due to her fondness for her favorite tree. The voyage of this tree continues in a second *mo‘olelo*, as this is the wooden source used to carve the god of Pākākā Heiau. This *mo‘olelo* is available in its entirety in Appendix A :

> The story of the god of this temple is a story of voyages and vicissitudes. Olopana had sailed away from Waipio, Hawaii, for the island of distant seas. Somewhere in all the great number of islands which were grouped under the general name ‘Kahiki’ Olopana found a home. Here his daughter Mu-lei-ula (Mu-with-the-red-garland) was experiencing great trouble being near to childbirth. For some reason, Haumea, one of the Polynesian ancestors, had stopped for a time to visit the people of that land. When the friends were afraid that Mu-lei-ula would die, Haumea came to help, saying: ‘In our land the mother lives. The mother and child both live.’ The people said, ‘If you give us aid, how can we render payment or give you a reward?’
>
> Haumea said: ‘There is a beautiful tree with two strange but glorious flowers, which I like very much. It is “the tree of changing leaves” with two flowers, one kind singing sharply, and the other singing from time to time. For this tree I will save the life of the chief’s daughter and her child.’
>
> Gladly, the sick girl and her friends promised to give this beautiful tree to Haumea. It was a tree dearly loved by the princess.
>
> Haumea commenced the prayers and incantations which accompanied her treatment of the sick, and the chiefess rapidly grew stronger. This had come so quickly and easily that she repented the gift of the tree with the beautiful flowers, and cried out, ‘I will not give the tree.’
>
> Immediately she began to lose strength, and called to Haumea that she would give the tree if she could be forgiving and healed. However, as strength came to her once more she again felt sorry for her tree and refused to let it go. Again the incantations were broken off and the divine aid withdrawn.
>
> Olopana in agony cried to his daughter: ‘Give up the tree. Of what use will it be with its flowers if you die?’ Haumea, with the most powerful incantations, gave her the final strength, and mother and child both lived and became well and strong.
>
> Haumea took the tree and travelled over the far seas to distant Hawaii. On that larger island she found no place to plant the tree. She crossed over to the island Maui, and came to the ‘four rivers.’ There she found the awa of the gods and prepared it for drinking, but needed fresh water to mix with it.

She laid her tree on the ground at Puu-kume by the Wai-hee stream and went down after water. When she returned the tree had rooted. While she looked it began to stand up and send forth branches. She built a stone wall around it, to protect it from the winds. When it blossomed Haumea returned to her divine home in Nuumealani, the land of mists and shadows where the gods dwelt. [Westervelt 1915:21-25]

4.8.2 The God of Pākākā Heiau and the Story of Kū-ho‘one‘e-nu‘u

The following *mo‘olelo* describes the same great tree known by the name of Kalauokekāhuli; this tree was given to the deity Haumea in exchange for her services as a midwife. The tree goes with Haumea on a mythical journey eventually becoming carved into a god form of Kūho‘one‘enu‘u used for worship at the Pākākā Heiau in Honolulu. The *mo‘olelo* in its entirety can be found in Appendix A . The following is an excerpt from Kamakau’s account of this epic story:

PĀKĀKĀ was an ancient *heiau*, a *waihau po‘o kanaka*. It was built by Ka-maunu-i-Halakaipo; the god for whom it was built was Kū-ho‘one‘e-nu‘u. Kū-ho‘one‘e-nu‘u was a god from Kahiki-kū; this is his story.

When Haumea was traveling in Kahiki-kū and Kahiki-moe, Mulei‘ula, the daughter of ‘Olopana, ruler of those lands, was having difficulty in childbirth. Sounds of lamentation filled the air, and preparations were being made to cut open her stomach. The mother would die, but the child would live. Haumea said, ‘In our land the mother lives. The mother and the child would both live.’ ‘Olopana said to her, ‘Then deliver my daughter so that my daughter and my grandchild may live. What payment do you want for the delivery?’ Haumea answered, ‘This tree with beautiful flowers.’

The name of the tree was Ka-lau-o-ke-kāhuli, and its flowers were Kanikawī and Kanikawā. This precious tree with exceedingly beautiful flowers belonged to the daughter of ‘Olopana of Kahiki-kū, the ‘‘*iwa kilau moku*’ of Kahiki, whose perfection among the chiefs was without compare in the world. Not wanting to die, she consented to the giving of the tree. [Kamakau 1991:6-8]

The story of the tree continues:

One branch of this tree was made into a rack on which wooden bowls or netted calabashes were slung (that was Ka-haka-iki). Another branch became a shelf on which bundles were placed (that was Keolo‘ewa). Another branch landed of the seashore at Oneawa, in Kailua, O‘ahu. The fish followed it, and this became a place where schools of fish would come in. When this branch (that is, Mākālei) was taken inland of Kailua, the fish of Kawainui Pond followed it inland. The trunk of the tree was used as a dung heap and as a place for throwing wastes. This was Kū-ho‘one‘e-nu‘u.

Wai-la‘ahia the husband and Halelua the wife were people without gods. The god Kū-ho‘one‘e-nu‘u came at night in a dream to have them go and get it [the tree trunk] for a god themselves. For three nights and three days they were urged to go and carve a god [from the tree] for themselves. On the third day of urging. Wai-la‘ahia prepared the things that had been ordered—a pig, coconuts, red fish,

garments, and *kohekohe* grass. Then he went and laid down his offering and freed the *kapu*. Then he took the tree trunk inland to Polipoli at Nāpoko there in Waiehu. Wai-la‘ahia erected a *waihau* [a *heiau* for Kū-ho‘one‘e-nu‘u], dedicated it, and freed it.

This god became famous as a god of *mana* [divine power] and a god who seized kingdoms (*he akua kā‘ili aupuni*). The chiefs as far as O‘ahu heard of him. Wai-la‘ahia was a *kahu* of Ka-maunu-i-Halakaipo, chief of O‘ahu. He brought the god to O‘ahu, and Ka-maunu-i-Halakaipo built Pākākā as a heiau for it.

Kū-ho‘one‘e-nu‘u was a god of the chiefs of O‘ahu from remote times to the times of Kūali‘i, Ka-pi‘i-oho-o-ka-lani, Pele-i‘ō-hōlani, Kūmahana, and Kahahana. It is said that this was the most ancient god from Hawai‘i to Kaua‘i. [Kamakau 1991:6-8]

4.9 *Ala Hele*

In John Papa ‘Ī‘ī’s 1959 publication, *Fragments of Hawaiian History*, he discusses the historic trails spanning from the current alignment of Punchbowl Street to Wai‘alae. ‘Ī‘ī describes the locations of sites:

Next came Kekumanoha’s place, then a vacant place that reached as far as the bathing pool of Honokaupu, above Queen Street, north of a pier at the corner where Queen and Alakea Streets now meet. There were two houses above this bathing pool which belonged to Kaiwikokoole; and north of the pool was one house, on the mauka side of the trail. Many bathers gathered often at this pool.

The trail went on above the spring of Honokaupua to the *loku* [downpour of rain’ blowing of wind] site at Merchant and Alakea Streets. Just above this spot it joined the trail from Waikiki which came over a wall and branched off to the two drilling sites mentioned earlier. Beyond them, to the west of the drilling sites, were the king’s houses. A trail joined the one from Waikiki above the field where *maika* rolling and foot racing were held, on the mauka side of the king’s houses, and came out at Pakaka. [‘Ī‘ī 1959:91]

‘Ī‘ī continues:

On the mauka side of the place where the trails met at Honokaupu, the houses occupied both sides of the trail. The stone wall mentioned before ran on mauka of the church at Polelewa to the upper corner of King and Nuuanu Streets. Then the stone wall turned and went on up to Beretania Street. The fence on the mauka side was made of hau wood, and it led to the corner of Emma Street. There is turned and came down to meet the edge of the trail from Waikiki. That was the enclosure of the yam farm called Kapauhi mentioned earlier.

The trail to Nuuanu began at Kalanikahua and led north of Kaumakapili Church to below the little stream which flowed out of Kamanuwai pond. There the trail turned slightly to the right, went along the edge of the pond, and down into the water. Then, coming up on the bank onto Waiakemi, it led to Waaakekupua, along the

bank of the taro patches, to the Pauoa stream, up to Pualoalo, and on to the gap at Nuuanu Pali. [‘Ī‘ī 1959:92]

4.10 Agriculture and Subsistence

For spiritual and dietary reasons, *kalo* (taro; *Colocasia esculenta*) was a sacred staple in the Hawaiian diet and way of life. According to Hawaiian mythology, man was born from the taro plant. According to the Kumulipo (origin, genesis), Hāloa, “he of the long breath,” is the second son of Wākea (Father Sky) and Papa (Mother Earth). Wākea and Papa’s first born, Hāloa-naka was born premature and died shortly after his birth (Kanahele 1995:17). After burying Hāloa-naka, a taro plant sprouted at his grave. Shortly after, a second son (Hāloa) was born. A human child, Hāloa symbolizes taro and man. Taro is a metaphor for life, Kanahele explains,

> In the mythologies of many cultures, plants have been used to symbolize human spiritual growth. Hawaiians made taro a metaphor for life because, like the taro plant, it needs to be rooted in good soil and to be constantly nourished with the waters of Kāne. As the stalk grows taller with its leaves reaching toward the light of the sun, symbolized by Wākea, so Hawaiians grow aspiring to be closer to their heavenly spirit. Just as every young shoot can become a full-grown plant, so can they become gods as descendants of Hāloa. As every plant must die, however, they too must die. And from the remains a new plant lives again. In this continuity of life, both plant and man repeat the mystery of the unending cycle. [Kanahele 1995:18]

Honolulu Ahupua‘a was abundant in taro as the area was bountiful with streams flowing from upper Nu‘uanu Valley. Taro lands extended *makai* to at least half-way to upper Nu‘uanu Valley (Handy and Handy 1972:475).

The Pauoa area in Honolulu Ahupua‘a was ideal for sweet potatoes. Some areas in Pauoa were cultivated in taro as well. The Round Top (Tantulus) and Makiki areas were famous for their sweet potato production. The name for this area was ‘Ualaka‘a or “rolling sweet potato.” Because this area was on a slope, it was said that if a sweet potato was displaced, the *‘uala* (sweet potato; *Ipomoea batatas*) would roll down the hill (Handy and Handy 1972:478).

4.11 *Ilina*

Pākākā Heiau was located near the foot of Fort Street (approximately three to four blocks *mauka* of Aloha Tower). It is unknown if the *heiau* was of *po‘okanaka* or sacrificial class. However, several burials have been encountered in the Downtown Honolulu region. State Inventory Historic Property (SIHP) # 50-80-14-02918 was found during excavations at the former Honolulu Ironworks site and was later documented in the archaeological inventory survey for the Honolulu High-Capacity Transit Corridor Project (Hammatt 2013; Yent 1985). SIHP # -2918 consists of a subsurface cultural deposit and six human burials. The burials were determined to be of pre- and post-Contact era. The function of SIHP # -2918 was determined as habitation and burial interment. Table 2 describes burials found within the Honolulu segment of the project area. Figure 15 depicts burials found within and in the vicinity of the current project area.

Table 2. Burials Found within the Honolulu Segment of the Project Area

SIHP Number	Location	Description
# 50-80-14-2918	Ala Moana Blvd and Punchbowl Street	Subsurface cultural deposits and six human burials of pre- and post-Contact era

4.12 Kaka‘ako and Kewalo ‘Ili

The following section continues the traditional background for the second land division. The Kaka‘ako/Kewalo area remained outside the two most intensely populated and cultivated areas of southeastern O‘ahu—Waikīkī and Honolulu, yet Hawaiians used the marshes and wetlands for salt making, farming with fishponds, and some limited wetland agriculture. The Kaka‘ako area has been heavily modified over the last 150 years due to historic filling of the area for land reclamation. Much of the cultural and natural deposits and land forms of the area (lowland marshes, sand deposits, coral reef flats, and fishponds) have survived below this fill, and numerous pre- and post-Contact burials have been documented, largely the result of post-Contact epidemics. However, the history of land use in the project area is very recent in time. The area was once primarily shallow coral reefs under water at high tide. The coastline along the Kaka‘ako region was expanding in the early twentieth century as a result of dredging and reclamation of marsh lands. The Kukuluāe‘o coastline was also marsh, salt pans, and fishponds in the late 1880s. In successive waves of development, the coastline was extended *makai* to the current Ala Moana Boulevard by 1914, the Kewalo Channel was dredged in 1924 and expanded in 1941, and the dredged material was used to create a revetment—now the Kewalo Basin Park—in 1955 (Kewalo Basin Harbor 2014). For clarity, the cultural properties once located within Kaka‘ako, including *wahi pana*, *heiau*, *loko i‘a* (fishpond), *ala hele*, and *ilina* are discussed as they pertain to the project area.

4.13 *Wahi Pana* of Kaka‘ako and Kewalo ‘Ili

A Hawaiian *wahi pana* is an integral part of Hawaiian culture. “In Hawaiian culture, if a particular spot is given a name, it is because an event occurred there which has meaning for the people of that time” (McGuire 2000:17). Hawaiian place names convey a wide variety of information about the relationships among people, landscapes, and other natural and cultural resources. Place names may also express cultural, historical and/or spiritual values and concepts important to Hawaiian world views. It is common for places and landscape features to have multiple names, some of which may only be known to certain *‘ohana* (families) or even certain individuals within *‘ohana*, and many have also been lost, forgotten or kept secret through time. Before the introduction of writing to the Islands, when cultural information was exclusively preserved and perpetuated orally, Hawaiians gave names to literally everything in their environment, including individual garden plots and *‘auwai* (ditch, canal), house sites, intangible phenomena such as meteorological and atmospheric effects, *pōhaku* (rocks), *pūnāwai* (freshwater springs), and many others. In this way, the *wahi pana* of Kaka‘ako, and the specific project area tangibly link the *kama‘āina* of Kaka‘ako to their past. All *wahi pana* meanings are cited from Pukui et al. (1974) unless otherwise noted. Table 3 is a compilation of place names, definitions, and descriptions.

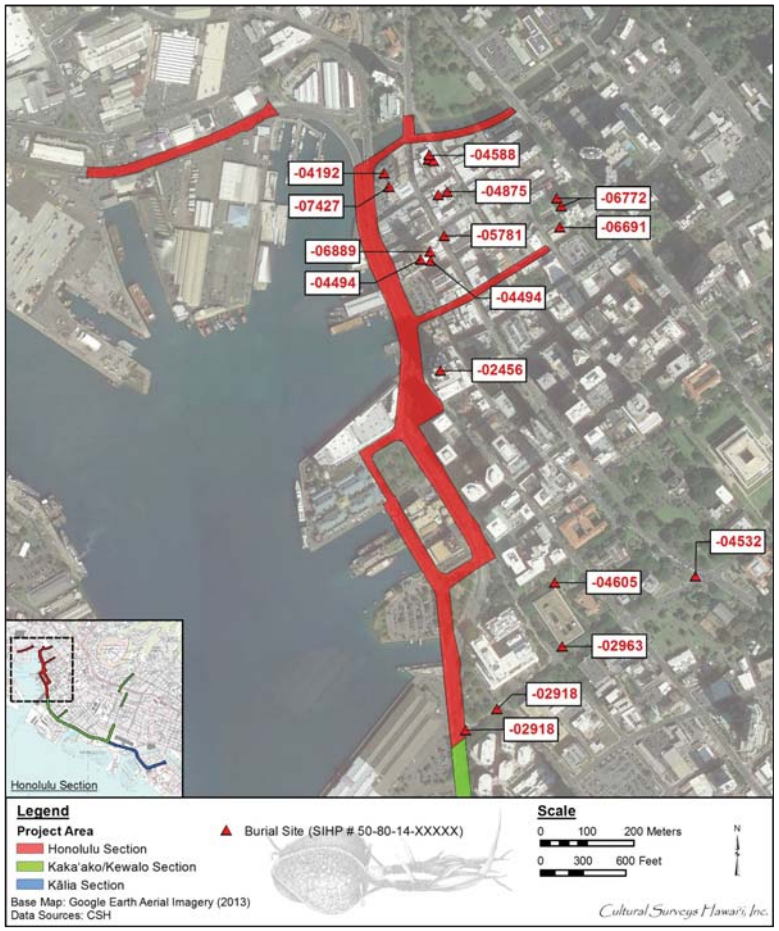

Figure 15. Google Earth aerial imagery (2013) depicting burials found in the Honolulu section; note SIHP #-02918 is within the project area

4.13.1 Pu‘ukea Heiau of Kaka‘ako

The chief Huanuikalala‘ila‘i governed Pu‘ukea Heiau in the land section of Kukuluāe‘o, according to Kamakau (1991:24). Pu‘ukea literally means “white hill” and is also the name of a small land division within the *‘ili* of Kukuluāe‘o that is mentioned in at least two Land Commission cases, LCA 1502 (not awarded) and LCA 1504. LCA 1504 is located near the junction of Halekauwila and Cooke streets. It is common for a *heiau* to have the same name as the *‘ili* in which it is located, so it is possible Pu‘ukea Heiau was also near the junction of Halekauwila and Cooke streets. The majority of the house sites in the mid-nineteenth century in Kukuluāe‘o were located near Halekauwila and Queen streets, *mauka* of the low-lying coastal swamplands on higher, dry ground. It is possible the *heiau* platform or the area that it was built on was one of the few elevated locations in the flat, low-lying swamp that surrounded it, and thus gained the name *pu‘u kea*, or “white hill.” Kamakau mentions Pu‘ukea Heiau in a traditional *wānana* (prophecy) (1991:24–25):

[*Ka makaua ua kahi o ‘Ewa*]	[The increasing ‘first rain’ of ‘Ewa]
Ua puni ka i‘a o Mokumoa,	Overcomes the fish of Mokumoa,
Ua kau i‘a ka nene;	Washes up fish to the nene plants;
Ua ha‘a kalo ha‘a nu;	Lays low the taro as it patters down;
Ha‘a ka i‘a o kewalo,	Lays low the fish of Kewalo,
Ha‘a na ‘ualu o Pahua,	Lays low the sweet potatoes of Pahua,
Ha‘a ka mahiki i Pu‘ukea,	Lays low the mahiki grass at Pu‘ukea,
Ha‘a ka unuunu i Pele‘ula,	Lays low the growing things at Pele‘ula
Ha‘a Makaaho i ke ala.	Lays low Makaaho [Makāho] in its path
E Kū e, ma ke kaha ka ua, e Kū,	O Kū, the rain goes along the edge [of the island], O Kū
[*I ‘ai ‘na ka i‘a o Maunalua*] . . .	[‘Eating’ the fish of Maunalua] . . .

Table 3. *Wahi Pana* Found in the Kaka‘ako Section of the Proposed Project Area

Wahi Pana	**Translation (Pukui et al. 1974)**	**Description**
Ka‘ākaukukui	The right (or north) light	Possible maritime navigation landmark; an *‘ili lele*
kākā‘āko	Dull, slow	Thrum also defined as “prepare the thatching” (*kākā* is “to chop, beat, or thresh” and *ako* is “thatch”); possible reference to the salt marshes where *pili* grass was abundant and used to thatch traditional Hawaiian homes
Kewalo	The calling (as an echo)	Sacrificial drownings of the *kauwā* were performed here; an *‘ili* in the Kaka‘ako area
Kululuāe‘o	Hawaiian stilt or to walk on stilts	Area formerly fronting Kewalo Basin where the Hawaiian stilt most likely was found; an *‘ili*
Pualoalo	Hibiscus flower	*‘Ili lele* in the Kaka‘ako area

Wahi Pana	Translation (Pukui et al. 1974)	Description
Pu‘ukea (*heiau*)	White hill	A small land division within Kukuluāe‘o ‘Ili; *heiau* near the junction of Halekauwila and Cooke streets
Pu‘unui	Big hill	*‘Ili lele* in the Kaka‘ako area

Thrum (1906:37–47), does not mention Pu‘ukea Heiau. In his report on O‘ahu sites in the early 1930s, McAllister (1933:80) says of Honolulu: “Information regarding former sites within the present limits of Honolulu must come entirely from literary sources.” See Section 4.15 for an *oli* that mentions Pu‘ukea Heiau.

4.13.2 *‘Ili Lele* of Kaka‘ako

An *‘ili lele* is a portion of an *‘ili* land division that is separated from the main portion of the *‘ili* but still considered part of it. Pukui et al. (1974) do not give a meaning for the place name Kaka‘ako, but Pukui and Elbert (1986:110) translate the word *kākā‘ākо* as “dull, slow,” and Thrum (1922:639) translated the word as “prepare the thatching,” as *kākā* means “to chop, beat, or thresh” and *ako* means “thatch.” If Thrum’s translation is correct, it could be related to the fact that salt marshes, such as areas like Kaka‘ako, were excellent places to gather tall *pili* (*Heteropogon contortus*; a type of grass), which the Hawaiians traditionally used to thatch their houses.

4.13.2.1 Ka‘ākaukukui ‘Ili

Ka‘ākaukukui, a filled in reef, means “the right (or north) light,” and it may refer to a maritime navigation landmark. According to Kekahuna (1958:4), Ka‘ākaukukui was “a beautiful sand beach and reef that formerly extended a quarter mile along Ala Moana Park to Kewalo Basin. Various translations of Ka‘ākaukukui include “radiating place for lamp” (Thrum 1922:635) and “to the right of the lighthouse” (Gessler 1937:187). This would have been an accurate description of the area at that time as Ka‘ākaukukui was east, or “to the right” of the Honolulu Lighthouse in the harbor. This is probably a historic, not an ancient, interpretation as the Honolulu Lighthouse was not built until 1869 (Dean 1991:7). Ka‘ākaukukui was a *lele* (a detached part or lot of land belonging to one *‘ili* and located in another) with one parcel on the coast and two other, non-contiguous parcels inland. Ka‘ākaukukui was adjacent on the *mauka* side to several other small *‘ili* and *lele* lands, including portions of Pu‘unui (big hill) and Pualoalo (*Hibiscus kokio*; Thrum 1922:667).

4.13.2.2 Kukuluāe‘o ‘Ili

Kukuluāe‘o, which translates literally as the “Hawaiian stilt (bird),” means “to walk on stilts.” This area on the upland side of Ka‘ākaukukui (Kekahuna 1958:4) formerly fronted Kewalo Basin and was an ideal environment for the Hawaiian stilt with its marshes, salt pans, and small fishponds (Griffin et al. 1987:36).

4.13.2.3 Kolowalu ‘Ili

Kolowalu was a small land section between Kukuluāe‘o and Kewalo that encompassed a large fishpond. Pukui et al. (1974:116-117) do not give a meaning for Kolowalu Pond but they interpret the name of Kolowalu, a ridge in Mānoa, as “eight creeping.” As Kolowalu Kai was probably associated with Mānoa, it is possible that “eight creeping” is also the correct interpretation for the

pond name. Thrum (1922:652) interpreted *kolowalu* as “a beneficent law of Kualii.” The *kolowalu* law was initiated by the Hawaiian chief Kūali‘i, who ruled O‘ahu from about 1720 to 1740 (Cordy 2002:19). This law protected the rights of commoners and provided food to the hungry (Fornander 1917:4).

4.13.2.4 Kewalo ‘Ili

Kewalo literally means “the calling (as an echo).” Land Commission and other historic era documents identify it as the area between Cooke and Sheridan streets *mauka* of Queen Street and the coastal sections of Ka‘ākaukukui, Kukuluāe‘o, and Kālia. According to Pukui et al. (1974:109), *kauwā*, or members of an outcast caste, intended for sacrifice were drowned there. At one time, there was a sand beach at Kewalo, where various sports such as surfing were held (Kekahuna 1958). The *‘ōlelo no‘eau*, “*Ka wai huahua‘i o Kewalo*,” translated as “The bubbling water of Kewalo” (Pukui 1983:178), suggests Kewalo once contained a freshwater spring. A *mo‘olelo* of Kawaiaha‘o also mentions two springs in Kewalo— Kawaiaha‘o (The Waters of Ha‘o) and Kewalo Spring (Pukui 1988:87-89).

4.14 *‘Ōlelo No‘eau* of Kaka‘ako/Kewalo

Hawaiian sayings collected, translated, and annotated by Mary Kawena Pukui in the definitive *Ōlelo No‘eau: Hawaiian Proverbs and Poetical Sayings* (1983) offer a unique opportunity to relish the wisdom, poetic beauty, and earthy humor of the Hawaiian language. They reveal deeper layers of meaning, sharing an understanding not only of Hawai‘i and its people but of human nature. These sayings are considered to be the highest form of cultural expression in old Hawai‘i and they bring one closer to the everyday thoughts and lives of the Hawaiians who created them (Pukui 1983:vii).

4.14.1 *‘Ōlelo No‘eau* #1652

The following *‘ōlelo no‘eau* pertains to the project area and suggests a fresh water spring in the Kewalo area.

> ***Ka wai huahua’i o Kewalo.***
>
> **The bubbling water of Kewalo.**
>
> Kewalo once had a large spring where many went for cool, refreshing water. [Pukui 1983:178]

4.15 *Oli*

The *heiau* of Pu‘ukea and an area called Kaka‘ako are mentioned in the chant “The Battle of Nu‘uanu,” which concerns the 1795 invasion and conquest of O‘ahu by Kamehameha I. One section of the chant describes locations in Honolulu, possibly listing them from east to west:

75 *Lauwili i Pūkē (Pu‘ukea) i Ka-imu-hai-kanaka,*
76 *I Kai-kua, i Kakaako, i Mamala,*
77 *I ke kai o Kuloloia, Pakaka,*
78 *I ka-imu-hai-kanaka, i ka-wai-apuka-Kāne*. [Kala‘ikuahulu 1880:131]

4.16 *Mo‘olelo* of Kaka‘ako/Kewalo

4.16.1 ‘Ai‘ai Travels to Kaka‘ako

Kaka‘ako is mentioned in Thrum’s version of the legend of Kū‘ula, the god presiding over fish, and his son ‘Ai‘ai. ‘Ai‘ai was the first to teach Hawaiians how to make various fishing lines and nets, the first to set up a *ko‘a kū‘ula* (*heiau* near the sea for worship of fish gods) on which the fishermen placed their first catch as an offering to Kū‘ula, and the first to set up *ko‘a i‘a* (fishing stations) where certain fish were known to gather. Leaving his birthplace in Maui, ‘Ai‘ai traveled around the Islands, establishing *ko‘a kū‘ula* and *ko‘a i‘a*. On O‘ahu, he landed first at Makapu‘u in Ko‘olaupoko, and then traveled clockwise around the island:

> Aiai came to Kalia [Waikīkī] and so on to Kakaako. Here he was befriended by a man named Apua, with whom he remained several days, observing and listening to the murmurs of the chief named Kou. This chief was a skillful haiku [bonito] fisherman, his grounds being outside of Mamala until you came to Moanalua. There was none so skilled as he, and generous withal, giving akus to the people throughout the district. [Thrum 1998:242]

4.16.2 Kawaiaha‘o and the Waters of Ha‘o

Two springs in Kewalo are mentioned in the *mo‘olelo* of the *Waters of Ha‘o*, which describes two children of the chief Ha‘o who ran away from their cruel stepmother. They stayed a time with the caretakers of Kewalo Spring, which may have been located close to the trail that connected Waikīkī and Honolulu. The children then left when they heard that the chiefess had sent men to look for them. The two children followed the moonlit trail across the plain toward Kou (Honolulu), but finally collapsed from weariness and thirst. In a dream, the boy’s mother told him to pull up a plant close to his feet. When he did, he found a spring under the plant, which was called the Water of Ha‘o, or Kawaiaha‘o. This spring is located at the western end of the trail, near Kawaiaha‘o Church in Kaka‘ako (Pukui 1988:87-89).

4.16.3 Kānāwai Kaihehe‘e

Kewalo once had a famous fishpond used to drown the *kauwā* and *kapu* breakers as the first step in a sacrificial ritual known as Kānāwai Kaihehe‘e (Kamakau 1991:6) or Ke-kai-he‘ehe‘e, which translates as “sea sliding along,” suggesting the victims were slid under the sea (Westervelt 1963:16). Kewalo is described as follows:

> A fishpond and surrounding land on the plains below King Street, and beyond Koula. It contains a spring rather famous in the times previous to the conversion to Christianity, as the place where victims designed for the Heiau of Kanelaau on Punchbowl slopes, was first drowned. The priest holding the victim’s head under water would say to her or him on any signs of struggling, ‘Moe malie i ke kai o ko haku.’ ‘Lie still in the waters of your superiors.’ From this it was called Kawailumalumai, ‘drowning waters.’ [Sterling and Summers 1978:292]

4.16.4 The Legend of Kapo‘i Kukaeunahiokapueo

In one legend, Kewalo is a marsh near the beach, where tall *pili* grass grew. A man named Kapo‘i went to this area to get thatching for his house. While there, he found seven eggs of a *pueo* (Hawaiian short-eared owl) and took them home to cook for his supper. An owl perched on the

fence surrounding his house and cried out “O Kapoi, give me my eggs!” After several such pleas, Kapo‘i eventually returned the eggs. In return, the owl became his *‘aumakua* (deified ancestor) and instructed him to build a *heiau* named Mānoa. Kapo‘i built the *heiau*, placed some bananas on the altar as a sacrifice, and set the *kapu* days for its dedication. The king of O‘ahu, Kākuhihewa, who was building his own *heiau*, had made a law that if any man among his people erected a *heiau* and set the *kapu* before him, that man should die. Kapo‘i was seized and taken to the *heiau* of Kūpalaha at Waikīkī. Kapo‘i’s *‘aumakua* asked for aid from the king of the owls at Pu‘u Pueo in Mānoa, who gathered all of the owls of the islands. They flew to Kūpalaha and battled the king’s men, who finally surrendered: “The owls scratched at the eyes and noses of the men and befouled them with excrement” (Kamakau 1991:23). From this time, Hawaiians considered the owl a powerful *akua* (god, divine). Because of this battle, the Hawaiians named the area Kukaeunahiokapueo, which means, “the confused noise of owls rising in masses” (Thrum 1998:200-202; Westervelt 1963:135-137).

4.16.5 Huanuikalala‘ila‘i

Kewalo was the birthplace of Huanuikalala‘ila‘i, a chief famous for his love of cultivation and his care for the people (Kamakau 1991:24). An *oli* recounted by Kamakau (1991) captures the significance of Kewalo:

‘O Hua-a-Kamapau ke ‘li‘i	Hua-a-Kamapau the chief
O Honolulu o Waikīkī	O Honolulu, of Waikīkī
I hanau no la i kahua la i Kewalo,	Was born at Kewalo,
‘O Kālia la kahua	Kālia was the place [the site]
O Makiki la ke ēwe,	At Makiki the placenta,
I Kānelā‘au i Kahehuna ke piko,	At Kānelā‘au at Kahehuna the navel cord,
I Kalo i Pauoa ka ‘a‘a;	At Kalo at Pauoa the caul;
I uka i Kaho‘iwai i	Upland at Kaho‘iwai, at
Kanaloaho‘okau . . .	Kanaloaho‘okau . . .

[Kamakau 1991:24]

Kamakau (1991) recorded a traditional *wānana* (prophecy) that mentions the chief Huanuikalala‘ila‘i of Pu‘ukea Heiau. Cited above in Section 4.13.1, the chant mentions the *mahiki* grass (seashore rush grass; *Sprorbolus virginicus*) of Pu‘ukea, a tufted rush found near the seashore. The term *mahiki* connotes several historical and contemporary meanings. With serious family discord, a *kupuna* (grandparent, ancestor) can contine with lines of inquiry of *ho‘oponopono* (family conference in which relationships are set right) to “peel off” layers of deeper feelings (Pukui et al. 1972:228). In a deeper Hawaiian past, skilled *kāhuna* (priests) formely exorcised malicious spirits from the afflicted in an exorcist ritual with the aid of *mahiki* (Pukui and Elbert 1986:219). The use of this grass in a ritual may explain its association with a ceremonial *heiau*, or it may simply be that the Kukuluāe‘o coast was a good habitat and thus a favored place for healers to collect this type of grass.

4.17 *Ala Hele*

John Papa ‘Ī‘ī (1959) mentions some relevant place names while discussing early nineteenth century trails in the Honolulu/Waikīkī area. The fact that a trail traversed this region characterized by ponds, marshlands, and *lo‘i* suggests the trail, especially as it neared the coastline at Kālia, must

have run on a sand berm raised above surrounding wetlands and coral flats. ‘Ī‘ī describes the middle trail (probably close to the current alignment of Queen Street) from Waikīkī to Honolulu:

> The trail from Kalia led to Kukuluaeo, then along the graves of those who died in the smallpox epidemic of 1853, and into the center of the coconut grove of Honuakaha. On the upper side of the trail was the place of Kinau, the father of Kekauonohi. [‘Ī‘ī 1959:89]

The grave site referred to is Honuakaha Cemetery located at the *makai* corner of Halekauwila and South streets. The cemetery is *makai* of Kawaiaha‘o Church. Honuakaha was a settlement located generally between Punchbowl and South streets on the *makai* side of Queen Street. ‘Ī‘ī describes the lower, coastal trail from Honolulu towards Waikīkī: “From the makai side of Kaoaopa was a trail to the sea at Kakaako, where stood the homes of the fishermen. Below the trail lived Hewahewa and his fellow kahunas [priest]” (‘Ī‘ī 1959:91).

4.18 Agriculture and Aquaculture

Kaka‘ako is between two traditional centers of population, Honolulu and Waikīkī. In Waikīkī, a system of irrigated taro *lo‘i* fed by streams descending from Makiki, Mānoa, and Pālolo valleys blanketed the plain, and networks of fishponds dotted the shoreline. Similarly Honolulu has surrounding its harbor shoreward fishponds and irrigated fields watered by perennial streams descending from Nu‘uanu and Pauoa valleys. Reverend Hiram Bingham, arriving in Honolulu-Kou in 1820, described a still predominantly Native Hawaiian environment—still a “village”—on the brink of western-induced transformations:

> We can anchor in the roadstead abreast of Honolulu village, on the south side of the island, about 17 miles from the eastern extremity. . . . Passing through the irregular village of some thousands of inhabitants, whose grass thatched habitations were mostly small and mean, while some were more spacious, we walked about a mile northwardly to the opening of the valley of Pauoa, then turning southeasterly, ascending to the top of Punchbowl Hill, an extinguished crater, whose base bounds the northeast part of the village or town. . . . Below us, on the south and west, spread the plain of Honolulu, having its fishponds and salt making pools along the seashore, the village and fort between us and the harbor, and the valley stretching a few miles north into the interior, which presented its scattered habitations and numerous beds of kalo in its various stages of growth, with its large green leaves, beautifully embossed on the silvery water, in which it flourishes. [Bingham 1847:92-93]

The Kaka‘ako district would have been in Bingham’s view as he stood atop “Punchbowl Hill” looking toward Waikīkī to the south. It would have comprised part of the area he describes as the “plain of Honolulu” with its “fishponds and salt making pools along the seashore.”

4.19 *Ilina*

Several burials have been discovered within and in the vicinity of the project area for the Kaka‘ako segment of the proposed project. Human skeletal remains were discovered at the intersection of Ala Moana Boulevard and Kamake‘e Street during archaeological monitoring (Souza et al. 2002). SIHP # 50-80-14-06376 consisted of a single cranial vault. SIHP # -06376 is

within the project area. SIHP # -07656 is also within the proposed project area. The previously identified, isolated human cranial fragment was located within disturbed and reworked at the Ward Warehouse, fronting Ala Moana Boulevard (Pammer et al. 2014).

Burials found in the vicinity of the proposed project area include SIHP # -07580, a pre- to post-Contact cultural layer with a historic burial cluster; SIHP # -07581, a pre-Contact traditional Hawaiian bundle burial; SIHP # -07582, disarticulated human skeletal remains within a non-burial context; and SIHP # -07583, disarticulated human skeletal remains within a non-burial context (Tulchin et al. 2014). Figure 16 displays burials found within and in the vicinity of the project area. Table 4 displays SIHP numbers, locations, and descriptions of burials found within and in the vicinity of the Kaka‘ako segment of the proposed project.

Table 4. Burials Found within and in the Vicinity of the Kaka‘ako Segment of the Project Area

SIHP Number	Location	Description
Within Project Area		
# 50-80-14-06376	Ala Moana Blvd and Kamake‘e St	Single cranial vault during archaeological monitoring
# 50-80-14-07656	Ward Warehouse fronting Ala Moana Blvd	Previously identified, isolated human cranial fragment; most likely previously disturbed
Vicinity of Project Area		
# 50-80-14-07580	Between Ala Moana Blvd (*makai*) and Auahi St (*mauka*)	Pre-Contact to post-Contact cultural layer with a historic burial cluster; possible habitation site consisting of 27 pit features, 17 subfeatures, and eight burials
# 50-80-14-07581	Between Ala Moana Blvd (*makai*) and Auahi St (*mauka*)	Pre-Contact traditional Hawaiian bundle burial (femur, tibia, humerus, ulna, and ribs)
# 50-80-14-07582	Between Ala Moana Blvd (*makai*) and Auahi St (*mauka*)	Disarticulated human skeletal remains (single adult molar and a possible cranial fragment) in a non-burial context (associated with imported historic landfill reclamation fill)
# 50-80-14-07583	Between Ala Moana Blvd (*makai*) and Auahi St (*mauka*)	Disarticulated human skeletal remains (a partial adult human mandible) in a non-burial context; found in an imported fill layer associated with early twentieth century land use; isolated find believed to have been imported from an off-site location

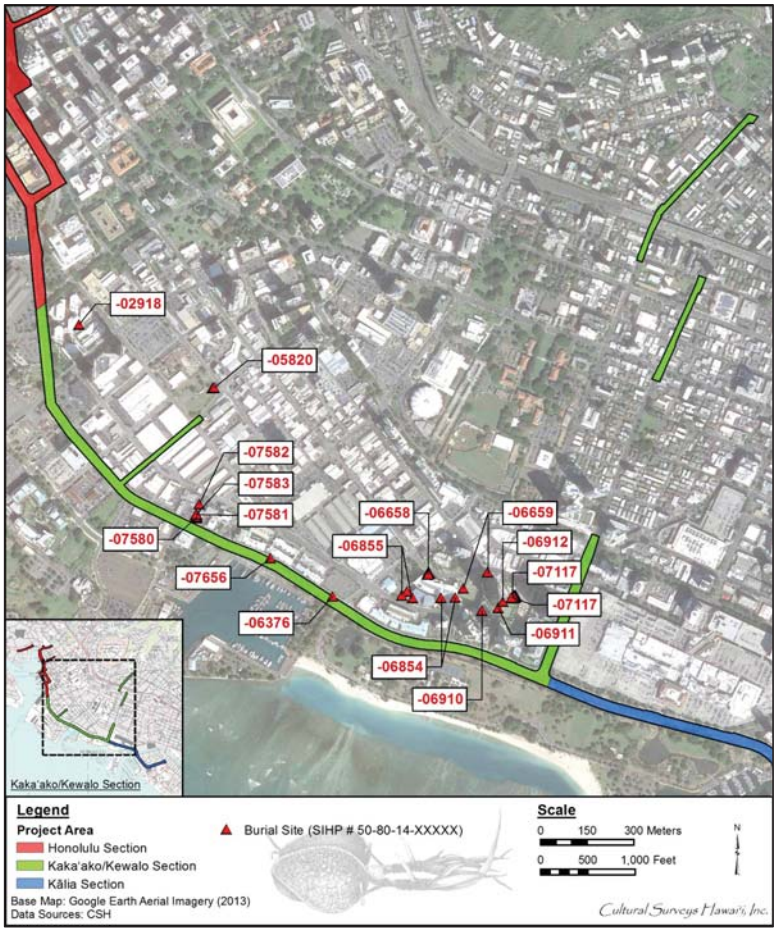

Figure 16. Google Earth Imagery (2013) depicting burials found within and in the vicinity of the project area

4.20 Waikīkī Ahupua‘a

The following section continues with the traditional background for the Waikīkī Ahupua‘a. The *ahupua‘a* once extended from the Ko‘olau mountain range to the shoreline. The ancient *ahupua’a* of Waikīkī once extended from the land called Kou to Maunalua (commonly known as Hawai‘i Kai) (Hawaiian Studies Institute 1987), which was originally an *‘ili kūpono* (a nearly independent *‘ili* land division within an *ahupua‘a*, paying tribute to the ruling chief and not to the chief of the *ahupua‘a*) of Waimānalo that was integrated into Honolulu District in 1859 as an *ahupua‘a* (King 1935:223). On modern maps, the ancient *ahupua‘a* of Waikīkī is bounded by Pi‘ikoi Street to the west and Niu Valley to the east.

Considering the vast scale of the ancient *ahupua‘a* of Waikīkī, which includes the modern *ahupua‘a* designations of Mānoa, Pālolo, Wai‘alae Nui, Wai‘alae Iki, Wailupe, Niu, and Kuli‘ou‘ou, and the size of the marshland of Waikīkī (which was four times the size of Waikīkī today) (Kanahele 1995:6), this report focuses on the coastal strip of Waikīkī.

4.21 *Wahi Pana* of Waikīkī

The name Waikīkī translates as “water spurting from many sources,” and reveals the character of the intact watershed system of Waikīkī prior to European Contact, where water from the valleys of Mānoa and Pālolo gushed forth from underground. Before the construction of the Ala Wai Canal, these streams did not merge until deep within Waikīkī. As they entered the flat plain of Waikīkī, the names of the streams changed; Mānoa Stream became Kālia Stream. They joined in the *‘ili* of Hamohamo (“rub gently” [as the sea on the beach]) and then divided into three new streams that flowed into the sea—Kuekaunahi, ‘Āpuakēhau, and Pi‘inaio. The land between these three streams was called Waikolu, meaning “three waters” (Kanahele 1995:7–8).

Waikīkī Kai was once divided into smaller *‘ili* lands, Kālia (“waited for”), Pau (“finished”), Niukukahi (“coconut standing alone”), Loko Moo, Keōmuku (“the shortened sand”), Helumoa (“chicken scratch”), Ulukou (“*kou* [*Cordia subcordata*] tree grove”), Mookahi, Kaluaokau, Auaukai, Hamohamo (“rub gently [as the sea on the beach]”), Uluniu (“coconut grove”), Kapuni (“the surrounding”), Kekio, Kāneloa (“tall Kāne”), Kapua (“the flower”), and Kaluahole (“the āhole fish cavern”) (Bishop 1881; ‘Ī‘ī 1959:92–94).

Thomas G. Thrum reports that eight *heiau* were once located in Waikīkī, consisting of Papa‘ena‘ena Heiau, Kapua Heiau, Kūpalaha Heiau, Helumoa Heiau, Makahuna Heiau, Kamauakapu Heiau, Kulanihakoi Heiau, and Pahu-a-Maui Heiau (Thrum 1905:44–45), as well as four large *pōhaku* that constituted a religious site, commonly called the Wizard Stones of Kapeimāhū (Thrum 1906:139–141). Samuel Kamakau notes another *heiau* of Waikīkī called Halekumukaaha Heiau (Kamakau n.d. in McAllister 1933:78), and early historic maps by C.J. Lyons (Registered Map [RM] 726 and RM 727) indicate the location of another *heiau* called Ōpūnahā Heiau. Several of the *heiau* were of *po‘okanaka* classification, used ceremoniously for human sacrifices (Stokes 1991:24).

4.21.1 Papa‘ena‘ena Heiau

Papa‘ena‘ena Heiau was once located at the base of Lē‘ahi (Diamond Head) (McAllister Site 58, McAllister 1933:71–74). Papa‘ena‘ena Heiau, of *po‘okanaka* class, was a quadrangular paved terrace approximately 130 by 70 ft with walls on three sides from 6 to 8 ft in height and 8 ft thick

at the base, and open on the western side facing the village of Waikīkī (McAllister 1933:74). Papa‘ena‘ena Heiau may have been built by the Maui ruler Kahekili to honor his victory of O‘ahu in 1780 and to avenge his ancestor, Kauhi-a-Kama, whose remains were desecrated at ‘Āpuakēhau Heiau in the sixteenth century (Thrum 1926:109). Kamehameha, who took O‘ahu from Kahekili’s successor, Kalanikupulu, in 1795, commanded sacrifices at Papa‘ena‘ena Heiau and impaled the bodies of Kiana, *mō‘ī* (paramount king) of O‘ahu, and other slain chieftains upon its walls (Jarves 1843:59–60 in McAllister 1933:73).

John Papa ‘Ī‘ī (1959:33, 35) described the physical layout and customs of Papa‘ena‘ena Heiau when Kamehameha became ill in late 1803 or early 1804, and Paul Rockwood drew an image of such a *luakini* (sacrificial, to include human sacrifices) class *heiau* as described by ‘Ī‘ī.

> The house in which they dwelt was called the Hale Pahu, for that was where the drums of the gods were kept. These drums, which were sounded every morning at dawn, were kept in the gods’ houses by their keepers, who did the drumming. It was also said that the drums were sounded in the Hale Pahu when the king did not utter the ‘amama [finished] prayer.
>
> The Hale Pahu was closed from top to bottom on the side and back walls, whereas the front had only posts, like a lanai. It faced the ‘anu‘u tower and the row of idols in front of the ‘anu‘u. Between them was the lele altar. Three of the houses were thatched with leaves of the loulu palm (lau lauli‘i). The largest house, called the Hale Mana, was long, like a halau [long house]. Its front and door faced the entrance of this luakini heiau. The third house was the Hale Umu, or Oven House, which stood on the left side of the Hale Mana, extending forward of it a little, with front and door directly toward the back of the Hale Pahu. The fourth house, called the Hale Waiea, was a small one between the Hale Umu and the Hale Pahu. It was twice the length of the distance from fingertip to elbow in length, its height, and breadth being half that measure. Two images stood before it on either side of the opening, and the king and kahuna conducted their ‘aha (prayer) services at the right side of the opening, in the dark of the night before the birds began to twitter. [‘Ī‘ī 1959:33, 35]

Kamehameha was said to have visited Papa‘ena‘ena Heiau before setting off to battle for Ni‘ihau and Kaua‘i in 1804. Five years later, Kamehameha placed the remains of his nephew Kanihonui, who committed adultery with Ka‘ahumanu, at Papa‘ena‘ena Heiau, “all prepared in the customary manner of that time” (‘Ī‘ī 1959:51). This would have been one of the last human sacrifices in the kingdom. Queen Emma, the widow of Alexander Liholiho (Kamehameha IV), had Papa‘ena‘ena Heiau dismantled, and she used the rocks to build a fence to surround her Waikīkī estate in Kaluaokau (Kanahele 1995:136).

In addition to functioning as a site of human sacrifice, Papa‘ena‘ena Heiau also served as a way for surfers to obtain *mana*; *kahuna* at the *heiau* notified surfers of excellent surfing conditions by flying a kite high into the air (Kanahele 1995:56). In 1919, Walter F. Dillingham purchased the area once occupied by Papa‘ena‘ena Heiau from the James Campbell Estate and built a palatial home (Hibbard and Franzen 1986:40), which later became the site of the Hawai‘i School for Girls at La Pietra (Becket and Singer 1999:x).

4.21.2 Kapua Heiau

Kapua Heiau was of *po‘okanaka* class and located in Kapi‘olani Park near Camp McKinley. It is reported to have been connected to Papa‘ena‘ena Heiau. Fragments of its walls torn down in 1860 reveal it was approximately 240 ft. *Mo‘olelo* indicate that Kaolohaka, a chief from Hawai‘i, was sacrificed at Kapua Heiau on suspicion of being a spy (Thrum 1905:44).

4.21.3 Kūpalaha Heiau

Another *heiau* in Kapi‘olani Park closely associated with Papa‘ena‘ena Heiau was Kūpalaha Heiau, located southeast of the intersection of Kalākaua Avenue and Monsarrat Avenue (Thrum 1905:44). Kakuhihewa, *mō‘ī* of O‘ahu ca. 1540–1634, attempted to sacrifice a man from Honolulu named Kapo‘i at Kūpalaha Heiau for consecrating a *heiau* called Manu‘a on a day that the *mō‘ī* had made *kapu*. Kakuhihewa’s warriors were then attacked by owls from Moloka‘i, Lāna‘i, Maui, Hawai‘i, O‘ahu, Kaua‘i, and Ni‘ihau at the order of Kapo‘i’s *‘aumakua*, which was a *pueo*. The owls defeated Kakuhihewa’s warriors in the *mo‘olelo* known as the “Battle of the Owls.” Kakuhihewa acknowledged that Kapo‘i’s *akua* was a powerful one and from that time, the owl has been recognized as one of the many deities venerated by the Hawaiian people (Kamakau 1964:23; Thrum 1904:200–202). This failed attempt to sacrifice Kapo‘i at Kūpalaha Heiau may indicate this *heiau* was of *po‘okanaka* class.

Emma Metcalf Nakuina (Nakuina 1904:8 in Sterling and Summers 1978:98) describes two *heiau* on O‘ahu devoted to the sun; one of these was located at Kāneloa in Kapi‘olani Park (the other was located at Kuaokala in Wai‘anae at Pu‘u o Kapolei). Nakuina describes there being sun worshippers among the first settlers of Hawai‘i, and that only a few could claim it as a privilege. The Waikīkī sun *heiau* could have been Kūpalaha Heiau—*kūpalaha* is defined as a temporary *heiau* structure (Pukui and Elbert 1986), and the syllable “*la*,” if spelled “*lā*,” also denotes the sun. Alternatively, the Waikīkī sun *heiau* could be Ōpūnahā Heiau, located on the Honolulu Aquarium property just seaward of the Hawaiian Monk Seal exhibit as drawn on maps by C.J. Lyons between 1875–1877 (RM 726 and RM 727).

Depending on its pronunciation, relevant translations for *ōpū* include “to rest, exist” and “a tower in a *heiau*,” while the relevant translations for *‘opu* include “to dive into the water,” and, as a rare form of *‘upu*, “to keep thinking of with anticipation.” The second part of the word, if pronunciated *nahā*, means “to blot out from sight.” Given that the place where the sun set was called the “resting place of Kāne” (Beckwith 1970:62), the various combinations of these words certainly conjure imagery of an anticipated event of the sun sinking below Pu‘u o Kapolei.

Joyce Akin, Michael Akin, and Rick Scudder linked Nakuina’s reference to a sun *heiau* with Kamakau’s description of the changing of the seasons (Akin et al. 1985 in *Ka Nuhou o ka ‘Aina* 2002:2). Their synthesis of Kamakau’s writings describe that the passage of seasonal time on O‘ahu was reckoned according to where the sun set: When the set over Pu‘u o Kapolei and migrated north to Mahimaomao, this period of warmth was called Kau or Makali‘i; when the setting of the sun shifted south of Pu‘u o Kapolei, this colder period of rainfall, planting, germination (*‘ōilo*), and harvesting was called Ho‘ōilo. According to Akin et al. (1985), the exact timing of the sun setting over Pu‘u o Kapolei is May 1. Cultural practitioner Shad Kāne explains that this shifting of the seasons—the northern and southern movement of the setting sun—is, from a non-Hawaiian perspective, the summer solstice (about June 21), but that *kūpuna* describe this event occurring one month earlier in May (Kāne 2008). After many observations of the setting of

the sun from various locations, Akin et al. (1985 in *Ka Nuhou o ka ‘Aina* 2002:2) determined that an observer would witness this event—actually the sun sinking below Pu‘u Pālailai, which is directly behind Pu‘u o Kapolei—by looking out from Queens Surf near Kapi‘olani Park. Their review of a map drawn about 1840-1850 indicated an altar on the beach on the Aquarium property just *makai* of the Hawaiian monk seal exhibit (which may be similar to that recorded by C.J. Lyons (1875–1877). An ‘Ewa *hālau* (group) commemorates this changing of the seasons at the Aquarium each year on May 1 (Akin et al. 1985 in *Ka Nuhou o ka ‘Aina* 2002:2).

4.21.4 Kamauakapu and Makahuna Heiau

Two other *heiau* near Kapi‘olani Park were Kamauakapu Heiau and Makahuna Heiau. Kamauakapu Heiau, of husbandry class, measured about 11 by 16 ft and was located in Kapahulu. It was erected by Kalākaua in 1888 for his Naua Society but was already in partial ruins in the early 1900s (Thrum 1905:44). Makahuna Heiau was a large *heiau* dedicated to Kāne and Kanekoa, “of Kuula [*kū‘ula*] character,” located at Diamond Head (Thrum 1905:44). A third *heiau*, Pahu-a-Maui, was located on the site of the light house station on Diamond Head (Thrum 1905:45).

4.21.5 Helumoa Heiau

Helumoa Heiau, also known as ‘Āpuakēhau Heiau, was located in central Waikīkī near the *muliwai* of ‘Āpuakēhau Stream. This *heiau* was of *po‘okanaka* class and was the site of the sacrifice of Kauhi-a-Kama, a defeated *mō‘ī* of Maui. He was killed during his attempted conquest of O‘ahu in approximately 1610 (Thrum 1905:44). This sacrificial *heiau* was also where Ka‘opulupulu—the last O‘ahu-born Kahuna Nui of O‘ahu—was laid after being slain in Wai‘anae by Kahāhana (Thrum 1903:112–113). The memory of Kauhi-a-Kama’s death and desecration of his remains at ‘Āpuakēhau Heiau may have prompted his descendant, Kahekili, to massacre the O‘ahu chiefs and sacrifice Kahāhana at ‘Āpuakēhau Heiau (Fornander 1918:2:208) and to build Papa‘ena‘ena Heiau (Thrum 1926:109). Portions the Royal Hawaiian Hotel are built on the former site of ‘Āpuakēhau Heiau. An athletic field of *ali‘i* was also formerly built at the site of the Royal Hawaiian Hotel, as excavations for the hotel uncovered *‘ulumaika* (ancient Hawaiian game suggesting bowling) (Thrum 1905:79).

4.21.6 Nā Pōhaku ‘Ola Kapaemāhū a Kapuni (Wizard Stones)

Another religious site in Waikīkī is Nā Pōhaku ‘Ola Kapaemāhū a Kapuni, commonly referred to as the Wizard Stones of Kapaemāhū. These stones were unearthed in the late 1800s on the Waikīkī premises of the Cleghorn family, including Governor A. Cleghorn, his wife Princess Likelike, and their daughter Princess Ka‘iulani. According to a *mo‘olelo* gathered by Thrum (1906:139–141), four soothsayers from the court of a Tahiti king came to Hawai‘i and helped heal many people. Four large stones were gathered from the vicinity of a “bell rock” in Kaimukī and erected in Waikīkī to commemorate them, two at their habitation and two at their bathing place in the sea. The chief of the wizards, Kapaemahu, named his stone after himself, and a virtuous young chiefess was sacrificed and placed beneath the stone. Today they are located at Kūhiō Beach Park (Thrum 1906:139–141).

Richard Paglinawan summarizes the history of Nā Pōhaku ‘Ola Kapaemahu a Kapuni, or the Life-giving Stones of Kapaemāhū and Kapuni, commonly referred to as the Wizard Stones (Paglinawan 1997:1). According to Mr. Paglinawan’s summary of various *mo‘olelo*, four healers gifted in medicinal practices once came from Kahiki, most likely the sacred land of Raiatea. While

some sources claim they were homosexuals, Tutu Mary Kawena Pukui asserts they were gender neutral. The wizards included Kapaemāhū, who, due to his neutral gender, could examine and heal both men and women; Kahoe, a diagnostician who could determine illness just by visual assessment; Kahaloa, who was able to breathe life into ill patients; and Kapuni, who could envelope his patients with his *mana* (power, authority) to overcome their illness (Paglinawan 1997:1).

When the four healers returned to Kahiki, they had stones placed to commemorate their existence. They were most likely quarried from a site in Kaimukī near the present-day intersection of Wai‘alae Avenue and Fifth Avenue, and then transported to Waikīkī. The coastal and inland region of Waikīkī was dominated by *lo‘i*, which would have made the movement of these *pōhaku* difficult but, according to Dr. George S. Kanahele, the stones may have been moved on a 12-ft wide causeway that extended between Mānoa and Waikīkī., observed by George Vancouver in 1792 (Paglinawan 1997:3-4).

Two of the commemorative stones were placed at the healers’ residences, and two were placed in their bathing place in the sea. The Honorable A.S. Cleghorn unearthed an 8-ton stone at his residence close to the Moana Hotel in 1905. Another stone weighing 10 tons was uncovered by Mr. Lutted, and two more were excavated in a straight line with the others. Underneath the 10-ton stone Mr. Cleghorn uncovered a female jaw bone and some crude images, which he later cemented onto the stone. In 1941, the Waikiki Bowling Alley was constructed with the stones serving as part of the foundation, but they were then uncovered in 1958 when the building was razed. In 1963 the stones were located together on the beach, and in 1980 they were relocated to their present site near the police substation. The location of Mr. Cleghorn’s cement casings indicated the stones had been positioned incorrectly; however, a decision was reached to leave them as they had been placed (Paglinawan 1997:5-6).

4.21.7 Kālia ‘Ili

Located in the western section of Waikīkī, Pi‘inaio is a name used for the central portion of Mānoa Stream and the name of the coastal area where the Pi‘inaio Stream emptied into the ocean. The exact meaning of Pi‘inaio is unknown, but *pi‘ina* means “climb or ascend” (Pukui and Elbert 1986:327). The stream’s mouth was on the western end of the Waikīkī coast, where the Ala Moana Shopping Center is now located, west of Duke Kahanamoku Beach and Lagoon.

4.21.8 Kaluaokau ‘Ili

Located in the central area of Waikīkī, Kaluaokau has several possible meanings depending on pronunciation and combination of root words. Henry Kekahuna, a Hawaiian ethnologist, pronounced Kaluaokau as ka-lu‘a-o-ka‘u, which Thrum (1922:641) translated as “the grave of Ka‘u” (*lu‘a* means “heap, pile or grave”). Edith Kawelohea McKinzie (2005), drawing from the Hawaiian dictionaries by Pukui and Elbert (1986) and Andrews (1974), provides several other translations of Kaluaokau that suggest a place deeply connected to the *mana* (supernatural or divine power) of the Waikīkī *ali‘i* as indicated by interpretations of human sacrifice.

The term Kaluaokau can be divided as ka-lua-o-Kau, which literally translates as *ka* (the) *lua* (pit) *o* (of) *Kau* (a personal name), or “the pit of Kau” (McKinzie 2005:24). While others have similarly defined Kaluaokau without additional interpretation (Feesing 2006:90), McKinzie (2005:25–26) suggests Kaluaokau may be an epithet commemorating the burning sacrifice of

Kauhi-a-Kama at ‘Āpuakēhau Heiau. McKinzie elaborates that sacrifices were offered in a variety of ways, including the burning or baking of a person in an underground oven, a process called *kālua*, which is similar in phrasing to *ka-lua* (the pit). Since Kau may be a shortened name of Kauhi-a-Kama, the place name Kaluaokau may refer to “the pit of Kauhi-a-Kama” (Ka-lua-o-Kauhi-a-Kama), or, with the inclusion of a *kahakō* (diacritical), Kāluaokau may refer to the “baking of Kauhi-a-Kama” (Kālua-o-Kauhi-a-Kama) (McKinzie 2005:25–26). McKinzie does not make use the *kahakō* in her text, which is added here.

Alternatively, Kaluaokau may be connected to human sacrifice through other meanings of the terms *lua* and *kau* (McKinzie 2005:27–28). *Lua* can refer to a type of dangerous hand-to-hand combat in which the fighters typically broke bones, dislocated bones at the joints, and inflicted severe pain by pressing on nerve centers, and *kau* can also mean to hang or crucify a criminal. Kaluaokau can thus be translated as “strike lua of kau [hanging]” (ka-lua-o-kau), which may refer to a strike or blow (*ka*) of a certain (*o*) fighting stroke (*lua)* similar to hanging (*kau*) (McKinzie 2005:27), i.e., a “lua fighting stroke of kau [hanging]” (Paglinawan 2008:8). McKinzie explains that “noosing” was a particular technique of lua fighting used for execution. To procure victims for sacrifice or to execute those who had broken *kapu* laws, *mū* (public executioners) utilized basic cordage or a *ka‘ane* (special strangling cord) consisting of a short handle and a cord loop to “noose” or strangle people to death in a manner similar to hanging (McKinzie 2005:27–28).

4.21.9 Helumoa ‘Ili

Located in the central *makai* section of Waikīkī, Helumoa translates as “chicken scratch,” a reference to *mo‘olelo* about the bodies of sacrificial victims being pecked over for maggots (see Section 4.23.2). Two foci of chiefly residence were at places called Helumoa, now the site of the Royal Hawaiian Hotel, and Ulukou, now the site of the Moana Hotel (Hibbard and Franzen 1986:2).

‘Āpuakēhau Stream, literally “basket [of] dew” and possibly named for a rain (Pukui et al. 1974), emptied into the ocean between these two centers. Kawehewehe, sometimes synonymous with the mouth of ‘Āpuakēhau Stream and also the name of the reef entrance and channel at what is known today as Gray’s Beach just east of the contemporary Halekūlani Hotel, translates as “the removal,” which appears to refer to the water’s famous healing powers for removing sickness and forgiving of sins (Pukui et al. 1974:99). A famous surfing spot called Kalehuawehe was located at the mouth of ‘Āpuakēhau Stream (Hibbard and Franzen 1986:2).

Wahi pana in Waikīkī are listed below in Table 5.

Table 5. *Wahi Pana* in Waikīkī Ahupua‘a

Place Name	Meaning	Description	Source
‘Āpuakēhau Stream	Basket [of] dew	Stream entered the ocean at Helumoa (between the Royal Hawaiian and Moana hotels), probably named for a rain; also called Ulukou	Kanahele 1995:7 Pukui et al. 1974
‘Au‘aukai	(undocumented)	*‘Ili*	Bishop 1881

Place Name	Meaning	Description	Source
Hamohamo	Rub gently (as the sea on the beach)	*‘Ili* where Kālia and Pāhoa streams joined and then divided to form Kuekaunahi, ‘Āpuakēhau, and Pi‘inaio streams	Kanahele 1995:7
Helumoa	Chicken scratch	*‘Ili* and site of a *heiau* where Kahanana was sacrificed, named in reference to *mo‘olelo* about the bodies of sacrificial victims pecked over for maggots	Pukui et al. 1974
Kālia	Waited for	*‘Ili*; a stream in the Waikīkī Plain that came from Mānoa	Kanahele 1995:7
Kalehuawehe	The removed *lehua lei*	An ancient surfing area, now called Castle’s	Finney and Housten 1966:38
Kaluahole	The *āhole* fish cavern	*‘Ili*; coast between Waikīkī and Black Point	‘Ī‘ī 1959:92 Pukui et al. 1974
Kaluaokau	(undocumented)	*‘Ili*	Bishop 1881
Kāneloa	Tall Kāne	*‘Ili*	Bishop 1881
Kapaemāhū Pōhaku	Wizard Stones	*Pōhaku*, a set of four stones placed to commemorate four healers from Kahiki (the ancestral homeland of the Hawaiians)	Paglinawan 1997
Kapua	The flower	*‘Ili*; ancient surfing area, now filled in and part of Kapi‘olani Park	Finney and Housten 1966:28 Lyons 1876
Kapuni	The surrounding	*‘Ili*; ancient surfing area	Finney and Housten 1966:28
Kawehewehe	The removal	Name of the mouth of ‘Āpuakēhau Stream and also the name of the reef entrance and channel at what is known today as Gray’s Beach; the water had healing powers for removing sickness	Pukui et al. 1974:99
Kekio	(undocumented)	*‘Ili*	Bishop 1881
Keōmuku	The shortened sand	*‘Ili*	Bishop 1881
Kuekaunahi Stream	(undocumented)	Stream entered the ocean at Hamohamo (near intersection of ‘Ohua Ave and Kalākaua Ave)	Kanahele 1995:7

Place Name	Meaning	Description	Source
Lē‘ahi	(undocumented)	The highest peak in Diamond Head; variant for Lae-‘ahi	Pukui et al. 1974
Loko Mo‘o	(undocumented)	*‘Ili*	Bishop 1881
Mo‘okahi	(undocumented)	*‘Ili*	Bishop 1881
Niukūkahi	Coconut standing alone	*‘Ili*; ancient surfing area	Finney and Housten 1996:28
Pae-ki‘i	(undocumented)	Stones marking a site where strangers suspected of initiating war or searching for human sacrifices were drowned, a type of death called *kai he‘e kai*	Beckwith 1970:89
Pāhoa Stream	(undocumented)	Stream in the Waikīkī Plain that came from Pālolo	Kanahele 1995:7
Pau	Finished	*‘Ili*	Bishop 1881
Pi‘inaio Stream	(undocumented)	Stream entered the ocean at Kālia, becoming a large delta	Kanahele 1995:8
Ulukou	Kou tree grove	*‘Ili*; another name for ‘Āpuakēhau	Bishop 1881 Pukui et al. 1974
Uluniu	Coconut grove	*‘Ili*	Bishop 1881
Waikīkī	Water spurting from many sources	*Ahupua‘a*	Pukui et al. 1974
Waikolu	Three waters	The land between Kuekaunahi, ‘Āpuakēhau, and Pi‘inaio streams	Kanahele 1995

4.22 *‘Ōlelo No‘eau* of Waikīkī

4.22.1.1 *‘Ōlelo No‘eau* #27

The following *‘ōlelo no‘eau* is a classic Hawaiian play on words. Literally the saying is speaking about a sedge plant, *‘ahu‘awa* (*Cyperus javanicus*), found in Waikīkī. However, the original composer would have intended an alternative connotation. Breaking the word apart *ahu* (heap) and *‘awa* (sour), it now describes a heap of sour, in other words—disappointment found in Waikīkī. This is a clever Hawaiian way of saying something negative, without actually saying anything negative.

