

**DEPARTMENT OF ENVIRONMENTAL SERVICES**  
**KA 'OIHANA LAWELAWE KAIĀPUNI**  
**CITY AND COUNTY OF HONOLULU**

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IN REPLY REFER TO:  
WEC.PE 25-009

May 28, 2025

Ms. Mary Alice Evans, Director  
Office of Planning and Sustainability Development  
State of Hawai'i  
235 South Beretania Street, Suite 702  
Honolulu, Hawai'i 96813

Dear Ms. Evans:

SUBJECT: West Loch Estates Wastewater Pump Station Upgrade

With this letter, the City and County of Honolulu, the Department of Environmental Services, hereby transmits the Final Environmental Assessment and Finding of No Significant Impact (FEA-FONSI) for the West Loch Estates Wastewater Pump Station Upgrade project situated at Tax Map Key (1) 9-1-181:001 (POR), in the 'Ewa District on the island of O'ahu for publication in the next available edition of The Environmental Notice.

The Department of Environmental Services has included copies of public comments and the corresponding responses from the applicant that were received during the 30-day public comment period on the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI).

In addition to this letter, we have also submitted the Environmental Review Program Online Submittal Form and an electronic copy of the FEA-FONSI in PDF format through the online submission portal.

Should you have any questions, please contact Paul Gamble from our Division of Wastewater Engineering and Construction at (808) 768-8744 or via email at paul.gamble@honolulu.gov.

Sincerely,

  
Digitally signed by  
Babcock, Roger W  
Date: 2025.05.28  
13:37:24 -10'00'

Roger Babcock, Jr., Ph.D., P.E.  
Director

cc: Department of Environmental Services, Wastewater Engineering and Construction Division

**From:** [webmaster@hawaii.gov](mailto:webmaster@hawaii.gov)  
**To:** [DBEDT OPSD Environmental Review Program](#)  
**Subject:** New online submission for The Environmental Notice  
**Date:** Monday, June 2, 2025 3:50:05 PM

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<b>Action Name</b>
West Loch Estates Wastewater Pump Station Upgrade Project
<b>Type of Document/Determination</b>
Final environmental assessment and finding of no significant impact (FEA-FONSI)
<b>HRS §343-5(a) Trigger(s)</b>
<ul style="list-style-type: none"><li>● (1) Propose the use of state or county lands or the use of state or county funds</li><li>● (3) Propose any use within a shoreline area</li></ul>
<b>Judicial district</b>
‘Ewa, O‘ahu
<b>Tax Map Key(s) (TMK(s))</b>
(1) 9-1-181:001 (POR)
<b>Action type</b>
Agency
<b>Other required permits and approvals</b>
National Pollutant Discharge Elimination System (NPDES) General Permit Appendix C: Discharges of construction storm water, Appendix F: Discharges of Hydrotesting Waters, Appendix G: Discharges Associated with Construction Activity Dewatering; City & County: Special Management Area Use Permit (Major), Noise Permit, Variance (for new aboveground fuel storage tank), Grading permit, Trenching Permit, Building Permit, Dewatering Permit
<b>Proposing/determining agency</b>
Department of Environmental Services (ENV)
<b>Agency jurisdiction</b>
City and County of Honolulu
<b>Agency contact name</b>
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1000 Uluohia Street, Suite 308  
Kapolei, Hawaii 96707  
United States  
[Map It](#)

#### Is there a consultant for this action?

Yes

#### Consultant

Environmental Planning Solutions, LLC

#### Consultant contact name

Colette Sakoda

#### Consultant contact email

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#### Consultant contact phone

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#### Consultant address

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[Map It](#)

#### Action summary

The West Loch Estates Wastewater Pump Station (WWPS), located in the leeward region of O'ahu, Hawai'i, services the West Loch Estates community. Located at the 91-1024 Kapapapuhi Street, 'Ewa Beach, it is sited within the western (ma'uka) portion of the City and County of Honolulu's West Loch Kapapapuhi Shoreline Park parking lot. The existing WWPS infrastructure and building, constructed 35 years ago, are in operable condition but improvements are required to address its aging condition and to comply with current codes and standards, as well as improve the reliability and operations of the WWPS to decrease the likelihood of failures.

#### Reasons supporting determination

Please refer to Section 10 Summary of Effects, and Section 11 Summary of Findings and Significance Determination in this FEA FONSI.

#### Attached documents (signed agency letter & EA/EIS)

- [WestLochEstates-WWPS-Upgr-FEA-FONSI\\_rev\\_060225.pdf](#)

#### ADA Compliance certification (HRS §368-1.5):

The authorized individual listed below acknowledges that they retain the responsibility for ADA compliance and are knowingly submitting documents that are unlocked, searchable, and may not be in an ADA compliant format for publication. The project files will be published without further ADA compliance changes from ERP, with the following statement included below the project summary in The Environmental Notice: "If you are experiencing any ADA compliance issues with the above project, please contact (authorized individual submitting the project and phone and/or email)."

#### Shapefile

The location map for this Final EA is the same as the location map for the associated Draft EA.

**Action location map**

- [Aerial-Location-Map2.zip](#)

**Authorized individual**

Colette Sakoda

**Authorized individual email**

[cmsakoda@gmail.com](mailto:cmsakoda@gmail.com)

**Authorized individual phone**

(808) 748-1529

**Authorization**

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

# **FINAL ENVIRONMENTAL ASSESSMENT**

*for*

## **WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE KAPAPAPUHI POINT PARK ‘EWA, O‘ahu, Hawai‘i**

*Prepared for:*

Kaula AE LLC  
Honolulu, Hawai‘i

*On Behalf of:*

City and County of Honolulu Department of Environmental Services (ENV)  
Wastewater Engineering & Construction Division (WEC)  
Honolulu, Hawai‘i

*Prepared by:*

Environmental Planning Solutions, LLC  
Honolulu, Hawai‘i

June 2025

*This document is submitted pursuant to Chapter 343 Hawai‘i Revised Statutes and Chapter 11-200.1, Hawai‘i Administrative Rules*

# **FINAL ENVIRONMENTAL ASSESSMENT**

FOR

## **WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE KAPAPAPUHI POINT PARK 'EWA, O'AHU, HAWAI'I**

City and County of Honolulu  
Department of Environmental Services (ENV)  
Wastewater Engineering & Construction Division (WEC)  
Honolulu, Hawai'i

June 2025

*This document is submitted pursuant to Chapter 343 Hawai'i Revised Statutes and Chapter 11-200.1, Hawai'i Administrative Rules*

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Appendix B	Final Hazardous Materials Assessment, Haley & Aldrich, October 2024
Appendix C	Trees Assessment Report, Murata Landscape Architect/Planner LLC, July 2024
Appendix D	Archaeological Literature Review and Field Inspection, Cultural Impact Assessment Keala Pono Archaeological Consulting, 2024 End of Field Work (EOF) Monitoring Report, July 2024
Appendix E	Geotechnical Recommendations Report, Haley & Aldrich, October 2024
Appendix F	Early Consultation: Comments Received during the Pre-Assessment and DEA Comment Periods

## ***Acronyms and Abbreviations***

AC	Asphalt Concrete
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AMSL	above mean sea level
ARV	Air Relief Valve
bgs	below ground surface
BMPs	Best Management Practices
BWS	Honolulu Board of Water Supply
CAB	Clean Air Branch
CFR	Code of Federal Regulations
cm	centimeter
COPC	Contaminants of potential concern
CWA	Clean Water Act
CWB	Clean Water Branch
CZMA	Coastal Zone Management Act
CZM	Coastal Zone Management Federal Consistency Review
CZO	Comprehensive Zoning Ordinance
CZMP	Coastal Zone Management Program
dBA	Decibels
DBEDT	Department of Business, Economic Development, and Tourism, State of Hawai‘i
DEA	Draft Environmental Assessment
DEAL	Direct Exposure Action Level
DLNR	Department of Land and Natural Resources, State of Hawai‘i
DOE	Department of Education, State of Hawai‘i
DOFAW	Department of Forestry and Wildlife, State of Hawai‘i
DOH	Department of Health, State of Hawai‘i
DPP	Department of Planning and Permitting
EA	Environmental Assessment
ECP	Erosion Control Plan
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency

## ***Acronyms and Abbreviations***

ESA	Endangered Species Act
F	Fahrenheit
FEA	Final Environmental Assessment
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FONSI	Finding of No Significant Impact
ft	Feet
GHG	Green House Gas
H-1	Interstate Highway 1
HAR	Hawai'i Administrative Rules
HDOH	Department of Health, State of Hawai'i
HDOT	Department of Transportation, State of Hawai'i
HFD	Honolulu Fire Department
HPD	Honolulu Police Department
HRS	Hawai'i Revised Statutes
HSTP	Hawai'i State Transportation Plan
LOS	Level of Service
lf	Linear Feet
MOU	Memorandum of Understanding
NFIP	National Flood Insurance Program
NFPA	National Fire Protection in Wastewater Treatment & Collection Facilities
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OEQC	Office of Environmental Quality Control
OP	DBEDT, Office of Planning & Sustainable Development
POLs	Petroleum, Oils, and Lubricants
PM	Particulate Matter
ppt	parts per thousand
PVC	Polyvinyl Chloride

## ***Acronyms and Abbreviations***

ROW	Right-of-way
SCADA	Supervisory Control and Data Acquisition system
SHPD	State Historic Preservation Division
SMA	Special Management Area
TMP	Traffic Management Plan
TMK	Tax Map Keys
USDA	U. S. Department of Agriculture
USFWS	U. S. Fish & Wildlife Service
USGS	U. S. Geological Survey

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## ***Section 1*** ***Project Summary***

Project:	West Loch Estates WWPS Upgrade, 'Ewa , Island of O'ahu, Hawai'i
Project Applicant:	City & County of Honolulu Department of Environmental Services (ENV)
Approving Authority:	City & County of Honolulu Department of Environmental Services (ENV)
Agent:	Kaula AE LLC
Location:	'Ewa Island of O'ahu, Hawai'i 96706
Proposed Action:	Construction of engineering upgrades to the 34-year old WWPS Pump Station
Present Use:	Wastewater Pump Station facility
Tax Map Keys (TMK) & Address:	(1) 9-1-181:001 (por) 91-1024 Kapapapuhi Street
Land Area Used:	Approximately 4,000 square feet (sf)
Flood Zones:	Zone X
State Land Use District:	Agricultural & Urban
Special Management Area (SMA):	Yes
City and County of Honolulu Zoning:	AG-1 Restricted Agricultural District
Land Ownership:	City and County of Honolulu
Permits That May be Required:	STATE: Environmental Assessment (EA) under Hawai'i Revised Statutes (HRS), Chapter 343; National Pollutant Discharge Elimination System (NPDES) General Permit Appendix C: Discharges of construction storm water, Appendix F: Discharges of Hydrotesting Waters, Appendix G: Discharges Associated with Construction Activity Dewatering; City & County: Special Management Area Use Permit (Major), Noise Permit, Variance (for new aboveground fuel storage tank), Grading permit, Trenching Permit, Building Permit, Dewatering Permit
Anticipated Determination	Finding of No Significant Impact (FONSI)

## ***Section 2***

### ***Project Purpose and Location***

#### ***2.1 Background***

The City and County of Honolulu Department of Environmental Services (ENV) proposes to rehabilitate and upgrade the West Loch Estates Wastewater Pump Station (WWPS) in the 'Ewa District of O'ahu, Hawai'i, and has prepared this HRS, Chapter 343, Environmental Assessment (EA) to provide information on the project and the potential for environmental effects from the proposed action. Due to the project site's location in the City and County of Honolulu's Special Management Area, an SMA permit is required.

The West Loch Estates Wastewater Pump Station (WWPS), located in the leeward region of O'ahu, Hawai'i, services the West Loch Estates community. Located at the 91-1024 Kapapapuhi Street, 'Ewa Beach, it is sited within the western (ma'uka) portion of the City and County of Honolulu's West Loch Kapapapuhi Shoreline Park parking lot. An aerial view location map is shown in Figure 1.

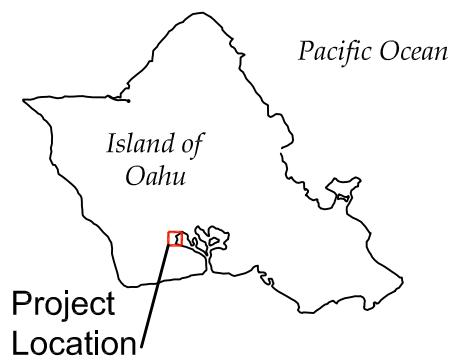
The existing WWPS infrastructure and building are in operable condition but improvements are required to address its aging condition and to comply with current codes and standards, as well as improve the reliability and operations of the WWPS to decrease the likelihood of failures. In 2023, the City conducted a technical/operational review of the state of the condition of its West Loch Estates WWPS in accordance with the National Fire Protection in Wastewater Treatment & Collection Facilities Association (NFPA) 820 standards. The purpose of this review was to evaluate the physical, hydraulic, operational, reliability, and regulatory conditions of the facility, and to recommend alternatives to address the identified constraints and deficiencies.

Operating under the guidance of the City and County of Honolulu's 'Ewa Development Plan and West Māmala Bay Wastewater System, the West Loch Estates WWPS was placed into service in 1989. An 8-inch and 12-inch diameter gravity sewer line serving the West Loch Estates community and a 4-inch gravity sewer line serving the comfort station of Kapapapuhi Point Park feeds into the pump station. Flow discharges from the pump station via a 10-inch force main (FM). This force main is approximately 4,500 linear feet in length, travels northward along Pearl Harbor shoreline, and discharges into a manhole located on the shoreside of Waipahu's industrial area then gravity-flows to the Kunia WWPS, and eventually to the Honouliuli Wastewater Treatment Plant (WWTP) (Design Alternatives Report, Kaula AE LLC, April 21, 2023).

#### ***2.2 Purpose and Need of Project***

As stated in Section 2.1, the West Loch Estates WWPS was placed into service in 1989 and its existing infrastructure and building are in operable condition. However, improvements are required to address the West Loch Estates WWPS' need to eliminate any potential hazardous conditions and to address other code issues.

**Figure 1**  
**Aerial Location Map**



**Aerial Location Map**  
West Loch Estates Wastewater  
Pump Station (WWPS) Upgrade

TMK: 9-1-181:001  
Ewa, Oahu, Hawaii  
City & County of Honolulu

Environmental Planning Solutions, LLC



0 250 500  
Feet

## *2.3 Purpose of Environmental Assessment*

The purpose of this Environmental Assessment (EA) is to address the requirements of HRS, Chapter 343, and Hawai'i Administrative Rules (HAR), Chapter 11-200.1. The specific action that requires the preparation of this EA includes the use of state land and/or County funds for the proposed action.

This EA incorporates comments received during the pre-assessment and Draft EA comment periods and provides information and evaluation of the potential for adverse environmental impacts on the natural and built environment associated with the proposed project. The 'Ewa Neighborhood Board is being kept apprised of the proposed action during its regularly scheduled meetings in 2025 and as needed during project construction. The Draft EA was filed and published with the ERP (formerly OEQC) January 23, 2025 to February 24, 2025 for its 30-day public comment period. All relevant written comments received during the 30-day public comment periods have been addressed in the revisions and finalization of this document. Comment letters and their responses are included in Appendix F of this Final EA.

## *2.4 Project Location*

The West Loch Estates Wastewater Pump Station (WWPS) is located in the leeward region of Oahu, at 91-1024 Kapapapuhi Street, Ewa Beach, Hawai'i. The WWPS is located within the parking lot serving Kapapapuhi Point Park (aka West Loch Community Shoreline Park), and its access is via City and County-owned Kapapapuhi Street.

## ***Section 3***

### ***Project Description, Estimated Construction Cost and Schedule***

#### ***3.1 Description of Proposed Project***

The City and County of Honolulu Department of Environmental Services (ENV) proposes to update the West Loch Estates Wastewater Pump Station (WWPS) in the 'Ewa District of O'ahu, Hawai'i, and is preparing a HRS, Chapter 343, Environmental Assessment (EA) to provide information on the project and the potential for environmental effects from the proposed action. Due to the project site's location in the City and County of Honolulu's Special Management Area, an SMA permit is required. This 2,300 square foot (sf) project site is located within the 80-acre City and County's West Loch Shoreline Kapapapuhi Park.

The City conducted a technical/operational review of the state of the condition of its West Loch Estates WWPS. The purpose of the Design Alternatives Report (DAR) (Kaula AE, April 2023) was to evaluate the physical, hydraulic, operational, reliability, and regulatory conditions of the facility, and to recommend alternatives to address the identified constraints and deficiencies. The existing West Loch Estates WWPS infrastructure and building are in operable condition, but improvements are required to address its aging condition and to comply with current codes and standards. According to the CSM personnel, the existing submersible pumps are running fine, with no overflow or spill problems observed. Besides the fact that the building and electrical room are located over the wet well and creating a potentially hazardous environment, other deficiencies that were observed during the field investigation are described below.

Having the wet well in the same room and adjacent to the electrical equipment is not a currently preferred or recommended design but was a typical design when constructed 35 years ago. This situation has not resulted in shutdowns or other operational problems per maintenance logs from the station.

The single exhaust fan in the pump room provides the only air flow for the building. There is no combustible gas detection system, airflow monitoring system nor alarm signaling system observed at the site.

NFPA\* 820 - *Standard for Fire Protection in Wastewater Treatment and Collection Facilities* states that pump rooms not physically separate from the wet well are required to be continuously ventilated at a minimum of 12 air changes per hour to protect the equipment and facility from corrosive, flammable and explosive gas buildup. NFPA 820 also requires "loss of flow" detectors, indicators or alarms.

An approximately 6-foot-high cement rubble masonry (CRM) wall surrounds the site and appears to be well-maintained. The wall appears to have created ADA-compliance and clearance issues along the south and east sides of the CRM wall and the exterior walls of the pump station building. In addition, the CRM wall has restricted access to the existing generator room and removal of the generator. Minor exterior damage to the building's south and west side walls was also observed.

The damages included minor cracking, chipping and spalling. The building’s roof appears to be in good condition and seems to have been replaced relatively recently. An existing aboveground fuel storage tank is located in the west yard. It appears to be in good condition but is situated too close to the pump station building and does not have any spill containment.

From the as-built drawings, the two (2) existing wastewater submersible pumps were each sized for the following capacities:

Capacity: 706 gpm  
Head: 32 ft TDH (total dynamic head)

Review of the last five (5) years of Supervisory Control and Data Acquisition (SCADA) system data for the West Loch Estate pump station revealed that even during high rainfall weather the pump station is able to handle the increased flow with only one (1) pump. Based on the recent SCADA data and the selected peak flow, a design capacity of 730 gpm capacity is expected to be sufficient for the new pumps. Pumps were selected based on a peak flow of 730 gpm and TDH of 21 feet. Two pumps would be provided. One pump would be in operation and the second pump would be a standby pump. The pump motors would be approximately 10 HP.

The existing West Loch Estates WWPS infrastructure and building which services the West Loch community, are in operable condition but improvements are required to address its aging condition and current code issues. The building and electrical room are located over the wetwell, creating a potentially hazardous environment. Additionally, the existing surrounding 6-foot high cement rubble masonry (CRM) wall presents ADA-compliance and clearance issues, and an existing aboveground fuel storage tank is situated too close to the pump station building and does not have any spill containment.

To address these safety and access concerns, the following improvements are proposed:

- Creating an open breezeway within the existing pump station building by removing portions of the north and south walls of the building and adding security mesh screening. The mesh screening will be heavy-duty and vandal resistant to provide security and prevent unauthorized entry into the pump station room. It shall replace the portions of the north and south walls of the pump station building that are removed to create an open breezeway.
- Relocating the emergency generator and day tank into a newly constructed generator room attached to the existing building, located at the northwest corner of the existing generator room.
- Relocating the electrical motor control center (MCC) and supervisory control and data acquisition (SCADA) system into the existing generator room to provide a separate electrical room away from the pumps.
- Enlarging the existing wastewater pump station site by relocating the north and east CRM walls further outward. This will add approximately 1,700-sf to the existing WWPS site, bringing the total occupied site to 4,000-sf. The larger site will allow for more space to

properly operate and maintain the pump station, including providing a dedicated parking space for a maintenance vehicle.

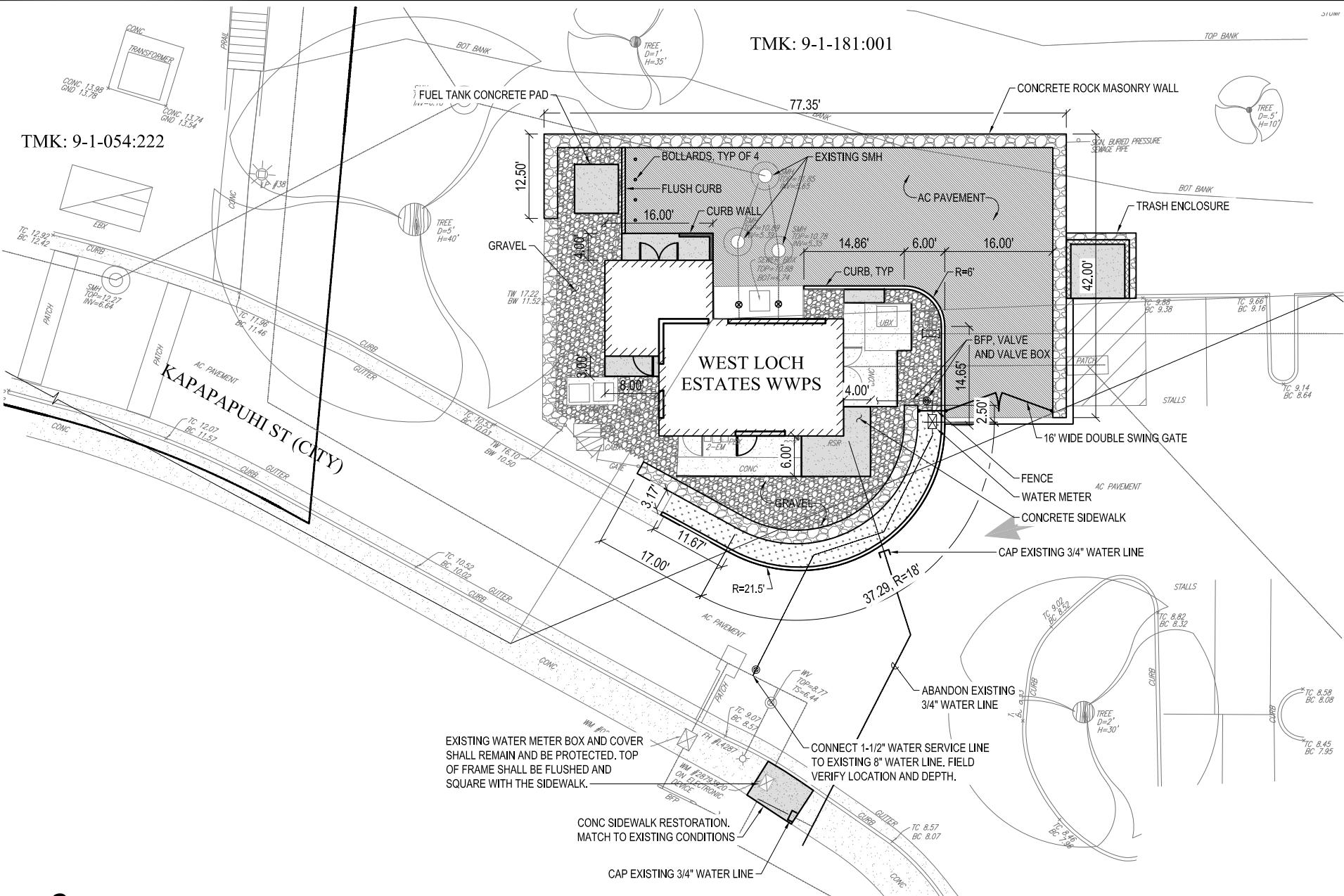
Other proposed improvements include the following:

- Replacement of the submersible pumps, guiderail and associated appurtenances
- Replacement of 6- and 10-inch force main piping, valves and appurtenances within the pump room from wastewater pump connection to bypass connection point
- Install new Air Relief Valve (ARV) on 10-inch force main piping
- Replacement of the influent gate valves and operators
- Rehabilitation and coating of the wetwell
- Replacement of level control system
- Site improvements including repair/replacement of the entrance gates
- Architectural improvements including window and door replacements, and interior and exterior painting
- Structural improvements including reinforcement of the new openings on the north and south walls, and installation of security mesh screening
- Ventilation system for the restroom, new generator room, and new electrical room
- New air gap tank and piping
- Replacement of the restroom facilities
- Electrical improvements including replacement of and/or upgrades to the MCC and SCADA system
- Construction of a new attached generator room to house a new diesel fuel generator and day tank
- Installation of an aboveground double-walled fuel storage tank and reducing the tank size from the standard minimum of 1,000-gallon to 500-gallon
- Replacement of the existing venturi meter
- Installation of a flushing tank to service flow, discharge pressure and wet well level transmitter
- Relocation of the force main bypass system
- Park paved parking lot site improvements including construction of a new trash enclosure, and
- Water system improvements

All proposed improvements are to be accomplished within the existing enlarged 4,000 sf project site. See Figures 2 Site Plan, and 3 and 4 Typical Sections, Elevations.

Staging/storage area for contractor usage during the construction phase: The staging/storage area is planned to be located within the northern parking stalls of the park, closest to the wastewater pump station facility.

The proposed project addresses the potential hazardous environment created by having the existing wetwell under and within the pump station structure along with the electrical equipment. The solution to eliminating this hazardous environment is to remove one or more of the walls of the pump station building, creating an open-air environment. It is proposed to demolish the north wall and part of the south wall of the pump room and for security, replacing them with a heavy-duty mesh screen enclosure fence. The existing roof will remain in place. In addition, the generator will be relocated outside of the existing structure into a newly constructed generator room, and the electrical equipment moved into the old generator room to address other code issues.



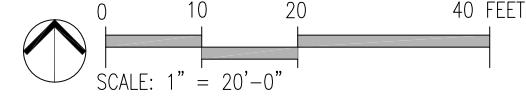
**Figure 2**

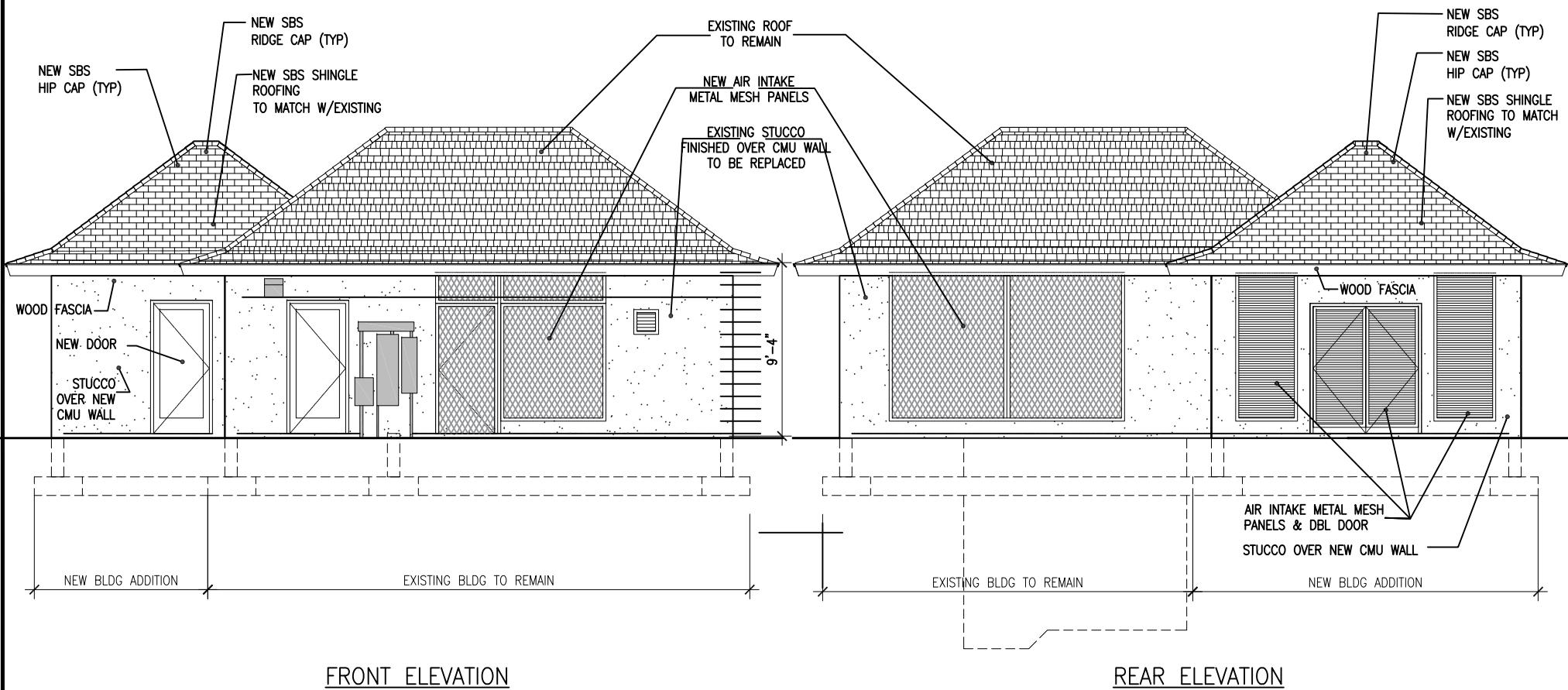
**Proposed Site Plan**

West Loch Estates Wastewater Pump Station (WWPS) Upgrade

**TMK: 9-1-181:001**  
Ewa, Oahu, Hawaii  
City & County of Honolulu

Environmental Planning Solutions, LLC





**Figure 3**

### Pump Building Elevation 1

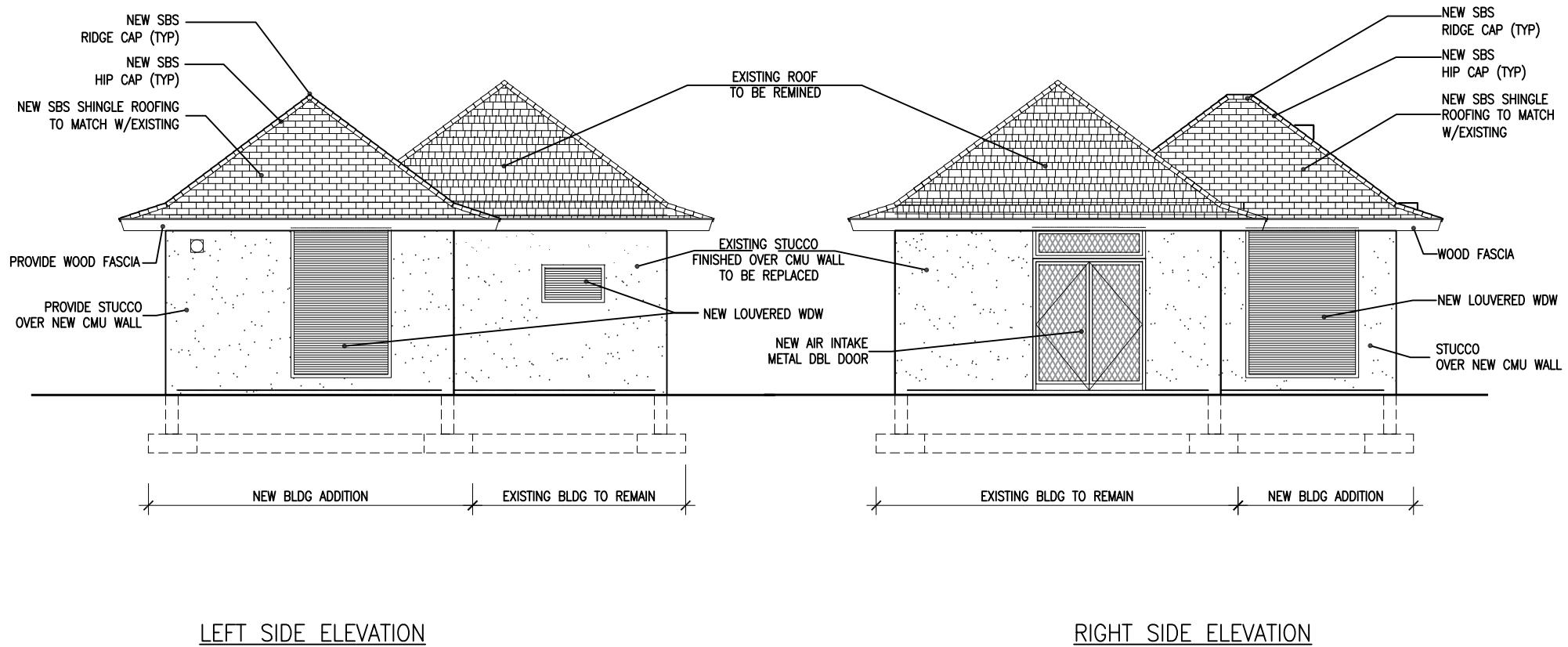
West Loch Estates Wastewater  
Pump Station (WWPS) Upgrade

TMK: 9-1-181:001  
Ewa, Oahu, Hawaii  
City & County of Honolulu

Environmental Planning Solutions, LLC

0 2 5 10 FEET

SCALE: 1/8" = 1'-0"



**Figure 4**

**Pump Building Elevation 2**

West Loch Estates Wastewater  
Pump Station (WWPS) Upgrade

TMK: 9-1-181:001  
Ewa, Oahu, Hawaii  
City & County of Honolulu

Environmental Planning Solutions, LLC

0 2 5 10 FEET

SCALE: 1/8" = 1'-0"

### *3.2 Property Ownership*

The project property, Tax Map Key no. (9) 1-181:001 (por), is owned entirely by the City and County of Honolulu. See Figure 5, Tax Map Key Boundaries.

### *3.3 Construction Activities*

Demolition and construction related traffic, noise, and air quality (dust) disturbances are anticipated. Construction equipment used for this project may include but is not limited to use of a loader, bulldozers, dump trucks, loader-backhoe, trencher, grader, water trucks, and flatbed trucks. The contractor will be required to observe and comply with all federal, state, and City & County of Honolulu laws required for the protection of public health, safety, and the environment.

The contractor will prepare a Best Management Practices (BMPs) Plan for this project. The BMPs Plan will consist of erosion control measures such as planting or hydromulching grass seedling, erecting silt fencing/curtains, berms, and/or other applicable erosion control devices to prevent construction related soils and silt from mixing with storm water runoff and will be used in accordance with the Occupational Safety and Health Administration requirements (part 3, Chapter 132). No blasting will be required or allowed.

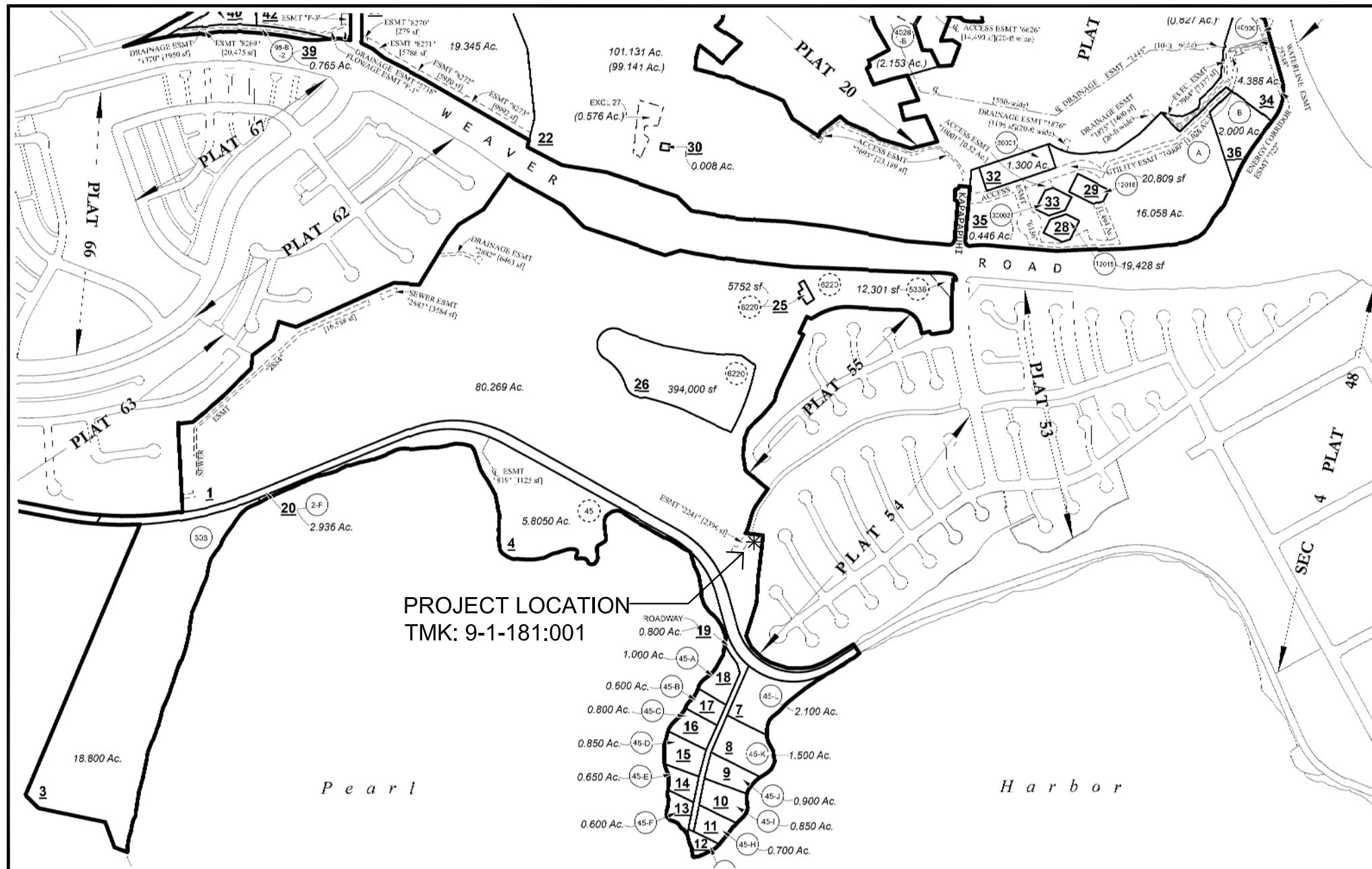
Upon the completion of work, areas surrounding the project site that have been affected by construction will be restored as much as practicable to pre-existing conditions. The following will be required:

- All construction-related debris, including excavated material, fill material, and refuse shall be removed from the project site and disposed of properly by the contractor.
- All construction equipment shall be removed from the project site promptly after construction is complete.
- Any temporary modification to existing utilities, such as power or communications lines, shall be repaired to their pre-existing condition.
- Roadways providing access to the site shall be cleared of construction debris and any damage from construction traffic repaired.
- All areas damaged by construction staging shall be restored. Exposed ground areas shall be seeded or hydromulched as appropriate.

Temporary utility lines will be removed from the site and all surplus excavation material and construction debris will be removed and disposed of off-site in compliance with applicable State, and City and County of Honolulu regulations.

### *3.4 Project Schedule and Cost*

The planned project schedule will include working with government agencies, perform site and environmental studies, and process the required permitting and design documents. The proposed project is estimated to cost approximately \$4,401,500 (\$4.4 million) (Kaula AE, 2023), and will be borne by the City and County of Honolulu. Construction is tentatively scheduled to commence as early as mid-2027.



## Figure 5

## **TMK Boundaries**

# West Loch Estates Wastewater Pump Station (WWPS) Upgrade

TMK: 9-1-181:001  
Ewa, Oahu, Hawaii  
City & County of Honolulu

Environmental Planning Solutions, LLC



NOT TO SCALE

## ***Section 4***

### ***Project Alternatives and Preferred Alternative***

#### ***4.1 Alternatives to the Proposed Action***

Alternatives to the proposed project include: (1) the No Action Alternative; (2) the Delayed Action Alternative; and (3) The Preferred Action Alternative. A description of each is provided below.

##### ***4.1.1 No Action***

The No Action alternative involves no action to upgrade the West Loch Estates WWPS. Taking No Action would avert the potential for negative adverse environmental impacts associated with construction activities and would eliminate the need for the expenditure of approximately \$4.4 million in construction costs.

The No Action alternative, however, would fail to accomplish the project objective to improve the function and efficiency of the community's WWPS that would serve its wastewater infrastructure reliability for the next 20 to 30 years.

Because the No Action alternative would fail to accomplish the objective of the project it is rejected from further consideration.

##### ***4.1.2 Delayed Action***

The Delayed Action alternative involves the construction of the project, but at a later date. Delaying the project would temporarily avoid the potential for adverse environmental effects and the need for the expenditure of funds for planning, design, development, and construction activities. However, because the potential for environmental impacts and project costs would only be delayed, impacts and costs associated with the project would eventually be borne when the project is implemented.

Delaying the project to a later time is expected to have virtually the same effect as the No Action alternative:

- Construction costs would be averted in the short-term but are expected to ultimately be higher due to inflation and other factors while resulting in environmental outcomes similar to the Preferred Alternative of proceeding with the proposed project.
- Delayed Action would also delay the project's implementation schedule for necessary environmental safety and accessibility improvements.

Because the Delayed Action alternative would fail to accomplish the project objective to provide infrastructure improvements that would support the long term goal of the City and County's need to ensure reliable and environmentally sound wastewater system operations at the West Loch Estates WWPS, it is also rejected from further consideration.

##### ***4.1.3 Preferred Alternative***

As stated in Section 2.1 Background of this Environmental Assessment, a Design Alternatives Report (Kaula AE, 2023) was prepared for the purpose of evaluating and presenting the physical,

hydraulic, operational, reliability, and regulatory conditions of the facility, and to recommend alternatives to address the identified constraints and deficiencies.

Three alternative design scenarios were generated and closely evaluated based on the following criteria:

- Constructability and Cost
- Operation and Maintenance
- Facility Reliability
- Health and Safety
- Regulatory Statutes and Industry Standards
- Impacts to the Community and Environment

Three (3) potential design alternatives were considered. It was requested that one of these alternatives consider the conversion of the existing submersible pump wet-pit design to the City's standard of separate wet-pit/dry-pit design.

The three (3) proposed alternatives considered to address the code compliant issue, were as follows:

- Alternative 1: Construct Open-Air Pump Room
- Alternative 2: Remove Existing Aboveground Pump Room Structure
- Alternative 3: Construct New Wet Well and Dry Pit

Alternative 1 and Alternative 2 offered two options associated with them as follows:

- Option A: Emergency generator and day tank with integral fuel storage tank to be relocated from the existing generator room into a separate prefabricated sound attenuation outdoor enclosure located in the northwest corner of the station's site to stay within the existing pump station footprint.
- Option B: Emergency generator and day tank to be relocated into a separate building to be constructed initially within the northeastern yard of the station.

The design alternative providing the best option for upgrade improvements to the West Loch Estates WWPS and the City ENV's preferred alternative which features construction of an open-air pump room and the emergency generator and day tank relocated into a new generator room located at and attached to the northwest corner of the existing structure (aka Alternative 1B.2). The proposed upgrades increase the longevity and reliability of the facility and provide for a safer environment for operations personnel. Further, the proposed upgrades improve reliability for the surrounding community. The main benefits of the preferred alternative include the following:

- Cost to bring the pump station up to current codes and standards is favorable, considering that the emergency generator will be housed in its own room and not in a pre-fabricated enclosure or separate building.
- Replacement of the existing submersible pumps will increase the longevity of

the pump station. One pump will have the capability of handling design peak flows with the second pump acting as standby.

- Replacing all existing gate valves with new knife gate valves may decrease the occurrence of ragging and clogging, therefore, improving pump performance.
- Rehabilitation to the wetwell increases its service life.
- No additional building/structure to maintain.
- Antiquated electrical and control equipment, such as the MCC and SCADA cabinet, will be replaced with newer models and technologies to provide improved operations and maintenance capabilities in its own room.
- Expanded pump station site provides additional work area, parking space and secures venturi meter within pump station site.

1. Constructability and Cost: Each new pump will be capable of handling design peak flows; Wetwell rehabilitation increases longevity of wetwell structure; No additional building structure to maintain; Construction of an attached generator room will require partial modification of the existing roof line; New outdoor aboveground fuel storage tank is needed.
2. Operation and Maintenance: Updated pumps, piping and appurtenances, and electrical/mechanical components ensure longevity and ease of maintenance; With the additional land area, the pump station facility now includes a vehicle parking/loading service area; Flow meter is now secured inside of pump station; All equipment (pumps, generator, MCC, SCADA, etc.) are housed within one building.
3. Facility Reliability: Updated pumps, piping and appurtenances, and electrical/mechanical components ensure longevity and improves monitoring capabilities; Replacing gate valves with knife gate valves may reduce the occurrence of ragging and clogging; Updated ventilation system and new warning systems improve working conditions for operators and warn against explosion risk; Updated restroom facilities available for operators.
4. Regulatory Statutes and Industry Standards: Upgrades to the pump station meet current building code and industry standards.
5. Community and Environment: Upgrades improve longevity and reliability for service to the surrounding community.

Based on the above, the Preferred Alternative is to upgrade the West Loch Estates WWPS as described in Section 3, Project Description, Estimated Construction Cost and Schedule, of this document. The Preferred Alternative meets the objective of addressing the City and County of Honolulu's ongoing commitment to provide current and efficient wastewater services to the West Loch Estates community, the 'Ewa region, and O'ahu.

## ***Section 5***

### ***Description of Existing Site Conditions, Potential Impacts, and Proposed Mitigation***

This section summarizes the existing environmental setting, potential short- and long-term, secondary, and cumulative effects of the proposed project, and mitigation measures. Short-term effects are from construction and infrastructure improvement activities, while long-term effects continue or occur after the project is completed. Although the subject EA document does not require an assessment of impacts according to National Environmental Policy Act (NEPA) requirements, the definition of impacts, according to NEPA, provides guidance toward understanding potential environmental impacts and applicability to this project.

Secondary impacts are generally defined as those induced or caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR §§ 1500-1508). Potential cumulative effects may result from the incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions (40 C.F.R. §1508.7).

#### ***5.1 Existing Site Conditions***

##### ***5.1.1 Description***

The project site is located approximately 500 feet (0.10 mi.) west of the West Loch of Pearl Harbor on the island of O'ahu, at the southern end of Kapapapuhi Street, Ewa Beach, approximately 17 miles west of the primary urban center of Honolulu. It is sited within the parking lot serving the 80-acre Kapapapuhi Point Park (also known as West Loch Community Shoreline Park). The project site is situated within the West Loch Estates residential community and vehicular access to the site is via Kapapapuhi Street. The WWPS was constructed for the West Loch Estates subdivision in 1988.

A 197-acre, 18-hole municipal West Loch Golf Course and West Loch Estates single-family residences form the southwestern and northern boundaries of the shoreline park parking lot. The project site, municipal golf course and shoreline park are located between the 'Ewa community, located to the southwest, and Waipahu community, located to the northeast.

The 2,300 sq.ft, project site is located west of the Pearl Harbor West Loch shoreline that borders the southern and eastern edges of Kapapapuhi Point Park. West Loch Estates single-family residences border the northern and western boundaries of the project site. A public restroom for the park is located within the parking lot, approximately 200 ft. southeast of the pump station project site.

Makai (east) of the park's parking lot and project site, the shoreline park consists of pedestrian and bicycle paths along the West Loch. Southbound paths meander toward Ewa Beach and northbound path meander toward Waipahu. The southern sector of the park is bounded by waters of West Loch. A protected wetland preserve and the West Loch golf course are located west of the shoreline park and its parking lot. Other features within the park include gazebos and educational signage about wetland wildlife and allowed recreational activities.

The Explosive Safety Quantity Distance (EQSD) hazard zone that originates from the ammunition wharves at NAVMAG Lualualei, West Loch Branch exists approximately 200 feet makai (east) of the shoreline park. These explosive safety quantity distance arcs or “blast hazard zone. The mouth of Honouliuli Stream is located approximately 1,000 feet to the south of the project site and generally extends to the northwest. It is buffered from the park and setback area related to the U.S. Fish and Wildlife Service bird refuge.

A 40-foot wide OR&L Railroad right-of-way runs along the shoreline of West Loch. An energy corridor is also located within this railroad right-of-way and provides a connection from the Campbell Industrial Park to Nimitz Highway for Chevron USA.

The project area consists largely of gently sloping lands that were previously used for sugarcane cultivation. Within the landscaped park three (3) trees immediately surround the project site. A 40 ft. tall Monkeypod tree and two (2) African tulip trees are found on the sloped areas between the park’s parking lot and residential development. A Tree Assessment Report (M. Murata, July 2024) has been prepared is discussed further in Section 5.8 of this EA, and is included as Appendix C.

South and adjacent to the project site is the 18-hole West Loch Golf Course, a municipal golf course that opened in 1990. Designed by Robin Nelson and Rodney Wright, West Loch Golf Course measures 6,335 yards from the longest tees and has a slope rating of 119 and a 67.8 USGA rating. The course features two sets of tees for different skill levels. Greens and fairways are bermuda grass.

### *5.1.2 Potential Impacts and Proposed Mitigation*

The proposed project has the potential for adverse environmental impacts resulting from short term construction activities including grubbing, grading, and trenching. Public access to the shoreline park would not be seriously impacted, although park visitors may need to avoid areas closest to the project site but could park on the eastside of the parking lot during peak construction periods. A traffic safety and control plan will be prepared and implemented by the contractor to ensure unimpeded traffic flow through the immediate surrounding portion of the West Loch Estates neighborhood to minimize traffic circulation problems during construction.

Upon completion of construction, all equipment and personnel will be removed, and the site will be returned to existing conditions with no permanent intrusion to the site. Because the direct impacts from the proposed action would be only short-term and other past, present, and reasonably foreseeable future actions are expected to be consistent with the existing development and use of the area, the project would make no persistent contribution to secondary or cumulative impacts.

## *5.2 Climate*

### *5.2.1 Description*

The climate of the Ewa District is typically warm and dry in climate. According to the National Weather Service Honolulu Office, over a period of 30 years, normal monthly high temperatures

range from 80 degrees in January to a high of 89 degrees in August for an average of 84 degrees. Normal monthly low temperatures range from a low of 65 degrees in February and a high of 74 degrees in August for a monthly average of 70 degrees. Precipitation typically ranges from 0.44 inches in August to a high of 3.8 inches in December. The annual average rainfall in Honolulu is 70 inches per year.

The prevailing wind direction is from the east and northeast. Northeasterly trade winds prevail over O'ahu approximately 80 percent of the time, with average wind speeds ranging from 10 to 15 miles per hour. The trade winds blow most strongly and consistently from April through November. Southerly or "Kona" winds occur roughly less than half the time during December through March.

There has been considerable detailed research on the global and local implications of accelerating sea level rise. The City Climate Change Commission builds on findings in the *Hawai'i Sea Level Rise Vulnerability and Adaptation Report (2017)*, Sweet et al. (2017), USGCRP (2017), Sweet et al. (2018), and other scientific literature to provide specific policy and planning guidance on responding to sea level rise by the City. Pursuant to the Revised Charter of Honolulu ("RCH") Section 6-107(h), the City and County of Honolulu's Climate Change Commission is charged with gathering the latest science and information on climate change impacts to Hawai'i and providing advice and recommendations to the mayor, City Council, and executive departments as they look to draft policy and engage in planning for future climate scenarios and reducing Honolulu's contribution to global greenhouse gas emissions.

With respect to global temperatures and global mean sea level rise, the City's "Sea Level Rise Guidance" concluded that:

1. The projected median global temperature increase this century is 5.8°F (3.2°C). The likely range of global temperature increase is 3.6 to 8.8°F (2.0 to 4.9°C), with a 5% chance that it will be less than 3.6°F (2°C) and a 1% chance that it will be less than 2.7°F (1.5°C) by the end of this century.
2. Relative to the year 2000, the projected rise of global mean sea level (GMSL) by the end of this century is 1.0 to 4.3 ft (0.3 to 1.3 m). Relative to the year 2000, GMSL is very likely (90 to 100% confidence) to rise 0.3 to 0.6 ft (0.09 to 0.18 m) by 2030, 0.5 to 1.2 ft (0.15 to 0.36 m) by 2050, and 1.0 to 4.3 ft (0.3 to 1.3 m) by 2100.

In 2017, the *Hawai'i Sea Level Rise Vulnerability and Adaptation Report* was published to provide a basis for recommendations on reducing exposure and increasing adaptability to the impacts of sea level rise (SLR) resulting from human-generated global greenhouse gas (GHG) emissions, including carbon dioxide, methane, nitrous oxide, and fluorinated gases (Hawai'i Climate Change Mitigation and Adaptation Commission, 2017). Research is also in agreement that GHG emissions are a key contributor to the unprecedented increases in global atmospheric warming over the past century. Research within the report notes that the intensity and frequency of natural disasters have increased and will continue to do so and further provides technical projections of areas along the coast that are vulnerable to SLR based on the latest available science. The report includes recommendations to address risks associated with climate change. The report finds that for O'ahu, with no mitigative actions, 3.2 feet of SLR, which is projected

by 2100, and its associated erosion, flooding, and waves will have significant impacts to the island's land, building and land values, residents, structures, and major roadways. See Section 5.7, Natural Hazards for an assessment of the possible impacts of SLR on the project site. See Figure 9.

### 5.2.2 Potential Impacts and Proposed Mitigation

The proposed upgrades and operation of the West Loch Estates WWPS project will not individually affect the climate. However, the proposed action to construct improvements to project site would produce GHGs temporarily during construction activities. Further discussion on mitigation measures is provided in Section 5.7.2.

The proposed project is not expected to have an impact on the region's climate; therefore, no mitigation measures are warranted.

## 5.3 Geology and Topography

### 5.3.1 Description

**Geology.** The Hawaiian Islands represent the southernmost portion of the Hawaiian Archipelago, a series of northwest-trending ridges produced by a succession of volcanic eruptions during the Pliocene Epoch.

Regional site geology is provided in *Geologic Map of the State of Hawai'i—Island of O'ahu, Sheet 2* (Sherrod et al., 2021). The island of O'ahu was built by three shield volcanoes, Ka'ena, Wai'anae, and Ko'olau, in order from oldest to youngest. Modern geomorphology of O'ahu generally consists of the Wai'anae volcano to the west and Ko'olau volcano to the east. The older Wai'anae Volcano has volcanics with ages ranging from 4.0 to 2.9 Megaannum (Ma). The younger Ko'olau Volcano is dated from about 3.0 Ma to 1.78 Ma. The island of O'ahu is also comprised of rejuvenation stage volcanism, known as the Honolulu Volcanics. The age range for the Honolulu Volcanics is determined to be between 0.80 Ma to younger than 0.1 Ma.

Pearl Harbor is a system of drowned river valleys (Macdonald et al., 1983). Towards the end of the buildup of the Wai'anae and Ko'olau Volcanoes, four main river systems converged into a single river that drained into the ocean; this is the present-day entrance of Pearl Harbor. As the island subsided, the river valleys began to flood, and sediments began to be deposited in the harbor from surrounding weathered basaltic rock. Coral reefs formed inside the harbor, but they were ultimately smothered by sediments. Sea level rose and fell several times over the last 2 Ma, depositing and eroding sediments, until present day Pearl Harbor was formed.

The site is generally mapped as surficial deposits of alluvium (Sherrod et al., 2021). The site sits at the boundary between alluvium (Qa) deposits from the Holocene, 0.0 to 0.011 Ma, and older alluvium (Qao) deposits from the Pleistocene, 0.011 to 2.58 Ma; however, deposits in this unit are thought to be only as old as 2.00 Ma. While the site is mapped discretely within Qao older alluvium deposits, the Sherrod report notes that mapped contacts should be considered to have a standard error of 100 meters, or plus or minus 50 meters.

The younger alluvium is generally described to consist of unconsolidated deposits of silt, sand, and gravel. The younger alluvium deposited in this area are assumed to be deposited by the Honouliuli Stream. Generally, the older alluvium deposits consist of consolidated sand and

gravel, some of it sufficiently lithified to warrant the designation “conglomerate.” Grains are well-rounded and moderately sorted, but include minor, poorly sorted colluvial deposits.

Surficial soils in the site area are described in the Natural Resources Conservation Service Web-based soil survey as Honouliuli clay, 0 to 2 percent slopes (HxA), in the northern half of the site and Helemano silty clay, 30 to 90 percent slopes (HLMG), in the southern half of the site. Both the Honouliuli clay and the Helemano silty clay consist of well-drained soils that formed from a parent material of basic igneous rock. Both soils are mapped as having a high corrosion risk for steel and a low corrosion risk for concrete. They also are mapped as having very limited shallow and deep infiltration. The permeability of the Honouliuli clay is very low to moderately high, whereas the permeability of the Helemano silty clay is moderately high to high.

Proposed project earthwork involves the cut of approximately 65 cubic yards (cy) of soil and fill of 12 cy.

**Topography.** Topographic map coverage of the site is included on the U. S. Department of the Interior Geological Survey (USGS) 7.5-minute Ewa quadrangle map. Based on the West Loch Estates Project, Shoreline Park Phase design plans, the site ground elevations range from 9 to 13 feet mean sea level (msl) (Haley & Aldrich, Inc., *Draft Geotechnical Recommendations report*, 2024). Behind and to the north of the WWPS, the park grades from roughly 12 to 26 feet msl to the edge of the West Loch Estates subdivision. A September 2021 topographic survey indicated elevations at the site range from approximately 9 to 13 feet msl (Controlpoint Surveying Inc.). The existing project facility measures 2,300 sf, and is proposed to be expanded to 4,000 sf, with minimal change to the existing overall site topography.

### 5.3.2 Potential Impacts and Proposed Mitigation

The potential for significant adverse effects to topography and geology are not anticipated based on the limited scope and scale of the proposed project. The total project area is 4,000 sf and includes the area required for earthwork, construction, and temporary staging and storage of construction equipment and materials. Activities will be limited to the general vicinity of existing roadways and involve clearing and grading, and the construction of the proposed upgrade. The WWPS facility's proposed upgrade will be at or near their existing elevation and would not affect the geology or topography of the area. No mitigation measures are necessary or recommended. See Section 5.5, Soils and Potential for Hazardous Materials, for further discussion. No secondary or cumulative impacts to topography and geology are expected during the operation of the proposed project, or during the implementation of other past, present, and reasonably foreseeable future actions.

## 5.4 Water Resources and Hydrology

### 5.4.1 Surface Water

#### 5.4.1.1 Description

There are no surface waters in the form of perennial stream flows throughout the proposed project site. Honouliuli Stream is located approximately 780 ft. south of the project site, buffered by the grassed, landscaped Kapapapuhi Shoreline Park. See Figure 6, Surface Waters.

The minimally sloped topography of the project site combined with the moderate permeability of the soils will allow storm water runoff to readily infiltrate and collect in existing man-made detention basins or pits for infiltrating into the subsurface. During extreme precipitation events however, storm water typically overflows and sheet-flows into the nearby harbor.

The Flood Insurance Rate Maps (FIRMs) published by the Federal Emergency Management Agency (FEMA 2011), identifies the entire project area within Zone X, which denotes an area determined to be outside of the floodplain as reflected in FEMA-FIRM Map No. 15003C\_1877 (HI-NFIP, 2011), or which designates areas with 0.2 percent annual chance (500-year) floodplain, where BFE are undetermined. See Figure 7, FEMA FIRM.

Nearshore waters of the West Loch Pearl Harbor are designated “Class II” in the Department of Health (DOH) Water Quality Standards, Chapter 54, Title 11. Class II Waters are protected for recreational purposes, propagation of fish and other aquatic life, and agricultural and industrial water supply (*West Loch Golf Course & Shoreline Park SMP & SV, April 1988*).

#### *5.4.1.2 Potential Impacts and Proposed Mitigation*

The proposed project will not impact any perennial stream flows or channels. Necessary approvals and permits will be obtained during planning and design phases covering federal, state, and county requirements to address water quality regulations (i.e., HAR, Chapter 11-54, Water Quality Standards). In addition, the contractor will be required to adhere to temporary erosion control BMPs and must retain a storm water pollution prevention plan on-site during construction to document the maintenance of all storm water controls.

Positive long-term cumulative effects would result from the proposed action in conjunction with ongoing projects in the watershed to improve water quality.

During construction, pollution control measures will be implemented and included in the filing of a National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit, in accordance with Clean Water Act regulations. As required Site-Specific Construction Storm Water BMPs will be prepared and followed by the project contractor to handle the treatment of storm water runoff, erosion, and sediment control.

#### *5.4.2 Groundwater*

##### *5.4.2.1 Description*

Mink and Lau (1990) identify the groundwater beneath the project site as a shallow, predominantly caprock groundwater system and an underlying deep basal aquifer. They classify the groundwater as within the Ewa Aquifer System of the Pearl Harbor Aquifer Sector:

- The uppermost member is characterized as an unconfined basal aquifer contained in sedimentary nonvolcanic lithology layers. This caprock groundwater is given a Status Code of 13321 which indicates that the groundwater has moderate salinity (i.e., with a chloride content of 1,000 to 5,000 milligrams per liter [mg/L]). Under the Mink and Lau system, the code indicates that the shallow caprock groundwater is currently used but not as a drinking or ecologically important groundwater source, is a replaceable resource, and has a high vulnerability to contamination.

**Figure 6**  
**Surface Waters**



<p>Pacific Ocean Island of Oahu Project Location</p>	<b>LEGEND:</b> <span style="background-color: cyan; display: inline-block; width: 15px; height: 15px; margin-right: 10px;"></span> SURFACE WATERS <span style="background-color: pink; display: inline-block; width: 15px; height: 15px; margin-right: 10px;"></span> UIC LINE	<b>Surface Waters</b> West Loch Estates Wastewater Pump Station (WWPS) Upgrade TMK: 9-1-181:001 Ewa, Oahu, Hawaii City & County of Honolulu  Environmental Planning Solutions, LLC
		<p>0 250 500 Feet</p>

**Figure 7**  
**FEMA Flood Zones**



<p>Island of Oahu Pacific Ocean Project Location</p>	<p><b>LEGEND:</b></p> <table border="1"> <tbody> <tr> <td>Cyan Box</td> <td>ZONE X</td> </tr> <tr> <td>Red Vertical Lines</td> <td>ZONE D</td> </tr> <tr> <td>Red Diagonal Lines</td> <td>ZONE AE</td> </tr> <tr> <td>Cyan Diagonal Lines</td> <td>FLOODWAY</td> </tr> <tr> <td>Pink Dots</td> <td>ZONE VE</td> </tr> </tbody> </table>	Cyan Box	ZONE X	Red Vertical Lines	ZONE D	Red Diagonal Lines	ZONE AE	Cyan Diagonal Lines	FLOODWAY	Pink Dots	ZONE VE	<p><b>FEMA FLOOD ZONES</b> West Loch Estates Wastewater Pump Station (WWPS) Upgrade TMK: 9-1-181:001 Ewa, Oahu, Hawaii City &amp; County of Honolulu</p>
Cyan Box	ZONE X											
Red Vertical Lines	ZONE D											
Red Diagonal Lines	ZONE AE											
Cyan Diagonal Lines	FLOODWAY											
Pink Dots	ZONE VE											
		<p>Environmental Planning Solutions, LLC</p> <div style="display: flex; justify-content: space-around;"> <span>0</span> <span>250</span> <span>500</span> </div> <p>Feet</p>										

- The deep, underlying aquifer is characterized as a confined basal aquifer contained in dike compartments. Under the Mink and Lau system, the groundwater contained in the deep aquifer is given a Status Code of 13213, indicating that the groundwater has a low salinity (i.e., with a chloride content of 250 to 1,000 mg/L). Under the Mink and Lau system, the code indicates that the deep groundwater is currently used as neither a drinking-water or ecologically important source and has a low susceptibility to contamination because of confinement and the overlying caprock.

During geotechnical drilling July 19, 2024, groundwater was encountered on the project site at approximately 9.5 feet below ground surface (bgs). Based on the site's proximity to the West Loch of Pearl Harbor, it is anticipated the groundwater may fluctuate with tidal variations and also fluctuate seasonally (Haley & Aldrich, Inc., *Draft Geotechnical Recommendations West Loch Estates WWPS Upgrade Report*, August 2024).

Table 5-1 below summarizes a review of nearby water wells indicating regional groundwater levels range from approximately 13 feet msl to 23 msl.

<b>Table 5-1 Groundwater Data from Nearby Wells (elevations are in feet)</b>			
<b>Well ID</b>	<b>Land Surface Elevation (above local msl)</b>	<b>Highest Recorded Groundwater Elevation (msl)</b>	<b>Absolute Depth To Groundwater</b>
212211158020301 3-2202-22 W260	20.00	13.30	6.70
212258158012701 3-2201-06 W256 WAIPA	25.00	22.34	2.66
212224158020101 3-2202-01 Honouliuli (W258)	29.00	18.40	10.60
212234158015302 3-2201-04 W257-B WAI	40.00	23.10	16.90
212220158021801 3-2202-13	50.00	22.10	27.90
212250158015801 3- 2201- 10 Kunia T41 DMW	84.00	19.34	64.66

Source: United States Geologic Survey (USGS), 2020. National Water Information System.  
<https://maps.waterdata.usgs.gov/mapper/>

#### 5.4.2.2 Potential Impacts and Proposed Mitigation

Groundwater would not be significantly impacted by the proposed project. The project area is situated over deep confined basalt aquifers and overlying shallow caprock aquifers. The basalt aquifer of the 'Ewa System is considered too deep to be contaminated from the surface. The

shallow aquifer of the ‘Ewa System, although considered highly vulnerable to contamination, is brackish and not suitable for consumption or irrigation without desalination.

No short- or long-term, secondary, or cumulative adverse impacts to groundwater resources are anticipated during construction or operation of the proposed project, or during the implementation of other past, present, and reasonably foreseeable future actions.

## *5.5 Soils and Potential Hazardous Materials*

### *5.5.1 Description*

According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), the soil in the area of the site is classified as follows:

- Helemano silty clay, 30 to 90 percent slopes (HLMG) occurs in the pastures near Waipi‘o Acres. The soil is characterized by well drained, rapid or very rapid runoff, moderately rapid permeability. This soil is used for pasture, woodland and wildlife.
- Honouliuli clay, 0 to 2 percent slopes (HxA) occurs in the lowlands along the coastal plains. The soil is characterized by moderately slow permeability, slow runoff, and an erosion hazard that is no more than slight. This soil is used for sugarcane, truck crops, and pasture.

See Figure 8 for soil types located within the project site.

### *Potential Hazardous Materials*

On July 17, 2024 a Hazardous Materials (HAZMAT) survey was conducted by Haley & Alrich (H&A), to identify the presence of Asbestos-containing materials (ACM) and/or Lead-containing paint (LCP) within the project site. The survey was of the existing 375 sq.ft. (sf) single-story building of two rooms: a generator room on the west side of the building and a larger pump room on the east side, which contains the Supervisory Control and Data Acquisition (SCADA) equipment, float levels and controls, wetwells, and restroom. The survey was conducted on the portions of the WWPS building that are planned to be demolished to accommodate pump station improvements specified by the project design plans.

### *Scope of Work*

The survey team’s scope of work and methodology included the following:

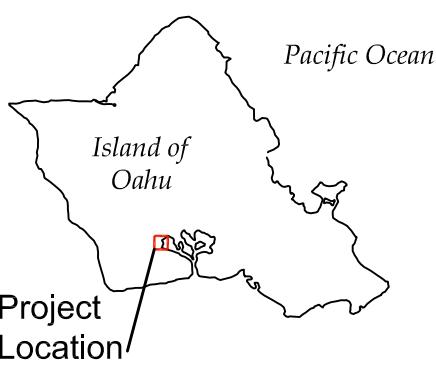
- Performed site reconnaissance at the project site;

### *Asbestos*

On July 17, 2024, H&A Hawai‘i-certified asbestos building inspectors Taylor Chock (HIASB-4478) and Derek Sheldon (HIASB-52122) collected 18 samples of suspected asbestos-containing materials from the Project Site for asbestos analysis. These samples were collected in accordance with DOH/EPA guidelines and recommendations.

Each suspected asbestos-containing material was first wetted with water. A small piece was then removed and placed in a labeled re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. All samples were properly logged and recorded following strict chain of custody procedure and submitted to

**Figure 8**  
**Soils Map**



**SOILS KEY:**

**HLMG:** Helemano silty clay, 30 to 90 percent slopes

**HxA:** Honouliuli clay, 0 to 2 percent slopes

**W:** Water > 40 acres

**KmbA:** Keaua clay, saline, 0 to 2 percent slopes

**Ph:** Pearl Harbor clay, 0 to 2 percent slopes, MLRA 163

**USDA Soils Map**

West Loch Estates Wastewater Pump Station (WWPS) Upgrade

TMK: 9-1-181:001

Ewa, Oahu, Hawaii

City & County of Honolulu

Environmental Planning Solutions, LLC



0 250 500  
Feet

HAL for analysis by PLM in accordance with EPA Method 600/R-93/116. HAL is accredited for bulk asbestos analysis through successful participation in the National Voluntary Lab Accreditation Program (NVLAP).

#### *Lead Paint*

H&A personnel collected five (5) paint chip samples from the Project Site in accordance with the DOH/EPA guidelines and recommendations.

The suspected lead paints were wetted with water before sample collection. Paint was carefully scraped and placed into a labeled re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. All samples were logged and recorded following strict chain of custody (COC) procedures and submitted to HAL for analysis in accordance with EPA Method 7082m by FAAS.

The findings of the site survey, and samples collected and analyzed are summarized below. See Appendix B, HAZMAT Survey Report (October 2024).

#### *Asbestos-Containing Materials (ACM)*

No asbestos-containing materials (ACM) were identified during the hazardous materials survey.

#### *Lead-Containing Paint (LCP)*

One (1) of the sampled painted building components contained lead exceeding the EPA guideline of 5,000 mg/kg to be considered Lead-Based Paint (LBP). Detection level was at 59,000 mg/kg. This was specifically found as part of the orange-colored interior paint on the float support structure in the pump room.

Lead-Containing Paints (LCPs) were assumed and identified in poor to fair conditions on various painted surfaces throughout the project site. The HAZMAT report recommendations for LCP disturbance are:

- Spot remove and dispose of all LCP that may be disturbed or become dislodged during renovation/demolition activities in accordance with applicable local, state, and federal regulations.
- Remove and dispose of all loose and flaking (poor condition) LCP that may be disturbed or become dislodged during renovation activities in accordance with applicable local, state, and federal regulations.
- Workers performing disturbance of LCP must take appropriate measures to comply with applicable OSHA and HIOSH regulations pertaining to the handling of lead containing materials, lead dust and worker protection. Note that OSHA and HIOSH regulate activities that disturb paint which contain any detectable concentration of lead.

A qualified consultant should be obtained to conduct air monitoring and inspection activities to ensure compliance with applicable state and federal regulations pertaining to the handling of LCP.

### *5.5.2 Potential Impacts and Proposed Mitigation*

Excavation at the site will be accomplished using conventional excavating equipment. It is expected that most of the excavated materials will be returned to trenches, safely covered on-site, or disposed of at an approved State or City and County of Honolulu facility.

During construction, the potential for release of sediments in storm water runoff from excavated areas and stockpile material sites will be addressed through a City and County of Honolulu-approved Erosion Control Plan (ECP) that will be secured for this project. A NPDES permit will be obtained for this project from the DOH, CWB. The ECP and NPDES permit applications will provide for the use of BMPs to prevent or mitigate the potential for impacts to State waters as a result of storm water runoff from the construction site.

There is a possibility that surface soils may be impacted due to hazardous substances or petroleum products that may have migrated from ma‘uka upland properties to the project site.

If contaminated materials are detected, construction will cease immediately and standard protocols for soil contamination will be followed, including the implementation of mitigation measures to ensure no further adverse impact to the soil conditions on the project site or to worker health and safety.

The contractor shall be responsible for taking safety, contamination management, and documentation actions as required by HRS, Chapter 396, Occupational Safety and Health, and HAR, Chapter 12-8, Hawai‘i Occupational Safety and Health. Compliance with the guidance provided in these regulations involves the protection of workers and public health and safety; and immediate notification of the DOH including monitoring requirements.

Other impacts to soils include the potential for erosion and the generation of dust during grading and construction. Clearing and grubbing activities will temporarily disturb the soil retention values of existing vegetation and expose soils to erosional forces. Some wind erosion of soils could occur without a proper watering and regrassing program. Heavy rainfall could also cause erosion of soils within disturbed areas of land. BMPs to minimize impacts may include the following:

- Minimizing the time of construction;
- Retaining existing ground cover as long as possible;
- Constructing drainage control features early;
- Using temporary area sprinklers in non-active construction areas when ground cover is removed;
- Providing a water truck on-site during the construction period to provide immediate sprinkling, as needed;
- Using temporary berms and cut-off ditches, where needed, for erosion control;
- Watering graded areas when construction activity for each day has ceased;
- Grassing or planting all cut and fill slopes immediately after grading work has been completed; and

- Installing dust barriers, silt fences, sediment traps, and diversion swales, where appropriate.
- Employee training on proper use of BMPs

After construction, the new improvements will provide long-term erosion control. Construction activities will comply with all applicable Federal, State, and City and County regulations and rules for erosion control. A grading permit, if required, will be procured from the City and County of Honolulu. Compliance with the NPDES permit program will be required.

Adherence to the above mitigation measures and provisions of law are expected to maintain public and worker health and safety and mitigate against the potential for significant short or long term adverse environmental impacts. No secondary or cumulative impacts to soils are expected from the proposed action.

## *5.6 Wetlands*

### *5.6.1 Description*

Wetlands play an integral role in the environment. They prevent erosion in the surrounding area through the presence of wetland associated plants with root systems that hold soil in place. The plants also serve as a physical barrier and absorb energy from waves. Wetlands also provide a natural filtration system for runoff. Nutrients swept into the wetland from runoff are absorbed by plant roots and microorganisms that live in the soil or stick to the soil particles themselves. Through this process, most of the nutrients and pollution in the water are absorbed and retained and are prevented from entering the ocean (EPA, 2016).

A wetland exists approximately 450 ft. southwest of the project site along the eastern boundary of the West Loch Golf Course within the western landscape of Kapapapuhi Shoreline Park and parking lot entrance off Kapapapuhi Street and the Shoreline Park public restroom facility. See Figure 6 which illustrates the wetland as surface waters.

### *5.6.2 Potential Impacts and Proposed Mitigation*

Potential adverse impact to the nearby wetland could be possible during construction activities of the WWPS upgrade.

During operation of the proposed project, a BMPs plan and an ECP will be implemented to protect against inadvertent spills or releases of contaminants. Section 5.4.1.2 addresses preventive measures to be taken by the construction contractor to avoid spills into the shoreline park wetland, which is the nearest groundwater resource southwest of the project site construction activities.

No direct, secondary, or cumulative adverse impacts to the area wetlands are anticipated and no further mitigation is anticipated to be required. All work proposed would adhere to City and County of Honolulu regulatory requirements.

## 5.7 Natural Hazards

### 5.7.1 Description

Hawai'i is susceptible to potential natural hazards such as flooding, hurricanes, earthquakes, and tsunamis. This section provides an analysis of the Project Site's vulnerability to such hazards.

#### Floods

As indicated in Section 5.4.1, Surface Waters, the proposed project site is located in flood hazard Zone X, an area determined to be outside of the floodplain as reflected in FEMA-FIRM Map No. 15003C\_1877 (HI-NFIP, 2011). See also Figure 7, FEMA FIRM Map.

#### Hurricanes

Hawai'i's hurricane season is between June and November, when the sun can heat the ocean enough to produce strong storms (University of Hawai'i at Hilo, 2013). Hurricanes are not very common in Hawai'i (as opposed to, for example, the Caribbean). This is because the ocean around the islands is relatively cool and wind patterns are more likely to create shear, which tears storms apart. However, since 1950, when reliable recordkeeping on hurricanes began, five hurricanes have caused major damage to Hawai'i. Hurricane 'Iniki (1992) is the worst storm to have hit Hawai'i (Williams, 2013) causing an estimated \$2.3 billion in damages. No hurricanes or tropical storms have caused substantial damage since 'Iniki.

#### Seismic Hazards

In Hawai'i, most earthquakes are linked to volcanic activity, unlike other areas where a shift in tectonic plates is the cause of an earthquake. Each year, thousands of earthquakes occur in Hawai'i, the vast majority of which are so small they are detectable only with highly sensitive instruments. However, moderate and disastrous earthquakes have occurred in the islands.

The Hawaiian Islands are formed as the Pacific tectonic plate shifts to the Northwest across the stationary Hawaiian hot spot, creating long-lived magma chambers which feed complex venting systems, resulting in the world's largest shield volcanoes (Peterson and Moore, 1987). This and other complex volcanic and tectonic processes cause high rates of earthquake activity under the southern portion of the Island of Hawai'i and moderate or low seismicity across the rest of the island chain (Klein et al., 2001). There are three main sources of seismicity in the Hawaiian Islands: volcanic, tectonic, and mantle (USGS, 2023).

Volcanic earthquakes are attributed to the underground movement of magma and eruptions of active volcanoes. Volcanic earthquakes are most prevalent on the Island of Hawai'i, which overlies the Hawaiian hot spot, and the risk of seismic activity and degree of ground shaking diminishes with increased distance from Hawai'i Island (Department of Land and Natural Resources, 2004). There are hundreds to thousands of small earthquakes attributed to volcanic activity in the Hawaiian Islands each year. Volcanic earthquakes are typically less than moment magnitude (M) 4 (*H&A, Geotechnical Recommendations, August 2024*).

Tectonic earthquakes are attributed to slippage along tectonic faults. Minor tectonic earthquakes up to M5 occur on upper crustal faults beneath and within the volcanoes. Tectonic earthquakes from crustal faults are the most numerous types of earthquakes in Hawai'i. Large flank (up to M8) earthquakes occur along the décollement fault, which separates the ancient oceanic crust

and the overlying volcanoes at a depth of roughly 5 to 6 miles. These are the most dangerous types of earthquakes in Hawai'i since both large earthquakes and local tsunamis originate from the décollement fault (USGS, 2023).

Mantle earthquakes are caused by flexural stresses (bending) of the Earth's crust and upper mantle, known as the lithosphere, due to the weight of the overlying islands. Mantle earthquakes are usually generated at great depths, more than 12 miles below sea level, and are the most common source of damaging earthquakes north of the Island of Hawai'i. These deep offshore earthquakes have been recorded to range between M4.8 and 7.5 (Petersen et al., 2021)

The seismic site class using information about the supporting foundation soils in general accordance with the 2018 IBC. The seismic site class is typically determined by characterizing the shear wave velocity to a depth of 100 feet bgs. Based on our site-specific subsurface data, review of nearby geotechnical data, and understanding of the regional geology, we estimate the site should be designated as seismic Site Class D.

Based on the project location, subsurface conditions, and topography, the risks at the site for fault rupture, lateral spread, and flow failure are generally low (Haley & Aldrich, Inc., 2024).

FEMA rating D: Could experience very strong shaking; Very strong shaking—Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures (<https://www.fema.gov/emergency-managers/risk-management/earthquake/hazard-maps>).

### *Tsunami Hazard*

The project site is located within the Extreme Tsunami Evacuation Zone designated by the federal National Oceanic Atmospheric Administration Hawai'i State Emergency Management Agency. As such, there is a tsunami risk at the project site.

### *Climate Change*

According to recent findings by researchers at the Hawai'i Climate Change Commission and University of Hawai'i (IPRC, 2013, var.), the effects of climate change are increasingly evident in Hawai'i: air temperature has risen; rain intensity has increased while total rainfall has decreased; stream flows have decreased; sea surface temperatures and sea levels have increased; and the ocean is becoming more acidic (Hawai'i Climate Change Commission, 2017 and SB No. 2745, 2012).

Research is also in agreement that GHG emissions, including carbon dioxide, methane, nitrous oxide, and fluorinated gases, are a key contributor to the unprecedented increases in global atmospheric warming over the past century (EPA, 2011 and IPRC, 2013). These trends are projected to continue to increase in the future posing unique and considerable challenges to Hawai'i. Research at the University of Hawai'i, School of Ocean and Earth Science and Technology (SOEST) indicates that sea level has risen in Hawai'i by approximately 0.6 inches per decade (1.5 mm per year) over the past century (SOEST, 2012). Research in the 2017 *Hawai'i Sea Level Rise Vulnerability and Adaptation Report* finds that 3.2 feet of SLR is expected by year 2100 (Hawai'i Climate Change Mitigation and Adaptation Commission, 2017).

According to the Intergovernmental Panel on Climate Change's Fifth Assessment Report, Climate Change 2013, Chapter 13, Sea Level Change, released in 2014, it is estimated that at most, a global sea-level rise of approximately 0.45 -0.82 m (1.48 – 2.70 ft) is likely to occur for the period of 2081-2100. There will be deviations of local and regional sea level change from the global change – it is estimated that about 70% of coastlines are projected to experience a relative sea level change within 20% of the global mean sea level change.

The project site elevation is 9 to 13 feet msl and direct inundation due to sea level rise is not anticipated in the context of 21st century sea level rise projections. Furthermore, according to the Hawai'i SLR Viewer (accessed 2019), the project site is not within the 3.2-feet SLR Exposure Area. Please see Figure 9, Sea Level Rise. The Center for Island Climate Adaptation and Policy and the University of Hawai'i Sea Grant note that sea level is expected to rise one foot by 2050 and three ft by 2100, and recommends that state and local governments plan accordingly (Center for Island Climate Adaptation and Policy, 2011). While an accelerating rise in local sea level should be planned for, specific water levels should not be anticipated because sea level rise models are inherently uncertain. Sources of this uncertainty include sparse local data, intrinsic uncertainty in climate warming and ice melt models, and prospective shifts in human behavior to curb green-house gas emissions.

### *5.7.2 Potential Impacts and Proposed Mitigation*

The occurrence of a natural disaster cannot be predicted, and should one occur, it could pose a risk of life and property at the project site. Because the site's access, Kapapapuhi Street, will provide efficient access, it is important this public roadway be protected from natural disasters so that resources are available to assist in impacted areas.

To protect against natural hazards (particularly hurricanes and earthquakes), the proposed upgrade components will be constructed in compliance with requirements of the Uniform Building Code and other county, state, and federal standards.

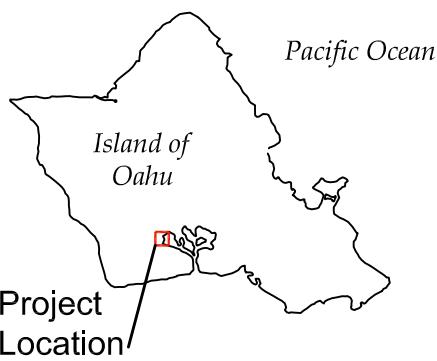
#### *Climate Change*

The proposed West Loch Estates WWPS upgrade project would not result nor constitute a source of impact to the climate of the project area or region and does not propose activities that will lead to an increase in the generation of GHGs. Because the project would not increase the use of machinery in the project area, it is not anticipated to result in a persistent contribution to long term or secondary impacts.

Potential impacts associated with climate change are being addressed through long-range planning. No significant secondary or cumulative impacts at the project site are anticipated from climate change, as plans for adaptation are established, e.g., Act 286, Session Laws of Hawai'i 2012.

The development and operation of the West Loch Estate WWPS upgrade project will not individually affect the climate. However, Global Warming theory postulates that human activities cumulatively affect the climate through the creation of GHGs. GHGs will be produced in the construction and operation of the project. Strict adherence to State DOH policy guidance regarding Contractor BMPs during construction will help to mitigate the project's "carbon footprint" through careful selection and practice of recycling and the use of renewable, energy efficient materials and practices. During operation of the WWPS, the greenhouse effect is

**Figure 9**  
**Sea Level Rise**



**LEGEND:**  
3.2 ft. Sea Level Rise  
by Year 2050

**Sea Level Rise**  
West Loch Estates Wastewater  
Pump Station (WWPS) Upgrade

TMK: 9-1-181:001  
Ewa, Oahu, Hawaii  
City & County of Honolulu

Environmental Planning Solutions, LLC



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expected to also be mitigated through efficient energy use strategies, including the use of natural as opposed to mechanical ventilation and renewable onsite energy generation.

## 5.8 Flora and Fauna

The biological communities of potential concern in the project area are botanical and terrestrial and avian faunal organisms.

### 5.8.1 Terrestrial Flora

The project site is located within the parking lot of Kapapapuhi Shoreline Park. The wastewater pump station site is surrounded by the park section that is grassed and inhabited by several grown trees. A Tree Assessment report (July, 2024) was prepared for the proposed project to document the health and structural integrity of the existing trees and discuss potential impacts and actions of the anticipated construction activities.

One (1) Monkeypod tree and two (2) African Tulip Trees are found on the sloped areas between the parking and residential development by the proposed WWPS improvements site. At the closest point, the existing wall of the WWPS site is located approximately 15-feet away from the Monkeypod tree's root flare. See Photo 1 in Appendix C of this EA. The African Tulip tree located about 20-feet ma'uka of the existing rock wall at the rear of the WWPS is 30-feet tall. The second African Tulip tree (#2 Monkeypod), approximately 10-feet in height, is located about 20-feet ma'uka of the existing trash enclosure which is expected to be demolished as part of the WPS upgrade. See Photos 2 & 5 in Appendix C of this EA.

#### Flowering Plants, Ferns

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPac) website provides the following list of species and resources that are known or expected to be in the vicinity of the project area (September 19, 2024):

The following flowering plants and ferns which are endangered species have possible critical habitat in the vicinity of the adjacent West Loch shoreline park and USFWS wildlife refuge, however, the existing project site does not overlap with the critical habitats of these species (iPac, 9/19/24), as the 4,000 sf WWPS site in the park's parking lot, was cleared, constructed and placed into continuous service since 1989: akoko (*Euphorbia celastroides* var. *kaenana*), akoko (*Euphorbia skottbergii* var. *skottbergii*), enaena (*Pseudognaphalium sandwicensium* var. *molokaiense*), Awiwi (*Schenkia sebaeoides*), Carter's Panicgrass (*Panicum fauriel* var. *carteri*), Ihī (*Portulaca villosa*), 'Ōhai (*Sesbania tomentosa*), Pōpolo (*Solanum nelsonii*), Puukaa (*Cyperus trachysanthos*), Ihīhi (*Marsilea villosa*).

#### 5.8.1.1 Potential Impacts and Proposed Mitigation

The proposed upgrade of the WWPS could result in adverse impacts to the identified trees at the project site. Thus, the following actions and mitigation measures to protect them are:

(#1) Monkeypod tree: The tree is to remain on site and is to be protected during construction per the City & County of Honolulu, Department of Parks & Recreation (DPR), Revised Tree Protection/Preservation Notes and Details, dated March 10, 2022. The proposed pump station improvements are designed to stay away from the existing Monkeypod tree and expand toward the ma'uka side. A Tree Protection Zone (TPZ) of the minimum 15'-0" radius from the tree

trunk is recommended. Adequate compaction beneath the new AC pavement and root barriers are also recommended to deter root systems from going under the proposed improvements. The construction phase of the project must include the services of a qualified arborist to prepare a tree protection/preservation plan and monitor the tree during the construction period.

(#2) African Tulip tree: The tree is to remain on site and is to be protected during construction. A tree protection fence is to be installed for this tree and built per the DPR Tree Protection/Preservation details and notes. A TPZ minimum of 10-foot radius is to be established.

(#3) African Tulip tree: A new rock wall at the back of WWPS will be built about 10-feet from the tree. Considering poor structural conditions and future safety concerns due to the proximity to the new improvements, it is recommended that this tree be removed.

No adverse effects to rare, threatened or endangered flora are anticipated from construction of the proposed improvements as all work will be within an area that has been previously subjected to extensive disturbance associated with the specifically identified upgrade of equipment and structures within the WWPS and its boundary CRM walls. The proposed project would not result in significant adverse secondary or cumulative impacts to flora resources.

The State Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW) was consulted during the project Pre-assessment phase and will continue to be consulted through the EA process.

## 5.8.2 Fauna

### 5.8.2.1 Description

*Terrestrial Mammals.* Feral and domestic (pet) cats and rodents may be found in the residential areas adjacent to as well as within the project site. Other mammal species likely occurring in the area include the small Asian mongoose and various rodents, all of which are considered alien to the Hawaiian Islands, and deleterious to native ecosystems and native faunal species.

*Endangered and Threatened Mammals, Reptiles.* The Hawaiian Hoary Bat (*asiurus cinereus semotus*), an endangered mammal, has no critical habitat in the project site (iPac, 9/19/24).

A critical habitat is proposed in the West Loch area for the threatened Green Sea Turtle (*Chelonia mydas*), but the project site does not overlap the proposed habitat (iPac, 9/19/24). A critical habitat exists for the endangered Hawksbill Sea Turtle (*Eretmochelys imbricata*) in the project area. However, the project site does not overlap this critical habitat (iPac, 9/19/24).

*Avian Fauna.* Many of the endemic birds, which are unique to the Hawaiian Islands are classified as endangered or threatened species and are provided suitable habitat by the Honouliuli Fish and Wildlife Service refuge in the area further south of Kapapapuhi Shoreline Park. Existing wetlands in the project area, composed of mangrove swamp and cattail-bulrush marsh, occur along the West Loch boundary. While the wetlands do not contain any species of botanical significance, they do provide habitat for a number of endangered Hawaiian waterbirds, including Hawaiian Black-necked Stilt or 'ae'o (*Himantopus mexicanus knudseni*) and migratory Wandering Tattler or 'ulili (*Trainga incana*) (iPac, 9/19/24).

The following are endangered (and one threatened) birds that may exist in the project vicinity but have no critical habitat: Band-rumped Storm-petrel (*Hydrobates castro*), Hawaiian Common Gallinule (*Gallinula galeata sandvicensis*), Hawaiian Coot ('alae Ke'oke'o), Hawaiian Duck

(*Anas wyvilliana*), Hawaiian Petrel (*Pteroma sandwichensis*), Hawaiian Stilt (*Himantopus mexicanus knudseni*), Newell's Shearwater (*Puffinus newelli*) (threatened species), Short-tailed Albatross (*Phoebastria [=Diomedea] albatrus*) (iPac, 9/19/24).

No indigenous nesting seabirds are found in the vicinity of the project site. Introduced birds are also found throughout the project area, however, none are considered threatened or endangered species.

The State Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW) was consulted during the project Pre-assessment phase and will continue to be consulted through the EA process.

#### 5.8.2.2 Potential Impacts and Proposed Mitigation

*Avian Resources.* The potential impact to seabirds would be the installation of outdoor lights. Night lights can disorient nocturnally-flying seabirds, particularly fledglings, resulting in their potential downing and harm from collision with objects and/or predation by feral dogs and cats if downed. Mitigation measures are planned to include:

- During construction, the presence of any ESA-listed species within 50 m (164 ft) of the project work area would necessitate halting of work until the animal voluntarily leaves the work area.
- Immediately prior to the start of grading at the far western end of the site, a survey for Pueo ground-nesting activity would be undertaken. If a nest is discovered, The Department of Land and Natural Resources (DLNR) must be notified before proceeding with grading or grubbing that could disturb nesting activity.
- If night-time construction activity and/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 at the ground.
- If streetlights or exterior facility lighting are installed in conjunction with the project, it is recommended that the lights be shielded to reduce the potential for interactions between nocturnally flying seabirds and external lights and/or man-made structures (Reed et al., 1985; Telfer et al., 1987).

*Mammalian Resources.* To avoid potential impacts to roosting Hawaiian hoary bats with pups, it is recommended that no woody vegetation taller than 4.6 m (15 ft) be removed during the pupping season, from June 1 to September 15.

## *5.9 Archaeological and Historic Resources*

### *5.9.1 Description*

#### *Introduction*

A Literature Review and Field Inspection (LRFI) Report was prepared by Keala Pono for the proposed project. The project area subject to archaeological field inspection comprised of approximately 0.053 acre with field work conducted October 2, 2024, by Keala Pono archaeologist Tiffany Brown, BA. See Appendix D, Literature Review and Field Inspection (Keala Pono, October 2024).

The literature research and investigation were designed based on detailed historical, cultural, and archaeological background research and field inspection of the project area. The purpose was to determine the likelihood that historic properties may be affected by the project and based on findings, to provide cultural resource management recommendations. The LRFI is intended to facilitate the project's planning and support compliance requirements for historic preservation and environmental review in HRS, Chapter 6E and HRS, Chapter 343.

#### *Findings*

The project area is located in 'Ewa District, the largest land district on O'ahu, which is situated in the southern portion of central O'ahu. The name 'Ewa means "to crook, to twist, to bend" (Andrews 1865). This name may refer to the mo'olelo in which the Hawaiian gods Kāne and Kanaloa threw stones to determine the boundaries of the district (see Mo'olelo section) (Sterling and Summers 1978). The current area of study is located within the ahupua'a of Honouliuli, the largest and westernmost ahupua'a within 'Ewa District. Translated, Honouliuli means "dark bay" (Pukui et al. 1974), likely referring to the deep waters of Pu'uloa, or Pearl Harbor, which is located on the eastern perimeter of Honouliuli Ahupua'a.

The 'Ewa Plain was known to be a very fruitful place, with abundant resources in the ocean and on land. Protecting such a place was the kia'i, or caretaker, of 'Ewa, named Kanekua'ana (Kamakau 1991:83).

#### *Summary of Background Research*

Through examination of traditional and historic land use for Honouliuli Ahupua'a as demonstrated in mo'olelo, historic literature, and archaeological investigations, this area is a land rich in natural and cultural resources. Lo'i were planted along the streams, and fishponds dotted the coast at Pu'uloa, which was a gathering place for many types of prized invertebrates like the pearl oyster. The fertile soil of the plain was ideal for growing 'awa, mamaki, wauke, and olonā. Known as an ali'i stronghold, as well as a vacation spot for royalty, Honouliuli was a significant ahupua'a in the pre- and post-contact periods.

The continuous development of the Honouliuli area in modern times has triggered much archaeological work in the region over the years. Previously conducted archaeological studies have resulted in the identification and documentation of traditional and historic activities that once occurred in the project vicinity. Pre-contact sites identified near the current project area include sites related to the procurement of marine resources such as fishing shrines and fishponds, as well as iwi kūpuna (human burials), habitation areas, and agricultural sites. Many sites from the post-contact period adjacent to the project area were associated with the historic

sugarcane plantation era. These sites consist of foundations and remnants of former plantation villages, historic burials, irrigation features, wells, roadways, and remnants of the OR&L railroad.

While a field inspection did not identify anything of archaeological interest on the surface, it is possible that subsurface deposits or features remain. An assessment of findings of the archaeological literature review and field inspection is presented below.

#### *Results of Historical Research on Land Use*

The ahupua'a of Honouliuli contained an abundance of natural resources in traditional times. The fisheries, fishponds, and the numerous freshwater streams could easily provide more than enough subsistence resources to support a sizable population. A notable trail system crossed the region connecting this area with other parts of the island. 'Ewa District, in general, was known for its abundance of marine resources, including shellfish, and people often traveled there from other parts of the island to acquire them. The deep bays of West Loch combined with the numerous freshwater streams that emptied into the bays provided excellent conditions for the construction of fishponds and fish traps. The wide lowlands of Honouliuli were bisected by streams creating marshlands which were utilized for lo'i. Bananas and yams were grown along the valley slopes, and mamaki, 'awa, wauke, and olonā were inland crops. In the late 1870s Honouliuli was primarily under commercial sugarcane cultivation and was also utilized as ranchlands. For most of the 20th century the U.S. military and then the U.S. Navy developed and utilized a sizeable portion of the Honouliuli area.

#### *Results of Land Commission Awards Search*

During the Māhele, the majority of the 97 awarded claims within Honouliuli were utilized for lo'i. An area long-favored by the ali'i, Kekau'ōnohi, the granddaughter of Kamehameha I, claimed the majority of Honouliuli, totaling 43,250 acres, under LCA 11216/Royal Patent 6971. She held on to these lands until the time of her death, when they were passed on to her family. The West Loch WWPS project area is within the lands awarded to Kekau'ōnohi.

#### *Knowledge from Previous Archaeological Studies*

The following overview provides information on archaeological investigations that have been performed within a 0.9 mile radius of the project area, based on archaeological reports from the SHPD library (Table 5.2 at the end of Section 5.9.2). Previously identified historic properties are identified by their unique State Inventory of Historic Places (SIHP) site number designation. Sites in the vicinity of the current project site are shown in Figure 10, Location of Archaeological Sites.

An early archaeological investigation of Honouliuli conducted in the 1930s, identified SIHP 139 (McAllister 1933), a traditional fishing shrine located southeast of the West Loch WWPS. More recent studies near the project area have identified traditional habitation sites (T-1, T-2) and a disarticulated human burial (SIHP 4816). However, the majority of sites recently documented nearby are associated with the historic plantation era. The sites consist of remnants of plantation villages, historic cemeteries, historic house sites, and small gardens. Numerous sites representing evidence of ditches, and water catchments. Several sites have been identified in proximity to the current project area on the ground surface and in subsurface contexts.

### *Results of the Field Inspection*

A walk-through of the property did not identify anything of archaeological interest. A wastewater pump station, gravel yard, CMU dumpster enclosure, CRM wall enclosing the pump station, and CRM wall around the dumpster enclosure cover most of the property. The pump station and its associated features were constructed in 1989 or later and are therefore less than 50 years old and considered modern. Due the extensive modern use of the project area, it is unlikely that any surface archaeological features remain. However, it is possible that subsurface archaeological features or deposits have survived the more recent disturbances.

### *Monitoring During Predevelopment Geotechnical Drilling*

The geotechnical testing was carried out on July 19, 2024, by Haley & Aldrich Inc. and involved an auger excavation by Shinsato Engineering, Inc. of a single test borehole located in the northwest corner of the project area, behind the West Loch Wastewater Pump Station. The July 19th geotechnical testing was the initial testing completed for this site with simultaneous monitoring by a Keala Pono archaeologist. The geotechnical test bore was accomplished with Shinsato Engineering Inc. utility truck auger rig utilizing a 4-inch (10 cm) diameter drill head as well as a 2-inch (5 cm) diameter drill head. A boulder buster was also utilized to progress through a relatively thin rock obstruction located approximately halfway through the target borehole depth. The test borehole measured approximately 15 cm in diameter and reached a depth of 6.1 m below the existing grade. Monitoring of the single auger-excavated borehole did not identify any archaeological features, deposits, or materials and inspection of backdirt and boring tailings produced during auger excavations did not identify anything of archaeological interest (Keala Pono, EOF, July 2024). Soils observed within the excavated borehole and backdirt/tailings consist of a top gravel fill layer, commingled fine sand-clay secondary fill soil, and a natural silty clay soil.

### *Conclusions and Recommendations*

Multiple lines of evidence illustrate that the lands of West Loch have a long and important role in Hawaiian history. The area is renowned for its abundance of terrestrial and marine resources. Its unique location provided access to near-coast and deep water marine resources, while the coastal marshlands afforded ample land for *lo'i*. During the Māhele, the area was retained by a prominent ali'i until her death in the mid-1850s. Following her death, the lands stayed within the family for several more decades. The project area is within the boundaries of a traditional village and a historic plantation-era sugarcane field. In addition, previous archaeological studies have identified traditional habitation, ceremonial, and human burials near the project area. Based on these findings, there is the potential for traditional and historic cultural resources to be present, particularly in subsurface contexts. These cultural resources may include human burials, as well as evidence of traditional and historic habitation, and sites related to the procurement of marine and coastal resources. A program of archaeological monitoring is recommended during all ground disturbing activities to identify and properly treat any historic properties that may be encountered. An archaeological monitoring plan should be prepared under a separate cover to be reviewed and accepted by the SHPD prior to the commencement of construction.

No historic properties were identified or designated in the project site by this study.

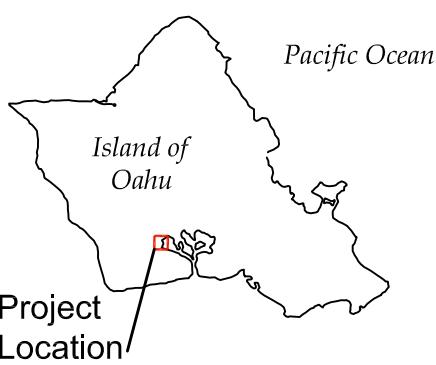
In the unlikely event that cultural deposits and/or human skeletal remains are encountered during ground disturbing activities, work should be stopped immediately in that area and the SHPD notified of the nature of the discovery.

#### *5.9.2 Potential Impacts and Proposed Mitigation*

The potential for adverse effects to archaeological and historical resources are not anticipated as no historic properties were encountered or discovered during past surveys in the vicinity of the project site. An important factor for the lack of archaeological and historical resources present includes the past use of the area which would have otherwise removed or destroyed any resources that may have once been present.

No secondary or cumulative effects to archeological or cultural resources are anticipated from the proposed project. However, because there is always the potential for the discovery of 'iwi or other cultural remains, any inadvertent finds will immediately result in the cessation of work and the immediate reporting of the find to the SHPD at (808) 692-8015 (Main Office, O'ahu). SHPD will provide further instructions regarding the treatment of the find and the conditions when work may be resumed.

**Figure 10**  
**Archaeological Sites**



**Archaeological Sites**  
West Loch Estates Wastewater Pump Station (WWPS) Upgrade  
TMK: 9-1-181:001  
Ewa, Oahu, Hawaii  
City & County of Honolulu

Environmental Planning Solutions, LLC



0 250 500  
Feet

**Table 5-2, Previous Archaeology in the Project Vicinity**

<b>Author(s) and Date</b>	<b>Location</b>	<b>Type of Study</b>	<b>Findings</b>
McAllister 1933	Island-wide	Survey	Documented SIHP 139, Kalanamaihiki fishing shrine; SIHP 140, a fishpond adjoining Laulaunui Island; SIHP 141, Kaihuopalai, Ewa; and SIHP 146, numerous sites covering the Ewa coral plain.
Rosendahl 1987	West Loch Estates	Archaeological Reconnaissance Survey	Identified four new sites: T-1, a traditional habitation site comprised of a midden deposit; T-2, a historic habitation site comprised of surface artifact scatter; T-3, a historic burial complex comprised of five graves; T-4, and a historic habitation comprised of surface artifact concentration. SIHP numbers were not assigned at the time of the study.
Bath 1989	Hō‘ae‘ae Point	Burial Investigation	Documented SIHP 4816, disarticulated human skeletal remains.
Hammatt and Shideler 1990	West Loch Bluffs	Archaeological Inventory Survey	Identified five new sites: SIHP 4344, three iron pipe features, two welded pipe constructions, and a tall metal post; SHIP 4345, well preserved sections of the Ewa Plantation Company railroad rock-faced berm; SHIP 4346, the northern pumping station; SHIP 4347, the central pumping station/habitation and agriculture complex; and SHIP 4348, the southern pumping station. All sites were interpreted to be associated with the historic plantation-era.
Hammatt 1990	West Loch Bluffs	Preservation Plan	Outlined preservation measures for SIHP 4345, 4346, 4347, and 4348 identified by Hammatt and Shideler (1990).
Corbin et al. 1996	Laulaunui Island and Fishpond	Field Inspection	Observed 5-6 concrete foundations, including a house foundation, and refuse interpreted to be associated with the U.S. Military. Identified the fishpond wall.
O‘Hare et al. 2006	West Loch Bluffs	Archaeological Inventory Survey	Located SIHP 4344–4348 previously identified by Hammatt and Shideler (1990) and identified four new features of SIHP 4344: two rock walls, a stone-faced berm, a concrete masonry catchment basement, and a concrete ditch) associated with the historic plantation era. SIHP 4344, Features A-D, originally identified by Hammatt and Shideler (1990), were not relocated and may have been destroyed after 1990.
Altizer et al. 2009	Hale Kipa	Archaeological Inventory Survey	Recorded two new sites: SIHP 7084, historic house foundations, a cesspool, and water control features; and SIHP 7085, a traditional lo‘i.

## *5.10 Noise Conditions*

### *5.10.1 Description*

The regulation of noise is governed by HAR, Chapter 11-46, Community Noise Control. Allowable day and nighttime noise standards for sensitive receptors have been established for conservation, residential, apartment, hotel, business, agricultural and industrial districts. Current noise sources in the project vicinity include vehicular traffic, aircraft traffic, and equipment use associated with residential and business uses, and grounds and building maintenance at the WWPS and public restroom at the western entrance to Kapapapuhi Shoreline Park. West Loch Estates single family residences are located in proximity of the project site, about 30 to 35 feet upslope of its northwestern boundary.

The State of Hawai'i Department of Health (DOH) Indoor and Radiological Health Branch and the U. S. Environmental Protection Agency (EPA) have established guidelines and standards for assessing environmental noise impacts and establish noise limits as a function of land use. DOH Chapter 11-46-3 establishes the standards to excessive noise sources: stationary noise sources, and equipment related to agricultural, construction, and industrial activities.

The project site is located in a residential and recreational environment where certain levels of environmental noise are acceptable. Table 5-3 below illustrates the sound levels permissible in decibels (dBA).

**Table 5-3 Maximum Permissible Sound Levels in dBA**

Zoning Districts	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
Class A	55 dBA	45 dBA
Class B	60 dBA	50 dBA
Class C	70 dBA	70 dBA

Source: State of Hawai'i DOH §11-46-4 Hawai'i Administrative Rules (HAR).

Class A zoning districts include all areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type.

Class B zoning districts include all areas equivalent to lands zoned for multi-family dwellings, apartment, business, commercial, hotel, resort, or similar type.

Class C zoning districts include all areas equivalent to lands zoned agriculture, count, indust4al, or similar type.

According to Table 5-3 above stationary and equipment generated noise levels at the project site would be subject to DOH's Class A daytime limit of 55 dBA and nighttime limit of 45 dBA given the project site's proximity to adjacent West Loch Estates single family residences.

### *5.10.2 Potential Impacts and Proposed Mitigation*

Existing sources of noise in the area include motor vehicle and aircraft traffic, and the periodic use of combustion and electric powered equipment associated with maintenance of the public restroom and WWPS in the adjacent shoreline park.

Construction associated noise is anticipated to negatively affect the adjacent single family residences. Construction equipment is expected to include, but not be limited to, the use of bulldozers, excavators, dump trucks, concrete delivery trucks, and related powered hand tools.

Short-term noise impacts are expected during the construction period and may have an impact on nearby residents and businesses. Construction noise, however, will be short-term and limited to daytime hours. Proper mitigation measures will be implemented to minimize noise impacts, and all work will comply with DOH noise limits. All construction activities will be monitored to ensure compliance with HAR, Chapter 11-46. The project construction contractor will apply for a Noise Permit at the State of Hawai'i DOH prior to the start of construction.

Nighttime work in this residential area is not anticipated for this project and the DOH will enforce the provisions its noise regulations. Compliance with DOH noise regulations is not expected to result in significant noise-related impacts.

Nearby areas which include residential, commercial and light industrial uses may be temporarily affected by construction generated noise. However, noise generated from construction activities will for the most part not radiate or extend beyond the immediate surrounding project site. Construction related noise is expected to be temporary, of limited duration, and restricted to daytime hours.

This action is not expected to result in any persistent contribution to cumulative impacts, and upon completion, ambient noise levels in the area would return to pre-existing background levels.

Mitigation measures to address the generation of short-term construction related noise include:

- All equipment will be properly muffled in accordance with DOH noise regulations.
- All combustion and air-powered equipment will be maintained in proper working order.
- Work will be limited to weekdays during daylight hours between 7:00 am and 6:00 pm. No work will be scheduled on federal or state holidays.
- The contractor will secure a noise permit, as required, from the DOH prior to the initiation of construction.

No long term adverse noise impacts associated with this project are anticipated. Mitigation measures as described will be employed to minimize and reduce the potential for such impacts. No further mitigation measures are anticipated to be required.

## *5.11 Air Quality*

### *5.11.1 Description*

The DOH, Clean Air Branch (CAB) has identified the following four potential sources of air pollution in the vicinity of the proposed project: (1) industrial sources, such as power plants and refineries; (2) mobile sources, such as motor vehicles; (3) agricultural sources, such as cane burning (no longer practiced on O'ahu); and (4) natural sources, such as wind-generated dust and volcanic activity (DOH, 2013, 2014b, 2015b). Air quality around the project site and its surroundings is generally excellent year-round. The prevailing northeasterly trade winds tend to push any human-made or natural pollutants out to sea. However, during certain periods winds can shift from a southeasterly direction causing the air flow to carry volcanic smog (more commonly referred to as vog) over and toward the 'Ewa region leading to an increase in pollution and a decrease in visibility.

According to the State of Hawai'i, Annual Summary 2015 Air Quality Data, air quality levels for the monitoring station closest to the project site is the Kapolei Station. Air quality data is recorded for levels of ozone, PM<sub>2.5</sub>, PM<sub>10</sub>, carbon monoxide, sulfur dioxide, ozone, NO<sub>2</sub>, and lead, and remain below the state and federal ambient air quality standards.

Air quality in the vicinity of the project site is primarily affected by construction activities (i.e. fugitive dust) and by vehicular emissions generated along surrounding streets. Among the various air pollutants for which State and National standards have been established, the level of carbon monoxide is the primary concern when it is near locations with heavy traffic flow. According to the DOH Clean Air Branch, air quality near the Kapolei Station, located at the Kapolei Business Park on Lauwiliwili Street, is within the range considered as good.

### *5.11.2 Potential Impacts and Proposed Mitigation*

Construction activities are expected to have little to no impact based on the limited duration and scope of the project. Where engine exhausts may be a potential source of air pollution, all internal combustion equipment will be governed in accordance with applicable state regulations in HAR, Chapters 11-59 and 11-60, Air Pollution Control.

It is expected that no State of Hawai'i air quality standards will be violated during or after construction. Construction activities such as site clearing and grading will be temporary, and all construction activities will comply with the provisions of HAR, Chapter 11-59 and 60.1-33, Fugitive Dust. An effective dust control plan will be implemented as necessary. Measures to control dust during various phases of construction include:

- Providing an adequate water source at the site prior to start-up construction activities.
- Irrigating the construction site during periods of drought or high winds.
- Controlling dust debris being hauled away from the project site.
- Providing adequate dust control measures during weekends, after hours, and before daily start-up of construction activities.
- Installing silt screening in the areas of disturbance.

During construction, fugitive dust is expected to be generated. Fugitive dust will be controlled with regular wetting of the soil by the contractor and/or with the use of dust screens, as required. There will be no long-term or secondary effects to air quality once construction is completed.

In the long-term construction and operational impacts are not expected to be significant.

Other past, present, and reasonably foreseeable actions have used and may use heavy machinery in the future. Cumulatively, however, the impact on air quality from all future planned projects, including the proposed project, is not considered as significant due to the limited intensity and duration of construction.

## *5.12 Visual Resources*

### *5.12.1 Description*

Significant views and vistas within the area of the proposed project are identified in the City and County of Honolulu's 'Ewa DP (2020) and include:

#### *Significant Views and Vistas*

1. *Distant vistas of the shoreline from the H-1 Freeway above the 'Ewa Plain;*
2. *Views of the ocean from Farrington Highway between Kahe Point and the boundary of the Wai'anae Development Plan Area;*
3. *Views of the Wai'anae Range from H-1 Freeway between Kunia Road and Kalo'i Gulch, and from Kunia Road;*
4. *Views of Nā Pu'u at Kapolei, Pālailai, and Makakilo;*
5. *Ma'uka and makai views; and*
6. *Views of central Honolulu and Diamond Head, particularly from Pu'u O Kapolei, Pu'u Pālailai, and Pu'u Makakilo.*

### *5.12.2 Potential Impacts and Proposed Mitigation*

No adverse impacts to scenic and visual resources are anticipated. Vistas of the shoreline from the Interstate Highway 1 (H-1) Freeway above the 'Ewa Plain and views toward Honolulu and Diamond Head would be mostly unaffected as the nature of the upgrade project would principally involve renovation and minor expansion within the project site. Limited views of exterior building lights for nighttime visibility, however, may be observable but would not be considered to be an adverse negative impact to views. Views of the ocean and the Wai'anae Range from Farrington Highway and other vantage points would similarly be unaffected and would not be considered an adverse negative impact.

The proposed project has been designed to be consistent with the West Loch Estates master planned residential community needs in accordance with City and County of Honolulu standards to maintain safe and efficient wastewater system transport within the existing lines to the Kunia WWPS.

The project would not result in significant adverse secondary visual and aesthetic resource impacts. Upon the completion of construction, all equipment and personnel will be removed and the environmental conditions of the site will be permitted to return to existing conditions with no significant visual impact. No mitigation measures are anticipated to be required. Because other past, present, and reasonably foreseeable future actions are expected to be consistent visually with existing development no cumulative visual impacts are anticipated.

## *5.13 Socio-Economic Environment and Demographics*

### *5.13.1 Description*

West Loch Estates WWPS is located within the 'Ewa region of O'ahu and bounded by Kapolei on the west. In general, the surrounding areas outside of the project site consist of planned developments with a diverse mix of single-family, low-density and medium density buildings. The overall character is one of a low density suburban residential community with a mix of recreational and institutional land uses.

Much of the 'Ewa region was once dedicated to the cultivation of sugar cane up until the closure of the O'ahu Sugar Company in the early 1990s. During the 1990s, the cane fields yielded to newly constructed homes with much of the new development east of Kalaeloa along Fort Weaver Road. The region is now home to approximately 70,000 people, while the larger Leeward O'ahu area ('Ewa, Central O'ahu, North Shore and Wai'anae) has nearly 300,000 residents.

The 'Ewa region is growing into a new urban center and is the location on O'ahu most likely to accommodate population growth. While the O'ahu-wide population increase is forecast at 1.6 percent annually, 'Ewa could experience a 3.6 percent average annual growth rate. Of the 200,000 additional residents expected on O'ahu (between 2000 and 2025), about 30 percent are expected to live in the 'Ewa region. The City's 'Ewa DP contemplates a resident population in the year 2020 of almost 125,000.

Tourism is the primary economic engine of O'ahu, but the public sector also plays a major role in the island's economy. According to the Hawai'i Tourism Authority, in 2012, the number of visitors to O'ahu was 5,065,645, an 11.9 percent increase from 2011. This is 62.3 percent of all the visitors to the state in 2012. Visitors that year expended \$7.7 billion on O'ahu.

According to the U.S. Census American Community Survey, median household income in the project site Census Tract 87.03 West Loch was estimated at \$59,046 (2012-2016 American Community Survey 5-year Estimate). Median Family Income was \$63,519. Median household income in Honolulu County was \$91,139 and per capita income was \$30,735.

### *5.13.2 Potential Impacts and Proposed Mitigation*

The economic viability and potential for growth of the 'Ewa neighborhoods are closely tied to the capacity of essential infrastructure. This includes the proposed West Loch Estates WWPS upgrade project.

In the short term, construction expenditures will have a beneficial impact on the local construction industry, and construction activities will benefit the community indirectly through the creation of jobs.

In the long term, improving the condition of the West Loch Estates WWPS and its resulting contributing improvement to the Honouliuli wastewater treatment network will provide for more safe and efficient operations to community and recreational activities. In turn, this is expected to stimulate direct service-related expenditures.

Implementation of the proposed project will result in potential secondary beneficial impacts by stimulating local business enterprises and increasing local employment. Combined increased business activities will result in increased state revenues in the form of excise, individual, and corporate taxes.

Combined with other past, present, and reasonably foreseeable future actions the proposed project would support the local economy and anticipated increased area population. Because population growth on

O'ahu is anticipated to occur with or without implementation of the proposed project no significant adverse cumulative impacts to the socio-economic environment are anticipated.

