DRAFT ENVIRONMENTAL ASSESSMENT

for

AALA SHIP SERVICE WAREHOUSE ADDITION

Honolulu, Oahu, Hawaii

Prepared Pursuant to Chapter 343,
Hawaii Revised Statutes (HRS)

by

Environmental Communications, Inc.

For

Aala Ship Service
Department of Transportation, Harbors Division

October 2009

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I. PROJECT SUMMARY

APPLICANT:	Aala Ship Service 869 N. Nimitz Highway Honolulu, Hawaii 96817
ACCEPTING AGENCY:	State of Hawaii Department of Transportation 869 Punchbowl Street Honolulu, Hawaii 96813
ENVIRONMENTAL CONSULTANT:	Environmental Communications, Inc. 1188 Bishop Street, Suite 2210 Honolulu, Hawaii 96701
PROJECT NAME:	Aala Ship Service Warehouse Building
PROJECT LOCATION:	869 N. Nimitz Highway Honolulu, Hawaii 96817
TAXMAPKEY/ OWNERSHIP:	1-5-035: 007 por. State of Hawaii Department of Transportation Harbors Division
AREA:	53,918 square feet 1.237 acres
ZONING:	I-3 Waterfront Industrial
STATE LAND USE:	Urban District
CURRENT LAND USE:	The project site presently consists of a vacated industrial lot that was formerly used for refrigerated storage. The lot is paved and structural elements of the former warehouse remain. No industrial uses occur on the property but the warehouse foundation area is used for automobile parking.
PROJECT SCOPE:	The proposed action consists of the construction of a warehouse building for the Aala Ship Service complex. This warehouse structure will consists of a metal building with the dimensions of 60x165 feet for a total of 9,900 square feet of floor area. The structure will feature two roll up doors for access

and a single toilet room. The warehouse is intended for storage and holding of overflow items that cannot be accommodated in the existing Aala Ship Service warehouse.

PROJECT COST/PHASING

The total project cost, inclusive of land is approximately $2,000,0000 and will be privately financed.

The proposed project will be conducted in a single continuous phase.

II. PROPOSED PROJECT AND STATEMENT OF OBJECTIVES

A. Project Location

The proposed action is located on industrial lands owned by the State of Hawaii Department of Transportation Harbors Division. The project site is located within the waterfront industrial complex identified as TMK 1-5-035: por. 007 along the makai side of Nimitz Highway (Figures 1 and 2). Piers 34 and 35 are located to the west, and Piers 29 through 33 are located south of the project site. The Aala Ship Service project site is not located on the waterfront but is centrally located to the aforementioned Piers. Two smaller warehouse structures and an open parcel are located immediately to the north while a large storage tank is located to the east. The western boundary of the site is used as an automobile storage lot.

The site is presently unused except for a few unmarked parking stalls that are located within the framework of the former cold storage facility that used to occupy the site.

B. Project Description

The proposed action consists of the clearing of the existing remnant structure and the construction of an at grade warehouse of approximately 9,900 square feet. This simple metal structure will be located at grade and will not require any significant excavation as the site is already graded and paved. The structure will be 165 feet in length, 60 feet wide and approximately 30 feet high at the ridgeline. The structure will consist of metal supports and metal siding. Two roll up doors and two standard building doors will provide access to the warehouse. The metal roof will include skylights. Interior improvements will be limited to a single toilet room. All improvements will occur at existing grade level and no shipping containers are expected to be off-loaded directly into the new warehouse. Required parking will be located between the new structure and the existing warehouse facility. See Figures 3 through 7.

Aala Ship Service is a ship chandler that supplies marine equipment, durable goods, provisions and supplies and stores bonded stores. The warehouse will be used for the storage of durable goods, provisions and bonded stores. Provisions, durable goods and equipment are delivered to ships in port by trucks and trailers. All equipment, stores and supplies are kept under secured cover in the existing warehouse. These items are delivered and received at a loading dock. The new warehouse facility will provided expanded storage and faster access. No new business activities are anticipated with the construction of the new warehouse building.

C. Project Objective and Need for Action

The objective of the proposed action is to create additional covered storage for goods that cannot be accommodated in the existing Aala Ship Service warehouse.

The subject Environmental Assessment is prepared in conformance with Chapter 343 Hawaii Revised Statutes, as the project will involve the use of State lands. The property is owned in fee by the State of Hawaii Department of Transportation Harbors Division. The State Department of Transportation will serve as the accepting authority for the subject Environmental Assessment.