Aia aku la paha i Waikīkī i ka ‘imi ‘ahu‘awa.

Perhaps gone to Waikīkī to seek the ‘ahu‘awa sedge.

Gone where disappointment is met. A play on *ahu* (heap) and *‘awa* (sour). [Pukui 1983:6]

4.22.1.2 *‘Ōlelo No‘eau* #1032

Kālia is also a place where *‘alamihi* crabs (*Metopograpsus thukuhar*) were once plentiful, leading to a play on the word *‘ala-mihi* (path of repentance), indicating someone who is in a repentant mood (Pukui 1983:110):

Ho‘i i Kālia i ka ‘ai ‘alamihi.

Gone to Kālia to eat ‘alamihi crabs.

He is in a repentant mood. A play on ‘ala-mihi (path-of-repentance). Kālia, O‘ahu, is a place where ‘alamihi crabs were once plentiful. [Pukui 1983:110]

4.22.1.3 *‘Ōlelo No‘eau* #1378

The following *‘ōlelo no‘eau* describes the fishing techniques found in the Kālia area on O‘ahu Island.

Ka i‘a pīkoi kānaka o Kālia; he kānaka ka pīkoi, he kānaka ka pōhuku.

The fish caught by the men of Kālia; men are the floaters, men are the sinkers.

In ancient days, when a school of mullet appeared at Kālia, O‘ahu, a bag net was set and the men swan out in a row and surrounded the fish. Then the men would slap the water together and kick their feet, driving the frightened fish into the opening of their bag net. Thus the fishermen of Kālia became known as human fishnets. [Pukui 1983:151]

4.22.1.4 *‘Ōlelo No‘eau* #1734

The following *‘ōlelo no‘eau* describes the pleasant ocean reverberations characteristic of shallow reef shorelines.

Ke kai wawalo leo le‘a o Kālia.

The pleasing, echoing sea of Kālia.

Refers to the sea of Kālia, Honolulu, now known as Ala Moana. [Pukui 1983:186]

4.23 *Mo‘olelo* of Waikīkī

4.23.1 Kawelo and the Strong Man

In the “Legend of Kawelo,” two boys are born on the same day, Kawelo-lei-makua, called Kawelo, the great nephew of the king of Kaua‘i, and Kawelo-aikanaka, called ‘Aikanaka, the grandson of the king. Kawelo’s older brothers and his parents soon moved from Kaua‘i to live at Waikīkī in O‘ahu near the ruling chief of O‘ahu, Kākuhihewa. The older brothers of Kawelo often challenged a famous wrestler living with Kākuhihewa, but they could never beat him.

The brothers of Kawelo were great surf riders, and they often went to ride the surf at Kalehuawehe (near the present Seaside Hotel in Waikīkī). After the surf ride they would go to the

stream of ‘Āpuakēhau and wash, and from there they would go to the shed where the wrestling bouts were held and test their skill with Kākuhihewa’s strong man; but in all their trials they never once were able to throw him (Fornander 1918:4).

When the king of Kaua‘i died, ‘Aikanaka became the new king. The grandparents, who longed to see their other children, traveled with Kawelo to O‘ahu, to Ulukou in Waikīkī, near the mouth of the stream ‘Āpuakēhau, where his elder brother and parents had been living. His grandparents later took him just inland of the coast. While Kawelo was working in the fields, he heard some shouting from the beach, and asked his grandparents, “What is that shouting down yonder?” (Fornander 1918:5). The grandparents answered that his older brothers had just finished surfing and must have challenged the king’s strong man. The shouting indicated one of them must have been thrown. Next day, Kawelo went down to the beach, went surfing with his brothers, and then bathed in the freshwater stream of ‘Āpuakēhau. He challenged the strong man to a match, even though his brothers mocked him, saying “Are you strong enough to meet that man? If we whose bones are older cannot throw him, how much less are the chances of yourself, a mere youngster?” (Fornander 1918:6). The strong man, impressed by Kawelo’s courage, said:

> ‘Ina wau e kahea penei, “Kahewahewa, he ua!” alaila, kulai kaua.’ Hai aku la no hoi o Kawelo i kana olelo hooulu, penei: ‘Kanepuaa! Ke nahu nei! Alia! Alia i oki ka aina o Kahewahewa, he ua!’
>
> ‘If I should call out “Kahewahewa, it is raining,” then we begin.’ Kawelo then replied in a mocking way: ‘Kanepuaa, he is biting, wait awhile, wait awhile. Don’t cut the land of Kahewahewa, it is raining.’ [Fornander 1918:6]

Kawelo won the match, shaming his older brothers so much that they returned to Kaua‘i. In another version (Thrum 1923:154), the strong man was from Halemano (central O‘ahu), and was killed by a mighty blow from Kawelo. The man’s body was given to the king of O‘ahu, and was carried as a sacrifice to the gods to a *heiau* in Lualualei, Wai‘anae.

4.23.2 Ka‘opulupulu

Thrum (1998:203–214) recounts the *mo‘olelo* of the *kahuna nui* (highest priest) of O‘ahu, Ka‘opulupulu, whose curse upon his death resulted in *ke one ‘ai ali‘i o Kakuhihewa* (the chief devouring sand of Kakuhihewa). Ka‘opulupulu had a son named Kahulupu‘e, who he taught all the traditions and rituals of the priestly caste. At this time, the *ali‘i aimoku* (ruler) of O‘ahu was Kumuhana, a cruel chief who terrorized his people and would not listen to the counsel of his priest, Kahulupu‘e. Kumuhana was finally driven off the island by the people and the lesser chiefs. When Kahekili, the king of Maui, heard this news, he sent his foster son, Kahāhana (brother of Kumuhana), to rule O‘ahu in Kumuhana’s place (ca. 1773). Kahāhana chose a grove of coconut and *kou* trees, called Ulukou, located on the Waikīkī coast as his place of residence, and many *ali‘i* gathered in that place around him. One day, Kahāhana sent a messenger to Ka‘opulupulu to attend him at Ulukou, who traveled from his home in Waimea and was greeted by the retainers of the king when he reached the mouth of the stream ‘Āpuakēhau. At first Kahāhana valued the wisdom of the priest, but after several years, Kahahana began to be as cruel to the people as his predecessor, Kumuhana. In protest, the priest Ka‘opulupulu left Waikīkī to return to his home in Waimea, where he tattooed his knees, a sign that Kahāhana had turned a deaf ear to his advice. This angered the king, who sent messengers to order Ka‘opulupulu and his son, Kahulupu‘e, to come to Wai‘anae, where Kahāhana then resided.

At Wai‘anae, Ka‘opulupulu and his son were placed into a special grass hut, one tied to the end post and one tied to the corner post. The next day, Kahāhana ordered his men to torture the son, stabbing his eyes and stoning him while his father watched. When Ka‘opulupulu saw this, he commanded his son to flee into the sea, saying these words, which contained a prophecy:

E nui ke aho, e ku‘u keiki,	Take a deep breath, my son, and
a moe i ke kai, no ke kai la	lay yourself in the sea, for then
ho‘i ka ‘āina.	the land shall belong to the sea. [Pukui 1983:44]

Ka‘opulupulu was taken by the soldiers to Pu‘uloa (Pearl Harbor), at ‘Ewa, and slain before the king. His body was put into a canoe and taken to Waikīkī, where it was placed high in the coconut trees at Kukaeunahi at the *heiau* of Helumoa, so that the flesh would decompose and fall to the sand (Thrum 1998:214). According to one *mo‘olelo*, the meaning of Helumoa, “chicken scratch,” refers to chickens scratching to find the maggots that fell from victims placed in the trees who were human sacrifices at the *heiau* of ‘Āpuakēhau (Pukui et al. 1974:44). When the king of Maui, Kahekili, heard this news he grieved for Ka‘opulupulu and turned against his foster son. With his warriors, he set out over the sea for Waikīkī to take back the rulership of O‘ahu under his own authority. This fulfilled the prophecy of Ka‘opulupulu. According to S.M. Kamakau and David Malo, this saying was also in keeping with a prophecy by Kekiopilo presaging the arrival in the islands of foreigners, which would lead to “the foreigners possess[ing] the land” (Thrum 1998:214).

The sands of Ulukou was known as “Ke One ‘Ai Ali‘i o Kākuhihewa” because of the curse placed by the prophet Ka‘opulupulu. When Ka‘opulupulu was brought with his son, Kahulupu‘e, to be executed at Waikīkī, he cursed the place where his body-grease would drip upon the sand, as well as the chiefs and the people (Hibbard and Franzen 1986:5). This curse continued to have an effect for the descendants of Kamehameha. Kamehameha II died in England. From the warning of this curse by the *kahuna*, Luau-nui-a-lepokapo, after the death of Kamehameha II, Kamehameha III (Kauikeaouli) transferred the seat of the government from O‘ahu to Lahaina in 1838. He later reconsidered moving back to O‘ahu against the counsel of his *kahuna*:

> ‘O chief! This land of Oahu of Lua is made bitter by the fat of the man of god and his words lie like a squirming maggot for Kakuhihewa. If you listen to those who ask that the government be taken back to Oahu, it will become a maggot which will consume your race.’ [Green and Pukui 1936:123]

However, Kauikeaouli ignored the advice, and the prophecy was fulfilled with the smallpox epidemic of 1852–1853 (Thrum 1998:214).

4.23.3 Kawehewehe

‘Āpuakēhau Stream has sometimes been referred to as the *muliwai* (river, river mouth) of Kawehewehe. The place name Kawehewehe, cited by ‘Ī‘ī (1959:93) and in the Māhele records, is also of note:

> [The] Reef entrance and channel off Grey’s Beach, just east of the Hale-kū-lani Hotel, Wai-kīkī, Honolulu. The sick were bathed here as treatment. The patient might wear a seaweed (limu-kala) lei and leave it in the water as a request that his sins be forgiven, the lei being a symbol. Lit., the removal. [Pukui et al. 1974:99]

The *līpoa* (*Dictyopteris plagiogramma* and *D. australis*) seaweed of Waikīkī, especially at Kawehewehe, was so fragrant that one could smell it while standing on the shore. It was often mentioned in *mo‘olelo* about Waikīkī, including the following saying from Pukui (1983):

Na līpoa ‘ala The fragrant līpōa
O Kawehewehe. of Kawehewehe.
[Pukui 1983:246]

4.24 *Ala Hele*

The two major centers of population, Honolulu and Waikīkī, were navigated and connected through a network of trails (Figure 17). The following is an excerpt describing some of the pathways used by the ancient Hawaiians, as recorded by Hawaiian historian Papa ‘Ī‘ī.

> The trail from Kawaiahao which led to lower Waikiki went along Kaananiau, into the coconut grove at Pawaa, the coconut grove of Kuakuaka, then down to Piinaio; along the upper side of Kahanaumaikai’s coconut grove, along the border of Kaihikapu pond, into Kawehewehe; then through the center of Helumoa of Puaaliilii, down to the mouth of the Apuakehau stream; along the sandy beach of Ulukou to Kapuni, where the surfs roll in; thence to the stream of Kuekaunahi; to Waiaula and to Paliik . . .
>
> From Paliiki the trail ran up to Kalahu, above Leahi, and on to the place where the Waialae stream reached the sand. The trail that ran through Kaluahole went to Kaalawai, up over, and down into Kahala, to meet the other trail at the place where the stream reached the sand. [‘Ī‘ī 1959:92–94]

4.25 Agriculture and Subsistence

The Waikīkī marshland was thought of an ideal place for taro cultivation, providing an abundance of water and sunlight (Figure 18). Taro grown under sunnier conditions matures noticeably faster, thus making Waikīkī a key area for cultivation and an even better place for growing taro than the revered *ahupua’a* of Kāne‘ohe and *‘ili* of ‘Āhuimanu in Kahalu‘u (Kanahele 1995:22). *‘Uala* and the prized *ipu* (gourd; *Lagenaria siceraria*, also *L. vulgaris*) were also abundant in the lower Waikīkī marshlands (Kanahele 1995:35).

The settlers of Waikīkī had to travel *mauka* to the foothills of Mānoa and the valley of Pālolo to gather grasses, vines, and other fauna. *Pili* grass could be found in the drier areas of Mānoa as well as Kapahulu and Kaimukī (Kanahele 1995:24). *Pili* grass was used primarily to thatch homes. Along stream banks grew *hau* (beach hibiscus; *Hibiscus tiliaceus*). The tree’s wood proved excellent for outrigger canoe frames and kite supports; the bark was used for ropes, nets, and *kapa* (cloth); while the flowers were used for medicine (Kanahele 1995:25). *Kukui* (candlenut; *Aleurites moluccana*) trees could be found mid-way in Mānoa Valley (Kanahele 1995:26). The kernels were used to make *‘inamona* (relish) and the oily nut could also be used for stone lamps. The flowers, leaves, branches, and bark were used for medicinal purposes, curing a range of ailments from sore throats to bouts of constipation (Kanahele 1995:26). *‘Ōhia ‘ai* (mountain apple; *Eugenia malaccensis*) could also be found mid-way in Mānoa Valley (Kanahele 1995:26).

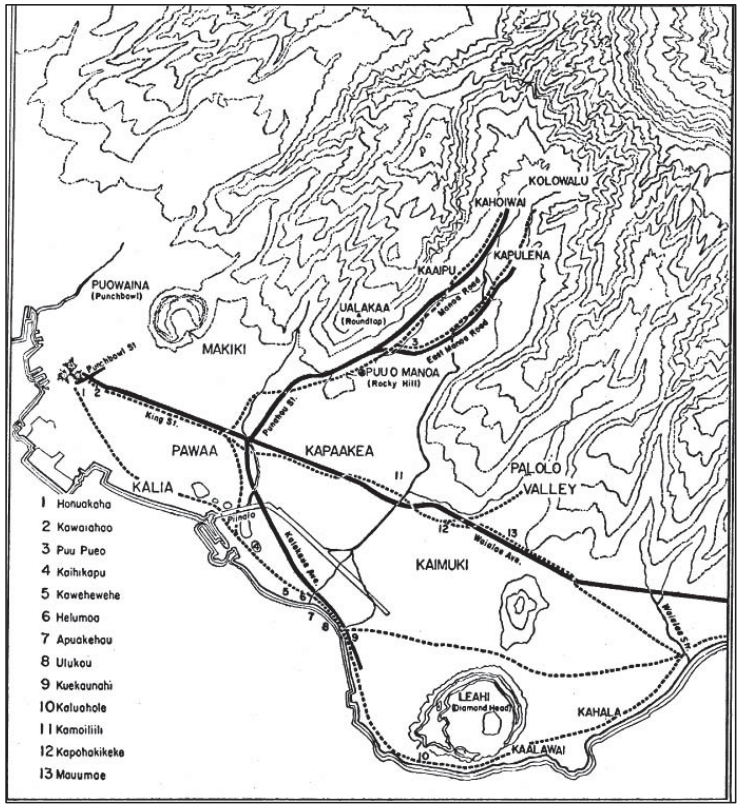

Figure 17. Trails on the southwest coast of O‘ahu ca. 1810 (sketch by Gerald Ober; reprinted in ‘Ī‘ī 1959: 93; not to scale), showing locations of some place names in Waikīkī



Figure 18. Photo of Waikīkī looking to Diamond Head across *lo‘i kalo* (irrigated terrace of taro) from McCully Street area (Baker Collection courtesy of Kamehameha Schools)

4.26 Marine Resources

4.26.1 *Loko I‘a*

Historic maps and images depict the locations of numerous *loko i‘a* in Waikīkī and historic documents describe “several hundred” and “innumerable” artificial freshwater fishponds extending a mile inland from the shore (Bloxam 1925:35–36 in McAllister 1933:76). Two studies by the U.S. Commission of Fish and Fisheries (Bowers 1902:429; Cobb 1902 in McAllister 1933:76) listed extant fishponds in Kālia in 1901, including Ka‘ihikapu (“the taboo sacredness”), Kūwili (“stand swirling”), Kaipuni (1 and 2), Paweo (1 and 2), Kapu‘uiki, Kapaakea,Maalahia, Opu, and Opukaala, as well as several fishponds with undocumented names. In addition, historic maps provide the locations of several of these and other fishponds: Kaohai, Oo, Halemauuola, Moo, Kuilei (“lei stringing”), and Kaheana (Bishop 1881).

Fishponds were one of the most important traditional resources for the Hawaiian community in Waikīkī. Historic maps and images depict the locations of numerous *loko i‘a* in Waikīkī (Figure 19).

The fame of Kālia’s fishponds are attested to in a *mo‘olelo* recounted by John Papa ‘Ī‘ī (Wyban 1992) that deals with prohibitions against wasting food:

> Once Kinopu gave a tribute of fish to Kamehameha’s son Kinau, at Moehonua’s fishpond in Kalia. While Kinau and his wife Kahukuhaakoi (Wahine-pio) were going to Waikiki from Honolulu, the sea came into the pond and fishes of every kind entered the sluice gate. Kinopu ordered the keepers of the pond to lower fish nets and the result was a catch so large that a great heap of fish lay spoiling upon the bank of a pond.
>
> The news of the huge catch reached Kamehameha, who was then with Kalanimoku, war leader and officer of the king’s guard. The king said nothing at the time, but sat with bowed head and downcast eyes, apparently disapproving of such reckless waste. [Wyban 1992:87]

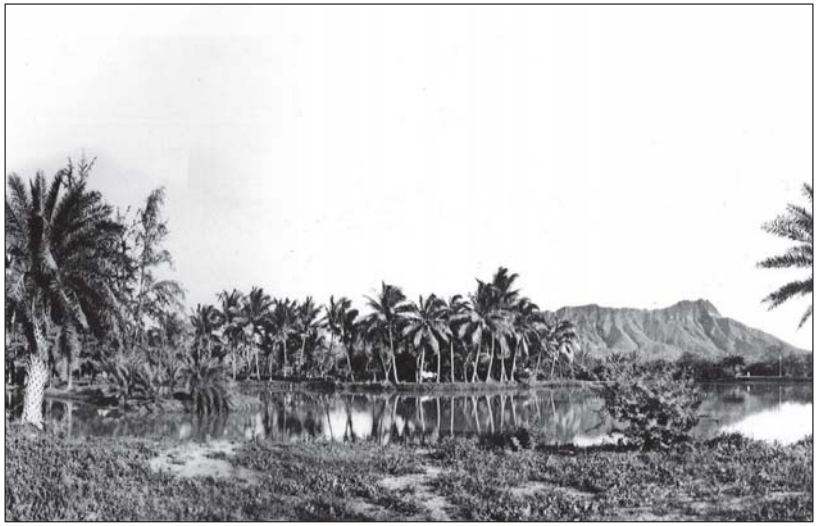

Figure 19. Photo of Diamond Head from fishponds in the Kālia ‘Ili area (Hawai‘i State Archives n.d.)

4.27 *Ilina* and Human Sacrifice

Hawaiian authors in the nineteenth and twentieth centuries have emphasized that victims for sacrifice were “criminals,” “wrongdoers,” or “individuals who had broken tabu, or rendered themselves obnoxious to the chiefs” (Kanahele 1986:116). Another major category of human sacrifice victims was the *kauwā*. Pukui and Elbert (1986:128) translate *kauwā* as “Untouchable, outcast, pariah: a caste which lived apart and was drawn on for sacrificial victims.”

Waikīkī was famous for the drowning of *kauwā* with the same formulaic phrase, “Moe mālie i ke kai o ko haku,” (‘Lie still in the waters of your superior’) used for *kauwā* drownings at Kawailumaluma‘i, Kewalo, and Kualoa. An account of sacrificial drowning of *kauwā* at Waikīkī appeared in the Hawaiian language newspaper *Ka Loea Kālai‘āina*:

> *A penei na‘e i kauwā loa* [sic “loa‘a”] *ai. Aia a mana‘o ke Ali‘i Nui (Mō‘ī) e ‘au‘au kai i Waikīkī. Eia ka nīnau a ke Ali‘i Nui i ke ali‘i ma lalo iho ona, ‘Pehea āu mau wahi lepo kanu o Pu‘u Ku‘ua? ‘A‘ole paha he mau wahi pōhuli?’*
>
> *Eia ka pane a ke ali‘i ma lalo iho ona, ‘He Pōhuli nō.’ ‘O ke kauoha ia akula nō ia e ki‘i.*
>
> *‘Oiai ko kāne me ka wahine e nanea ana me nā keiki, a hiki ‘ana ke ki‘i i mau keiki. ‘O ke kū a‘ela nō ia o ka makuakāne a lawe ‘ana i kāna mau keiki a hiki i Waikīkī.*
>
> *Aia ho‘i a hiki i ka wā a ke Ali‘i e hele ai i ka ‘au‘au kai, a laila, hoouna ‘ia mai ke kahu e ki‘i mai i ua keiki a lawe aku ia ma kahi pāpa‘u o ke kai, ma kahi a ke Ali‘i*
>
> *nui e hele kū ‘ana, a laila kau nā lima o ka Mō‘ī i luna o kahi keiki a me kahi keiki, ma nā ‘ā‘ī o nā keiki a pa‘a ai.*
>
> *‘O ka hua ‘ōlelo ma ka waha o ke Ali‘i nui e ‘ōlelo ai, ‘‘A‘ole pau ku‘u loa! ‘A‘ole pau ku‘u loa!’ ‘Oiai ‘o ia e ‘au ana me ka pa‘a nō o nā lima i nā keiki a hiki i ka umauma ke kai o ke ali‘i.*
>
> *Ua lana a‘ela nā keiki i luna o ka ‘ilikai, aia ke alo i lalo. Eia ho‘i ka ‘ōlelo a ka makuakāne ma kula aku nei, ‘Moe mālie i ke kai o ko Haku,’ a pēlā aku.*
>
> *‘O ke kai o Waikīkī ke kai i ‘ōlelo ‘ia he kai lumaluma‘i kanaka o ka lua, aia i Kualoa.*

Translation:

> When the ruling chief wished to go to Waikīkī for sea bathing he asked the chief just below him in rank, ‘How are my planting places at Pu‘u Ku‘ua, [a place in the Wai‘anae Range famous as a kauwā residence and place of mixed caste], have they not produced young suckers?’ The chief next to him answered, ‘There are some suckers,’ and sent someone for them. When the men, women and children least expected it, the messenger came to get some of the children. The father stood up and took his sons to Waikīkī.
>
> Then, when the ruling chief went sea bathing, he sent an attendant to get the boys and take them to a shallow place where the ruling chief would come. Then the ruler placed a hand on each of the boys, holding them by the necks. The words he uttered were, ‘My height has not been reached! My height has not been reached!’ He

> advanced and held onto the boys until the sea was up to his chest. The boys floated on the water face down. The father on shore called out, ‘Lie still in the sea of your Lord,’ and so on.
>
> The Sea of Waikīkī is said to have been used to kill men in and the other place is Kualoa. [*Ka Loea Kālai‘āina*, 8 July 1899, translation in Sterling and Summers 1978:33]

No specific location at Waikīkī is indicated as the sacrificial site. Numerous accounts of human sacrifice (or near sacrifice) at Waikīkī have a mythopoeic quality for which the historical basis is uncertain.

Papa‘ena‘ena, certainly the most famous *heiau*, was located at the foot of Diamond Head crater in the environs of the present La Pietra Estates condominium development. Papa‘ena‘ena Heiau is traditionally associated with Kamehameha I who was said to have visited the *heiau* before setting off to battle for Ni‘ihau and Kaua‘i in 1804. Five years later, according to John Papa ‘Ī‘ī, Kamehameha placed at Papa‘ena‘ena the remains of an adulterer—“all prepared in the customary manner of that time” (‘Ī‘ī 1959:50–51). This would have been one of the last human sacrifices in the kingdom.

In the “Legend of Kapo‘i,” a man from Makiki built a *heiau* in Mānoa in response to his *‘aumakua* (family or personal god), the *pueo*. Kamakau gives an account of the near sacrifice of Kapo‘i at Kūpalaha Heiau.

> *Kuku‘i akula a lohe ke ali‘i ‘o Kākuhihewa, e noho ana i Waikīkī, me ka ‘ōlelo ‘ia aku, ua kapu mai nei kekahi kanaka i ka heiau o kona akua, a ua noa. He kānāwai kapu; inā e kūkulu kekahi ali‘i a kanaka paha i ka heiau, a kapu ē ma mua , a noa, ‘a‘ole na‘e i noa ke kapu heiau a ke ali‘i ‘ai moku, a laila, he kipi ‘ia a ho‘okahi ona hope ‘o ka make.* [Kamakau 1991:23]

Translation:

> Word came to the chief Kākuhihewa, who was living in Waikīkī, that a man had dedicated a heiau to his god and had freed the kapu. Kākuhihewa had issued a decree that no chief or man (kanaka) was to build a heiau and dedicate it and free it before the heiau of the ali‘i ai moku, the paramount chief himself, had been dedicated and freed. This would be an act of rebellion and death would be the penalty. Therefore, Kapo‘i, the wrongdoer, was fetched and led to the heiau of Kūpalaha in Waikīkī. [Kamakau 1991:23]

Our present evaluation of the Waikīkī burials is much more mundane than battle deaths or human sacrifices—namely that the vast majority of the deceased were the common people of Waikīkī. Withington, probably referring to the *‘ōku‘u* (disease at the time of Kamehameha, perhaps cholera or dysentery) plague ca. 1804, says, “A few years of peace settled over the Islands. Kamehameha and other warring chiefs took this opportunity to re-establish their forces, which had been greatly reduced through war and disease. A terrible epidemic of measles had attacked the people of the islands. It is claimed that more than three hundred bodies were carried out to sea from Waikīkī in one day,” (Withington 1953:16). Possibly many of the Waikīkī burials relate to such early depopulation by introduced diseases.

Rank seems to have had profound influences on places available for disposal. A king’s body, or those of his attendants, could be placed within the district of the king’s authority. Many geographical features were available. Fewer were available to lesser chiefs and their attendants, who were presumably limited to their own districts. The number of geographical features available for disposal seems to have decreased as rank decreased. Disposal for members of an extended family living in an *‘ili* was restricted to those geographical features located within the land unit, whether broken lava flats, lava tubes, earth plains, or sand dunes (Bowen 1961:21).

According to Bowen (1961:21), most Hawaiians in the pre-Contact period belonged to the *maka‘āinana* (commoner class) and their bones were usually buried in no other area than their particular *‘ili*; this particular practice is reflected in a Hawaiian term for one’s natal locality—*kulāiwi* meaning “plain of one’s bones” (Cleghorn 1987:41).

Burials are commonly reported from clean, consolidated sand deposits, clearly a common place of interment practiced by Hawaiians (Cleghorn 1987:42). One of the earliest references to burials was made by Urey Lisiansky (1814:122), who visited Hawai‘i in June 1804. He notes, “The poor are buried anywhere along the beach . . .”

Commenting on the nature of burial areas and body positions used in burial, Ellis says,

> The common people committed their dead to the earth in a most singular manner. The body was flexed, bound with cord, wrapped in a coarse mat, and buried one or two days after death. Graves were . . . either simply pits dug in the earth, or large enclosures . . . Occasionally they buried their dead in sequestered places at a short distance from their habitations, but frequently in their gardens and sometimes in their houses. Their graves were not deep and the bodies were usually placed in them in a sitting posture. [Ellis 1827:361–363]

Regarding the Castle burials in Waikīkī, Bowen goes on to report, “Concerning the circumstances of burial, Emerson says: ‘From the absence of fractures and marks of violence in the bones I have examined, such as might have been caused in battle, I am inclined to think that the site where they were found was at one time a Hawaiian cemetery” (Bowen 1961:149).

Areas immediately inland and adjacent to the project area have yielded a large number of burials from both pre-Contact and early historic times. Many archaeological studies have documented burials in both Jaucas sand deposits and in more terrigenous sediments throughout Waikīkī.

One burial (SIHP # 50-80-14-07087) was found in the immediate project area (Figure 20). A previously disturbed human burial, which consisted of a nearly complete human cranium and cranial fragments, were inadvertently discovered near the intersection of Kālia Road and Ala Moana Boulevard (Mooney et al. 2009:i). The burial was left in situ. Table 6 lists the historic property found within Waikīkī segment of the project area.

Table 6. Burials Found within the Waikīkī Segment of the Project Area

SIHP	Location	Description
# 50-80-14-07087	Ala Moana Blvd and Kālia Rd	Previously disturbed human burial, most likely Native Hawiian; near complete cranium and cranial fragments; left in situ



Figure 20. Google Earth Imagery (2013) with burials found within and in the vicinity of the Kālia portion of the proposed project

Section 5 Historical Background

The following section provides a summary of the historical events that transpired within Honolulu Ahupua‘a, between Honolulu and Waikīkī. Focusing on geographic and temporal scales, this section traces the exploration of the Pacific Ocean and the subsequent delivery, settlement, and expansion into the Hawaiian archipelago. The historical background illustrates changes to the project area from the arrival of Captain Cook in 1778, the first Western explorer to visit Hawai‘i, through to the present era.

5.1 Honolulu Ahupua‘a

5.1.1 Early Historic Period

5.1.1.1 Honolulu

The area that today comprises the portion of downtown Honolulu that surrounds Honolulu Harbor and extends to the mouth of Nu‘uanu Stream was known to the Hawaiians as “Kou,” a center of population and activity similar to Waikīkī, its preeminent neighbor to the southeast. Kou stretched from “Nu‘uanu to Alakea streets and from Hotel Street to the sea” (McAllister 1933:80) and possessed shoreward fishponds and irrigated fields fed by streams descending from Nu‘uanu and Pauoa valleys.

Kamehameha defeated Kalanikūpule at the battle of Nu‘uanu in 1795, and in 1809, moved his court, government, and residence from Waikīkī to Honolulu. Kamehameha was known to have taken a special interest in farming and would work in the fields alongside the commoners to demonstrate the importance of agriculture. Crops such as yams were developed under Kamehameha and were often sold to the captains of foreign ships in need of provisions at Honolulu Harbor (‘Ī‘ī 1959:69).

Honolulu was somewhat slow to catch on as a major destination for foreigners visiting the archipelago. The only stop of Cook’s ships on O‘ahu was at Waimea Bay (1779), not viable as a significant port owing to the famous winter swell that breaks there. A discouraging factor for early trade at O‘ahu was political instability. The ruling chief Peleiōhōlani died around 1780, and his heir, Kumuhana was almost immediately deposed in a coup d’etat. A period of political unrest followed including the successful invasion of Maui by Kahekili in 1783, the bloody crushing of the O‘ahu rebellion in 1786, the invasion by the Kaua‘i ruler Ka‘eokūlani in 1791, the passing of the rule following Kahekili’s death in 1794 to Kalanikūpule, and finally, his defeat by Kamehameha I in 1795 (Beechert 1991:12-14).

E.S. Craighill Handy and Elizabeth G. Handy give a description of Honolulu:

> What is now Honolulu was originally that flatland area between the lower ends of Nu‘uanu and Pauoa Valleys and the harbor. Westervelt (1915, p. 1) wrote that ‘Honolulu’ was probably a name given to a very rich district of farm land near what is now . . . the junction of Liliha and School Streets, because its chief was Honolulu, one of the high chiefs at the time of Kakuhihewa . . . It is probable that the chief referred to by Westervelt took his name from the harbor and adjoining land. The original name of the land where the town grew when the harbor became a haven for foreign ships was Kou (Pukui and Elbert, 1957, p. 154). The number of heiau in this area indicates that it was a place of first importance before the era of foreign contact. [Handy and Handy 1972:479]

Rev. Hiram Bingham arrived in Honolulu in 1820. He described Honolulu as a still predominantly native Hawaiian environment—still a “village”—on the brink of western transformations:

> We can anchor in the roadstead abreast of Honolulu village, on the south side of the island, about 17 miles from the eastern extremity . . . Passing through the irregular village of some thousands of inhabitants, whose grass thatched habitations were mostly small and mean, while some were more spacious, we walked about a mile northwardly to the opening of the valley of Pauoa, then turning southeasterly, ascending to the top of Punchbowl Hill, an extinguished crater, whose base bounds the northeast part of the village or town . . . Below us, on the south and west, spread the plain of Honolulu, having its fishponds and salt making pools along the seashore, the village and fort between us and the harbor, and the valley stretching a few miles north into the interior, which presented its scattered habitations and numerous beds of *kalo* (*arum esculentum*) in its various stages of growth, with its large green leaves, beautifully embossed on the silvery water, in which it flourishes. [Bingham 1847:92-93]

5.1.2 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele—the division of Hawaiian lands—that introduced private property into Hawaiian society. In 1848, the Crown and the *ali‘i* received their land titles as *konohiki* (land manager) awards. *Kuleana* (Native land rights) awards to commoners for individual parcels within the *ahupua‘a* were subsequently granted in 1850 and thereafter. The Crown Lands were considered the private lands of the monarch, and many lands were sold or mortgaged during the reigns of Kamehameha III and IV to settle debts to foreigners. To end this practice, the Crown Lands were made inalienable in 1865, and their dispensation was regulated by a Board of Commissioners of Crown Lands, which effectively put them under the administrative control of foreign-born residents (Kame‘eleihiwa 1992:310).

In 1850, the Privy Council passed resolutions that affirmed the rights of the commoners or native tenants. To apply for simple title to their lands, native tenants were required to file their claim with the Land Commission within the specified time period of February 1846 and 14 February 1848. The Kuleana Act of 1850 confirmed and protected the rights of native tenants. Under this act, the claimant was required to have two witnesses who could testify they knew the claimant and the boundaries of the land, knew that the claimant had lived on the land for a minimum of two years, and knew that no one had challenged the claim. The land also had to be surveyed (Chinen 1958:31).

These awards were presented to tenants, Native Hawaiians, naturalized foreigners, non-Hawaiians born in the Islands, or long-term resident foreigners who could prove occupancy on the parcels before 1845. LCA documents indicate these parcels were awards to a variety of Native Hawaiians and foreign settlers who had moved into Honolulu as the city developed (Table 7).

On 8 March 1848, Kamehameha III divided his property in the Islands reserved for him through the Māhele into two parts; the smaller portion he retained for himself and his heirs, while the larger

Table 7. LCA List for the Honolulu Ahupua'a

LCA	Claimant (Awardee)	*Ahupua'a*	*'Ili* or Street Name	Description
19	Naahu	Honolulu	*Kaoaopa*	One *'āpana* (parcel), 0.6 acre
22	Weloula	Honolulu	*Kapuukolo*	One *'āpana*, 0.2 acre
23	Smith	Honolulu	Richards St	One *'āpana*, 0.16 acre
30	Kahoowaha	Honolulu	*Kapuukolo*	Twp *'āpana*, 0.21 acre
38	E. & H. Grimes	Honolulu	Nuuanu St	One *'āpana*, 0.5109 sq ft
46	J. Maughan	Honolulu	Maunakea St	One *'āpana*, 0.13 acre
57	S. Kou	Honolulu	*Kapuukolo*	One *'āpana*, 0.08 acre
63	Namauu	Honolulu	*Honuakaha*	One *'āpana*, 0.73 acre
66	Napahi	Honolulu	*Kapuukolo*	One *'āpana*, 0.35 acre
116	A. Paki	Honolulu	Queen and Punchbowl St	One *'āpana*, 0.98 acre
129	Kinimaka	Honolulu	Queen and Punchbowl St/ *Honuakaha*	Three *'āpana*, 2.9 acres
164	Kekuanaoa for V. Kamāmalu	Honolulu	Fort St	One *'āpana*, 0.168 acre
170	M. Kekuanaoa	Honolulu	King St	One *'āpana*, 0.79 acre
180	L. Kamehameha	Honolulu	Punchbowl St	One *'āpana*, 0.98 acre
186 B	V. Kamamalu	Honolulu	Queen St (*Aienui*)	One *'āpana*, 0.06 acre
191	Kekauonohi	Honolulu	King St, Merchant St, Queen St, Richards St	Three *'āpana*, 0.98 acre One *'āpana*, 0.32 acre One *'āpana*, 0.93 acre One *'āpana*, 1.08 acres
214	Maunuiki	Honolulu	Fort St	One *'āpana*, 0.19 acre
247	C. Kanaina for Wm. Lunalilo	Honolulu	Beretania St, Queen St, King St, Fort St, Merchant St, Printers Lane, Punchbowl, *Kaka'ako*	One *'āpana*, 0.543 acre One *'āpana*, 0.51 acre Four *'āpana*, 5.33 acres One *'āpana*, 0.11 acre One *'āpana*, 0.13 acre One *'āpana*, 0.23 acre One *'āpana*, 0.13 acre One *'āpana*, 0.25 acre
256	Kalukini	Honolulu	*Kapuukolo*	One *'āpana*, 0.23 acre
298	Namakeha	Honolulu	King St	Two *'āpana*, 0.68 acre

LCA	Claimant (Awardee)	*Ahupua'a*	*'Ili* or Street Name	Description
387	ABCFM (American Board of Commissioners for Foreign Missions)	Honolulu	Beretania St, *Punahou*, *Kawaiahao*, *Kukuluāe'o Kaumakapili*	Two *'āpana*, 5.36 acres Three *'āpana*, 338.58 acres Two *'āpana*, 30.5 acres Three *'āpana*, 77 acres Three *'āpana*, 1,32 acre
626	S. Reynolds	Honolulu	Hotel St, Merchant St	Three *'āpana*
738	Kaunuohua	Honolulu	Beretania St	One *'āpana*, 0.39 acre
773	Kealoha	Honolulu	Queen St, *Kīkīhale*	One *'āpana*, 0.4 acre
810	Jones	Honolulu	Marine St	Two *'āpana*, 0.54 acre
2065	Keo Bolabola	Honolulu	*Kapuukolo*	One *'āpana*, 0.03 acre
2938	Huanu	Honolulu	*Pauoa*,*Kalawaihine*, Maunakea St, *Kaakaukukui*	One *'āpana*, 1.51 acre One *'āpana*, 2.31 acres Four *'āpana*, 18.49 acres
4457	Kaloa	Honolulu	*Kaka'ako*	One *'āpana*, 0.48 acre
7712	V. Kamāmalu	Honolulu	*Paeaki*, *Kaakaukukui*	One *'āpana*, 9.25 acres Four *'āpana*, 40.487 acres

portion was given "to his Chiefs and People"; the latter became known as "Government Lands" (Chinen 1958:26). Fifty-two *'ili* in Honolulu, Kalihi, and Waikīkī were set aside from the Government Lands as "Fort Lands" for the support of the garrison of the fort at Honolulu. A distinct series of LCAs were issued for the *kuleana* in these lands, marked FL (Fort Land) to distinguish them from other awards. The Fort Land *kuleana* were granted free of charge to the awardees. Most of the LCAs in Honolulu were house lots and store lots *mauka* of Queen Street.

5.1.3 Mid- to Late 1800s

In 1846, Honolulu was made the capitol of the Hawaiian Kingdom and was well on its way to becoming the commercial and political hub of the Islands. By 1850, Honolulu was, as described by Charles Wilkes, "very conspicuous from the sea and has more the appearance of a civilized land, with its churches and spires, than any other island in Polynesia" (Wilkes 1856:373).

During this period there was an obvious increase in density of land use and urbanization. The waterfront of Honolulu changed significantly during this period. Experiencing the peak of the whaling industry around 1850, the harbor area became crowded with trading and whaling vessels, and required additional wharfs to accommodate them.

Honolulu was in a period of rapid change. Reverend Sereno Bishop offers a unique perspective on the changes in the layout of Honolulu and the structures that lined the streets:

> When I returned to Honolulu in 1853, after an absence of thirteen years, I was struck by the many changes . . . [In 1840] The major portion of the residents of Honolulu still lived in thatched houses. In fact the town was almost entirely composed of this kind of dwellings . . . When I went away there were only Punchbowl Road,

> Beretania Street, King Street and Merchant Street. This was the condition of the city in 1840. [Bishop 1916:58]

During the whaling era, when seamen came ashore for “rest and relaxation,” the downtown area from Nu‘uanu Street west to Nu‘uanu Stream was a district of “dilapidated native huts and tenements, tiny bar-rooms, coffee-shops, and run-down ‘boarding houses,’ all turning to the harbor for their opportunities and income” (Daws 2006:239).

5.1.3.1 Cholera Epidemic of 1895

In 1895, a cholera epidemic struck the Islands and spread due to the unsanitary conditions of the harbors and Nu‘uanu Stream. Near the King Street bridges were many laundries. This area was called *‘a‘ala* (fragrant) by the Hawaiians, an ironic statement on the odors of the area. The cholera

> . . . came in the form of active cases among Chinese steerage passengers on the *Belgic*, which arrived August 9. The harbor waters—stagnant, alkaline, and heavily contaminated with sewage and refuse became infected and crabs feeding upon this infected material were believed to have been the means through which it spread, first to a native woman, and then to guests at a luau in her house. One of these secondary cases washed his clothing at the Aala laundries and infected the Nuuanu stream, and various rice and taro patches became contaminated in a similar manner. [Arnold 1956:317]

A total of 88 cases, 76 being Hawaiians, were reported between the start of the epidemic in August to its end in October. A total of 64 people died, all in the Honolulu area (Arnold 1956:317; Schmitt 1977:363). In the late nineteenth century, spurred by the deaths of the recent cholera epidemic, the government began to plan and institute public improvements to the roads, bridges, sewer systems, and streams in the western Honolulu area. Thomas Thrum, editor of the *Hawaiian Almanac and Annual*, reported on these improvements in his annual retrospect of the preceding year.

In retrospect for 1895, Thrum noted,

> The new spirit of public improvements . . . has been pushed with vigor. The relaying of larger water mains through a number of streets and completion of the new pumping plant, auxiliary to the reservoir system, was effected in time to do valuable service during the cholera period by shutting off the reservoir supply with its possible contamination, and flushing the mains with artesian water. . . .the enlargement of the inner harbor by dredging, with contemplated increased wharfage facilities along the extension of Queen street toward the King street bridge has already been entered upon. The dredging serves the further beneficial purpose of filling in the low land partly occupied, till recently, by the old wash houses, on the northern side of Nuuanu stream which is to be assigned to park [‘A‘ala Park] purposes for the benefit of the residents in that part of the city and the improvement of its sanitary condition. [Thrum 1896:144]

In the retrospect for 1897, the *Hawaiian Annual* gave an update on the project:

> The dredging of Honolulu harbor and rock cutting to deepen the site at the Waikiki end of the Pacific–Mail Wharf selected for the special needs of the big steamers of

> the Orient line, has been pushed, and considerable progress made in filling in the Aala and other tracts adjacent to the Nuuanu stream. There remains much yet to be done to complete the extensive channelization contemplated by this river and harbor improvement. [Thrum 1898:158]

5.1.4 Repatriation of Bones in Chinatown

Land records associated with Mataio Kekuanaoa’s LCA 170 at Kapukolo (also known as Kapu‘ukolo) indicate traditional Hawaiian land use on the property according. However, the immediate area was also part of a rich Chinese cultural landscape. This particular parcel is within the area today known as Chinatown and is bound between North King Street (*mauka*) and North Nimitz Highway (*mauka*). For nearly a century, the common practice was for Chinese patriots to disinter their fellow countrymen’s bones and prepare them for shipment back to their homeland of China. In a general sense, it is logical to assume that many of these bones most likely passed through Honolulu’s Chinatown, but the details are not well-known. Maly and Maly (2013) provide the following account:

> Preparing Bones for Shipment to China from Honolulu’s Chinatown (1896)
>
> *Hawaiian Gazette*
>
> February 14, 1896 (page 4)
>
> A Strange Occupation.
>
> A House in Nuuanu Stream Where This Is Done—
>
> A Gruesome Trade Carried On.
>
> Situated just at the foot of Hotel street and a little back of the buildings fronting on the land now being built up by the dredger mud, silt and sand, is a very rough 8 x 12 structure of most unpromising appearance. It stands on four posts about four feet from the ground and looks for all the world like a top-heavy pigeon coop. To look at its exterior would mean nothing to the observer, but to know of its inside workings would make everything about it interesting at once.
>
> It is known as the Chinese club house. Whenever a Chinaman has a bag of human bones to prepare for transportation to China it is inside the very narrow limits of this structure that the work of scraping away dried-up skin fragments and other unnecessary matter is done.
>
> A peep in at the window close on to the hour of midnight in the dark of the moon is perhaps the best mode of receiving a lasting impression on seeing a couple of Chinamen seated on the floor, each with a pile of bones in front of him and working by the dim rays of a peanut oil lamp. A broken sickle in the hands of one serves to cut away the unnecessary dried skin and ligaments, while a cocoanut grater in the hands of the other, does good work toward removing what the sickle has failed to do. A couple of black oil cloth valises constitute the receptacles for the bones which are done up, some in cloth and others in brown paper. Such portions as the skulls are always wrapped in cloth while the legs and arms suffer the indignity of brown paper. A pile of scrapings here and there furnish the only decorations that the room

> affords. Cracks in the walls serve, on a windy night, to make peculiar noises, which seem a fitting accompaniment for the work of the industrious ones inside.
>
> Ever since the Chinese first came into the country has this custom been observed, and as long as they remain here will the same thing go on. No matter if the law says they shall not dig up the dead from places of burial, they will continue to do it some way or other. If the present club house is removed they will have recourse to another place.
>
> The former position of the club house was where the dredger pipes are now emptying their mud. It will be remembered that Nuuanu stream was in a very decidedly marshy condition at that point before the introduction of improvements.
>
> Then, as now, Chinamen made nightly visits to the place and scraped the bones of their relatives preparatory to transportation, but instead of carrying all waste material as they have to do now, they simply dumped this into the stream to be carried out to sea or to settle among the bulrushes. [Maly and Maly 2013:155-156]

The exact location of the place where the processing of human bones is described as an 8 by 12 structure is unknown. The “Chinese club house” is said to be “where the dredger pipes are now emptying their mud” presumably in or at the edge of Nu‘uanu Stream. An 1891 Dakin fire insurance map (Figure 21) indicates a Joss House (a Chinese temple or shrine) a block east of Nu‘uanu Stream. This building may have been the “Chinese club house” referred to in the 1896 *Hawaiian Gazette* article of “A Strange Occupation.” The 1891 Dakin map shows the location of the Joss House and the proximity of Nu‘uanu Stream. Note that the project area is in the vicinity of the former location of the Joss House.

5.1.5 1900s

5.1.5.1 The 1900 Chinatown Fire

In 1852, there were only about 71 Chinese living around Honolulu, most of whom had come to the Islands as merchants and continued to carry out this trade. In 1852, sugar planters began to import large numbers of Chinese “coolies” to work on their sugar plantations. Once their contracts were filled, some of the workers moved to Honolulu to open their own businesses in the area that soon came to be known as Chinatown. The unsanitary and over-populated area alarmed the white business class who noted, “Most Chinese businesses were housed in decaying buildings on the depressed lower blocks of Nu‘uanu and Maunakea Street, and in Chinatown the womanless coolies congregated to gamble, smoke opium or simply pass the time” (Daws 2006:300). By the 1870s, a sizeable population of Chinese immigrants had settled in Honolulu, especially concentrated in the blocks between Nu‘uanu and Maunakea streets. An 1878 census recorded 1,299 Chinese in Honolulu; the total city population numbered 14,114.

In 1899, the first case of bubonic plague was identified in Hawai‘i, in a Chinese bookkeeper named You Chong. After an examination by Dr. G.H. Herbert, who noted a high temperature and swelling in the groin, the patient died the next night. After an autopsy, the diagnosis of bubonic plague was determined.

Since the disease had broken out in the immigrant’s area of Honolulu, all Chinese and Japanese were barred from leaving Honolulu for other ports. Two other cases were reported on the same

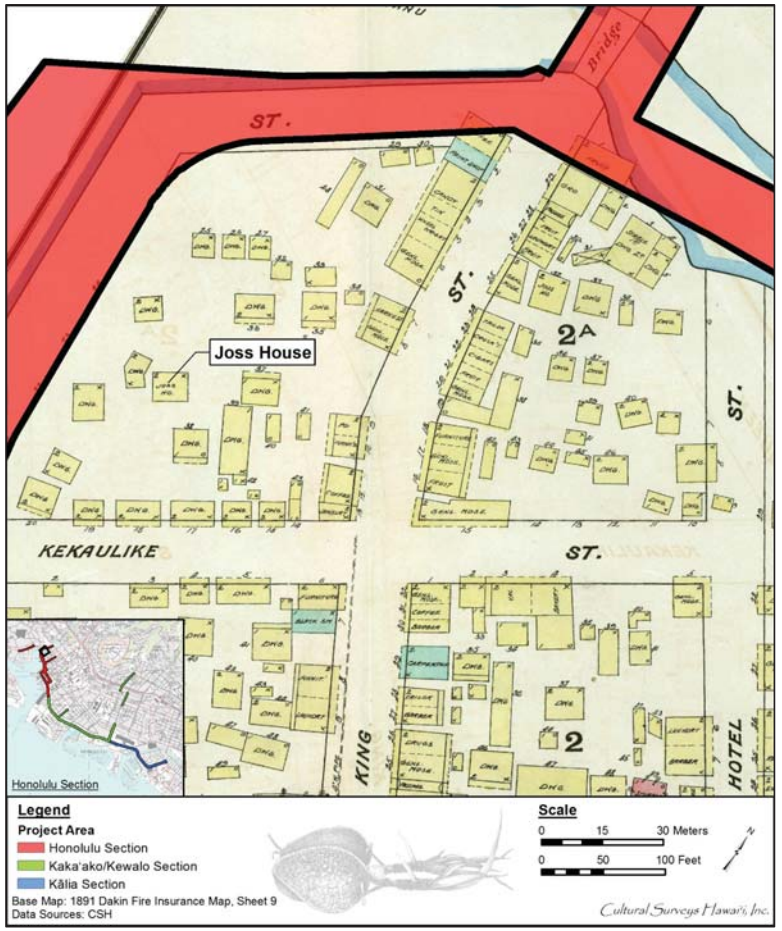

Figure 21. 1891 Dakin fire insurance map, Sheet 9 with location of Joss House and the project area; note Nu‘uanu Stream is to the north-northwest of the project area

day, and the Board of Health laid down a strict quarantine for Chinatown, that area of Honolulu bound by Nu‘uanu, Kukui, River, and Queen streets. Within this area about 7,000 people, primarily Chinese and Japanese immigrants, lived and worked (Iwamoto 1967:122-124). A third ethnic group who inhabited the area were Hawaiians; about 1,000 lived in areas their families had occupied for generations (Mohr 2005:63).

From 12 December 1899 to 31 March 1900, 71 cases were reported, with 61 deaths, 41 of whom lived within the established Chinatown quarantine area. The Board of Health concluded they could not contain the plague and decided the best remedy was to set “sanitary fires” to infected wooden buildings. A total of 41 controlled fires were set between 31 December 1899 and 13 August 1900:

> Therefore, on December 30, after careful deliberation, the Board of Health chose fire as the ‘surest, most thorough, and most expeditious’ method. Fire would destroy the plague germs, kill rats, cleanse the soil and open it up to the purifying influence of sun and air, and would prevent any occupancy of the premises until a safe period of time had elapsed. [Iwamoto 1967:124]

Infected patients were moved to a quarantine camp at Kaka‘ako. Some people, not necessarily patients, whose houses were burned were housed at the barracks of the Kaka‘ako Rifle Range. Their belongings were stored in the cellars of Kaumakapili Church.

On 20 January 1900, a fire was set between Kaumakapili Church and Nu‘uanu Avenue, which quickly got out of control. Rising winds swept burning embers to the roof of the church; the fire then jumped to several other blocks and then to the wharfs:

> By 1:30 p.m. the fire began making its way from Beretania Street along Achi Lane toward Kukui Street. People feared that the *mauka* section of the city would be destroyed. Chinatown refugees rushed back to save belongings, but were driven back by fire and smoke; they formed a seething mob near the bridge and Kukui Street. . . . The Chinese consul and vice consul also circulated among the people and tried to pacify them, since at this time the Chinese believed that the Board of Heath had purposely burned their homes. [Iwamoto 1967:130-131]

No one was killed in the fire, but Chinatown was destroyed. Many people were homeless and bereft of all belongings, which were lost when Kaumakapili Church burned to the ground. No additional patients were identified with the disease in April 1900, and the Hawaiian Islands were declared free of plague (Iwamoto 1967:125, 129).

5.1.6 Contemporary Land Use

Honolulu in the late nineteenth century consisted of many streets still unpaved and several small lanes (that no longer exist) between major roads. Bishop Street, the main road now between Fort and Alakea streets, did not exist. Union Street exists now only as a pedestrian walkway between buildings.

By 1919 however, Honolulu had wide paved streets, with blocks of contiguous brick and stone stores along all major downtown roads. The first section of Bishop Street, between Fort and King streets, was built in 1900. This street quickly became the financial sector of the city, and many of the “Big Five” companies built their headquarters and their banks on this street (Ames 1996:27). By 1918, the section from the harbor to King Street had been completed and paved (Ames 1996:119). In 1919, the *mauka* extension of Bishop Street from Hotel to Beretania Street began.

The city condemned all of the property in the way of this new thoroughfare and in 1927, razed all of the structures, including several of the residences near the project area (Ames 1996:120).

The first efforts to deepen Honolulu Harbor were made in the 1840s. The idea of using the dredged material composed of sand and crushed coral to fill in low-lying lands was quickly adopted. From 1857 to 1870, the “Esplanade” between Fort Street and Alakea Street was created on 22 acres of former reef and tideland. By 1874, Sand (Quarantine) Island, site of the first immigration station, had been created over “reclaimed” land on reefs.

5.2 Kaka‘ako/Kewalo ‘Ili

5.2.1 Early Historic Period

The modern urban area known as Kaka‘ako is located between two longtime centers of population: Honolulu and Waikīkī. In Waikīkī, a system of *taro lo‘i* fed by streams descending from Makiki, Mānoa, and Pālolo valleys covered the coastal plain, and networks of fishponds dotted the shoreline. Similarly, Kou previously had fishponds and irrigated fields watered by streams descending from Nu‘uanu and Pauoa valleys. The pre-Contact population and land use patterns of the Kaka‘ako area may have derived from its relationship to these two densely populated areas.

5.2.1.1 Kaka‘ako/Kewalo ‘Ili Early 1800s

The Kaka‘ako area would have been in Bingham’s view as he stood atop “Punchbowl Hill” looking toward Waikīkī to the south; he describes Honolulu with “fishponds and salt making pools along the seashore.”

Captain Jacobus Boelen, another visitor to Honolulu in the 1820s, hints at the pre-Contact character of Honolulu and its environs:

> It would be difficult to say much about Honoruru. On its southern side is the harbor or the basin of that name (which as a result of variations in pronunciation [*sic*] is also written as Honolulu, and on some maps, Honoonoono). The landlocked side in the northwest consists mostly of taro fields. More to the north there are some sugar plantations and a sugar mill, worked by a team of mules. From the north toward the east, where the beach forms the bight of Whytetee, the soil around the village is less fertile, or at least not greatly cultivated. [Boelen 1988:62]

Boelen’s description implies that the Pu‘unui and Ka‘ākaukukui area is within a “not greatly cultivated” region of Honolulu, perhaps extending from Pūowaina (Punchbowl Crater) at the north, through Kaka‘ako, to the Kālia portion of Waikīkī in the west.

An early, somewhat generalized, depiction of the pre-Contact native Hawaiian shaping of the Kaka‘ako area was made by Otto von Kotzebue (1821), commander of the Russian ship *Rurick*, who had visited O‘ahu the previous year. His descriptions and map show taro *lo‘i* massed around the streams descending from Nu‘uanu and Mānoa valleys. Early historic population patterns were influenced by the post-Contact shift of the population to the area around Honolulu harbor—the only sheltered landing for large western-sized vessels on O‘ahu and the center of increasing trade with visiting foreign vessels. Kamehameha himself had moved from Waikīkī to Honolulu in 1809.

A clearer picture of the Kaka‘ako/Kewalo area develops with accounts of other visitors and settlers in Honolulu during the first half of the nineteenth century. Gorman D. Gilman, who arrived in Honolulu in 1841, recalled in a memoir the limits of Honolulu during the early 1840s:

> The boundaries of the old town may be said to have been, on the makai [seaward] side, the waters of the harbor; on the mauka [inland] side, Beretania street; on the Waikīkī [east] side, the barren and dusty plain [i.e., the area just beyond Punchbowl Street], and on the Ewa [west] side, the Nuuanu Stream. [Gilman 1903:97]

Gilman describes the “barren and dusty plain” beyond (east of) Punchbowl Street:

> The next and last street running parallel [he had been describing the streets running *mauka-makai*, or from the mountains to the shore] was that known as Punchbowl Street. There was on the entire length of this street, from the makai side to the slopes of Punchbowl, but one residence, the two-story house of Mr. Henry Diamond, mauka of King Street. Beyond the street was the old Kawaiahao church and burying ground. A more forsaken, desolate looking place than the latter can scarcely be imagined. One, to see it in its present attractiveness of fences, trees and shrubbery, can hardly believe its former desolation, when without enclosure, horses and cattle had free access to the whole place. [Gilman 1903:89]

The environs of the missionary enclave and Kawaiaha‘o Church were indeed “forsaken” and “desolate looking” in the 1820s when they were first settled. C.S. Stewart, arriving on Maui after living at the Honolulu mission, declared Lahaina to be “like the delights of an Eden” after “four weeks residence on the dreary plain of Honoruru” (Stewart 1970:177).

5.2.2 The Māhele and the Kuleana Act

Among the first descriptions of Kukuluāe‘o, Kewalo, and Ka‘ākaukukui by the Hawaiians themselves are testimonies recorded during the 1840s in documents associated with land awards and awardees of the Great Māhele. A portion of a modern tracing of an 1884 map by S.E. Bishop shows the disposition of LCAs granted in the environs of the study area (Figure 36 through Figure 38). The tracing includes some modern streets not present in 1884. These additions, however, permit an accurate positioning of the study area on the 1884 map. This general depiction is believed to be quite accurate, with the annotated “Beach Road,” that runs along the edge of the sea, becoming the present Ala Moana Boulevard/Nimitz Highway alignment.

The *‘ili* of Kukuluāe‘o (LCA 387) was awarded to the American Board of Commissioners for Foreign Missions. Initially this land was associated with Punahou School in Mānoa Valley, as Chief Boki gave the Punahou lands to Hiram Bingham, pastor of Kawaiaha‘o Church in 1829 (DeLeon 1978:3). In the Māhele, however, this sea land became “detached” from the Mānoa award and was instead given to the pastor of the Kawaiaha‘o Church, as noted in a history of the Punahou School (Punahou School and Oahu College 1866).

Curtis Perry Ward, a native of Kentucky, came to the Hawaiian Islands in 1853, and soon established a livery and draying business. In 1865, he bought a large 12-acre estate *mauka* of King Street. Sometime before 1875, Ward added to his property with the purchase of 77 acres and 3,000 ft of ocean frontage in the *‘ili* of Kukuluāe‘o, *makai* of Queen Street (Figure 22).



Figure 22. 1888 photograph of the “long lagoon” looking from the cupola of the Ward house towards the Kukuluāe‘o marshlands and the ocean (photograph reprinted in Hustace 2000:2)

The *‘ili* of Kewalo (LCA 10605) was awarded to Kamake‘e Pi‘ikoi, wife of Jonah Pi‘ikoi (awardee of Pualoalo *‘ili*), as part of LCA 10605, 7 *‘āpana*. The award was shared between husband and wife (Kame‘eleihiwa 1992:269). Kewalo was a large 270.84-acre land section extending from Kawaiaha‘o Church to Sheridan Street. This land section had numerous large fishponds, which were awarded as part of the claim to Pi‘ikoi.

The *‘ili* of Ka‘ākaukukui (LCA 7712*O) was awarded to Victoria Kamāmalu, sister of Kamehameha IV and Kamehameha V. There were no awards to *maka‘āinana* (commoners) in this *‘ili*, which seems to have consisted entirely of land used for salt making. No residences are shown in this area until the twentieth century. Ka‘ākaukukui consisted of three non-contiguous sections, a type of *‘āina* called a *lele* (to fly, jump).

> . . . Kaakaukukui held Fisherman’s Point and the present harbor of Honolulu; then kalo land near the present Kukui street, and also a large tract of forest at the head of Pouoa [Pauoa] Valley . . .
>
> These different pieces were called variously, either by their own individual name or by that of the whole ili, thus puzzling one sadly when attempting to obtain information with respect to them. [Lyons 1894:1697]

There are no LCAs within or in the vicinity of the project area due to the fact that the area was filled in. In addition, LCA records also reveal that, midway through the nineteenth century, taro cultivation and the traditional salt making and fishpond farming activities continued within the environs *mauka* of the present study area. These activities and the land features that supported them were eliminated during the remainder of the nineteenth century by the increasing urbanized expansion of Honolulu.

5.2.3 Mid- to Late 1800s

5.2.3.1 Kaka‘ako Salt Works and the Salt Pans of Kewalo and Kukuluāe‘o

As noted in the Land Commission Award testimony, much of the land in Ka‘ākaukukui was used to produce salt (Figure 23 and Figure 24). The Hawaiians used *pa‘akai* (salt) for a variety of purposes: to flavor food, to preserve fish by salting, for medicines, and for ceremonial purposes. David Malo describes the traditional method of making salt:

> O ka paakai kekahi mea e pono ai, he mea e ono ai, ka ia, a me ke koekoe o ka paina ana, he mea hana ia ka paakai, ma kekahi aina, aole i hana a ma kekahi aina, o ke kai makai, e kii aku no ka wahine, a lawe mai ma ke poi, a ke kai hooholo ia mai kekahi ma kauwahi mai.
>
> E waiho kela kai ma kekahi poho paha, he ekaha paha, he kahe ka paha, a liu malaila, alaila lawe ana kauwahi e, a paakai iho la no ia, o ka papa laau ka mea kui poi. [Malo 2006:73]

Translation:

> Pa‘akai (salt) is another beneficial item. It is used to make fish delicious and tasteless foods edible. Pa‘akai is made at a particular place, [but] it [salt] is not actually made from this spot, rather it [salt water] came from the sea. A woman

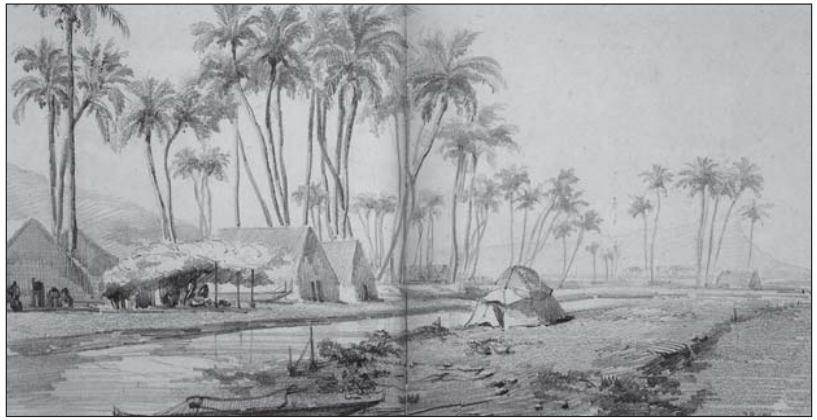

Figure 23. 1838 sketch of “Honolulu Salt Pan, near Kaka‘ako” drawn by a French visitor, Auguste Borget (original sketch at Peabody Essex Museum, Salem, Massachusetts; reproduced in Grant and Hymer 2000:64-65)



Figure 24. 1845 sketch of “Native Church [Kawaiaha‘o Church], Oahu, from the Old Salt Pans,” drawn by John B. Dale, from the U.S. Exploring Expedition led by Lt. Charles Wilkes (J. Welles Henderson Collection, reproduced in Forbes 1992:126).