## **5.14 Public Facilities and Services**

### **5.14.1 Roads and Transportation**

#### **5.14.1.1 Description**

The project site is located at the eastern (makai) end of Kapapapuhi Street approximately 2,250 feet (0.43 mi) from Fort Weaver Road (Route 76) via Laulaunui Street, a two-way east-west City and County West Loch Estates residential access roadway. Laulaunui Street accessible off Fort Weaver Road, the major north-south collector regional roadway between H-1 Freeway and the 'Ewa Beach community. Fort Weaver Road is a six-lane, divided State of Hawai'i highway. Fort Weaver Road is signalized at its intersection with Laulaunui Street.

#### *Existing Transit Services*

"The Bus" is O'ahu's primary form of public transit provided by the City and County. This system provides access within the greater urban area of Honolulu, as well as in communities on the 'Ewa plain, North Shore, Leeward Coast, and Windward Coast. The closest bus stop is located approximately 0.4 miles from the project site in the ma'uka-ewa direction, near the intersection of Fort Weaver Road and Laulaunui Street. Transit service provided by the City and County's SKYLINE is located at the East Kapolei rail station located approximately 2.7 miles southwest of the project site.

#### *Existing Pedestrian and Bicycle Facilities*

The two-mile West Loch segment of the 11-mile long Leeward bicycle path exists within the public park portion approximately 250 feet east (makai) of the project site. A recently completed southern segment was built within the 40-foot wide former Oahu Railroad & Land Company (OR&L) right-of-way (ROW) and connects with the southwest end of the West Loch Bike Path.

Several current regional and development plans define the need for a shared use path that links the neighborhoods in West Oahu to beach parks, recreation areas, regional attractions, historic sites, and nature habitats. They include the *2003 Pearl Harbor Historic Trail Master Plan*; *2002 Central Oahu Sustainable Communities Plan*; *2012 O'ahu Bike Plan*; and *2013 Ewa Development Plan*. Furthermore, these plans identify the former OR&L ROW as a resource where a safe and continuous bicycle and pedestrian path could be provided. Additionally, by connecting the communities from Ewa to Aiea, the Leeward Bikeway would address major residential, business, and commercial growth in the Ewa and Central Oahu areas occurring over the past several decades and in the future by providing an outstanding recreational resource and non-motorized transportation facility.

#### **5.14.1.2 Potential Impacts and Proposed Mitigation**

The major source of disturbance to traffic is anticipated from construction activities during deliveries and transit of vehicles to and from the job site. Occasional increases in construction traffic may also result from the periodic movement of vehicles to and from the job site to dispose of demolition debris.

These impacts, however, will be short term in duration and will cease with the completion of the proposed improvements. Mitigative measures will include the planning of construction activities during the daytime hours with no night work anticipated to be required, and the use of flagmen and/or traffic controls to maintain accessibility for park visitors and community residents who may visit the park. It is

recommended that construction materials and equipment will be transferred to and from the project site during off peak traffic hours (8:30 AM to 3:30 PM) to minimize any possible disruption to traffic on the local streets to minimize traffic impacts for neighborhood residents. A Traffic Management Plan (TMP) including BMP controls and ADA compliance requirements would be prepared for review and approval by appropriate State and City and County of Honolulu agencies, including DTS and DPP. The TMP would be implemented by the contractor to ensure unimpeded traffic flow through the West Loch Estates neighborhood to minimize traffic circulation problems. Any damage to State and City-owned roadways caused by the project would be repaired to current City and County of Honolulu standards as well as meet ADA requirements. The contractor would obtain street usage permits from DTS for any construction-related work that may require temporary closure of any traffic lane on a City and County of Honolulu right-of-way. The construction contractor would continue to apprise the Ewa Neighborhood Board No. 23, area businesses and schools, emergency services, and ENV of its construction plans, schedule, and any changes throughout the project planning and implementation process. With respect to State of Hawai'i highways, the HDOT indicated, "Considering the project description and location, (HDOT) does not anticipate any significant adverse impacts (Sept. 13, 2024)."

**Parking.** The project will be taking two (2) of the parking stalls closest to the existing trash enclosure. Those two stalls will be striped for "No Parking" similar to what is out there currently. Otherwise the remaining existing parking stalls will not be impacted.

The proposed expansion of the pump station will minimally impact the operations of the park parking lot and park activities. The Department of Environmental Services is having on-going discussions with the Department of Parks and Recreation to minimize the impacts of this construction on Kapapapuhi Point Park.

The proposed project would not result in significant adverse cumulative transportation impacts.

#### *5.14.2 Utilities*

The utilities within the project site is described as follows:

##### *5.14.2.1 Description*

###### *Electrical and Telecommunications Supply*

**Existing Electrical System** – Electrical service to the West Loch Estates WWPS is provided by Hawaiian Electric Company's (HECO) underground primary distribution system along Kapapapuhi Street. Primary service conductors are extended to two, single phase HECO pad-mounted transformers via an underground concrete-encased ductline. The HECO transformers are located at the west end of the pump building. The transformers are identified as HECO Vaults 6128A and 6218B and rated 25 kVA each. The pad-mounted transformers are configured in a delta arrangement and provide the pump station with secondary electrical service at 240 volts, 3-phase, 3-wire, 60 hertz. An underground secondary electrical ductline consisting of one 2-inch PVC, concrete-encased conduit extends from the pad mounted transformers to HECO kilowatt-hour (kWH) Meter #651361, mounted on the exterior wall of the pump station.

A second HECO kWh meter (Meter #651478), also served by the same HECO secondary service conductors, is located adjacent to Meter #651361 and is used to serve the public restroom at Kapapapuhi Point Park.

The exterior lighting system appears to consist of wall-mounted luminaires utilizing high-pressure sodium lamps. The luminaires appear to be the original luminaires installed when the building was first constructed. These exterior luminaires illuminate the exterior perimeter of the pump building and are controlled via photocell. Interior lighting at the pump station consists of fluorescent, wraparound-type luminaires with metal housings and prismatic acrylic lamps.

Proposed Electrical System Upgrades—The Hawaiian Electric Company (HECO) is responsible for the pad-mounted transformer, primary ductlines and cables and HECO meter. The City only becomes involved if there are changes concerning the service capacity and/or modification/relocation of any of these items. The project proposes to replace the two (2) 10 HP wastewater pump motors with new 10 HP pump motors. It is assumed that one of the two pumps will operate at a time, including under worst-case conditions with a second pump acting as a backup.

The existing HECO transformer, HECO meter and service entrance conductors have sufficient capacity to support the proposed pump station modifications and no upgrade of the existing HECO service will be required unless there is a desire to make a change to the secondary service voltage to the pump station.

Existing Telecommunications System - Hawaiian Telcom is responsible for the existing telephone service cable to the pump station. The existing Hawaiian Telcom service to the pump station can remain for telephone (voice) service connectivity, if desired by the City. Hawaiian Telcom (HT) currently provides underground telecommunications service to the WWPS. HT utilizes a 2-inch underground ductline to provide an analog copper telephone line from its cable facilities along Kapapapuhi Street to the pump station.

Proposed Telecommunications System Upgrades - The City & County is in the process of upgrading telecommunications service links for their wastewater facilities to a Spectrum fiber link for remote monitoring and control functions. There is currently no Spectrum service infrastructure to the pump station. The City & County indicated that there are plans to service the pump station with the Spectrum fiber link. Per direction from the City & County the project will assume that the Spectrum fiber service will be present at the site by the time construction of the pump station improvements begin. The Spectrum fiber service cable is anticipated to utilize the existing 2-inch Hawaiian Telcom service conduit and will be extended into the pump station building to the existing telephone cabinet in the pump room. This fiber service cable will be extended from the telephone cabinet to a new network panel within the pump station building.

### *Water Supply*

Existing Water System – The Board of Water Supply has an 8-inch water main along Kapapapuhi Street in the vicinity of the project area. This water main should be located within paved roadways and made accessible for repairs and maintenance (BWS letter dated 9/12/24 received during Pre-assessment phase). Potable water is supplied to the park via an 8-inch water main which traverses from the West Loch Estates subdivision and into Kapapapuhi Point Park along the existing concrete stairway leading from the subdivision into the park. The 8-inch water main then runs along the Kapapapuhi Street to a

water meter located in the concrete sidewalk south of the driveway. The existing pump station is supplied via a ¾-inch service lateral coming off the 8-inch main. The existing restrooms are supplied via a 2-1/2-inch service lateral which also taps into the 8-inch main. The existing pump station building is located adjacent to the park access driveway which also serves as the fire apparatus access road.

#### *Proposed Water System*

The water system will be designed and constructed to BWS Standards.

Upgrades to the water service encompasses upsizing the existing ¾-inch service lateral to the pump station to a 1-1/2-inch service line. All existing water supply lines will remain.

Any structures should be adequately set back from the water main easements for the safety of the public and to prevent damage to the structures in the event of main breaks, repair, and maintenance.

The construction drawings should be submitted for BWS review and approval, and the construction schedule should be coordinated to minimize impact to the water system.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department. Fire protection for the site should be through the existing FH#L4287 that is located on the concrete sidewalk south of the driveway. See Dwg. C-001 of the 60% plans.

#### *Wastewater*

**Existing Wastewater System** – As discussed in Sections 2.1 and 3.0, the West Loch Estates Wastewater Pump Station, placed into service in 1989, collects and pumps wastewater from the residential neighborhood of West Loch Estates and transports the wastewater to the Kunia WWPS.

An 8-inch and 12-inch diameter gravity sewer line serving the West Loch Estates community and a 4-inch gravity sewer line serving the comfort station of Kapapapuhi Point Park feeds into the pump station. Flow discharges from the pump station via a 10-inch force main (FM). This force main is approximately 4,500 linear feet in length, travels northward along Pearl Harbor shoreline, and discharges into a manhole located on the shoreside of Waipahu's industrial area then gravity-flows to the Kunia WWPS, and eventually to the Honouliuli Wastewater Treatment Plant (WWTP) (Design Alternatives Report, Kaula AE LLC, April 21, 2023).

**Proposed Sewer System** – The proposed WWPS upgraded wastewater system is being designed to meet City and County of Honolulu Sewer Standards, and short- and long-term effects are discussed in this Final EA.

#### *Drainage System*

**Existing Drainage System** – The project site has no formal drainage system. Stormwater surface flows from the pump station site onto the driveway and parking area. The park itself does not have a drainage system. The closest catch basins are along Kapapapuhi Street, approximately 250-ft northwest of the project site. The catch basins are part of the drainage system that serves the West Loch Estates subdivision, which eventually outfalls into the detention basin located to the southwest of the project

site. It is assumed that all stormwater runoff from the park will eventually sheet flow into West Loch and/or Honouliuli Bay.

Proposed Drainage System – There are no planned upgrades to the storm drainage system with this project.

#### *5.14.2 Potential Impacts and Proposed Mitigation*

Residents and area businesses will be notified prior to construction should any temporary disruption of utility service be required, i.e., if the proposed project requires disconnection of a water main, a standby tanker truck will be provided for the provision of water to residents and businesses. Prior to construction, ENV will require all drawing submittals for the project include detailed BMPs for review and approval by State and City and County agencies as part of the project grading and construction permit process. Erosion control measures may consist of, but are not limited to, hydromulching grass seedling, erecting silt fencing/curtains, berms, and/or other applicable erosion control devices to prevent construction-related soils and silt from mixing with storm water runoff. The project's compliance with City and County Storm Drainage Standards and Rules Relating to Water Quality will be verified during the review of construction plans. Once construction is complete, utility services will be restored. The proposed project would not result in secondary or cumulative impacts to water or wastewater resources.

#### *5.14.3 Solid Waste*

##### *5.14.3.1 Description*

Most residential and general commercial trash from Honolulu is hauled to the Campbell Industrial Park H-POWER (Honolulu Program of Waste Energy Recovery) Plant. This waste-to-energy plant processes over 600,000 tons of waste per year and produces up to 10 percent of O'ahu's electricity. Residual ash and non-combustible construction and demolition debris, as well as industry waste is disposed of in a landfill. The two landfills on O'ahu are the 'Ewa Gulch Sanitary Landfill, administered by the Department of Environmental Services, and the PVT landfill in Nānākuli, administered by the PVT Land Company (CITY AND COUNTY Department of Environmental Services, 2005).

##### *5.14.3.2 Potential Impacts and Proposed Mitigation*

The proposed project is not anticipated to generate a significant quantity of solid waste during planned construction activities. Solid waste that is generated will be disposed of in accordance with HAR, Chapter 11-58.1, Solid Waste Management Control. No secondary or cumulative impacts to solid waste facilities would occur from the implementation of the proposed project.

#### *5.14.4 Police Protection*

##### *5.14.4.1 Description*

The Honolulu Police Department (HPD)'s Kapolei police station is located at 1100 Kamokila Boulevard. The project site is in Patrol District 8, Sector 2. As of May 2012, HPD had 1,933 sworn officers (HPD, n.d.).

#### *5.14.4.2 Potential Impacts and Proposed Mitigation*

The proposed construction of the WWPS upgrade project would not result in an increase in demand for police protection services. No direct, secondary or cumulative impacts to police protection are anticipated or expected, and no mitigation measures are necessary or recommended.

#### *5.14.5 Fire Protection*

##### *5.14.5.1 Description*

Fire prevention, suppression, and protection services for all of O'ahu is provided by the HFD. The Waikiki Fire Station No. 42 at 94-840 Lumiaina St., Waipahu, is the closest fire station to the project site. In 2013, the HFD employed over 1,100 firefighters (Honolulu Fire Department, September 9, 2024).

The existing pump station building is located along the park access driveway which also serves as the fire apparatus access road. Existing fire hydrant FH-#L4287 located along the access driveway, is directly south of the pump station building, approximately 50-ft away.

##### *5.14.5.2 Potential Impacts and Proposed Mitigation*

The proposed West Loch Estates WWPS upgrade project would not result in an increase in demand for fire protection services. The following are Pre-assessment period comments received in a letter dated September 9, 2024 from the Fire Department:

Fire department access roads shall be provided such that any portion of the project facility or any portion of an exterior wall of the building is located not more than 150 feet from fire department access roads as measured by an approved route around the exterior of the building or facility (National Fire Protection Association [NFPA] 1; 2018 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1, as amended.) A fire department access road shall extend to within 50 feet of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2018 Edition, Section 18.2.3.2.1.) Fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3.

An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Sections 18.3 and 18.4.

The proposed WWPS site improvements will comply with Ewa Development Plan and all applicable City and County design standards to meet health and fire safety requirements. HFD will review and approve the civil drawings for this project during the Building Permit review phase. No direct, secondary or cumulative impacts on fire protection are anticipated or expected, and no mitigation measures are necessary or recommended.

Construction period activities are not anticipated to significantly impact the existing access driveway.

### *5.14.6 Health Care and Emergency Services*

#### *5.14.6.1 Description*

The nearest major medical facility is the Queen's Medical Center West O'ahu, an approximately one-mile drive from the project site. Emergency medical service is provided by the City and County of Honolulu Emergency Services Department, Emergency Medical Services Division. This facility provides emergency care as well as clinic specialty services, generally excluding General Medicine and Family Practice. The largest hospital on the island is The Queen's Medical Center on Punchbowl Street, with 505 small care beds and 28 sub-acute beds. Queen's at Punchbowl is the only Level II trauma center in the Pacific Region and provides emergency, primary, and specialized care. Any trauma patients are transferred to Queen's, approximately six miles from the project site (The Queen's Medical Center, 2013). In addition, numerous privately operated medical/dental clinics and offices are located in the area to serve the local population.

#### *5.14.6.2 Potential Impacts and Proposed Mitigation*

The proposed construction activities to achieve improvements to the West Loch Estates WWPS would not result in a short-term, temporary increase in demand for health and emergency services. Post construction and upon completion of the proposed improvements, there would be no direct, secondary or cumulative impacts on emergency services are anticipated or expected, and no mitigation measures are necessary or recommended.

### *5.14.7 Schools and Libraries*

#### *5.14.7.1 Description*

The project site is within the Leeward O'ahu school district, in the Campbell-Kapolei Complex area. In addition to two high schools, the complex includes 12 elementary schools and three intermediate schools.

There are two private schools in Kapolei, the American Renaissance Academy and Island Pacific Academy, which enrolled 87 and 483 students, respectively, in 2014-2015 (Hawai'i Association of Independent Schools, 2016). Kapolei Charter School by Goodwill Hawai'i serves 49 students throughout grades 9 through 12 and is located 0.5 mile west of the western portion of the project site (Strive HI, 2018).

In addition, higher education institutions in proximity to the project site include the University of Hawai'i, West O'ahu, which enrolled 3,128 undergraduate students in 2018 (University of Hawai'i , West O'ahu, 2018), and the Hawai'i Tokai International College, which enrolled 158 undergraduate students in 2016 (Hawai'i Tokai International College, 2016). Both are located approximately 2.8 miles southwest of the project site.

There are two public libraries in the vicinity, Kapolei north of the project site, and 'Ewa Beach to the east near the James Campbell High School.

#### *5.14.7.2 Potential Impacts and Proposed Mitigation*

Because the proposed project is to improve safety and efficiency operations of the existing West Loch Estates WWPS, the project is not anticipated to impact any schools or libraries.

During construction, the project may result in short-term disruption of vehicle traffic along roadways within the near vicinity or periphery of the project site. However, the project is not anticipated to obstruct or hinder access to educational facilities, including the University of Hawai'i West O'ahu campus.

The proposed project would not increase nor decrease the provision of educational services to the community, and would not directly, secondarily, or cumulatively result in an increase in the area population, which would otherwise generate the need for school services.

## *5.15 Recreational Resources*

### *5.15.1 Description*

The project site is located within the City and County of Honolulu's Kapapapuhi Shoreline Park. The project site is adjacent to the 18-hole West Loch Golf Course, a public facility, as well as in proximity to the Pearl Harbor National Wildlife Refuge. Other diverse recreational opportunities are available in the surrounding region. The following recreational facilities are within two miles of the project site:

- Kapolei Community Park People's Open Market
- Kapolei High School Farmer's Market
- Kapolei Community Park
- Kapolei Regional Park
- Kamokila Community Park
- Makakilo Neighborhood Park
- Mehana Neighborhood Park
- Nimitz Beach Park/Kalaeloa Beach Park
- Pointer Fields
- Pride Fields

Most recreational resources are available for use by the general public. The parks and baseball fields are owned and managed by the City and County Department of Parks and Recreation (DPR). DPR is currently under a licensing agreement with the U.S. Navy for the Pointer and Pride Fields and the Nimitz Beach Park/Kalaeloa Beach Park, while the City and County owns the other parks listed above. The Pearl Harbor National Wildlife Refuge is owned by the U.S. and allows restricted, escorted public access.

### *5.15.2 Potential Impacts and Proposed Mitigation*

Vehicular and pedestrian access to park's bike path and pedestrian paths to Kapapapuhi Point (West Loch) shoreline activities and views may be adversely impacted throughout the period of project construction activities. Except for portions of the park grounds and facilities affected by this contract, the park facilities will be in use by the public. The contractor shall provide full cooperation with the DPR to effectively maintain such use of the park facilities.

It is highly unlikely that the West Loch Estates WWPS shall experience a complete failure of its operations. Various safeguards have been established to prevent such an event including but not limited to on-site alarm systems, remote alarms via SCADA (Supervisory Control and Data Acquisition) system, emergency backup generator, and a force main bypass connection. Other spill containment and mitigation measures include: cordon off the spill points to prevent public contact, post signs and use media/public service announcements to inform the public of the spill, use of sandbags to plug storm drain entrance points and to contain the spill in the vicinity of the spill point, remove/clean up spill using hauling trucks and/or portable pump system, and disinfect spill site and initiate water quality monitoring per City and State DOH requirements.

Potential spill response for this wastewater pump station have been addressed in reports entitled *Spill Response Procedures Facility Manual for West Loch Estates Wastewater Pump Station*, dated June 2010 and *Programmatic Spill Contingency Plan for Small Force Mains*, dated June 2012, both prepared by Fukunaga & Associates, Inc. Both reports detail the direct response to undertake in the unlikely event a spill occurs. Copies of the reports may be obtained from the City's Department of Environmental Services, Division of Wastewater Engineering and Construction.

A traffic management plan may be prepared, reviewed and approved by ENV and DPR to ensure that public access will be safe and secure during the construction period. Upon completion of construction activities related to the proposed project, access to public recreation areas will be restored to pre-construction conditions. During construction, the project may result in short-term disruption of vehicle traffic along roadways within the near vicinity or periphery of the project. However, the project is not anticipated to obstruct or hinder access to nearby recreational facilities in the short- or long-term.

## **Section 6** **Cultural Impact Assessment**

Articles IX and XII of the State of Hawai'i Constitution require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 HRS also requires environmental assessment of cultural resources in determining the significance of a proposed project (*Environmental Council, State of Hawaii November 19, 1997*).

Keala Pono ethnographers began the Cultural Impact Assessment (CIA) process by identifying individuals to interview who are knowledgeable about the project area's cultural setting, land use, and historical development. Initial contact with the following individuals for recommendations of people to interview:

- Kamakua Ferreira, Lead Compliance Specialist, Office of Hawaiian Affairs
- Noah Gomes, Ethnographer, State Historic Preservation Division
- Regina Hilo, Burial Sites Specialist, State Historic Preservation Division
- Kaahiki Solis, Cultural Historian (O'ahu, Kaua'i, and Ni'ihau)

The CIA process is continuing with potential interviews of the following individuals:

- Kepoo Keliipaakaua, Cultural Resource Specialist & Ph.D. student
- Shad Kāne, 'Ewa Moku Rep. & Cultural Practitioner
- Jewel Kaimana Jose, Born and raised in Ota Camp
- Kumu Tatiana Fox, Has a hālau in the area
- Corrina "Rina" Moelu, 'Ewa-Puuloa Hawaiian Civic Club
- Marleen Kkaulionalani "Kaui" Serrao, 'Ewa Puuloa Outrigger Canoe Club Co-founder & Director
- Kuuwainani Eaton, Granddaughter of Aunty Arline Eaton, President/Director of Haokalei Cultural Foundation & Teacher at Ka Oha
- Antoinette Lee, Pearl Harbor Hawaiian Civic Club
- Alcosiba 'Ohana (Eric, Chris, and Mike), Born and raised in old Honouliuli Village by Queen's West
- Kumu Jaemie, Kumu hula for Rahiti Hawai'i/Hālau hula O Ke A'o 'Ula Noweo A Ka Puuku
- Dietrix J. Ulokoia Dhaylonsod, Kumu hula, cultural practitioner from Honoluliuli, (Honokai Hale)

Findings, Conclusions, Recommendations determined from interviews conducted as of December 2024: The Kapapapuhi and Puuloa region, mauka to makai (from the hills to the shoreline), is rich in cultural history, resources and practices. While interviewees as well as documented research indicate the existence of cultural resources and practices close to the project area and in the vicinity, no known evidence exists within the project area itself.

The proposed project was presented to the 'Ewa Neighborhood Board at its regular monthly meeting on April 10, 2025 and the Board will be kept apprised as the project progresses.

Based on the above, the potential for adverse direct, secondary, or cumulative effects to traditional or contemporary cultural practices is not anticipated. However, as noted in Section 5.9.2, because there is always the potential for the discovery of *iwi* or other cultural remains, any inadvertent finds will immediately result in the cessation of work and the immediate reporting of the find to the SHPD at (808) 692-8015 (Main Office, O'ahu). SHPD will provide further instructions regarding the treatment of the find and the conditions when work may be resumed.

## **Section 7**

### **Relationship to Land Use Policies, Plans, and Controls**

Federal Government, State of Hawai'i and City and County of Honolulu policies, plans, and land use controls are established to guide development in a manner that enhances the environment and quality of life. The establishment of policies, plans, and land use controls at all levels of government are further promulgated to help ensure that the long-term social, economic, environmental, and land use needs of the community and region can be met. The proposed project's relationship to land use policies, plans, and controls for the region and proposed activity are as follows.

#### **7.1 State of Hawai'i**

##### **7.1.2 Hawai'i State Plan**

The Hawai'i State Plan, adopted in 1978, and promulgated in HRS, Chapter 226, consists of three major parts:

Part I, describes the overall theme including Hawai'i's desired future and quality of life as expressed in goals, objectives, and policies.

Part II, Planning Coordination and Implementation, describing a statewide planning system designed to coordinate and guide all major state and county activities and to implement the goals, objectives, policies, and priority guidelines of the Hawai'i State Plan.

Part III, Priority Guidelines, which express the pursuit of desirable courses of action in major areas of statewide concern.

The proposed project is consistent with the objectives and policies of the Hawai'i State Plan. Specifically, the proposed action will increase and diversify the State's economic base through upgrading wastewater facilities necessary to support the existing community of West Loch Estates. An analysis of the project's ability to meet the objectives, policies, and priority guidelines of the Hawai'i State Plan are provided in Table 7-1 below.

**Table 7-1, Hawai'i State Plan Applicability to the Proposed Project**

Hawai'i State Plan Objectives, Policies, and Priority Guidelines	Applicability to the Proposed Project
<b>Objectives and Policies</b>	
§226-5 Objective and policies for population	Not Applicable
§226-6 Objectives and policies for the economy--in general	Not Applicable
§226-7 Objectives and policies for the economy—agriculture	Not Applicable
§226-8 Objective and policies for the economy--visitor industry	Not Applicable
§226-9 Objective and policies for the economy--federal expenditures.	Not Applicable
§226-10 Objective and policies for the economy--potential growth activities	Not Applicable
§226-10.5 Objectives and policies for the economy--information industry	Not Applicable
§226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.	Not Applicable
§226-12 Objective and policies for the physical environment--scenic, natural beauty, and historic resources.	Not Applicable
§226-13 Objectives and policies for the physical environment--land, air, and water quality	Not Applicable
§226-14 Objective and policies for facility systems--in general	<b>Applicable</b>
§226-15 Objectives and policies for facility systems--solid and liquid wastes	<b>Applicable</b>
§226-16 Objective and policies for facility systems--water	Not Applicable

Hawai'i State Plan Objectives, Policies, and Priority Guidelines	Applicability to the Proposed Project
§226-17 Objectives and policies for facility systems--transportation	Not Applicable
§226-18 Objectives and policies for facility systems--energy	Not Applicable
§226-18.5 Objectives and policies for facility systems--telecommunications	Not Applicable
§226-19 Objectives and policies for socio-cultural advancement--housing	Not Applicable
§226-20 Objectives and policies for socio-cultural advancement--health	Not Applicable
§226-21 Objective and policies for socio-cultural advancement--education	Not Applicable
§226-22 Objective and policies for socio-cultural advancement--social services	Not Applicable
§226-23 Objective and policies for socio-cultural advancement--leisure	Not Applicable
§226-24 Objective and policies for socio-cultural advancement--individual rights and personal well-being	Not Applicable
§226-25 Objective and policies for socio-cultural advancement--culture	Not Applicable
§226-26 Objectives and policies for socio-cultural advancement--public safety	Not Applicable
§226-27 Objectives and policies for socio-cultural advancement--government	Not Applicable
<b>Priority Guidelines</b>	
§226-102 Overall Direction	<b>Applicable</b>
§226-103 Economic priority guidelines	Not Applicable
§226-104 Population growth and land resources priority guidelines	Not Applicable
§226-105 Crime and criminal justice	Not Applicable
§226-106 Affordable housing	Not Applicable
§226-107 Quality education	Not Applicable

The objectives, policies, and priority guidelines of the Hawai'i State Plan directly applicable to the proposed project are discussed in further detail below (emphasis added).

*§226-3 Overall theme: Community or social well-being. In essence, it refers to healthy social, economic, and physical environments that benefit the community as a whole.*

*§226-4 State goals. In order to guarantee, for present and future generations, those elements of choice and mobility that insure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goals of the State to achieve:*

*(1) A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations.*

*(2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.*

*§226-13 Objectives and policies for the physical environment--land, air, and water quality:*

*(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:*

*(1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.*

*(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:*

*(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.*

*§226-14 Objectives and policies for facility systems--in general:*

- (a) *Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.*
- (b) *To achieve the general facility systems objective, it shall be the policy of this State to:*
  - (1) *Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.*
  - (2) *Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.*
  - (3) *Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.*
  - (4) *Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.*

*§226-15 Objectives and policies for facility systems----solid and liquid wastes:*

- (a) *Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:*
  - (1) *Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.*
  - (2) *Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.*
- (b) *To achieve solid and liquid waste objectives, it shall be the policy of this State to:*
  - (1) *Encourage the adequate development of sewerage facilities that complement planned growth.*
  - (2) *Promote re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic.*
  - (3) *Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.*

*Discussion:*

The themes and goals of the Hawai'i State Plan of ensuring support of community health, stability, well-being and self-reliance into the future are applicable to the proposed project as they support the City and County's plans to anticipate and improve major infrastructure systems necessary for maintaining public health and safety while preserving the physical environment.

The proposed project is consistent with the objectives and policies of the Hawai'i State Plan, as the project will provide flexibility, reliability and redundancy in the wastewater disposal process. It would enable the City and County to maintain basic sanitation standards relating to wastewater collection and treatment in O'ahu's 'Ewa district wastewater service areas. The project would result in adequate sewerage facilities to support both current and future economic activities.

### *7.1.3 State Land Use Law*

The State Land Use Commission classifies all lands in the State of Hawai'i into one of four land use designations: Urban, Rural, Agricultural and Conservation. According to HRS, Chapter 205, State Land Use Law:

***"Chapter 205, HRS, Districting and classification of lands:"***

*"(a) There shall be four major land use districts in which all lands in the State shall be placed: urban, rural, agricultural and conservation. The land use commission shall group contiguous land areas suitable for inclusion in one of these four major districts. The commission shall set standards for determining the boundaries of each district provided that:"*

*"(1) In the establishment of boundaries of urban districts those lands that are now in urban use and a sufficient reserve area for foreseeable urban growth shall be included;"*

*"In establishing the boundaries of the districts in each county, the commission shall give consideration to the master plan or general plan of the county."*

*(b) Urban districts shall include activities or uses as provided by ordinances or regulations of the county within which the urban district is situated.*

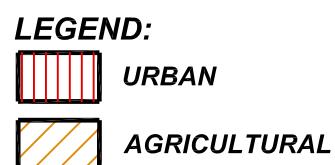
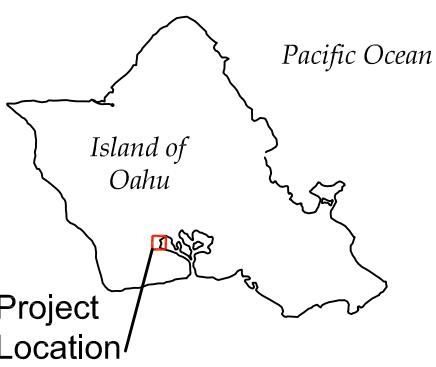
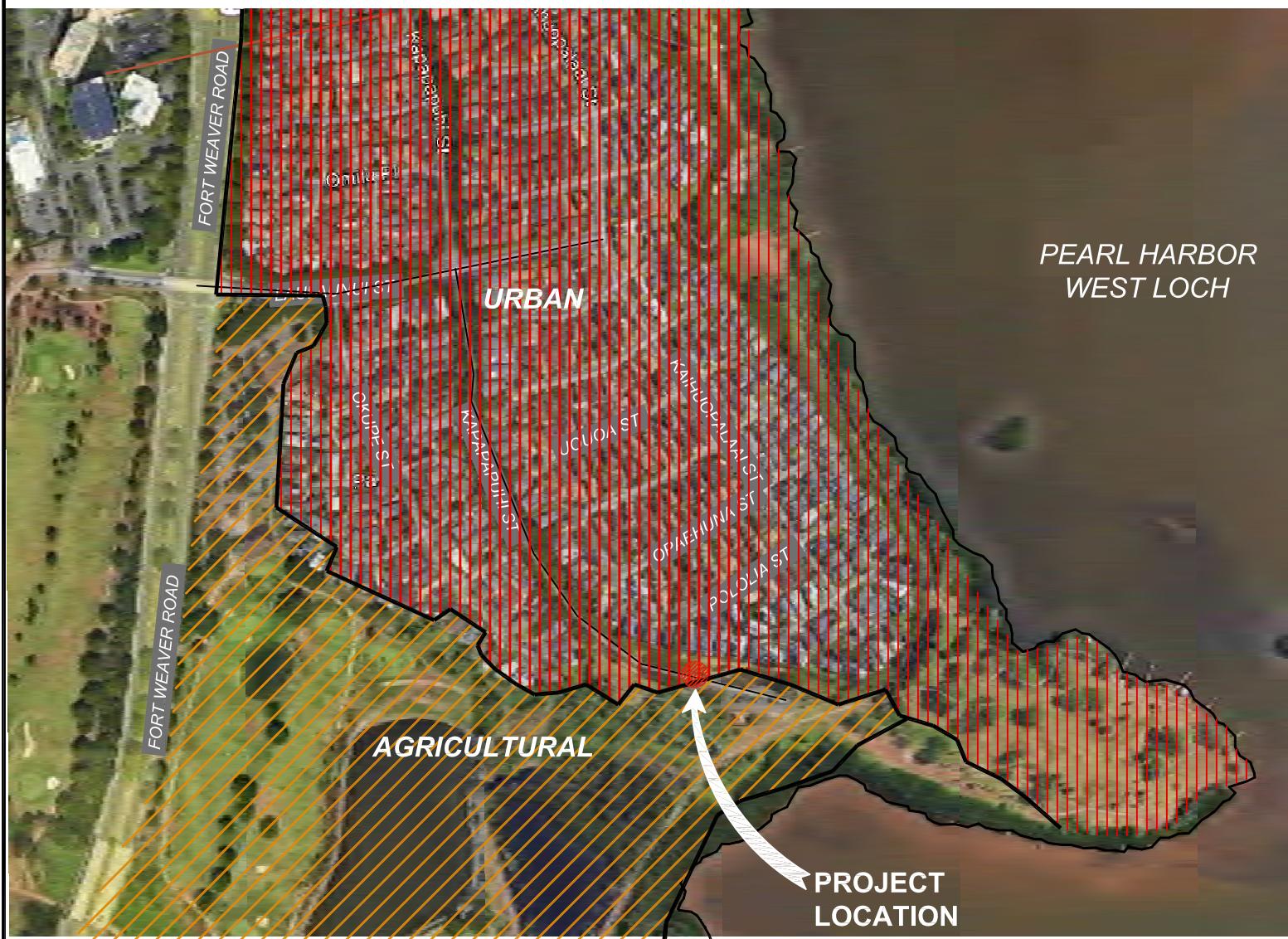
*"(3) In the establishment of the boundaries of agricultural districts the greatest possible protection shall be given to those lands with a high capacity for intensive cultivation."*

**Discussion:** The proposed action involves the use of land within the Urban and Agricultural State Land Use Districts. The proposed project involving the upgrade of an existing WWPS is allowed/consistent with the designations as Urban and Agricultural as the project site serves as a necessary public infrastructure installation to the West Loch Estates community. See Figure 11, State Land Use Districts.

### *7.1.4 State Functional Plans*

State Functional Plans are the framework for implementation of the Hawai'i State Plan by establishing policies and guidelines for specific activities. State Functional Plans are developed by the agency responsible for the functional area, including agriculture, conservation lands, education, energy, higher education, health, historic preservation, housing, recreation, tourism, and transportation. The proposed project is consistent with the State's facility planning objective for solid and liquid wastes by providing adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, and mobility. It is applicable to this objective by providing City-owned property the purpose of operating and maintaining the West Loch Estates WPS.

**Figure 11**  
**State Land Use Districts**



**State Land Use  
Commission (SLUC) Map**  
West Loch Estates Wastewater  
Pump Station (WWPS) Upgrade

TMK: 9-1-181:001  
Ewa, Oahu, Hawaii  
City & County of Honolulu  
Environmental Planning Solutions, LLC



0 250 500  
Feet

### *7.1.5 Special Management Area (SMA)*

The City and County of Honolulu has designated the shoreline and certain inland areas of the island of O'ahu as being within the SMA. SMA areas are designated sensitive environments and protected in accordance with the State's Coastal Zone Management policies, as set forth in HRS, Chapter 205A, Coastal Zone Management. See Figure 12, Special Management Area.

Discussion: The project site is located approximately 450 feet west (ma'uka) of the coastline fronting the Pearl Harbor West Loch which places it within the SMA.

The project will require a SMA (Major) permit application for the proposed WWPS upgrade within the SMA, this permit is administered by the DPP. The following is a discussion of the project's conformity with SMA guidelines, as cited in Section 25-3.2, ROH, *Review Guidelines*.

*(a) All development in the special management area shall be subject to reasonable terms and conditions set by the council to ensure that:*

*(1) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas and natural reserves is provided to the extent consistent with sound conservation principles;*

Discussion: The project site is located at the eastern (makai) end of Kapapapuhi Street within the public parking lot of West Loch Shoreline Park. Vehicular and pedestrian access to the park's bike path and pedestrian paths to West Loch shoreline activities and views will be maintained throughout the period of project activities and during operation following construction.

A traffic management plan will be prepared and managed by ENV, for DTS staff review and approval so that public access will be safe and secure during the construction period. Upon completion of construction activities related to the proposed project, access to public recreation areas will be restored to pre-construction conditions.

*(2) Adequate and properly located public recreation areas and wildlife preserves are reserved;*

Discussion: The project consists of improvements within an existing, established WWPS facility. Public recreation areas and wildlife preserves will not be affected by project activities or operation of the existing facility's proposed upgrade following construction. The contractor's staging areas will be located within the limits of the entire construction zone at the project site, including the dumpster area, to the east of the pump station. The construction zone is estimated at approximately 785-sf in the project work area, and a 112-lf perimeter physical buffer zone between recreational park activities and the project construction activities will ensure public safety and safe operation at the construction site.

Siting of the WWPS 35 years ago during the master planning phase, was based on its downslope location from residential land uses, and within the City and County's public park parking lot.

Capital costs as well as the time involved in the planning, permitting and construction of a new facility would prove to be cost prohibitive.

*(3) Provisions are made for solid and liquid waste treatment, disposition and management which will minimize adverse effects upon special management area resources; and,*

**Discussion:**

Under an operating worst case scenario, should any spill of 1,361 gals. (total volumetric capacity of the wet well) were to occur at the upgraded WWPS, this volume would not be instantly “dumped” onto the park’s property. ENV personnel will be notified immediately of any higher than usual levels of wastewater in the wet well and will respond appropriately per the Spill Response Plan. In the unlikely event that a spill does occur, it will most likely be contained within the pump station building or on the pump station grounds.

Construction activities will not generate a significant quantity of wastewater, construction waste and demolition debris. As stated in Section 5.3.1 Geology of this EA, the amount of soil expected to be cut is approximately 65 cubic yards (cy), and fill of 12 cy. Construction and use of the proposed project will not disrupt or otherwise adversely affect wastewater systems. Construction and demolition debris will be disposed of at the PVT Landfill in accordance with City and County and State DOH regulations and provisions of the PVT facility license. Excess soils resulting from excavation activities will be disposed by storage within a designated offsite location. Construction personnel will have access to existing restroom facilities at the solids handling building or be provided with portable toilets. No other mitigation measures are recommended or required.

Protection of existing coastal ecosystems will be ensured by contractor’s strict adherence to BMPs during construction of the project. No use of the coastal ecosystem will be required. Prior to construction, BMPs will be prepared and strictly followed to prevent potential pollutant (sediment) discharges into storm water runoff. These measures will be in place and functional before project activities begin and will be maintained throughout the construction period. When completed, the use of filters is expected to help improve upon current conditions.

*(4) Alterations to existing land forms and vegetation; except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation or failure in the event of earthquake.*

**Discussion:**

The proposed WWPS improvements will be constructed in areas within the existing 4,000 sf project boundary. The existing wastewater pump station facility will be enlarged by relocating the north and east CRM walls further outward. This will add approximately 1,700-sf to the existing WWPS site, bringing the total occupied site to 4,000-sf. The larger site will allow for more space to properly operate and maintain the pump station, including providing a dedicated parking space for a maintenance vehicle near the western and eastern boundaries of the plant.

The project site is relatively flat with an existing elevation of approximately 9 to 12 feet above msl, and is not susceptible to landslides or erosion. There are no surface waters in the immediate vicinity. BMPs will be undertaken during construction activities to ensure that silt and dust will not escape the project site during ground disturbing activities. The majority of the site is located in FEMA Flood Zone X, which designates areas with 0.2 percent annual chance (500-year) floodplain, where BFE are undetermined. The southern portion of the site is located in the tsunami evacuation zone.

The visual impact created by the upgraded WWPS facility is not anticipated to reduce or impede views from West Loch Estates residences in surrounding areas. The expansion of the existing facility will be consistent with the zoning designation and significant adverse visual effects are not anticipated.

See Discussion in Criteria 3, Provisions for wastewater facility systems, above. The proposed project will conform to all applicable State and City and County regulations with respect to construction and facility maintenance and operations to ensure minimal adverse effects to existing water and recreational resources. Structural improvements will be designed to current regulatory standards to protect project facilities from earthquakes and other natural hazards. A comprehensive list of permits that may be required is provided in Section 8. While the proposed project site is within the coastal zone, no coastal resources will be adversely affected.

*(b) No development shall be approved unless the council has first found that:*

*(1) The development will not have any substantial, adverse environmental or ecological effect except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health and safety, or compelling public interest. Such adverse effect shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect and the elimination of planning options;*

*Discussion:*

The proposed project is not anticipated to involve a substantial degradation of environmental quality. The site has been developed and operated to serve the West Loch Estates as its wastewater pump station facility since 1989. The planned upgrade and operation of the improvements will result in improved pump station operations, but otherwise will not substantially alter environmental conditions at the project site. Planning and design for the project includes mitigation measures to prevent or minimize potential adverse environmental effects. The project will not result in cumulative effects, will not involve a commitment to larger actions, and will not result in the elimination of planning options.

*(2) The development is consistent with the objectives and policies set forth in Section 25-3.1 and area guidelines contained in HRS Section 205A-26;*

**Discussion:**

The proposed project is in compliance with the objectives and policies set forth in Chapter 205A-2, HRS, and SMA guidelines contained in Chapter 205-A26, HRS. This document is prepared to summarize the project effects in relation to the SMA guidelines in Section 205A-26, HRS, and Section 25, ROH. See **Section 6.2.5** for discussion of the project's compliance with the State's objectives and policies for the Coastal Zone.

*(3) The development is consistent with the county general plan, development plans and zoning. Such a finding of consistency does not preclude concurrent processing where a development plan amendment or zone change may also be required.*

**Discussion:**

The proposed project is in conformance with the GP's objectives for Transportation and Utilities, as described in Section 7.2.1. The County zoning designation for the project site is AG-1, Restricted Agricultural District. The WWPS facility is consistent with utility installation Type A requirements in service to the simultaneously master planned and developed West Loch Golf Course, Shoreline Park, and residential Estates projects. Type A utility installations are defined as, "those with minor impact on adjacent land uses and typically include: 46 kilovolt transmission substations, vaults, water wells and tanks and distribution equipment, sewage pump stations, telecommunications antennas, and other similar uses," (Sect. 21-5.650, LUO) restricted agricultural district.

*(c) The council shall seek to minimize, where reasonable:*

*(1) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;*

**Discussion:**

The project does not involve filling or otherwise altering any water body.

*(2) Any development which would reduce the size of any beach or other area usable for public recreation;*

**Discussion:**

The project site is located within the existing WWPS facility within the park parking lot and does not affect any beach or other areas usable for public recreation.

*(3) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management area and the mean high tide line where there is no beach;*

*Discussion:*

The project is not located where it would reduce or impose restrictions upon public access to any shoreline areas or surface waters.

*(4) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast; and*

*Discussion:*

The proposed West Loch Estates WWPS upgrade will not interfere with nor detract from the line of sight toward Pearl Harbor West Loch from the state highway nearest the coast.

*(5) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.*

*Discussion:*

The project site is located within an existing 2,300 sf WWPS facility in the parking lot of Kapapapuhi Shoreline Park and is expected to support continued reliable wastewater service requirements for the West Loch Estates community. The proposed project facility expansion to 4,000 sf will not adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

Peak design flow for the pump station is 730 gpm (1,050 mgd). Total volumetric capacity of the wet well is 1,361 gallons. As mentioned above, various safeguards have been established to prevent complete failure of the facility, including but not limited to, on-site alarm systems, remote alarms via SCADA (Supervisory Control and Data Acquisition) system, emergency backup generator, and a force main bypass connection.

#### *7.1.6 Coastal Zone Management Act (CZMA)*

All land and water use activities in the state must comply with HRS, Chapter 205A, Hawai‘i Coastal Zone Law. The State of Hawai‘i designates the Coastal Zone Management Program (CZMP) to manage the intent, purpose and provisions of HRS, Chapter 205(A)-2, as amended, for the areas from the shoreline to the seaward limit of the State’s jurisdiction, and any other area which a lead agency may designate for the purpose of administering the CZMP.

The following is an assessment of the project with respect to the CZMP objectives and policies set forth in Section 205(A)-2.

## **1. Recreational resources**

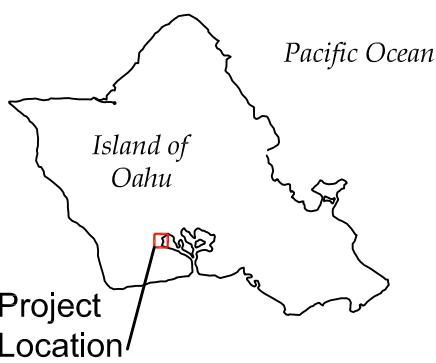
*Objective: Provide coastal recreational opportunities accessible to the public.*

*Policies: A) Improve coordination and funding of coastal recreational planning and management; and*

*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; and*
- (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 crediting such dedication against the requirements of section 46-6.*

**Figure 12**  
**Special Management Area (SMA)**



**LEGEND:**

	<b>WITHIN SMA</b>
	<b>OUTSIDE SMA</b>

### Special Management Area

West Loch Estates Wastewater Pump Station (WWPS) Upgrade

TMK: 9-1-181:001

Ewa, Oahu, Hawaii

City & County of Honolulu

Environmental Planning Solutions, LLC



0 250 500  
Feet

**Discussion:** As indicated in Section 7.1.5 the proposed project is located within the West Loch Shoreline Park parking lot, approximately 450 ft (0.3 mi.) west (ma‘uka) of the West Loch shoreline. The proposed safety and operational upgrades proposed would have some short-term, temporary adverse effect on existing access to and from the park parking facility and to the recreational areas within the park during the construction period.

The City and County ENV and its contractor will provide advance notification to the public park goers of the periods of limited access through all available means well in advance of the start of work on the ground.

A traffic management plan will be prepared for ENV, DTS and DPR review and approval to ensure that public access will be safely maintained during the construction period.

Existing recreational uses currently occur within the immediate area surrounding the project site and 'Ewa Beach, and the proposed project is not expected to adversely affect the continuation of these uses.

## **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.*

*Policies: (A) Identify and analyze significant archaeological resources; (B) Maximize information retention through preservation of remains and artifacts or salvage operations; and (C) Support state goals for protection, restoration, interpretation, and display of historic resources.*

**Discussion:** No historic properties were identified or designated in the project site by this study. However, in accordance with HRS, Chapter 6E, and the requirements of the SHPD, should any historic resources, including human skeletal and significant cultural remains be identified during the construction of the proposed project, the following shall be implemented:

1. Work will cease in the immediate vicinity of the find;
2. The find will be protected from any additional disturbance by the contractor; and,
3. SHPD will be contacted immediately at (808) 692-8015 (Main Office, O'ahu) for further instructions including the conditions under which work activities may resume.

## **3. Scenic and open space resources**

*Objective: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.*

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

- (B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural land forms and existing public views to and along the shoreline;
- (C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and
- (D) Encourage those developments that are not coastal dependent to locate in inland areas.

**Discussion:** The potential for adverse visual impacts is anticipated to be minimal. The proposed project will involve the replacement and upgrade of equipment and operations within the West Loch wastewater pump station facility. There will be the use of construction equipment and personnel, which are not expected to constitute an adverse effect to the surrounding viewplane. Public access will continue through Kapapapuhi Street to the shoreline park parking lot; access to limited areas may be temporarily restricted from public access to maintain safety during the construction period. These activities will be only for a short period of time and will not result in any adverse permanent changes.

#### **4. Coastal ecosystems**

**Objective:** Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

- Policies:**
- (A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
  - (B) Improve the technical basis for natural resource management;
  - (C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
  - (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; and
  - (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.

**Discussion:** Coastal ecosystems will not be affected by the project. No use of the coastal ecosystem will be required. During construction, BMPs will be employed to prevent potential pollutant (sediment) discharges into storm water runoff. These measures will be in place and functional before project activities begin and will be maintained throughout the construction period. When completed, the use of permanent storm water and erosion controls is expected to help improve upon current conditions.

#### **5. Economic uses**

**Objective:** Provide public or private facilities and improvements important to the State's economy in suitable locations.

- Policies:**
- (A) Concentrate coastal dependent development in appropriate areas;

- (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; and*
- (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; and*
  - (iii) The development is important to the State's economy.*

**Discussion:** The proposed project will provide needed improvement of the existing facility and its infrastructure system. Overall, the net economic (direct, indirect, and induced) effects of the West Loch Estates WWPS upgrade construction are positive for jobs, earnings, and tax revenues.

In the short term, construction expenditures will have an overall beneficial impact on the local construction industry. In the long term, there will be updated environmentally safer and efficient transmission of collected wastewater to the Kunia WWPS in accordance with federal, State and City and County standards.

## **6. Coastal hazards**

***Objective:*** *Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.*

- Policies:***
- (A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;*
  - (B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;*
  - (C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and*
  - (D) Prevent coastal flooding from inland projects.*

**Discussion:** The proposed project has been evaluated for potential impacts associated with natural hazards including flooding, erosion, and nonpoint source pollution hazards. Natural hazards such as hurricanes, flooding, and tsunami are unavoidable for all coastal areas. Accordingly, all structures proposed for this project will be built, at a minimum, according to equivalent standards for the area's flood zone. To mitigate from hurricanes, the project will ensure that improvements are designed to present building codes which offer some protection from damage.

ENV will continue to coordinate with the City and County's Civil Defense agency to implement and maintain established procedures in the event of a flood or tsunami. It is noted that no habitable structures are proposed that would constitute an unreasonable risk to life or property. Given the requirement for the proposed project to be located within

proximity of the shoreline, the proposed use is considered reasonable and is not anticipated to have a significant impact on flood conditions.

To minimize the potential for adverse effects from flooding, and to prevent planned improvements from creating conditions that could exacerbate flooding and flood damage, all planned improvements will be constructed in accordance with City and County's flood hazard area ordinance and rules relating to storm drainage standards and water quality.

To safeguard against tsunami damage, all new above-ground wastewater facilities in coastal high hazard areas will be designed in compliance with ROH Section 16-11, to resist flood depths, pressures, velocities, and impact and uplift forces associated with floodwaters due to tsunamis.

ENV will continue to coordinate City and County agencies to implement and maintain established procedures in the event of a flood or tsunami. It is noted that no habitable structures are proposed that would constitute an unreasonable risk to life or property. Given the requirement for the proposed project to be located within proximity of the shoreline, the proposed use is considered reasonable and is not anticipated to have a significant impact on flood conditions.

## **7. Managing development**

*Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.*

*Policies:* (A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development; (B) Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and (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.

Discussion: The proposed project conforms to all State of Hawai'i regulations. A comprehensive list of permits that may be required is provided in Section 8 of this EA. While the proposed project site is within the coastal zone, no coastal resources will be adversely affected.

## **8. Public participation;**

*Objective: Stimulate public awareness, education, and participation in coastal management.*

*Policies:* (A) Promote public involvement in coastal zone management processes; (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; and

*(C) Organize workshops, policy dialogues, and site-specific mitigation to respond to coastal issues and conflicts.*

**Discussion:** The provision for public participation will be provided through the environmental review process as required in HRS, Chapter 343. Public comments were received during the public comment periods associated with the filing of the Pre-assessment letter and Draft EA. Presentation of the project was made to the 'Ewa Neighborhood Board at its April 10, 2025 regular meeting. In addition, a Special Management Area Use Permit (SMA major) application is expected to be filed for the project. This permit will be subject to governmental agency and public review as well as a public hearing and ruling by City Council, as required under law.

#### **9. Beach protection;**

*Objective: Protect beaches for public use and recreation.*

*Policies: (A) Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;*

*(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; and*

*(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.*

**Discussion:** The proposed project does not involve nor require the direct use of swimming beaches. Shoreline access via West Loch Shoreline Park is present in the subject area as the project site is about 450 ft (0.3 mi) ma'uka of the shoreline.

The proposed safety and operational upgrades would have some short-term, temporary adverse effects on existing access to and from the park parking facility and to the recreational areas within the park during the construction period.

The City and County ENV and its contractor will provide advance notification to the public park goers of the periods of limited access.

A traffic management plan will be prepared for ENV, DPR and DTS review and approval to ensure that public access will be safely maintained during the construction period.

#### **10. Marine resources**

*Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.*

*Policies: (A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;*

*(B) Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;*

- (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) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and*
- (E) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.*

**Discussion:** The proposed project does not involve the use or development of marine and coastal resources.

## *7.2 City and County of Honolulu*

### *7.2.1 General Plan*

The O'ahu General Plan is the policy document for the long-range development of the island of O'ahu. Adopted in 1977, it was subsequently updated and adopted by the City Council on December 1, 2021, as [Resolution 21-023, CD1](#), and signed by the Mayor on January 14, 2022, the plan sets forth general social, economic, environmental, and design objectives to be achieved for the general welfare and prosperity of the people of O'ahu and the most desirable population distribution and regional development pattern (Section 6-1508, [Revised Charter](#)). Combined with the regional development plans, the General Plan provides direction and framework to guide the programs and activities of the City and County of Honolulu.

The relevant goals, objectives, policies and implementing actions, along with a discussion of project conformance, are discussed below.

The following is a discussion regarding the project's consistency with the most relevant section and subsequent objectives and policies of the updated GP, Section V, Transportation and Utilities and Section VII, Physical Development and Urban Design (City and County of Honolulu GP).

### Section V

**Objective B:** *To provide an adequate supply of water and environmentally sound system of waste disposal for O'ahu's existing population and for future generations, and support a one water approach that uses and manages freshwater, wastewater, and stormwater resources in an integrated manner.*

**Policy 6:** Provide safe, reliable, efficient and environmentally sound waste-collection and waste-disposal services that consider the near- and long-term impacts of climate change during the siting and construction of new facilities.

**Policy 7:** Pursue programs to expand on-island recycling and resource recovery from O'ahu's solid-waste and wastewater streams.

**Objective C:** To ensure reliable, cost-effective, and responsive service for all utilities with equitable access for residents.

Policy 3: Facilitate timely and orderly upgrades and expansion of utility systems.

**Objective D:** To maintain transportation and utility systems which support O'ahu as a desirable place to live and visit.

Policy 2: Evaluate the social, cultural, economic and environmental impact of additions to the transportation and utility systems before they are constructed.

Policy 5: Evaluate impacts of sea level rise on existing public infrastructure, especially sewage treatment plants, roads and other public and private utilities located along or near O'ahu's coastal areas, and avoid the placement of future public infrastructure in threatened areas.

## Section VII

**Objective A:** To coordinate changes in the physical environment of O'ahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located.

*Policy 1: Provide infrastructure improvements to serve new growth areas, redevelopment areas, and areas with badly deteriorating infrastructure.*

*Policy 2: Coordinate the location and timing of new development with the availability of adequate water supply, sewage treatment, drainage, transportation, and other public facilities and services.*

### Discussion:

The project is consistent with Section V, Objective B, concerning environmentally-sound utility systems. The planning process is concerned with improving the safety, efficiency and environmental sensitivity of wastewater collection and treatment services. Implementation of the wastewater facility improvements would enhance efficiency of the systems and the secondary treatment to provide safe waste collection and disposal.

Section V, Objective C, Policy 3 is aimed at maintaining a high level of service for all utilities under the jurisdiction of the City and County, including wastewater collection and treatment. Planned improvements would benefit the communities within the West Loch Estates service area. Maintaining a high level of service and reliability in this service area is consistent with City and County's emphasis on retaining the population concentration within the districts. The environmental documentation in this EA evaluates the social, economic and environmental impact of the proposed improvements.

With regard to Section V, Objective D, Policy 2, the planned improvements are intended not only to maintain, but to upgrade the wastewater treatment process and wastewater facilities that would enable O'ahu to continue to be a desirable place to live and visit. The proposed project is

consistent with Section V, Objective D, Policy 5, as this EA is evaluating the effects on the existing West Loch Estates Wastewater Pump Station.

The proposed project is consistent with Section VII, Objective A, Policy 1, concerning the potential effects to the built environment. The WWPS upgrades are being constructed within the 'Ewa District, within the existing pump station site.

### *7.2.2 'Ewa Development Plan*

Supporting the General Plan are eight sustainable communities plans (SCPs) and development plans (DPs) for various regions of O'ahu intended to help guide public policy, investment and decision-making on a 25 year planning horizon. Each plan explains the role of the particular region in O'ahu's overall development pattern; the vision statement for the area; land use policies, principles and guidelines; public facilities and infrastructure policies and principles; implementation strategies; and maps of Open Space, Land Use and Public Utilities.

The proposed project is located within the 'Ewa DP area. The 'Ewa DP, revised and adopted by the Honolulu City Council in 2020, sets forth a vision and implementation plan for a Secondary Urban Center in 'Ewa. The DP vision statement notes that development of adequate infrastructure is essential to meet the needs of new and existing development. Future population and economic growth on O'ahu are to be directed to the 'Ewa planning region and the Primary Urban Center. DPP estimates that the population in the 'Ewa region is projected to grow from 101,397 in 2010 to 164,500 by 2035. As such, the DP serves as a policy guide for the actions and decisions that will support that growth.

The City and County's West Māmala Bay Wastewater Facilities Plan (2001) provides estimates that treatment/disposal capacity at the Honouliuli WTP will need to be increased from existing capacity for primary treatment of 38 mgd to almost 51 mgd by 2020 to meet projected population and economic growth in 'Ewa and Central O'ahu resulting from implementation of the Development Plans.

The remainder of the section provides general policies for wastewater system development in 'Ewa.

The following general policies and guidelines envisioned for West Loch Estates as outlined in the 'Ewa DP are applicable to the project:

#### *4.13.1 General Policies*

- *Require all wastewater produced by new developments in 'Ewa to be connected to a regional or municipal sewer service system.*
- *Use a City review and approval process, which provides adequate public notice and input, complete technical analysis of the project by the DPP, and approval by the City Council, for any major new private wastewater treatment plant. Other system elements, such as pump stations and mains, should not require such comprehensive review and policy approval.*

**Discussion:** The proposed WWPS upgrade and improvements are consistent with the DP's vision of providing adequate infrastructure to meet the needs of new and existing development.

### *7.2.3 City and County of Honolulu Land Use Ordinance*

The Land Use Ordinance (LUO) (Revised Ordinances of Hawai'i (ROH, Chapter 21-3) implements the goals and objectives of the O'ahu General Plan and the 'Ewa DP. All lands within the City and County of Honolulu are zoned into specified districts. The project site is located within the AG-1 Restrictive Agricultural district as the existing WPS facility is permitted (ROH, Chapter 21-3.40-1 (b)). See Figure 13, City and County of Honolulu Zoning.

The proposed project is located on lands designated as AG-1 Restricted Agricultural but is consistent with Utility Installation Type A requirements in service to the simultaneously master planned and developed West Loch Golf Course, Shoreline Park, and residential Estates projects. Type A utility installations are defined as, "those with minor impact on adjacent land uses and typically include: 46 kilovolt transmission substations, vaults, water wells and tanks and distribution equipment, sewage pump stations, telecommunications antennas, and other similar uses," (Sect. 21-5.650, LUO).

**Discussion:** This project is consistent with the LUO as having been designated Utility Installation Type A by the City and County of Honolulu Land Use Ordinance, which is a permitted use in all zoning districts, subject to standards in Section 21-5.650, or Article 5 regarding utility installations.

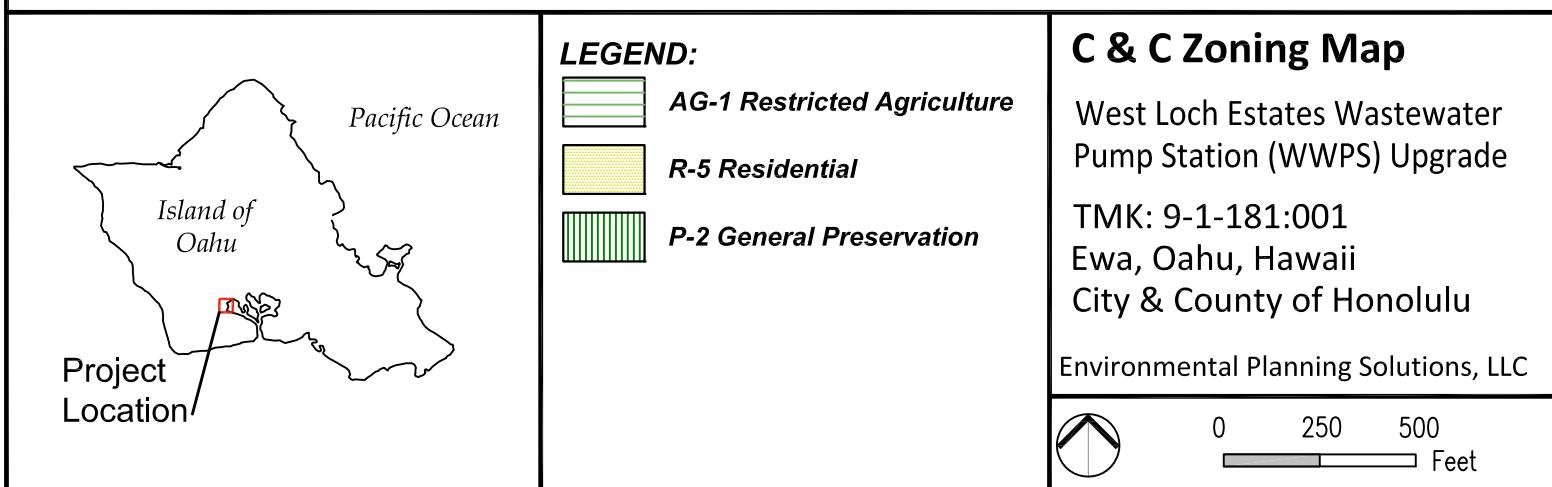
Proposed engineering design upgrades which would expand the project facility from its current 2,300 sf to 4,000 sf size within which the existing 16 ft. height of the components of the upgraded facility will remain at the same height, with little to no adverse impact on the park environment. The WWPS facility height of 16 ft. is within the development standards set by the Land Use Ordinance, ROH Chapter 21 which are as follows:

- (1) Height. The maximum height may be increased from 15 to 25 feet if height setbacks are provided.
- (2) Height Setbacks. Any portion of a structure exceeding 15 feet must be set back from every front, side, and rear buildable area boundary line one foot for each two feet of additional height above 15 feet.

The WWPS facility's proposed physical upgrade is planned to remain within its required minimum set back of at least 15 feet on all sides within the shoreline park parking lot.

The existing grown trees except are being protected during construction activities and shall remain in place post construction. Thus, the proposed project will be accomplished in accordance with Section 21-5.650, ROH Chapter 21 standards that apply to Type A utility installations within the City's 80-acre West Loch shoreline park.

**Figure 13**  
**City & County Zoning Map**



## ***Section 8*** ***Permits and Approvals That May Be Required***

### ***8.1 State of Hawai'i***

Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) under Hawai'i Revised Statutes (HRS), Chapter 343

Section 402, CWA, NPDES Notice of Intent Appendix C, Permit Application for Discharges of Storm Water Associated with Construction Activity (CWB, DOH)

- Section 402, CWA, NPDES Notice of Intent Appendix F, Discharges of Hydrotesting Waters (DOH)
- Section 402, CWA, NPDES Notice of Intent Appendix G: Discharges Associated with Construction Activity Dewatering (DOH)
- Noise Variance (DOH)

### ***8.2 City and County of Honolulu***

Special Management Area Use Permit, DPP

Variance Application for new aboveground fuel storage tank, DPP

Trenching Permit, DPP

Construction Plan Review, DPP

Dewatering Permit, DPP

Traffic Management Plan, DPP

Grading Permit, DPP

ADA review by DCAB

Offsite Storage and Staging Area Permit, DPP

## ***Section 9***

### ***Agencies, Organizations, and Individuals to be Consulted for the Environmental Assessment***

The following agencies, organizations, and individuals will be contacted during the HRS, Chapter 343, environmental review process to disclose the environmental conditions of the site, the proposed undertaking, and the potential impacts and mitigation measures that will be applied to ensure against adverse impacts.

#### *9.1 State of Hawai'i*

DLNR:  
DOFAW  
SHPD  
DOH  
CWB  
DBEDT  
OP, CZMP  
HDOT

#### *9.2 City and County of Honolulu*

BWS  
DDC  
DFM  
DPP  
DTS  
HFD  
HPD

#### *9.3 Elected Officials, Organizations and Individuals*

Honolulu County Councilmember Augie Tulba, Council District #9  
John Clark III, Chair Neighborhood Board No. 23, 'Ewa Beach  
Hawaiian Telcom  
Spectrum (Formerly Oceanic Time Warner)

## *9.4 Consultation*

### *9.4.1 Community Consultation*

The project was coordinated with ENV early in the planning process, and included meetings, phone calls, and overall coordination of the project. The proposed improvements to the WWPS facility also involved discussion with City and County of Honolulu's DPR commencing in mid-2024.

### *9.4.2 Comments Received During EA Consultation*

Pre-assessment letters were sent to agencies, community leaders and members for the subject project in August 2024 for early consultation. Draft Environmental Assessment (DEA) letters were sent seeking comments, January 17, 2025, to the same affected parties during the availability of the DEA in the State of Hawai'i Environmental Review Program (ERP)'s on line publication from January 23, 2025 to February 24, 2025. A list of comment letters received during the 30-day consultation periods parties review and comment periods is provided in Table 9-1, below. All comment letters received were provided with a written response for inclusion and use in the preparation of this EA. For a full record of the Draft EA comment and response letters prepared, see Appendix F.

**Table 9-1, Comment Letters Received During the Pre-Assessment & DEA Comment Periods**

<b>Agency/Org</b>	<b>Dates of Letters</b>	<b>Draft EA</b>	<b>Final EA</b>
DFM			
DBEDT, OP			
DOE			
HFD	9/9/24, 1/29/25	5.14.5.2 Fire Protection	5.14.2 Fire Protection
HDOT	9/13/24, 2/24/25	5.14.1 Roads and Transportation	5.14.1 Road and Transportation
DAGS		--	
DLNR			
DPP	9/11/24, 2/14/25	2.1 Project location; 7.1.5 Special Management Area; 7.1.6 Coastal Management Act; 5.6 Wetlands; 5.8 Flora and Fauna; 5.9 Archaeological and Historic Resources;	1.0 Project Summary; 2.1 Project location; 3.1 Project Description; 5.15.2 Recreational Resources; 7.1.5 Special Management Area; 7.2.3 LUO
DPR		--	
DDC	9/6/24, 2/13/25	No comment offered	5.14.1.2 Roads & Transportation
BWS	9/12/24	5.14.2 Utilities	
DTS			
HPD			
DOH CAB	2/7/25		5.11 Air Quality

## ***Section 10*** ***Summary of Effects***

In accordance with the content requirements of HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, an applicant or agency must determine whether an action may have significant impacts on the environment, including all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects, and its short- and long-term effects.

HAR, Section 11-200.1-24 requires discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Short-term and long-term do not necessarily refer to fixed time periods but are viewed relative to environmentally significant consequences of the proposed action. Sections 10.1 and 10.2 below discuss the extent to which the proposed action involves trade-offs among short-term and long-term gains and losses, as well as the extent to which the proposed action forecloses future options and/or narrows the range of beneficial uses of the environment. Table 10-1 provides a summary of impacts and mitigation measures by resource area.

In making the determination of whether an action may have significant impacts on the environment, HAR, Chapter 11-200.1-13 establishes "Significance Criteria" to be applied as a basis for identifying whether significant environmental impacts will occur. An action shall be determined to have a significant impact on the environment if it meets any one of the criteria. The relationship of the proposed action to the criteria is discussed below in Section 10.3.

### ***10.1 Short Term Effects***

Short-term effects associated with the proposed project will be principally during the construction phase. Noise will be temporarily generated from construction activities and the related mobilization of equipment. Construction equipment is expected to include, but not be limited to, backhoe(s), loader(s), or excavator(s), work trucks, and powered hand tools. All internal combustion powered equipment will be muffled in accordance with standard engine operating practices. Upon the completion of work, noise levels will return to preexisting ambient levels.

Fugitive dust may be generated during construction. The contractor will be required to control fugitive dust through the regular wetting of soils and ground areas susceptible to the generation of dust during work activities. Only enough water to wet the surface of the ground will be used to prevent the generation of runoff.

Protection of water quality will be through the use of mitigative measures including silt fencing/curtains, berms, and other applicable erosion controls to prevent construction storm water related soils and silt from leaving active areas of work. Specifications for the use of these measures will be through the construction plan approval process and National Pollutant Discharge Elimination System (NPDES) permit application that will be filed by the design consultant during the design phase.

Upon completion of work all construction equipment, machinery, and personnel will be demobilized from the job site with no further disturbance to the area. All debris and waste

materials will be disposed of at an approved refuse facility. Active work areas will be replanted with vegetation, similar to that found at the existing site.

## *10.2 Long Term, Secondary, and Cumulative Effects*

Potential long-term direct, secondary, and cumulative impacts have been evaluated and are documented for the following resources or issues: land use; land ownership; public health and safety; roadways and traffic; utilities; public facilities and services; topography, geology, and soils; hydrology; natural hazards; climate and air quality; noise; visual resources; marine environment; terrestrial flora and fauna; cultural resources; and socioeconomics. Of the resources and issues evaluated, the following long-term direct, secondary and cumulative impacts are potentially significant.

### *Surface Water, Drainage, and Water Quality*

The proposed project would provide needed improvement of the West Loch Estates community Wastewater Pump Station which has been in service since 1989. An adverse increase in surface runoff is not expected to result in significant adverse impacts. Upon the completion of work, all equipment used on-site will be demobilized and all debris and waste materials disposed of at an approved state or City and County refuse facility.

The proposed project would result in positive long-term and secondary impacts by providing environmental benefits in the form of increased safety and efficiency in the existing wastewater handling and operations. The proposed upgrade project facilitates the City's long-term objectives in terms of: reasonable constructability and cost, operation and maintenance, facility reliability, health and safety, regulatory statutes and industry standards, and achievable desired impacts to the community and environment. Long-term impacts from the proposed improvements are expected to protect nearshore State marine waters and provide the conditions necessary to improve public health and safety.

### *Socio-Economics*

There would be positive long-term and secondary impacts involving social benefits for residents and visitors from use of the West Loch Estates community's improved wastewater system. With or without the proposed action, the continued infill residential developments in the West Loch community and overall 'Ewa region would evolve with anticipated future growth of the State.

The proposed project will maintain and enhance economic productivity by supporting the effective use of public and private land to accommodate future growth in real estate, service sectors, and the retail industry. The project will further benefit the State of Hawai'i, and residents and visitors to O'ahu, by facilitating the environmentally safe and efficient transport of wastewater to the intended wastewater pump and treatment facilities of southern O'ahu, to enable the island to continue to be a desirable place to live and visit.

The main benefits of the preferred alternative include the following:

1. **Constructability and Cost:** Each new pump will be capable of handling design peak flows; Wetwell rehabilitation increases longevity of wetwell structure; No additional building structure to maintain; Construction of an attached generator room will require

- partial modification of the existing roof line; New outdoor aboveground fuel storage tank is needed.
2. Operation and Maintenance: Updated pumps, piping and appurtenances, and electrical/mechanical components ensure longevity and ease of maintenance; With the additional land area, the pump station facility now includes a vehicle parking/loading service area; Flow meter is now secured within the pump station boundaries; All equipment (pumps, generator, MCC, SCADA, etc.) are housed within one building.
  3. Facility Reliability: Updated pumps, piping and appurtenances, and electrical/mechanical components ensure longevity and improves monitoring capabilities; Replacing gate valves with knife gate valves may reduce the occurrence of ragging and clogging; Updated ventilation system and new warning systems improve working conditions for operators and warn against explosion risk; Updated restroom facilities available for operators.
  4. Regulatory Statutes and Industry Standards: Upgrades to the pump station meet current building code and industry standards.
  5. Community and Environment: Upgrades improve longevity and reliability for service to the surrounding community.

The potential for significant adverse cumulative impacts is not anticipated:

- The proposed project is consistent with the long-range goals, policies and objectives articulated in policy documents for the Ewa Development Plan. It is also compatible with existing land uses in the area and would comply with applicable land use regulations. As a result, project implementation would not contribute to potentially significant land use compatibility or policy conflicts.
- The proposed project is designed to provide facility improvements to the existing wastewater system and allow for the continued long-term use of existing public infrastructure. The project would benefit accomplishing related aspects of the 'Ewa Development Plan by encouraging economic growth and continued vitality and sustainability of 'Ewa as the secondary urban center.
- The proposed project would result in positive long-term impacts by providing increased efficiency of services of the City and County's wastewater system that supports private and public lands. The proposed project would also meet current and future demand for the use of O'ahu wastewater facilities.
- The proposed project is located in an area adequately served by public services including police and fire protection. The project would not significantly affect the existing level of service of either police or fire protection service. The potential (less than significant) construction related impacts associated with the future use of the site would not alter the ability of fire or police protection from providing adequate levels of service and would not place an undue burden on public facilities that would support the project.

### *10.3 Significance Criteria*

In accordance with the provisions set forth in HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, this Final EA has determined that the project will have no significant adverse impact to air and water quality, existing utilities, noise, archaeological or

cultural sites, or wildlife habitat. All anticipated impacts will be temporary and will not adversely impact the environmental quality of the area.

According to the Significance Criteria:

*1. Irrevocably commit a natural, cultural, or historic resource;*

Proposed improvements to the West Loch Estates WWPS will require irrevocable commitment of land for wastewater facilities. Project improvements will take place within developed areas where effects on natural resources, including flora and fauna, water, and soils, are anticipated to be minimal.

An LRFI and CIA have been prepared as part of the EA process to identify existing and potential historic, archaeological, and cultural resources and shall recommend mitigation measures as necessary and an archaeological monitoring plan(s) for proposed work activities and sites will be prepared by a qualified archaeologist. The monitoring plan(s) will be submitted to the SHPD for review and approval prior to the commencement of any work activities.

The proposed project is not expected to adversely affect archaeological or cultural resources in the project area, and in the unlikely event that any remains or artifacts are encountered, practices as identified in Section 5.9 of this document would be applicable. Any inadvertent finds will immediately result in the cessation of work and the immediate reporting of the find to the SHPD who will furnish further instructions regarding the treatment of the find and the conditions when work may be resumed.

*2. Curtail the range of beneficial uses of the environment;*

The proposed project and use are not anticipated to significantly detract from the function or use of the environment and must be evaluated with regard to its benefit to the health and welfare of the residents of O'ahu. The project will enable the City and County to maintain basic sanitation standards relating to wastewater system management and operation in O'ahu's Ewa wastewater service areas. The project would result in adequate sewerage facilities to support both current and future economic activities.

The proposed use of the site will facilitate the long-term improvement and operations of wastewater facility of the West Loch Estates community and will not curtail existing or planned surrounding land uses.

*3. Conflicts with the state's long-term environmental policies or long-term environmental goals established by law;*

This FEA addresses the proposed upgrades to the wastewater pump station system. As part of the EA, an evaluation and analysis of the project's conformance to the state's long-term environmental policies and goals and guidelines has been undertaken in a manner consistent with Chapter 344, HRS, State Environmental Policy. The project is required to meet the needs of Honolulu's existing and future population for reliable wastewater system functions to ensure public health and welfare.

The proposed project is consistent with the environmental policies, goals and guidelines as delineated in HRS, Chapter 344, and as documented in this EA. See also Sections 7.1, State of Hawai'i; and 7.2, City and County of Honolulu.

*4. Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State;*

The wastewater system upgrade under consideration will benefit the community within the service area and the larger population of O'ahu, by protecting public health and safety through the environmentally responsible management and treatment of wastewater. The planned upgrades will ensure that the municipal wastewater system will continue to provide reliable service and meet future service demands.

A primary project objective is to ensure that public investment is directed toward wastewater system improvements that provide the greatest benefit to current and future users in terms of both initial capital expenditure and long-term operation and maintenance costs. Short-term economic benefits will result from construction jobs, services, and procurements in the form of construction supplies and equipment. These benefits will be limited in scope however, and will cease when the project is complete.

The proposed project is expected to have little to no effect on the social and economic environment. The proposed project will not, by itself, stimulate economic growth and welfare, but would accommodate current and future uses associated with the West Loch Estates community.

See also Sections 5.9, Archaeological and Historic Resources; 5.13, Socio-economic Environment; and 6, Cultural Impact Assessment.

*5. Have substantial adverse effect on public health;*

No substantial adverse effects to public health are anticipated to result from the facility improvements under consideration. Short-term effects to noise, air, water quality, and traffic that could result from construction activities will be limited to the construction phase and will be mitigated through BMPs and adherence to the requirements of regulations as described in Section 5 and 6 of this document. Long-term effects from planned expansion and upgrades to the WWPS facility are expected to be beneficial to the maintenance of public health.

The proposed project will be developed in accordance with State, and City and County rules and regulations governing public safety and health. Potential sources of adverse impacts have been identified and appropriate mitigative measures developed. The primary public health concerns are anticipated to involve noise and traffic impacts. However, these impacts will be either minimized or brought to negligible levels by the appropriate use of the mitigation measures as described in this document.

*6. Involve adverse secondary impacts, such as population changes or effects on public facilities;*

Development of the proposed project will not result in substantial secondary or cumulative impacts to the natural or built environment or to the social and economic community. The planned WWPS upgrade will be designed to accommodate projected population growth within the service area based on existing state and City and County plans and zoning constraints. The project itself is therefore not anticipated to stimulate unexpected changes in population, but will accommodate the current and anticipated future needs of the WWPS service area.

See also Section 5.13, Socioeconomic Environment.

*7. Involve a substantial degradation of environmental quality;*

The WWPS improvements under consideration do not involve substantial degradation of environmental quality. Project activities will be conducted in compliance with State, and City and County rules and regulations governing environmental quality and public health.

The proposed project will be developed in accordance with the environmental policies of HRS, Chapter 343. The analysis provided in this EA indicates that no substantial environmental degradation is anticipated or expected.

*8. Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions;*

The WWPS wastewater system is an essential public facility. Facility improvements are under development by City and County to provide for the safe and efficient handling of municipal wastewater. Necessary upgrades and expansion of the subject wastewater system are being developed and evaluated on the basis of a long-range, comprehensive facility plan. The cumulative effects of the system are explicitly addressed in the facility design standards and performance criteria. The development of municipal wastewater facilities involves a long-term commitment to maintain and upgrade the system to meet the current and projected needs of O'ahu's population. The facilities will not result in a cumulative adverse effect upon the environment.

*9. Have a substantial adverse effect on rare, threatened, or endangered species, or its habitat;*

The project site is located within an existing wastewater pump facility which is not known to provide habitat for any rare, threatened or endangered plant or animal species. The project area does not contain any designated Critical Habitat. Construction of WWPS improvements is not expected to result in substantial adverse impacts to any such species. Mitigation measures are proposed to minimize the affects of nighttime lighting on nocturnal marine avifauna.

There are no threatened or endangered flora or fauna species within or immediately surrounding the project site. No adverse environmental effects to rare, threatened, or endangered species, or habitat are anticipated. See also Section 5.8, Flora and Fauna.

*10. Have a substantial adverse effect on air or water quality or ambient noise levels;*

The WWPS improvements under consideration will not detrimentally affect air or water quality or ambient noise levels. These wastewater facility improvements are being undertaken in accordance with CWA and Clean Air Act requirements to ensure the long-term protection of O'ahu's water and air resources, and public health and safety. Mitigation measures and BMPs will be employed during construction activities to mitigate temporary air, noise, and water pollution. Runoff from construction areas will be regulated under NPDES permit conditions. BMPs will be employed to prevent soil loss and sediment discharges from work sites. Project activities will comply with DOH regulations as set forth in HAR, Title 11 Chapter 54 – *Water Quality Standards*, and Chapter 55 – *Water Pollution Controls*.

Construction-related exhaust emissions and dust generation will be mitigated by requiring that construction activities comply with HAR Chapter 11-59 and 60 – *Air Pollution Control*.

Construction-related effects to air quality will be temporary and will cease when construction is completed.

Any potential for adverse impacts to air, water quality, or noise levels will be addressed by use of appropriate mitigative measures as described in this EA. See also Sections 5.4, Water Resources and Hydrology; 5.10, Noise Conditions; and 5.11, Air Quality.

- 11. Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*

The project study area includes the coastline along the shore of Pearl Harbor West Loch. Areas along the coastline, are susceptible to inundation from flooding and tsunami. As required, facility improvements will be developed in compliance with ROH, Section 21-9.10-1 through 21-9.10-14, relating to development within the flood hazard districts.

Planned surface facilities will occur outside of the 40-ft shoreline setback and away from erosion prone segments of the shoreline and are not expected to suffer damage from or contribute to coastal erosion.

The project is located in a seismically hazardous area classified by the IBC as “Seismic Zone 2A” and seismic design category “D”, which represents the highest load effect on a structure. Wastewater treatment facilities are classified by the City as essential facilities that are required for post-earthquake recovery. The design of the proposed improvements will be in accordance with all applicable IBC seismic design standards and City and County standards pertaining to seismic safety (ROH, Chapter 16, Table 1604.5).

Planned project improvements are not anticipated to affect or suffer damage by being located in environmentally sensitive areas.

See also Sections 5.3, Geology and Topography; 5.4, Water Resources and Hydrology; 5.6, Wetlands; and 5.7, Natural Hazards.

- 12. Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies; or,*

Adverse effects to scenic vistas and view planes are not anticipated to result from the WWPS facility improvements under consideration. The project principally involves the construction of facilities that when completed will have limited to no impact on scenic view planes and resources. Improvements to WWPS, such as a new generator room or the relocation of the northern and eastern CRM walls further outward, will occur substantially within the boundaries of the existing facility. The new improvements will be substantially similar in appearance and character to the existing industrial setting and are thus not likely to detract from existing visual resource values.

During construction activities, work crews operating equipment and machinery will be visible. However, construction activities will be of limited scope and temporary duration and will cease upon project completion. Mitigation measures to screen construction activities from view and minimize nighttime lighting are proposed. Upon completion of work, all construction equipment, materials, and personnel no longer essential to the project will be demobilized.

The proposed site is not located within any scenic vista or view plane identified in City and County or State Plans. The proposed project is not expected to result in long-term visual impacts as described in this EA. The improvements will be noticeable but will not intrude on existing view planes. In general, the appearance of the project will not detract from existing views. Visual impacts associated with construction activities will be temporary and cease with the removal of construction equipment and personnel. See also Section 5.12, Visual Resources.

*13. Require substantial energy consumption or emit substantial greenhouse gases.*

Project construction activities will require high, short-term energy use, primarily in the form of petroleum fuel and electricity used by heavy equipment, vehicles, and power tools, and in the manufacture of construction materials.

West Loch Estates WWPS facility will require substantial energy consumption for the operation of pumps and odor control units in addition to the relatively nominal energy consumption required for facility controls, lighting, office machinery, and communication utilities. For the foreseeable future, these technologies will provide only a nominal amount of the energy required by the facility. City and County of Honolulu will continue to evaluate alternatives for energy recovery and for utilizing new emerging technologies that could feasibly result in energy reduction.

Energy that is used will be in the form of fossil fueled internal combustion equipment, machinery, and vehicles, and electricity supplied to the site by either an existing Hawaiian Electric Company power connection or by the use of portable generator(s). The use of these forms of energy is not expected to be greater or significantly greater than that used for the development of similar projects.

**Table 10-1, West Loch Estates WWPS Upgrade Project Impacts Summary**

Resource Area	Direct Short-term Impacts	Direct Long-term Impacts	Secondary Impacts	Cumulative Impacts	Mitigation and BMPs	EA Section
Climate	Construction activities that require the use of heavy machinery would present a short-term increase in GHGs.	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – because the direct impact to climate would be only short-term, and would not increase the use of machinery, the project would make no persistent contribution to cumulative impacts (e.g., Act 286, Session Laws of Hawai'i 2012).	No Mitigation required.	5.2 Climate
Geology, Topography, and Soil Resources	Ground disturbing activities	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	<ul style="list-style-type: none"> <li>Erosion control measures will be employed during construction.</li> <li>Site restoration to original condition at conclusion of project.</li> <li>Disposal will be at an approved facility or location in accordance with Federal, State, and City and County of Honolulu regulations.</li> </ul> No Mitigation required.	5.3 Geology and Topography 5.5 Soils and Potential for Hazardous Materials
Groundwater, Surface Water, Drainage, and Water Quality	Localized and potential temporary increase in turbidity.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	<ul style="list-style-type: none"> <li>Construction will be regulated through adherence to NPDES permit conditions.</li> <li>During construction, work activities will be in compliance with HAR 11-55 Water Pollution Control.</li> <li>Discharge pollution prevention measures will be employed in all phases of the project.</li> <li>Following construction all areas of ground disturbance will be stabilized with appropriate materials.</li> </ul>	5.4 Water Resources and Hydrology
Natural Hazards	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.7 Natural Hazards
Wetlands	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.6 Wetlands
Terrestrial Flora	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.8.1 Terrestrial Flora
Terrestrial Fauna	Increased lighting during construction of the proposed project.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	<ul style="list-style-type: none"> <li>Light fixtures utilized for this project will be designed and installed to reduce glare and fully shield light from migrating and/or nocturnally flying seabirds.</li> <li>A survey for Pueo ground nesting activity will be undertaken and if discovered, DLNR would be notified prior to construction activity.</li> <li>Recommendation that no woody vegetation taller than 4.6 m (15 ft) to be removed during June 1 through September 15 to observe the Hawaiian hoary bat nesting season.</li> </ul>	5.8.2 Terrestrial Fauna

Resource Area	Direct Short-term Impacts	Direct Long-term Impacts	Secondary Impacts	Cumulative Impacts	Mitigation and BMPs	EA Section
Archaeological Cultural Resources	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	<ul style="list-style-type: none"> <li>In the unlikely event cultural deposits and/or human skeletal remains are encountered during ground disturbance, work stopped immediately and SHPD notified of the nature of the discovery.</li> </ul> <p>No further mitigation required.</p>	5.9 Archaeological and Cultural Resources
Noise	Temporary source of noise above ambient levels from construction noise.	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – because other past, present, and reasonably foreseeable future actions are expected to be consistent with existing development and the direct impact to noise would be only short-term, the project would make no persistent contribution to cumulative impacts.	<ul style="list-style-type: none"> <li>Mufflers used on all combustion powered construction vehicles and machinery, and all noise attenuation equipment maintained</li> <li>Work limited to weekdays during daylight hours between 7:00 am and 6:00 pm. No work scheduled on federal or state holidays.</li> <li>The contractor to secure a noise permit from the DOH prior to the initiation of construction.</li> </ul>	5.10 Noise Conditions
Air Quality	Temporary and localized emissions from increased fugitive dust and exhaust emissions from construction related equipment, and vehicles.	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – because the direct impact to air quality would be only short-term, the project would make no persistent contribution to cumulative impacts.	<ul style="list-style-type: none"> <li>Construction equipment and vehicles shall be maintained in proper working order to reduce air emissions.</li> <li>During construction, work activities will be in compliance with HAR, Chapter 11-59 and 11-60.</li> <li>Dust control plan to include water source, use of soils wetting, use of silt screening.</li> </ul> <p>No further mitigation required.</p>	5.11 Air Quality
Visual Resources	Temporary visual impacts from the presence of construction equipment	No Adverse Impact.	No Secondary Impact.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent visually with existing development.	<ul style="list-style-type: none"> <li>Equipment will be confined to work areas.</li> <li>All construction related equipment will be removed following the completion of work.</li> </ul> <p>No further mitigation required.</p>	5.12 Visual Resources
Socio-Economic Environment and Demographics	No Adverse Impact.	No Adverse Impact.	Minimal Secondary Impact –reasonably foreseeable future actions are expected to be consistent with existing development.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent with the socio-economic environment of the existing development.	No Mitigation required.	5.13 Socio-Economic Environment and Demographics
Transportation Facilities	Potential for limited, non-substantial short-term effects on transportation due to construction related activities and transit of vehicles to and from the job site.	No Adverse Impact.	Minimal Secondary Impact –reasonably foreseeable future actions are expected to be consistent with existing development.	Minimal Cumulative Impact – other past, present, and reasonably foreseeable future actions are expected to be consistent with the existing development.	No Mitigation required.	5.14.1 Roads and Transportation

Resource Area	Direct Short-term Impacts	Direct Long-term Impacts	Secondary Impacts	Cumulative Impacts	Mitigation and BMPs	EA Section
Electrical, Water, and Wastewater	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.14.2 Utilities
Solid Waste	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	• Disposal of solid waste will be handled in accordance with applicable Federal, State, and City and County of Honolulu rules and regulations.	5.14.3 Solid Waste
Police, Fire, Health Care and Emergency Services	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.14.4 Police Protection 5.14.5 Fire Protection 5.14.6 Health Care and Emergency Services
Schools and Libraries	No Adverse Impact.	No Adverse Impact	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.14.7 Schools
Recreational Facilities	No Adverse Impact.	No Adverse Impact.	No Secondary Impact.	No Cumulative Impact.	No Mitigation required.	5.15 Recreational Resources

## ***Section 11***

### ***Summary of Findings and Significance Determination***

In accordance with the provisions set forth in HRS, Chapter 343, and the significance criteria in HAR, Chapter 11-200.1-13, this EA has evaluated and assessed the potential for environmental impacts associated with the proposed project and it is determined that a HRS, Chapter 343, EIS will not be required.

The proposed West Loch Estates WWPS Upgrade project is not anticipated to result in significant adverse impacts to geology, soils, hydrology, stream flow, biological resources, air quality, natural hazards, cultural resources, socioeconomic, or land uses. Minimal impacts may consist of minor traffic, noise and air quality disturbances to residents in the immediate surrounding location of the project site but will completely cease once construction is completed.

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For Tsunami zone mapping

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## **APPENDICES**

**APPENDIX A**  
**Preliminary Construction Drawings**

JOB NO. W#-##  
**60% SUBMITTAL**

# WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE

EWA, OAHU, HAWAII  
TMK: 9-1-181:001

DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION  
DEPARTMENT OF ENVIRONMENTAL SERVICES  
CITY & COUNTY OF HONOLULU

**PRIME CONSULTANT:**  
KAULA AE LLC  
700 BISHOP STREET, SUITE 1930  
HONOLULU, HI 96813

**SUBCONSULTANTS:**  
ARCHITECTS PACIFIC, INC.  
938C KAPAHULU AVENUE  
HONOLULU, HI 96816  
CONSULTING STRUCTURAL HAWAII, INC.  
99-860 IWAENA STREET, SUITE 204  
AIEA, HI 96701

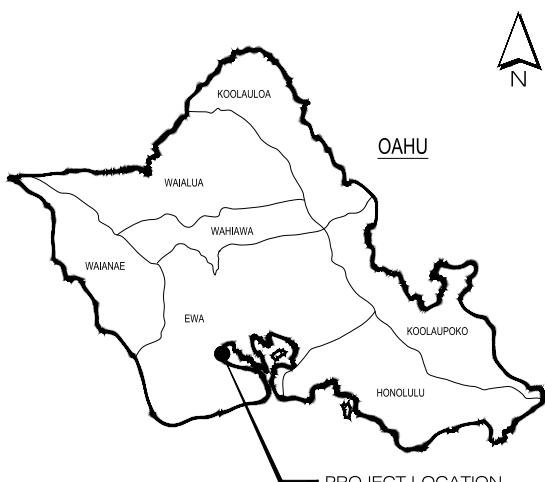
THERMAL ENGINEERING CORPORATION  
512 KAHLI STREET  
HONOLULU, HI 96819

ECS, INC.  
615 PIKOI STREET, SUITE 207  
HONOLULU, HI 96814

HALEY & ALDRICH, INC.  
500 ALA MOANA BOULEVARD, SUITE 6-250  
HONOLULU, HI 96813

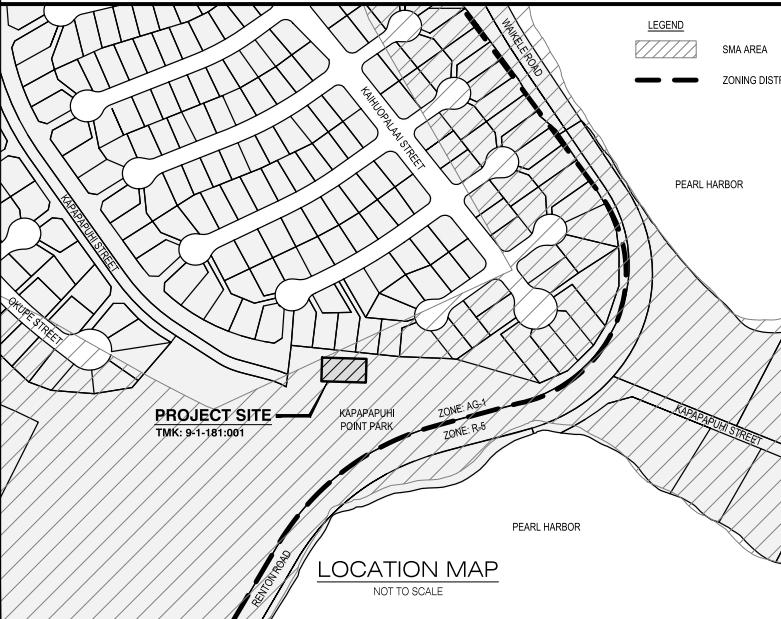
CONTROLPOINT SURVEYING, INC.  
700 BISHOP ST, SUITE 1930  
HONOLULU, HI 96813

VICINITY MAP



VICINITY MAP  
NOT TO SCALE

LOCATION MAP



LOCATION MAP  
NOT TO SCALE

APPROVED

DIRECTOR  
DEPARTMENT OF DESIGN & CONSTRUCTION  
CITY AND COUNTY OF HONOLULU

DATE

DIRECTOR  
DEPARTMENT OF ENVIRONMENTAL SERVICES  
CITY AND COUNTY OF HONOLULU

DATE

CHIEF  
ENVIRONMENTAL MANAGEMENT DIVISION  
DEPARTMENT OF HEALTH, STATE OF HAWAII

DATE

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60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: INDEX OF DRAWINGS			
DESIGNED BY:	LK	CHECKED BY:	JN
DRAWN BY:	EN	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE			
JOB NO. W# - # #			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAWN BY	FILE NUMBER	FILE NUMBER

## GENERAL CONSTRUCTION NOTES

- ALL APPLICABLE CONSTRUCTION WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, SEPTEMBER 1986 AND STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, SEPTEMBER 1984, AS AMENDED, OF THE DEPARTMENT OF PUBLIC WORKS, CITY AND COUNTY OF HONOLULU AND THE COUNTIES OF KAUAI, MAUI, AND HAWAII.
- ALL EXISTING UTILITIES SHALL REMAIN IN SERVICE, WHETHER OR NOT SHOWN ON THE PLANS, AND SHALL BE PROTECTED AT ALL TIMES BY THE CONTRACTOR DURING CONSTRUCTION UNLESS SPECIFIED ON THE PLANS TO BE ABANDONED. ANY DAMAGE TO THE EXISTING UTILITIES SHOWN ON THE PLAN OR MADE KNOWN TO THE CONTRACTOR SHALL BE REPAIRED AND PAID FOR BY THE CONTRACTOR.
- UNLESS RELOCATION IS CALLED FOR ON THE PLANS, EXISTING UTILITIES SHALL REMAIN IN SERVICE AND IN PLACE, IF RELOCATION OF EXISTING UTILITIES IS REQUIRED FOR THE CONTRACTOR'S CONVENIENCE, INTERRUPTION OF SERVICE SHALL BE KEPT TO A MINIMUM AND SHALL BE DONE AT THE CONTRACTOR'S EXPENSE AND ONLY WITH THE APPROVAL OF THE OWNER.
- THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA, WHEREVER CONNECTIONS OF NEW UTILITIES TO EXISTING UTILITIES ARE SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.
- NO CONTRACTOR SHALL PERFORM ANY CONSTRUCTION OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW INTO EXISTING CITY DRAINAGE SYSTEMS, OR ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES, SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFORMANCE WITH APPLICABLE PROVISIONS OF THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS" AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL", AS WELL AS CHAPTER 14 OF THE REVISED ORDINANCES OF HONOLULU, AS AMENDED. BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING CONSTRUCTION.
- THE CONTRACTOR SHALL OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE(S) FOR THE FOLLOWING:
  - DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY DEWATERING, AND
  - DISCHARGES OF HYDROTESTING EFFLUENT, DEWATERING EFFLUENT, AND WELL DRILLING EFFLUENT TO STATE WATERS.
 IN ACCORDANCE WITH STATE LAW, ALL DISCHARGES RELATED TO PROJECT CONSTRUCTION OR OPERATIONS ARE REQUIRED TO COMPLY WITH STATE WATER QUALITY STANDARDS (HAWAII ADMINISTRATIVE RULES, CHAPTER 11-54), BEST MANAGEMENT PRACTICES SHALL BE USED TO MINIMIZE OR PREVENT THE DISCHARGE OF SEDIMENT, DEBRIS, AND OTHER POLLUTANTS TO STATE WATERS. PERMIT COVERAGE IS AVAILABLE FROM THE DEPARTMENT OF HEALTH, CLEAN WATER BRANCH AT <http://health.hawaii.gov/cwb>. THE OWNER/DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR OBTAINING OTHER FEDERAL, STATE, OR LOCAL AUTHORIZATIONS AS REQUIRED BY LAW.
- FOR CITY PROJECTS, THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE RESPONSIBLE CITY AGENCY FOR REVIEW AND APPROVAL. ALSO, THE CONTRACTOR SHALL COORDINATE INSPECTORIAL SERVICES WITH THE RESPONSIBLE CITY AGENCY.
- CONFINED SPACE FOR ENTRY BY CITY PERSONNEL, INCLUDING INSPECTORS, INTO A PERMIT REQUIRED CONFINED SPACE AS DEFINED IN 29 CFR PART 1910.146(b), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING:
  - ALL SAFETY EQUIPMENT REQUIRED BY THE CONFINED SPACE REGULATIONS APPLICABLE TO ALL PARTIES OTHER THAN THE CONSTRUCTION INDUSTRY, TO INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:
    - FULL BODY HARNESSES FOR UP TO TWO PERSONNEL;
    - LIFELINE AND ASSOCIATED CLIPS;
    - INGRESS/EGRESS AND FALL PROTECTION EQUIPMENT;
    - TWO-WAY RADIOS (WALKIE-TALKIES) IF OUT OF LINE-OF-SIGHT;
    - EMERGENCY (ESCAPE) RESPIRATOR (10 MINUTE DURATION);
    - CELLULAR TELEPHONE TO CALL FOR EMERGENCY ASSISTANCE;
    - CONTINUOUS GAS DETECTOR (CALIBRATED) TO MEASURE OXYGEN, HYDROGEN SULFIDE, CARBON MONOXIDE AND FLAMMABLES (CAPABLE OF MONITORING AT A DISTANCE AT LEAST 20 FEET AWAY);
    - PERSONAL MULTI-GAS DETECTOR TO BE CARRIED BY INSPECTOR.
  - CONTINUOUS FORCED AIR VENTILATION ADEQUATE TO PROVIDE SAFE ENTRY CONDITIONS.
  - ONE ATTENDANT/RESCUE PERSONNEL TOPSIDE (TWO, IF CONDITIONS WARRANT IT).
  - ALL SAFETY EQUIPMENT SHALL COMPLY WITH THE STANDARDS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND ALL APPLICABLE FEDERAL, STATE, AND COUNTY LAWS AND REGULATIONS.
- PURSUANT TO CHAPTER 6E, HRS, IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY SUSPEND WORK AND NOTIFY THE HONOLULU POLICE DEPARTMENT, THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015), IN ADDITION, FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL INFORM THE CIVIL ENGINEERING BRANCH, DEPARTMENT OF PLANNING AND PERMITTING (768-8084), AND FOR CITY PROJECTS, NOTIFY THE RESPONSIBLE CITY AGENCY.
- FOR PROJECTS ABUTTING STATE HIGHWAYS RIGHTS-OF-WAY, THE OWNER OR HIS AUTHORIZED REPRESENTATIVE SHALL NOTIFY THE STATE DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION, OAHU DISTRICT, DRAINAGE DISCHARGE UNIT AT 831-6793 FOR AN ASSESSMENT OF STATE HIGHWAYS PERMIT REQUIREMENTS.
- TOPOGRAPHIC AND UTILITY SURVEY FOR THIS PROJECT WERE COMPLETED BY:  
CONTROL POINT SURVEYING, INC.  
1150 SOUTH KING STREET, SUITE 1200  
HONOLULU, HI 96814  
DATE OF SURVEY: 9/2/2021  
FOR BENCH MARK, SEE SHEET C-001.

## GRADING NOTES

- ALL GRADING WORK SHALL BE DONE IN ACCORDANCE WITH CHAPTER 18A, ARTICLES 1, 2, 3 AND 4, AS RELATED TO GRADING, SOIL AND SEDIMENT CONTROL OF THE REVISED ORDINANCES OF HONOLULU, 2021, AS AMENDED, AND SOILS REPORT BY HALEY & ALDRICH, INC., DATED (OCTOBER 16, 2024). A REPORT, AFTER GRADING, PREPARED BY A PROFESSIONAL ENGINEER, IS REQUIRED UPON COMPLETION OF THIS PROJECT.
- NO CONTRACTOR SHALL PERFORM ANY GRADING OPERATION SO AS TO CAUSE FALLING ROCKS, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES, SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR MAY BE CITED AND THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
- THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE, THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 60.1, "AIR POLLUTION CONTROL".
- THE UNDERGROUND PIPES, CABLES OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS SEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE FACILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA, WHEREVER CONNECTIONS OF NEW UTILITIES AREA SHOWN ON THE PLANS, THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.
- ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SURFACE WATERS FROM DAMAGING THE CUT FACE OF AN EXCAVATION OR THE SLOPED SURFACES OF A FILL. FURTHERMORE, ADEQUATE PROVISIONS SHALL BE MADE TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE.
- ALL SLOPES AND EXPOSED AREAS SHALL BE SODDED OR PLANTED AS SOON AS FINAL GRADES HAVE BEEN ESTABLISHED. PLANTING SHALL NOT BE DELAYED UNTIL ALL GRADING WORK HAS BEEN COMPLETED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS, AND ANY AREA WITHIN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED SHALL BE PLANTED.
- FILLS ON SLOPES STEEPER THAN 5:1 SHALL BE KEYED.
- THE CITY SHALL BE INFORMED OF THE LOCATION OF THE BORROW/DISPOSAL SITE FOR THE PROJECT WHEN THE APPLICATION FOR A GRADING PERMIT IS MADE. THE BORROW/DISPOSAL SITE SHALL ALSO FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE.
- NO GRADING WORK SHALL BE DONE ON SATURDAYS, SUNDAYS AND HOLIDAYS AT ANY TIME WITHOUT PRIOR NOTICE TO THE DIRECTOR, D.P.P., PROVIDED SUCH GRADING WORK IS ALSO IN CONFORMANCE WITH THE COMMUNITY NOISE CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 46, "COMMUNITY NOISE CONTROL".
- THE LIMITS OF THE AREA TO BE GRADED SHALL BE FLAGGED BEFORE THE COMMENCEMENT OF THE GRADING WORK.
- THE GENERAL CONTRACTOR / DEVELOPER / OWNER OF THE PROJECT SHALL BE RESPONSIBLE FOR ALL GRADING OPERATIONS TO BE PERFORMED IN CONFORMANCE WITH APPLICABLE PROVISIONS OF THE HAWAII ADMINISTRATIVE RULES, TITLE 11, CHAPTER 54, "WATER QUALITY STANDARDS", AND TITLE 11, CHAPTER 55, "WATER POLLUTION CONTROL", AS WELL AS CHAPTER 14 OF THE REVISED ORDINANCES OF HONOLULU, AS AMENDED. BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED AT ALL TIMES DURING CONSTRUCTION.
- THE GENERAL CONTRACTOR / DEVELOPER / OWNER OF THE PROJECT SHALL OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE(S) FOR THE FOLLOWING:
  - STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES THAT DISTURB ONE (1) ACRE OR MORE, AND
  - DISCHARGES OF HYDROTESTING EFFLUENT, DEWATERING EFFLUENT, AND WELL DRILLING EFFLUENT TO STATE WATERS.
 IN ACCORDANCE WITH STATE LAW, ALL DISCHARGES RELATED TO PROJECT CONSTRUCTION OR OPERATIONS ARE REQUIRED TO COMPLY WITH STATE WATER QUALITY STANDARDS (HAWAII ADMINISTRATIVE RULES, CHAPTER 11-54). BEST MANAGEMENT PRACTICES SHALL BE USED TO MINIMIZE OR PREVENT THE DISCHARGE OF SEDIMENT, DEBRIS, AND OTHER POLLUTANTS TO STATE WATERS. PERMIT COVERAGE IS AVAILABLE FROM THE DEPARTMENT OF HEALTH, CLEAN WATER BRANCH AT <http://health.hawaii.gov/cwb>. THE GENERAL CONTRACTOR / DEVELOPER / OWNER IS RESPONSIBLE FOR OBTAINING OTHER FEDERAL, STATE, OR LOCAL AUTHORIZATIONS AS REQUIRED BY LAW.
- WHERE APPLICABLE AND NECESSARY THE MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY EARTH MOVING PHASE OF THE GRADING IS INITIATED.
- TEMPORARY EROSION CONTROLS SHALL NOT BE REMOVED BEFORE PERMANENT EROSION CONTROLS ARE IN-PLACE AND ESTABLISHED.
- TEMPORARY EROSION CONTROL PROCEDURES SHALL BE SUBMITTED FOR APPROVAL PRIOR TO APPLICATION FOR GRADING PERMIT.
- IF THE GRADING WORK INVOLVES CONTAMINATED SOIL, THEN ALL GRADING WORK SHALL BE DONE IN CONFORMANCE WITH APPLICABLE STATE AND FEDERAL REQUIREMENTS.
- BUILDING PERMIT FOR RETAINING WALLS SHALL BE OBTAINED PRIOR TO COMMENCEMENT OF GRADING WORK ON SITE.
- FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL NOTIFY THE CIVIL ENGINEERING BRANCH, D.P.P. AT 789-8084 TO ARRANGE FOR INSPECTORIAL SERVICES AND SUBMIT TWO (2) SETS OF APPROVED CONSTRUCTION PLANS SEVEN (7) DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION WORK. FOR CITY PROJECTS, THE CONTRACTOR SHALL COORDINATE INSPECTORIAL SERVICES WITH THE RESPONSIBLE CITY AGENCY.
- PURSUANT TO CHAPTER 6E, HRS, IN THE EVENT ANY ARTIFACTS OR HUMAN REMAINS ARE UNCOVERED DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL IMMEDIATELY SUSPEND WORK AND NOTIFY THE HONOLULU POLICE DEPARTMENT, THE STATE DEPARTMENT OF LAND AND NATURAL RESOURCES-HISTORIC PRESERVATION DIVISION (692-8015). IN ADDITION, FOR NON-CITY PROJECTS, THE CONTRACTOR SHALL INFORM THE CIVIL ENGINEERING BRANCH, D.P.P. (768-8084); AND FOR CITY PROJECTS, NOTIFY THE RESPONSIBLE CITY AGENCY.
- FOR ALL PROJECTS, WHICH WILL DISTURB ONE (1) ACRE OR MORE OF LAND, THE CONTRACTOR SHALL NOT START CONSTRUCTION UNTIL A NOTICE OF GENERAL PERMIT COVERAGE (NGPC) IS RECEIVED FROM THE DEPARTMENT OF HEALTH, STATE OF HAWAII, AND HAS SATISFIED ANY OTHER APPLICABLE REQUIREMENTS OF THE NPDES PERMIT PROGRAM. ALSO, FOR NON-CITY AND OTHER NON-GOVERNMENTAL AGENCY PROJECTS, THE CONTRACTOR SHALL PROVIDE A WRITTEN COPY OF THE NGPC TO THE APPROPRIATE CITY DEPARTMENT OR GOVERNMENTAL AGENCY BY D.P.P., AT LEAST SEVEN (7) CALENDAR DAYS BEFORE THE START OF CONSTRUCTION, FOR CITY OR OTHER GOVERNMENTAL PROJECTS, THE CONTRACTOR SHOULD PROVIDE A WRITTEN COPY OF THE NGPC TO THE APPROPRIATE CITY DEPARTMENT OR GOVERNMENTAL AGENCY PER THEIR REQUIREMENTS.

## GRADING NOTES (CONTINUED)

- ALL GRADING AND CONSTRUCTION WORK SHALL IMPLEMENT MEASURES TO ENSURE THAT THE DISCHARGE OF POLLUTANTS FROM THE CONSTRUCTION SITE WILL BE REDUCED TO THE MAXIMUM EXTENT PRACTICABLE AND WILL NOT CAUSE OR CONTRIBUTE TO AN EXCEDENCE OF WATER QUALITY STANDARDS.
- NON-COMPLIANCE TO ANY OF THE ABOVE REQUIREMENTS SHALL MEAN IMMEDIATE SUSPENSION OF ALL WORK AND REMEDIAL WORK SHALL COMMENCE IMMEDIATELY. ALL COSTS INCURRED SHALL BE BILLED TO THE VIOLATOR. FURTHERMORE, VIOLATORS SHALL BE SUBJECT TO ADMINISTRATIVE, CIVIL AND/OR CRIMINAL PENALTIES.
- FOR BENCH MARK, SEE SHEET C-001.

## PUBLIC HEALTH, SAFETY, AND CONVENIENCE NOTES

- THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF THE PUBLIC HEALTH AND SAFETY AND ENVIRONMENTAL QUALITY.
- THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AND ITS SURROUNDING AREAS FREE FROM DUST NUISANCE, THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.
- NO CONTRACTOR SHALL PERFORM ANY CONSTRUCTION ACTIVITY SO AS TO CAUSE FALLING ROCK, SOIL OR DEBRIS IN ANY FORM TO FALL, SLIDE OR FLOW ONTO ADJOINING PROPERTIES, STREETS OR NATURAL WATERCOURSES, SHOULD SUCH VIOLATIONS OCCUR, THE CONTRACTOR SHALL IMMEDIATELY MAKE ALL REMEDIAL ACTIONS NECESSARY.
- THE CONTRACTOR SHALL PROVIDE, INSTALL, AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE AND SAFETY OF THE PUBLIC. THE CONTRACTOR SHALL APPLY FOR A CONSTRUCTION PERMIT WITH A NOISE POLLUTION CONTROL PLAN.