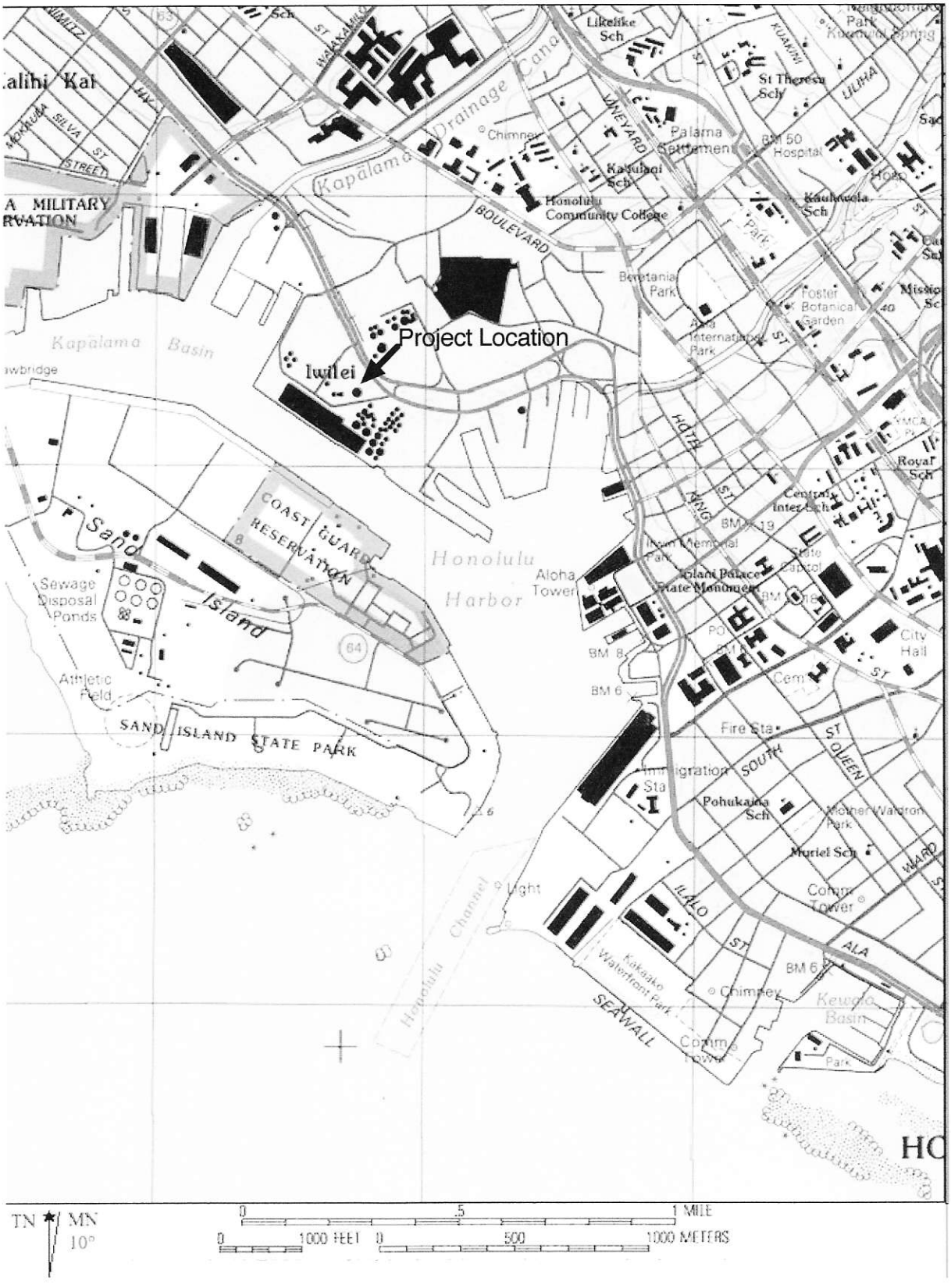

Figure 1: Location Map

Source: US Geological Service

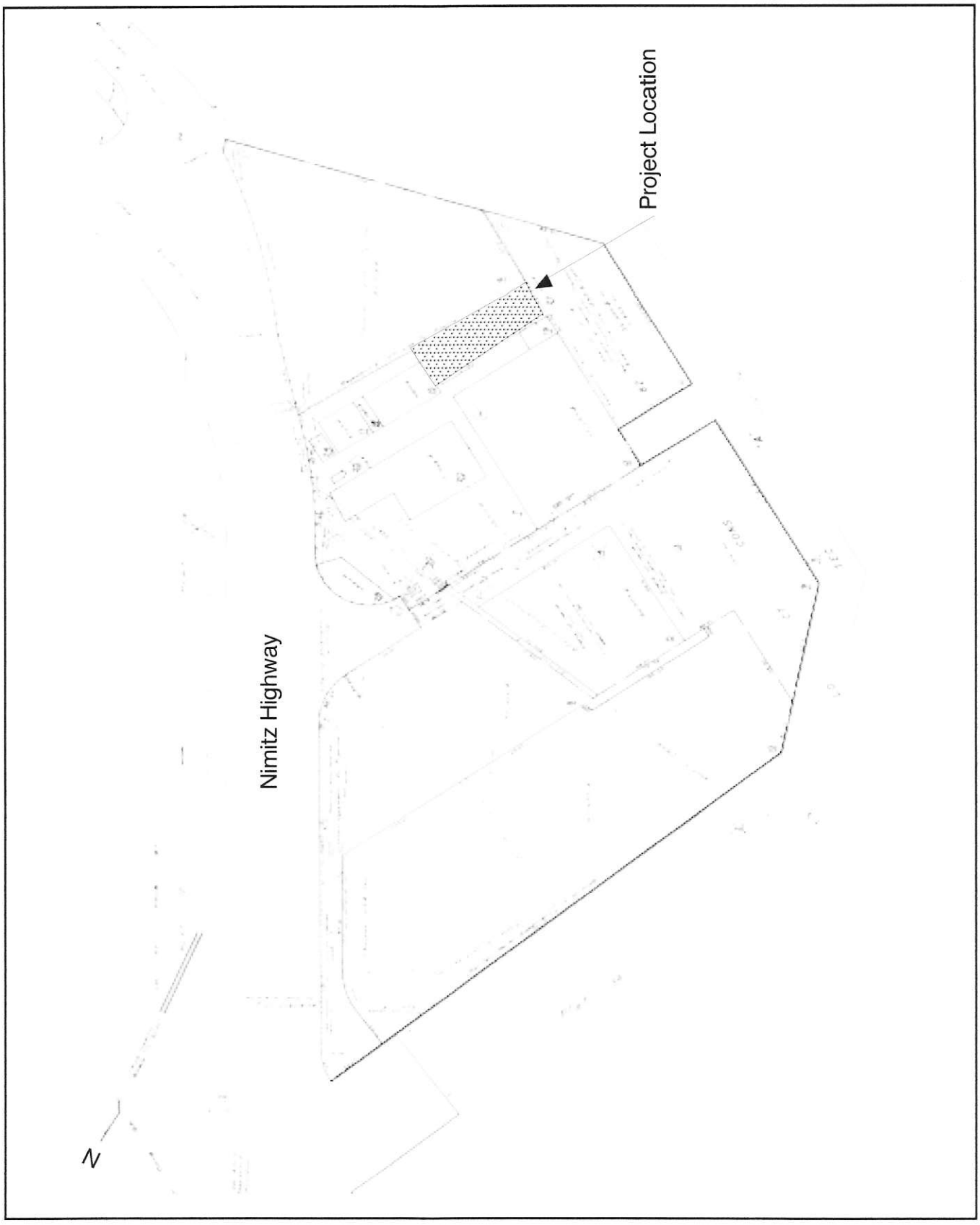

Figure 2: Tax Map

Source: City and County of Honolulu

NORTH

SITE PLAN
SCALE: 1/16" = 1'-0"

Figure 3: Site Plan

Revision	By	Date	

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Checked
Designed
Drawn
Date MARCH 2008
Project
Title SITE PLAN

NEW WAREHOUSE BUILDING
FOR
A'ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY,
'IWILEI, HAWAII 96817
TAX MAP KEY: 1-5-035:012