> went to get some when the sea crashed [upon the rocks] and she ran back [the salt water] to this particular spot. That salt water (kai) is placed in, perhaps, a depression (poho) or a ‘Bird’s nest’ (ēkeha) or rock basin (kāheka) and allowed to evaporate (liu). Then it is taken to another spot and is formed into pa‘akai. Wooden boards (papa lā‘au) are used to pound poi (mashed cooked kalo corms) on. [Malo 2006:95]

In 1903, Nathaniel Emerson translated David Malo’s articles on early Hawaiian life. In his publication, the translations are not literal, but include information that Emerson added for clarity:

> Salt was one of the necessities and was a condiment used with fish and meat, also as a relish with fresh food. Salt was manufactured in certain places. The women brought sea-water in calabashes, or conducted it in ditches to natural holes, hollows and shallow ponds (kekaha) on the sea-coast, where it soon became strong brine from evaporation. Thence it was transferred to another hollow or shallow vat, where crystallization into salt was completed. [Malo 1951:123]

Captain Cook was the first to note the method of making salt in prepared “saltpans”:

> Amongst their arts, we must not forget that of making salt, with which we were amply supplied, during our stay at these islands, and which was perfectly good of its kind. Their saltpans are made of earth, lined with clay; being generally six or eight feet square, and about eight inches deep. They are raised upon a bank of stones near the high-water mark, from whence the salt water is conducted to the foot of them, in small trenches, out of which they are filled, and the sun quickly performs the necessary process of evaporation . . . Besides the quantity we used in salting pork, we filled all our empty casks, amounting to sixteen puncheons, in the Resolution only. [Cook 1784:151]

The export of salt declined in the late nineteenth century. Thrum (1924:116) states that the apex of the trade was in 1870, but by 1883 he noted that “salt and oil have disappeared entirely” from the list of yearly exports (Thrum 1884:68). By 1916, only one salt works, the Honolulu Salt Company, was still in operation. However, salt continued to be manufactured for local use. The Kaka‘ako Salt Works appears as late as 1891 and a page in Victoria Ward’s ledger for 1883 notes a yearly income of $651.50 received from her “Salt Lands” in Kukuluāe‘o (Hustace 2000:50). As noted above, Thrum (1924:116) said the Honolulu Salt Company was the only salt producer on O‘ahu in 1916. A 1916 Commerce Report (Taylor 1916:723) states the Honolulu Salt Company operates “salt beds at Puuloa, Kalihi, and Waikiki, on the island of O‘ahu.” No mention is made of Kaka‘ako, suggesting the Kaka‘ako salt works had closed before 1916.

The traditional method of salt production was gradually replaced by the more labor intensive Chinese method, as Chinese immigrants began to take over the traditional salt and fishponds of Honolulu in order to grow rice, to raise ducks, and to make salt. In a 1906 article, Rev. Westervelt (1906:43-46) explained the Chinese method of salt evaporation for the Honolulu salt beds. The Chinese worker first used a water pump to draw the seawater from the larger ditch below to the salt-evaporation beds above. The man moved the two handles back and forth to work the pump. The evaporation beds were lined with clay, wet with sea water, and tramped and pounded down. Each pan was about 20 ft square, covered with about 2 inches of water, and bound by an earth

dyke. On early historic maps, the area of salt pans is often marked out as a large grid of contiguous squares.

After allowing the sun to evaporate some of the water, the worker stepped into the evaporation pan and scraped the salt into a pile in the center with a simple wooden scraper. The worker then threw a large basket-shaped scoop into the brine and used a tin dipper to move the salt to the basket. Two baskets, one on each side of a pole, were then carried on the back of a worker across the thin earth dykes between the salt pans. The baskets were dumped into large drying piles, where the remaining water seeped out into the ground. The salt was then sewn into gunny sacks and sent to the market for sale.

By 1901, most of the fishponds and salt pans *makai* of King Street were reported as abandoned. In that year, the Hawai‘i Legislature proposed to build a ditch to drain away the “foul and filthy water that overflows that district at the present time.”

> The district makai of King St. and the Catholic Cemetery, Ewa of Mrs. Ward’s (the Old Plantation), mauka of Clayton St., and Waikiki of the land from King St., leading to the Hoomananaauao Church, consists of six large abandoned fish ponds and a large number of smaller ones, all in filthy condition, fed by springs and flowing into Peck’s ditches. Just makai of these ponds, at the end of Clayton street, The rear portion of Mrs. Ward’s property down to Waimanu St. used to be fish ponds all connecting to the sea by a ditch which is fed by an artesian well. These ponds, with the exception of three, are abandoned. Next to Mr. Ward’s, is Peck’s place. An artesian well flushing the wash houses flows into two foul ditches, thence to the big pond which is Waikiki of what used to be Cyclomere and next to Mrs. Ward’s line [ditch] extending down to Waimanu St. [Hawaii Legislature 1901:185]

5.2.3.2 Honolulu Iron Works

In the 1850s, Hawaiian sugar planters became interested in a type of centrifugal machine that could separate sugar from molasses. An engineer named David Weston installed his version of this machine in a Maui sugar mill in 1851. With backing from Hawaiian businessmen, Weston returned to the Islands in 1853 and founded the Honolulu Iron Works (Figure 25), which he set up in a building already occupied by a flour mill (Kuykendall 1938:326-327). The flour mill was at first the most successful part of the business, where wheat from Maui and as far away as Chile was ground into flour and then exported to California. However, as the sugar industry became more prominent in the Hawai‘i economy, the Iron Works began to build the machinery needed to operate the new sugar mills, not only in Hawai‘i but all over the world. At one point, the Iron Works employed 1,500 workers, many of whom lived in the Kaka‘ako area (Nicol 1998:510).

Business began to decline in the 1950s, and in 1973 the Honolulu Iron Works closed (Nicol 1998:510). At first the old buildings were converted to retail space, but eventually all were torn down; the last warehouse was demolished in 1982 (Kawasaki 2005:2). The main lot for this complex is now covered by One Waterfront Plaza.

5.2.3.3 The 1874 Transit of Venus Observatory at ‘Āpua

In 1874, several astronomical teams from Great Britain traveled to different parts of the world to observe a rare transit of the planet Venus across the sun. The “purpose of the observations was

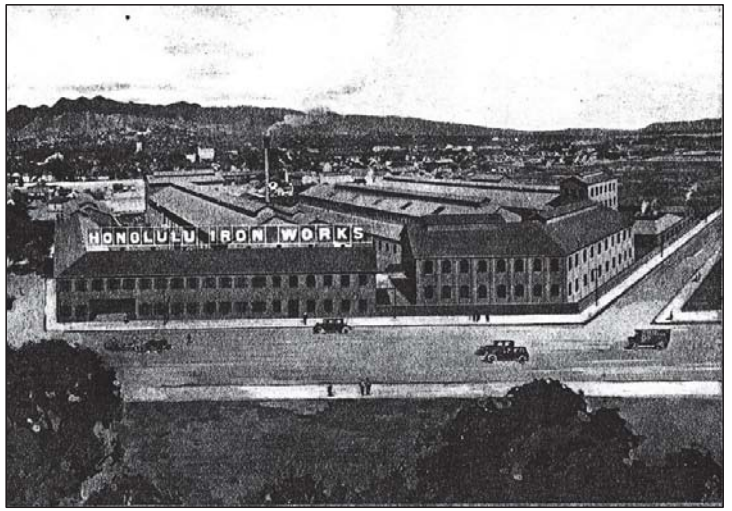

Figure 25. Photograph of Honolulu Iron Works (Hawai‘i State Archives n.d.)

to better determine the value of the astronomical unit (AU)—the Earth-sun distance—and thereby the absolute scale of the solar system" (Chauvin 2004:xii). This project attracted enormous interest in Hawai‘i, and members of the Hawaiian Government Survey worked with the British team, who set up observatories on Hawai‘i, Kaua‘i, and O‘ahu Islands. Each station needed an equatorial telescope, other telescopes, a transit instrument, an altazimuth (surrounded by a portable wooden observatory with a revolving dome), and several clocks, chronometers, compasses, micrometers, reflecting circles, and artificial horizons (Chauvin 2004:51, 60).

Upon reaching Honolulu, the British team of seven astronomers temporarily moved into the Hawaiian Hotel in downtown Honolulu, and began to look for an adequate place to set up the O‘ahu observatory. King Kalākaua, who strongly supported the project, gave them permission to use a piece of land in the *‘ili* of ‘Āpua. Captain Tupman, head of the expedition wrote the following:

> Difficulty was experienced in finding a suitable place of observation, as I considered it of great importance that the observers should be lodged very close to the instruments; and house accommodation is rather limited. However we have been enabled to rent a cottage belonging to the Princess Ruth, Governess of Molokai, capable of accommodating the Head Station observers, and adjoining some land owned by His Majesty the King who had kindly given us permission to erect our instruments Etc. and enclose as much land as may be necessary. [Chauvin 2004:76-77]

The land in question was a 0.3-acre "open piece of grass land in the district called Apua. South of Punchbowl street, and west of Queen Street." Several buildings were erected, including a barracks and workshop, a cookhouse, a photo hut thatched with grass, the stages (platforms) for the instruments, and a wooden palisade to enclose the lot (Figure 26 and Figure 27). The observations of the Transit of Venus on 8 December 1874 in Honolulu were a great success, and the British party was feted by the king and other prominent families of Hawai‘i. All that was left was to dismantle the temporary buildings at ‘Āpua. Tupman wrote,

> Mar. 13. The sale. Our household goods sold well, many friends desiring to obtain a memento of our visit. The long shed, Cook house, walls of huts, transit hut complete, water pipes & taps, 6-foot fencing and a large pile of lumber were knocked down to His Majesty the King for a very small sum, as no one would bid against him. We were not altogether sorry for this as His Majesty has given us the land rent free & had aided us in many ways tending to save expense to the British Government. [Chauvin 2004:124]

5.2.3.4 Squattersville

In the case of Kewalo Basin, most of the land between it and Fort Armstrong, to the northwest, had been previously filled (ca. 1900-1920). The area between Kewalo Basin and Fort Armstrong, *makai* of Ala Moana, became a part of Kaka‘ako called Squattersville. "Squattersville, like Gaul, is divided into three parts. There is the original settlement at Kewalo Basin Point, there is a tiny offshoot of this and there is the later settlement along Ala Moana" (Johnson 1991:111). The later (ca. 1925-1930) dredging and filling created Ala Moana Beach Park and commercial dock space at the Ala Wai and Kewalo Basins.

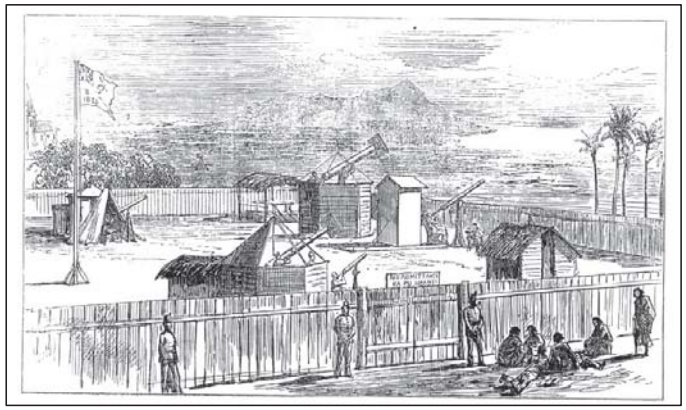

Figure 26. Sketch of the Transit of Venus station at ‘Āpua near Honolulu, view to east (sketch from *Illustrated London News*, 23 January 1875; reprinted in Chauvin 2004:108); note armed guards keeping curious onlookers outside the fenced enclosure

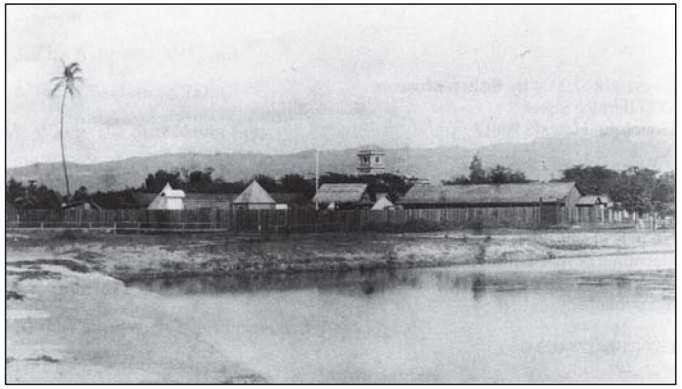

Figure 27. 1874 photograph of Transit of Venus station at ‘Āpua near Honolulu, view to north (Bishop Museum Archives, reprinted in Chauvin 2004:iii); note the pond (part of ‘Auwaiolimu) in the foreground, the long barracks/workshops and other buildings of the station in the mid-ground, and the spire of Kawaiaha‘o Church in the background

5.2.3.5 Kewalo Harbor Improvement

Prior to dredging, Kewalo Basin was a natural deep pocket in the reef seaward of Ala Moana Boulevard between Ward Avenue and Kamake‘e Street. It had been used as a canoe landing in pre-Contact times. In 1919, the Hawai‘i Government appropriated $130,000 to improve the small harbor of Kewalo for the aim of “harbor extension in that it will be made to serve the fishing and other small craft, to the relief of Honolulu harbor proper” (Thrum 1920:147). As the area chosen for the harbor area was adjacent to several lumber yards, the basin was initially made to provide docking for lumber schooners, but by the time the wharf was completed in 1926, this import business had faded, so the harbor was used mainly by commercial fishermen. The dredged material from the basin was used to fill a portion of the Bishop Estate on the western edge of Waikīkī and some of the Ward Estate in the coastal area east of Ward Avenue (U. S. Department of Interior 1920:52). In 1941, the basin was dredged and expanded to its current 55 acres. . In 1955, dredged material was placed along the *makai* side to form an 8-acre land section protected by a revetment, now part of the Kewalo Basin Park (Kewalo Basin Harbor 2014).

5.2.3.6 Kaka‘ako Battery

During the monarchy, the point at Kaka‘ako was the location for a battery, with three cannons used to salute visiting naval vessels, which responded with their own cannon salutes. Other saluting batteries were at the top of Punchbowl Crater and at the Honolulu Fort (Dukas 2004:163). The Hawaiian Annual and Almanac for 1887 (Thrum 1886:37) reported that $4,500 had been spent to build the battery. It was used for gun salutes up to at least the overthrow of the monarchy in 1893 (Judd 1975:57).

After the annexation of the Islands by the United States in 1899, the U.S. Congress began to plan for the coastal defenses of their new islands. The major batteries were placed at Pearl Harbor and in Waikīkī, but a small reservation named Fort Armstrong was also set up on the Ka‘ākaukukui Reef as a station for the storage of underwater mines. Fort Armstrong (1899 to 1950s) was named after General Samuel Chapman Armstrong (1839-1893), born on Maui and graduated from Punahou, was a hero of the Union defense of Cemetery Ridge at Gettysburg.

In the attack on the Islands on 7 December 1941, the fort escaped relatively unscathed; only one motor pool structure was hit. Antiaircraft shells were fired from the fort but were ineffective; at least one hit the town rather than any aircraft (Richardson 2005:34). In the 1950s, the federal government returned most of Fort Armstrong to the Territory of Hawai‘i, which used the area to expand the shipping piers of the harbor.

The region of Kaka‘ako surrounding the project area contains historic properties of both pre-Contact and post-Contact origin. McAllister (1933:80), in his report on the survey of O‘ahu sites conducted in the early 1930s, says of Honolulu, “Information regarding former sites within the present limits of Honolulu must come entirely from literary sources.” The Kaka‘ako area became a focus of archaeological work during the 1980s, impelled by the construction of local and federal government buildings and by state-planned redevelopment.

5.2.4 Contemporary Land Use

5.2.4.1 Kaka‘ako Reclamation

By the 1880s, infilling of the mud flats, marshes, and salt ponds in the Kaka‘ako area had begun. This infilling was driven by three separate, but overlapping, improvement justifications. The first directive was for the construction of new roads and improvement of older roads by raising the grade so improvements would not be washed away by flooding during heavy rains. A report by the Hawaii Board of Health noted the following:

> I beg to call attention to the built-up section of Kewalo, ‘Kaka‘ako,’ where extensive street improvements, filling and grading have been done. This, no doubt, is greatly appreciated and desirable to the property owners of that locality, but from a sanitary point of view is dangerous, inasmuch as no provision has been made to drain the improved section, on which have been erected neat cottages occupied for the greater part by Hawaiian and Portuguese families, now being from one to three feet below the street surface, and which will be entirely flooded during the rainy season. Unless this is remedied this locality will be susceptible to an outbreak [of cholera) such as we experienced in the past. [Hawaii Board of Health 1908:80]

The justification for infilling low-lying areas most frequently cited was public health and sanitation: the desire to clean up rivers and ponds that were reservoirs for diseases such as cholera and acted as breeding places for rats and mosquitoes. Thus, as early as 1902, it is reported that,

> The Board has paid a great deal of attention to low-lying stagnant ponds in different parts of the city, and has condemned a number of them. The Superintendent of Public Works has given great assistance to seeing that the ponds condemned by the Board are filled. In September a pond on South Street was condemned as deleterious to the public health. [Hawaii Board of Health 1902:80]

The first areas to be filled were those closest to Honolulu, then moving outwards to Kaka‘ako (Griffin et al. 1987:13). The first fill material may have been set down in 1881 for the Kaka‘ako Leper Branch Hospital, which had been built on a salt marsh. Laborers were hired to “haul in wagonloads of rubble and earth to fill up that end of the marsh” (Hanley and Bushnell 1980:113). In 1903, five more lots in Kewalo, on Ilaniwai, Queen, and Cooke streets, were condemned and ordered filled (Hawaii Board of Health 1903:6).

Although public health and safety were prominently cited, according to Nakamura (1979:43), the main desire (and third justification) to infill Honolulu, Kewalo, and then Waikīkī lands was to provide more room for residential subdivisions, industrial areas, and finally tourist resorts. In the early part of the twentieth century, Kaka‘ako was becoming a prime spot for large industrial complexes such as iron works, lumber yards, and draying companies, which needed large spaces for their stables, feed lots, and wagon sheds. In 1900, the Honolulu Iron Works, which produced most of the large equipment for the Hawaiian plantation sugar mills, moved from their old location at Queen and Merchant Street near downtown Honolulu to the shore at Kaka‘ako, on land that had been filled from dredged material during the deepening of Honolulu Harbor (Thrum 1900:172). Other businesses soon followed. Thrum (1901) noted the following:

> The Union Feed Co. is another concern whose business has outgrown the limits of its old location, corner of Queen and Edinburgh streets. Like the Iron Works Co. they have secured spacious premises at Kakaako, erecting buildings specially adapted to the needs of their extensive business at the corner of Ala Moana (Ocean Road) and South Street. [Thrum 1901:168]

Private enterprises were not the only new occupants of Kaka‘ako. A sewer pumping station, an immigrant station, and a garbage incinerator were also built on “reclaimed land.” Thrum noted,

> The dredging of Honolulu harbor and its channel is completed as far as planned for the present . . . the material there from being used to fill in a large area of Kakaako and the flats in the vicinity of the sewer pumping station and garbage crematory. [Thrum 1907:148-149]

For the incinerator, Thrum noted,

> The new station is built on piles on reclaimed land that is being filled in from the coral dredgings that is going on, and is gradually taking on a tropical appearance. . . . Adjoining its premises on the mauka side is the new building designed for the Planters’s Association for their labor bureau. [Thrum 1907:148-149]

Although the Board of Health could condemn a property and the Department of Public Works could then fill in the land, the process was rather arbitrary and piecemeal. In 1910, after an epidemic of bubonic plague, the Board of Health condemned a large section of Kewalo (including areas in Pu‘unui and Ka‘ākaukukui), consisting of 140 land parcels that had numerous ponds (Hawaii Department of Public Works 1914:196).

In 1915, the entire

> locality bounded by King street, Ward avenue, Ala Moana and South street, comprising a total area of about two hundred acres, had been found by the board of health of the Territory to be deleterious to the public health in consequence of being low and below ‘the established grades of the street nearest thereto’ and at times covered or partly covered by water and improperly drained and incapable by reasonable expenditure of effectual drainage, and that said lands were in an insanitary and dangerous condition. [Hawaii Supreme Court 1915:329]

The superintendent then sent a letter to all of the property owners, informing them that they must fill in the lands to the grade of the street level within 60 days. Only a few of the landowners complied, infilling their land with a variety of materials. Most of the landowners did not comply with the notice, and in 1912 the bid was given to Lord-Young Engineering Company to fill in the land with “sand, coral, and material dredged from the harbor or reef and the depositing of the same upon the land by the hydraulic method” (Hawaii Supreme Court 1915:331). The affected landowners sued to stop the work, and in the suit, the method of hydraulic filling is described:

> By this [hydraulic] method the material dredged is carried in suspension or by the influence of water which is forced through large pipes and laid upon the lands and intervening streets, and afterwards is distributed and leveled, the water having drained off through ditches provided for the purpose. The work is done in large sections around which bulkheads have been constructed. A section can be filled in

> about thirty days, the dredger working about fifteen hours per day. And in about two months after a section has been filled the ground will have dried out so as to be fit for use as before . . . The character of the material varies from very fine sand to coarse bits of coral . . .
>
> It appears in evidence that though the method employed the finest of the material which is carried upon the land settles when the water which transports it becomes quiet and as the water runs off a sludge or mud remains which forms a strata more or less impervious to water. This strata, however, is covered by the coarser and more porous material…it appears that by mixing in to a depth of a few inches ordinary soil small plants will grow without difficulty . . . The character of the locality must be considered. It is not adapted to agriculture, but is suited more particularly to such business purposes as it now partly used for, such as stables, laundries, warehouses, mills, etc., and for cottages with small yards for the accommodation of laborers engaged in connection therewith. Upon the whole, we are of the opinion that the material proposed to be used in the fill-in of the lands of the complainants is not of a character as should be held to be improper for any of the reasons urged. [Hawaii Supreme Court 1914:351]

The first land to be filled was the portion of the Ward Estate property west of Ward Avenue, which was completely filled in by June 1913. In July, “25,000 cubic yards of sand and ground-up coral were deposited on the Bishop Estate property in the vicinity of Ala Moana and Keawe Street, the reason for shifting operations to this part of the district being that the Hawaiian Sugar Planter’s Association had erected a reinforced concrete building there and wished to have the lot brought to grade” (Hawaii Department of Public Works 1914:198). By August, the remaining Ward Estate lands west of Ward Avenue had been completely filled in. By February 1914, all of the land from South Street to Ward Avenue and from Ala Moana Boulevard to Queen Street had been filled, including portions of the current project area.

5.2.4.2 Urban Expansion in the Kaka‘ako Area

Kaka‘ako was considered outside the Honolulu town boundary and was used in the mid- to late nineteenth century as a place for cemeteries, burial grounds, and for the quarantine of contagious patients. Then, in the beginning of the twentieth century, the area was used as a place for sewage treatment and garbage burning, before finally becoming an area for cheap housing and commercial industries (Griffin et al. 1987:13).

Late nineteenth century maps show the emerging traces of the future development in Kaka‘ako as the grid of roads extending southeast from Honolulu toward Waikīkī. Queen Street, which was planned to connect to the beach road near Waikīkī, appears to follow the route of the traditional trail from Honolulu to Waikīkī, as described by John Papa ‘Ī‘ī (1959:93). This trail likely traversed a sand berm raised above the surrounding marshlands and coral flats, probably near Queen Street.

As previously discussed, the current project area and vicinity were completely filled by 1914, during road improvement projects and the Kaka‘ako/Kewalo Reclamation projects. All of the ponds and the low-lying areas in the vicinity of the current project area were filled, and new land was created from dredged material.

5.3 Waikīkī Ahupua‘a

5.3.1 Early Historic Period

By the time of the arrival of Europeans in the Hawaiian Islands during the late eighteenth century, Waikīkī had long been a center of population and political power on O‘ahu. Martha Beckwith (1970) writes that by the end of the fourteenth century, Waikīkī had become “the ruling seat of the chiefs of O‘ahu.” The preeminence of Waikīkī continued into the eighteenth century, evidenced by Kamehameha’s decision to reside there after winning control of O‘ahu by defeating the island’s chief, Kalanikūpule. The nineteenth century Hawaiian historian John Papa ‘Ī‘ī, himself a member of the *ali‘i*, describes the king’s Waikīkī residence (Helumoa is depicted in Figure 28):

> Kamehameha’s houses were at Puaaliilii, makai of the old road, and extended as far as the west side of the sands of Apuakehau. Within it was Helumoa, where Kaahumanu ma went to while away the time. The king built a stone house there, enclosed by a fence . . . [‘Ī‘ī 1959:17]

‘Ī‘ī (1959:17) further notes the “place had long been a residence of chiefs. It is said that it had been Kekuapoi’s home, through her husband Kahahana, since the time of Kahekili.”

Chiefly residences, however, were only one element of a complex of features which were able to sustain the large population that characterized Waikīkī up to pre-Contact times. Beginning in the fifteenth century, a vast system of irrigated taro fields was constructed, extending across the littoral plain from Waikīkī to lower Mānoa and Pālolo valleys. This field system—an impressive engineering feat traditionally attributed to the chief Kalamakua—took advantage of streams descending from Makiki, Mānoa and Pālolo valleys that also provided ample fresh water for the Hawaiians living in the *ahupua‘a*. Water was also available from springs in nearby Mō‘ili‘ili and Punahou. Closer to the Waikīkī shoreline, coconut groves and fishponds dotted the landscape. A sizeable population developed amidst this Hawaiian-engineered abundance. Captain George Vancouver, arriving at “Whyteete” in 1792, captured something of this profusion in his journals:

> On shores, the villages appeared numerous, large, and in good repair; and the surrounding country pleasingly interspersed with deep, though not extensive valleys; which, with the plains near the sea-side, presented a high degree of cultivation and fertility.
>
> [Our] guides led us to the northward through the village, to an exceedingly well-made causeway, about twelve feet broad, with a ditch on each side.
>
> This opened our view to a spacious plain, which, in the immediate vicinity of the village, had the appearance of the open common fields in England; but, on advancing, the major part appeared to be divided into fields of irregular shape and figure, which were separated from each other by low stone walls, and were in a very high state of cultivation. These several portions of land were planted with the eddo or taro root, in different stages of inundation; none being perfectly dry, and some from three to six or seven inches under water. The causeway led us near a mile from the beach, at the end of which was the water we were in quest of. It was



Figure 28. Photo of Helumoa ca. 1863 (Kamehameha Schools Archive 1863)

> a rivulet five or six feet wide, and about two or three feet deep, well banked up, and nearly motionless; some small rills only, finding a passage through the dams that checked the sluggish stream, by which a constant supply was afforded to the taro plantations.
>
> [We] found the plain in a high state of cultivation, mostly under immediate crops of taro; and abounding with a variety of wild fowl, chiefly of the duck kind . . . The sides of the hills, which were at some distance, seemed rocky and barren; the intermediate vallies, which were all inhabited, produced some large trees, and made a pleasing appearance. The plain, however, if we may judge from the labour bestowed on their cultivation, seemed to afford the principal proportion of the different vegetable productions on which the inhabitants depend for their subsistence. [Vancouver 1798:161–164]

Further details of the exuberant life of the period are given by Archibald Menzies, a naturalist accompanying Vancouver's expedition:

> The verge of the shore was planted with a large grove of coconut palms, affording a delightful shade to the scattered habitations of the natives. Some of those near the beach were raised a few feet from the ground upon a kind of stage, so as to admit the surf to wash underneath them. We pursued a pleasing path back to the plantation, which was nearly level and very extensive, and laid out with great neatness into little fields planted with taro, yams, sweet potatoes and the cloth plant. These, in many cases, were divided by little banks on which grew the sugar cane and a species of Draecena without the aid of much cultivation, and the whole was watered in a most ingenious manner by dividing the general stream into little aqueducts leading in various directions so as to be able to supply the most distant fields at pleasure, and the soil seemed to repay the labour and industry of these people by the luxuriancy of its productions. Here and there we met with ponds of considerable size, and besides being well stocked with fish, they swarmed with water fowl of various kinds such as ducks, coots, water hens, bitterns, plovers and curlews. [Menzies 1920:23–24]

However, the traditional Hawaiian focus on Waikīkī as a center of chiefly and agricultural activities on southeastern O‘ahu was soon to change, disrupted by Euro-American Contact. The *ahupua‘a* of Honolulu became the center for trade with visiting foreign vessels, drawing increasing numbers of Hawaiians away from their traditional environments. The shift in preeminence is illustrated by the fact that Kamehameha moved his residence from Waikīkī to Honolulu. By 1828, Levi Chamberlain described a journey into Waikīkī and noted,

> Our path led us along the borders of extensive plats of marshy ground, having raised banks on one or more sides, and which were once filled with water, and replenished abundantly with esculent fish; but now overgrown with tall rushes waving in the wind. The land all around for several miles has the appearance of having once been under cultivation. I entered into conversation with the natives respecting this present neglected state. They ascribed it to the decrease of population. [Chamberlain 1957:26]

Tragically, the depopulation of Waikīkī was not simply a result of the attractions of Honolulu (where, by the 1820s, the population was estimated at 6,000 to 7,000) but also of the European diseases that had devastating effects upon the Hawaiian populace.

5.3.2 The Māhele and the Kuleana Act

Prior to 1848, all land belonged to the *akua* (gods), held in trust for them by the paramount chief and managed by subordinate chiefs. In the mid-1800s, Kamehameha III decreed a division of lands called the Māhele, which divided land for private land ownership in Hawaiian society (Chinen 1958). In 1848, lands were divided into three portions, crown lands, government lands, and lands set aside for the chiefs. Individual plots, called *kuleana* awards, were granted within these divided lands to native inhabitants who lived on and farmed these plots and came forward to claim them. The chiefs and *konohiki* (land managers) were required to pay a commutation fee for their lands, usually about one-third the value of any unimproved lands. Awardees usually "returned" a portion of the lands awarded to pay the commutation fee for the lands they "retained." The returned lands usually became government lands (Chinen 1958:13).

The Kuleana Act was legislated in 1850 allowing *maka‘āinana* to own land parcels which they were currently and actively cultivating and/or using as a residence. In theory, this "set aside" hundreds of thousands of acres as potential *kuleana* parcels, but in actuality it led to about 10,000 claimants obtaining approximately 30,000 acres. The *konohiki*, 252 chiefs, divided up about a million acres. Many Hawaiians were disenfranchised by these acts (Cordy et al. 1991). See Table 8 below for LCAs.

Table 8. LCA list for the Waikīkī Ahupua‘a

LCA	Claimant (Awardee)	*Ahupua‘a*	Description
99 FL	Uma	Waikīkī	House lot
1775	Paoa	Waikīkī	Two *‘āpana*, house lot and *lo‘i kalo*
2549	Luaiku	Waikīkī	Three *‘āpana*, four *lo‘i kalo*, and a house lot
2081	Kaoneanea	Waikīkī	Two *‘āpana*; *lo‘i kalo*, and Kamo‘okahi Fishpond; house lot with *kula ‘āina* (plain)
2083	Kahiloaho	Waikīkī	Four *‘āpana*; *lo‘i kalo*, and a house lot

5.3.3 Mid- to Late 1800s

5.3.3.1 Land Use

Waikīkī became a popular site among foreigners—mostly American—who had settled on O‘ahu throughout the course of the nineteenth century. An 1865 article in the *Pacific Commercial Advertiser* mentions a small community that had developed along the beach. The area continued to be popular with the *ali‘i*. A visitor to O‘ahu in 1873 describes Waikīkī as "a hamlet of plain cottages, whither the people of Honolulu go to revel in bathing clothes, mosquitoes, and solitude, at odd times of the year" (Bliss 1873).

Several developments during the second half of the nineteenth century dramatically impacted and altered the landscape of Waikīkī during the twentieth century. These included improvement of the road connecting Waikīkī to Honolulu (now the present day Kalākaua Avenue), the building

of a tram line between the two areas, and the opening of Kapi‘olani Park on 11 June 1877. Traditional land uses in Waikīkī were abandoned or modified. By the end of the nineteenth century most of the fishponds that had previously proliferated had been neglected and allowed to deteriorate. The remaining taro fields were planted in rice to supply the growing numbers of immigrant laborers imported from China and Japan, and for shipment to the west coast of the United States (Figure 29 and Figure 30; Coulter and Chun 1937).

5.3.3.2 Immigration Labor

As the sugar industry throughout the Hawaiian kingdom expanded in the second half of the nineteenth century, the need for increased numbers of field laborers prompted passage of contract labor laws. In 1852, the first Chinese contract laborers arrived in the Islands. Upon completion of their contracts, a number of the immigrants remained in the Islands, many becoming merchants or rice farmers. As was happening in other locales in the 1880s, groups of Chinese began leasing and buying (from the Hawaiians of Waikīkī) former taro lands for conversion to rice farming (Coulter and Chun 1937). By 1892, Waikīkī had 542 acres planted in rice, representing almost 12% of the total 4,659 acres planted in rice on O‘ahu (Figure 31).

5.3.3.3 Bath Houses

In the late nineteenth century, the Waikīkī beach area in Ulukou and Kahaloa was dotted with small cottages and some bathing houses. These “bathing houses,” placed strategically near the beach, were places where people could change into their bathing suits, rent towels, and walk directly into the ocean. One of the first of these bathhouses was the “Long Branch Baths,” named after a popular New Jersey resort. This long wooden shed was built near the edge of ‘Āpuakēhau Stream by James Dodd in 1881 at the former residence of Kākuhihewa (Scott 1968).

5.3.4 1900s

5.3.4.1 The Moana Hotel

W.C. Peacock, a wealthy Honolulu landowner, had a seaside cottage in Waikīkī, east of ‘Āpuakēhau Stream. He tore down his cottage and built the Moana Hotel, which opened on 11 March 1901. The first hotel building had 75 rooms, each with its own private bath and telephone, an unheard of luxury. In 1905, Peacock sold the hotel to Alexander Young, who had an interest in several other Hawaiian hotels. Young’s estate managed the hotel until 1928, when it was purchased by the Matson Navigation Company to cater to the new steamship tourists who were flocking to Hawai‘i as a vacation spot. Under the title of the Territorial Hotel Company, Ltd., Matson operated a number of hotels in Hawai‘i including the Moana, the Royal Hawaiian, and its predecessor the Seaside Hotel.

The Seaside Hotel was built in 1906, and consisted of a 10-acre parcel west of ‘Āpuakēhau Stream west of the Moana Hotel. Scattered on the grounds were bungalows and tent houses for guests. Many famous people came to stay at the hotel including Alice Roosevelt Longworth, the daughter of the Theodore Roosevelt, and Jack London, who wrote several of his South Pacific stories at the hotel during his stay (Scott 1968).

By 1928, the Matson Steamship Company owned the Moana Hotel and held the lease for the Seaside Hotel. In 1925, they began to move many of the bungalows and cottages from the Seaside

Hotel beach area to the *mauka* side of Kalākaua Avenue to clear the ground for construction of the new Royal Hawaiian Hotel.



Figure 29. Photo of Diamond Head from Helumoa Grove ca. 1859 (Hawai‘i State Archives)

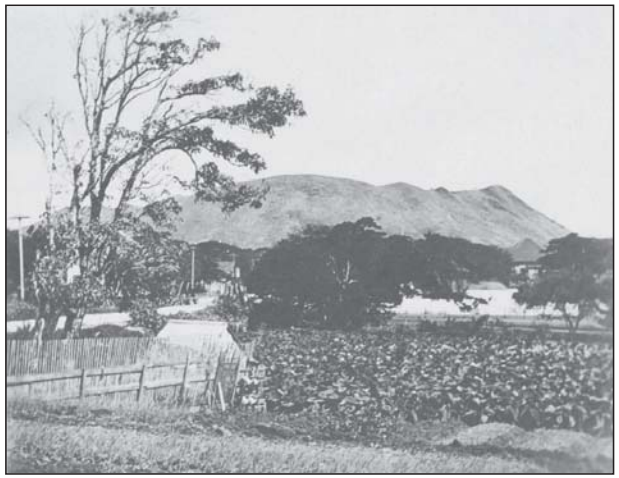

Figure 30. Photo of Diamond Head across taro fields ca. 1900 (University of Hawai‘i at Mānoa Digital Collection)



Figure 31. Photo of Kalākaua Road with trolley tracks (right) and Diamond Head (background), ca. 1890 (Hawaiian Historical Society Collection)

In his book on the Princess Ka‘iulani Hotel, Stan Cohen (1995:42) recounts, “In 1920 cottages and an expansive lawn were built across Kalākaua Avenue at the former site of ‘Āinahau.” These generally refer to a number of small rectangular cottages directly opposite the Moana Hotel on the *mauka* side of Kalākaua Avenue, east of Ka‘iulani Avenue.

5.3.4.2 The Royal Hawaiian Hotel

The Royal Hawaiian Hotel, also known as the “Pink Palace of the Pacific,” opened on 1 February 1927 at an estimated cost of $4 million. Construction began in 1925 and at the time, it was the biggest construction project in the Pacific. Notable visitors to the Royal Hawaiian Hotel included the Rockefellers, the Beatles, and Marilyn Monroe. After Pearl Harbor was attacked, the the hotel closed its doors for the duration of World War II. Subsequently, the United States Navy used the hotel as a rest and recreation center for enlisted sailors. The Navy vacated the hotel shortly after the end of World War II and it reopened in January 1947 (Fischer n.d.:1–2).

5.3.4.3 Ala Wai Canal

During the 1920s, the Waikīkī landscape was transformed by construction of the Ala Wai Drainage Canal—begun in 1921 and completed in 1928—which resulted in the draining and filling in of the remaining ponds and irrigated fields of Waikīkī. The canal was one element of a plan to urbanize Waikīkī and the surrounding districts:

> The [Honolulu city] planning commission began by submitting street layout plans for a Waikīkī reclamation district. In January 1922 a Waikīkī improvement commission resubmitted these plans to the board of supervisors, which, in turn, approved them a year later. From this grew a wider plan that eventually reached the Kapahulu, Mō‘ili‘ili, and McCully districts, as well as lower Makiki and Mānoa. The standard plan for new neighborhoods, with allowances for local terrain, was to be that of a grid, with 80-foot-wide streets crossing 70-foot-wide avenues at right angles so as to leave blocks of house lots about 260 by 620 feet. Allowing for a 10-foot-wide sidewalk and a 10-foot right-of-way [alley] down the center of each block, there would be twenty house lots, each about 60 by 120 feet, in each block. [Johnson 1991:311]

Newly created land tracts following the Ala Wai Canal’s construction spurred a rush of development in the 1930s. An article in the *Honolulu Star-Bulletin* in 1939 extolled the area’s progress:

> The expansion of apartment and private residence construction is no secret. Examination of building permits will show that more projects have been completed during the past year, and more are now underway in this area, than in any other section of the territory.
>
> These developments are being made by island residents who have recognized the fact that Waikīkī presents the unparalleled possibility for safe investment with excellent return. [Newton 1939:10]

5.3.4.4 Fort DeRussy

During the first decade of the twentieth century, the U.S. War Department acquired more than 70-acres in the Kālia portion of Waikīkī for the establishment of a military reservation called Fort DeRussy, named in honor of Brigadier General R.E. DeRussy of the Army Corps of Engineers.

> On 12 November 1908, a detachment of the 1st Battalion of Engineers from Fort Mason, California, occupied the new post . . .
>
> Between 1909 and 1911 the engineers were primarily occupied with mapping the island of O‘ahu. At DeRussy other activities also had to be attended to—especially the filling of a portion of the fishponds which covered most of the Fort. This task fell to the Quartermaster Corps, and they accomplished it through the use of a hydraulic dredger which pumped fill from the ocean continuously for nearly a year in order to build up an area on which permanent structures could be built. Thus the Army began the transformation of Waikīkī from wetlands to solid ground. [Hibbard and Franzen 1986:79]

5.3.4.5 World War II

The entrance of the United States into World War II following the Japanese bombing of Pearl Harbor on 7 December 1941 put on hold plans for the development of Waikīkī as a tourist destination. Until the war’s end in 1945, the tourist trade was non-existent “since the Navy controlled travel to and from Hawai‘i and did not allow pleasure trips” (Brown 1989:141). For the duration of the war, Waikīkī was transformed into a recreation area for military personnel.

> It was not the same Waikīkī as before the war, though; barbed wire barricades now lined its sands, and there were other changes too. Fort DeRussy became a huge recreation center, with a dance hall called Maluhia that attracted thousands of men at a time. The Moana Hotel continued to function, but many other establishments and private homes in the area were taken over by the military. [Brown 1989:141]

5.3.4.6 Post-World War II

The war ended in 1945 and by the mid-1950s there were more than 50 hotels and apartment buildings from the Kālia area to the Diamond Head end of Kapi‘olani Park. The Waikīkī population at that time was not limited to transient tourists but included 11,000 permanent residents living in 4,000 single dwellings and apartments in stucco or frame buildings. Development of hotel properties in Waikīkī during the 1950s raised concern over public rights-of-way for access to the Waikīkī beach which, like all of Hawai‘i’s beaches, is public from the ocean to the high water mark.

5.3.4.7 Ala Moana Center

The traditional name for the area where the present day Ala Moana Shopping Center stands is called Kālia. The Kālia area was known for its numerous fishponds such as Loko Kūwili, which is now filled in. The parcel where the Ala Moana Center stands today was granted to Lot Kapuāiwa, also known as Kamehameha V (Land Grant 2790; RM 1398). The 50-acre swampy area was deemed unproductive land and was put up for sale in 1884 in accordance with Princess Bernice Pauahi Bishop’s will (*Hawaii News Now* 2009). In 1912, Walter Dillingham bought the

property for nearly $25,000 and had his company, Hawaiian Dredging Company, fill the swamp land with coral from nearby projects (*Honolulu Advertiser* 2006).

In 1948, Lowell Dillingham, Walter Dillingham's son and president of Hawaiian Land Company (an affiliate of Hawaiian Dredging Company), announced plans to construct a shopping complex on the 50-acre site. Construction of the shopping complex began in 1957 and on 13 August 1959 the shopping center opened for business (*Hawaii News Now* 2009). The shopping complex initially opened with 87 stores on 680,000 sq ft (*Honolulu Advertiser* 2006). In 2009, the shopping center celebrated its fiftieth anniversary and has expanded to over 2,000,000 sq ft catering to *kama'āina* and tourists with its mix of retailers (*Hawaii News Now* 2009).

5.4 Historic Maps

A series of historic maps from the early 1800s through the modern era are presented with an overlay of the project area for scale and orientation. The Honolulu harbor access has played a critical role in the distribution and dissemination of information and resources over O'ahu Island and along the Hawaiian archipelago. The following section shows the physical change to the landscape created by the contemporary move towards modernity.

5.4.1 Kotzebue Map (1817)

The pre-Contact shaping of Waikīkī, Honolulu, and the Kaka'ako\Kewalo region is illustrated in the 1817 map (Figure 32) by Otto von Kotzebue, commander of the Russian ship *Rurick*, who had visited O'ahu the previous year. Kotzebue's map illustrates the Kaka'ako area formed a "break" between the heavily populated and cultivated centers of Honolulu and Waikīkī. The area is characterized by fishponds (ovals), salt ponds (square clusters), trails connecting Honolulu and Waikīkī, and occasional taro *lo'i* (rectangles) and habitation sites (trapezoids) along the main trail (later Queen Street). The areas of high population and habitation concentration probably reflect distortions caused by the post-Contact shift of Hawaiians to the area around Honolulu harbor—the only sheltered landing on O'ahu and also the center of increasing trade with visiting foreign vessels.

5.4.2 Malden Map (1825)

The coconut groves and *taro* farms of Waikīkī illustrated on an 1825 map (Figure 33), drawn by Charles Malden, a lieutenant on the HMS *Blonde*, the British ship captained by Lord Byron. During a visit to London in 1824, Kamehameha II and his favorite wife Kamāmalu died of smallpox (Byron 1826:66-69), and their bodies were brought back to the Islands aboard the *Blonde*. This map also shows a coconut grove in the plain area (now upper Pi'ikoi/Pensacola Street area) and scattered fishponds.

5.4.3 LaPasse Map (1855)

An 1855 map (Figure 34) by Lt. Joseph de La Passe of the French ship *L'Eurydice* shows the growth of the town of Honolulu to the mid-nineteenth century. The map by La Passe seems to show many more salt ponds and fishponds between Honolulu and Waikīkī (in the Kaka'ako area), suggesting that although the area was not a focus for habitation or agriculture, it was an area for important resource collection from the sea, the shoreline, from salt ponds near the coast, and inland

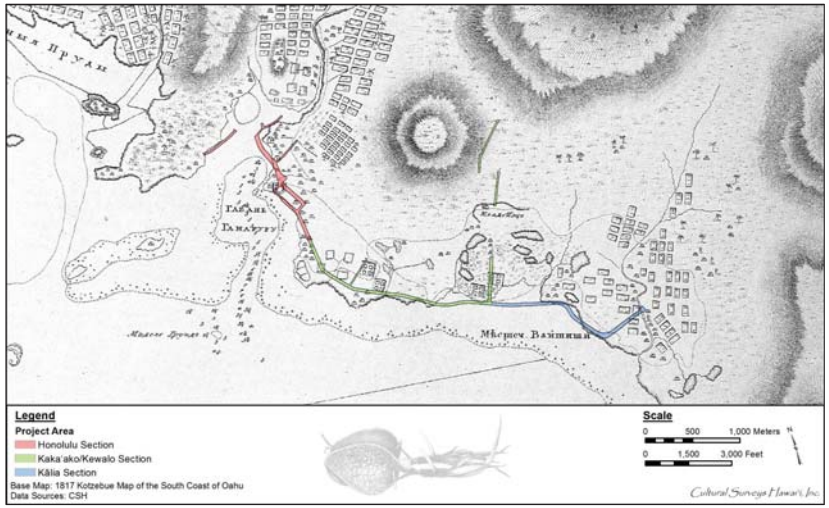

Figure 32. Portion of 1817 map by Otto von Kotzebue, commander of the Russian ship *Rurick*, showing fishponds and salt pans in the Kaka'ako area

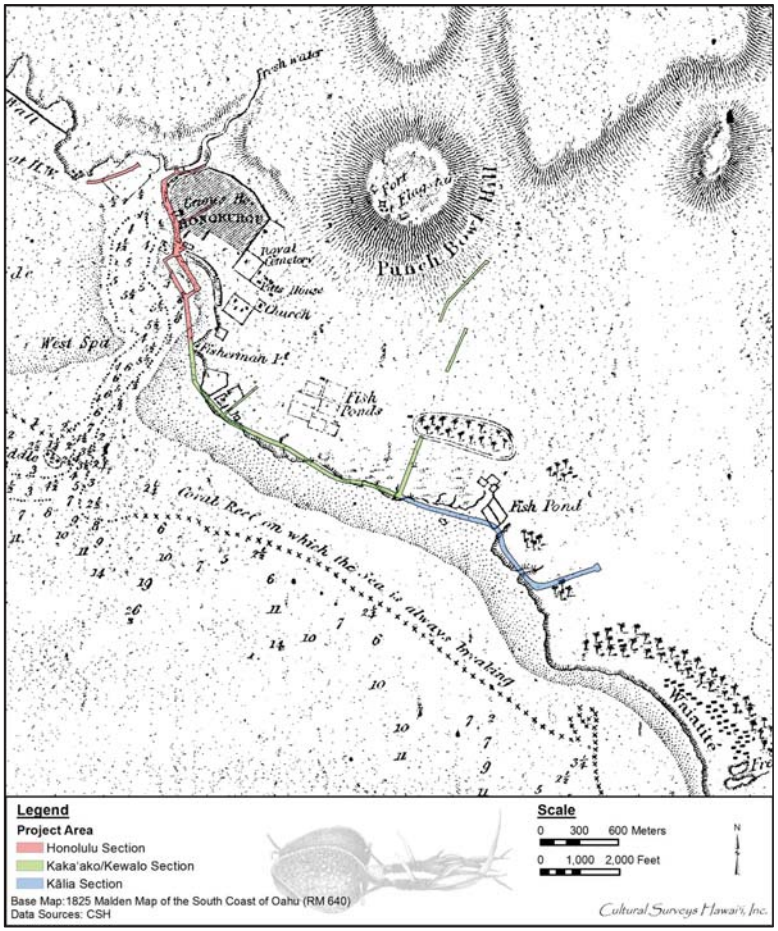

Figure 33. 1825 map (portion) of Honolulu and the South Coast of O'ahu, by Lieutenant C.R. Malden, showing the locations of structures, coconut groves, and fishponds in the Honolulu, Kaka'ako, and Kālia (Waikīkī) areas

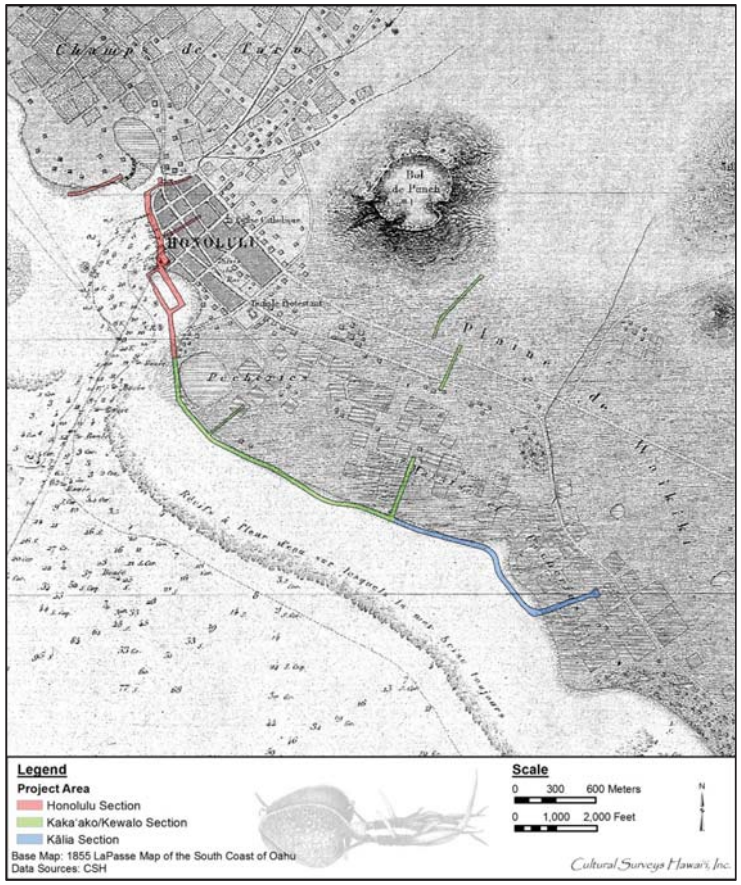

Figure 34. Portion of 1855 map of Honolulu by Lt. Joseph de LaPasse of the French vessel, *L'Eurydice*; project area is southeast of an area labeled "*Pecheries*" ("Fishponds")

fishponds. This settlement pattern of fishponds and salt pans near the shore and habitations clustered around the *mauka* boundary of the Kaka'ako area near Queen and King streets, is even more evident in the 1855 LaPasse map of Honolulu**.**

5.4.4 Waterworks Plan and Bishop Map Series (1884 and 1881)

Portions of a modern tracing of an 1884 map by S.E. Bishop show the disposition of LCAs granted in the environs of the study area (Figure 35 through Figure 38). The tracing includes some modern streets not present in 1884. These additions, however, permit an accurate positioning of the study area on the 1884 map. This general depiction is believed to be quite accurate, with the annotated "Beach Road," that runs along the edge of the sea becoming the present Ala Moana Boulevard/Nimitz Highway alignment.

The *mauka* portion of Koalele's claim that includes the *taro* patches is not shown on the 1884 map; it is likely somewhere immediately *mauka* of King Street. The *makai* portion—the "*Lokos*" or fishponds—is shown located northeast of the present study area.

5.4.5 U.S Army War Department Fire Control Map (1919)

A 1919 U.S. War Department map of O'ahu shows residences clustered around Queen Street and Ward Avenue (Figure 39 through Figure 41). There were still many ponds east of Ward Avenue, especially at the future site of McKinley High School, and the area east along the coast, which would be developed into the Ala Moana Shopping Center and Park. There is a trail along the eastern boundary of the project area that aligns with the makai end of Victoria Street, which connects the residential areas around King Street to the residential areas along Queen Street. The area east of Fort Armstrong has only recently been filled, but is not yet developed. Kewalo Harbor does not as yet exist.

The 1919 map shows additional land has been made in Iwilei, Kawa Pond has been filled, and material from the dredging of Honolulu Harbor will soon to be used to form Sand Island, which now consists of Quarantine Island and high reef areas. A spur of the OR&L railroad extends from the main depot area to a wharf opposite the junction of Queen and River streets. The Esplanade area (Piers 9 to 11) extends from Bethel to Bishop Street, but the construction of Aloha Tower will not be completed until 1927. Queen Street is still the main coastal road and there are three bridges over Nu'unau Stream, at Queen, King, and Beretania streets connecting College Walk along the west side of the stream and River Street on the east side.

5.4.6 U.S. Army War Department Fire Control Map (1933)

The 1933 U.S. Army War Department map (Figure 42 and Figure 43) indicates development of Kaka'ako focused in the area from Punchbowl to South Street and north of Queen Street. The land was inhabited more than is evident from this map. The Ward family leased lands to the Japanese for camps, schools, playgrounds, temples, and shrines. Kaka'ako was one of the first residential areas for working class families, housing people working at the laundries, the harbor, the Honolulu Iron Works, the Honolulu Brewery, and truck drivers, seamen, and fishermen. In 1940, Kaka'ako had a population of over 5,000 residents. Hawaiians, Portuguese, Chinese, and

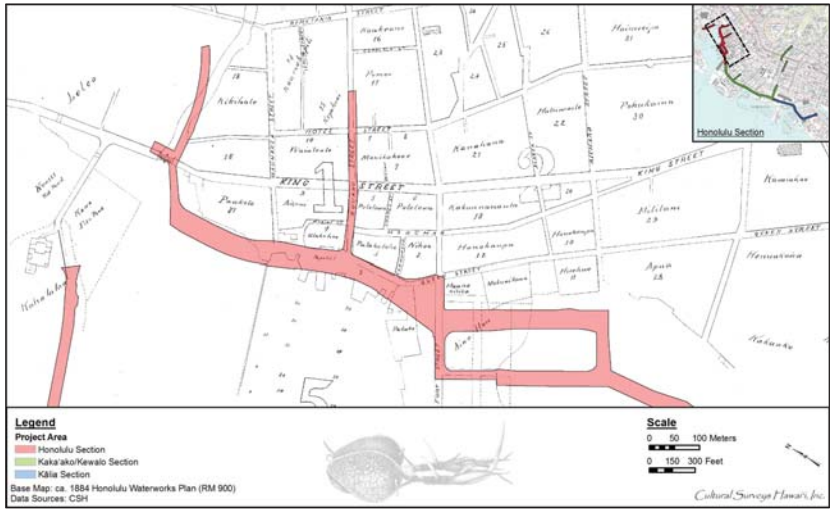

Figure 35. 1884 Honolulu Waterworks Plan showing western portion of the Honolulu section (shaded in red); project area is in former reef areas (later filled in)

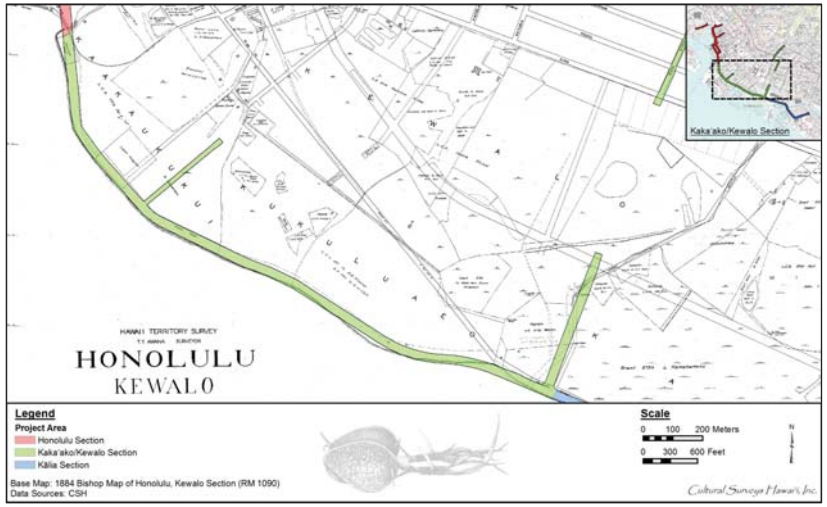

Figure 36. 1884 Bishop map showing central Kaka'ako portion (shaded in green) of the project area

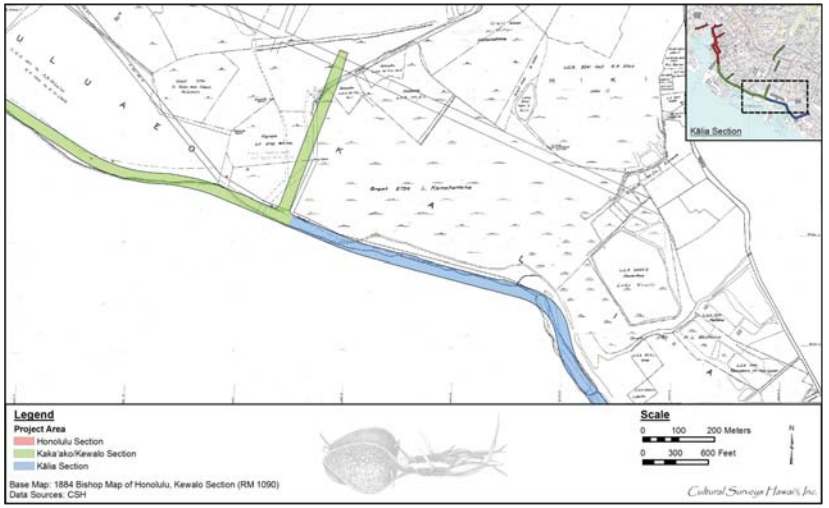

Figure 37. 1884 Bishop map showing part of the Kaka'ako and Waikīkī portion (shaded in blue) of the project area

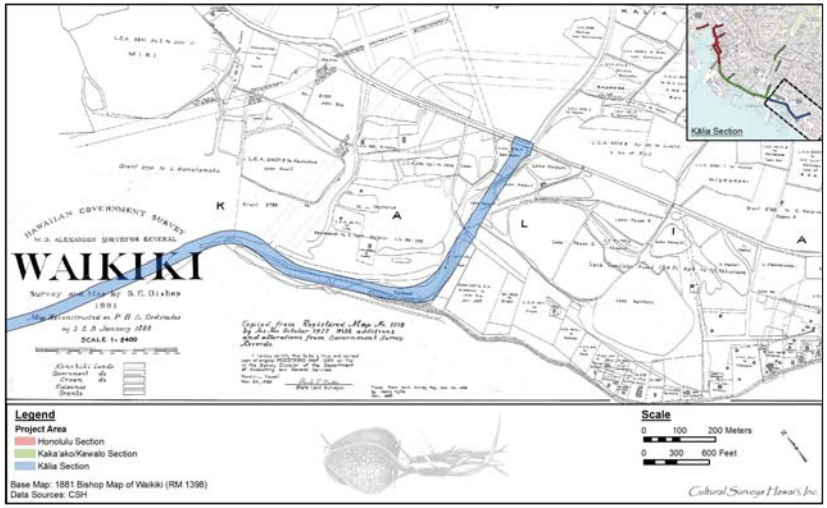

Figure 38. 1881 Bishop map show Waikīkī portion (shaded in blue) of the project area

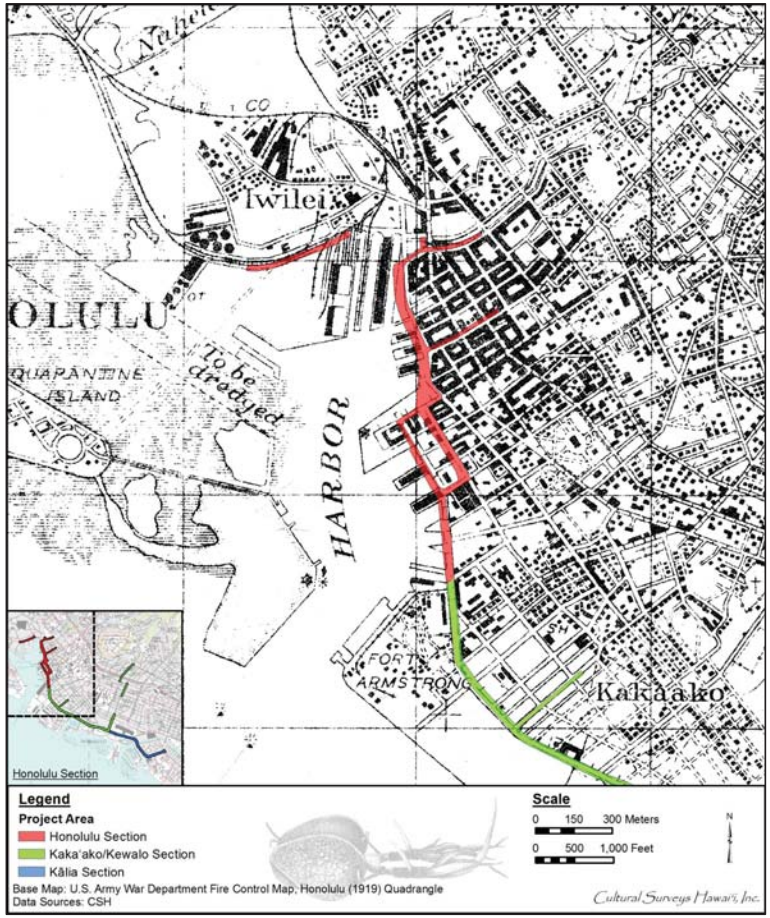

Figure 39. 1919 U.S. Army War Department fire control map of O'ahu, Honolulu quadrangle, showing location of the Honolulu section of the project area (shaded in red)

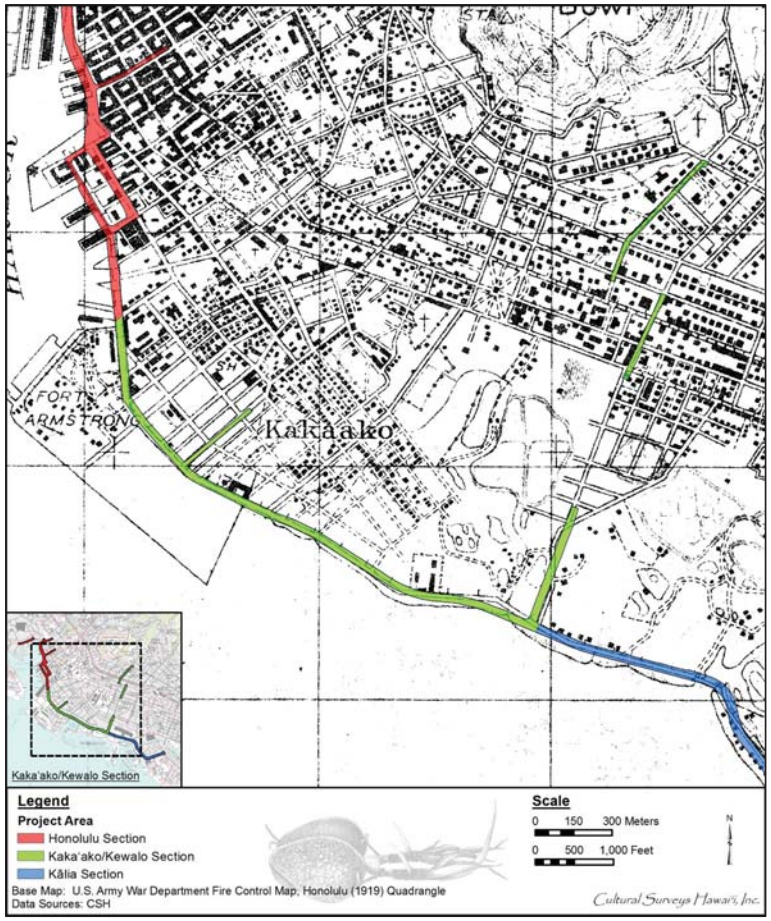

Figure 40. 1919 U.S. Army War Department fire control map of O‘ahu, Honolulu quadrangle, showing location of the Kaka‘ako section of the project area (shaded in green)

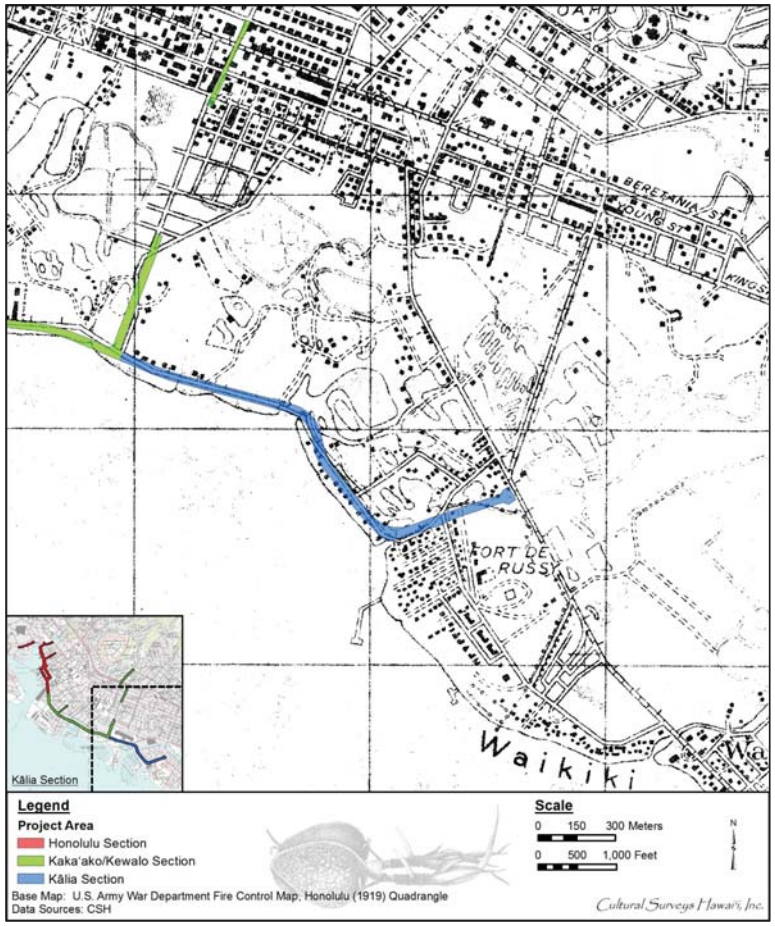

Figure 41. 1919 U.S. Army War Department fire control map of O‘ahu, Honolulu quadrangle, showing location of the Waikīkī section of the project area (shaded in blue)

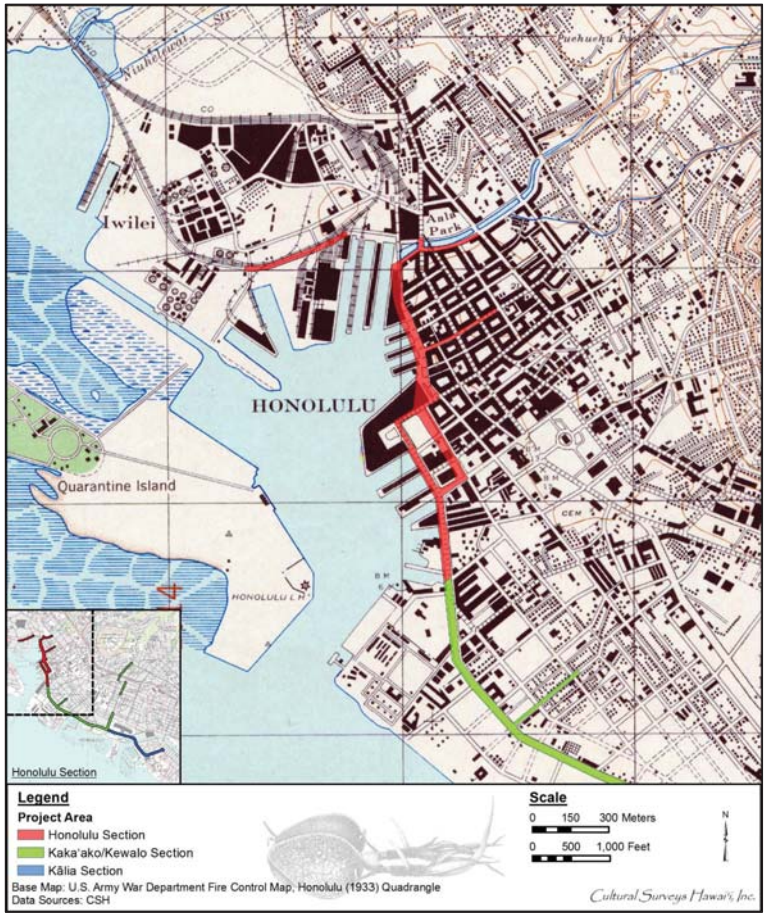

Figure 42. 1933 U.S. Army War Department fire control map of O‘ahu, Honolulu quadrangle, showing location of the Honolulu section of the project area (shaded in red)

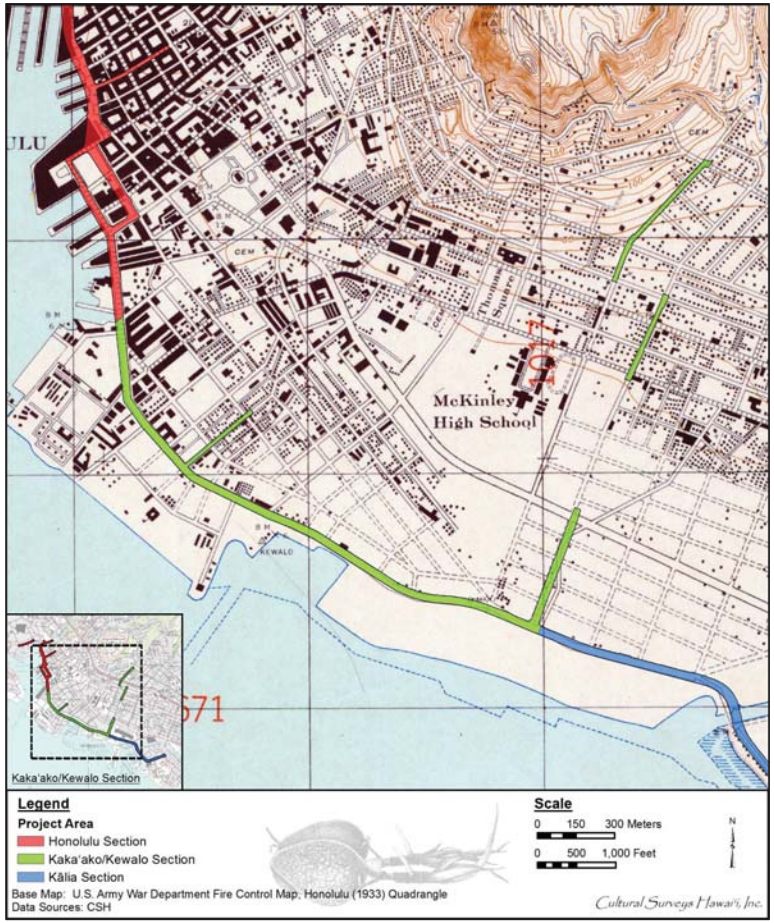

Figure 43. 1933 U.S. Army War Department fire control map of O‘ahu, Honolulu quadrangle, showing location of the Kaka‘ako section of the project area (shaded in green)

Japanese settled in camps based on their ethnic origins, but they came together for social and community functions. Most of the streets east of South Street are in the planning stages only or undeveloped (dirt roads), as they are marked on the map by dashed rather than solid lines. The map shows the completion of part of the east side of Kewalo Basin as a result of the creation of Ala Moana Park. Barely discernable on the west side of Kewalo Basin is the City & County incinerator built in 1930 (and replaced in 1946; the surf break is still called “Incinerators”). It is understood that the products from incineration were generally used right there as land fill.