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	GENERAL NOTES - 1		
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISORY CONTROL BY _____			
DESIGNED BY	LK	CHECKED BY	JIN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD _____		
SIGNATURE	DATE _____		
JOB NO. W#-#			
EXPIRATION DATE OF THE USEPER	FILE NUMBER	FILE NUMBER	FILE NUMBER
FILE NUMBER	DRAWER	FILE NUMBER	FILE NUMBER

## SEWER NOTES

- ALL SEWER CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE CITY'S "STANDARD SPECIFICATIONS," SEPT. 1986, THE DEPARTMENT OF ENVIRONMENTAL SERVICES "WASTEWATER SYSTEM DESIGN STANDARDS," JULY 2017, AND "WASTEWATER SYSTEM STANDARD DETAILS," JULY 2017, CURRENT CITY PRACTICES AND REVISED ORDINANCES OF HONOLULU, 1990 AS AMENDED.
- IN THE EVENT THAT ANY CHANGE IN ALIGNMENT OR GRADE FOR THE PROPOSED SEWERS ARE REQUIRED DUE TO UNFORESEEN CONFLICT WITH OTHER UTILITIES, THE ENGINEER IN CHARGE OR THE MAKER OF THE PLANS SHALL BE RESPONSIBLE FOR THE REQUIRED CHANGES WHICH ARE TO BE PRESENTED TO THE DEPARTMENT OF PLANNING AND PERMITTING (DPP) FOR APPROVAL.
- THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGEMENT BRANCH, WASTEWATER ENGINEERING AND CONSTRUCTION DIVISION, ENV, AT 768-8785, 768-8769, OR 768-8755 TO ARRANGE FOR INSPECTION SERVICES AND SUBMIT THREE (3) SETS OF APPROVED CONSTRUCTION PLANS AND ONE (1) PDF COPY ON A CD TO THE WASTEWATER BRANCH, DPP SEVEN (7) DAYS PRIOR TO COMMENCEMENT OF SEWER WORK. THE CONTRACTOR SHALL PAY FOR ALL INSPECTION COSTS.
- CRUSHED ROCK CRADLE IS PERMITTED WHERE SOIL IS STABILE, IN AREAS OF UNSTABLE SOIL, THE MAKER OF THE PLANS AND THE CONSTRUCTION ENGINEER WILL DETERMINE THE PIPE SUPPORT REQUIRED.
- THE UNDERGROUND PIPES, CABLES, OR DUCTLINES KNOWN TO EXIST BY THE ENGINEER FROM HIS RESEARCH OF RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF THE FACILITIES, INCLUDING AND AFFECTING SEWER LINES, IN THE PRESENCE OF THE WASTEWATER INSPECTOR, AND EXERCISE PROPER CARE IN EXCAVATING THE AREA. THE CONTRACTOR SHALL BE RESPONSIBLE AND SHALL PAY FOR ALL DAMAGED UTILITIES.
- SEWER LATERALS SHALL BE CLEAR OF AND NOT CONFLICTING WITH ANY OTHER UTILITY. MINIMUM HORIZONTAL AND VERTICAL CLEARANCES SHALL BE STRICTLY OBSERVED AND FOLLOWED.
- SLOPE FOR SEWER LATERALS SHALL BE A MINIMUM OF 2.00% UNLESS OTHERWISE NOTED.
- BUILDING PLUMBING FACILITIES SHALL BE CONTROLLED BY SEWER LATERAL INVERTS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING CONTINUOUS SEWER SERVICE TO ALL AFFECTED AREAS DURING CONSTRUCTION.
- THE CONSULTING ENGINEER SHALL SUBMIT TO THE WASTEWATER BRANCH, DPP AS-BUILT™ TRACINGS AND ELECTRONIC FILES OF THE CONSTRUCTION PLANS AS ACTUALLY CONSTRUCTED, SHOWING ALL CHANGES FROM THE ORIGINAL PLANS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY SEWAGE SPILLS CAUSED DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE STATE DEPARTMENT OF HEALTH AND UTILIZE APPROPRIATE SAMPLING AND ANALYZING PROCEDURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PUBLIC NOTIFICATIONS AND PRESS RELEASES.
- THE CONTRACTOR SHALL INSTALL 'RAINSTOPPER' MANHOLE INSERTS IN ALL SEWER MANHOLES WITH TYPE 'SA' FRAME AND COVER.
- THE CONTRACTOR SHALL OBTAIN APPROVAL FOR ADVANCE SEWER RISER AGREEMENT AT THE DPP AND OBTAIN BUILDING PERMIT FOR PLUMBING WORK BEFORE ANY ADVANCE RISER IS MADE.
- SAC PIPE CRADLE SEALS SHALL BE INSTALLED 10 FEET FROM ALL SEWER MANHOLES TO PREVENT SOIL MIGRATION.
- CONFINED SPACE:  
FOR ENTRY BY CITY PERSONNEL, INCLUDING INSPECTORS, INTO A PERMIT-REQUIRED CONFINED SPACE AS DEFINED IN 29 CFR PART 1910.146(B), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING:  
A. ALL SAFETY EQUIPMENT REQUIRED BY THE CONFINED SPACE REGULATIONS APPLICABLE TO ALL PARTIES OTHER THAN THE CONSTRUCTION INDUSTRY, TO INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:  
a. FULL BODY HARNESSES FOR UP TO TWO PERSONNEL.  
b. LIFELINE AND ASSOCIATED CLIPS.  
c. INGRESS/EGRESS AND FALL PROTECTION EQUIPMENT.  
d. TWO-WAY RADIOS (WALKIE-TALKIES) OUT OF LINE-OF-SIGHT.  
e. EMERGENCY (ESCAPE) RESPIRATOR (10 MINUTE DURATION).  
f. CELLULAR TELEPHONE TO CALL FOR EMERGENCY ASSISTANCE.  
g. CONTINUOUS GAS DETECTOR (CALIBRATED) TO MEASURE OXYGEN, HYDROGEN SULFIDE, CARBON MONOXIDE AND FLAMMABLES (CAPABLE OF MONITORING AT A DISTANCE AT LEAST 20-FEET AWAY).  
h. PERSONAL MULTI-GAS DETECTOR TO BE CARRIED BY INSPECTOR.  
B. CONTINUOUS FORCED AIR VENTILATION ADEQUATE TO PROVIDE SAFE ENTRY CONDITIONS.  
C. ONE ATTENDANT/RESCUE PERSONNEL TOPSIDE (TWO, IF CONDITIONS WARRANT IT).
- WHEN CONNECTING TO A LIVE SEWER LINE, THE CONTRACTOR SHALL ABIDE BY ALL CONDITIONS THAT THE STATE DEPARTMENT OF HEALTH SETS FORTH TO MITIGATE ANY WASTEWATER SPILL THAT MAY OCCUR. THE CONTRACTOR SHALL INFORM THE CITY INSPECTOR FIVE (5) WORKING DAYS PRIOR TO THE ACTUAL CONNECTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY FINES AND PENALTIES DUE TO ANY SPILLS RESULTING FROM THE CONNECTION.
- NO RUNGS SHALL BE INSTALLED INSIDE NEW SEWER MANHOLES.
- FOR SEWER MANHOLE ADJUSTMENTS UPWARD LESS THAN 3", SEE WASTEWATER SYSTEM STANDARD DETAIL S-2 FOR SMH ADJUSTMENTS UPWARD GREATER THAN 3" OR FOR ANY ADJUSTMENTS DOWNWARD, RECONSTRUCT SMH TOP FROM BELOW THE CONE SECTION.
- IF THE CONTRACTOR ENCOUNTERS FLOW MONITORING DEVICES, SUCH AS SPECIAL SEWER MANHOLE COVERS EMBEDDED WITH SOLAR PANELS, CONTACT COLLECTION SYSTEMS MAINTENANCE (CSM), ENV AT 768-2722 TO COORDINATE TEMPORARY REMOVAL.
- THE CONTRACTOR SHALL MAINTAIN VISIBILITY AND MAINTENANCE ACCESS TO LIVE SEWER MANHOLE LOCATIONS AT ALL TIMES, INCLUDING DURING NON-WORK HOURS AND PAVING OPERATIONS.
- THE CONTRACTOR SHALL USE A MANHOLE DEBRIS CATCHING DEVICE WHEN PERFORMING MANHOLE HEIGHT ADJUSTMENT WORK AND REMOVE ANY CONSTRUCTION DEBRIS THAT HAS FALLEN INTO THE MANHOLE. DISPOSAL OF CONSTRUCTION DEBRIS IN THE SEWER SYSTEM IS STRICTLY PROHIBITED.
- FOR PRECAST SEWER MANHOLES, THE CONSULTING ENGINEER SHALL SUBMIT FOUR (4) SETS OF SHOP DRAWINGS TO THE WASTEWATER BRANCH, DPP FOR APPROVAL. AFTER THE SHOP DRAWINGS ARE APPROVED, THE MANUFACTURER SHALL NOTIFY THE CONSTRUCTION MANAGEMENT BRANCH, WASTEWATER ENGINEERING AND CONSTRUCTION DIVISION, ENV, AT 768-8785, 768-8769, OR 768-8755 TO ARRANGE FOR INSPECTION SERVICES FOR CONCRETE POURS MADE AT ITS PLANT SEVEN (7) DAYS PRIOR TO POUR.
- SEWER MANHOLE FRAME AND COVERS SHALL BE ADJUSTED AND REINSTATEMENT WITHIN 60 CALENDAR DAYS OF ADJACENT REPAVING COMPLETION, TO ALLOW CITY MAINTENANCE TRUCKS TO REGAIN ACCESS TO MANHOLES TO PERFORM SEWER MAINTENANCE.

## WATER NOTES

- UNLESS OTHERWISE SPECIFIED, ALL MATERIALS AND CONSTRUCTION OF WATER SYSTEM FACILITIES AND APPURTENANCES SHALL BE IN ACCORDANCE WITH THE CITY AND COUNTY OF HONOLULU BOARD OF WATER SUPPLY'S "WATER SYSTEM STANDARDS", DATED 2002, THE "WATER SYSTEM EXTERNAL CORROSION CONTROL STANDARDS", VOLUME 3, DATED 2021, AND ALL SUBSEQUENT AMENDMENTS AND ADDITIONS.
- NO DEVIATION TO THE BOARD OF WATER SUPPLY 2002 WATER SYSTEM STANDARDS, AS AMENDED, SHALL BE ALLOWED WITHOUT THE MANAGER AND CHIEF ENGINEER'S APPROVAL.
- ALL PLANS APPROVED BY THE BOARD OF WATER SUPPLY ARE BASED SOLELY ON THE ADEQUACY OF THE WATER SUPPLY.
- THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES AS SHOWN ON THE PLANS ARE FROM THE LATEST AVAILABLE DATE, BUT ARE NOT GUARANTEED AS TO THEIR ACCURACY OR THE ENCOUNTERING OF OTHER OBSTACLES DURING THE COURSE OF THE WORK. THE CONTRACTOR SHALL RESPOND AND PAY FOR ALL DAMAGES TO EXISTING UTILITIES, THE CONTRACTOR SHALL NOT ASSUME THAT WHERE NO UTILITIES ARE SHOWN, THAT NONE EXIST.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL WATER LINES DURING CONSTRUCTION. THE CONTRACTOR SHALL BE ESPECIALLY CAREFUL WHEN EXCAVATING BEHIND WATERLINES, TEES, AND BENDS. WHETHER THERE IS A POSSIBILITY OF WATERLINE MOVEMENT DUE TO THE REMOVAL OF THE SUPPORTING EARTH BEHIND THE EXISTING REACTION BLOCKS, THE CONTRACTOR SHALL TAKE WHATEVER MEASURES NECESSARY TO PROTECT THE WATERLINES, SUCH AS CONSTRUCTING SPECIAL REACTION BLOCKS (WITH BOARD OF WATER SUPPLY APPROVAL) AND/OR MODIFYING HIS CONSTRUCTION METHOD.
- WHEN A UTILITY (GAS, SEWER, ELECTRICAL DUCT LINE, FIBER OPTIC, DRAINAGE, ETC.) CROSSES BELOW A BOARD OF WATER SUPPLY WATER MAIN, THE DESIGNER OF RECORD AND THEIR CONSTRUCTION ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING ADEQUATE WATER MAIN STRUCTURAL SUPPORT AND SUBMIT THE CONSTRUCTION METHOD AND SHOP DRAWING, STAMPED BY A LICENSED ENGINEER AND REVIEWED AND ACCEPTED BY THE DESIGNER OF RECORD, TO THE BOARD OF WATER SUPPLY FOR REVIEW AND APPROVAL. ALL WORK SHALL BE AT NO COST TO THE BOARD OF WATER SUPPLY.
- THE CONTRACTOR SHALL NOTIFY BWS CAPITAL PROJECTS DIVISION, CONSTRUCTION SECTION IN WRITING OR CALL (808) 748-5730 AND SUBMIT SIX (6) SETS OF 24" x 36" APPROVED CONSTRUCTION DRAWINGS, ONE WEEK PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES.
- RE-APPROVAL SHALL BE REQUIRED IF THIS PROJECT IS NOT UNDER CONSTRUCTION WITHIN A PERIOD OF TWO (2) YEARS.
- PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL VERIFY IN THE FIELD, THE LOCATION OF EXISTING WATERLINES AND APPURTENANCES.
- ANY ADJUSTMENTS TO THE EXISTING WATER SYSTEM REQUIRED DURING CONSTRUCTION, TO MEET THE REQUIREMENTS OF THE BOARD OF WATER SUPPLY WATER SYSTEM STANDARDS, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE DONE BY THE CONTRACTOR AT NO COST TO THE BOARD OF WATER SUPPLY.
- THE PROJECT SHALL PAY THE APPLICABLE WATER SYSTEM FACILITIES AND/OR ONE-TIME SERVICE CHARGE AND FOR THE METER WHICH WILL BE FURNISHED BY BOARD OF WATER SUPPLY AND INSTALLED BY THE CONTRACTOR WHEN THE LATERAL IS INSTALLED.
- CONTRACTOR SHALL CUT AND PLUG AND REMOVE ALL EXISTING UNUSED LATERALS AT THE MAIN WHETHER OR NOT SHOWN ON THE PLANS, METER AND VALVE BOXES TO BE OR ALREADY ABANDONED SHALL BE DEMOLISHED OR REMOVED AND PROPERLY DISPOSED OF. THE DAMAGED AREA SHALL BE REPAIRED TO AN EQUAL OR BETTER CONDITION THAN THE IMMEDIATE AREA. ALL WORK SHALL BE DONE AT THE EXPENSE OF THE CONTRACTOR.
- BOARD OF WATER SUPPLY APPROVAL OF THESE PLANS DOES NOT CONSTITUTE A WATER COMMITMENT. AVAILABILITY OF WATER WILL BE DETERMINED WHEN BUILDING PERMIT IS PRESENTED TO THE DEPARTMENT. WATER COMMITMENT WILL DEPEND UPON THE STATUS OF THE WATER SYSTEM AT THAT TIME. SHOULD WATER SERVICE BE MADE AVAILABLE, THE WATER COMMITMENT WILL BE EFFECTIVE WHEN THE PROJECT RECEIVES AN APPROVED BUILDING PERMIT FROM THE BUILDING DEPARTMENT. ALL WATER COMMITMENTS WILL BE CANCELED IN THE EVENT THE BUILDING PERMIT IS CANCELED.
- THE PROJECT SHALL BE SUBJECT TO THE BOARD OF WATER SUPPLY'S CROSS-CONNECTION CONTROL REQUIREMENTS PRIOR TO ISSUANCE OF THE BUILDING PERMIT.
- EASEMENT DOCUMENTS MUST BE SUBMITTED TO BOARD OF WATER SUPPLY AND RECORDED BEFORE METER IS ISSUED.
- THE INSTALLATION, CHLORINATION AND TESTING OF THE WATER MAIN AND FACILITIES AFTER THE PROPERTY LINE SHALL NOT BE THE RESPONSIBILITY OF THE BOARD OF WATER SUPPLY.
- THE BACKFLOW PREVENTER DEVICE MUST BE INSTALLED BEFORE METER IS ISSUED.
- THE CONTRACTOR SHALL FURNISH AND INSTALL AN INSULATING CORPORATION STOP AND PETROLATUM WAX TAPE AT ALL TAPS (FOR DUCTILE IRON PIPE AND COPPER LATERAL COMBINATION ONLY).
- PIPE CUSHION SHALL BE OF HIGH RESISTIVITY MATERIAL. THE CONTRACTOR SHALL SUBMIT A SOIL CERTIFICATION THAT HIGH RESISTANT CUSHION MATERIAL HAS A RESISTIVITY GREATER THAN 5,000 OHM-CM. REMAINDER OF THE BACKFILL MATERIAL SHALL BE AS SPECIFIED IN THE WATER SYSTEM STANDARDS. PIPE CUSHION AND BACKFILL MATERIAL SHALL CONTAIN NO HAZARDOUS SUBSTANCES ABOVE REGULATORY ACTION LEVELS INCLUDING BUT NOT LIMITED TO LEAD, ASBESTOS, MERCURY, CHROMIUM, CADMIUM, ZINC, STRONTIUM, AND POLYCHLORINATED BIIPHENYLS (PCBs).

## BWS FLOW REQUIREMENTS

WEST LOCH ESTATES WASTEWATER PUMP STATION EWA, OAHU, HAWAII 96706			
PREMISE NUMBER: ##### METER NUMBER: 28793920			
	WSFU	GPM	GPD
A. PROPOSED DOMESTIC (ALL FIXTURES BEING INSTALLED)	2.5	1.7	8.5
B. PROPOSED IRRIGATION	0.0	0.0	0.0
C. OTHER	0.0	0.0	0.0
D. TOTAL PROPOSED	2.5	1.7	8.5
E. DEMOLITION (ALL FIXTURES BEING REMOVED)	0.0	0.0	0.0
F. NET CHANGE (SUBTRACT E FROM "D" ABOVE)	2.5	1.7	8.5
G. EXISTING TO REMAIN (OTHER FIXTURES SERVICED BY THIS METER, BUT NOT AFFECTED BY THIS PROJECT)	7.0	4.7	23.5
H. EXISTING IRRIGATION	0.0	0.0	0.0
I. GRAND TOTAL (ADD "F", "G", AND "H" ABOVE)	9.5	6.4	32.0

ITEM A. PROPOSED DOMESTIC			
	QTY	WSFU/FIX	TOTAL
HOSE BIBB, FIRST ONE	1.0	2.5	2.5
TOTAL EXISTING TO REMAIN FIXTURES:		2.5	WSFU
		1.7	GPM

ITEM G. EXISTING TO REMAIN			
	QTY	WSFU/FIX	TOTAL
LAVATORY	1.0	1.0	1.0
WATER CLOSET, FLUSH TANK	1.0	2.5	2.5
HOSE BIBB, FIRST ONE	1.0	2.5	2.5
HOSE BIBB, EACH ADDITIONAL	1.0	1.0	1.0
TOTAL EXISTING TO REMAIN FIXTURES:		7.0	WSFU
		4.7	GPM

WATER SUPPLY NOTES:			
1. THE EXISTING DOMESTIC WATER METER (METER NUMBER: 28793920) DOES NOT SERVE ANY IRRIGATION OR AIR CONDITIONING SYSTEM.			

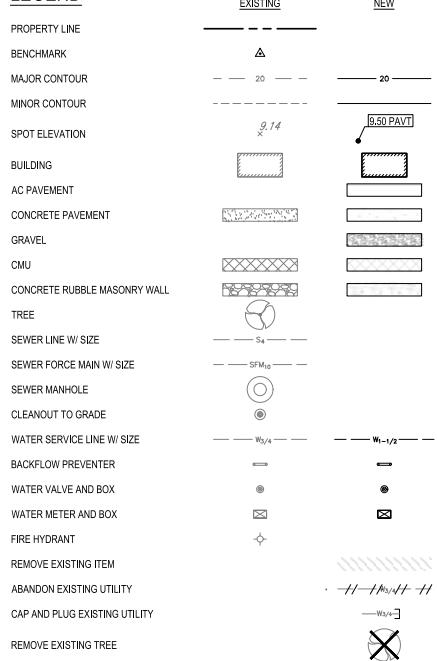
60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	GENERAL NOTES - 2		
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.	LK EN	CHECKED BY SECTION HEAD BRANCH HEAD	JIN
SIGNATURE	JOB NO. W#-##		
EXPIRATION DATE OF THE USENS	FILE NUMBER	DRIVER	FILE NUMBER
FILE NUMBER	DRIVER	FILE NUMBER	FILE NUMBER

## ABBREVIATIONS

AC	ASPHALT CONCRETE
APPROX	APPROXIMATE
BC	BOTTOM CURB
BFP	BACKFLOW PREVENTOR
BLDG	BUILDING
BOT	BOTTOM
BW	BOTTOM WALL
CABX	CABLE BOX
CCH	CITY AND COUNTY OF HONOLULU
CLR	CLEARANCE
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
CONC	CONCRETE
CRM	CEMENT RUBBLE MASONRY
CSM	COLLECTION SYSTEM MAINTENANCE
CV	CHECK VALVE
CY	CUBIC YARDS
D	DIAMETER
DI	DUCTILE IRON
DWGS	DRAWINGS
DPR	DEPARTMENT OF PARKS AND RECREATION
EBX	ELECTRONIC BOX
ELEC	ELECTRIC / ELECTRICAL
ELEV	ELEVATION
EM	ELECTRIC METER
EXIST / E	EXISTING
FFE	FINISHED FLOOR ELEVATION
FH	FIRE HYDRANT
FS	FINISHED SURFACE
FT	FOOT / FEET
G / GRD	GROUND
GPM	GALLONS PER MINUTE
GV	GATE VALVE
H	HEIGHT
HB	HOSE BIBB
HECO	HAWAIIAN ELECTRIC COMPANY
HP	HIGH POINT
INV	INVERT
LP	LIGHT POLE
	LOW POINT
LF	LINEAR FEET
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MGD	MILLIONS OF GALLONS PER DAY
MIN	MINIMUM
MSL	MEAN SEA LEVEL
NTS	NOT TO SCALE
O.C.	ON CENTER
P / PAVT	PAVEMENT
PBX	PANEL BOX
PRAL	PIPE RAIL
PVC	POLYVINYL CHLORIDE
R	RADIUS
RSR	RISER
S	SEWER
SF	SQUARE FEET
SFM	SEWER FORCE MAIN
SMH	SEWER MANHOLE
STA	STATION
SW	SIDEWALK
TBX	TELEPHONE BOX
TC	TOP CURB
TP	TOP OF PIPE
TS	TOP OF STEM
TOP	TOP OF SLAB
TOP	TOP OF SIDEWALK
TW	TOP WALL
TYP	TYPICAL
UBX	UTILITY BOX
UCVR	UTILITY COVER
VTR	VENT THROUGH ROOF
W	WATER
WM	WATER METER
WWPS	WASTEWATER PUMP STATION
WV	WATER VALVE
W/	WITH
XFMR	TRANSFORMER

## LEGEND



## DESIGN DATA

DESIGN FLOW	
AVERAGE FLOW:	0.01 MGD (69 GPM)
PEAK DESIGN FLOW:	1.05 MGD (730 GPM)
EXISTING PUMP CAPACITY:	2 - 1.02 MGD (708 GPM) @ 32 FT TDH
NEW PUMP CAPACITY:	2 - 1.05 MGD (730 GPM) @ 21 FT TDH
EXISTING FORCE MAIN LENGTH:	4,454 FT



60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: ABBREVIATIONS, LEGEND & DESIGN DATA			
DESIGNED BY:	LK	CHECKED BY:	JN
DRAWN BY:	EN	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	FILE NUMBER

## TREE PROTECTION / PRESERVATION NOTES

1. ABBREVIATIONS LIST:
 

A/E	— ARCHITECT / ENGINEER CONSULTANT
BWS	— BOARD OF WATER SUPPLY
DDC	— DEPARTMENT OF DESIGN AND CONSTRUCTION
DPR	— DEPARTMENT OF PARKS AND RECREATION
DPP	— DEPARTMENT OF PLANNING AND PERMITTING
DUF	— DIVISION OF URBAN FORESTRY, DPR
FLMP	— FORMAL LANDSCAPE MAINTENANCE PERIOD
GSTAUA	— GUIDELINES AND STANDARDS FOR TREES IN URBAN AREAS
LC	— LANDSCAPE CONTRACTOR
OIC	— OFFICE-IN-CHARGE, DDC
PMRS	— PARK MAINTENANCE AND RECREATION SERVICES, DPR
QA	— QUALIFIED ARBORIST
QAA	— QUALIFIED ARBORIST APPLICATION
TAR	— TREE ASSESSMENT REPORT
TPZ	— TREE PROTECTION ZONE
2. SHOULD THE PROPOSED CONSTRUCTION IMPACT PARK TREES, STREET TREES, CITY TREES, OR PRIVATE PROPERTY TREES, THE CONTRACTOR SHALL:
  - A. HIRE A QA AT NO COST TO THE CITY, THE QA SHALL:
    - a. SUBMIT QAA AND INCLUDE COPIES OF THEIR CURRENT IA CERTIFIED ARBORIST AND TREE RISK ASSESSMENT QUALIFICATION CREDENTIALS TO THE ADDRESS LISTED IN 2C OR VIA EMAIL TO DUF@HONOLULU.GOV.
    - b. OBSERVE AND SUPERVISE THE TREE ROOT AND BRANCH PRUNING WORK TO ASSURE THE WORK PERFORMED DOES NOT DESTABILIZE THE TREE AND CAUSE FAILURE OR DEMISE OF THE TREES AND RISK PERSONAL INJURY AND PROPERTY DAMAGES.
    - c. IMMEDIATELY REPORT THEIR CONCERN'S TO THE DUF.
  - B. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL:
    - a. SUBMIT CURRENT PHOTOS (DO NOT INCLUDE GOOGLE STREET VIEW PHOTOS) AND/OR VIDEO TO DOCUMENT THE EXISTING SITE CONDITIONS.
    - (i). NOTE DISCREPANCIES FROM THE PLANS, ITEMS BROKEN OR DAMAGED OR IN NEED OF REPAIR, ERODED AREAS, TREES AND GROUNDS, SUBMIT MARKED SET OF PLANS WITH ITEMS MARKED IN RED TO:  
URBAN FORESTRY ADMINISTRATOR  
DIVISION OF URBAN FORESTRY  
DEPARTMENT OF PARKS AND RECREATION
3. CONTRACTOR SHALL SCHEDULE A PRE-MOBILIZATION MEETING:
  - A. CONTACT DIVISION OF URBAN FORESTRY (DUF), VIA EMAIL AT: DUF@HONOLULU.GOV, ALLOW A MINIMUM OF SEVEN DAYS NOTICE.
  - B. THE MEETING ATTENDEES SHALL INCLUDE THE QA, A/E/C, DDC PROJECT MANAGER, OIC, CONTRACTOR, LC, DUF, PMRS STAFF.
  - C. THE DISCUSSION SHALL INCLUDE, BUT NOT LIMITED TO:
    - a. TREE ASSESS REPORT, IF APPLICABLE,
    - b. TREE DISPOSITION PLAN, IF APPLICABLE,
    - c. TREE INVENTORY PLAN, IF APPLICABLE,
    - d. THE PROPOSED CONSTRUCTION SCHEDULE IN REGARD TO:
      - (1) EXPOSING OF TREE/SHRUB ROOTS
      - (2) GRADING
      - (3) DEMOLITION
      - (4) TRENCHING
      - (5) EXCAVATION WORK, TREE/SHRUB REMOVALS
      - (6) TREE/SHRUB RELOCATIONS
      - (7) TREE ROOT/BRANCH PRUNING
      - (8) TREE PROTECTION MITIGATION MEASURES
      - (9) TREE PROTECTION ZONE FENCING ALIGNMENT
      - (10) INSTALLATION OF TEMPORARY CONSTRUCTION BMP'S SUCH AS SILT FENCE, FILTER SOCK FILTRATION TUBE, ETC.
    - e. DETERMINING VEHicular, AND EQUIPMENT INGRESS/EGRESS ACCESS ROUTE FROM THE STREET,
    - f. VEHICLE AND EQUIPMENT TURNING RADIISES INCLUDING, 0-POINT TURNS, TREE BRANCH PRUNING FOR SCAFFOLDING AND WORK SET-UP, LOW BRANCH PRUNING AND FROND TRIMMING WORK (FOR VEHICLE VERTICAL AND HORIZONTAL CLEARANCE),
    - g. LOCATING IRRIGATION HEADS AND UTILITY VALVE BOXES,
    - h. MODIFICATIONS TO THE EXISTING IRRIGATION SYSTEM, TREE, SHRUB, AND GRASS WATERING (INSIDE AND OUTSIDE THE PROJECT LIMITS LINE).
    - i. 120-CALENDAR DAY FORMAL LANDSCAPE MAINTENANCE PERIOD (FLMP) FOR TREE CARE,
    - j. 90-CALENDAR DAY MAINTENANCE PERIOD FOR GRASS, GROUND COVERS, AND SHRUBS,
    - k. IDENTIFYING PARKING AREAS FOR WORKERS (PARKING IS NOT PERMITTED UNDER TREES AND IN GRASSED AREAS),
    - l. STAGING AND STOCKPILING AREAS TO PREVENT DAMAGE TO TREE SURFACE ROOTS AND TO PROTECT THE LANDSCAPED AREAS, GRASS, AND GROUNDS FROM COMPACTION AND EROSION.
    - m. APPRISE (DUF) AND (PMRS) OF THE HOURS OF CONSTRUCTION FOR THE PROJECT.
  4. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY APPROVALS, INCLUDING, BUT NOT LIMITED TO:
    - A. EXCAVATION PERMIT
    - B. STREET USAGE PERMIT
    - C. EXCEPTIONAL TREE PERMIT (DPR)
    - D. TRENCHING PERMIT
  5. FOR WORK ON OR IN THE VICINITY OF EXCEPTIONAL TREES OR AS DETERMINED BY DUF, THE CONTRACTOR SHALL:
    - A. SUBMIT AN EXCEPTIONAL TREE PERMIT APPLICATION, REFER TO THE FOLLOWING WEBSITE:  
[http://www.honolulu.gov/rept/eplnphbg\\_docs/ROH\\_Chapter\\_41a1-25.pdf](http://www.honolulu.gov/rept/eplnphbg_docs/ROH_Chapter_41a1-25.pdf)
    - B. FOR TREE CROWN AND/OR ROOT PRUNING, CONTRACTOR SHALL SUBMIT AN APPLICATION FOR PRUNING, REFER TO THE FOLLOWING WEBSITE:  
[http://www.honolulu.gov/rept/eplnphbg\\_docs/ET\\_PRUNING\\_PERMIT\\_rev\\_2017fillable.pdf](http://www.honolulu.gov/rept/eplnphbg_docs/ET_PRUNING_PERMIT_rev_2017fillable.pdf)
    - C. SUBMIT THE COMPLETED APPLICATIONS WITH ATTACHED CREDENTIALS TO:  
DUF ADMINISTRATOR  
3922 PAKI AVENUE  
HONOLULU, HAWAII 96815  
OR VIA EMAIL TO DUF@HONOLULU.GOV
    - D. INCLUDE SUPPORTING DOCUMENTATION SUCH AS SITE MAP, PLANS, PHOTOGRAPHS, TREE ASSESSMENT REPORT, TREE DISPOSITION PLAN, IF APPLICABLE, TREE PROTECTION PLAN WITH THE APPLICATION.
  6. PROHIBITED ACTIVITIES:
    - A. DUMPING OF CONSTRUCTION MATERIALS, EQUIPMENT, WASTE PRODUCTS AND HAZARDOUS DEBRIS.
    - B. VEHICLES STAGED, PARKED, STORED OR OPERATING WITHIN THE DRIP LINE OF THE TREES.
    - C. DRIVING VEHICLES AND EQUIPMENT OVER THE TREE SURFACE ROOTS.
    - D. SOIL COMPACTION AND EROSION DAMAGE OF THE GROUNDS IRRIGATION SYSTEM, TREE TRUNK, BRANCHES, ROOTS, LANDSCAPED AREAS AND GRASS.
    - E. VEHICLE PARKING FOR WORKERS WITHIN THE PROJECT LIMITS LINE, GRASSED AREAS OUTSIDE THE PROJECT LIMITS LINE, STAGING AREAS, PLANTING STRIPS AND ROADWAY SHOULDERs, UNLESS OTHERWISE DETERMINED BY DUF AND PARK MAINTENANCE AND RECREATION SERVICES (PMRS) OF DESIGNATED STAFF.
  7. DURING THE CONSTRUCTION PERIOD THE QA SHALL:
    - A. SHALL PREPARE AN ARBORIST FIELD REPORT (INCLUDE PHOTOS) AFTER EVERY SITE VISIT AND SUBMIT TO DUF FOR REVIEW AND COMMENT IN A TIMELY MATTER.
    - B. THE QA SHALL NOT SUB-CONTRACT THE WORK TO OTHER ARBORISTS WITHOUT WRITTEN APPROVAL BY DUF.
  8. THE CONTRACTOR AND QA ARE RESPONSIBLE FOR:
    - A. DEVELOPING A TREE WATERING SCHEDULE (WATERING DAYS, WATER USAGE, RUN TIMES, CYCLES), AND TO ENSURE THAT THE TREES AND GRASS INSIDE THE LIMITS OF WORK AND IN STAGING/STOCKPILING AREAS ARE SATISFACTORILY WATERED.
    - B. ON-GOING LANDSCAPE MAINTENANCE, SUCH AS:
      - a. PRUNING TREES AND HEDGES
      - b. FERTILIZING, INCORPORATING SOIL AMENDMENTS
      - c. WEEDING, WATERING AND GRASS MOWING
    - C. SHOULD THERE BE NO AUTOMATIC IRRIGATION SYSTEM OR IT IS DISABLED, THEN THESE AREAS ARE TO BE HAND-WATERED USING HOSES, INCLUDING AREAS OUTSIDE THE PROJECT LIMITS LINE THAT ARE AFFECTED BY THE DISABLED IRRIGATION SYSTEM.
    - D. STAKING OUT THE TREE PROTECTION ZONE FENCING ALIGNMENT, IRRIGATION HEADS AND UTILITY VALVE BOXES AND ABOVE-GRADE TREE SURFACE ROOTS AND MARK WITH ORANGE-SURVEYOR'S PANT FOR DUF REVIEW, MODIFICATION AND APPROVAL AT THE PRE-MOBILIZATION MEETING.
    - E. MONITORING THE HEALTH OF THE TREES IN THE VICINITY OF THE WORK TO ASSESS THEIR POTENTIAL TO DROP LARGE BRANCHES AND/OR FAIL, WHICH CAN DAMAGE THE CONSTRUCTION WORK AREA AND CAUSE BODYLY INJURY TO WORKERS.
  9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING:
    - A. PAYING FOR ITS WATER AND ELECTRICAL USAGE FOR THE PROJECT.
    - B. THE RE-GRASSING OF ALL GRASSED AREAS WITHIN THE PROJECT LIMITS LINE.
    - C. RESTORATION OF DAMAGED AREA TO MATCH THE EXISTING AREAS AND FINISHED GRADES.
    - D. RESTORATION SHALL INCLUDE, BUT NOT LIMITED TO:
      - a. SOIL AERATION (AERATOR EQUIPMENT).
      - b. TOPSOIL.
      - c. SOIL AMENDMENTS.
      - d. GRASS (SOD), SPRIGS, OR STOLONS (OR SEED).
      - e. LEVEL, FINE GRADE, COMPACT WITH MECHANICAL ROLLER.
      - f. FERTILIZING.
      - g. FILLING TO PROPER GRADE ALL DEPRESSIONS AND LOW SPOTS CAUSED BY THE CONTRACTOR'S OPERATIONS INCLUDING REGRASSING.
      - h. IRRIGATION, MULCHING AND OTHER BENEFICIAL PRACTICES.
      - i. NEW GRASS TYPE SHALL MATCH THE EXISTING GRASS TYPE, UNLESS OTHERWISE DIRECTED BY THE OIC OR PMRS OR DESIGNATED STAFF PRIOR TO GRASS PLANTING.
      - j. THE AREA TO BE RESTORED SHALL BE AERATED OR ROTOTILLED TO LOSEN THE COMPACTION.
      - k. IF IMPORTED TOPSOIL IS REQUIRED, ROLL THE AREA TO PREVENT DEPRESSIONS AND RUTS, TOPSOIL SHALL BE PLACED NO LESS THAN ONE-HALF INCH BELOW THE TOP OF THE WALKWAYS TO PREVENT A TRIP HAZARD.
      - l. PREPARE THE AREA PRIOR TO GRASS PLANTING TO INCLUDE USE OF PRE AND POST-EMERGENT HERBICIDES.
  - E. MINIMIZE ROOT CUTTING BY REROUTING THE PIPE AWAY FROM ROOTS OR SNAKE PIPE OR MICRO-TUNNEL UNDER AND/OR OVER THE TREE ROOTS FOR TRENCHING WORK INVOLVING PIPE WORK.
  - F. THE CONTRACTOR AND SUB-CONTRACTORS ARE REQUIRED TO CONTINUE TO FOLLOW AND APPLY TREE PROTECTION PROTOCOLS DURING THE CONSTRUCTION WORK.
  - G. INSPECTION OF ALL TREES PRIOR TO THE START OF CONSTRUCTION FOR WHITE TERNS, HAWAIIAN HONEY BATS AND OTHER THREATENED AND ENDANGERED SPECIES THAT MAY BE NESTING OR ROOSTING IN THE TREES.
  - H. REPLACING GRASS THAT IS NOT READILY AVAILABLE MAY REQUIRED SAVING THE EXISTING GRASS TO BE RE-PLANTED AFTER CONSTRUCTION.
  - I. INSURE THAT GRAVEL FROM THE TEMPORARY INGRESS/EGRESS CONSTRUCTION GRAVEL PAD DOES NOT SPILL INTO GRASSED/LANDSCAPED AREAS, SIDEWALKS, WALKWAYS, DRIVEWAYS, PARKING LOT AND STREETS, CONTRACTOR SHALL BE RESPONSIBLE FOR:
    - a. ANY DAMAGES TO VEHICLES.
    - b. INJURIES TO PEDESTRIANS.
    - c. DAMAGES TO MOWING EQUIPMENT AND INJURIES TO THE PUBLIC FROM AIRBORNE GRAVEL THROWN UP DURING MOWING
    - d. DELAYS OR EXTENSIONS TO THE FLMP CAUSED BY GRAVEL EMBEDDED IN THE SOIL.
  - J. CAREFULLY REMOVE EXISTING PAVEMENT, CURBS AND GUTTERS (IF APPLICABLE) AROUND TREES SO AS NOT TO DAMAGE THE ROOTS THAT ARE BELOW THE PAVEMENT.
  - K. FOR TRENCHING WORK, WHERE POSSIBLE, MINIMIZE ROOT CUTTING BY REROUTING THE PIPE AWAY FROM ROOTS, OR SNAKE PIPE OR MICRO-TUNNEL UNDER AND/OR OVER THE TREE ROOTS.
  10. NEW TREES, REPLACEMENT TREES, RELOCATED TREES AND ROOT/BRANCH PRUNED TREES
    - A. SHALL BE PRE-APPROVED AT THE NURSERY BY THE CONSULTANT'S LANDSCAPE ARCHITECT (LC), AND DUF AT LEAST TWO (2) WEEKS PRIOR TO THEIR DELIVERY TO THE PROJECT SITE, CONTACT OUR NURSERY AND LANDSCAPE SECTION VIA EMAIL AT DUF@HONOLULU.GOV TO SCHEDULE AN INSPECTION.
    - B. DUF WILL NOT ACCEPT NEW, REPLACEMENT AND RELOCATED TREES THAT:
      - a. HAVE AN UNDEVELOPED ROOT SYSTEM.
      - b. ARE ROOT-BOUND.
      - c. ARE DAMAGED DUE TO THE REMOVAL, TRANSPORT, OR INSTALLATION WORK BY THE LC, OR ITS SUB-CONTRACTORS.
      - d. ARE UNHEALTHY, OR
      - e. HAVE POOR STRUCTURE.
    - C. FOR LANDSCAPE PLANTERS, PLANTING STRIPS AND TREE WELL PLANTINGS, DUF WILL NOT ACCEPT TREES:
      - a. THAT HAVE TRUNKS WHICH ARE NOT CENTERED IN THE MIDDLE OF THE LANDSCAPE PLANTERS, PLANTING STRIP, OR TREE WELL.
      - b. WHERE THE TRUNK AND/OR ROOT FLARES THAT RUB AGAINST THE TREE WELL GRATES.
    - D. CONTRACTOR TO INSURE THAT THE MATURE TREE TRUNK AND CANOPY DO NOT:
      - a. CONFLICT WITH OTHER TREE CANPIES.
      - b. CONFLICT WITH VEHICULAR TRAFFIC SIGHT LINES.
      - c. TOUCH BUILDING FAÇADE, ROOF, OR AWNING.
      - d. DO NOT BLOCK STREET LIGHTING (NIGHT ILLUMINATION).
    - E. TREE PLANTING
      - a. FOR FIELD STOCK TREE RELOCATIONS, CONTRACTOR SHALL:
        - (1) USE A WATERING PROBE TO MOVE SOIL WHILE BACKFILLING AND FILLING AIR POCKETS.
        - (2) CONTINUE TO PROBE THREE TIMES A WEEK FOR TWO WEEKS OR UNTIL THE AIR POCKETS ARE FILLED WITH SOIL. BACKFILL AREAS AFTER INITIAL PROBING.
        - (3) LEAVE NO HOLES AROUND THE ROOT BALL WHICH MAY DRY OUT THE EXPOSED ROOTS.
      - b. FOR TREE INSTALLATIONS NEAR THE GROUND WATER TABLE, THE CONTRACTOR SHALL:
        - (1) NOT EXCAVATE DOWN BELOW THE GROUND WATER TABLE.
        - (2) PLANT ROOT BALL SHALLOW OR ABOVE GRADE WITH A MULCH LAYER COVERING THE ENTIRE ROOT BALL.
      - c. IN HIGH WIND AREAS, TREES SHALL BE INSTALLED WITH THE CANOPY SLIGHTLY LEANING INTO THE WIND.
  - F. THE LC AND QA SHALL CONSULT THE HAWAII PACIFIC RISK ASSESSMENT (HPRA) WEBSITE FOR TREES HAVING POTENTIAL TO BE INVASIVE IN THE STATE OF HAWAII, <https://doh.hawaii.gov/nis/ies/2019/04/02/18HPRA-Y18-FinalReport.pdf>
  - G. THE CONTRACTOR SHALL PROVIDE A 120-DAY CALENDAR DAY FLMP WHICH SHALL INCLUDE, BUT NOT LIMITED TO:
    - a. TREE PRUNING/PALM TRIMMING.
    - b. REPAIRING STAKES, GUYS, AND TIRES.
    - c. CONTROLLING FOR DISEASES, INSECTS, AND PESTS.
  - H. SHALL BE GUARANTEED FOR ONE YEAR:
    - a. FINAL ACCEPTANCE WILL BE BASED ON SUCCESSFUL COMPLETION OF THE 120-DAY CALENDAR DAY FLMP.
    - b. THE GUARANTEE PERIOD SHALL BEGIN ONLY AFTER ACCEPTANCE BY OIC, DUF, AND PMRS.
    - c. THE CONTRACTOR SHALL CONTACT OIC AND DUF FOR THE COMMENCEMENT DATE OF THE ON-YEAR TREE GUARANTEE PERIOD.

APPROVED BY:

DIRECTOR, DEPARTMENT OF PARKS AND RECREATION

DATE

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	DPR TREE PROTECTION NOTES - 1		
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY	LK	CHECKED BY	JIN
DRAWN BY	EN	SECTION HEAD	
APPROVED BY	BRANCH HEAD		
SIGNATURE	DATE		
JOB NO. W#-#			
EXPIRATION DATE OF THE USE AGREEMENT	FILE NUMBER	DRIVEN	FILE NUMBER

## TREE PROTECTION / PRESERVATION NOTES (CONTINUED)

- I. AT THE END OF THE FLMP, A FINAL INSPECTION OF THE TREES SHALL BE HELD. SHOULD THE OIC DUF AND PMRS DETERMINE THAT ALL OR CERTAIN PORTIONS OF THE WORK ARE NOT ACCEPTABLE AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS, THE CONTRACTOR SHALL BE REQUIRED TO:
    - a. PROVIDE AN ADDITIONAL 60-DAY MAINTENANCE PERIOD AT NO COST TO THE CITY.
    - b. DURING THIS PERIOD, THE CONTRACTOR SHALL MEET ALL CONTRACT REQUIREMENTS AND CORRECT ALL DEFICIENCIES.
    - c. SHOULD ANY TREE SHOW DECLINING HEALTH OR FAIL TO SURVIVE THE DURATION OF THE FLMP, THE CONTRACTOR SHALL PROVIDE AND INSTALL A REPLACEMENT PLANT OF THE SAME SIZE AND SPECIES AT NO COST TO THE CITY.
  - J. AFTER THE SUCCESSFUL COMPLETION OF THE FLMP AND ANY EXTENSION CONTRACTOR SHALL:
    - a. REMOVE THE WATERING BERMS AROUND TREES.
    - b. LEVEL TO FINISH GRADE AND, IF DIRECTED BY DUF, INSTALL A FOUR-INCH THICK MULCH BLANKET.
    - c. RESTORE GRASS AROUND THE TREE.
  - K. THE CONTRACTOR SHALL NOT BE LIABLE FOR ANY TREE LOSS DUE TO LACK OF PROPER MAINTENANCE BY THE CITY, VANDALISM AND/OR ACCIDENT NOT CAUSED BY THE CONTRACTOR OR ITS SUBCONTRACTORS.
  - L. IF THE QA AND LC ARE UNABLE TO RELOCATE, PLANT NEW OR PLANT REPLACEMENT TREES AND SHRUBS WITHIN THE PARK DUE TO THE LACK OF SPACE OR UTILITY LINES, THEN THESE TREES SHALL BE PLANTED AT ONE OF THE FOLLOWING LOCATIONS AS DETERMINED BY DUF:
    - a. AS STREET TREES FRONTPING THE PARK.
    - b. AS PARKING LOT TREES.
    - c. AT A CITY-OWNED FACILITY (LOCATION DETERMINED BY DUF).
    - d. OR DELIVERED TO THE CITY TREE NURSERY.
  - M. PARTIAL APPROVAL FOR MULTIPLE TREE INSTALLATIONS WILL NOT BE GIVEN.
  1. LANDSCAPE IMPROVEMENTS, I.E. GRASS, GROUND COVERS, SHRUBS, IRRIGATION SYSTEM, GROUNDS RESTORATION AND AERATION
    - A. THE CONTRACTOR SHALL PROVIDE A 90-CALENDAR DAY FLMP WHICH SHALL INCLUDE, BUT NOT LIMITED TO:
      - a. IRRIGATION MODIFICATION, WATERING
      - b. SHRUB PRUNING/TRIMMING
      - c. MOWING, WEEDING, SOIL AERATION (AERATOR EQUIPMENT)
      - d. RE-GRASSING, FERTILIZATION, TOP-DRESSING
    - B. FINAL ACCEPTANCE FOR LANDSCAPE IMPROVEMENTS, I.E. GRASS, GROUND COVERS, SHRUBS, IRRIGATION SYSTEM, GROUNDS RESTORATION AND AERATION SHALL BE AFTER THE SUCCESSFUL COMPLETION OF THE 90-CALENDAR DAY FLMP AND ANY EXTENSIONS.
    - C. AT THE COMPLETION OF ALL PLANTING OPERATIONS:
      - a. A PRE-MAINTENANCE INSPECTION SHALL BE HELD PRIOR TO START OF FLMP.
      - b. PRE-MAINTENANCE INSPECTION SHALL INCLUDE OIC, A/E/C, DUF, PMRS, CONTRACTOR AND LC.
      - c. ISSUANCE OF THE COMMENCEMENT DATE FOR THE FLMP IS CONTINGENT UPON ACCEPTANCE OF THE CORRECTION OF ALL DEFICIENCIES AND ACCEPTANCE BY OIC, DUF AND PARS.
    - D. FINAL ACCEPTANCE OF GROUND COVER PLANTING AT THE END OF THE FLMP:
      - a. SHALL BE CONTINGENT UPON 95% GROUND COVER COVERAGE OF THE OVERALL AREA AND LESS THAN 5% WEEDS.
      - b. INDIVIDUAL BARE SPOTS SHALL NOT EXCEED ONE SQUARE FOOT IN AREA.
      - c. FINAL ACCEPTANCE INSPECTION SHALL INCLUDE OIC, DUF AND PMRS.
      - d. SHOULD ANY SHRUB SHOW DECLINING HEALTH OR FAIL TO SURVIVE THE DURATION OF THE FLMP, THE CONTRACTOR SHALL PROVIDE AND INSTALL A REPLACEMENT PLANT OF THE SAME SIZE AND SPECIES AT NO COST TO THE CITY.
    - E. IF WORK NOT ACCEPTABLE AT THE END OF THE FLMP CONTRACTOR SHALL:
      - a. PROVIDE AN ADDITIONAL 60-CALENDAR DAYS OF MAINTENANCE AT NO COST TO THE CITY.
      - b. DURING THIS PERIOD, THE CONTRACTOR SHALL MEET ALL REQUIREMENTS AND CORRECT ALL DEFICIENCIES.
    - F. WEEDS, DEFINED AS ANY PLANT, GRASS, BROADLEAF, OR SEDGE, OTHER THAN THAT SPECIFIED IN THE DRAWINGS, SHALL NOT EXCEED AN AREA GREATER THAN 5% OF THE OVERALL GRASS AREA, NOR SHOULD THEY CONSTITUTE MORE THAN 5% OF A 1,000 SQUARE FOOT AREA.
  2. DAMAGE TO THE TREES DUE TO CONTRACTOR'S EQUIPMENT:
    - A. IS NOT ALLOWED, CONTRACTOR IS RESPONSIBLE FOR ALL COSTS TO MITIGATE DAMAGES.
    - B. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE QA OF BRANCH, ROOT AND/OR TRUNK INJURIES TO ON-SITE, OFF-SITE AND/OR PRIVATE PROPERTY TREES DUE TO THE CONSTRUCTION WORK.
    - C. THE QA SHALL EVALUATE THE INJURY AND NOTIFY DUF BEFORE APPLYING TREATMENT.
    - D. QA SHALL SUBMIT A WRITTEN REPORT OF ALL TREE INJURIES, THE REPORT SHALL INCLUDE THE TREE'S HEALTH ASSESSMENT AND TREATMENT.
    - E. CONTRACTOR SHALL SUBMIT THE REPORT TO DUF AND PMRS DESIGNATED STAFF.
    - F. UPON APPROVAL FROM DUF, THE QA SHALL HAVE THE CONTRACTOR PERFORM REMEDIAL WORK WHICH MAY INCLUDE BARK TRACING TO CLEAN THE WOUND, PROVIDE SUPPLEMENTAL WATERING, AND MONITORING AS REQUIRED.
    - G. THE USE OF TREE PAINT TO DRESS TREE WOUNDS IS NOT ALLOWED.
  3. TREE MITIGATION MEASURES SHALL INCLUDE BUT NOT BE LIMITED TO:
    - A. WRAPPING THE TREE TRUNK WITH A THICK CARPET OR PROTECTIVE RUBBER Padding OR "TREE TRUNK SHIELD".
    - B. A POLYPROPYLENE FABRIC WITH BAMBOO AND PVC PIPE INSERTS TO PROTECT THE TRUNK, ROOT FLARE, AND SURFACE ROOTS.
    - C. TREE PROTECTION ZONE FENCING.
    - D. TREE PROTECTING ZONE WARNING SIGNS.
- E. THICK PLYWOOD BOARDS (FULL SIZE), STEEL PLATES.
- F. HEAVY DUTY GROUND PROTECTION MATS OVER AN EIGHT-INCH ORGANIC MULCH LAYER UNDER THE TREE'S DRIP LINE.
- G. PROTECTION TREE WELLS.
- H. PLANTING STRIPS WITH EITHER PLASTIC BARRICADES (WATER FILLABLE) OR PORTABLE METAL BARRIERS.
14. TREE ROOT/BRANCH PRUNING BY CONTRACTOR AND LC SHALL:
- A. RECEIVE APPROVAL FROM DUF PRIOR TO THE START OF THE WORK.
  - B. NOTIFY DUF A MINIMUM OF SEVEN DAYS IN ADVANCE VIA EMAIL (SEE NOTE 4A) TO ATTEND A MEETING WITH THE QA, LC AND CONTRACTOR TO DISCUSS WORK,
  - C. BE PERFORMED UNDER THE DIRECT OBSERVATION AND SUPERVISION OF THE QA WHO WILL BE RESPONSIBLE FOR THE FOLLOWING:
    - a. INSPECT THE WORK TO PROTECT THE CITY FROM LIABILITY AND POOR WORKMANSHIP.
    - b. INSURE THAT THE WORK DOES NOT AFFECT THE HEALTH AND CAUSE FAILURE OR DEMISE OF THE TREE.
    - c. THE QA IS REQUIRED TO BE AT THE WORK SITE AT ALL TIMES DURING WORK PERFORMED ON OR NEAR TREES TO PROTECT THE CITY FROM LIABILITY AND POOR WORKMANSHIP.
    - d. THE QA IS RESPONSIBLE TO INSURE THAT THE WORK PERFORMED DOES NOT DESTABILIZE THE TREE, AFFECT THEIR HEALTH AND/OR CAUSE FAILURE OR DEMISE OF THE TREE.
    - e. CONDUCT TREE HAZARD ASSESSMENT; INSPECT TREES FOR POTENTIAL FAILURE, CHECK ENVIRONMENT THAT MAY CONTRIBUTE TO THAT FAILURE; IDENTIFY POTENTIAL TARGETS (INJURIES TO PERSONS/DAMAGE TO OBJECTS).
  - D. EXPOSE THE TREE ROOTS PRIOR TO THE APPROVAL OF ANY DEMOLITION, GRADING, EXCAVATION, TRENCHING AND RESTORATION WORK.
  - E. IF THE QA IS UNABLE TO DETERMINE THROUGH VISUAL INSPECTION THE AMOUNT AND EXTENT OF THE ROOT SYSTEM IN LIEU OF BACKHOE EQUIPMENT AND SHOVELS, DUF MAY REQUIRE USE OF AN AIR-WAND (AIR SPADE GUN) TO EXPOSE THE EXISTING TREE ROOTS.
  - F. USE A CHAIN SAW WHEN MAKING THE INITIAL CUTS IN ROOT PRUNING, ALL FINAL CUTS SHALL BE MADE USING A SHARP HAND-SAW OR APPROVED ROOT PRUNING EQUIPMENT TO ENSURE CLEAN, NON-JAGGED CUTS.
  - G. FOR LARGE ROOT PRUNING USING BACKHOE EQUIPMENT FOR MAKING INITIAL CUTS THE OPERATOR SHALL NOT ALIGN THE FRONT EDGE OF THE BUCKET PARALLEL TO THE TREE ROOTS TO AVOID RIPPING ROOTS, ALL FINAL CUTS SHALL BE MADE USING A SHARP HAND-SAW OR APPROVED ROOT PRUNING EQUIPMENT TO ENSURE CLEAN, NON-JAGGED CUTS.
15. GUIDELINES AND STANDARDS FOR TREES IN URBAN AREAS (GSTUA):
  - A. FOR ADDITIONAL TREE PRESERVATION AND TREE PROTECTION NOTES, REFER TO THE GSTUA IN THE PROJECT SPECIFICATIONS.

## DEPARTMENT OF PARKS & RECREATION (DPR) NOTES

1. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY ALL EXISTING DIMENSIONS, AS-BUILT CONDITIONS, STRUCTURES, SITE IMPROVEMENTS, ETC. PRIOR TO BIDDING.
2. ALL INDICATED ITEMS ARE NEW UNLESS OTHERWISE NOTED.
3. THE CONTRACTOR SHALL CONTACT THE DPR DISTRICT MANAGER, PHONE NO. (808) AND DPR'S DIVISION OF URBAN FORESTRY (DUF) AT DUF@HONOLULU.GOV TWO WEEKS PRIOR TO START OF WORK.
4. EXCEPT FOR PORTIONS OF THE PARK GROUNDS AND FACILITIES AFFECTED BY THIS CONTRACT, THE PARK FACILITIES WILL BE IN USE BY THE PUBLIC. THE CONTRACTOR SHALL PROVIDE FULL COOPERATION WITH THE DPR TO EFFECTIVELY MAINTAIN SUCH USE OF THE PARK FACILITIES.
5. THE EXTENT OF REMOVAL AS INDICATED IS APPROXIMATE. THE CONTRACTOR SHALL VERIFY THE EXTENT OF THE REMOVAL WORK TO PROPERLY ACCOMMODATE HIS METHOD OF CONSTRUCTING NEW WORK AS REQUIRED, ADDITIONAL REMOVAL, PATCHING, AND RESTORATION REQUIRED TO ACCOMMODATE CONSTRUCTION SHALL BE CONSIDERED INCIDENTAL TO THE NEW WORK.
6. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES AND OTHER SITE IMPROVEMENTS TO REMAIN, ANY DAMAGES RESULTING DIRECTLY OR INDIRECTLY FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AND/OR REPLACED TO THE SATISFACTION OF THE OFFICER-IN-CHARGE (OIC) AT NO ADDITIONAL COST TO THE CITY AND COUNTY OF HONOLULU, CITY.
7. LOCATIONS OF ALL EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN EXCAVATING NEAR UTILITIES. ANY AND ALL DAMAGE SHALL BE IMMEDIATELY REPORTED TO THE PROJECT MANAGER, THEN REPAIRED, REPLACED, AND/OR ITEM(S) RESTORED TO THEIR ORIGINAL CONDITION BY THE CONTRACTOR AT THEIR COST. UTILITIES SHALL INCLUDE BUT NOT LIMITED TO ELECTRICAL, TELEPHONE, SEWER, WATER, IRRIGATION SYSTEMS, ETC.
8. THE UNDERGROUND PIPES, CABLES OR DUCT LINES KNOWN TO EXIST BY THE ENGINEER FROM THEIR SEARCH OF THEIR RECORDS ARE INDICATED ON THE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF THE UTILITIES AND EXERCISE PROPER CARE IN EXCAVATING IN THE AREA. THE NEVER CONNECTION OF NEW UTILITIES TO THE EXISTING UTILITIES ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL EXPOSE THE EXISTING LINES AT THE PROPOSED CONNECTIONS TO VERIFY THEIR LOCATIONS AND DEPTHS PRIOR TO EXCAVATION FOR THE NEW LINES.
9. NO TRACKED VEHICLES OR EQUIPMENT ALLOWED.
10. EXISTING IRRIGATION SYSTEM:
  - A. THE EXISTING IRRIGATION SYSTEM SHALL BE REPAIRED AND/OR RELOCATED AS SHOWN AND/OR AS NOTED ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR IRRIGATION AND WATER SYSTEMS OF THE DEPARTMENT OF PARKS AND RECREATION CITY AND COUNTY OF HONOLULU.
  - B. THE CONTRACTOR SHALL VERIFY AND OPERATE THE EXISTING IRRIGATION, WATER AND ELECTRICAL SYSTEMS TO BECOME FAMILIAR WITH RESPECTIVE SYSTEMS NOT AFFECTED BY THIS PROJECT BUT WITHIN THE PROJECT LIMITS PRIOR TO THE START OF CONSTRUCTION AND DEMOLITION.

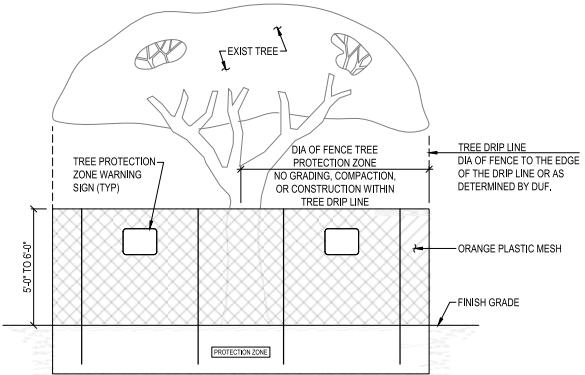
APPROVED BY:

DIRECTOR, DEPARTMENT OF PARKS AND RECREATION

DATE

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: DPR TREE PROTECTION NOTES - 2			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY	LK	CHECKED BY	JIN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE	DATE		
JOB NO. W#-#			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	FILE NUMBER	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



#### TREE PROTECTION ZONE FENCE NOTES:

1. FOR TREES THAT ARE IN NARROW PLANTING STRIPS, THE ENTIRE PLANTING STRIP SHALL BE ENCLOSED.
2. FOR TREE WELLS AND SMALL PLANTER AREAS THAT ARE FULL OF ROOTS, USE PLASTIC TRAFFIC BARRICADES (WATER FILABLE) MINIMUM (3) EACH, OR TYPE 1 OR TYPE 2 BARRICADES, MINIMUM (4) EACH OR AS DETERMINED BY DUF.
3. TREE WILL REQUIRE SUPPLEMENTAL WATERING.
4. IF THE FENCE IS INSIDE THE DRIP LINE, PLYWOOD BOARDS OR STEEL PLATES OR HEAVY DUTY GROUND PROTECTION MATS OVER AN 8' MULCH LAYER WILL BE REQUIRED TO PROTECT THE TREE ROOTS AND CONSTRUCTION EQUIPMENT VEHICLES.
5. 2" GALVANIZED IRON POSTS, DRIVEN INTO THE GROUND TO MIN. 24" DEPTH, AT NO MORE THAN 10' SPACING.
6. THE GENERAL CONTRACTOR SHALL SCHEDULE AN ON-SITE MEETING WITH THE DIVISION OF URBAN FORESTRY AT (808) 971-7151, DISCUSS THE INSTALLATION AND LAYOUT OF THE TREE PROTECTION FENCING.
7. AVOID DAMAGING ROOTS DURING FENCE POST INSTALLATION.

#### TREE PROTECTION DETAIL

NOT TO SCALE

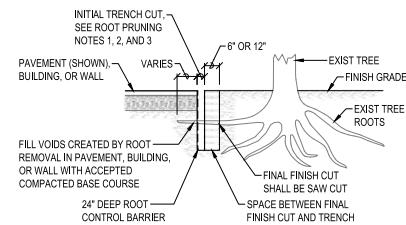


#### SIGN NOTES:

1. MINIMUM SIZE OF SIGN: 8 1/2" x 11"
2. SECURELY FASTEN TO FENCE.
3. HANG MORE THAN ONE SIGN FOR VISIBILITY PURPOSES IF NEEDED AND AS INDICATED.
4. SIGN TO BE MADE OF WEATHERPROOF MATERIAL.
5. AVOID DAMAGING TREE ROOTS DURING FENCE POST INSTALLATION.

#### TREE PROTECTION SIGN DETAIL

NOT TO SCALE



#### NOTES:

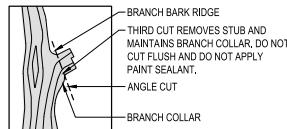
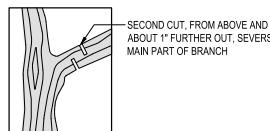
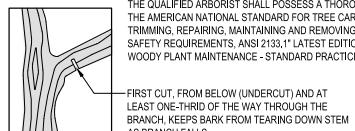
1. ALL RELOCATION SHALL BE DONE UNDER THE SUPERVISION OF A QUALIFIED ARBORIST PER SPECIFICATIONS.
2. TRUNK DIAMETER OF THE TREE IS MEASURED AT 54 INCHES FROM EXISTING GROUND LEVEL.
3. THE QUALIFIED ARBORIST AND DUF/DPR SHALL DETERMINE THE AMOUNT OF THE TREE CANOPY PRUNING AFTER ROOT PRUNING.
4. WORK TO BE DONE UNDER THE DIRECT SUPERVISION OF A QUALIFIED ARBORIST.
5. REMOVE AND DISPOSE OF PRUNED ROOTS AND BRANCHES.

#### ROOT PRUNING DETAIL

NOT TO SCALE

#### NOTE:

THE QUALIFIED ARBORIST SHALL POSSESS A THOROUGH WORKING KNOWLEDGE OF THE AMERICAN NATIONAL STANDARD FOR TREE CARE OPERATIONS: "PRUNING, TRIMMING, REPAIRING, MAINTAINING AND REMOVING TREES AND CUTTING BRUSH SAFETY REQUIREMENTS, ANSI Z133.1," LATEST EDITION AND "TREE, SHRUB AND OTHER WOODY PLANT MAINTENANCE - STANDARD PRACTICES, ANSI A300" LATEST EDITION.



#### LARGE BRANCH PRUNING DETAIL

NOT TO SCALE

#### ROOT PRUNING NOTES:

1. MAKE INITIAL TRENCH CUTS 6" BEYOND THE FINAL FINISH CUT WHEN USING A TRENCHER.
2. MAKE INITIAL TRENCH CUTS 12" BEYOND THE FINAL FINISH CUTS AND AVOID RIPPLING ROOTS WHEN USING A BACKHOE AND/OR EXCAVATOR.
3. BACKFILL TRENCH WITH NATIVE SOIL DUG FROM THE TRENCH AND COMPACT ALL VOIDS TO MATCH EXISTING FINISH GRADE, AND SEED, SPRIG OR SOD WITH GRASS AS SPECIFIED.
4. WHEN USING BACKHOE EQUIPMENT FOR INITIAL CUTS, USE THE FRONT EDGE OF THE BUCKET PARALLEL TO THE TREE ROOTS (TRANSVERSE DIRECTION TO RADIATING ROOTS) TO SEVER THE TREE ROOTS TO AVOID RIPPLING THE ROOTS.
5. HAND EXCAVATE AROUND ROOTS TO THE SIZE OF DESIRED ROOTBALL AND THEN PRUNE OFF PROTRUDING ROOTS BY HAND SAW OR CHAIN SAW.
6. ALL FINAL FINISH CUTS SHALL BE MADE USING A SHARP HAND SAW OR APPROVED ROOT PRUNING EQUIPMENT TO ENSURE CLEAN, NON-JAGGED CUTS.
7. WORK SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A QUALIFIED ARBORIST.
8. THE QUALIFIED ARBORIST AND THE DIVISION OF URBAN FORESTRY, DEPARTMENT OF PARKS & RECREATION STAFF SHALL DETERMINE THE AMOUNT OF THE TREE CANOPY THAT SHALL BE PRUNED AFTER ROOT PRUNING.
9. ALL PRUNED ROOTS AND BRANCHES SHALL BE REMOVED AND DISPOSED OF.
10. WHEN EXCAVATING ROOTS, DO NOT DAMAGE OR STRIP OUTER LAYER OF ROOT TISSUE.

APPROVED BY:

DIRECTOR, DEPARTMENT OF PARKS AND RECREATION

DATE

#### 60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: DPR TREE PROTECTION DETAILS			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY	LK DRAWN BY APPROVED	CHECKED BY SECTION HEAD BRANCH HEAD	
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE USE AGREEMENT	FILE NUMBER	DRIVER	FILE NUMBER

## GOOD HOUSEKEEPING BMPS

- STREET SWEEPING AND VACUUMING.  
ALL POLLUTANTS DISCHARGED FROM CONSTRUCTION SITE TO OFF-SITE AREAS MUST BE SWEEP OR VACUUM EACH DAY BEFORE LEAVING THE JOB SITE.
- MATERIALS DELIVERY, STORAGE AND USE MANAGEMENT.  
PREVENT POLLUTION BY ELIMINATING THE DISCHARGE OF POLLUTANTS FROM MATERIAL DELIVERY, STORAGE, AND USE TO THE STORM WATER SYSTEM OR WATER COURSES BY MINIMIZING THE STORAGE OF HAZARDOUS MATERIALS ON SITE, STORING MATERIALS IN A DESIGNATED AREA, INSTALLING SECONDARY CONTAINMENT, CONSTRUCTION MATERIALS, WASTE, TOXIC AND HAZARDOUS SUBSTANCES, STOCKPILES AND OTHER SOURCES OF POLLUTION SHALL NOT BE STORED IN BUFFER AREAS NEAR AREAS OF CONCENTRATED FLOW, OR AREAS ABUTTING THE MS4 RECEIVING WATERS, OR DRAINAGE IMPROVEMENTS THAT DISCHARGE OFF-SITE, PRIMARY AND SECONDARY CONTAINMENT CONTROLS AND COVERS SHALL BE IMPLEMENTED TO THE MAXIMUM.
- SPILL PREVENTION AND CONTROL.  
CREATE AND IMPLEMENT SPILL PREVENTION AND RESPONSE PLANS TO ELIMINATE AND MINIMIZE THE DISCHARGE OF POLLUTANTS TO THE MS4 AND RECEIVING WATERS FROM LEAKS AND SPILLS BY REDUCING THE CHANCE FOR SPILLS, ABSORBING, CONTAINING, AND CLEANING UP SPILLS AND PROPERLY DISPOSING OF SPILL MATERIALS. AT MAXIMUM, ALL PROJECTS SHALL CLEANUP ALL LEAKS AND SPILLS IMMEDIATELY.
- HAZARDOUS MATERIALS.  
PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM HAZARDOUS WASTE THROUGH PROPER MATERIAL USE AND WASTE DISPOSAL. IN THE EVENT THAT HAZARDOUS MATERIALS ARE DISCHARGED TO THE MS4, THE PROPERTY OWNER OR ESCP COORDINATOR SHALL IMMEDIATELY NOTIFY THE DEPARTMENT OF FACILITIES MAINTENANCE, HONOLULU FIRE DEPARTMENT, AND HONOLULU POLICE DEPARTMENT OF THE DISCHARGE BY TELEPHONE. A WRITTEN REPORT DESCRIBING THE POLLUTANTS THAT WERE DISCHARGED, THE REASONS FOR THE DISCHARGE, AND THE MEASURES THAT HAVE BEEN TAKEN OR WILL BE TAKEN TO PREVENT A REOCURRENCE OF THE DISCHARGE SHALL BE SUBMITTED TO THE DIRECTOR NO LESS THAN 3 DAYS AFTER NOTIFICATION BY PHONE.
- NONHAZARDOUS MATERIALS.  
IN THE EVENT THAT NONHAZARDOUS MATERIALS ARE DISCHARGED TO THE MS4, THE PROPERTY OWNER OR ESCP COORDINATOR SHALL NOTIFY THE CITY DEPARTMENT OF FACILITIES MAINTENANCE BY TELEPHONE NO LATER THAN THE NEXT BUSINESS DAY. A WRITTEN REPORT DESCRIBING THE POLLUTANTS THAT WERE DISCHARGED, THE REASONS FOR THE DISCHARGE, AND THE MEASURES THAT HAVE BEEN TAKEN OR WILL BE TAKEN TO PREVENT A REOCURRENCE OF THE DISCHARGE SHALL BE SUBMITTED TO THE DIRECTOR NO LESS THAN 3 DAYS AFTER NOTIFICATION BY PHONE.
- VEHICLE AND EQUIPMENT CLEANING.  
ELIMINATE OR MINIMIZE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM VEHICLE AND EQUIPMENT CLEANING OPERATIONS BY USING OFF-SITE FACILITIES WHEN FEASIBLE, WASHING IN DESIGNATED, CONTAINED AREAS ONLY, AND ELIMINATING DISCHARGES TO THE STORM DRAIN SYSTEM BY EVAPORATING AND/OR TREATING WASH WATER, AS APPROPRIATE OR INFILTRATING WASH WATER FOR EXTERIOR CLEANING ACTIVITIES THAT USE WATER ONLY.
- VEHICLE AND EQUIPMENT FUELING.  
PREVENT FUEL SPILLS AND LEAKS BY USING OFF-SITE FACILITIES. FUELING ONLY IN DESIGNATED AREAS, ENCLOSING OR COVERING STORED FUEL, AND IMPLEMENTING SPILL CONTROLS SUCH AS SECONDARY CONTAINMENT AND ACTIVE MEASURES USING SPILL RESPONSE KITS.
- VEHICLE AND EQUIPMENT MAINTENANCE.  
ELIMINATE OR MINIMIZE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM VEHICLE AND EQUIPMENT MAINTENANCE OPERATIONS BY USING OFF-SITE MAINTENANCE FACILITIES WHEN FEASIBLE, PERFORMING WORK IN DESIGNATED AREAS ONLY, USING SPILL PADS UNDER VEHICLES AND EQUIPMENT, CHECKING FOR LEAKS AND SPILLS, AND CONTAINING AND CLEANING UP SPILLS IMMEDIATELY.
- SOLID WASTE MANAGEMENT.  
PREVENT OR REDUCE DISCHARGE OF POLLUTANTS TO THE LAND, GROUNDWATER, AND IN STORM WATER FROM SOLID WASTE OR CONSTRUCTION AND DEMOLITION WASTE BY PROVIDING DESIGNATED WASTE COLLECTION AREAS, COLLECT SITE TRASH DAILY, AND ENSURING THAT CONSTRUCTION WASTE IS COLLECTED, REMOVED, AND DISPOSED OF ONLY AT AUTHORIZED DISPOSAL AREAS.
- SANITARY/SEPTIC WASTE MANAGEMENT.  
TEMPORARY AND PORTABLE SANITARY AND SEPTIC WASTE SYSTEMS SHALL BE MOUNTED OR STAKED IN WELL-MAINTAINED AND SCHEDULED FOR REGULAR WASTE DISPOSAL AND SERVICING SOURCES OF SANITARY AND SEPTIC WASTE SHALL NOT BE STORED NEAR THE MS4 OR RECEIVING WATERS.
- STOCKPILE MANAGEMENT.  
STOCKPILES SHALL NOT BE LOCATED IN DRAINAGEWAYS, WITHIN 50 FEET FROM AREAS OF CONCENTRATED FLOWS, AND ARE NOT ALLOWED IN THE CITY RIGHT-OF-WAY. SEDIMENT BARRIERS OR SILT FENCES SHALL BE USED AROUND THE BASE OF ALL STOCKPILES. STOCKPILES SHALL NOT EXCEED 15 FEET IN HEIGHT. STOCKPILES GREATER THAN 15 FEET IN HEIGHT SHALL REQUIRE 8 FOOT WIDE BENCHING IN ACCORDANCE WITH ROI CHAPTER 14, ARTICLE 15. STOCKPILES MUST BE COVERED WITH PLASTIC SHEETING OR A COMPARABLE MATERIAL IF THEY WILL NOT BE ACTIVELY USED WITHIN 7 DAYS.
- LIQUID WASTE MANAGEMENT.  
LIQUID WASTE SHALL BE CONTAINED IN A CONTROLLED AREA SUCH AS A HOLDING PIT, SEDIMENT BASIN, ROLL-OFF BIN, OR PORTABLE TANK OF SUFFICIENT VOLUME AND TO CONTAIN THE LIQUID WASTES GENERATED. CONTAINMENT AREAS OR DEVICES MUST BE IMPERMEABLE AND LEAK FREE AND SHOULD NOT BE LOCATED WHERE ACCIDENTAL RELEASE OF THE CONTAINED LIQUID CAN DISCHARGE TO WATER BODIES, CHANNELS, OR STORM DRAINS.
- CONCRETE WASTE MANAGEMENT.  
PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM CONCRETE WASTE BY CONDUCTING WASHOUT OFFSITE OR PERFORMING ON SITE WASHOUT IN A DESIGNATED AREA CONSTRUCTED AND MAINTAINED IN SUFFICIENT QUANTITY AND SIZE TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS. PLASTIC LINING MATERIAL SHOULD BE A MINIMUM OF 10 MILLIMETER POLYETHYLENE SHEETING AND SHOULD BE FREE OF HOLES, TEARS, OR OTHER DEFECTS THAT COMPROMISE THE IMPERMEABILITY OF THE MATERIAL. CONTAINMENT AREAS OR DEVICES SHOULD NOT BE LOCATED WHERE ACCIDENTAL RELEASE OF THE CONTAINED LIQUID CAN DISCHARGE TO WATER BODIES, CHANNELS, OR STORM DRAINS. WASHOUT FACILITIES MUST BE CLEANED, OR NEW FACILITIES MUST BE CONSTRUCTED AND READY TO USE BEFORE THE WASHOUT IS 75% FULL. ONCE CONCRETE WASTES ARE WASHED INTO THE DESIGNATED AREA AND ALLOWED TO HARDEN, THE CONCRETE SHOULD BE BROKEN UP, REMOVED, AND DISPOSED OF AS SOLID WASTES.
- NOT USED.

## GOOD HOUSEKEEPING BMPS (CONTINUED)

- DUST CONTROL.  
DUST FROM A PROJECT SITE SHALL NOT BE TRANSPORTED OR DISCHARGED TO OFF-SITE AREAS. THE WORK MUST BE IN CONFORMANCE WITH AIR POLLUTION CONTROL STANDARDS CONTAINED IN THE HAWAII ADMINISTRATIVE RULES, TITLE 11 CHAPTER 60.1 "AIR POLLUTION CONTROL." ALL ESCPs SHALL PROVIDE FOR THE CONTROL OF DUST BY ONE OR MORE OF THE FOLLOWING:
  - MULCHING TO A DEPTH OF NO LESS THAN 1 INCH.
  - SPRINKLING EXPOSED SOILS WITH WATER TO MAINTAIN MOISTNESS AT A DEPTH OF 2-3 INCHES DURING WORKING HOURS AND NOT TO GENERATE ANY RUNOFF.
  - VERTICAL DUST BARRIERS NO LESS THAN 6 FEET IN HEIGHT, CONSTRUCTED OF MATERIALS CAPABLE OF EFFECTIVELY PREVENTING THE SPREAD OF DUST PARTICLES.
- BMP AND SITE MAINTENANCE.  
ALL ESCP BMPS SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT. ADDITIONAL BMPS SHALL BE IMPLEMENTED AS NECESSARY TO ADDRESS EROSION AND SEDIMENT CONTROL AT THE PROJECT SITE.

## EROSION PREVENTION / SEDIMENT CONTROL NOTES

- THE CONTRACTOR SHALL FOLLOW THE GUIDELINES IN THE CITY AND COUNTY OF HONOLULU'S RULES RELATING TO WATER QUALITY\*
- MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY CONSTRUCTION IS INITIATED.
- NOT USED.
- TEMPORARY STABILIZATION.  
TEMPORARY STABILIZATION IS REQUIRED ON DISTURBED AREAS WHICH ARE AT FINAL GRADE OR WHEN THE DISTURBED AREA WILL NOT BE WORKED FOR 14 CONSECUTIVE DAYS OR MORE.
- PERMANENT STABILIZATION.  
ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED USING VEGETATIVE COVERING, PAVEMENT, OR EQUIVALENT, PRIOR TO REMOVING EROSION AND SEDIMENT MEASURES. TRAPPED SEDIMENT AND AREAS OF EXPOSED SOIL WHICH RESULT FROM THE REMOVAL OF THE TEMPORARY MEASURES SHALL BE IMMEDIATELY AND PERMANENTLY STABILIZED.
- PRESERVE EXISTING VEGETATION.  
CLEARLY MARK THE AREAS TO BE PRESERVED WITH FLAGS OR TEMPORARY FENCING, WHERE TEMPORARY FENCING IS USED, FENCING MUST BE ADEQUATELY SUPPORTED BY POSTS AND MAINTAINED IN AN UPRIGHT POSITION.
- MINIMIZE SOIL COMPACTION.  
AREAS WHERE FINAL STABILIZATION OR INFILTRATION PRACTICES WILL BE INSTALLED SHALL BE PROTECTED FROM EXCESSIVE COMPACTION DURING CONSTRUCTION. VEHICLE AND EQUIPMENT USE SHALL BE RESTRICTED OR TECHNIQUES TO CONDITION THE SOILS TO SUPPORT VEGETATION SHALL BE IMPLEMENTED IN THE AREAS THAT HAVE BEEN COMPACTED AND ARE DESIGNATED TO REMAIN VEGETATED OR POST-CONSTRUCTION INFILTRATION AREAS. CLEARLY MARK THE AREAS TO BE AVOIDED WITH FLAGS OR TEMPORARY FENCING, WHERE TEMPORARY FENCING IS USED, FENCING MUST BE ADEQUATELY SUPPORTED BY POSTS AND MAINTAINED IN AN UPRIGHT POSITION.
- PERIMETER CONTROLS.  
PERIMETER CONTROLS ARE REQUIRED DOWNSLOPE OF ALL DISTURBED AREAS, MAINTAIN DOWNSTREAM VEGETATED BUFFER AREA.
- NOT USED.
- NOT USED.
- NOT USED.
- NOT USED.
- TRACKING CONTROL.  
  - MINIMIZE SEDIMENT TRACK-OUT ONTO OFF-SITE STREETS, OTHER PAVED AREAS, AND SIDEWALKS FROM VEHICLES EXITING THE CONSTRUCTION SITE BY RESTRICTING VEHICLE TRAFFIC TO PROPERLY DESIGNATED AREAS AND USING ADDITIONAL CONTROLS TO REMOVE SEDIMENT FROM VEHICLE TIRES PRIOR TO EXITING THE SITE.
  - VEHICULAR PARKING AND MOVEMENTS ON PROJECT SITES MUST BE CONFINED TO PAVED SURFACES OR PREDEFINED PARKING AREAS AND VEHICLE PATHS, WHICH SHALL BE MARKED WITH FLAGS OR BOUNDARY FENCING.
  - ALL POLLUTANTS AND MATERIALS THAT ARE DROPPED, WASHED, TRACKED, SPILLED, OR OTHERWISE DISCHARGED FROM A PROJECT SITE TO OFF-SITE STREETS, OTHER PAVED AREAS, SIDEWALKS OR THE MS4 MUST BE CLEANED USING DRY METHODS SUCH AS SWEEPING OR VACUUMING.
  - WASHING POLLUTANTS AND MATERIALS THAT ARE DISCHARGED FROM THE PROJECT SITE TO THE MS4 INTO DRAIN INLETS OR CATCH BASINS IS PROHIBITED UNLESS THE MATERIAL IS SEDIMENT AND THE INLETS ARE DIRECTED TO A SEDIMENT BIN OR SEDIMENT TRAP.
- BEST MANAGEMENT PRACTICES (BMPS) SHALL NOT BE REMOVED UNTIL FINAL STABILIZATION IS COMPLETE FOR THAT PHASE.
- REFER TO CITY AND COUNTY OF HONOLULU STORM WATER BEST MANAGEMENT PRACTICES MANUAL - CONSTRUCTION, FOR MORE INFORMATION ON BMPS.
- THE FOLLOWING BMPS WERE DETERMINED TO BE NOT APPLICABLE BASED ON THE SITE SPECIFIC CONDITIONS. A BRIEF EXPLANATION OF WHY EACH OMITTED BMP IS UNNECESSARY OR IMPRACTICABLE FOR THE PROJECT HAS BEEN PROVIDED BELOW, AS CONSTRUCTION PROGRESSES, REVISIONS MAY BE NECESSARY AND WILL BE PROVIDED TO DPP INSPECTORS.
  - SLOPE PROTECTION - ALL WORK WILL BE ON SLOPES LESS THAN 15%.
  - SEDIMENT BARRIERS - THE PROPOSED BMPS (PERIMETER CONTROLS) ARE SUFFICIENT TO ADDRESS ANY POTENTIAL SEDIMENT RUNOFF.
  - STORM DRAIN INLET PROTECTION - NOT APPLICABLE; NO STORM DRAIN INLETS WITHIN VICINITY OF PROJECT.
  - STABILIZED CONSTRUCTION ENTRANCE AND EXIT - VEHICULAR TRAFFIC WILL BE LIMITED TO PAVED SURFACES, THE PROPOSED BMPS (TRACKING CONTROLS AND GOOD HOUSEKEEPING BMPS) ARE SUFFICIENT TO ADDRESS ANY POTENTIAL TRACK OUT.
  - SEDIMENT TRAPS AND BASINS - NOT APPLICABLE AS THE DISTURBED AREA IS LESS THAN 1 ACRE.
  - CONTAMINATED SOIL MANAGEMENT - NO CONTAMINATED SOIL ANTICIPATED ON SITE.
- THE CONTRACTOR SHALL COMPLY WITH THE PROJECT SCHEDULING REQUIREMENTS OF THE CITY'S RULES RELATING TO WATER QUALITY.
- THE OWNER OF THE PROPERTY, OR THEIR AUTHORIZED AGENT, MUST DESIGNATE A PERSON RESPONSIBLE FOR IMPLEMENTING THE ESCP AT THE PROJECT SITE ("ESCP COORDINATOR") PRIOR TO PERMIT ISSUANCE USING THE FORM PROVIDED AS APPENDIX A TO THE RULES RELATING TO WATER QUALITY.
- NOT USED.

## ESCP SCHEDULE AND RAIN RESPONSE PLAN

- PROJECT SEQUENCE:
- INSTALL PERIMETER CONTROLS FOR PROTECTED AREAS AND CLEARING AND GRUBBING AS NECESSARY FOR THE INSTALLATION OF THESE BMPS.
  - CLEAR, GRUB AND GRADE THE SITE, RELOCATE, RECONSTRUCT AND MAINTAIN BMPS AS NEEDED TO KEEP THEM EFFECTIVE AT ALL TIMES.
  - PROCEED WITH CONSTRUCTION WITH LEAST POSSIBLE DISTURBANCE OF VEGETATIVE AREAS AND TEMPORARY STRUCTURES.
  - PLANT PERMANENT GROUND COVER AS SOON AS POSSIBLE AFTER COMPLETING ACTIVE GRADING.
  - REMOVE OR DISMANTLE TEMPORARY EROSION CONTROL STRUCTURES AFTER AT LEAST 90% ESTABLISHMENT OF PERMANENT VEGETATION COVER.
  - PRACTICE GOOD HOUSEKEEPING MEASURE THROUGHOUT THE DURATION OF CONSTRUCTION.
  - INSPECTIONS WILL BE PERFORMED MONTHLY. COMPLETED INSPECTION CHECKLISTS AND PROJECT LOG SHALL BE MAINTAINED AT THE PROJECT SITE AT ALL TIMES OR BE AVAILABLE ELECTRONICALLY, AND AVAILABLE FOR REVIEW BY THE CITY OFFICIAL.
  - BMP MAINTENANCE SHALL BE ONGOING ON AN AS NEEDED BASIS. MONTHLY INSPECTIONS SHALL IDENTIFY ANY DEFICIENCIES AND SHALL DOCUMENT CORRECTIVE ACTIONS.
  - UPDATES TO THE PROJECT SCHEDULE SHALL BE SUBMITTED TO DPP AND APPROVED BY THE DIRECTOR. BEFORE WORK MAY BE PERFORMED PURSUANT TO THE REVISED SCHEDULE, A COPY OF THE ORIGINAL PROJECT SCHEDULE AND ALL REVISED SCHEDULES MUST BE KEPT IN THE PROJECT LOG.

### RAIN RESPONSE PLAN:

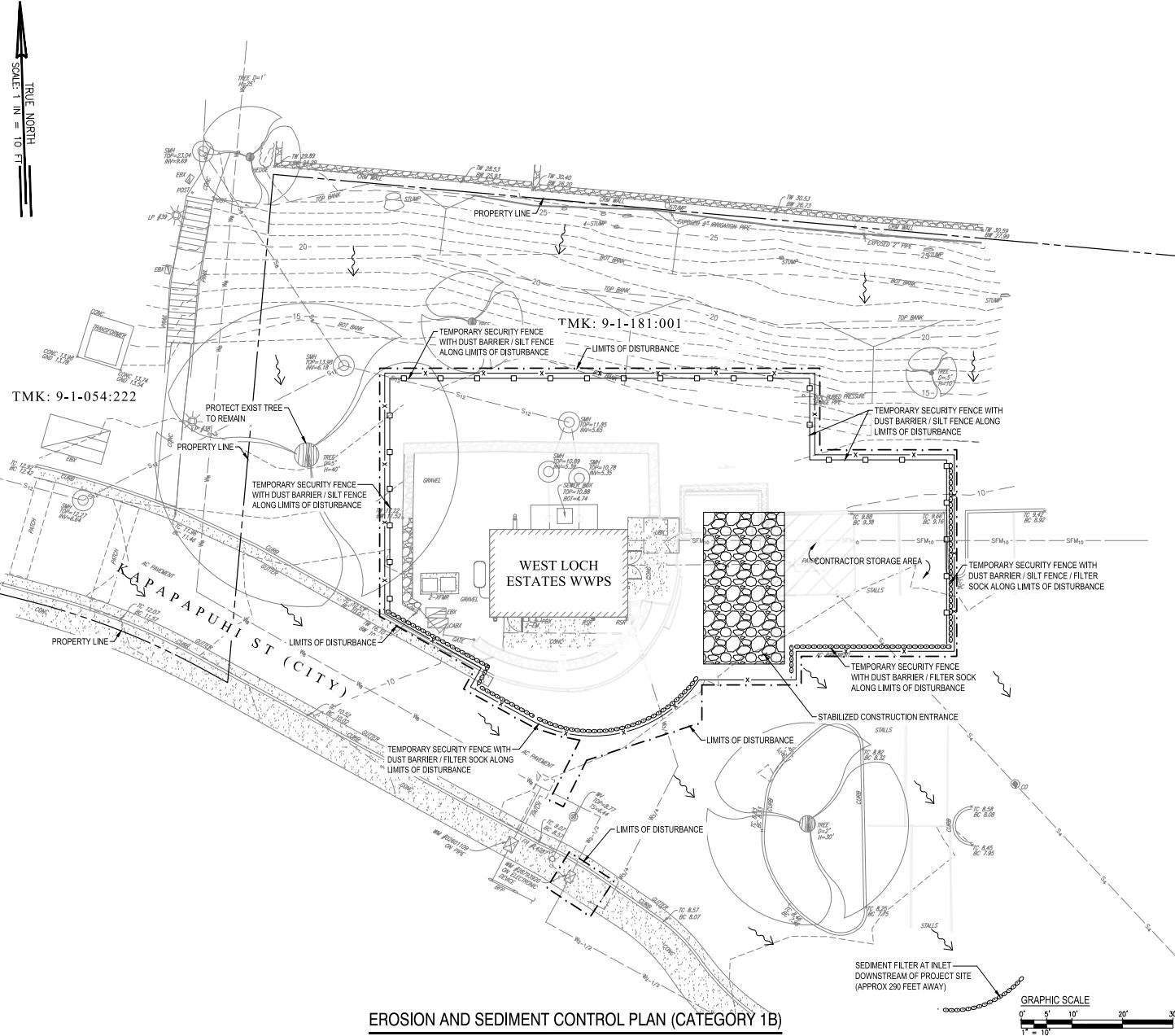
- THE FOLLOWING WILL BE PERFORMED WHEN HEAVY RAINS, TROPICAL STORM OR HURRICANE IS IMMINENT OR IS FORECASTED IN THE NEXT 48 HOURS.
- TEMPORARY SUSPENSION OF ACTIVE GRADING, GRADING, GRUBBING AND TRENCHING.
- INSPECT ALL PERIMETER CONTROLS AND MAINTAIN AS NEEDED. REINSTALL ANY PERIMETER CONTROLS THAT WERE REMOVED DUE TO ACTIVE WORK IN THE AREA.
- COVER OR RELOCATE MATERIAL STOCKPILES AND LIQUID MATERIAL CONTAINERS TO AVOID CONTACT WITH RAINWATER.
- PLACE SPILL PANS OR OIL-ONLY SPILL PADS UNDER CONSTRUCTION VEHICLES TO PREVENT RUNOFF FROM CONTACTING ANY SPILLED PETROLEUM PRODUCTS. PROPERLY DISPOSE OF ANY ACCUMULATED OILY WATER AFTER THE RAIN EVENT.
- RE-INSPECT AFTER THE APPROACHING HEAVY RAINS, TROPICAL STORM OR HURRICANE AND REPLACE OR REPAIR BMPS AS NEEDED.

## ESCP INSPECTION NOTES

- AT LEAST TWO WEEKS BEFORE THE BEGINNING CONSTRUCTION, THE CONTRACTOR OR THE PERSON IN CHARGE OF CONSTRUCTION SHALL NOTIFY THE STORM WATER INSPECTOR LISTED ON THE BUILDING PERMIT.
- AFTER INSTALLATION THE CONSTRUCTION BMPS AND MOBILIZING ANY CONSTRUCTION APPARATUS IN ACCORDANCE WITH THE APPROVED ESCP (OR APPENDIX B - ESCP FOR SMALL PROJECT TEMPLATE), THE CONTRACTOR OR THE PERSON IN CHARGE OF CONSTRUCTION SHALL CONTACT THE ESCP COORDINATOR LISTED ON THE BUILDING PERMIT FOR A PRECONSTRUCTION INSPECTION.
- THE ESCP COORDINATOR SHALL SUBMIT THE PRECONSTRUCTION INSPECTION CHECKLIST TO THE STORM WATER INSPECTOR (EMAIL TO DPP-NPDES@HONOLULU.GOV) CONFIRMING THE BMPS AND GOOD HOUSEKEEPING MEASURES ARE IN COMPLIANCE.

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: EROSION AND SEDIMENT CONTROL NOTES			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.	LK EN	CHECKED BY: SECTION HEAD BRANCH HEAD	
SIGNATURE	DATE		
JOB NO. W#-#			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVER	FILE NUMBER
FILE NUMBER	DRIVER	FILE NUMBER	FILE NUMBER



## LIST OF BEST MANAGEMENT PRACTICES

PRE-CONSTRUCTION BMI

- PERIMETER CONTROLS - FILTER SOCK / SILT FENCE / DUST BARRIER
  - PRESERVATION OF EXISTING VEGETATION

DURING CONSTRUCTION BM

- DUST CONTROL (WATER WASH DOWN; DUST BARRIERS)
  - BMPS FOR STOCKPILES, STAGING AND MATERIAL STORAGE AREAS
  - CONCRETE WASHOUT
  - TEMPORARY STABILIZATION

POST-CONSTRUCTION BMPS

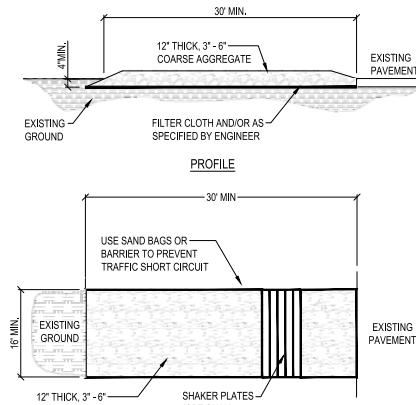
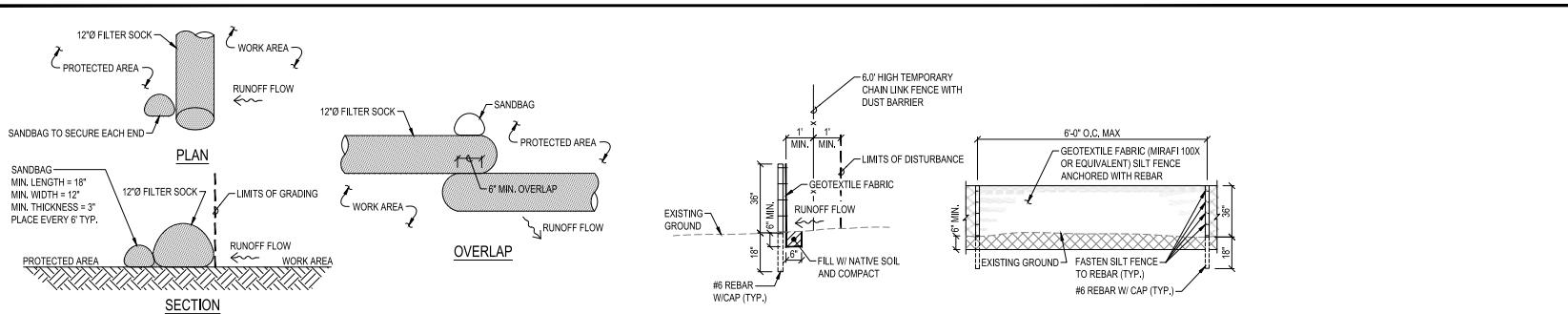
- PERMANENT STABILIZATION

POST-CONSTRUCTION BMPs

LEGEND

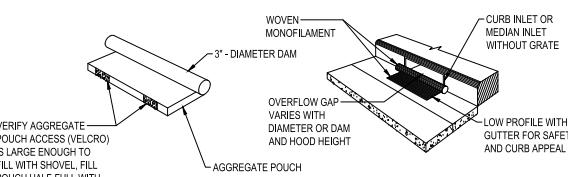
60% SUBMITTAL

<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	
REVISION	DATE	BRIEF
		BY APPROVE
<b>DIVISION OF WASTEWATER ENGINEERING &amp; CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY &amp; COUNTY OF HONOLULU</b>		
PROJECT: <b>WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE</b>		
ITEM: <b>EWA, OAHU, HAWAII</b>		
<b>EROSION AND SEDIMENT CONTROL PLAN</b>		
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION: _____		
DESIGNED BY: _____ LK _____ DRAWN BY: _____ EN _____ APPROVED: _____  CHECKED BY: _____ JIN _____ SECTION HEAD: _____ BRANCH HEAD: _____		
CROSS REFERENCE SHEET		
JOB NO. W#-##		
FUSE CABINET	DRAWER	FUSE POCKET
FURNITURE	STAPLER	POLY BAG
FILE CABINET	DRAWER	FILE POCKET
FURNITURE	STAPLER	POLY BAG



**4 SEDIMENT FILTER FOR INLETS**

EC-003 SCALE: NTS



**NOTES:**

1. STONE - 3'-6" COARSE AGGREGATE.
2. LENGTH - AS EFFECTIVE, BUT NOT LESS THAN 30 FEET.
3. WIDTH - AS EFFECTIVE, BUT NOT LESS THAN 16 FEET.
4. THICKNESS - NOT LESS THAN TWELVE (12) INCHES.
5. WASHING - WHEN NECESSARY, WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO ADJACENT PAVED AREAS. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH, OR WATERCOURSE THROUGH USE OF SAND BAGS, GRAVEL BOARDS OR OTHER APPROVED METHODS.
6. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO ADJACENT PAVED AREAS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH CRUSHED STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT OR CONSTRUCTION MATERIALS SPILLED, DROPPED, WASHED OR TRACKED ONTO ADJACENT PAVED ROAD SURFACES MUST BE REMOVED IMMEDIATELY.

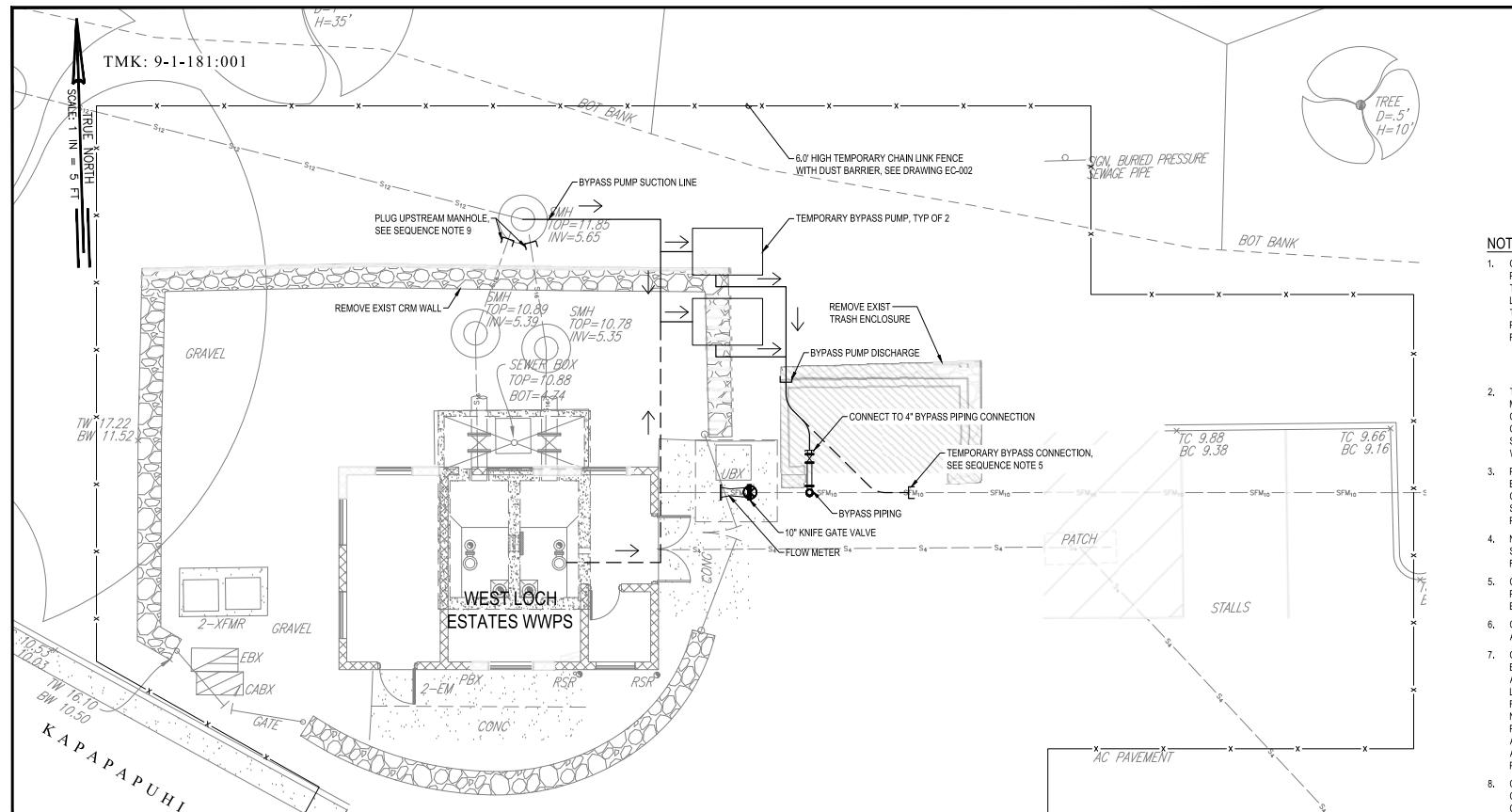
**3 STABILIZED CONSTRUCTION ENTRANCE DETAIL**

EC-003 SCALE: NTS

GRAPHIC SCALE  
0' 5' 10' 20' 30'  
1' = 10'

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	EROSION AND SEDIMENT CONTROL DETAILS		
DESIGNED BY	LK	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED		BRANCH HEAD	
SIGNATURE			
JOB NO. W#-#			
EXPIRATION DATE OF THE USEPER			
FILE NUMBER	DRAFTER	FILE NUMBER	FILE NUMBER



### TEMPORARY BYPASS PLAN

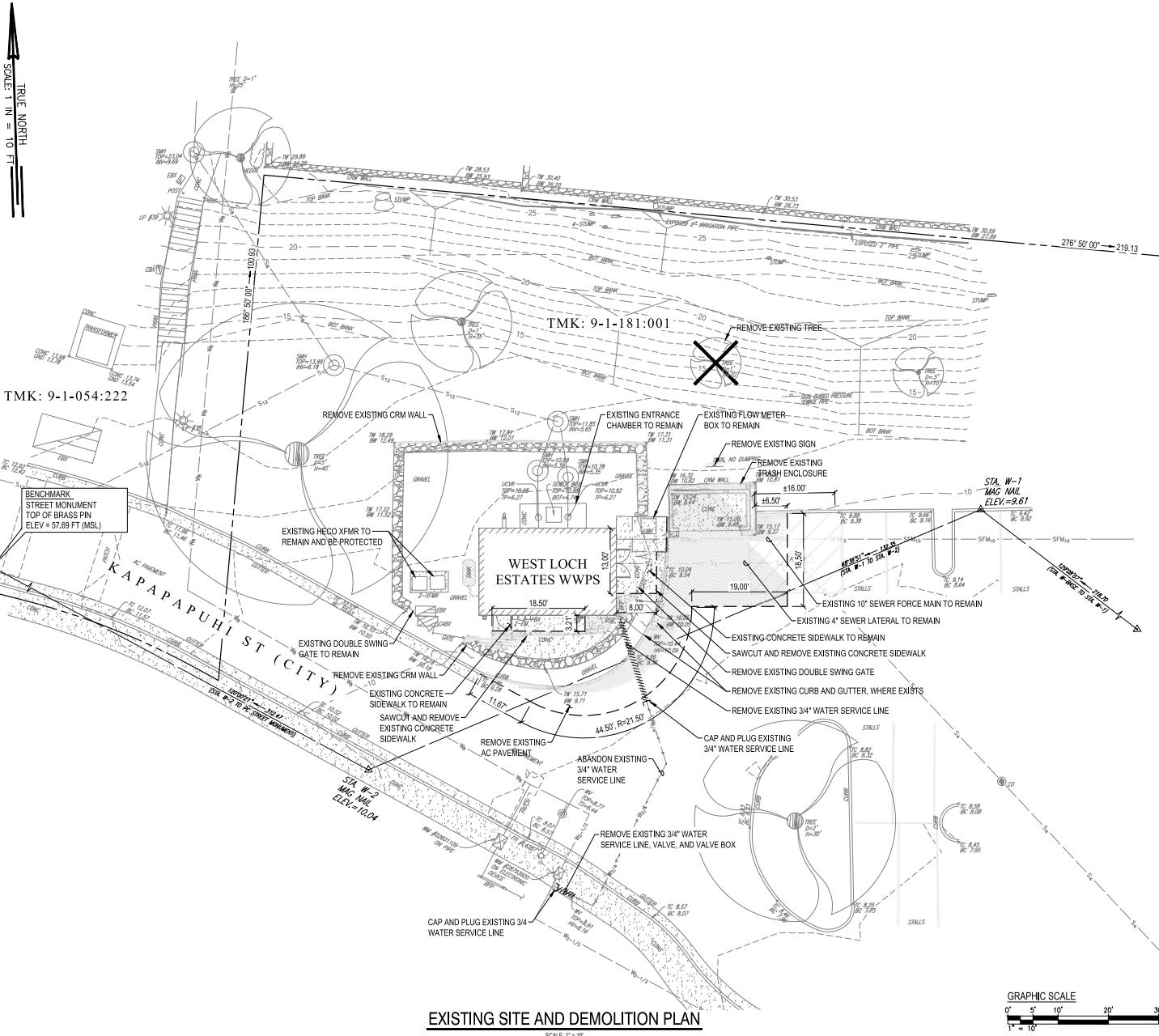
SCALE: NTS

#### SUGGESTED CONSTRUCTION SEQUENCING:

- REMOVE EXISTING CRM WALL.
- REMOVE EXISTING TRASH ENCLOSURE (CMU WALL AND CRM WALL).
- SETUP TEMPORARY SEWER BYPASS PUMPS AND PIPING.
- DRAIN CONTENTS OF 10" FORCE MAIN TO WET WELL. PUMP OUT CONTENTS WITH A PUMPER TRUCK.
- INITIALLY CUT AND REMOVE SECTION OF SEWER FORCE MAIN DOWNSTREAM OF NEW BYPASS PIPING AND CONNECT TEMPORARY FORCE MAIN DIRECTLY TO EXISTING 10" SEWER FORCE MAIN USING TEMPORARY BYPASS CONNECTION.
- REMOVE EXISTING SEWER FORCE MAIN AND FLOW METER PIPING AND VALVES AND INSTALL NEW 10" KNIFE GATE VALVE AND 4" BYPASS PIPING CONNECTION.
- TEMPORARILY SHUTDOWN SYSTEM TO TRANSFER TEMPORARY BYPASS CONNECTION TO NEW 4" BYPASS CONNECTION.
- CLOSE 10" KNIFE GATE VALVE IN FLOW METER VAULT TO ALLOW USE OF NEW BYPASS PIPING.
- BEFORE PERFORMING ANY WORK IN THE EXISTING WETWELLS OR ON INFLUENT VALVES, PLUG UPSTREAM MANHOLE TO PREVENT WASTEWATER FROM FLOWING TO THE TWO INFILTRANT MANHOLES THAT DISCHARGE TO THE PUMP STATION.
- MOVE PUMP INFLUENT CONNECTION TO UPSTREAM MANHOLES, PROCEED WITH REMAINING WORK FOR PUMP STATION UPGRADES.

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE ITEM: TEMPORARY BYPASS PLAN			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED		BRANCH HEAD	
SIGNATURE			
Clerk _____ Date _____			
JOB NO. W#-## EXP. DATE OF THE USE SHEET			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

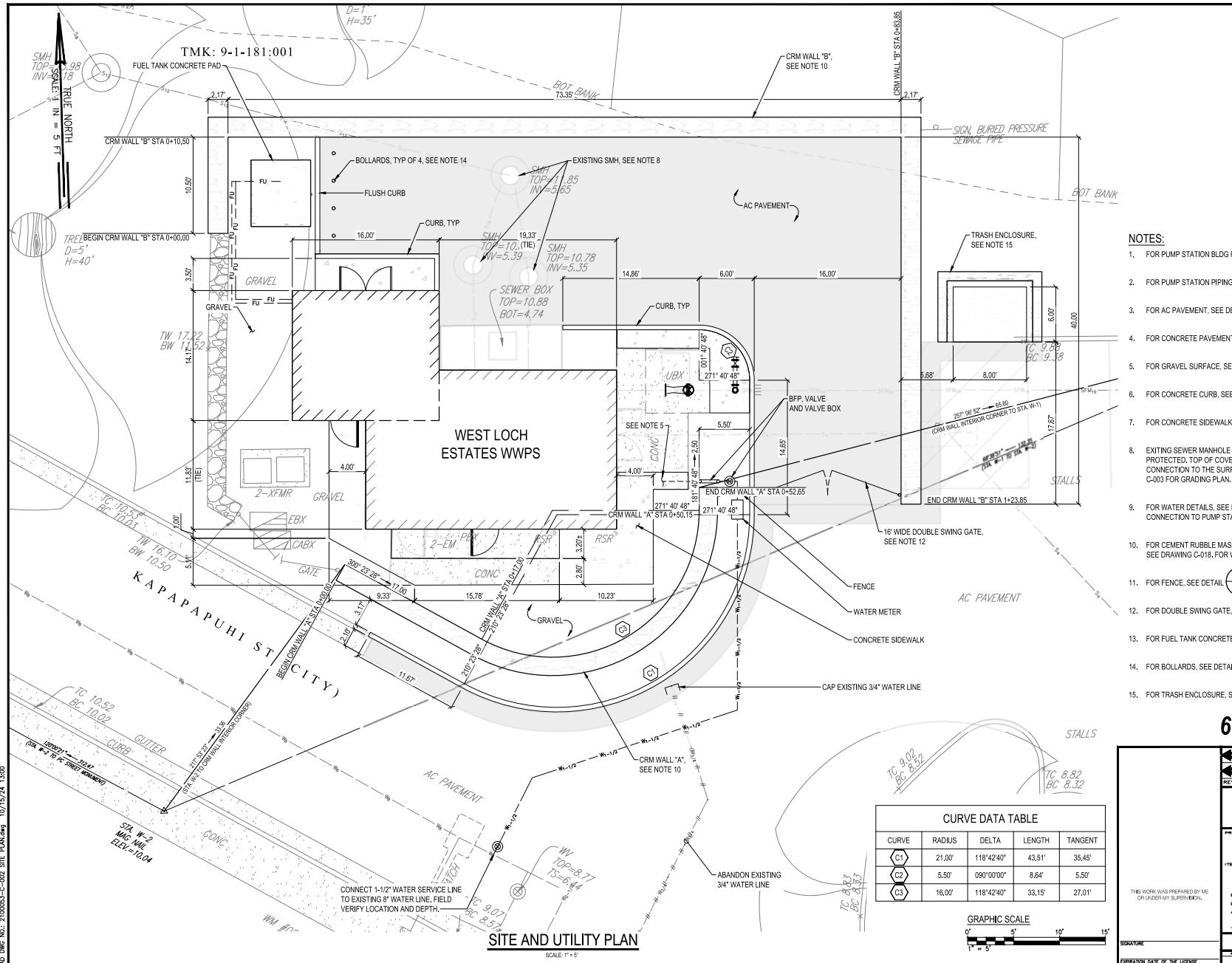


#### NOTES:

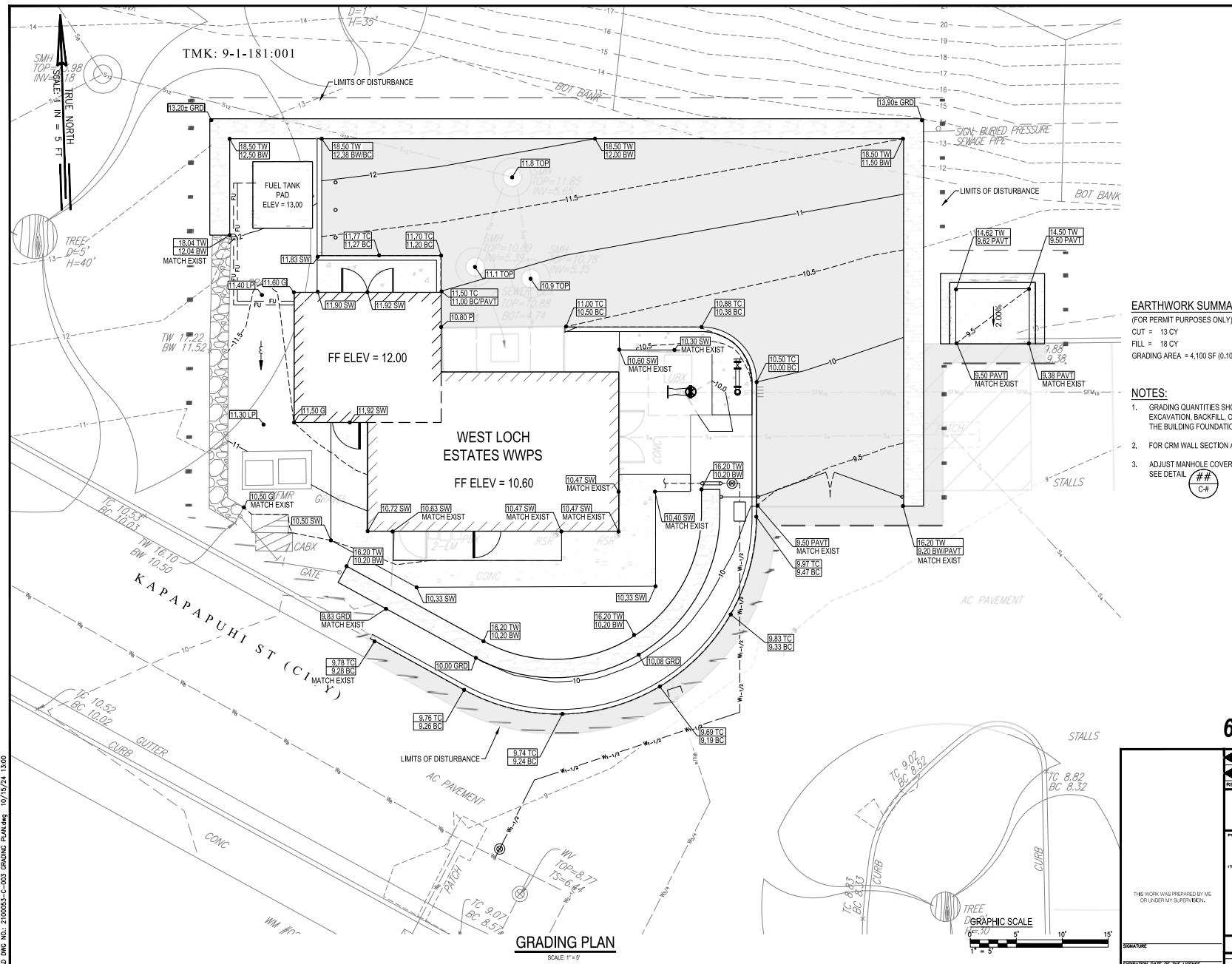
- UNDERGROUND UTILITY LOCATIONS SHOWN ARE BASED ON AVAILABLE AS-BUILT INFORMATION ALONG WITH VISIBLE EVIDENCE GATHERED DURING THE FIELD SURVEY. THEREFORE, THE ACCURACY OR COMPLETENESS OF THE EXISTING UNDERGROUND UTILITIES DEPICTED ON PLANS CANNOT BE GUARANTEED. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATIONS AND THE DEPTH OF THE UTILITIES AND EXERCISE PROPER CARE WHEN EXCAVATING WITHIN THE PROJECT AREA. THE CONTRACTOR SHALL ASSUME THAT UNDERGROUND UTILITIES MAY OR MAY NOT BE PRESENT AT THE LOCATIONS SHOWN.
- ALL EXISTING STRUCTURES AND UTILITIES DESIGNATED TO REMAIN SHALL BE PROTECTED, UNLESS OTHERWISE NOTED.
- THE CONTRACTOR SHALL SUBMIT A WASTEWATER SPILL MITIGATION PLAN FOR REVIEW AND APPROVAL BY THE OFFICER-IN-CHARGE. THE PLAN SHALL INCLUDE SEWAGE DIVERSION AND BYPASS PUMPING PLANS WHICH HAVE BEEN APPROVED BY THE OFFICER-IN-CHARGE BEFORE ANY DIVERSION OF SEWAGE FLOWS.
- SEQUENCE OF PUMP REMOVAL MUST BE COORDINATED WITH CSM.
- CSM MUST BE NOTIFIED BEFORE REMOVING ANY EQUIPMENT OR APPURTENANCES.
- ALL CONCRETE DEMOLITION MUST BE COMPLETED NEATLY AND CLEANLY.
- NUTS AND BOLTS EMBEDDED IN CONCRETE SURFACES MUST BE RECEDED, PATCHED, AND PAINTED.
- FOR PUMP STATION BUILDING DEMOLITION, SEE SHEET C-004.