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3/7/08 PHASE I

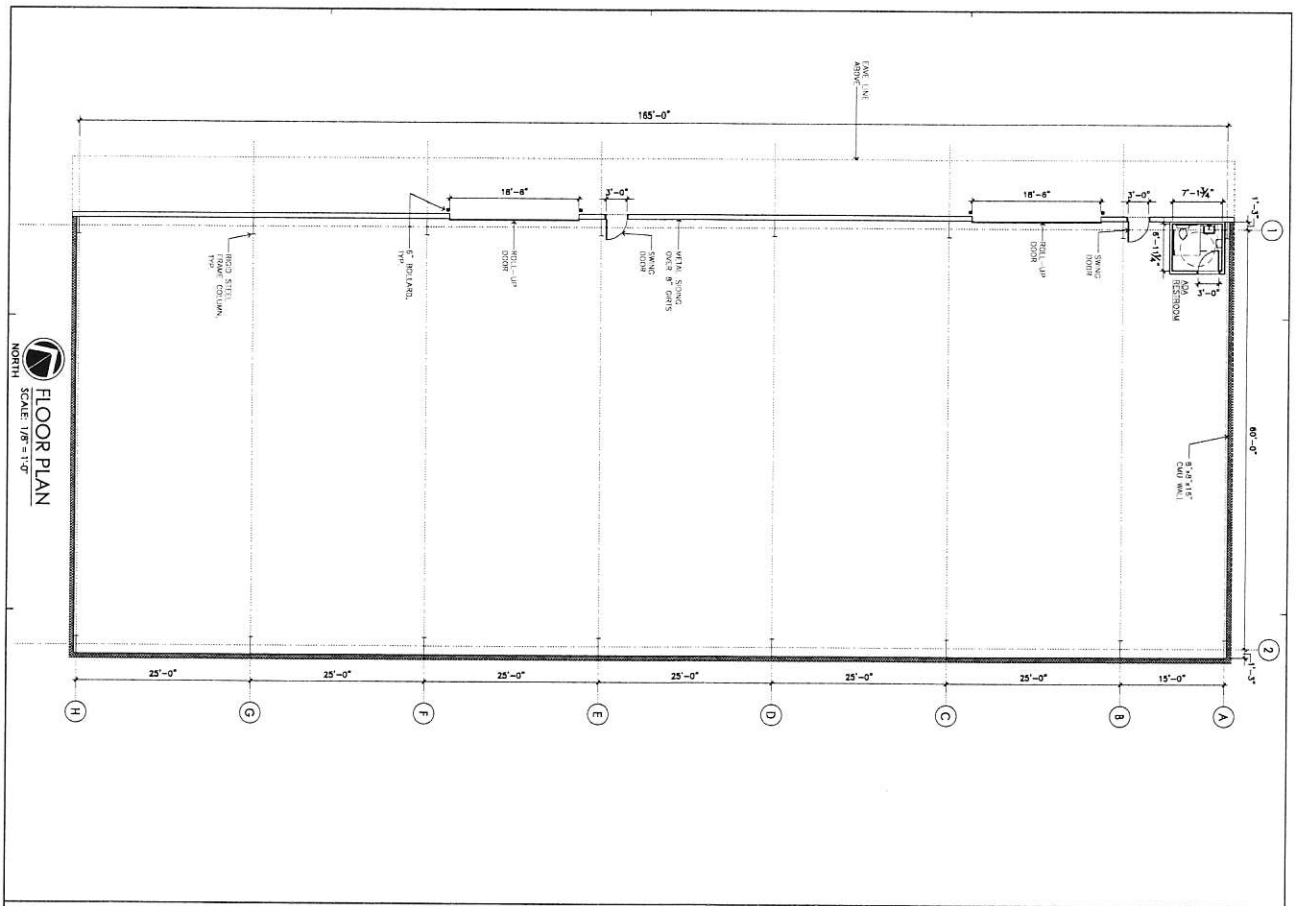

Figure 4: Floor and Roof Plan

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Project	
Title	FLOOR & ROOF PLANS

Revision	By	Date

NEW WAREHOUSE BUILDING
FOR
A'ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY,
'IWILEI, HAWAII 96817
TAX MAP KEY: 1-5-035:012

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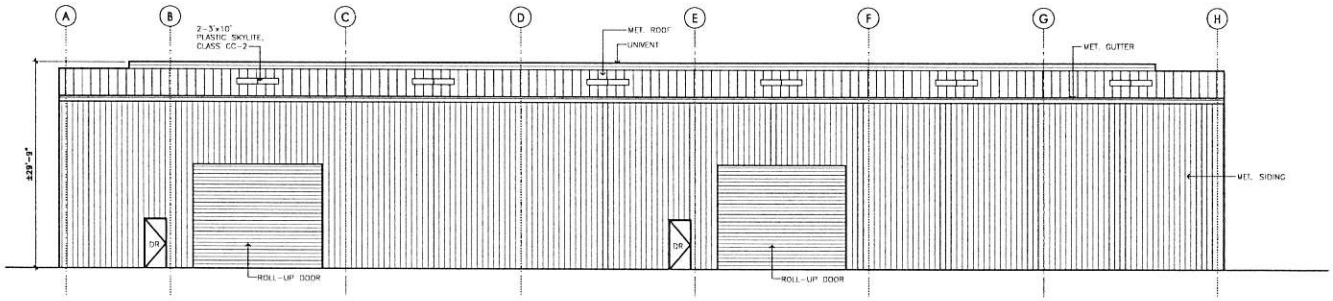
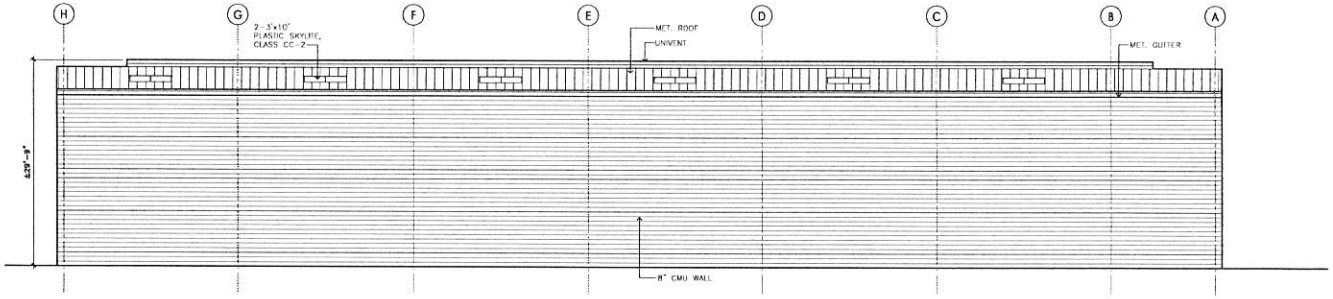
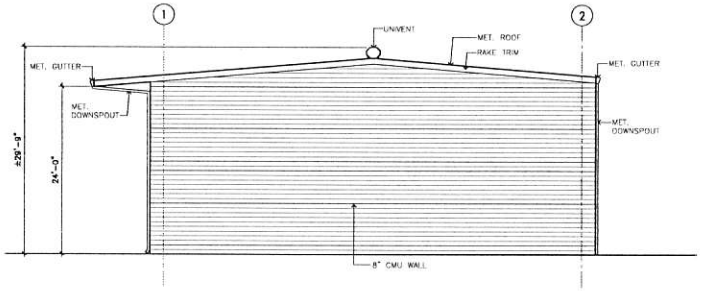