5.4.7 U.S. Army War Department Terrain Map 1943

A series of 1943 maps (Figure 44 through Figure 46) shows increasing commercial development in Iwilei with additional railroad spurs and wharf development along Nimitz Highway. After World War II, the Kaka‘ako area became increasingly industrialized and residents moved out to the newer subdivisions away from the central Honolulu area. The 1943 U.S. War Department map (see Figure 44 through Figure 46) is the first to show the newly developed Kewalo Basin. The Kewalo Channel had been dredged in 1924 and the McFarlane Tuna Company (now Hawaiian Tuna Packers) built a shipyard there in 1929 for their fishermen’s “sampan fleet.” The 1943 map shows the northern and western areas of Kaka‘ako developed for commercial and residential purposes, but the eastern section is still relatively empty, with only planned or undeveloped streets (marked by dashed rather than solid lines). Much of this area is filled only with large warehouses or open lumber yards. Completed and planned dredging offshore is shown by the blue lines and the proposed new shoreline made of fill and dredged material is denoted by a dashed blue line.

5.4.8 USGS Topographic Map (1953)

The 1953 map (Figure 47 and Figure 48) shows the completion of Nimitz Highway (marked 4 LANE), which led to the loss of several piers in the River Street area around the mouth of Nu‘uanu Stream. The 1953 map also shows a park around Aloha Tower in the Aloha Tower complex.

By 1953, Kewalo Basin has been completely excavated, the area from Fort Armstrong to Ward Street has been filled to make new land, and Ala Moana Park has been formed from new dredged and filled land *makai* of Ala Moana Boulevard. The 1953 map (see Figure 47 and Figure 48) shows a fully developed Kaka‘ako with neighborhoods, schools, and numerous streets with governmental, commercial, and industrial areas. By this time, the entire area *makai* of Ala Moana Boulevard had been dredged and the area *makai* of the boulevard filled to create Ala Moana Park.

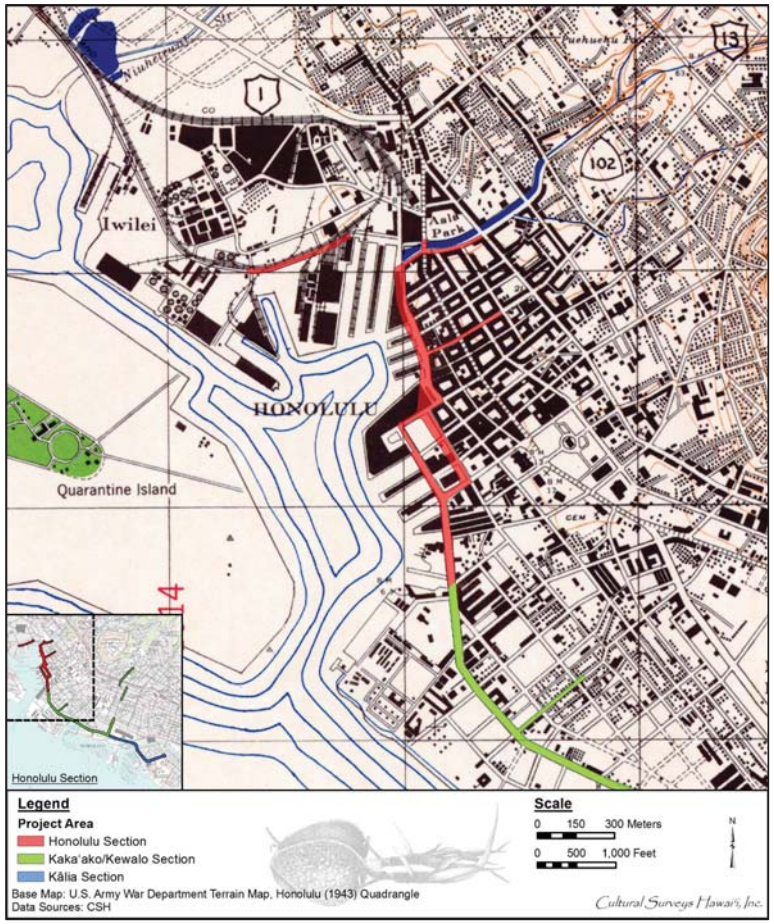

Figure 44. 1943 U.S. Army War Department terrain map of O‘ahu, Honolulu quadrangle, showing location of the Honolulu section of the project area (shaded in red)

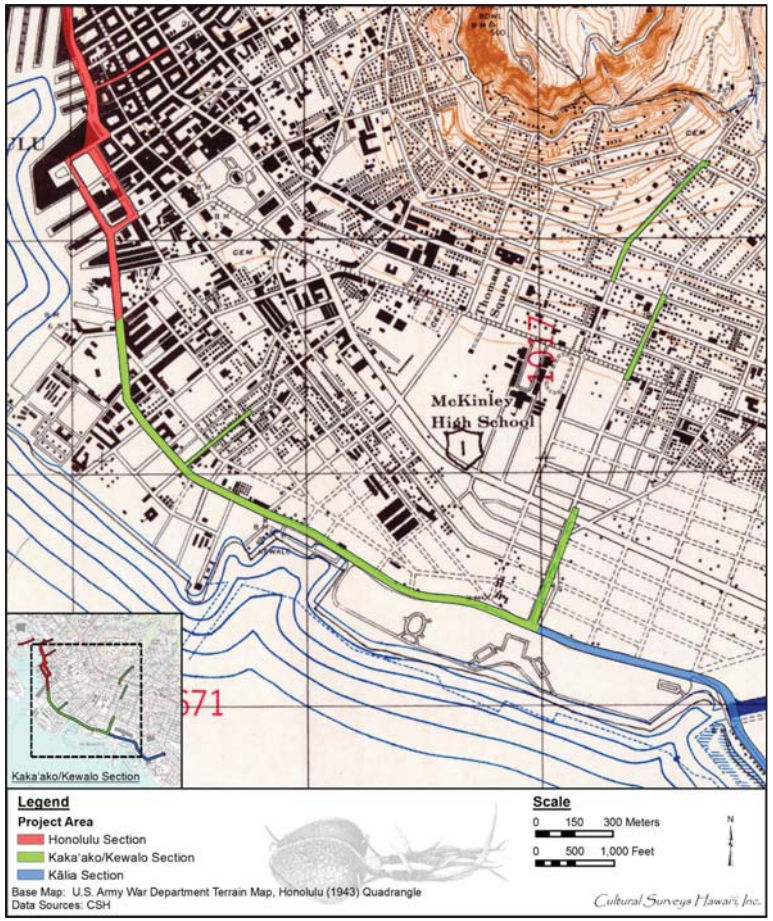

Figure 45. 1943 U.S. Army War Department terrain map of O‘ahu, Honolulu quadrangle, showing location of the Kaka‘ako section of the project area (shaded in green)

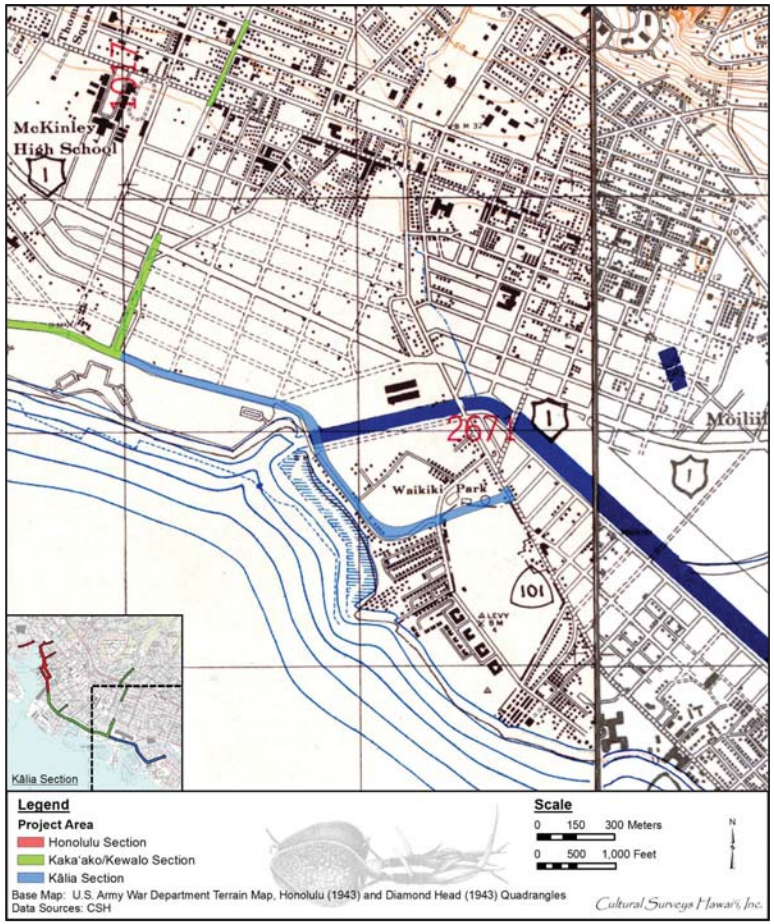

Figure 46. 1943 U.S. Army War Department terrain map of O‘ahu, Honolulu quadrangle, showing location of the Waikīkī section of the project area (shaded in blue)

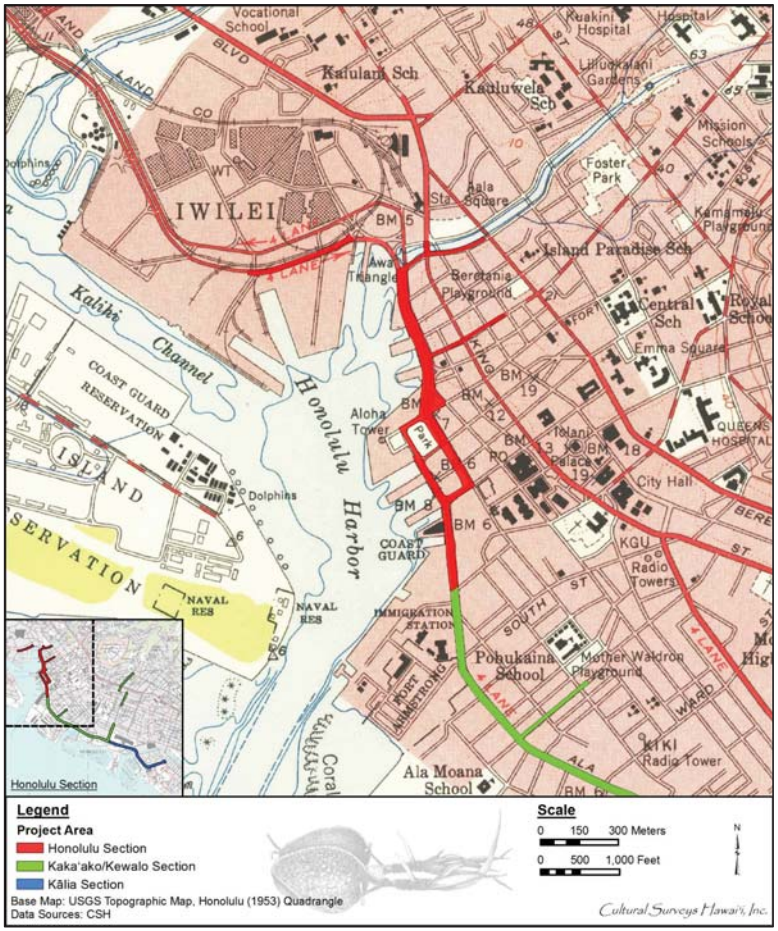

Figure 47. Portion of 1953 Honolulu USGS 7.5-minute series topographic quadrangle, showing location of the Honolulu section (shaded in red) and Kaka'ako section (shaded in green) of the project area

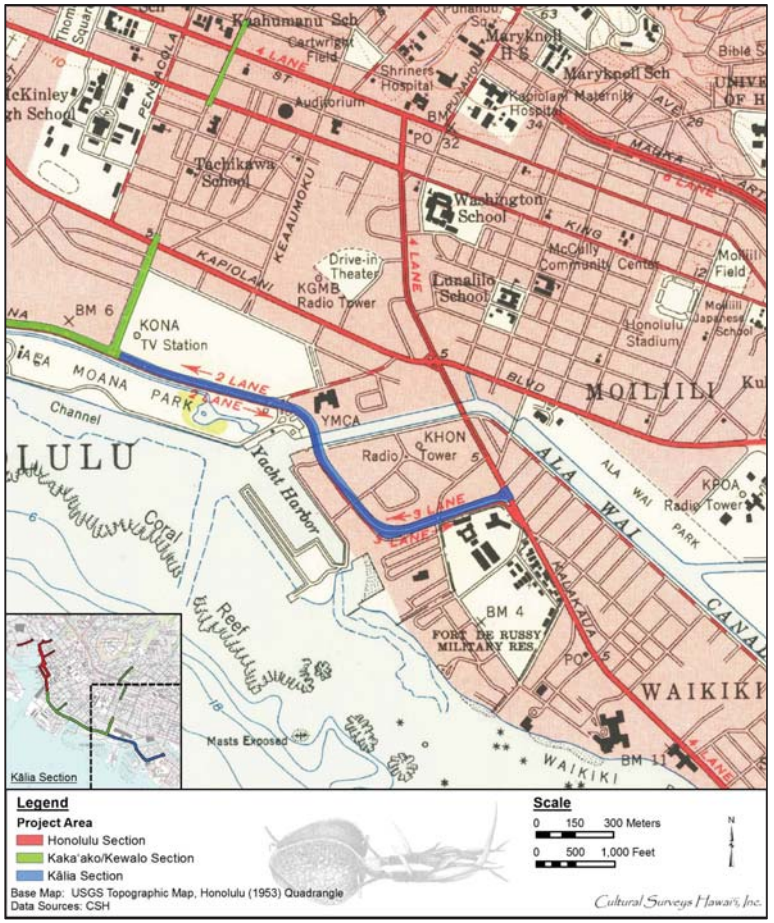

Figure 48. Portion of 1953 Honolulu USGS 7.5-minute series topographic quadrangle, showing location of the Waikīkī section of the project area (shaded in blue)

Section 6 Previous Oral History Research

The following section draws from previous oral history research conducted by the University of Hawai‘i’s Center for Oral History (UHCOH) to highlight the voices of several people who have or have had deep knowledge of the culture and history of the project areas. Indigenous cultures have used oral history to preserve a record of their past in the absence of written records.

In 1976, the Center for Oral History (COH) was established by the Hawai‘i State Legislature with the intent to preserve the memories of Hawai‘i’s people through oral interviews for the purpose of disseminating transcripts to researchers, students, and the general community. To date, 12 communities have been recorded by the COH, two of which are in the project area, Kaka‘ako and Waikīkī. Below are summaries and excerpts from this vast collection of oral histories. Please note that diacritical marks for Hawaiian words are presented as they appeared in the actual UHCOH study, unless otherwise summarized.

6.1 Honolulu

The oral history from the *ahupua‘a* of Honolulu has not been recorded to date. Historical documentation, scholarly endeavors, and oral histories from the peripheral localities of Kaka‘ako and Waikīkī have been included and reflect their sections of the project area.

6.2 Remembering Kaka‘ako

In 1978, the UHCOH produced a two-volume report called Remembering Kaka‘ako, which covered the vibrant residents of the area during the early to mid-nineteenth century (UH 1978). The Kaka‘ako area was home to a diverse ethnic mix of Hawaiians, Chinese, Japanese, Filipinos, Portuguese, and others. Bachelors lived in rented rooms while families lived in small homes clustered together with others of the same ethnic background. Although each ethnic group lived in their own clusters, diverse residents congregated at church, school, and during community activities and events. Their *mo‘olelo* color the cultural and historical background with nuanced recollections and add depth to the information provided by *kūpuna* and *kama‘āina* interviewed for this CIA. Summaries and excerpts from this collection of oral histories are presented below.

6.2.1 Eleanor Nahiapo Wilson Heavy

Mrs. Eleanor Nahiapo Wilson Heavy, a Hawaiian-English-Chinese woman, was born in Kaka‘ako in 1912 and lived there until 1938 (UH 1978:340–405). Her home was on Pohukaina and South streets and she attended Muriel Kindergarten in Kaka‘ako. She used to help her mother collect herbs such as *pōpolo* (black nightshade; *Solanum nigrum*) for cold and congested chest, and the *‘uhaloa* (American weed; *Waltheria indica var. americana*) root for colds. The people in Kaka‘ako at this time still went to the medicinal *kahuna*; the hospital was a place where you would go when no hope remained.

Her mother traveled to the Squattersville area (Ka‘ākaukukui area west of project parcels) to gather *limu* (seaweed), *wana* or *‘ina* (sea urchins), squid, and *‘ōpae* (shrimp) for the family’s meals. Mrs. Heavy also remembered that they used Hawaiian salt to embalm bodies. They would stuff the *‘ōkole* (buttocks) with salt, working it in with *ti* leaves. They also put salt in cuts under the armpit, and within the mouth, nose and ears. The body then could be viewed by relatives at the

undertakers for several days. The body was later put into a coffin for burial at the Catholic Cemetery or at the Kawaiaha‘o Church cemetery, both on King Street.

6.2.2 David Tai Loy Ho

Mr. David Tai Loy Ho, Chinese-Hawaiian, was born in Kaka‘ako in 1910 (UH 1978:405–465). As a child he made money picking *kiawe* (Algaroba tree; *Prosopis pallida*) beans, selling newspapers, and diving for coins at Honolulu Harbor when the large tourist cruise lines came into port. His home was on the corner of Queen and Cooke streets. The best place to pick the beans was the private property of the Ward Estate, between Queen and King streets. He and his brothers would sneak under the wire fence, and load up on the *kiawe* beans near the Ward horse stables. The *kiawe* beans were sold as horse and cattle feed.

Mr. Ho said there were not many Chinese in the area:

> Well, the Chinese people who lived there were all storekeepers. Well, let’s see, they were laundry men and storekeepers. The two storekeepers right on the corner there. The barbers were Japanese. The poi men were Chinese; the poi men were all Chinese because I guess they got the poi from the Chinese who lived on the farms. The Chinese planted rice and later on, they changed to taro because rice came from California . . . They lived right in the buildings [stores], right in the back. They’d eat; they have a little stove in the back. Live with their family. [UHCOH 1978:413–414]

6.2.3 Joseph Kekauoha

Mr. Joseph Kekauoha, a Hawaiian, was born in Kaka‘ako in 1920 (UH 1978:633–669). His mother worked at the American Sanitary Laundry, his father at the Honolulu Iron Works. He attended Pohukaina School and his family attended the Latter Day Saints Church on Cooke and Ilaniwai. He began to play slack-key guitar and Hawaiian music after he left Kaka‘ako, but sometimes returned to play at Felix Florentine’s Garden. He remembered some of the residential areas and the stores of Kaka‘ako:

> So had Magoon Block and Kumulae Block (where dad gambled). Magoon Block was, if you facing this way, it’s on the left. If you going towards Waikiki. And Kumulae Block was one laundry store. One laundry and the poi factory in the back. And Magoon Block had all stores—barber shop, and small snack and everything. And at the corner of South and Queen used to be Murata Furniture Store. . . .And then, across, if you see where the new fire station is at, Kakaako fire station, across the street used to be Kawaiahao Court. That’s another section of people besides the graveyard and the poi factory there. Another poi factory. And along side where that big McKesson something, alongside there was another poi factory. We had about 1, 2, 3 poi factories in Kakaako. Because all Hawaiian—they got to have their poi or whatever. [UHCOH 1978:637]

6.2.4 Mary Ka‘uhane Naito

Mary Ka‘uhane Naito, Hawaiian-Caucasian, was born in Kaka‘ako in 1920 (UH 1978:877–912). Her father worked at the Hawaiian Electric powerhouse. Their family lived for a time in Squattersville, and they were one of the families evicted when the houses were torn down.

Although she remembered that Kaka‘ako was mainly a district of poor people, she still talked of her birthplace with pride:

> I going tell I’m proud because I come from Kakaako because we had good people. We get along with one another. You know? And if there’s a Palama team going, and Kakaako team go, we still stick together. You know. Regardless of what, we still stick. And we all born and raise in Kakaako. . . That’s why I’m not ashamed to say that I came from Kakaako because all the people in Kakaako was good. [UHCOH 1978:911]

6.2.5 Charlie Correa

Charlie Correa, of Portuguese ethnicity, was born in Kaka‘ako in 1917 (UH 1978:102–127). His father was a driver for the City Transfer Company, but he was hurt on the job and his family depended on his mother and grandmother who made and sold Portuguese sausage and sweet bread (UH 1978:102). In 1978, he recalled that electricity was still uncommon in some areas in the late 1920s. One of his tasks as a child was to gather *kiawe* branches and other wood for the kerosene stoves. The wood was also used to boil water for washing, which was done in large metal tubs in the backyard. Toilets in each house were not common until about 1927. Mr. Correa went to the Ala Moana Opportunity School, a vocational school in Kaka‘ako, where he took classes in carpentry and other skills. After leaving school, he worked for H.C. and D., who had a yard on South Street, delivering ice for the Hawaiian Electric Company. Later he drove a tractor that picked up merchandise from the piers at Honolulu Harbor. His first house in Kaka‘ako was on Queen Street between Cooke and Kamani streets. It was adjacent to a rice-bagging warehouse and a rooming house for single Filipino and Hawaiian men. In their second house, also on Queen Street, they had a brick Portuguese oven in their backyard, where his mother would bake bread about once a month.

He remembered an early air strip on the beach called Malolo Field, in the area now covered by the Ala Moana Center, where the first one-seat plane landed. He recalled,

> Malolo was the first one that landed there. When they named the plane, a one-seater, Malolo because . . . like the fish in the ocean, when the liner travels, this fish is right alongside the liner when she flies up in the air and she goes down. That’s the malolo. And that’s when they named the plane ‘Malolo.’ [UHCOH 1978:119]

A biplane called “Malolo” was owned by the Lewis Air Tour’s Martin Jensen in the 1920s. Holbrook Goodale, who tried to start the first commercial inter-island flying service, the Hawaiian Air Transpiration Company of Honolulu, was taught to fly by this company. He was flying the Lewis plane “Malolo” in 1927 when it crashed in Lā‘ie, putting an end to the early dream of the air service company. Mr. Correa seems to be referencing an early grass airfield in Kaka‘ako in the 1930s or 1940s. A more elaborate, paved airport, called the Ala Moana Airport, was planned in 1944 by the Territorial Department of Public Works, but it was never built (Hawaii Aviation 2010).

6.2.6 Usaburo Katamoto

Mr. Usaburo Katamoto is a retired boat builder of Japanese descent who moved to Kaka’ako in 1910 (UH 1978:534–632). He knew a great deal of information about the fishing boats that used

Kewalo Basin. He recollected the dredging of the area to make Kewalo Basin and Ala Moana Park, an area once used for salt making. He said,

> Used to be salt field [Ala Moana Boulevard area]. You know, Chinese had the salt field there. High tide come, they put the sea water go in. And shut the gate. And throw the sea water on the field and make it dry. And then rake it up and put ‘em in the trough like, you know. Make the salt water richer (dried in the field, more concentrated). How they make that Hawaiian salt. [UHCOH 1978:622]

6.2.7 Wallace Amioka

Mr. Wallace Amioka, of Japanese ancestry, was born on South Street in Kaka‘ako in 1914 (UH 1978:20–63). His father was a fisherman and his mother came to Hawai‘i as a picture bride. Wallace attended Pohukaina School and then McKinley High School, and participated in sports sponsored by the schools and by the Kaka‘ako YMA, or Young Man’s Association. These sporting events often became rough when rival footballs teams met at the Honolulu Stadium and squared off after the games. His family were Buddhists, so they attended the Jodo Shu Temple in Kaka‘ako. He remembered watching sumo wrestling matches and going with his family to Japanese movies on the grounds of the Japanese Temple. The Kaka‘ako people of different ethnicities lived in different “camps.” Mr. Amioka explained this concept:

> By camp I mean the houses are very close together. Okay? You don’t have a big, lush yard like you find in homes today. You don’t have a 10,000 square feet lot, now. You just, your house is here. There’s a common, right? Common, ah, roadway you might say. The next house is almost next door to you. You know, very close . . . that’s what we mean by camp. See? And you’d have the main street, of course. But you have these clusters, or groupings of houses. Cluster houses what they would call today. [UHCOH 1978:33]

6.2.8 Francis Zane

Francis Zane was one of the few Chinese living in Kaka‘ako (UH 1978:1147–1183). His family moved there in 1909 when he was about 10 years old. His father worked for various companies, the E. Hall and Son Company, the Bank of Hawai‘i, and the Soda Water Works in Honolulu. Francis made extra money for the family by selling newspapers and by diving for coins in Honolulu Harbor. On the way to the harbor, he would pass the marshy areas near the base of Ward Avenue. He noted,

> And you know Ward Street, coming down. Before you reach the Fisherman Wharf, coming down? It’s on the right side. They used to have a place, where they used to make salt. Gee, you pass it when the sun shine, that’s salt, eh, burn your eye, you know, from the salt . . . red salt, white salt? [UHCOH 1978:1178]

6.3 Waikīkī 1910-1985 Oral History

In 1985, the UHCOH produced a four-volume report called *Wakīkī 1910-1985 Oral History*, which highlights the voices of several people who have or have had deep knowledge of the culture and history of the *ahupua‘a* of Waikīkī. The three-year effort included four

researchers/interviewers and three transcribers who collected the oral histories of various residents of Waikīkī. Summaries and excerpts from this vast collection of oral histories are presented below.

6.3.1 Sadao Hikida

The UHCOH documented the autobiography of Mr. Sadao Hikida on 18 December 1986. Mr. Hikida was born in 1914 and raised in Waikīkī and is a *nisei* (second generation) Japanese. He was a caretaker for ‘Āinahau, the former home of Princess Ka‘iulani, and a night watchmen for the Moana Hotel. In his autobiographical recollections recorded by UHCOH, Mr. Hikida shared his childhood memories of Kapi‘olani Park:

> The Kapi‘olani Park and zoo, as I remember in my childhood days, had many little islands, with tiny bridges to cross over, that were planted with palm trees, hibiscus, crotons, and willows. There also were picnic areas and many lily ponds, some with goldfishes and ducks swimming in them. When the lilies were in bloom it was a beautiful sight to see various hues matching the colorful colors of the goldfishes . . . Monsarrat and Kapahulu Avenues was mostly marshland with bulrushes and other swamp grass inhabited by mosquito fish and shrimp. The roads were mostly dirt roads lined with many date palms. I used to climb those date trees, trim the thorns and pick the delicious fruit to eat.
>
> In the early 1920s the park’s ponds, streams and marshlands were filled with the dredging material of coral and mud from the Ala Wai Canal. The park also had a sports arena where they had polo matches, horse racing, and buggy cart and auto racing.
>
> I would like to mention three wonderful and unforgettable memories. 1) Daisy the elephant, we used to ride on her back with the caretaker walking her around in a wide circle. 2) The blimp (balloon airship) which hovered over the tree tops anchored by a long rope to the ground. 3) The chimpanzee who was set free to roam although tied to a tree by a long chain. Other activities I recall are the tennis tournaments, family outings, school and club outings, hanamatsuri, etc. [UHCOH 1985:2:975]

Mr. Hikida shared a story about ‘Āpuakēhau Stream:

> The ‘Āpuakēhau Stream flowed past our back and front yards and emptied into the ocean between the Moana Hotel and the Outrigger Canoe Club. The banks of the river were lined with hau groves and palm trees. The river was abundant with shrimp and fishes such as mullet, ‘a‘awa [wrasse; Bodianus bilunulatus], āholehole [young stage of *āhole*, or Hawaiian flagtail; *Kuhlia sandvicensis*], pāpio [young stage of *ulua*; *Caranx hippos*], manini [reef surgeonfish; *Acanthurus triostegus*] and ‘o‘opu [general name for fishes included in the families Eleotridae, Gobiddae, and Blennidae]. I spent many happy relaxing hours fishing from the banks of the river or from the bridge which spanned the river. There was also a pond by our home which was connected to the ‘Āpuakēhau Stream. It was filled with shrimps and small fishes. And it was where we raised our ducks. [UHCOH 1985:2:967]

Mr. Hikida also discussed the Ala Wai Canal project during his youth in the 1920s:

> The dredging of Ala Wai Canal started about 1920 and was completed around 1926. The canal is about two and a half miles long, ending at Makee Road. It is about 150 feet wide and about 10 to 20 feet deep. This solved the flooding problem of Waikīkī. The dredged material of mud and coral was used to fill up hundreds of acres of pond fields and marshland in Waikīkī, Mō‘ili‘ili, McCully, Kapahulu and Kapi‘olani Park. They also filled up the ‘Āpuakēhau, the Kukaunahi and other small streams. While the ‘Āpuakēhau Stream was being filled, thousands of mullet and other fishes and shrimps were being smothered by the land fill. [UHCOH 1985:2:970]

6.3.2 Joseph Akana

The UHCOH interviewed Joe Akana on 22 March 1985 in his Hawai‘i Kai home. Mr. Akana was born and raised on ‘Ōhua Lane in Waikīkī, and he grew up and worked in Waikīkī as a beach boy during the summer and winter months. An oral history interviewee, Mr. Joeseph Akana lived and grew up in Waikīkī in the 1920s. He shared his memories of the Moana Hotel and the area directly *makai* of the project area. He also pointed out that he went to Waikiki School, located right across the street from the Moana Hotel, which was a Hawaiian church with a cemetery. Mr. Akana described the area of Waikīkī known as Long Branch:

> Yeah, included the Seaside—the street, Seaside Avenue; where the school was; and down towards the Seaside Hotel which was on the water side, beside, across the street. Both sides of Kalakaua Avenue was the Seaside Hotel. It included that Waikīkī Theater [area]. I think it went as far as Lewers Street. And in the area there where the Waikīkī Theater is, there were banana patches. Of course wherever there was banana, we always went to steal bananas. [UHCOH 1985:1:6]

He also recalled Waikīkī School and the Kawaiha‘o Waikīkī Branch Church and Cemetery, which was located north of the project area at the current location of the Princess Ka‘iulani Hotel:

> There was a cemetery there. I can’t say exactly what year. Let’s see, could be about 1909 or 1910. (JA clarifies to after 1915.) I mention those years because the Waikīkī School moved then between Hamohamo [Road] and Kaneloa [Road]. Waikīkī School. I don’t know what year it moved to the present site [3710 Lē‘ahi Avenue] . . . I think the church went down and they disinterred the (remains for burial elsewhere). Even those years, I think, they did things properly, you know. They removed the bones and whatnot. I don’t know where to. [UHCOH 1985:1:6]

Mr. Akana remembered the Waikīkī Theater and the dredging of the Ala Wai Canal:

> The Waikīkī Theater didn’t go up until about . . . I could get it pretty close. (Pause) About the middle ‘20s. [Waikīkī Theater opened in 1936.] You know why? That late? It was because the dredging of the canal didn’t occur till about the early ‘20s.
>
> And then, of course, where the Waikīkī Theater is now is filled-in property. All coral. It was all coral that came in from the canal. The dredger had pumps that pumped the drainage, whatever, the coral and what not that were dug out. That’s the first time in my life I noticed suction—dredging by suction. Before that, they used to have big clam shells that went down and grabbed the coral, lifted it up,

swung it across, and put ‘em in trucks, and the trucks hauled ‘em away. The dredger would grind coral, and they had big pipes close by. They suck the coral right into a big pipeline. Pipes about this big (twenty or twenty-four inches in diameter. Spiked grinders loosened coral that was spontaneously sucked and forced through pipes and spilled to designated areas). [UHCOH 1985:1:7]

Mr. Akana also discussed the politics surrounding the dredging of the Ala Wai Canal and pointed out that Ala Moana Park used to be the city dump:

> You see, the Dillinghams [Hawaiian Dredging] engaged in a contract with the State [Territory of Hawai‘i] that they [the Territorial government] would provide all the money necessary to dredge the canal, but with the proposition that certain areas that they filled—don’t know what the acreage would be—that they [the Territory] could keep. And the [Ala Moana] Shopping Center was one of them. And where the [Ala Moana] Park is now used to be a dump, the city dump . . . Yeah, city dump. So they filled that in and gave it to the City. (Actually, the City already owned the property. Dillingham filled the dump and surrounding swamp area to create the park.) So they had a pretty good agreement going. Everything went fine. There were no big squawks. Of course, they were responsible for a lot of Ala Moana Boulevard, you know. That’s all coral. What they dredged. [UHCOH 1985:1:7]

Mr. Akana also explained the streetcars that travelled around Waikīkī:

> Well, the streetcar used to travel on Kalakaua [Avenue] and it made a turn up to King Street on elevated tracks. You know how trains do. They build elevated banks so that they could lay the rails and the train [streetcar] would ride on these rails. Well, the same thing happened at McCully. It was the McCully area, they called it. And everybody who rode streetcars could see the ducks, white ducks. You could see eggs in the islets, you know. Chinn Ho lived in that area. And it was a fact that the duck ponds did not have—people who lived there didn’t have water lines, fresh water, drinking water. There was no line for drinking water. So, Chinn Ho, after school—you remember the old days when they used to carry the five-gallon tanks? Kerosene cans, they were. One here, one here [one on each side of the body], and they have a stick [on the shoulder]? You know. They still do that in the Orient, I guess. He went across the street and ask the people for water, brought it home daily.
>
> I believe he had a newspaper route, too, later on. He was older than me. [UHCOH 1985:1:5]

6.3.3 John C. Ernstberg

UHCOH interviewed Mr. John C. Ernstberg on 15 March 1985 at his home in Waikīkī. Mr. Ernstberg was born in 1910 in Kahului, Maui and is a former Waikīkī beach boy, musician, and a retired Honolulu City and County lifeguard. In his interview with UHCOH, Mr. Ernstberg described the various ocean resources in Waikīkī during his youth:

> The limu [seaweed] was there. You want limu. You need limu now. All the Hawaiian[s] do. I do. My wife needs limu because she’s got goiter, in that for the throat and things like that. Before all the limu, all the līpoa and everything I can get

> here manauea, līpoa, wāwae‘iole and eh, everything you like. All kinds of limu. You like līpoa?
>
> You like manini (reef surgeonfish)? I love manini, one, two manini. I go out there, see, I go on the reef over there when the tide coming up. You go out there with your net, walk outside on the reef, flat reef, you wait over there. Soon as the tide starts coming up, you see the manini. All big schools come up. They go on top of the reef. When the wave break, you can see them—all that green. You stay up there. You wait, wait, wait, wait till they all come on the flat one time. Throw. You look, you see the all green and spiral. You go in there and pick ‘em up little by little now. Go pick up, put ‘em all in your bag. You look—full, ‘nough. Going home. [UHCOH 1985:125]

6.3.4 Lemon “Rusty” Holt

Mr. Lemon “Rusty” Holt was interviewed for the UHCOH project on 15 March 1985 at his home in Wilhemina Rise in Honolulu. Mr. Holt was born and raised in Waikīkī in 1904. Mr. Holt graduated from Kamehameha Schools in 1928 and later from the University of Hawai‘i. Later he became a postmaster, personnel department head, and store and apartment manager. In his interview with UHCOH, Mr. Holt described his experiences with the dangers of gathering *wana* (sea urchin) in Waikīkī during his youth:

> The best wana grounds is at where Queen’s Surf is. There’s a little channel, and right next to the channel is a reef. Wana growing underneath running water or (white) waves breaking is supposed to be fat. Good wana. Worthwhile getting and eating. You pick them in the month of October. They’re fatter then.
>
> Well, one day we went out, and (who was) steering, I forget. I was in the middle. We had gotten what wana we wanted—three or four gunny sack bags, filled up. They were in the front of me, at the bow was my sister Dawn Kinney, who just recently passed away. So in coming in, we caught a wave, a good sized wave. We shouldn’t have. We shouldn’t have, but we did. I can’t remember now who was steering. Anyway, we caught the wave and as we came in, it ran into white water. The spray, came into the boat. My sister, who was sitting at the bow, when the spray came in, leaned back. When she leaned back, she leaned back onto the wana (bags), into the spears. Those spears are deadly because they break off. You can’t get them out unless you use tweezers right away. I don’t know how many hours it took for somebody to pick out all they could find.
>
> Years later, quite a few years later, I can’t remember how many years later, my sister complained of her big toe hurting. So somebody got a razor and started to scrape around where she said it was hurting because they could feel it was hard. Then somebody got a pair of tweezers, and they opened it up a little bit, and they pulled out the tip of one of those wana spears.
>
> After all those years, one of them came out in her big toe. It was white in color, being in the stream, the bloodstream, all that time. But they could see, they could tell that it was still in the shape of the wana point. [UHCOH 1985:808–809]

6.3.5 Earle “Liko” Vida

Earle “Liko” Vida was interviewed on 21 March 1985 at his home in Wai‘alae. Mr. Vida was born on 23 October 1901 at 1713 Ala Moana Road (formerly Kaiser Hospital, currently the location of the Hawai‘i Prince Hotel). He was raised in the Kālia area of Waikīkī. His father, Henry Cornwall Vida, was a superintendent for Hawaiian Dredging Company, and supervised the construction of the Ala Wai Canal during the 1920s. His mother was Lena Hart Vida from Waimea, Kaua‘i.

Mr. Vida recalled the Jarrett family living *makai* of him; the Paoa family near Fort DeRussy; and between those two areas lived the Clarks, Nauweles, Campbells, Vidas, Harbottles, and Simersons. He stated that they “were all practically one family.”

Mr. Vida described fishing with Kaimi, an old local fisherman who lived in the Kālia area, and the types of fish they would catch:

> ‘Ōpelu, and go out and get ulua, pāpio. He’ll get the pāpios right in the waves. As the waves break, you can see them. He goes in his little canoe, and he has a drag line all the time with floaters. And when the float comes in on the wave, bang, then he pulls it in. So, he was a crackerjack. I used to do the same thing and watched him. I’d go into the channels with my little outboard motor. Of course, he never had an outboard motor. He always paddled his canoe. [UHCOH 1985:582]

On gathering sustenance in the Kālia area:

> All of us that lived on the beach, our food (came) right from the ocean. Of course, we raised pigs and stuff like that. I had a little piggery there that I raised (pigs), and Mother would kālua [to bake in an underground oven] a pig. And we had our chickens. It was just like a regular farm. [UHCOH 1985:586]

Section 7 Community Consultation

Throughout the course of this assessment, an effort was made to contact and consult with Hawaiian organizations, agencies, and community members including lineal and cultural descendants of Waikīkī and Honolulu. CSH initiated the outreach effort in August 2014 through letters, email, telephone calls, and in-person contact. CSH completed the community consultation in December 2014. In the majority of cases, letters along with a map and an aerial photograph of the project were mailed with the following text:

> At the request of Gray Hong Nojima & Associates, Cultural Surveys Hawai‘i Inc. (CSH) is conducting a Cultural Impact Assessment (CIA) for the Board of Water Supply (BWS) Honolulu Water System Improvements (WSI) Environmental Assessment, Honolulu and Waikīkī Ahupua‘a, Honolulu (Kona) District, O‘ahu, Tax Map Keys (TMK) [1] 1-5, 1-7, 2-1, 2-3, 2-4, and 2-6: Various Plats and Parcels.
>
> The Honolulu Water System Improvements project includes the following:
>
> 1. The main work entails installation of a new 24” replacement water main from: the vicinity of the intersection of River St. and North King St.; then southwest, or *makai* (seaward) on River St. to Nimitz Hwy; then southeast on Nimitz Hwy to Fort Street Mall; then southwest to Aloha Tower Dr.; then along Aloha Tower Dr. to Ala Moana Blvd; and, then along Ala Moana Blvd to the intersection with Kalākaua Ave., for a distance of approximately 20,000 feet.
> 2. Excavation for the installation of a new 16” replacement water main along Nimitz Hwy. between Pacific St. and Sumner St. for approximately 1,355 ft.
> 3. Excavation for the installation of a new 20” replacement water main along Cooke St. from Ala Moana Blvd. to Pohukaina St. for approximately 1,038 ft.
> 4. Excavation for the installation of a new 16” replacement water main along Pi‘ikoi St. from Ala Moana Blvd., north to Kapi‘olani Blvd. for approximately 1,510 ft.
> 5. Excavation for the installation of a new 16” replacement water main along Pi‘ikoi St. from S. King St. to Kīna‘u St. for approximately 1,028 ft.
> 6. Excavation for the installation of a new 24” replacement water main along Pensacola St. from Kīna‘u St. to Wilder St. for approximately 1,806 ft.
> 7. Alternate 24” water main project areas include River St. between N. King St. and N. Beretania St., Nu‘uanu Ave. from Nimitz Hwy. to Pauahi St. and S. Nimitz Hwy. between Fort St. Mall and Richard St., and thence makai to Aloha Tower Dr.
>
> These excavations may be up to 12-ft below the ground surface and in trenches 6 to 8 ft wide.

The purpose of the CIA is to gather information about the project area and its surroundings through research and interviews with individuals that are knowledgeable about this area. The research and interviews assists us when assessing potential impacts to the cultural resources, cultural practices, and beliefs identified as a result of the planned project. We are seeking your *kōkua* (assistance) and guidance regarding the following aspects of our study:

- **General history and present and past land use of the project area.**
- **Knowledge of cultural sites- for example, historic sites, archaeological sites, and burials.**
- **Knowledge of traditional gathering practices in the project area, both past and ongoing.**
- **Cultural associations of the project area, such as legends and traditional uses.**
- **Referrals of *kūpuna* or elders and *kama‘āina* who might be willing to share their cultural knowledge of the project area and the surrounding *ahupua‘a* lands.**
- **Any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the project area.**

In most cases, two or three attempts were made to contact individuals, organizations, and agencies. Community outreach letters were sent to a total of 76 individuals or groups; and five of these *kama‘āina* and/or *kūpuna* met with CSH for a more in-depth interview. The results of the community consultation process are presented below in Table 9. The interview summaries are presented in Section 7.

Table 9. Community Consultation

Name	Affiliation	Notes
Ayau, Halealoha	Hui Mālama I Nā Kūpuna ‘O Hawai‘i Nei	Letter and figures sent via email 22 August 2014 Second letter and figures sent via email 30 September 2014
Becket, Jan	Author, photographer, knowledgeable in cultural sites, Kona Moku Representative, Committee on the Preservation of Historic Sites and Cultural Properties	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014 Mr. Becket responded to CSH via email 8 October 2014 for a possible site visit CSH responded to Mr. Becket via email on 9 October 2014 confirming a site visit is fine Mr. Becket responded to CSH via email 10 October 2014 with the following: *As for the Honolulu ahupua‘a, yes, I know of choke places, all in the uplands. I know the locations of a few destroyed heiau below Punchbowl as well, so we can talk about that. There are really interesting sites up in Pauoa Valley beyond the houses. Not*

Name	Affiliation	Notes
		sure who owns the land. LOTS of places in Nu‘uanu, including a heiau at O‘ahu Country Club that may be Kawaluna. I would love to get there. Anyway, lots to talk about for that project. CSH responded to Mr. Becket 14 October 2014 stating that October or November would be ideal for site visits and asking if any landowners would need to be contacted Mr. Becket responded to CSH via email on 16 October 2014 with the following: *Regarding the sites above Kou/Honolulu—there are so many that we will have to discuss which ones to visit. The one at the rear of O‘ahu Country Club *might* be Kawaluna. There is the one from Sites of O‘ahu in the bamboo forest along the Pali Hwy, and Makuku at the rear of the valley, and the really nice platform at Lulumahu Valley behind the reservoir, and the one Buddy Neller mentioned to me in the back yard of a house on Liliha. I would love to get back to all of those places . . .* CSH emailed Mr. Becket 28 October 2014 stating we were unable to get a response from the O‘ahu Country Club in time to visit Waolani Heiau; however, confirming Makuku and Old Pali Road visits Mr. Becket responded to CSH via email on 28 October 2014 with the following: *I was up on Tantalus today, photographing the (former) location of Pepeiaoohikiau Heiau, now a Hawaiian Telcom / cel phone relay station. Also got a chance to visit The Meadow, where I had not been since the 70s. Long time. That’s a cultural site too, but more connected w/ the ‘60s.* *The locked gate at Lulumahu might sabotage the access there. I have no clue how to get to the place from the Pali Hwy—unless we can jump the fence and get on to the reservoir access road. We’ll have to assess the Makuku parking situation. Yes, I'm up for the pohaku at the Pali! I can show you where*

Name	Affiliation	Notes
		the other stone used to be located—the one I remember from my childhood. I have an article about that stone I can share. *Does the project allow us to visit sites in Kalihi? I am in the process of setting up access to the site complex in the upper valley with a former student of mine. Lots of lo‘i up there.* *Let’s talk in the morning before we meet up.* Site visit to Nu‘uanu Mauka with Jan Becket on 29 October 2014 Mr. Becket emailed CSH on 3 November 2014 with two articles; see Appendix C Mr. Becket responded to CSH 4 November 2014 confirming a site visit to Nu‘uanu Mauka sites for 11 November 2014 Site visit to Nu‘uanu Mauka with Jan Becket and Māhealani Cypher on 11 November 2014 CSH emailed Mr. Becket his draft interview summary for approval on 13 January 2015 CSH followed up with Mr. Becket via email regarding his draft interview summary on 21 January 2015 Mr. Becket approved his interview summary on 21 January 2015
Capener, Marc	Chinese Medical Clinic, Oriental Medical School, Kalihi Farm	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Crabbe, Kamana‘opono	Ka Pouhana, Office of Hawaiian Affairs	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Cypher, Māhealani	Past President, Ko‘olaupoko Hawaiian Civic Club, Cultural practitioner, and Board Member for the Board of Water Supply	CSH called Ms. Cypher on 4 November 2014 asking if she could escort Mr. Jan Becket and CSH staff to Lulumahu; Ms. Cypher agreed and said 11 November 2014 would be ideal

Name	Affiliation	Notes
		Ms. Cypher emailed CSH 10 November 2014 confirming site visit to Lulumahu for 11 November 2014; CSH replied yes Site visit to Nu‘uanu Mauka and Lulumahu with Mr. Becket and Ms. Cypher on 11 November 2014 CSH emailed Ms. Cypher her draft interview summary for approval on 11 December 2014 Ms. Cypher replied to CSH via email on 11 December 2014 with edits to her draft interview summary CSH emailed Ms. Cypher a second draft of her interview summary on 19 December 2014 CSH emailed Ms. Cypher on 30 December 2014 regarding the second draft of her interview summary CSH emailed Ms. Cypher on 8 January 2015 regarding the second draft of her interview summary Ms. Cypher replied to CSH via email on 8 January 2015 stating she had additional edits to the interview summary CSH replied to Ms. Cypher via email on 12 January 2015 CSH emailed Ms. Cypher on 21 January 2015 regarding additional edits to her second draft of her interview summary
DaMate, Leimana	Executive Director, DLNR-Aha Moku	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Del Toro, Benjamin	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Del Toro, Daniel	Cultural descendant	Letter and figures sent out via mail 22 August 2014

Name	Affiliation	Notes
		Second letter and figures sent out via mail 22 September 2014
Del Toro, Rachel	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Del Toro, Samuel	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Faulkner, Kiersten	Executive Director, Historic Hawai‘i Foundation	Letter and figures sent out via email 22 August 2014 Ms. Megan Borthwick responded to CSH via email with comments from the Historic Hawai‘i Foundation on 4 September 2014; see Section 7.2 for an expanded version of Historic Hawai‘i Foundation’s response
Friends of ‘Iolani Palace		Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Friends of Kewalos		Letter and figures sent out via mail 22 August 2014 Ron Iwami and Tom Iwai of Friends of Kewalos consulted on 10 September 2014 Second letter and figures sent via email 30 September 2014
Gomes, Phoebe	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Gomes, Robin	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Hawai‘i Chinese Association of Hawai‘i		Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Hawai‘i Chinese Cultural Services Center		Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via email 30 September 2014
Hawaiian Civic Club of Honolulu		Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014

Name	Affiliation	Notes
Higgins, Collette		Letter and figures sent out via email 22 August 2014 Second letter and figures sent out via email 30 September 2014
Kaka‘ako Cares		Letter and figures sent out via email 22 August 2014 Second letter and figures sent out via email 30 September 2014
Kaka‘ako Do It Right		Letter and figures sent out via mail 22 August 2014 Letter and figures returned to CSH 24 August 2014
Kaka‘ako Ūnited		Letter and figures sent out via mail 22 August 2014 Letter and figures returned to CSH 26 August 2014 Letter and figures sent out via email 30 September 2014
Kaleikini, Ali‘ikaua	Lineal descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kaleikini, Hāloa	Lineal descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kaleikini, Kala	Lineal descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kaleikini, Moehonua	Lineal descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kaleikini, No‘eau	Lineal descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kaleikini, Paulette Ka‘anohi	Lineal descendant	Letter and figures sent out via mail 22 August 2014 Ms. Kaleikini responded to CSH via email 24 August 2014 CSH replied to Ms. Kaleikini 27 August 2014 See Section 7.1 for an expanded version of her response
Kamai, Dwynn	Treasurer, Waikīkī Hawaiian Civic Club	Letter and figures sent out via email 22 August 2014 Second letter and figures sent out via email 2 October 2014

Name	Affiliation	Notes
		Ms. Kamai replied to CSH 21 October 2014 with the following response: *Sorry for the delay in responding to your request. I really have not made the time to sort and put together a write up for to fulfill your request.* *Attached are a couple of articles found on the Internet regarding Waikiki and Palolo Stream. I hope it will help in your assessment/survey.* See Appendix C
Kamai, Winona	President, Waikīkī Hawaiian Civic Club	Letter and figures sent out via email 30 September 2014
Kawaiha‘o Church		Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keana‘āina, Betty	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keana‘āina, Kīhei	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keana‘āina, Luther	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keana‘āina, Noelani	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keana‘āina, Regina	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keana‘āina, Vicky	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keana‘āina, Wilsam	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kekaula, Mary K.	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014

Name	Affiliation	Notes
Keli‘inoi, Kalahikiola	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keli‘inoi, Kilinahe	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keli‘inoi, Moani	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keli‘ipa‘akaua, Chase	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keli‘ipa‘akaua, Justin	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keohokālole, Ema	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keohokālole, Jeanine	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keohokālole, Joseph	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Keohokālole, Lori	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kini, Debbie	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Kini, Nalani	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Lao, Chester	Former Board of Water Supply employee, knowledgeable in water	Letter and figures sent out via email 22 August 2014 Mr. Lao responded via email 23 August 2014 with the following: *So nice to hear from you again. The area for the pipeline construction is notorious for pipeline*

Name	Affiliation	Notes
		failure because of complex nature of the reef and the heavy loads of big trucks on the route. The reef is laced with tidal channels, pockets of no solid reef. The solid portions of hard reef are just fine but it is the areas cut by the streams Nuuanu, Makiki, and small unnamed drains are soft and require more careful inspection to see that these areas support the heavy traffic loads. By careful inspection, I mean that the inspectors have to watch the backfilling of the troublesome spots to insure [sic] *that it provides adequate support for the pipe. If you drive these routes and are aware of the rough areas, you know what I mean. Adequate compaction of the backfill is absolutely necessary, and not just the word of the contractor. Visual inspection and testing is required at all times to minimize settlement in these areas. While this may not be understood by bystanders thinking this is just rubber necking, this is extremely important. Inspection of the backfill over the pipe is important so that no rocks can directly impact the pipeline from heavy loads over head. If construction occurs at night time, this makes inspection more difficult despite lighting. Experienced inspectors aware of the task are necessary to make sure the construction is done right.* *In Hawaii Kai, a main inspection after a break revealed chicken bones and leftover lunch from workers who disposed of lunch leftovers figuring no one would ever find out. Workers are many times poorly trained or don't care. Inspectors are hard put to be everywhere at once so inspectors have to be adequately staffed. So the task of placing and inspection pipeline in a difficult area is the goal of the BWS.* *These are my comments on the project.* CSH responded to Mr. Lao via email 27 August 2014 thanking him for his input and asking permission to include his *mana‘o* (thought, idea, belief) in the report

Name	Affiliation	Notes
		Mr. Lao responded to CSH via email 27 August 2014 granting permission to include his new *mana‘o* CSH emailed Mr. Lao 11 September 2014 with a draft interview summary Mr. Lao responded to CSH via email 23 September 2014 saying he will review the draft interview summary CSH followed up with Mr. Lao via email 1 October 2014 on the status of his draft interview summary CSH followed up with Mr. Lao via email 21 October 2014 on the status of his draft interview summary Mr. Lao emailed CSH 12 December 2014 with edits of his draft interview summary CSH responded to Mr. Lao via email 19 December 2014 acknowledging receipt of his interview summary; final interview summary with corrections emailed to Mr. lao 19 December 2014
Letoto, Leon	Chinese Medical Clinic, Oriental Medical School, Reiki Master, Qigong Instructor, Kalihi Farm Knight of the Royal Order of Kamehameha I, Helu Ekahi, Heiau of Hawai‘i	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Lew, Haumea	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Lopes, Leina‘ala	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Luka, Alika	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Mamac, Violet	Cultural descendant	Letter and figures sent out via mail 22 August 2014

Name	Affiliation	Notes
		Second letter and figures sent out via mail 22 September 2014
Matsuo, Mike	Board of Water Supply –Land Division	CSH called Mr. Matsuo on 21 October 2014 for permission to access cultural sites in Nu‘uanu Mauka; Mr. Matsuo referred CSH to Ryan Peralta of the Department of Land and Natural Resources–Division of Forestry and Wildlife CSH called Mr. Matsuo on 5 November 2014 for access to the Nu‘uanu 822’ Reservoir site Mr. Matsuo emailed CSH 7 November 2014 confirming access to Nu‘uanu 822’ Reservoir Site visit to Nu‘uanu 822’ Reservoir 11 November 2014
Medeiros Jr., Clarence	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Nakayama, Perry	Researcher for the 1978 UHCOH Kaka‘ako Study	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Native Hawaiian Church		Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Norman, Carolyn	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Norman, Eileen	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Norman, Kaleo	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Norman, Keli‘inui	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Norman, Theodore	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Paik, Kaleo	Cultural practitioner	Letter and figures sent out via mail 22 August 2014

Name	Affiliation	Notes
		Second letter and figures sent out via email 30 September 2014
Papa Jr., Richard Likeke	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Pascua, Bruce H.	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Peralta, Ryan	Forestry Program Manager, Department of Land and Natural Resources–Division of Forestry and Wildlife	CSH called Mr. Peralta on 21 October 2014 for a permit to enter the Nu‘uanu Mauka area managed by DLNR-DOFAW; left a message CSH emailed Mr. Peralta 21 October 2014 requesting a permit to enter the Nu‘uanu Mauka area Mr. Peralta called CSH 27 October 2014; approved permit for Nu‘uanu Mauka areas for the 29 October 2014 CSH entered the Nu‘uanu Mauka area with Mr. Jan Becket 29 October 2014 CSH called Mr. Peralta 5 November 2014 requesting access to Nu‘uanu Mauka; approved permit for Nu‘uanu Mauka 11 and 12 of November 2014 CSH entered the Nu‘uanu Mauka area with Mr. Jan Becket and Ms. Māhealani Cypher 11 November 2014
Rash, Regina	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Rodrigues, Hinano	Interim Culture and Branch Chief, SHPD	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Roy, Corbett	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Soares, Moani Kaleikini	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014

Name	Affiliation	Notes
Stroud, Soulee LKO	Association of Hawaiian Civic Clubs	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Wong-Kalu, Hinaleimoana	OIBC Chair	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014
Yokooji, Dayleen	Cultural descendant	Letter and figures sent out via mail 22 August 2014 Second letter and figures sent out via mail 22 September 2014

7.1 Paulette Ka‘anohi Kaleikini

CSH contacted Paulette Ka‘anohi Kaleikini, a State of Hawai‘i recognized lineal descendant, on 22 August 2014. Ms. Kaleikini responded to CSH via email on 24 August 2014. Below is her statement:

> Aloha Nicole, this is aunty Ka‘anohi again.
>
> This project will be taking place in very, very sensitive areas, you already know that. it makes me cringe just to think about this project.
>
> The project begins at the Ewa end of the urban corridor. So a lot of subsurface disturbance occurred. But there are areas that have not been touched. This project could very well impact these untouched areas.
>
> My concern is for the pre-contact and some post-contact land use of the project area. In pre-contact times, there were many thousands of native Hawaiians living in the urban corridor. Today, we are still finding their bones, so we know their habitation of this area to be true. Their bones are proof.
>
> There are numerous information everywhere that note the cultural, historic and archaeological sites of this area, and including burial sites. So I won't list them here.
>
> I have noted traditional gathering practices of the past for these areas and there are numerous information out there as well.
>
> This was the area where the kauhale of the ali‘i was located. All around the kauhale were the people of the land; the kanaka maoli. There were heiau, fish ponds, lo‘i, salt beds; everything to sustain the community.
>
> My concern for this project area is the impact that it may have on iwi kupuna; whether they be in situ or isolated finds. The excavations that will go below the ground surface concerns me.
>
> I request to be kept abreast of every step of this project.
>
> Mahalo nui for the invitation to comment on this CIA.