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	EXISTING SITE AND DEMOLITION PLAN		
DESIGNED BY	LK	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED			
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER



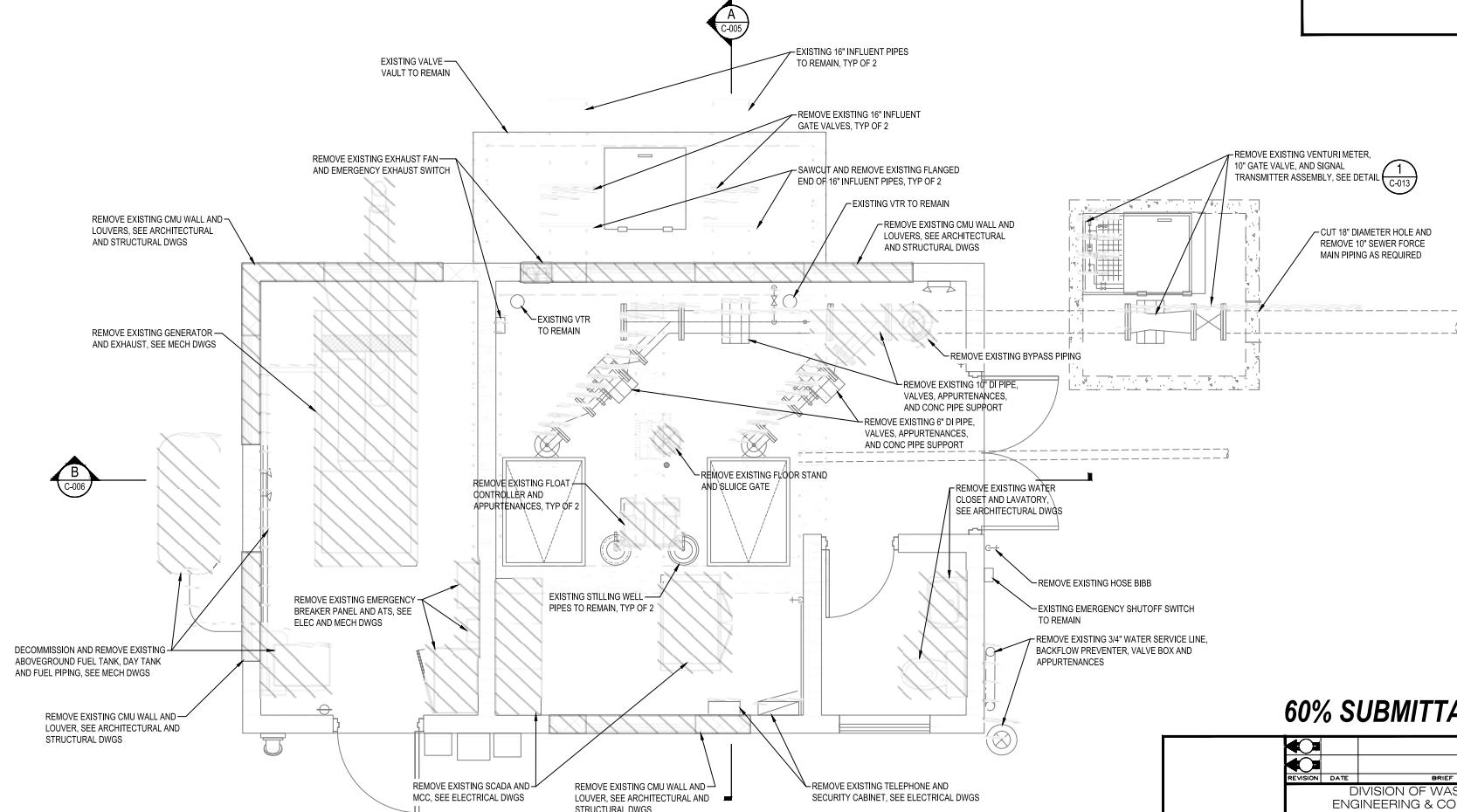
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE ITEM: EWA, OAHU, HAWAII			
SITE AND UTILITY PLAN			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY	LK DRAWN BY	EN SECTION HEAD	checked by JIN BRANCH HEAD
APPROVED			
SIGNATURE			
JOB NO. W#-#			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET



**60% SUBMITTAL**

			BRIEF	BY APPROVE
REVISION	DATE			
<b>DIVISION OF WASTEWATER ENGINEERING &amp; CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY &amp; COUNTY OF HONOLULU</b>				
<b>PROJECT:</b> WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE ITEM: EWA, OAHU, HAWAII				
<b>GRADING PLAN</b>				
DESIGNED BY		LK	CHECKED BY	JN
DRAWN BY		EN	SECTION HEAD	
APPROVED:			BRANCH HEAD	
SHEET # / DATE				
JOB NO. W-#/#				
FILE CHANNEL	DRAWER	FILE	POCKET	FOLDER
FURNITURE LIST OF THE LOT				

TRUE NORTH  
SCALE: 1/2" = 1'-0"



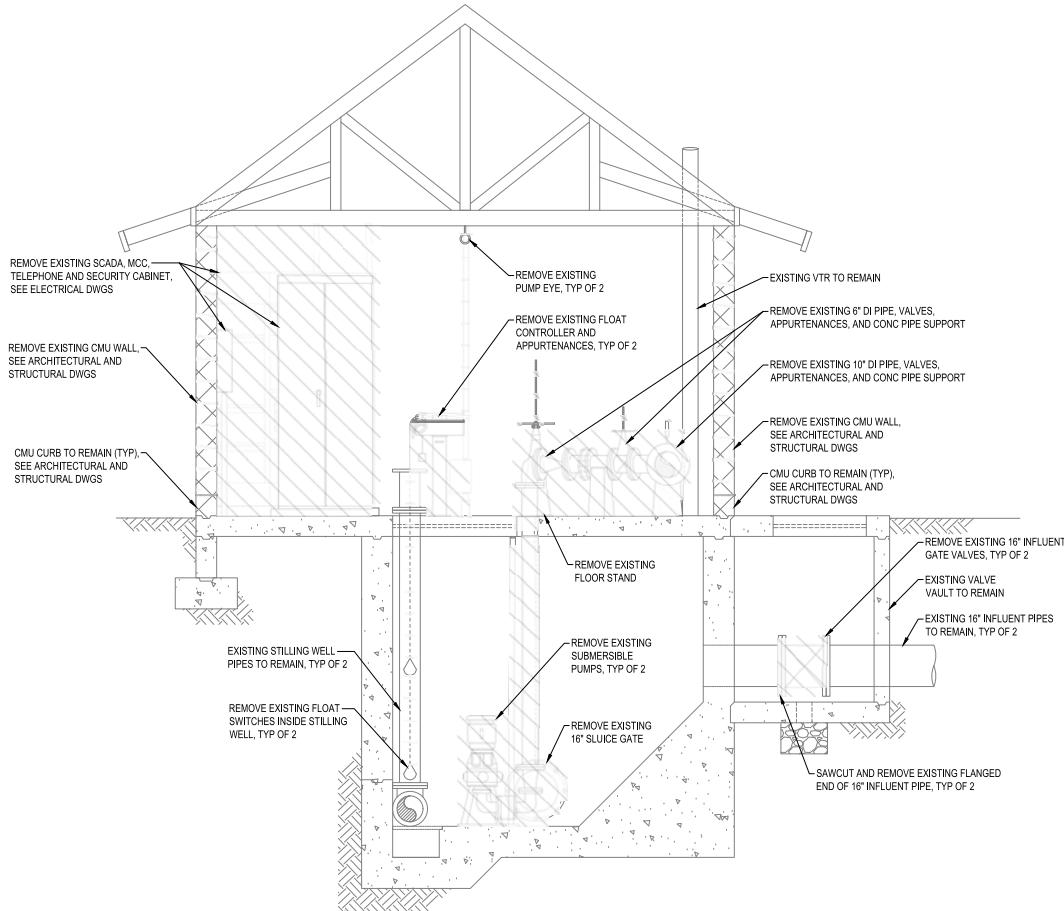
### DEMOLITION PLAN - PUMP STATION

SCALE: 1/2" = 1'-0"

GRAPHIC SCALE  
0' 2' 4' 6'  
1/2" = 1'-0"

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	DEMOLITION PLAN - PUMP STATION		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED		BRANCH HEAD	
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRIVEN	FILE NUMBER	POLICY NO.



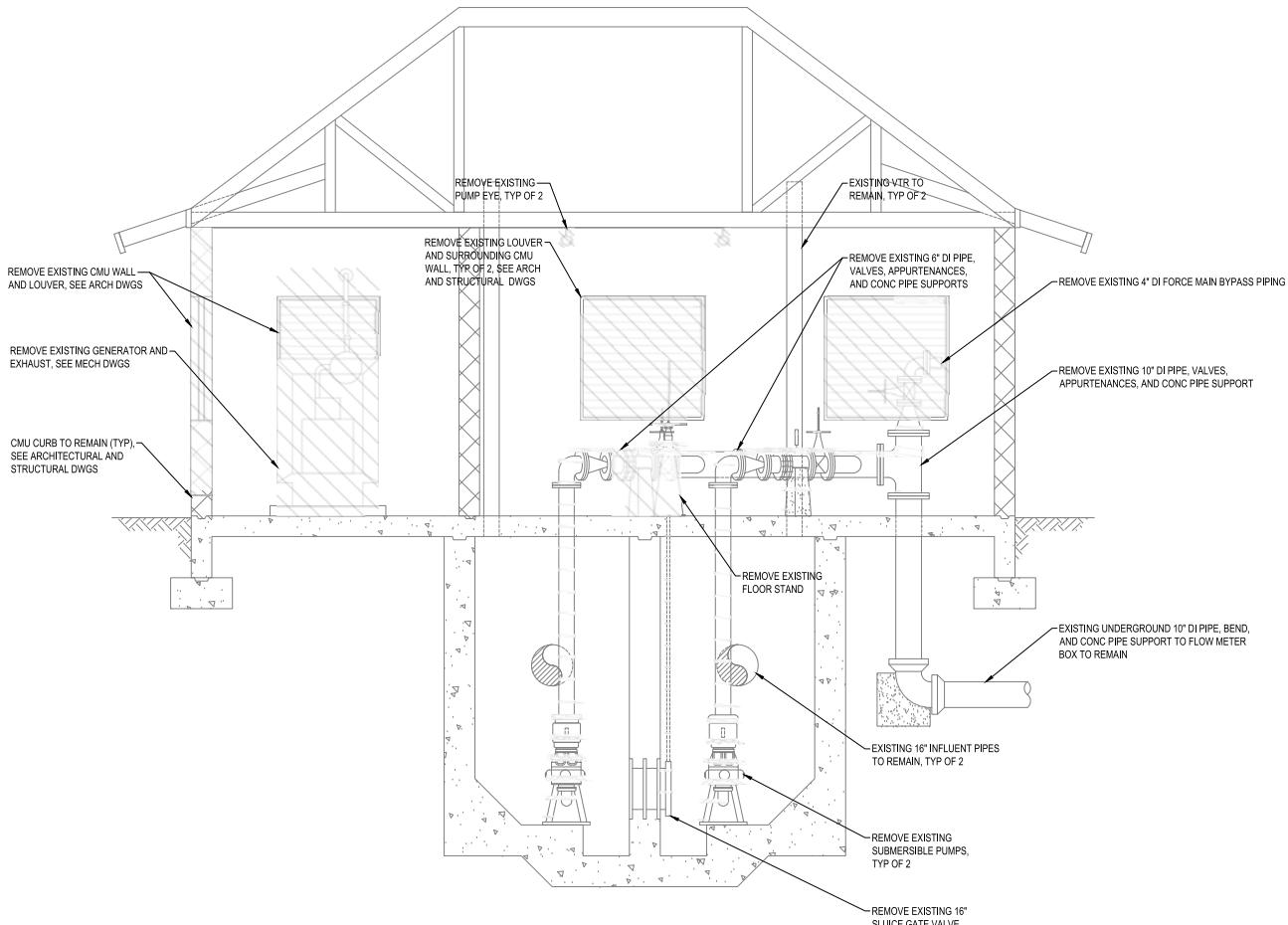
## DEMOLITION PLAN - SECTION A

SCALE: 1/2" = 1'-0"

GRAPHIC SCALE  
0' 2' 4' 6'  
1/2" = 1'-0"

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	DEMOLITION PLAN - SECTION A		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET



**DEMOLITION PLAN - SECTION B**

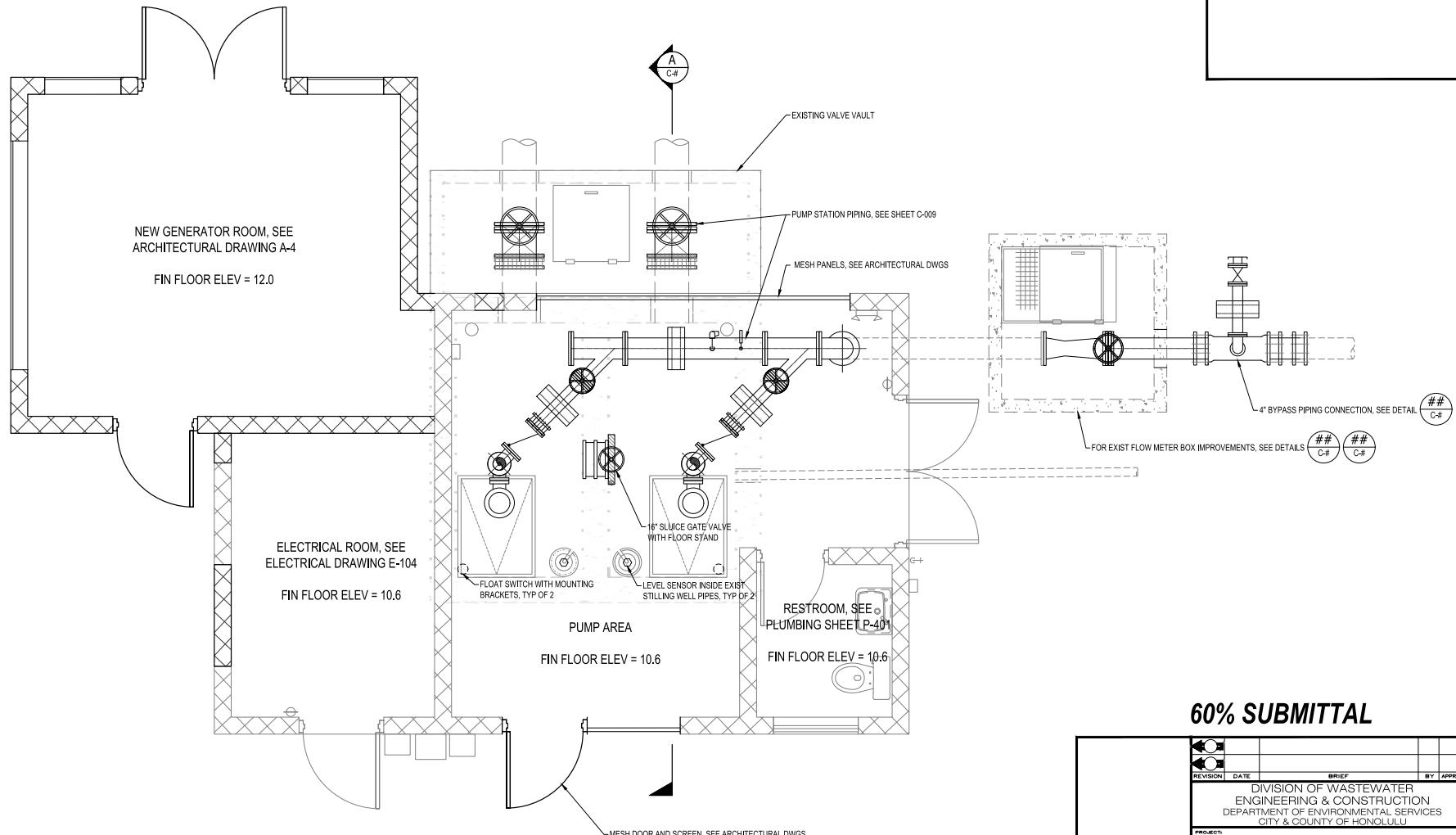
SCALE: 1/2" = 1'-0"



**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	DEMOLITION PLAN - SECTION B		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

TRUE NORTH  
SCALE 1/2" = 1'-0"



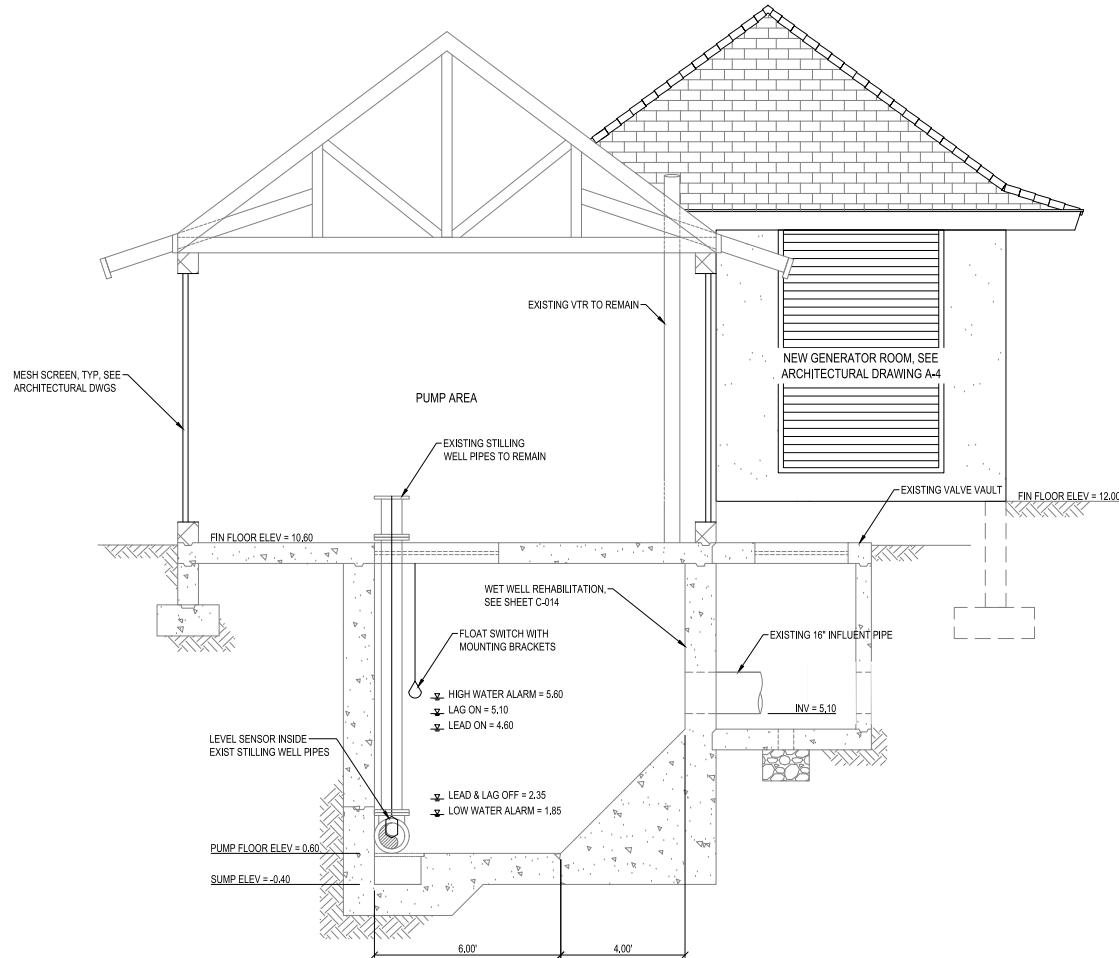
### PUMP STATION PLAN

SCALE: 1/2" = 1'-0"

GRAPHIC SCALE  
0' 2' 4' 6'  
1/2" = 1'-0"

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	PUMP STATION PLAN		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD	DATE	
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAWN BY	FILE NUMBER	FILE NUMBER



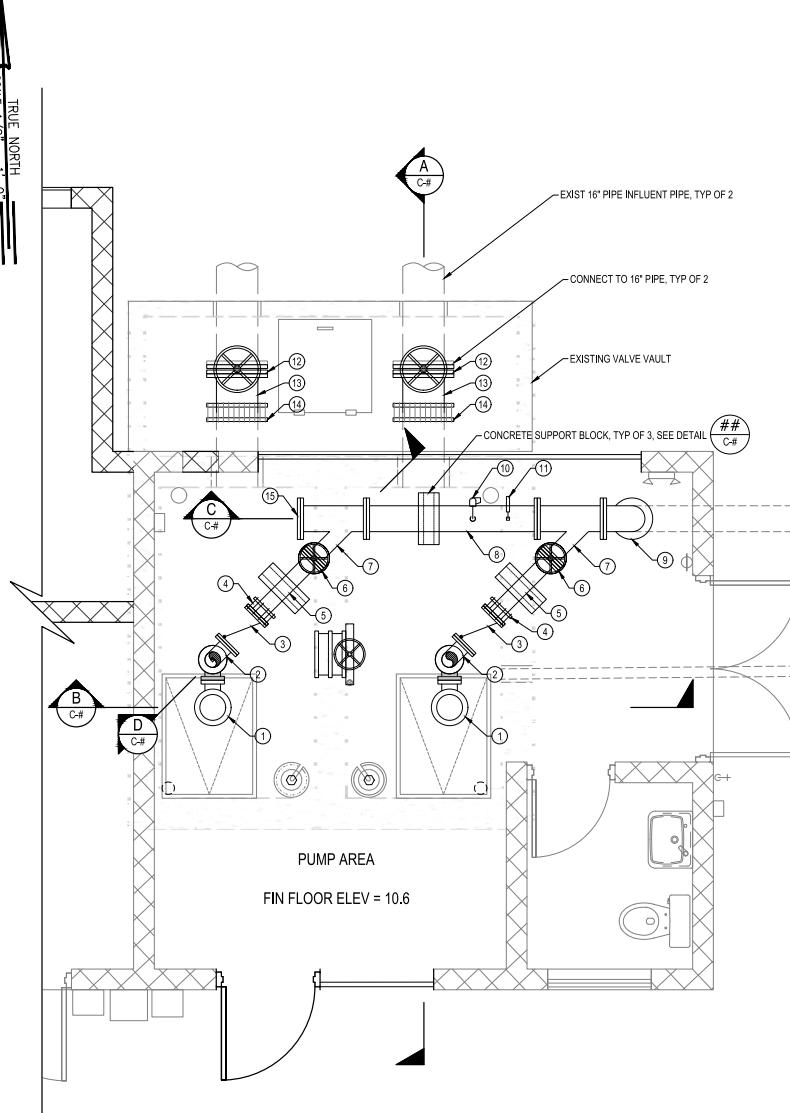
PUMP STATION - SECTION A

SCALE: 1/2" = 1'-0"

GRAPHIC SCALE  
0' 2' 4' 6'  
1/2" = 1'-0"

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	PUMP STATION - SECTION A		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAWER	FILE NUMBER	FILE NUMBER



PIPING PLAN

SCALE: 1/2" = 1'-0"

PIPE SCHEDULE	
No.	DESCRIPTION
①	SUMMERSIBLE PUMP, FLYGT PUMP MODEL NO. NP 3127 LT3 - ADAPTIVE 426 OR APPROVED EQUAL
②	6" DI 1/4 BEND (FE x FE) WITH BOSS TAP FOR PRESSURE GAUGE
③	6" DI CHECK VALVE, FE x FE
④	6" FLANGED COUPLING ADAPTER
⑤	6" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑥	6" DI KNIFE GATE VALVE, FE x FE
⑦	10" x 6" DI WYE, FE x FE
⑧	10" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑨	10" DI 1/4 BEND, FE x FE
⑩	AIR RELIEF VALVE, DRAIN TO WET WELL
⑪	PRESSURE TRANSMITTER
⑫	16" DI KNIFE GATE VALVE, FE x FE
⑬	16" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑭	16" PIPE COUPLING
⑮	10" DI BLIND FLANGE

NOTES

- FOR PRESSURE GAUGE, SEE DETAIL C-015
- FOR AIR RELIEF VALVE, SEE DETAIL C-013

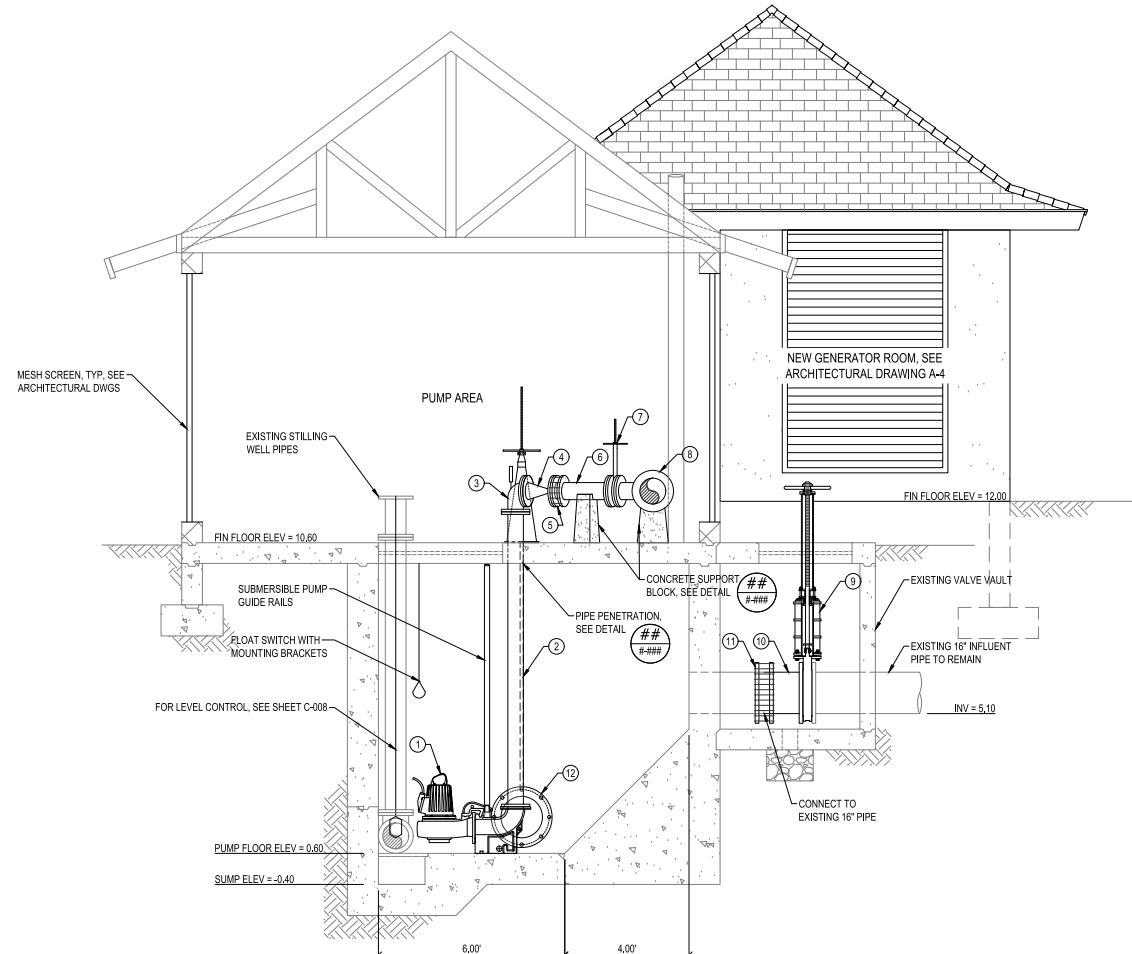
60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	PIPING PLAN		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED		BRANCH HEAD	
SIGNATURE	DATE		
JOB NO. W#-# #			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

GRAPHIC SCALE  
0' 2' 4' 6'  
1/2" = 1'-0"

DRAWING C-009

SHEET # - OF #



PIPING PLAN - SECTION A

SCALE: 1/2" = 1'-0"

PIPE SCHEDULE	
No.	DESCRIPTION
①	SUMBERSIBLE PUMP, FLG/T PUMP MODEL NO. NP 3127 LT3 - ADAPTIVE 426 OR APPROVED EQUAL
②	6" DI PIPE SPOOL, LENGTH TO SUIT
③	6" DI 1/4 BEND (FE x FE) WITH BOSS TAP FOR PRESSURE GAUGE
④	6" DI CHECK VALVE, FE x FE
⑤	6" FLANGED COUPLING ADAPTER
⑥	6" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑦	6" DI KNIFE GATE VALVE, FE x FE
⑧	10" x 6" DI WYE, FE x FE
⑨	10" DI KNIFE GATE VALVE WITH FLOOR STAND, FE x FE
⑩	16" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑪	16" PIPE COUPLING
⑫	16" DI SLICE GATE VALVE WITH FLOOR STAND

NOTES

1. FOR PRESSURE GAUGE, SEE DETAIL ###

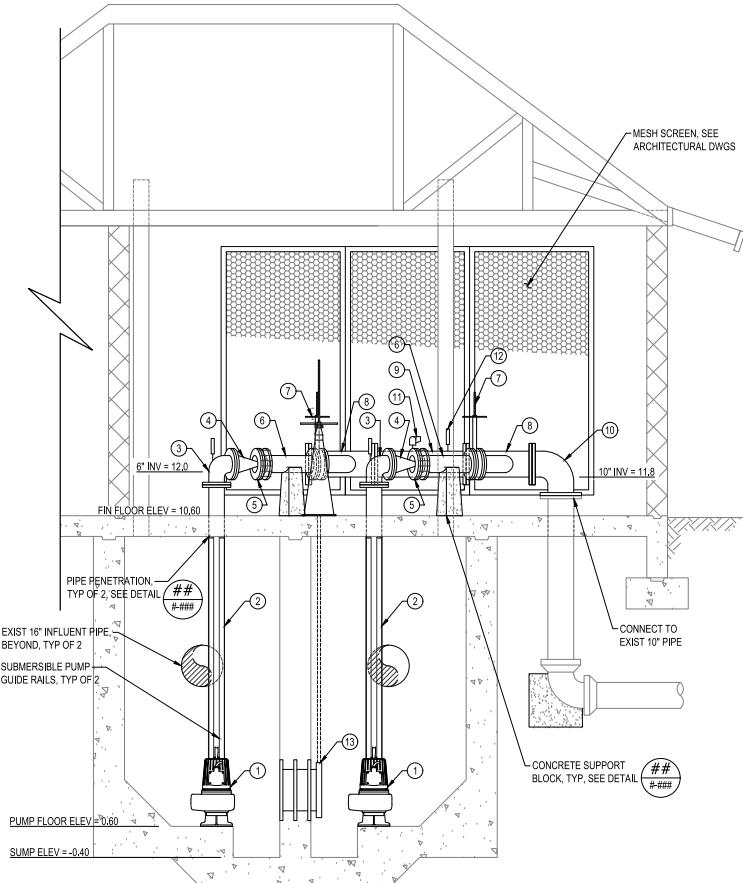
60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	PIPING PLAN - SECTION A		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	FILE NUMBER

GRAPHIC SCALE  
0' 2' 4' 6'  
1/2" = 1'-0"

DRAWING C-010

SHEET # OF #



PIPING PLAN - SECTION B

SCALE: 1/2" = 1'-0"

PIPE SCHEDULE	
No.	DESCRIPTION
①	SUMBERSIBLE PUMP, FLGT PUMP MODEL NO. NP 3127 LT3 - ADAPTIVE 426 OR APPROVED EQUAL
②	6" DI PIPE SPOOL, LENGTH TO SUIT, FE x FE
③	6" DI 1/4 BEND (FE x FE) WITH BOSS TAP FOR PRESSURE GAUGE
④	6" DI CHECK VALVE, FE x FE
⑤	6" FLANGED COUPLING ADAPTER
⑥	6" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑦	6" DI KNIFE GATE VALVE, FE x FE
⑧	10" x 6" DI WYE, FE x FE
⑨	10" DI PIPE SPOOL, LENGTH TO SUIT, FE x FE
⑩	10" DI 1/4 BEND, FE x FE
⑪	AIR RELIEF VALVE, DRAIN TO WET WELL
⑫	PRESSURE TRANSMITTER
⑬	16" DI SLICE GATE VALVE WITH FLOOR STAND

## NOTES

- FOR PRESSURE GAUGE, SEE DETAIL C-#
- FOR AIR RELIEF VALVE, SEE DETAIL C-#

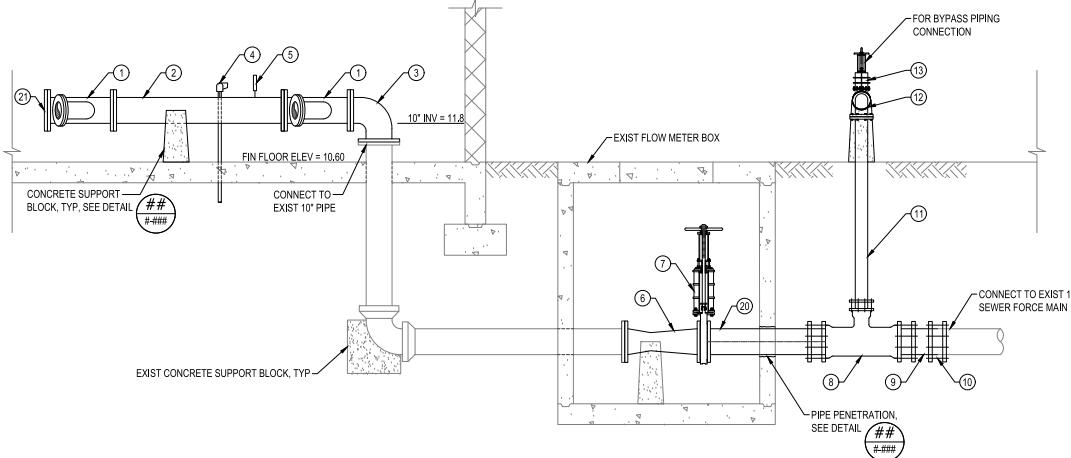
60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	PIPING PLAN - SECTION B		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD	DATE	
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

GRAPHIC SCALE  
0' 2' 4' 6'  
1/2" = 1'-0"

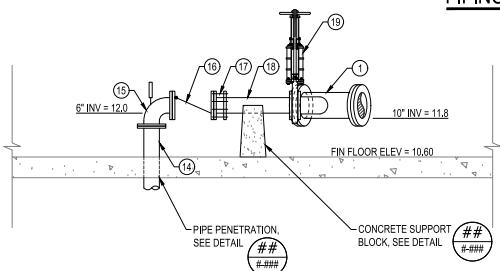
DRAWING C-011

SHEET # - OF # -



PIPING PLAN - SECTION C

SCALE: 1/2" = 1'-0"



PIPING PLAN - SECTION D

SCALE: 1/2" = 1'-0"

PIPE SCHEDULE	
No.	DESCRIPTION
①	10" x 6" DI WYE, FE x FE
②	10" DI PIPE SPOOL, LENGTH TO SUIT, FE x FE
③	10" DI 1/4 BEND, FE x FE
④	AIR RELIEF VALVE, DRAIN TO WET WELL
⑤	PRESSURE TRANSMITTER
⑥	10" VENTURI METER, FE x FE
⑦	10" DI KNIFE GATE VALVE, FE x FE
⑧	10" x 4" TEE (MJ x MJ x MJ) WITH 4" RESTRAINED JOINT
⑨	10" PIPE SPOOL, MIN 1'-0", PE x PE
⑩	10" PIPE COUPLING
⑪	4" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑫	4" DI 1/4 BEND, FE x FE
⑬	4" DI KNIFE GATE VALVE
⑭	6" DI PIPE SPOOL, LENGTH TO SUIT, FE x FE
⑮	6" DI 1/4 BEND (FE x FE) WITH BOSS TAP FOR PRESSURE GAUGE
⑯	6" DI CHECK VALVE, FE x FE
⑰	6" DI FLANGED COUPLING ADAPTER
⑱	6" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
⑲	6" DI KNIFE GATE VALVE, FE x FE
⑳	10" DI PIPE SPOOL, LENGTH TO SUIT, FE x PE
㉑	10" DI BLIND FLANGE

NOTES

1. FOR PRESSURE GAUGE, SEE DETAIL C-#
2. FOR AIR RELIEF VALVE, SEE DETAIL C-#

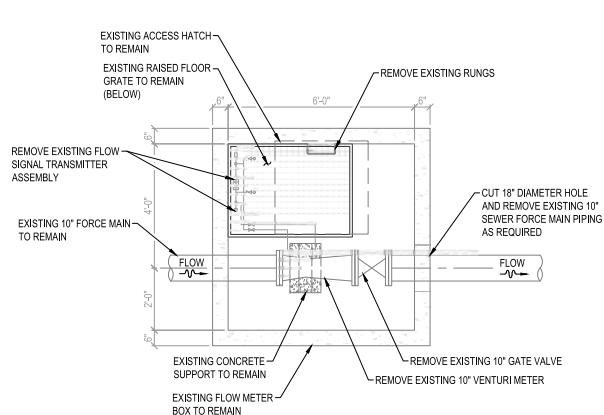
**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: PIPING PLAN - SECTION C AND D			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	ST	CHECKED BY:	JN
DRAWN BY:	EN	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	DATE		
JOB NO. W# - #			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	FILE NUMBER



DRAWING C-012

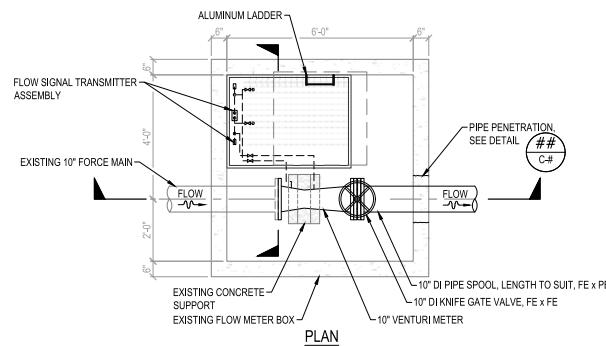
SHEET # OF #



1 EXISTING FLOW METER BOX DEMOLITION DETAIL

C-013

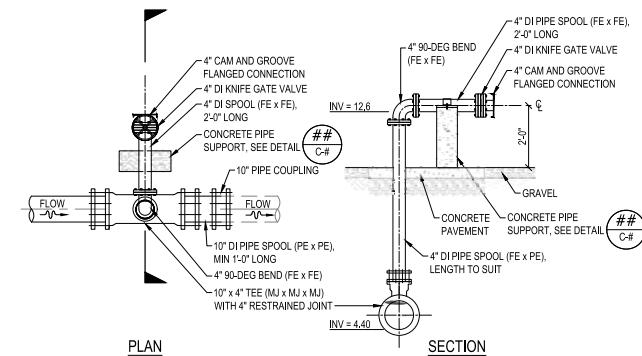
SCALE: 1/2" = 1'-0"



2 EXISTING FLOW METER BOX IMPROVEMENTS DETAIL

C-013

SCALE: 1/2" = 1'-0"



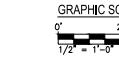
3 BYPASS PIPING CONNECTION DETAIL

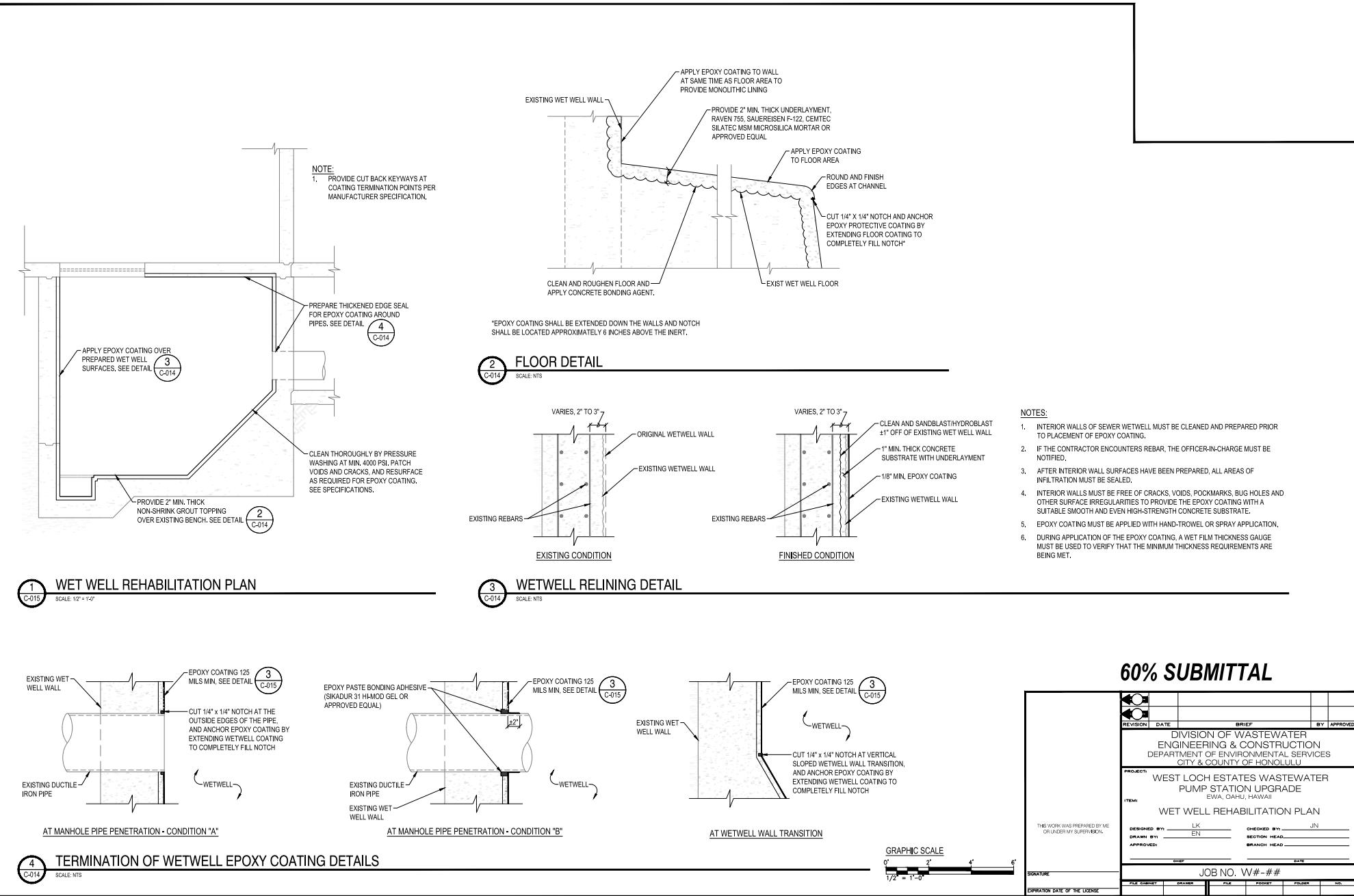
C-013

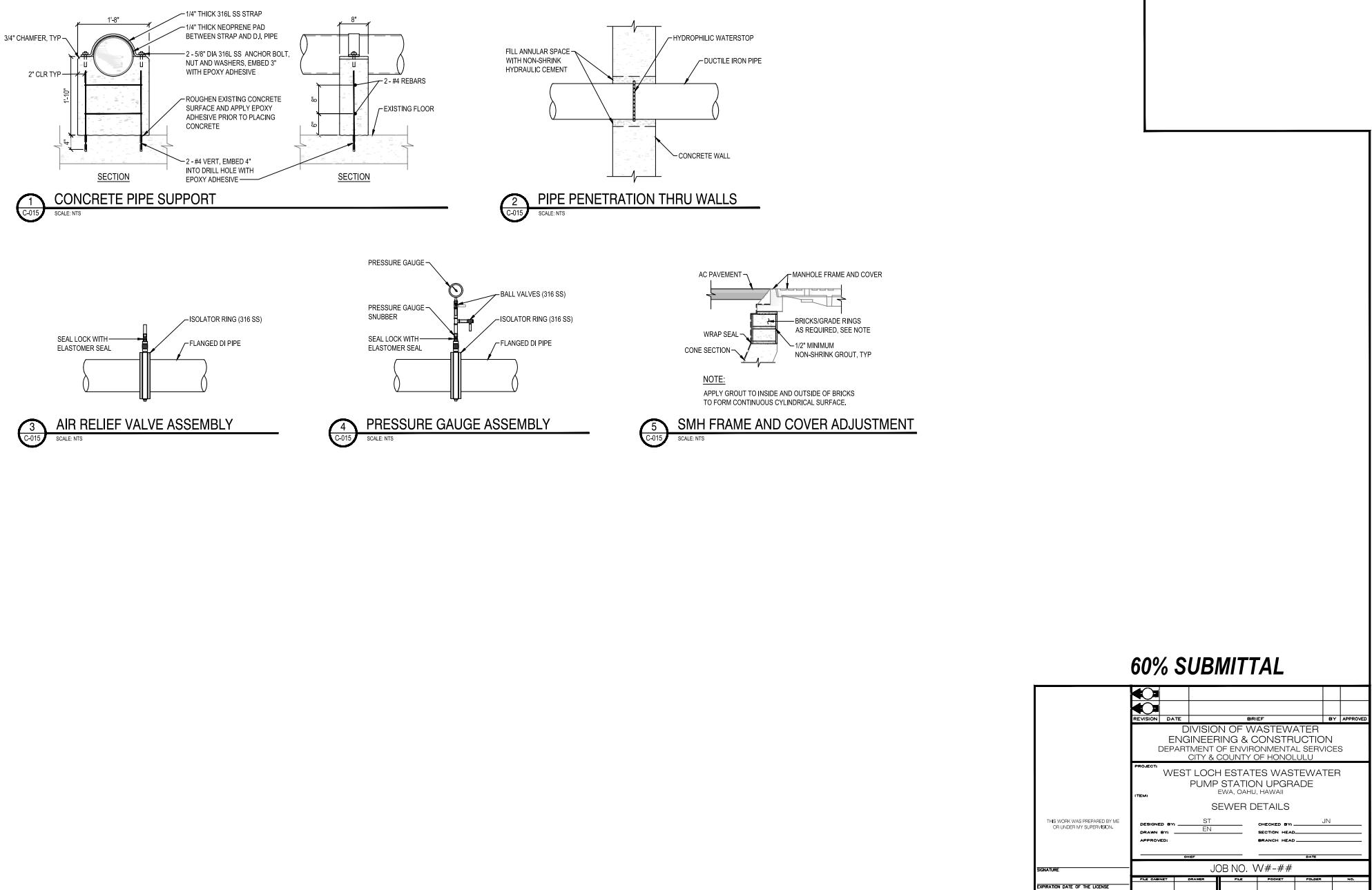
SCALE: 1/2" = 1'-0"

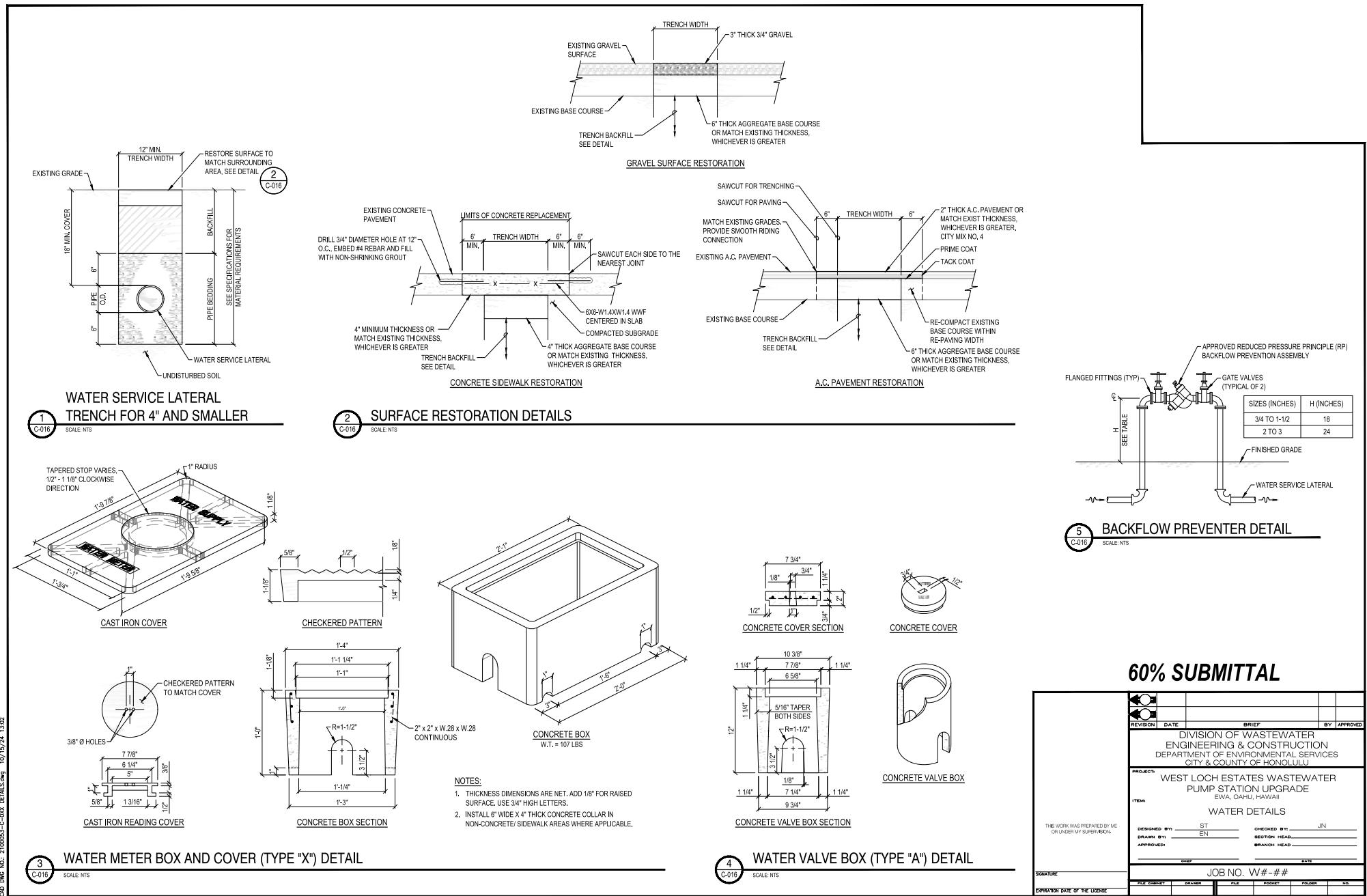
60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	FLOW METER BOX PLAN AND DETAILS		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE	DATE		
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
JOB NO. W# - #			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	FILE NUMBER	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER







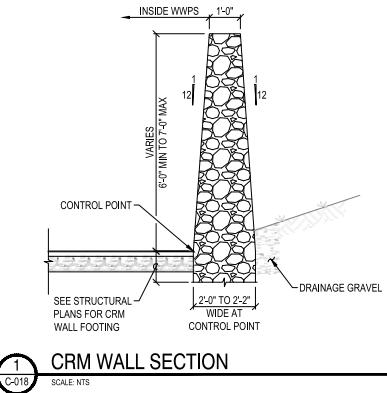
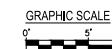


CRM WALL PROFILE "A"

SCALE: 1" = 5'

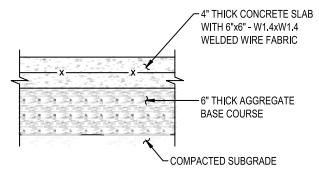
CRM WALL PROFILE "B"

SCALE: 1" = 5'



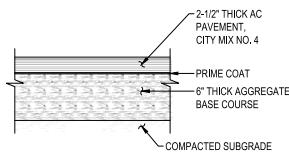
**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	CRM WALL SECTION AND ELEVATIONS		
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY	LK	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



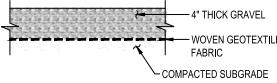
**1 CONCRETE SIDEWALK SECTION**

C-019 SCALE: NTS



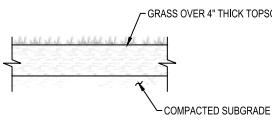
**2 AC PAVEMENT SECTION**

C-019 SCALE: NTS



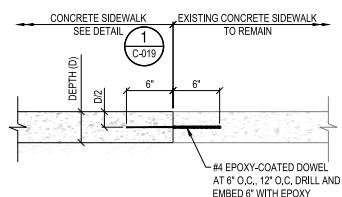
**3 GRAVEL SECTION**

C-019 SCALE: NTS



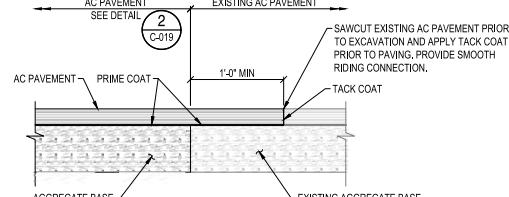
**4 GRASS SECTION**

C-019 SCALE: NTS



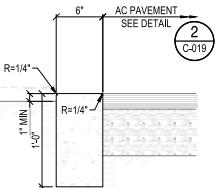
**5 CONCRETE SIDEWALK CONNECTION DETAIL**

C-019 SCALE: NTS



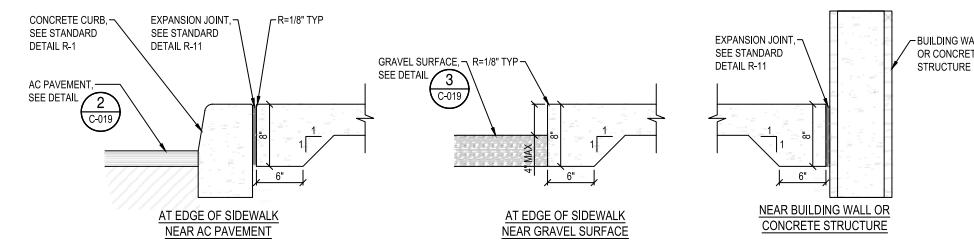
**6 AC PAVEMENT TRANSITION DETAIL**

C-019 SCALE: NTS



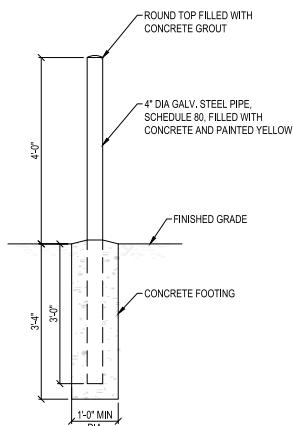
**7 CONCRETE FLUSH CURB**

C-019 SCALE: NTS



**8 CONCRETE SIDEWALK TYPICAL SECTIONS**

C-019 SCALE: NTS



NOTES:

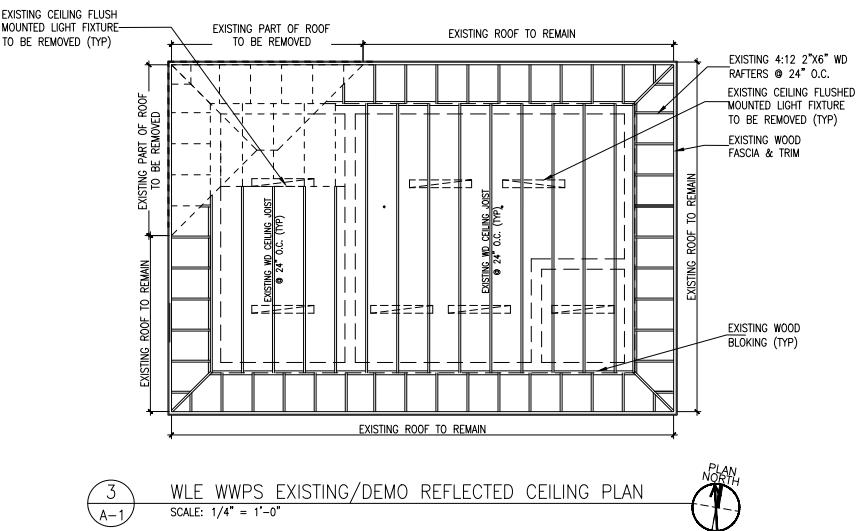
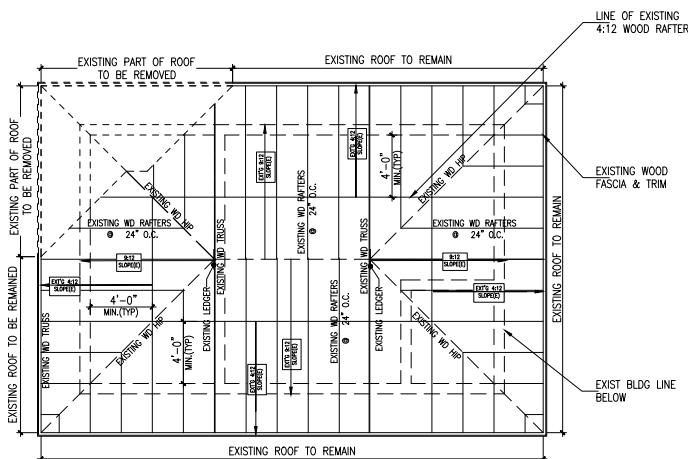
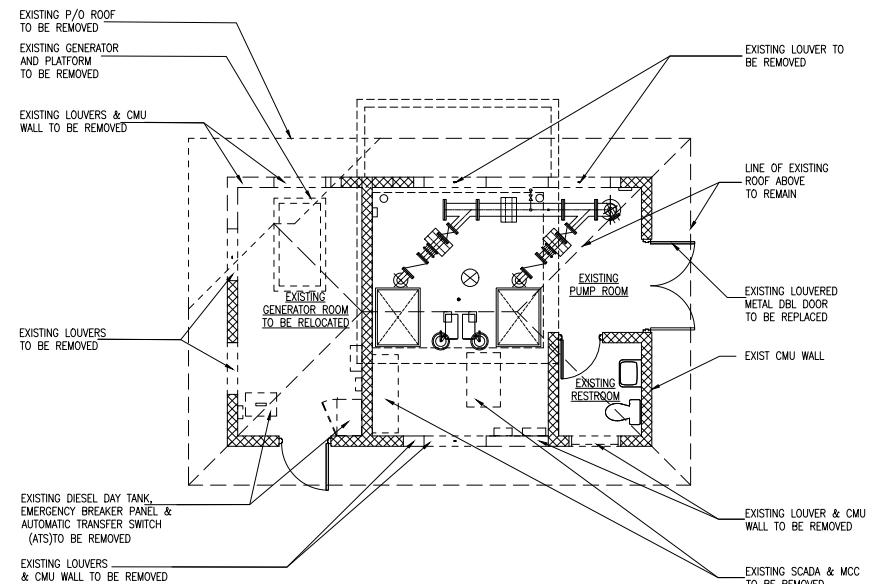
1. CONCRETE FOOTING MUST BE 3000 PSI MIN COMPRESSIVE STRENGTH AT 28 DAYS.
2. CLEAR DISTANCE BETWEEN BOLLARDS MUST BE 4'-0" MAX.

**9 CONCRETE BOLLARD DETAIL**

C-019 SCALE: NTS

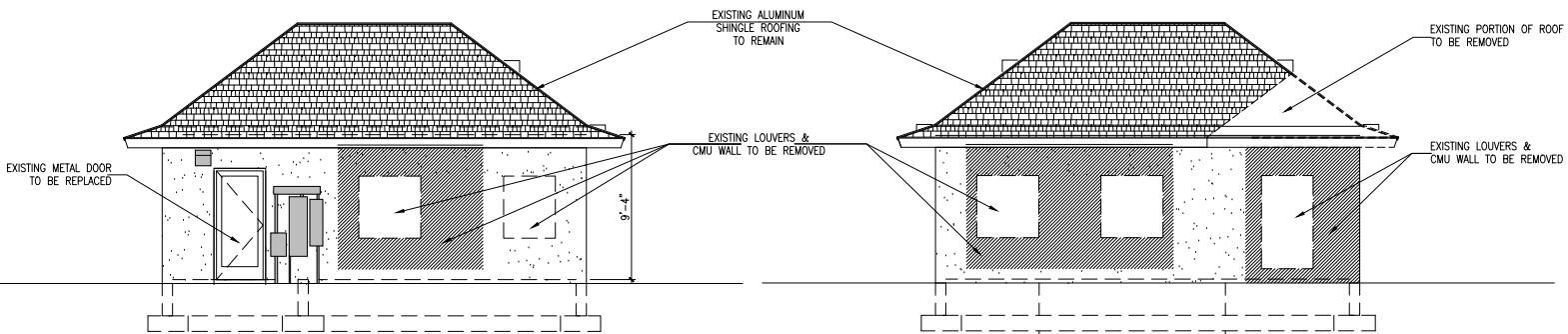
**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	MISCELLANEOUS DETAILS - 1		
DESIGNED BY	ST	CHECKED BY	JN
DRAWN BY	EN	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W# - ##			
EXPIRATION DATE OF THE USEPER			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



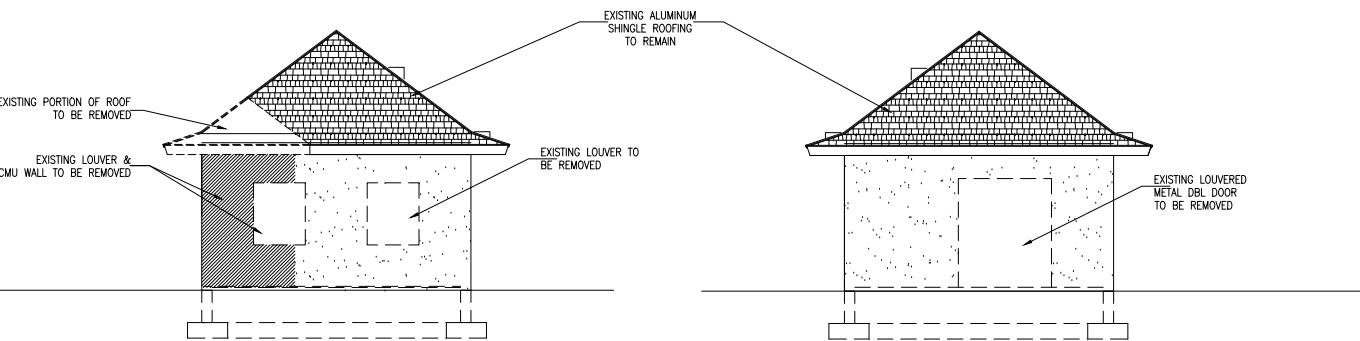
**60% SUBMITTAL**

REVISION DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU		
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EVIA, OAHU, HAWAII		
ITEM: EXISTING / DEMO FLOOR PLAN FRAMING PLAN & REFLECTED CEILING PLAN		
DESIGNED BY:	CHECKED BY:	
DRAWN BY:	SECTION HEAD:	BRANCH HEAD:
SIGNATURE	DATE	
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.		
JOB NO. W#-#		
GRAPHIC SCALE		
EXPIRATION DATE OF THE LICENSE		
FILE NUMBER	DRIVEN	FILE NUMBER
PICKET	FILE NUMBER	FILE NUMBER



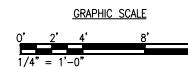
1 WLE WWPS EXT'G/DEMO FRONT ELEVATION  
A-2 SCALE: 1/4" = 1'-0"

2 WLE WWPS EXT'G/DEMO REAR ELEVATION  
A-2 SCALE: 1/4" = 1'-0"



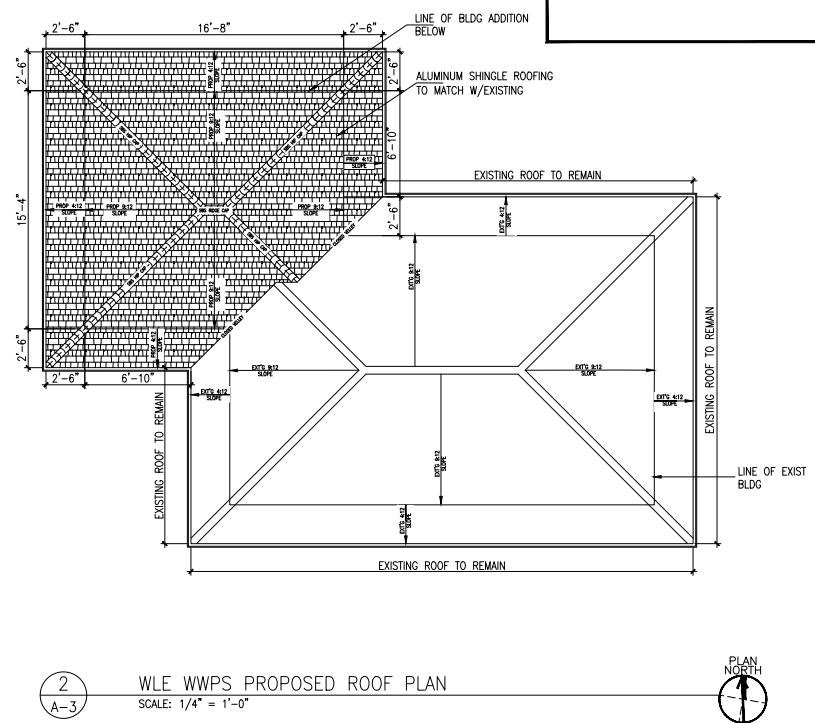
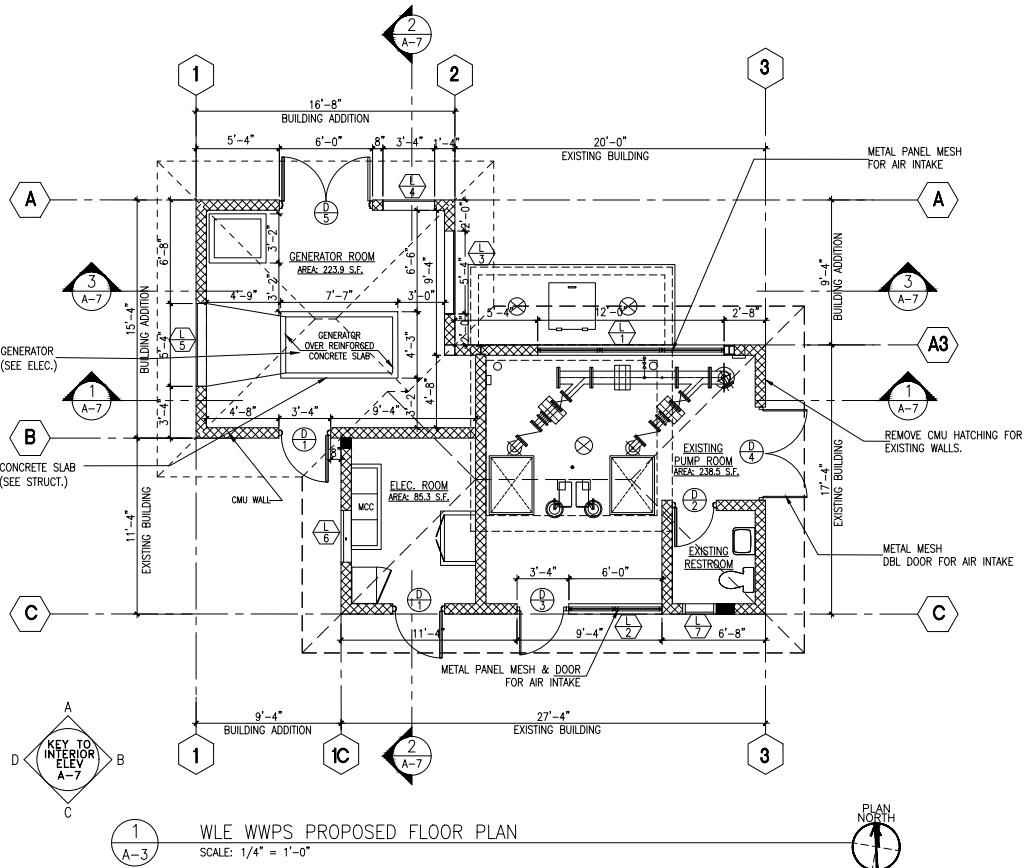
3 WLE WWPS EXT'G/DEMO LEFT SIDE ELEVATION  
A-2 SCALE: 1/4" = 1'-0"

4 WLE WWPS EXT'G/DEMO RIGHT SIDE ELEVATION  
A-2 SCALE: 1/4" = 1'-0"



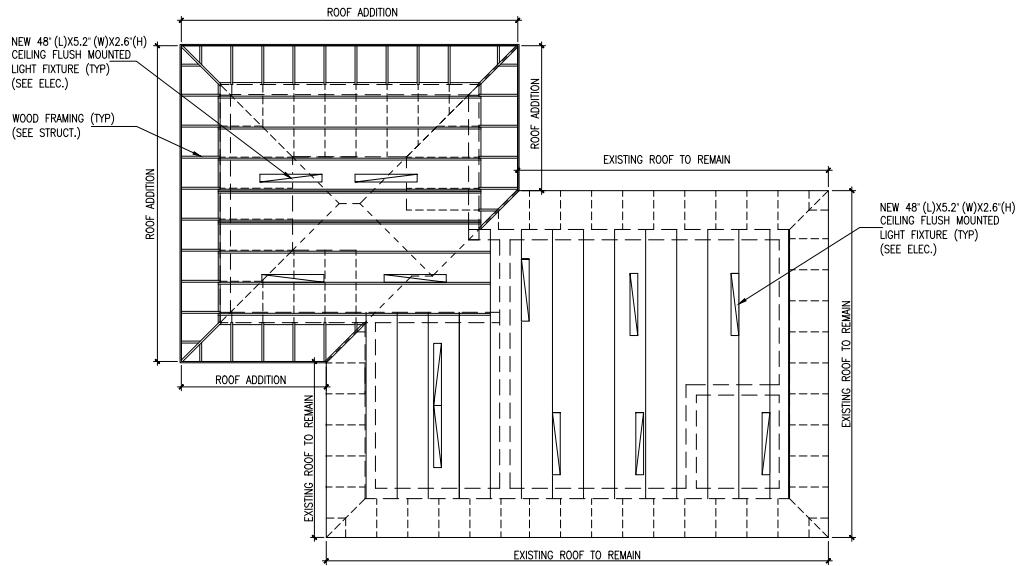
**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	EXISTING / DEMO ELEVATIONS		
DESIGNED BY	CHECKED BY	SECTION HEAD	BRANCH HEAD
DRAWN BY	APPROVED	DATE	
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE USENS	FILE NUMBER	DRWNR	PLC
FILE NUMBER	DRWNR	PLC	POCKET



**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: PROPOSED FLOOR PLAN & ROOF PLAN			
DESIGNED BY:	CHECKED BY:	SECTION HEAD:	
DRAWN BY:	APPROVED:	BRANCH HEAD:	
SUPERVISOR:	DATE:		
GRAPHIC SCALE			
0' 2' 4' 8' 12'			
1/4" = 1'-0"			
SIGNATURE			
EXPIRATION DATE OF THE USE PERMIT			
PERMIT NUMBER:	DRAYER:	FILE NUMBER:	POLICY NUMBER:
JOB NO. W#-##			



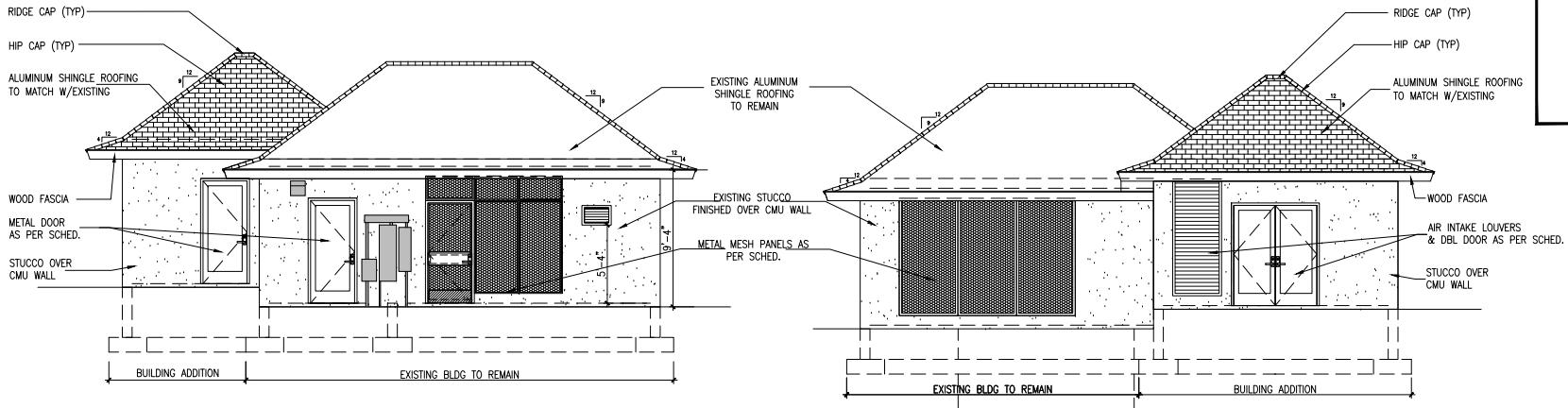
1  
A-4

WLE WWPS PROPOSED REFLECTED CEILING PLAN  
SCALE: 1/4" = 1'-0"

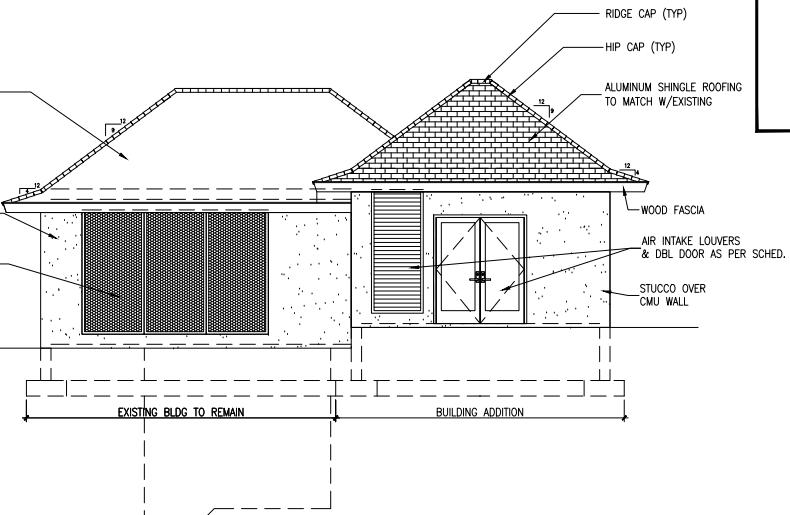


**60% SUBMITTAL**

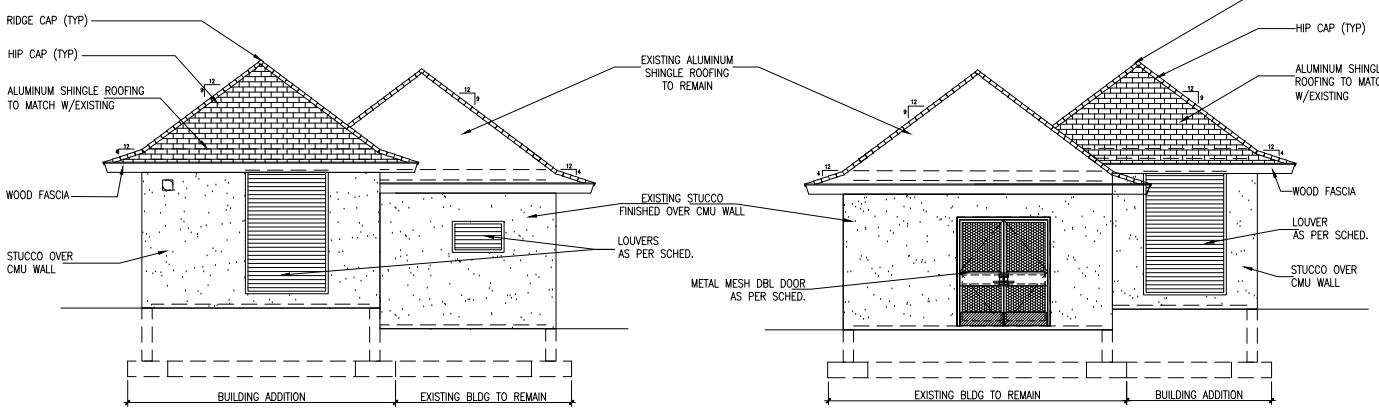
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	PROPOSED REFLECTED CEILING PLAN		
DESIGNED BY	CHECKED BY	SECTION HEAD	BRANCH HEAD
DRAWN BY	APPROVED	DATE	
SUPERVISOR	SIGNATURE	JOB NO. W#-##	
GRAPHIC SCALE			
EXPIRATION DATE OF THE USENRE			
FILE NUMBER	DRAYER	FILE NUMBER	FILE NUMBER



1  
A-5 WLE WWPS FRONT ELEVATION  
SCALE: 1/4" = 1'-0"



2  
A-5 WLE WWPS REAR ELEVATION  
SCALE: 1/4" = 1'-0"

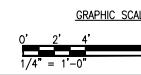


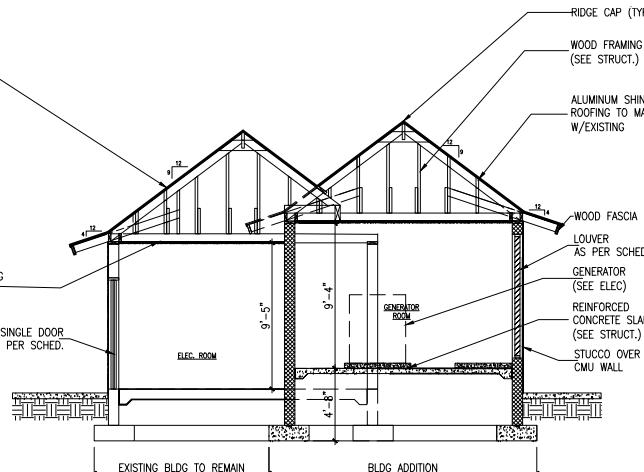
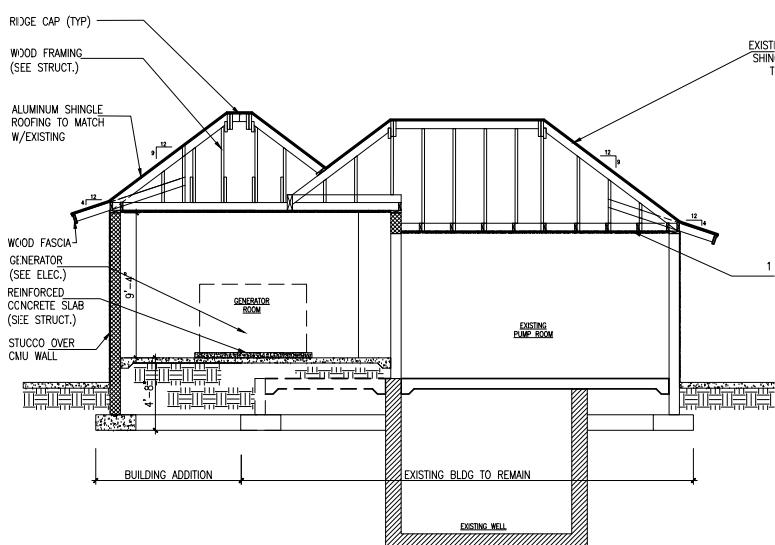
3  
A-5 WLE WWPS LEFT SIDE ELEVATION  
SCALE: 1/4" = 1'-0"

4  
A-5 WLE WWPS RIGHT SIDE ELEVATION  
SCALE: 1/4" = 1'-0"

**60% SUBMITTAL**

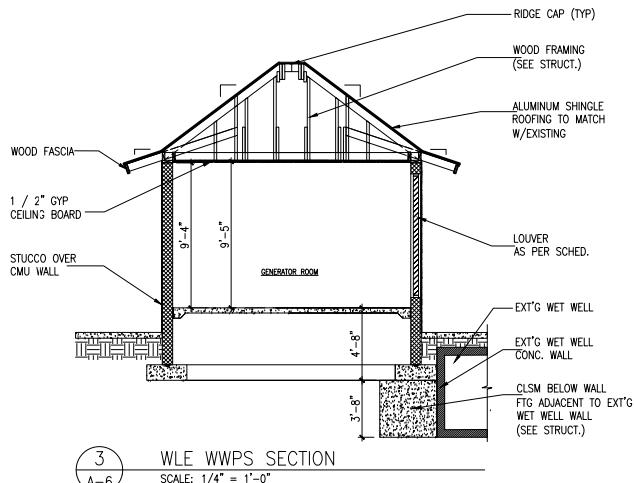
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	PROPOSED ELEVATIONS		
DESIGNED BY	CHECKED BY	SECTION HEAD	BRANCH HEAD
DRAWN BY	APPROVED		
SIGNATURE	DRAWN BY _____ DATE _____		
JOB NO. W#-##			
FILE NUMBER	DRAFTER	FILE NUMBER	FILE NUMBER
EXPIRATION DATE OF THE USE AGREEMENT			





1  
A-6 WLE WWPS SECTION  
SCALE: 1/4" = 1'-0"

2  
A-6 WLE WWPS SECTION  
SCALE: 1/4" = 1'-0"

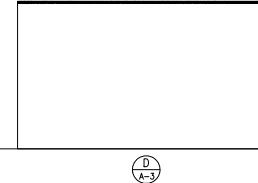
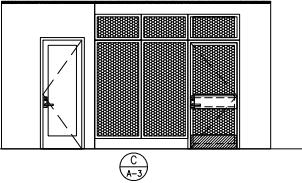
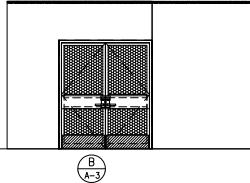
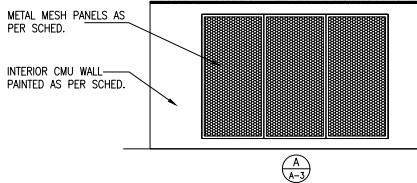


3  
A-6 WLE WWPS SECTION  
SCALE: 1/4" = 1'-0"

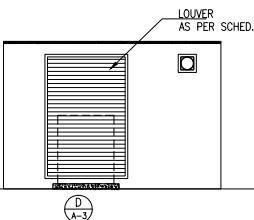
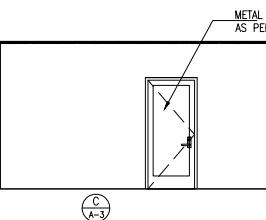
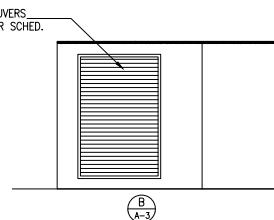
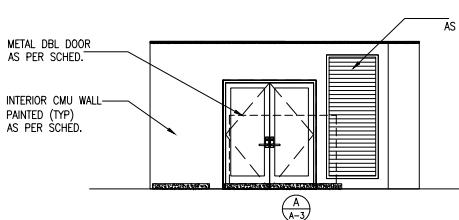
4  
A-6 WLE WWPS SECTION  
SCALE: 1/4" = 1'-0"

**60% SUBMITTAL**

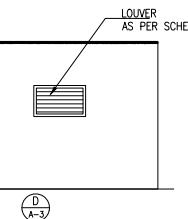
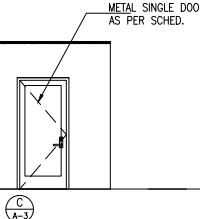
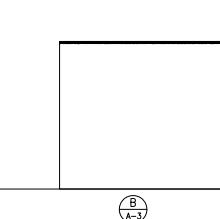
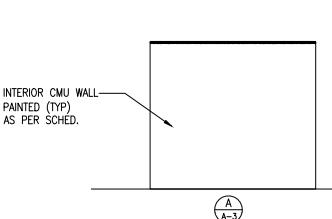
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	BUILDING SECTIONS		
DESIGNED BY	CHECKED BY	APPROVED	DATE
DRAWN BY	SECTION HEAD	BRANCH HEAD	
SIGNATURE			
JOB NO. W#-#			
EXPIRATION DATE OF THE USEPER			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET



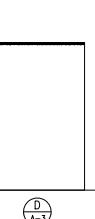
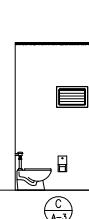
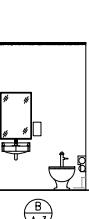
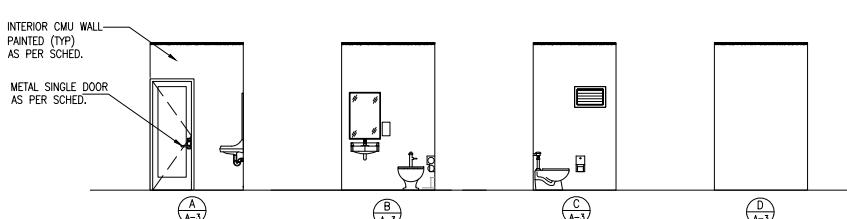
1 WLE WWPS PUMP ROOM INTERIOR ELEVATIONS  
SCALE: 1/4" = 1'-0"



2 WLE WWPS GENERATOR ROOM INTERIOR ELEVATIONS  
SCALE: 1/4" = 1'-0"



3 WLE WWPS ELECTRICAL ROOM INTERIOR ELEVATIONS  
SCALE: 1/4" = 1'-0"



4 WLE WWPS RESTROOM INTERIOR ELEVATIONS  
SCALE: 1/4" = 1'-0"

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	INTERIOR ELEVATIONS		
DESIGNED BY:	CHECKED BY:	SECTION HEAD:	BRANCH HEAD:
DRAWN BY:	APPROVED:	DATE	
SIGNATURE	JOB NO. W#-##		
EXPIRATION DATE OF THE USEPER	FILE NUMBER		
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET

GRAPHIC SCALE  
0' 2' 4' 8' 12'  
1/4" = 1'-0"

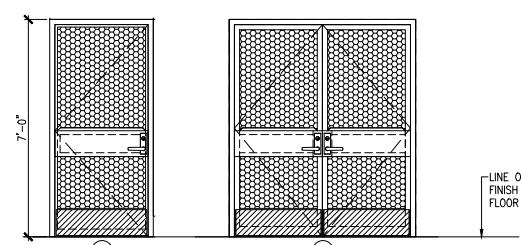
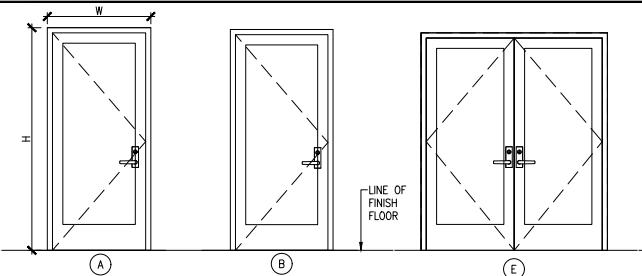
DRAWING A-7

SHEET 7 OF 10

10-11-2024

DOOR SCHEDULE														
DOOR MARK	OPENING SIZE		DOOR TYPE (*1)	THICKNESS (*2)	DOOR CONSTR (*3)	DOOR FINISH (*4)	FRAME CONSTR 6)	FRAMING DETAILS			QUANTITIES	HOME GROUP (SEE SPECS)	REMARKS	
	W	H						HEAD	JAMB	SILL				
1	3'-4"	7'-0"	A	1 3/4"	AL	PT-5	AL	4/A-9	5/A-9	N/A	6/A-9	2	000	ELEC. ROOM / GENERATOR ROOM
2	2'-10" X 6'-8"	B	1 3/4"	AL	PT-3	AL	PT-3	4/A-9	5/A-9	N/A	6/A-9	1	000	RESTROOM
3	3'-4" X 7'-0"	C	*	AL	PT-5	AL	PT-5	1/A-10	2/A-10	N/A	3/A-10	1	000	PUMP ROOM / METAL MESH
4	6'-0" X 7'-0"	D	*	AL	PT-5	AL	PT-5	1/A-10	2/A-10	N/A	3/A-10	1	000	PUMP ROOM / METAL MESH
5	6'-0" X 7'-0"	E	1 3/4"	AL	PT-5	AL	PT-5	4/A-9	5/A-9	N/A	6/A-9	1	000	GENERATOR RM

### DOOR TYPES & DOOR SCHEDULE NOTES



- \*1. **DOOR TYPE:**  
(SEE DOOR TYPES ELEVATIONS)
- \*2. **THICKNESS:**  
AS INDICATED (OTHERS NOT INDICATED IS MANUF STANDARD THICKNESS)
- \*3. **DOOR CONSTRUCTION:**  
AL EXTRUDED ALUMINUM  
FRP FIBERGLASS REINFORCED PLASTIC
- \*4. **DOOR FINISH:**  
PT PAINT AND/OR  
IMC INTEGRALLY MOLDED COLOR
- \*5. **FRAME CONSTRUCTION**  
AL EXTRUDED ALUMINUM  
FRP FIBERGLASS REINFORCED PLASTIC
- \*6. **FRAME FINISH:**  
IMC INTEGRALLY MOLDED COLOR
- \*7. **N/A**  
NON APPLICABLE
- \*8. **\***  
REFER TO SPECS

### MATERIAL SCHEDULE

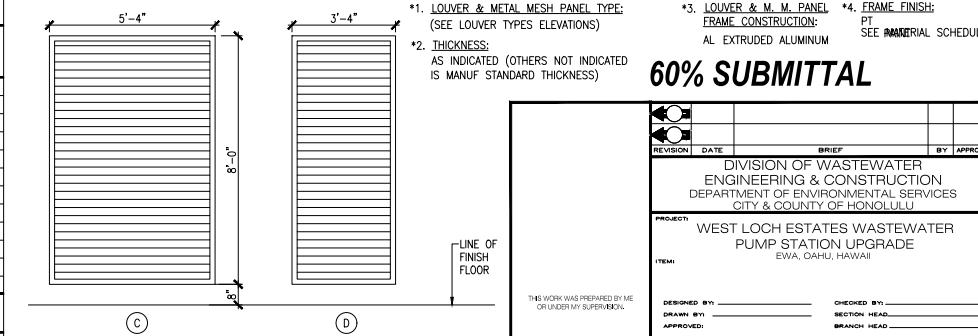
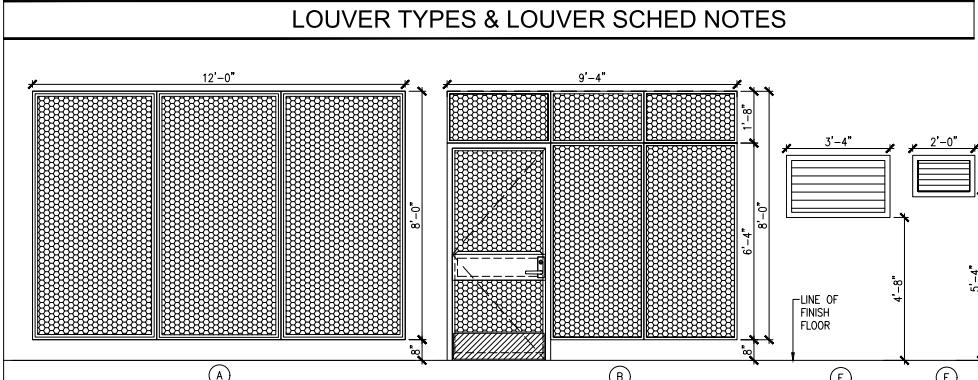
KEY	MATERIAL DESCRIPTION	SOURCE / MANUFACTURER (FOR REFERENCE ONLY)	PATTERN / SIZE / FINISH	COLOR NAME / PRODUCT NO (FOR REFERENCE ONLY)	REMARKS
PT-1	PAINT	BENJAMIN MOORE	SEMI-GLOSS	-	INTERIOR CMU WALLS
PT-2	PAINT	BENJAMIN MOORE	SEMI-GLOSS	-	INTERIOR ROOF FRAMING & CEILING
PT-3	PAINT	BENJAMIN MOORE	SEMI-GLOSS	-	INTERIOR METAL DOORS & FRAMES, ALUMINUM FRAMES
PT-4	PAINT	BENJAMIN MOORE	SEMI-GLOSS	-	EXTERIOR CMU WALLS
PT-5	PAINT	BENJAMIN MOORE	SEMI-GLOSS	-	EXTERIOR METAL DOORS & FRAMES, ALUMINUM FRAMES
PT-6	PAINT	BENJAMIN MOORE	SEMI-GLOSS	-	EXTERIOR ROOF FRAMING, FASCIA & TRIM

### MATERIAL SCHEDULE NOTES

1. MANUFACTURERS' NAMES AND COLOR REFERENCES ARE USED FOR THE PURPOSE OF COLOR IDENTIFICATION ONLY. PRODUCTS OF OTHER MANUFACTURERS ARE ACCEPTABLE IF THE COLORS APPROXIMATE COLORS INDICATED OR SELECTED AND THE PRODUCT CONFORMS TO SPECIFIED REQUIREMENTS.

LOUVER MARK (L)	METAL MESH MARK (W)	OPENING SIZE		FIELD VERIFY W X H	LOUVER TYPE (*1)	METAL MESH TYPE (*1)	LOUVER (*3) METAL MESH CONSTRUCTION	FRAME CONSTR (*4)	LOUVER MARK	FRAMING DETAILS			QUANTITIES	REMARKS
		L	W							M. M. HEAD	LVR HEAD	M. M. JAMB	LVR JAMB	M. M. SILL
1	12'-0" X 8'-0"				A		AL	AL	4/A-10	5/A-10	6/A-10	8'-8"	1	PUMP ROOM / INSECT SCREEN IF REQUIRED
2	9'-4" X 8'-0"				B		AL	AL	4/A-10	5/A-10	6/A-10	8'-8"	1	PUMP ROOM / INSECT SCREEN IF REQUIRED
5	5'-4" X 8'-0"	C					AL	AL	1/A-9	2/A-9	3/A-9	8'-8"	2	GENERATOR ROOM / INSECT SCREEN
4	3'-4" X 8'-0"	D					AL	AL	1/A-9	2/A-9	3/A-9	8'-8"	1	GENERATOR ROOM / INSECT SCREEN
6	4'-0" X 2'-0"	E					AL	AL	1/A-9	2/A-9	3/A-9	6'-8"	1	ELEC. ROOM / INSECT SCREEN
7	2'-0" X 1'-4"	F					AL	AL	1/A-9	2/A-9	3/A-9	6'-8"	1	RESTROOM / INSECT SCREEN

### LOUVER / METAL MESH SCHEDULE

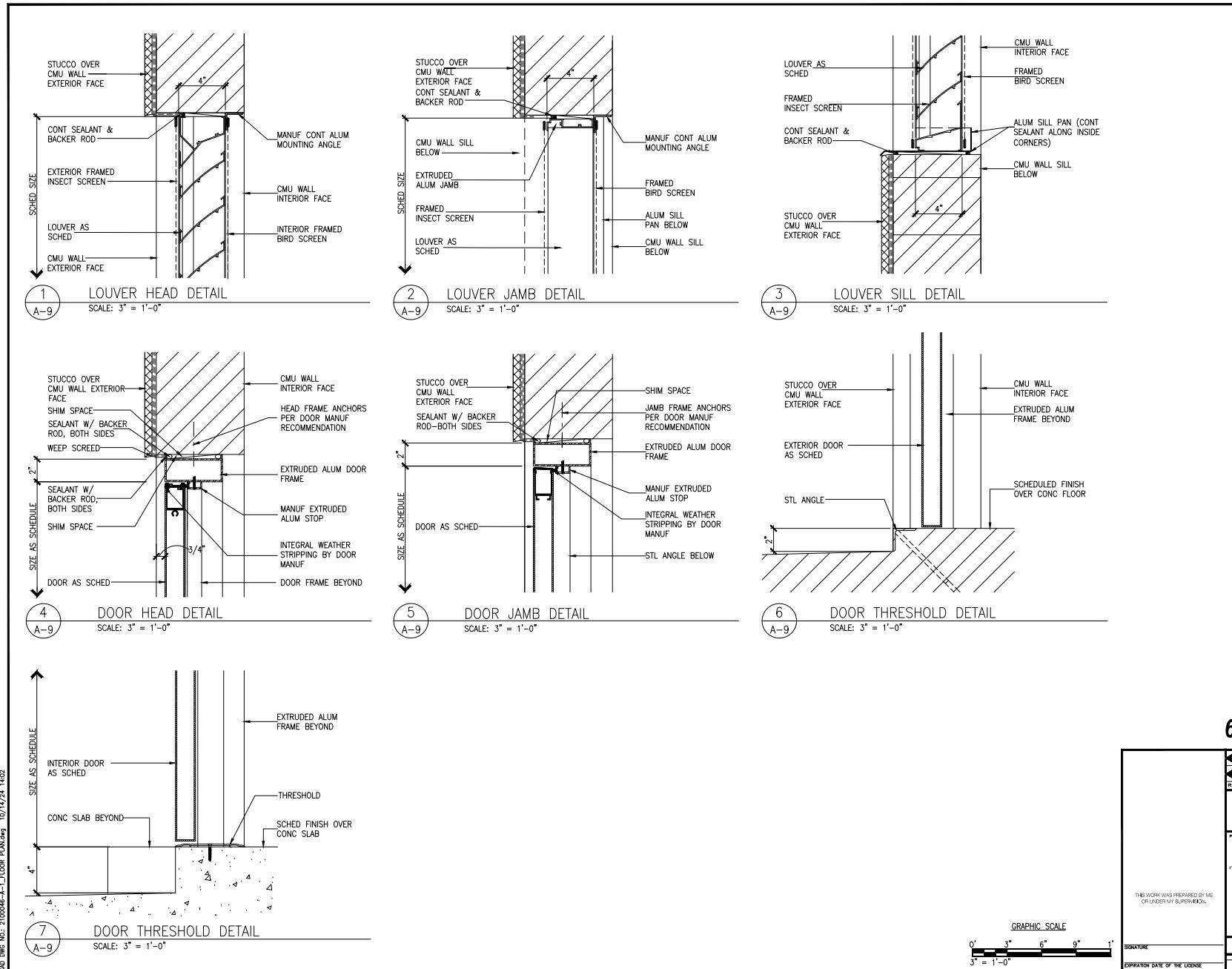


- \*1. **LOUVER & METAL MESH PANEL TYPE:**  
(SEE LOUVER TYPES ELEVATIONS)
- \*2. **THICKNESS:**  
AS INDICATED (OTHERS NOT INDICATED IS MANUF STANDARD THICKNESS)

- \*3. **LOUVER & M. M. PANEL:**  
FRAME CONSTRUCTION:  
AL EXTRUDED ALUMINUM
- \*4. **FRAME FINISH:**  
SEE MATERIAL SCHEDULE

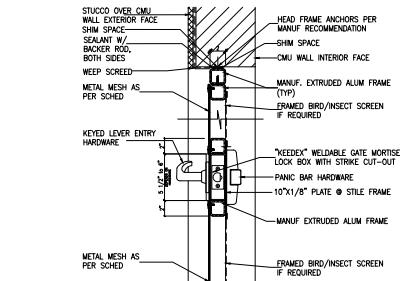
**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	CHECKED BY:	DATE	
DRAWN BY:	SECTION HEAD:	BRANCH HEAD:	
APPROVED:	SIGNATURE		
EXPIRATION DATE OF THE USE SHEET			
FILE NUMBER	DRAFTER	FILE NUMBER	FILE NUMBER
JOB NO. PW #	DRAWING A-8 SHEET 8 OF 10		

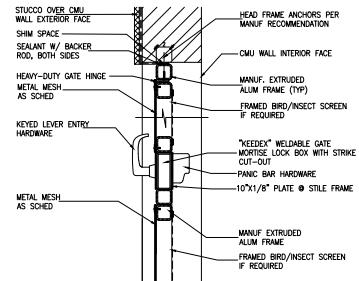


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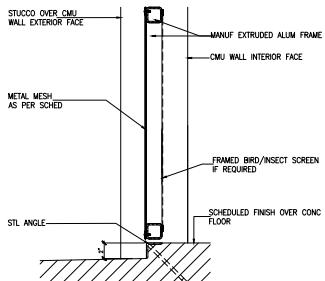
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM			
DETAILS			
DESIGNED BY	CHECKED BY		
DRAWN BY	SECTION HEAD		
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE USEN			
FILE NUMBER	DRWNR	FILE NUMBER	FILE NUMBER



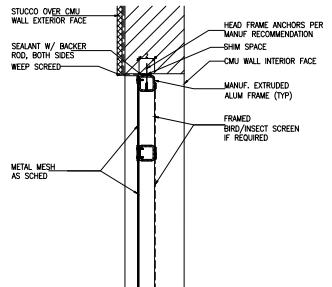
1  
A-10 METAL MESH PANEL DOOR HEAD DETAIL  
SCALE: 1 1/2" = 1'-0"



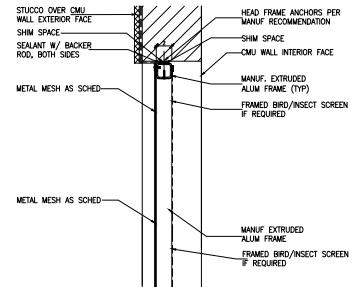
2  
A-10 METAL MESH PANEL DOOR JAMB DETAIL  
SCALE: 1 1/2" = 1'-0"



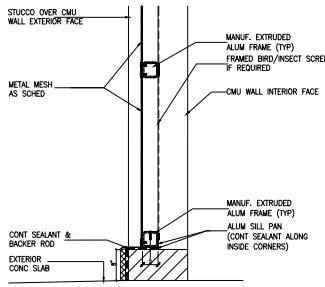
3  
A-10 METAL MESH PANEL DOOR THRESHOLD  
SCALE: 1 1/2" = 1'-0"



4  
A-10 METAL MESH PANEL WINDOW HEAD DETAIL  
SCALE: 1 1/2" = 1'-0"



5  
A-10 METAL MESH PANEL WDW JAMB DETAIL  
SCALE: 1 1/2" = 1'-0"



6  
A-10 METAL MESH PANEL WDW SILL DETAIL  
SCALE: 1 1/2" = 1'-0"

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	METAL MESH DETAILS		
DESIGNED BY	CHECKED BY	SECTION HEAD	
DRAWN BY	BRANCH		DATE
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
GRAPHIC SCALE			
 1 1/2" = 1'-0"			
SIGNATURE			
JOB NO. W#-##			
FILE NUMBER	DRWNR	FILE NUMBER	FILE NUMBER
EXPIRATION DATE OF THE USENS			

## GENERAL NOTES:

## GENERAL :

- A. CONSTRUCTION OF THIS PROJECT MUST CONFORM TO THE INTERNATIONAL BUILDING CODE, 2018 EDITION, AND STANDARDS REFERENCED THEREIN, AS ADOPTED AND AMENDED BY THE CITY AND COUNTY OF HONOLULU.
- B. THE CONTRACTOR MUST VERIFY ALL FIELD DIMENSIONS, EXISTING GROUND ELEVATIONS AND CONDITIONS AGAINST THE PROJECT DRAWINGS PRIOR TO STARTING WORK. ALL DISCREPANCIES MUST BE REPORTED TO THE ENGINEER.
- C. THE CONTRACTOR MUST BE SOLELY RESPONSIBLE FOR ALL EXCAVATION PROCEDURES INCLUDING SHORING, LACING, AND PROTECTION OF ADJACENT PROPERTIES, STRUCTURES, STREETS AND UTILITIES IN ACCORDANCE WITH ALL NATIONAL, STATE AND LOCAL ORDINANCES.
- D. DURING CONSTRUCTION, THE CONTRACTOR MUST BE RESPONSIBLE FOR JOBSITE SAFETY. THE CONTRACTOR MUST ASSUME RESPONSIBILITY FOR THE DESIGN AND PROVISION OF ALL TEMPORARY BRACING, SHORING, GUYS, ETC, IN ACCORDANCE WITH ALL NATIONAL, STATE AND LOCAL SAFETY ORDINANCES.
- E. SPECIFIC DETAILS AND SCHEDULES MUST TAKE PRECEDENCE OVER TYPICAL DETAILS AND SCHEDULES. IN GENERAL, DETAILS AND NOTES IN DRAWINGS MUST TAKE PRECEDENCE OVER THE SPECIFICATIONS.
- F. ALL OMISSIONS OR CONFLICTS BETWEEN THE VARIOUS ELEMENTS OF THE WORKING DRAWINGS AND/OR SPECIFICATIONS MUST BE BROUGHT TO THE ATTENTION OF THE ARCHITECT BEFORE STARTING ANY WORK SO INVOLVED.
- G. CONSTRUCTION LOADING MUST NOT EXCEED THE DESIGN LIVE LOAD UNLESS SPECIAL SHORING IS PROVIDED. ALLOWABLE LOADS MUST BE REDUCED IN AREAS WHERE THE STRUCTURE HAS NOT ATTAINED ITS FULL DESIGN STRENGTH.

## FOUNDATION NOTES :

- A. FOUNDATION IS DESIGNED BASED ON SOIL REPORT TITLED, "GEOTECHNICAL RECOMMENDATIONS; WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE; KAPAPAPIU POINT PARK; EWA, OAHU, HAWAII," AS PREPARED BY HALEY & ALDRICH, INC., AND DATED 21 AUGUST 2024. CONTRACTOR MUST REFER TO THIS REPORT IN PREPARING SUBGRADE AND FOUNDATION. THIS REPORT MUST BECOME A PART OF THE CONTRACT DOCUMENTS BY REFERENCE AND SHOULD BE KEPT AT THE JOBSITE AT ALL TIMES.
- B. ALL FOOTING TRENCHES, FILL, AND BACKFILL OPERATIONS MUST BE REVIEWED AND CONSULTED WITH A GEOTECHNICAL ENGINEER. COST OF GEOTECHNICAL ENGINEER'S SERVICES MUST BE BORNE BY THE CITY AND COUNTY OF HONOLULU. CONTRACTOR MUST MAKE APPROPRIATE ARRANGEMENTS FOR INSPECTIONS AS REQUIRED.
- C. FOUNDATION EXCAVATIONS MUST BE REVIEWED BY THE GEOTECHNICAL ENGINEER OR HIS REPRESENTATIVE PRIOR TO THE PLACEMENT OF ANY REINFORCING STEEL OR CONCRETE.
- D. THE FOUNDATION DESIGN IS BASED ON A BEARING CAPACITY OF 2000 PSF AND MAY BE INCREASED BY UP TO ONE-THIRD FOR LOADS OF SHORT DURATION (I.E., WIND AND SEISMIC).
- E. BOTTOMS OF ALL FOOTINGS MUST BE FOUNDED AT LEAST 36" BELOW LOWEST ADJACENT FINISH GRADE. BOTTOMS OF FOOTINGS CAN BE EMBEDDED 18" BELOW ADJACENT GRADE, IF THEY ARE UNDERLAIN BY AN 18"-THICK GRAVEL PAD.
- F. FOOTING THICKNESSES ARE MINIMUM THICKNESSES ONLY AND MAY BE INCREASED DUE TO SPECIFIC CONDITIONS.
- G. COEFFICIENT OF FRICTION VALUES OF 0.35 OR 0.45 FOR FOOTINGS POURED ON NATIVE FINE-GRAINED SOIL OR GRANULAR STRUCTURAL FILL, RESPECTIVELY. ALLOWABLE PASSIVE RESISTANCE OF 350 PCF MAY BE ASSUMED.
- H. CLEAN AND MOISTEN FOOTING TRENCHES PRIOR TO POURING FOOTING.
- I. FILL PLACEMENT:
1. FILL MATERIAL MUST BE IMPORTED SOIL OR REUSED WELL-GRADED GRAVEL FILL. SELECT IMPORTED GRANULAR FILL BETWEEN 2" AND 6" IN DIMENSION AND WITH LESS THAN 5% PASSING THE #4 SIEVE.
  2. MAINTAIN MOISTURE CONTENT TO WITHIN 2% OF OPTIMUM MOISTURE CONTENT AND RECOMPACT TO 95% MAXIMUM DENSITY PER ASTM D1557.
  3. PLACE FILL IN 10" LOOSE LIFTS AND IN 6"-8" LOOSE LIFTS IF USING SMALL, HAND-OPERATED EQUIPMENT.
- J. DO NOT PLACE CONDUITS AND UTILITY LINES IN FOOTING TRENCHES.

## DESIGN LOADS :

- A. LATERAL LOADS
1. EARTHQUAKE:

RISK CATEGORY	II
SEISMIC IMPORTANCE FACTOR, $i_e$	1.00
MAPPED SPECTRAL RESPONSE ACCELERATION, $S_g$	0.56
MAPPED SPECTRAL RESPONSE ACCELERATION, $S_i$	0.16
SITE CLASS	D
DESIGN SPECTRAL RESPONSE ACCELERATION, $S_{ds}$	0.50
DESIGN SPECTRAL RESPONSE COEFFICIENT, $S_{dp}$	0.24
SEISMIC DESIGN CATEGORY	C
BASIC SEISMIC FORCE-RESISTING SYSTEM	ORDINARY REINF MASONRY SHEARWALLS
DESIGN BASE SHEAR (KIPS)	1.00
SEISMIC RESPONSE COEFFICIENT, CS	1.00
RESPONSE MODIFICATION FACTOR, R	2
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE

## 2. WIND:

RISK CATEGORY	II
BASIC WIND SPEED, MPH	132
WIND EXPOSURE	C
Kz1	1.00
APPLICABLE INTERNAL PRESSURE COEFFICIENT, $C_{pi}$	0.18
DESIGN EXTERIOR WIND PRESSURE FOR COMPONENTS AND CLADDING	20.00 PSF

## B. UNIFORM LIVE LOADS

ROOF	20 PSF
------	--------

## REINFORCING STEEL :

- A. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 60.
- C. WELDING OF REINFORCING BARS SHALL BE PROHIBITED.
- D. MINIMUM CONCRETE COVER FOR REINFORCING BARS SHALL BE:

## 1. CAST-IN-PLACE CONCRETE:

CAST AGAINST EARTH	3"
CONCRETE EXPOSED TO EARTH OR WEATHER	#6 THROUGH #18 BAR #5 AND SMALLER 2"
CONCRETE NOT EXPOSED TO EARTH OR WEATHER: SLABS, WALLS, JOISTS	#14 AND #18 BAR #11 AND SMALLER 1-1/2" 3/4"
CONCRETE NOT EXPOSED TO EARTH OR WEATHER: BEAMS, COLUMNS	PRIMARY REINFORCEMENT, TIES, STIRRUPS, SPIRALS 1-1/2"
CONCRETE NOT EXPOSED TO EARTH OR WEATHER: SHELLS, FOLDED PLATES	#6 AND LARGER #5 AND SMALLER 3/4" 1/2"

## E. PROVIDE DOWELS IN FOOTINGS AND GRADE BEAMS THE SAME SIZE AND SPACING AS COLUMN AND WALL BARS, UNLESS OTHERWISE NOTED.

F. ALL REINFORCING STEEL SHALL BE LAPPED OR SPLICED AT LOCATIONS AS INDICATED. WHERE LAP OR SPLICE LOCATIONS ARE NOT SPECIFICALLY INDICATED, LAPS OR SPLICES SHALL BE WELL STAGGERED.

G. ALL REINFORCING STEEL SHALL BE LAPPED 40 BAR DIAMETERS OR 2 FEET MINIMUM UNLESS NOTED OTHERWISE IN PLANS.

## I. ANCHOR BOLTS, DOWELS AND OTHER EMBEDDED ITEMS SHALL BE SECURELY TIED IN PLACE BEFORE CONCRETE IS POURED.

J. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO STARTING FABRICATION. SHOP DRAWINGS SHALL BE COMPLETE AND INCLUDE GRADES, SIZES, LENGTHS, BENDS, AND SPACINGS OF ALL FOOTING, SLAB, COLUMN, WALL AND BEAM REINFORCING.

## CONCRETE :

A. ALL CONCRETE WORK MUST CONFORM TO ACI 301.

B. CONCRETE PROPERTIES SHALL BE AS FOLLOWS:

COMPONENT	SPECIFICATION
CONCRETE	NORMAL WEIGHT HARD ROCK, 150 PCF
AGGREGATES	ASTM C33
CEMENT	ASTM C595, TYPE II
WATER CEMENT RATIO	0.50 OR LESS

## C. 28 DAY COMPRESSIVE STRENGTH, AGGREGATE SIZE AND SLUMP MUST BE AS FOLLOWS:

COMPONENT	STRENGTH PSI	MAXIMUM AGGREGATE	SLUMP +/- 1"
SLABS-ON-GRADE	3000	3/4"	4"
FOOTINGS	4000	1-1/2"	4"
COLUMNS	4000	3/4"	4"

D. ALL INSERTS, ANCHOR BOLTS, PLATES, ETC, EMBEDDED IN CONCRETE MUST BE HOT DIPPED GALVANIZED UNLESS NOTED OTHERWISE.

E. EXCEPT FOR WALLS, PIPES MAY PASS THROUGH STRUCTURAL CONCRETE IN SLEEVES BUT MUST NOT BE EMBEDDED THEREIN. SLEEVES MUST BE 1" LARGER IN DIAMETER THAN THE PIPE AND THE ANNULAR SPACE MUST BE CAULKED WITH A RESILIENT MATERIAL.

F. SLEEVES EXCEEDING ONE THIRD THE WALL THICKNESS MUST NOT BE PLACED LONGITUDINALLY IN THE WALLS, UNLESS SPECIFICALLY DETAILED.

G. THE CONTRACTOR MUST NOTIFY THE ENGINEER 72 HOURS PRIOR TO ANY CONCRETE POURS SO THAT THE REINFORCING STEEL LAYOUT AND CONCRETE POUR MAY BE OBSERVED. POURS MUST NOT PROCEED WITHOUT REINFORCING STEEL OBSERVATION.

H. ALL SLABS-ON-GRADE MUST BE POURED WITH CRACK CONTROL JOINTS NOT MORE THAN 20'-0" APART IN EACH DIRECTION OR AS INDICATED IN DRAWINGS. JOINTS MUST BE SAWED OR MADE WITH PRE-FORMED METAL KEYS. WALKWAY JOINTS MUST BE SPACED AT 6'-0" MAXIMUM OR AS SHOWN IN ARCHITECTURAL DRAWINGS.

I. SUBMIT LOCATION OF ALL CONSTRUCTION JOINTS PRIOR TO PLACEMENT. CONSTRUCTION JOINTS MUST BE LOCATED TO MINIMIZE EFFECTS OF SHRINKAGE AS WELL AS PLACED AT POINTS OF LOW STRESS. UNLESS OTHERWISE NOTED, CONSTRUCTION JOINTS MUST BE AT MIDSPAN FOR BEAMS AND SLABS, AND AT BEAM OR SLAB SOFFITS FOR COLUMNS AND WALLS.

J. KEYED CONSTRUCTION JOINTS MUST BE USED IN ALL CASES. ALL CONSTRUCTION JOINTS MUST BE THOROUGHLY CLEANED AND ALL LAITANCE SHALL BE REMOVED.

K. CONCRETE MUST BE MAINTAINED IN A MOIST CONDITION FOR AT LEAST THE FIRST SEVEN (7) DAYS AFTER PLACEMENT. ALTERNATE METHODS OF CURING WILL BE APPROVED IF SATISFACTORY PERFORMANCE CAN BE ASSURED.

L. THE CONTRACTOR MUST SUBMIT CONCRETE MIX DESIGNS FOR REVIEW AT LEAST TWO WEEKS PRIOR TO CONCRETE POURS.

## REINFORCING STEEL :

## CONCRETE BLOCK MASONRY :

A. MASONRY PROPERTIES WILL BE AS FOLLOWS:

COMPONENT	SPECIFICATION
FULLY GROUTED MASONRY ASSEMBLY DESIGN	1500 PSI
CONCRETE BLOCK - HOLLOW LOAD BEARING UNITS	ASTM C90, TYPE II
MASONRY MORTAR	ASTM C270, TYPE "M", 2500 PSI
MASONRY GROUT	ASTM C476, 2500 PSI

B. ALL WALLS MUST BE CONSTRUCTED CONVENTIONAL RUNNING BOND, UNLESS NOTED OTHERWISE.

C. REINFORCING MUST BE SECURED AGAINST DISPLACEMENT PRIOR TO GROUTING BY WIRE POSITIONERS AT INTERVALS NOT EXCEEDING 200 BAR DIAMETERS NOR 10 FEET.

D. REINFORCING STEEL IN MASONRY MUST BE LAPPED 48 BAR DIAMETERS OR 2'-0" MINIMUM.

E. GROUT MASONRY IN 8'-0" LIFTS MAXIMUM. CLEANOUTS ARE REQUIRED FOR ALL GROUT POURS OVER 5'-0" IN HEIGHT.

F. IF GROUT POUR IS STOPPED ONE HOUR OR LONGER, PROVIDE HORIZONTAL CONSTRUCTION JOINTS BY STOPPING THE GROUT 1-1/2" BELOW THE TOP OF THE BLOCK.

G. THE THICKNESS OF THE GROUT BETWEEN THE INSIDE FACE OF BLOCK UNITS AND REINFORCING STEEL MUST NOT BE LESS THAN 1/2". THE CLEAR SPACE BETWEEN PARALLEL BARS IN WALLS MUST NOT BE LESS THAN THE BAR DIAMETER OR 1".

## STRUCTURAL STEEL :

A. ALL STEEL WORK MUST CONFORM TO THE "STEEL CONSTRUCTION MANUAL," FIFTEENTH EDITION, AS PREPARED BY THE AISC.

B. ALL STRUCTURAL STEEL MUST CONFORM TO THE FOLLOWING:

W SHAPES	A992
CHANNELS	A36
PIPE	A53, GRADE B
TUBES	A500, GRADE B
PLATES	A36
ANCHOR BOLTS	F1554
BOLTS	A307

C. ALL WELDS MUST CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.1 BY THE AMERICAN WELDING SOCIETY AND BE DONE BY CERTIFIED WELDERS, ELECTRIC ARC PROCESS, AND E70 ELECTRODES.