FRONT ELEVATION
SCALE: 1/8" = 1'-0"



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



RIGHT ELEVATION (LEFT ELEV. SIM./OPP.)
SCALE: 1/8" = 1'-0"

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869 NORTH NIMITZ HIGHWAY,
'IWILEI, HAWAII 96817
TAX MAP KEY: 1-5-035:012

Revision	By	Date

EXTERIOR ELEVATIONS

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Project
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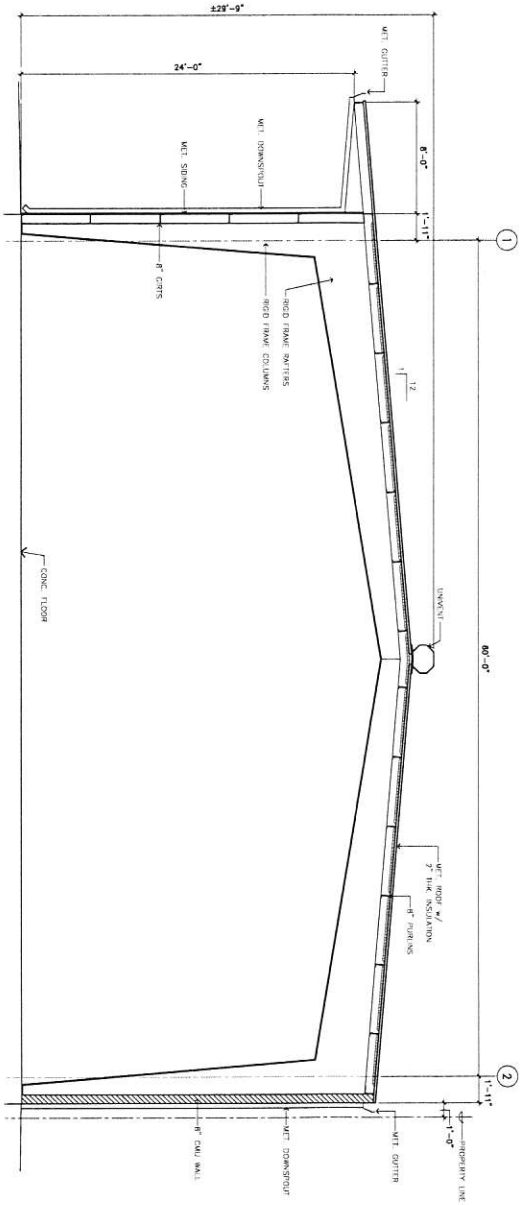
Figure 5: Elevations



CROSS SECTION
SCALE: 1/4" = 1'-0"

Figure 6: Building Section

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NEW WAREHOUSE BUILDING
FOR
A'ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY,
'IWILEI, HAWAII 96817
TAX MAP KEY: 1-5-035:012

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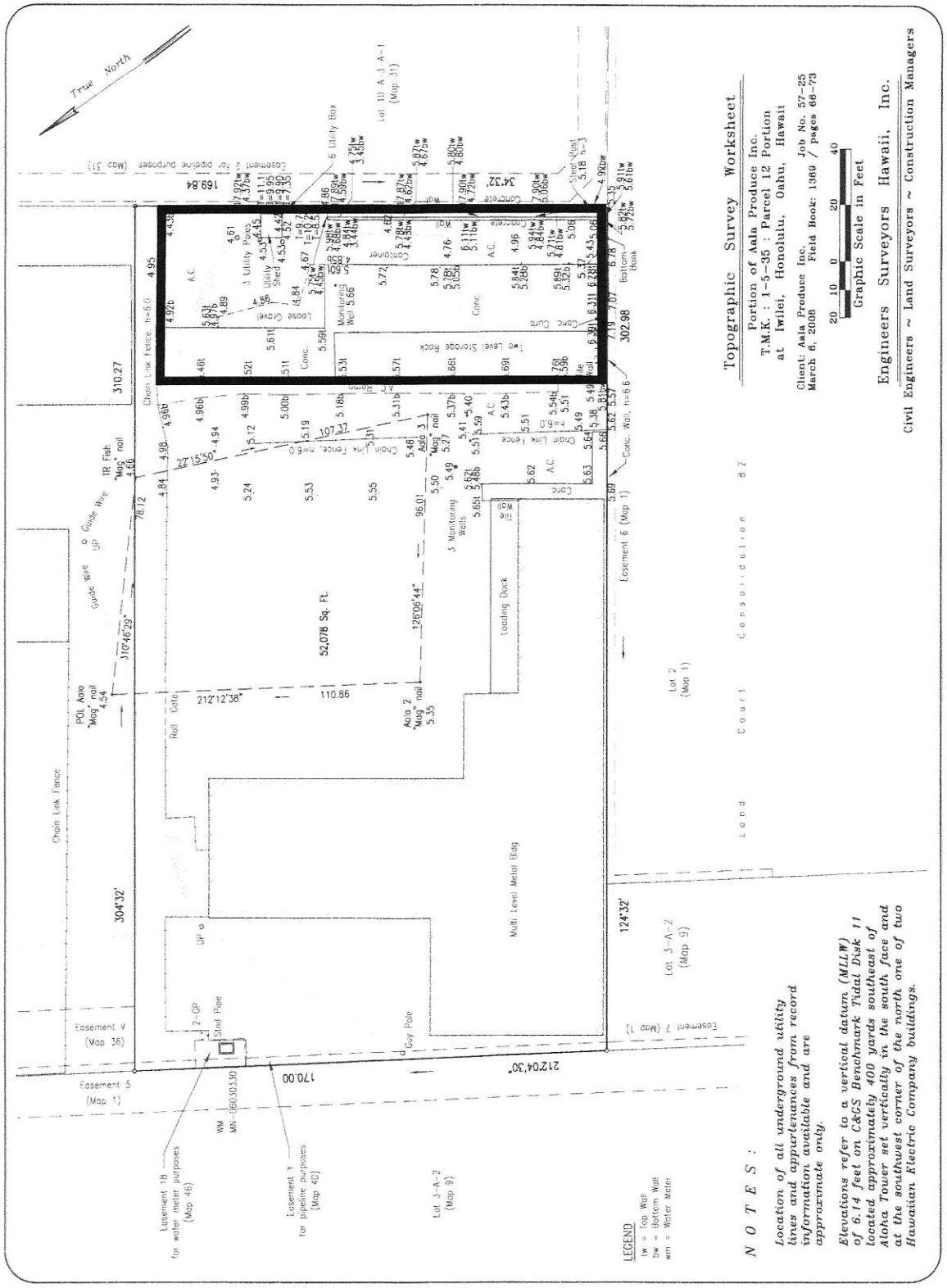