> P. Ka‘anohi Kaleikini
>
> State Recognized Descendant for Honolulu and Waikiki Ahupuaa

CSH responded to Ms. Kaleikini via email on 25 September 2014 thanking her for her *mana‘o* (thought, opion) on the project. Ms. Kaleikini responded to CSH via email the same day with the following statement:

> Aloha,
>
> This is a huge undertaking.
>
> This project is in a culturally sensitive area of the urban corridor. It is clear that the excavations for the new water main will be deep and wide.
>
> There is a long history of cultural sites, including human remains, being impacted in the urban corridor by huge projects like the HART’s rail.
>
> I would advise that consultation occur with State recognized descendants of both the Honolulu and Waikiki ahupuaa soon after development of the CIA.
>
> An archaeological inventory plan should be developed and a survey to follow before any work is done. Cultural monitoring must be considered and be incorporated alongside archaeological monitoring for this project.
>
> Let me know if there are any questions.
>
> Mahalo nui
>
> kaanohi

7.2 Historic Hawai‘i Foundation

CSH contacted Kiersten Faulkner of the Historic Hawai‘i Foundation on 22 August 2014. Ms. Megan Borthwick responded to CSH on behalf of the Historic Hawai‘i Foundation via email on 4 September 2014. Below is the Historic Hawai‘i Foundation’s response. In addition, the original letter can be found in Appendix B :

> Thank you for including Historic Hawai‘i Foundation (HHF) in the Cultural Impact Assessment consultation for the Honolulu Water System Improvements (WSI) Environmental Assessment.
>
> Since 1974, HHF has been a statewide leader for historic preservation with a mission to preserve and encourage the preservation of historic properties significant to the history of Hawai‘i.
>
> This Cultural Impact Assessment prepared for Gray Hong Nojima & Associates, covers an area though Chinatown, Downtown, Kaka‘ako, and Waikīkī and include excavation and installation of replacement water main. The majority of work will run along Nimitz and Ala Moana Boulevard.
>
> This is a major route through town which passes a number of historic properties and districts. Historic Hawai‘i Foundation feels that an architectural resource survey should be conducted through this area to identify potential impacts to

historic resources. Properties already designated on the State or National Register of Historic Places—including historic districts such as Chinatown and Capital Districts—should be specifically evaluated for potential adverse effects (the State Register is available from the State Historic Preservation Division, and is also provided under the Historic Properties tab at www.historichawaii.org). In addition, the Architectural Inventory Survey may identify any additional historic properties that are eligible for the historic register but not formally designated.

If the proposed work is contained within the street right of way and does not have an above-ground component, then we believe that impacts to historic buildings and structures will be minimal. However, there are likely underground cultural deposits, iwi kūpuna [ancestral bones] or other cultural resources that should be identified and treated appropriately if found or disturbed.

Thank you for this opportunity to express our concerns with the proposed project. Megan Borthwick will be our point of contact for this project. Please contact her with questions or concerns. She can be reached at (808) 523-2900 or by email at megan@historichawaii.org

Section 8 Interviews

Kama‘āina and *kūpuna* with knowledge of the proposed project and study area participated in semi-structured interviews from August through December 2014 for this CIA. CSH attempted to contact 74 community members and government agency and community organization representatives for this CIA report; of those, three participated in formal interviews. CSH initiated the interviews with questions from the following five broad categories: *wahi pana* and *mo‘olelo*, agriculture and gathering practices, freshwater and marine resources, cultural and historic properties, and burials. Participants’ biographical backgrounds, comments, and concerns about the proposed development and project area are presented below.

The authors and researchers of this report extend our deep appreciation to everyone who took time to speak and share their *mana‘o* with CSH whether in interviews or brief consultation, including contacts who opted not to contribute to the current cultural impact assessment, but nevertheless spent time explaining their position on the proposed project. We request that if these interviews are used in future documents, the words of contributors are reproduced accurately and in no way altered, and that if large excerpts from interviews are used, report preparers obtain the express written consent of the interviewee/s.

8.1 Chester Lao

CSH previously interviewed Chester Lao on 6 December 2009 and 4 June 2014 for past projects. Mr. Lao responded to this project via email on 23 August 2014. This interview is a compilation of his interviews and responses.

Mr. Chester Lao was born in Menlo Park, California in 1931. He later moved to O‘ahu in 1962 when he was 31 years old. He worked for the Board of Water Supply for approximately 43 years. Mr. Lao began the interview describing the water table in the caprock aquifier, which is a lower permeable formation but has permeable marine formations that overlie highly permeable volcanic rock. When the missionaries first arrived in Hawai‘i, the water table was high within the caprock aquifier. The location of the Missionary Homes and the Board of Water Supply in downtown Honolulu overlies cinders and coral that collect water. Another source of water for the area was in the coral limestone beneath the cinders that form part of the caprock. A hand-dug well at the Mission Homes, which is approximately 25 ft in depth, contained water suitable for everyday drinking and cooking. The water quality in the area extending to the Board of Water Supply and the Alapai Transit Center was also similar to the Mission Homes. Mr. Lao shared with CSH that the water foundation that stands in front of the Board of Water Supply building on South Beretania Street is fed by a slightly brackish well that is usable for landscaping. However, the water was fresher before but has become brackish over time.

Moving east, Mr. Lao gave the background of the former Ward Estate, which is now the current site of the Neal S. Blaisdell Center. The Ward Estate was owned by the Ward sisters and was once famous for its ponds and springs. The Kaka‘ako area contains brackish water. During the construction of the Neal S. Blaisdell Center two wells were drilled. The well farthest *makai* was considered very brackish and salt water fish were dropped into the newly created pond. The *mauka* well was still usable but too brackish to drink, so it was used to raise *koi* (carp; *Cryprinus carpio*).

The lower pond that surrounds the arena is strictly artificial and fish such as *pāpio*, tangs, tilapia, and *‘ōmilu* (variety of crevalle) can be seen. Mr. Lao stated that approximately ten years ago a sewer project was being conducted along Ward Avenue that drained off a lot of brackish water so the water table became increasingly salty.

Traveling to the eastern portion of Honolulu Ahupua‘a (commonly known as Kaka‘ako) and toward Waikīkī Ahupua‘a at the edge of Kālia ‘Ili, the Ala Moana Center, and the vicinity of the area was considered swamp land. Mr. Lao recalled traveling toward Diamond Head on Ala Moana Boulevard and turning *mauka* onto Atkinson Drive and noting the whole area as swampy—filled with stagnant and probably brackish water. To create the Ala Moana Center, the area used fill material from Ala Moana Beach Park. Mr. Lao added that Hawaiian Dredging Construction Company was smart when they offered to dredge the Ala Wai Canal only if they could keep the debris. The debris was then transferred and used to fill the remainder of the Ala Moana Center property. The last area was filled with material from other sources. The areas around the shopping center including Liberty House (now Macy’s), the Ala Moana Hotel, and the Ala Wai Hotel were not filled in until about 1966. Mr. Lao shared that a small community of Native Hawaiian families called the swampy Ala Moana area home in the park area until they were displaced for the construction of the park and shopping center. The families eventually made their way *mauka* towards the Papakōlea area and onto Board of Water Supply land. The Board of Water Supply was given land via a Presidential Decree to create several sites for water tunnels including a future Papakōlea Shaft, Wai‘alae Shaft, and Kalihi Shaft. The Papakōlea Shaft was located just *mauka* of Roosevelt High School. During Mr. Lao’s employment at the Board of Water Supply, he recalled the Land Division sector receiving many complaints of a piggery near the Papakōlea Shaft. Schools and neighbors complained of the smell the piggery emitted. Upon inspection, he added that one particular family raised a pig that weighed approximately 500 pounds. The outcome of the constant complaints was that the Board of Water Supply, under pressure from Hawaiian Homelands for more homes, eventually agreed to give up 10 acres of land to the Department of Hawaiian Homelands and to the squatters. The Board of Water Supply only kept 1 acre of land for a needed reservoir. Approximately ten years ago the Department of Hawaiian Homelands utilized the land to build a subdivision for Hawaiian families.

The former KGMB-TV station and offices were once located near the intersection of Kapi‘olani Boulevard and Ke‘eaumoku Street. Mr. Lao recalled the TV station being at that location for the last 50 years. Mr. Lao said there are a couple of reasons why the TV station chose to stay at the Kapi‘olani Boulevard location for so long. The first reason is because the swampy land was cheap and considered marginal. Prior to the development of the Kapi‘olani Boulevard area, the land was originally swampy. The second reason is because the swampy location made for good ground conduction of the transmission tower. As Mr. Lao explained, plain water is a conductor. However, when salt is mixed in it is an even better conductor. Mr. Lao recalled his mother-in-law sharing her stories of the area around Kaheka Street, which is located near the former KGMB-TV station location that was also swampy in various areas. Mr. Lao’s mother-in-law once frequented the area to purchase duck eggs, swamp cabbage, watercress, and taro. Once the Ala Wai Canal was dredged, development of the area, and sewers were constructed, the swampy areas in the vicinity eventually dried out.

Mr. Lao shared that the Ala Wai Canal was originally conceived in 1927 by developers as the “Venice of the Pacific.” The original plan was to have an entrance and exit in the canal; buildings were to be constructed along the canal; and boats and gondolas were to navigate the Ala Wai waters. Like the Venice in southern California, the project only progressed as far as dredging of the canal. However, a planned exit to the canal was never constructed. The proposed outlet would extend from the current location of the Waikīkī-Kapahulu Public Library and turn *makai* connecting to the sea at the Kapahulu Groin so the canal could have better circulation. Due to the current construction of the canal without an outlet, the water is very stagnant especially near the Waikīkī-Kapahulu Public Library and filled with debris and other noxious items. To Mr. Lao’s recollection, the last time the area by the library was cleaned out was approximately 15 to 20 years ago. He believes it was mostly a surface cleanup of cars, tires, and grocery carts at the eastern end. The western length was suction dredged and the spoils dumped out to sea.

Mr. Lao stated that the cleanest drinking water available is closest to the mountain range and it begins to get polluted when it encounters development on weathered or non-weathered volcanoes. For example, areas above the H-1 freeway that are not developed and where the peaks are high—there the water is considered to be very pure. However, once the water begins to enter the area of the plains, encounters development, or areas that were formerly used for agriculture such as sugar cane, pineapple, and cattle—then the land use will affect the water quality. Mr. Lao gave the following example:

> The pineapple plantations—when they were [in] existence they used pesticides that got into the ground water. So you have pesticide pollution all over Pearl Harbor. So the Pearl Harbor in general—not as clean as you might think. And the towns that grew up around there—if they had cesspools like back in the old communities—then the water went down directly, through the weathered basalt, down into the basalt caprock, where it affects agriculture and something like—they do have—sugar left its imprint, but not as bad as pineapple. Pineapple pesticides were a lot higher in health hazards in the area of carcinogens, cancer causing. And in the places they proposed replacement agriculture that’s got to be watched carefully too to make sure the insecticides, herbicides, and fertilizer don’t get into our water. In a meeting with diversified agriculture, attended primarily by the seed corn growers Monsanto, they were cautioned by me that BWS [Board of Water Supply] has evidence of over application of fertilizer caused anomalous high increases in a well station nearby. As evidence, the seed corn operation of 500-acres replacing pineapple was the only new operation in the area. If the new operation caused contamination, they would be held responsible for cleanup.

Mr. Lao continued, stating that sugar cane cultivation utilized more brackish water by pumping from sources located beneath the caprock and pumped to cane at higher elevations. The brackish irrigation water escaped the root zone, infiltrated to the water table, and increased its saltiness from its natural state. Without any development or agriculture the water was fine. In contrast, Mr. Lao added that previous agricultural efforts in ancient times such as *lo‘i* had no negative effects on water use. Taro cultivation needed to be as waterproof as possible so water was kept inside the *lo‘i*. As taro cultivation began to transition to rice cultivation, agricultural methodology was similar so there were no major changes to the ecosystem. Pesticides and insecticides were not used for

taro and rice cultivation. Mr. Lao suggested that animals were probably used, such as water buffalo, to till the *lo‘i*.

As previously mentioned, another method of retrieving water was via tunnels and wells. The Board of Water Supply drilled several tunnels in Honolulu during the early 1900s and stopped by the early 1930s, including two tunnels in Mānoa, one in Pālolo, and as previously mentioned, one in Makiki slightly *mauka* of Roosevelt High School. The water derived from the tunnels was described by Mr. Lao as pristine due to the fact there is no development in the vicinity. Tunnels are also drilled at a slight incline upwards so water drained towards to the entrance where pumps were installed to keep the tunnel dry until completed. The Pālolo tunnel is drilled under Ka‘au Crater and tends to have a bit of bacterial pollution. This might be attributed to the fact there is a swamp within Ka‘au Crater that empties into the stream below. Another reason for the bacterial pollution is human and animal contact with the water.

Newspaper articles and hiking books discussing various hikes and associated waterways island-wide bring forth adventure seekers and the like. When people do not *mālama* (take care of) hiking trails and waterways, many of these resources become polluted with trash and/or bacteria, such as giardia, a bacteria transmitted via human fecal matter. Mr. Lao is aware of giardia cases on Maui and doesn’t doubt O‘ahu had a few cases. Giardia causes violent diarrhea and other gastro-intestinal problems in those susceptible. Leptospirosis is a common bacterial infection known throughout the Hawaiian Islands spread by rodents. Mr. Lao stated that leptospirosis has been present in the Islands for centuries and was probably brought by the first Polynesian settlers. Shigella is another bacterial infection transmitted via snails. Although shigella is transmitted by all snails, the most common snail that is a carrier of shigella is the African snail. Originally, African snails were brought to Hawai‘i as a food source but it was later discovered that they are disease carriers. Today, African snails are a backyard nuisance but they are still considered to be a delicacy in other parts of the world. *Escargot* is the French word for the delicacy. The variety used in California restaurants are collected and fed clean food to flush their systems of disease bacteria. As a youngster in California, Mr. Lao remembers putting salt on the snails and crushing them because they ate vegetables growing in his garden. All of these bacterial infections are caused when an infected person or animal comes in contact with a water source. When a person enters the infected water source with an open wound, ingests the water, or opens their eyes in the water—they become infected.

As far as fish and/or wildlife that utilize the streams of Mānoa, Mr. Lao stated that you will find some fish where the water source begins. As you travel *makai*, you will begin to see native species of fish. As you travel further down and encounter brackish water, you will encounter tilapia and salt water fish. Mr. Lao is aware of an *‘o‘opu* population in Mānoa. As the Mō‘ili‘ili area is approached, the brackish and marine species are encountered. The Ala Wai Canal with all its pollution is caused by man.

In regards to the current project area of downtown Honolulu, Mr. Lao stated that “the pipeline construction is notorious for pipeline failure because of [the] complex nature of the reef and the heavy loads of big trucks on the route.” He continued, stating that “the reef is laced with tidal channels” and there are no extended stretches of solid reef. As you can see in modern reefs, they are cut with channels and pot holes. However, solid portions of the reef are safe but areas that intersect with streams in Nu‘uanu, Makiki, and other small unnamed drains are considered “soft”

and require careful inspection to see if these unstable areas can support the heavy traffic. Mr. Lao continued,

> By careful inspection, I mean that the inspector [has] to watch the backfilling of the troublesome spots to insure [*sic*] that it provides adequate support for the pipe. If you drive these routes and are aware of the rough areas, you know what I mean. Adequate compaction of the backfill is absolutely necessary, and not just the word of the contractor. Visual inspection and testing is required at all times to minimize settlement in these areas. While this may not be understood by bystanders thinking this is just rubber necking and a waste of manpower, this is extremely important. What must be remembered is that one or several persons can be the excavation at one time and the others will be inspecting or waiting their time to be in the hole. Inspection of the backfill over the pipe is important so that no rocks can directly impact the pipeline from heavy loads overhead. If construction occurs at night time, this make[s] inspection more difficult despite lighting. Experienced inspectors aware of the task are necessary to make sure the construction is done right.

Mr. Lao recalled a time when a water main broke in Hawai‘i Kai that revealed chicken bones left behind from a worker’s lunch who disposed of the leftovers figuring no one would find it. Mr. Lao stated that “workers are many times poorly trained and don’t care” and urges inspectors to be adequately staffed. He closed with “the task of placing and inspection pipeline in a difficult area is the goal of the BWS.”

8.2 Jan Becket

Jan Becket is a retired teacher with Kamehameha Schools who is well-recognized for his black-and-white photographic documentation of sacred sites. He has conducted extensive archival research on sites of cultural significance, learned from *kūpuna*, and photographed many undocumented sites on O‘ahu, which resulted in a co-written book, *Pana O‘ahu* (Becket and Singer 1999). He is a member of the Committee for the Preservation of Cultural Sites and Properties under the O‘ahu Council of Hawaiian Civic Clubs, and reports back to the chair of the committee (Shad Kāne) on issues concerning cultural sites in the Kona district of O‘ahu.

On 28 April 2012, Mr. Becket led CSH on a site visit to two cultural sites within the broad cultural landscape of Waikīkī. One cultural site is located in the center of Wa‘ahila Valley on the lower slope of Wa‘ahila Ridge, which is *mauka* of the Kamakakuokalani Center for Hawaiian Studies at the University of Hawai‘i at Mānoa. This site, nestled between a rock face, a steep drop-off and three low, basalt walls, would command an impressive view of Waikīkī were it not for the unchecked vegetation. The site is now composed of two small terraces built upon natural rock, a *po‘o pōhaku* (a stone with an outcropping that looks like a head), and an area of loose cobbles and boulders (Figure 49). An enclosing wall runs along the *makai* side of the site. Based on a previous visit, Mr. Becket points out how mountain bikers ten years ago had used the stones from the *mauka* wall of the enclosure to make a pavement that allowed them to actually ride across the site and jump off the *po‘o pōhaku*. Mr. Becket helped inform the State of this site’s destruction which led to the closing of the biker’s access trail. Currently, a homeless person lives within this site.



Figure 49. Site 5463 with *po‘o pōhaku* and terrace in foreground and Waikīkī in background ca. 1998 (photo courtesy of Jan Becket)

Paul Rosendahl assessed this cultural site as part of an archaeological inventory survey in a nearby area in 1996 though no excavations were made. Designated as Site 5463, Rosendahl (1996:22) described it as “an area used for agriculture, with some potential for containing habitation features” likely associated with pre-Contact activity (Figure 50).

Mr. Becket and other members of the Committee for the Preservation of Cultural Sites and Properties, under the O‘ahu Council of Hawaiian Civic Clubs, collectively felt that Site 5463 may be a possible *heiau*. In a letter to the DLNR in 2001, the preservation committee explains their reasoning:

> …It is the only ancient structure in that area, with no features usually associated with agriculture (‘auwai, lo‘i) either in the surrounding forest or within the structure itself. Although the structure sits on marginal upland soil, it lies above the Mānoa/Mō‘ili‘ili plain, one of the richest growing areas on O‘ahu. This unusual placement raises the question of which crops might have been raised so far from habitations and from other, far more productive cultivation areas. No house platforms are evident within the enclosure.
>
> On the other hand, no information about the rectangular enclosure contradicts the interpretation of its function as ceremonial. It looks out over Waikiki, directly over the ancient seat of political power for the entire island since the time of Ma‘ilikukahi: Helumoa (or ‘Apuakehau), now the location of the Royal Hawaiian Hotel. Often, heiau were deliberately placed so that they would command such sweeping views. Furthermore, at the center of the enclosure lies an unusual and prominent stone [the po‘o pōhaku]. Our cultural resource experts tell us that some heiau were constructed around such prominent stones, which were the focus of the structures, their reason for existing. Although no one can be absolutely sure at this point, the enclosure does appear to be constructed around such a stone, although the archaeological survey makes no mention of it.

The preservation committee elaborated on how the area surrounding Site 5463 is culturally significant in several ways. The ridge of Wa‘ahila is a *wao nahele* (upland forest zone) close to the city for gathering and other cultural activities. The ridge is also associated with one of the early gods—Kauhi, whose form can be seen along the ridgeline from Mānoa. This *wahi pana* of Kauhi makes the ridge, to some degree, a *wai akua* (abode of the gods), according to the preservation committee.

The other cultural site is located in Kamanele Park in Mānoa Valley. Situated on the *makai* side of the park just below the grounds of the Mid-Pacific Institute is, at first glance, a large natural stone outcropping. An archaeologist had previously pointed out to Mr. Becket that the grains of most of these large stones, remnants of a basalt lava flow that cooled in an unusual way, run in the same direction, indicating that this is a natural formation. Behind this massive feature and along its sides, however, are several areas of distinct artificial terracing, as well as a small rock overhang (Figure 51). After clearing some vegetation, Mr. Becket indicated an alignment of stones that is possibly an *ahu* (altar) (Figure 52). He noted how an upright stone rises above two stones that form

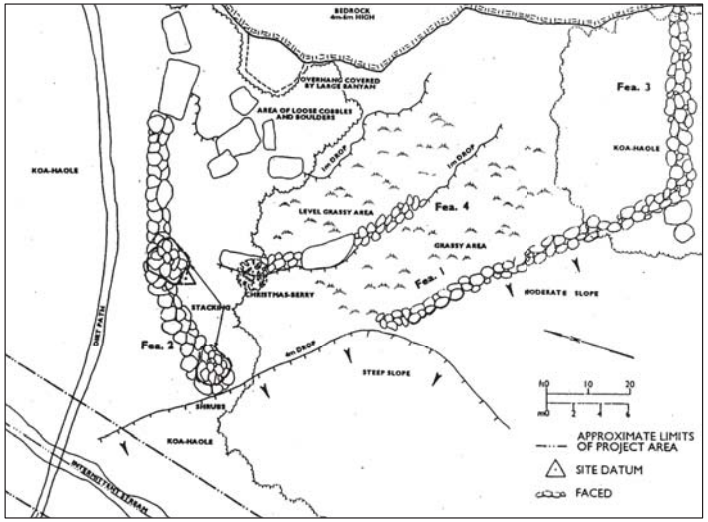

Figure 50. Sketch of Site 5463 (Rosendahl 1996:22)



Figure 51. *Heiau* at Kamanele Park showing terracing, April 2012 (photo courtesy of Jan Becket)



Figure 52. *Heiau* at Kamanele Park with possible *ahu*, April 2012 (photo courtesy of Jan Becket)

a *kohe* (vagina), with a small terrace below it; a similar Papa/Wakea feature exists at a recorded *heiau* in Hālawa Valley, in a complex under the H-3 Freeway and at a site at Maunawili, O‘ahu, according to Mr. Becket.

Mr. Becket also recalls that an early twentieth century article titled “Where Fact and Fancy Meet,” published in *The Mid-Pacific Student* (1907), described three *heiau* in Mānoa Valley—Ka-ua-laa (the sacred rain), Ka-uwalo-malie (the place of the silent crying), and Ka-ui-o-Mānoa (the beauty of Mānoa). The description of the latter *heiau* as being located on “the rounded knoll” on the Mid-Pacific property may refer to the Kamanele Park cultural site, according to Mr. Becket.

Mr. Becket also shared (with the permission of the chair of the Committee) a report from the Committee for the Preservation of Cultural Sites and Properties to the O’ahu Council of Hawaiian Civic Clubs in 2011 regarding the cultural significance of this site. The Committee noted that an old City & County map labeled the site as a *heiau*, and explained their rationale for why this cultural site was pre-Contact: The features include stone-faced terraces, small platforms and enclosures. In 2011, the Committee report to the O‘ahu Council of Hawaiian Civic Clubs reiterated their statement that this culturally significant site was likely a pre-Contact structure. The report elaborated that although questions had been previously raised about the name of the structure, the primary issue surrounding this unrecorded site is its origin and function. The Committee’s cultural experts observed that pre-Contact use of existing natural rock formations was not unusual and can be seen in several major *heiau* on O‘ahu, and that both ends of this outcrop appear to have been modified, in addition to the features described above.

On 12 January 2014, Mr. Becket led CSH on second site visit. This particular site visit entailed viewing and photographing the cultural landscape of Waikīkī from a panoramic perspective. Mr. Becket and CSH hiked to the summit of Diamond Head State Monument. From the summit Mr. Becket pointed out several cultural sites including the approximate location of Papa‘ena‘ena Heiau, which currently is the site of La Pietra, Hawai‘i School for Girls; and Pahu-a-Maui Heiau that once stood at the current site of the Diamond Head Lighthouse. Mr. Becket added that he would like to find the approximate location of Kapua Heiau. Kapua is an *‘ili* located within Waikīkī Ahupua‘a in the southern portion of Kapi‘olani Park and is also considered a *po‘okanaka* class *heiau*. The area of Kapua is bound by Lē‘ahi Avenue to the east, Poni Moi Road to the south, and the ocean to the west. The northern boundary of Kapua ‘Ili is approximately 1,050 feet from the Waikīkī Shell. Mr. Becket attributes his knowledge of Kapua Heiau to have come from Buddy Neller, a former archaeologist.

Mr. Becket explains to CSH that La Pietra was built over Papa‘ena‘ena Heiau (Figure 53). He recalls reading a first-hand account of a sacrifice being made at the *heiau* including numerous accounts by early visitors. Although the *heiau* is completely demolished, Mr. Becket recalls having a conversation with the late Marion Kelly, anthropologist and activist, sometime between the 1980s-1990s, regarding possible remnants of the lower portion of Papa‘ena‘ena Heiau below the site of La Pietra. After descending Diamond Head State Monument, Mr. Becket and CSH traversed the southern portion of Kapi‘olani Park to investigate the area south of the City & County of Honolulu’s nursery located *mauka* of Kapi‘olani Park. A small mound covered in California grass was discovered south of the nursery. A couple of basalt rocks wedged into the mound as well as a small piece of coral and several water-worn rocks were found. Mr. Becket recalls being told by



Figure 53. La Pietra Hawai‘i School for Girls, the former site of Papa‘ena‘ena Heiau, January 2014 (photo courtesy of Jan Becket)

cultural practitioners that branch coral at a structure might indicate a ceremonial function or a burial. Other materials such as trash, rebar, and chunks of concrete slabs were also found withinand in the vicinity of the mound indicating heavy disturbance. The outcome of finding the lower portion of Papa‘ena‘ena Heiau was deemed inconclusive. CSH and Mr. Becket continued to travel south of the mound. Three medium sized *pōhaku* were found at the southern-most area that was surveyed within the park. Mr. Becket concluded that these three *pōhaku* most likely were transported or fell during the grading of the dirt wall above the park that separates private townhomes from Kapi‘olani Park.

The Pahu-a-Maui Heiau once stood at the current site of the Diamond Head Lighthouse (Figure 54). Today, the lighthouse is owned and operated by the Coast Guard. Mr. Becket recalls seeing a photo of a dry stacked wall with the Diamond Head Lighthouse built on it. Photos taken at the summit of Diamond Head State Monument suggest that the location where the dry stacked wall once stood is possibly now the site of a caretaker’s home or administrative building. However, closer investigation of the lighthouse property is recommended to confirm the existence of the dry stacked wall. Mr. Becket adds that according to McAllister’s survey of O‘ahu Island in 1933, many human skulls were discovered by someone walking below the lighthouse area. The account indicated that the person who the skulls was told that the area was a place of execution where people were thrown off Diamond Head with bodies lying unburied in the gulches.

On 29 October 2014, Mr. Becket led a CSH on a third site visit to several cultural sites within Honolulu Ahupua‘a. The first site is located near the Honolulu and Kāne‘ohe Ahupua‘a border. A large *pōhaku* can be found in a bamboo forest at the Nu‘uanu Pali State Wayside park (Figure 55). The *pōhaku* can be found perched on an incline near the ridgeline of a *pali* (cliff). Below the *pōhaku* several water worn rocks somewhat resembling remnants of a terrace are evident. Walking towards the Pali Lookout, a second *pōhaku* once stood on a small portion of land to the side of the original Pali Road. Mr. Becket recalls passing the *pōhaku* on the road growing up. Today, the stone is no longer there. Mr. Becket believes the stone was either pushed down the cliff or blasted during the construction of the Pali Tunnels. All that remains where the *pōhaku* once stood is heavy vegetation including *hau* and ginger. Mr. Becket believes that this stone may have been Kalanaihauola, a *mo‘o* who guarded the Pali (Figure 56). Across from the former location of the *pōhaku* thought to be Kalanaihauola are several circular holes in the mountainside. Mr. Becket stated he has seen a woman stuffing *piko* (navel cord) in these holes.

Mr. Becket led CSH to an *‘ili* known as Makuku located 10-15 minutes *makai* from Nu‘uanu Pali Drive, the road that exits town-bound from the Pali Lookout State Wayside park. Mr. Becket indicated that he knows of a possible *heiau*, upright stone, and a burial under a rock mound. Mr. Becket stated that the last time he visited and photographed the sites at Makuku was during the 1990s. Mr. Becket led CSH to a wooded area of strawberry guava, ginger, ti, and *palapalai* (fern). The rock mound paved with *‘ili‘ili* (pebble, small stone) with an upright stone mark a possible burial (Figure 57). The mound and upright stone run parallel to the Pali Highway. A scattering of various sized *pōhaku* were observed approximately 50 feet *makai* of the mound and upright stone. Unfortunately, Mr. Becket and CSH were unable to locate the possible *heiau*. However, Mr. Becket believes that we were in the vicinity of the possible *heiau* and may have just not inspected the area thoroughly.



Figure 54. Diamond Head Lighthouse, the former site of Pahu-a-Maui Heiau, January 2014 (photo courtesy of Jan Becket)

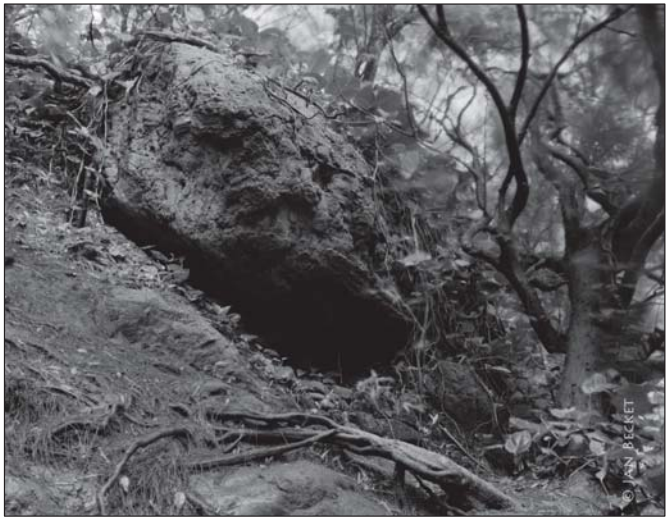

Figure 55. Possible *pōhaku kia'i* (stone guard, stone watchman) on the *'ewa* side of the Pali Lookout, October 2014 (photo courtesy of Jan Becket)



Figure 56. Photo of the former location of *mo'o* and *pōhaku* Kalanaihauola once stood where the *hau* grows in the foreground; Lanihuli peak in the background, October 2014 (photo courtesy of Jan Becket)



Figure 57. Photo of upright stones in Makuku 'Ili, October 2014 (photo courtesy of Jan Becket)

Other cultural sites that Mr. Becket shared with CSH include the original location of Kaumakapili Church and Pākākā Heiau, which have been completely destroyed. The original location of Kaumakapili was near the current location of Maunakea Street and North Beretania Street. The caretaker of Kaumakapili was Kahuoi. It is said that Kahuoi would fish with his pet bird named Kau-maka-pili (“perched with eyes closed”). The translation of Kau-maka-pili tells the way the bird would catch its prey—it would swoop from above and close one eye before grabbing a fish. Pākākā Heiau was once located near the foot of the *makai* end of Fort Street Mall. Mr. Becket assumes that some of the rubble from Pākākā Heiau was most likely used for the construction of roads in downtown Honolulu. Pākākā Heiau was the most important *heiau* in Honolulu Ahupua‘a. It was near Kamehameha’s compound and was possibly the headquarters for Kahuna Kū.

The last stop was Kunawai Springs located in Liliha. According to Pukui, the spring and pools were named after a supernatural fresh water eel (*kuna*). This eel lived in a pool of water (*wai*) were wild ducks never swam. Kahānaiakekua, a chief, bathed in this pool. Kahānaiakekua was raised at Waolani Heiau by the gods Kāne and Kanaloa. Kahānaiakeakua eventually married his sister and became the ruling chief of O‘ahu over the Mū (legendary people of Lā‘au-haela-mai, Kaua‘i), Wā (shouting people), and Menehune (legendary race of small people who worked at night, building fishponds, roads, temples). Some believe that the water from Kunawai Springs had healing qualities. The springs are located on Kunawai Lane just *mauka* of Kuakini Medical Center in the Liliha area. The Kunawai Springs Urban Park consists of a landscaped area with a large pool of water and amphitheater seating. A plaque with the story of Kunawai Springs is located near the pool emblazoned with the following *mo‘olelo*:

KUNAWAI SPRINGS

> The water bubbling into this pool comes from the Kunawai Springs, natural source of water situated beneath this and nearby properties on Kunawai Lane.
>
> The springs were the site of an ancient healing center, as recently as the late 1860’s, the healing center was regulated by a wahine kahuna (priestess) who believed herself to be a descendant of the first moo [mo‘o] sent to earth. (Moo [mo‘o] were supernatural peoples of olden Hawaii sent to earth by the gods to guard the fresh water sources.)
>
> Many springs and lakes were originally in the area. In later years the following six were well known: Kuna-wai-nui, Kuna-wai-iki, Ka-wai-olena, Kumu-hahana, Kalua Palolo, and Kalua Moo.
>
> The springs were noted for the curative benefits derived from the waters and from clay found at the bottom of one of the springs. Only the alii [ali‘i] (nobility) were allowed in any of the places on Kunawai Lane, the Kumu-Hahana and Kalua Moo pools were considered very sacred.
>
> Medicines were made with waters from Ka-wai-olena which is located under the adjacent ewa properties. Treatment for the ill began with use of the medicines and ended with a bath in Ka-wai-nui, the largest of the bodies of fresh water, which is under Kunawai Playground across the street, the sick could bathe in Kuna-wai-nui and Kuna-wai-iki with permission of the guardian moo [mo‘o] after proper prayers and offerings were presented. It was believed that the pure waters of the springs and lakes washed away the sins causing the illness.
>
> Clay for which Kunawai was known was found at the bottom of Kalu Palolo. It was whitish gray and was valuable as a pack for irritated skin and for falling of dull hair.
>
> The Kunawai waters were important also because they irrigated the taro patches in lower Nuuanu [Nu‘uanu] Valley and thus helped to provide Hawaiians with their staff of life.
>
> Department of Parks and Recreation
>
> City and County of Honolulu
>
> 1966

A small pool of water, umbrella sedge, and mud was found several feet away from the plaque. A sidewalk divides the small pool of water with sedge from the larger pool which is home to several ducks. CSH observed the small pool of water and noticed that it was slowly bubbling as water spilled onto the sidewalk. The larger pool is lined by a cement and rock wall (Figure 58). A PVC pipe was observed in the rock wall and carried a steady flow of water, emptying into the larger pool. Mr. Becket mentioned that the springs were capped years ago, however, it was evident that there was a steady water source coming from the smaller pool, which drained into the larger pool. As we walked the perimeter of the larger pool, we observed a drain to west. The water is then transported to the western edge of Kunawai Springs Urban Park and flows *makai* into a historic cement and rock ditch. The ditch appears to run in back of several private residences. Mr. Becket recalls in the past residents who lived along the ditch would place a hose or pipe into the water and siphon the water. No hoses or pipes were observed in the ditch.

Mr. Becket and the plaque indicated that another spring related to the Kunawai Spring system was across the street. Directly across the street from Kunawai Springs Urban Park is another park. The park is divided in half by a sidewalk that runs *mauka* to *makai*. The Diamond Head portion consists of a playground and basketball court; while the *‘ewa* (place name west of Honolulu, used as a direction term) portion is an open grassy area. In the northwestern corner of the *‘ewa* portion, a small pool was observed. The perimeter is comprised of flat *pōhaku* cemented in place. A shower tree stands in the northeast portion of the wall. In the northwest portion of the wall is a *hala* tree, which is also located near the drainage point of this pool. The drain empties into a cement and stone lined ditch borders the park’s limits and travels *makai*. The pool is rather shallow measuring no more than a few inches in height and appears to be cemented in. The pool appears to be dry, however, with closer inspection a trickle of water stems from the northeast corner of the wall before it crosses the center of the pool and drains to the western corner. A pottery shard and a piece of coral were found at the pool. CSH inspected the neighborhood *mauka* of the second pool but did not see any other sources of water in the area.



Figure 58. Kunawai Spring, October 2014 (photo courtesy of Jan Becket)

CSH and Mr. Becket met again on 11 November 2014 on Country Club Road located in Waolani ‘Ili, Nu‘uanu. In correspondence between CSH and Mr. Becket, he mentioned a possible *heiau* within the O‘ahu Country Club property located just mauka of the fairway. Mr. Becket notes this might be Kawaluna Heiau and describes it via email as “a very important heiau.” He recalls the *heiau* being in excellent condition, however, it needs a good vegetation clearing. CSH attempted to contact O‘ahu Country Club General Manager, Peter Hansen, asking permission to access the *heiau* and document the structure. Unfortunately due to time constraints, CSH and Mr. Becket were unable to secure a visitation.

Another site in the vicinity of O‘ahu Country Club is Pōhaku Aumeume, a stone connected to the Menehune. The *pōhaku* is located in the backyard of a private residence (Figure 59). Mr. Becket photographed the stone years ago and also shared a *mo‘olelo* from his friend. Mr. Becket’s friend recalled when her friend from the mainland had moved to O‘ahu and rented a home near the O‘ahu Country Club. Without any prior cultural or historic knowledge of the Hawaiian Islands, this person mentioned to Mr. Becket’s friend how “little, deformed men” would wake her up in the middle of the night and surround her in her room. She moved out of the home as soon as possible. CSH and Mr. Becket located the *pōhaku* on the backside of the residence. The Pōhaku Aumeume is on a paved platform shaded by a *hau* tree. Branch coral and *‘ili‘ili* sit within the many crevices of the *pōhaku*. Mr. Becket adds that these crevices are fingerprints from the Menehune when they threw the *pōhaku*.

Mr. Becket wanted to investigate another site that Mr. Buddy Neller had mentioned to him years ago that is located in the backyard of a home on the 2200 block of Liliha Street. There was an alleged *heiau* or remnants of one within property of a private residence. CSH and Mr. Becket parked along Liliha Street on the 2200 block to investigate the possible remnants. It appears that two properties have a scattering of large *pōhaku* in their yard and are confined by historic stone walls. The corner property on the 2200 block contained more *pōhaku* than its neighbor. Unfortunately, no one was home at the corner property to question regarding the history of the stones. It appears that *makai* of the home within the property limits is a grouping of large *pōhaku* with a scattering of medium rocks leading *mauka*. Some of these *pōhaku* are being held in place with pieces of rebar and the yard is very well maintained.

CSH visited the neighboring home and asked a tenant there if she knew anything about the rocks. She replied that the rocks were put there by a landscaper years ago. Results if there was a *heiau* or possible structure on the 2200 block on Liliha Street was inconclusive and further investigation and research needs to be conducted.

The next stop was Lulumahu Valley. We met with Māhealani Cypher of the Ko‘olaupoko Hawaiian Civic Club at the intersection of the Pali Highway and Nu‘uanu Pali Drive. From there we drove to the Nu‘uanu Reservoir No. 3 owned by the Board of Water Supply and parked our vehicles at the trailhead of Lulumahu Valley. Ms. Cypher led the group to an area near the reservoir where she pointed out the valley. The valley blends in with the mountains creating the illusion that it is just another ridgeline along the Ko‘olau Mountain Range. However, upon closer inspection, the valley is actually hidden with the ridge facing *makai*.



Figure 59. Pōhaku Aumeume, n.d. (photo courtesy of Jan Becket)

The group began to head *mauka* on the Lulumahu Trail where several historic water control features were observed. Ginger, *hau*, *māmaki* (*Pipturus spp.*), strawberry guava, and the invasive *clidemia hirta* grow alongside the trail. Significantly large *pōhaku* were spotted alongside the trail as well as burial mounds. In the past, Mr. Becket photographed a stacked terrace wall with an upright stone on the left side of the trail (Figure 60). The group stopped to *mālama* the terrace wall by clearing fallen debris and invasive plants. A large piece of rebar was nestled between tree branches at the foot of the terrace. Mauka of the wall was a large stone mound. After debris and vegetation removal, it became apparent that there were two terrace walls and three upright stones. Ti plants were spread amongst the site including one next to an upright stone. Native plants such as *palapalai* and *laua‘e* (fragrant fern) were not removed from the terrace wall. After Mr. Becket photographed the wall and took GPS (Global Positioning System) coordinates of the site, the group traversed the trail to the trailhead where we parted ways with Ms. Cypher.

CSH and Mr. Becket then drove to the Nu‘uanu 822 Reservoir Site located along Nu‘uanu Pali Drive. CSH had previously contacted Michael Matsuo of the Board of Water Supply’s Land Division for permission to access the Nu‘uanu 822 Reservoir. We parked within the Board of Water Supply property and began walking to the left of the reservoir where stone paving was observed alongside a footpath. After passing the stone paving, the footpath ended and a small, dry *‘auwai* was observed. After crossing the *‘auwai*, we were in a dense bamboo forest, which then opened into a grove of *hau* and Christmas Berry. After exiting the grove of tangled *hau* and Christmas Berry, we found ourselves on the shoulder of the Pali Highway where we proceeded to walk *makai*. Mr. Becket recalls a petroglyph rock on the side of the Pali Highway. After walking down several feet *makai* we spotted a *pōhaku* a foot or two into the dense bamboo forest. The medium sized *pōhaku* consists of one human stick figure. Mr. Becket learned about the site from the late J. Mikilani Ho-Holuole, petroglyph and Hawaiian sites specialist. After a brief discussion between CSH and Mr. Becket, there is a possibility that the *pōhaku* may have been moved out of the way for the construction of the Pali Highway but it is unclear.

Mr. Becket wanted to show CSH an enclosure just off of the Pali Highway. CSH and Mr. Becket continued to travel *makai* along the highway where we reached a drainage ditch, hiked down, and into another dense bamboo forest. A steep *‘auwai* cuts through the bamboo forest, which leads to the previously mentioned drainage ditch. The enclosure is on the opposite side of the stream bank immediately exiting the *‘auwai*. The enclosure is in excellent condition with the exception of several stalks of bamboo that have managed to sprout between the *pōhaku* (Figure 61, Figure 62). The wall is approximately one to three feet in height and three to four feet in width. CSH explored *mauka* of the enclosure and discovered a second enclosure with historic bottle and plate shards amongst the site. Mr. Becket referred to the enclosure as Kahapa‘akai. CSH and Mr. Becket discussed the site’s name trying to connect the word *pa‘akai* to the location, as it is far from the ocean. After conducting some research, Kahapa‘akai is an *‘ili* (1874 Lyons; Registered Map 133) within Nu‘uanu Valley. The term *kaha* translates to “place.” The word *pa‘akai* is usually associated with salt, however, it is also a variety of taro and also a variety of *limu* (seaweed) (Pukui and Elbert 1986). In this case, the term refers to a type of taro that was usually grown in the uplands and used for *poi*. The name Kahapa‘akai simply translates to “taro place,” which is appropriate as Nu‘uanu Mauka was an excellent source for cultivating *kalo* based on its many streams and terraces (Handy and Handy 1972). Figure 63 is a composite of cultural sites pointed out by Mr. Becket in October and November 2014.



Figure 60. Lulumahu Valley terrace wall and upright stones, November 2014 (photo courtesy of Jan Becket)



Figure 61. Photo of enclosure in Kahapa'akai 'Ili, November 2014 (photo courtesy of Jan Becket)



Figure 62. Photo of enclosure at Kahapa‘akai ‘Ili facing *mauka*, November 2014 (photo courtesy of Jan Becket)

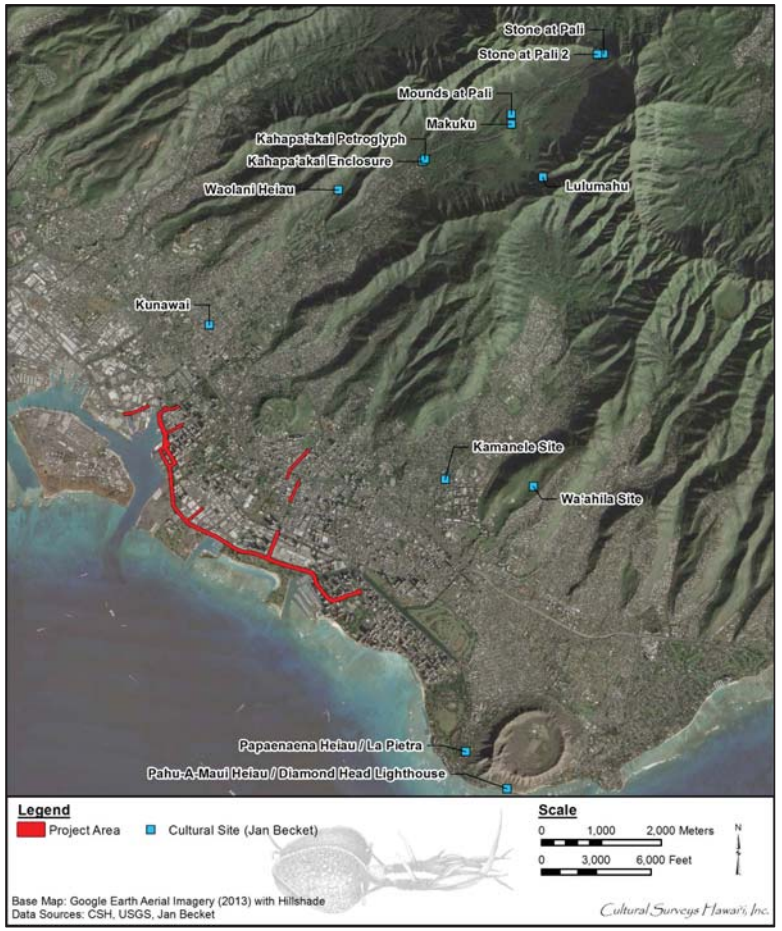

Figure 63. Google Earth Aerial Imagery (2013) with significant cultural sites pointed out by Mr. Becket

8.3 Māhealani Cypher

CSH interviewed Māhealani Cypher in 2011 and 2012 for multiple projects in the *moku* of Ko‘olaupoko. Ms. Cypher is the former president of the Ko‘olaupoko Hawaiian Civic Club and is also a former member of the Board of Directors for the Board of Water Supply. Ms. Cypher, born in 1946, refers to herself as a “baby boomer” due to her birth being a product of World War II. Her biological father was stationed on O‘ahu during World War II and left without knowing she was ever to be born. Her grandparents, whom she calls Papa and Mama Cypher, subsequently adopted her and her younger sister. They raised the two sisters as their own in Kāne‘ohe, where Ms. Cypher has since spent her whole life. She considers them her parents and credits them for sharing their cultural knowledge with her.

Papa Cypher was born in Hana, Maui, and later moved to O‘ahu. He was a police sergeant and then lieutenant for the entire windward side of O‘ahu from Makapu‘u to Waimea. Ms. Cypher recalls that everyone knew this man, who weighed over 300 pounds and was over six feet tall. After retiring from the police force, he became a distributor for the *Honolulu Star-Bulletin* on the windward side of O‘ahu. Ms. Cypher recalls driving along the coast when he distributed the newspapers and visiting all the windward *ahupua‘a*. Ms. Cypher recalls that he always protected the family but, in his later years, he developed gout and had heart problems and eventually passed away when Ms. Cypher was only six years old.

Mama Elizabeth Cypher was a strong woman—“tiny but tough.” Her mother was Holokahiki Na-kapuahi Kukila, and her father was Lum Ho from Beijing, China. She grew up in Hilo with her father, but when he passed away she became the foster child of his best friend, the tailor Ah Ping. When she was 12 years old, her Hawaiian family sent her to Kalihi on O‘ahu to live with her eldest sister Koiwiloa Manewa. Instead of being able to attend school, which she deeply loved, she was forced to work as if she were the house servant. So, when she was old enough, she married George Cypher when she was 17 or 18, thereby gaining her independence. They had six children of their own, as well as many foster children that Papa Cypher brought home. Mama Cypher died in 1983 at 86 years old. Ever since her passing, Ms. Cypher feels that Mama Cypher is with her, as her *‘aumakua* for her, a protecting spirit making Māhealani feel safe and cared for at all times.

A key part of Ms. Cypher’s upbringing was spending time with Mama Cypher and listening to her stories. Due to her granddaughter’s asthmatic condition as a young child, Mama Cypher took extra care to watch over Māhealani’s health. This allowed Ms. Cypher to spend more time with Mama Cypher than the other children. Mama Cypher shared with her a great deal of family *mo‘olelo*, which Ms. Cypher has preserved in writing. She often went driving with Mama Cypher along the windward coast. Her grandmother described its various *ahupua‘a* as they passed through, and shared stories of the area and the people.

CSH met with Ms. Cypher on 11 November 2014 at the intersection of Pali Highway and the Old Pali Road. Ms. Cypher then escorted CSH into the Nu‘uanu Reservoir No. 3 property owned by the Board of Water Supply (Figure 64). After parking our cars at the head of the Lulumahu Trail, Ms. Cypher led CSH to an area near the reservoir. This is where she pointed out Lulumahu Valley (Figure 65).



Figure 64. Photo of Nu‘uanu Reservoir No. 3 (CSH 2014)



Figure 65. Lulumahu Valley (left) concealed at an angle (CSH 2014)

The valley seems to blend in with the mountains creating the illusion that it is just another ridgeline. Ms. Cypher states that the word *lulumahu* has never been defined. After conducting research on the name, Ms. Cypher broke down the word *lulumahu* as “hidden curtain” or “hidden from view.” The definition is fitting as the valley is concealed. Ms. Cypher shares with CSH as to why *lulumahu* means “hidden curtain” or “hidden from view.” At the end of the trail is Lulumahu Falls. The water from the falls is supplied by the Ko‘olau Summit. The water from the falls gives the illusion of a curtain as it flows over one’s body.

Ms. Cypher offers another reason why *lulumahu* is a “hidden curtain” or is “hidden from view.” She tells a *mo‘olelo* of women, *kūpuna*, and children fleeing to Lulumahu during the Battle of Nu‘uanu. Nu‘uanu Valley was once comprised of *lo‘i*. After Kalanikūpule perished in battle, Kamehameha’s army spread throughout Nu‘uanu looking for the residents of O‘ahu who escaped. Although Lulumahu is somewhat hidden, the narrow valley did not provide enough protection. Those who were found in the valley were killed. *Keiki* (child) were abandoned on the trailside. The *lo‘i* were destroyed in Nu‘uanu Valley. Eventually over time, Kamehameha restored the *lo‘i* in Nu‘uanu Valley. Today, large stone mounds in Lulumahu Valley are covered in tall ti leaves along the trail can be found in the valley. Ms. Cypher shares that these large stone mounds contain burials of those who were killed when Kamehameha’s army invaded the valley. She adds that during the time of Mā‘ilikūkahi, a *mō‘ī*, chiefs and priests may have possibly resided in Lulumahu.

Many yellow ginger plants can be found in the Lulumahu area—near the reservoir and also along the trail. Ms. Cypher recalls hiking to Lulumahu in the past and wanting to take home gingers. She remembers that it was early June and it was not ginger season yet. As she passed the green plants with no blooms she told herself, “Too bad it’s not blooming. I wish I had gingers.” She began to hear the faint voices of women and children but no one was around her. As she turned around to hike back down to the trailhead, she spotted one large stalk of gingers in full bloom. When she returned the following week to the exact same spot, there was no evidence that ginger had ever bloomed.

As we make our way up *mauka*, several historic water control features can be seen alongside the trail (Figure 66). Large *pōhaku* can be found scattered in the streambed and along the stream banks. Ti, strawberry guava, *māmaki* (*Pipturus spp.*), and the invasive *Clidemia hirta* (soapbush or Koster’s Curse) were observed as the main plants in the valley.

Ms. Cypher pointed out several burial mounds, *pōhaku kūpuna* (elder stone), and *pōhaku kia‘i* along the trail (Figure 67 and Figure 68). A portion of a historic wall was also observed along the trail. Several metal rods were found in concrete blocks (Figure 69). Ms. Cypher explains that these metal and concrete remnants were once a part of a railroad track that traversed up the valley to carry water. The railroad track was later dismantled.

On the left side of the trail, we stopped to *mālama* a terrace wall shrouded with *palapalai* (fern) and other vegetation. A large piece of rebar was nestled between tree branches at the foot of the terrace. After some invasive species removal and vegetation clearance, it became apparent that there were two terrace walls and three upright stones. Ti plants were spread amongst the site. Immediately southeast of the terrace walls was a large stone mound. We continued to travel *mauka* to the waterfall. The waterfall appears to travel to several levels before emptying into the main pool. A small cave was observed to the left of the waterfall (Figure 70). Large rocks are grouped

near the waterfall. One exceptionally large boulder that was flat on top was noted to the right of the waterfall. Ms. Cypher stated this was waterfall was the site where *ali‘i* once sat to relax, bathe, and maybe even collect water from.

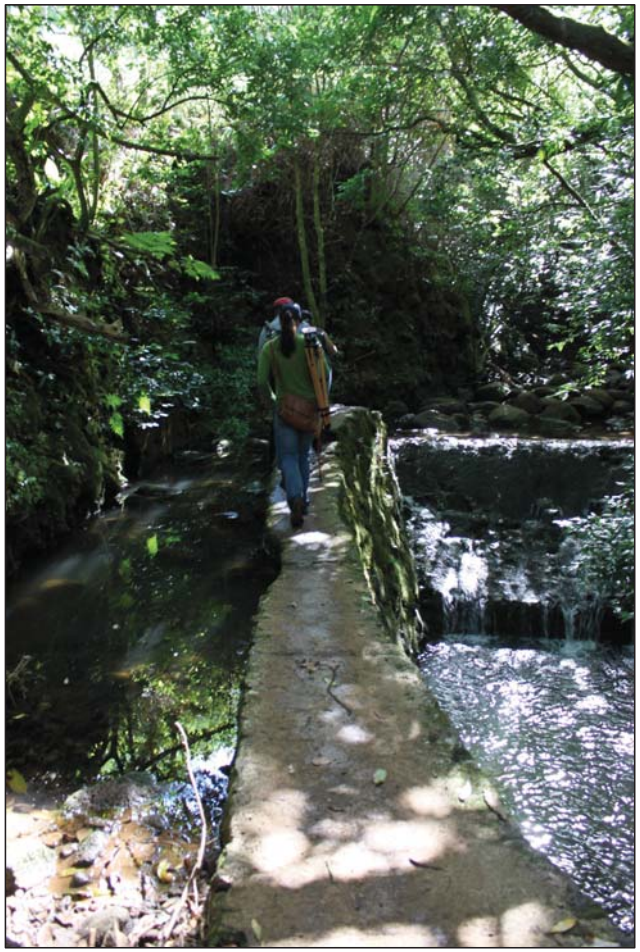

Figure 66. Photo of historic water control feature on the Lulumahu Valley trail (CSH 2014)



Figure 67. Photo of large pōhaku along the Lulumahu Valley trail (CSH 2014)



Figure 68. Photo of large stone mound; according to interviewee Māhealani Cypher, these mounds contain burials from the Battle of Nu‘uanu (CSH 2014)



Figure 69. Photo of concrete and metal remnants that were once part of a historic railroad track in the valley (CSH 2014)



Figure 70. Photo of hikers enjoying waterfall at the end of the Lulumahu Valley trail; note the small cave to the left of the falls (CSH 2014)

8.4 Ron Iwami and Tom Iwai for Friends of Kewalos

Cultural Surveys Hawai‘i met with avid surfers Ron Iwami, a local retired fireman for the City & County of Honolulu and Thomas Iwai Jr., a local retired Aquatic Biologist with the Department of Land and Natural Resources (DLNR)-Division of Aquatic Resources (DAR) on September 10, 2014 at the Kewalo Basin Park, located *makai* of the Kewalo Basin Harbor.

Born in 1955, Mr. Iwami, now 59 years old, has been surfing at Kewalo’s—the Kewalo Basin—for 45 years and has witnessed intense changes to the harbor, the land, and the surrounding ocean. Mr. Iwami first lived a short while in Pālolo Valley and later moved with his family to Mānoa Valley, where he still lives to this day. While attending Roosevelt High School, Mr. Iwami and his friends discovered several hidden surf breaks near the Kewalo Harbor entrance. The shoreline in front of the harbor was blocked from sight and covered with dense *haole koa* (*Leucaena leucocephala*). In order to see over the thick brush, Mr. Iwami and his friends would climb to the top of an elevated hill near the old parking lot, which they affectionately referred to as “The Hill.” Once at the top, they could see the expansive coastline and all of the surf breaks spanning to Diamond Head. Following a small trail, a then 15-year old boy, Ron and his friends would walk to the secret surf spots that were hidden from view.

Mr. Iwai, 65, born and raised in Kalihi, also shared some of his childhood experiences. He remembers going day and night fishing often in Kewalo Basin with his family and uncle who used to operate a tug boat to assist the tuna fishing boats into the basin. His uncle worked for the Coral tuna cannery that was next to the Fisherman’s Wharf restaurant. Today, fishing is not allowed in the basin for safety reasons to prevent commercial and recreational boaters from accidentally getting poked from discarded fishing hooks that got stuck in the mooring lines. However, fishermen are still allowed to fish along the entrance into Kewalo Basin.

Mr. Iwami recalls a *tako* (Japanese for octopus) hunter often frequents the area. “One man comes with the glass box and he looks for *tako*. You know like the old ways.” Mr. Iwami also listed a few of the fish that the fisherman catch today (Figure 71):

> Menpachi, soldierfish [*Myripristis spp*.]
>
> Aweoweo, bigeye [*Priacanthus meeki*]
>
> Ulua, bigeye jack [*Caranx sexfasciatus*]…papio [juveniles]
>
> Akule, bigeye scad [*Selar crumenophthalmus*]…halalu [juveniles]
>
> The fishermen often come in the early morning to fish off the jetty and if “lucky” may catch Ulua. Sometimes, they will even catch squid.

Mr. Iwami remembers when Kewalo Basin used to be filled with many *aku* (skipjack tuna; *Katsuwonus pelamis*) fishing boats. However, only one, the *Nisei*, remains today. He aslo recalls fishermen used to line up along the pier to fish for *halalu* (juvenile *akule*, *Selar crumenophthalmus*). As mentioned earlier, while fishing isn’t allowed in the basin, it is allowed along the jetty entrance to Kewalo Basin.

Mr. Iwami shared his history with the area and a few of the buildings. One in particular was the old net shed, now being rented out to a non-profit community outreach group known as Kupu.



Figure 71. Photo of fishermen at the end of the Kewalo Basin (CSH 2014)

> A major component of the park is that shed over there. You see that two story structure. Ok. It was built originally to be a net shed, where the fishermen, the long line fishermen would mend their nets in it. So it's basically an open pavilion with a big surface area where they could spread out their nets. The net shed is no longer user. Because the need for net shed you know waned in recent years.
>
> So, HCDA [Hawai‘i Development Community Authority] rents it out to Kupu, which is a nonprofit organization that deals with at risk youth and helps them turn their life around. It's a very community service oriented, and we welcome them to the community, and we have a great partnership with them.

The Kewalo Basin Harbor is deeply connected with the community. Several social groups incorporating Mr. Iwami's generation and a younger generation have formed according to the four distinct surf breaks. On the eastern end of the shoreline is Marine Land, named after a dolphin laboratory that used to be located on shore. Straight Outs fronts the centrally located comfort stations at Kewalo Basin. Farther to the west is a break called Rennicks or alternatively known as Right Next. The former being named after a surfer and the latter as a nickname for it being right next to another break at the channel known as The Point. In addition, Point Panic is a body surfing break located west of the harbor channel in front of the Kaka‘ako Waterfront Park. Overall, the oceanic environment (the close proximity of excellent surf breaks), the geography of the land (the short section of oceanfront land), and the infrastructure (the single entrance to the park) have contributed to the enduring bonds of a social community of surfers .Both men agree and stated that the *mana* of Kewalo Basin comes from the scarcity of its resources. It's a secluded secret right next to a few well-advertised attractions, Ward Centers, Ala Moana Center and Ala Moana Beach

Park. "Over here there is only one way in and one way out. So it's kind of like secluded, but not. That's why people come here to relax. I describe it as, our country in the city. Right here, we don't have to drive all the way to the north shore."

Kewalo Basin Park Association known as "Friends of Kewalos" back in 2005 was founded by Mr. Iwami and friends to represent the recreational users of the park and the surrounding ocean, including surfers, fishermen, divers, swimmers, and joggers. "Friends of Kewalo was formed in 2005 when we first got wind of the development," Mr. Iwami states in a recently published book telling the story of the struggle to preserve the existing public space against being developed by big company industry. Mr. Iwami continues to describe his book:

> … basically it tells the story of how we were formed. And how we spread our message to more people and form the coalition and how we fought to save this area from over development… you folks remember in 2005 and 2006 the Alexander and Baldwin plan, with HCDA. But they wanted to build, I mean since you're here. The net house was going to be a high end restaurant. The, you see across the channel of Kewalo's, is the three story UH [University of Hawai‘i] Kewalo Marine lab. Over there was going to be a high end restaurant. For obvious reasons right, it's right on the water. And then that gravel lot on the corner right here were going to walk right by it. And as you come in, the exact footprint of this. Would have been a two story ward warehouse commercial complex all over here. Now to get the most outrageous one, you see that tan building over here. That is the harbor master building, and that one it was a NOAA [National Oceanic and Atmospheric Administration] facility before. They were going to get rid of NOAA and the Harbor Master and build a giant bridge from this side, go over the Kewalo channel and come down by where John Dominis used to be. And at each end of the bridge, like this end, would have white tent like structure, like the Waikīkī Theater have, it has the big white tent. Well, there's another big white tent right here. And I guess small retail. So it was like a place where people would gather, to go over the bridge, it was a pedestrian bridge. So it would have be at least a 45 feet high. So the tallest sailboat mast can clear it. So I asked him, oh why are you for building that bridge? So one of the, I guess, the, requirements of the RFD Request for Proposals was that you need to include an icon feature, so that's the iconic feature. The giant bridge.

Mr. Iwami explains the process. "So we had to go against the state of Hawai‘i which was HCDA. And we had to go against Alexander and Baldwin one of the biggest developers here." Kewalo Basin Park is managed by the Hawai‘i Community Development Authority. Friends of Kewalos was successful in their endeavors and were able to procure a change in the law to have residential areas on the *makai* side of Ala Moana Boulevard. The organization attained status as a nonprofit organization 501(c) (3).

The law states, you cannot sell any public land Kaka‘ako Makai. Because the land where Alexander Baldwin was going to build their towers was a cross the channel, by John Dominis, that's public land, state land. They were going to purchase it for 50 million dollars. So with the law passed, that's basically what stopped the development, they said if we can't buy the land we pulling out, so they pulled out. And another part of the law is you cannot build any residential at all. From a studio to a 600 foot high-rise. So no residential at all on the *makai* side of Ala Moana

Boulevard. That’s why today you only see building cranes coming up on the *mauka* side of Ala Moana Boulevard because there is no law there, but there is a law on the *makai* side.

One final reflection Mr. Iwami shared with us about the area are the memorials dedicated to patrons of the park.

> … At the end of this promenade, there is a statue of a *pueo*, which is the *‘aumakua* of Kewalo. The Hawaiian *pueo*. And there is that story on that statue, about, I think a Hawaiian man named Kapoi, who encountered a *pueo* at Kewalo’s, at this site [Figure 72].
>
> Kapoi, the owl helped Kapoi to defeat an enemy right here, so that how it became a protector of this area. And that’s why our Friends of Kewalos logo, here in the back of my t-shirt, is and owl.
>
> Another thing you might be interested in is, along the way we’re going to pass the… it’s Saint Mariana Pope. She has history here, ‘cause if you ask, why she is here at Kewalo’s? Because she was… do you know Bank of Hawai‘i Ward, Ward and Ala Moana. I think the Bank of Hawai‘i closed, but use to be there, across from Ward--Ward Warehouse. But used to have hospital there, to take care of the Hansen’s disease, the leprosy patients. So she was there, that was her soul mission. And during her break she would come here and fish, she would relaxed here. And that’s why the sisters wanted her statue to be here looking out at the ocean [Figure 73].
>
> …At the pavilion you will also notice there are two plaques. One plaque honors a Filipino fisherman who sailed all the way from Hawai‘i to the Philippines while the other pays tribute to ‘Save Our Surf’ and certain individuals such as John Kelly, Wally Froiseth, Lord ‘Tally-Ho’ Blears, and George Downing who fought to protect places like Kewalos as one of the public’s ocean park [Figure 74].