D. UNLESS A LARGER SIZE OF FILLET WELD IS SPECIFIED ON THE PLANS, PROVIDE A MINIMUM SIZE OF WELD PER AISC SPECIFICATION TABLE J2.4.

E. ALL STEEL JOINTS OR SPLICES NOT DETAILED MUST BE FULLY WELDED.

F. ALL STRUCTURAL STEEL FRAMING, INCLUDING ROLLED SHAPES, BUILT-UP MEMBERS, PIPES, TUBES, PLATES, AND ANCHOR BOLTS MUST BE HOT-DIPPED GALVANIZED.

G. THE CONTRACTOR MUST SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO STARTING FABRICATION. SHOP DRAWINGS MUST INCLUDE STEEL GRADE, MEMBER SIZES AND LENGTHS, BOLTED AND/OR WELDED CONNECTION DETAILS, AND SURFACE FINISHES.

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	GENERAL NOTES - 1		
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
DESIGNED BY	AKMO	CHECKED BY	EO
DRAWN BY	CO	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE	DATE		
JOB NO. W# - #			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVER	FILE NUMBER

## GENERAL NOTES:

## WOOD :

- A. ALL WOOD STRUCTURAL MEMBERS MUST BE DOUGLAS FIR-LARCH MEETING THE FOLLOWING MINIMUM GRADES AS ESTABLISHED BY THE WEST COAST LUMBER INSPECTION BUREAU:

COMPONENT	GRADE
4X	NO. 1
2X JOISTS, RAFTERS, STUDS, PLATES, BLOCKING, WALL STUDS ETC	NO. 2

- B. MAXIMUM MOISTURE CONTENT MUST NOT EXCEED 18% FOR ALL STRUCTURAL MEMBERS.  
C. PROVIDE STANDARD WASHERS UNDER ALL HEADS AND NUTS OF ALL BOLTS AND LAG SCREWS BEARING ON WOOD.  
D. BOLT HOLES MUST BE NOMINAL DIAMETER OF BOLT PLUS 1/16" UNLESS OTHERWISE NOTED.  
E. HOLES THROUGH JOISTS, PLATES, AND STUDS MUST BE CENTERED IN THE MEMBER AND MUST NOT EXCEED 1/3 THE MEMBER DEPTH. ALL HOLES MUST BE BORED. HOLES IN JOISTS MUST BE LIMITED TO THE MIDDLE THIRD OF THE SPAN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.  
F. STRUCTURAL MEMBERS MUST NOT BE CUT OR NOTCHED UNLESS SPECIFICALLY SHOWN, NOTED, OR APPROVED BY THE ENGINEER.  
G. ALL PRE-FABRICATED METAL CONNECTORS INDICATED ON DRAWINGS ARE "SIMPSON STRONG TIE" CONNECTORS. FOLLOW NAILING SCHEDULE AS SPECIFIED BY MANUFACTURER.  
H. MINIMUM NAILING MUST COMPLY WITH TABLE 2304.9.1 OF THE INTERNATIONAL BUILDING CODE UNLESS NOTED OTHERWISE. SUBSTITUTIONS FOR FRAMING HARDWARE MUST NOT BE USED UNLESS APPROVED.  
I. ALL WOOD STRUCTURAL MEMBERS MUST BE PRESSURE TREATED WITH AN APPROVED PROCESS TO PROTECT AGAINST ROT AND INSECT DAMAGE.  
J. PLYWOOD SHEATHING MUST BE APA RATED SHEATHING, EXPOSURE 1, CONFORMING TO U.S. COMMERCIAL STANDARD PS 1.  
K. LAY ALL ROOF AND FLOOR SHEATHING WITH FACE GRAIN ACROSS SUPPORTS, STAGGERED.  
L. PROVIDE 15# FELT BELOW ALL PLATES RESTING ON CONCRETE OR MASONRY.  
M. PROVIDE SIMPSON H2.5 HURRICANE TIES BETWEEN RAFTER AND TOP PLATE AT ALL EAVE RAFTERS.  
N. PROVIDE 2x CONTINUOUS STRUCTURAL FASCIA AT ALL EAVES. DO NOT SPLIC FASCIA WITHIN 12'-0" OF CORNERS.  
O. ALL WASHERS, NAILS, BOLTS, STEEL PLATES, AND METAL CONNECTORS MUST BE HOT-DIPPED GALVANIZED.

## PREFABRICATED WOOD TRUSSES :

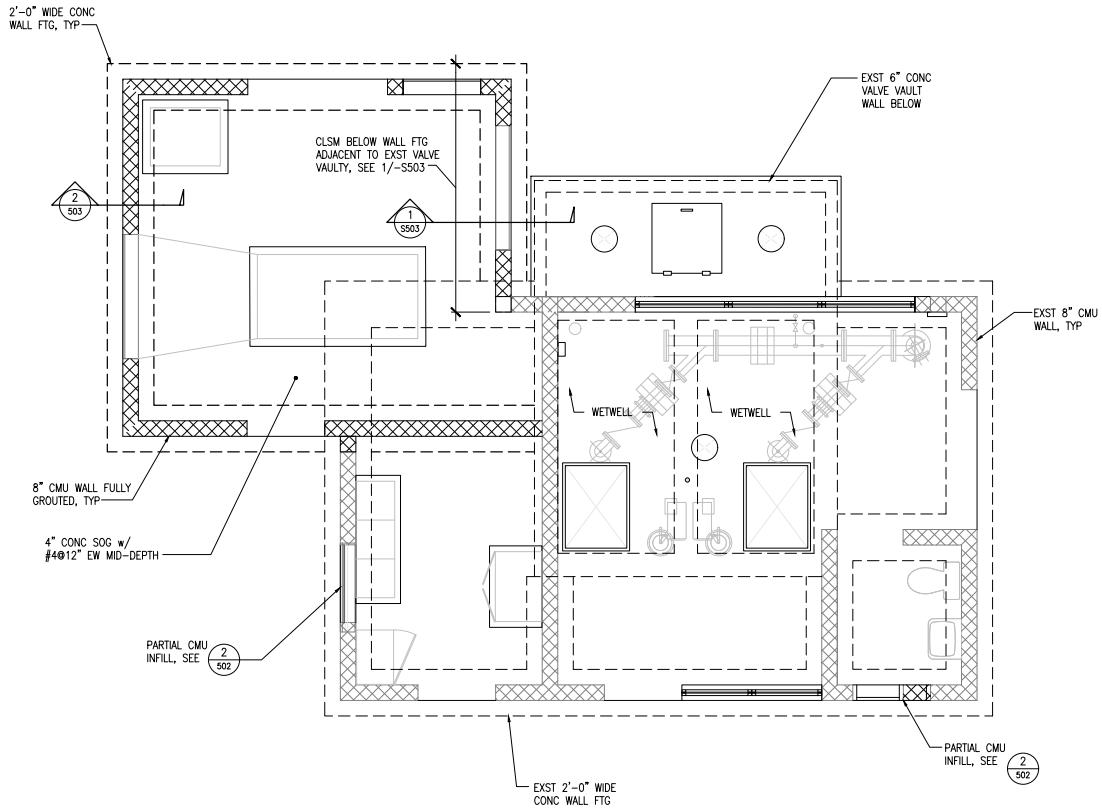
- A. PREFABRICATED WOOD TRUSSES SHALL CONFORM TO THE "DESIGN SPECIFICATION FOR METAL PLATE CONNECTED WOOD TRUSS" AS ADOPTED BY THE TRUSS PLATE INSTITUTE.  
B. ALL TRUSS MEMBERS SHALL BE DOUGLAS FIR NO. 2 OR BETTER.  
C. ALL TRUSS CONNECTOR PLATES, NAILS AND FASTENERS SHALL BE GALVANIZED STEEL.  
D. ALL TRUSSES SHALL BE DESIGNED BY THE FABRICATOR TO FIT DIMENSIONS NOTED ON THE PLANS FOR THE FOLLOWING MINIMUM LOADS:

DEAD LOAD AT TOP CHORD	10 PSF
LIVE LOAD AT TOP CHORD	20 PSF
DEAD LOAD AT BOTTOM CHORD	4 PSF
TYPICAL "NET" UPLIFT AT TOP CHORD (0.6D+0.6W)	40 PSF
TYPICAL "NET" UPLIFT AT EAVE (0.6D+0.6W)	57 PSF

- E. ALL TRUSSES SHALL SATISFY STRESS AND DEFLECTION REQUIREMENTS. ALLOWABLE TOTAL LOAD DEFLECTION SHALL BE SPAN/240, BUT NEVER MORE THAN 1".  
F. WEB CONFIGURATION SHOWN ON ELEVATIONS ARE SCHEMATIC ONLY. TRUSS MANUFACTURER SHALL DETERMINE ACTUAL WEB AND CHORD SIZES AND CONFIGURATION. VERIFY SIZE OF TOP CHORD NOTED ON ELEVATIONS.  
G. ALL TRUSS MEMBERS SHALL BE PRESSURE TREATED WITH AN APPROVED PROCESS TO PROTECT AGAINST ROT AND INSECT DAMAGE.  
H. THE CONTRACTOR SHALL SUBMIT THE FOLLOWING FOR REVIEW PRIOR TO STARTING FABRICATION:  
1. FABRICATION AND ERECTION DRAWINGS SHOWING TRUSS LOCATIONS, MEMBER SIZES, CRITICAL DIMENSIONS, CONNECTOR PLATES, PLATE DIMENSIONS AND CAPACITIES STAMPED BY A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF HAWAII.  
2. DESIGN CALCULATIONS, PREPARED AND STAMPED BY A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF HAWAII.  
I. CONTRACTOR SHALL PROVIDE THE STRUCTURAL ENGINEER OF RECORD AN OPPORTUNITY FOR INSPECTION OF THE INSTALLATION PRIOR TO CEILING INSTALLATION.  
J. LAY ALL ROOF AND FLOOR SHEATHING WITH FACE GRAIN ACROSS SUPPORTS, STAGGERED.  
K. PROVIDE 15# FELT BELOW ALL PLATES RESTING ON CONCRETE OR MASONRY.  
L. AT ALL SOLE PLATES RESTING ON CONCRETE, PROVIDE 5/8" DIAMETER ANCHOR BOLTS OR EXPANSION ANCHORS AT 34" ON CENTER AND AT ALL WALL ENDS, CORNERS, AND AT ALL DOOR AND WINDOW JAMB LOCATIONS, UNLESS OTHERWISE NOTED.

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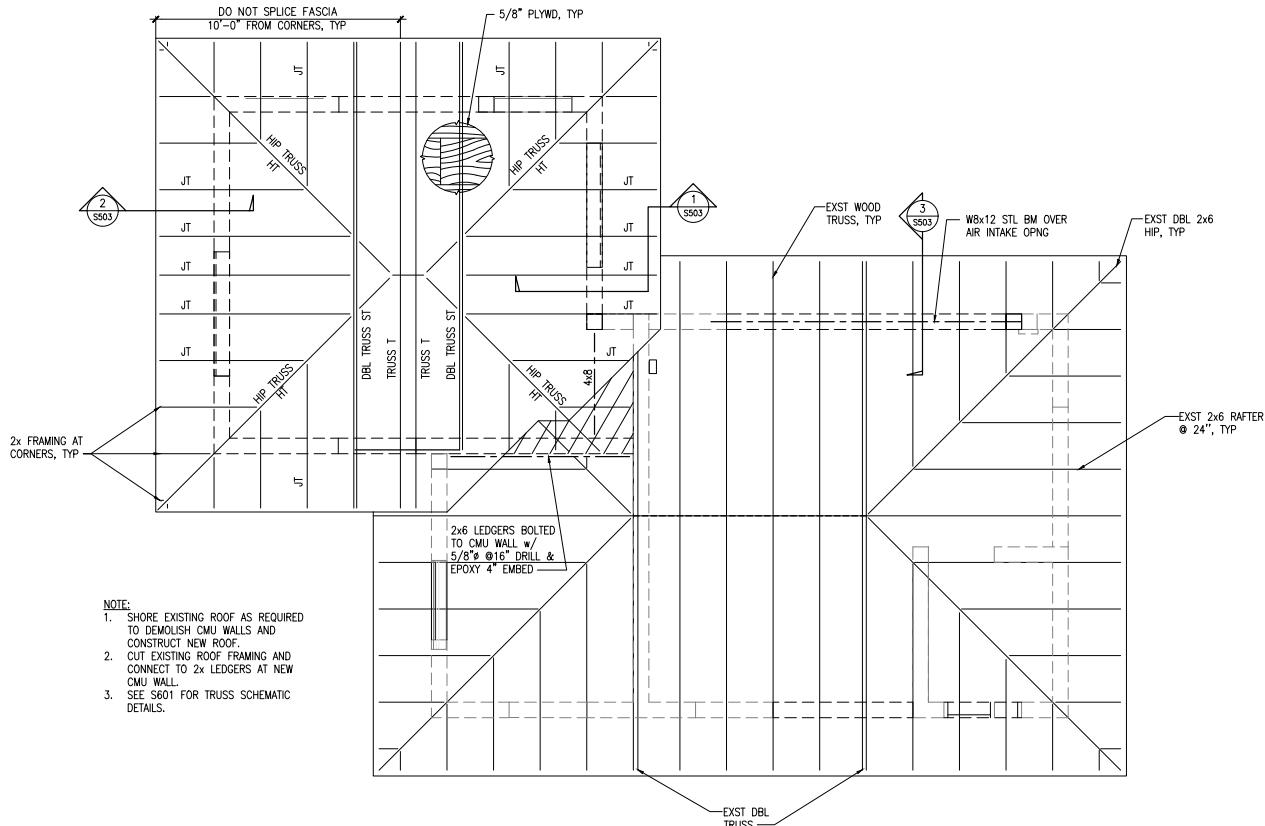
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION	DESIGNED BY	AKMO	CHECKED BY
	DRAWN BY	CO	EO
	APPROVED BY		
SIGNATURE	DATE		
GENERAL NOTES - 2			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	FOUNDATION PLAN		
DESIGNED BY	AKMO	CHECKED BY	EO
DRAWN BY	CO	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	OWNER

**A** FOUNDATION PLAN  
S101 SC: 3/8" = 1'-0"



**LEGEND:**  
/ / / DENOTES BUILT-UP 2x ROOF FRAMING

**(A) ROOF FRAMING PLAN**  
 S102 SC: 3/8" = 1'-0"

**60% SUBMITTAL**

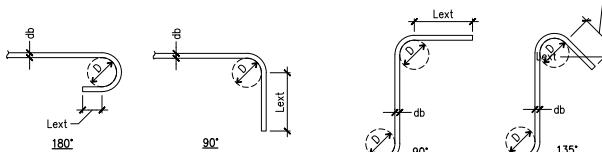
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	ROOF FRAMING PLAN		
DESIGNED BY	AKMO	CHECKED BY	EO
DRAWN BY	CO	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-#			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET

MIN. LAP SPLICING SCHEDULE		
BAR SIZE	f'c = 3,000 psi	f'c = 4,000 psi
#3	28"	24"
#4	37"	33"
#5	47"	41"
#6	56"	49"
#7	81"	71"
#8	93"	81"
#9	105"	91"
#10	116"	102"
#11	131"	113"

MIN. DEVELOPMENT LENGTH SCHEDULE			
BAR SIZE	f'c = 3,000 psi	f'c = 4,000 psi	
	Straight Bars	Hooked Bars	Straight Bars
#3	22"	6"	19"
#4	29"	6"	25"
#5	36"	8"	31"
#6	43"	11"	37"
#7	63"	13"	54"
#8	72"	16"	62"
#9	81"	20"	70"
#10	91"	23"	79"
#11	101"	27"	87"

BAR SIZE	180° HOOKS		90° HOOKS	
	D	Lext	D	Lext
#3	2 1/4"	2 1/2"	2 1/4"	4 1/2"
#4	3"	2 1/2"	3"	6"
#5	3 3/4"	2 1/2"	3 3/4"	7 1/2"
#6	4 1/2"	3"	4 1/2"	9"
#7	5 1/4"	3 1/2"	5 1/4"	10 1/2"
#8	6"	4"	6"	1'-0"
#9	9"	4 1/2"	9"	1'-1 1/2"

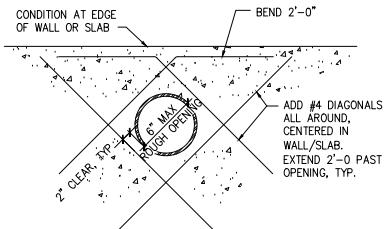
BAR SIZE	D	90° HOOK	135° HOOK
#3	1 1/2"	3"	3"
#4	2"	3"	3"
#5	2 1/2"	3 3/4"	3 3/4"



END HOOKS

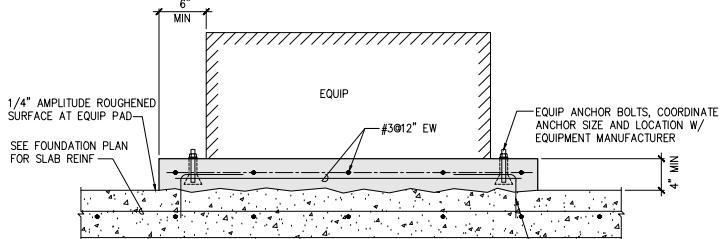
STIRRUPS & TIE HOOKS

1 TYP LAP SPLICING AND DEVELOPMENT LENGTH SCHEDULE  
S501 SC: NOT TO SCALE



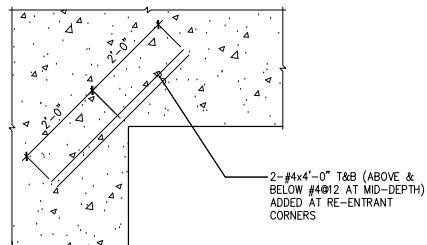
NOTE:  
1. COORDINATE SLEEVE/CONDUIT SIZE WITH OTHER DISCIPLINES.

3 TYP PIPE PENETRATION THRU CONC WALL/SLAB  
S501 SC: NOT TO SCALE

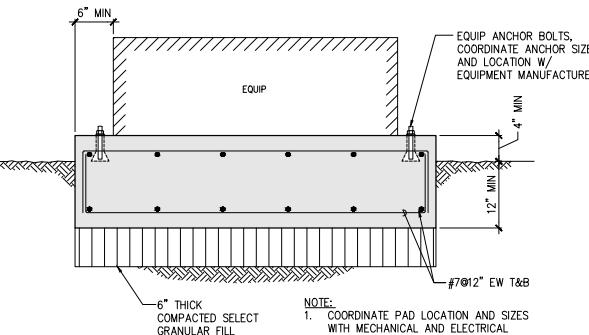


NOTE:  
1. COORDINATE PAD LOCATION AND SIZES WITH MECHANICAL, ELECTRICAL, AND PROCESS DRAWINGS, AND MANUFACTURER RECOMMENDATIONS.  
2. PROVIDE PAD EDGE 6" MINIMUM FROM EDGE OF EQUIPMENT, UNLESS OTHERWISE NOTED OR CONSTRAINED BY CLEARANCES TO ADJACENT WALLS, TRENCHES, ETC.

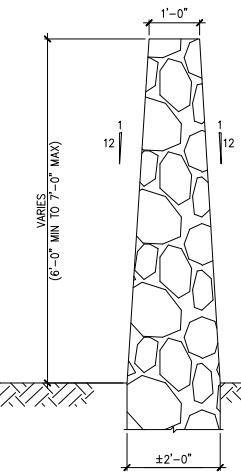
6 INTERIOR EQUIPMENT PAD DETAIL  
S501 SC: NOT TO SCALE



2 TYP STANDARD HOOK DETAIL  
S501 SC: NOT TO SCALE



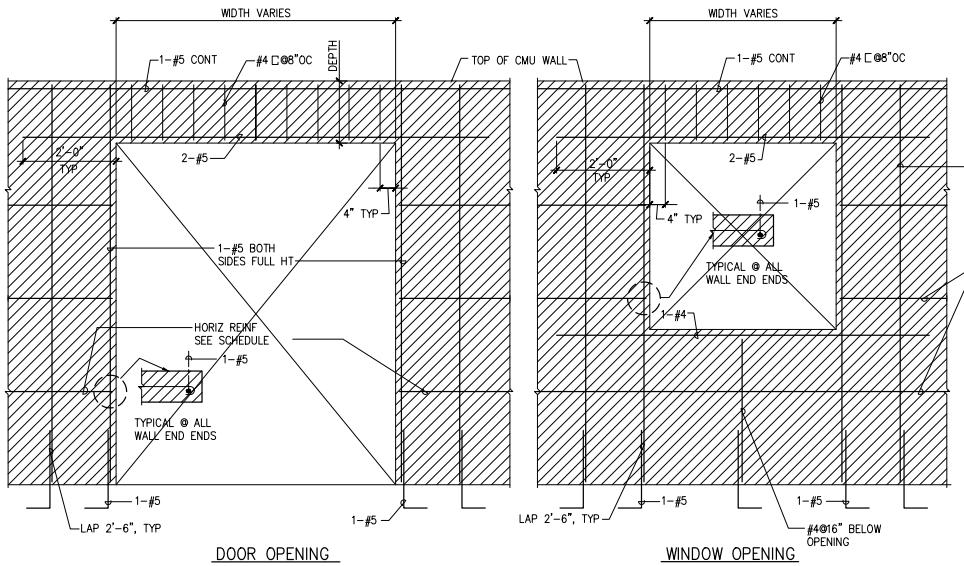
7 EXTERIOR EQUIPMENT PAD DETAIL  
S501 SC: NOT TO SCALE



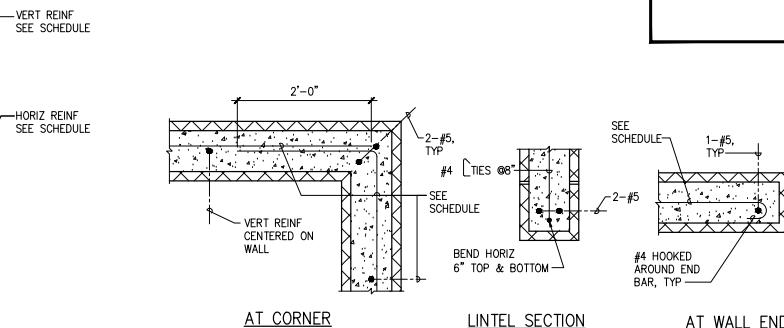
5 ROCK WALL DETAIL  
S501 SC: NOT TO SCALE

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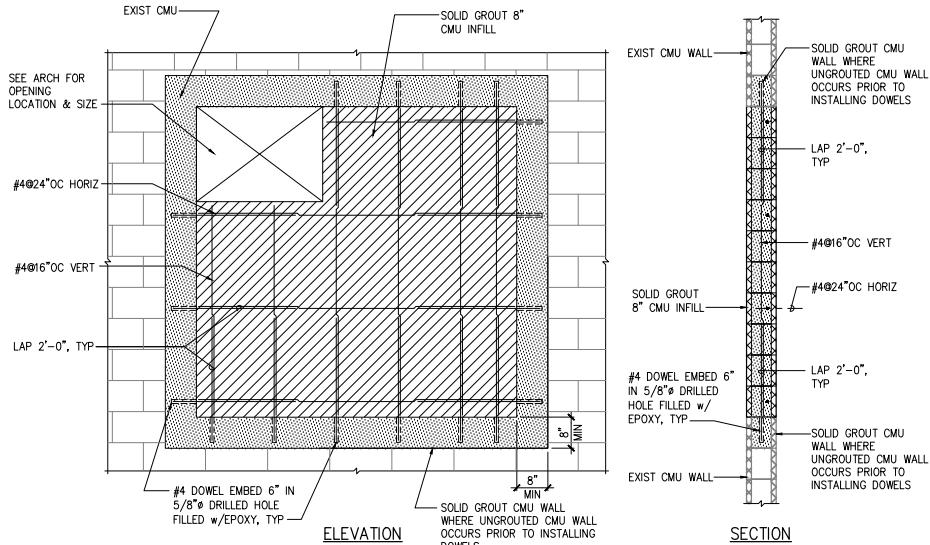
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	ITEM DETAILS - 1		
DESIGNED BY	AKM&O	CHECKED BY	EO
DRAWN BY	CO	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-#			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAWN BY	FILE NUMBER	FILE NUMBER



8" WALL REINFORCING SCHEDULE (UNLESS NOTED OTHERWISE)					
WALL TYPE	t	HORIZONTAL REINFORCING		VERTICAL REINF.	
		SIZE & SPACING	SPLICE LENGTH	SIZE & SPACING	SPLICE LENGTH
TYPICAL	8"	#4@16"	2'-0"	#5@16"	2'-6"



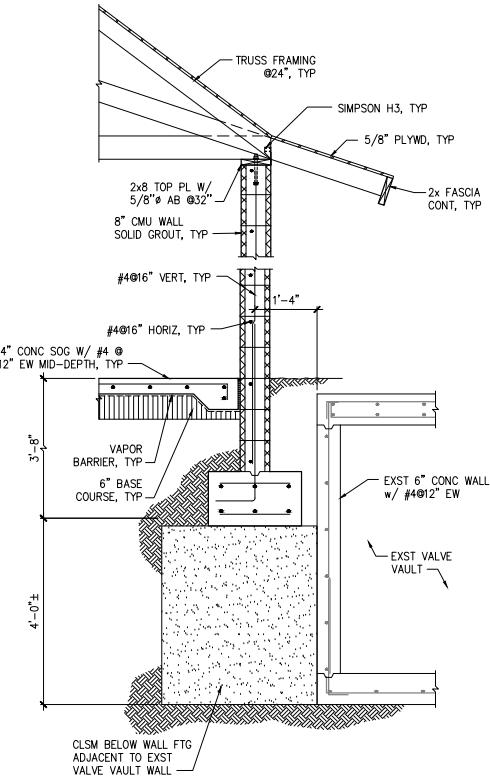
1 TYPICAL CMU WALL DETAILS & SCHEDULE  
SC: NOT TO SCALE



2 TYPICAL CMU PARTIAL INFILL DETAIL  
SC: NOT TO SCALE

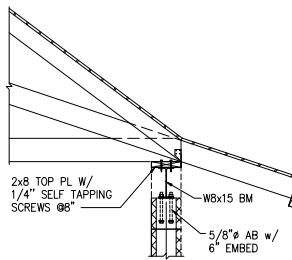
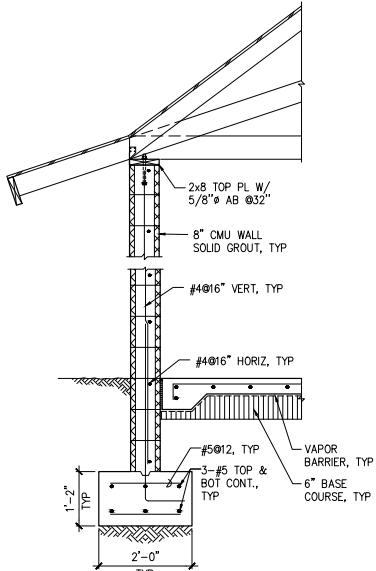
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REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	TYPICAL DETAILS - 2		
DESIGNED BY	AKMO	CHECKED BY	EO
DRAWN BY	CO	SECTION HEAD	
APPROVED		BRANCH HEAD	
SIGNATURE			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	OWNER
JOB NO. W#-##			

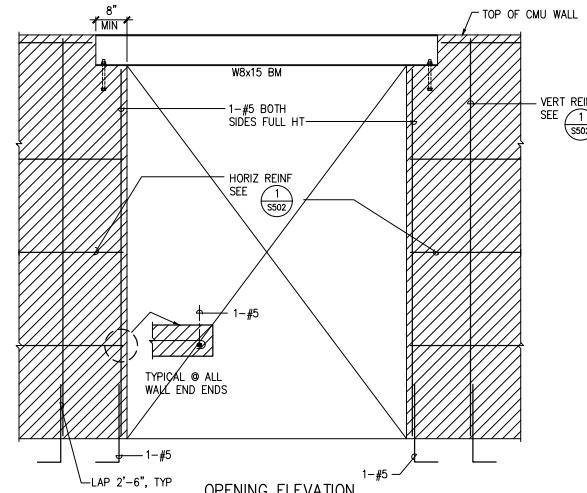


1 SECTION - WALL FOOTING AT VALVE VAULT  
S503 SC: NOT TO SCALE

2 SECTION - WALL FOOTING TYP  
S503 SC: NOT TO SCALE



HEADER SECTION

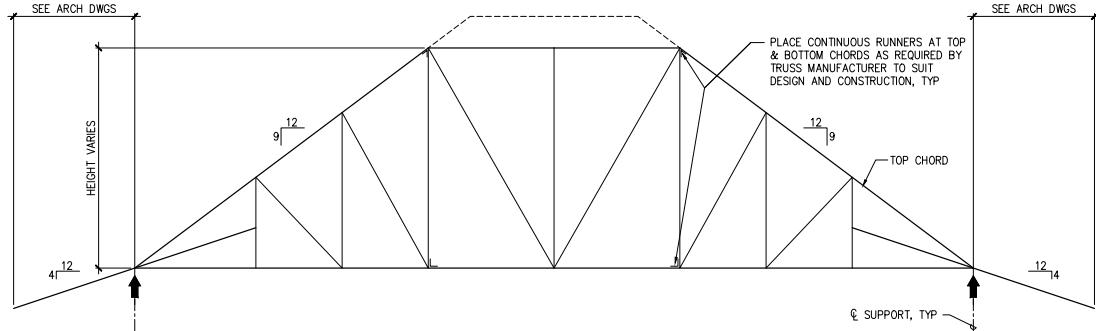


OPENING ELEVATION

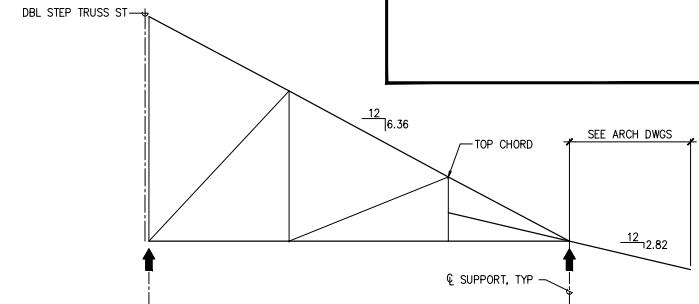
3 DETAIL - AIR INTAKE OPENING  
S503 SC: NOT TO SCALE

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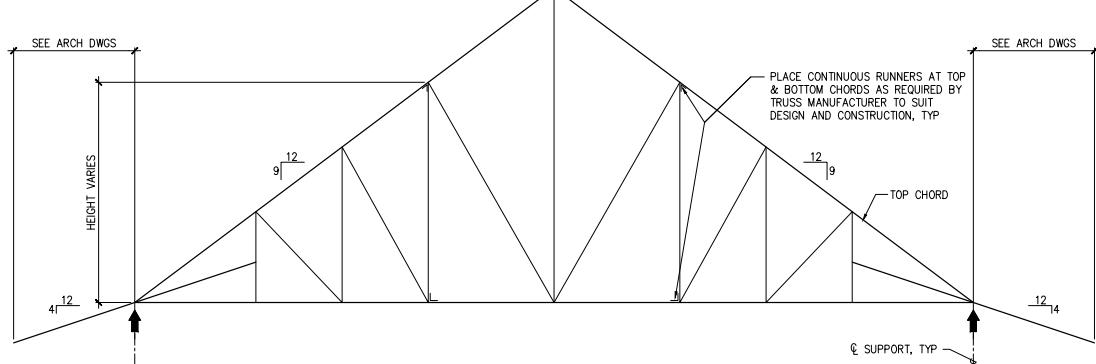
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	STRUCTURAL DETAILS - 1		
DESIGNED BY	AKMO	CHECKED BY	EO
DRAWN BY	CO	SECTION HEAD	
APPROVED			
SIGNATURE			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAWN BY	FILE NUMBER	FILE NUMBER
JOB NO. W#-##			



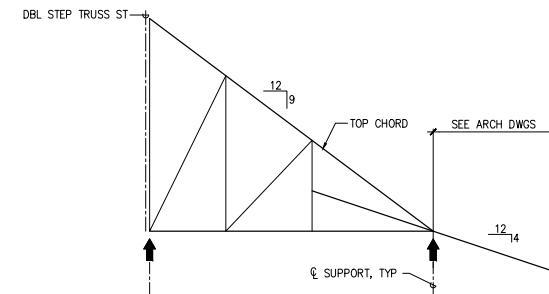
**1a** STEP TRUSS (ST)  
S601 NOT TO SCALE



**1b** HIP TRUSS (HT)  
S601 NOT TO SCALE



**1c** TRUSS (T)  
S601 NOT TO SCALE



**1d** JACK TRUSS (JT)  
S601 NOT TO SCALE

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	TRUSS SCHEMATIC ELEVATIONS		
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY	AKMO	CHECKED BY	EO
DRAWN BY	CO	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRAFTER	FILE NUMBER	POLICE NO.

**1** TRUSS SCHEMATIC ELEVATIONS  
S601 NOT TO SCALE

GENERAL LEGEND & ABBREVIATIONS					
SYMBOLS	ABBREVIATIONS	DESCRIPTIONS	SYMBOLS	ABBREVIATIONS	DESCRIPTIONS
AFF	ABOVE FINISHED FLOOR		IC	INDIVIDUAL CONTROLLER	
AHU	AIR HANDLING UNIT		MAX	MAXIMUM	
AI	ANALOG INPUT		MIN	MINIMUM	
AO	ANALOG OUTPUT		M	MOTOR	
AP	ACCESS PANEL		MV	MOTORIZED VALVE	
ARCH	ARCHITECTURAL	+ + +		MOTORIZED DAMPER	
BV	BALL VALVE	CV		3-WAY MODULATING CONTROL VALVE	
BV	BUTTERFLY VALVE	MPV		MOTORIZED PLUG VALVE	
CB	CIRCUIT BREAKER		OA	OUTSIDE AIR	
CV	CHECK VALVE		OL	OVERLOAD	
CD	CONDENSATE DRAIN		PFRR	PHASE FAILURE AND REVERSAL RELAY	
CHWR	CHILLED WATER RETURN		PH	PHASE	
CHWS	CHILLED WATER SUPPLY		PRV	PRESSURE REDUCING VALVE	
CLG	CEILING	171	PV	PLUG VALVE	
CLR	CLEARANCE	— + —	POC	POINT OF CONNECTION	
CO	CLEAN OUT	○—		PRESSURE GAUGE	
CONCEALED OPERATOR VOLUME DAMPER		□	RA	RETURN AIR	
CONCRETE		□ + +	RAR	RETURN AIR REGISTER	
CONNECTION			RAV	RETURN AIR VALVE	
CONTINUATION			RHC	REHEAT COIL	
CR	CONTROL RELAY		RTD	RESISTANCE TEMPERATURE DETECTOR	
DDC	DIRECT DIGITAL CONTROL	☒	SA	SUPPLY AIR	
DI	DIGITAL INPUT	→ ☒ →	SAD	SUPPLY AIR DIFFUSER	
DIA	DIAMETER	→ □ —	SAR	SUPPLY AIR REGISTER	
DPS	DIFFERENTIAL PRESSURE SENSOR		SAV	SUPPLY AIR VALVE	
PI	MANUAL INDICATING DIFF. PRESSURE INDICATOR		SL	SLOPE IN DIRECTION OF ARROW	
DPS	DIFFERENTIAL PRESSURE SWITCH	△—	SD	SMOKE DAMPER	
DN	DOWN	④ + +	SD	SMOKE DETECTOR	
DO	DIGITAL OUTPUT	7'	STRAINER		
DWGS	DRAWINGS		SS	STAINLESS STEEL	
EA	EXHAUST AIR	④	SPS	STATIC PRESSURE SENSOR	
EAR	EXHAUST AIR REGISTER		STRUCT	STRUCTURAL	
EF	EXHAUST FAN	▨▨▨	TBD	TO BE REMOVED OR DEMOLISHED	
ELEC	ELECTRICAL	■■■	NEW WORK		
EXH	EXHAUST		TAR	TRANSFER AIR REGISTER	
EXST	EXISTING		TB	TERMINAL BLOCK	
FHAV	FUME HOOD AIR VALVE		TDR	TIME DELAY RELAY	
FID	FIELD INTERFACE DEVICE		TEMP	TEMPERATURE	
FIN FLR	FINISHED FLOOR	④	TE	TEMPERATURE ELEMENT	
FD	FIRE DAMPER (HORIZONTAL)	④ + +	TS	TEMPERATURE SENSOR	
FD	FIRE DAMPER (VERTICAL)	—	TM	THERMOMETER	
FS	FIRE/SMOKE DAMPER (HORIZONTAL)	④	T-STAT	THERMOSTAT	
FS	FIRE/SMOKE DAMPER (VERTICAL)	—	TYP	TYPICAL	
FC	FLOW CONNECTION		UNION		
FC	FLOW CONTROL	V	VOLTS		
FE	FLOW ELEMENT		VAV	VARIABLE AIR VOLUME	
FS	FLOW SWITCH	— 1°	VD	VOLUME DAMPER	
GEAV	GENERAL EXHAUST AIR VALVE		VFD	VARIABLE FREQUENCY DRIVE	
H-O-A	HAND-OFF-AUTO	④	AL	AMBER PILOT LIGHT	
HEPA	HIGH EFFICIENCY PARTICULATE ARRESTANCE	④	GP	GREEN PILOT LIGHT	
HS	HUMIDITY SENSOR	④	RP	RED PILOT LIGHT	

CITY AND COUNTY OF HONOLULU REVISED ORDINANCES OF HONOLULU 2021 CHAPTER 16B		
To the best of my knowledge, this project's design substantially conforms to the Building Energy Conservation Code for:		
<input type="checkbox"/>	BUILDING COMPONENT SYSTEMS	
<input type="checkbox"/>	ELECTRICAL COMPONENT SYSTEMS	
<input checked="" type="checkbox"/>	MECHANICAL COMPONENT SYSTEMS	
Signature: CAREY S. NAKAGAWA Date: _____		
Name: CAREY S. NAKAGAWA Title: _____		
License No.: _____		

**60% SUBMITTAL**

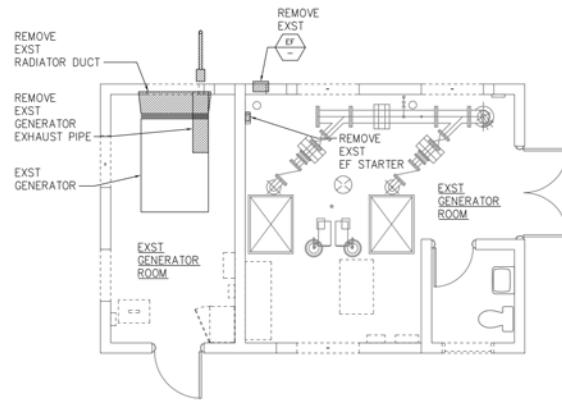
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: _____			
ITEM: _____			
LEGEND AND ABBREVIATIONS			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	YKY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	_____
APPROVED:	BRANCH HEAD: _____		
SIGNATURE: _____ DATE: _____			
CASH: _____ DATE: _____			
JOB NO. _____			
EXPIRATION DATE OF THE LICENSE: _____			
FILE NUMBER:	DRIVEN BY:	FILE NUMBER:	FILE NUMBER:

## MECHANICAL NOTES

1. CONTRACTOR SHALL VERIFY ALL CONDITIONS PRIOR TO FABRICATION, INSTALLATION AND COMMENCEMENT OF ALL WORK TO BE DONE. COORDINATE ALL WORK TO BE DONE WITH OTHER TRADES.
2. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER.
3. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES AND FIELD CONDITIONS AFFECTING OR AFFECTED BY THIS INSTALLATION. SHOULD CONFLICTS OCCUR, THE OWNER SHALL BE NOTIFIED IMMEDIATELY.
4. SCHEDULING OF ALL ON-SITE CONSTRUCTION WORK SHALL BE IN ACCORDANCE WITH THE APPROVED CONSTRUCTION SCHEDULE. SEQUENCE ON-SITE WORK TO MINIMIZE DISRUPTIONS (e.g. NOISE, DUST, ODORS, ETC.) TO THE NORMAL OPERATION OF THE TENANTS. PROVIDE BARRICADES, TEMPORARY BARRIERS, ETC AS REQUIRED TO SEPARATE THE CONSTRUCTION WORK AREA FROM THE TENANT'S WORK AREAS AND PROVIDE SAFE WORKING CONDITIONS.
5. AIR CONDITIONING OUTAGES INCLUDING SHUTDOWN OF ANY PORTION, OF OR THE COMPLETE AIR CONDITIONING SYSTEM FOR REASONED WIRE PIPING CONNECTIONS, ELECTRIC SYSTEM CONNECTIONS, DUCT CONNECTIONS, ETC. SHALL BE SUBMITTED FOR APPROVAL AND SHOWN ON THE CONSTRUCTION SCHEDULE BY THE CONTRACTOR. THE OWNER WILL LIMIT THE NUMBER OF OUTAGES AND THE DURATION OF EACH OUTAGE. AN ADEQUATE AIR CONDITIONING SYSTEM SHALL BE OPERATIONAL (I.E. MAXIMUM SPACE TEMPERATURE OF 78°F THROUGHOUT THE SPACE) BY 6 AM FOLLOWING THE APPROVED OUTAGE. LOUD NOISE PRODUCING CONSTRUCTION ACTIVITIES SHALL ALSO BE SCHEDULED FOR THE AFTER NORMAL HOURS PERIOD UNLESS APPROVED BY THE OWNER. SEE SPECIFICATIONS FOR FURTHER REQUIREMENTS AND RESTRICTIONS FOR UTILITY INTERRUPTIONS.
6. CONTRACTOR SHALL COORDINATE LOCATION OF NEW DUCTWORK AND MAKE ADJUSTMENTS TO AVOID INTERFERENCE WITH EXISTING CONDUIT, BEAMS AND FRAMING.
7. CONTRACTOR SHALL VERIFY ALL REFRIGERANT PIPING PRIOR TO DEMOLITION. NEW REFRIGERANT PIPING SHALL BE SAME SIZE AS EXISTING.
8. ALL ITEMS ARE NEW UNLESS OTHERWISE NOTED. ALL EXISTING EQUIPMENT AND OTHER ITEMS SHALL REMAIN UNLESS OTHERWISE NOTED.
9. PROVIDE DIELECTRIC CONNECTIONS AT ALL FERROUS TO COPPER CONNECTIONS.
10. PROVIDE FIRE STOPPING AT ALL PIPE AND DUCT PENETRATIONS THROUGH FIRE RATED WALLS AND SMOKE WALLS AND FLOORS.
11. PATCH AND PAINT ALL SURFACES Affected BY SELECTIVE DEMOLITION TO MATCH ADJACENT AND/OR EXISTING CONDITIONS. OBTAIN APPROVAL OF MATCHING MATERIAL.
12. PROVIDE HOT DIPPED GALVANIZED COATING ON ALL EXTERIOR PIPING AND DUCT SUPPORTS. PROVIDE EPOXY COATING OVER GALVANIZING.
13. CONTROL CABLING SHALL BE GROUPED IN THE CEILING AND LABELED EVERY 20 FEET.
14. CONTRACTOR SHALL PROVIDE SUPPLEMENTAL STEEL FOR SUPPORT OF DUCTS, PIPING AND OTHER MECHANICAL EQUIPMENT AS INDICATED OR IN STRUCTURAL DRAWINGS. DO NOT DRILL STRUCTURAL STEEL OR JOISTS.
15. INSTALLATION OF ELECTRICAL ITEMS (E.G. CABLE TRAYS, CONDUITS, ETC.) IN THE CEILING CAVITY SHALL BE CLOSELY COORDINATED WITH ALL TRADES (I.E. HVAC, FIRE PROTECTION SYSTEMS, ETC.) TO AVOID CONFLICTS AND TO INSURE PROPER CLEARANCES ARE MET.
16. ALL MOTOR CONTROLLERS AND CONTROL PANELS SHALL BE INSTALLED WITH CLEARANCE SPACES IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE.
17. UNLESS OTHERWISE INDICATED, MOUNT ALL WALL MOUNTED MECHANICAL DEVICES, PANELS, SWITCHES, THERMOSTATS, ETC. AT 48 INCHES AFF.
18. ALL ROOF, WALL AND FLOOR PENETRATIONS SHALL BE VERIFIED AND COORDINATED WITH THE STRUCTURAL DRAWINGS.
19. CONTRACTOR SHALL ENSURE THAT ALL EQUIPMENT AND PIPING ARE INSTALLED WITH MANUFACTURER'S RECOMMENDED ACCESS SPACE FOR MAINTENANCE, OPERATION & CODES.
20. FOR ALL WALL MOUNTED THERMOSTATS, SENSORS & SWITCHES, PROVIDE ALL CONDUIT & JUNCTION BOXES IN WALL (INCLUDING CMU WALLS) WHERE CONDITION OCCURS. EXPOSED CONDUIT & JUNCTION BOXES WILL NOT BE ALLOWED.
21. ALL GAPS AT THE PENETRATIONS THROUGH FIRE RATED CEILING AND WALL ASSEMBLIES FOR DUCTS, PIPES, PIPE AND DUCT SUPPORTS, RODS, STRAPS, CONTROL CONDUITS, ETC. SHALL BE SEALED WITH APPROVED FIRESTOPPING MATERIAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS TO MAINTAIN THE FIRE RATING OF THE ASSEMBLY. SEE ARCH DRAWINGS FOR LOCATION OF FIRE RATED WALLS & CEILINGS.
22. STRUCTURES UNDERGOING CONSTRUCTION, ALTERATION OR DEMOLITION OPERATIONS, INCLUDING THOSE IN UNDERGROUND LOCATIONS, SHALL COMPLY WITH NFPA 241 AND CHAPTER 16 OF THE 2018 NFPA 1.
23. THE AIR CONDITIONING & VENTILATION SYSTEM SHALL COMPLY WITH TITLE II, ADMINISTRATIVE RULES, DEPARTMENT OF HEALTH, CHAPTER 39, AIR CONDITIONING & VENTILATING REQUIREMENTS.
24. POINT-OF-CONNECTIONS INDICATED ARE SUGGESTED LOCATIONS. CONTRACTOR MAY, AT HIS OPTION, RELOCATE THE POINT-OF-CONNECTIONS (POC) TO A MORE CONVENIENT LOCATION. ALL EXTRA PIPING AND FITTINGS FOR RELOCATED POC'S SHALL BE PROVIDED AT NO EXTRA COST TO THE OWNER.

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM: MECHANICAL NOTES			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	YXX	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	DATE		
CABINET			
JOB NO.			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



 **MECHANICAL DEMO PLAN**  
SCALE: 1/4" = 1'-0"

**60% SUBMITTAL**

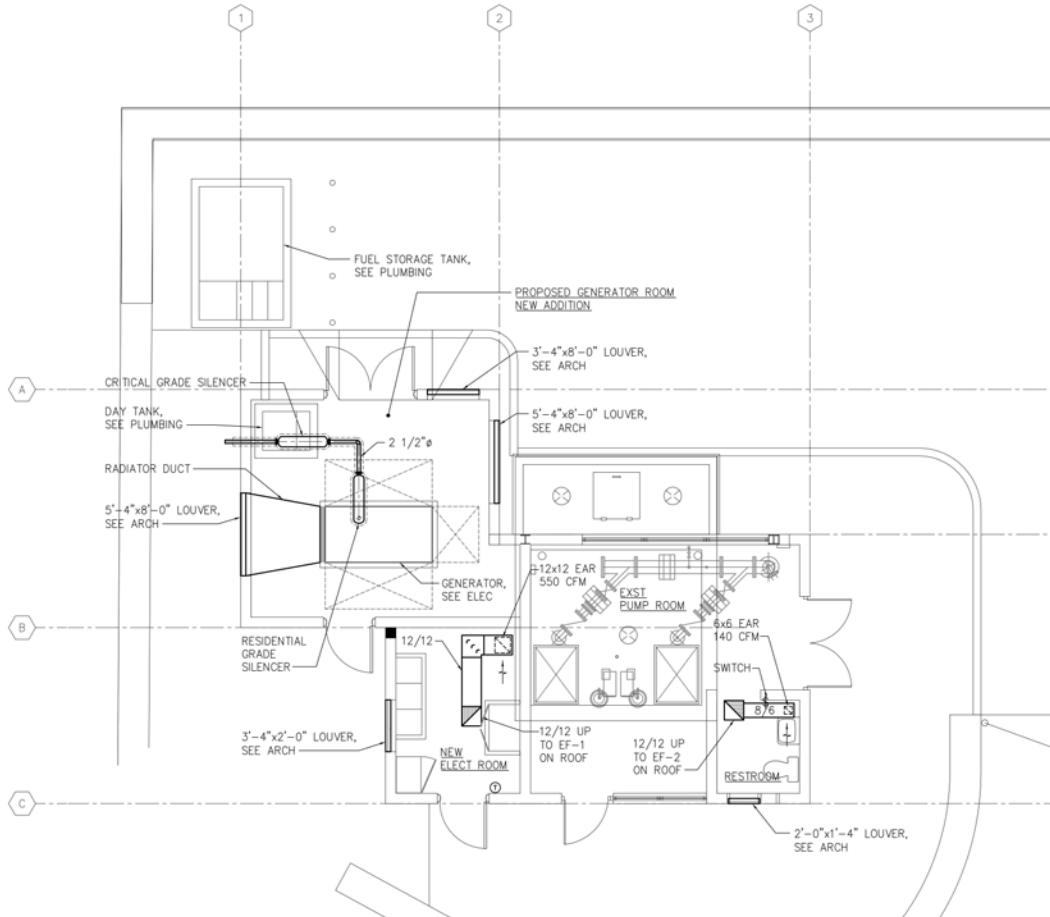
GRAPHIC SCALE

1/4" = 1'-0"      4'      0'      4'      8'      12'

DRAWING M-101

SHEET - OF -

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
MECHANICAL PLAN			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	CHIEF	DATE	
JOB NO.			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER



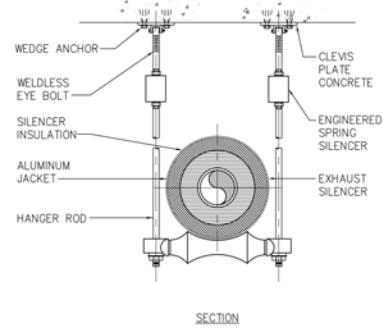
**MECHANICAL PLAN**  
SCALE: 1/4" = 1'-0"

**GRAPHIC SCALE**

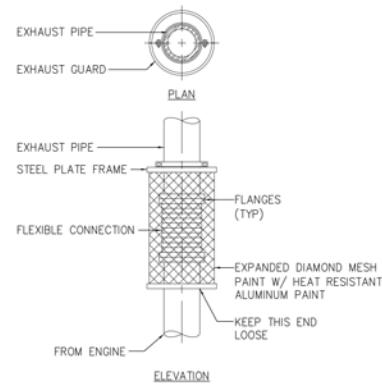
1/4" = 1'-0"      4'      0'      4'      8'      12'

**60% SUBMITTAL**

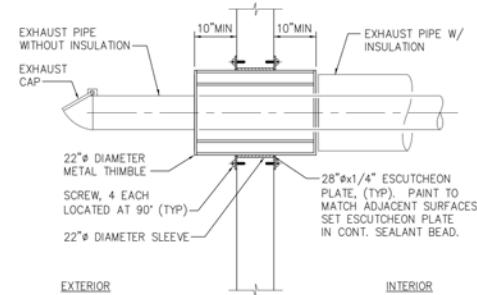
REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
MECHANICAL PLAN			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	CHIEF	DATE	JOB NO.
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



**1 EXHAUST SILENCER HANGER DETAIL**  
M-501 SCALE: NONE



**2 EXHAUST GUARD DETAIL**  
M-501 SCALE: NONE



**3 EXHAUST PIPE PENETRATION DETAIL**  
M-501 SCALE: NONE

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
DETAILS			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	DATE		
JOB NO.			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

EXHAUST FAN SCHEDULE

NO ITEM	AREA SERVED	NO	TYPE	CFM	E.S.P. (W.G.)	DRIVE	MOTOR			POWER	SONES	WEIGHT (LBS)	REMARKS
							HP	ENCLOSURE	FAN RPM				
EF 1	ELEC ROOM	1	PRV	550	0.5	BELT	1/4	TEFC	1,206	115V/1Ø/60HZ	7.4	65	GREENHECK GB-099-4 OR APPROVED EQUAL
EF 2	RESTROOM	1	PRV	140	0.5	BELT	1/4	TEFC	1,209	115V/1Ø/60HZ	5.4	64	GREENHECK GB-097-4 OR APPROVED EQUAL

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM: EQUIPMENT SCHEDULES			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	DATE	JOB NO.	
OPERATOR DATE OF THE LICENSE		FILE NUMBER	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

LEGEND & ABBREVIATIONS		
SYMBOLS	ABBREVIATIONS	DESCRIPTIONS
ABV	ABOVE	
AFF	ABOVE FINISHED FLOOR	
A-LAV	ACCESSIBLE LAVATORY	
A-WC	ACCESSIBLE WATER CLOSET	
AST	ABOVEGROUND FUEL STORAGE TANK	
BV	BALL VALVE	
CV	CHECK VALVE	
CO	CLEANOUT	
CONC	CONCRETE	
CONN	CONNECTION	
CW	COLD WATER	
DN	DOWN	
DT	DAY TANK	
EXST	EXISTING	
FCO	FLOOR CLEANOUT	
FD	FLOOR DRAIN	
FOR	FUEL OIL RETURN	
FOS	FUEL OIL SUPPLY	
FS	FLOOR SINK	
GV	GATE VALVE	
HB	HOSE BIBB	
HW	HOT WATER	
HWR	HOT WATER RETURN	
LAV	LAVATORY	
MS	MOP SINK	
POC	POINT OF CONNECTION	
PV	PLUG VALVE	
RPPB	REDUCED PRESSURE BACKFLOW PREVENTER	
SK	SINK	
S	SOIL/WASTE	
TYP	TYPICAL	
V	VENT	
VTR	VENT THROUGH ROOF	
WC	WATER CLOSET	
WCO	WALL CLEANOUT	
WHA	WATER HAMMER ARRESTOR	

## PLUMBING NOTES

- CONTRACTOR SHALL VERIFY ALL CONDITIONS PRIOR TO FABRICATION, INSTALLATION AND COMMENCEMENT OF ALL WORK TO BE DONE. COORDINATE ALL WORK TO BE DONE WITH OTHER TRADES.
- ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER.
- CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES AND FIELD CONDITIONS AFFECTING OR AFECTED BY THIS INSTALLATION. SHOULD CONFLICTS OCCUR, THE CONTRACTING OFFICER SHALL BE NOTIFIED IMMEDIATELY.
- ALL ITEMS ARE NEW UNLESS OTHERWISE NOTED.
- PROVIDE DIELECTRIC CONNECTIONS AT ALL FERROUS TO COPPER CONNECTIONS.
- CONTRACTOR SHALL PROVIDE SUPPLEMENTAL STEEL FOR SUPPORT OF DUCTS, PIPING AND OTHER MECHANICAL EQUIPMENT AS INDICATED IN STRUCTURAL DRAWINGS. DO NOT DRILL STRUCTURAL STEEL OR JOISTS.
- UNLESS OTHERWISE INDICATED, MOUNT ALL WALL MOUNTED MECHANICAL DEVICES, PANELS, SWITCHES, ETC AT 48" AFF.
- ALL ROOF, WALL AND FLOOR PENETRATIONS SHALL BE VERIFIED AND COORDINATED WITH THE STRUCTURAL DRAWINGS.
- CONTRACTOR SHALL ENSURE THAT ALL EQUIPMENT AND PIPING ARE INSTALLED WITH MANUFACTURER'S RECOMMENDED ACCESS SPACE FOR MAINTENANCE, OPERATION & CODES.
- PROVIDE SEISMIC BRACING AS SPECIFIED AND COMPLIANT WITH 2018 INTERNATIONAL BUILDING CODE.
- ALL GAPS AT THE PENETRATIONS THROUGH FIRE RATED CEILING AND WALL ASSEMBLIES FOR DUCTS, PIPES, PIPE AND DUCT SUPPORTS, RODS, STRAPS, CONTROL CONDUITS, ETC. SHALL BE SEALED WITH APPROVED FIRESTOPPING MATERIAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS TO MAINTAIN THE FIRE RATING OF THE ASSEMBLY. SEE ARCH DRAWINGS FOR LOCATION OF FIRE RATED WALLS & CEILINGS.
- STRUCTURES UNDERGOING CONSTRUCTION, ALTERATION OR DEMOLITION OPERATIONS, INCLUDING THOSE IN UNDERGROUND LOCATIONS, SHALL COMPLY WITH NFPA 241 AND CHAPTER 16 OF THE 2018 NFPA 1.
- COORDINATE ALL ACCESS PANEL LOCATIONS WITH THE ARCHITECTURAL DRAWINGS AND CENTER ON THE EQUIPMENT OR DEVICES IT SERVES (eg WHA, VALVES, ETC). FOR 1 HOUR RATED WALLS AND ROOF/CEILING ASSEMBLIES, PROVIDE MINIMUM 1 HOUR RATED ACCESS PANELS.
- ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST FEDERAL (EPA), STATE AND COUNTY STANDARDS.
- ALL INSTALLATION WORK SHALL COMPLY WITH NFPA 30 AND 70, APPLICABLE FIRE AND ELECTRICAL CODES.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER FUNCTION AND OPERATION OF THE LEAK DETECTION SYSTEM.

## BOARD OF WATER FLOW REQUIREMENTS:

PREMISE ID#: XXXXXXXX

METER NUMBER (M/N): XXXXXXX

DESCRIPTION	E.U.	GPM.	GPD.
A. PROPOSED DOMESTIC: (ALL FIXTURES BEING INSTALLED)	-	-	-
B. PROPOSED AFS:	0		
C. PROPOSED OTHER:	0	0	0
D. TOTAL PROPOSED: (DO NOT INCLUDE IRRIGATION GPM IF LESS THAN DOMESTIC & DONE DURING OFF-PEAK HOURS)	-	-	-
E. DEMOLITION: DOMESTIC (ALL FIXTURES BEING REMOVED) DEMO PERMIT #XXXXXX-XX-XXXX DATE: -	-	-	0
F. DEMOLITION: AFS DEMO PERMIT # N/A DATE: N/A	0		
G. DEMOLITION: OTHER DEMO PERMIT # N/A DATE: N/A	0	0	0
H. TOTAL DEMOLITION (ADD "E", "F", & "G")	-	-	0
I. NET CHANGE: (SUBTRACT "H" FROM "D" ABOVE)	-	-	-
J. EXISTING DOMESTIC TO REMAIN: (OTHER FIXTURES SERVICED BY THIS METER BUT NOT AFECTED BY PROJECT INCLUDING IRRIGATION)	-	-	-
K. EXISTING AFS TO REMAIN: (OTHER AFS SERVICED BY THIS METER BUT NOT AFECTED BY PROJECT)	0		
L. TOTAL EXISTING TO REMAIN: (ADD "J" & "K")	-	-	-
M. GRAND TOTAL: (ADD "D" & "L")	-	-	-

## NOTES:

- A/C WORK WILL NOT AFFECT THE EXISTING WATER METER.
- THERE IS NO IRRIGATION WORK AND DOES NOT AFFECT THIS METER.
- THE EXISTING WATER METER (METER NUMBER: XXXXXXX) IS ADEQUATE TO SERVICE THE AUTOMATIC FIRE SPRINKLER SYSTEM; INCLUSIVE OF THIS PROJECT'S SCOPE OF WORK

## PLUMBING FIXTURES TO BE REMOVED

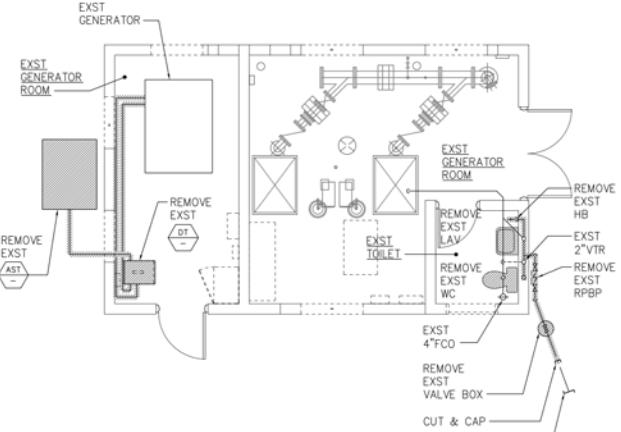
FIXTURE TYPE	QUANTITY	WATER	
		FU/FIX	TOTAL FU
LAVATORY	1	-	-
WATER CLOSET (TANK)	1	-	-
<b>TOTAL FIXTURE UNITS:</b>		-	-
<b>TOTAL GPM:</b>		-	-

\* FIXTURE UNITS FOR PRIVATE SYSTEM SHOWN.

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
LEGEND AND ABBREV PLUMB NOTES			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE			
CROSS-REF:			
JOB NO.			
EXPIRATION DATE OF THE LICENSE		DATE	
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

PLUMBING FIXTURE SCHEDULE					
TAG	DESCRIPTION	CW	HW	DRAIN	VENT
WC	TANK TYPE WATER CLOSET, FLOOR MOUNTED	1	4	2	1.28 GPF
LAV	LAVATORY, WALL MOUNT	3/4	2	2	0.5 GPM



PLUMBING DEMO PLAN

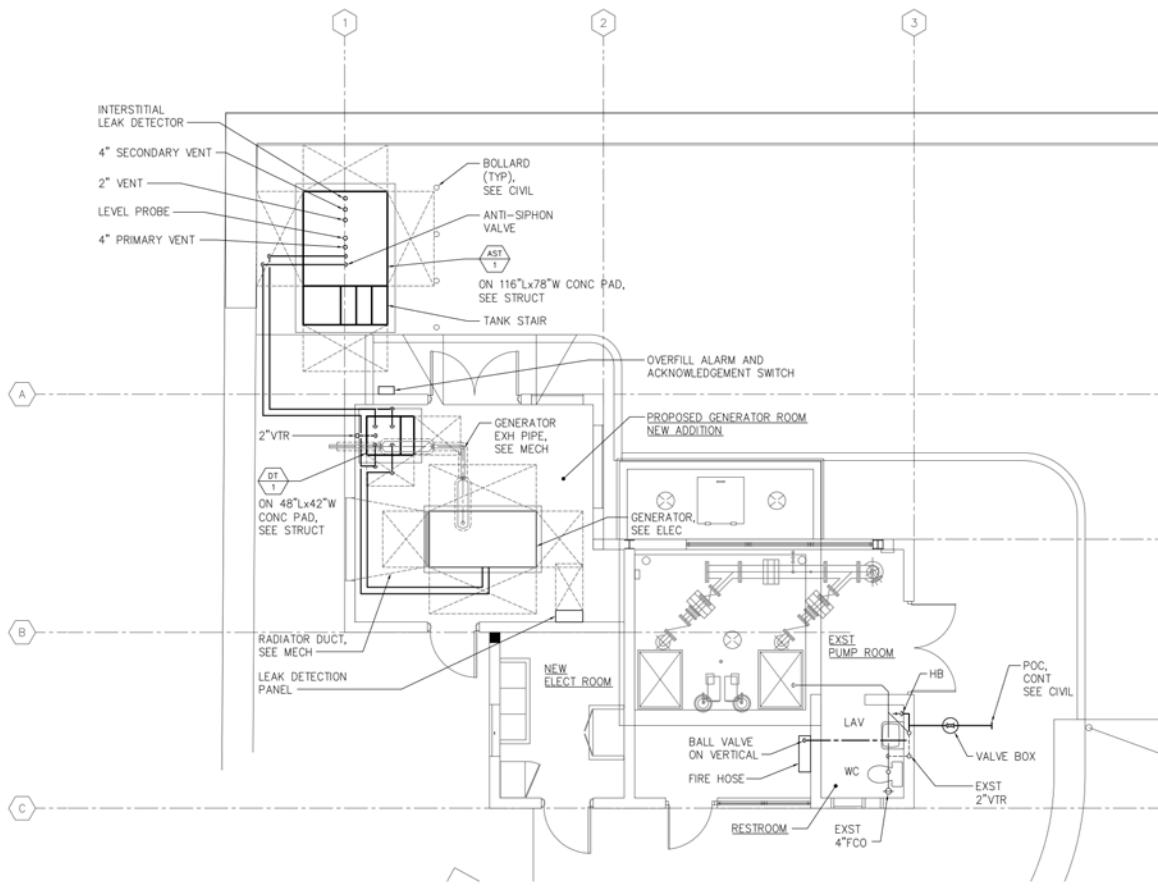
SCALE: 1/4" = 1'-0"

**60% SUBMITTAL**

GRAPHIC SCALE

1/4" = 1'-0"      4'      0'      4'      8'      12'

		BRIEF	BY APPROVED
REVISION	DATE		
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
MECHANICAL PLAN			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	CHIEF	DATE	
JOB NO.			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER



**60% SUBMITTAL**

 PLUMBING PLAN  
SCALE: 1/4" = 1'-0"

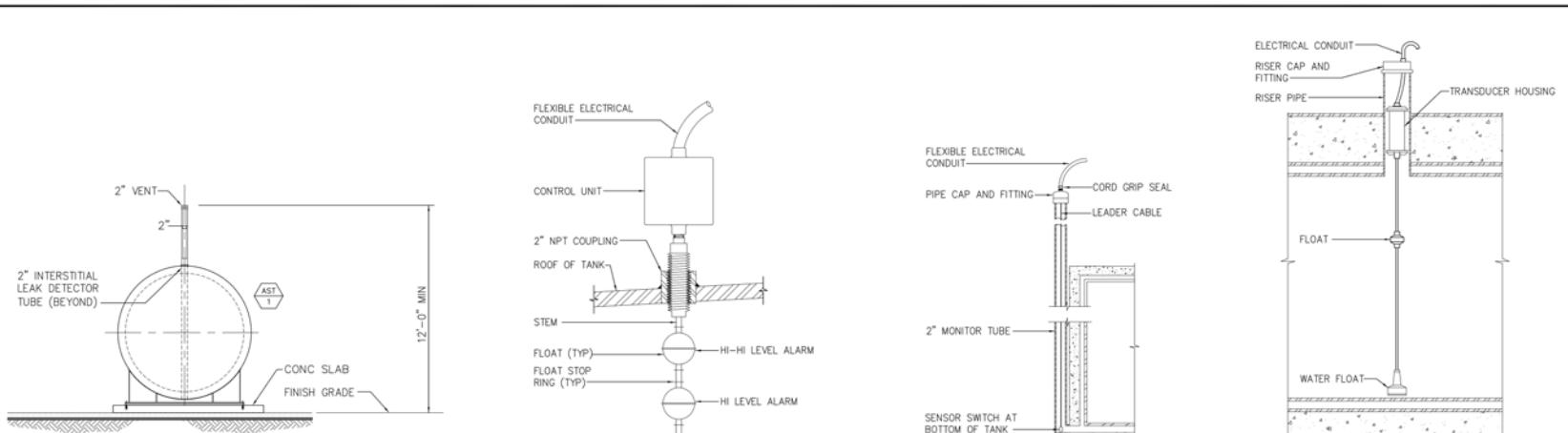
GRAPHIC SCALE

1/4" = 1'-0" 4' 0' 4' 8' 12'

DRAWING P-401

SHEET - OF -

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
PLUMBING PLAN			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED			
SIGNATURE			
JOB NO.			
EXPIRATION DATE OF THE LICENSE		FILE NUMBER	
FILE NUMBER		FILE NUMBER	
DRIVEN		PICKED	
FILE NUMBER		FILE NUMBER	

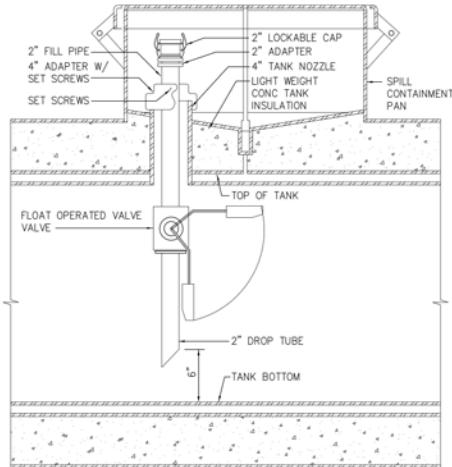


**1 FUEL STORAGE TANK ELEVATION**  
P-501  
SCALE: NONE

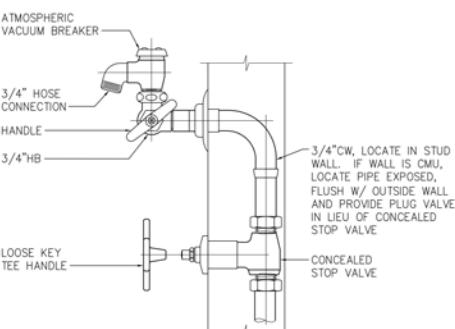
**2 HIGH LEVEL ALARM SWITCH DETAIL**  
P-501  
SCALE: NONE

**3 FUEL STORAGE TANK INTERSTITIAL LEAK DETECTION TUBE DETAIL**  
P-501  
SCALE: NONE

**4 FUEL STORAGE TANK LEVEL PROBE DETAIL**  
P-501  
SCALE: NONE



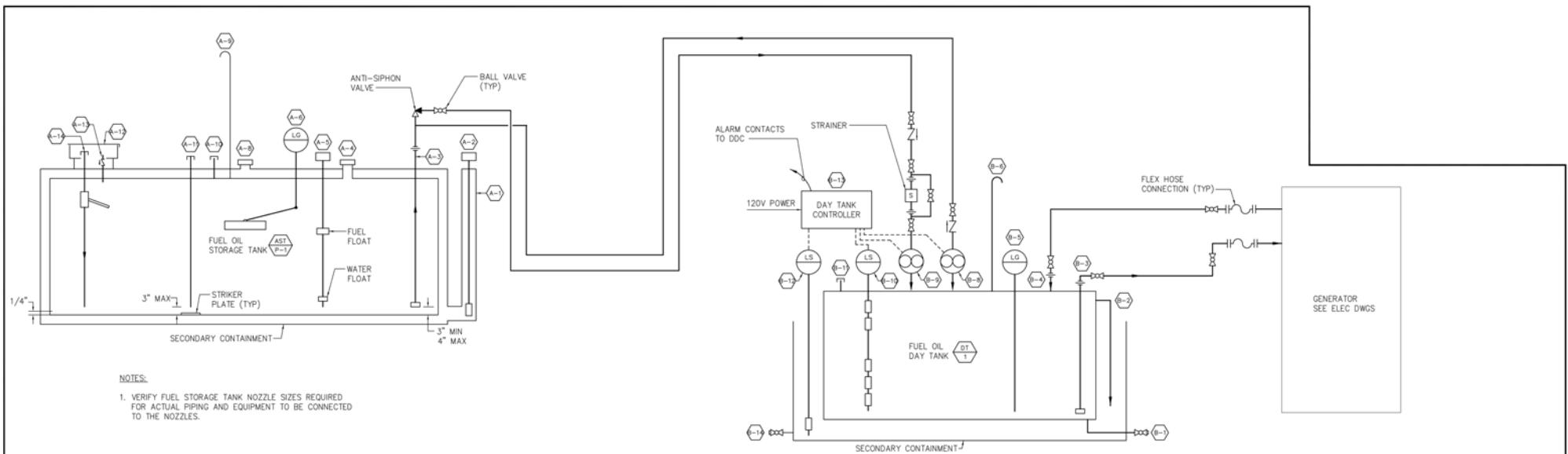
**5 FUEL STORAGE TANK FILL CONNECTION WITH FILL LIMITER AND OVERFILL CONTAINMENT DETAIL**  
P-501  
SCALE: NONE



**6 INTERIOR HOSE BIBB DETAIL**  
P-501  
SCALE: NONE

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
DETAILS			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:			
SIGNATURE	DATE		
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER
JOB NO.			



FUEL OIL SYSTEM SCHEMATIC DIAGRAM  
SCALE: NONE

FUEL OIL STORAGE TANK COMPONENTS

ITEM NO.	TANK NOZZLE SIZE	ITEM DESCRIPTION
A-1	2"	INTERSTITIAL LEAK DETECTION MONITOR TUBE
A-2		INTERSTITIAL LIQUID LEVEL SENSOR
A-3	2"	SUCTION PIPE WITH FOOT VALVE
A-4	4"	4" EMERGENCY VENT - PRIMARY TANK
A-5	4"	TANK LEVEL PROBE
A-6	4"	MECHANICAL LEVEL GAGE WITH INDICATOR (ANALOG GAGE)
A-7		NOT USED
A-8	4"	4" EMERGENCY VENT - INTERSTITIAL SPACE
A-9	2"	2" VENT WITH VENT CAP, TERMINATE 12'-0" ABOVE GRADE
A-10	4"	4" CAPPED SPARE
A-11	4"	STICK GAGE CONNECTION
A-12		SPILL CONTAINMENT PAN W/ LOCKABLE HINGED COVER
A-13		NOT USED
A-14	4"	FILL CONNECTION WITH HOSE CAM-LOCK CONNECTION ADAPTER, DROP TUBE AND FILL LIMITER VALVE
A-15		NOT USED

FUEL OIL DAY TANK COMPONENTS

ITEM NO.	ITEM DESCRIPTION
B-1	1" TANK DRAIN WITH PLUGGED BALL VALVE
B-2	1" OVERFLOW
B-3	SUCTION PIPE WITH FOOT VALVE
B-4	RETURN PIPE
B-5	MECHANICAL LEVEL GAGE WITH LOCAL INDICATOR
B-6	2" VENT TO EXTERIOR OF BUILDING, WITH GOOSENECK AND INSECT SCREEN
B-7	NOT USED
B-8	DAY TANK PUMP, FUEL OIL RETURN TO TANK, POSITIVE DISPLACEMENT
B-9	DAY TANK PUMP, FUEL OIL SUPPLY FROM STORAGE TANK, POSITIVE DISPLACEMENT
B-10	LEVEL SWITCH FOR CRITICAL HIGH LEVEL ALARM/FUEL OIL RETURN PUMP ON, HIGH LEVEL/FUEL OIL SUPPLY PUMP OFF, LOW LEVEL/FUEL OIL SUPPLY PUMP ON, LOW-LOW LEVEL ALARM
B-11	2" CAPPED MANUAL FILL
B-12	SECONDARY CONTAINMENT LIQUID SENSOR/FLOAT SWITCH
B-13	DAY TANK CONTROLLER FOR PUMP CONTROL AND LEVEL ALARM, 120V/1PH/60Hz
B-14	1" SECONDARY CONTAINMENT DRAIN WITH PLUGGED BALL VALVE

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM:			
FUEL OIL SYSTEM SCHEMATIC DIAGRAM			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SHEET			
JOB NO.			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

ABOVE GROUND FUEL STORAGE TANK SCHEDULE

UNIT	PRODUCT STORED	TYPE	PRIMARY TANK VOLUME (GALLONS)	SECONDARY TANK VOLUME	SIZE (FT) LxDIA	WEIGHT (LBS)	REMARKS
AST 1	NO. 2 DIESEL FUEL	ABOVE GROUND	500	110%	6'-3" x 5'-5"	5,100	SUPERVAULT, FIREGUARD OR APPROVED EQUAL

DAY TANK SCHEDULE

UNIT	PRODUCT STORED	TYPE	PRIMARY TANK VOLUME (GALLONS)	SECONDARY TANK VOLUME (GALLONS)	SIZE (FT) LxWxH	WEIGHT (LBS)	POWER V/PH./HZ	FOS PUMP		FOR PUMP		REMARKS
								GPM	HP	GPM	HP	
DT 1	NO.2 DIESEL FUEL	ABOVE GROUND	100	110%	3' x 2'-6" x 6'-8"	540	120/1/60	2	1/3	4	1/3	SIMPLEX, TRAMONT OR APPROVED EQUAL



**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:			
ITEM: EQUIPMENT SCHEDULES			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	YXY	CHECKED BY:	CSN
DRAWN BY:	TEC	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	CHIEF	DATE	
JOB NO.			
OPERATOR DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER

ELECTRICAL SYMBOL LIST/MOUNTING HEIGHT SCHEDULE									
MOUNTING HEIGHT FROM FLOOR TO	(SPECIAL MOUNTING HEIGHTS INDICATED ON PLAN)			MOUNTING HEIGHT FROM FLOOR TO	(SPECIAL MOUNTING HEIGHTS INDICATED ON PLAN)			DESCRIPTION	
	TOP	C	SYMBOL	EXISTING	NEW	SYMBOL	EXISTING	NEW	
					(1)	LUMINAIRE, CEILING MOUNTED (NUMERAL IN CIRCLE CORRESPONDS TO LUMINAIRE SCHEDULE)			
					(1)	LUMINAIRE, WALL MOUNTED (NUMERAL IN CIRCLE CORRESPONDS TO LUMINAIRE SCHEDULE)			
8'-0"						EMERGENCY LIGHTING UNIT, WALL MOUNTED			
46"					\$ <sup>a</sup>	LIGHT SWITCH, FLUSH WALL MOUNTED, 1P20A, 120/277V, 1HP MAX. (LETTER INDICATES LUMINAIRES CONTROLLED)			
46"					\$ <sup>a</sup> <sub>3</sub>	3-WAY SWITCH (LETTER INDICATES LUMINAIRES CONTROLLED)			
46"						OCCUPANCY SENSOR/WALL SWITCH			
18"						RECEPTACLE, DUPLEX, GROUNDING TYPE, 125V, NEMA TYPE 5-15R			
18"						RECEPTACLE, DUPLEX, GFCI TYPE, 125V, NEMA TYPE 5-20R			
					(J)	JUNCTION BOX, HORIZONTALLY MOUNTED			
48"					(J)H	JUNCTION BOX, WALL MOUNTED			
48"						CONTROL STATION, TYPE AS INDICATED			
48"						EMERGENCY STOP PUSHBUTTON			
						EQUIPMENT TERMINATION WITH FLEXIBLE CONDUIT WHIP			
					J	LARGE JUNCTION BOX, HORIZONTALLY MOUNTED, SIZE AS INDICATED			
					JH	LARGE JUNCTION BOX, WALL MOUNTED, SIZE AS INDICATED			
5'-0"						NON-FUSED DISCONNECT SWITCH, 3P30A UNLESS OTHERWISE NOTED, VOLTAGE TO MATCH CIRCUITING			
6'-0"						PANELBOARD			
						ELECTRICAL EQUIPMENT			
6'-0"						EQUIPMENT CABINET			
					D	MAGNETIC DOOR SWITCH			
						SCADA/CONTROL CONDUIT			
						CONDUIT CONCEALED BELOW GRADE OR WITHIN FLOOR SLAB			
					#	CONCEALED CONDUIT IN CEILING OR WALLS, (HASHMARKS INDICATE QUANTITY OF CURRENT-CARRYING CONDUCTORS WITHIN, NO HASHMARKS INDICATE 2 CURRENT-CARRYING CONDUCTORS WITHIN)			
					#	SURFACE MOUNTED RACEWAY, PROVIDE SUPPORTS AT 8'-0" ON CENTER MAXIMUM (HASHMARKS INDICATE QUANTITY OF CURRENT-CARRYING CONDUCTORS WITHIN, NO HASHMARKS INDICATE 2 CURRENT-CARRYING CONDUCTORS WITHIN)			
	A-1,3				A-1,3	HOMERUN ARROW TO PANELBOARD, LETTER INDICATES PANELBOARD, NUMBERS INDICATES CIRCUITS			
						LIQUID-TIGHT FLEXIBLE CONDUIT			
						EYS SEAL			

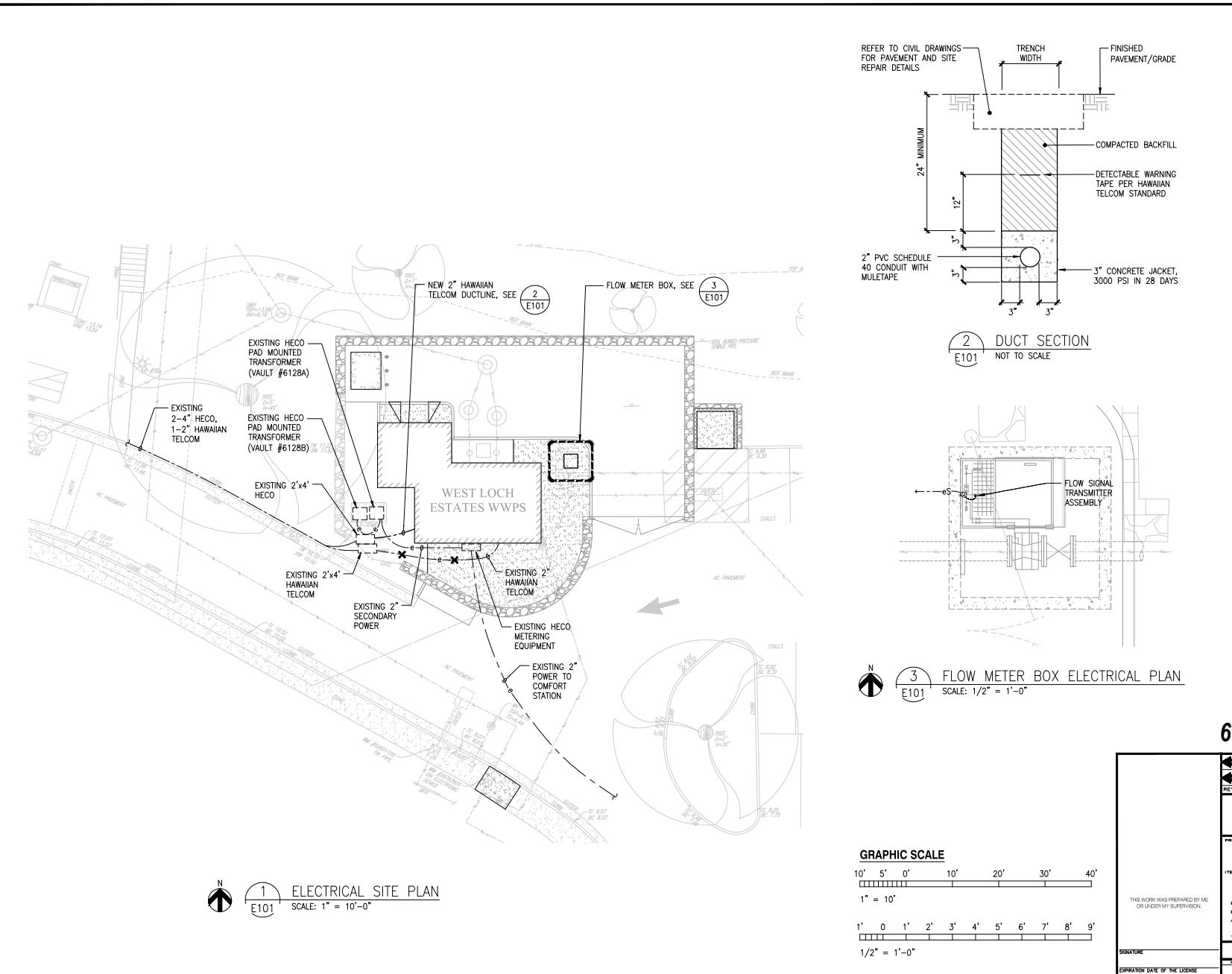
#### GENERAL NOTES:

1. ALL ELECTRICAL ITEMS INDICATED ON THE DRAWINGS ARE NEW AND SHALL BE PROVIDED BY THE CONTRACTOR UNLESS OTHERWISE NOTED.
2. ALL CONDUIT ROUTING AND JUNCTION BOX LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE, THE CONTRACTOR SHALL ROUTE CONDUITS AND MOUNT JUNCTION BOXES IN A LOGICAL AND CONSTRUCTIBLE MANNER.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK AND TO INSURE THE INSTALLATION OF ALL WORK WITHIN THE AVAILABLE SPACE. NOTIFY THE OFFICER-IN-CHARGE OF ALL QUESTIONS IN WRITING AND RESOLVE ALL QUESTIONS AND CONCERN PRIOR TO PROCUREMENT AND BEFORE START OF CONSTRUCTION.
4. ALL JUNCTION BOXES SHALL BE PROPERLY MOUNTED, ANCHORED AND SUPPORTED BY APPROVED METHODS FOR SEISMIC RESTRAINT.
5. PAINT ALL EXPOSED JUNCTION BOXES, CONDUITS AND FITTINGS. REFER TO SPECIFICATIONS FOR PAINT TYPE AND FINISH COLOR.
6. TONING: EXISTING UNDERGROUND UTILITY LINES ARE SHOWN IN APPROXIMATE LOCATIONS AND SUBJECT TO FIELD VERIFICATION. CONTRACTOR SHALL TONE FOR ALL EXISTING UNDERGROUND WATER, DRAIN, IRRIGATION, SEWER, ELECTRICAL AND TELECOMMUNICATION FACILITIES PRIOR TO EXCAVATION. DAMAGE TO EXISTING UTILITIES CAUSED BY THE CONTRACTOR'S WORK SHALL BE REPAIRED BY THE CONTRACTOR AT NO COST, TO THE SATISFACTION OF THE OFFICER-IN-CHARGE.
7. PHASING OF WORK WILL BE REQUIRED. THE CONTRACTOR SHALL SCHEDULE ALL WORK TO MINIMIZE DISRUPTION TO EXISTING FACILITY OPERATIONS. CONTRACTOR SHALL COORDINATE SCHEDULING REQUIREMENTS WITH OFFICER-IN-CHARGE PRIOR TO COMMENCING WORK.
8. VERIFY ALL CONDUIT AND EQUIPMENT CONNECTION LOCATIONS WITH MECHANICAL AND ELECTRICAL EQUIPMENT SHOP DRAWINGS. PRIOR TO ROUGH-IN WORK, CONDUIT ROUTING IS DEPICTED DIAGRAMMATICALLY AND SHALL BE INSTALLED TO COORDINATE WITH SITE, EQUIPMENT AND STRUCTURAL ELEMENTS.

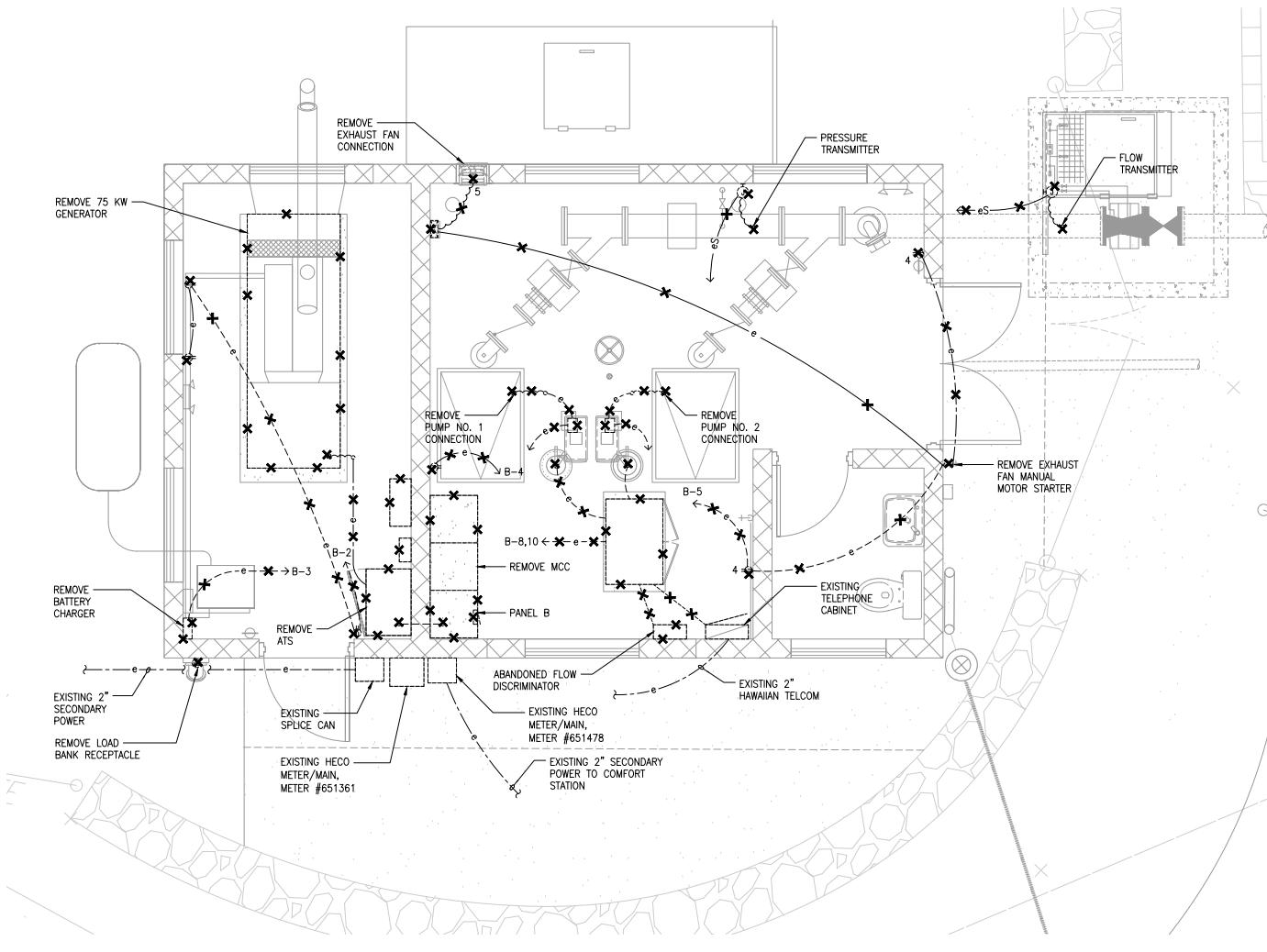
ONE-LINE SYMBOL LIST	
SYMBOL NEW	DESCRIPTION
	POWER TRANSFORMER
	GROUND
	CIRCUIT BREAKER
	NON-FUSED DISCONNECT SWITCH
	POTENTIAL TRANSFORMER
	CURRENT TRANSFORMER
	FUSE
	METER SOCKET AND KILOWATT HOUR METER
	AUTOMATIC TRANSFER/ISOLATION BYPASS SWITCH
	DIESEL ENGINE GENERATOR SET

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	ELECTRICAL SYMBOLS AND GENERAL ELECTRICAL NOTES		
DESIGNED BY	MA	CHECKED BY	MA
DRAWN BY	OL	SECTION HEAD	
APPROVED	BRANCH HEAD		
CHEF	DATE		
SIGNATURE			
JOB NO. W#-#			
EXPIRATION DATE OF THE USENS			
FILE NUMBER	DRAYER	FILE NUMBER	FILE NUMBER



REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	ELECTRICAL SITE PLAN		
DESIGNED BY	MA	CHECKED BY	MA
DRAWN BY	OL	SECTION HEAD	BRANCH HEAD
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE USENS	FILE NUMBER	DRIVEN	PICKED UP

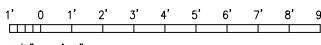


E102

POWER & OUTLETS DEMOLITION PLAN

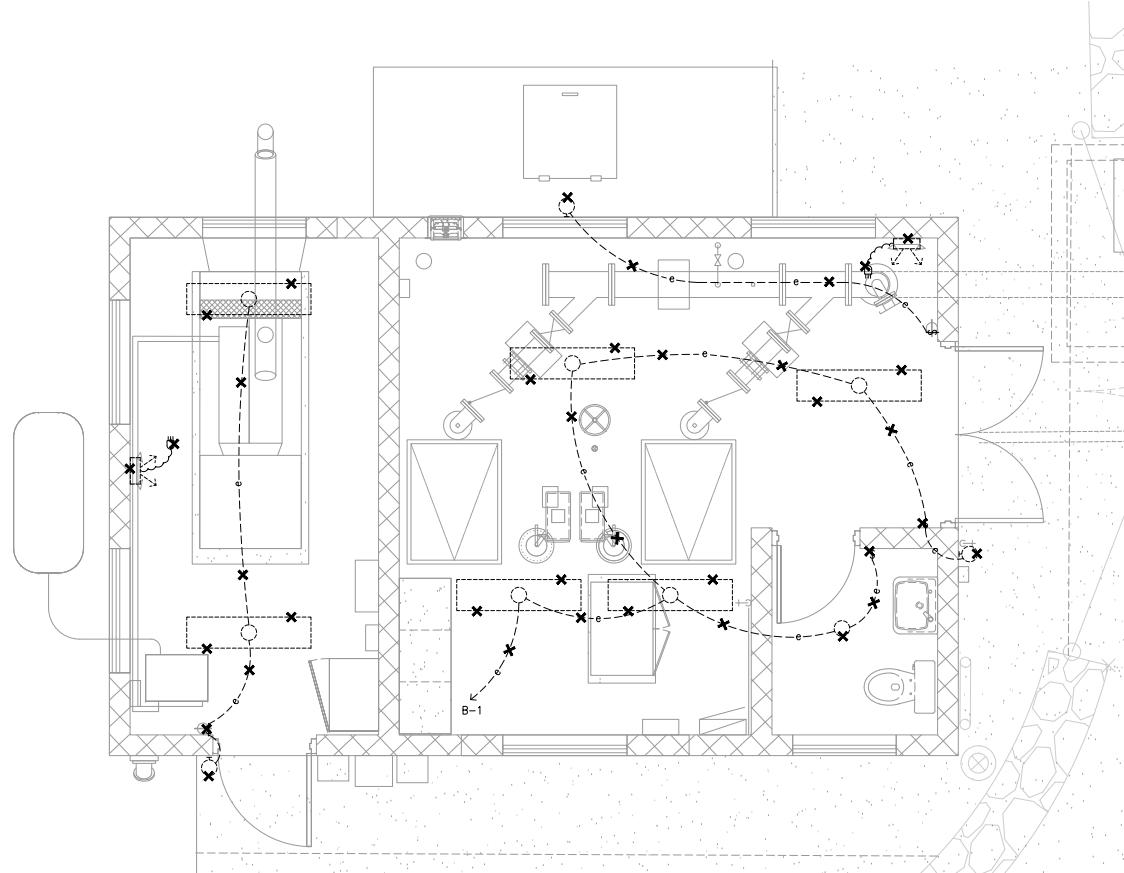
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE



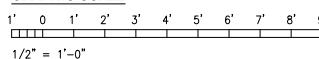
**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	POWER & OUTLETS DEMOLITION PLAN		
DESIGNED BY	MA	CHECKED BY	MA
DRAWN BY	OL	SECTION HEAD	BRANCH HEAD
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE USENS			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET



1  
E103 LIGHTING DEMOLITION PLAN  
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE

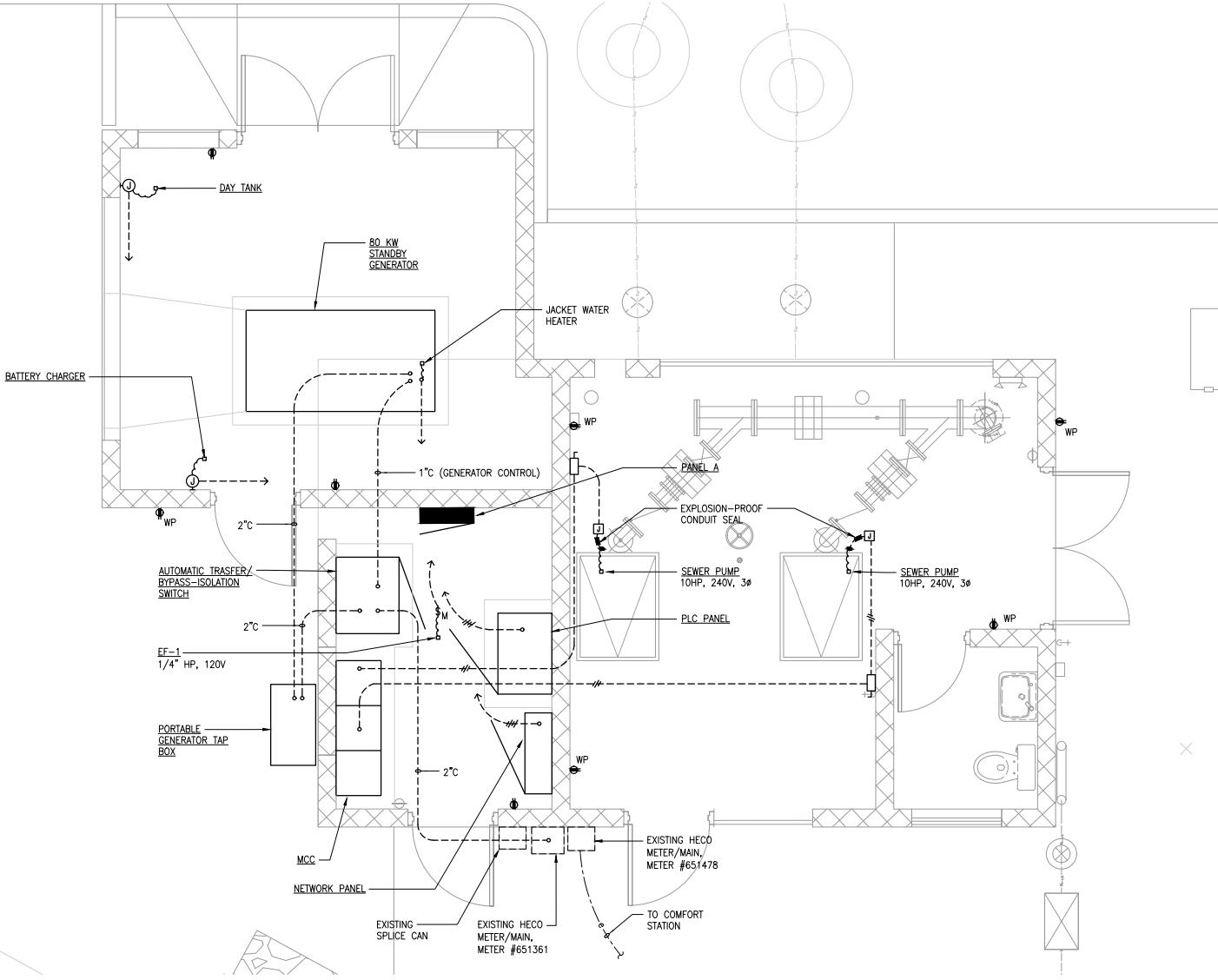


DRAWING E103.

SHEET \_\_\_\_ OF \_\_\_\_

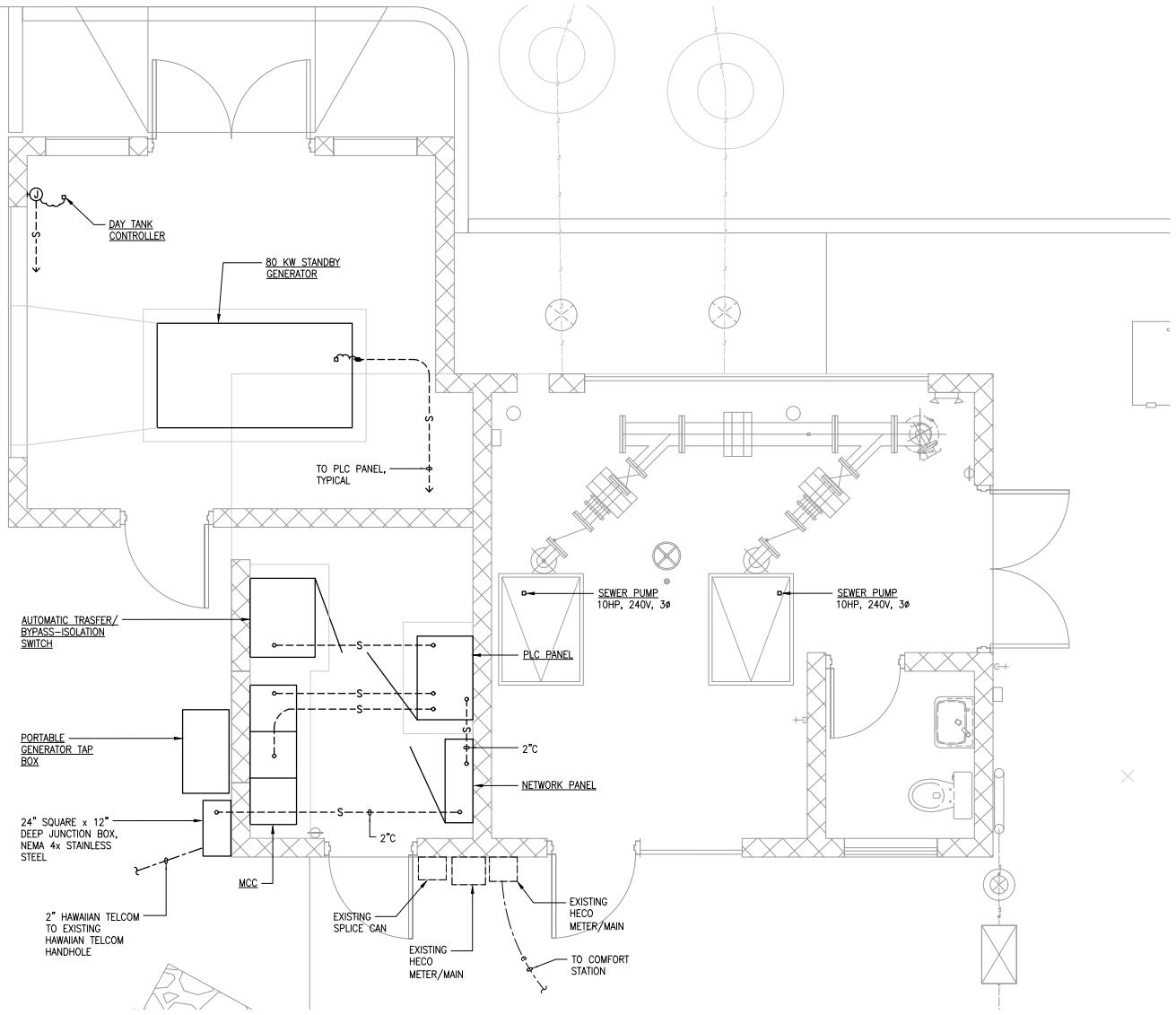
**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	LIGHTING DEMOLITION PLAN		
DESIGNED BY	MA	CHECKED BY	MA
DRAWN BY	OL	SECTION HEAD	BRANCH HEAD
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE LICENSE	FILE NUMBER	DRIVEN	FILE NUMBER
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	POWER & OUTLETS PLAN		
DESIGNED BY	MA	CHECKED BY	MA
DRAWN BY	OL	SECTION HEAD	BRANCH HEAD
APPROVED			
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE USENCE			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET



N  
E105

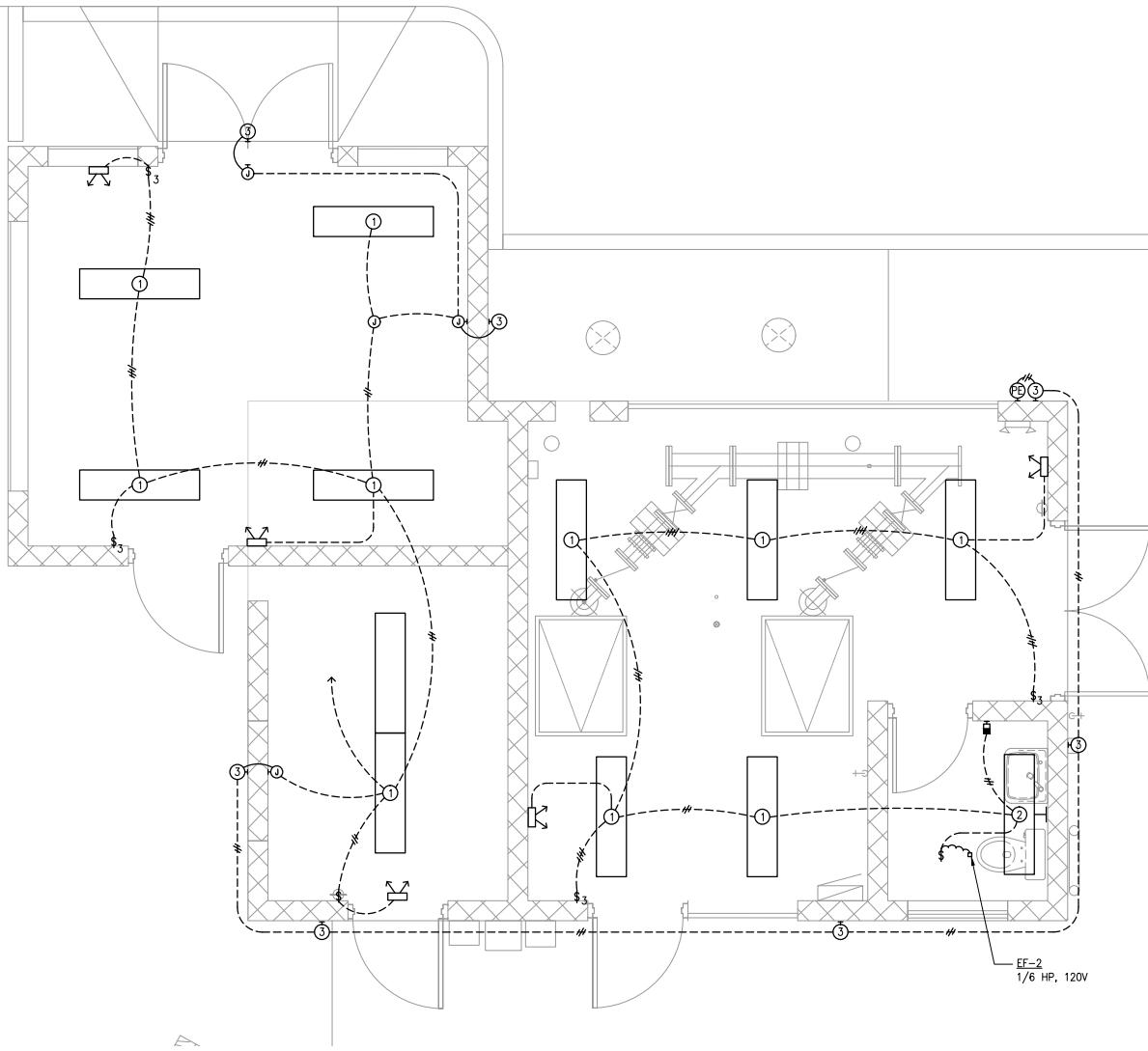
SIGNAL PLAN  
SCALE: 1/2" = 1'-0"

GRAPHIC SCALE

1' 0 1' 2' 3' 4' 5' 6' 7' 8' 9'  
1/2" = 1'-0"

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	SIGNAL PLAN		
DESIGNED BY	MA	CHECKED BY	MA
DRAWN BY	OL	SECTION HEAD	BRANCH HEAD
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE USENS			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET FOLDER NO.