Figure 7: Topographic Survey Map

Source: Engineers Surveyors Hawaii

III. DECRIPTION OF ANTICIPATED IMPACTS

A. Environmental Setting

The project site consists of 0.873 acres of Waterfront Industrial zoned lands located immediately makai of Nimitz Highway. Piers 34 and 35 are located to the west, and Piers 29 through 33 are located south of the project site. The area is characterized by its heavy industrial uses.

Typical uses in the project vicinity consist of industrial fuel and liquid storage, shipping, packaging and storage warehouses and automobile storage lots. This working environment is not readily accessible to the general public and the project site is subject to monitoring and security measures due to its location near the harbor.

The project site is not a scenic resource nor does it serve as a natural resource. The area is not well suited for residential or retail use nor are these uses allowed by the zoning code. Across Nimitz Highway lie other similar uses and some commercial uses that are more accessible to the public.

B. Surrounding Uses

The area surrounding the project site is characterized by industrial and waterfront uses. Further to the north lie the Iwilei and Kalihi industrial areas. The Kalihi Kai industrial area lies to further to the west beyond the Kapalama Stream. Further south, across the Kapalama Channel lays Sand Island, which also contains industrial, public facilities and recreational uses. Chinatown and downtown Honolulu lie to the east across Nuuanu Stream. The proposed use is consistent with the immediate surroundings as well as the general character of the entire district.

C. Environmental Considerations

1. Geological Characteristics

Topography

The project improvement area is flat and open, as it had been previously improved with a cold storage facility. The majority of the site that will contain the warehouse is covered with a concrete pad. The remaining areas are paved with asphalt. Various weedy species of flora are located along the concrete and asphalt seams. Debris and relatively small amounts of remnant material from the former use remain on site.

A steel and concrete structure from the former use is presently used as a parking garage for five automobiles. The steel frame building is topped with a concrete pad but is not used for storage purposes. A concrete block wall is attached at the makai end of the structure.

The eastern boundary of the project site is bounded by a concrete wall approximately 8-feet in height. This wall serves as a containment barrier for the storage tank located on the adjacent parcel. Three wood poles elevate a transformer platform that is located along the northeastern corner of the property. This transformer bank and the attached electrical lines will need to be relocated prior to construction of the warehouse building. See Figure 7.

The proposed warehouse addition will result in the loss of some open space however the structure will not result in the loss of any scenic views from public access points. The site is in industrial use and warehouse structures are normative for this use. The existing open space areas did not serve as a visual resource.

Climate

The geography of the Honolulu District is typically warm and dry in climate. Prevailing trade winds arrive from the northeast. 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 month 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.

USDA Soil Survey Report

According to panel 62 of the *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* by the US Department of Agriculture Soil Conservation Service, the project site is located primarily on soils classified as Fill Lands, Mixed (FL). This land type occurs primarily near Pearl Harbor and Honolulu. It consists of dredged material, garbage and general excess material. This land type is used for urban development including industrial facilities.