Mr. Iwami and Mr. Iwai’s main concerns regarding the project are focused on parking and accessibility. There are already a large number of park patrons and boat patrons who all share the limited number of parking stalls currently located near the project area. Additionally, road work in the area may further displace parking for public park use and accessibility. Public access to the Kewalo Basin Park must be ensured during and after the construction phase with no decrease in free parking availability.

In closing, instead of “activists”, Friends of Kewalos prefer the term “conservationists” to describe what we do. We are trying very hard to protect and save the ocean lifestyle. Thousands of people use the ocean daily, it defines who we are as a people, and the ocean is just as much a part of us as we are of it. It is our hope that we are successful in “conserving” this lifestyle for the sake of the people of Hawai‘i, for today and tomorrow.



Figure 72. Photo of *pueo* statue commemorating the *mo‘olelo* of Kapoi near the entrance of the Kewalo Basin (CSH 2014)



Figure 73. Photo of Sister Marianne Cope memorial with the Kewalo Basin in background (CSH 2014)



Figure 74. Photo of the Save Our Surf plaque at the pavilion adjacent to Kewalo Basin (CSH 2014)

Section 9 Cultural Landscape

The following section draws on specific aspects of traditional Hawaiian culture as they may relate to the project area. This section integrates information from Sections 4–6 in order to examine cultural resources and practices identified within or in close proximity to the project area in the broader context of the encompassing Honolulu and Waikīkī landscape. Excerpts from interview sessions from past and present cultural studies are incorporated throughout this section where applicable.

9.1 Hawaiian Habitation

Kalo was the sacred staple in the Hawaiian diet and way of life. According to the Kumulipo, the Hawaiian genesis chant, Hāloa was the second son of Wākea and Papa. Hāloa-naka was the first born who was born prematurely and died shortly after birth (Kanahele 1995:17). After burying Hāloa-naka, a *kalo* sprouted from his grave. Hāloa was born shortly after the sprouting of this *kalo* plant. Hāloa symbolizes *kalo* and man. Kanahele explains that *kalo* is a metaphor for life and that "plants have been used to symbolize human spiritual growth. Hawaiians made taro a metaphor for life because, like the taro plant, it needs to be rooted in good soil and to be constantly nourished with the waters of Kāne" (Kanahele 1995:18).

Honolulu Ahupua‘a was abundant in taro. Upper Nu‘uanu Valley provided an abundance of water to the lower portion of the *ahupua‘a*. Taro lands extended *makai* to at least half-way of upper Nu‘uanu Valley (Handy and Handy 1972:475). Māhealani Cypher, former president of the Ko‘olaupoko Hawaiian Civic Club and former member of the Board of Directors for the Board of Water Supply, led CSH on a tour of Lulumahu Valley. Ms. Cypher emphasizes that Nu‘uanu Valley was full of *lo‘i* until it was destroyed during the battle of Kalanikūpule and Kamehameha. The *lo‘i* was later restored by Kamehameha. The Pauoa area, located to the east of Nu‘uanu Valley and the west of Mānoa Valley, was an ideal location for the cultivation of sweet potatoes. Some areas in Pauoa were cultivated in taro as well. Round Top (Tantulus) and Makiki were famous for their sweet potato production. The area was called ‘Ualaka‘a or "rolling sweet potato" because the area was on a slope and if a sweet potato was displaced, the *‘uala* would roll down the hill (Handy and Handy 1972:478).

The Kaka‘ako area is located between two traditional centers of population, Honolulu and Waikīkī. The *ahupua‘a* of Waikīkī consisted of a large system of irrigated *lo‘i* ascending from Makiki, Mānoa, and Pālolo valleys toward the ocean. A network of fishponds and salt pans dotted the shoreline in Kaka‘ako and Waikīkī (Bingham 1847:92–93). State of Hawai‘i recognized lineal descendant Paulette Ka‘anohi Kaleikini shared that the project area consisted of *ali‘i* and *maka‘āinana* habitation. *Heiau*, fishponds, *lo‘i*, and salt beds once sustained this community. Bones found within the urban corridor are proof that habitation occurred in these areas. Community participant Chester Lao recalled the former Ward Estate, the current location of the Neal S. Blaisdell Center, being famous for its ponds and springs. During construction of the Neal S. Blaisdell Center, two wells were drilled. The *makai* pond was considered to be too brackish and saltwater fish were dropped into the pool. The *mauka* pool was usable but too brackish to drink and *koi* were raised in the pond. Moving toward Waikīkī Ahupua‘a at the edge of Kālia ‘Ili, Mr. Lao recalled the Ala Moana Center area and vicinity was considered swamp land filled with

brackish water. The Kaheka Street area was where Mr. Lao's mother-in-law would purchase duck eggs, swamp cabbage, watercress, and taro.

Mr. Ron Iwami and Mr. Tom Iwai of the Friends of Kewalos shared their experiences and memories centered around the Kewalo area in Kaka‘ako. Mr. Iwami recalls seeing a *tako* hunter who would use a glass box. He also shared the various types of fish caught in the area including *menpachi*, *aweoweo*, *ulua*, *akule*, *halalu*, and sometimes squid. Mr. Iwami remembers when Kewalo Basin was once filled with *aku* boats. Today, only one *aku* boat remains in the harbor—the *Nisei*. Mr. Iwai recalls fishing in Kewalo Basin with his family and uncle who once operated a tug boat to assist the tuna fishing boats into the basin. Today, fishing is not allowed in the basin due to safety reasons.

9.2 *Wahi Pana*

Cultural association with the landscape is evident in the strict observation of the natural environment most evident in the Hawaiian term *wahi pana*. Place names convey *kaona* (hidden meanings) and *huna* (secret) information that may even have political or subversive undertones.

The Kaka‘ako area once held a famous fishpond that was used to for the sacrificial offering of *kauwā* or *kapu* breakers as the first step in a sacrificial ritual known as *Kānāwai Kaihehe‘e* (Kamakau 1991:6), or *Ke-kai-he‘ehe‘e*, which translates as "sea sliding along," suggesting the victims were slid under the sea (Westervelt 1991:16). Kaka‘ako is described as follows:

> Koula [Kō‘ula]. It contains a spring rather famous in the times previous to the conversion to Christianity, as the place where victims designed for the Heiau of Kanelaau on Punchbowl slopes, was [*sic*] first drowned. The priest holding the victim's head under water would say to her or him on any signs of struggling, 'Moe malie i ke kai o ko haku.' 'Lie still in the waters of your superiors.' From this it was called Kawailumalumai, 'Drowning waters.' [Sterling and Summers 1978:292]

Waikīkī was also a site for sacrificial drownings, however, no specific location has been indicated.

The Nā Pōhaku ‘Ola Kapaemāhū a Kapuni (Wizard Stones of Kapaemāhū) were unearthed by the Honorable A. Cleghorn, husband of Princess Likelike and father of Princess Ka‘iulani. First, an 8-ton stone was unearthed followed by a second stoneweighing 10 tons. Two more stones were unearthed shortly after the first two were discovered. Under the 10-ton stone was a female jaw bone and crude images, which were later cemented onto the stone.

Thomas G. Thrum reports that Waikīkī Ahupua‘a consisted of eight *heiau* (Papa‘ena‘ena, Kapua, Kūpalaha, Helumoa, Makahuna, Kamauakapu, Kulanihakoi, and Pahu-a-Maui) and the four *pōhaku* that make up the Nā Pōhaku ‘Ola Kapaemāhū a Kapuni. Two other *heiau* have been documented: Halekumukaaha (reported by Kamakau) and Ōpūnahā (illustrated on historic maps by C.J. Lyons). Several of the *heiau* in Waikīkī were of *po‘okanaka* class or ceremonial human sacrifice.

Author and photographer, Jan Becket, escorted CSH to multiple *wahi pana* from 2012 to present. Site 5463 located *mauka* from the University of Hawai‘i of Mānoa's Kamakakuokalani Center for Hawaiian Studies is nestled between a rock face, a steep drop-off and three low, basalt walls. The site commands an impressive view of Waikīkī. It is also culturally significant in terms that is a *wao nahele* that is close to the city. The site is also on Wa‘ahila Ridge, which is associated

with one of the early gods—Kauahi, whose form can be seen from Mānoa. There is a large natural stone outrcropping on the *makai* side of Kamanele Park in Mānoa Valley. The remnants of the basalt lava cooled in an unusual way where the grains run in the same direction indicating a natural formation. However, behind the outcropping there are areas of distinct artificial terracing with several possible features including a possible *ahu* and *kohe*. Mr. Becket has also pointed out the former locations of Papa‘ena‘ena Heiau (currently the site of La Pietra, Hawai‘i School for Grils) and Pahu-a-Maui Heiau (currently the Diamond Head Lighthouse).

Mr. Becket escorted CSH to several *wahi pana* within Honolulu Ahupua‘a. A large *pōhaku* near the Honolulu and Kāne‘ohe Ahupua‘a border that sits near the ridgeline of a *pali* on the *‘ewa* side of the Nu‘uanu Pali State Wayside park. Several water worn rocks resembling a terrace sit below the *pōhaku*. A second *pōhaku* once stood on a small portion of land on the side of the original Pali Road. Mr. Becket recalls passing this *pōhaku* when he was younger. Today, the stone is no longer there. Mr. Becket believes the stone was either pushed down the cliff or blasted during the construction of the Pali Tunnels. He believes this stone may have been Kalanaihauola, a *mo‘o* who guarded the Pali. Several historic water features, large *pōhaku*, burial mounds, and a stacked terrace with upright stones were found in Lulumahu Valley. Off the Pali Highway, Mr. Becket also showed CSH a single petroglyph and an enclosure in the *‘ili* of Kahapa‘akai.

9.3 *Mo‘olelo*

Traditional Hawaiian knowledge was preserved through a narrative dialogue known as *mo‘olelo*, the oral history and legends of the Hawaiian people, as factual as any written account of history. Origin myths, cosmology, and genealogies are indigenous forms of knowledge that account for the creation of the world and the first Hawaiians. *Mo‘olelo* also chronicle the rise and fall of divine kingship throughout Hawai‘i (Kirch 2010).

In the *mo‘olelo* of the ritual known as Kānāwai Kaihehe‘e or Ke-kai-he‘e-he‘e (“sea sliding along”), members of the *kauwā* class were sacrificed. The Kewalo area utilized a fishpond to drown *kauwā* while other *mo‘olelo* have mentioned a place in Waikīkī that was used.

Mr. Becket escorted CSH to several *wahi pana*. In addition, he has shared *mo‘olelo* of cultural sites that we were unable to visit or have been destroyed. Mr. Becket shares that the original location of Kaumakapili Church was near the current alignment of Maunakea Street and North Beretania Street. The caretaker of Kaumakapili was Kahuoi. The translation of Kau-maka-pili describes the way the bird would catch its prey—swooping from above and closing one eye before grabbing a fish. Pākākā Heiau was once located near the foot of the *makai* end of Fort Street Mall. Pākākā Heiau was the most important *heiau* within Honolulu Ahupua‘a. It was near Kamehameha’s compound and was possibly the headquarters for Kahuna Kū.

Mr. Becket also shared a *mo‘olelo* from his friend whose friend had rented a home near the O‘ahu Country Club in Nu‘uanu Valley. Without any prior cultural or historic knowledge of the Hawaiian Islands, this person mentioned to Mr. Becket’s friend how “little, deformed men” would wake her up in the middle of the night and surround her in her room. She moved out of the home as soon as possible. The Pōhaku Aumeume, a stone connected to the Menehune (a legendary race of small people who worked at night), is a block away from the O‘ahu Country Club. The *pōhaku* was supposedly thrown by the Menehune. Upon observation, small crevices can be seen from the

front of the *pōhaku*. Mr. Becket adds that these crevices are fingerprints from the Menehune when they threw the stone.

Community participant, Māhealani Cypher, shared with CSH a couple of translations of the word *lulumahu* including “hidden curtain” or “hidden from view.” The translations are fitting as Lulumahu Valley is concealed. Ms. Cypher shares that during the Battle of Nu‘uanu, women, *kūpuna*, and children fled to Lulumahu. Although Lulumahu is somewhat hidden, the narrow valley did not provide enough protection and those who were found in the valley were killed. *Keiki* were abandoned on the side of the trail. Ms. Cypher added that at the end of the hiking trail is a waterfall—Lulumahu Falls. The water from the falls is supplied by the Ko‘olau Summit and as the water falls, it gives the illusion of a curtain as it flows over one’s body.

The Friends of Kewalos pointed out a memorial at the end of the promenade at Kewalo Basin of a *pueo*, an *‘aumakua* of Kewalo. The plaque on the statue tells the *mo‘olelo* of Kapoi, a man who defeated an enemy with the help of the *pueo*. Mr. Iwami adds that the Friends of Kewalos logo is an owl. The owl is a protector of the area.

9.4 *Ilina*

It is unknown if Pākākā Heiau was of *po‘okanaka* class. However, several burials have been encountered in the Downtown Honolulu area including SIHP # -02918, a subsurface cultural deposit with six human burials (Hammatt 2013; Yent 1985). The burials were determined to be of pre- and post-Contact era and were a habitation and burial interment site.

In the late 1800s, Mataio Kekuanaoa’s property (LCA 170) at Kapukolo (also known as Kapu‘ukolo) indicated traditional Hawaiian land use according to land records. This area was also part of a rich Chinese cultural landscape. LCA 170 is now within the area known as Chinatown and is bound between North King Street and North Nimitz Highway. For nearly a century, a common practice was for Chinese patriots to disinter their fellow countrymen’s bones and to repatriate them to their homeland of China. Generally and logically, one would assume these bones most likely passed through Chinatown. Although the details are not well-known, there have been some accounts. An 1896 article in the *Hawaiian Gazette* titled “A Strange Occupation” discusses an 8 by 12 structure known as a “Chinese club house” where men carefully “cut away the unnecessary dried skin and ligaments” from bodies. The article describes the club house to be either in or near the edge of Nu‘uanu Stream. However, an 1891 Dakin fire insurance map indicates the location of a Joss House, a Chinese temple or shrine, one block east of Nu‘uanu Stream. The Joss House may have been the “Chinese club house” being referred to in the article.

Several burials have been discovered within and in the vicinity of the Kaka‘ako segment of the proposed project. A single cranial vault (SIHP # -06376) was found during archaeological monitoring at the intersection of Ala Moana Boulevard and Kamake‘e Street, which is within the current project area (Souza et al. 2002). SIHP # -07656, a previously identified, isolated human cranial fragment, was located within disturbed and reworked sand at the Ward Warehouse fronting Ala Moana Bouelvard (Pammer et al. 2014). A pre-Contact to post-Contact cultural layer with a historic burial cluster (SIHP # -07580); a pre-Contact traditional Hawaiian bundle burial (SIHP # -07581); and disarticulated human skeletal remains found within a non-burial context (SIHP # -07582 and -07583) were found a block *mauka* from the proposed project area.

As previously mentioned, several Waikīkī *heiau* were of sacrificial class. However, the focus here is on burials. The *maka‘āinana* class and their bones were usually buried in their particular *‘ili* of residence. Native Hawaiians favored Jaucas sand deposits to bury their dead in. One burial (SIHP # -07087) was found within the Waikīkī segment of the proposed project. The previously disturbed human burial, which consisted of a nearly complete human cranium and cranial fragments, was inadvertently discovered at the intersection of Kālia Road and Ala Moana Boulevard (Mooney et al. 2009:i). The burial was left in situ.

As previously mentioned, Ms. Kaleikini noted that bones found within the urban corridor are proof that habitation occurred in these areas. She added that the proposed project is in a very culturally sensitive area. Ms. Megan Borthwick of Historic Hawai‘i Foundation has also stated that the proposed project is on a major route and bypasses many historic properties and districts, including Chinatown and the Capitol District. Ms. Borthwick added that underground cultural deposits, *iwi kūpuna*, and/or other cultural resources that may be inadvertently found during project activities should be identified and treated appropriately.

During a *huaka‘i* (trip) to Lulumahu Valley, several large stone mounds covered in tall ti plants were observed. Ms. Māhealani Cypher stated that these large stone mounds contain burils of those who were killed when Kamehameha’s army invaded the valley during the Battle of Nu‘uanu.

Section 10 Summary and Recommendations

CSH undertook this CIA at the request of Gray Hong Nojima & Associates, Inc. The research broadly covered the majority of Honolulu and Waikīkī Ahupua‘a, including the 64.43-acre project area.

10.1 Results of Background Research

Background research for this study yielded the following results, which are presented in approximate chronological order:

1. Honolulu literally translates to “protected bay,” which refers to Honolulu Harbor (Pukui et al. 1974:49-50). Older names for the harbor are Kou and Māmala.
2. Pākākā was the name of a coastal point, canoe landing, wharf built off the point in 1827, and *heiau*. The name literally means “to skim, as stones over the water” (Pukui et al. 1974:175). Thrum (1906) mentions Pākākā Heiau being the main royal temple in Honolulu. This *heiau* would be located near the foot of Fort Street today.
3. *Kalo* was the sacred stample in the Hawaiian diet and way of life. According to Hawaiian mythology, man was born from the taro plant. In the Kumulipo, also known as the Hawaiian genesis chant, Wākea (Father Sky) and Papa (Mother Earth) had their first born child Hāloa-naka. This child was born prematurely and died shortly after his birth (Kanahele 1995:17). After burying Hāloa-naka, a taro plant sprouted at his grave and a second son, Hāloa, was born. Hāloa, a human child, symbolizes taro and man. Taro is a metaphor for life “because, like the taro plant, it needs to be rooted in good soil and to be constantly nourished with the waters of Kāne” (Kanahele 1995:18).
4. Honolulu Ahupua‘a was abundant in taro. The *ahupua‘a* was bountiful with streams flowing from upper Nu‘uanu Valley. Taro lands extended *makai* to at least half-way to upper Nu‘uanu Valley. The Pauoa area was ideal for sweet potatoes as well as taro cultivation. The Round Top (Tantulus) and Makiki areas were famous for their sweet potato production. The name for this area was ‘Ualaka‘a or “rolling sweet potato” due to the sloping hill. It was said, if a sweet potato was displaced, the *‘uala* would roll down the hill (Handy and Handy 1972:478).
5. SIHP # -02918 was found during excavations at the former Honolulu Ironworks site and was later documented in the archaeological inventory survey for the Honolulu High-Capacity Transit Corridor Project (Hammatt 2013; Yent 1985). SIHP # -02918 consists of a subsurface cultural deposit and six human burials. The burials were from the pre- and post-Contact era.
6. In 1846, Honolulu was the capitol of the Hawaiian Kingdom and was on its way to becoming the commercial and political hub of the Islands. During this time there was an obvious increase in population, land use, and urbanization. The waterfront area changed dramatically to accommodate trading and whaling vessels.
7. In 1895, a cholera epidemic struck the Islands and spread rapidly due to unsanitary conditions of the harbors and Nu‘uanu Stream. The epidemic broke out in August and ended in October. A total of 64 people died. Shortly after the end of the epidemic, the government

began to plan and institute public improvements to roads, bridges, sewage systems, and streams.

8. A rich Chinese cultural landscape was just *mauka* of the waterfront in an area called Kapukolo (also known as Kapu‘ukolo). For nearly a century, Chinese patriots practiced disinterring their fellow countrymen’s bones to prepare them for shipment back to China. It is logical to assume that many of these bones passed through Honolulu’s Chinatown, but details are not well-known. An 1896 article in the *Hawaiian Gazette* discusses a “Chinese club house” in or near Nu‘uanu Stream that processed these bones.
9. Kaka‘ako is located within Honolulu Ahupua‘a. Kaka‘ako is located between two of the most intensely populated and cultivated areas in southeastern O‘ahu during the pre-Contact period: Waikīkī and Honolulu. Marshes and wetlands were utilized for salt production, farming of fishponds, and some wetland agriculture.
10. The Kaka‘ako area has been heavily modified over the 150 years due to historic filling of the area for land reclamation.
11. Members of the *kauwā*, a pariah caste, were drowned in the Kewalo area for sacrificial purposes.
12. Pu‘ukea Heiau was located in the *‘ili* of Kukuluāe‘o according to Kamakau (1991:40). Pu‘ukea translates to “white hill” and was also the name of a smaller land division within Kukuluāe‘o ‘Ili. LCAs 1502 (not awarded) and 1504 mention Pu‘ukea. LCA 1504 is located near the junction of Halekauwila and Cooke streets. There is a possibility the *heiau* was built near this junction due to the slightly elevated location.
13. A trail once traversed the Kaka‘ako area, which connected Waikīkī to Honolulu. John Papa ‘Ī‘ī (1959:89) described the middle trail (close to the current alignment of Queen Street) extending from Kālia to Kukuluāe‘o as passing “along the graves of those who died in the smallpox epidemic of 1853.”
14. Several burials have been documented within and in the vicinity of the project area including SIHP # -06376, a single cranial vault, discovered at the intersection of Ala Moana Boulevard and Kamake‘e Street (Souza et al. 2002); and SIHP # -07656, a previously identified, isolated human cranial fragment, at the Ward Warehouse, fronting Ala Moana Boulevard (Pammer et al. 2014).
15. LCA testimonies express that much of the land in Ka‘ākaukukui ‘Īli was used for salt production. Native Hawaiians used salt for a variety of purposes including to flavor food, preserve fish, medicinal reasons, and ceremonial purposes. Salt was traded and by 1870 it was at its peak. By 1883, traditional Native Hawaiian salt production was on the decline and was replaced by the labor intensive Chinese method. By 1901, the majority of fishponds and salt pans *makai* of King Street were abandoned.
16. By the 1880s, the Kaka‘ako area was being filled in for the construction of new roads and improvement of older roads. The justification for filling former mud flats, marshes, and fishponds was that low-lying areas were frequently being cited for unsanitary conditions and contributing to cholera outbreaks and breeding areas for rats and mosquitoes. By February 1914, the land from South Street to Ward Avenue and from Ala Moana Boulevard to Queen Street had been filled in.

17. The name Waikīkī translates to “water spurting from many sources” and reveals the character of the intact watershed system of Waikīkī prior to European Contact, where water from the valleys of Mānoa and Pālolo gushed forth from underground.
18. A vast system of irrigated taro fields was constructed across the littoral plain from Waikīkī Kai to the lower valleys of Mānoa and Pālolo in approximately AD 1400. This, in combination with coconut groves and fishponds along the shoreline, enabled the growth of a sizeable population, including the coastal village of Waikīkī, which most likely centered around the mouth of ‘Āpuakēhau Stream.
19. *‘Uala* and *ipu* were abundant in the lower Waikīkī marshlands. The foothills of Mānoa and Pālolo contained *pili* grass for thatching of homes and *hau*, which was used for canoe frames and kite supports. Bark from the *hau* was used for the construction of nets, ropes, and *kapa*. *Kukui* trees could be found mid-way in Mānoa Valley. The kernels were used for *‘inamona* and the oily nuts were used for stone lamps.
20. Approximately 11 known fishponds were in the *‘ili* of Kālia, also the location of the current project area. In addition to the 11 known fishponds were several more with undocumented names.
21. Thomas G. Thrum reports that eight *heiau* were once located in Waikīkī as well as Nā Pōhaku ‘Ola Kapaemahu a Kupuni (commonly known as the Wizard Stones) (Paglinawan 1997; Thrum 1907:139-141). These sites are connected through *mo‘olelo* to ‘Āpuakēhau Stream. Four of these *heiau* were associated with human sacrifice including Helumoa Heiau. Sacrificial drownings of the *kauwā* class were also perfomed in Waikīkī (Sterling and Summers 1978:33).
22. One burial was documented in the Waikīkī segment of the current project area. SIHP # -07087, a previously disturbed human burial, which consisted of a nearly complete human cranium and cranial fragments, was found near the intersecton of Kālia Road and Ala Moana Boulevard (Mooney et al. 2009:i). The burial was left in situ.
23. The construction of the Ala Wai Canal began in 1921 and was completed in 1928, which resulted in draining and filling in the remaining fishponds and irrigated fields of Waikīkī. The construction of the Ala Wai Canal was one element of a plan to urbanize Waikīkī and the surrounding districts.
24. The U.S. War Department acquired approximately 70 acres in Kālia ‘Ili to establish a military reservation, which was named Fort DeRussy in honor of Brigadier General R.E. DeRussy of the Army Corps of Engineers. The Waikīkī portion of the project runs through Kālia ‘Īli and borders the north portion of Fort DeRussy.
25. The present day Ala Moana Shopping Center is located in the *‘ili* of Kālia. Kālia ‘Ili was known for its numerous fishponds. The parcel where Ala Moana Shopping Center stands today was granted to Lot Kapuāiwa, also known as Kamehameha V (Land Grant 2790). The 50-acre swamp was deemed unproductive land and was put up for sale in 1884 in accordance to Princess Bernice Pauahi Bishop’s will. In 1912, Walter Dillingham bought the property for $25,000 and had his company fill in the swamp land with coral. In 1948, Lowell Dillingham, Walter Dillingham’s son, announced plans to construct a shopping center. Construction began in 1957. The shopping center opened for business on 13 August 1959.

10.2 Results of Community Consultations

CSH attempted to contact Hawaiian organizations, agencies, and community members as well as cultural and lineal descedants of Honolulu and Waikīkī in order to identify individuals with cultural expertise and/or knowledge of the project area and vicinity. Community outreach letters were sent to a total of 76 individuals or groups; nine responded and five of these *kama‘āina* and/or *kūpuna* met with CSH for more in-depth interview. CSH is still awaiting written responses from SHPD and OHA. Community consultation gathered the following information:

1. State of Hawai‘i recognized lineal descendant Paulette Ka‘anohi Kaleikini stated the proposed project “will be taking place in very, very sensitive areas.” She continued on, stating that the ‘Ewa portion of the project area has a lot of subsurface disturbance, however, there are also areas that have not been disturbed. The areas that have not been previously disturbed could be impacted by the current project’s activities.
2. Ms. Kaleikini’s primary concern regarding the proposed project is pre- and post-Contact land use within the project area. She stated that thousands of Native Hawaiians lived within the current urban corridor. Bones found within the urban corridor are proof that habitation occurred in these areas.
3. According to Ms. Kaleikini, the project area consisted of *ali‘i* and *maka‘āinana* habitation. She noted *heiau*, fishponds, *lo‘i*, and salt beds once sustained a community.
4. Ms. Kaleikini recommended an archaeological inventory survey plan. She added that cultural monitoring should be considered alongside archaeological monitoring for this “culturally sensitive area.”
5. Ms. Megan Borthwick of Historic Hawai‘i Foundation stated the project area is on a major route and bypasses many historic properties and districts. Historic Hawai‘i Foundation recommended an architectural resource survey be conducted to identify potential impacts to historic resources. In addition, an architectural inventory survey may identify additional historic properties that are eligible for the historic register but have not been previously nominated or designated. Properties listed on the State and/or National Register of Historic Places, including historic districts such as Chinatown and the Capitol District, should be evaluated for potential adverse effects.
6. The Historic Hawai‘i Foundation is also concerned about underground cultural deposits, *iwi kūpuna*, and/or other cultural resources that should be identified and treated appropriately in the event of discovery.
7. Mr. Chester Lao, a former Board of Water Supply employee, described the water table in parts of Honolulu and Waikīkī Ahupua‘a. He noted the Missionary Homes and the Board of Water Supply office in downtown Honolulu overlie cinders and coral that collects water. The Mission Homes has a hand-dug well that extends to 25 ft in depth. The water from this well was suitable for everyday drinking and cooking. However, the Board of Water Supply office a couple blocks *mauka* is fed by a slightly brackish well.
8. The former Ward Estate (the current site of the Neal S. Blaisdell Center) was once famous for its ponds and springs. Mr. Lao stated the Kaka‘ako area contains brackish water. During the construction of the Neal S. Blaisdell Center, two wells were drilled. The well farthest *makai* was considered very brackish and saltwater fish were dropped into the pond. The *mauka* well was also brackish and utilized as a *koi* pond. The lower pond that surrounds the

arena was artificially created and ocean fish such as *pāpio*, tangs, tilapia, and *‘ōmilu* can be seen.

9. Ala Moana Shopping Center was constructed on former swamp land. To create the Ala Moana Shopping Center, the area needed to be filled in. Mr. Lao recalled Ala Moana Shopping Center being filled in with material from Ala Moana Beach Park and with debris dredged from the Ala Wai Canal.
10. Mr. Lao recalled a small community of Native Hawaiian families who once lived on the land where the Ala Moana Shopping Center stands today. The families eventually made their way *mauka* towards Papakōlea and onto Board of Water Supply land. During Mr. Lao’s employment with the Board of Water Supply, he recalled the Land Division sector receiving many complaints of a piggery near the Board of Water Supply’s Papakōlea Shaft. The outcome of constant complaints led to the Board of Water Supply agreeing to give the Department of Hawaiian Homelands 10 acres of land to build more homesteads. The Board of Water Supply kept 1 acre of land for a needed reservoir.
11. Mr. Lao described the cultural landscape of the Kapi‘olani Boulevard and Ke‘eaumoku Street area as swamp land where his mother-in-law would purchase duck eggs, swamp cabbage, watercress, and taro.
12. The Ala Wai Canal was originally conceived in 1927 by developers as the “Venice of the Pacific.” The original plan was to have an entrance and exit into the canal, buildings were to be constructed along the canal, and boats and gondolas were to navigate the canal waters. The canal was dredged, however, the exit was never constructed. The proposed outlet would extend from the current location of the Waikīkī-Kapahulu Public Library and turn *makai* connecting to the sea so the canal could have better circulation. Due to the current construction of the canal without an outlet, the water tends to be very stagnant and filled with debris.
13. Mr. Jan Becket, retired Kamehameha Schools teacher who is well-recognized for his photographic documentation of *wahi pana*, escorted CSH to multiple cultural sites from April 2012 to November 2014 within Waikīkī and Honolulu Ahupua‘a. A total of 16 sites within Waikīkī and Honolulu Ahupua‘a have been mentioned for the current study. Two of those 16 sites were once in the vicinity of the project area but have since been destroyed: Pākākā Heiau and the first location of Kaumakapili Church.
14. Pākākā Heiau was once located near the foot of the *makai* end of Fort Street Mall. Mr. Becket assumes that some of the rubble from Pākākā Heiau was the most likely used for the construction of roads in downtown Honolulu. Pākākā was the most important *heiau* in Honolulu Ahupua‘a. It was also near Kamehameha’s compound and was possibly the headquarters for Kahuna Kū.
15. Mr. Becket states the original location of Kaumakapili Church was near the current alignment of Maunakea Street and North Beretania Street. The caretaker of Kaumakapili was Kahuoi. Mr. Becket shares that Kahuoi would fish with his pet bird named Kau-maka-pili (“perched with eyes closed”). The translation of Kau-maka-pili describes the way the bird would catch its prey by swooping down and closing one eye before grabbing a fish.
16. Māhealani Cypher, former president of the Ko‘olaupoko Hawaiian Civic Club and former member of the Board of Directors for the Board of Water Supply, escorted CSH to Lulumahu Valley in Nu‘uanu. Ms. Cypher states the word *Lulumahu* has never been

defined. After conducting research on the name, Ms. Cypher translates the word to “hidden curtain” or “hidden from view.” The translation is fitting as the valley is concealed. She offers two reasons why the valley is named *lulumahu*. A waterfall is at the end of the Lulumahu Valley trail. The water is supplied for the waterfall is supplied by the Ko‘olau Summit. The water from the falls gives the illusion of a curtain as it flows over one’s body. The second reason relates to a *mo‘olelo*. During the Battle of Nu‘uanu, women, *kūpuna*, and children hid in Lulumahu Valley. Kamehameha’s army spread throughout Nu‘uanu looking for the residents. Although the valley is somewhat hidden, it did not provide enough protection and those who were found in Lulumahu were killed.

17. Ms. Cypher pointed out several large stone mounds along the Lulumahu Valley trail. The mounds are covered in tall ti leaves. Ms. Cypher shares that these mounds contain burials of those were killed when Kamehameha’s army invaded the valley. *Pōhaku kūpuna, pōhaku kia‘i,* and historic features were also observed. Several metal rods and concrete blocks were found on the side of the trail as well. Ms. Cypher explained that these remnants were part of a railroad track that traversed up the valley to carry water.
18. CSH met with Ron Iwami, a local retired fireman for the City & County of Honolulu and Thomas Iwai Jr., a local retired Aquatic Biologist with the Department of Land and Natural Resources (DLNR) – Division of Aquatic Resources (DAR). Mr. Iwami and Mr. Iwai represent the group known as Friends of Kewalos. The group represents recreational users of the park and surrounding ocean, which includes surfers, fishermen, divers, swimmers, and joggers.
19. Mr. Iwami has been surfing at Kewalo Basin for 45 years and has witnessed the many changes the harbor, land, and surrounding ocean. He recalls the harbor being blocked with a thick forest of *haole koa*.
20. Mr. Iwai recalls fishing in Kewalo Basin with his family and uncle who was a tug boat operator for tuna fishing boats. His uncle worked for the Coral tuna cannery located next to the former Fisherman’s Wharf restaurant. Today, fishing within the basin is not allowed for safety reasons.
21. Mr. Iwami and Mr. Iwai recalls catching *tako, menpachi, aweoweo, ulua, papio, akule,* and *halalu.*
22. Mr. Iwami points out several memorials within the park including a statute of a *pueo*, which is the *‘aumakua* of Kewalo. A plaque on the statue relates the story of Kapoi who defeated an enemy with the help of the *pueo*. The logo for the Friends of Kewalos is also the *pueo* to commemorate the *mo‘olelo*. Another memorial is of Saint Mariana Pope, a nun who assisted leprosy patients within the Kaka‘ako area. During Saint Mariana Pope’s downtime, she would fish and relax in the Kewalo Basin area. Two plaques can also be found under the pavilion. One honors a Filipino fisherman who sailed from Hawai‘i to the Phillipines. The second plaque is dedicated to Save Our Surf, an organization comprised of John Kelly, Wally Froseith, Lord “Tally-Ho” Blears, and George Downing—all who fought to protect public parks and surf spots.
23. Mr. Iwami and Mr. Iwai’s main concerns regarding the project are focused on parking and accessibility for park and boat patrons. Road work in the area may further displace parking and accessibility.

10.3 Recommendations

Based on the information gathered for the cultural and historic background and community consultation detailed in this CIA report, the proposed project may potentially impact Native Hawaiian burials and subsurface cultural layers. CSH identifies below these potential impacts and makes the following recommendations:

1. Personnel involved in the construction activities should exercise caution due to the culturally sensitive nature of the proposed project areas as indicated by two community participants.
2. Personnel involved in the construction activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. Should burials (or other cultural finds) be encountered during ground disturbance, the construction contractor should immediately cease all work and the appropriate agencies should be notified pursuant to applicable law.
3. If any *iwi kūpuna* or other inadvertent cultural finds are found during ground disturbance, the Honolulu Board of Water Supply in conjunction with the SHPD and OIBC should consult with lineal and cultural descendants of Honolulu (including Kaka‘ako) and Waikīkī to develop a reinterment plan and cultural preservation plan.

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Appendix A Complete *Mo‘olelo* for Pākākā *Heiau*

The following *mo‘olelo* is from Kamakau (1991):

The Story of Kū-ho‘one‘e-nu‘u

PĀKĀKĀ was an ancient *heiau*, a *waihau po‘o kanaka*. It was built by Ka-maunu-i-Halakaipo; the god for whom it was built was Kū-ho‘one‘e-nu‘u. Kū-ho‘one‘e-nu‘u was a god from Kahiki-kū; this is his story.

When Haumea was traveling in Kahiki-kū and Kahiki-moe, Mulei‘ula, the daughter of ‘Olopana, ruler of those lands, was having difficulty in childbirth. Sounds of lamentation filled the air, and preparations were being made to cut open her stomach. The mother would die, but the child would live. Haumea said, “In our land the mother lives. The mother and the child would both live.” ‘Olopana said to her, “Then deliver my daughter so that my daughter and my grandchild may live. What payment do you want for the delivery?” Haumea answered, “This tree with beautiful flowers.”

The name of the tree was Ka-lau-o-ke-kāhuli, and its flowers were Kanikawī and Kanikawā. This precious tree with exceedingly beautiful flowers belonged to the daughter of ‘Olopana of Kahiki-kū, the “‘*iwa kilau moku*” of Kahiki, whose perfection among the chiefs was without compare in the world. Not wanting to die, she consented to the giving of the tree.

Haumea began to deliver the child. When Mulei‘ula knew that the child was being removed, she withdrew her consent to the giving of the tree. Haumea clasped her thighs together, holding the shoulder of the child; it stuck and did not come out. Mulei‘ula again consented to the giving of the tree; the child came out. Seeing this, she again withdrew her consent. Haumea held fast to the placenta; Mulei‘ula began to sink into death. Her father cried out, “Why do you withhold your tree? Give it up! Choose between death and the tree!” She gladly gave up the tree, and her troubles were over.

Haumea grasped the branches and the roots of the tree and jumped up into the sky with it. She jumped beyond the Pillars of Kahiki and reached Hawai‘i. She circled the island but found no place to set the tree down. She jumped over to Maui and circled it until she came to Waihe‘e where she set the tree down. Pu‘ukuma is the spot where she set it down. She left the tree there and went for a drink of water—the water of Kāne. When she returned, she went to life the tree and found that its roots had crept below and that it was held fast. Haumea erected a wall around the

growing tree, a wall that reaches from Pihana to Kaho‘omano Point. Secure within the wall until this time (*Pa‘a i ka pā a hiki i keia manawa*), it was kept from the winds without; the Kili‘o‘opu was the wind within. Haumea took the two blossoms Kanikawī and Kanikawā and returned to Nu‘umehalani.

A man of Nakohola named ‘A‘a‘ala‘au went up to the mountains to cut wood and came upon this tree. “*Ka!* Here is a tree close by!” He chopped at the tree until it fell down and then he returned home. That night a fierce storm began that lasted for twenty nights and twenty days. There were rushing streams where no streams had been before. The wall surrounding the tree was broken up; parts of it washed away, out into the ocean. After six months it washed ashore at Niukūkahi in Waiehu, Maui.

One branch of this tree was made into a rack on which wooden bowls or netted calabashes were slung (that was Ka-haka-iki). Another branch became a shelf on which bundles were placed (that was Keolo‘ewa). Another branch landed of the seashore at Oneawa, in Kailua, O‘ahu. The fish followed it, and this became a place where schools of fish would come in. When this branch (that is, Mākālei) was taken inland of Kailua, the fish of Kawainui Pond followed it inland. The trunk of the tree was used as a dung heap and as a place for throwing wastes. This was Kū-ho‘one‘e-nu‘u.

Wai-la‘ahia the husband and Halelua the wife were people without gods. The god Kū-ho‘one‘e-nu‘u came at night in a dream to have them go and get it [the tree trunk] for a god themselves. For three nights and three days they were urged to go and carve a god [from the tree] for themselves. On the third day of urging. Wai-la‘ahia prepared the things that had been ordered—a pig, coconuts, red fish, garments, and *kohekohe* grass. Then he went and laid down his offering and freed the *kapu.* Then he took the tree trunk inland to Polipoli at Nāpoko there in Waiehu. Wai-la‘ahia erected a *waihau* [a *heiau* for Kū-ho‘one‘e-nu‘u], dedicated it, and freed it.

This god became famous as a god of *mana* and a god who seized kingdoms (*he akua kā ‘ili aupuni*). The chiefs as far as O‘ahu heard of him. Wai-la‘ahia was a *kahu* of Ka-maunu-i-Halakaipo, chief of O‘ahu. He brought the god to O‘ahu, and Ka-maunu-i-Halakaipo built Pākākā as a *heiau* for it.
Kū-ho‘one‘e-nu‘u was a god of the chiefs of O‘ahu from remote times to the times of Kūali‘i, Ka-pi‘i-oho-o-ka-lani, Pele-i‘ō-hōlani, Kūmahana, and Kahahana. It is said that this was the most ancient god from Hawai‘i to Kaua‘i. It was later that Kūkeolo‘ewa was made a god for the chiefs of Maui.
[Kamakau 1991:6-8]

The *mo‘olelo* below is from Westervelt (1915) regarding Pākākā Heiau:

The *Mo‘olelo* of the God of Pākākā *Heiau* (Temple)

Pakaka was a heiau, or temple. There are several legends connected with this heiau. One of the most interesting is that which tells how the god of the temple came into being.

The story of the god of this temple is a story of voyages and vicissitudes. Olopana had sailed away from Waipio, Hawaii, for the island of distant seas. Somewhere in all the great number of islands which were grouped under the general name “Kahiki” Olopana found a home. Here his daughter Mu-lei-ula (Mu-with-the-red-garland) was experiencing great trouble being near to childbirth. For some reason, Haumea, one of the Polynesian ancestors, had stopped for a time to visit the people of that land. When the friends were afraid that Mu-lei-ula would die, Haumea came to help, saying: “In our land the mother lives. The mother and child both live.” The people said, “If you give us aid, how can we render payment or give you a reward?” Haumea said: “There is a beautiful tree with two strange but glorious flowers, which I like very much. It is ‘the tree of changing leaves’ with two flowers, one kind singing sharply, and the other singing from time to time. For this tree I will save the life of the chief’s daughter and her child.”

Gladly, the sick girl and her friends promised to give this beautiful tree to Haumea. It was a tree dearly loved by the princess.

Haumea commenced the prayers and incantations which accompanied her treatment of the sick, and the chiefess rapidly grew stronger. This had come so quickly and easily that she repented the gift of the tree with the beautiful flowers, and cried out, “I will not give the tree.”

Immediately she began to lose strength, and called to Haumea that she would give the tree if she could be forgiving and healed. However, as strength came to her once more she again felt sorry for her tree and refused to let it go. Again the incantations were broken off and the divine aid withdrawn.

Olopana in agony cried to his daughter: “Give up the tree. Of what use will it be with its flowers if you die?” The Haumea, with the most powerful incantations, gave her the final strength, and mother and child both lived and became well and strong.

Haumea took the tree and travelled over the far seas to distant Hawaii. On that larger island she found no place to plant the tree. She crossed over to the island Maui, and came to the “four rivers.” There she found the awa of the gods and prepared it for drinking, but needed fresh water to mix with it.

She laid her tree on the ground at Puu-kume by the Wai-hee stream and went down after water. When she returned the tree had rooted. While she looked it began to stand up and send forth branches. She built a stone wall around it, to protect it from the winds. When it blossomed Haumea returned to her divine home in Nuumealani,* the land of mists and shadows where the gods dwelt.

By and by a man took his stone axe and went out to cut a tree, short and beautiful, and after hours of labor cut it down. The night was coming on, so he left it as it fell and went home.

That night a fierce and mighty storm came down from the mountains. Blood-red were the streams of water pouring down into the valleys. Curing twenty nights and twenty days the angry rain punished the land above and around Wai-hee. The river was more than a rushing torrent. It built up hills and dug ravines. It hurled it mighty waves against the wall inside which the tree stood. It crushed the wall, scattered the stones, and bore the tree down one of the deep ravines. The branches were broken off and carried with the trunk of the tree far out into the ocean.

For six months the waves tossed this burden from one place to another, and at last threw the largest branch on the reef near the beach of Kailua, on the island Hawaii. The people saw a very wonderful thing. Where this branch lay stranded In the water, fish on many kinds gathered leaping around it. The chiefs took this wonderful branch inland and made the god Makalei, which was a god of Hawaii for generations.

Another branch of the tree rolled back and forth along the beach near the four waters, and was wrapped in the reuse of the sea.

A chief and his wife had not yet found a god for their home. In a dream they were told to get a god. For three days they consulted priests, repeated prayers and incantations, and offered sacrifices to the great gods, while they made search for wood from which to cut out their god. On the third night the omens led them down to the beach and they saw this trunk of a tree rolling back and forth. A dim haze was playing over it in the moonlight. They took that tree, cut out their god, and called it Ku-hoo-nee-nuu. They built a heiau, or temple, for this god was very great, and it was a noted god from Hawaii to Kauai. Favor and prosperity rested upon this chief who had found the tree, made it a god, and built a temple for it.

The king who was living on the island Oahu heard about this tree, and sent servants to the island of Maui to find out whether or no the reports were true. If true they should bring that god to Oahu.

The found the god and told the chief that the king wanted to establish it at Kou,** and would build a temple for it there. The chief readily gave up his god and it was carried over to its new home.
So the temple, or heiau, was built at Kou and the god Ku-hoo-nee-nuu placed in it. This temple was Pakaka, the most noted temple on the island Oahu, while its god, the log of the tree from a foreign land, became the god of the chiefs of Oahu.

*See “Home of the Ancestors” Part II. in *Legends of Ghosts and Ghost-Gods*
**Ancient Honolulu
[Westervelt 1915:21-27]

Appendix B Response from Historic Hawai‘i Foundation

HISTORIC HAWAI'I FOUNDATION
1974 ► 2014

September 3, 2014

Nicole Ishihara
Cultural Researcher
Cultural Surveys Hawai'i
PO Box 1114
Kailua, Hawai'i 96734

Re: **Cultural Impact Assessment, Honolulu 54**
Board of Water Supply, Honolulu Water System Improvements
Environmental Assessment
TMK: (1) 1-5, 1-7, 2-1, 2-3, 2-4, 2-6 Various

Dear Ms. Nicole Ishihara,

Thank you for including Historic Hawai'i Foundation (HHF) in the Cultural Impact Assessment consultation for the Honolulu Water System Improvements (WSI) Environmental Assessment.

Since 1974, HHF has been a statewide leader for historic preservation with a mission to preserve and encourage the preservation of historic properties significant to the history of Hawai'i.

This Cultural Impact Assessment prepared for Gray Hong Nojima & Associates, covers an area through Chinatown, Downtown, Kaka'ako, and Waikīkī and includes excavation and installation of replacement water main. The majority of work will run along Nimitz and Ala Moana Boulevard.

This is a major route through town which passes a number of historic properties and districts. Historic Hawai'i Foundation feels that an architectural resource survey should be conducted through this area to identify potential impacts to historic resources. Properties already designated on the State or National Register of Historic Places—including historic districts such as Chinatown and Capital Districts—should be specifically evaluated for potential adverse effects (the State Register is available from the State Historic Preservation Division, and is also provided under the Historic Properties tab at www.historichawaii.org). In addition, the Architectural Inventory Survey may identify any additional historic properties that are eligible for the historic register but not formally designated.

If the proposed work is contained within the street right of way and does not have an above-ground component, then we believe that impacts to historic buildings and structures will be minimal. However, there are likely underground cultural deposits, iwi kūpuna or other cultural resources that should be identified and treated appropriately if found or disturbed.

Thank you for this opportunity to express our concerns with the proposed project. Megan Borthwick will be our point of contact for this project. Please contact her with questions or concerns. She can be reached at (808) 523-2900 or by email at megan@historichawaii.org

Sincerely,
Kiersten Faulkner
Kiersten Faulkner, AICP
Executive Director

680 Iwilei Road, Suite 690 / Honolulu, Hawai'i 96817 / Tel (808)523-2900 / Fax (808)523-0800
Email preservation@historichawaii.org / Web www.historichawaii.org

Appendix C Photo and Articles from Dwynn Kamai



Appendix D Articles from Jan Becket



Windward resident remembers legend



SECTION B • Honolulu

AD 3/04 Joe Singer

Our Honolulu

By Bob Krauss

▲▲▲

Recalling old ways, landmarks

There must be many once-familiar landmarks in Our Honolulu that are now forgotten. I remember a huge boulder that stood to the height of a man on the cliff side of the Pali Highway just after you passed the lookout and started down the Windward side.

That was in the 1950s. People said it was the old guardian rock to which people made offerings when they crossed from one side to the other in the days when the trail was dangerous. One day I drove over the Pali and noticed that the rock was gone. I never could find out why. Most people don't even remember it.

Recently I read in an old newspaper about another landmark that has disappeared, one that I never knew existed. A shark god in Mānoa Valley.

"This relic of the early days which can be seen from the road leading to the falls is an almost life-size representation of a shark carved out of solid stone," read a story in The Advertiser on Aug. 22, 1900. "It is an idol dedicated to the shark god.

"Even up to two decades ago the stone image was visited nightly by native kahunas ...

"Years ago, during the time of Kamehameha III, there lived a family on the place which is called Kaaipuu, named after the stone god which was found on the premises. It lay in a gully and at night crowds of natives came hither accompanied by kahunas to do honor to the god. They brought awa root tied in ti leaves and deposited it in the mouth."

APPENDIX F

Traffic Information Report for Proposed Waterline Projects,
Various Locations Honolulu, Hawaii

Traffic Information Report

for Proposed Waterline projects

Various locations,

Honolulu, Hawai‘i

Prepared for:

City and County of Honolulu Board of Water Supply

Prepared by:

Julian Ng Incorporated
P.O. Box 816
Kaneohe, HI 96744

DRAFT

July 2015

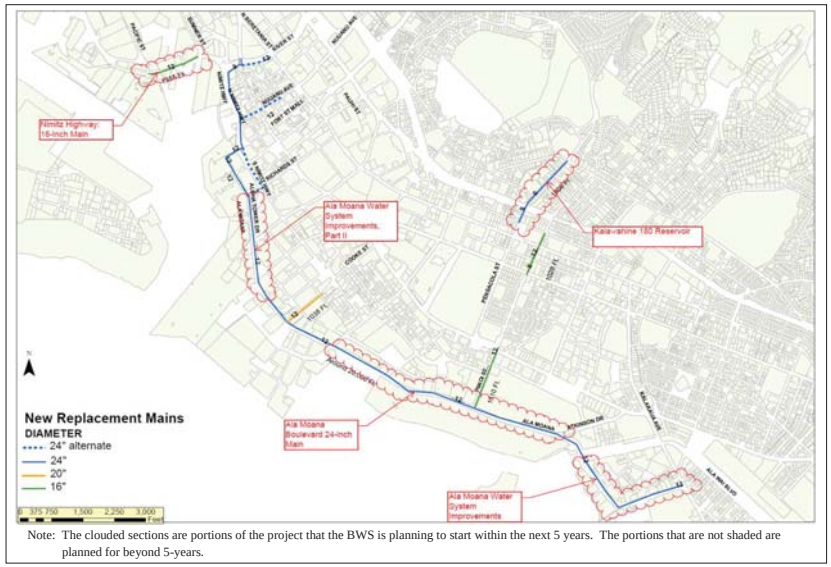
Traffic Conditions and Impacts

The project consists of replacing various water lines with larger diameter water lines in the following areas (see also map on the next page):

- Installation of a new 24” replacement water main from: the vicinity of the intersection of River Street and North King Street; then southwest, or makai (seaward) on River Street to Nimitz Highway; then southeast on Nimitz Highway to Fort Street Mall; then southwest to Aloha Tower Drive; then along Aloha Tower Drive to Ala Moana Boulevard; and, then along Ala Moana Boulevard to the intersection with Kalakaua Avenue, for a distance of approximately 20,000 feet.
- Installation of a new 16” replacement water main along Nimitz Highway between Pacific Street and Sumner Street for approximately 1,355 feet.
- Installation of a new 20” replacement water main along Cooke Street from Ala Moana Boulevard to Pohukaina Street for approximately 1,038 feet.
- Installation of a new 16” replacement water main along Piikoi Street from S. King Street to Kinau Street for approximately 1,028 feet.
- Installation of a new 16” replacement water main along Piikoi Street from Ala Moana Boulevard Kapiolani Boulevard for approximately 1,510 feet.
- Installation of a new 24” replacement water main along Pensacola Street from Kinau Street to Wilder Avenue for approximately 1,806 feet.
- Alternate 24” water main project areas include River Street between N. King Street and N. Beretania Street, Nuuanu Avenue from Nimitz Highway to Pauahi Street and S. Nimitz Highway between Fort Street Mall and Richards Street, and thence makai to Aloha Tower Drive.

The clouded sections are portions of the project that the BWS is planning to start within the next 5 years. The portions that are not shaded are beyond 5-years.

The project, when completed, is not expected to have any traffic impacts. However, there may be lane closures or other interference with vehicular or pedestrian traffic during construction. Normal construction practices will provide for warning signs, barricades, and other measures to maintain access during construction. Construction activities that affect traffic should be coordinated with other work that may have similar effects, and scheduled to minimize impacts to the traveling public and reduce any temporary inconveniences. Major community events that occur at various times of the year and use portions of the affected streets should also be considered. This report identifies existing traffic conditions to provide a better understanding of how to minimize construction impacts to traffic.



Note: The clouded sections are portions of the project that the BWS is planning to start within the next 5 years. The portions that are not shaded are planned for beyond 5-years.

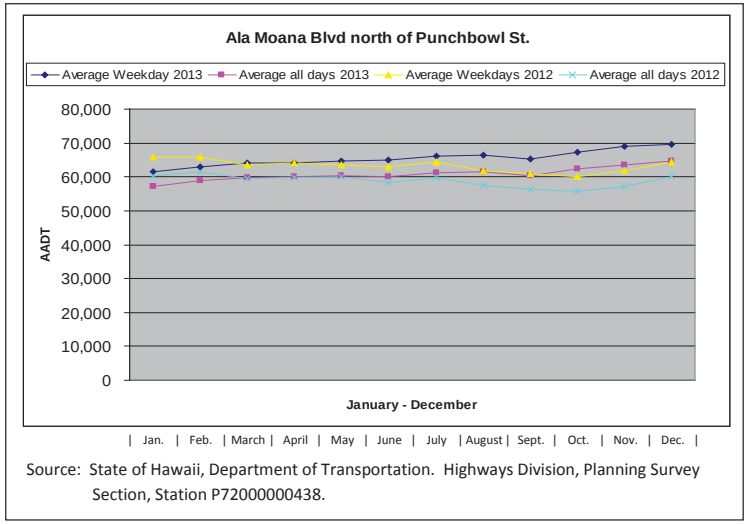
Figure 1

General Traffic Conditions

The project will be constructing new waterlines on major streets in central Honolulu. While much of the work will occur on the multi-lane State Highway Route 92 (Nimitz Highway and Ala Moana Boulevard), work will also be done on smaller streets in residential and industrial settings.

Daily traffic volumes in central Honolulu typically do not vary too much throughout the year, with weekly totals ranging from about 85% to 115% of those of an average week. Higher peak hour volumes usually occur for a period of several weeks in August, when high visitor totals combine with the return to school for most public and private school students; the higher peaks are more noticeable near schools.

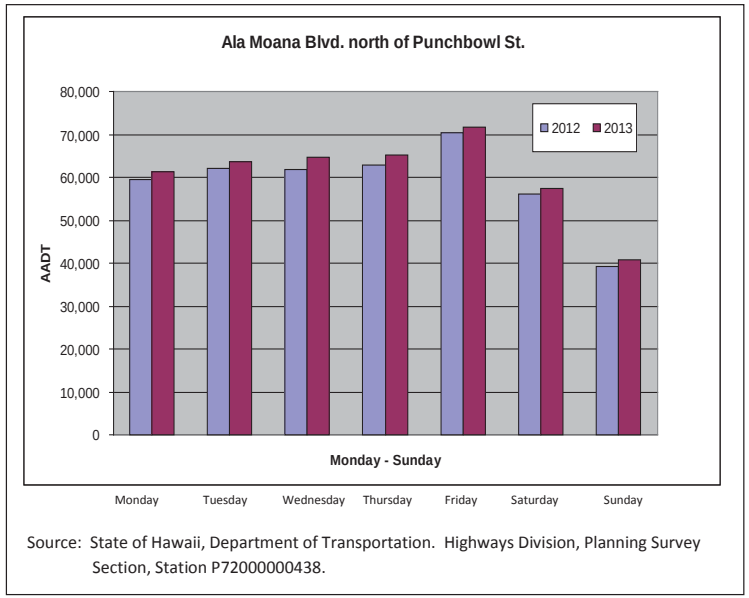
While extensive traffic data is not available for most street segments, there is a continuous count station (counts are taken every day of the year) on Ala Moana Boulevard north of Punchbowl Street, maintained by the State Highways Division. At that location, Average Annual Daily Traffic (AADT) was 60,000 vehicles per day (vpd), total in two directions, in 2012 and 60,700 vehicles per day in 2013. The data suggest that traffic volumes are increasing at a rate of about 1% per year. The average daily volumes for each month are shown below.



Source: State of Hawaii, Department of Transportation. Highways Division, Planning Survey Section, Station P72000000438.

Figure 2

Variation in traffic by day of week was greater than the variation by month. Traffic volumes were highest on Fridays (about 10% higher than an average weekday), with weekend volumes being lower than average weekdays (Saturday about 10% lower, Sunday about 30% lower). Plots of counts taken in 2012 and 2013 by the State Highways Division are shown below illustrate these variations.



Source: State of Hawaii, Department of Transportation. Highways Division, Planning Survey Section, Station P72000000438.

Figure 3

Additional traffic data related to time-of-day are presented for each street.

River Street

The segment of River Street between Nimitz Highway and North King Street serves two-way vehicular traffic, generally a single lane in each direction, between two signalized intersections. River Street runs adjacent to Nuuanu Stream, with lava rock curbs, and concrete gutters define a pavement area less than 30 feet across. Concrete sidewalks run along both sides of the street, between the curb and a rock wall overlooking the stream on one side, and between the curb and retail storefronts on the opposite side of the street; awnings from the adjacent buildings overhang the sidewalk. There is one driveway (exiting traffic only) located between buildings, about midblock opposite the stream.

Maukabound (eastbound) vehicular traffic consists of right turns from the outbound lanes of Nimitz Highway, and at the approach to North King Street, traffic is split into two lanes, one for right turns only onto North King Street, the other for traffic remaining maukabound on River Street. High pedestrian traffic on the crosswalk across King Street often delay right turn movements.

Makaibound (westbound) vehicular traffic consists of either right turns from North King Street or through traffic from River Street, and this traffic must turn right onto the outbound lanes of Nimitz Highway. Right turns on red are not permitted. Drivers wishing to proceed to the inbound lanes of Nimitz Highway have to option of using a "U"-turn lane provided on the other side of Nuuanu Stream after making the right turn onto the outbound lanes, or proceeding farther an making a "U"-turn either at Sumner Street or at Pacific Street.

The segment of River Street between North King Street and North Beretania Street serves two-way vehicular traffic, generally a single lane in each direction. In addition to traffic signal-controlled intersections at the ends of this segment, River Street also intersects with the Hotel Street Bus Mall at a signalized intersection and with Pauahi Street at an unsignalized "T"-intersection, where traffic on the Pauahi Street approach is controlled by a stop sign.

This segment of River Street also runs adjacent to Nuuanu Stream, with concrete and lava rock curbs on both sides, and concrete gutters define a pavement area about 36 feet across; however, tree wells have been added, reducing the width available for vehicular traffic to as little as 20 feet. Freight loading zones, a bus stop, and metered parking stalls are placed between the tree wells. Concrete sidewalks run along both sides of the street, between the curb and a rock wall overlooking the stream on one side, and between the curb and retail storefronts on the opposite side of the street; awnings from the adjacent buildings overhang the sidewalk. The sidewalks vary in width due to placement of planter boxes. There are no vehicular driveways connected directly to River Street along this segment.

Portions of TheBus Routes 19 and 20 run along the makaibound lane of River Street from North Beretania Street to Hotel Street. A bus stop is located near Beretania Street. Typical bus service provided by both routes combined is 3 buses per hour with an additional bus running during peak periods in the morning and afternoon (increasing service to $3^{2}/_{3}$ buses per hour).

While no recent traffic counts on River Street were readily available, counts were taken in May 2009 on Pauahi Street between River Street and Maunakea Street, with a two-way volume of 2,040 vehicles per day. Highest volumes were recorded between 9:00 AM and 10:00 AM and between 11:00 AM and noon. A graph with plots of that data is shown below as an indicator of the variation of traffic volumes on River Street through a weekday (traffic volumes on River Street, however, are estimated to be between two and four times the volumes counted on Pauahi Street).

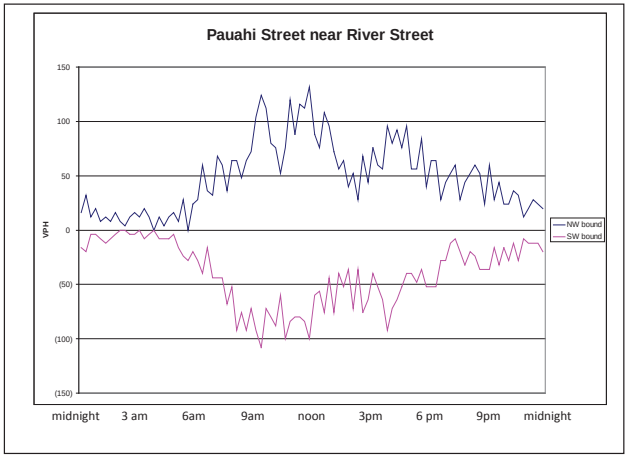


Figure 4

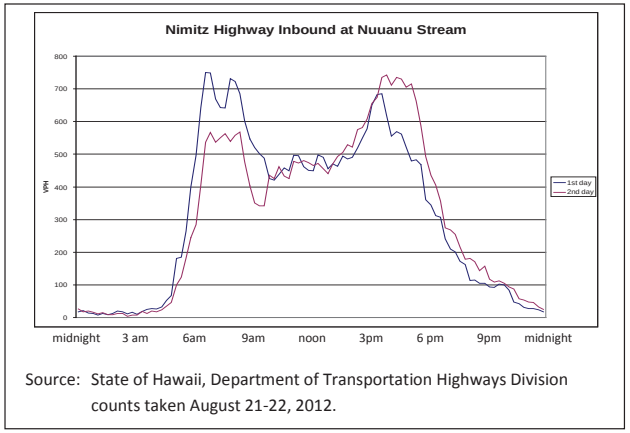
Nimitz Highway

Nimitz Highway is a major arterial under the jurisdiction of the State of Hawaii Department of Transportation Highways Division, running from its west end at Pearl Harbor Interchange to downtown Honolulu, where it connects directly onto Ala Moana Boulevard. Two segments of Nimitz Highway would be affected by the project.

The half-mile portion of Nimitz Highway just west of Nuuanu Stream is separated by a median with mixed uses, including warehouses, restaurants, other retail outlets, and other industrial and commercial uses. The median is approximately 200 feet wide.

The project will affect traffic in the inbound lanes of Nimtz Highway between Pacific Street and Sumner Street. Nimitz Highway in this area has four lanes for motorized vehicles traveling inbound (toward downtown Honolulu); a bicycle lane is also provided to the right of the other lanes. Kuikahi Street and two driveways near Sumner Street provide access to the Pier 19 area. Several other driveways provide vehicular access to properties in the median and in the waterfront areas (although the driveways to the waterfront are gated and appear to not be in use). A concrete sidewalk runs along the right side of the roadway the entire length, while a sidewalk on the left side exists only between Kuikahi Street and Sumner Street.

Traffic counts taken in August 2012 at Nuuanu Stream Bridge show an average of 30,450 vehicles per weekday on the inbound lanes (volumes in the project segment between Pacific Street and Sumner Street are estimated to be 32,000 vehicles per day). The graph below shows the pattern of the traffic through the day, which includes a "plateau" of moderate traffic volumes between two distinct peak traffic periods (roughly 6 AM - 9 AM and 3 PM - 6 PM).



Source: State of Hawaii, Department of Transportation Highways Division counts taken August 21-22, 2012.