**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: LIGHTING PLAN			
DESIGNED BY:	MA	CHECKED BY:	MA
DRAWN BY:	OL	APPROVED:	BRANCH HEAD
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE USENSC			
FILE NUMBER	DRAFTER	FILE NUMBER	PICKET

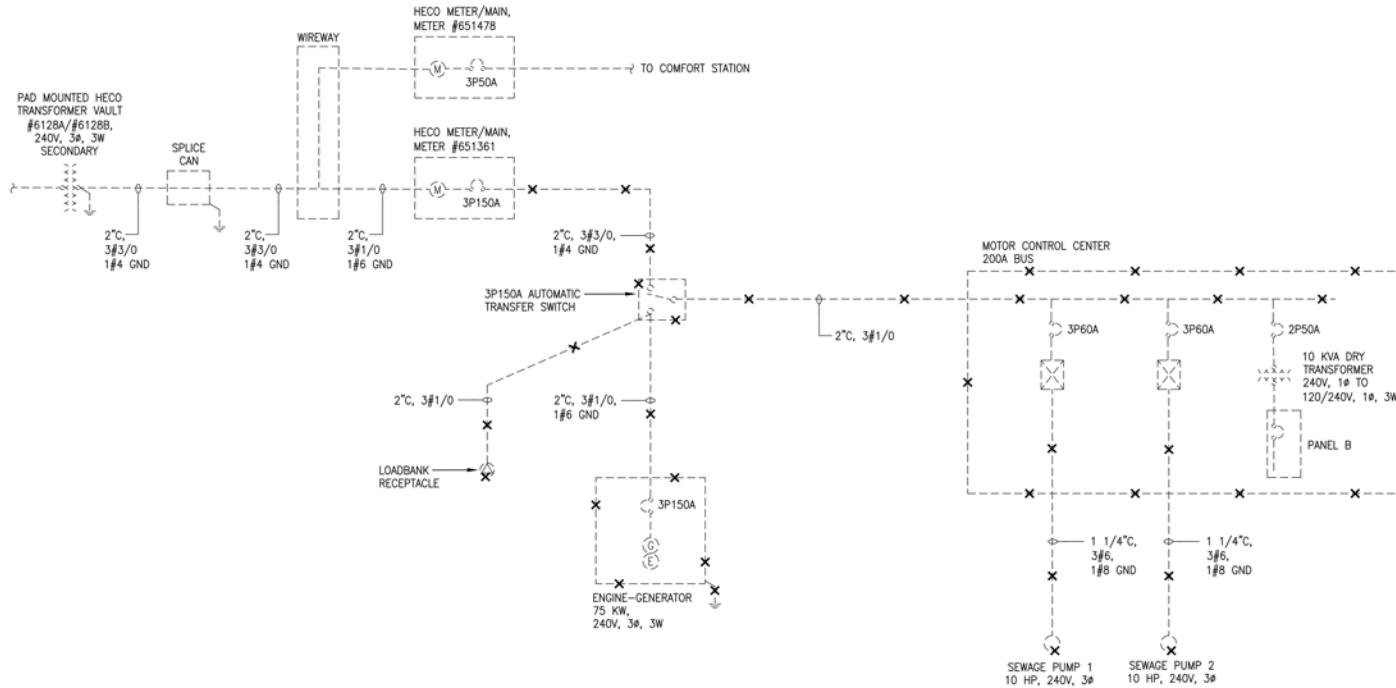
N  
E106  
1  
LIGHTING PLAN  
SCALE: 1/2" = 1'-0"

**GRAPHIC SCALE**

1' 0 1' 2' 3' 4' 5' 6' 7' 8' 9'  
1/2" = 1'-0"

DRAWING E106

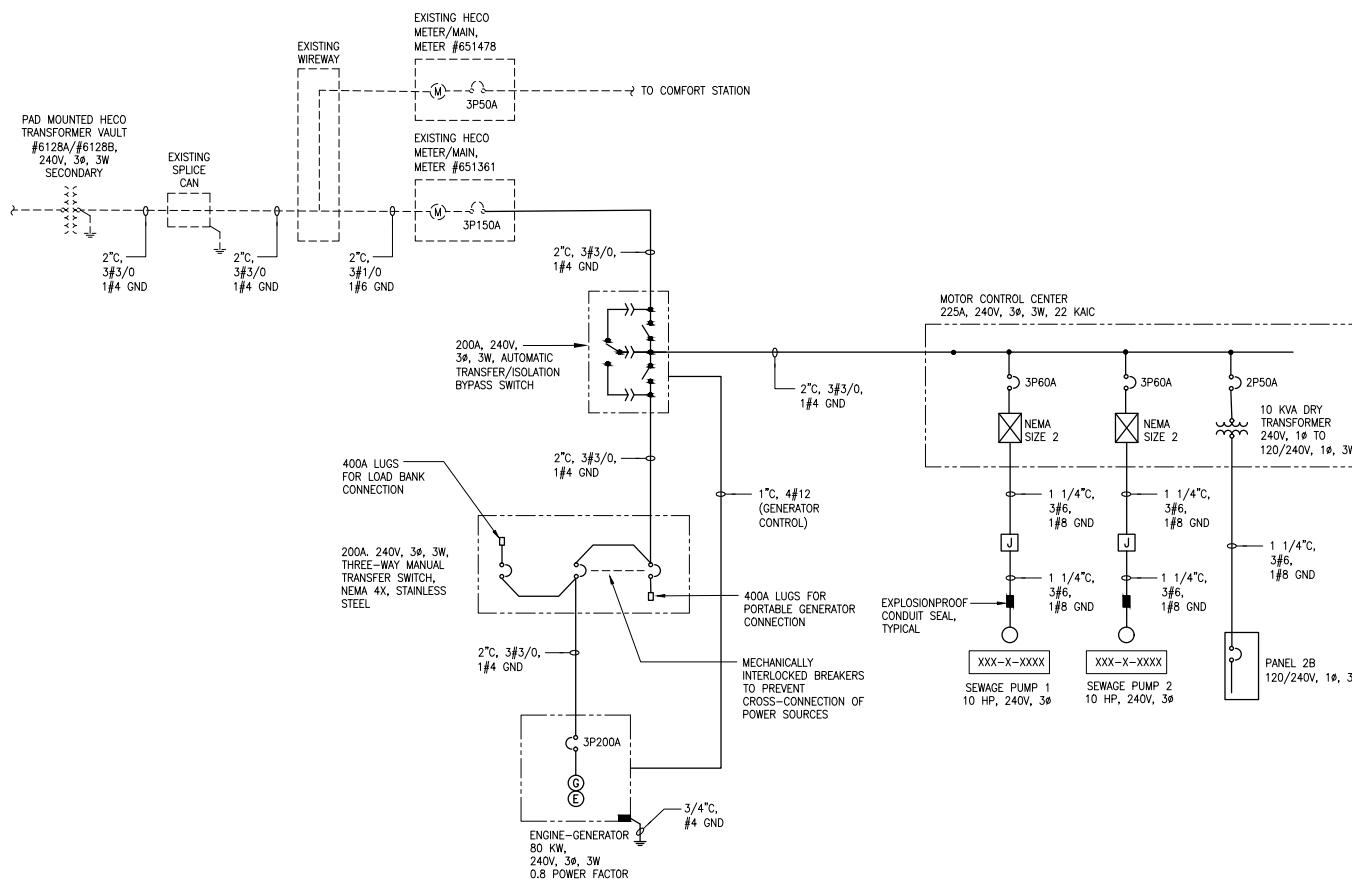
SHEET \_\_\_\_ OF \_\_\_\_



1 DEMOLITION ONE LINE DIAGRAM  
E601 NO SCALE

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT:	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM:	DEMOLITION ONE LINE DIAGRAM		
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	MA	CHECKED BY:	MA
DRAWN BY:	OL	SECTION HEAD:	
APPROVED:	BRANCH HEAD:		
SIGNATURE:			
JOB NO. W#-# #			
EXPIRATION DATE OF THE LICENSE			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



1 ONE LINE DIAGRAM  
E602 NO SCALE

NOTES:  
DASHED LINES DENOTE EXISTING. SOLID LINES DENOTE NEW WORK

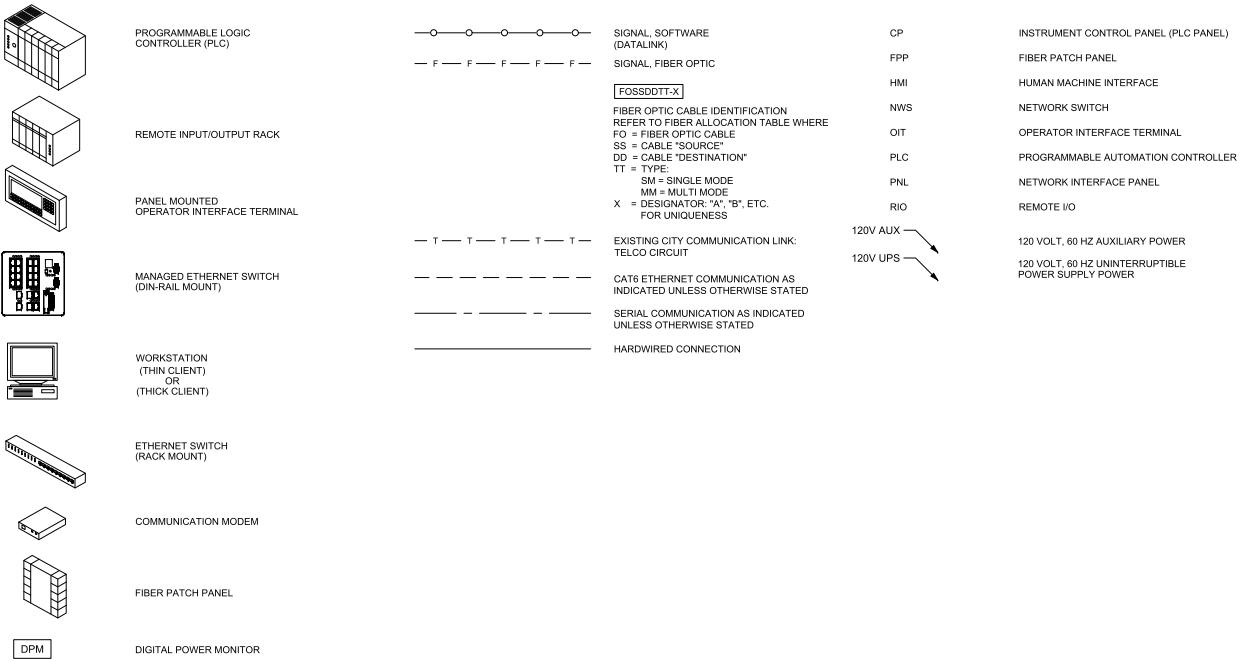
60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII		
ITEM	ONE LINE DIAGRAM		
DESIGNED BY	MA	CHECKED BY	MA
DRAWN BY	OL	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE			
JOB NO. W#-##			
EXPIRATION DATE OF THE USENSC			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

LUMINAIRE SCHEDULE		
TYPE	DESCRIPTION	LAMPS
①	LED STEM MOUNTED, FIBERGLASS HOUSING, NOMINAL 4' LONG, ONE PIECE RIBBED FROSTED POLYCARBONATE LENS, BAKED WHITE ENAMEL, FULLY GASKETED, STAINLESS STEEL LATCHES, WET LOCATION LABEL, FIXED OUTPUT DRIVER, MOUNTED AT +9'-6", 120V COLUMBIA #LXEM4-40HL-RFP-EU-SSL-SWH OR APPROVED EQUIVALENT	48W 5700 LUMENS 4000K
②	LED WALL MOUNTED, FIBERGLASS HOUSING, NOMINAL 4' LONG, ONE PIECE RIBBED FROSTED POLYCARBONATE LENS, BAKED WHITE ENAMEL, FULLY GASKETED, STAINLESS STEEL LATCHES, WET LOCATION LABEL, FIXED OUTPUT DRIVER, MOUNTED AT +7'-0", 120V COLUMBIA #LXEM4-40WL-RFP-EU-SSL OR APPROVED EQUIVALENT	25W 2900 LUMENS 4000K
③	LED, WALL MOUNTED, BOTTOM AT +8'-6", DIE-CAST LOW COPPER ALUMINUM HOUSING AND MOUNTING ARM, TYPE III DISTRIBUTION, FULLY SHIELDED, TEMPERED GLASS OUTER LENS, DARK BRONZE POWDER COAT FINISH KIM LIGHTING #WDS-D-24-40-4K8-3-UNV-DB OR APPROVED EQUIVALENT	40W 4500 LUMENS 4000K
⚡	EMERGENCY WALL PACK, SEALED AND GASKETED, THERMOPLASTIC HOUSING, POLYCARBONATE LED LENSES, PAINTED STAINLESS STEEL MOUNTING PLATE, CORROSION RESISTANT HARDWARE, TEST SWITCH AND AC "ON" LIGHT, LONG-LIFE LITHIUM ION BATTERY, NEMA 4X RATED, 120V DUALITE DYNAMO SERIES OR APPROVED EQUIVALENT	2-3W LED LAMPS

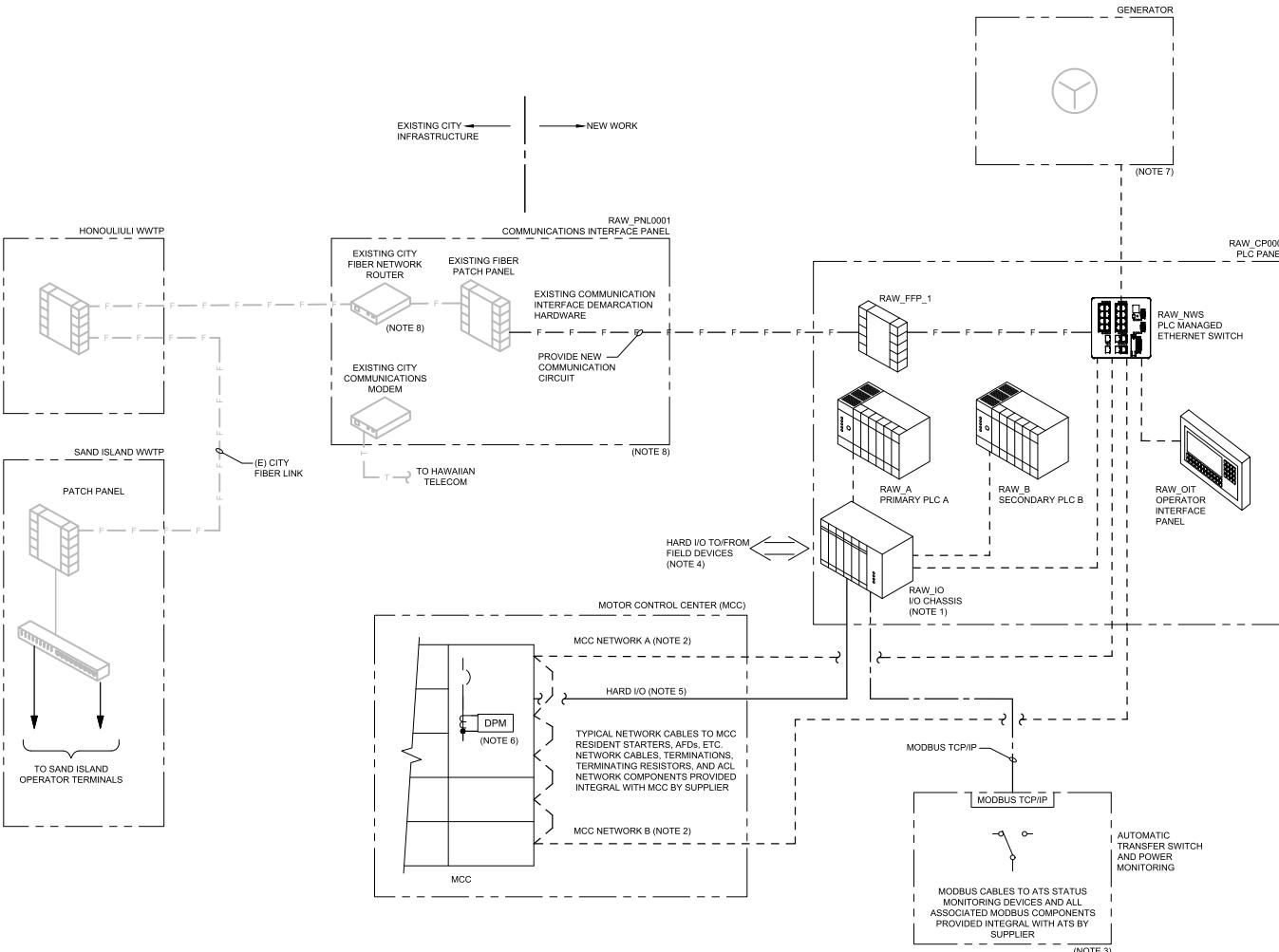
60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: SCHEDULES			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	MA	CHECKED BY:	MA
DRAWN BY:	OL	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	DATE		
JOB NO. W#-##			
EXPIRATION DATE OF THE USENRE	FILE NUMBER	DRAYER	FILE NUMBER
FILE NUMBER	DRAYER	FILE NUMBER	FILE NUMBER



**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII ITEM: INSTRUMENTATION AND CONTROLS			
CONTROL SYSTEM LEGEND AND ABBREVIATION			
<small>THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.</small>			
DESIGNED BY:	HT	CHECKED BY:	P.J.G.
DRAWN BY:	B.V.	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	4/30/26 EXPIRATION DATE OF THE LICENSE		
JOB NO. W#-##			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER



#### SHEET NOTES:

1. EQUIPMENT TAGS HAVE THE FOLLOWING PREFIX: L023\_

#### NOTES:

1. EQUIPMENT TAGS HAVE THE FOLLOWING PREFIX: L023\_
2. PROVIDE NETWORK INTERFACE PROTOCOL TO MOTOR CONTROLS AND CONTROL COMPONENTS AS REQUIRED.
3. PROVIDE MODBUS TCP/IP INTERFACE CARD FOR MODBUS TCP/IP DEVICE MONITORING.
4. HARD IO INCLUDES BOTH NEW AND EXISTING I/O. EXISTING I/O MIGRATED FROM LEGACY BARRINGTON SYSTEM COMPONENTS.
5. REFER TO I/O LIST FOR SPECIFIED HARD I/O.
6. TYPICAL FOR MCC MAIN, SEWAGE PUMPS, DISTRIBUTION TRANSFORMERS, SUMP PUMPS, EXHAUST FANS, AND SUPPLY FANS. PROVIDE NETWORK CONNECTION TO PLC FOR POWER MONITORING.
7. ALL GENERATOR CONTROLS SHALL BE NETWORKED VIA MODBUS TCP/IP OR ETHERNET/IP. ALL GENERATOR POINTS USED FOR STATUS AND CONTROL SHALL BE HARDWIRED TO PLC I/O MODULES.
8. PUMP STATION HAS SPECTRUM FIBER COMMUNICATIONS. PROTECT EXISTING NETWORK EQUIPMENT DURING CONSTRUCTION. DISCONNECT NETWORK CONNECTIONS AND PULL BACK TO NEAREST JUNCTION BOX AS SPECIFIED ON ELECTRICAL DRAWINGS. LEAVE COILED AND PROTECTED UNTIL READY FOR REROUTING AND DETERMINATION WORK.

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EVIA, OAHU, HAWAII ITEM: INSTRUMENTATION AND CONTROLS			
TYPICAL CONTROL NETWORK BLOCK DIAGRAM			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
DESIGNED BY	HT	CHEKED BY	P.J.G.
DRAWN BY	B.V.	SECTION HEAD	
APPROVED		BRANCH HEAD	
SIGNATURE	DATE		
JOB NO. W#-#			
4/30/26	EXPIRATION DATE OF THE LICENSE		
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

## CONTROLLOGIX BILL OF MATERIALS

ITEM	MANUF.	PART#	DESCRIPTION	QTY
1	SAGINAW	90P36F1	BACK PANEL, 78"X32"	1
2	ALUMINUM		BACK PANEL, 82"X32"	1
3	ALLEN-BRADLEY	IE 3300 8T2S E	CISCO IE 3300 ETHERNET MANAGED SWITCH	1
4	ALLEN-BRADLEY	1756-PA75R	REDUNDANT POWER SUPPLY, 120VAC	1
5	ALLEN-BRADLEY	1756-PSCA2//C	POWER SUPPLY, 120VAC	2
6	ALLEN-BRADLEY	1756-PSA2	POWER SUPPLY CABLE	2
7	ALLEN-BRADLEY	1756-PSCA2	CHASSIS REDUNDANT POWER SUPPLY ADAPTER	1
8	ALLEN-BRADLEY	1756-A17	17 SLOT CHASSIS	1
9	ALLEN-BRADLEY	1756-A4	4 SLOT CHASSIS	2
10	ALLEN-BRADLEY	1756-L72	CONTROLLOGIX CONTROLLER WITH 4 MB MEMORY W/COMPACT FLASH CARD	1
11	ALLEN-BRADLEY	1756-EN2T	CONTROLLOGIX ETHERNET COMMUNICATION MODULE	2
12	ALLEN-BRADLEY	1756-DR1	REDUNDANT ETHERNET/LC DUPLEX 1M CABLE	1
13	ALLEN-BRADLEY	1756-RMC1	ANALOG INPUT MODULE, 16 CHANNEL CURRENT	1
14	ALLEN-BRADLEY	1492-AFM6-F-5	ANALOG INPUT INTERFACE MODULE, 16 CHANNELS	1
20	ALLEN-BRADLEY	1492-ACABLE-010UB	ANALOG INPUT INTERFACE MODULE CABLE, 1.0 METER	1
21	ALLEN-BRADLEY	1756-OF8	ANALOG OUTPUT VOLTAGE MODULE, 8-CHANNEL	1
22	ALLEN-BRADLEY	1492-AFM8-3	FEED THROUGH 8-CHANNEL ANALOG INTERFACE MODULE	1
23	ALLEN-BRADLEY	1492-ACABLE010WB	ANALOG INPUT INTERFACE MODULE CABLE, 1.0 METER	1
24	ALLEN-BRADLEY	1492-DR1	DISCRETE INPUT MODULE, 16 POINT	3
26	ALLEN-BRADLEY	1492-EM2OF-F24A-2	DISCRETE INPUT INTERFACE MODULE, 16 POINT	3
27	ALLEN-BRADLEY	1492-CABLE010X	DISCRETE INPUT/OUTPUT INTERFACE MODULE CABLE, 1.0 METER	3
27	ALLEN-BRADLEY	1756-OB16E	DISCRETE OUTPUT MODULE, 16 POINT, DC	1
28	ALLEN-BRADLEY	1492-XIM2024-16R	DISCRETE OUTPUT INTERFACE MODULE, 16 POINT	1
29	ALLEN-BRADLEY	1492-CABLE025X	DISCRETE INPUT/OUTPUT INTERFACE MODULE CABLE, 2.5 METER	1
30	ALLEN-BRADLEY	1756-SPL	SPARE SLOT FILLER MODULE	A/R
31	ALLEN-BRADLEY	1606-XI240DR	240VAC POWER SUPPLY	2
32	ALLEN-BRADLEY	1492-R6R	DIN RAIL, HI-RISE, ALUMINUM	A/R
33	PHOENIX CONTACT	DIN_RAIL_ND_35/15_PERE	DIN RAIL, ND, 35/15 PERE	A/R
34	ALLEN-BRADLEY	1492-EAJ35	END ANCHOR, DIN RAIL, NORMAL DUTY	A/R
35	ALLEN-BRADLEY	1492-J4-B	SCREW CONNECTION TERMINAL BLOCK, BLUE	A/R
36	ALLEN-BRADLEY	1492-J4	SCREW CONNECTION TERMINAL BLOCK, GREY	A/R
37	ALLEN-BRADLEY	1492-J4-BL	SCREW CONNECTION TERMINAL BLOCK, BLACK	A/R
38	ALLEN-BRADLEY	1492-J4C	SCREW CONNECTION TERMINAL BLOCK, GROUNDING BLOCK, GREEN/YELLOW	A/R
39	ALLEN-BRADLEY	1492-SC45	SCREW CONNECTION TERMINAL BLOCK, FUSE BLOCK, BLACK W/LED	A/R
40	ALLEN-BRADLEY	1492-N37	END BARRIER, EOF, 1492-H5	A/R
41	ALLEN-BRADLEY	1492-SPJ3	SEPARATION PLATE	A/R
42	ALLEN-BRADLEY	1492-CUL6-4	TERMINAL BLOCK ACCESSORIES, SCREWLESS CENTER JUMPER	A/R
43	ALLEN-BRADLEY	1492-BJ5-B	SCREW CONNECTION TERMINAL BLOCK, END BARRIER, BLUE	A/R
44	ALLEN-BRADLEY	1492-EBJ3	SCREW CONNECTION TERMINAL BLOCK, END BARRIER, GRAY	A/R
45	ALLEN-BRADLEY	1492-SPC150	CIRCUIT BREAKER, 1SA	A/R
46	ALLEN-BRADLEY	1492-SPC100	CIRCUIT BREAKER, 1SA	A/R
47	ALLEN-BRADLEY	1492-SPC100	CIRCUIT BREAKER, 1SA	A/R
48	ALLEN-BRADLEY	1492-SPC100	CIRCUIT BREAKER, 2A	A/R
49	ALLEN-BRADLEY	1492-SPC100	CIRCUIT BREAKER, 1A	A/R
50	PANODUT	313 SERIES	3&0 SLO-BLO FUSE, 1A	A/R
51	LITTLEFUSE	313 SERIES	3&0 SLO-BLO FUSE, 2A	A/R
52	LITTLEFUSE	313 SERIES	3&0 SLO-BLO FUSE, 3A	A/R
53	LITTLEFUSE	313 SERIES	3&0 SLO-BLO FUSE, 4A	A/R
54	CAROL CABLE	01950-70.01	8FT, 14-3 SJT CORD	2
55	PANDUIT	LAM2/A2/0-14-6Y	GROUNDING LUG	2
56	PANDUIT	WR2-C	WIRE RETAINER, 2"	A/R
57	PANDUIT	WR3-C	WIRE RETAINER, 3"	A/R
58	PANDUIT	WR4-C	WIRE RETAINER, 4"	A/R
59	PANDUIT	CD4H6	DIVIDER WALL	A/R
60	PANDUIT	DD4-C	DUCT DIVIDER BASE	A/R
61	PANDUIT	C4XL406	WIRE DUCT, 4" X 4"	A/R
62	PANDUIT	C4L66	WIRE DUCT COVER, 4"	A/R
63	PANDUIT	C3XL46	WIRE DUCT, 3" X 4"	A/R
64	PANDUIT	C3L66	WIRE DUCT COVER, 3"	A/R
65	PANDUIT	C2XL66	WIRE DUCT, 2" X 4"	A/R
66	PANDUIT	C2L66	WIRE DUCT COVER, 2"	A/R
67	PANDUIT	CT4XL66	WIRE DUCT, 4"	A/R
68	PANDUIT	CT4L66	WIRE DUCT COVER, 4"	A/R
69	ALLEN-BRADLEY	ASEM 6300B	ROCKWELL AUTOMATION 6300B INDUSTRIAL PC WITH 6300 SERIES DISPLAY	1
70			CATS PATCH CABLE (10 FT., 25 FT.)	A/R
71	POWERWAVE	PW9130L1000T-XL	1000VA 120V UPS	2
72	HOFFMAN	ALF16M18R	LIGHT KIT WITH MANUAL SWITCH	1
73	HOFFMAN	AASHLF1818	FOLDING SHELF	1
74	ALLEN-BRADLEY	1756-HISTIG	FACTORY HISTORIAN ME 1GB MODULE	1
75	ALLEN-BRADLEY	471 SERIES	5X1000A 0.500A TIME LAG FUSE	A/R
76	ALLEN-BRADLEY	1756-L72	CONTROLLOGIX CONTROLLER-4MB	2
77	WYSI	THIN CLIENT	THIN CLIENT	1
78				

A/R = AS REQUIRED

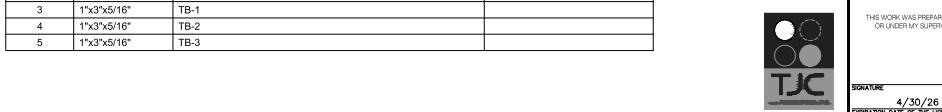
### GENERAL NOTES

- THE RECEPTACLE WILL BE MOUNTED BELOW THE BACKPANEL TO THE ENCLOSURE.
- STICKER, "TIGHTENING TORQUE: 3.5-4.5 LB-IN"
- STICKER, "TIGHTENING TORQUE: 4.5-5.5 LB-IN"
- STICKER, "TIGHTENING TORQUE: 3.5 LB-IN"
- STICKER, "TIGHTENING TORQUE: 21 LB-IN"
- STICKER, "TIGHTENING TORQUE: 9.0 LB-IN"
- STICKER, "TIGHTENING TORQUE: 17 LB-IN"
- STICKER, "TIGHTENING TORQUE: 35 LB-IN"
- STICKER, "TIGHTENING TORQUE: 2.0 LB-IN"
- STICKER, "CLASS 1 CONTROL CIRCUIT"

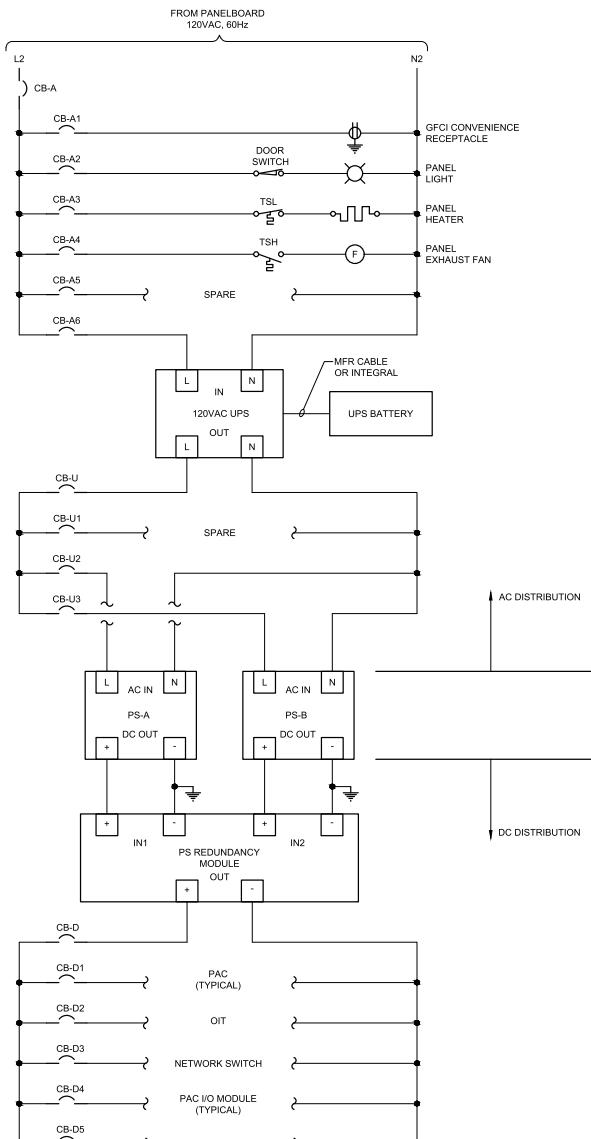
- FINAL COMPONENTS AND LAYOUT TO BE DETERMINED BY PCS1 LAYOUT
- SHOWN IS GENERAL REPRESENTATION OF THE EQUIPMENT. NOT ALL DEVICES OR PANEL FEATURES REQUIRED REFER TO SPECIFICATIONS.
- ALLEN-BRADLEY HARDWARE IS SHOWN FOR TYPICAL PANELS. APPROVED EQUAL COMPONENTS MAY BE PROVIDED PER SPECIFICATIONS.

### NAMEPLATE SCHEDULE

ITEM	SIZE	LINE 1	LINE 2
1	2"x6"x1/2"	FLOW STORAGE BASIN #1 / #2 CONTROL PANEL	CONTROL PANEL
2	1"x3"x5/16"	L083PLC009	
3	1"x3"x5/16"	TB-1	
4	1"x3"x5/16"	TB-2	
5	1"x3"x5/16"	TB-3	



REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EVIA - OAHU, HAWAII INSTRUMENTATION AND CONTROLS			
ITEM: SAMPLE PLC PANEL (IOP) LAYOUT			
DESIGNED BY:	HT	CHECKED BY:	PJG
DRAWN BY:	BV	SECTION HEAD:	
APPROVED:	BRANCH HEAD:		
SIGNATURE		DATE	
JOB NO. W#-#			
FILE NUMBER	DRAWN BY	FILE NUMBER	FILE NUMBER
4/30/26			
EXPIRATION DATE OF THE LICENSE			



### GENERAL NOTES

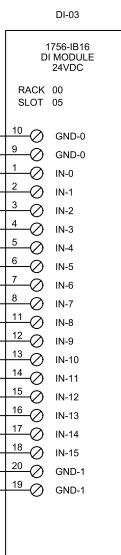
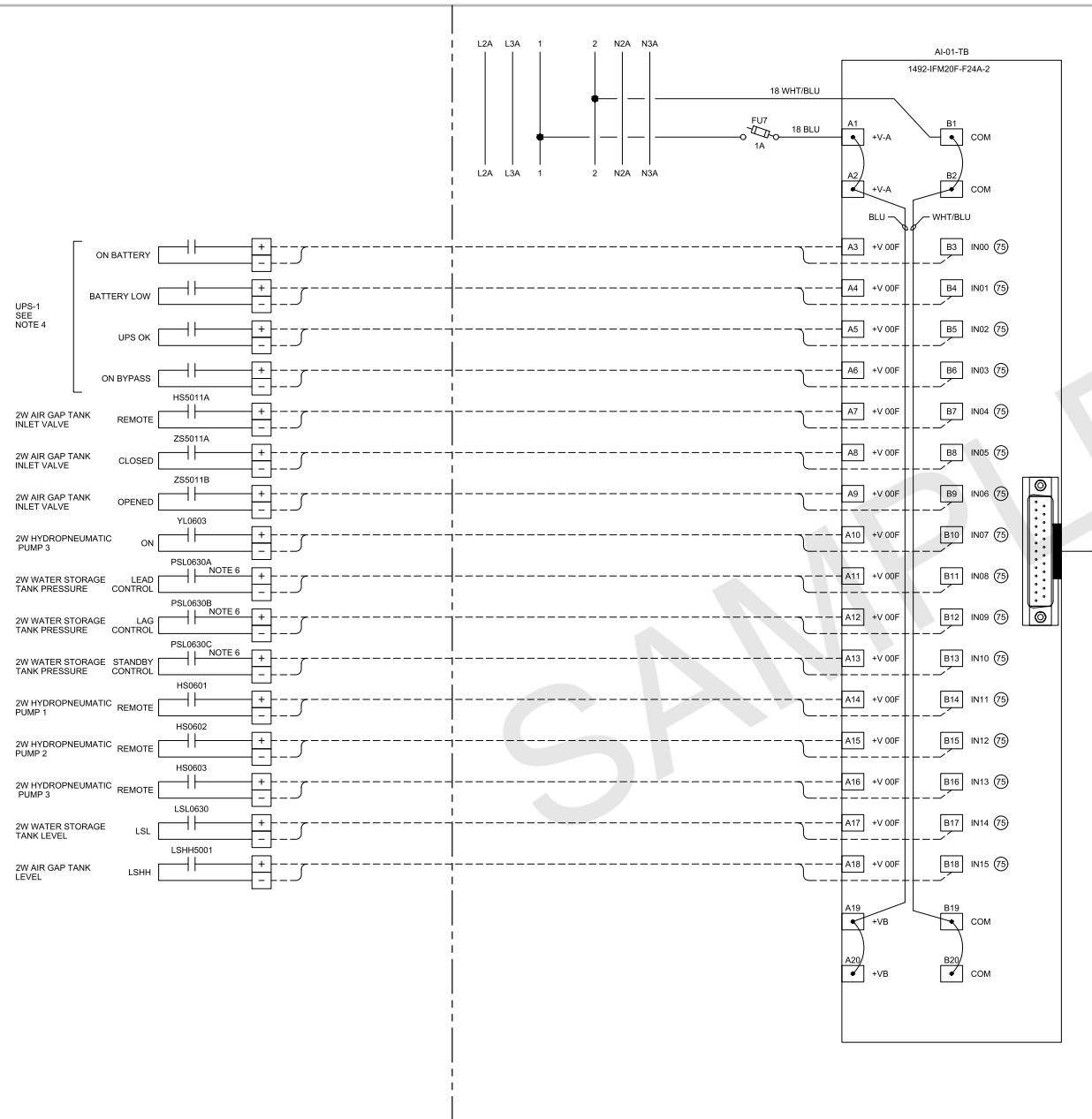
1. PROVIDE 100% SPARE CIRCUIT BREAKERS, FUSES AND POWER TERMINALS FOR FUTURE LOADS.
2. FINAL COMPONENTS AND LAYOUT TO BE DETERMINED BY PCS! LAYOUT SHOWN IS GENERAL REPRESENTATION ONLY AND DOES NOT INCLUDE ALL DISCRETE AND CONTINUOUS FEATURES REQUIRED. REFER TO SPECIFICATIONS.
3. INTERPOSING RELAY CONTACT FROM PLC DISCRETE OUTPUT AS REQUIRED (TYPICAL).

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EVIA, OAHU, HAWAII ITEM: PLC PANEL (ICP) SAMPLE POWER DISTRIBUTION			
THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
DESIGNED BY:	HT	CHECKED BY:	PJG
DRAWN BY:	BV	SECTION HEAD:	
APPROVED:		BRANCH HEAD:	
SIGNATURE	DATE		
JOB NO. W#-#			
4/30/26	EXPIRATION DATE OF THE LICENSE		
FILE NUMBER	DRAFTER	FILE NUMBER	OWNER
FILE NUMBER	DRAFTER	FILE NUMBER	OWNER

FIELD OR AS NOTED

CONTROL PANEL

**GENERAL NOTES**

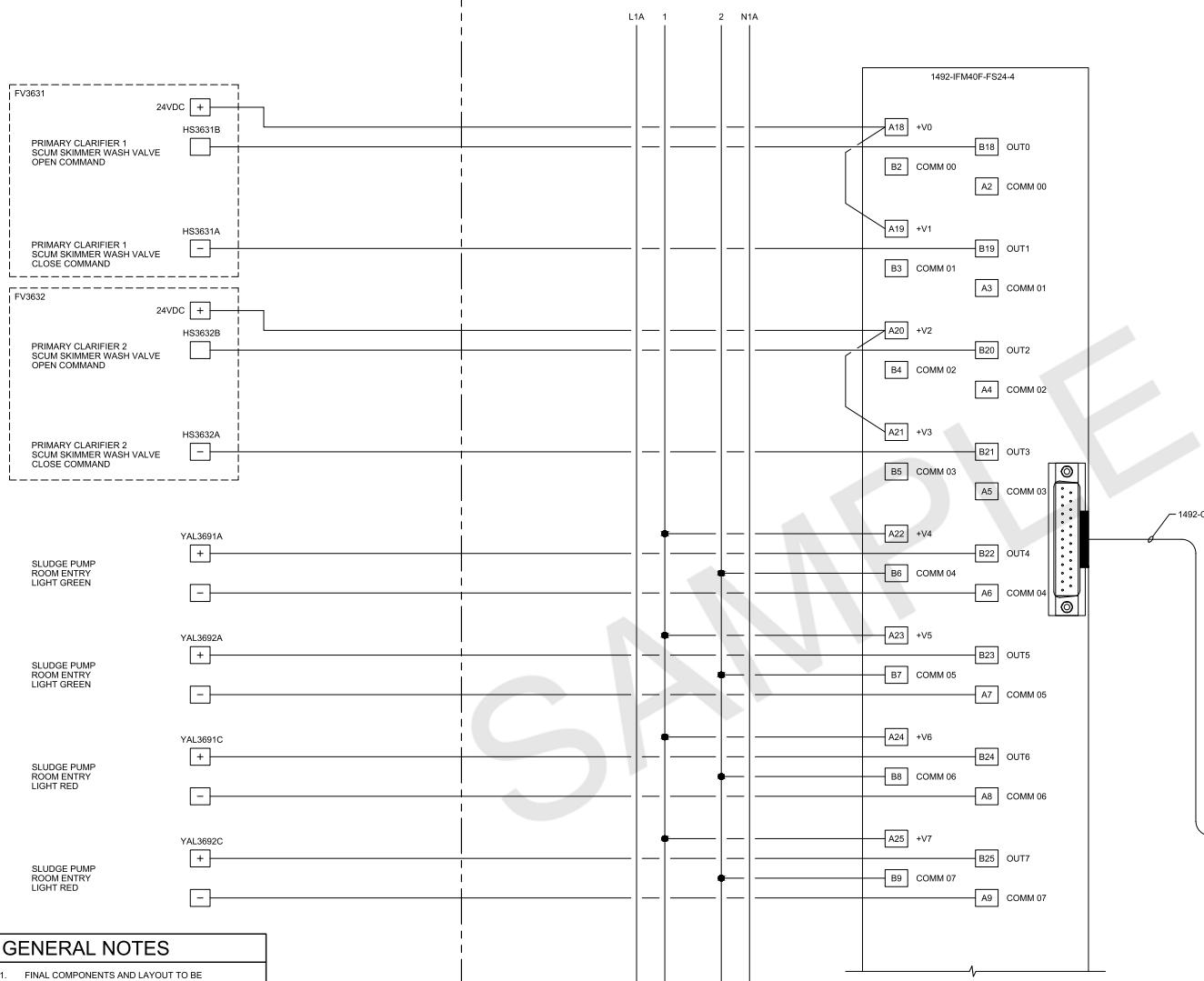
- FINAL COMPONENTS AND LAYOUT TO BE DETERMINED BY PC BOARD. THIS IS GENERAL REPRESENTATION ONLY AND DOES NOT INCLUDE ALL DEVICES OR PANEL FEATURES REQUIRED. REFER TO SPECIFICATIONS.
- TERMINALS STARTING W/A ARE ON LOWER ROW OF TERMINALS.
- TERMINALS STARTING W/B ARE ON UPPER ROW OF TERMINALS.
- INSTALL 0.5A FUSE (75) FOR ALL INPUTS (QTY. 16 REQUIRED).
- USING POWERWARE 9130L1500T-XL RELAY INTERFACE CARD P/N 1014018, PHOENIX CONNECTOR SUBCON 15F/F-SH
- DUAL ACTION PRESSURE SWITCH

**60% SUBMITTAL**

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII ITEM: SAMPLE PLC DI MODULE WIRING DRAWING			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
DESIGNED BY:	HT	CHECKED BY:	PJG
DRAWN BY:	BV	SECTION HEAD:	
APPROVED:	BRANCH HEAD:		
SIGNATURE	DATE		
JOB NO. W#-##			
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER
EXPIRATION DATE OF THE LICENSE			

## FIELD OR AS NOTED

## CONTROL PANEL



1756-QB16I DO MODULE 24VDC	
RACK 01	SLOT 03
ORANGE	2
BLUE	1
WHITE/BLACK	4
RED/BLACK	3
GREEN/BLACK	6
BLACK/WHITE	5
BLUE/BLACK	8
BLACK/WHITE	7
RED/WHITE	10
GREEN/WHITE	9
BLUE/WHITE	12
BLACK/RED	11
WHITE/RED	14
ORANGE/RED	13
BLUE/RED	16
RED/GREEN	15
IN-7	1
ORANGE/GREEN	18
BLACK/WHITE/RED	17
WHITE/BLACK/RED	20
RED/BLACK/WHITE	19
GREEN/BLACK/WHITE	22
ORANGE/BLACK/WHITE	21
BLACK/BLACK/WHITE	24
BLACK/RED/GREEN	23
WHITE/RED/GREEN	26
RED/BLACK/GREEN	25
GREEN/BLACK/ORANGE	28
ORANGE/BLACK/GREEN	27
BLUE/WHITE/ORANGE	30
BLACK/WHITE/ORANGE	29
WHITE/RED/ORANGE	32
ORANGE/WHITE/BLUE	31
IN-15	2

60% SUBMITTAL

REVISION	DATE	BRIEF	BY APPROVED
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT	WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII INSTRUMENTATION AND CONTROLS		
ITEM	SAMPLE PLC DO MODULE WIRING DRAWING		
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION			
DESIGNED BY	HT	CHECKED BY	PJG
DRAWN BY	BV	SECTION HEAD	
APPROVED	BRANCH HEAD		
SIGNATURE	DATE		
JOB NO. W#-#			
EXPIRATION DATE OF LICENSE	4/30/26		
FILE NUMBER	DRIVEN	FILE NUMBER	FILE NUMBER

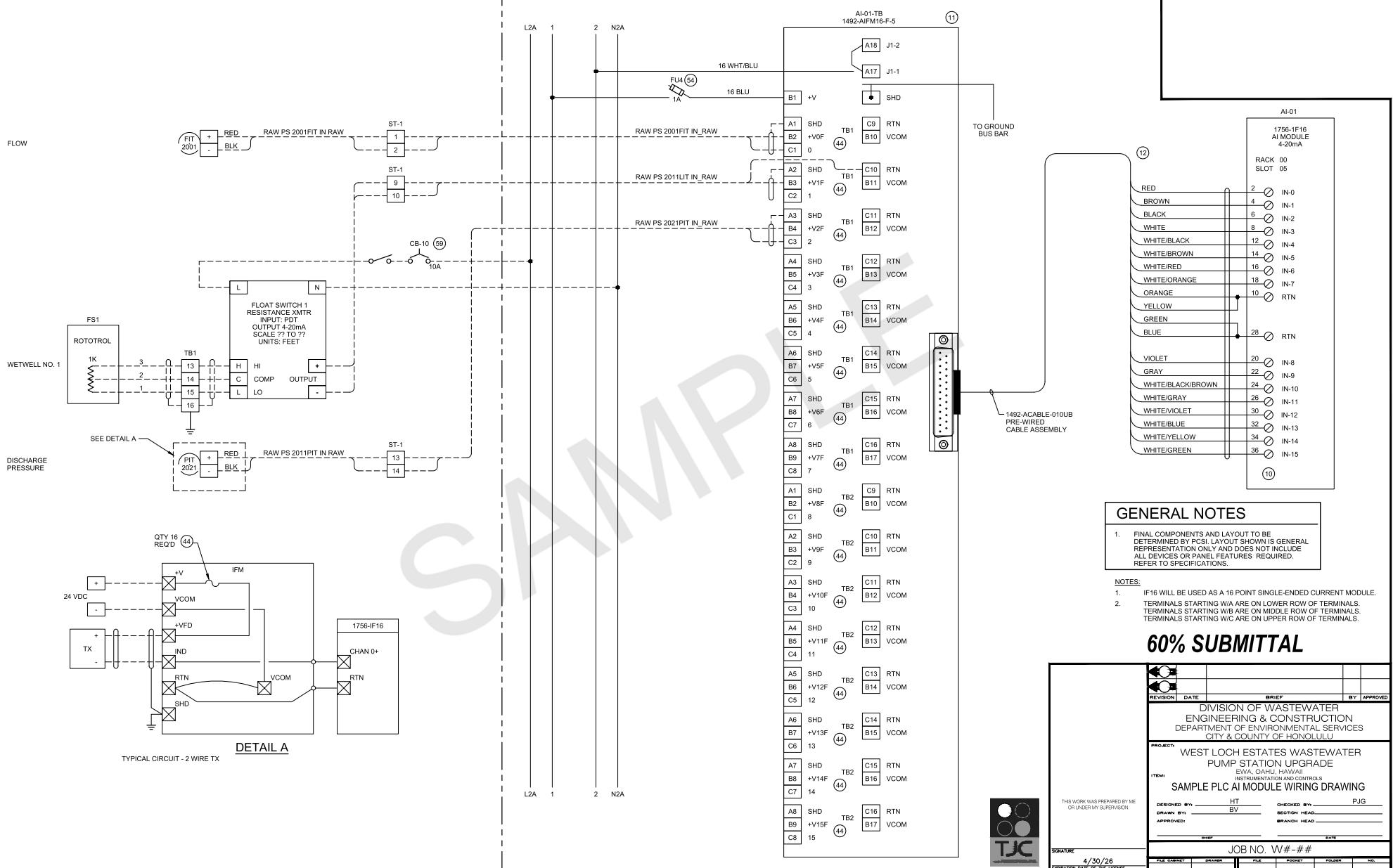
## GENERAL NOTES

- FINAL COMPONENTS AND LAYOUT TO BE DETERMINED BY PCS1 LAYOUT SHOWN IS GENERAL REPRESENTATION ONLY AND DOES NOT INCLUDE ALL DEVICES OR PANEL FEATURES REQUIRED. REFER TO SPECIFICATIONS.

- NOTES:
- TERMINALS STARTING W/A ARE ON LOWER ROW OF TERMINALS.
  - TERMINALS STARTING WB ARE ON UPPER ROW OF TERMINALS.
  - INSTALL 0.5 A FUSE FOR ALL INPUTS (QUANTITY 16 REQUIRED).

FIELD OR AS NOTED

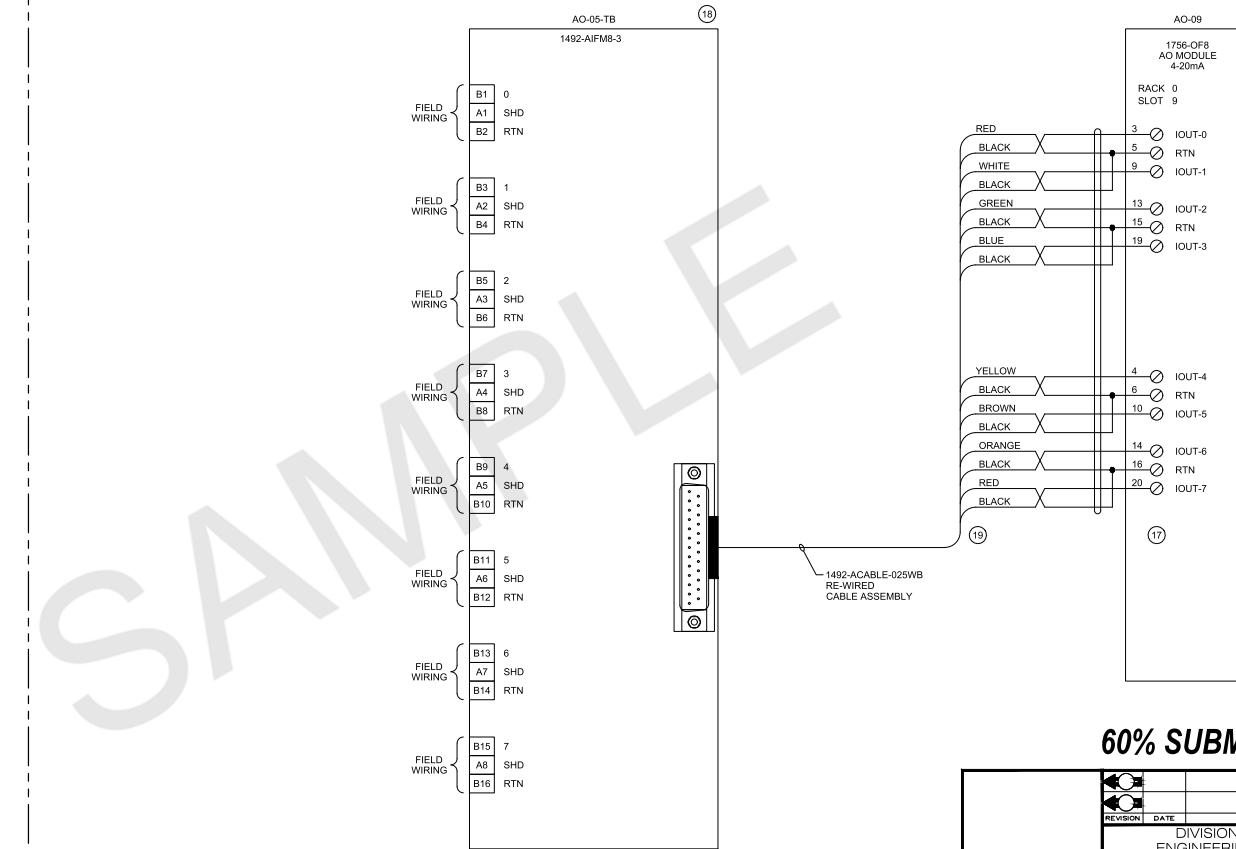
CONTROL PANEL



FIELD OR AS NOTED

CONTROL PANEL

L1A	L1B	3
4	LNB	LNA



60% SUBMITTAL

		BRIEF	BY APPROVED
REVISION	DATE		
DIVISION OF WASTEWATER ENGINEERING & CONSTRUCTION DEPARTMENT OF ENVIRONMENTAL SERVICES CITY & COUNTY OF HONOLULU			
PROJECT: WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE EWA, OAHU, HAWAII			
ITEM: SAMPLE PLC AO MODULE WIRING DRAWING			
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.			
DESIGNED BY:	HT	CHECKED BY:	PJG
DRAWN BY:	BV	SECTION HEAD:	
APPROVED:	BRANCH HEAD:		
SIGNATURE:	DATE:		
JOB NO. W#-##			
FILE NUMBER:	DRWNR:	FILE NUMBER:	PCNTR:
EXPIRATION DATE OF THE LICENSE:			

## GENERAL NOTES

- FINAL COMPONENTS AND LAYOUT TO BE DETERMINED BY PCS1 LAYOUT SHOWN IS GENERAL REPRESENTATION ONLY AND DOES NOT INCLUDE ALL DEVICES OR PANEL FEATURES REQUIRED. REFER TO SPECIFICATIONS.

- NOTES:
- TERMINALS STARTING W/A ARE ON LOWER ROW OF TERMINALS.
  - TERMINALS STARTING W/B ARE ON UPPER ROW OF TERMINALS.

**APPENDIX B**  
**Final Hazardous Materials Assessment**

**FINAL**

HAZARDOUS MATERIALS SURVEY REPORT  
WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE  
91-1024 KAPAPAPUHI STREET  
'EWA BEACH, ISLAND OF O'AHU, HAWAI'I  
TAX MAP KEY: (1) 9-1-181:001

by  
Haley & Aldrich, Inc.  
500 Ala Moana Boulevard, Suite 6-250  
Honolulu, HI 96813

for  
Kaula AE, LLC  
700 Bishop Street, Suite 1930  
Honolulu, HI, 96813

File No. 0208611-000  
October 2024



HALEY & ALDRICH  
500 Ala Moana Boulevard, Suite 6-250  
Honolulu, HI 96813  
808.587.7747

October 16, 2024  
File No. 0208611-000

June Nakamura, P.E.  
Kaula AE, LLC  
700 Bishop Street, Suite 1930  
Honolulu, Hawai'i 96813

Subject: Hazardous Materials Survey Report  
West Loch Estates Wastewater Pump Station Upgrade  
91-1024 Kapapapuhi Street  
'Ewa Beach, O'ahu, Hawai'i  
Portion of Tax Map Key (TMK): (1) 9-1-181:001

Dear Ms. Nakamura,

Haley & Aldrich, Inc. is pleased to submit this Hazardous Materials (HAZMAT) Survey to support West Loch Estates Westwater Pump Station Upgrades in 'Ewa Beach, Hawai'i. Haley & Aldrich's findings and recommendations are based on research, site observations, government regulations, and laboratory data which were gathered at the time and location of the study. Opinions stated in this report do not apply to changes that may have occurred after the services were performed. Should you have any questions, please contact Taylor Chock at tchock@haleyaldrich.com.

Sincerely yours,  
**HALEY & ALDRICH**

Taylor Chock  
Environmental Scientist

Dennis Peters  
Senior Client Account Manager

[https://haleyaldrich.sharepoint.com/sites/KaulaAELLC/Shared%20Documents/0208611.Kaula%20AE%20West%20Loch%20WWPS%20Upgrades/Workspace/HAZMAT%20Report/FINAL%20West%20Loch%20WWPS%20HAZMAT%20Report\\_10.16.2024.docx](https://haleyaldrich.sharepoint.com/sites/KaulaAELLC/Shared%20Documents/0208611.Kaula%20AE%20West%20Loch%20WWPS%20Upgrades/Workspace/HAZMAT%20Report/FINAL%20West%20Loch%20WWPS%20HAZMAT%20Report_10.16.2024.docx)

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<b>Appendix</b>	<b>Title</b>
A	Site Plan showing LBP
B	Photograph Log
C	Hawaii Analytical Laboratory Asbestos and Lead Laboratory Analytical Results and Chain-of-Custody Forms

## 1. Certifications and Limitations

Haley & Aldrich, Inc. is pleased to submit this Hazardous Materials (HAZMAT) Survey Report for the West Loch Estates Wastewater Pump Station in ‘Ewa Beach, Hawai‘i. Haley & Aldrich’s findings and recommendations are based on research, site observations, government regulations and laboratory data, which were limited in their scope to the time and location of the study. Opinions stated in this report do not apply to changes that may have occurred after the services were performed.

Haley & Aldrich has performed specified services for this project with the degree of care, skill and diligence ordinarily exercised by professional consultants performing the same or similar services. No other warranty, guarantee, or representation, expressed or implied, is included or intended; unless otherwise specifically agreed to in writing by both Haley & Aldrich and their client. Haley & Aldrich makes no warranty and assumes no liability for the inappropriate use or misuse of this document.

Prepared By:

Derek Sheldon   
State of Hawai‘i Asbestos Building Inspector  
Certification #: HIASB-5222, Expires: 6/1/2025

Date: 10/16/2024

And

Taylor Chock   
State of Hawai‘i Asbestos Building Inspector  
Certification #: HIASB-4478, Expires: 7/17/25

Date: 10/16/2024

## 2. Summary of Findings and Recommendations

Haley & Aldrich conducted a HAZMAT survey on July 17, 2024, at the West Loch Estates Wastewater Pump Station (WWPS) located in ‘Ewa Beach on the island of O’ahu, Hawai‘i. The WWPS was put into service in 1989 and is an approximately 375-square-foot, single-story concrete masonry unit building with an open beam ceiling and aluminum shingle roof enclosed by rubble masonry walls and secured with two metal gates for access (herein, the Project Site). The WWPS building had two rooms: a generator room on the west side of the building and a larger pump room on the east side, which contained the Supervisory Control and Data Acquisition (SCADA) equipment, wetwell, float levels and controls, and restroom. The survey was conducted on the portions of the WWPS building that will be demolished to accommodate pump station improvements according to the demolition plan provided by Kaula AE (Appendix A; Figure 1).

### Asbestos-Containing Materials (ACM)

No asbestos-containing materials (ACM) were identified during the hazardous materials survey. Appendix B contains a Photograph Log of photos of the building materials sampled.

### Lead-Based Paint (LBP)

One of the five samples was found to contain lead-based paint (LBP) (i.e., >5,000 mg/kg) as noted below. Lead-containing paints were assumed and identified in poor (e.g., loose and flaking) to fair (e.g., better than poor condition, but still showing wear and not in “good” condition) conditions on various painted surfaces throughout the Project Site. Haley & Aldrich recommends the following for LBP disturbance:

- Spot remove and dispose of all LBP that may be disturbed or become dislodged during renovation/demolition activities in accordance with applicable local, state, and federal regulations.
- Remove and dispose of all loose and flaking (poor condition) LBP that may be disturbed or become dislodged during renovation activities in accordance with applicable local, state, and federal regulations.
- Workers performing disturbance of LBP must take appropriate measures to comply with applicable OSHA and HIOSH regulations pertaining to the handling of lead containing materials, lead dust and worker protection. Note that OSHA and HIOSH regulate activities that disturb paint which contain any detectable concentration of lead.

A qualified consultant should be obtained to conduct air monitoring and inspection activities to ensure compliance with applicable state and federal regulations pertaining to the handling of LBP.

The table below summarizes the identified LBP at the Project Site.

*Table 1: Identified LBP*

Int/Ext.	Room/Area	Homogenous Materials	Color	Type	Condition	Est. Amt of Material (sq ft)
Interior	SCADA Room	Float Support Paint	Orange	Paint	Fair	5

### **3. Scope of Work**

Haley & Aldrich performed the scope of work:

- Performed site reconnaissance at the Project Site;
- Collected 18 bulk samples from potential asbestos-containing building materials marked for demolition at the Project Site in accordance with State of Hawai'i Department of Health (DOH)/United States Environmental Protection Agency (EPA) guidelines;
- Collected five (5) paint chip samples from painted surfaces marked for demolition at the Project Site;
- Submitted the bulk and paint chip samples to Hawaii Analytical Laboratories, LLC (HAL) for analysis by polarized light microscopy (PLM) EPA Method 600/R/93/116 to evaluate asbestos type and content and National Institute for Occupational Safety and Health (NIOSH) Method 7082m by Flame Absorption Spectrophotometry (FAAS) for total lead content;
- Provided this written report summarizing methodology, photographs, laboratory results, findings, and recommendations.

## **4. Methodology**

### **Asbestos**

On July 17, 2024, Haley & Aldrich's Hawai'i-certified asbestos building inspectors Taylor Chock (HIASB-4478) and Derek Sheldon (HIASB-52122) collected 18 samples of suspect asbestos-containing materials from the Project Site for asbestos analysis. These samples were collected in accordance with DOH/EPA guidelines and recommendations.

Each suspect asbestos containing material was first wetted with water. A small piece was then removed and placed in a labeled re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. All samples were properly logged and recorded following strict chain of custody procedure and submitted to HAL for analysis by PLM in accordance with EPA Method 600/R-93/116. HAL is accredited for bulk asbestos analysis through successful participation in the National Voluntary Lab Accreditation Program (NVLAP).

### **Lead Paint**

Haley & Aldrich personnel collected five (5) paint chip samples from the Project Site in accordance with the DOH/EPA guidelines and recommendations.

The suspected lead paints were wetted with water before sample collection. Paint was carefully scraped and placed into a labeled re-sealable plastic bag. The sampling equipment was cleaned between each sample collection to avoid cross-contamination between samples. All samples were logged and recorded following strict chain of custody (COC) procedures and submitted to HAL for analysis in accordance with EPA Method 7082m by FAAS.

## 5. Results

### Asbestos

Laboratory analyses did not identify levels of asbestos above the regulatory limit of 1% in the interior or exterior building materials planned for demolition at the Project Site. Table 2 below summarizes these results. Additionally, Appendix B includes photographs of the sampled materials. Laboratory results are included in Appendix C.

*Table 2: Asbestos Bulk Sampling Results*

Int/Ext.	Room/Area	Homogenous Materials	Color	Friable	Type	Condition	Est. Amt of Material (sq ft)	Asbestos Content	Sample ID
Exterior	NW Corner	Concrete / Paint	Gray	Yes	N/A	Poor	400	None Detected	A1
Exterior	SW Corner	Concrete / Paint	Gray	Yes	N/A	Poor	400	None Detected	A2
Exterior	S Wall	Concrete / Paint	Gray	Yes	N/A	Poor	400	None Detected	A3
Exterior	North Window	Caulking	Black	No	N/A	Fair	120	None Detected	B1
Exterior	North Window	Caulking	Black	No	N/A	Fair	120	None Detected	B2
Exterior	North Window	Caulking	Black	No	N/A	Fair	120	None Detected	B3
Exterior	North Exhaust Pipe	Insulation	Yellow	Yes	N/A	Fair	4	None Detected	C1
Exterior	North Exhaust Pipe	Insulation	Yellow	Yes	N/A	Fair	4	None Detected	C2
Exterior	North Exhaust Pipe	Insulation	Yellow	Yes	N/A	Fair	4	None Detected	C3
Interior	SCADA Room Ceiling	Drywall / Joint Compound	White	Yes	N/A	Fair	150	None Detected	D1
Interior	SCADA Room Ceiling	Drywall / Joint Compound	White	Yes	N/A	Fair	150	None Detected	D2
Interior	SCADA Room Ceiling	Drywall / Joint Compound	White	Yes	N/A	Fair	150	None Detected	D3
Interior	SCADA Room Window	Caulking	Black	No	N/A	Fair	120	None Detected	E1
Interior	SCADA Room Window	Caulking	Black	No	N/A	Fair	120	None Detected	E2
Interior	SCADA Room Window	Caulking	Black	No	N/A	Fair	120	None Detected	E3
Interior	Generator Room Wall/Ceiling	Acoustic Ceiling Tile	White	Yes	N/A	Fair	250	None Detected	F1
Interior	Generator Room Wall/Ceiling	Acoustic Ceiling Tile	White	Yes	N/A	Fair	250	None Detected	F2
Interior	Generator Room Wall/Ceiling	Acoustic Ceiling Tile	White	Yes	N/A	Fair	250	None Detected	F3

## **Lead Paint**

One (1) of the sampled painted building components contained lead exceeding the EPA guideline of 5,000 mg/kg to be considered Lead-Based Paint (LBP). Table 3 below summarizes these results.

Appendix A shows the location of the identified orange LBP on the float supports. Additionally, Appendix B includes photographs of the sampled paints. The laboratory results are included in Appendix C.

*Table 3: Paint Chip Sampling Results*

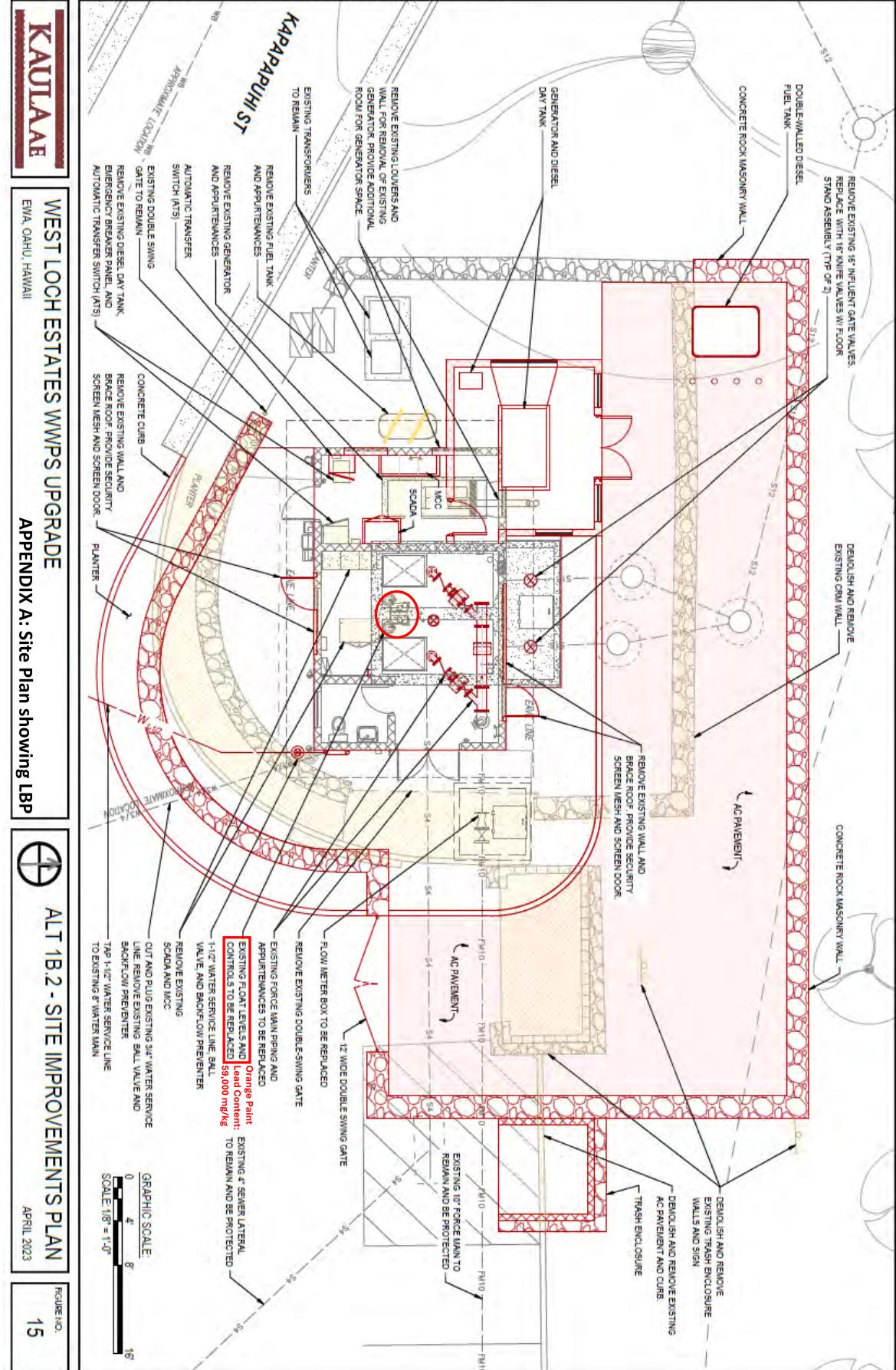
Int/Ext.	Room/Area	Homogenous Materials	Color	Type	Condition	Est. Amt of Material (sq ft)	Lead Content (mg/kg)	Sample ID
Exterior	North Facade	Masonry Paint	Off-white	N/A	Poor	400	<40	L1
Exterior	North Exhaust Pipe	Exhaust Pipe Paint	Silver	N/A	Fair	4	<40	L2
Interior	SCADA Room	Masonry Paint	Off-white	N/A	Fair	400	<40	L3
Interior	SCADA Room	Float Support Paint	Orange	N/A	Fair	5	59,000*	L4
Interior	SCADA Room	Floor Paint	Red	N/A	Fair	100	<40	L5

*Notes:*

\*LBP

[https://haleyaldrich.sharepoint.com/sites/KaulaAELLC/Shared%20Documents/0208611.Kaula%20AE%20West%20Loch%20WWPS%20Upgrades/Workspace/HAZMAT%20Report/FINAL%20West%20Loch%20WWPS%20HAZMAT%20Report\\_10.16.2024.docx](https://haleyaldrich.sharepoint.com/sites/KaulaAELLC/Shared%20Documents/0208611.Kaula%20AE%20West%20Loch%20WWPS%20Upgrades/Workspace/HAZMAT%20Report/FINAL%20West%20Loch%20WWPS%20HAZMAT%20Report_10.16.2024.docx)

**APPENDIX A**  
**Site Plan showing LBP**



**APPENDIX B**  
**PHOTOGRAPH LOG**

**Hazardous Materials Survey Report**  
**West Loch Estates Wastewater Pump Station**  
**Ewa Beach, O'ahu, Hawai'i**  
**File No. 0208611-000**  
**Date Photographs Taken: July 17, 2024**

---

Sample No.	Photograph	Description
Asbestos A-1 A-2 A-3		Asbestos Samples  Exterior Concrete Mastic Material (gray)  No Asbestos Detected
Asbestos B-1 B-2 B-3		Asbestos Samples  Exterior Window Caulking/Sealant (white)  No Asbestos Detected

**Hazardous Materials Survey Report**  
**West Loch Estates Wastewater Pump Station**  
**Ewa Beach, O'ahu, Hawai'i**  
**File No. 0208611-000**  
**Date Photographs Taken: July 17, 2024**

---

Sample No.	Photograph	Description
Asbestos C-1 C-2 C-3	 A photograph of a vertical white exhaust pipe insulation. A rectangular piece of brown material, identified as asbestos, has been removed from the surface, revealing the underlying pipe. The date "07/17/2024 08:42 AM" is visible at the bottom right of the image.   A photograph of an orange-painted drywall ceiling. A small white rectangular sample of asbestos has been removed, exposing the drywall substrate. An orange cable is visible on the left. The date "07/17/2024 08:57 AM" is visible at the bottom right of the image.	Asbestos Samples  Exterior Exhaust Pipe Insulation (brown)  No Asbestos Detected
Asbestos D-1 D-2 D-3		Asbestos Samples  Interior Ceiling Drywall (white)  No Asbestos Detected

**Hazardous Materials Survey Report**  
**West Loch Estates Wastewater Pump Station**  
**Ewa Beach, O'ahu, Hawai'i**  
**File No. 0208611-000**  
**Date Photographs Taken: July 17, 2024**

---

Sample No.	Photograph	Description
Asbestos E-1 E-2 E-3		Asbestos Samples  Interior window caulking (black)  No Asbestos Detected
Asbestos F-1 F-2 F-3		Asbestos Sample  Interior of generator room wall and ceiling acoustic tiles (off-white)  No Asbestos Detected

**Hazardous Materials Survey Report**  
**West Loch Estates Wastewater Pump Station**  
**Ewa Beach, O'ahu, Hawai'i**  
**File No. 0208611-000**  
**Date Photographs Taken: July 17, 2024**

---

Sample No.	Photograph	Description
Paint Chip L-1		Paint Chip Sample  Exterior wall paint (off-white)  <40 mg/kg lead detected
Paint Chip L-2		Paint Chip Sample  Exterior exhaust pipe (silver)  <40 mg/kg lead detected

**Hazardous Materials Survey Report**  
**West Loch Estates Wastewater Pump Station**  
**Ewa Beach, O'ahu, Hawai'i**  
**File No. 0208611-000**  
**Date Photographs Taken: July 17, 2024**

---

Sample No.	Photograph	Description
Paint Chip L-3	 <p>A photograph showing a section of a concrete block wall. The wall is light gray and shows signs of wear and discoloration. A timestamp in the bottom right corner reads "07/17/2024 09:11AM".</p>	Paint Chip Sample  Interior wall paint (off-white)  <40 mg/kg lead detected
Paint Chip L-4	 <p>A photograph showing a worker in an orange safety vest and cap working on a pump system. The worker is wearing black gloves and appears to be inspecting or working on a vertical support structure made of orange pipes. A timestamp in the bottom right corner reads "07/17/2024 09:10AM".</p>	Paint Chip Sample  Interior paint on float support structure (orange)  59,000 mg/kg lead detected

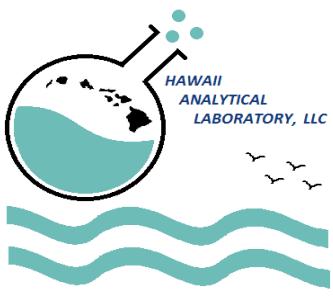
**Hazardous Materials Survey Report**  
**West Loch Estates Wastewater Pump Station**  
**Ewa Beach, O'ahu, Hawai'i**  
**File No. 0208611-000**  
**Date Photographs Taken: July 17, 2024**

---

Sample No.	Photograph	Description
Paint Chip L-5		Paint Chip Sample Interior floor paint (red) <40 mg/kg lead detected

**APPENDIX C**  
**Hawaii Analytical Laboratory**

**Asbestos and Lead Laboratory Analytical Results and  
Chain-of-Custody Forms**



# Hawaii Analytical Laboratory

## ANALYTICAL REPORT

Wednesday, July 24, 2024

Mr. Taylor Chock  
Haley & Aldrich  
500 Ala Moana Blvd., Suite 6-250  
Honolulu HI 96813

Phone Number: (808)470-2081  
Facsimile:  
Email: tchock@haleyaldrich.com

Lab Job No: 202407273

Date Submitted: 7/17/2024

Your Project: 0208611-000, West Loch WWPS Upgrades, 7/17/24

### Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
202450695	A-1		NONE DETECTED		None detected		Cementitious + paint + other	7/22/2024
<u>Layer</u>	<u>Gray concrete / paint</u>							
Comments								
202450696	A-2		NONE DETECTED		None detected		Cementitious + paint + other	7/22/2024
<u>Layer</u>	<u>Gray concrete / paint</u>							
Comments								
202450697	A-3		NONE DETECTED		None detected		Cementitious + paint + other	7/22/2024
<u>Layer</u>	<u>Gray concrete / paint</u>							
Comments								
202450698	B-1		NONE DETECTED		None detected		Binder + paint	7/22/2024
<u>Layer</u>	<u>Black caulking / gray paint</u>							
Comments								
202450698	B-1		NONE DETECTED		None detected		Foam	7/22/2024
<u>Layer</u>	<u>Gray foam</u>							
Comments								
202450699	B-2		NONE DETECTED		None detected		Binder + paint	7/22/2024
<u>Layer</u>	<u>Black caulking / gray paint</u>							
Comments								

Hawaii Analytical Laboratory is a NIST NVLAP accredited laboratory (NVLAP Lab Code 200655-0) and is accredited in accordance with the recognized ISO/IEC 17025:2017. Controlled doc.: Asbestos Report, rev. 4 – 20240311

Mr. Taylor Chock  
Haley & Aldrich  
500 Ala Moana Blvd., Suite 6-250  
Honolulu HI 96813

Phone Number: (808)470-2081  
Facsimile:  
Email: tchock@haleyaldrich.com

Lab Job No: 202407273  
Date Submitted: 7/17/2024  
Your Project: 0208611-000, West Loch WWPS Upgrades, 7/17/24

## Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
202450699	B-2	NONE DETECTED			None detected		Foam	7/22/2024
	<u>Layer</u> <u>Gray foam</u>							
	Comments							
202450700	B-3	NONE DETECTED			None detected		Binder + paint	7/22/2024
	<u>Layer</u> <u>Black caulking / gray paint</u>							
	Comments							
202450700	B-3	NONE DETECTED			None detected		Foam	7/22/2024
	<u>Layer</u> <u>Gray foam</u>							
	Comments							
202450701	C-1	NONE DETECTED			Fibrous glass (amorphous)	15	Aluminum + other	7/23/2024
	<u>Layer</u> <u>Silver wrap</u>							
	Comments							
202450701	C-1	NONE DETECTED			Fibrous glass (amorphous)	> 99	None detected	7/23/2024
	<u>Layer</u> <u>Yellow insulation</u>							
	Comments							
202450702	C-2	NONE DETECTED			Fibrous glass (amorphous)	15	Aluminum + other	7/23/2024
	<u>Layer</u> <u>Silver wrap</u>							
	Comments							
202450702	C-2	NONE DETECTED			Fibrous glass (amorphous)	> 99	None detected	7/23/2024
	<u>Layer</u> <u>Yellow insulation</u>							
	Comments							
202450703	C-3	NONE DETECTED			Fibrous glass (amorphous)	15	Aluminum + other	7/23/2024
	<u>Layer</u> <u>Silver wrap</u>							
	Comments							

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**Lab Job No:** 202407273  
**Date Submitted:** 7/17/2024  
**Your Project:** 0208611-000, West Loch WWPS Upgrades, 7/17/24

## Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
202450703	C-3	NONE DETECTED		Fibrous glass (amorphous)	> 99	None detected		7/23/2024
<u>Layer</u>	<u>Yellow insulation</u>							
Comments								
202450704	D-1	NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	15	Gypsum		7/23/2024
<u>Layer</u>	<u>White drywall</u>							
Comments								
202450704	D-1	NONE DETECTED		None detected		Calcite + binder + paint		7/23/2024
<u>Layer</u>	<u>White joint compound (1) / gray paint</u>							
Comments								
202450704	D-1	NONE DETECTED		Cellulose (undulose)	20	Calcite + binder		7/23/2024
<u>Layer</u>	<u>White joint compound (2) / paper</u>							
Comments								
202450705	D-2	NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	15	Gypsum		7/23/2024
<u>Layer</u>	<u>White drywall</u>							
Comments								
202450705	D-2	NONE DETECTED		None detected		Calcite + binder + paint		7/23/2024
<u>Layer</u>	<u>White joint compound (1) / gray paint</u>							
Comments								
202450705	D-2	NONE DETECTED		Cellulose (undulose)	20	Calcite + binder		7/23/2024
<u>Layer</u>	<u>White joint compound (2) / paper</u>							
Comments								
202450706	D-3	NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	15	Gypsum		7/23/2024
<u>Layer</u>	<u>White drywall</u>							
Comments								

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Lab Job No: 202407273  
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Your Project: 0208611-000, West Loch WWPS Upgrades, 7/17/24

## Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
202450706	D-3	NONE DETECTED		None detected		Calcite + binder + paint		7/23/2024
Layer	<u>White joint compound (1) / gray paint</u>							
Comments								
202450706	D-3	NONE DETECTED		Cellulose (undulose)	20	Calcite + binder		7/23/2024
Layer	<u>White joint compound (2) / paper</u>							
Comments								
202450707	E-1	NONE DETECTED		None detected		Binder		7/23/2024
Layer	<u>Black caulking</u>							
Comments								
202450707	E-1	NONE DETECTED		None detected		Foam		7/23/2024
Layer	<u>Gray foam</u>							
Comments								
202450708	E-2	NONE DETECTED		None detected		Binder		7/23/2024
Layer	<u>Black caulking</u>							
Comments								
202450708	E-2	NONE DETECTED		None detected		Foam		7/23/2024
Layer	<u>Gray foam</u>							
Comments								
202450709	E-3	NONE DETECTED		None detected		Binder		7/23/2024
Layer	<u>Black caulking</u>							
Comments								
202450709	E-3	NONE DETECTED		None detected		Foam		7/23/2024
Layer	<u>Gray foam</u>							
Comments								

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**Lab Job No:** 202407273  
**Date Submitted:** 7/17/2024  
**Your Project:** 0208611-000, West Loch WWPS Upgrades, 7/17/24

## Bulk Asbestos Determination

Sample No.	Your Sample ID / Description	Asbestos Present?	Type	%v/v	Other Fibrous	%v/v	Matrix	Date Analyzed
202450710	F-1		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65	Perlite + other	7/23/2024
<u>Layer</u> <u>White acoustic ceiling tile</u>								
Comments								
202450711	F-2		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65	Perlite + other	7/23/2024
<u>Layer</u> <u>White acoustic ceiling tile</u>								
Comments								
202450712	F-3		NONE DETECTED		Cellulose (undulose) + fibrous glass (amorphous)	65	Perlite + other	7/23/2024
<u>Layer</u> <u>White acoustic ceiling tile</u>								
Comments								

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**Lab Job No:** 202407273  
**Date Submitted:** 7/17/2024  
**Your Project:** 0208611-000, West Loch WWPS Upgrades, 7/17/24

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General Comments

The bulk sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures outlined in the United States Environmental Protection Agency's "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA-600/M4-82-020, Dec. 1982) and / or "Method for Determination of Asbestos in bulk Building Materials" (EPA-600/R-93-116, July 1993). The analysis of each bulk sample relates only to the material examined, and may or may not represent the overall composition of its original source. Floor tile and other resinously bound materials, when analyzed by the EPA methods referenced above may yield false negative results because of limitations in separating closely bound fibers and in detecting fibers of small length and diameter. Gravimetric treatment, which HAL does not offer, may also be appropriate for certain NOB (non-friable organically bound) materials. Unless specifically requested by clients, NOB samples can be subcontracted to a NVLAP accredited lab, or else, they will be analyzed by HAL using regular PLM technique. In addition, alternative methods of identification, including Transmission Electron Microscopy (TEM) may or may not be applicable. We utilize calibrated visual area estimation on a routine basis and do not conduct point counting unless specifically requested to do so. Estimated error for the visual determinations presented are 75% relative (1 to 2%), 50% relative (3 to 5%); 25% relative (6 to 25%) and 20% (>26% v/v). We will not separate layers which in our opinion are not readily discernable. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST or any agency of Federal Government. Unless otherwise indicated, the sample condition at the time of receipt was acceptable.

Results and Symbols Definitions

- > This testing result is greater than the numerical value listed.
- < This testing result is less than the numerical value listed.

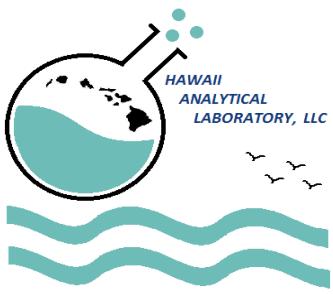
None Detected = asbestos was not observed in the sample. If trace amount of asbestos was detected below our quantifiable limits of 1.0%, <1% (trace) would be indicated and the asbestos type listed. Point counting, where applicable, are recommended to improve accuracy.



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Jennifer Hsu Liao  
Laboratory Manager

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# Hawaii Analytical Laboratory

## ANALYTICAL REPORT

Tuesday, July 23, 2024

Mr. Taylor Chock  
Haley & Aldrich  
500 Ala Moana Blvd., Suite 6-250  
Honolulu HI 96813

Phone Number: (808)470-2081  
Facsimile:  
Email: tchock@haleyaldrich.com

Lab Job No: 202407273  
Date Submitted: 7/17/2024  
Your Project: 0208611-000, West Loch WWPS Upgrades, 7/17/24

### Total Lead (paint chips)

NIOSH Method: 7082m LEAD by FAAS

Sample No.	Your Sample ID / Description	Results	Units	Date Analyzed
202450713	L-1 Comments	< 40	mg/kg	7/19/2024
202450714	L-2 Comments	< 40	mg/kg	7/19/2024
202450715	L-3 Comments	< 40	mg/kg	7/19/2024
202450716	L-4 Comments	59000	mg/kg	7/19/2024
202450717	L-5 Comments	< 40	mg/kg	7/19/2024

Hawaii Analytical Laboratory (101812) is accredited by the AIHA LAP, LLC in the EMLAP, IHLAP, and ELLAP programs for the scope of work listed on [www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org), in accordance with the recognized ISO/ IEC 17025:2005. AIHA is a NLLAP recognized accrediting body. Controlled doc.: Lead Report, rev. 3 – 20181015

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**Email:** tchock@haleyaldrich.com

**Lab Job No:** 202407273  
**Date Submitted:** 7/17/2024  
**Your Project:** 0208611-000, West Loch WWPS Upgrades, 7/17/24

---

All Quality Control data are acceptable unless otherwise noted.

MRL for lead air is 5ug.

MRL for lead wipe is 10ug.

MRL for lead paint or soil is 40 mg/kg for a 0.25g sample.

General Comments

The sample[s] analysis subject of this analytical report were conducted in general accordance with the procedures associated with the "analytical method" referenced above. Modifications to this methodology may have been made based upon the analyst's professional judgment and / or sample matrix effects encountered. The analysis of sample relates only to the sample analyzed, and may or may not be representative of the original source of the material submitted for our analysis. All analysts participate in interlaboratory quality control testing to continuously document proficiency. This report is not to be duplicated except in full without the expressed written permission of Hawaii Analytical Laboratory. This report should not be construed as an endorsement for a product or a service by the AIHA LAP, LLC or any affiliated organizations. Sample and associated sampling / collection data is reported as provided by client. TWA values have been calculated based on information supplied by the client that the laboratory has not independently verified. Results have not been corrected for blank determinations unless noted in remarks. Unless otherwise indicated the sample condition at the time of receipt was acceptable.

Results and Symbols Definitions

> This testing result is greater than the numerical value listed.

< This testing result is less than the numerical value listed.

# = Analytical methods marked with an "#" are not within our AIHA LAP, LLC Scope of Accreditation.

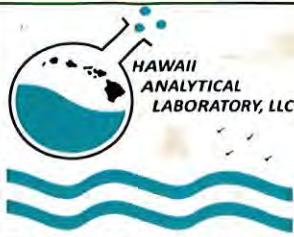
MRL = Method Reporting Limit.



---

Jennifer Hsu Liao  
Laboratory Manager

Hawaii Analytical Laboratory (101812) is accredited by the AIHA LAP, LLC in the EMLAP, IHLAP, and ELLAP programs for the scope of work listed on [www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org), in accordance with the recognized ISO/ IEC 17025:2005. AIHA is a NLLAP recognized accrediting body. Controlled doc.: Lead Report, rev. 3 – 20181015



3615 Harding Avenue, Suite 308  
Honolulu, HI 96816  
Ph: 808-735-0422 - Fax: 808-735-0047  
<https://analyzehawaii.com>

**Need Results By\*:**

- 5 Working Days (WD)
- 4 WD
- 3 WD
- 2 WD
- 24 hours
- 6 hours or less
- 4 hours or less
- 1-2 hours

New Client?

Report To\* : Taylor Chock  
Company : Haley & Aldrich, Inc.  
Address\* : 500 Ala Moana Boulevard, Suite 6-250  
Honolulu, HI 96813  
Phone / Cell No.\* : (808) 470-2081  
Report results to : Taylor Chock  
Email / Fax : [tchock@haleyaldrich.com](mailto:tchock@haleyaldrich.com)

Invoice To\* : Taylor Chock  
Company : Haley & Aldrich, Inc.  
Address\* : 500 Ala Moana Boulevard, Suite 6-250  
Honolulu, HI 96813  
Phone / Cell No.\* : (808) 470-2081  
Purchase Order No. :  
Email Invoice To : [tchock@haleyaldrich.com](mailto:tchock@haleyaldrich.com)

Site/Project Name: <b>West Loch WWPS Upgrades</b>	Client Project No.: <b>0208611-000</b>	Verbal results? <input type="checkbox"/>	Sampled By & Certif. #: <b>Taylor Chock (HIASB-4478)</b>
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Special Instructions:	PLM POSITIVE STOP Instructions: <input checked="" type="checkbox"/> + stop / SAMPLE <input type="checkbox"/> + stop / LAYER	Lab Report No.: <b>202407273</b>
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Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
1 A-1	Ext. NW corner	7/17/2024	Concrete masonry	400 SF	PLM	EPA 600R-93/116	202450695
2 A-2	Ext. SW corner	7/17/2024	"	400 SF			202450696
3 A-3	Ext. S wall	7/17/2024	"	400 SF			202450697
4 B-1	Ext window caulk	7/17/2024	Caulk	120 SF			202450698
5 B-2	Ext window caulk	7/17/2024	Caulk	120 SF			202450699
6 B-3	Ext. window caulk	7/17/2024	Caulk	120 SF			202450700
7 C-1	Ext. pipe insulation	7/17/2024	Insulation	4 SF			202450701
8 C-2	Ext. pipe insulation	7/17/2024	Insulation	4 SF			202450702
9 C-3	Ext. pipe insulation	7/17/2024	Insulation	4 SF			202450703
10 D-1	Int. ceiling drywall NW corner	7/17/2024	Dry wall	150 SF			202450704
11 D-2	Int. ceiling drywall west	7/17/2024	"	150 SF			202450705
12 D-3	Int. ceiling drywall west	7/17/2024	"	150 SF			202450706

Relinquished By (Print and Sign)

Date/Time

Received By (Print and Sign)

Date/Time

Taylor Chock *Taylor Chock*

07/17/2024 / 0415 PM

Haley Leavitt

07-17-24 P04:24 RCVD

\*Sample description can be paint chips, concrete, specific sample collection location, etc...

If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.

All samples submitted are subject to Hawaii Analytical Laboratory terms and conditions.

\*Required fields, failure to complete these fields may result in a delay in your samples being processed.

via HAC

via USPS

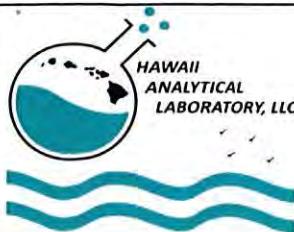
via drop box

via FedEx

via pick up

awb# 173-

Page: 1 of 3



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Site/Project Name: West Loch WWPS Upgrades	Client Project No.: 0200611-000	Verbal results? <input type="checkbox"/>	Sampled By & Certif. #: Taylor Chock (HIASB-4478)
---	------------------------------------	--	--

Special Instructions:	PLM POSITIVE STOP Instructions: <input checked="" type="checkbox"/> + stop / SAMPLE <input type="checkbox"/> + stop / LAYER	Lab Report No.: <b>202407273</b>
-----------------------	---	-------------------------------------

Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
1 E-1	Int. BLACK window caulking	7/17/2024	Caulk	120 SF	PLM	EPA 600R-93/116	<b>202450707</b>
2 E-2	"	7/17/2024	Caulk	120 SF			<b>202450708</b>
3 E-3	"	7/17/2024	Caulk	120 SF			<b>202450709</b>
4 F-1	Int. exhaust room wall tile (white)	7/17/2024	Ceiling tile	250 SF			<b>202450710</b>
5 F-2	" (white)	7/17/2024	"	250 SF			<b>202450711</b>
6 F-3	" (white)	7/17/2024	"	250 SF	↓	↓	<b>202450712</b>
7		7/17/2024					
8		7/17/2024					
9		7/17/2024					
10		7/17/2024					
11		7/17/2024					
12		7/17/2024					

Relinquished By (Print and Sign)

Taylor Chock *Taylor Chock*

Date/Time

07/17/2024 / 04:15 PM

Received By (Print and Sign)

Haley Leavitt  
*Haley Leavitt*

Date/Time

07-17-24 P04:24 RCV'D

\*Sample description can be paint chips, concrete, specific sample collection location, etc...

If matrix is 'soil', please specify if it is a FOREIGN SOIL SAMPLE (outside Hawaii) in the comment section.

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via HAC,

via USPS

via drop box

via FedEx

via pick up

awb# 173.....

Page: 2 of 3



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Site/Project Name: <b>West Loch WWPS Upgrades</b>	Client Project No.: <b>0208611-000</b>	Verbal results? <input type="checkbox"/>	Sampled By & Certif. #: <b>Taylor Chock (HIASB-4478)</b>
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Special Instructions:	PLM POSITIVE STOP Instructions: <input type="checkbox"/> + stop / SAMPLE <input type="checkbox"/> + stop / LAYER	Lab Report No.: <b>202407273</b>
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Sample ID	Sample Description*	Date Sampled* (mm/dd/yy)	Collection Medium	Sample Area / Air Volume	Analysis Requested*	Method Reference	Lab Sample(s) No.:
1 L-1	Ext. SWall skim coat	7/17/2024	concrete masonry	400 sf	Lead in Paint Chip	NIOSH 7082m	202450713
2 L-2	Ext. silver pipe	7/17/2024	metal pipe	4 sf			202450714
3 L-3	int. off white wall	7/17/2024	concrete masonry	400 sf			202450715
4 L-4	Int. orange float support struc	7/17/2024	metal pipe	5 sf			202450716
5 L-5	Int. red floor paint	7/17/2024	concrete	100 sf			202450717
6		7/17/2024					
7		7/17/2024					
8		7/17/2024					
9		7/17/2024					
10		7/17/2024					
11		7/17/2024					
12		7/17/2024					

Relinquished By (Print and Sign)

Taylor Chock *Taylor Chock*

Date/Time

07/17/2024 / 04:15 PM

Received By (Print and Sign)

Haley Leavitt

Date/Time

07-17-24 P04:24 RCV'D

\*Sample description can be paint chips, concrete, specific sample collection location, etc...

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via pick up

awb# 173-.....

Page: 3 of 3

**APPENDIX C**  
**Trees Assessment Report**

## Existing Tree Report

**Date:** July 1, 2024

**Project Name/ Location:** West Loch Estates Wastewater Pump Station (WWPS) Upgrade

### Existing Tree Report:

The following comments and tree assessments are provided for trees located near the proposed Wastewater Pump Station (WWPS) Upgrade site. The improvements will take place within the parking area for Kapapapuhi Point Park (TMK:9-1-181:001) at West Loch Estates in Ewa Beach. This tree report addresses the health and structural integrity of the subject trees. Visual inspection of the subject trees was made to identify branching structure, broken branches, rubbing/crossing of branches, signs of insects or disease infestation, and trunk and root structure. The attached copy of a topographic survey (dated September 22, 2021) shows approximate location of the subject trees.

A site visit was conducted on May 13, 2024. One (1) Monkeypod tree and two (2) African Tulip Trees are found on the sloped areas between the parking and residential development by the proposed WWPS improvements site. Individual tree recommendation and corresponding photos and location map are provided below:

**#1 Monkeypod tree (*Samanea saman*):** The tree has a 5-foot trunk diameter, 40-foot height, and nearly 100-foot crown spread (**Photo 1**). The extensive crown extends over the existing pump station to the east, walkway to the west, and the park access driveway to the south. Branches from this tree are growing into the adjacent African Tulip tree and rubbing branches (**Photo 2**). It appears that the tree has a good structure and nice canopy. Major surface roots were observed near the existing rock wall of the pump station (**Photo 3**). At the closest point the existing wall is located about 15-feet from the root flare (**Photo 4**). Overall, the tree is in good condition, appears to be healthy, and has good trunk and branch structure.

### Recommendations:

The tree is to remain on site and is to be protected during construction per the City & County of Honolulu, Department of Parks & Recreation (DPR), Revised Tree Protection/Preservation Notes and Details, dated March 10, 2022. The proposed pump station improvements are designed to stay away from the existing Monkeypod tree and expand toward the mauka side. A Tree Protection Zone (TPZ) of the minimum 15'-0" radius from the tree trunk is recommended. Adequate compaction beneath the new AC pavement and root barriers are also recommended to deter root systems from going under the proposed improvements. The construction phase of the project must include the services of a qualified arborist to prepare a tree protection/preservation plan and monitor the tree during the construction period.

**#2 African Tulip tree (*Spathodea campanulata*):** This tree is located roughly 20-feet mauka of the existing rock wall at the back of the existing WWPS. The tree has multiple trunks which measure about 12-inches in overall trunk diameter. It is about 30-feet in height and has a 10-foot crown spread. Its canopy is overpowered by the adjacent Monkeypod tree (Tree #1) and the branches are rubbing against Tree #1 (**Photo 2**). The structural condition is poor due to the multiple trunks and proximity to the large Monkeypod tree. The tree appears to be stressed.

### **Recommendations:**

The tree is to remain on site and is to be protected during construction. A tree protection fence is to be installed for this tree and built per the DPR Tree Protection/Preservation details and notes. A TPZ minimum of 10-foot radius is to be established.

**#3 African Tulip tree (*Spathodea campanulata*):** This tree is located roughly 20-feet mauka of the existing trash enclosure which will be demolished as part of the WWPS Upgrade project. The tree has a codominant trunk which measures about 12-inches in overall trunk diameter (**Photo 5**). It is about 10-feet in height and has a 10-foot crown spread. Health conditions appear to be fair, and structural conditions are poor due to the codominant trunk.

### **Recommendations:**

Per the Conceptual Plan, the new rock wall at the back of WWPS will be built about 10-feet from the tree. Considering poor structural conditions and future safety concerns due to the proximity to the new improvements, it is recommended that this tree be removed.

Reported by: Tomo Murata, ISA Certified Arborist (#WE-5941A)



Photo 1 Tree #1 Monkeypod tree



Photo 2 Tree #2 African Tulip tree



Photo 3 Tree #1 Surface Roots

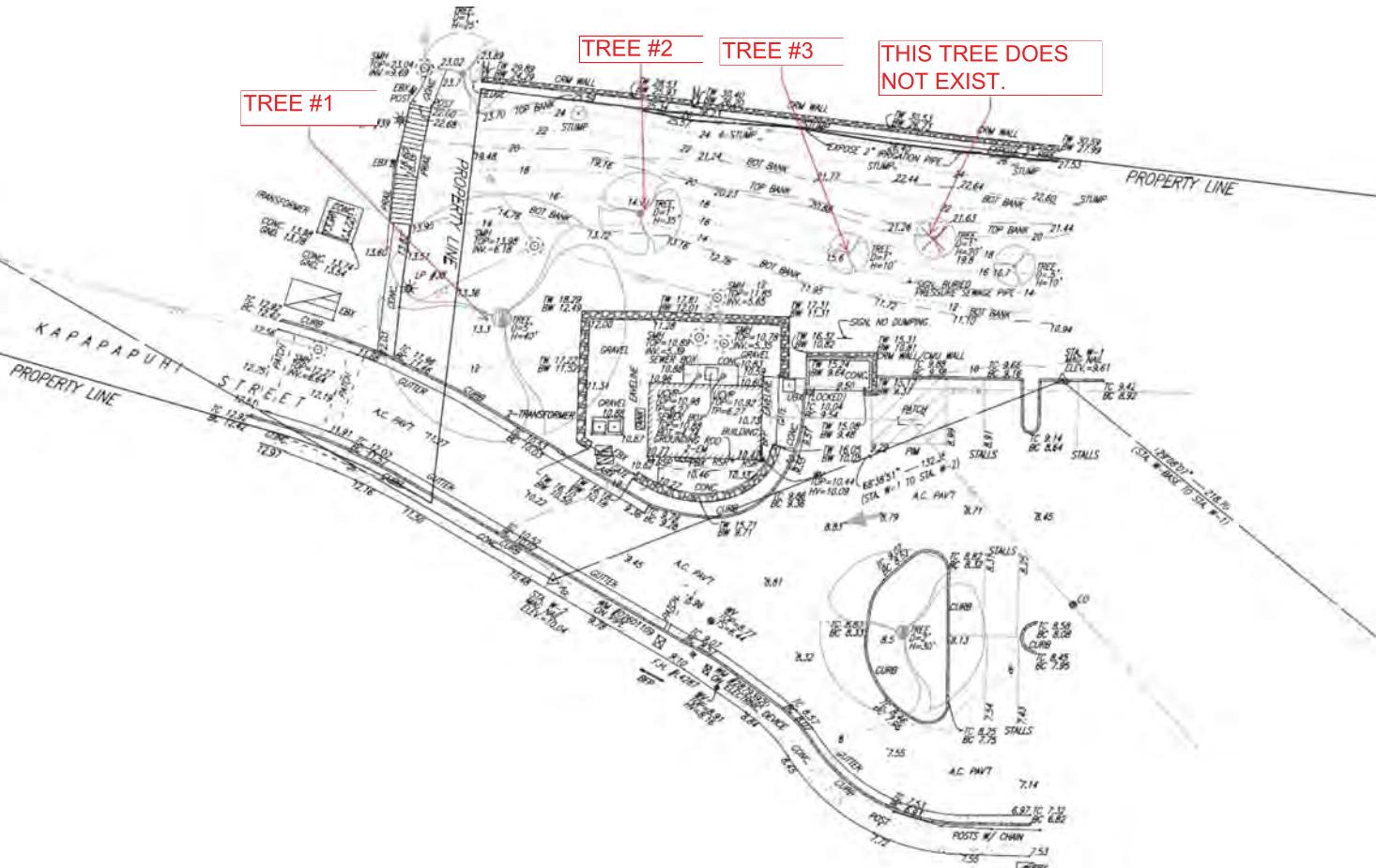


Photo 4 Existing Wall to Remain



Photo 5 Tree #3 African Tulip tree

TRUE NORTH  
SCALE: 1 IN = 20 FT



**BENCHMARK**  
CITY & COUNTY STREET MONUMENT  
TOP END OF LAULAUHUAU STREET  
ELEVATION = 57.69 U.S. FEET, MEAN SEA LEVEL

LEGEND	
A.C.	ASPHALT CONCRETE
BC	BOTTOM CURB
BP	BADGE OR PREVENTOR
BOT	BOTTOM
BW	BOTTOM WALL
CABN	CABLE BOX
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
CONC	CONCRETE
CRM	CONCRETE RUBBLE MASONRY
DSP	DRY STOOPPIPE
ERX	ELECTRIC BOX
ELEV.	ELEVATION
EM	ELECTRIC METER
F.H.	FIRE HYDRANT
GND.	GROUND
H	HEIGHT
INV.	INVERT
LP	LAW POLE
PBV	PAVEMENT
PBX	PANEL BOX
PIR	PIPE RAIL
PRM	PIPE RAIL
RSA	RISER
SMH	SEWER MANHOLE
STA.	STATION
TBX	TELEPHONE BOX
TW	TOP CURB
TW	TOP WALL
UBX	UTILITY BOX
UCV	UTILITY COVER
WM	WATER METER
WV	WATER VALVE

#### GRAPHIC SCALE



## TOPOGRAPHIC SURVEY MAP WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADES

HONOLULU, EWA, CAHU, HAWAII

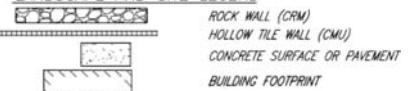
TMK: (1) 9-1-017-006 9-1-181:001

SCALE: 1 in. = 20 ft. SEPTEMBER 22, 2021

JOB NO. 21071 FIELD BOOK: 3761A: 23

DRN: JPP/EP FLD: EP

#### LANDSCAPE AND SITE LEGEND



TREES (D=DIAMETER, H=HEIGHT)  
(APPROXIMATE Drip LINE AS SHOWN)



\* LAMP POST

#### NOTES:

THIS MAP AND ASSOCIATED CAD FILE IS A TOPOGRAPHIC SURVEY OF THE SUBJECT PARCEL OR PROJECT SITE. THE DEPICTION OF BOUNDARIES AND ENCUMBRANCES AFFECTING THE PROJECT SITE ARE TAKEN FROM LATEST MAPS ONLY. OBTAINING A COPY OF THE CURRENT TITLE REPORT OR DEED FOR AREAS WHERE PROPERTY AND ENCUMBRANCE ISSUES ARE CRITICAL IS RECOMMENDED PRIOR TO ANY DESIGN AND CONSTRUCTION WORK.

UNDERGROUND UTILITY LINES AND/OR STRUCTURES, IF SHOWN, ARE PROVIDED BASED ON INFORMATION FROM PLANS/MAPS PREPARED BY OTHERS, AND NEED TO BE REVIEWED BY PUBLIC UTILITY AGENCIES OR ASSOCIATED FACILITIES.

UNLESS OTHERWISE NOTED, ALL LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES ARE APPROXIMATE. NO GUARANTEE IS MADE ON THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE OWNER(S) OF THIS TOPOGRAPHIC SURVEY MAP SHALL VERIFY THE INFORMATION, AS NEEDED, DURING DESIGN AND CONSTRUCTION.

CONTROLPOINT SURVEYING, INC.  
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HONOLULU, HAWAII 96814

**APPENDIX D**  
**Archaeological Literature Review and Field Inspection**  
**End of Field Work Monitoring Report**

**DRAFT—Archaeological Literature Review and Field Inspection for the West Loch Estates Wastewater Pump Station Upgrade, Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu, Hawai‘i**

TMK: (1) 9-1-181:001 portion [Formerly TMK: (1) 9-1-017:006 por.]



**Prepared For:**

City and County of Honolulu  
Department of Environmental Services  
1000 Ulu‘ohi‘a Street  
Kapolei, HI 96707

October 2024

Keala Pono

Keala Pono Archaeological Consulting, LLC • 98-030 Hekaha St. Suite 31, Aiea, HI 96701 • Phone 808.381.2361

**DRAFT—Archaeological Literature and Field Inspection for  
the West Loch Estates Wastewater Pump Station Upgrade,  
Honouliuli Ahupua‘a, ‘Ewa District, Island of O‘ahu, Hawai‘i**

**TMK: (1) 9-1-181:001 (por.) [Formerly TMK: (1) 9-1-017:006 por.]**

**Prepared For:**

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October 2024

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## **MANAGEMENT SUMMARY**

An archaeological literature review and field inspection has been conducted for the West Loch Estates Wastewater Pump Station (WWPS) Upgrade project. The project area is located in the Kapapapuhi Point Park parking lot, in ‘Ewa Beach, Hawai‘i [TMK: (1) 9-1-181:001 por.; previously TMK: (1) 9-1-017:006 por.]. The subject property is located in Honouliuli Ahupua‘a, ‘Ewa District, on the island of O‘ahu. The purpose of this study is to identify any archaeological resources that may be located within the project area in anticipation of proposed ground disturbing activities.

The existing West Loch Estates WWPS facility was constructed in the late 1980s. The WWPS is surrounded by an approximately 6 foot-high cement rubble masonry wall, which was built after 1989. The facility is in a good, but aging state. Thus, the City and County of Honolulu is proposing upgrades to keep the facility in sound operating condition. A walk-through of the property did not identify anything of archaeological interest. A wastewater pump station, gravel yard, CMU dumpster enclosure, CRM wall enclosing the pump station, and CRM wall around the dumpster enclosure cover most of the property. The pump station and its associated features are less than 50 years old and are therefore considered modern.

Due the extensive modern use of the project area, it is unlikely that any surface archaeological features remain. However, it is possible that subsurface archaeological features or deposits have survived the more recent disturbances. A program of archaeological monitoring is recommended during construction to identify and properly treat any historic properties that may be encountered.

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## INTRODUCTION

At the request of Environmental Planning Solutions, LLC, on behalf of the City and County of Honolulu, Department of Environmental Services, Keala Pono Archaeological Consulting conducted an archaeological literature review and field inspection (LRFI) in advance of upgrades to the existing West Loch Estates Wastewater Pump Station (WWPS). The purpose of this LRFI is to identify any archaeological, historical, or cultural properties within the project area in anticipation of the proposed work. The report begins with a description of the project area and a historical overview of land use and archaeology in the region. Results of the LRFI are summarized and recommendations are made in the final section. Hawaiian words, flora and fauna, and technical terms are defined in a glossary at the end of the document.

### **Project Location and Environment**

The project area is situated on 0.053 acres (ac.) [0.021 hectares (ha)] in the West Loch area, in leeward O‘ahu, on land owned by the City and County of Honolulu. The property is located at 91-1024 Kapapapuhi Street, in ‘Ewa Beach, Honouliuli Ahupua‘a, ‘Ewa District, O‘ahu on a portion of TMK: (1) 9-1-181:001; [formerly TMK: (1) 9-1-017:006] (Figures 1 and 2). It is positioned roughly 0.25 miles (mi.) [0.41 kilometers (km)] west of the West Loch shoreline and approximately 0.33 mi. (0.54 km) east of Fort Weaver Road at an elevation of approximately 22 feet (ft.) [6.7 meters (m)] above mean sea level (amsl).

The study area is located within the boundaries of the existing parking lot of Kapapapuhi Point Park, previously known as the West Loch Community Shoreline Park. Residential neighborhoods bound the park on the north and east sides, the West Loch Golf Course forms the west boundary, and an unnamed dirt road forms the south boundary of the park. There are no permanent water courses nearby. However the non-perennial Honouliuli Stream will run through the upland gulches during periods of heavy rain. Honouliuli Stream empties into Pearl Harbor, West Loch, approximately 0.18 mi. (0.29 km) south of the project area. Mean annual rainfall for the area is roughly 20 inches (in.) [50.8 centimeters (cm)] with October through January receiving the most precipitation and June being the driest month of the year (National Science Foundation n.d.).

### **Project Description**

The West Loch Estates WWPS started operations in 1989. A 6 ft. (2 m) high wall constructed of cement rubble masonry (CRM) surrounds the facility; it was built after 1989. Currently, the Kunia WWPS receives discharge material from the West Loch Estates WWPS through one 8-inch diameter gravity sewer line and one 12-inch diameter gravity sewer line. The Kapapapuhi Point Park comfort station is served by a 4-inch gravity sewer line that feeds into the West Loch Estates WWPS. Discharge materials from the West Loch Estates WWPS travel north, along the Pearl Harbor shoreline, through a 10-inch force main approximately 4,500 ft. (1,372 m) long, where they discharge into a manhole in the Waipahu industrial area, and then continue traveling, via gravity flow, to the Kunia WWPS. A recent evaluation conducted by Kaula AE (2023) found the existing West Loch Estates WWPS building and infrastructure in good operating condition, but aging, and identified a number of potential environmental hazards:

- the location of the electrical room and the building above the wet well;
- the CRM wall appears to have ADA compliance and clearance issues;
- the CRM wall restricts access to the generator room and removal of the generator;
- the south and west side walls of the WWPS building exhibit minor exterior damage;

- the existing aboveground fuel storage tank is positioned too close to the WWPS; and
- the existing aboveground fuel storage tank does not have any spill containment.

In addition, a recent review of Supervisory Control and Data Acquisition (SCADA) data, for the West Loch Estates WWPS covering the past five years, indicated the need to replace the existing pump and add a second pump for backup purposes (Kaula AE 2023:viii). The project proposes three alternative methods of addressing the above-listed potential environmental hazards and implementing the new pumps as suggested by Kaula AE (2023: viii):

### **Alternative 1: Construct Open-Air Pump Room**

Alternative 1 proposes to address the potential hazardous environment created by having the existing wetwell under and within the pump station structure along with the electrical equipment. The simplest solution to eliminating this hazardous environment is to remove one or more of the walls of the pump station building, creating an open-air environment. It is proposed to demolish the north wall and part of the south wall of the pump room and for security, replacing them with a heavy-duty mesh screen enclosure fence. The existing roof will remain in place. [Kaula AE 2023:viii]

### **Alternative 2: Remove Existing Aboveground Pump Room Structure**

Alternative 2 is similar to Alternative 1 as it creates an open-air pump room. However, Alternative 2 will remove the entire aboveground structure of the pump room, leaving the piping exposed to the air and unroofed. A new restroom and electrical room will be created under a smaller roof on the west side of the building. Like Alternative 1, the generator will be relocated. [Kaula AE 2023:ix]

### **Alternative 3: Construct New Wet Well and Dry Pit**

Alternative 3 proposes to convert the existing wet-pit submersible pump station to the City's standard wet-pit/dry-pit design. This alternative proposes converting the existing wetwell into a dry-pit to house the pumps and constructing a new wetwell where the existing valve vault chamber is located. [Kaula AE 2023:x]

The project area is almost equally positioned within soil types (Figure 3). The northern half of the project area is within soils of the Honouliuli Series, specifically Honouliuli clay, 0 to 2 percent slopes (HxA), while the southern half is within soils of the Helemano Series, specifically Helemano silty clay, 30 to 90 percent slopes (HLMG). These soils are described below. No other soil types are in proximity to the project. However, a body of water (W) is located southwest of the property.

#### Honouliuli Series

This series consists of well-drained soils on coastal plains on the island of Oahu in the Ewa area. These soils developed in alluvium derived from basic igneous material. They are nearly level and gently sloping. Elevations range from 15 to 125 feet...These soils are used for sugarcane, truck crops, orchards, and pasture. (Foote et al. 1972:40)

#### Helemano series

This series consists of well-drained soils on alluvial fans and colluvial slopes on the sides of gulches. These soils are on Oahu. They developed in alluvium and colluvium derived from basic igneous rock. They are steep to extremely steep. Elevations range from 500 to 1,200 feet...These soils are used for pasture, woodland, and wildlife habitat. The natural vegetation consists of Bermuda grass, Christmas berry, eucalyptus, Formosa koa, guava, Japanese tea, Java plum, and koa haole. (Foote et al. 1972:40)



Figure 1. USGS quadrangle map showing project area location (USGS 2023).

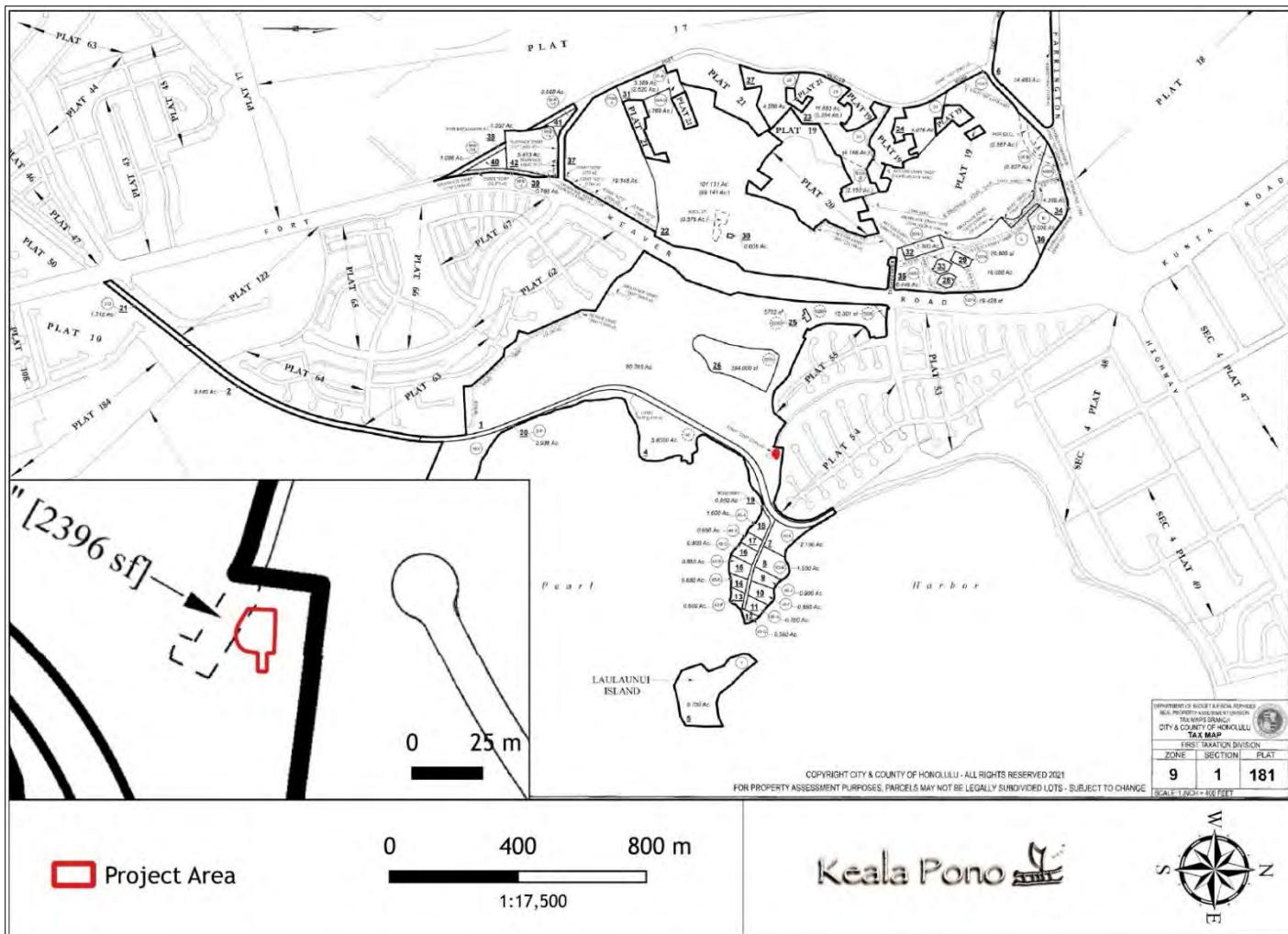


Figure 2. TMK plat (1) 9-1-181 showing the project area (State of Hawai'i 2021). Note that the project area was formerly TMK: (1) 9-1-017:006.



Figure 3. Soils in the project area and vicinity (United States Department of Agriculture 2018).

## BACKGROUND

This section of the report presents background information as a means to provide a context through which one can examine the cultural and historical significance of the ‘Ewa Plain and the ahupua‘a of Honouliuli. In the attempt to record and preserve both the tangible (e.g., traditional and historic archaeological sites) and intangible (e.g., mo‘olelo, mele, place names) culture, this research assists in the discussion of anticipated finds. Research was conducted at the Hawai‘i State Archives, Hawai‘i State Library, the State Historic Preservation Division (SHPD) library, and online on the Department of Accounting and General Services (DAGS n.d.), Waihona Aina (n.d.), and Ulukau (n.d.) databases. Historical maps, archaeological reports, and historical reference books were among the materials examined.

### ‘Ewa and Honouliuli in the Pre-Contact Era

The project area is located in ‘Ewa District, the largest land district on O‘ahu, which is situated in the southern portion of central O‘ahu. The name ‘Ewa means “to crook, to twist, to bend” (Andrews 1865). This name may refer to the mo‘olelo in which the Hawaiian gods Kāne and Kanaloa threw stones to determine the boundaries of the district (see Mo‘olelo section) (Sterling and Summers 1978). The current area of study is located within the ahupua‘a of Honouliuli, the largest and westernmost ahupua‘a within ‘Ewa District. Translated, Honouliuli means “dark bay” (Pukui et al. 1974), likely referring to the deep waters of Pu‘uloa, or Pearl Harbor, which is located on the eastern perimeter of Honouliuli Ahupua‘a.

### Place Names

There are other means, besides archival documentation, by which Hawai‘i’s history has been preserved. One often-overlooked source of history is the information embedded in the Hawaiian landscape. Hawaiian place names “usually have understandable meanings, and the stories illustrating many of the place names are well known and appreciated...The place names provide a living and largely intelligible history” (Pukui et al. 1974:xii). Several places around the current project area and within Honouliuli Ahupua‘a are listed in *Place Names of Hawaii* (Pukui et al. 1974), along with the meanings of their names and/or other comments about the specific locales.

#### **Hō‘ae‘ae**

Land section and point, ‘Ewa, O‘ahu, *Lit.*, to make soft or fine. A stone called Pōhaku-pili (clinging rock) is on the edge of the cliff on the boundary of Hō‘ae‘ae and Wai-kele; it belonged to the gods Kāne and Kanaloa. (Pukui et al. 1974:47)

#### **Ka-ihu-o-Pala‘ai**

West Loch, Pearl Harbor, Oahu...Pala‘ai was a woman from here who married a Lā‘ie man; she sent her husband from Lā‘ie to fetch mullet from Honouliuli; mullet followed him as far as Kai-papa‘u and then turned back— as they do today. *Lit.*, the nose of Pala‘ai. (Pukui et al. 1974:68) (see Site 141 in Previous Archaeology section).

#### **Kalaeloa**

Literally meaning “the long point,” this area later became known as Barbers Point after Captain Henry Barber ran aground at the point in 1796 (Pukui et al. 1974:72).

### ***Kaloi***

....Harry's first thought when riding over the country was where to find water, and during the years 1890-91-92 much was done in the way of new troughs, getting water from plantations of flumes, and digging out wet places that showed any prospects of water. One of those places is on the old trail to Palehua, and had evidently been a place of which the Hawaiians had known, for its name is Kaloi (the taro patch), and even in dry weather, water would be standing in the holes made by the cattle, as they tried to get a drop or two....When water was finally led down the rocky hillside to the trough at Kaloi, Mr. William R. Castle, who was with Harry, rechristened the spring "Wai o Kakela," Kakela being Mr. Castle's Hawaiian name. But the old name still stuck to it, and as Kaloi it is known to this day. (Knudsen von Holt 1953:116 in Sterling and Summers 1978:35)

### ***Laulau-nui***

Islet. Pearl Harbor, O'ahu. Lit., large leaf package. (Pukui et al. 1974:130)

### ***Pohakea***

This is the place where Lohiau and Hi'iaka rested on their journey to meet Pele, between 'Ewa and Wai'anae (Fornander 1918:188).

...The travelers only stopped one night and spent the following night on the other side of Pohakea. The elders and children who went with them slept above Kunia on this side of Pohakea... ('I'i 1959:23)

### ***Puu-Kuua***

Here are some pointers for the traveler to Ewa. If you are going by train, look up toward the Ewa mill. If you are above Puuloa, you will see Puu-o-Kapolei, a small hill. Lying below and back of that hill is the government road going to Waianae. Above that is also a small hill and back of that, is a big hill and above it is a large hollow. That is Puu-Kuua where the very dirty ones lived. (*Ka Loea Kalaaina* 1899 in Sterling and Summers 1978:32)

...A place where the chiefs lived. Was said to be a battlefield. There were two important things concerning this place. (1) This place is entirely deserted and left uninhabited and it seems that this happened before the coming of righteousness to Hawaii Nei. Not an inhabitant is left. (2) The descendants of the people of this place were so mixed that they were all of one class. Here the gods became tired of working and returned to Kahiki. (*Ka Loea Kalaaina* 1899 in Sterling and Summers 1978:32-33)

### ***Pu'u'ula***

Land section, camp, salt works, station, street. playground, beach park, village, area east of Pearl Harbor, and old name for Pearl Harbor. O'ahu; it is said that breadfruit were brought here from Samoa. Lit., long hill. (Pukui et al. 1974:201)

### ***Puu o Kapolei***

According to legend, "it is here that Kamauluaniho (Kamaunuaniho) lived with her grandson, Kekeleaiku, the older brother of Kamapua'a after they left Kaliwaa in Kaluanui, Koolau-loa" (*Ka Loea Kalaaina* 1900 in Sterling and Summers 1978:32-33).

After Kamapua'a conquered most of O'ahu, he installed his grandmother, Kamaunuaniho as queen, taking her to Pu'u o Kapolei. It was noted as a desolate spot, being "almost equally distant from the sea, from which came the fish supplies; from the taro and potato patches of Ewa, and from the

mountain ravines containing the banana and sugar cane plantations” (Nakuina 1904 in Sterling and Summers 1978:34). It was believed that the foundations of Kamaunuaniho’s house, as well as her grave, were still present before the turn of the 20<sup>th</sup> century. However, with the expansion of sisal and cane activities at the base of Pu‘u o Kapolei, stones may have been removed for making walls (Nakuina 1904 in Sterling and Summers 1978:34).