Air Quality and Noise Environment

The ambient air quality of the project site is typical of the industrial nature of the site. No point source pollution sources have been identified in the general area and typical trade winds ensure that air quality remains within acceptable standards as recorded by the Department of Health air quality monitors. Fish odors were noted during a site visit and anecdotal reports stated that the odors were caused by

a fish processing plant located immediately north of the project site. The processing plant has subsequently been closed and odors are not expected to continue in the long-term.

Air quality impacts from the construction and operation of the new warehouse are expected to be minimal to insignificant. During the construction period, gasoline or diesel powered heavy equipment will be required to transport and erect the building. Air quality degradation from the operation of this equipment will be negligible and temporary. In the long-term, no additional freight shipments are expected beyond the existing average of two trailer/containers per day. No long-term air quality impacts should occur from the operation of the new warehouse.

The noise environment will be minimally affected by the new warehouse. Storage and moving activities occur primarily indoors or within the confines of the Aala Ship Service complex. The addition of the new warehouse will ensure that noise levels are attenuated even further as the new warehouse will contain the eastern boundary of the site and will prevent any activity noise from traveling further east. All activities will continue to adhere to State Department of Health community noise standards.

2. Water Resources

Hydrologic Hazards and Resources

According to Panel 150001 0115C of the Federal Emergency Management Agency Flood Insurance Rate Map, the entire project area is located in Zone X, an area where flood hazards are undetermined. See Figure 9.

Special Management Area

The project site is not located within the Special Management Area (SMA).

Water Quality

The project will not adversely affect water quality as the purpose of the project is to provide stored goods and equipment with environmental protection. Site drainage will not be affected as the existing site is already completely paved.

3. Archaeological, Cultural, Botanical and Faunal Resources

Archaeological Resources

As stated earlier, the project site is located on mixed fill lands that consist entirely of materials that were brought to the current location. As such no archaeological or historic materials are expected to exist on the project site.

In the unlikely event that any archaeological artifacts are uncovered, all work will cease and the Department of Land and Natural Resources Historic Preservation Division will be notified for appropriate action.

Cultural Resources

The Honolulu Harbor area has historically been a heavily used seaport and trade center. This is well recorded and documented but specific to the project site, no cultural activities are known to have occurred on the subject area. As stated in the preceding paragraph, the site was created by introduced fill material and cultural activities, if any, have not occurred on the site since the time the site was hardened and used for industrial use.

Flora

The majority of the project site is covered with concrete or asphalt paving. Various weedy species were found along the boundary and within cracks in the paved surfaces. These are considered noxious weeds and will be removed prior to any project improvements. No rare, threatened or endangered species of flora were observed within the project site. Invasive species from foreign plants are not expected to be a problem as goods moved and stored at the facility are dry goods that are unlikely to harbor undesirable species.

Fauna

The site does not serve as an endangered wildlife habitat although avifauna, feral cats, and rodents may be found on-site. No fauna was observed during site visits and no rare or endangered species of avifauna were identified.

4. Infrastructure and Utilities

The proposed improvements are not expected to have a significant impact on existing infrastructure and utilities.

Vehicular Access and Traffic Conditions

Vehicular access to the project site is provided through a driveway located off of Nimitz Highway. This driveway serves as the primary interior circulation for the Pier 35 area but is not well marked as a roadway. The area is generally paved and provides easy access for large trailers and trucks that serve the surrounding lots.

The proposed warehouse addition will not alter existing internal circulation nor will it place any additional demand for internal and highway access circulation. The proposed improvement is intended for storage purposes of current shipped goods and is not an expansion of the existing business. Nine parking stalls will be included in the scope of the proposed project. Loading areas for the new

warehouse will use existing on-site circulation patterns and will not affect existing operations.

No additional traffic within the Pier 35 area or Nimitz Highway will be generated as a result of the operations of the completed project. Cumulative impacts to the project area are also not expected to increase as a result of the construction of the new warehouse. Limited direct impacts will be experienced during the construction phase of the project as construction vehicles and workers will require access to the site. Early consultation with the Department of Transportation Highways Division indicated that no highway impacts were anticipated. The Highways Division will be retained as a party to be consulted during the EA process.

Water

The proposed improvements will have minimal impact on municipal potable water resources. A single toilet room will be included in the warehouse with a total of two water fixtures.

Wastewater

Wastewater for the project site will be accommodated by the existing municipal wastewater system. The total wastewater demand for the proposed action is limited to the additional two water fixtures included within the scope of the proposed improvements.

Drainage

The majority of the site is paved and is relatively flat. The proposed action will not result in the loss of any permeable surfaces as the site is already paved. Stormwater generally flows from south to north where it is received by an area identified as Easement V which directs flow into the State municipal storm drain system. Drainage is not directed onto other properties.

Solid Waste

Solid waste disposal will be collected by a private hauler and disposed of at an approved County refuse site.

Telephone and Electrical Services

Telephone and electrical services are available for the project via mainlines located along Nimitz Highway. The demand for telephone and electrical service is not expected to be significant for this skylight-illuminated facility.

5. Public Facilities

The proposed project will not have any significant impact on public facilities including schools, police, and fire or emergency medical services.