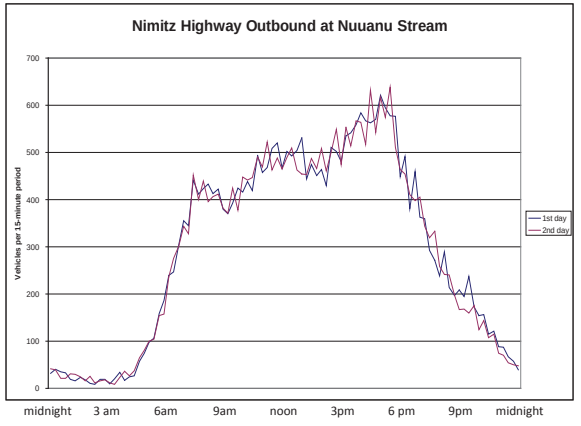
Figure 5

Between Nuuanu Stream and Richards Street, Nimitz Highway is a divided highway with a narrow planted median strip. The cross-section for the inbound lanes is similar to the segment west of the stream (four lanes for motorized vehicles, bicycle lane, concrete sidewalk) up to Fort Street, where the bicycle lane terminates. The fourth lane for motorized vehicles terminates at Bishop Street, with three through lanes continuing on past Richards Street.

The median in generally landscaped, with grassed surface and palm trees where there is sufficient width in the median. Turn lanes from the highway's inbound lanes are located on the approaches to several intersections (Smith Street, Nuuanu Avenue-Bethel Street, Bishop Street-Alakea Street, and Richards Street (traffic turns onto Halekauwila Street).

In the opposite direction, the highway's outbound lanes has a cross-section consisting of four lanes for motorized vehicles, a bicycle lane, and a concrete sidewalk between Fort Street and Nuuanu Stream. Between Richards Street and Fort Street, there is no bicycle lane and there are only three outbound traffic lanes (a fourth auxiliary lane serves the entry and exit driveways of a large parking garage between Bishop Street and Fort Street.

Plots of the traffic counts of the outbound lanes at Nuuanu Stream show no morning peak period, but midday volumes are similar to those in the inbound lanes. A distinct afternoon peak period occurs, but volumes are slightly lower than on the inbound lanes.



Source: State of Hawaii, Department of Transportation Highways Division counts taken August 21-22, 2012.

Figure 6

Driveways to adjoining properties from Nimitz Highway include several on the makai side for Pier 15, a fire station, Piers 13-14, Pier 12, and the Harbors Division offices at Pier 11. All of these driveways serve areas that have no other vehicular access, and would need to be kept open at all times. Construction activities at Pier 12 and at Pier 15 are ongoing and expected to be completed by the end of 2016. On the mauka side, there are limited locations with driveway connections; in addition to the large garage, there is a service driveway between Alakea Street and Bishop Street, and several driveways to smaller parking facilties between Maunakea Street and River Street.

Fort Street, Aloha Tower Drive, Richards Street (makai of Nimitz Highway)

Fort Street, Aloha Tower Drive, and Richards Street makai of Nimitz Highway vary in width from one to four traffic lanes. All of these "streets" are part of the parking lots serving the waterfront area near Aloha Tower. No recent traffic counts were obtained; however, the recent change of the Aloha Tower complex from a predominantly commercial use to a college campus is expected to reduce vehicular traffic demands on these streets. Pedestrian activity, however, is expected to increase.

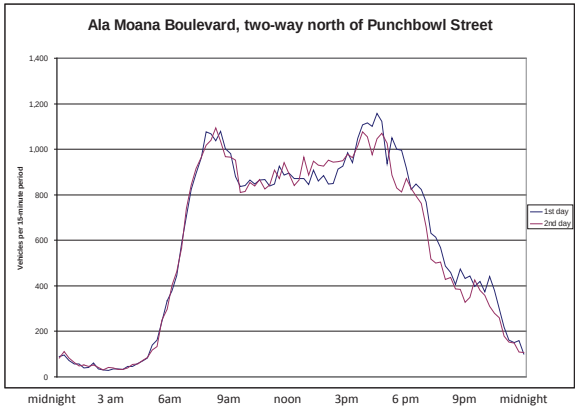
Ala Moana Boulevard

Nimitz Highway continues past Richards Street out of downtown Honolulu toward Waikiki, maintaining a six-lane (three lanes in each direction) configuration and becoming Ala Moana Boulevard. A fourth outbound lane is added between Hobron Lane and Kalia Road, leading to a double right turn lane onto Kalia Road; there are only two outbound lanes between Kalia Road and Kalakaua Avenue.

Left turn lanes are added at the approaches to intersections. Planted medians are located between Richards Street and Punchbowl Street, and from Kewalo Basin (between Ward Avenue and Kamakee Street) to the end of Ala Moana Boulevard at Kalakaua Avenue. Concrete sidewalks are provided on each side of the roadway.

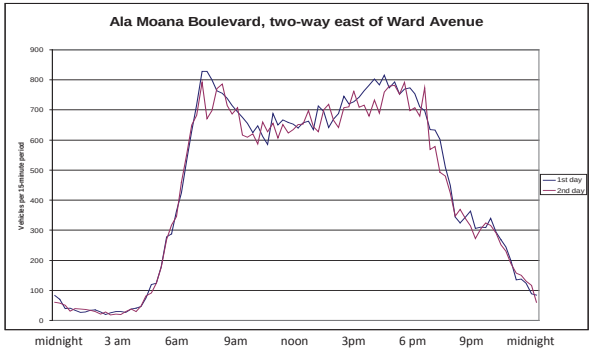
A continuous count station maintained by the State Highways Division on Ala Moana Boulevard near Punchbowl Street showed an average annual daily volume of 58,828 vehicles per day in year 2012, with the average weekday volume being 63,271 vehicles per day. Variations by month and by day-of-week were discussed earlier in this report.

Other recent traffic counts with two-day durations were taken on Ala Moana Boulevard at several locations and plots of the variation by time-of-day are shown below and on the following pages.



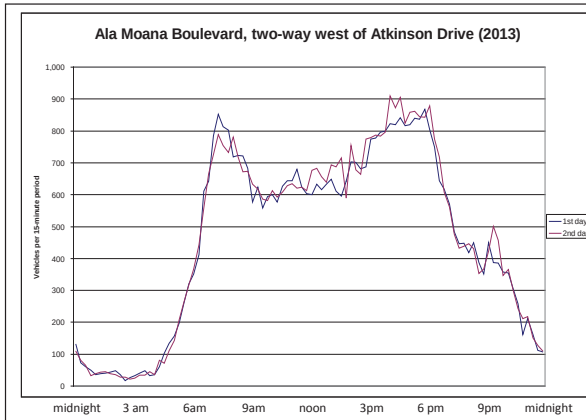
Source: State of Hawaii, Department of Transportation Highways Division counts taken September 24-25, 2013.

Figure 7



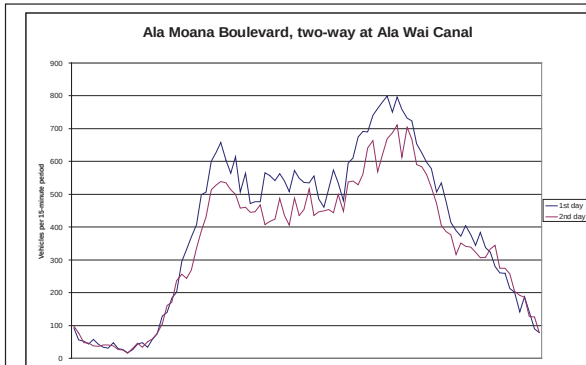
Source: State of Hawaii, Department of Transportation Highways Division counts taken September 24-25, 2013.

Figure 8



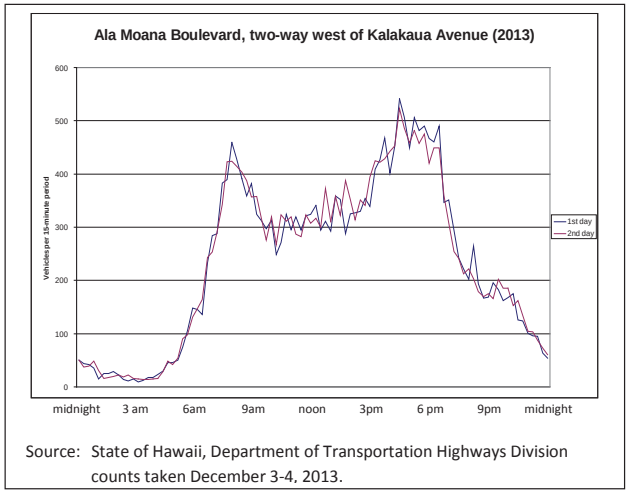
Source: State of Hawaii, Department of Transportation Highways Division counts taken September 24-25, 2013.

Figure 9



Source: State of Hawaii, Department of Transportation Highways Division counts taken September 24-25, 2013.

Figure 10



Source: State of Hawaii, Department of Transportation Highways Division counts taken December 3-4, 2013.

Figure 11

Numerous bus routes use portions of Ala Moana Boulevard. In addition to the major bus stops along the Ala Moana Center frontage, several routes to windward Oahu run along Ala Moana Boulevard between Piikoi Street and Richards Street.

Nuuanu Avenue

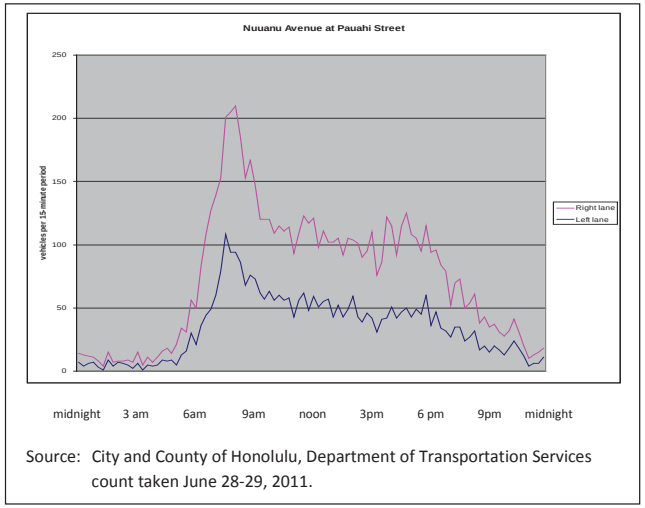
Nuuanu Avenue is a minor collector street that connects Nimitz Highway at the downtown waterfront to the middle of Nuuanu Valley. It varies in width from three to seven lanes and connects at the mauka end to Pali Highway at the Wyllie Street overpass.

In the segment between Pauahi Street and Nimitz Highway where waterline construction may occur, Nuuanu Avenue is a one-way street serving the abutting retail and residential properties, carrying makaibound traffic with a posted speed limit of 25 miles per hour. Concrete or lava rock curbs and concrete sidewalks are provided on each side of the street, with retail frontage and building eaves overhanging the sidewalk in many areas. A bus route uses Nuuanu Avenue between Pauahi Street and Hotel Street.

For most of its length through this segment, parallel parking is permitted on both sides of the street, so its four lanes carries only two lanes of traffic for most of the day. While morning peak period (6:30 AM to 8:30 AM) parking restrictions provide up to four lanes of traffic, the narrow street width does not really support four lanes of moving traffic. Full-time

parking restrictions at the intersection approaches improve flow, but traffic flow and capacities are limited by the traffic signals at Hotel Street, King Street, and Nimitz Highway.

Traffic counts taken from noon June 28 (Tuesday) to noon June 29 (Wednesday) 2011 on Nuuanu Avenue at its approach to Pauahi Street showed a total 24-hour volume of 7,129 vehicles per day, with the highest hourly volume (801 vehicles per hour) recorded in the hour between 7:30 AM and 8:30 AM. The count data, reported by lane, showed nearly similar volumes left of, and right of, the street centerline.



Source: City and County of Honolulu, Department of Transportation Services count taken June 28-29, 2011.

Figure 12

Cooke Street

Cooke Street is a collector street serving the heart of the Kakaako area, which is being redeveloped from industrial and commercial uses to mixed use with high- and medium- density apartments. Existing posted speed limit is 25 miles per hour.

The project is located between Ala Moana Boulevard and Pohukaina Street; in this segment, Cooke Street has concrete sidewalks on both sides, with the street framed by curbs and gutters. Cooke Street is approximately 40 feet wide and is striped for four lanes of traffic, two in each direction. In the single block between Ala Moana Boulevard and Auahi Street, on-street parking is not allowed, and there are several driveways serving parking areas adjacent to the street that connect to Cooke Street. Traffic approaching the Cooke Street intersection from

Auahi Street is controlled by stop signs. In the single block between Auahi Street and Pohukaina Street, on-street metered parking is permitted in the curb lane, except during the afternoon weekday peak period (3:30 PM to 5:30 PM); a plot of traffic counts taken on this block is shown below. There are multiple driveways on each side of the street in this block. The intersection of Pohukaina Street and Cooke Street has an all-way stop control.

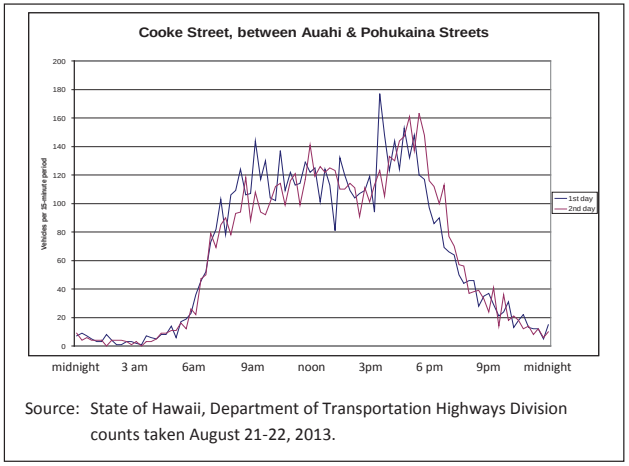


Figure 13

Piikoi Street

Piikoi Street runs one-way maukabound from Kapiolani Boulevard to Pensacola Street, and coupled with Pensacola Street, provides a crucial link between a major retail center (Ala Moana Center) and the H-1 Freeway. The couplet also serves as a major access route to the upper Makiki and Punchbowl neighborhoods.

Piikoi Street from South King Street to Kinau Street is a one-way street that varies in width (either five or six lanes wide). Numerous driveways are accessed off of Piikoi Street and there are concrete sidewalks on both sides.

Between South King Street and Young Street, metered on-street parking is permitted on both sides of the street. Four parking stalls are provided on the left side of the street, where adjoining uses are a fast-food restaurant, an office building with ground floor retail, and a medical office building. Two parking stalls are on the right side, which fronts a convenience store and gas station; the right lane on the Young Street approach is for right turns only.

Between Young Street and South Beretania Street, Piikoi Street is five lanes wide, with a restaurant, a parking lot, and an office building on the left side and residential apartments and a retail store on the right side. On-street parking is not permitted on this block. On the approach to South Beretania Street, the left lane is for left turns only.

Between South Beretania Street and Kinau Street, Piikoi Street is five lanes wide, with an elementary school on the left side and retail uses on the right side. On-street parking is not permitted on this block. On the approach to Kinau Street, the right lane is for right turns only.

Traffic counts taken April 30 (Tuesday) & May 1 (Wednesday) 2013 on Piikoi Street between South King Street and Young Street showed an average weekday volume of 31,505 vehicles per day, with the highest hourly volume (2,717 vehicles per hour) recorded in the hour between 3:30 PM and 4:30 PM on Wednesday.

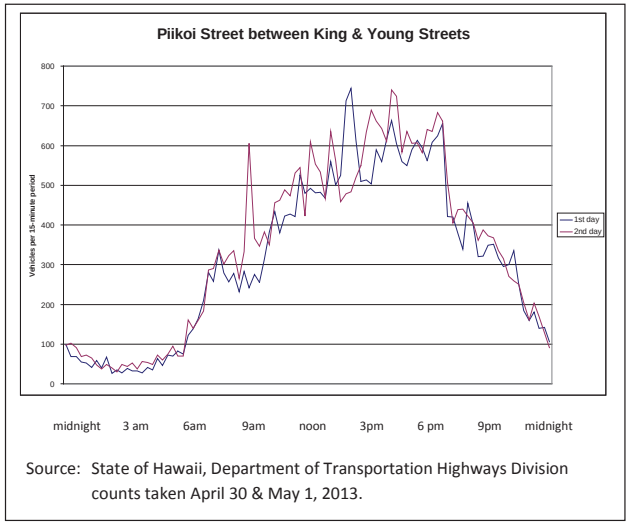
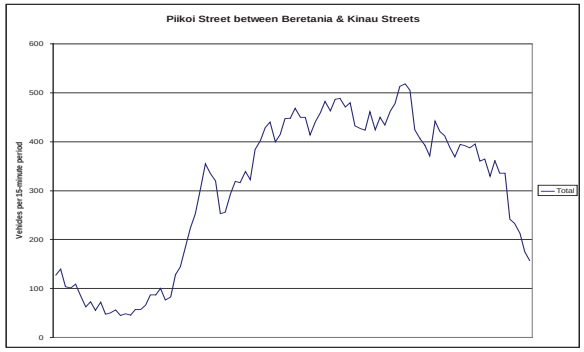


Figure 14

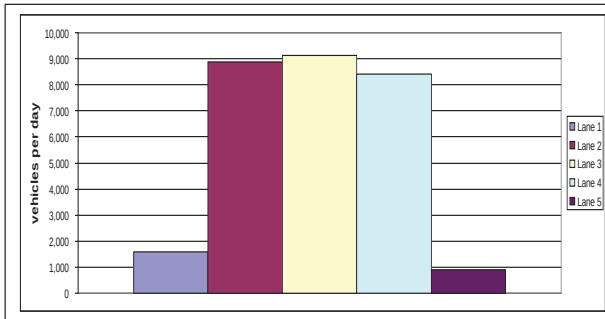
Traffic counts taken from noon December 4 (Tuesday) to noon December 5 (Wednesday) 2012 on Piikoi Street between South Beretania Street and Kinau Street showed a total 24-hour volume of 28,927 vehicles per day, with the highest hourly volume (2,014 vehicles per hour) recorded in the hour between 5:00 PM and 6:00 PM.



Source: City and County of Honolulu, Department of Transportation Services count taken December 4-5, 2012.

Figure 15

The December 2012 count data were also reported by lane, with the 24-hour totals in each lane shown below (Lane 1 is the left lane).



Source: City and County of Honolulu, Department of Transportation Services count taken December 4-5, 2012.

Figure 16

Between Ala Moana Boulevard and Kapiolani Boulevard, Piikoi Street is a divided roadway, with two or three lanes makaibound and three to five lanes maukabound, separated by a planted median. High-rise residential condominiums and street-level retail uses are located on the ewa side of Piikoi Street in this area; the opposite side has several driveways to the Ala Moana Shopping Center and a driveway to a mid-rise office building. Several public bus routes use this portion of Piikoi Street.

Recent traffic data for this portion of Piikoi Street were not available. However, major changes at the shopping center have been occurring and any historical traffic data may not be indicative of future traffic patterns on the street.

Pensacola Street

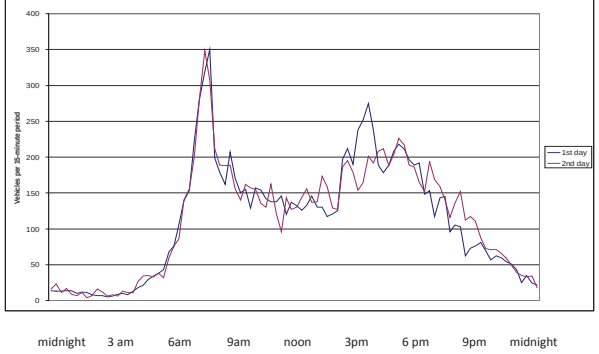
Pensacola Street between Piikoi Street and Waimanu Street is operated as part of the Piikoi-Pensacola Street one-way couplet, serving makaibound traffic. Generally, there are curbs and sidewalks and on-street parallel parking is permitted on both sides (with some peak hour restrictions) and the street width varies from four to six lanes. Between Kapiolani Boulevard and Waimanu Street, however, the street is unimproved (no curb or sidewalk) and varies is either two or three lanes wide. Pensacola Street is used by the public bus system.

The segment affected by the project, between Wilder Avenue and Kinau Street, is four lanes wide with on-street parking permitted on both sides. Land uses abutting this portion of Pensacola Street are mostly residential apartments; the Hawaiian Mission Academy campus is located ewa of the street, fronting about half of the block between Hassinger Street and Lunalilo Street. Parking restrictions on one side opens up a third lane during the weekday morning peak period (6:30 AM to 8:30 AM) between Wilder Avenue and Hassinger Street, with a fourth lane opened with parking restrictions on the other side of the street between Hassinger Street and Lunalilo Street.

The Makiki Post Office and a church are located on the Kokohead side of the street between Lunalilo Street and Kinau Street and on-street parking is not permitted on that side of the street. The normally three-lane segment has a fourth lane for traffic during the morning peak period when parking on the Ewa side of the street is not permitted.

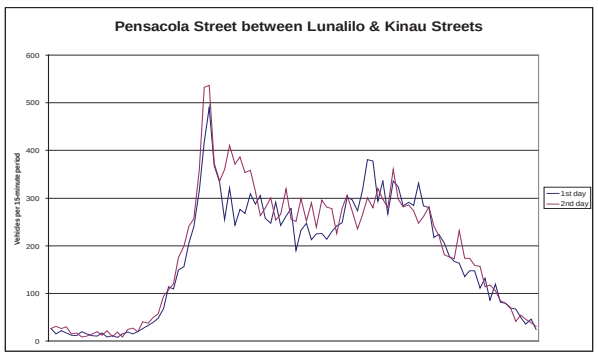
Traffic counts taken April 30 (Tuesday) & May 1 (Wednesday) 2013 on Pensacola Street between Wilder Avenue and Davenport Street showed an average weekday volume of 10,974 vehicles per day, with the highest hourly volume (1,172 vehicles per hour) recorded in the hour between 7:00 AM and 8:00 AM on Tuesday.

Traffic counts were also taken April 30 (Tuesday) & May 1 (Wednesday) 2013 on Pensacola Street between Lunalilo Street and Kinau Street; average weekday volume of 17,890 vehicles per day was recorded, with the highest hourly volume (1,802 vehicles per hour) recorded in the hour between 7:15 AM and 8:15 AM on Wednesday. This segment of Pensacola Street is a link between the H-1 Freeway and Beretania Street for westbound traffic that exits onto Lunalilo Street; it is the first opportunity to turn left to proceed two blocks before turning right to continue westbound toward the central part of downtown Honolulu.



Source: State of Hawaii, Department of Transportation Highways Division counts taken April 30 & May 1, 2013.

Figure 17



Source: State of Hawaii, Department of Transportation Highways Division counts taken April 30 & May 1, 2013.

Figure 18

Potential Traffic Impacts and Possible Mitigation Measures

The impact to traffic of the various waterline projects will depend on the lane and sidewalk closures required. The locations of the lane closures will be affected by the location of the new waterline within the street right-of-way, and may be affected by other existing or planned utilities, drainage systems, or other uses within the street rights-of-way. Once the locations of the new waterlines are determined, construction methods to minimize impacts to traffic and access can be considered. These methods could include tunneling instead of trenching, and the selection of pit locations for tunneling should include consideration of possible traffic impacts (in general, locations away from intersections would have less impact).

Lane closures and impacts to access, both vehicular and pedestrian, will also be affected by other construction work in the area. The scheduling of work should be coordinated with other projects that are planned for the same or parallel corridors; these projects include the Honolulu Area Rapid Transit project, which would affect portions of Nimitz Highway and could affect any work on Piikoi Street near Kona Street, development projects in Kakaako (which may affect work on Ala Moana Boulevard, Cooke Street, or Piikoi Street), and waterfront projects (which would affect work along Nimitz Highway).

For the projects that are expected to start within five years, the recent traffic data provide information on the possible impacts of any lane closures for construction, and the times of day that any lane closures would have less impact to traffic. In general, any construction activity that would affect traffic would not occur during weekday peak commuting times (before 8:30 AM and after 3:00 PM); however, review of the traffic data shows that any lane closures on many of the affected roadways could have significant traffic impacts (note that the discussion below does not account for concurrent construction activity).

On Nimitz Highway between Pacific and Sumner Streets, the inbound lanes carry high volumes (1,500 vehicles per hour and higher) of traffic during most of the weekday daylight hours (6 AM to 7 PM), with peak flows greater than 2,000 vehicles per hour during not only the morning (6 AM to 9 AM) but also the afternoon (3 PM to 6 PM) commuting times. The count data suggests that closure of one of the four lanes between 9 AM and 3 PM may not create significant impacts to traffic. Any closure of multiple lanes, however, should be scheduled for other times (since there are limited residential uses near this segment, night work should be considered to mitigate possible impacts to traffic).

On Ala Moana Boulevard west of Piikoi Street, the traffic data indicate that volumes during the day (between the morning and afternoon peak periods) are about 75% of the peak hour volumes, which indicates that congested conditions could be expected if a 33% reduction in the number of available traffic lanes were to occur. Therefore, any lane closure would result in conditions that are worse than existing conditions during peak hours.

East of Piikoi Street, traffic flow rates on Ala Moana Boulevard during the middle of the day (after 9:30 AM and before 2:30 PM) are about 60%-65% of the highest rates measured

during the peak periods. Therefore, on Ala Moana Boulevard east of Piikoi Street, a single-lane closure may have a tolerable impact.

On Pensacola Street, two lanes of traffic should be maintained to accommodate the volumes that would occur during the day. Prohibiting on-street parking to allow one or both curb lanes to be used to move traffic if a regular lane needs to be closed would be necessary to provide two lanes for traffic. There are also areas along Pensacola Street where access to properties are through very wide, or continuous, driveways, and any trenching that affects this access should be mitigated.

For the projects that are not expected to start within five years, the recent traffic data may not be applicable. This would be especially true for Cooke Street, where there are plans to change the recent industrial and warehousing uses to residential and retail.

Construction activities will also affect (or be affected by) other uses of the affected streets. Portions of Nimitz Highway and Ala Moana Boulevard are used for events such as the annual Great Aloha Run (February) and parades (various times of the year). Monthly events are held in downtown Honolulu include closure of Nuuanu Avenue.

APPENDIX G

Draft Environmental Assessment Public Comments

DEPARTMENT OF THE ARMY
30th SIGNAL BATTALION
148 CURTIS LOOP, WHEELER ARMY AIRFIELD
SCHOFIELD BARRACKS, HAWAII 96857-5020

REPLY TO
ATTENTION OF

AUG 2 9 2016

Joint Trunking System

Mr. Gavin Masaki
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926

Dear Mr. Masaki:

Your letter dated January 7, 2016, along with the drawing identifying the project boundaries for Draft Environmental Assessment, Honolulu Water Systems Improvements project was received.

The Government reviewed the project drawing and determined that Joint Trunking System (JTS) cable numbers C-8195, C-8103, C-8106 are located within the project limits. For your information and inclusion in your engineering report and eventual project drawings, JTS cable drawings 1111-FC-101 and 1111A-FC-155 are enclosed. The JTS cable appears to run along Ala Moana Boulevard between Koula Street and Kalia Road.

The Government also identified Joint Trunking System cable C-8207 located within the intersection of Wilder Avenue and Pensacola Street. For your information and inclusion in your engineering report and eventual project drawings, JTS cable drawing 1111A-FC-149 is enclosed.

Please note that JTS drawings may indicate that the cable is "not in use" or "abandoned." Such notations are not generally true since other commercial service providers may have spliced the cable which now bears a new cable number. Furthermore, cables may have been relocated or modified during Department of Transportation (DOT), State of Hawaii roadway improvement projects. We recommend including the DOT in your inquiry to ensure their input is included in your project development.

Existing JTS cables, in most instances, are direct buried. The general depth of the cables can be anywhere from 18 to 36 inches below finished grade. The JTS drawings do not include general depth information. With that said, we recommend ascertaining the exact location of the JTS cables prior to commencing any work. The U.S. Army does not participate in One Call Center services; therefore, should you require toning/locating, you are advised to contact a third party communication vendor specializing in toning of lead cable. The information on the actual physical placement of our cable will be provided at that time. The following are contractors who perform this type of cable work:

Choy Enterprises Incorporated	(808) 479-4607
Henkels and McCoy	(808) 455-1310
Verizon Federal	(808) 484-7990

Should unknown communications cables be discovered at any time during the project, please contact the points of contact listed below.

If relocation of the cables is required, please contact one of the points of contact immediately. They will in turn provide information regarding infrastructure, testing, and easement modification requirements.

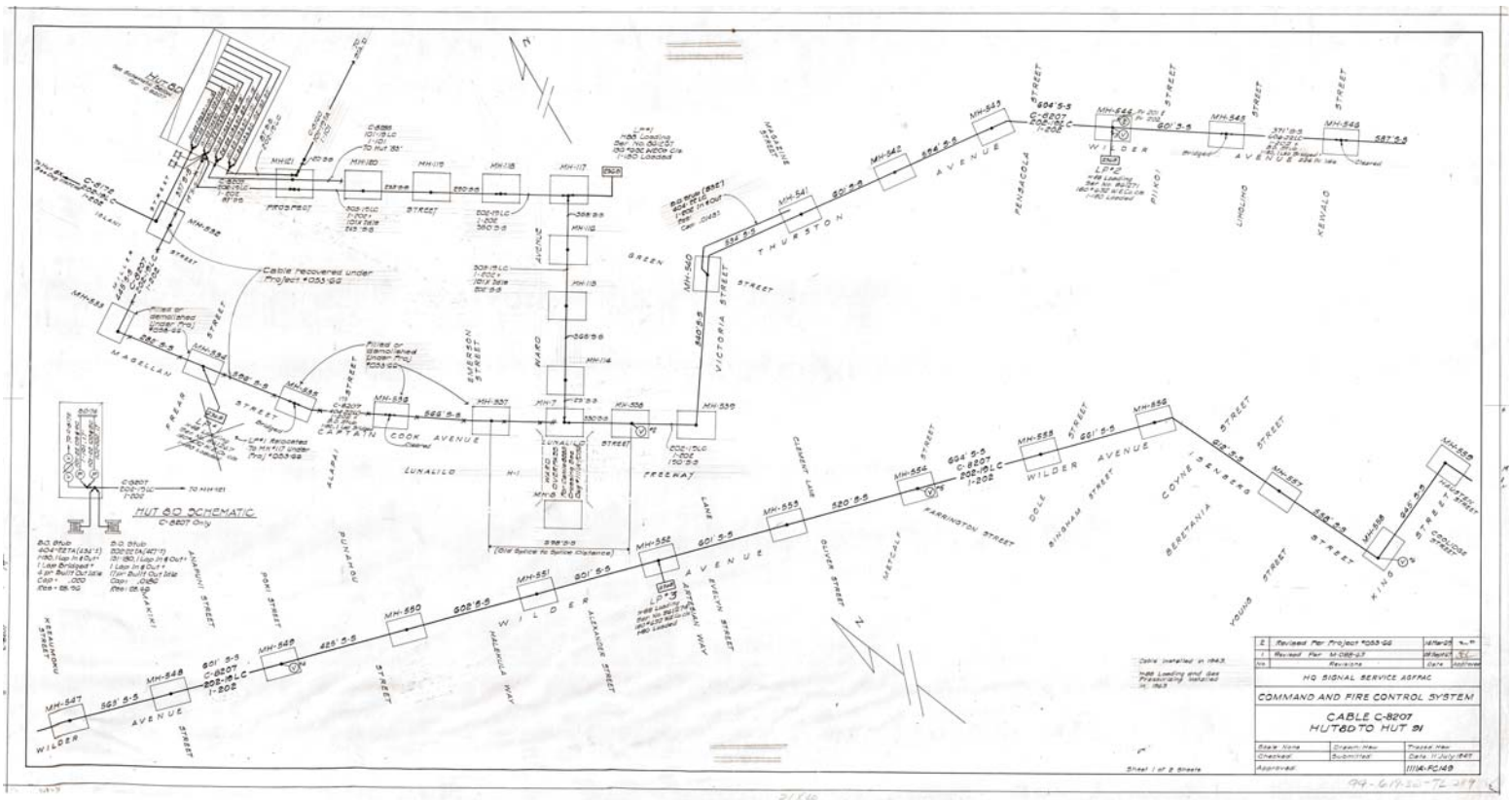
The point of contact for this review is Mr. Gerald Kosaka, gerald.g.kosaka.civ@mail.mil, (808) 656-0041. The alternate is Ms. Dale Shinseki-Hironaka, dale.a.shinseki-hironaka.civ@mail.mil, (808) 656-3514.

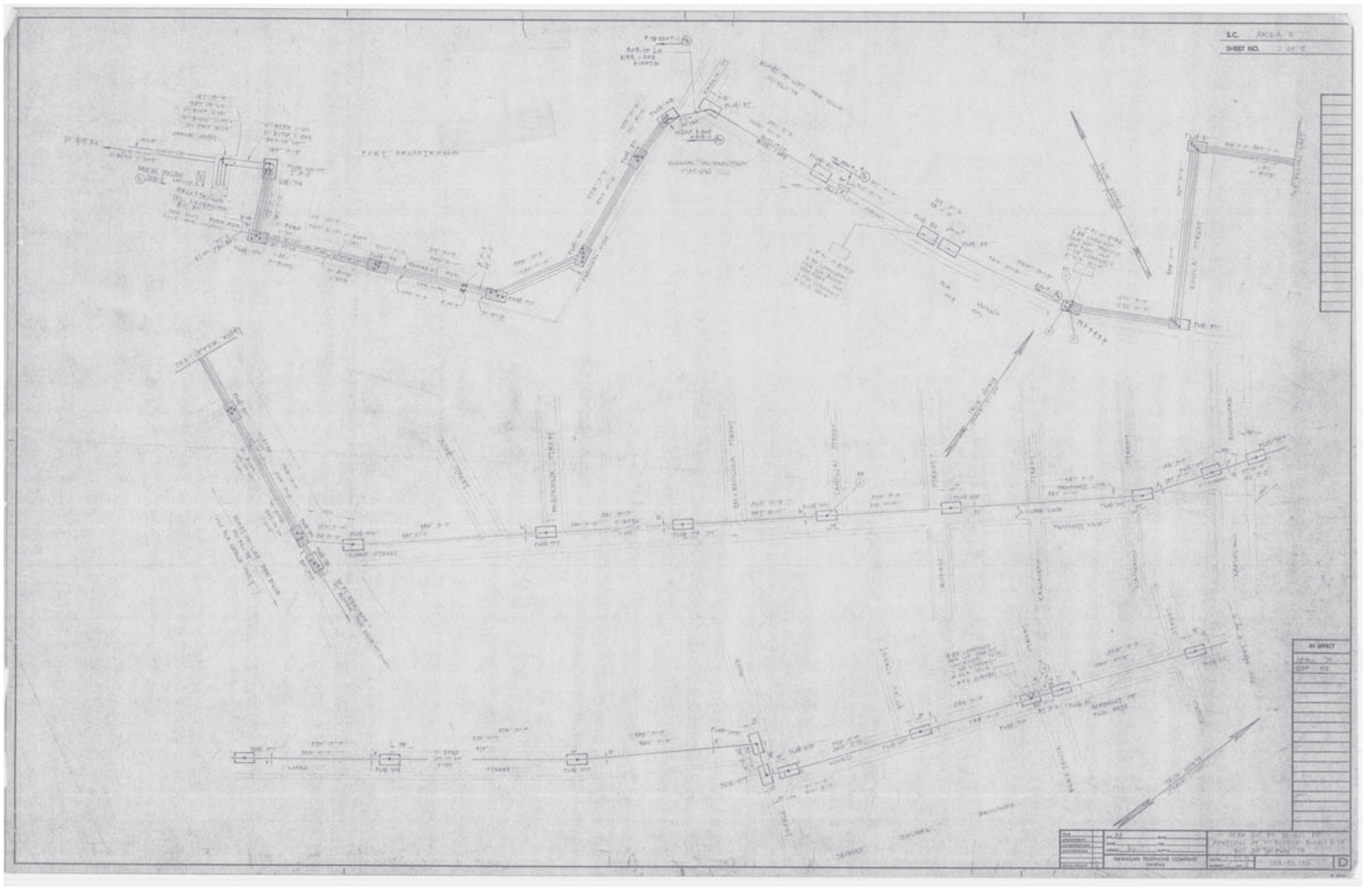
Sincerely,

for

Kevin M. MacNeil
Lieutenant Colonel, U.S. Army
Executive Agent, Joint Trunking System

Enclosures


HUT 8D SCHEMATIC
C-8207 Only
HQ SIGNAL SERVICE AGFAC
COMMAND AND FIRE CONTROL SYSTEM
CABLE C-8207
HUT 8D TO HUT 9I
Sheet 1 of 2 Sheets
Cable recovered under Project #053-66
Cable installed in 1943.
H-88 Loading and Gas Pressurizing installed in 1943
WILDER AVENUE
CAPTAIN COOK AVENUE
THURSTON AVENUE
KING STREET
FREEWAY


S.C.
SHEET NO.
HAWAIIAN TELEPHONE COMPANY



BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

October 5, 2016

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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Lieutenant Colonel Kevin M. MacNeil
Executive Agent
Joint Trunking System
30th Signal Battalion
Department of the Army
148 Curtis Loop
Wheeler Army Airfield
Schofield Barracks, Hawaii 96857-5020

Attention: Mr. Gerald Kosaka

Dear Colonel MacNeil:

Subject: Your Letter Dated August 29, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project
Tax Map Keys: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii

Thank you for your letter dated August 29, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge that Joint Trunking System (JTS) cables are located within the project vicinity. We will verify JTS cable locations and coordinate required relocations during the design and construction phases with your office to minimize any potential conflicts.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

Gavin Masaki

From: Paahana, Jessie K POH <Jessie.K.Paahana@usace.army.mil>
Sent: Monday, February 29, 2016 9:41 AM
To: Gavin Masaki
Subject: RE: POH-2014-00182 Honolulu Water System Improvements Environmental Assessment
Attachments: PreApp Letter - POH-2014-00182.pdf

Aloha, Gavin:

In response to the subject draft EA, the Corps maintains the comments previously provided to you by letter dated 22 Oct 14 indicating that insufficient information has been provided to this office to determine if a permit is required. A DA permit should be completed and submitted to this office as specific plans are developed.

Mahalo,
Jessie

-----Original Message-----
From: Gavin Masaki [mailto:gmasaki@grayhongnojima.com]
Sent: Thursday, February 04, 2016 2:12 PM
To: Paahana, Jessie K POH <Jessie.K.Paahana@usace.army.mil>
Subject: [EXTERNAL] POH-2014-00182 Honolulu Water System Improvements Environmental Assessment

Hello Jessie

Per our phone discussion, the link below connects to an electronic version of the draft EA (may take a little while to download):

Blockedhttp://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Oahu/2010s/2016-01-08-OA-5B-DEA-Honolulu-Water-System-Improvements.pdf

Thank you,

Gavin Masaki

Gray*Hong*Nojima & Associates, Inc.

201 Merchant St, Suite 1900 -- Honolulu HI 96813

(808) 521-0306 ext 110 | (808) 531-8018 fax

email: gmasaki@grayhongnojima.com <mailto:gmasaki@grayhongnojima.com>

website: Blockedwww.grayhongnojima.com <Blockedhttp://www.grayhongnojima.com/>

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DEPARTMENT OF THE ARMY
HONOLULU DISTRICT, U.S. ARMY CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

October 22, 2014

SUBJECT: Comments for Pre-Assessment Consultation for the Proposed Replacement and Upgrade of Various Pipelines within Honolulu, Island of Oahu, Hawaii; Department of the Army File No. POH-2014-00182

Mr. Gavin Masaki, PE
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Mr. Masaki:

The U.S. Army Corps of Engineers (Corps) has reviewed the letter dated September 12, 2014, provided on behalf of the Honolulu Board of Water Supply, for the proposed replacement and upgrade of various pipelines within Honolulu, Island of Oahu, Hawaii. This proposed project has been assigned Corps File No. **POH-2014-00182**. Please refer to this number in all correspondence with this office.

The Corps has determined that Nuuanu Stream and the Ala Wai Canal at the project locations shown in the figure provided may be waters of the United States by review under a preliminary jurisdictional determination (PJD) under Section 10 of the Rivers and Harbors Act of 1899 (RHA) and Section 404 of the Clean Water Act (CWA). If Nuuanu Stream and the Ala Wai Canal are considered navigable waters under Section 10 of the RHA, a Department of the Army permit is required for any work or structures in or affecting those navigable waters. The placement of dredged or fill material into these waters may require a Department of the Army permit under our regulatory authorities found in Section 404 of the CWA.

Enclosed is a permit application form for your use if needed (Enclosure 1). When we receive the completed permit application we can further assess your permit needs.

If you have any questions regarding our regulatory authority or need additional information, please contact the Regulatory Office at the letterhead address, by telephone at (808) 835-4303, or email at CEPOH-RO@usace.army.mil.

Sincerely,

Michelle Lynch

Michelle R. Lynch
Chief, Regulatory Office

Enclosure

U.S. ARMY CORPS OF ENGINEERS

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 31-AUGUST-2013

Public reporting for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Middle - Last -	First - Middle - Last -
Company -	Company -
E-mail Address -	E-mail Address -
6. APPLICANT'S ADDRESS:	9. AGENT'S ADDRESS:
Address-	Address-
City - State - Zip - Country -	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. w/AREA CODE	10. AGENTS PHONE NOs. w/AREA CODE
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

_____ _____

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
	Address
15. LOCATION OF PROJECT Latitude: °N Longitude: °W	City - State- Zip-

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality

Section - Township - Range -

24. Is Any Portion of the Work Already Complete? ☐ Yes ☐ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address-

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

_____ _____ _____ _____

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Instructions for Preparing a
Department of the Army Permit Application

Blocks 1 through 4. To be completed by Corps of Engineers.

Block 5. Applicant's Name. Enter the name and the E-mail address of the responsible party or parties. If the responsible party is an agency, company, corporation, or other organization, indicate the name of the organization and responsible officer and title. If more than one party is associated with the application, please attach a sheet with the necessary information marked Block 5.

Block 6. Address of Applicant. Please provide the full address of the party or parties responsible for the application. If more space is needed, attach an extra sheet of paper marked Block 6.

Block 7. Applicant Telephone Number(s). Please provide the number where you can usually be reached during normal business hours.

Blocks 8 through 11. To be completed, if you choose to have an agent.

Block 8. Authorized Agent's Name and Title. Indicate name of individual or agency, designated by you, to represent you in this process. An agent can be an attorney, builder, contractor, engineer, or any other person or organization. Note: An agent is not required.

Blocks 9 and 10. Agent's Address and Telephone Number. Please provide the complete mailing address of the agent, along with the telephone number where he / she can be reached during normal business hours.

Block 11. Statement of Authorization. To be completed by applicant, if an agent is to be employed.

Block 12. Proposed Project Name or Title. Please provide name identifying the proposed project, e.g., Landmark Plaza, Burned Hills Subdivision, or Edsall Commercial Center.

Block 13. Name of Waterbody. Please provide the name of any stream, lake, marsh, or other waterway to be directly impacted by the activity. If it is a minor (no name) stream, identify the waterbody the minor stream enters.

Block 14. Proposed Project Street Address. If the proposed project is located at a site having a street address (not a box number), please enter it here.

Block 15. Location of Proposed Project. Enter the latitude and longitude of where the proposed project is located. If more space is required, please attach a sheet with the necessary information marked Block 15.

Block 16. Other Location Descriptions. If available, provide the Tax Parcel Identification number of the site, Section, Township, and Range of the site (if known), and / or local Municipality that the site is located in.

Block 17. Directions to the Site. Provide directions to the site from a known location or landmark. Include highway and street numbers as well as names. Also provide distances from known locations and any other information that would assist in locating the site. You may also provide description of the proposed project location, such as lot numbers, tract numbers, or you may choose to locate the proposed project site from a known point (such as the right descending bank of Smith Creek, one mile downstream from the Highway 14 bridge). If a large river or stream, include the river mile of the proposed project site if known

Block 18. Nature of Activity. Describe the overall activity or project. Give appropriate dimensions of structures such as wing walls, dikes (identify the materials to be used in construction, as well as the methods by which the work is to be done), or excavations (length, width, and height). Indicate whether discharge of dredged or fill material is involved. Also, identify any structure to be constructed on a fill, piles, or float-supported platforms.

The written descriptions and illustrations are an important part of the application. Please describe, in detail, what you wish to do. If more space is needed, attach an extra sheet of paper marked Block 18.

Block 19. Proposed Project Purpose. Describe the purpose and need for the proposed project. What will it be used for and why? Also include a brief description of any related activities to be developed as the result of the proposed project. Give the approximate dates you plan to both begin and complete all work.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

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Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Ms. Michelle R. Lynch, Chief
Regulatory Office
Department of the Army
Honolulu District, U.S. Army Corps of Engineers
Fort Shafter, Hawaii 96858-5440

Attention: Jessie K. Paahana

Dear Ms. Lynch:

Subject: Your Letter Dated February 29, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, File No. POH-2014-00182

Thank you for your email dated February 29, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge that there is insufficient information at this time for the Army Corps of Engineers to determine if a Department of the Army permit is required. Therefore, we will request a determination on the permits required when the plans and method for the waterline crossings at Nuuanu Stream and Ala Wai Canal are formally evaluated.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

In Reply Refer To:
01EPIF00-2016-TA-0154

FEB 0 8 2016

Ms. Iris Oda, PE
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai'I 96843

Subject: Technical Assistance for the Draft Environmental Assessment for the Honolulu Water System Improvement Project, Honolulu, O'ahu

Dear Ms. Oda:

The U.S. Fish and Wildlife Service (Service) received your letter on January 18, 2016, requesting our comments on the Draft Environmental Assessment for the Honolulu Water System Improvement Project, located in Honolulu, O'ahu (TMKs: (1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6). Tihe Honolulu Board of Water Supply is proposing to undertake the replacement and upgrades (increase in size) to various water mains within Honolulu. The proposed improvements will be designed and constructed in several projects. The projects will entail work within various State and City road right-of-ways in the Iwilei, downtown, Kaka'ako, Ala Moana, Waikīkī, and Makiki neighborhoods of Honolulu. The water system improvements are intended to reduce the occurrence of water main break incidents and improve the reliability of the Honolulu Water System. The various water main improvement projects are expected to begin approximately in 2017 to 2018 and continue over several years.

This response is in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*) and the Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703–712). We offer the following comments to assist you with the proposed project. We have reviewed the information you provided, our previous correspondence (File No. 2014-TA-0429), and pertinent information in our files, including data compiled by the Hawai'i Biodiversity and Mapping Program. We acknowledge you have incorporated our comments into your DEA to address minimization measures for the federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), and species protected under the MBTA, such as the wedge-tailed shearwater (*Puffinus pacificus chlorhynchus*) and white tern (*Gygis alba*).

Our data indicate the endangered Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*), threatened Newell's shearwater (*Puffinus auricularis newelii*), and a species proposed for listing as endangered, the band-rumped storm-petrel (*Oceanodroma castro*), (collectively referred to as

Hawaiian seabirds) should also be addressed in your proposed project. We offer the following recommendations to assist you in the proposed project.

Hawaiian seabirds
Outdoor lighting, such as street lights and night-time work, can adversely impact listed and migratory seabird species found in the vicinity of the proposed project. Seabirds fly at night and are attracted to artificially lighted areas which can result in disorientation and subsequent fallout due to exhaustion or collision with objects such as utility lines, guy wires, and towers that protrude above the vegetation layer. Once grounded, they are vulnerable to predators or often struck by vehicles along roadways. Any increase in the use of night-time lighting, particularly during each year's peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality. Impacts to seabirds can be minimized by shielding outdoor lights associated with the project to the maximum extent possible, eliminating night-time construction, and providing all project staff with information about seabird fallout. All lights, including street lights, should be shielded so the bulb can only be seen from below and use the lowest wattage bulbs possible. The project description should address all potential impacts to seabirds and outline conservation measures to minimize these impacts.

We appreciate your efforts to conserve protected species. If you have questions regarding this letter, please contact Jiny Kim, Fish and Wildlife Biologist (phone: 808-792-9400; email: jiny_kim@fws.gov).

Sincerely,

Aaron Nadig
Island Team Manager
O'ahu, Kaua'i, Northwestern Hawaiian Islands, and American Samoa

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

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Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Aaron Nadig, Island Team Manager
United States Department of the Interior
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Attention: Jiny Kim

Dear Mr. Nadig:

Subject: Your Letter Dated February 8, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Ref: 0IEPIF00-2016-TA-0154

Thank you for your letter dated February 8, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We will include the Hawaiian petrel and band-rumped storm-petrel in the discussion and mitigative measures portions of the applicable sections of the document.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
Comptroller

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1021.6

FEB - 4 2016

Ms. Iris Oda, PE
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Ms. Oda:

Subject: Draft Environmental Assessment
Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6
Honolulu, Oahu, Hawaii

This is in response to your letter dated January 7, 2016 regarding the subject project. The subject project involves construction in public roadways and not in any of the Department of Accounting and General Services' existing facilities, and we have no comments to offer at this time.

If you have any questions, your staff may call Mr. David DePonte of the Public Works Division at 586-0492.

Sincerely,

DOUGLAS MURDOCK
Comptroller

c: Mr. Gavin Masaki, Gray, Hong, Nojima & Associates, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Douglas Murdock, Comptroller
State of Hawaii
Department of Accounting and General Services
P. O. Box 119
Honolulu, Hawaii 96810-0119

Dear Mr. Murdock:

Subject: Your Letter Dated February 4, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5,1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Ref: (P)1021.6

Thank you for your letter dated February 4, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge that the State Department of Accounting and General Services has no comments to offer at this time.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DAVID Y. IGE
GOVERNOR

CRAIG K. HIRAI
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
HAWAII HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX: (808) 587-0600

IN REPLY REFER TO:
16:DEV/004

February 2, 2016

Ms. Sheryl E. Nojima, PhD. PE, President
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813-2926

Dear Ms. Nojima:

Subject: Draft Environmental Assessment
Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii

The Hawaii Housing Finance and Development Corporation (HHFDC) has reviewed the subject Draft Environmental Assessment (DEA) for the Honolulu Water System Improvements project.

As a housing agency, we are in general support of any upgrades to major infrastructure facilities that could provide services to future housing development projects. The current project scope for water infrastructure improvements does not appear to impact any of our existing projects, therefore we do not have any comments to provide to the subject DEA.

Should there be any questions, please call Leo Domingo, Project Coordinator, at 587-3170 or Richard Prahler, Development Branch Chief, at 587-0527.

Sincerely,

Craig K. Hirai
Executive Director

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

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FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Craig K. Hirai, Executive Director
State of Hawaii
Department of Business, Economic
Development and Tourism
Hawaii Housing Finance and Development Corporation
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Attention: Leo Domingo

Dear Mr. Hirai:

Subject: Your Letter Dated February 2, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Ref: 16:DEV/004

Thank you for your letter dated February 2, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge the Hawaii Housing Finance and Development Corporation's general support for the project. We also note your agency has no comments to offer as it appears there will be no impacts to your existing projects.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

OFFICE OF PLANNING
STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Ref. No. P-15032

January 29, 2016

Ms. Iris Oda, P.E.
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Ms. Oda:

Subject: Draft Environmental Assessment for the Honolulu Water System Improvements; Tax Map Key: (1) 1-5, 1-7, 2-1, and 2-6

Thank you for the opportunity to provide comments on the Draft Environmental Assessment (Draft EA) for the proposed Honolulu Water System Improvements project. The Draft EA review material was transmitted to our office by letter dated January 7, 2016.

It is our understanding that the Honolulu Board of Water Supply (BWS) is proposing to undertake the replacement and upgrade (increase in size) of various water mains within Honolulu. The proposed improvements will take place in several locations. The projects will entail work within various State and City road right-of-ways in the Iwilei, Downtown, Kakaako, Ala Moana, Waikiki, and Makiki neighborhoods of Honolulu.

Direct impacts resulting from construction activities include increased traffic congestion, disruption of residential/business activities, noise, dust, and utility interruptions due to possible relocations. Beneficial long-term impacts include reduction in water main break occurrences, improvement in the reliability of the Honolulu Water System in meeting future increases in demands, and fire suppression capabilities.

The Office of Planning (OP) has reviewed the transmitted material and has the following comments to offer:

1. The Draft EA addresses a number of our comments made in a previous pre-consultation letter dated October 9, 2014 (reference number P-14534). The Draft EA addresses the project's consistency with the objectives and policies of the Hawaii Coastal Zone Management Act, listed in Hawaii Revised Statutes (HRS) § 205A-2; includes a list of applicable Federal, State, and County permits; and has stated that if any portion of the project encroaches within Special Management Area (SMA) boundaries, OP and/or the City and County of Honolulu, Department of Planning and Permitting will be consulted prior to any activity within the SMA.

2. Section 5.11, page 72 of the Draft EA acknowledges that if a Section 404 Clean Water Act permit is deemed necessary by the U.S. Army Corps of Engineers, OP will be consulted on the procedures for conducting a Federal Consistency Review.

3. Section 3.5, pages 23-29 of the Draft EA lists the proposed methods for the trenching and installation of the new water lines. The project calls for the use of open cut trenching, pilot tube micro-tunneling and horizontal directional drilling. Micro-tunneling and horizontal directional drilling will result in less ground disturbances. When possible, the project will rely on those methods, rather than open cut trenching. Furthermore, Section 4.4.11, pages 56-57 states that to the maximum extent possible, construction work will occur during dry weather conditions and will halt activities during heavy storm events. This, along with construction best management practices to limit sediment loss and erosion, should limit the water quality impact on the near shore environment during the construction phase.

4. Section 5.2, page 63 of the Draft EA partially addresses the objectives and policies of the Hawaii State Plan. The Draft EA sites the project's consistency with HRS § 226-16(a) – facility systems, and HRS § 226-16(b)(4) – quality, efficiency, and storage capabilities.

   However, this analysis should also consider an examination of HRS § 226-108 - priority guidelines on sustainability. HRS § 226-108(2) encourages planning that respects and promotes living within natural resources and limits of the State. The goal of this project is to foster water efficiency and reliability. The water system improvements should incorporate design measures that promote water conservation.

   The analysis contained in Section 5.2 should include an analysis on HRS § 226-109 - priority guidelines on climate change adaptation. As illustrated in Figure 16 on page 37 of the Draft EA, much of the project is located within relatively low-lying flood prone areas, and within the Tsunami Inundation Zone. HRS § 226-109(7) promotes sector resilience in areas such as water, road, airports, and public health. In this case, sea-level rise could be a potential threat to urban Honolulu's water supply. An examination on sector resilience should identify climate change threats, assess potential consequences, and evaluate adaption options. The Final Environmental Assessment should include an analysis on this project's consistency with the aforementioned priority guidelines.

If you have any questions regarding this comment letter, please contact Josh Hekekia of our office at (808) 587-2845.

Sincerely,

Leo R. Asuncion
Director

c: Gavin Masaki, P.E., Gray, Hong, Nojima & Associates, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

August 10, 2016

KIRK CALDWELL, MAYOR

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DAVID C. HULIHEE
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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Leo R. Asuncion, Director
State of Hawaii
Office of Planning
235 South Beretania Street, 6th Floor
Honolulu, Hawaii 96813

Attention: Josh Hekekia

Dear Mr. Asuncion:

Subject: Your Letter Dated January 29, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Ref: P-15032

Thank you for your letter dated January 29, 2016 regarding the Draft Environmental Assessment (DEA) for the Honolulu Water System Improvements (WSI) project.

We have the following responses to your comments:

1. We recognize the DEA addresses the project consistency with the objectives and policies of the Hawaii Coastal Zone Management Act, Chapter 205-A-2, HRS.

2. The priority guidelines on sustainability, Chapter 226-108, HRS, will be discussed in Section 5.2 of the Final Environmental Assessment (FEA). We understand the priority guidelines encourage planning that respects and promotes living within natural resources and limits of the State.

   The project is consistent with the guidelines as the proposed WSI replace existing older mains such that there is an overall reduction in main breaks and water loss. In addition, the WSI will increase distribution system capacity and efficiency to accommodate planned growth consistent with State and City Land Use plans.

3. A discussion on climate change adaptation and WSI resilience will be included in Section 5.2 of the FEA as well as in the Oahu Water Management Plan and Board of Water Supply (BWS) Water Master Plan. Sea level rise in urban Honolulu will impact all infrastructure, not just water. While the new pipelines will be designed for corrosion protection in an increasingly salt water environment, property flooding, drainage, wastewater, roadway transportation and quality of life will be severely impacted as well. BWS is funding research on climate change impacts to water supply from drought and infrastructure vulnerability from the spatial extent of sea level rise and coastal erosion with the University of Hawaii and the Water Research Foundation.

   As private properties in Waikiki, Kakaako, Iwilei and Mapunapuna are elevated above future sea level rise levels, roadways and the utilities within it will have to be elevated as well. We anticipate major infrastructure relocation costs during the transition. Dewatering to repair main breaks in inundated areas will be a challenge if drainage systems will not be able to accommodate effluent discharges. We are hopeful that the State Office of Planning and City Department of Planning and Permitting will provide important leadership roles in coordinating the public and private sectors to collaboratively plan to address climate change and sea level rise. BWS is supportive and will be an active partner in such a leadership effort.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DAVID Y. IGE
GOVERNOR

160228

ARTHUR J. LOGAN
MAJOR GENERAL
ADJUTANT GENERAL

KENNETH S. HARA
BRIGADIER GENERAL
DEPUTY ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

February 2, 2016

2016 FEB 10 A 11:57

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai'i 96843

Attn.: Ms. Iris Oda, P.E.

Subject: Draft Environmental Assessment – Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii

Dear Ms. Oda:

Thank you for the opportunity to comment on the above project. The State of Hawaii Department of Defense has no comments to offer relative to the project.

If you have any questions, please contact Mr. Lloyd Maki, Assistant Chief Engineering Officer at (808) 733-4250.

Sincerely,

for ARTHUR J. LOGAN
Major General
Hawaii National Guard
Adjutant General

c: Mr. Gavin Masaki, P.E., Gray, Hong, Nojima & Associates, Inc.
Ms. Havinne Okamura, Hawaii Emergency Management Agency

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

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FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Major General Arthur J. Logan, Adjutant General
State of Hawaii
Department of Defense
Office of the Adjutant General
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Attention: Lloyd Maki

Dear Major General Logan:

Subject: Your Letter Dated February 2, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5,1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii

Thank you for your letter dated February 2, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge that the State Department of Defense has no comments to offer.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DAVID Y. IGE
GOVERNOR

KATHRYN S. MATAYOSHI
SUPERINTENDENT

STATE OF HAWAI'I

DEPARTMENT OF EDUCATION

P.O. BOX 2360

HONOLULU, HAWAI'I 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

February 3, 2016

Ms. Iris Oda, PE
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Re: Draft Environmental Assessment, Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii

Dear Ms. Oda:

The Department of Education (DOE) has reviewed the Draft Environmental Assessment for the Honolulu Water System Improvements Project. DOE has concerns over any interruption of water service and any impact construction will have on vehicular and pedestrian traffic surrounding Kaahumanu Elementary and McKinley High Schools. The impact of construction noise and dust emission is also a concern.

DOE requests that the Honolulu Board of Water Supply inform administrators of the schools identified, in person and in writing, about the project's scope, schedule and impacts.

Thank you for the opportunity to provide comment. Should you have any questions, please call Roy Ikeda of the Planning Section, Facilities Development Branch at 377-8301.

Respectfully,

Kenneth G. Masden II
Public Works Manager
Planning Section

KGM:jmb

c: Gavin Masaki, PE, Gray, Hong, Nojima & Associates, Inc.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 20, 2016

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Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer ak

Mr. Kenneth G. Masden II, Public Works Manager
Planning Section
State of Hawaii
Department of Education
Office of School Facilities and Support Services
P. O. Box 2360
Honolulu, Hawaii 96804

Attention: Roy Ikeda

Dear Mr. Masden:

Subject: Your Letter Dated February 3, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii

Thank you for your letter dated February 8, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We have the following responses to your comments:

1. We acknowledge your department's concerns regarding water service, traffic, noise and dust impacts during construction.

2. As mitigative measures, traffic, noise and dust control plans will be developed and implemented by the contractor.

3. Kaahumanu Elementary and McKinley High Schools' Administration will be notified when the project's construction schedule is finalized. We will attempt to provide advance notification as requested. This information will also be provided to the affected Neighborhood Boards prior to the start of construction.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

for ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

Water for Life . . . Ka Wai Ola

DAVID Y. IGE
GOVERNOR
STATE OF HAWAII

SHAN S. TSUTSUI
LT. GOVERNOR
STATE OF HAWAII

JOBIE M. K. MASAGATANI
CHAIRMAN
HAWAIIAN HOMES COMMISSION

WILLIAM J. AILA, JR.
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

February 18, 2016

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai'i 96843
Attn: Iris Oda, PE

Dear Ms. Oda:

Subject: Draft Environmental Assessment for Honolulu Water System Improvements, TMKs (1) 1-5, 1-7, 2-1, 2-3, and 2,6, Honolulu, O'ahu, Hawai'i.

Mahalo for transmitting the Draft Environmental Assessment (DEA) for Proposed Honolulu Water System Improvements to the Department of Hawaiian Home Lands (DHHL). DHHL reviewed your January 7, 2016 request for comments on this DEA and, as requested, provides the following comments. We understand the Honolulu Board of Water Supply (BWS) proposes these improvements in Iwilei, Downtown, Kaka'ako, Ala Moana, Waikīkī, and Makiki neighborhoods of Honolulu.

Comment #1: DEA should disclose foreseeable impacts of the proposed project's enlargement of water system on the volume of water usage in affected aquifer areas.

As elaborated further below, our main concern arises from potential impacts of increased water system capacity on sensitive, over-allocated areas in the Nu'uanu and Palolo Aquifer System Areas (ASAs) within the Honolulu Aquifer Sector and DHHL's land use development plans in these areas.

Table 2.1 "Proposed Water System Improvements" identifies three projects (A, B, C) already accounted for under BWS' Capital Improvement Program (CIP) budgets and six further projects, three of which are alternative routes. DEA at 6. The proposed main pipe sizes (16-24 inches) are generally larger than the listed

existing main sizes (between 6-12 inches). All proposed improvements are located within the Nu'uanu ASA. Increasing the main size for these significant water improvements could foreseeably result in increased water usage within the Nu'uanu ASA and surrounding aquifer areas.

Comment #2: DHHL's general, island, regional, and water policy plans should be consulted in assessing the significant, cumulative, and secondary impacts of the proposed project.

The DEA discusses relationships between the proposed actions and the State Land Use Plan, Hawai'i State Plan, City and County of Honolulu General Plan, City and County of Honolulu Primary Urban Center Development Plan, City and County of Honolulu Zoning, City and County of Honolulu Special Districts, City and County of Honolulu Transit Oriented Development Special Districts, City and County of Honolulu Public Infrastructure Map, City and County of Honolulu Flood Hazard Districts, Kaka'ako Community Development District, and the State Coastal Zone Management Area Program. DEA at 63-78. DHHL also develops and maintains a series of land use and water policy plans, which should be consulted to determine reasonably foreseeable cumulative and secondary impacts of the proposed project.

DHHL develops and maintains a general plan providing for the development and use of land needed for fulfilling the purposes of the Hawaiian Homes Commission Act of 1920, as amended (HHCA). Hawaii Administrative Rule (HAR) §10-4-2; *see* "Department of Hawaiian Home Lands General Plan," (approved Feb. 26, 2002). DHHL developed its O'ahu Island Plan (July 2014), which identifies DHHL land use designations for its O'ahu lands and which designations function similarly to county land-use zoning. DHHL also developed regional plans, which identify land use development factors, issues, opportunities, and each region's top priority projects for implementation within three years of regional plan development for each island. Most pertinent to the proposed water system improvements are DHHL's Water Policy Plan (Jul. 2014)[1] and the DHHL O'ahu Island Plan (July 2014).

[1] *See* The Hawaiian Homes Commission Water Policy Plan, adopted July 22, 2014 *available at:* http://dhhl.hawaii.gov/wp-content/uploads/2013/09/HHC-Water-Policy-Plan-140722.pdf.

A priority policy of DHHL's Water Policy Plan is to "[e]xpressly determine and plan for future water needs and actively participate in broader water management, use and protection efforts in Hawai`i in order to secure water." Water Policy Plan at 2. Consistent with this policy, this comment raises DHHL's foreseeable future water needs in order to ensure these needs are adequately planned for.