Pu‘u o Kapolei is also noted as an important landmark which indicated the season of Ho‘oilo:

...the people of Oahu reckoned from the time when the sun set over Pu‘uokapolei until it set in the hollow of Mahinaona and called this period Kau, and when it moved south again from Pu‘uokapolei and it grew cold and the time came when young sprouts started, the season was called for their germination (oilo) the season of Ho‘oilo. (Kamakau n.d. in Sterling and Summers 1978:34)

Legendary fisherman, Niho‘oleki, lived at Ku‘uku‘ua on Pu‘u o Kapolei under the name of Keahaiholeha. Born at Keauhou in Kona, he became a ruling chief of Wai‘anae. Wielding his famous aku-attracting pearl fishhook named Pahuhu, Keaha-ikiaholeha traveled to Kaua‘i, the birthplace of his high chiefess wife, and became ruling chief. When he died, his body was brought back to Wai‘anae and prayed back to life by his parents. Among his later exploits, Niho‘oleki returns to Wai‘anae and “enters his tomb” and dies (Beckwith 1970:420).

### **Mo‘olelo**

As mentioned earlier, Hawaiian place names were connected to traditional stories through which the history of the places was preserved. These stories were referred to as:

mo‘olelo, a term embracing many kinds of recounted knowledge, including history, legend, and myth. It included stories of every kind, whether factual or fabulous, lyrical or prosaic. Mo‘olelo were repositories of cultural insight and a foundation for understanding history and origins, often presented as allegories to interpret or illuminate contemporary life...Certainly many such [oral] accounts were lost in the sweep of time, especially with the decline of the Hawaiian population and native language. (Nogelmeier 2006:429– 430).

The boundaries of ‘Ewa have been linked to the story of the gods Kāne and Kanaloa who, while surveying the islands, reached Red Hill and saw the expanse of what is the ‘Ewa Plain. To mark the boundaries of the area, they would throw a stone, and the boundary would be placed where the stone landed. Seeing the beautiful land below them, they thought to include as much as possible, throwing the stone as far as the Wai‘anae mountain range in the area known as Waimanalo. While in search of their flung stone, Kāne and Kanaloa were unable to find where it had landed. Because of this, the area was named ‘Ewa due to the straying of the stone. Eventually, the stone was found on a hill and was named Pili o Kahe. This place marks the boundary between the ‘Ewa and Wai‘anae Districts, Honouliuli Ahupua‘a within ‘Ewa, and Nānākuli in Wai‘anae (Nawa‘a in Sterling and Summers 1978:1).

The cultural richness of ‘Ewa Moku is seen with the important mo‘olelo of the origin of the ‘ulu, or breadfruit, in Hawai‘i. It was noted as one of the two places in Hawai‘i where the ‘ulu “is to be found,” the other being Ka‘awaloa in Kona on the island of Hawai‘i (W.S. Lokai in Fornander 1919:676–677). The breadfruit of Pu‘uloa came from a mythical land in Kahiki, named Kanehunamoku. It was brought by two men of Pu‘uloa who were out fishing and, caught in a rainstorm, landed on an island only inhabited by the gods who then introduced the two men to the fruit of the ‘ulu tree.

According to Beckwith (1970), near Pu‘uloa, at ‘Ewa Beach, the first humans, who were olohe, landed on O‘ahu. At this place, caves of the olohe (ka lua olohe) are to be seen. Represented in

legends as “professional robbers” with tendencies towards cannibalism, the olohe, or Ha‘a people, were highly skilled in the art of lua which includes wrestling and bone-breaking (Beckwith 1970:343). Olohe translates to “hairless,” and lua experts shaved so that their enemies could not take hold of them in combat.

In the epic tale of Hi‘iakaikapoliopele, the sister of Pele traversed the ‘Ewa Plain as she returned back to her sister’s domain of Kīlauea, Hawai‘i, from Hā‘ena, Kaua‘i where she was to fetch her sister’s lover, Lohi‘au-ipo (Lohi‘au). The full story was printed in the Hawaiian language newspaper *Ka Hōkū o Hawai‘i* from September 18, 1924 to July 17, 1928. An excerpt pertaining to the ‘Ewa Plain and Honouliuli is included below (translations by Kepā Maly).

...Aloha ka hau o Ka‘ala  
‘Oia hau halihali ‘a‘ala mau‘u nēnē  
Honi ai ke kupa o Pu‘uloa  
He loa ka imina e ke aloha e...  
Beloved is the dew of Ka‘ala  
That dew which bears the fragrance of the *nēnē* grasses  
[fragrant dew which] Kissed the natives of Pu‘uloa  
One searches far for love...  
(*Ka Hōkū o Hawai‘i* 1927 in Beardsley 2001:G-1)

As Lohi‘au and Wahine‘ōma‘o traveled by boat from Pōka‘i (Wai‘anae) to Kou (Honolulu), Hi‘iaka traveled over land and traversed the plain of Honouliuli, encountering women on their way to gather pāpa‘i (crabs), limu (seaweed), mahamoe, and ‘ōkupe (both edible bivalves). At the plain of Keahumoa (between Waipi‘o and Honouliuli), Hi‘iaka came across a group of women gathering ma‘o blossoms (*Gossypium tomentosum*, an endemic yellow-flowered hibiscus typically found on dryland plains) with which they would make lei. Hi‘iaka offered them the following oli:

E lei ana ke kula o Keahumoa i ka ma‘o  
‘Ohu‘ohu wale nā wahine kui lei o ke kanahele  
Ua like no a like me ka lehua o Hōpoe  
Me he pua koili lehua ala i ka lā  
Ka oni pua koai‘a i ka pali  
I nā kaupoku hale o ‘Āpuku  
Ke ku no I ke alo o ka pali o Pu‘uku‘ua  
He ali‘i no na‘e ka ‘āina  
He kauwā no na‘e ke kanaka  
I kauwā no na‘e wau i ke aloha  
Na ke aloha no na‘e i kono e haele no māua  
E hele no wau a—

The plain of Keahumoa wears the ma‘o blossoms as its lei  
Adorning the women who string garlands in the wild  
It is like the lehua blossoms of Hōpoe  
Lehua blossom upon which the sun beats down  
On the nodding koai‘a flowers of the cliff  
On the rooftops of the houses at ‘Āpuku  
Rising in the presence of the cliff of Pu‘uku‘ua

The land is indeed the chief  
Man is indeed a slave  
I am indeed a slave to aloha – love  
It is love which invites us two – come  
I come-

(*Ka Hōkū o Hawai‘i* in Beardsley 2001:G-3)

[Place names ‘Ākupu and Pu‘u Ku‘ua are both areas located in the uplands of Honouliuli]

The mo‘olelo of Kahalaopuna also takes place in ‘Ewa (Fornander 1918, vol. V:188–192). Kahalaopuna was a young woman who was from Mānoa. Betrothed to marry Kauhi, a man from Ko‘olau, he sent her numerous gifts before they were to be married. He soon became very angry when he heard rumors that Kahalaopuna had been unfaithful to him. Kauhi took Kahalaopuna to ‘Ewa, leading her through the back valley and trails to a place known as Pohakea and a large lehua tree, where he took her life, even though she begged of her innocence. After burying her body under leaves of the lehua tree, Kauhi returned home. Meanwhile, Kahalaopuna’s spirit had flown into the tree, and was able to chant to passers-by to tell her parents of her death and of her location. After she was brought back to life by her parents, Kauhi returned to Kahalaopuna, asking for forgiveness, however, she would not listen to him.

The mo‘olelo of Namakaokapao‘o, is about a boy of that name, who had extraordinary strength for a young man his age. His father was Kauluakahai, a great chief who hailed from a great land in Kahiki. Namakaokapao‘o’s mother was Pokai. The couple met in ‘Ewa, in Hō‘ae‘ae. Shortly after Namakaokapao‘o was conceived, Kauluakahai returned to his own land. Pokai then met a man named Puali‘i who was fishing at Honouliuli. The couple resided at the plains of Keahumoa where Puali‘i had two large ‘uala patches. One day, while Puali‘i was gone, Namakaokapao‘o pulled up Puali‘i’s plants. Upon his return, Puali‘i attempted to kill Namakaokapao‘o with his axe, but ended up cutting off his own head. Namakaokapao‘o flung the head towards Waipouli, a cave located on the beach at Honouliuli (Fornander 1918, vol. V:275, 276).

In the mo‘olelo of Kawelo, the chief Aikanaka is offended by Kawelo and sends him to live at Waikīkī. While at Waikīkī, Kawelo studied the art of lua in order to get his revenge on Aikanaka. Kawelo’s teacher was a fish kupua, or demi-god, Uhu maikaikai, who lived at Pohaku o Kawai, near Kalaeloa (Hawaiian Ethnological Notes, vol. II in Sterling and Summers 1978:41).

The ‘Ewa Plain was known to be a very fruitful place, with abundant resources in the ocean and on land. Protecting such a place was the kia‘i, or caretaker, of ‘Ewa, named Kanekua‘ana (Kamakau 1991:83). Relied on by the ‘Ewa kama‘aina, during times of scarcity of fish, her descendants built Waihau Heiau and lit fires for the cooking of offerings with the hope of blessings. According to Kamakau (1991), blessings were in the form of the various types of seafood:

The *pipi* (pearl oyster)—strung along from Namakaohalawa to the cliffs of Honouliuli, from the *kuapa* fishponds of inland ‘Ewa clear out to Kapakule. That was the oyster that came in from the deep water to the mussel beds near shore, from the channel entrance of Pu‘uloa to the rocks along the edges of the fishponds. They grew right on the *nahawele* mussels, and thus was this *i‘a* obtained. Not six months after the *hau* branches [that placed a kapu on these waters until the *pipi* should come in] were set up, the *pipi* were found in abundance—enough for all ‘Ewa—and fat with flesh. Within the oyster was a jewel (*daimana*) called a pearl (*momi*), beautiful as the eyeball of a fish, white and shining; white as cuttlefish, and shining with the colors of the rainbow—reds and yellows and blues, and some pinkish white, ranging in size from small to large. They were of great bargaining value (*he waiwai kumuku‘ai nui*) in the ancient days, but were just “rubbish” (*opala*) in ‘Ewa. (Kamakau 1991:83)

Other seafood described by Kamakau include the transparent shrimp ('ōpae huna) and spiked shrimp ('ōpae kakala) which came into the kuapā and pu'uone fishponds, the nehu pala and nehu maoli fish which filled the nuku awalau (lochs), as well as the bivalves mahamoe and 'ōkupe and other types which have disappeared long ago (Kamakau 1991:84).

'Ewa's abundance could also be attributed to the blessings it received from the gods Kāne and Kanaloa:

...There are many other legends of 'Ewa which Mrs. Pukui has collected from old-timers or translated from old newspaper stories. ...According to another legend it was here in 'Ewa that Kane and Kanaloa were invoked by a planter of sweet potatoes, taros, and 'awa named Maihea. This man, living in the upland of Wai'awa, when he had prepared his meal and his 'awa, would pray:

O unknown gods of mine,  
Here are 'awa, taro greens and sweet potatoes  
Raised by me, Maihea, the great farmer.  
Grant health to me, to my wife and to my son.  
Grant us *mana*, knowledge and skill.  
Amama. It is freed.

Kane and Kanaloa sent ashore at Waimalu a great whale. It lay there many days. Children climbed on it. Maihea's son did likewise. One day the whale moved into the water. The other children jumped off, but Maihea's son remained on the whale's back. It swam out to sea, and on to Kahiki. There 'Ula-a-Maihea, the farmer's son, "was trained in priestly lore and all of its arts through the instructions of these gods, Kane and Kanaloa." One day two strangers appeared at his door as Maihea was about to pray to his unknown gods. He poured 'awa into three cups and said, "Let me pray to my unknown gods." Then the two strangers revealed that they were his "unknown gods," Kane and Kanaloa, and instructed him to call upon them by name. "This was the beginning of the travels of these gods on earth...." The gods went up the hill named Haupu'u and gazed down upon the fishponds and plantations and coconut groves of 'Ewa and blessed them.

There was a fisherman at Pu'uloa named Hanakahi, who, like Maihea, prayed to "unknown gods." Kane and Kanaloa visited him also, revealed their identity, and taught him to pray properly. They went on to Ke-ana-pua'a, and built a fishpond which "is there to this day." They made another at Kepo'okala, and then another opposite this. Then they returned to Hanakahi's house and told them that these ponds were made for him and his descendants. Thus they blessed the beautiful land of 'Ewa." (Ka Loea Kalai'aina 1899 in Handy et al. 1991:472, 473)

The land of Honouliuli was known for its 'ama'ama, or mullet fish. The following mo'olelo describes how the route of the 'ama'ama, which travel from Honouliuli to Lā'ie, came to be.

Kaihuopala'ai (a place) was famous from olden times down to the time when the foreigner ruled Honouliuli, after which time the famous old name was no longer used. It is said that in those days the 'ama'ama heard and understood speech, for it was a fish born of a human being, a supernatural fish. These were the keepers of this fish. Kaulu, the husband, and Apoka'a, the wife, who bore the children, Laniloa, the son, and Awawalei, the daughter. These two children were born with two other supernatural children, an eel and a young 'ama'ama. From this 'ama'ama child came all the 'ama'ama of Kaihuopala'ai, and thus did it gain renown for its 'ama'ama. Laniloa went to La'ie, in Ko'olauloa, and there he married. His sister remained in Honouliuli and married Mokueo, and to them were born the people who owned the 'ama'ama, including the late Mauli'awa and others. These were

fishermen who knew the art of making the fish multiply and make them come up to the sand.

While Laniloa lived in La‘ie he heard of the great schools of ‘ama‘ama at Honouliuli. There were no ‘ama‘ama, large or small, where he lived. He thought of his younger sister, the ‘ama‘ama, and guessed that was the reason the place was growing so famous. He said to his wife, “I shall ask my sister to send us some fish for I have a longing for ‘ama‘ama ...” Laniloa left La‘ie to go to Ewa. He reached the house and found his parents and sister. His parents were quite old for he had been away a long time. He said, “I have come to my ‘ama‘ama sister for a bit of fish as there is none where I live except for some *au moana* (sea-faring) crabs.” After three days and nights he left Ewa. The fish were divided into two groups, those that were going and those that were staying. As Laniloa’s sister went along the shore she went in her human form. The fish came from, that is, left Honouliuli without being seen on the surface. They went deep under water until they passed Ka‘a‘ali‘i, then they rose to the surface. They reached Waikiki. They went on. The sister slept at Nu‘upia while the fish stopped outside of Na Moku Manu. Finally she reached La‘ie, and to this day this is the route taken by the ‘ama‘ama. (Mokumaia 1922 and *Ka Loea Kalaiaina* 1899 in Titcomb 1972:65)

### ‘Ōlelo No‘eau

Traditional proverbs and wise sayings, known as ‘ōlelo no‘eau, are another means by which the history of Hawaiian places has been recorded. In 1983, Mary Kawena Pukui published a volume of close to 3,000 ‘ōlelo no‘eau that she collected throughout the islands. The introductory chapter of that book reminds us that if we could understand these proverbs and wise sayings well, then we would understand Hawai‘i well (Pukui 1983).

‘ōlelo no‘eau referring to the ‘Ewa Plain are numerous while a single ‘ōlelo no‘eau was found referring to Honouliuli specifically. The following Hawaiian proverbs and poetical sayings provide further insight to traditional beliefs and practices of these lands.

‘Āina koi ‘ula i ka lepo.  
*Land reddened by the rising dust.*  
Said of ‘Ewa, O‘ahu. (Pukui 1983:11)

O ‘Ewa, ‘āina kai ‘ula i ka lepo.  
*Ewa, land of the sea reddened by earth.*  
‘Ewa was once noted for being dusty, and its sea was reddened by mud in time of rain.  
(Pukui 1983:257)

Anu o ‘Ewa i ka i‘a hāmau leo e. E hāmau!  
*Ewa is made cold by the fish that silences the voice. Hush!*  
A warning to keep still. First uttered by Hi‘iaka to her friend Wahine‘oma‘o to warn her not to speak to Lohi‘au while they were in a canoe near ‘Ewa. (Pukui 1983:16)

E ‘Ewa e—e ku‘i na lima!  
*O ‘Ewa—join hands!*  
This cry was a call of the men of Kona, O‘ahu, when they went with their chief to destroy his brother, the ‘Ewa chief. (Pukui 1983:33)

‘Ewa kai lumaluma‘i.  
*Ewa of the drowning sea.*  
An epithet applied to ‘Ewa, where *kauwā* were drowned prior to offering their bodies in sacrifice. (Pukui 1983:47)

‘Ewa nui a La‘akona.

*Great ‘Ewa of La‘akona.*

La‘akona was a chief of ‘Ewa, which was prosperous in his day. (Pukui 1983:47)

He kai puhi nehu, puhi lala ke kai o ‘Ewa.

A sea that blows up nehu fish, blows up a quantity of them, is the sea of ‘Ewa. (Pukui 1983:74)

He lō‘ihi o ‘Ewa; he pali o Nu‘uanu; he kula o Kulaokahu‘a; he hiki mai koe.

*‘Ewa is a long way off; Nu‘uanu is a cliff; Kulaokahu‘a is a dry plain; but all will be here before long.*

Said of an unkept promise of food, fish, etc. O‘ahu was once peopled by evil beings who invited canoe travelers ashore with promises of food and other things. When the travelers asked when these things were coming, this was the reply. When the visitors were fast asleep at night, the evil ones would creep in and kill them. (Pukui 1983:85)

I Waialua ka po‘ina a ke kai, o ka leo ka ‘Ewa e ho‘olohe nei.

*The dashing of the waves is at Waialua but the sound is being heard at ‘Ewa.*

Sounds of fighting in one locality are quickly heard in another. (Pukui 1983:137)

Ka i‘a hāmau leo o ‘Ewa.

*The fish of ‘Ewa that silences the voice.*

The pearl oyster, which has to be gathered in silence. (Pukui 1983:145)

Ka i‘a kuhi lima o ‘Ewa.

*The gesturing fish of ‘Ewa.*

The *pipi*, or pearl oyster. Fishermen did not speak when fishing for them but gestured to each other like deaf-mutes. (Pukui 1983:148)

Ke kai he‘e nehu o ‘Ewa.

*The sea where the nehu come in schools to ‘Ewa.*

Nehu (anchovy) come by the millions into Pearl Harbor. They are used as bait for fishing, or eaten dried or fresh. (Pukui 1983:185)

Ke one kuilima laula o ‘Ewa.

*The sand on which there was a linking of arms on the breadth of ‘Ewa.*

‘Ewa, O‘ahu. The chiefs of Waikīkī and Waikēle were brothers. The former wanted to destroy the latter and laid his plot. He went fishing and caught a large *niuhi*, whose skin he stretched over a framework. Then he sent a messenger to ask his brother if he would keep a fish for him. Having gained his consent, the chief left Waikīkī, hidden with his best warriors in the “fish.” Other warriors joined them along the way until there was a large army. They surrounded the residence of the chief of Waikēle and linked arms to form a wall, while the Waikīkī warriors poured out of the “fish” and destroyed those of Waikēle. (Pukui 1983:191)

Ku a‘e ‘Ewa; Noho iho ‘Ewa.

*Stand-up ‘Ewa; Sit-down ‘Ewa.*

The names of two stones, now destroyed, that once marked the boundary between the chiefs’ land (*Kua‘e ‘Ewa*) and that of the commoners (*Noho iho ‘Ewa*) in ‘Ewa, O‘ahu. (Pukui 1983:200)

Ua ‘ai i ke kāī-koi o ‘Ewa.

*He has eaten the kāī-koi taro of ‘Ewa.*

*Kāī* is O‘ahu’s best eating taro; one who has eaten it will always like it. Said of a youth or a maiden of ‘Ewa, who, like the *kāī* taro, is not easily forgotten. (Pukui 1983:305)

Ka i‘a hali a ka makani.

*The fish fetched by the wind.*

The ‘anaeholo, a fish that travels from Honouliuli, where it breeds, to Kaipāpa‘u on the windward side of O‘ahu. It then turns about and returns to its original home. It is driven closer to shore when the wind is strong. (Pukui 1983:145)

## Winds

With their lives closely connected to the natural environment and physical surroundings, Hawaiian winds were individually named and associated with a specific place, region, or island. These wind names can offer further insight to cultural traditions and beliefs of the area.

In the mo‘olelo of Kūapāka‘a and Pāka‘a and the wind gourd of La‘amaomao, the winds of O‘ahu are recited by Kūapāka‘a:

...Moa‘e-ku is of Ewaloa,  
Kēhau is of Waiopua,  
Waikōloa is of Līhu‘e,  
Kona is of Pu‘uokapolei,  
Māunuunu is of Pu‘uloa... (Nakuina 1990:43)

...He Moae-ku ko Ewaloa,  
He Kehau ko Waiopua,  
He Waikoloa ko Lihue,  
He Kona ko Puuokapolei,  
He Maunuunu ko Puuloa... (Nakuina 1902:57)

This Moa‘e wind is also mentioned in an ‘ōlelo no‘eau, “Haunāele ‘Ewa i ka Moa‘e” which is translated as ‘Ewa is disturbed by the Moa‘e wind (Pukui 1983:59). According to Pukui, this phrase was used when discussing something disturbing, such as a violent argument. It is said that the people of ‘Ewa gathered pipi, or pearl oyster, in silence due to the belief that if they spoke, a Moa‘e breeze would blow, rippling the water and making the oysters “disappear” (Pukui 1983:59).

## Land Use and Coastal Resources

What truly sets the ‘Ewa area apart is its expansive coastal plain which is surrounded by the deep bays of West Loch and Pearl Harbor. Offering a favorable environment for the construction of fishponds and fish traps, residents of this area also had the opportunity to catch deep-sea fish such as akule, which entered the bays during the incoming tide. These ponds were the summer home of the ‘ama‘ama, or mullet. Another important resource of the coastal area was the diverse variety of shellfish found in the harbor. The Hawaiian pearl oyster, pipi, was eaten raw and was prized for its shell that was used to make fishhooks. Other shellfish of the area included pāpaua, ‘owā‘owaka, nahawele, kupekala, and mahamoe (Lahilahi Webb in Handy et al. 1991:471).

The wide lowlands, bisected by streams, created a land that easily facilitated the cultivation of lo‘i kalo, irrigated taro patches. ‘Ewa’s natural landscape with a sprawling plain and gently sloping valley walls, created environments ideal for crops such as banana and yams. Inland, ‘Ewa was noted for the cultivation of ‘awa, as well as its mamaki, wauke, and olonā. This extensive upland area, also known as wao, gave inhabitants an advantage during times of famine as a place where they could

forage for food during periods of drought (Handy et al. 1991:469). The upland areas of ‘Ewa were also home to unique avifauna and birds, which were prized for their colorful feathers that were used in helmets, capes, and lei.

The notable historian John Papa ‘Ī‘ī (1959) reminds us that there was a well-known, well-traveled network of trails that crisscrossed O‘ahu connecting east to west and north to south. These trails provided access to subsistence, ceremonial and medicinal resources. They also linked settlements for religious and social purposes. The project area is located close to a major junction of three main trails that meet at Hō‘ea‘ea, north of project area (Figure 4).

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

### **Power and Warfare in Honouliuli**

Known for its bountiful resources which included fertile lands and well-stocked fishponds, the ‘Ewa area was a sought-after land for the ali‘i, and as a result, numerous battles ensued. One such example is the unfought battle of the Keahumoa Plain which involved Kuali‘i (ca. 1650) who was a celebrated ali‘i, skilled and victorious in the art of warfare. Kuali‘i was aged at the time of the battle and was unable to walk. His servants made a net of strings and carried him to Keahumoa. This battle was instigated by brothers Kapaahulani and Kamakaaulani, and a peace agreement was made before any fighting ensued (Fornander 1918, vol. IV:364).

Another battle known to have taken place on the ‘Ewa Plain was that of Mā‘ilikūkahi. During this battle, chiefs from the island of Hawai‘i, joined with ali‘i from Maui, waged war on O‘ahu mō‘ī, Mā‘ilikūkahi. Fornander offers a genealogy of ali‘i preceding Mā‘ilikūkahi and follows with an account of the battle:

On Oahu, at the close of the migratory period, after the departure of *Laamaikahiki*, we find his son, *Lauli-a-Laa*, (88) Maelo, married to *Maelo*, the sixth in descent from *Maweke*, and daughter of *Kuolono*, on the *Mulielealii-Moikeha* line. They probably ruled over the Kona side of the island, while *Kaulaulaokalani*, on the *Maweke-Kalehenui* line, ruled over the Koolau side, and *Lakona*, also sixth from *Maweke*, on the *Mulielealii-Kumuhonua* line, ruled over Ewa, Waianae, and Waialua districts, and in this latter line descended the dignity of Moi of Oahu. Tradition is scanty as to the exploits of the Oahu Mois and chieftains, until we arrive at the time of *Haka*, Moi of Oahu, chief of Ewa, and residing at Lihue. The only genealogy of this chief that I have, while correct and confirmed by others from *Maweke* to *Kapae-a-Lakona*, is deficient in three generations from *Kapae-a-Lakona* to *Haka*. Of *Haka*'s place on the genealogy there can be no doubt, however, as he was superseded as Moi by *Mailikukahi*, whose genealogy is perfectly correct from the time of *Maweke* down, and conformable to all the other genealogies, descending from *Maweke* through his various children and grandchildren. Of this *Haka*, tradition records that he was a stingy, rapacious, and ill-natured chief, who paid no regard to either his chiefs or his commoners. As a consequence they revolted from him, made war upon him, and besieged him in his fortress, called Waewae, near Lihue. During one night of the siege, an officer of his guards, whom he had ill-treated, surrendered the fort to the rebel chiefs, who entered and killed *Haka*, whose life- was the only one spilt on the occasion. Tradition does not say whether *Mailikukahi* had a hand in this affair, but he was clamorously elected by the Oahu chiefs in council convened as Moi of Oahu, and duly installed and anointed as such at the Heiau (temple).

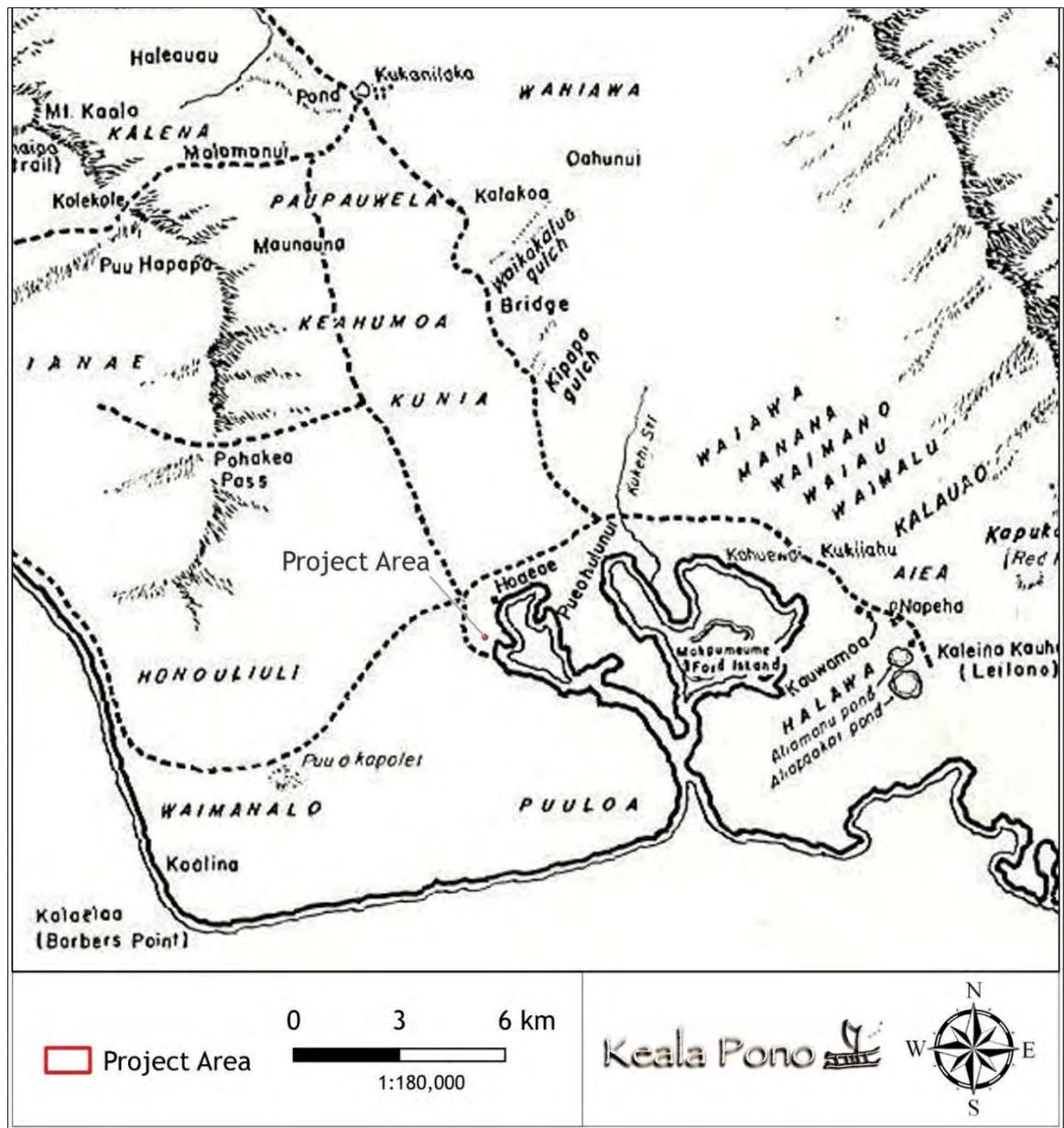


Figure 4. Trails of leeward and central O'ahu as described by Īī (Rockwood n.d. in Īī 1959:96).

I have before...referred to the expedition by some Hawaii chiefs, *Hilo-a-Lakapu*, *Hilo-a Hilo-Kapuhi*, and *Punaluu*, joined by *Luokoo* of Maui, which invaded Oahu during the reign of *Mailikukahi*. It cannot be considered as a war between the two islands, but rather as a raid by some restless and turbulent Hawaii chiefs, whom the pacific temper of *Mailikukahi* and the wealthy condition of his island had emboldened to attempt the enterprise, as well as the *éclat* that would attend them if successful, a very frequent motive alone in those days. The invading force landed at first at Waikiki, but, for reasons not stated in the legend, altered their mind, and proceeded up the Ewa lagoon and marched inland. At Waikakalaua they met *Mailikukahi* with his forces, and a sanguinary battle ensued. The fight continued from there to the Kipapa gulch. The invaders were thoroughly defeated,

and the gulch is said to have been literally paved with the corpses of the slain, and received its name, “Kipapa,” from this circumstance. *Punaluu* was slain on the plain which bears his name, the fugitives were pursued as far as Waimano, and the head of *Hilo* was cut off and carried in triumph to Honouliuli, and stuck up at a place called *Poo-Hilo*.

*Mailikukahi*’s wife was *Kanepukoa*, but to what branch of the aristocratic families of the country she belonged has not been retained on the legends. They had two sons, *Kalononui* and *Kalona-iki*, the latter succeeding his father as Moi of Oahu. (Fornander 1996:87–90)

### ‘Ewa and Honouliuli in the Historic Period

When the first Westerners arrived in the Hawaiian archipelago in 1778, the islands were not yet united under one sovereign. At that time, Honouliuli and the entire island of O‘ahu were under the rule of Chief Kahahana. In 1783, Chief Kahahana’s reign ended with the invasion and victory of Chief Kahekili of Maui. This would forever be the end of O‘ahu’s independence as a separate island kingdom. When Chief Kahekili died in 1794, control of O‘ahu went to his son Kalanikūpule. The following year, Chief Kamehameha of Hawai‘i Island invaded O‘ahu to engage Kalanikūpule in battle. Kamehameha overwhelmed Kalanikūpule’s warriors, effectively gaining control of all the islands from Hawai‘i to O‘ahu. Eventually, Kamehameha would make a peaceful agreement with Chief Kaumuali‘i of Kaua‘i, bringing that island and Ni‘ihau into the fold and thereby uniting the Hawaiian archipelago under one rule (Kamakau 1996, Kanahale 1995).

It is recorded that in 1778, James Cook became the first Westerner to see the Hawaiian Islands. Following Cook, a wave of other western explorers landed on Hawai‘i’s shores. Among these early visitors was Captain George Vancouver, who described the ‘Ewa landscape from his vantage point anchored off the entrance to West Loch, in 1793.

The part of the island opposite to us was low, or rather only moderately elevated, forming a level country between the mountains that compose the east [Koolau] and west [Waianae] ends of the island. This tract of land was of some extent, but did not seem to be populous, nor to possess any great degree of natural fertility; although we were told that, at a little distance from the sea, the soil is rich, and all the necessaries of life are abundantly produced. ...Mr. Whitbey obsesrvd [sic], that the soil in the neighborhood of the harbor appeared of a loose sandy nature; the country low for some distance, and, from the number of houses within the harbour, it should seem to be very populous; but the very few inhabitants who made their appearance were an indication of the contrary. (Vancouver 1801, vol. III:361, 363)

Campbell’s 1819 account includes a description of his way through ‘Ewa, also noting the rich soil of the region:

We passed by foot-paths winding through an extensive and fertile plain, the whole of which is the highest state of cultivation. Every stream was carefully embanked, to supply water for the taro beds. Where there was no water, the land was under crops of yams and sweet potatoes. The roads and numerous houses are shaded by cocoa-nut trees, and the sides of the mountains covered with wood to a great height. We halted two or three times, and were treated by the natives with the utmost hospitality. (Campbell 1819:145)

Similar to earlier accounts, G.F. Mathison, visiting the “Sandwich Islands” in 1821–1822, noted the abundance of resources within the ‘Ewa Plain:

The adjoining low country is overflowed both naturally and by artificial means, and is well stocked with taro-plantations [sic], bananas, etc. The land belongs to many different proprietors; and on every estate there is a fishpond surrounded by a stone wall, where the fish are strictly preserved for the use of their rightful owners, or tabooed, as the natives

express it. One of particular dimensions belongs to the King. (Mathison 1825 in McAllister 1933:109)

During a visit to Hawai‘i in 1825, James Macrae offered the following remarks about Pu‘uloa and the surrounding area:

The neighborhood of the Pearl River is very extensive, rising backwards with a gentle slope towards the woods, but is without cultivation, except round the outskirts to about half a mile from the water. The country is divided into separate farms or allotments belonging to the chiefs, and enclosed with walls from four to six feet high, made of a mixture of mud and stone. (Macrae 1922 in McAllister 1933:31)

Captain Jacobus Boelen’s 1828 narrative of Pu‘uloa discusses traveling to ‘Ewa from Honolulu and the shallow reefs that shelter the bay. Like previous accounts, he notes the highly fertile soils which are heavily cultivated in kalo and early sugarcane crops:

On 26 February, in the company of some good friends and acquaintances, we made an excursion to what the Indians called the harbor of Oporoaa [Pu‘uloa], which I believe means approximately “Pearl River”—at least that is what the foreigners call this bay. This is because the Indians sometimes find pearls there, which they offer for sale in Honoruru. We departed from Honoruru at ten o’clock in the morning in two boats, sailed out of the harbor to sea, and rowed a distance of about three quarters or one league toward the west along the coral reef that encircles the whole south coast of Woahoo. We passed over the bar of Oporoaa harbor. The bar is no more than ten feet deep at low tide, from which one can conclude that in a rough sea high waves will break against it. Even at high tide the passing of this bar can be very dangerous unless the sea is calm. Therefore, on the advice of our pilot, a native of the island, we remained for a time outside the bar and then rowed hard across it.

We found ourselves in a rectangular bay, or rather a lake with several arms, consisting of several deep bights. Two of the most important of these stretched to the northeast, while the one to the northwest cut the farthest....The soil in this region seemed at first sight to be exceptionally fertile, and the land consisted of meadows and *taro* and sugar [cane] fields....

We rowed to the end of the harbor of Opooroa, or the so-called Pearl River, and landed with the boats near a small Indian village with the name of Mannonco....In the meantime, we strolled through the surrounding land, which everywhere was very fertile, with cultivated fields of *tarro*, maize, and also sugar cane. (Boelen 1988:64–65)

### **Changes in Land Tenure and Historic Land Use**

The change in the traditional land tenure system in Hawai‘i began with the appointment of the Board of Commissioners to Quiet Land Titles by Kamehameha III in 1845. The Māhele took place during the first few months of 1848 when Kamehameha III and more than 240 of his chiefs worked out their interests in the lands of the Kingdom. This division of land was recorded in the Māhele Book. The King retained roughly a million acres as his own as Crown Lands, while approximately a million and a half acres were designated as Government Lands. The Konohiki Awards amounted to about a million and a half acres, however title was not awarded until the konohiki presented the claim before the Land Commission.

In the fall of 1850 legislation was passed allowing citizens to present claims before the Land Commission for parcels that they were cultivating within the Crown, Government, or Konohiki lands. By 1855 the Land Commission had made visits to all of the islands and had received testimony for about 12,000 land claims. Ultimately between 9,000 and 11,000 kuleana land claims were awarded to kama‘āina totaling only about 30,000 acres and recorded in ten large volumes.

During the Māhele, 97 kuleana awards were given to applicants in Honouliuli by the Board of Commissioners to Quiet Land Titles. A majority of these claims were located in lo‘i and were approximately one acre in size, with all 97 awards totaling only 106.54 acres (Haun 1991:160). Much of the land of Honouliuli, 43,250 acres, was granted to Kekau‘ōnohi, granddaughter of Kamehameha I, under LCA 11216/Royal Patent 6971 (Waihona ‘Aina n.d.). The current project area is located within the lands awarded to Kekau‘ōnohi (OHA n.d.).

In 1849, Kekau‘ōnohi sold the land of Pu‘uloa, now known as Pearl Harbor, to Isaac Montgomery, where it is believed that he and Kamehameha III established a successful salt works enterprise that shipped salt to the Pacific Northwest (Haun 1991:160). The land continued to change hands after the death of Kekau‘ōnohi in 1851, when her Honouliuli properties were transferred to her husband Ha‘alele‘a, and again following the death of Ha‘alele‘a. After Ha‘alele‘a died, his second wife, Anadelia Amoe, deeded the land to her sister’s husband, John H. Coney. In 1877, Coney sold Honouliuli to James Campbell. For approximately 43,640 acres, Campbell paid a sum of \$95,000 (Haun 1991:160). During the initial years of his ownership, Campbell utilized about 10,000 acres as a cattle ranch and also leased out land for rice cultivation, fishing rights to Pearl Harbor, as well as a lime quarry.

Campbell firmly believed the arid ‘Ewa Plain could successfully be used for the commercial production of sugarcane. However, sugar as a commercial venture was not viable until 1879, when the first artesian well in Honouliuli was drilled by James Ashley, an expert driller from California hired by Campbell expressly for this purpose. Subsequently, Campbell contracted the McCandless brothers, who drilled additional wells across the ‘Ewa Plain that provided an abundant water flow and established a steady source of water for sugarcane irrigation (Condé and Best 1973:278).

In 1889, Campbell leased Honouliuli for 50 years to Benjamin Dillingham, who, with several investors, established the Ewa Sugar Plantation in the lower portion of the ahupua‘a, and Oahu Sugar Company’s cane fields in the upper reaches of Honouliuli. The Ewa Plantation formally initiated operations on January 6, 1890, under the direction of W.J. Lowerie, the plantation’s first manager and one of its investors (Condé and Best 1973:278). Following the end of World War II, the number of sugarcane plantations in Hawai‘i began to steadily decline. In 1970, the O‘ahu Sugar Company merged with the Ewa Plantation Company and took over complete control of its operations (Dorrance and Morgan 2000:43).

Dillingham is also renowned for building the Oahu Railway and Land Company (OR&L). Construction of the railroad began in 1849. Originating in Honolulu, it extended through Honouliuli, on to Wai‘anae, and ultimately to around the island. In June of 1890, the Ewa Plantation Company began to utilize the OR&L railroad to haul freight, with the first crop of sugarcane carried by the OR&L consisting of 2,849 tons produced by the Ewa Plantation.

The *Pacific Commercial Advertiser* also took note of the progress at Ewa in 1890 and commented several times on that theme. On June 19, that paper reported: “The first carload of freight to Ewa Plantation went over the OR&L Co.’s line yesterday.” Again on the 1st of August appears: “On Wednesday last the track of the Ewa Plantation railway was completed to the harbor front, so the first train reached the wharf and several carloads of bananas were placed in scows and put on board the *Australia*.” Finally, on August 18<sup>th</sup> the paper was reporting: “Coal from the barque *Wenona* shipped directly to Ewa. 50 tons was moved on August 7th, and placed in the coal bunkers at Honouliuli. The train left the docks at 2: 30 pm and the load was secure in the bunkers at 5:00 pm.” (*Pacific Commercial Advertiser* in Condé and Best 1973:279)

A spirited legal dispute took place in 1892 between the Ewa Plantation Company and the OR&L over the use of the tracks within the Ewa Plantation. The conflict was resolved the following year

when it was determined that the terms of the lease provided Ewa Plantation free use of OR&L track “for the full term of the lease” (Condé and Best 1973:279). The OR&L railroad continued to be used to haul the harvested sugarcane to the mill until 1947, when the use of trucks was implemented (Dorrance and Morgan 2000:45). In 1893, the first sisal was brought to Hawai‘i from Florida and was grown in Honouliuli. The sisal plantation operated under the name of Hawaii Fibre Company in 1898 (Haun 1991:166).

Printed during the last few months of 1895, *Buke Mele Lahui*, was a response to the recent overthrow of the Hawaiian monarchy in 1893. A collection of 105 songs, this publication served as a means of expression during a time of censorship. The song “Kue Hao O Ka Lanakila” mentions various places in ‘Ewa and Wai‘anae, and in this mele the bending sugarcane leaves of beautiful Honouliuli are described (Figure 5) (Hawaiian Historical Society 2003:98–99).

The presence of government structures in the region began in 1888 with the construction of the Barbers Point Lighthouse in Kalaehoa by the Hawaiian Government. This work included the construction of the United States Coast and Geodetic Survey Magnetic Observatory. Shortly thereafter, in 1916 the Waiahole Water Company added a system of tunnels, ditches and pipes to bring water from the wet windward to the dry leeward side of the island. In the 1930s the military leased a 3,000 square foot area from Campbell Estate. This era brought much development of the region’s infrastructure and capital improvements and included the creation of approximately 18 miles of road built between 1935 and 1937 (Beardsley 2001:II.23). When the military’s lease expired in 1940, the Navy acquired a lease of 3,500 acres on which the ‘Ewa Marine Corps Air Station, and later, Barbers Point Naval Air Station would be built. Following the Japanese bombings of Pearl Harbor on December 7, 1941, construction at the Air Station dramatically increased after the ‘Ewa airstrip and majority of the planes were destroyed in the attack. Construction of the Naval Air Station at Barbers Point was completed on April 15, 1942.

Since World War II, Barbers Point Naval Air Station has played an integral role as a strategic military base and has provided a diverse range of functions including an antisubmarine patrol, headquarters of the Pacific Airborne Barrier Command (1958–1965), guided missile units, and the Pacific Sound Surveillance System (Beardsley 2001:II.24). Over time, activities associated with construction and the execution of these functions have had a major impact on cultural and natural resources. Some of these impacts include a defensive line of barbed wire and gun emplacements along the coast, infrastructure developments of roads, sewers, water systems, utilities, electricity, gas, housing units, and general bulldozing and grading in surrounding areas (Hammatt 1984, Kelly 1991, Tuggle and Tomonari-Tuggle 1995). In 1999 the Naval Air Station was closed and turned over to the State of Hawai‘i and is currently named the Kalaehoa Community Development District (HCDA 2012).

A former internment camp used during World War II for prisoners of war, U.S. citizens, and resident aliens under martial law was located in the Kunia area of Honouliuli, northwest of the project area (Farrell 2017). In 1942, President Roosevelt signed Executive Order No. 9066 authorizing the confinement of 120,000 Americans of Japanese ancestry, and camps were created across Hawai‘i. The remains and location of the Honouliuli camp, which was bulldozed and abandoned after the war, were rediscovered by the Japanese Cultural Center of Hawai‘i in 2002 and subsequently documented (Farrell 2017).

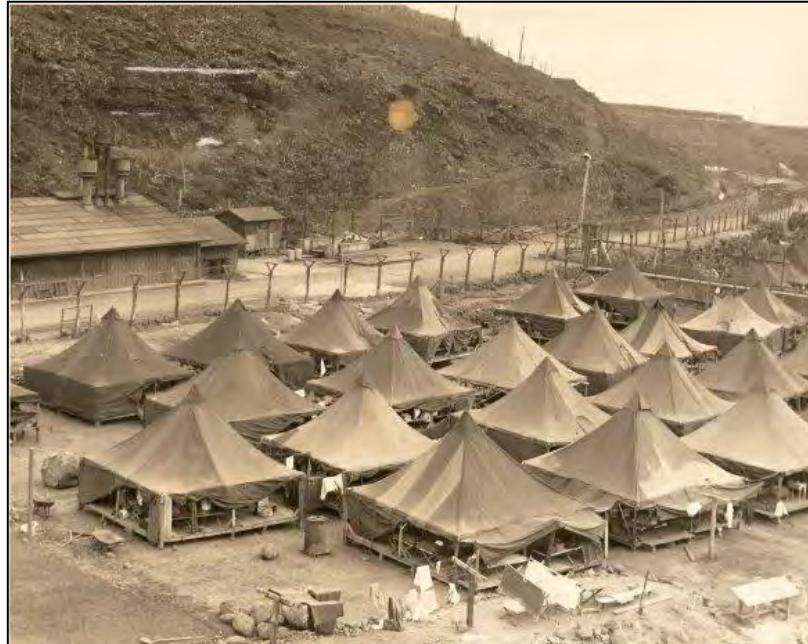
The Honouliuli Internment and POW Camp was built “from scratch” (Gordon 1981), following the bombing of Pearl Harbor, and opened on March 2, 1943. It includes roughly 122.5 acres within Honouliuli Gulch and was designed with facilities for approximately 3,000 POWs and internees (Springer 1943). There were several compounds and separations made between Japanese Americans and German Americans, and POWs and civilian internees (Figure 6) (Nye 2005). At the time of the

**KUE HAO O KA LANAKILA.**

Hanohano Lanakila i ka'u ike,  
Ka niniu poahi a na kue,  
Ua kohu naia no ka moana,  
Ka pakika, ka pahee i ke alahao,  
Kilohi iho au ma ka aoao,  
O Moanalua ka i hai ke au,  
A ke kula makou a o Puuloa,  
Laulea pu ana me na hoa,  
Kau aku ka manao no Aiea,  
Ka pa a ka makani a he Moae,  
Aia ka iini i Pualehua,  
I ka hale hulahula malu ohai,  
A hiki makou a i Manana,  
Ano kaukaulua e ka Lanakila,  
Ike i ka nani kai o Polea,  
I ka hapa-Ilikini ili-ulaula;  
Hanohano Waikele i ka ulu niu,  
I ke kai o ka Pa Hamauleo,  
A Honouliuli ike i ka nani,  
I ka luhe a na lau o ke kumu ko,  
A ke kula wela a o Waimanalo,  
Malu ana e ka lau a o ke kiawe,  
Alawa ae au Puuohulu,  
O ka puu kaulana o Waianae,  
Kuupau Lanakila i ke oeoe,  
E i mai ana o Waianae,  
Ike i ka nani o ia wahī,  
Me ke kai holu mai i ka pueone;  
Haina ka puana no Waianae,  
Ka makani aheahe he Kaiaulu

S. PINAO.

**Figure 5. Mele that mentions places in ‘Ewa (Hawaiian Historical Society 2003:98, 99).**



**Figure 6. Compound IV Mess Hall (background) and POW tents ca. 1945–1946 (NPS n.d.:1).**

internment camp's rediscovery in 2002, the land was owned by Monsanto Hawaii, who allowed access for the numerous field studies. The site was listed on the National Register of Historic Places (NRHP) in 2012. After it became a National Monument on February 24, 2015, Monsanto donated the land to the NPS so it could become an interpretive historic site (Farrell 2017).

### **Historic Maps**

The earliest map of the area was drafted by C.R. Malden (1825), a British naval officer. Malden was also a surveyor who prepared a number of maps of the Honouliuli region during the early 19<sup>th</sup> century. Figure 7 depicts the project area located along the southern edge of a peninsula dotted with house sites that were likely a traditional village. To the west is a marshy coastal area containing lo‘i. An unnamed freshwater stream is shown at its coastal outlet and labeled “Watering Place.”

On a later Alexander (1873) map, numerous place names are shown, such as Waioha, Milolii, Hō‘ae‘ae, and the islet Laulaunui. Also identified are an “Old Catholic Church,” salt ponds, and the location of J. Robinson’s Ranch (Figure 8). There are no annotations on the map within the project area.

A map of “Honouliuli Taro Lands” by Monsarrat (1878) illustrates the thriving cultivation of kalo in Honouliuli (Figure 9). Numerous family farm plots are mapped in this figure, as is an area on the west marked as “mud flats,” a road circling the land plots, and a wall, or “pa aina” which encloses several of the lots. This map shows the character of the region in the late 1800s. The project area is located to the east of the farmlands.

A much later map of the region (Condé and Best 1973, Figure 10) shows the West Loch area as within sugarcane fields owned by the Ewa Plantation Company. The project area is adjacent to a plantation road within Field 32. The OR&L railroad line is just east of the project area, along the coastline.

### **Previous Archaeology**

The following discussion provides information on archaeological investigations that have been performed within a 1.5 km radius of the project area, based on archaeological reports from the SHPD library (Figure 11 and Table 1). Previously identified historic properties are identified by their unique State Inventory of Historic Places (SIHP) site number designation. Sites in the vicinity of the current project area are prefixed with 50-80-12 unless otherwise noted and are shown on Figure 12.

T.G. Thrum was the first researcher to mention the heiau at Pu‘u Kapolei, although very briefly, during his survey of heiau in Hawai‘i. He writes, “Ewa— size and class unknown. Its walls thrown down for fencing” (Thrum 1906:46). The next archaeological study was an island-wide survey conducted in the 1930s by J.G. McAllister (1933). In his study of O‘ahu, McAllister recorded numerous sites in the ahupua‘a of Honouliuli, including heiau, ko‘a, fishponds, and ranching walls. As previously discussed, Pu‘u Kapolei Heiau (SIHP 50-80-12-138) was recorded. Unfortunately, the heiau was destroyed by the time of McAllister’s study (1933:108):

The stones from the heiau supplied the rock crusher which was located on the side of this elevation, which is about 100 feet away on the sea side. There was formerly a large rock shelter on the sea side where Kamapuaa is said to have lived with his grandmother.

Other sites in the region identified by McAllister (1933) include Site 140, a fishpond adjoining Laulaunui Island; Site 141, the area called Kaihuopalai; and Site 146, which includes the many sites he observed on the ‘Ewa Coral Plains. These sites fall outside the 1.5 km radius and are not shown on Figure 12.

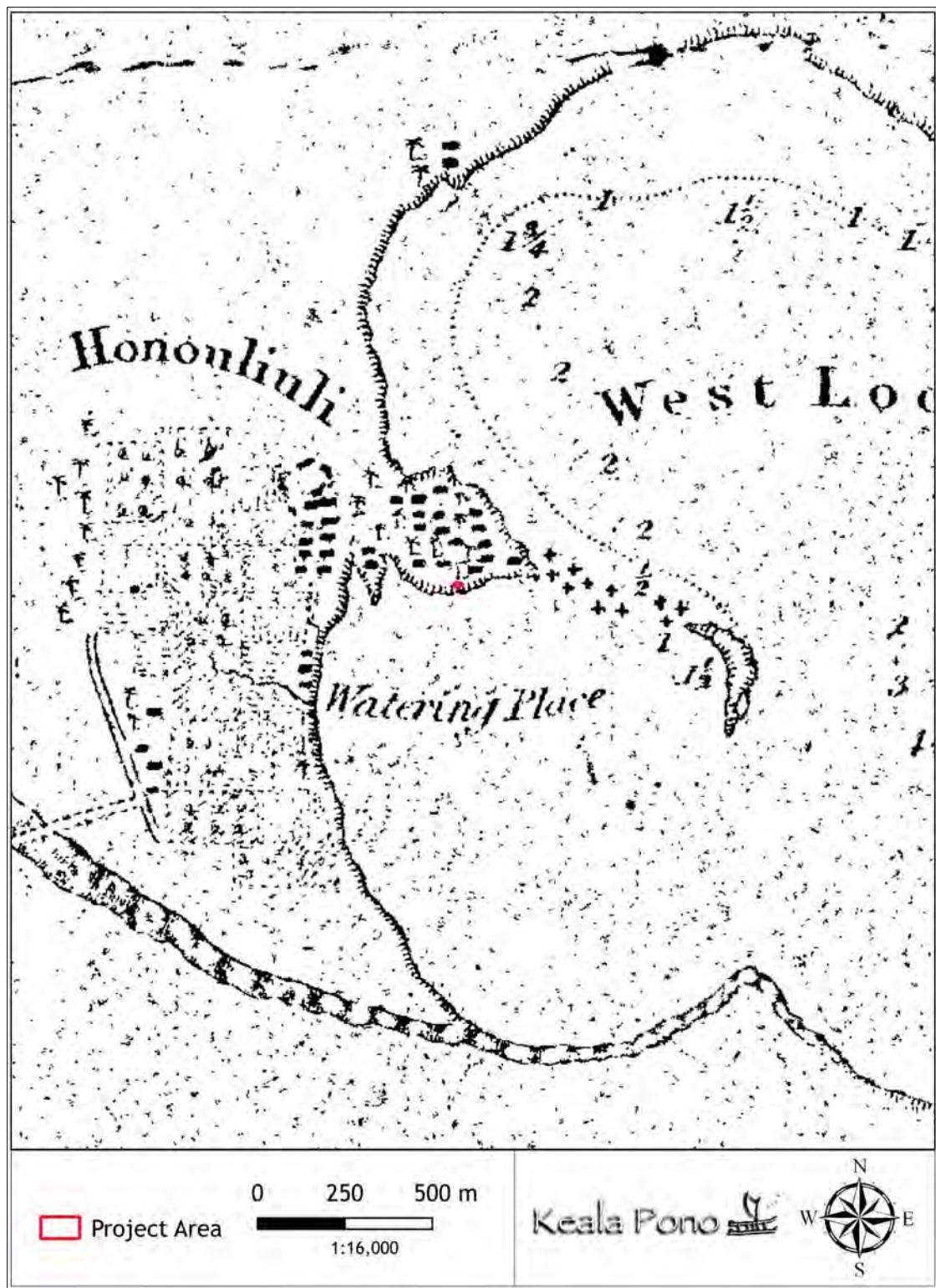


Figure 7. A portion of the Malden (1825) map showing the project area.

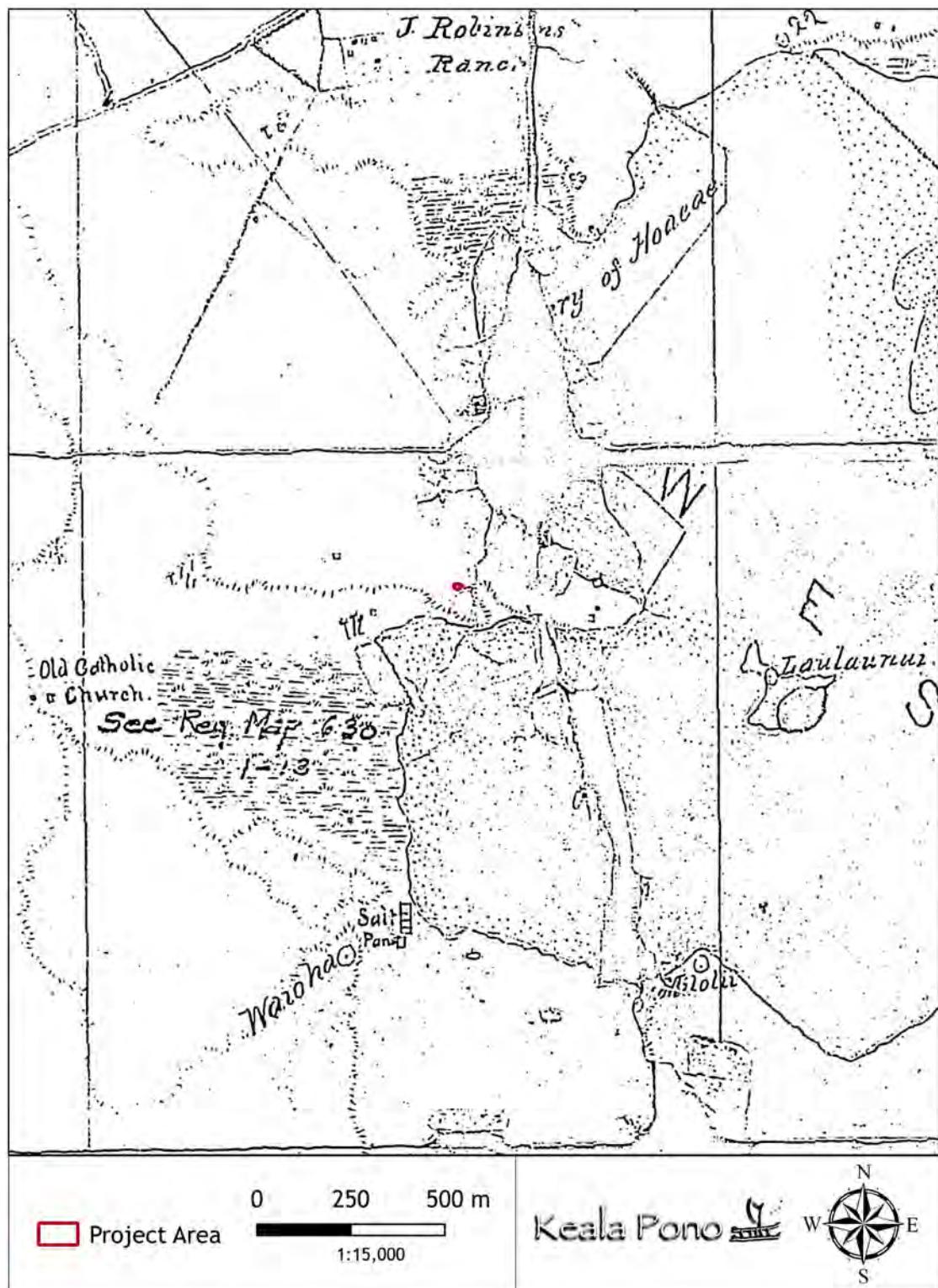


Figure 8. A portion of a map of Honouliuli (Alexander 1873).

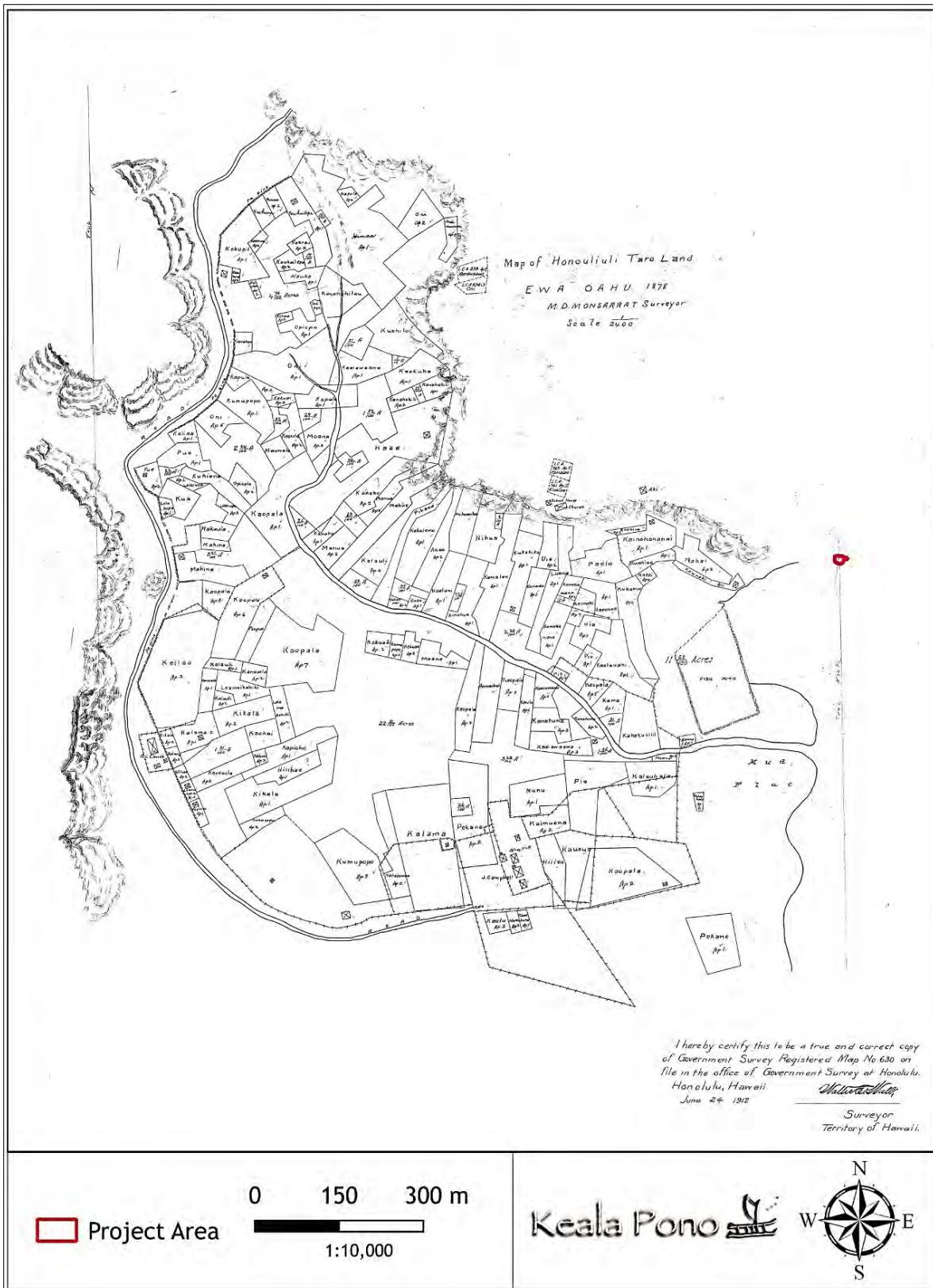


Figure 9. A map of Honouliuli taro lands (Monsarrat 1878).



Figure 10. A portion of an Ewa Plantation Company map (Condé and Best 1973).

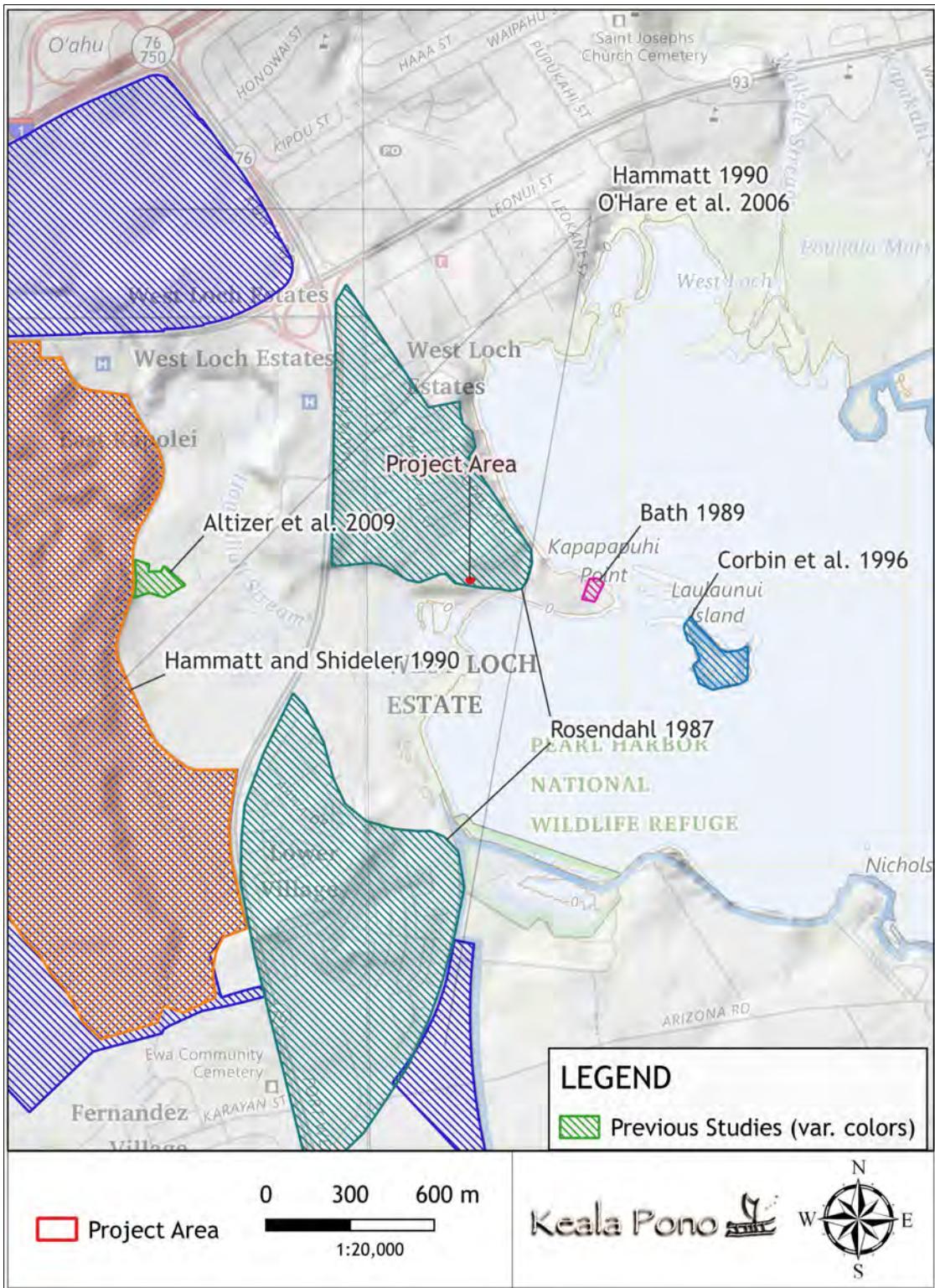
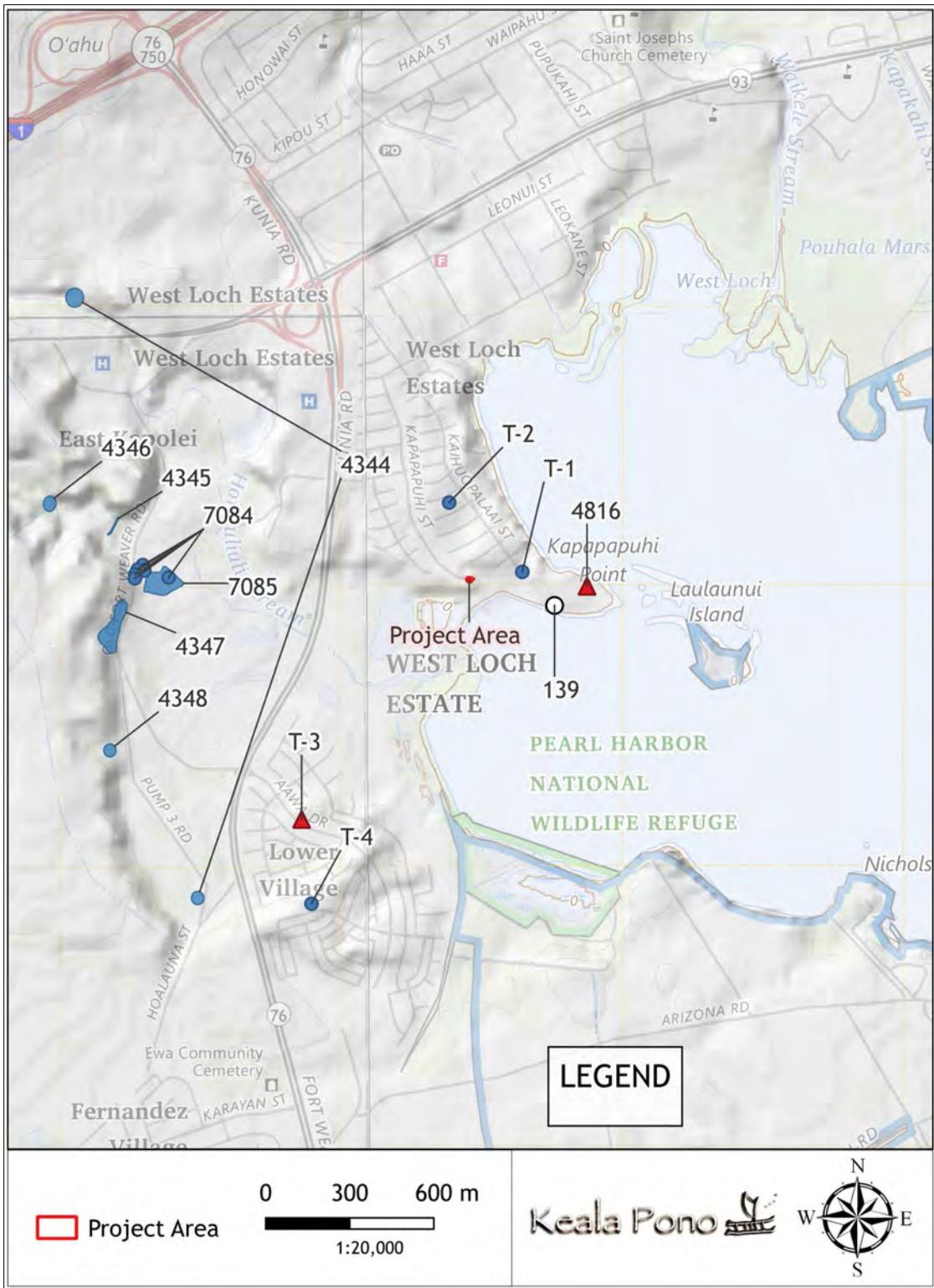


Figure 11. USGS Quadrangle map showing previous archaeological studies near the project area.



**Figure 12. USGS Quadrangle map showing previously identified historic properties in the vicinity of the project area.**

**Table 1. Previous Archaeology in the Project Vicinity**

<b>Author(s) and Date</b>	<b>Location</b>	<b>Type of Study</b>	<b>Findings</b>
McAllister 1933	Island-wide	Survey	Documented SIHP 139, Kalanamaihiki fishing shrine; SIHP 140, a fishpond adjoining Laulaunui Island; SIHP 141, Kaihuopalaai, Ewa; and SIHP 146, numerous sites covering the Ewa coral plain.
Rosendahl 1987	West Loch Estates	Archaeological Reconnaissance Survey	Identified four new sites: T-1, a traditional habitation site comprised of a midden deposit; T-2, a historic habitation site comprised of surface artifact scatter; T-3, a historic burial complex comprised of five graves; T-4, and a historic habitation comprised of surface artifact concentration. SIHP numbers were not assigned at the time of the study.
Bath 1989	Hō‘ae‘ae Point	Burial Investigation	Documented SIHP 4816, disarticulated human skeletal remains.
Hammatt and Shideler 1990	West Loch Bluffs	Archaeological Inventory Survey	Identified five new sites: SIHP 4344, three iron pipe features, two welded pipe constructions, and a tall metal post; SHIP 4345, well preserved sections of the Ewa Plantation Company railroad rock-faced berm; SHIP 4346, the northern pumping station; SHIP 4347, the central pumping station/habitation and agriculture complex; and SHIP 4348, the southern pumping station. All sites were interpreted to be associated with the historic plantation-era.
Hammatt 1990	West Loch Bluffs	Preservation Plan	Outlined preservation measures for SIHP 4345, 4346, 4347, and 4348 identified by Hammatt and Shideler (1990).
Corbin et al. 1996	Laulaunui Island and Fishpond	Field Inspection	Observed 5-6 concrete foundations, including a house foundation, and refuse interpreted to be associated with the U.S. Military. Identified the fishpond wall.
O'Hare et al. 2006	West Loch Bluffs	Archaeological Inventory Survey	Located SIHP 4344–4348 previously identified by Hammatt and Shideler (1990) and identified four new features of SIHP 4344: two rock walls, a stone-faced berm, a concrete masonry catchment basement, and a concrete ditch) associated with the historic plantation era. SIHP 4344, Features A-D, originally identified by Hammatt and Shideler (1990), were not relocated and may have been destroyed after 1990.
Altizer et al. 2009	Hale Kipa	Archaeological Inventory Survey	Recorded two new sites: SIHP 7084, historic house foundations, a cesspool, and water control features; and SIHP 7085, a traditional lo‘i.

#### Site 140 (SIHP 140) Fishpond adjoining Laulaunui

The pond is possibly Laulaunui fishpond, and named for the island. It is 4 to 5 acres 111 extent with a wall approximately 900 feet long, 7 feet wide, and 3.5 feet high. There are no outlet gates (*makaha*). (McAllister 1933:108)

#### Site 141 (SIHP 141) Kaihuopalaai, Ewa

This name is said to apply to the whole West Loch of Pearl Harbor. Each year, beginning in October or November, large shoals of mullet are said to go from Pearl Harbor east to

Makapuu Point and then north and west to Laie or Malaekahana, from which point they return to Pearl Harbor over the same route in March or April. This is a favorite story which one comes across frequently about the island and the oral versions are as diverse as those written. Kaihuopalaai is the pond from which the mullet come. The site is named for Kaihuopalaai, said to be the daughter of Konikonia and his wife Hinaaimalama. Fornander...writes: "...on Oahu, Kaihuopalaai saw a goodly man by the name of Kapapaapuhi...who was living at Honouliuli, Ewa; she fell in love with him and they were united, so Kailuopalaai has remained in Ewa to this day. She was changed into that fishpond in which mullet are kept and fattened, and this fish is used for that purpose to this day."

According to old Hawaiians, there never was a fishpond by this name. In another version... Ihuopalaai is the brother of a woman living in Laie. As the fish were scarce in Laie, this woman sent her husband to Ihuopalaai, who had the mullet follow her husband on his return trip which was made along the shore around Makapuu Point with the mullet following in the water. Makea tells me that Kaihuopalaai's sister was. named Malaekahana. Another story tells of a man who lured the mullet around the island by tossing sweet potatoes into the sea. (McAllister 1933:108)

McAllister designated the many sites he observed on the 'Ewa Plain as Site 146 (SIHP 146).

Ewa coral plains, throughout which are the remains of many sites. The great extent of old stone walls, particularly near the Puuloa Salt Works, belongs to the ranching period of about 75 years ago. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here. (McAllister 1933:109)

Closer to the current project area, McAllister identified Site 139 (SIHP 139), Kalanamaihiki fishing shrine (ko'a) at Kapapuhi, Honouliuli:

Near the end of the small tongue of land that juts out opposite Laulaunui Island in the west loch of Pearl Harbor, are two large rough stones about 2.5 feet in size, with six or seven smooth stones averaging 1 foot in size in a small pile adjoining the larger stones. The entire site is covered with akulikuli (*Batis maritima*?) and would not be noticed or considered if the Hawaiians did not know of its former sacredness. (McAllister 1933:108)

A more recent archaeological field inspection was conducted of Laulaunui Island and fishpond by the SHPD (Corbin et al. 1996). During the field inspection, five or six concrete foundations were observed "on top of the island" that were interpreted as having been constructed by the U.S. Military. The largest foundation measured 30 by 60 ft. and was interpreted to be a house foundation. Undated refuse, including bottles, cans, a shopping cart, and wood were present on the ground surface. The fishpond, located at the southern tip of the island, was silted-in, but the fishpond wall was found to be intact and in good condition, as was the mākāhā These features were not formally recorded and no feature or site map were provided and no SIHP number was assigned.

An archaeological reconnaissance survey was carried out at the West Loch Estates Residential project for increments I and II (Rosendahl 1987). The survey resulted in the identification of four sites (T-1 through T-4). T-1 consisted of a subsurface deposit of marine shell interpreted to be a traditional habitation site. The site was located along the mauka side of the old cane haul road above the former OR&L railroad right-of-way. T-2 was a disturbed historic artifact scatter (historic bottles and ceramic sherds) located near a former historic house site that was interpreted to be a post-contact habitation site. T-3 was a historic burial complex comprised of five well-marked historic graves distributed across a knoll. The site was located "immediately adjacent to an abandoned section of

the old ‘Ewa Beach Road’ (Rosendahl 1987:8). A 1927-28 USGS Waipahu quadrangle depicts a cemetery in approximately that location. T-4 consisted of an extensive surface scatter comprised of historic artifacts associated with a former plantation village known as Lower Village.

In 1989, SHPD conducted an archaeological field inspection in response to a notification that human skeletal remains were inadvertently encountered at Hō‘ae‘ae Point (Bath 1989). The burial site showed signs of recent excavation, and disarticulated human skeletal elements were observed on the ground surface. Given the level of disturbance, it could not be determined whether the burial had been in situ before it was disturbed. The site was designated as SIHP 4816.

The West Lochs Bluffs was the subject of an archaeological inventory survey in 1990 (Hammatt and Shideler 1990). The survey resulted in the documentation of five newly identified sites that were interpreted to be associated with the historic plantation era. SIHP 4344 consisted of three iron pipe features, two welded pipe constructions, and a tall metal post interpreted to be plantation infrastructure associated with Drivers and PipeLine Village. Well-preserved sections of the OR&L Company railroad rock-faced berm were designated as SIHP 4345. SIHP 4346 consisted of a stone-lined well and an indeterminate number of associated features were thought to be remnants of the northern pumping station. SIHP 4347 was a complex comprised of eight features: Feature A, a well; Feature B, a blockhouse structure; Feature C, a concrete slab; Feature D, a pipeline pylon; Feature E, a roadway alignment; Feature F, an agricultural terrace; and Feature G, a house terrace. These features were thought to be the central pumphouse with agricultural and habitation components. SIHP 4348 consisted of a stone-lined well and an indeterminate number of associated features interpreted to be the southern pumping station. Of these sites, SIHP 4344 through 4348 are within 1.5 km of the current project area and their locations are shown on Figure 12. Hammatt (1990) prepared a preservation plan for SIHP 4345, the Ewa Plantation Company railroad berm; SIHP 4346, the northern pumping station; SIHP 4347, the central pumping station; and SIHP 4348, the southern pumping station.

An archaeological inventory survey was completed for the East Kapolei project (O’Hare et al. 2006). SIHP 4344 through 4348, previously identified by Hammatt and Shideler (1990), were relocated and four newly identified features interpreted to be associated with the historic plantation era were incorporated into SIHP 4344. The newly identified features consisted of two rock walls (Features D and E), a stone-faced berm (Feature F); and a concrete masonry catchment basement and concrete ditch (Feature G). SIHP 4344, Features A through D, originally identified by Hammatt and Shideler (1990), were not relocated and may have been destroyed between 1990 and 2006.

A 4.28-acre property underwent an archaeological inventory survey in advance of the Hale Kipa project (Altizer et al. 2009). The study resulted in the identification of two new sites (SIHP 7084 and SIHP 7085). SIHP 7084 was comprised of a series of historic features including two foundations, a cesspool, water control ditch remnants, and a water control feature that was previously recorded. The features were interpreted to represent two historic house sites possibly associated with the plantation-era. A third foundation was interpreted to be of modern construction. SIHP 7085 consisted of a subsurface agricultural layer thought to be a lo‘i, as two LCAs once were on the property. Radiocarbon analysis yielded data suggesting the feature dated between AD 1270 and 1400.

### **Settlement Patterns**

Based on a review of previous archaeological studies and an examination of both pre- and post-contact Hawaiian history, settlement patterns for the Honouliuli area and larger ‘Ewa Plain can be surmised. Synthesized with Cordy’s (1993) O‘ahu sociopolitical model, Beardsley (2001:III-8, III-9) summarizes the following settlement pattern for Honouliuli:

**Pre-AD 1000** – During this period political organization of the islands consisted of small chiefdoms. Temporary habitations were located in resource rich areas. Permanent settlements were clustered around prime agricultural land; these prime agricultural lands were probably located in well-watered valleys. For the ‘Ewa Plain, this means that only temporary habitations should be found in the project area, located to exploit rich marine resource areas and possible to exploit bird populations. Permanent settlements might have been established in the Honouliuli floodplain.

**AD 1000 to 1300s** – The political organization of the island coalesced into three independent districts: Greater ‘Ewa, Ko‘olau and Kona. Temporary settlements were established for the first time in inland garden areas, associated with dryland agriculture; permanent habitation expanded into new areas. For ‘Ewa, the Honouliuli floodplain would have been the focus of permanent habitation. Settlement in the project area focused on exploitation of marine resources, but was also associated with permanent inland settlement.

**AD 1400 to 1500s** – Full development of class stratification occurred during this period, together with the unification of the entire island under one chief. Permanent habitations expanded in all areas; temporary habitations in inland garden areas were replaced by permanent habitations. For the project area, permanent habitations, possibly associated with rectangular enclosures, developed.

**AD 1600 to 1778** – District chiefs fought for control over the resources of the islands. For ‘Ewa, the population density was still concentrated on the irrigated Honouliuli Valley floodplain. Other population concentrations occurred around Pearl Harbor and at the base of the Wai‘anae Range. Scattered permanent habitation in the project area, possibly on a seasonal basis, or only in years of high rainfall, might have also occurred.

**Post-Contact** – Scattered Hawaiian occupations continued across the ‘Ewa Plain and in the project area until the mid-19<sup>th</sup> century. In the later historical period, populations were low and consisted of scattered families with habitation sites along the coast for marine exploitation and inland houselots with possible walled agricultural areas.

## **Summary of Background Research**

Through examination of traditional and historic land use for Honouliuli Ahupua‘a as demonstrated in mo‘olelo, historic literature, and archaeological investigations, this area is a land rich in natural and cultural resources. Lo‘i were planted along the streams, and fishponds dotted the coast at Pu‘uloa, which was a gathering place for many types of prized invertebrates like the pearl oyster. The fertile soil of the plain was ideal for growing ‘awa, mamaki, wauke, and olonā. Known as an ali‘i stronghold, as well as a vacation spot for royalty, Honouliuli was a significant ahupua‘a in the pre- and post-contact periods.

The continuous development of the Honouliuli area in modern times has triggered much archaeological work in the region over the years. Previously conducted archaeological studies have resulted in the identification and documentation of traditional and historic activities that once occurred in the project vicinity. Pre-contact sites identified near the current project area include sites related to the procurement of marine resources such as fishing shrines and fishponds, as well as iwi kūpuna (human burials), habitation areas, and agricultural sites. Many sites from the post-contact period adjacent to the project area were associated with the historic sugarcane plantation era. These sites consist of foundations and remnants of former plantation villages, historic burials, irrigation features, wells, roadways, and remnants of the OR&L railroad.

## FIELD INSPECTION

A field visit was conducted on October 2, 2024 by Keala Pono archaeologist Tiffany Brown, BA. The project area was walked to determine if there are any surface archaeological remains present and which areas of the property might have a likelihood of supporting archaeological features. The property consists of a modern wastewater pump station with a detached concrete masonry unit (CMU) dumpster enclosure (Figure 13) located immediately to its east. A CRM wall encloses the pump station along all four of its sides (Figure 14) and an additional CRM wall reinforces the outer perimeter of the dumpster enclosure (Figure 15).

The north side of the wastewater pump station is comprised of a small gravel yard and a rectangular concrete slab of unknown function with a metal entry door embedded in the ground which runs along the north side of the pump station (Figure 16). Two manhole covers are embedded in the gravel just north of the concrete slab. The gravel yard extends around to the west side of the pump station. A diesel fuel tank sits parallel to the pump station at its southwest corner, with two metal HECO enclosures located just west of the diesel fuel tank (Figure 17). The south and east sides of the wastewater pump station are narrow concrete walkways which connect to two separate entry doors for the pump station (Figures 18 and 19). Both the south and east sides of the pump station are partially enclosed by the CRM wall as well as a blue metal gate (Figure 20).

The wastewater pump station, gravel yard, CMU dumpster enclosure, CRM wall enclosing the pump station, and CRM wall around the dumpster enclosure cover most of the property. The project area lacks any vegetation; however it is surrounded by a short grass field and trees, and residential lots are within the neighboring parcels. Nothing of archaeological interest was found within the project area during the field inspection. In sum, the property is a modern built and landscaped environment. No areas within the project boundaries were identified to have historical context. Due the extensive modern use of the property, it is unlikely that any traditional surface archaeological features remain. It is possible that subsurface features have survived the more recent disturbances.



**Figure 13. Wastewater pump station with a detached CMU dumpster enclosure, facing northwest.**



**Figure 14.** CRM wall enclosure, facing southwest.



**Figure 15.** CRM wall along the perimeter of the CMU dumpster enclosure, facing north.



**Figure 16. Concrete yard with imbedded concrete slab and manhole covers, facing northwest.**



**Figure 17. Gravel yard with diesel fuel tank and HECO enclosures, facing south.**



**Figure 18. Concrete walkway located along the south side of the pump station, facing east.**



**Figure 19. Concrete walkway along the east side of the pump station, facing south.**



**Figure 20.** CRM wall enclosure with attached blue metal gate, facing north.

## **ASSESSMENT AND RECOMMENDATIONS**

This archaeological literature review and field inspection was conducted in support of proposed upgrades to the West Loch Estates WWPS, which was constructed in 1989, with the surrounding CRM wall completed after 1989. The project area is located in the parking lot of the Kapapapuhi Point Park, in the residential area of ‘Ewa Beach [TMK: (1) 9-1-181:001 por., previously TMK: (1) 9-1-017:006 por.]. This is in the traditional land division of Honouliuli Ahupua‘a, within ‘Ewa District, on the island of O‘ahu, Hawai‘i.

While a field inspection did not identify anything of archaeological interest on the surface, it is possible that subsurface deposits or features remain. An assessment of findings of the archaeological literature review and field inspection is presented below.

### **Results of Historical Research on Land Use**

The ahupua‘a of Honouliuli contained an abundance of natural resources in traditional times. The fisheries, fishponds, and the numerous freshwater streams could easily provide more than enough subsistence resources to support a sizable population. A notable trail system crossed the region connecting this area with other parts of the island. ‘Ewa District, in general, was known for its abundance of marine resources, including shellfish, and people often traveled there from other parts of the island to acquire them. The deep bays of West Loch combined with the numerous freshwater streams that emptied into the bays provided excellent conditions for the construction of fishponds and fish traps. The wide lowlands of Honouliuli were bisected by streams creating marshlands which were utilized for lo‘i. Bananas and yams were grown along the valley slopes, and mamaki, ‘awa, wauke, and olonā were inland crops. In the late 1870s Honouliuli was primarily under commercial sugarcane cultivation and was also utilized as ranchlands. For most of the 20<sup>th</sup> century the U.S. military and then the U.S. Navy developed and utilized a sizeable portion of the Honouliuli area.

### **Evidence from Historic Maps**

An 1825 map illustrates the project area on a peninsula dotted with house sites. To the west is a marshy coastal area containing a number of lo‘i. By the late 1870s, the region has become more populated, a Catholic Church has been constructed, and numerous families are farming wetland kalo. By the late 1970s, most of lower Honouliuli is planted in commercial sugarcane on lands owned by the Ewa Plantation Company.

### **Results of Land Commission Awards Search**

During the Māhele, the majority of the 97 awarded claims within Honouliuli were utilized for lo‘i. An area long-favored by the ali‘i, Kekau‘ōnohi, the granddaughter of Kamehameha I, claimed the majority of Honouliuli, totaling 43,250 acres, under LCA 11216/Royal Patent 6971. She held on to these lands until the time of her death, when they were passed on to her family. The West Loch WWPS project area is within the lands awarded to Kekau‘ōnohi.

### **Knowledge from Previous Archaeological Studies**

An early archaeological investigation of Honouliuli conducted in the 1930s, identified SIHP 139 (McAllister 1933), a traditional fishing shrine located southeast of the West Loch WWPS. More recent studies near the project area have identified traditional habitation sites (T-1, T-2) and a disarticulated human burial (SIHP 4816). However, the majority of sites recently documented nearby are associated with the historic plantation era. The sites consist of remnants of plantation villages, historic cemeteries, historic house sites, and small gardens. Numerous sites representing evidence of

plantation-era infrastructure were also recorded such railroad berms, pumping stations, pipelines, ditches, and water catchments. Several sites have been identified in proximity to the current project area on the ground surface and in subsurface contexts.

### **Results of the Field Inspection**

A walk-through of the property did not identify anything of archaeological interest. A wastewater pump station, gravel yard, CMU dumpster enclosure, CRM wall enclosing the pump station, and CRM wall around the dumpster enclosure cover most of the property. The pump station and its associated features were constructed in 1989 or later and are therefore less than 50 years old and considered modern. Due the extensive modern use of the project area, it is unlikely that any surface archaeological features remain. However, it is possible that subsurface archaeological features or deposits have survived the more recent disturbances.

### **Summary and Recommendations**

Multiple lines of evidence illustrate that the lands of West Loch have a long and important role in Hawaiian history. The area is renowned for its abundance of terrestrial and marine resources. Its unique location provided access to near-coast and deep water marine resources, while the coastal marshlands afforded ample land for *lo‘i*. During the Māhele, the area was retained by a prominent ali‘i until her death in the mid-1850s. Following her death, the lands stayed within the family for several more decades. The project area is within the boundaries of a traditional village and a historic plantation-era sugarcane field. In addition, previous archaeological studies have identified traditional habitation, ceremonial, and human burials near the project area. Based on these findings, there is the potential for traditional and historic cultural resources to be present, particularly in subsurface contexts. These cultural resources may include human burials, as well as evidence of traditional and historic habitation, and sites related to the procurement of marine and coastal resources. A program of archaeological monitoring is recommended during all ground disturbing activities to identify and properly treat any historic properties that may be encountered. An archaeological monitoring plan should be prepared under a separate cover to be reviewed and accepted by the SHPD prior to the commencement of construction.

## GLOSSARY

<b>ahupua‘a</b>	Traditional Hawaiian land division usually extending from the uplands to the sea.
<b>‘āina</b>	Land.
<b>akule</b>	Big-eyed or Goggled-eyed scad fish ( <i>Trachurops crumenophthalmus</i> ).
<b>‘akulikuli</b>	The coastal herb <i>Sesuvium portulacastrum</i> , or a general term for succulent plants.
<b>ali‘i</b>	Chief, chiefess, monarch.
<b>‘ama‘ama</b>	The mullet, or <i>Mugil cephalus</i> , a prized indigenous fish.
<b>‘anae</b>	Full-sized ‘ama‘ama mullet fish.
<b>‘awa</b>	The shrub <i>Piper methysticum</i> , or <i>kava</i> , the root of which was used as a ceremonial drink throughout the Pacific.
<b>banana</b>	The mai‘a, or <i>Musa</i> sp., whose fruit was eaten and leaves used traditionally as a wrapping for cooking food in earth ovens.
<b>Bermuda grass</b>	The grass <i>Cynodon dactylon</i> , originally from the Middle East. This fast growing species is often used for turf grass.
<b>Christmas berry</b>	The ornamental tree <i>Schinus terebinthifolius</i> known for its bright red berry-like fruits.
<b>coconut</b>	The palm tree <i>Cocos nucifera</i> .
<b>eucalyptus</b>	Forest trees of the genus <i>Eucalyptus</i> , more than 90 species of which have been introduced to Hawai‘i.
<b>guava</b>	The invasive tree or shrub <i>Psidium guajava</i> , which forms dense thickets in disturbed areas.
<b>hau</b>	The indigenous tree <i>Hibiscus tiliaceous</i> , which had many uses in traditional Hawai‘i. Sandals were fashioned from the bark and cordage was made from fibers. Wood was shaped into net floats, canoe booms, and various sports equipment and flowers were used medicinally.
<b>heiau</b>	Place of worship and ritual in traditional Hawai‘i.
<b>ho‘oilo</b>	Rainy season, winter.
<b>i‘a</b>	Fish or other marine animal.
<b>iwi</b>	Bone.
<b>Java plum</b>	Introduced tree or shrub of the genus <i>Eugenia</i> or <i>Syzygium</i> , common in dry to mesic forests.
<b>Kahiki</b>	A far away land, sometimes refers to Tahiti.
<b>kalo</b>	The Polynesian-introduced <i>Colocasia esculenta</i> , or taro, the staple of the traditional Hawaiian diet.
<b>kama‘āina</b>	Native-born.
<b>Kanaloa</b>	A major god, typically associated with Kāne.
<b>Kāne</b>	The leading of the traditional Hawaiian deities.
<b>kapu</b>	Taboo, prohibited, forbidden.

<b>kauwā</b>	Outcast or slave caste within the traditional Hawaiian social hierarchy.
<b>kia‘i</b>	Guard, caretaker; to watch or guard; to overlook, as a bluff.
<b>kiawe</b>	The algarroba tree, <i>Prosopis</i> sp., a legume from tropical America, first planted in 1828 in Hawai‘i.
<b>ko‘a</b>	Fishing shrine.
<b>koa haole</b>	The small tree <i>Leucaena glauca</i> , historically introduced to Hawai‘i.
<b>konohiki</b>	The overseer of an ahupua‘a ranked below a chief; land or fishing rights under control of the konohiki; such rights are sometimes called konohiki rights.
<b>kuapā</b>	Wall of a fishpond.
<b>kuleana</b>	Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership.
<b>kupekala</b>	A bivalve of Pearl Harbor, possibly <i>Chama</i> spp.
<b>kupua</b>	Demigod, hero, or supernatural being below the level of a full-fledged deity.
<b>kupuna</b>	Grandparent, ancestor; kūpuna is the plural form.
<b>kū‘ula</b>	A stone god used to attract fish, an altar near the sea, or a hut where fishing gear was kept with kū‘ula images to invoke their power.
<b>lehua</b>	The native tree <i>Metrosideros polymorpha</i> , the wood of which was utilized for carving images, as temple posts and palisades, for canoe spreaders and gunwales, and in musical instruments.
<b>limu</b>	Refers to all sea plants, such as algae and edible seaweed.
<b>lo‘i, lo‘i kalo</b>	An irrigated terrace or set of terraces for the cultivation of taro.
<b>lua</b>	The ancient style of fighting involving the breaking of bones, dislocation of joints, and inflicting pain by applying pressure to nerve centers.
<b>mahamoe</b>	Sleek, as a plump animal, attractive; smooth; also the name of an edible bivalve.
<b>Māhele</b>	The 1848 division of land.
<b>maika</b>	Ancient Hawaiian game suggesting bowling.
<b>mākāhā</b>	A fish pond sluice gate.
<b>māmaki</b>	<i>Pipturus</i> spp., a small native tree. Fiber from its bark was used to make a kind of coarse tapa. Sometimes spelled mamake in old texts.
<b>mana</b>	Divine power.
<b>ma‘o</b>	<i>Gossypium sandvicense</i> , or native cotton, a shrub in the hibiscus family that bears yellow flowers and seed cases containing brown cotton.
<b>mauka</b>	Inland, upland, toward the mountain.
<b>mele</b>	Song, chant, or poem.
<b>mō‘ī</b>	King.
<b>moku</b>	District, island.
<b>momi</b>	Pearl; name for the shell pūpū Ni‘ihau; center of the eye or a fish eyeball; a watch face; the jackfish nuku momi.

<b>mo‘olelo</b>	A story, myth, history, tradition, legend, or record.
<b>mullet</b>	<i>Mugil cephalus</i> , or ‘ama‘ama, a very choice indigenous fish.
<b>nahawele</b>	Bivalves of the family <i>Isognomonidae</i> or <i>Brachiodontes</i> , the purse shell and mussel, respectively.
<b>nehu</b>	The anchovy, <i>Stolephorus purpureus</i> , used for eating and as a chum for bonito.
<b>niuhi</b>	Man-eating shark; any shark more than 3.5 m long is probably a niuhi. Catching the niuhi was a sport of chiefs.
<b>‘ōkupe</b>	A method of digging holes using a stick, to prod the earth aside, as for taro; to stumble or trip; err or go astray morally; the name for the bivalve <i>Spondylus tenebrosus</i> .
<b>‘ōlelo no‘eau</b>	Proverb, wise saying, traditional saying.
<b>oli</b>	Chant.
<b>olohe</b>	Barren, naked, bare; bald; destitute; skilled (particularly in lua fighting); pale; sick; ghost; also the name of a small ‘o‘opu (e.g., <i>Eleotridae</i> , <i>Gobiidae</i> , <i>Bleniidae</i> ) fish.
<b>olonā</b>	The native plant <i>Touchardia latifolia</i> , traditionally used for making cordage.
<b>‘ōpae</b>	Shrimp.
<b>‘ōpala</b>	Rubbish, trash, garbage, junk.
<b>‘owā‘owaka</b>	A bivalve, possibly of the family <i>Isognomonidae</i> .
<b>pāpā‘i</b>	General term for crabs.
<b>pāpaua</b>	The clam <i>Isognomon</i> , a bivalve.
<b>pipi</b>	<i>Pinctada radiata</i> , the Hawaiian Pearl Oyster. In songs this is referred to as the <i>i‘a hāmau leo o ‘Ewa</i> , or ‘Ewa’s silent sea creature, as it was believed that speaking would cause a breeze to ripple the ocean and scare the pipi.
<b>pu‘u</b>	Hill, mound, peak.
<b>pu‘uone</b>	Pond near the seashore, as at the end of a stream.
<b>sisal</b>	The non-native, drought-resistant <i>Agave sisalana</i> , also known as hemp.
<b>sugarcane</b>	The Polynesian-introduced <i>Saccharum officinarum</i> , or kō, a large grass traditionally used as a sweetener and for black dye.
<b>‘uala</b>	The sweet potato, or <i>Ipomoea batatas</i> , a Polynesian introduction.
<b>‘ulu</b>	The Polynesian-introduced tree <i>Artocarpus altilis</i> , or breadfruit.
<b>wao</b>	A general term for inland areas, usually forested and uninhabited.
<b>wauke</b>	The paper mulberry, or <i>Broussonetia papyrifera</i> , which was made into tapa cloth in traditional Hawai‘i.
<b>yam</b>	<i>Dioscorea alata</i> , known as uhi in Hawaiian, commonly grown for food.

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July 22, 2024

State Historic Preservation Division  
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Re: DRAFT—End of Fieldwork Letter for West Loch Estates Wastewater Station Geotech

Aloha,

Archaeological monitoring for geotechnical testing for the West Loch Estates Wastewater Pump Station Upgrade has been completed. The Project Area is located within the parking lot of Kapapapuhi Point Park at 91-1024 Kapapapuhi Street, Ewa Beach, Hawai'i on TMK 9-1-181:001 (Figures 1 and 2). The geotechnical testing was carried out on July 19, 2024, by Haley & Aldrich Inc. and involved an auger excavation by Shinsato Engineering, Inc. of a single test borehole located in the northwest corner of the project area, behind the West Loch Wastewater Pump Station (Figure 3). Keala Pono archaeologist Tiffany Brown, BA performed archaeological monitoring for the geotechnical work, with Windy McElroy, PhD serving as the Principal Investigator, overseeing all aspects of the project.

The SHPD, in concurrence by phone, approved geotechnical testing to commence with archaeological monitoring in advance of the acceptance of a prepared Archaeological Monitoring Plan (AMP). The July 19<sup>th</sup> geotechnical testing was the initial testing completed for this site. The geotechnical test bore was accomplished with Shinsato Engineering Inc. utility truck auger rig utilizing a 4-inch (10 cm) diameter drill head as well as a 2-inch (5 cm) diameter drill head. A boulder buster was also utilized to progress through a relatively thin rock obstruction located approximately halfway through the target borehole depth. The test borehole measured approximately 15 cm in diameter and reached a depth of 6.1 m below the existing grade. Monitoring of the single auger-excavated borehole did not identify any archaeological features, deposits, or materials and inspection of backdirt and boring tailings produced during auger excavations did not identify anything of archaeological interest. Soils observed within the excavated borehole and backdirt/tailings consist of a top gravel fill layer, commingled fine sand-clay secondary fill soil, and a natural silty clay soil (Figures 4–5. Due to the narrow diameter of the auger excavations the subsurface stratigraphy was not fully visible, therefore a stratigraphic profile could not be drawn.

Archaeological monitoring for the construction phase of for the West Loch Estates Wastewater Pump Station Upgrade Project will take place only following SHPD acceptance of an AMP for the project. Please feel free to contact us with any questions,

Tiffany Brown, BA  
Windy Keala McElroy, PhD  
Keala Pono Archaeological Consulting

# Keala Pono



Figure 1. Project area on an aerial image.

# Keala Pono

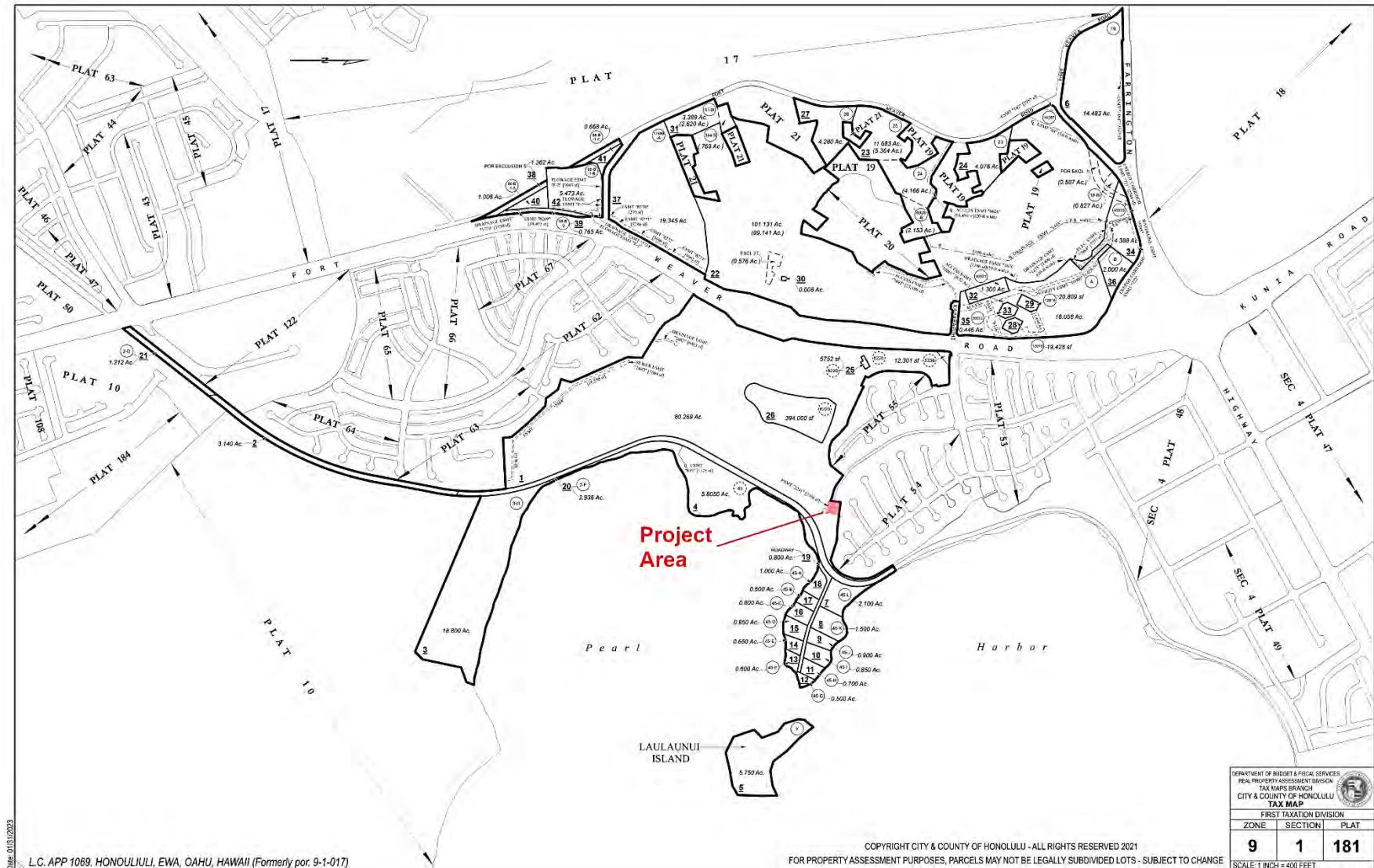


Figure 2. Project area on TMK plat (1) 9-1-181.

# Keala Pono



**Figure 3. Overview of the boring location, facing north.**



**Figure 4. Auger excavation in progress, facing northwest.**

# Keala Pono



**Figure 5. Auger-excavated borehole, facing north-northwest. The scale is marked in 10 cm increments.**

**APPENDIX E**  
**Geotechnical Recommendations Report**

**DRAFT REPORT ON  
GEOTECHNICAL RECOMMENDATIONS  
WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE  
KAPAPAPUHI POINT PARK  
EWA, OAHU, HAWAI'I**

by  
Haley & Aldrich, Inc.  
Honolulu, Hawai'i

for  
Kaula AE, LLC  
Honolulu, Hawai'i

File No. 0208611-000-001  
8 October 2024



HALEY & ALDRICH, INC.  
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SIGNATURE PAGE FOR

REPORT ON  
GEOTECHNICAL RECOMMENDATIONS  
WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE  
KAPAPAPUHI POINT PARK  
EWA, OAHU, HAWAI'I

PREPARED FOR  
KAULA AE, LLC  
HONOLULU, HAWAI'I

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REVIEWED AND APPROVED BY:

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Daniel Trisler, P.E. (HI)  
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A	Exploration Logs
B	Geotechnical Laboratory Test Results

## **1. Introduction**

This report summarizes the subsurface investigations undertaken by Haley & Aldrich, Inc. (Haley & Aldrich) at the West Loch Estates Wastewater Pump Station (WWPS) at Kapapapuhi Point Park, Ewa, Oahu, Hawai'i (site), provides our interpretation of the subsurface data, and provides geotechnical design recommendations for the proposed pump station improvements of the site. This work was performed in accordance with our agreement with Kaula AE, LLC (Kaula AE) dated 1 November 2023.

The project pump station improvements include:

- an attached generator building,
- a detached above-ground diesel tank pad,
- a new trash enclosure,
- a new 6-foot-tall wall around the pump station's expanded footprint and trash enclosure,
- a new concrete curb and planter area,
- asphalt pavement for parking within the pump station, and
- upgrades to components of the pump system.

It was anticipated that the building, walls, and tank will be constructed on shallow foundations.

## **2. Scope of Services and Use of this Report**

### **2.1 SCOPE OF SERVICES**

Our geotechnical scope of services consisted of the following tasks.

- Review readily available information such as geologic maps, borings logs, as-built information, other records on subsurface soil and rock conditions, and groundwater levels at and near the site that may be available from Kaula AE, City and County of Honolulu (CCH), or open-source databases;
- Conduct a program of subsurface exploration, including a drilled boring and three dynamic cone penetrometer (DCP) soundings to obtain subsurface information for project design and construction.
  - The test boring was drilled to a depth of 20.7 feet below ground surface (bgs) and representative soil samples were collected from the boring.
  - The three DCP soundings were advanced to a depth of 5 feet bgs.
- Perform limited geotechnical laboratory tests on select samples of soil collected from test boring to evaluate engineering characteristics;
- Assess subsurface information, including laboratory test results, to develop geotechnical design parameters for design of the proposed improvements; and
- Prepare this report summarizing the results of our investigation and our recommendations for design and construction of the proposed improvements.

### **2.2 USE OF THIS STUDY**

This report is for the exclusive use of Kaula AE for specific application to this project and site. We conducted our services in accordance with generally accepted geotechnical engineering practices for the nature and conditions of services conducted in the same or similar localities, at the time the services were performed, within the constraints of scope, schedule, and budget. We make no other warranty, express or implied.

### **3. Site Description**

#### **3.1 GENERAL SITE CONDITIONS**

The site is located along the West Loch of Pearl Harbor on the island of O'ahu, Hawai'i, at the southern end of Kapapapuhi Street, as shown on Figure 1. The WWPS was constructed for the West Loch Estates subdivision in 1988 at the west end of a paved parking lot for Kapapapuhi Point Park. The park also has a restroom facility, and generally extends to the east of the parking lot, with waterfront access to the West Loch of Pearl Harbor. The mouth of Honouliuli Stream is located approximately 1,000 feet to the south of the site and generally extends to the northwest.

Based on the West Loch Estates Project – Shoreline Park Phase I design plans, the site ground elevations range from 10 to 12 feet mean sea level (MSL). Behind and to the north of the WWPS, the park grades from roughly 12 to 26 feet MSL to the edge of the West Loch Estates subdivision. Likewise, a recent topographic survey performed by Controlpoint Surveying Inc., dated 22 September 2021, also indicated elevations at the site range from approximately 10 to 12 feet MSL.

The existing pump station building structure was designed with 2-foot-wide wall footings with an embedment of 3 feet below the existing grade bearing on approximately 18 inches of compacted select fill. The slab on grade in the existing generator room varies from 5 to 8 inches in thickness.

#### **3.2 GEOLOGIC CONDITIONS**

Regional site geology is provided in *Geologic Map of the State of Hawai'i—Island of O'ahu, Sheet 2* (Sherrod et al., 2021). The island of O'ahu was built by three shield volcanoes, Ka'ena, Wai'anae, and Ko'olau, in order from oldest to youngest. Modern geomorphology of O'ahu generally consists of the Wai'anae volcano to the west and Ko'olau volcano to the east. The older Wai'anae Volcano has volcanics with ages ranging from about 4.0 to 2.9 Megaannum (Ma). The younger Ko'olau Volcano is dated from about 3.0 Ma to 1.78 Ma. The island of O'ahu is also comprised of rejuvenation stage volcanism, known as the Honolulu Volcanics. The age range for the Honolulu Volcanics is determined to be between 0.80 Ma to younger than 0.1 Ma.

Pearl Harbor is a system of drowned river valleys (Macdonald et al., 1983). Towards the end of the buildup of the Wai'anae and Ko'olau Volcanoes, four main river systems converged into a single river that drained into the ocean; this is the present-day entrance of Pearl Harbor. As the island subsided, the river valleys began to flood, and sediments began to be deposited in the harbor from surrounding weathered basaltic rock. Coral reefs formed inside the harbor, but they were ultimately smothered by sediments. Sea level rose and fell several times over the last 2 Ma, depositing and eroding sediments, until present day Pearl Harbor was formed.

The site is generally mapped as surficial deposits of alluvium (Sherrod et al., 2021). The site sits at the boundary between alluvium (Qa) deposits from the Holocene, 0.0 to 0.011 Ma, and older alluvium (Qao) deposits from the Pleistocene, 0.011 to 2.58 Ma; however, deposits in this unit are thought to be only as old as 2.00 Ma. While the site is mapped discretely within Qao older alluvium deposits, the Sherrod report notes that mapped contacts should be considered to have a standard error of 100 meters, or plus or minus 50 meters.

The younger alluvium is generally described to consist of unconsolidated deposits of silt, sand, and gravel. The younger alluvium deposited in this area are assumed to be deposited by the Honouliuli Stream. Generally, the older alluvium deposits consist of consolidated sand and gravel, some of it sufficiently lithified to warrant the designation “conglomerate.” Grains are well-rounded and moderately sorted, but include minor, poorly sorted colluvial deposits.

Surficial soils in the site area are described in the Natural Resources Conservation Service Web-based soil survey as Honouliuli clay, 0 to 2 percent slopes (HxA), in the northern half of the site and Helemano silty clay, 30 to 90 percent slopes (HLMG), in the southern half of the site. Both the Honouliuli clay and the Helemano silty clay consist of well-drained soils that formed from a parent material of basic igneous rock. Both soils are mapped as having a high corrosion risk for steel and a low corrosion risk for concrete. They also are mapped as having very limited shallow and deep infiltration. The permeability of the Honouliuli clay is very low to moderately high, whereas the permeability of the Helemano silty clay is moderately high to high.

### **3.3 NEARBY GEOTECHNICAL DATA**

A boring conducted near the site in 1987 by Geolabs revealed brown, very hard clay up to a depth of 7 feet, below which gravel, cobbles, and boulders were encountered down to a depth of 15 feet.

### **3.4 SUBSURFACE CONDITIONS**

#### **3.4.1 General**

The following sections provide general descriptions of the soil conditions encountered in our test boring. Additionally, we evaluated near-surface soil consistency with three DCP tests. The approximate locations of the explorations are shown on Figure 2. The field exploration methods and subsurface conditions encountered in our explorations are presented on a boring log and on DCP data plots contained in Appendix A. Laboratory test results for selected samples are presented in Appendix B.

In general, our exploratory boring encountered two primary units, approximately 3 feet of fill underlain by native alluvial soils to the depth explored (20.7 feet bgs). Groundwater was encountered in the boring at approximately 9.5 feet bgs. These conditions are described in more detail below.

The explorations referenced in this study reveal subsurface conditions only at discrete locations across the site and the actual conditions in other areas may vary. The nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities are underway. If significant variations are later observed, we may need to modify our conclusions and recommendations to reflect actual site conditions.

#### **3.4.2 Soil Unit 1 – Fill**

Two fill materials were encountered at the site. The first was a thin layer of clean gravel surfacing across the ground surface within the walls of the WWPS. The second was a fill soil encountered 0.5 feet to approximately 3.0 feet bgs and classified by the Unified Soil Classification System as clayey sand with gravel (SC). The soil has both well-graded sand and gravel of both coral and basalt composition. The fill soil is generally thought to be reworked native soil fill due to the location of the soil layer and composition.

The relative density was medium dense with a Standard Penetration Test blow count value (N-value) of 22 blows per foot. Moisture content of the fill soil ranged from 11 percent to 19 percent and increased with depth. The fill soil was also tested for expansion potential and resulted in an expansion index of 27 for a low expansion potential.

### **3.4.3 Soil Unit 2 – Native Soils - Alluvium**

Naturally deposited alluvium which varies in combinations of gravels, sands, and silts and clays, as well as the presence of cobbles and boulders, were observed underlying the fill soils. Overall, three main types of soils were encountered in this unit: (1) low-plasticity clay (CL); (2) clayey gravel with sand (GC); and (3) elastic silt (MH).

A low-plasticity clay (CL) was encountered from approximately 3 to 11 feet bgs. The clay was brown and contained few fine to coarse sand and trace fine gravel, as well as cobbles or boulders. The sand varied from fine coral sand to fine to coarse subrounded basalt sand. Trace fine to coarse roots (less than or equal to 0.25-inch diameter) and other organics were also present. The consistency of the clay was medium stiff with an N-value of 22. The clay was generally moist and moisture content for the clay ranged from 24 to 29 percent. The clay was tested for plasticity and resulted in an index of 15 percent and a liquid limit of 37 percent, resulting in a CL or low-plasticity clay classification.

A clayey gravel with sand (GC) was encountered from approximately 11 to 14 feet bgs. This layer was red-brown and contained fine to coarse sand, fine to coarse basalt gravel, and cobbles or boulders. Trace fine to coarse roots (less than or equal to 0.25-inch diameter) and other organics were also present. Some of the granular materials were mechanically fractured by the sampling process, which results in artificially higher blow counts and refusal of the sampler. While the sampler did refuse for a blow count of 89 blows for 9 inches, the consistency of the gravel was judged to be medium dense to dense. The gravel was generally wet and moisture content of 35 percent.

An elastic silt (MH) was encountered from the base of the clayey gravel at approximately 14 feet bgs to the bottom of the borehole at 20.7 feet bgs. The silt was moist, brown, and contained trace fine to medium sand, including fine coral sand, as well as cobbles and boulders. The silt also contained a layer of well-graded sand with gravel, which were rounded to subangular. The silt also graded to gray-brown with few fine to coarse sand and iron oxide staining. The consistency of the silt was very stiff with N-values of 33 and a pocket penetrometer reading of 4.5 tons per square foot (tsf). The moisture content of the silt ranged from 26 to 48 percent.