Amongst DHHL landholdings in the Nu'uanu ASA are approximately two acres in the Mō'ili'ili area of the Waikīkī ahupua'a, which are designated for commercial use. O'ahu Island Plan at 6-19. Currently, the site comprises the former Bowl-O-Drome building and parking lot, but DHHL seeks to re-develop these lands for commercial revenue generation while also addressing the need for housing alternatives through a mixed use, two to ten story building. *See infra* Fig. 6-9 (extracted from the O'ahu Island Plan). Commercial, revenue-generating uses are proposed at the street level with up to 126 alternative housing units on the higher floors. O'ahu Island Plan at 6-20. DHHL has developed cost estimates for its Commercial, Mixed-Use Development in Mō'ili'ili. *Id.*

According to O'ahu Water System Standards, commercial-only water use requires 3,000 gallons/ acre and mixed commercial/ residential use requires 1,000 gallons/ sq. foot. If considered separately, residential land use components of 126 housing units would use between 300-400 gallons per unit. Under these water system standards, foreseeable uses of DHHL's two-acre parcel (87,120 square feet) in the Waikīkī ahupua'a could require 6,000 gpd, 10,454.4 gpd, or 50,100 gpd.

Comment #3: *DHHL's rights and interests in Honolulu aquifer sector resources and potential development needs for those water resources should be considered in assessing the significance of the proposed project's impacts.*

The State and its subdivisions (including the State Commission on Water Resource Management (CWRM) and BWS have duties to protect DHHL's rights in water resources as enumerated in the Hawaiian Homes Commission Act, 1920, as amended, §§ 101(4), 220, 221; the Hawai'i State Constitution, article XI, §§ 1 and 7; Chapter 174C, Hawaii Revised Statutes (HRS), also known as the State Water Code; and *Kauai Springs, Inc. v. Kauai Planning Comm'n*, 133 Hawai'i 141, 324 P.3d 951 (2014). Our

environmental review law, HRS Chapter 343, also contains clear language requiring that EAs examine the impacts of proposed actions on Hawaiian rights, including those of DHHL.

Our interpretations of significance assessment as required by HRS Chapter 343 indicate DHHL land use plans should be considered in the DEA. HAR §11-200-12(3) concerns: "conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders." Hawai'i's Environmental Policy Act, Chapter 344, HRS (HEPA) includes conserving natural resources by safeguarding "natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of the people of Hawai'i." HRS §344-3(1). Under the fourth significance criterion, the DEA addressed whether the proposed Well No. 2 "[s]ubstantially affects the economic welfare, social welfare, and cultural practices of the community or state." HAR §11-200-12(4). Consideration of DHHL's foreseeable development in the O'ahu WMA was appropriate under both criteria.

DHHL appreciates its continued benefit from BWS systems for its O'ahu-based land uses, including at its Mō'ili'ili lands. However, DHHL rights and interests extend beyond the use of BWS systems and such rights and interests must be considered to complete assessment of the proposed action's significance under HAR §11-200-12.

Proposed Honolulu water system improvements may foreseeably impact DHHL land development plans in the Nu'uanu ASA. Assessment of the proposed project's significant, cumulative, and secondary impacts should expressly address DHHL's water rights in the Honolulu aquifer sector, which is part of a ground water management area (WMA), and DHHL's potential need to exercise them.[2] These rights include DHHL's entitlement to reservation of water for its current and foreseeable water uses.[3]

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[2] HRS §174C-49(e) provides: "All permits issued by the commission shall be subject to the rights of the department of Hawaiian home lands as provided in section 221 of the Hawaiian Homes Commission Act, whether or not the condition is explicitly stated in the permit."

All water use permits are "subject to the rights of the department of Hawaiian home lands as provided in section 221 of the Hawaiian Homes Commission Act, whether or not the condition is explicitly stated in the permit." HRS §174C-49(e). CWRM decisions also "incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in [HHCA §221]." HRS §174C-101(a). DHHL's water rights also include the right to petition CWRM to reserve water for DHHL. HRS §174C-49(d).

DHHL's planned Mō'ili'ili Mixed Use Development lies within the Nu'uanu ASA and near the Palolo ASA. The Nu'uanu ASA has a sustainable yield (SY) of 15 mgd and existing water use permit allocations amounted to 15.271 mgd, although the 12-MAV was 13.351 mgd as of July 2005. Commission on Water Resource Management, State of Hawai'i, Water Resource Protection Plan, at 6-16 (2008). The Palolo aquifer has a SY of 5 mgd and existing water use permit allocations amounted to 5.65 mgd, although the 12-MAV was 4.431 mgd as of July 2005. WRPP at 16. Water use permit allocations exceed SY in the Palolo and Nu'uanu ASAs because declared existing uses at the time of designation exceeded the subsequent establishment of sustainable yields for these aquifers. "The Commission is monitoring the conditions in these over-allocated aquifers to determine whether the sustainable yields can be adjusted based on operational experience or water use permit allocations may be reduced due to nonuse as land use changes or new sources come online." WRPP at 6-16.

We also note that proposed Honolulu water system improvements may forward DHHL interests in further developing the Mō'ili'ili acreage because improvements to the old and undersized infrastructure in Mō'ili'ili is currently a limit on new development opportunities. *O'ahu Island Plan*, at 6-20. However, inasmuch as the proposed improvements as described in the DEA do not appear to extend to Mō'ili'ili, DHHL lacks information in order to make that assessment.

---

[3] *See* HRS §174C-49(d); HAR §13-171-60(b) ("The commission shall adopt within this subchapter specific reservations of water in water management areas in such quantities as are deemed necessary for purposes which are consistent with the public interest, including the provision of water for current and foreseeable development and use of Hawaiian home lands pursuant to section 221 of the Hawaiian Homes Commission Act and HRS §174C-101(a).").

Conclusion:

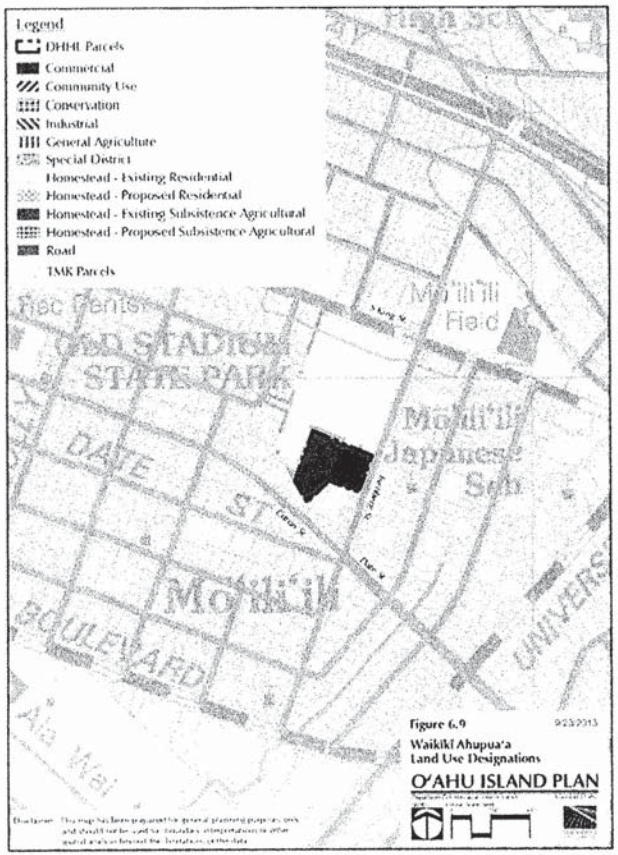
Mahalo nui for transmitting and requesting comments on the proposed Honolulu Water System Improvements DEA. DHHL commends the development of this draft assessment and requests that the final version fully and expressly address impacts on DHHL's reasonably foreseeable rights, interests, and plans for water and land development. Please direct any questions to me at (808) 620-9501, or your staff may contact Kaleo Manuel in our Planning Office at (808) 620-9485 or at Kaleo.L.Manuel@hawaii.gov.

Aloha,

Jobie M. K. Masagatani, Chairman
Hawaiian Homes Commission

Cc: Gray, Hong, Nojima & Assoc., Inc.
Project Consultant
201 Merchant Street, Suite 1900
Honolulu, Hawai'i 96813
Attn: Gavin Masaki, PE

Figure 6-9: DHHL's Land Use Designations for the Commercial, Mixed-Use Development in Mō'ili'ili, within the Waikīkī Ahupua'a



BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

December 23, 2016

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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Ms. Jobie M. K. Masagatani, Chairman
State of Hawaii
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu, Hawaii 96805

Attention: Kaleo Manuel

Dear Ms. Masagatani:

Subject: Your Letter Dated February 18, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project
Tax Map Keys: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii

Thank you for your letter dated February 18, 2016 regarding the Draft Environmental Assessment (DEA) for the Honolulu Water System Improvements (WSI) project.

We have the following responses to your comments:

1. *Comment #1: DEA should disclose foreseeable impacts of the proposed project's enlargement of water system on the volume of water usage in affected aquifer areas.*

   Successful water conservation programs initiated in the 1990's have reduced water demand in the Honolulu water system from 85 million gallons per day (mgd) to 70 mgd today. Most of that capacity still exists and will be reallocated to the Transit-Oriented Developments.

   We clarify that the sustainable yield (SY) for the Nuuanu Aquifer System is 14 mgd not 15 mgd. The Honolulu WSI project will increase transmission and distribution capacity for planned developments. Recognizing the Commission on Water Resource Management's (CWRM) recent reductions of SY in the Nuuanu and Moanalua aquifers, the pipeline improvements increase hydraulic capacity for fire protection and the flow of Pearl Harbor aquifer water into the Honolulu Metropolitan (Metro) Low system to compensate for the SY reduction. However, added water demand of transit-oriented development and other new developments could result in increased pumping from the Nuuanu and Palolo aquifers if the Honolulu WSI is not installed to allow Pearl Harbor aquifer water into the Honolulu Metro Low system. Sustainable yields and permitted uses from the aquifer system are under the purview of the Department of Land and Natural Resources CWRM.

2. *Comment #2: DHHL's general, island, regional, and water policy plans should be consulted in assessing the significant, cumulative, and secondary impacts of the proposed project.*

   The Final Environmental Assessment (FEA) will include a discussion of the proposed project's relationship with DHHL planning documents including the General Plan, Oahu Island Plan, Water Policy Plan, and the Papakolea Regional Plan. The FEA will also indicate any development at the "Bowl-o-Drome" site will be subject to our offsite fire protection requirements and coordination of the onsite fire protection requirements with the Honolulu Fire Department, submittal of construction drawings for our review and approval, determination of water availability at the building permit stage, payment of Water System Facility Charges for resource development, transmission and daily storage, and our cross-connection and backflow prevention requirements.

3. *Comment #3: DHHL's rights and interests in Honolulu aquifer sector resources and potential development needs for those water resources should be considered in assessing the significance of the proposed project's impacts.*

   The proposed water system improvements will provide for increased reliability and flexibility in meeting current and future water system requirements for all development including those of DHHL. The project ensures a reliable pipeline system to meet development predicated by State and City land use planning. We recognize DHHL as a public trust water-use in the Oahu Water Management Plan, Chapter 30, ROH. As such, water will be made available for DHHL developments in accordance with the Board of Water Supply water commitment policies. In addition, please note that DHHL has a water reservation in Waipahu-Waiawa of 1.358 mgd.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at ioda@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:
EPO 16-009

January 14, 2016

Ms. Sheryl Nojima
Gray, Hong, Nojima & Associates, Inc.
201 Merchant Street, Suite 1900
Honolulu, Hawaii 96813

Dear Ms. Nojima:

SUBJECT: Draft Environmental Assessment (DEA) for Honolulu Water System Improvements
Honolulu, Oahu
TMK: 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your DEA to our office via the OEQC link:
http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/Oahu/2010s/2016-01-08-OA-5B-DEA-Honolulu-Water-System-Improvements.pdf

EPO strongly recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments. EPO has recently prepared draft Environmental Health Management Maps for each county. They are online: http://health.hawaii.gov/epo/egis

We suggest you review the requirements for the National Pollutant Discharge Elimination System (NPDES) permit. We recommend contacting the Clean Water Branch at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov after relevant information is reviewed at:

1. http://health.hawaii.gov/cwb
2. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/standard-npdes-permit-conditions
3. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/forms

EPO recommends you review the need and/or requirements for a Clean Air Branch permit. The Clean Air Branch can be consulted via e-mail at: Cab.General@doh.hawaii.gov or via phone: (808) 586-4200.

If noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work. Please call the Indoor and Radiological Health Branch at (808) 586-4700 and review relevant information online at: http://health.hawaii.gov/irhb/noise

EPO encourages you to examine and utilize the Hawaii Environmental Health Portal. The portal provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings. The Portal is continually updated. Please visit it regularly at:
https://eha-cloud.doh.hawaii.gov

You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer This viewer geographically shows where previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared.

In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at:
http://www2.epa.gov/ejscreen

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design.

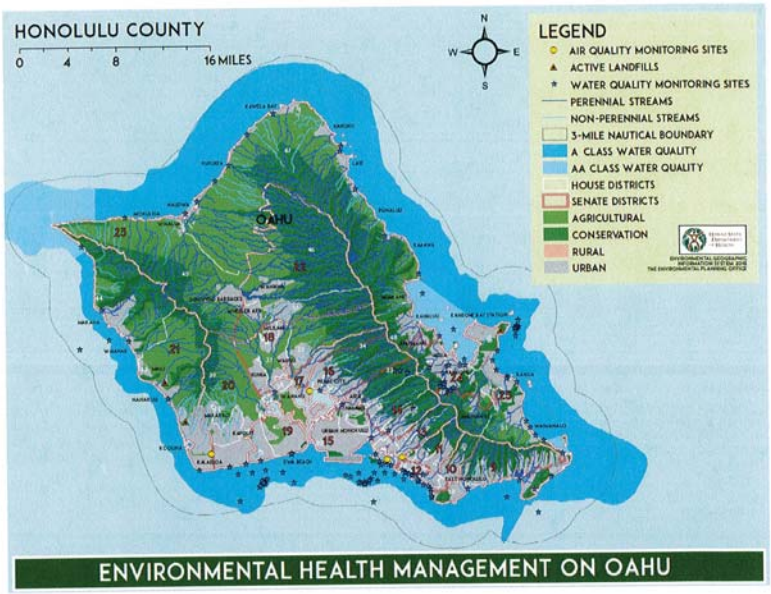
Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

LM:nn

Attachment 1: EPO Draft Environmental Health Management Map
Attachment 2: OEQC Viewer Map
Attachment 3: U.S. EPA EJSCREEN (3 page report)

c: Iris Oda, Board of Water Supply
Susan Polanco, EPA, R9, PICO {via email – polanco.susan@epa.gov}
DOH: SDWB, CAB, IRHB, ERO {via email only}





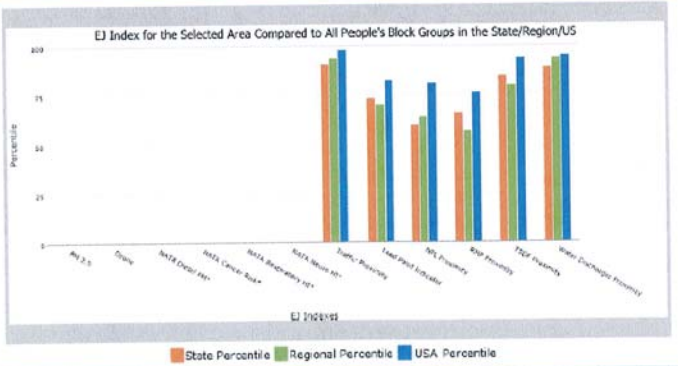
EPA United States Environmental Protection Agency

EJSCREEN Report

for 1 mile Ring around the Corridor, HAWAII, EPA Region 9

Approximate Population: 113872

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA Diesel PM*	N/A	N/A	N/A
EJ Index for NATA Air Toxics Cancer Risk*	N/A	N/A	N/A
EJ Index for NATA Respiratory Hazard Index*	N/A	N/A	N/A
EJ Index for NATA Neurological Hazard Index*	N/A	N/A	N/A
EJ Index for Traffic Proximity and Volume	91	94	98
EJ Index for Lead Paint Indicator	73	70	82
EJ Index for Proximity to NPL sites	60	64	81
EJ Index for Proximity to RMP sites	66	57	76
EJ Index for Proximity to TSDFs	85	80	94
EJ Index for Proximity to Major Direct Dischargers	89	94	95

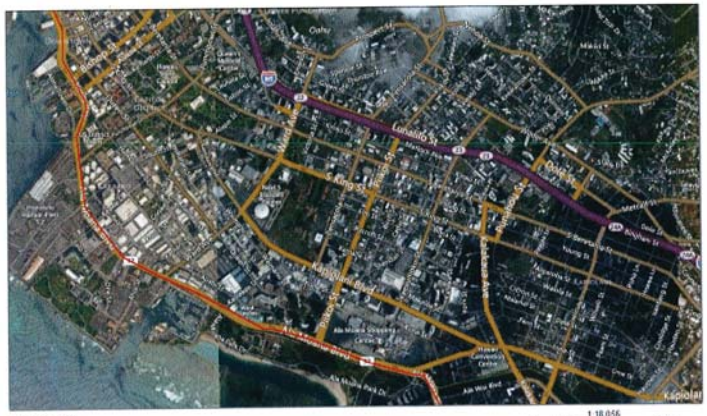


This report shows environmental, demographic, and EJ indicator values. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report

for 1 mile Ring around the Corridor, HAWAII, EPA Region 9

Approximate Population: 113872



EJSCREEN Report

for 1 mile Ring around the Corridor, HAWAII, EPA Region 9

Approximate Population: 113872

Selected Variables	Raw Data	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.95	N/A	9.78	N/A
Ozone (ppb)	N/A	N/A	N/A	49.7	N/A	46.1	N/A
NATA Diesel PM (µg/m³)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Cancer Risk (lifetime risk per million)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Respiratory Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Neurological Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Traffic Proximity and Volume (daily traffic count/distance to road)	740	280	89	190	94	110	97
Lead Paint Indicator (% Pre-1960 Housing)	0.19	0.17	61	0.25	54	0.3	47
NPL Proximity (site count/km distance)	0.054	0.092	53	0.11	47	0.096	54
RMP Proximity (facility count/km distance)	0.12	0.18	62	0.41	30	0.31	43
TSDF Proximity (facility count/km distance)	0.15	0.092	84	0.12	81	0.054	93
Water Discharger Proximity (facility count/km distance)	0.74	0.33	89	0.19	96	0.25	93
Demographic Indicators							
Demographic Index	58%	51%	73	46%	68	35%	80
Minority Population	81%	77%	47	57%	72	36%	85
Low Income Population	34%	25%	74	35%	54	34%	56
Linguistically Isolated Population	19%	6%	92	9%	82	5%	92
Population With Less Than High School Education	13%	10%	74	18%	49	14%	57
Population Under 5 years of age	4%	6%	29	7%	28	7%	30
Population over 64 years of age	18%	14%	71	12%	82	13%	78

* The National-scale Air Toxics Assessment (NATA) environmental indicators and EJ indexes, which include cancer risk, respiratory hazard, neurodevelopment hazard, and diesel particulate matter will be added into EJSCREEN during the first full public update after the soon-to-be-released 2011 dataset is made available. The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: http://www.epa.gov/ttn/atw/natamain/index.html.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 22, 2016

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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Ms. Laura Leialoha Phillips McIntyre, AICP
Program Manager
State of Hawaii
Department of Health
Environmental Planning Office
P. O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Ms. McIntyre:

Subject: Your Letter Dated January 14, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project – Tax Map Key: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Ref: EPO 16-009

Thank you for your letter dated January 14, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvement project.

We have the following responses to your comments:

1. The website information on sustainable design, Environmental Health Management Maps, Environmental Health Portal, Office of Environmental Quality Control viewer and the U.S. Environmental Protection Agency environmental justice mapping and screening tool will be reviewed throughout the project.

2. During the design phase, requirements for a National Pollutant Discharge Elimination System permit will be reviewed. The Clean Water Branch will be consulted if there are any questions regarding permit conditions.

3. Prior to construction, the requirements for a Clean Air Branch permit will be reviewed. The Clean Air Branch will be consulted as necessary.

4. We acknowledge that noise during construction may exceed the maximum allowable levels. A noise variance permit may therefore be required to be obtained before the commencement of work.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DAVID Y. IGE
GOVERNOR

RACHAEL WONG, DrPH
DIRECTOR

PANKAJ BHANOT
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF HUMAN SERVICES
Benefit, Employment & Support Services Division
820 Mililani Street, Suite 606
Honolulu, Hawaii 96813

January 26, 2015

Re: 16-0015

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843
Attn: Iris Oda, PE

Dear Ms. Oda:

Subject: Draft Environmental Assessment (DEA)
Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii
Ref. No. 14-0570

This is in response to your letter dated January 7, 2016 requesting the Department of Human Services (DHS) review and comment on the Draft Environmental Assessment for the Honolulu Water System Improvement project that the Honolulu Board of Water Supply is proposing to undertake. The project will involve the replacement and upgrade of various water mains in Honolulu and encompass an area from Iwilei through Waikiki and Makiki.

As stated in our previous letter dated September 22, 2014, the DHS had mentioned there are three (3) child care facilities in or around the immediate vicinities of the proposed replacement water main pipelines. Additionally, as this project involves a significant portion of metropolitan Honolulu, there are several DHS licensed child care homes who while not in the immediate vicinity, may be affected by the construction activities.

If you have any questions or need further information, please contact Ms. Jill Arizumi, Child Care Program Specialist, at (808) 586-5240.

Sincerely,

Scott Nakasone
Assistant Division Administrator

c: Gray, Hong, Nojima & Associates, Inc.

AN EQUAL OPPORTUNITY AGENCY

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
DAVID C. HULIHEE
KAPUA SPROAT
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FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Scott Nakasone, Assistant Division Administrator
State of Hawaii
Department of Human Services
Benefit, Employment & Support Services Division
820 Mililani Street, Suite 606
Honolulu, Hawaii 96813

Attention: Jill Arizumi

Dear Mr. Nakasone:

Subject: Your Letter Dated January 26, 2015 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5,1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Ref. No. 16-0015

Thank you for your letter dated January 26, 2015 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge the three (3) child care facilities in the immediate vicinity of the project (Strode Montessori, The Cole Academy and Ke Aloha Hookahi). In addition, we note that there are several licensed child care homes in the general vicinity that may be affected by the construction activities. Appropriate mitigative measures will be taken to minimize any impacts to the facilities.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

Water for Life . . . Ka Wai Ola

please log in

PHONE (808) 594-1888

FAX (808) 594-1938

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
560 N. NIMITZ HWY., SUITE 200
HONOLULU, HAWAI'I 96817

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WATER SUPPLY
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HRD16-7247D

February 3, 2016

Iris Oda, PE
Board of Water Supply, City and County of Honolulu
630 South Beretania St.
Honolulu, HI 96813

Re: Draft Environmental Assessment for the Honolulu Water System Improvements
Honolulu Ahupua'a, Kona Moku, O'ahu Mokupuni
Tax Map Key (1) 1-5, 1-7, 2-1, 2-3, and 2-6

Aloha Ms. Oda:

The Office of Hawaiian Affairs (OHA) is in receipt of your January 7, 2016 letter requesting comments on the draft environmental assessment (DEA) for the Honolulu Water System Improvements on behalf of the Honolulu Board of Water Supply. The proposed project entails the replacement and increase in capacity of various water mains on Nimitz Highway, Aloha Tower Drive, Ala Moana Boulevard, North King Street, River Street, Nu'uanu Avenue, Richards Street, Cooke Street, Pensacola Street, and Pi'ikoi Street. The project improvements will be staggered and will affect different roads at different times.

OHA observed that Cultural Surveys Hawai'i did not complete an archaeological inventory survey (AIS), providing instead a draft archaeological literature review & field inspection (LRFI). We recognize that the area of impact is comprised of major roadways and therefore it is difficult to conduct excavations for the completion of an AIS. We also understand that the area impacted has been subject to numerous disturbances in the past and that extensive studies have been conducted during previous activities, as noted in the LRFI.

Nevertheless, OHA asks that the following measures be adopted due to the large quantity of information available about past burial discoveries and the high likelihood of disturbing iwi kūpuna during excavation: (1) the State Historic Preservation Division (SHPD) shall be

consulted on whether an AIS is feasible under the circumstances; (2) the SHPD should be given the opportunity to comment and review the DEA and LRFI; (3) SHPD recommendations shall be implemented; (4) an archaeological monitor shall be assigned per piece of operating equipment with a ground disturbing function; (5) the archaeological monitors shall be present at all time during ground disturbing activities; and (6) the archaeological monitor shall have the expertise and qualification to implement *controlled excavation* methodology during construction when approaching in-situ or naturally occurring sand deposits and/or cultural deposit layers that have a high likelihood of containing either disturbed or intact iwi kūpuna.

As with all subsurface ground disturbances, OHA does request assurances that should iwi kūpuna or Native Hawaiian cultural deposits be identified during any ground altering activities, all work will immediately cease and the appropriate agencies, including OHA, will be contacted pursuant to applicable law.

Mahalo for the opportunity to provide comments. Should you have any questions, please contact Jeannin Jeremiah at 594-1790 or by email at jeanninj@oha.org.

'O wau iho nō me ka 'oia 'i'o,

Kamana'opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer

KC:jj

C: Gavin Masaki, PE - Gray, Hong, Nojima & Associates, Inc.

**Please address replies and similar, future correspondence to our agency:*
Dr. Kamana'opono Crabbe
Attn: OHA Compliance Enforcement
560 N. Nimitz Hwy, Ste. 200
Honolulu, HI 96817

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

October 5, 2016

KIRK CALDWELL, MAYOR

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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Kamana'opono Crabbe, Ph.D., Ka Pouhana
Chief Executive Officer
Office of Hawaiian Affairs
State of Hawaii
560 North Nimitz Highway, Suite 200
Honolulu, Hawaii 96817

Dear Dr. Crabbe:

Subject: Your Letter Dated February 3, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Ref: HRD16-7247D

Thank you for your letter dated February 3, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project. We apologize for the delay in our response.

We have the following responses to your comments:

1. We have consulted with the State Historic Preservation Division (SHPD) regarding the requirement for an Archaeological Inventory Survey (AIS). Based on SHPD review of the Draft Archaeological Literature Review and Field Investigation and subsequent meetings, a determination has been made that an AIS is required prior to the start of construction. SHPD has also requested an Archaeological Inventory Survey Plan (AISP) be prepared to guide the AIS. We therefore intend to undertake an AISP and AIS for which the scope and requirements will be determined and approved by SHPD.

2. Qualified archaeological monitor(s) will be utilized during construction and be present during all ground disturbing activities and specifically when excavating areas where there is a high likelihood of finding archaeological artifacts or remains.

3. Should archaeological artifacts or remains, especially iwi kupuna, or Native Hawaiian Cultural deposits be identified during construction, all work will immediately cease and the appropriate agencies, including the Office of Hawaiian Affairs, will be notified for the proper disposition of the finds.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at ioda@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

JEFFREY T. PEARSON
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
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

May 27, 2016

Mr. Jason H. Takaki, Head
Capital Projects Division
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Mr. David Shideler
Cultural Surveys Hawai'i, Inc.
P.O. Box 1114
Kailua, Hawaii 96734

IN REPLY REFER TO:
Log No. 2015.03880
Doc. No. 1605KM14
Archaeology

Dear Mr. Takaki and Mr. Shideler,

SUBJECT: **Chapter 6E-8 Historic Preservation Review –**
Request for Historic Properties Determination & Archaeological Literature Review and Field Inspection for Board of Water Supply (BWS) Honolulu Water Supply Improvements Project
Waikīkī Ahupua'a, Honolulu (Kona) District, Island of O'ahu
TMK: (1) 1-5, 1-7, 2-1, 2-3, 2-4, 2-6; various plats and parcels

Thank you for the opportunity to comment on the Board of Water Supply's (BWS) request for a historic properties determination regarding the proposed Honolulu Water Supply Improvements (WSI) project, including review of the draft supporting document titled *Archaeological Literature Review and Field Inspection Report for the Board of Water Supply (BWS) Honolulu Water Supply Improvements (WSI) Environmental Assessment, Honolulu Ahupua'a, Honolulu (Kona) District, O'ahu, TMK: (1) 1-5, 1-7, 2-1, 2-3, 2-4, 2-6; Various Plats and Parcels* (O'Hare et al. October 2015). We received this submittal on October 29, 2015; we apologize for the delayed review and thank you for your patience.

This archaeological literature review and field inspection (LRFI) report was prepared by Cultural Surveys of Hawaii, Inc. (CSH) at the request of Gray Hong Nojima and Associates, Inc. The project proponent is the Board of Water Supply (BWS). The project area minimally consists of approximately 4.56 acres spread over several locations and is located largely within either State of Hawaii owned or City and County of Honolulu owned roads. The project area locations include Nimitz Highway from Pacific Street in Iwilei to Richards Street, and the lower portion of Richards Street to the western end of Ala Moana Boulevard that goes through the Kaka'ako and Kālia areas; then across the Ala Wai Canal to Kalākaua Avenue in Waikīkī. Additionally, the project area also includes several offshoots from the main thoroughfares including a small portion of North King Street at Nu'uanu Stream and portions of River Street in Honolulu and on Nu'uanu Avenue in Honolulu; the Kaka'ako area includes a portion of Cooke Street and a lower portion of Pi'ikoi Street; the Kewalo area includes an upper portion of Pi'ikoi Street and a portion of Pensacola Street. The proposed project will involve a significant amount of ground disturbance with excavations anticipated to be at least 12 ft. in depth (but may be up to 20 ft. in some areas) and at least 6 to 8 ft. in width. A significant amount of work is planned as part of the proposed project including the following:

(1) The installation of a new 24-inch replacement water main from the intersection of River Street and North King Street, then southwest on River Street to Nimitz Highway, on Nimitz Highway to Fort Street Mall, southwest to Aloha Tower Drive to Ala Moana Boulevard, and then along Ala Moana Boulevard to the intersection with Kalākaua Avenue (an alternate route for the installation of the 24-inch water main and follows River Street from North King Street and North Beretania Street; on Nu'uanu Avenue from Nimitz Highway to Pauahi Street; and on Nimitz Highway from Fort Street Mall and Richards Street, and extending to Aloha Tower Drive);
(2) The installation of a new 16-inch replacement water main along Nimitz Highway between Pacific Street and Sumner Street;
(3) The installation of a new 20-inch replacement water main along Cooke Street from Ala Moana Boulevard to Pohukaina Street;
(4) The installation of a new 16-inch replacement water main along Pi'ikoi St. from Ala Moana Boulevard to Kapi'olani Boulevard;
(5) The installation of a new 16-inch replacement water main along Pi'ikoi Street from South King Street to Kīna'u Street; and
(6) The installation of a new 24-inch replacement water main along Pensacola Street from Kīna'u Street to Wilder Street.

The LRFI report provides a comprehensive overview of the previous archaeological studies and historic properties that occur within or near the project area. Studies and sites are presented separately for the Honolulu, Kaka'ako, Kewalo, and Kālia areas. Various portions of the project area have been included within previous archaeological studies but the entire project area has not been comprehensively surveyed. The different locations were assessed for their archaeological potential and evaluated as having low, medium, or high potential. Areas with the greatest potential for encountering archaeological resources include the downtown Honolulu area centered in the Chinatown Historic district, the southern end of Punchbowl Street, the portion of Ala Moana Boulevard from Cooke Street to Auahi Street and from Ala Wai Boulevard to Kalākaua Avenue. The LRFI report indicates that these areas contain subsurface historic properties including cultural layers and human burials. Additionally, other areas have potential to encounter subsurface historic properties such as marsh and salt pan sediments, fishpond sediments, and buried structural remnants.

Based on the above information, **SHPD's determination is that an archaeological inventory survey (AIS) is necessary prior to project work** beginning in order to properly identify, document, and address potential effects to any archaeological historic properties within the project area. In addition to the AIS, **SHPD also requests the following prior to project work:**

- An archaeological inventory survey plan (AISP) shall be developed to guide the inventory survey; and
- SHPD shall be consulted regarding the development of the AISP, including the subsurface testing strategy.

SHPD looks forward to receiving and reviewing an AISP meeting the requirements of HAR §13-276-4. SHPD will notify you when the required reports and/or plans have been reviewed and accepted and project work may commence.

SHPD requests to be notified at the start of archaeological inventory survey fieldwork. Upon completion of fieldwork, SHPD looks forward to reviewing an archaeological inventory survey report meeting the requirements of HAR §13-276-5.

Although this document does not fulfill the requirements of an archaeological inventory survey as specified in HAR §13-276, it serves to facilitate project planning and supports the historic preservation review process. Please send one hardcopy of the document, clearly marked FINAL, along with a copy of this review letter via US mail, and a searchable pdf copy via email, to the Kapolei SHPD office, attention SHPD Library.

Please contact Kimi Matsushima at (808) 692-8027 or at Kimi.R.Matsushima@hawaii.gov if you have any questions regarding this letter.

Aloha,

Susan A. Lebo

Susan A. Lebo, PhD
Archaeology Branch Chief

cc. Jonathan Suzuki, Asst. Program Administrator, Capital Projects Division (Jsuzuki@hbws.org)

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

October 7, 2016

KIRK CALDWELL, MAYOR

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ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Susan A. Lebo, Ph.D.
Archaeology Branch Chief
State of Hawaii
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Boulevard, Suite 555
Kapolei, Hawaii 96707

Dear Dr. Lebo:

Subject: Your Letter Dated May 27, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project Tax Map Keys: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii, Log No: 2015.03880, Doc No. 1605KM14, Archaeology

Thank you for your letter dated May 27, 2016 regarding the Draft Environmental Assessment (DEA) for the Honolulu Water System Improvements project.

We have the following responses to your comments:

1. An Archaeological Inventory Survey Plan (AISP) and Archaeological Inventory Survey (AIS) will be done in accordance with Hawaii Administrative Rules (HAR) §13-276-4. The AISP and AIS will be developed and conducted, respectively, in consultation with the State Historic Preservation Division (SHPD).

2. The AISP will be submitted to SHPD for review and approval prior to commencement of the AIS.

3. SHPD will be notified at the start of the AIS field work.

4. Upon completion of the field work, an AIS report prepared in accordance with HAR §13-276-5 will be submitted to SHPD for review.

5. To facilitate in the development of the AISP, diagram(s) will be prepared indicating the refined limits and schedules for each of the individual projects that the DEA addresses. The diagrams(s) will be submitted to SHPD upon completion.

6. The additional archaeological requirements will delay the project by at least two years and increase construction costs, which will affect our ability to replace aging infrastructure.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

160227

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 768-4567
Web site: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROBERT J. KRONING, P.E.
DIRECTOR

MARK YONAMINE, P.E.
DEPUTY DIRECTOR

January 22, 2016

2016 FEB 10 A 11:57
BOARD OF WATER SUPPLY

Ms. Iris Oda, PE
Board of Water Supply
City and County of Honolulu
630 Beretania Street
Honolulu, Hawaii 96843

Dear Ms. Oda:

Subject: Request for comments on Honolulu Water System Improvements
TMK: (1) 1-5,1-7,2-1,2-3, and 2-6, Honolulu, Oahu, Hawaii

The Department of Design and Construction, Wastewater Division has the following comments:

The attached Map shows future wastewater projects (red lines) in the area of the proposed BWS construction projects. BWS construction projects should be coordinated with wastewater construction projects to avoid conflicts.

The Department of Design and Construction, Civil Division has the following comments:

1. Page 6, Table 2.1- Proposed Water System Improvements
   a. All proposed water mains shall be installed a minimum 3 foot deep in roadways.
   b. EA should discuss BWS projects Kalakaua Avenue Water System improvements, Phase II, III, and IV.

2. Page 53, Impacts and Mitigation Measures
Besides "Rehabilitation of Streets, Unit 77, along Pensacola Street", other City's Department of Design and Construction upcoming resurfacing projects that may be subject to the one-year moratorium include:

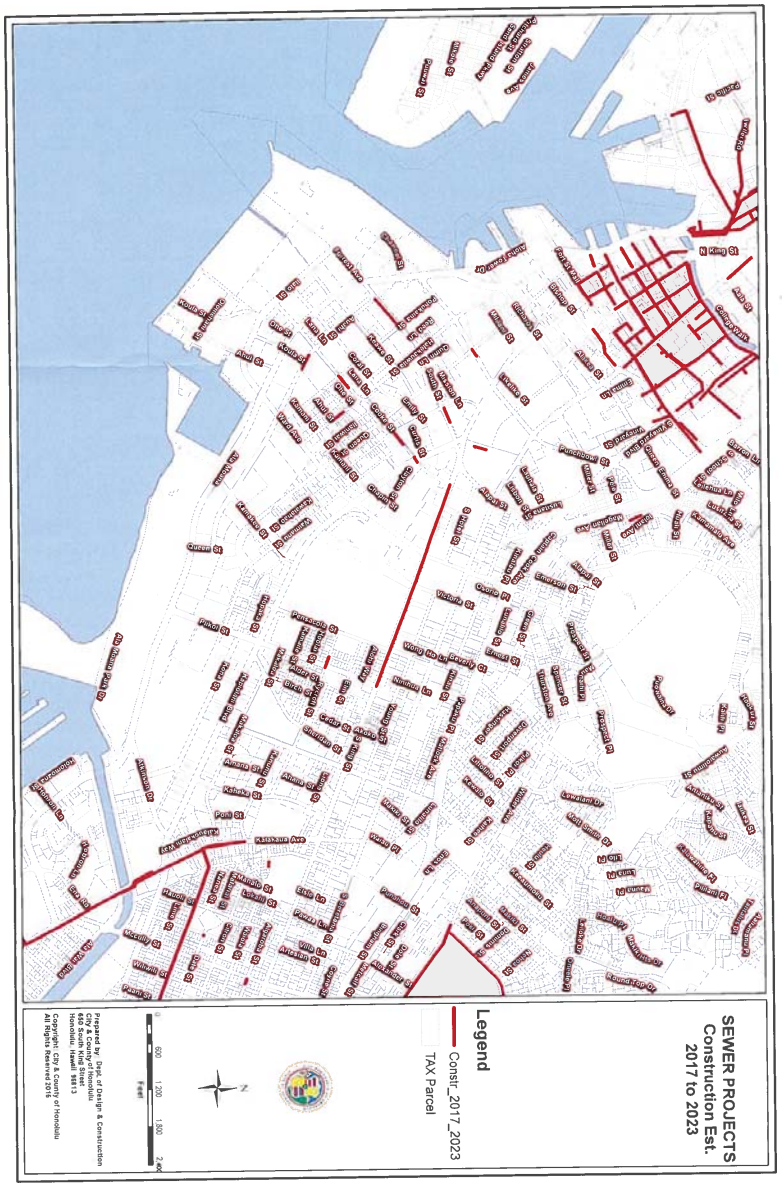
   a. "Rehabilitation of Streets, Unit 76-"Kalakaua Avenue", from Beretania Street to Ala Wai Boulevard
   b. "Rehabilitation of Streets, Unit 67- "King Street and Punchbowl Street", King Street from Bethel Street to Alapai Street and Punchbowl Street, from Vineyard Boulevard to King Street.
   c. "Rehabilitation of Localized Streets, Phase 12D- Chinatown", includes Nuuanu Avenue from Nimitz Highway to Vineyard Boulevard and River Street from Nimitz Highway to Beretania Street and Kukui Street to Vineyard Boulevard.

Thank you for the opportunity to review. Should there be any questions on comments from our Wastewater Division, Please contact Tina Ono at 768-8766, or for our Civil Division please contact Howard Kozo at 768-8403.

Sincerely,

Robert J. Kroning, P.E.
Director

RJK: ms (638497)



BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 21, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
DAVID C. HULIHEE
KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: ROBERT J. KRONING, P.E., DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR LETTER DATED JANUARY 22, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT - TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII

Thank you for your letter dated January 22, 2016 regarding the Draft Environmental Assessment (DEA) for the Honolulu Water System Improvements project.

We have the following responses to your comments:

1. The proposed waterline projects will be coordinated with the Department of Design and Construction Wastewater Division to minimize conflicts with future wastewater projects.

2. All proposed water mains shall be installed in accordance with Board of Water Supply Standards which call for a minimum 3 feet of cover.

3. A separate Environmental Assessment will be done for the Kalakaua Avenue Water System Improvements project.

4. We acknowledge that in addition to the "Rehabilitation of Streets, Unit 77 project discussed in the DEA, Rehabilitation of Streets, Unit 76, 67 and Rehabilitation of Localized Streets, Phase 12D projects may also be subject to the one-year moratorium.

5. We will continue to coordinate our schedule with your department to minimize impacts associated with construction.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Ulu'ohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768-3381
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

ROSS S. SASAMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

EDUARDO P. MANGLALLAN
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 16-106

February 2, 2016

Ms. Iris Oda, P.E.
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Ms. Oda:

SUBJECT: Draft Environmental Assessment
Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii
Ref. No. DRM 14-894

This is in reply to Gray, Hong, Nojima & Associates, Inc. letter dated January 7, 2016, on the above-subject project.

Our comments are as follows:

- Once construction phase commences, install approved Best Management Practices fronting all drainage facilities.
- During construction and upon completion of the project, any damages/deficiencies within City street right-of-ways shall be corrected to City standards and accepted by the City.
- Tall trenching work on City-owned or maintained roadways shall comply to the current City policy. See attachment.

If you have any questions, please contact Mr. Kyle Oyasato of the Division of Road Maintenance at 768-3697.

Sincerely,

Ross S. Sasamura, P.E.
Director and Chief Engineer

Attachment

cc: Gray, Hong, Nojima & Associates, Inc.

OFFICE OF THE MANAGING DIRECTOR

CITY AND COUNTY OF HONOLULU

530 SOUTH KING STREET, ROOM 306 • HONOLULU, HAWAII 96813
PHONE: (808) 523-4331 • FAX: (808) 523-4242 • INTERNET: www.honolulu.gov

JEREMY HARRIS
MAYOR

BENJAMIN B. LEE, FAIA
MANAGING DIRECTOR

MALCOLM J. TOM
DEPUTY MANAGING DIRECTOR

September 30, 2004

TO: ERIC CRISPIN, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

CLIFF JAMILE, P.E., CHIEF ENGINEER
BOARD OF WATER SUPPLY

TIMOTHY STEINBERGER, P.E., DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

LARRY LEOPARDI, P.E., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF FACILITY MAINTENANCE

FRANK DOYLE, P.E., DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

KEOKI MIYAMOTO, ACTING DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

BILL BALFOUR, JR., DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

DAVID ARAKAWA, CORPORATION COUNSEL
DEPARTMENT OF THE CORPORATION COUNSEL

FROM: BENJAMIN B. LEE, FAIA
MANAGING DIRECTOR

SUBJECT: **TRENCHING PERMITS AND REPAVING OF STREETS**

The policy for all trenching work on all City and County of Honolulu (City) owned or maintained roadways shall be as follows:

- Owner (HECO, VERIZON, GASCO, BWS, City agencies, and Others) shall **SELF CERTIFY** that trenching activities, which include all construction/emergency repairs, have been constructed as per City standards and/or specifications. Implicit to this certification is increased effort by the owners to take compaction tests (mechanical, nuclear gage, or other means) to ensure contract and specification compliance. The owners shall self-inspect their own or their contractors' work to ensure quality control and acceptable levels of compliance.

- The City shall work with the Hawaii Local Technical Assistance Program and others to provide an ongoing training program, which addresses the needs of inspectors to effectuate good quality trench restoration and pavement repair.

- The warranty period for all aspects of the trench restoration shall be increased to two years. Owners shall be responsible to correct any trench failures within that two-year period.

- All trenching in City roadways shall be designed to minimize trench alignment wandering with consideration given to the probable vehicles' wheel tracking within the travel way. This should help to provide improved pavement smoothness by keeping the trench locations outside of the vehicles' wheel tracking whenever possible.

- Flowable Fill or Controlled Low Strength Material (CLSM) shall be permitted for use as backfill as per the specifications. The CLSM shall be specified at a 28-day compressive strength between 50 and 100 psi to permit ease of subsequent mechanical excavation through the CLSM. The CLSM shall not be permitted higher than the bottom level of the permeable base layer so as to permit drainage flow through the pavement.

- Native soil or better material shall be permitted as long as the material conforms to City standards and specifications.

- The permanent pavement restoration shall be accomplished as soon as practicable but not to exceed two months after trench is backfilled. This applies to emergency repairs and designed/contracted construction.

- Trenches running longitudinally to the travel way on roadways where the paved travel way is greater than 36 feet shall be cold planed a minimum of two inches and repaved to the original grade. The paving shall be a minimum width of one lane not exceeding 15 feet in width with a minimum of two feet in added length to each end of the longitudinal trench. The replaced pavement within the trench limits, plus an additional one foot on each side of the trench (T-section), shall have a minimum thickness of four inches of asphalt concrete or match the existing pavement thickness, whichever is greater.

- Trenches running longitudinally to the travel way on roadways where the paved travel way is 36 feet or less shall be repaved to the trench width plus an additional one foot on each side of the trench (T- section) with a recommended two feet in added length to each end of the longitudinal trench. The replaced pavement shall have a minimum thickness of four inches of asphalt concrete or match the existing pavement thickness, whichever is greater.

- Trenches running perpendicular or skew to the travel way and/or longitudinal trenches less than ten feet in length shall be repaved a minimum of four feet wide with the trench centered within the paved width (T-section) or the paved area shall be the trench width plus an additional one foot on each side of the trench (T-section), whichever is greater. The length of the repaved trench shall be repaved a recommended two feet in added length to each end of the trench. The replaced pavement shall have a minimum thickness of four inches of asphalt concrete or match the existing pavement thickness, whichever is greater.

- Rectangular excavations (manholes or pits) shall be a minimum of three feet by four feet or two feet larger in each dimension than the excavated area, whichever is greater. The replaced pavement shall have a minimum thickness of four inches of asphalt concrete or match the existing pavement thickness, whichever is greater.

This policy is effective immediately. Please inform all applicable utility companies and governmental agencies and develop procedures to enforce this policy.

BENJAMIN B. LEE, FAIA
Managing Director

BBL:aa

CONCUR:

MAYOR JEREMY HARRIS

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 20, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
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KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: ROSS S. SASAMURA, P.E., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF FACILITIES MAINTENANCE

ATTN: KYLE OYASATO

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR LETTER DATED FEBRUARY 2, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT – TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII, REF: DRM 16-106

Thank you for your letter dated February 2, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We have the following responses to your comments:

1. Once the construction phase commences, the Contractor shall install approved Best Management Practices fronting all drainage facilities.

2. During construction and upon completion of the project, any damages/deficiencies within City street right-of-ways shall be corrected to City standards and accepted by the City.

3. All trenching work on City-owned or maintained roadways shall comply with the City's current policy per the Managing Director's memorandum entitled "Trenching Permits and Repaving of Streets" dated September 30, 2004.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DEPARTMENT OF PARKS & RECREATION

CITY AND COUNTY OF HONOLULU 160216

1000 Uluohia Street, Suite 309, Kapolei, Hawaii 96707
Phone: (808) 768-3003 • Fax: (808) 768-3053
Website: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHELE K. NEKOTA
DIRECTOR

JEANNE C. ISHIKAWA
DEPUTY DIRECTOR

January 22, 2016

2016 FEB -9 P 3:26

Ms. Iris Oda, PE
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Ms. Oda:

SUBJECT: Draft Environmental Assessment (EA)
Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6

Thank you for the opportunity to review and comment on the subject Draft Environmental Assessment for the proposed Board of Water Supply replacement and upgrade on various pipelines within Honolulu.

The Department of Parks and Recreation has no comment as the proposed project will have no impact on any of our programs and facilities. You may remove us as a consulted party for the balance of the EA process.

Should you have any questions, please contact John Reid, Planner at 768-3017.

Sincerely,

(for) Michele K. Nekota
Director

MKN:jr
(638559)

cc: Gavin Masaki, PE, Greg Hong Nojima & Associates, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
DAVID C. HULIHEE
KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: MICHELE K. NEKOTA, DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR LETTER DATED JANUARY 22, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT - TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII

Thank you for your letter dated January 22, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge that the Department of Parks and Recreation has no comments to offer as the proposed project will not impact any of your programs or facilities.

As requested, you will be removed as a consulted party for the balance of the process.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

KIRK CALDWELL
MAYOR

GEORGE I. ATTA, FAICP
DIRECTOR

ARTHUR D. CHALLACOMBE
DEPUTY DIRECTOR

2016/ELOG-71 (mw)

February 4, 2016

MEMORANDUM

TO: Ernest Y. W. Lau, P.E., Manager and Chief Engineer
Board of Water Supply

ATTN: Iris Oda, P.E.

FROM: George I. Atta, FAICP, Director
Department of Planning and Permitting

SUBJECT: Draft Environmental Assessment (EA) for Honolulu Water System Improvements

This is in response to your consultant's (Gray, Hong, Nojima & Associates, Inc.) letter dated January 7, 2016 requesting comments on your Draft EA for the Honolulu Water System Improvements. Our comments on the Draft EA are as follows.

1. Section 5.3, which quotes passages from the City's General Plan, should also quote the General Plan's Transportation and Utilities Objective C and its Policies 1 and 2, which emphasize the importance of proper maintenance and upgrades to all utility systems.

2. Section 5.4, which quotes two passages from the City's Primary Urban Center Development Plan (PUC DP), should also summarize the fifth bullet point of the PUC DP's Section 3.3.1.2, which discusses existing infrastructure deficiencies in the older areas of central Honolulu.

3. For your information, on Section 5.7 on Transit Oriented Development (TOD), the Ala Moana Neighborhood TOD Plan has not changed its total development capacity reflected in the July 2014 Public Review Draft.

Should you have any questions, please contact Mike Watkins of our staff at 768-8044.

GIA:js

cc: Gray, Hong, Nojima & Associates, Inc.
Attention: Gavin Masaki, P.E.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 21, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
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KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: GEORGE I. ATTA, FAICP, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

ATTN: MIKE WATKINS

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM DATED FEBRUARY 4, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT - TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII, Ref: 2016/ELOG-71 (mw)

Thank you for your memorandum dated February 4, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We have the following responses to your comments:

1. Section 5.3 of the document will be revised to include the General Plan's Transportation and Utilities Objective C, Policy 1 which emphasizes the importance of proper maintenance and upgrades to utility systems.

2. Section 5.4 of the document will be revised to include the Primary Urban Center Development Plan's Section 3.3.1.2, which discusses existing infrastructure deficiencies in the older areas of central Honolulu.

3. We acknowledge that the Ala Moana Neighborhood TOD Plan has not changed its total development capacity reflected in the July 2014 Public Review Draft.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

KIRK CALDWELL
MAYOR

MICHAEL D. FORMBY
DIRECTOR

MARK N. GARRITY, AICP
DEPUTY DIRECTOR

TP1/16-638687R

February 2, 2016

MEMORANDUM

TO: Ernest Y. W. Lau, P.E., Manager and Chief Engineer
Board of Water Supply

ATTENTION: Iris Oda, P.E.

FROM: Michael D. Formby, Director
Department of Transportation Services

SUBJECT: Draft Environmental Assessment (DEA) for Honolulu Water System Improvements, Honolulu, Oahu, Hawaii

This is in response to a letter we received from Ms. Sheryl E. Nojima, Ph.D., P.E., from Gray, Hong, Nojima & Associates, Inc. dated January 7, 2016, regarding the above DEA document.

We recommend that whenever feasible, the project includes complete streets provisions as part of the improvements.

Should you have any questions, please contact Renee Yamasaki of my staff at 768-8383.

cc: Mr. Gavin Masaki, P.E., Gray, Hong, Nojima & Associates, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
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FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: MICHAEL D. FORMBY, DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

ATTN: RENEE YAMASAKI

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM DATED FEBRUARY 2, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT - TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII, Ref: TP1/16-638687R

Thank you for your memorandum dated February 2, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We will review the complete street policy and whenever feasible implement applicable provisions.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

HART

HONOLULU AUTHORITY for RAPID TRANSPORTATION

160154

IN REPLY REFER TO:
CMS-AP00ENV-00659

Daniel A. Grabauskas
EXECUTIVE DIRECTOR AND CEO

BOARD OF DIRECTORS

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George I. Atta
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William "Buzz" Hong
Terrence M. Lee
Ivan M. Lui-Kwan

January 21, 2016

RECEIVED
BOARD OF WATER SUPPLY
2016 JAN 29 A 11:58

MEMORANDUM

TO: ERNEST Y. W. LAU
MANAGER AND CHIEF ENGINEER
HONOLULU BOARD OF WATER SUPPLY

ATTN: IRIS ODA, PROJECT ENGINEER

FROM: DANIEL A. GRABAUSKAS
EXECUTIVE DIRECTOR AND CEO

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA)
HONOLULU WATER SYSTEM IMPROVEMENTS
TAX MAP KEYS: (1) 1-5, 1-7, 2-1, 2-3, AND 2-6
HONOLULU, OAHU, HAWAII
REFERENCE NUMBER: CMS-AP00ENV-00446

Thank you for providing the Honolulu Authority for Rapid Transportation (HART) with the opportunity to comment on the Honolulu Board of Water Supply (BWS) proposed replacement and upgrades within Honolulu. Section 4.4.9 of the Draft EA identifies the areas of potential conflict between the Honolulu Rail Transit Project and the proposed water system improvements, and indicates that "the BWS and its consultants will work closely with HART and coordinate construction schedules and areas of construction activities." HART requests that BWS provide any planned design and construction dates for the various improvements that could assist in this effort.

If you have any questions regarding this matter, please contact Tomo Murata, Land Use Planner, at 768-6120.

Daniel A. Grabauskas
Executive Director and CEO

CITY AND COUNTY OF HONOLULU, Alii Place, Suite 1700, 1099 Alakea Street, Honolulu, Hawaii 96813
Phone: (808)768-6159 Fax: (808)768-5110 www.honolulutransit.org

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
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KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: DANIEL A. GRABAUSKAS, EXECUTIVE DIRECTOR AND CEO
HONOLULU AUTHORITY FOR RAPID TRANSPORTATION

ATTN: TOMO MURATA

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM DATED JANUARY 21, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT - TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII, Ref: CMS-AP00ENV-00659

Thank you for your memorandum dated January 21, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

The Board of Water Supply will provide your agency with the tentative design and construction schedules as they become available to assist in the coordination effort to minimize construction impacts.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

KIRK CALDWELL
MAYOR

MANUEL P. NEVES
FIRE CHIEF

LIONEL CAMARA JR.
DEPUTY FIRE CHIEF

January 26, 2016

TO: ERNEST LAU, P.E., MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: IRIS ODA, P.E., CIVIL ENGINEER
WATER RESOURCES LONG RANGE PLANNING

FROM: SOCRATES D. BRATAKOS, ASSISTANT CHIEF

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT
HONOLULU WATER SYSTEM IMPROVEMENTS
TAX MAP KEYS: 1-5, 1-7, 2-1, 2-3, AND 2-6

In response to a letter from Ms. Sheryl Nojima of Gray, Hong, Nojima, and Associates, Inc., dated January 7, 2016, regarding the above-mentioned subject, the Honolulu Fire Department determined that there will be no significant impact to fire department services.

Should you have questions, please contact Battalion Chief Terry Seelig of our Fire Prevention Bureau at 723-7151 or tseelig@honolulu.gov.

Socrates D. Bratakos

SOCRATES D. BRATAKOS
Assistant Chief

SDB/SY:bh

cc: Ms. Sheryl Nojima
Gray, Hong, Nojima, and Associates, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
DAVID C. HULIHEE
KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: SOCRATES D. BRATAKOS, ASSISTANT CHIEF
HONOLULU FIRE DEPARTMENT

ATTN: TERRY SEELIG, BATTALION CHIEF

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM DATED JANUARY 26, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT - TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII

Thank you for your memorandum dated January 26, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge the Honolulu Fire Department has no comments to offer as there will be no significant impacts to your services.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

KIRK CALDWELL
MAYOR

LOUIS M. KEALOHA
CHIEF

MARIE A. McCAULEY
CARY OKIMOTO
DEPUTY CHIEFS

OUR REFERENCE MT-DK

January 27, 2016

MEMORANDUM

TO: Ernest Y. W. Lau, P.E., Manager
Board of Water Supply

ATTENTION: Iris Oda, P.E.

FROM: Louis M. Kealoha, Chief of Police

SUBJECT: Draft Environmental Assessment
Honolulu Water System Improvements Project (Reference No. EO-WS)
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii

This is in response to a letter from Gray, Hong, Nojima and Associates, Inc. (dated January 7, 2016). The Honolulu Police Department (HPD) has reviewed the information provided and has concerns regarding the safe flow of vehicular traffic during the construction phase of this project.

This project will have an impact on traffic, particularly in the Kakaako and Downtown/ Chinatown areas of Honolulu. The Honolulu Police Department (HPD) recommends that the Board of Water Supply implement traffic controls and management (e.g., flagmen, special duty officers, signs, cones, etc.) for the project area. This will ensure a safe means of traffic flow for construction vehicles, motorists, and pedestrians in the vicinity.

If there are any questions, Major Roy Sugimoto of District 1 (Central Honolulu) may be contacted at 723-3327.

Louis M. Kealoha
Chief of Police

By
MARK TSUYEMURA
Management Analyst VI
Office of the Chief

cc: Mr. Gavin Masaki, P.E.
Gray, Hong, Nojima and Associates, Inc.

Serving and Protecting With Aloha

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

KIRK CALDWELL, MAYOR

DUANE R. MIYASHIRO, Chair
ADAM C. WONG, Vice Chair
DAVID C. HULIHEE
KAPUA SPROAT
BRYAN P. ANDAYA

ROSS S. SASAMURA, Ex-Officio
FORD N. FUCHIGAMI, Ex-Officio

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

TO: LOUIS M. KEALOHA, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

ATTN: MAJOR ROY SUGIMOTO
MARK TSUYEMURA

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM DATED JANUARY 27, 2016 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE HONOLULU WATER SYSTEM IMPROVEMENTS PROJECT - TAX MAP KEY: (1) 1-5, 1-7, 2-1, 2-3, 2-4 AND 2-6, HONOLULU, OAHU, HAWAII

Thank you for your memorandum dated January 27, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We have the following responses to your comments:

1. We acknowledge your department's concerns regarding traffic impacts during construction.

2. As a mitigative measure, traffic control plans will be developed during the design phase and coordinated with your department and appropriate state and city agencies. They will be included in the construction plans and implemented by the contractor.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

Water for Life . . . Ka Wai Ola

Gavin Masaki

From: GHN Email
Sent: Tuesday, February 09, 2016 9:54 AM
To: Sheryl Nojima; Gavin Masaki
Subject: FW: Honolulu Water System Improvements
Attachments: Honolulu Water System Improvements - Planning Comments Feb 2016.xlsx

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From: Kuwaye, Kristen [mailto:kristen.kuwaye@hawaiianelectric.com]
Sent: Tuesday, February 09, 2016 9:48 AM
To: GHN Email
Cc: Liu, Rouen
Subject: Honolulu Water System Improvements

Kristen Kuwaye on behalf of Rouen Liu

Dear Mr. Gavin Masaki,

Thank you for the opportunity to comment on the subject project. Hawaiian Electric Company has some proposed comments as there are a couple of existing (and one potential future) fiber cable routes in the vicinity of the project which we should be aware of. . Please see attachment. Another concern is the timeline listed will conflict with the City Center segment of the Rail project. Should HECO have existing easements and facilities on the subject property, we will need continued access for maintenance of our facilities.
We appreciate your efforts to keep us apprised of the subject project in the planning process. As the proposed Ala Wai 46kV Underground Transmission Cable Relocation Project comes to fruition, please continue to keep us informed. Further along in the design, we will be better able to evaluate the effects on our system facilities.
If you have any questions, please call me at 543-7245.

Sincerely,
Rouen Q. W. Liu
Permits Engineer
Tel: (808) 543-7245
Email: Rouen.liu@hawaiianelectric.com

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DEA Honolulu Water System Improvements EA
Telecom Planning Comments, 2-4-16

Project ID	Project Description	Potential Impact Location
A	Installation of new 24" replacement water main from: the vicinity of the intersection of River St and N. King St to the intersection of Ala Moana Blvd and Kalakaua Ave. Distance of approximately 20,000 feet	Ala Moana Blvd between River St and Fort St. Mall.
B	Installation of new 16" replacement water main along Nimitz Hwy between Pacific St and Sumner St: approximately 1355 ft	Vicinity of intersection of Nimitz Hwy and Sumner St.
C	Installation of new 24" replacement water main along Pensacola St. from Kinau St. to Wilder Ave. for approximately 1900 ft.	No impact anticipated.
D	Installation of new 16" replacement water main along Piikoi St from Ala Moana Blvd. to Kapiolani Blvd. for approximately 1510 ft.	Vicinity of intersection of Piikoi St and Kona St/Kapiolani Blvd.
E	Installation of new 16" replacement water main along Piikoi St from S. King St. to Kinau St. for approximately 1028 ft	Vicinity of intersection of Piikoi St and Beretania St.
F	Installation of new 20" replacement water main along Cooke St from Ala Moana Blvd. to Pohukaina St. for approximately 1038 ft	No impact anticipated.
G*, H*, I*	Alternate 24" water main project areas S. Nimitz Hwy. between Fort St Mall and Richards St. and makai to Aloha Tower Dr.	Ala Moana Blvd between Fort St. Mall and Richards St.

Comments
Existing fiber cables. Archer to Iwilei 138KV FO circuit (Dwg 13743). Will require further evaluation for potential existing electrical transmission lines.
Will require further evaluation for potential existing electrical transmission lines. Future fiber planned in vicinity of the project.
None
Existing fiber cables, Archer to Makaloa (AM-1) and Kewalo to Kamoku (KK-1). Will require further evaluation for potential existing electrical transmission lines.
Future fiber planned in vicinity of the project. Potential existing electrical transmission lines.
None
Future fiber planned in vicinity of the project. Existing fiber cables. Archer to Iwilei 138KV FO circuit (Dwg 13743). Will require further evaluation for potential existing electrical transmission lines.

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Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Rouen Q. W. Liu, Permits Engineer
Hawaiian Electric Company
P. O. Box 2750
Honolulu, Hawaii 96740

Attention: Kristen Kuwaye

Dear Mr. Liu:

Subject: Your E-Mail Dated February 9, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, TMKs: (1) 1-5, 1-7, 2-1, 2-3 and 2-6, Honolulu, Oahu, Hawaii

Thank you for your e-mail dated February 9, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge the potential impacts of existing and proposed fiber cables and electrical transmission lines in the vicinity of our project. We further acknowledge that the schedule of the proposed water system improvements may conflict with the City Center segment of the Rail project.

HECO will be consulted during the design and construction phases of the proposed water system improvement to minimize potential conflicts.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.

HAWAI'I GAS
THE CLEAN ENERGY COMPANY

March 7, 2016

Ms. Iris Oda, PE
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Ms. Oda:

Subject: Draft Environmental Assessment
Honolulu Water System Improvements
TMK: (1) 1-5, 1-7, 2-1, 2-3, and 2-6, Honolulu, Oahu, Hawaii

Please be advised that Hawaii Gas maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area and is interconnected with the utility network in Honolulu. We would appreciate your consideration during the project planning and design process to minimize any potential conflicts with the existing gas facilities in the project area.

Thank you for the opportunity to comment on the Draft Environmental Assessment. Should there be any questions, or if additional information is desired, please call Colin Chikamoto at 596-1430.

Sincerely,

Hawaii Gas

Keith K. Yamamoto
Manager, Engineering

KKY:krs

cc: ✓Gavin Masaki, PE, Gray, Hong, Nojima & Associates, Inc.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

June 16, 2016

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Manager and Chief Engineer

ELLEN E. KITAMURA, P.E.
Deputy Manager and Chief Engineer

Mr. Keith K. Yamamoto
Manager, Engineering
Hawaii Gas
P. O. Box 3000
Honolulu, Hawaii 96802-3000

Dear Mr. Yamamoto:

Subject: Your Letter Dated March 7, 2016 Regarding the Draft Environmental Assessment for the Honolulu Water System Improvements Project, Tax Map Key: (1) 1-5, 1-7, 2-1, 2-3, 2-4 and 2-6, Honolulu, Oahu, Hawaii

Thank you for your letter dated March 7, 2016 regarding the Draft Environmental Assessment for the Honolulu Water System Improvements project.

We acknowledge Hawaii Gas maintains underground utility gas mains in the project vicinity. We will verify gas main locations during the design and construction phases with your office to minimize any potential conflicts.

If you have any questions, please contact Iris Oda, Long-Range Planning Branch of our Water Resources Division at 748-5946 or email at IODA@hbws.org.

Very truly yours,

ERNEST Y. W. LAU, P.E.
Manager and Chief Engineer

cc: Sheryl Nojima, Gray Hong Nojima and Associates, Inc.