### **3.4.4 Groundwater**

Groundwater was encountered in boring B-1 at approximately 9.5 feet bgs (elevation +2.41 feet) at time of drilling. Based on the site's proximity to the West Loch of Pearl Harbor, we anticipate the groundwater may fluctuate with tidal variations and also fluctuate seasonally.

In Table 1, a review of nearby water wells generally indicates regional groundwater levels range from approximately 13 feet MSL to 23 feet MSL.

Table 1. Groundwater Data from Nearby Wells <sup>1</sup>			
Well ID	Land Surface Elevation (above Local MSL)	Highest Recorded Groundwater Elevation (MSL)	Absolute Depth to Groundwater
212211158020301 3-2202-22 W260	20.00	13.30	6.70
212258158012701 3-2201-06 W256 WAIPA	25.00	22.34	2.66
212224158020101 3-2202-01 Honouliuli (W258)	29.00	18.40	10.60
212234158015302 3-2201-04 W257-B WAI	40.00	23.10	16.90
212220158021801 3-2202-13	50.00	22.10	27.90
212250158015801 3-2201-10 Kunia T41 DMW	84.00	19.34	64.66
<b>Notes:</b>			
1. Elevations and measurements are in feet.			
Source: United States Geologic Survey (USGS), 2020. National Water Information System. <a href="https://maps.waterdata.usgs.gov/mapper/">https://maps.waterdata.usgs.gov/mapper/</a>			

### 3.4.5 Dynamic Cone Penetrometer Tests

Three Dual-Mass DCP tests were performed to depths of 5 feet bgs. DCP testing provides an evaluation of in-place California Bearing Ratio (CBR) and resilient modulus values for aggregate and soils. The CBR value was found to be between 20 to 50 percent (average is 34 percent), while the resilient modulus ranged from 6,000 to 10,000 pounds per square inch (psi; average is 7900 psi). The results of the DCP test are presented in Appendix A.

## **4. Seismic Design Considerations**

### **4.1 REGIONAL SEISMICITY**

The Hawaiian Islands are formed as the Pacific tectonic plate shifts to the Northwest across the stationary Hawaiian hot spot, creating long-lived magma chambers which feed complex venting systems, resulting in the world's largest shield volcanoes (Peterson and Moore, 1987). This and other complex volcanic and tectonic processes cause high rates of earthquake activity under the southern portion of the Island of Hawai'i and moderate or low seismicity across the rest of the island chain (Klein et al., 2001). There are three main sources of seismicity in the Hawaiian Islands: volcanic, tectonic, and mantle (USGS, 2023).

Volcanic earthquakes are attributed to the underground movement of magma around and eruptions of active volcanoes. Volcanic earthquakes are most prevalent on the Island of Hawai'i, which overlies the Hawaiian hot spot, and the risk of seismic activity and degree of ground shaking diminishes with increased distance from Hawai'i Island (Department of Land and Natural Resources, 2004). There are hundreds to thousands of small earthquakes attributed to volcanic activity in the Hawaiian Islands each year. Volcanic earthquakes are typically less than moment magnitude (M) 4.

Tectonic earthquakes are attributed to slippage along tectonic faults. Minor tectonic earthquakes up to M5 occur on upper crustal faults beneath and within the volcanoes. Tectonic earthquakes from crustal faults are the most numerous types of earthquakes in Hawai'i. Large flank (up to M8) earthquakes occur along the décollement fault, which separates the ancient oceanic crust and the overlying volcanoes at a depth of roughly 5 to 6 miles. These are the most dangerous types of earthquakes in Hawai'i since both large earthquakes and local tsunamis originate from the décollement fault (USGS, 2023).

Mantle earthquakes are caused by flexural stresses (bending) of the Earth's crust and upper mantle, known as the lithosphere, due to the weight of the overlying islands. Mantle earthquakes are usually generated at great depths, more than 12 miles below sea level, and are the most common source of damaging earthquakes north of the Island of Hawai'i. These deep offshore earthquakes have been recorded to range between M4.8 and 7.5 (Petersen et al., 2021)

We obtained a deaggregation of the seismic sources contributing to the expected 2,475-year (2 percent probability of exceedance in 50 years) earthquake at the site using 2021 National Seismic Hazard Map (Petersen et al., 2021) for the State of Hawai'i. The deaggregation indicates that the mean expected moment magnitude earthquake over all potential sources at the site is M6.28.

### **4.2 SEISMIC BASIS OF DESIGN**

Seismic design is assumed to be governed by the Hawai'i State Building Code (adopted April 2021), which amends the 2018 International Building Code (IBC). Accordingly, we have provided seismic design recommendations considering the 2018 IBC and American Society of Civil Engineers (ASCE) 7-16, which the 2018 IBC references.

#### 4.2.1 Seismic Site Class

We determined the seismic site class using information about the supporting foundation soils in general accordance with the 2018 IBC. The seismic site class is typically determined by characterizing the shear wave velocity to a depth of 100 feet bgs. Based on our site-specific subsurface data, review of nearby geotechnical data, and understanding of the regional geology, we estimate the site should be designated as seismic Site Class D.

#### 4.2.2 Seismic Design Parameters

The basis of seismic design outlined in the 2018 IBC is nominally a 2,475-year (2 percent probability of exceedance in 50 years) return period hazard, referred to as the maximum credible earthquake (MCE). This spectrum is then adjusted for risk and peak direction hazard to form the risk-adjusted maximum considered earthquake ( $MCE_R$ ). We obtained the seismic hazard from the ASCE 7-16 Hazard Tool web application (<https://asce7hazardtool.online/>). The ASCE 7-16 hazard tool is based on a probabilistic seismic hazard analysis that the USGS performed across the United States.

We provide parameters for seismic design in accordance with IBC 2018 in Table 2.

Table 2. 2018 IBC Seismic Design Parameters	
Parameter	Value
Latitude	21.366467
Longitude	-158.021356
Site Class	D
Spectral Response Acceleration, $S_8$	0.558 g
Spectral Response Acceleration, $S_1$	0.158 g
Site Coefficient, $F_a$	1.354
Site Coefficient, $F_v$	2.284
MCEG Peak Ground Acceleration, PGA	0.257
PGA Adjusted for Site Class Effects, $PGA_M$	0.345
Site Coefficient for PGA, $F_{PGA}$	1.343

**Notes:**

*g = acceleration of gravity*

*MCEG = Maximum Considered Earthquake Geometric mean*

### 4.3 SEISMIC HAZARDS

Based on the project location, subsurface conditions, and topography, the risks at the site for fault rupture, lateral spread, and flow failure are generally low.

**Tsunami.** The site is subject to mapping in the Tsunami Evacuation Zone of the County of Honolulu. Based on maps published by the Hawai'i Emergency Management Agency, the site is located in an "Extreme Tsunami Evacuation Zone"; as such, there is a tsunami risk at the site. We understand that the structure is not being designed to resist or be protected from tsunami inundation.

**Liquefaction and Subsidence.** When cyclic loading occurs during a seismic event, the shaking can increase the pore pressure in loose to medium dense saturated sands and cause liquefaction, or temporary loss of soil strength. This can lead to surface settlement. Based on the presence of generally fine-grained soil and relatively dense granular soils in the upper 20.7 feet of site soils, we consider the risk of liquefaction, seismically induced settlement, or significant ground deformation as a result of liquefaction from the design-level earthquake hazard to be low. If deeper zones of granular soils present beneath the materials characterized to 20.7 feet bgs are susceptible to liquefaction, then we expect potential adverse effects on the proposed structure to be relatively low due to the thick zone of non-liquefiable overlying soils.

DRAFT

## 5. Geotechnical Engineering Design Recommendations

This section of the report presents our geotechnical engineering design recommendations and construction guidelines for the proposed additions. Our recommendations are based on our understanding of the proposed project, the results of our subsurface explorations and testing, our review of existing information, our understanding of the regional geology, and our engineering interpretations and analyses. If the nature or locations of the proposed facilities are different than we have understood and presented herein, we should be notified so that we can confirm or modify our recommendations as appropriate.

The primary geotechnical considerations of this project are as follows.

- The existing structure is supported by a spread footing foundation system with a slab-on-grade floor. The existing footings are embedded approximately 3 feet below grade.
- The site soils encountered at or directly below the foundation bearing level generally consist of low plasticity clay that is soft.
- In order to maintain similar foundation performance between the new and existing structures, we recommend that new footings be embedded to similar depths as the existing footings. However, due to the soft clay, we also recommend that a 6-inch gravel bearing layer be placed if the soft clay is directly exposed in the base of the footing excavation. Alternatively, the footings can be embedded 18 inches below adjacent grade and be underlain by an 18-inch layer of compacted gravel.

### 5.1 SHALLOW FOUNDATIONS

The additions and associated privacy/retaining walls may be supported by shallow foundations consisting of spread footings and/or mat foundations.

#### 5.1.1 Dimensions and Bearing Parameters

We recommend the following for all shallow foundations bearing on the on-site soil.

- Existing foundations of slabs and spread footings were designed to allowable bearing soil pressure for 2,000 pounds per square foot.
- Use an increase in the allowable soil bearing pressure of up to one-third for loads of short duration, such as those caused by wind or seismic forces.
- Isolated column footings should have a minimum dimension of 24 inches.
- Continuous strip footings should have a minimum width of 18 inches.
- Place the base of all footings at least 36 inches below the lowest adjacent finished grade. Alternatively, footings can be embedded 18 inches below adjacent grade, if they are underlain by an 18-inch-thick gravel pad.
- Foundations should be founded outside of an imaginary one horizontal to one vertical (1H:1V) plane projected upward from the bottom edge of adjacent footings or utility trenches.
- If foundations are designed as a mat, the mat may be analyzed using a preliminary vertical subgrade modulus ( $K_s$ ) of 150 pounds per cubic inch for foundations bearing on new or existing

compacted structural fill. We consider this value to be a reasonable starting point for an iterative design process, as the vertical subgrade modulus will vary with foundation size and bearing pressure.

### 5.1.2 Lateral Load Resistance

Lateral loads on footings can be resisted by passive earth pressures on the sides of footings and by friction on the bearing surface. Allowable coefficient of friction values of 0.35 or 0.45 for footings poured neat on native fine-grained soil or granular structural fill, respectively, can be used to calculate resistance to sliding on the base of foundations. An allowable passive resistance of 350 pounds per cubic foot may be assumed to act against the sides of the embedded portions of footings, ignoring the upper 1 foot of embedment where the footing is exposed to exterior grades (e.g., not covered by a slab). The passive earth pressure and friction components may be combined, provided the passive component does not exceed two-thirds of the total.

The lateral resistance values provided above include a safety factor of 1.5.

### 5.1.3 Shallow Foundation Subgrade Preparation

The following guidelines for foundation subgrade preparation are recommended.

- If overexcavation of soil is required and structural fill is to be placed, then the width of the overexcavation shall extend 6 inches beyond all sides of the footing for every 1 foot of overexcavation required. For example, for the 18-inch overexcavation associated with the 18-inch footing embedment, the gravel layer would extend 9 inches beyond each side of the footing.
- The exposed subgrades should be evaluated to verify suitable bearing surfaces before rebar, formwork, or structural fill is placed.

### 5.1.4 Settlement of Foundations

Under the fully applied recommended bearing pressures, it is estimated that the total settlement of column footings up to 3 foot square or continuous footings up to 2.5 feet wide will be less than 1 inch.

## 5.2 SLABS-ON-GRADE

A minimum 6-inch-thick layer of crushed rock should be placed over the prepared subgrade to provide a uniform bearing surface. Crushed rock material placed directly below the slab should be 3/4- to 1-inch maximum size and have less than 5 percent fines.

If the potential for moisture vapor transmission through the slab is undesirable, then inclusion of a vapor barrier beneath the slab should be considered. Selection and design of an appropriate vapor barrier, if needed, should be based on discussions among members of the design team.

The floor slab should be reinforced according to the structural engineer's recommendations. Load-bearing concrete slabs may be designed assuming a modulus of subgrade reaction as described in *Section 5.1 Shallow Foundations*.

## **5.3 WALL FOUNDATIONS**

The foundations for perimeter walls should be designed in accordance with *Section 5.1 Shallow Foundations*, except footings may be embedded 12 inches below the lowest adjacent finished grade, as opposed to 3 feet. We note that additional embedment may be required for lateral or overturning resistance, as the upper 1 foot of soil should be ignored for resistance if there is no confining slab adjacent to the wall footing.

## **5.4 EARTHWORK**

We anticipate mass earthwork for the project will be limited to fine grading around the proposed building additions. Cuts and fills are expected to be less than 2 feet deep/thick, though deeper trenches will be required for footing and utility excavations. We recommend that earthwork activities be conducted in accordance with the City and County of Honolulu, Standard Specifications for Public Works Construction, dated September 1986 (CCHSS). The following sections include our recommendations for structural fill selection, placement, and compaction.

### **5.4.1 Site Preparation and Grading**

#### **5.4.1.1 Stripping and Clearing**

Initial site preparation and earthwork operations will include clearing and stripping of surficial organic materials. Based on our explorations, the anticipated depth of stripping will likely be limited in areas with gravel surfacing, though may average approximately 6 inches outside of those areas. However, actual stripping depths should be evaluated based on observations during the stripping operation. Generally, visible organic material (sod, humus, roots larger than 1/4-inch diameter, and/or other decaying plant material), debris, and other unsuitable materials should be removed from the subgrade areas. Large bushes and roots should be grubbed out to the depth of the roots, which could exceed 3 feet bgs. The prepared subgrade should be evaluated prior to the placement of fill or improvements to verify removal of organics.

#### **5.4.1.2 Subgrade Preparation and Evaluation**

Following completion of site stripping, clearing, and any mass excavation, and prior to the placement of any structural fill, the suitability of the subgrade should be evaluated by proof rolling with a fully loaded dump truck or similar heavy rubber-tired construction equipment to identify any remaining soft, loose, or unsuitable areas. If site access is such that proof rolling is infeasible, then the subgrade should be evaluated by observing excavation activity and probing with a steel foundation probe.

The subgrade evaluation should be conducted prior to placing any fill to identify areas of yielding that are indicative of soft or loose soil. If soft or loose zones are identified during evaluation, these areas should be excavated to remove these materials and replace them with compacted engineered fill.

#### **5.4.1.3 Wet Soil Considerations**

During wet weather or when adequate moisture control is not possible, it may be necessary to install a granular working blanket to support construction equipment and to provide a firm base on which to place subsequent fill and pavement. Commonly, the working blanket consists of bank run gravel or pit

run quarry rock (6-inch maximum size with no more than 5 percent by weight passing a U. S. Standard No. 200 sieve).

Based on our experience, between 12 and 18 inches of imported granular material is generally required to provide stable staging and haul road areas on similar soil subgrades. However, the actual thickness will depend on the contractor's means and methods and the exposed subgrade conditions, and accordingly, should be the contractor's responsibility. Additionally, a geotextile fabric should generally be placed as a barrier between the soil subgrade and imported granular material in areas of repeated construction traffic. The imported granular material and the geotextile fabric should meet the specifications in this report *Section 5.4.5 Structural Fill*.

#### **5.4.1.4    *Excavation***

Site soils generally consist of sandy fill and clayey native soils within expected excavation depths. It is our opinion that conventional earthmoving equipment in proper working condition should be capable of making necessary general excavations for utilities, footings, and other earthwork. The earthwork contractor should be responsible for providing equipment and following procedures as needed to safely excavate the site soils as described in this report.

#### **5.4.2    *Temporary Excavation Stability***

Excavations should be made in accordance with all local, state, and federal safety requirements. For planning purposes, the surficial soils across the site are likely classified per Occupational Safety and Health Administration (OSHA) standards (2001) as Type C.

The stability and safety of open trenches and cut slopes depend on several factors, including:

- Type and density of the soil;
- Presence and amount of seepage;
- Depth of cut;
- Proximity of the cut to any surcharge loads near the top of the cut, such as stockpiled material, traffic loads, structures, etc.;
- Duration of the open excavation; and
- Care and methods used by the contractor.

It is the responsibility of the contractor to ensure that the excavation is properly sloped or braced for worker protection, in accordance with OSHA guidelines. To assist with this effort, for planning purposes only, we make the following recommendations regarding temporary excavation slopes:

- Protecting slopes from erosion;
- Limiting the duration of open excavations as much as possible; and
- Place no surcharge loads (equipment, materials, etc.) within 10 feet of the top of any excavation or slope.

More restrictive requirements may apply depending on specific site conditions, which should be continuously assessed by the contractor.

If temporary sloping is not feasible due to site spatial constraints, excavations could be supported by internally braced shoring systems, such as a trench box or other temporary shoring. There are a variety of options available. We recommend that the contractor be responsible for selecting the type of shoring system to use. We note that box shoring is a safety feature used to protect workers and does not prevent caving. If the excavations are left open for extended periods of time, then caving of the sidewalls may occur. The presence of caved material will limit the ability to properly backfill and compact the trenches. The voids between the box shoring and the sidewalls of the trenches should be properly filled with sand or gravel before caving occurs.

#### 5.4.3 Permanent Slopes

Permanent slopes within the proposed Wastewater Treatment Plant should not exceed a gradient of 2H:1V.

Slopes should be planted with appropriate vegetation to provide protection against erosion as soon as possible after grading. Surface water runoff should be collected and directed away from slopes to prevent water from running down the face of the slope while the vegetation is being established.

#### 5.4.4 Dewatering

Groundwater was encountered at approximately 9.5 feet bgs at the time of our exploration (July 2024). Higher groundwater levels may be present during high tides, during the rainy season, or after periods of rain. Construction of utilities and other improvements that extend below groundwater levels will require dewatering and shoring programs capable of adapting to varied soil and groundwater conditions.

The site soils contain interbedded zone of fine-grained (clay and silt) soils with granular (sandy) soils, through which groundwater flow rates will vary greatly. If granular zones are penetrated with excavations, then rapid flow of groundwater may occur and the use of dewatering wells or well points may be required. If only fine-grained soils are encountered, then seepage rates would be expected to be relatively slow and it may be feasible to dewater excavations by pumping from sumps. Pumping from sumps may be effective in removing water from the bases of trenches, but will not prevent or reduce the greater risk of trench wall caving and sloughing caused by seepage.

The contractor shall be prepared to provide shoring and dewatering systems that are capable of adapting to varied soil and groundwater conditions. In addition to safety considerations, running soil, caving, or other loss of ground will increase backfill volumes and can result in damage to adjacent structures or utilities.

We anticipate that the base of excavations will be soft and/or unstable if groundwater is present or within a few feet of the base of the trenches. If that is the case, we recommend placing stabilization material at the base of excavations. Stabilization material should be placed to a minimum thickness of 12 inches or as needed to provide an adequate working surface and should meet the criteria discussed in *Section 5.4.5 Structural Fill*. The use of a geotextile separation fabric may be necessary below any stabilization material to help prevent the stabilization material from pushing into the unstable base materials.

#### **5.4.5 Structural Fill**

Fill placed below the new structure or below new pavement and utility trench backfill should be considered structural fill. Fill should only be placed over a subgrade that has been prepared in conformance with the prior sections of this report. A variety of material may be used as structural fill at the site. However, all material used as structural fill should be free of organic matter or other unsuitable materials and should meet specifications provided in the CCHSS. A brief characterization of some of the acceptable materials and our recommendations for their use as structural fill are provided below.

##### **5.4.5.1 *Reuse of Site Soil as Structural Fill***

The existing on-site granular fill consists of clayey sand with gravel. We recommend against its use as structural fill beneath structures. We consider its use as general fill outside of the envelope of the structures to be acceptable.

##### **5.4.5.2 *Imported Granular Fill***

Imported structural fill should meet the requirements set in the CCHSS Section 31 for "Aggregate Base Course."

Where imported granular fill is used as stabilization material for haul roads, staging areas, bases of wet trenches, etc., we recommend the material consist of pit or quarry run rock, or crushed rock. The material should generally be sized between 2 and 6 inches, have less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve, and have at least two mechanically fractured faces. The material should be free of organic matter and other deleterious material. Material meeting the gradations of the CCHSS Section 14 "Rock for Fill" are generally acceptable for use.

##### **5.4.5.3 *Drain Rock***

Drain rock used for back-of-wall drains shall consist of the CCHSS Section 28 "Subsurface Drains."

##### **5.4.5.4 *Crushed Rock***

Crushed rock used as aggregate base beneath pavements or atop slab subgrade shall consist of the CCHSS Section 30 "Select Borrow for Subbase Course."

##### **5.4.5.5 *Controlled Low Strength Material***

If controlled low strength material is used for backfill of excavations adjacent to or beneath the existing structure, it should be in general conformance with the HDOT-Highways 2005 Standard Specification Section 314 "Controlled Low Strength Material (CLSM) For Utilities and Structures."

#### **5.4.6 Placement and Compaction of Structural Fill**

We make the following recommendations for the proposed construction.

- Before fill placement can begin, the compaction characteristics of proposed fill material must be determined from representative samples of the structural and drainage fill. Samples should be obtained as soon as possible, but at least one week prior to use on site. A study of compaction

characteristics should include determination of optimum and natural moisture contents and maximum dry density of these soils. Additionally, the grain size distribution of the fill should be determined.

- Structural fill should consist of imported soil or reused well-graded gravel fill conditioned to meet gradation requirements.
- Compact imported structural fill to a minimum of 95 percent of the maximum dry density as determined by the modified Proctor (ASTM International [ASTM] D 1557) test method, except within 2 feet horizontally of structural walls where the compaction requirement should be 92 percent. Maintain moisture content within 2 percent of the optimum moisture content (ASTM D 1557).
- Place structural fill only on dense, non-yielding subgrade soils.
- Place and compact all structural fill in even lifts with a loose thickness no greater than 10 inches. If small, hand-operated compaction equipment is used to compact structural fill, fill lifts should not exceed 6 to 8 inches in loose thickness.
- In wet subgrade areas, clean material with a gravel content (material coarser than a U.S. Standard No. 4 sieve) of at least 30 to 35 percent may be necessary.
- The compacted densities of all lifts should be verified by testing. Any material to be used as structural fill should be sampled and tested prior to use on site, to determine its maximum dry density and gradation.

## 5.5 PAVEMENT DESIGN

Pavement will be required for the driveway, primarily to be used by passenger vehicles and lightweight trucks. Flexible (asphaltic concrete) pavement may be designed using 2.5 inches of asphaltic concrete on 6 inches of compacted base course gravel. Rigid (concrete) pavement may be designed using 5 inches of concrete on 4 inches of compacted base course gravel. Expansion/contraction joints shall be provided in concrete pavement.

Prior to constructing pavement, the upper 12 inches of subgrade soil shall be moisture conditioned and compacted per this report *Section 5.4 Earthwork*.

All material quality and compaction requirements for the pavement section shall be in accordance with HDOT-Highways 2005 Standard Specifications.

## **6. Recommendations for Continuing Geotechnical Services**

Recommendations discussed in this report should be reviewed and refined as project elements progress through final design and as more subsurface information is collected. Before construction begins, we recommend that Haley & Aldrich:

- Meets with the design team to address geotechnical questions that may arise as the design progresses;
- Reviews structural engineer's foundation plans and calculations;
- Reviews geotechnical aspects of the final design plans and earthwork specifications to see that our recommendations were properly interpreted and implemented in the design documents; and
- Provides review and consultation services during construction to evaluate that the contractor meets the intent of the design and to address differing site conditions or geotechnical issues that may arise.

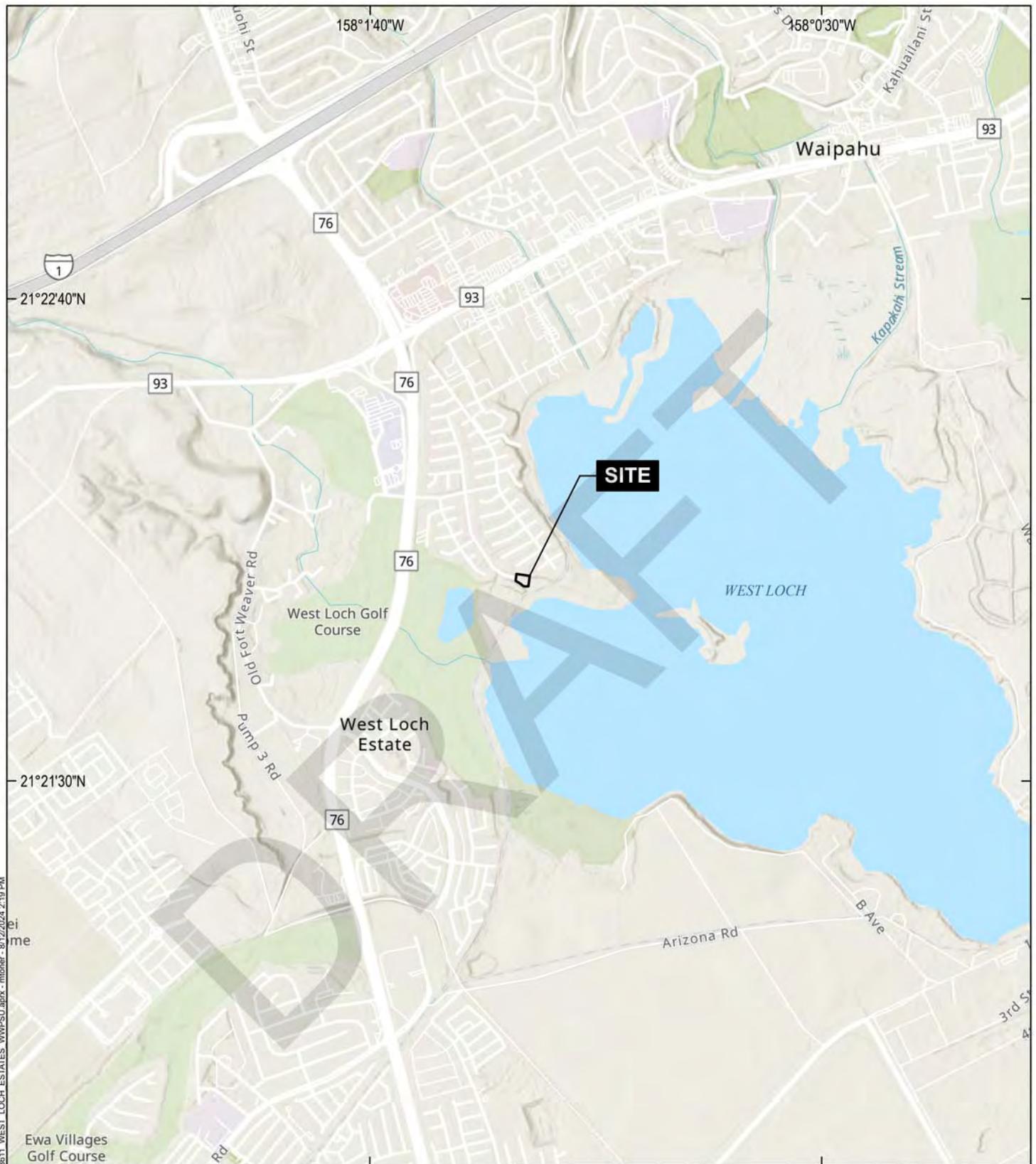
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[https://haleyaldrich.sharepoint.com/sites/KaulaAELLC/Shared%20Documents/0208611.Kaula%20AE%20West%20Loch%20WWPS%20Upgrades/Deliverables/Revised%20Draft%20Report/2024\\_1008\\_HAI\\_Kaula\\_AE\\_West\\_Loch\\_D.docx](https://haleyaldrich.sharepoint.com/sites/KaulaAELLC/Shared%20Documents/0208611.Kaula%20AE%20West%20Loch%20WWPS%20Upgrades/Deliverables/Revised%20Draft%20Report/2024_1008_HAI_Kaula_AE_West_Loch_D.docx)

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**FIGURES**



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MAP SOURCE: ESRI  
SITE COORDINATES: 21°21'59"N, 158°1'16"W

**HALEY ALDRICH**

WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE  
KAPAPAPUHI POINT PARK  
EWA, OAHU, HAWAII

#### PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT  
AUGUST 2024

**FIGURE 1**



**APPENDIX A**  
**Exploration Logs**

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## APPENDIX A

### Field Explorations

Subsurface explorations for this project by Haley & Aldrich, Inc. (Haley & Aldrich) included one mechanically drilled boring and three dynamic cone penetrometer (DCP) drive probes. The approximate location of the boring and the DCP probes is shown on Figure 2.

In the field, we classified the samples taken from the boring according to the methods presented on Figure A-1 *Key to Exploration Logs*. This key also provides a legend explaining the symbols and abbreviations used in the exploration log. The boring log in this appendix (Figure A-2) shows our interpretation of the exploration, sampling, and testing data. The log indicate the depths where the soils change. Note that the change may be gradual.

Plots of the DCP drive probe data are also presented in this appendix as Figures A-3 through A-5.

### Solid-Stem Auger Borings

One boring designated B-1 was drilled on 19 July 2024, using a 4-inch-diameter solid-stem auger advanced with an all-terrain vehicle-mounted drill rig subcontracted by Haley & Aldrich. The drilling was continuously observed by a geologic staff member from Haley & Aldrich and a detailed field log of the boring was prepared.

#### STANDARD PENETRATION TEST (SPT) PROCEDURES (ASTM D 1586)

Using an SPT sampler, we obtained soil samples in 2.5-foot and 5-foot sampling intervals from the boring. The SPT test is an approximate measure of soil density and consistency. To be useful, the results must be used with engineering judgment in conjunction with other tests. The SPT employs a standard 2-inch outside-diameter split-spoon sampler to obtain disturbed samples. Using a 140-pound manual hammer, free-falling 30 inches, the sampler is driven into the soil for 18 inches. The number of blows required to drive the sampler the last 12 inches only is the Standard Penetration Test resistance. This resistance (also referred to as blow count or N-value), measures the relative density of granular soils and the consistency of cohesive soils. The N-values are plotted on the boring log at their respective sample depths.

Soil samples were recovered from the split-barrel samplers, field classified, and placed into watertight bags. They are then taken to a subcontracted soils laboratory for further testing.

#### Dynamic Cone Penetration (DCP) Testing (ASTM D 6951/D 6951M-09)

Dual Mass DCP testing was conducted at DCP-1 through DCP-3. The DCP consists of a steel extension shaft assembly with a 60-degree hardened steel cone tip attached to one end which is driven into the subgrade by means of a sliding dual mass (10.1- or 17.6-pound) hammer. The 17.6-pound hammer was used in testing at this site. Testing provides an evaluation of in-place California Bearing Ratio and resilient modulus values for aggregate and soils. DCP testing was conducted by a member of Haley & Aldrich's geotechnical engineering staff.

## Sample Description

Identification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. ASTM D 2488 visual-manual identification methods were used as a guide. Where laboratory testing confirmed visual-manual identifications, then ASTM D 2487 was used to classify the soils.

### Relative Density/Consistency

Soil density/consistency in borings is related primarily to the standard penetration resistance (N). Soil density/consistency in test pits and probes is estimated based on visual observation and is presented parenthetically on the logs.

SAND or GRAVEL Relative Density	N (Blows/Foot)	SILT or CLAY Consistency	N (Blows/Foot)
Very loose	0 to 4	Very soft	0 to 1
Loose	5 to 10	Soft	2 to 4
Medium dense	11 to 30	Medium stiff	5 to 8
Dense	31 to 50	Stiff	9 to 15
Very dense	>50	Very stiff	16 to 30
		Hard	>30

### Minor Constituents

Sand, Gravel	Estimated Percentage
Trace	<5
Few	5 - 15
Cobbles, Boulders	
Trace	<5
Few	5 - 10
Little	15 - 25
Some	30 - 45

### Soil Test Symbols

%F	Percent Passing No. 200 Sieve
AL	Atterberg Limits (%)
	Liquid Limit (LL)
	Water Content (WC)
	Plastic Limit (PL)

### Chemical Analysis

CA	Consolidated Anisotropic Undrained Compression
CAUC	Consolidated Anisotropic Undrained Extension
CBR	California Bearing Ratio
CIDC	Consolidated Drained Isotropic Triaxial Compression
CIUC	Consolidated Isotropic Undrained Compression
CK0DC	Consolidated Drained k0 Triaxial Compression
CK0DSS	Consolidated k0 Undrained Direct Simple Shear
CK0UC	Consolidated k0 Undrained Compression
CK0UE	Consolidated k0 Undrained Extension
CRSCN	Constant Rate of Strain Consolidation
DS	Direct Shear
DSS	Direct Simple Shear
DT	In Situ Density
GS	Grain Size Classification
HYD	Hydrometer
ILCN	Incremental Load Consolidation
K0CN	k0 Consolidation
kc	Constant Head Permeability
kf	Falling Head Permeability
MD	Moisture Density Relationship
OC	Organic Content
OT	Tests by Others
P	Pressuremeter
PID	Photionization Detector Reading
PP	Pocket Penetrometer
SG	Specific Gravity
TRS	Torsional Ring Shear
TV	Torvane
UC	Unconfined Compression
UUC	Unconsolidated Undrained Triaxial Compression
VS	Vane Shear
WC	Water Content (%)

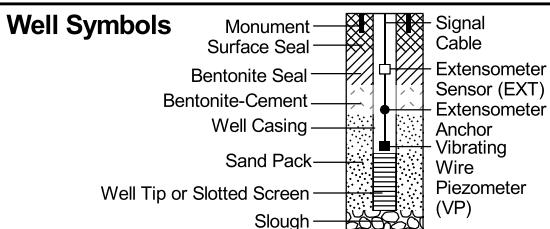
### Groundwater Indicators

	Groundwater Level on Date or At Time of Drilling (ATD)
	Groundwater Level on Date Measured in Piezometer
	Groundwater Seepage (Test Pits)

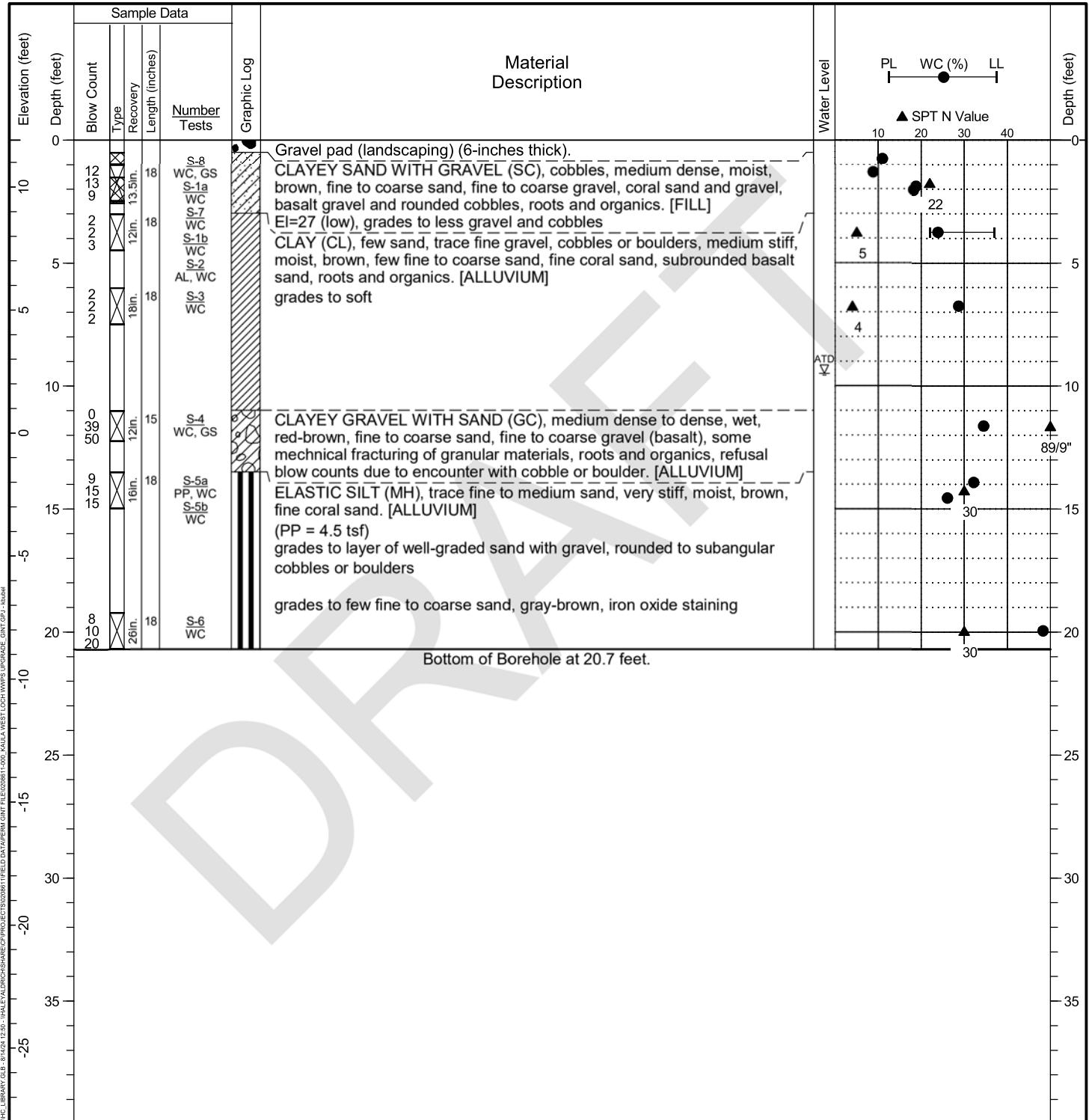
### Sample Symbols

	1.5" I.D. Split Spoon		Rock Core Run		Grab
	3.0" I.D. Split Spoon		Sonic Core		Cuttings
	Modified California Sampler		Thin-walled Sampler		Push Probe

### Well Symbols



Date Started: 07/19/2024	Date Completed: 07/19/2024	Drilling Contractor/Crew: Shinsato / Jason/Calvin
Logged by: S. Ueno	Checked by: D. Trisler	Drilling Method: Solid Stem Auger
Location: Lat: 21.366502 Long: -158.021397 (HI State Plane, Zone 3, NAD 83, ft.)		Rig Model/Type: ATV-mounted Drill
Ground Surface Elevation: 11.91 feet (Mean Sea Level)		Hammer Type: Safety-hammer/Cathead
Comments:		Hammer Weight (pounds): 140 Hammer Drop Height (inches): 30
		Measured Hammer Efficiency (%): Not Available
		Hole Diameter: 4 inches Well Casing Diameter: NA
		Total Depth: 20.7 feet Depth to Groundwater: 9.5 feet



#### General Notes:

- Refer to Figure A-1 for explanation of descriptions and symbols.
- Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
- USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
- Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
- Location and ground surface elevations are approximate.

# DCP TEST DATA

Project: *West Loch Estates WWPS Upgrade*  
 Location: *DCP-1*

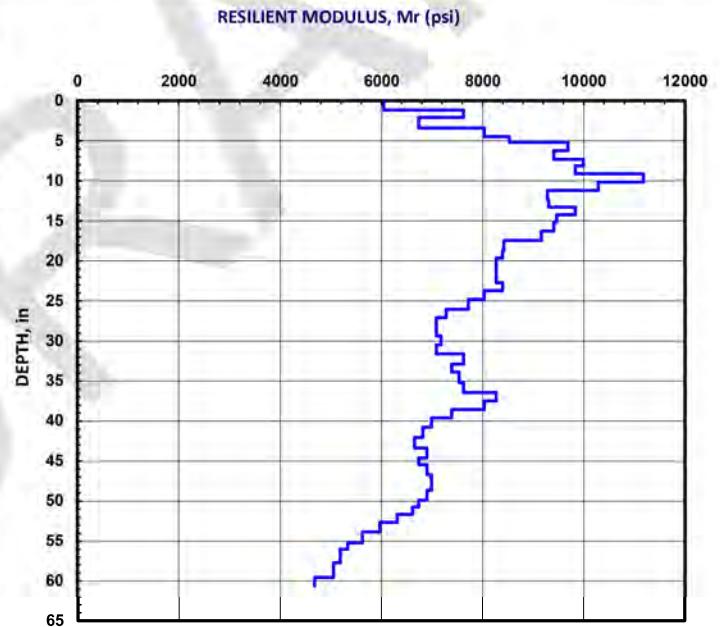
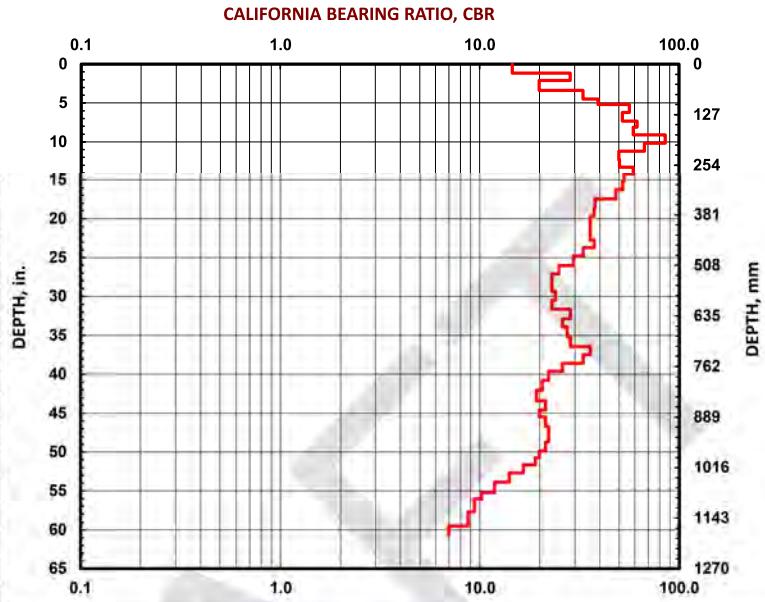
Date: *17-Jul-24*  
 Soil Type(s): *SC, CL*

Hammer  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

Soil Type  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
--------------	-------------------------------	----------------

0	0	1
2	29	1
3	53	1
3	86	1
4	114	1
3	132	1
6	158	1
6	186	1
5	206	1
6	231	1
9	258	1
7	284	1
6	313	1
5	337	1
6	362	1
5	385	1
6	413	1
6	443	1
5	474	1
4	499	1
4	525	1
4	551	1
4	577	1
4	602	1
4	630	1
4	661	1
3	688	1
3	717	1
3	746	1
3	774	1
3	803	1
4	835	1
3	861	1
4	894	1
4	926	1
4	952	1
4	980	1
3	1006	1
3	1036	1
3	1068	1
3	1102	1
3	1102	1
3	1133	1
2	1155	1
3	1186	1
2	1206	1
3	1236	1
3	1267	1
2	1289	1
2	1312	1
2	1338	1
2	1368	1
2	1403	1
1	1423	1
2	1466	1
2	1512	1
1	1540	1



## DCP TEST DATA

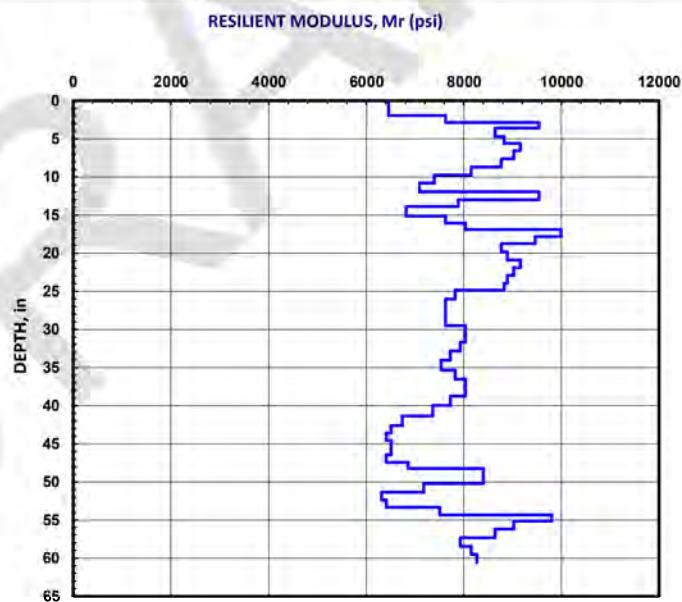
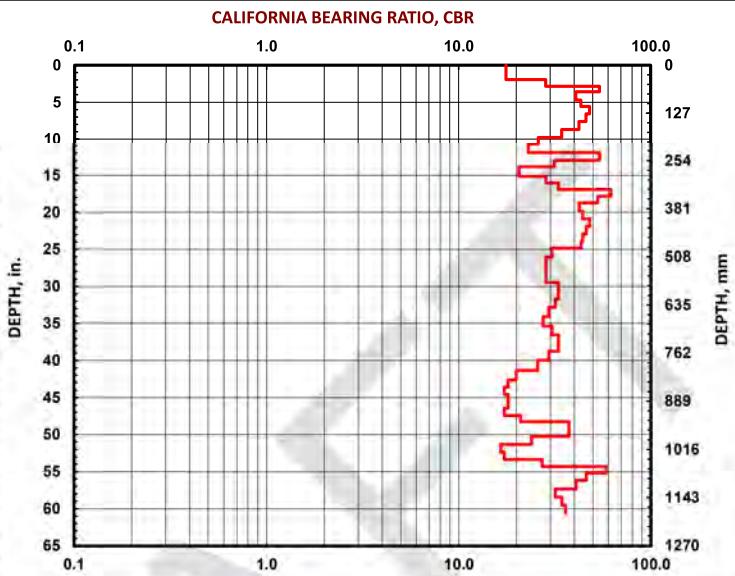
Project: West Loch Estates WWPS Upgrade  
 Location: DCP-2

Date: 17-Jul-24  
 Soil Type(s): SC, CL

- Hammer:  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

- Soil Type:  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
4	49	1
3	73	1
4	91	1
5	120	1
4	142	1
5	167	1
5	193	1
5	221	1
4	248	1
3	274	1
3	303	1
6	330	1
3	352	1
3	384	1
3	408	1
3	429	1
6	453	1
5	476	1
5	504	1
5	531	1
5	556	1
5	582	1
5	609	1
4	631	1
4	661	1
3	685	1
4	717	1
4	749	1
4	777	1
4	805	1
4	834	1
4	865	1
4	898	1
4	928	1
4	956	1
4	984	1
4	1015	1
4	1050	1
3	1083	1
2	1107	1
2	1132	1
2	1156	1
2	1180	1
2	1205	1
2	1226	1
4	1251	1
4	1276	1
3	1304	1
2	1330	1
2	1355	1
3	1380	1
5	1401	1
5	1427	1
5	1456	1
4	1485	1
4	1512	1
4	1538	1



## DCP TEST DATA

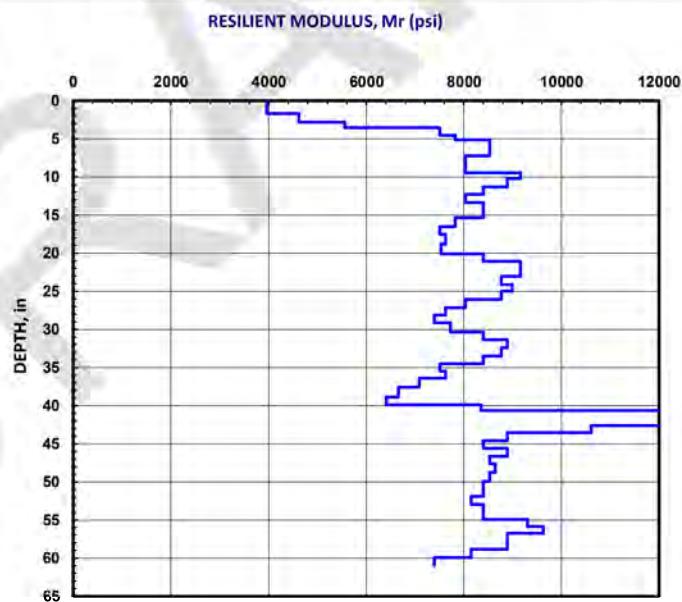
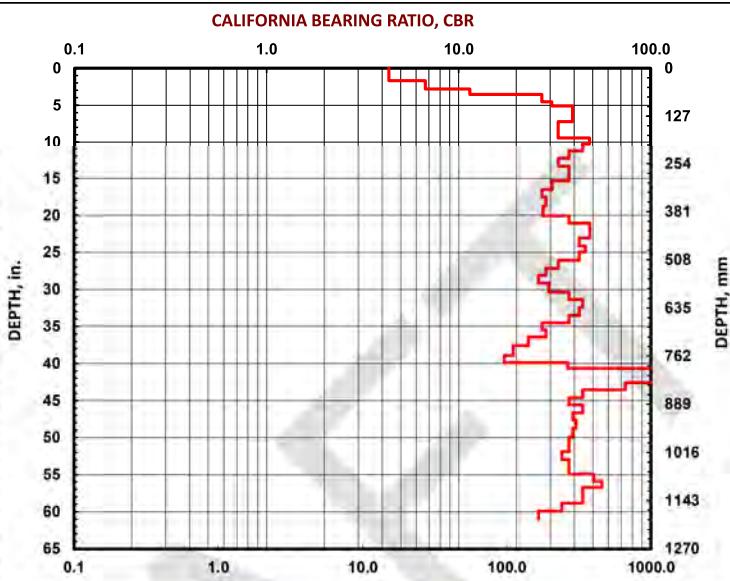
Project: West Loch Estates WWPS Upgrade  
 Location: DCP-3

Date: 17-Jul-24  
 Soil Type(s): SC, CL

- Hammer:  
 10.1 lbs.  
 17.6 lbs.  
 Both hammers used

- Soil Type:  
 CH  
 CL  
 All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	0	1
1	43	1
1	72	1
1	90	1
3	115	1
2	130	1
4	154	1
5	184	1
4	212	1
4	240	1
4	260	1
5	287	1
4	312	1
4	340	1
4	365	1
4	390	1
4	420	1
3	445	1
4	477	1
4	510	1
4	535	1
5	560	1
5	585	1
5	613	1
4	634	1
5	662	1
4	690	1
3	714	1
3	740	1
4	771	1
4	796	1
5	823	1
5	851	1
4	876	1
3	901	1
3	925	1
3	954	1
3	988	1
2	1013	1
3	1032	1
15	1056	1
16	1082	1
7	1106	1
5	1133	1
4	1158	1
5	1185	1
4	1209	1
5	1238	1
5	1268	1
4	1293	1
4	1318	1
4	1345	1
4	1370	1
4	1395	1
5	1419	1
5	1441	1
5	1468	1
5	1495	1
4	1522	1
3	1548	1



**APPENDIX B**  
**Geotechnical Laboratory Test Results**

DRAFT

## **APPENDIX B**

### **Laboratory Testing**

#### **General**

Soil samples obtained from the explorations were transported to Shinsato Engineering, Inc. (Shinsato Engineering) and evaluated to confirm or modify field classifications, as well as to assess engineering properties of the soils encountered. Representative samples were selected for laboratory testing. The tests were performed in general accordance with the test methods of the ASTM International (ASTM) or other applicable procedures.

#### **Visual Classifications**

Soil samples obtained from the explorations were visually classified in the field and in Shinsato Engineering's geotechnical laboratory based on the Unified Soil Classification System and ASTM classification methods. ASTM Test Method D 2488 was used to classify soils using visual and manual methods. ASTM Test Method D 2487 was used to classify soils based on laboratory test results.

#### **Laboratory Test Results**

##### **MOISTURE CONTENT**

Moisture contents of samples were obtained in general accordance with ASTM Test Method D 2216. The results of the moisture content tests completed on samples from the explorations are presented on the exploration logs included in Appendix A and on Page 1 in this appendix.

##### **EXPANSION INDEX**

The Expansion Index (EI) test is a standardized method used to determine the expansion potential of soils. The test involves preparing a soil specimen at a specified moisture content, compacting it into a mold, and then inundating it with distilled water under controlled conditions. The amount of expansion is measured over a 24-hour period, and the EI is calculated based on the percentage of swell and the fraction of soil passing a No. 4 sieve. The EI value is used to classify the soil's expansion potential, ranging from very low to very high. The test results are shown on page L-1 in this appendix.

##### **GRAIN SIZE DISTRIBUTION**

Grain size distribution analyses were conducted to determine the quantitative distribution of particle sizes in different soil samples. Fines content analyses were performed to determine the percentage of soils finer than the U.S. Standard No. 200 sieve—the boundary between sand size particles and silt size particles. The tests were performed in general accordance with ASTM D 6913. The fines content test results are indicated on the exploration logs included in Appendix A. The test results are shown on page L-2 in this appendix.

## ATTERBERG LIMITS TESTING

Atterberg limits (liquid limit, plastic limit, and plasticity index) were obtained in general accordance with ASTM Test Method D 4318. The results of the Atterberg limits tests are presented on page L-3 in this appendix.

## MAXIMUM DRY DENSITY/OPTIMUM MOISTURE CONTENT

The maximum dry density and optimum moisture content of the material is determined in accordance with the ASTM D 1557 test procedure. The sample is compacted into a mold in five equal layers using a 10-pound hammer falling from a height of 18 inches. The diameter of the mold is either 4 or 6 inches depending on the proportion of gravel in the sample. The sample is compacted at various moisture contents to develop a compaction curve for the soil. The curve is usually bell-shaped with a peak indicating the maximum dry density and optimum moisture content.

The results of the test for a bulk near-surface sample are presented on page L-4 in this appendix.

## MOISTURE CALCULATIONS

Job Name: West Loch WWPS Upgrade  
 Job No. : 24-0033

Boring Number	1									
Sample Number	1a	1b	2	3	4	5a	5b	6	7	8
Sample Depth	1-1.6'	1.6-2.1'	3-4'	6-7.5'	11- 12.3'	13.5-14.3'	14.3-14.8'	18.5-20.7'	1.6 - 2.5'	0.5-1.5'
Number of Rings										
Wt. of Soil and Rings										
Wet Density lbs/cft.										
Wet Wt of Soil + Tare	111.7	100.2	127.9	104.3	110.3	94.2	85.4	73.6	103	115.5
Dry Wt. of Soil + Tare	104.3	86.8	106.1	84.7	86	74.7	70.7	56.3	89.7	105.6
Net Wt. Moisture Loss	7.4	13.4	21.8	19.6	24.3	19.5	14.7	17.3	13.3	9.9
Wt. of Tare	20.4	15.7	14.7	16.3	15.5	14.2	14.4	20.5	16.7	15.7
Net Wt. Dry Soil	83.9	71.1	91.4	68.4	70.5	60.5	56.3	35.8	73	89.9
Moisture %	8.8	18.8	23.9	28.7	34.5	32.2	26.1	48.3	18.2	11.0

SHINSATO ENGINEERING, INC.  
 98-747 KUAHAO PLACE, #E  
 PEARL CITY, HI 96782

**EXPANSION INDEX RESULTS**  
ASTM D4829

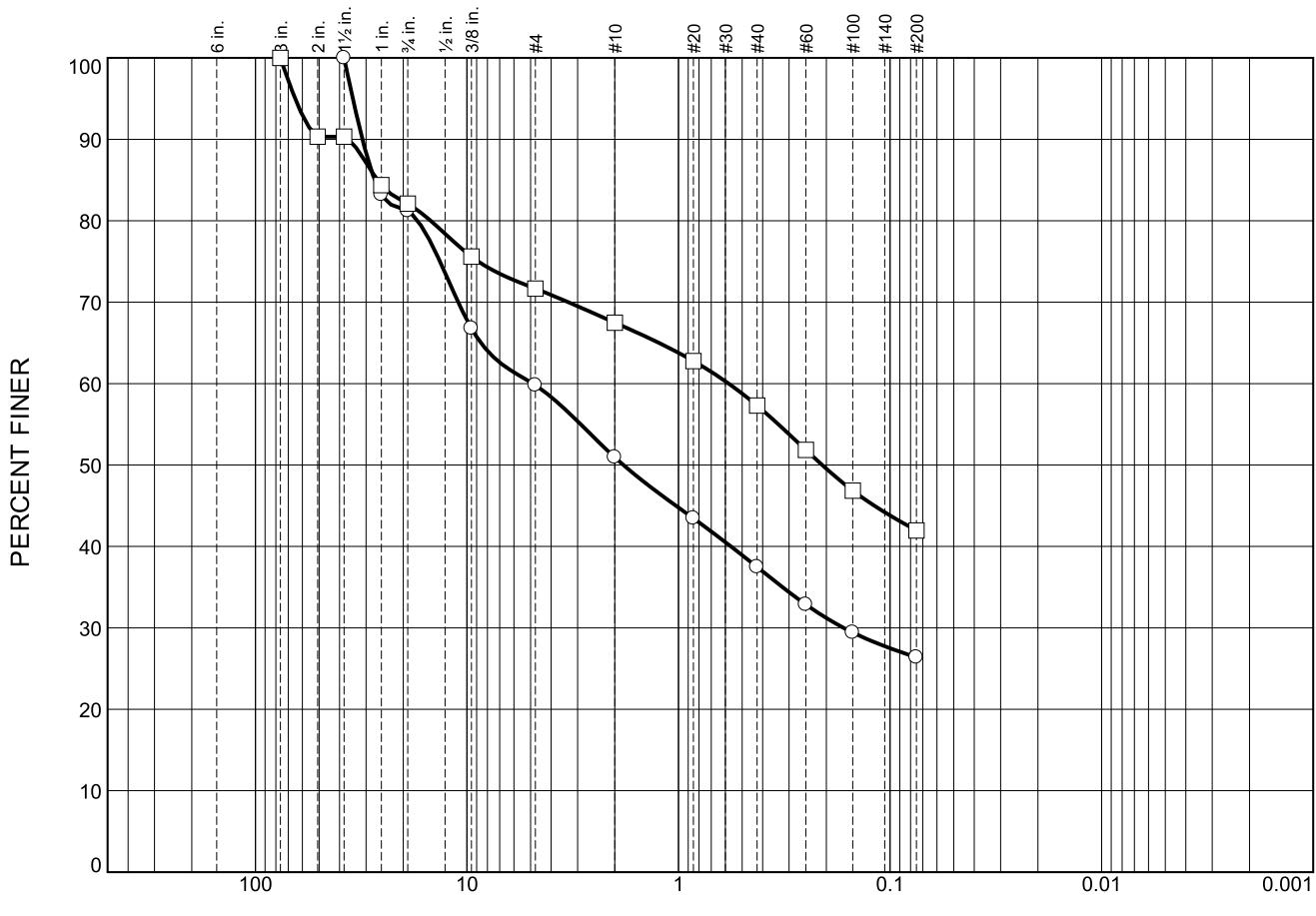
LOCATION	DEPTH (ft)	TEST DRY DENSITY (pcf)	MOISTURE CONTENT (%)			EXPANSION INDEX	SWELL POTENTIAL
			BEFORE	AFTER			
Boring 1, Sample 7	1.6 -2.5	101	14.6	28.2		27	low

NOTES:

- 1) 1 psi surcharge

EXPANSION INDEX	POTENTIAL EXPANSION
0-20	very low
21-50	low
51-90	medium
91-130	high
>130	Very high

# Particle Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	18.8	21.4	8.9	13.4	11.1	26.4
□	0.0	17.9	10.4	4.2	10.2	15.3	42.0

## SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-1	S-4	11-12.3'	clayey GRAVEL; with sand	GC
□	B-1	S-8	0.5-1.5'	clayey SAND; with gravel	SC

**SHINSATO ENGINEERING, INC.**

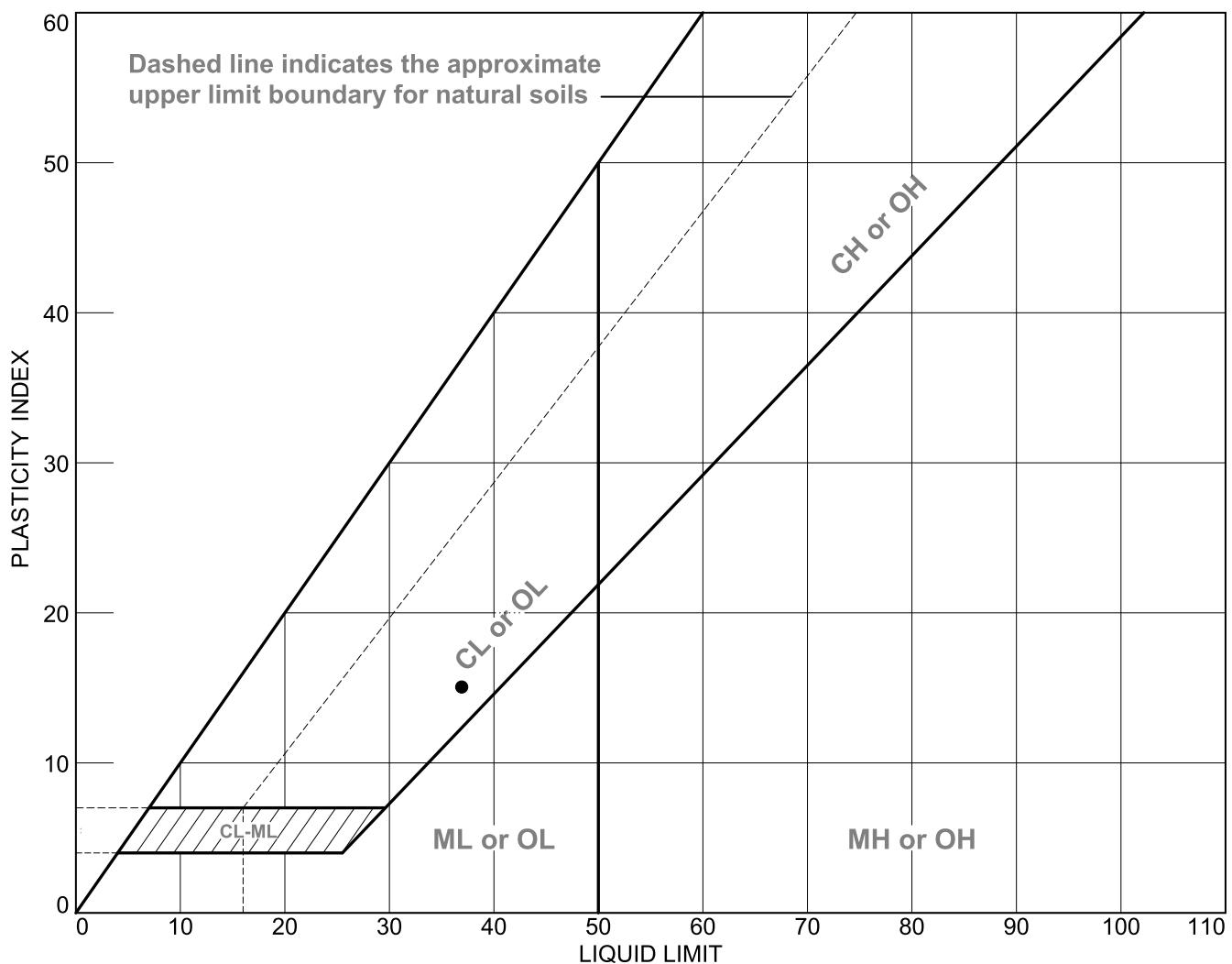
Pearl City, HI

Client:  
Project: West Loch WWPS Upgrade

Project No.: 24-0033

Figure L-2

# ATTERBERG LIMITS



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-1	S-2	3-4'		22	37	15	CL

SHINSATO ENGINEERING, INC.

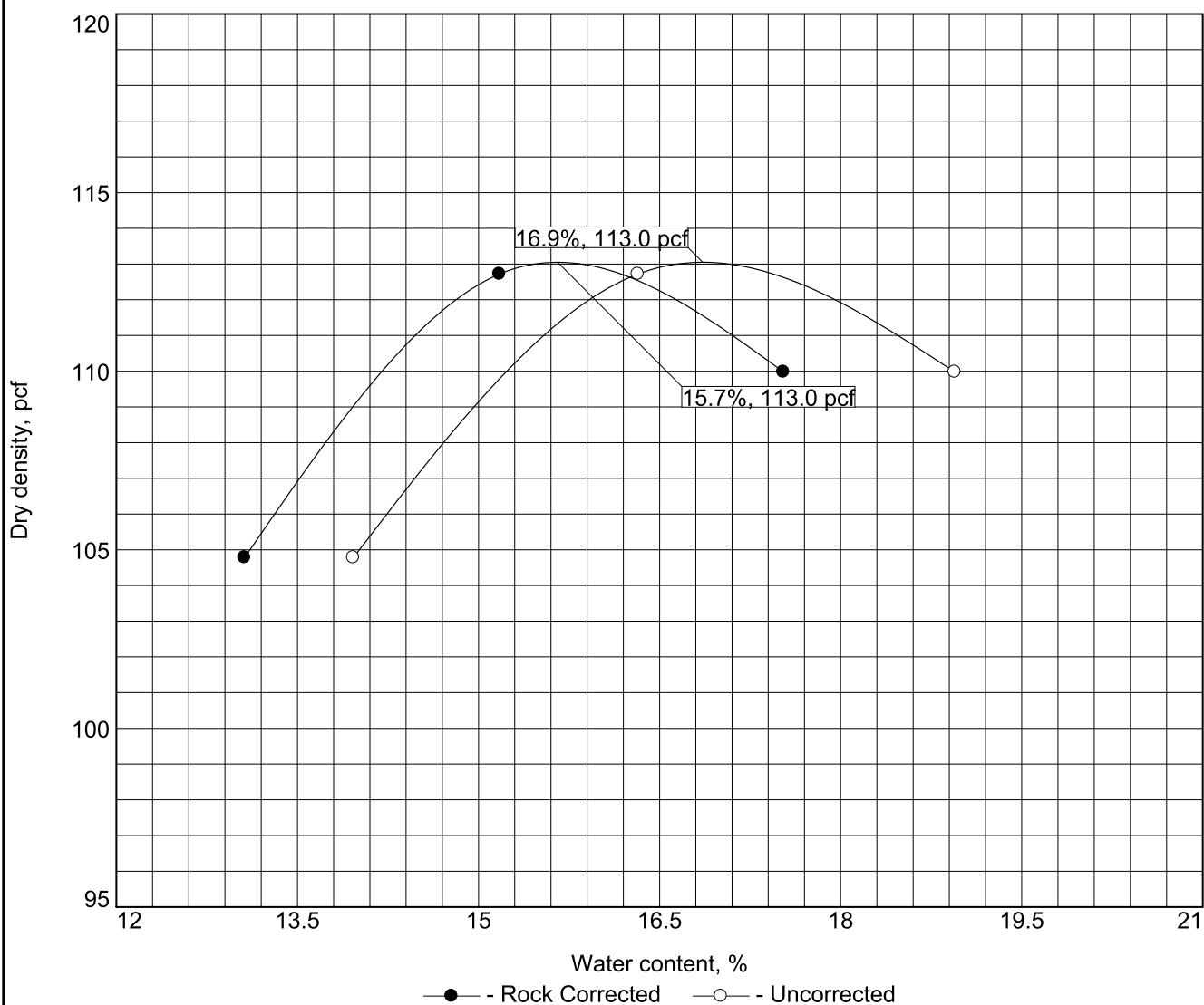
Pearl City, HI

Client:  
Project: West Loch WWPS Upgrade

Project No.: 24-0033

Figure L-3

# MAXIMUM DRY DENSITY REPORT



Test specification: ASTM D 1557-12 Method B Modified  
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200		
	USCS	AASHTO								
0.5-1.5	SC		14.0				10.4	42		
<b>ROCK CORRECTED TEST RESULTS</b>				<b>UNCORRECTED</b>		<b>MATERIAL DESCRIPTION</b>				
Maximum dry density = 113.0 pcf				113.0 pcf		clayey SAND; with gravel				
Optimum moisture = 15.7 %				16.9 %						
<b>Project No.</b> 24-0033 <b>Client:</b> <b>Project:</b> West Loch WWPS Upgrade							<b>Remarks:</b>			
<input checked="" type="radio"/> <b>Source of Sample:</b> B-1 <b>Sample Number:</b> S-8										
<b>SHINSATO ENGINEERING, INC.</b>										
Pearl City, HI							<b>Figure L-4</b>			

## **APPENDIX F**

### **Consultation: Comment Letters and Responses during Pre-Assessment & Draft EA Review Periods**

**HONOLULU FIRE DEPARTMENT  
KA 'OIHANA KINAI AHI O HONOLULU  
CITY AND COUNTY OF HONOLULU**

636 SOUTH STREET • HONOLULU, HAWAII 96813  
PHONE: (808) 723-7139 • FAX: (808) 723-7111 • WEBSITE: honolulu.gov

DEPARTMENT OF  
ENVIRONMENTAL SVCS

'24 SEP 17 P12:27

RICK BLANGIARDI  
MAYOR  
MEIA



SHELDON K. HAO  
FIRE CHIEF  
LUNA NUI KINAI AHI

JASON SAMALA  
DEPUTY FIRE CHIEF  
HOPE LUNA NUI KINAI AHI

September 9, 2024

**TO:** ROGER BABCOCK, JR. Ph.D., P.E., DIRECTOR  
DEPARTMENT OF ENVIRONMENTAL SERVICES

**ATTN:** PAUL GAMBLE, CIVIL ENGINEER III  
DIVISION OF WASTEWATER ENGINEERING AND CONSTRUCTION

**FROM:** SHELDON K. HAO, FIRE CHIEF

**SUBJECT:** ENVIRONMENTAL ASSESSMENT PREASSESSMENT CONSULTATION  
WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE  
91-1024 KAPAPAPUHI STREET, 'EWA, O'AHU  
TAX MAP KEY: 9-1-181: 001 (PORTION)

In response to your letter dated August 19, 2024, regarding the abovementioned subject, the Honolulu Fire Department (HFD) reviewed the submitted information and requires the following be complied with:

1. Fire department access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire department access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2018 Edition, Sections 18.2.3.2.2 and 18.2.3.2.2.1, as amended.)

A fire department access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2018 Edition, Section 18.2.3.2.1.)

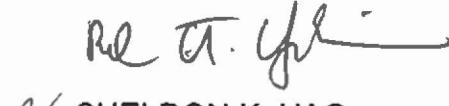
2. Fire department access roads shall be in accordance with NFPA 1; 2018 Edition, Section 18.2.3.

Roger Babcock Jr. Ph.D., P.E., Director  
Page 2  
September 9, 2024

3. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2018 Edition, Sections 18.3 and 18.4.
4. Civil drawings submitted to your department shall be routed to the HFD for review and approval.

The abovementioned provisions are required by the HFD. This project may necessitate that additional requirements be met as determined by other agencies.

Should you have questions, please contact Battalion Chief Pao-Chi Hwang of our Fire Prevention Bureau at 808-723-7151 or phwang@honolulu.gov.

  
 SHELDON K. HAO  
Fire Chief

SKH/EO:ns

JOSH GREEN, M.D.  
GOVERNOR  
KE KIAĀINA



EDWIN H. SNIFFEN  
DIRECTOR  
KA LUNA HO'OKELE

Deputy Directors  
Nā Hope Luna Ho'okele  
DREANALEE K. KALILI  
TAMMY L. LEE  
CURT T. OTAGURO  
ROBIN K. SHISHIDO

IN REPLY REFER TO

DIR 0000868  
STP 8.3825

STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAII  
DEPARTMENT OF TRANSPORTATION | KA 'OIHANA ALAKAU  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813-5097

September 13, 2024

VIA EMAIL: paul.gamble@honolulu.gov

Mr. Roger Babcock, Jr., Ph.D., P.E., Director  
City and County of Honolulu  
Wastewater Engineering and Construction Division  
Department of Environmental Services  
650 South King Street, 14<sup>th</sup> Floor  
Honolulu, Hawaii 96813

Dear Mr. Babcock:

Subject: Pre-Assessment Consultation for Environmental Assessment  
West Loch Estates Wastewater Pump Station (WWPS) Upgrade  
Ewa Beach, Oahu, Hawaii  
Tax Map Key: (1) 9-1-181: 001(portion)

Thank you for your letter, dated August 19, 2024, requesting the Hawaii Department of Transportation's (HDOT) review and comments on the subject project. HDOT understands the City and County of Honolulu, Department of Environmental Services, Wastewater Engineering and Construction Division is proposing to improve the aging condition of the West Loch Estates WWPS located in the Ewa District of Oahu.

Considering the project description and location, HDOT does not anticipate any significant adverse impacts, therefore, we have no comments to provide.

Please submit any subsequent land use entitlement related requests for review or correspondence to the HDOT Land Use Intake email address at DOT.LandUse@hawaii.gov.

If there are any questions, please contact Mr. Blayne Nikaido, Planner, Land Use Section of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

A handwritten signature in black ink.

EDWIN H. SNIFFEN  
Director of Transportation

928166

DEPARTMENT OF PLANNING AND PERMITTING  
KA 'OIHANA HO'OLĀLĀ A ME NĀ PALAPALA 'AE  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813  
PHONE: (808) 768-8000 • FAX: (808) 768-6041 • WEBSITE: honolulu.gov/dpp

RICK BLANGIARDI  
MAYOR  
MEIA



DAWN TAKEUCHI APUNA  
DIRECTOR  
PO'O

BRYAN GALLAGHER, P.E.  
DEPUTY DIRECTOR  
HOPE PO'O

REGINA MALEPEAI  
2ND DEPUTY DIRECTOR  
HOPE PO'O KUALUA

ENV-HEC 24SEP13 PM 1:19

September 11, 2024

2024/ELOG-1644(ST)

MEMORANDUM

TO: Roger Babcock, Jr., Ph.D., P.E., Director  
Department of Environmental Services

ATTENTION: Paul Gamble  
Wastewater Engineering and Construction Division

FROM: Dawn Takeuchi Apuna, Director  
Department of Planning and Permitting

SUBJECT: Pre-Assessment Consultation  
Hawaii Revised Statutes (HRS) Chapter 343  
West Loch Estates Wastewater Pump Station Upgrades  
91-1024 Kapapapuhi Street – Ewa  
Tax Map Key 9-1-181: Portion of 001

This is in responds to your letter, received August 27, 2024, requesting comments on any relevant issues or concerns which the Department of Planning and Permitting may have and which should be addressed in preparing the forthcoming Draft Environmental Assessment (DEA), as required under HRS Chapter 343.

1. Regulatory Boundaries: The Project site is portion of an 80-acre shoreline lot located in the AG-1 Restricted Agricultural District and the Special Management Area (SMA). The Project site should be clearly identified on a map(s) with the zoning district and SMA boundaries. It is possible that the Project site is outside the SMA.
2. Revised Ordinances of Honolulu (ROH) Chapter 25: The DEA should include an analysis of each of the SMA policies as presented in Revised Ordinances of Honolulu (ROH) Section 25-3.1, the Project's consistency with each of these policies, as well as the mandatory findings contained in ROH Section 25-4.1. Some specific issue areas requiring analyses are as follows:

Coastal Hazards - As an essential infrastructure facility located on a coastal property, the DEA should address possible coastal hazards which the existing facility may be exposed in the future, including sea level rise, wave action, flooding erosion, tsunamis, and storm surge. The proposed improvements address current upgrades to the existing facility which are necessary for the 35-year-old facility. However, the DEA should include a discussion of how proposed improvements enhance the long-term mitigative and or adaptive capabilities that must be considered and evaluated for the wastewater systems susceptibility to coastal hazards in the not so distance future. This analysis should evaluate the site's existing topographic, geologic, and shoreline environment, and show how the proposed Project will avoid impacts associated with other coastal hazards. The DEA should also explore Project alternatives, including site design (elevated structures, alternative foundations, etc.), best management practices, and appropriate mitigation measures to reduce potential impacts related to coastal hazards to the extent possible.

Wetlands and Sensitive Species - The DEA should identify the presence of and proximity to nearby protected wetlands, sensitive habitat, flora species, and fauna species. We recommend consulting the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation database to obtain a list of species that are known to occur, or may potentially occur, in the Project vicinity. Known, mapped wetlands can be viewed on the USFWS National Wetlands Inventory Wetlands Mapper. The State Department of Land and Natural Resources, Department of Aquatic Resources, and Department of Forestry and Wildlife should be consulted regarding the potential presence of State-listed sensitive species or critical habitat. The DEA should also discuss the impacts related to the spread of invasive species, such as little fire ants, coconut rhinoceros beetles, or the fungus that causes rapid ohia death. The DEA must evaluate potential impacts and incorporate standard agency-required mitigation measures as well as any Project-specific mitigation measures to avoid or minimize potential impacts.

Archaeological, Cultural, and Historic Resources - Although the area was extensively developed for the West Loch Golf Course and Shoreline Park, the DEA should identify soils type and provide background information regarding the previous historic resources and the disinterment and reinternment of iwi kupuna (Native Hawaiian burials) which occurred in the original development of the original shoreline park and nearby golf course. The DEA should discuss the cultural sites and practices in this area which were previously addressed and remain relevant to the proposed Project and adjacent shoreline park.

Mr. Roger Babcock, P.E.  
September 11, 2024  
Page 3

We also recommend the DEA include an analysis of the continued potential impact of the Project to Native Hawaiian access and cultural practices (Ka Paakai analysis). The DEA must evaluate potential impacts and incorporate standard agency-required mitigation measures to avoid or minimize such potential impacts.

3. Land Use Ordinance, ROH Chapter 21: The DEA should identify the size and maximum development potential of the proposed Project in relation to the development standards contained in ROH Chapter 21. Project compliance with these standards will be based on all uses and structures on the zoning lot, and must be presented and evaluated in the DEA. The ROH is available on our website at:

[www.honolulu.gov/dpp/resources/ordinances](http://www.honolulu.gov/dpp/resources/ordinances)

Thank you for the opportunity to comment on this proposal. Should you have any questions, please contact Steve Tagawa, of our Land Use Approval Branch, at extension 8-8024 or via email at [stagawa@honolulu.gov](mailto:stagawa@honolulu.gov).

Very truly yours,  
  
for Dawn Takeuchi Apuna  
Director

**BOARD OF WATER SUPPLY  
KA 'OIHANA WAI  
CITY AND COUNTY OF HONOLULU**

630 SOUTH BERETANIA STREET • HONOLULU, HAWAII 96843  
Phone: (808) 748-5000 • www.boardofwatersupply.com

24 SEP 13 AM 11:23

RICK BLANGIARDI  
MAYOR  
MEIA

ERNEST Y. W. LAU, P.E.  
MANAGER AND CHIEF ENGINEER  
MANAKIA A ME KAHU WILKI

ERWIN KAWATA  
DEPUTY MANAGER  
HOPE MANAKIA



NĀ'ALEHU ANTHONY, Chair  
JONATHAN KANESHIRO, Vice Chair  
BRYAN P. ANDAYA  
KAPUA SPROAT  
LANCE WILHELM  
EDWIN H. SNIFFEN, Ex-Officio  
GENE C. ALBANO, P.E., Ex-Officio

September 12, 2024

TO: ROGER BABCOCK, JR.  
DEPARTMENT OF ENVIRONMENTAL SERVICES

ATTN: PAUL GAMBLE, DIVISION OF WASTEWATER ENGINEERING AND CONSTRUCTION

FROM: ERNEST Y. W. LAU, P.E., MANAGER AND CHIEF ENGINEER *for* *REI*

SUBJECT: YOUR MEMORANDUM DATED AUGUST 19, 2024 ON THE ENVIRONMENTAL ASSESSMENT (EA) PRE-ASSESSMENT CONSULTATION WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE – TAX MAP KEY: 9-1-181: 001

The Board of Water Supply has an 8-inch water main along Kapapapuhi Street in the vicinity of the project area. This water main should be located within paved roadways and made accessible for repairs and maintenance. Any structures should be adequately set back from the water main easements for the safety of the public and to prevent damage to the structures in the event of main breaks, repair, and maintenance.

The construction drawings should be submitted for our approval and the construction schedule should be coordinated to minimize impact to the water system.

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

If you have any questions, please contact Daniel Koge, Project Review Branch of our Water Resources Division at (808) 748-5444.

**DEPARTMENT OF DESIGN AND CONSTRUCTION**  
**KA 'OIHANA HAKULAU A ME KE KĀPILI**  
**CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813  
PHONE: (808) 768-8480 • FAX: (808) 768-4567 • WEBSITE: [honolulu.gov](http://honolulu.gov)

RICK BLANGIARDI  
MAYOR  
MEIA



HAKU MILLES, P.E.  
DIRECTOR  
PO'O

MARK YONAMINE, P.E.  
DEPUTY DIRECTOR  
HOPE PO'O

September 6, 2024

**SENT VIA EMAIL**

Mr. Paul Gamble  
[Paul.gamble@honolulu.gov](mailto:Paul.gamble@honolulu.gov)

Dear Mr. Gamble:

Subject: Hawai'i Revised Statutes Section (HRS), Chapter 343  
Environmental Assessment (EA) Pre-assessment Consultation  
West Loch Estates Wastewater Pump Station Upgrade  
91-1024 Kapapahuhi Street, 'Ewa, O'ahu  
Tax Map Key: 9-1-181-001 (POR.)

Thank you for the opportunity to review and comment. The Department of Design and Construction has no comments to offer at this time.

Should you have any questions, please contact me at (808) 768-8480.

Sincerely,

A handwritten signature in black ink, appearing to read "Haku Milles".

Haku Milles, P.E., LEED AP  
Director

HM:krn (927103)

BOARD OF WATER SUPPLY  
KA 'OIHANA WAI  
CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET • HONOLULU, HAWAII 96843  
Phone: (808) 748-5000 • [www.boardofwatersupply.com](http://www.boardofwatersupply.com)

RICK BLANGIARDI  
MAYOR  
MEIA

ERNEST Y. W. LAU, P.E.  
MANAGER AND CHIEF ENGINEER  
*MANAKIA A ME KAHU WILIKI*

ERWIN KAWATA  
DEPUTY MANAGER  
*HOPE MANAKIA*



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GENE C ALBANO, P.E., Ex-Officio

February 6, 2025

TO: PAUL GAMBLE  
DIVISION OF WASTEWATER ENGINEERING AND CONSTRUCTION  
DEPARTMENT OF ENVIRONMENTAL SERVICES

FROM: ERNEST Y.W. LAU, P.E. MANAGER AND CHIEF ENGINEER 

SUBJECT: YOUR MEMORANDUM DATED JANUARY 17, 2025, ON THE WEST LOCH ESTATES WASTEWATER PUMP STATION UPGRADE PROJECT DRAFT ENVIRONMENTAL ASSESSMENT, TAX MAP KEY: 9-1-181: 001

The Board of Water Supply (BWS) has an 8-inch water main on Kapapapuhi Street in the vicinity of the project area. The water main should be located within paved roadways and made accessible for repairs and maintenance. Any structures should be adequately set back from the water main easements for the safety of the public and to prevent damage to the structures in the event of main breaks, repair, and maintenance.

The construction drawings should be submitted for our approval and the construction schedule should be coordinated with BWS to minimize impacts to the water system.

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

If you have any questions, please contact Daniel Koge, Project Review Branch of our Water Resources Division, at (808) 748-5444.

## ***Environmental Planning Solutions, LLC***

---

June 2, 2025

Board of Water Supply  
Ernest Y.W. Lau, Manager, Chief Engineer  
630 S Beretania St  
Honolulu, HI 96813  
Attention: Daniel Koge, Project Review Branch

Dear Mr. Lau:

**West Loch Estates WWPS Upgrade Project Draft Environmental Assessment (DEA)**  
**Chapter 343, HRS Comment Period: January 23 to February 24, 2025**

**91-1024 Kapapapuhi Street, ‘Ewa  
TMK no: 9-1-181: portion of 001**

Thank you for your comment letter dated February 6, 2025, for the proposed update of the West Loch Estates Wastewater Pump Station (WWPS) in the ‘Ewa District of O‘ahu.

The following are our responses to your comments:

Comment: The water main should be located within paved roadways and made accessible for repairs and maintenance. Any structures should be adequately set back from the water main easements for the safety of the public and to prevent damage to the structures in the event of main breaks, repair, and maintenance.

Response: Noted.

Comment: The construction drawings should be submitted for our approval and the construction schedule should be coordinated with BWS to minimize impacts on the water system.

Response: Noted. The contractor will coordinate the project schedule with BWS.

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

Response: Noted. Construction drawings will be submitted to HFD for review and approval.

We appreciate your comments as a part of the Chapter 343 HRS Draft EA review process. A copy of this along with all comment and response letters are included in the project Final EA.

Sincerely,



Colette M. Sakoda, Planner  
Environmental Planning Solutions, LLC

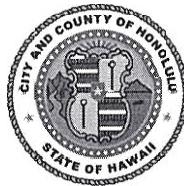
cc: June Nakamura, Kaula AE LLC  
Paul Gamble, ENV

DEPARTMENT OF DESIGN AND CONSTRUCTION  
KA 'OIHANA HAKULAU A ME KE KAPILI  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR • HONOLULU, HAWAII 96813  
PHONE: (808) 766-8480 • FAX: (006) 760-4567 • WEBSITE: [honolulu.gov](http://honolulu.gov)

ENH-EC 125FEB18 AM 8:100

RISK BLANGIARDI  
MAYOR  
MEIA



935148

HAKU MILLES, P.E.  
DIRECTOR  
PO'O

MARK YONAMINE, P.E.  
DEPUTY DIRECTOR  
HOPE PO'O

February 13, 2025

MEMORANDUM

TO: Paul Gamble, Engineer  
Division of Wastewater Engineering and Construction  
Department of Environmental Services

*h.m.y.*

FROM: Haku Milles, P.E., LEED AP, Director Designate  
Department of Design and Construction

SUBJECT: West Loch Estates WWPS Upgrade Project Draft Environmental Assessment (DEA)

This is in response to Environmental Planning Solutions, LLC's inquiry dated January 17, 2025 regarding the above. Thank you for the opportunity to review and comment.

Our Facilities Division (FD) has the following question and comment:

Will the expansion of the pump station site impact the operations of the park parking lot? The project team should review the area impacted by the expansion into the existing parking lot as it impacts the area where the trash enclosure is located. It does not appear that any parking stalls will be taken by this expansion.

Should you have any questions regarding the question and comment from FD, please contact Clifford Lau at x88484.

HM:krn (933749)

## *Environmental Planning Solutions, LLC*

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June 2, 2025

Department of Design & Construction  
Haku Milles, Director  
650 S. King Street, 11th Floor  
Honolulu, HI 96813  
Email: [ddc@honolulu.gov](mailto:ddc@honolulu.gov)

Dear Mr. Milles:

**West Loch Estates WWPS Upgrade Project Draft Environmental Assessment (DEA)**  
**Chapter 343, HRS Comment Period: January 23 to February 24, 2025**  
**91-1024 Kapapapuhi Street, ‘Ewa**  
**TMK no: 9-1-181: portion of 001**

Thank you for your comment memo dated February 13, 2025, for the proposed update of the West Loch Estates Wastewater Pump Station (WWPS) in the ‘Ewa District of O‘ahu.

The following are our responses to your comments:

Comment: Will the expansion of the pump station impact the operations of the park parking lot? The project team should review the area impacted by the expansion into the existing parking lot as it impacts the area where the trash enclosure is located. It does not appear that any parking stalls will be taken by this expansion.

Response: The proposed expansion of the pump station will minimally impact the operations of the park parking lot and park activities. We are having on-going discussions with the Department of Parks and Recreation to minimize the impacts of this construction on Kapapapuhi Point Park.

The project will be taking two (2) of the parking stalls closest to the existing trash enclosure. Those two stalls will be striped for “No Parking” similar to what is out there currently. Otherwise the remaining existing parking stalls will not be impacted.

We appreciate your comments as a part of the Chapter 343 HRS Draft EA review process. A copy of this, along with all comments and response letters, are included in the Final EA project.

Sincerely,



Colette M. Sakoda, Planner  
Environmental Planning Solutions, LLC

cc: June Nakamura, Kaula AE LLC  
Paul Gamble, ENV

DEPARTMENT OF PLANNING AND PERMITTING  
EA 'OIHANA HO'OLALA A. ME NA PALAPA.LA 'AE  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813  
PHONE (808) 766-8000 • FAX: (808) 768-6041 • WEBSITE honolulu.gov/dpp

RICK BLANGIARDI  
MAYOR  
MEIA

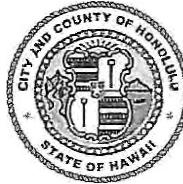
February 14, 2025

DAWN TAKEUCHI APUNA  
DIRECTOR  
PO'O

BRYAN GALLEGHER, P.E.  
DEPUTY DIRECTOR  
HOPE PO'O

REGINA MALEPEAI  
2<sup>nd</sup> DEPUTY DIRECTOR  
HOPE PO'O KUALUA

2025/ELOG-136(ST)



Ms. Colette M. Sakoda  
Environmental Planning Solutions, LLC  
945 Makaiwa Street  
Honolulu, Hawai'i 96816

Dear Ms. Sakoda:

SUBJECT: Draft Environmental Assessment (EA)  
Hawaii Revised Statutes (HRS) Chapter 343  
West Loch Estates Wastewater Pump Station Upgrade Project 91—  
1024 Kapapapuhi Street — Ewa  
Tax Map Key 9-1-181: Portion of 001

This is in responds to your request, received January 22, 2025, for comments or concerns which the Department of Planning and Permitting may have on the above-referenced Draft EA. The following are our comment and concerns:

1. Section 1 Project Summary: The table entry for "City and County of Honolulu Zoning" should be revised to indicate that the Wastewater Pump Station (WWPS) is located entirely within the AG-1 Restricted Agricultural District.
2. 2.1 Background. Please identify the current code(s) or feature(s) of the existing facility that were examined by the Design Alternatives Report (DAR, 2023) and found not to comply with relevant regulations. This document should disclose whether any citations or warnings have been issued by health or environmental protection agencies. Since improved reliability of the facility is identified as the feature of the Project, the Final EA should disclose examples or events which the \$4.4 million dollar upgrade are intended to prevent.

Although the various Figures are referred to throughout the text, they do not contain the associated labels (i.e., no numbers). We note that the List of Figures in the Table of Contents does identify the numbering of Figures.

3. 3.1 Description of Proposed Project: The section should clarify whether the current location of the electrical room over the existing wet well has been identified as a specific regulatory problem, and whether it has actually resulted in shutdown or other operation problem. The Final EA should clarify whether this configuration was allowed when the WWPS was constructed in 1989.

"Other proposed improvements" includes the installation of a new "ARV" which is listed but is not identified or explained. We note that the acronym stands for an Air Relief Valve which we understand releases trapped air pockets that can build up at high points in the system. The acronym is not listed in the list of Acronyms and Abbreviations and should be included in the Final EA.

The installation of security fencing is listed but is not described or shown in the attached "60% Submittal" plans. The Final EA should include a discussion of and plans for the proposed addition of security fencing at this facility.

5.15.2 Recreational Resources — Potential/ Impacts and Proposed Mitigation:

The description of potential impacts must be expanded to describe the impacts, however unlikely, of the complete failure of this facility including the potential contamination of the surrounding parking lot and all down slope areas of the West Loch Golf Course and or Kapapapuhui Point Park. The Final EA should describe the existing spill containment features of the facility, if any, or explain why such pollution mitigation is or is not required or necessary.

4. 7.1.5 Special Management Area (SMA):

- (2) *Adequate and properly located public recreation areas and wildlife preserves are reserved —*Discussion: The Final EA should expand this discussion to explain how the location of this facility, built over 35 years ago within public park and adjacent to the existing public golf course, remains appropriately located and could not be relocated and reconstructed in a less susceptible location.
- (3) *Provisions are made for solid and liquid waste treatment, disposition and management which will minimize adverse effects upon special management area resources, -*Discussion. The Final EA should be expanded to provide an estimate of the amount of excavation (i.e. cubic yards) necessary to complete the Project. The Final EA should briefly describe the best management practices (BMPs) which will be employed to prevent the loss of soil or the contamination of the surrounding areas during the construction of the expansion improvements and the replacement of existing wastewater components including six and ten-inch force main piping.

Ms. Colette Sakoda  
February 14, 2025  
Page 3

- (5) *Any development which would adversely affect water quality, existing areas of open safer free or visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.* —Discussion: The Final EA should expand this discussion to explain how the Project, if not implemented, would adversely affect these surrounding water quality and existing wildlife habitat. For example, please disclose the volume of wastewater conveyed by this facility, and how its failure would have devastating and lasting impacts. The Final EA should explain essential value of this facility, and how its location within areas of potential coastal hazards is not a risk. The Final EA should address how relocation of this facility in the long-term, is not considered as a necessary goal.
5. 72.3. City and County of Honolulu Land Use Ordinance: This section should be revised to clarify that the WWPS is considered a Utility Installation Type A, which is permitted in all zoning districts.

Thank you for the opportunity to comment on this proposal. Should you have any questions, please contact Steve Tagawa, of our Land Use Approval Branch, at (808) 768—8024 or via email at [stagawa@honolulu.gov](mailto:stagawa@honolulu.gov).

Very truly yours,



for: Dawn Takeuchi Apuna  
Director Designate

cc: Councilmember Augie Tulba  
Neighborhood Board No. 23

# *Environmental Planning Solutions, LLC*

---

June 2, 2025

Dawn Takeuchi Apuna, Director  
Department of Planning &  
Permitting 650 S. King Street, 7th  
Floor Honolulu, HI 96813  
Attention: Steve Tagawa

Dear Ms. Takeuchi Apuna:

**West Loch Estates WWPS Upgrade Project Draft Environmental Assessment (DEA)**  
**Chapter 343, HRS Comment Period: January 23 to February 24, 2025**  
**91-1024 Kapapapuhi Street, ‘Ewa**  
**TMK no: 9-1-181: portion of 001**

Dear Ms. Takeuchi Apuna:

Thank you for your comment letter dated February 14, 2025, for the proposed update of the West Loch Estates Wastewater Pump Station (WWPS) in the ‘Ewa District of O‘ahu.

The following are our responses to your comments:

1. Section 1 Project Summary: The table entry for “City and County of Honolulu Zoning” should be revised to indicate that the Wastewater Pump Station (WWPS) is located entirely within the AG-1 Restricted Agricultural District.

Response: Noted. The Project Summary is now revised to indicate the project is entirely within the AG-1 zoning district.

2. 2.1 Background: Please identify the current code(s) or feature(s) of the existing facility that were examined by the Design Alternatives Report (DAR, 2023) and found not to comply with relevant regulations. This document should disclose whether any citations or warnings have been issued by health or environmental protection agencies. Since improved reliability of the facility is identified as the feature of the Project, the Final EA should disclose examples or events which the \$4.4 million dollar upgrade are intended to prevent.

Response: Currently, the existing wet well is located beneath and within the pump station building superstructure, creating a potentially hazardous environment, although there has not been any incidents or citations issued. The single exhaust fan in the pump room provides the only air flow for the building. There is no combustible gas detection system, airflow monitoring system nor alarm signaling system observed at the site.

NFPA\* 820 - *Standard for Fire Protection in Wastewater Treatment and Collection Facilities* state that pump rooms not physically separate from the wet well are required to be continuously ventilated at a minimum of 12 air changes per hour to protect the equipment and facility from corrosive, flammable and explosive gas buildup. NFPA 820 also requires “loss of flow” detectors, indicators or alarms.

The first edition of NFPA 820 was published in 1990 so it is assumed that the requirements stated in this document were not in place during the 1989 design and construction of the West Loch Estates WWPS.

Comment: Although the various Figures are referred to throughout the text, they do not contain the associated labels (i.e., no numbers). We note that the List of Figures in the Table of Contents does identify the numbering of Figures.

Response: Noted. The figures are amended to include numbers to identify proper references.

3. **3.1 Description of Proposed Project:** The section should clarify whether the current location of the electrical room over the existing wet well has been identified as a specific regulatory problem, and whether it has actually resulted in shutdown or other operation problems. The Final EA should clarify whether this configuration was allowed when the WWPS was constructed in 1989.

Response: Having the wet well in the same room and adjacent to the electrical equipment is not a currently preferred or recommended design, but was a typical design when constructed 35 years ago. This situation has not resulted in shutdowns or other operational problems per maintenance logs from the station.

Comment: “Other proposed improvements” includes the installation of a new “ARV” which is listed but is not identified or explained. We note that the acronym stands for an Air Relief Valve, which we understand releases trapped air pockets that can build up at high points in the system. The acronym is not listed in the list of Acronyms and Abbreviations and should be included in the Final EA.

Response: Air Relief Valve (ARV) is now included in the FEA Acronyms list.

Comment: The installation of security fencing is listed but is not described or shown in the attached “60% Submittal” plans. The Final EA should include a discussion of and plans for the proposed addition of security fencing at this facility.

Response: Regarding the use of security fencing, this reference is revised to state “security mesh screening.” The mesh screening will be heavy-duty and vandal resistant to provide security and prevent unauthorized entry into the pump station room. It shall replace the portions of the north and south walls of the pump station building that are removed to create an open breezeway.

4. **5.15.2 Recreational Resources – Potential Impacts and Proposed Mitigation:** The description of potential impacts must be expanded to describe the impacts, however unlikely, of the complete failure of this facility including the potential contamination of the surrounding parking lot and all down slope areas of the West Loch Gold Course and or Kapapapuhi Point Park. The Final EA should describe the existing spill containment features of the facility, if any, or explain why such pollution mitigation is not required or necessary.

Response: It is highly unlikely that the West Loch Estates WWPS shall experience a complete failure of its operations. Various safeguards have been established to

prevent such an event including but not limited to on-site alarm systems, remote alarms via SCADA (Supervisory Control and Data Acquisition) system, emergency backup generator, and a

force main bypass connection. Other spill containment and mitigation measures include: cordoning off the spill points to prevent public contact, post signs and use media/public service announcements to inform the public of the spill, use of sandbags to plug storm drain entrance points and to contain the spill in the vicinity of the spill point, remove/clean up spill using hauling trucks and/or portable pump system, and disinfect spill site and initiate water quality monitoring per City and State DOH requirements.

Page | 3

Potential spill response for this wastewater pump station have been addressed in reports entitled *Spill Response Procedures Facility Manual for West Loch Estates Wastewater Pump Station*, dated June 2010 and *Programmatic Spill Contingency Plan for Small Force Mains*, dated June 2012, both prepared by Fukunaga & Associates, Inc. Both reports detail the direct response to undertake in the unlikely event a spill occurs. Copies of the reports may be obtained from the City's Department of Environmental Services, Division of Wastewater Engineering and Construction.

5. 7.1.5 Special Management Area (SMA):

(2) *Adequate and properly located public recreation areas and wildlife preserves are reserved – Discussion:* The Final EA should expand this discussion to explain how the location of this facility, built over 35 years ago within public park and adjacent to the existing public golf course, remains appropriately located and could not be relocated and reconstructed in a less susceptible location.

Response: Siting of the WWPS 35 years ago during the master planning phase, was based on its downslope location from residential land uses, and within the C&C public park parking lot. Capital costs as well as the time involved in the planning, permitting & construction of a new facility would prove to be cost prohibitive.

(3) *Provisions are made for solid and liquid waste treatment, disposition and management which will minimize adverse effects upon special management area resources- Discussion:* The Final EA should be expanded to provide an estimate of the amount of excavation (i.e., cubic yards) necessary to complete the Project. The Final EA should briefly describe the best management practices (BMPs) which will be employed to prevent the loss of soil or the contamination of the surrounding areas during the construction of the expansion improvements and the replacement of existing wastewater components including six and ten-inch force main piping.

Response: Section 5.3.1 Geology of the DEA provides the amount of soil expected cut of approximately 65 cubic yards (cy) of soil and fill of 12 cy. The FEA contains a discussion of BMPs to prevent loss of soil or contamination of the surrounding areas.

(5) *Any development which would adversely affect water quality, existing areas of open water free or visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land. -*

## *Environmental Planning Solutions, LLC*

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Discussion: The Final EA should expand this discussion to explain how the Project, if not implemented, would adversely affect these surrounding water quality and existing wildlife habitat. For example, please disclose the volume of wastewater conveyed by this facility, and how its failure would be devastating and lasting impacts. The Final EA should explain essential value of this facility, and how its location within areas of potential coastal hazards is not a risk. The Final EA should address how relocation of this facility in the long term, is not considered as a necessary goal.

Page | 4

Response: Peak design flow for the pump station is 730 gpm (1,050 mgd). Total volumetric capacity of the wet well is 1,361 gallons. As mentioned above, various safeguards have been established to prevent complete failure of the facility, including but not limited to, on-site alarm systems, remote alarms via SCADA (Supervisory Control and Data Acquisition) system, emergency backup generator, and a force main bypass connection.

6. 7.2.3 City and County of Honolulu Land Use Ordinance: This section should be revised to clarify that the WWPS is considered a Utility Installation Type A, which is permitted in all zoning districts.

Response: Noted. Section 7.2.3 is revised to reflect the WWPS is considered a Utility Installation Type A, permitted in all zoning districts.

We appreciate your comments as a part of the Chapter 343 HRS Draft EA review process. A copy of this along with all comment and response letters are included in the project Final EA.

Sincerely,



Colette M. Sakoda,  
Planner  
Environmental  
Planning Solutions,  
LLC

cc: June  
Nakamura,  
Kaula AE  
LLC Paul  
Gamble, ENV



Colette Sakoda <cmsakoda@gmail.com>

---

## CAB Comments: West Lock Estates Wastewater Pump Station Upgrade Project

6 messages

DOH.CABPASS <DOH.CABPASS@doh.hawaii.gov>  
To: "paul.gamble@honolulu.go" <paul.gamble@honolulu.go>  
Cc: "cmsakoda@gmail.com" <cmsakoda@gmail.com>

Fri, Feb 7, 2025 at 3:33 PM

To Paul Gamble,  
Environmental Planning Solutions,

Thank you for allowing us to review the West Lock Estates Wastewater Pump Station Upgrade Project published in the January 23rd edition of the TENs. Please go to the Clean Air Branch (CAB) website to download and utilize our Standard Comments for Land Use Reviews. The link is included below.

[Clean Air Branch | Standard Comments for Land Use Reviews](#)

Mahalo,

Katt Marshall | she/her  
Planner I | Clean Air Branch | Planning & Administrative Support Staff (PASS)  
Hawai'i State Department of Health | Ka 'Oihana Olakino  
[2827 Waimano Home Road #139 | Pearl City, Hawaii 96782](#)  
Office: (808) 586-4200

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---

Colette Sakoda <cmsakoda@gmail.com>  
To: "DOH.CABPASS" <DOH.CABPASS@doh.hawaii.gov>  
Cc: "paul.gamble@honolulu.go" <paul.gamble@honolulu.go>

Fri, Feb 7, 2025 at 4:33 PM

Dear Katt,

Thank you for your email. We are downloading CAB's standard comments from the DOH CAB's website to be included in the project Environmental Assessment process.

Colette Sakoda  
Environmental Planning Solutions LLC  
Mobile: (808) 748-1529

[Quoted text hidden]

---

Mail Delivery Subsystem <mailer-daemon@googlemail.com>  
To: cmsakoda@gmail.com

Fri, Feb 7, 2025 at 4:33 PM



## Address not found

Your message wasn't delivered to **paul.gamble@honolulu.go** because the domain honolulu.go couldn't be found. Check for typos or unnecessary spaces and try again.

[LEARN MORE](#)

The response was:

DNS Error: DNS type 'mx' lookup of honolulu.go responded with code NXDOMAIN Domain name not found: honolulu.go For more information, go to <https://support.google.com/mail/?p=BadRcptDomain>

Final-Recipient: rfc822; paul.gamble@honolulu.go

Action: failed

Status: 5.1.2

Diagnostic-Code: smtp; DNS Error: DNS type 'mx' lookup of honolulu.go responded with code NXDOMAIN

Domain name not found: honolulu.go For more information, go to <https://support.google.com/mail/?p=BadRcptDomain>

Last-Attempt-Date: Fri, 07 Feb 2025 18:33:23 -0800 (PST)

----- Forwarded message -----

From: Colette Sakoda <cmsakoda@gmail.com>

To: "DOH.CABPASS" <DOH.CABPASS@doh.hawaii.gov>

Cc: "paul.gamble@honolulu.go" <paul.gamble@honolulu.go>

Bcc:

Date: Fri, 7 Feb 2025 16:33:07 -1000

Subject: Re: CAB Comments: West Lock Estates Wastewater Pump Station Upgrade Project

----- Message truncated -----

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**Colette Sakoda** <cmsakoda@gmail.com>  
To: "Gamble, Paul F" <paul.gamble@honolulu.gov>

Fri, Feb 7, 2025 at 4:34 PM

Paul, forwarding my response to CAB since the first email for you was incorrect.

Colette Sakoda  
Environmental Planning Solutions LLC  
Mobile: (808) 748-1529

[Quoted text hidden]

[Quoted text hidden]

----- Forwarded message -----

From: Colette Sakoda <cmsakoda@gmail.com>

To: "DOH.CABPASS" <DOH.CABPASS@doh.hawaii.gov>

Cc: "paul.gamble@honolulu.go" <paul.gamble@honolulu.go>

Bcc:

Date: Fri, 7 Feb 2025 16:33:07 -1000

Subject: Re: CAB Comments: West Lock Estates Wastewater Pump Station Upgrade Project

----- Message truncated -----

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**Gamble, Paul F** <[paul.gamble@honolulu.gov](mailto:paul.gamble@honolulu.gov)>  
To: Colette Sakoda <[cmsakoda@gmail.com](mailto:cmsakoda@gmail.com)>

Mon, Feb 10, 2025 at 11:01 AM

Hi Colette-

Looks like the "v" was left off on the gov of my address. It looks like what you forwarded me doesn't have an attachment. Would resent that?

Mahalo,

Paul

Paul Gamble

Engineer III

Plant Engineering Branch, Wastewater Engineering and Construction

Department of Environmental Services, City and County of Honolulu

Frank Fasi Municipal Building

808-768-8744

---

**From:** Colette Sakoda <[cmsakoda@gmail.com](mailto:cmsakoda@gmail.com)>  
**Sent:** Friday, February 7, 2025 4:35 PM  
**To:** Gamble, Paul F <[paul.gamble@honolulu.gov](mailto:paul.gamble@honolulu.gov)>  
**Subject:** Fwd: Delivery Status Notification (Failure)

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

[Quoted text hidden]

---

**Colette Sakoda** <[cmsakoda@gmail.com](mailto:cmsakoda@gmail.com)>  
To: "Gamble, Paul F" <[paul.gamble@honolulu.gov](mailto:paul.gamble@honolulu.gov)>

Mon, Feb 10, 2025 at 11:38 AM

Hmm. Attached is a copy of the email trail of what transpired with DOH CAB. Please let me know if you have any questions.

Thanks,  
Colette  
Environmental Planning Solutions LLC  
Mobile: (808) 748-1529

[Quoted text hidden]

---

 **Email\_CAB Comments\_West Lock Estates Wastewater Pump Station Upgrade Proj.pdf**  
370K

## *Environmental Planning Solutions, LLC*

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June 2, 2025

Department of Health Environmental Health Administration  
Kathleen Ho, Deputy Director  
2827 Waimano Home Road  
Hale Ola Building, Room 222  
Pearl City, HI 96782-1487  
Attention: Katt Marshall, Clean Air Branch

Dear Ms. Ho:

**West Loch Estates WWPS Upgrade Project Draft Environmental Assessment (DEA)**  
**Chapter 343, HRS Comment Period: January 23 to February 24, 2025**  
**91-1024 Kapapapuhi Street, 'Ewa**  
**TMK no: 9-1-181: portion of 001**

Thank you for your email response dated February 7, 2025 for the proposed update of the West Loch Estates Wastewater Pump Station (WWPS) in the 'Ewa District of O'ahu.

In accordance with your request, we are including appropriate discussion regarding the proposed project construction activities to be conducted in compliance with the July 3, 2024 published State of Hawai'i Department of Health Clean Air Branch Hawai'i Administrative Rules (HAR), Chapter 11-59 and 11-60.1 regarding control of fugitive dust.

We appreciate your comments as a part of the Chapter 343 HRS Draft EA review process. A copy of this along with all comment and response letters are included in the project Final EA.

Sincerely,



Colette M. Sakoda, Planner  
Environmental Planning Solutions, LLC

cc: June Nakamura, Kaula AE LLC  
Paul Gamble, ENV

JOSH GREEN, M.D.  
GOVERNOR  
KE KIA'AINA



STATE OF HAWAI'I | KA MOKU'AINA 'O HAWAI'I  
DEPARTMENT OF TRANSPORTATION | KA 'OIHANA ALAKAU  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813-5097

EDWIN H. SNIFFEN  
DIRECTOR  
KA LUNA HO'OKELE

Deputy Directors  
Na Hope Luna Ho'okele  
DREANALEE K. KALILI  
TAMMY L. LEE  
CURT T. OTAGURO  
ROBIN K. SHISHIDO

IN REPLY REFER TO

DIR0001304  
STP 8.3893

February 24, 2025

VIA EMAIL: paul.gamble@honolulu.gov

Roger Babcock, Jr., Ph.D., P.E., Director  
City and County of Honolulu  
Wastewater Engineering and Construction Division  
Department of Environmental Services  
650 South King Street, 14" Floor  
Honolulu. Hawaii 96813

Attention: Mr. Paul Gamble, Engineer

Dear Dr. Babcock:

Subject: Draft Environmental Assessment (EA)  
West Loch Estates Wastewater Pump Station (WWPS) Upgrade  
Ewa Beach, Oahu, Hawaii  
Tax Map Key: (1) 9-1-181: 001(portion)

Thank you for your letter, dated January 17, 2025, requesting the Hawaii Department of Transportation's (HDOT) review and comments on the subject project. HDOT understands the City and County of Honolulu, Department of Environmental Services, Wastewater Engineering and Construction Division is proposing to improve the aging condition of the West Loch Estates WWPS located in the Ewa District of Oahu.

In reviewing the project description and location in the Draft EA, HDOT's position remains the same as our prior review during the pre-assessment consultation in letter STP 8.3825, dated September 13, 2024. Please include a copy of the HDOT's comments and appropriate responses in the Final EA.

Please submit any subsequent land use entitlement-related requests for review or correspondence to the HDOT Land Use Intake email address at DOT.LandUse@hawaii.gov.

If there are any questions, please contact Mr. Blayne Nikaido, Planner, Land Use Section of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Edwin H. Sniffen".

EDWIN H. SNIFFEN  
Director of Transportation

## *Environmental Planning Solutions, LLC*

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June 2, 2025

Department of Transportation  
Edwin Sniffen, Director  
Statewide Transportation Planning Office  
200 Rodgers Blvd  
Honolulu, Hawaii 96819  
Email: [dotpao@hawaii.gov](mailto:dotpao@hawaii.gov)

Dear Mr. Sniffen:

**West Loch Estates WWPS Upgrade Project Draft Environmental Assessment (DEA)**  
**Chapter 343, HRS Comment Period: January 23 to February 24, 2025**  
**91-1024 Kapapapuhi Street, 'Ewa**  
**TMK no: 9-1-181: portion of 001**

Thank you for your comment letter dated February 24, 2025, for the proposed update of the West Loch Estates Wastewater Pump Station (WWPS) in the 'Ewa District of O'ahu.

The following are our responses to your comments:

Comment: HDOT's position remains the same as our prior review during the pre-assessment consultation letter STP 8.3825, dated September 13, 2024. Please include a copy of the HDOT's comments and appropriate responses in the Final EA.

Response: Noted. As contained in Section 5.14.1.2 Roads and Transportation Potential Impacts and Proposed Mitigation in the DEA and is also included in the FEA.

Comment: Please submit any subsequent land use entitlement-related requests for review or correspondence to the HDOT Land Use Intake email address to [DOT.LandUse@hawaii.gov](mailto:DOT.LandUse@hawaii.gov).

Response: Noted.

We appreciate your comments as a part of the Chapter 343 HRS Draft EA review process. A copy of this along with all comment and response letters are included in the project Final EA.

Sincerely,



Colette M. Sakoda, Planner  
Environmental Planning Solutions, LLC

cc: June Nakamura, Kaula AE LLC  
Paul Gamble, ENV

HONOLULU FIRE DEPARTMENT  
EA 'OIHANA KINAI AHI O HONOLULU  
CITY AND COUNTY OF HONOLULU

636 SOUTH STREET • HONOLULU, HAWAII 96813  
PHONE: (808) 723-7139 • FAX: (808) 723-7111 • WEBSITE: honolulu.gov

RICK BLANGIARDI  
MAYOR  
MEIA



SHELDON K. HAO  
FIRE CHIEF  
*LUNA NUI KINAI AHI*

JASON SAMALA  
DEPUTY FIRE CHIEF  
*HOPE LUNA NUI KINAI AHI*

January 29, 2025

Ms. Colette Sakoda, Planner  
Environmental Planning Solutions, LLC  
945 Makaiwa Street  
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

**Subject: West Loch Estates Wastewater Pumping Station Upgrade Project  
Draft Environmental Assessment**

In response to your letter received on January 22, 2025, regarding the abovementioned subject, the Honolulu Fire Department (HFD) reviewed the submitted information and requires that the following be complied with:

1. Fire apparatus access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire apparatus access roads as measured by an approved route around the exterior of the building or facility. (National Fire Protection Association [NFPA] 1; 2021 Edition, Sections 18.2.3.2.2).

A fire apparatus access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2021 Edition, Section 18.2.3.2.1.).

2. Fire apparatus access roads shall be in accordance with NFPA 1; 2021 Edition, Section 18.2.3.

3. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2021 Edition, Sections 18.3 and 18.4.
4. Civil drawings submitted to your department shall be routed to the HFD for review and approval.

The requirements above are required by the HFD. This project may have additional requirements to be met as determined by other agencies.

Should you have questions, please contact Battalion Chief Pao-Chi Hwang of our Fire Prevention Bureau at 808-723-7151 or [hfdfpb1@honolulu.gov](mailto:hfdfpb1@honolulu.gov).

Sincerely,



CRAIG UCHIMURA  
Assistant Chief

CU/MD:sk

cc: Mr. Paul Gamble, Engineer  
Department of Environmental Services

June 2, 2025

Fire Department  
Sheldon K. Hao, Fire Chief  
636 South Street  
Honolulu, HI 96813-5007  
Attention: Assistant Chief Craig Uchimura

Dear Fire Chief Hao:

**West Loch Estates WWPS Upgrade Project Draft Environmental Assessment (DEA)**  
**Chapter 343, HRS Comment Period: January 23 to February 24, 2025**  
**91-1024 Kapapapuhi Street, ‘Ewa**  
**TMK no: 9-1-181: portion of 001**

Thank you for your comment letter dated January 29, 2025 for the proposed update of the West Loch Estates Wastewater Pump Station (WWPS) in the ‘Ewa District of O‘ahu.

The following are our responses to your comments:

1. Fire apparatus access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 feet (46 meters) from fire apparatus access roads as measured by an approved route around the exterior of the building or facility (National Fire Protection Association (NFPA) 1; 2021 Edition, Sections 18.2.3.2.2).

A fire apparatus access road shall extend to within 50 feet (15 meters) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; 2021 Edition, Section 18.2.3.2.1).

Response: The existing pump station building is located adjacent to the park access driveway which also serves as the fire apparatus access road.

2. Fire apparatus access roads shall be in accordance with NFPA 1; 2021 Edition, Section 18.2.3.

Response: The existing park access driveway serves as a fire access road. Proposed construction does not significantly impact the access driveway.

3. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into the jurisdiction. The approved water supply shall be in accordance with NFPA 1; 2021 Edition, Section 18.3 and 18.4.

Response: Existing fire hydrant FH-#L4287 located along the access driveway, directly south of the pump station building, is approximately 50 feet away.

## *Environmental Planning Solutions, LLC*

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4. Civil drawings submitted to your department shall be routed to the HFD for review and approval.

Response: Noted.

We appreciate your comments as a part of the Chapter 343 HRS Draft EA review process. A copy of this along with all comment and response letters are included in the project Final EA.

Sincerely,



Colette M. Sakoda, Planner  
Environmental Planning Solutions, LLC

cc: June Nakamura, Kaula AE LLC  
Paul Gamble, ENV