Kalihi Kai Fire Station Number 31 provides fire protection and first response emergency and rescue service to the project area. The station is located at 1334 Nimitz Highway, approximately one half mile from the project site. Response time to the site is approximately 5 minutes. An engine, ladder and rescue company serve this station.

Ambulance service for the project vicinity is provided by City and County of Honolulu Emergency Medical Service Charlie 1 unit operating out of St. Francis Hospital in Liliha or the Aiea unit located at Pali Momi Hospital. Response time to the project area is approximately 5 to 10 minutes.

Police service in the project area is part of the Honolulu Police Department's District 5. The district's administrative offices are located at the Kalihi Police Station.

D. Social and Economic Characteristics

The proposed action will not have significant social impact to the surrounding area. The project consists of a simple warehouse building that will be used for the safe keeping of transported goods in a dry and secure location.

The project will have some beneficial economic impacts. The construction of the facility will create short-term employment, the purchase of goods and services, the generation of excise and income taxes, and other secondary and tertiary effects as a result of the project expenditures.

The long-term operations of the facility will provide a safe and secure area to store goods awaiting transport to their final destination. The warehouse is critical in maintain the value of the goods in a dry, controlled facility.

E. Relationship to Plans, Codes and Ordinances

The project site is also zoned I-3 waterfront industrial use as specified under the City and County of Honolulu Zoning Map. Under the prevailing industrial and port related uses are permitted.

The proposed action is consistent with Sections II. Economic Activity and Section V. Transportation and Utilities of the City and County of Honolulu General Plan. The proposed warehouse addition will allow the continued operation of ship

chandelling by a local company supporting the local economy. The services provided by the applicant also ensure that ship transit times are keep efficient and timely.

The State Land Use Boundary Maps show the project locations to be in Urban use. The project is not located within the Special Management Area (SMA).

The project is also consistent with the objectives of the Hawaii State Plan particularly with respect to the objectives and policies of the economy. The provided services support trade, visitor and transportation industries and are a critical service to Hawaii.

The State of Hawaii Department of Transportation Oahu 2020 Master Plan is a plan for Oahu's commercial harbors. In this regard, the proposed action fully supports the Plan's objectives of meeting the future operational requirements of Honolulu's commercial harbor users. The proposed action will enhance harbor capacity and will provide a safe and secure environment. The proposed action will also promote Hawaii's economy through support of cargo and tourism operations as well as support maritime commercial operations in an efficient and productive manner.

The proposed improvements will require a number of County permits.

- Demolition Permit for the removal of the existing structure
- Building, Electrical and Plumbing Permits

Work on the proposed improvements will not commence until the demolition and building permits and the environmental assessment process are completed.

F. Probable Impact on the Environment

The proposed improvements will result in a more intensive use of the existing unused space. While the proposed use is greater than its current non-use, the subject property is zoned for industrial development and is also designated as an urban site on the State Land Use Map. As such, reasonable development of the site must be expected.

Construction and operation of the new warehouse facility will improve the general character of the area through its continued use and maintenance. In its current unused condition, the site is not well maintained and provides little value to the State or businesses operating in the project area.

Other offsetting impacts are the creation of short-term and long-term employment both on property and off-property, the generation of additional revenues to the

State of Hawaii and the lessee and the resultant secondary and tertiary spending and tax collections that will likely be experienced in the community.

G. Adverse Impacts Which Cannot be Avoided

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

Minor grading will be required for the construction of the project improvements. This work will create dust, noise and a minor traffic nuisance during the course of construction. Paving of the roadways will also require the use of heavy machines that will enter the project site. Traffic control measures will be used to minimize the disruption of traffic during the construction period.

The harbor port area is industrial in nature and there remains a possibility that some contaminated soils remain within the project site. No significant excavation is required for the project however in the event that any contaminated materials are discovered during the course of construction, work will cease, the Department of Transportation Harbors Division will be notified, and appropriate assessment and remediation measures will be taken.

H. Alternatives to the Proposed Action

Alternatives considered for the project were limited to uses allowed in the limited industrial zoning district which could be more disruptive and less visually appealing than the proposed project. Under I-3 zoning uses as intensive as automobile sales and repair, construction material storage, light manufacturing and warehousing are permissible. These uses were generally not consistent with the intent of the applicant and were therefore dismissed from further consideration.

The no-action alternative was not considered as non-action would not provide any value to the owner or with the owner's objectives of creating protected storage for ship stores.

I. Mitigation Measures

Long-term impacts resulting from the proposed improvements are expected to be minimal or non-existent based upon the subject environmental assessment. Long-term air and noise impacts are not expected to change significantly after improvements are completed. Traffic conditions will not change, as there will not be any new demand for access to the project site. Short-term construction-related

noise and air quality impact mitigation measures include general good housekeeping practices and scheduled maintenance to avoid a prolonged construction period. The contractor will be directed to use best management practices (BMP) wherever applicable.

Examples of BMPs that may be implemented include watering during demolition and clearing and the containment of any runoff during the construction period. All waste materials will be securely contained and appropriately disposed.

J. Irreversible and Irretrievable Commitment of Resources

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

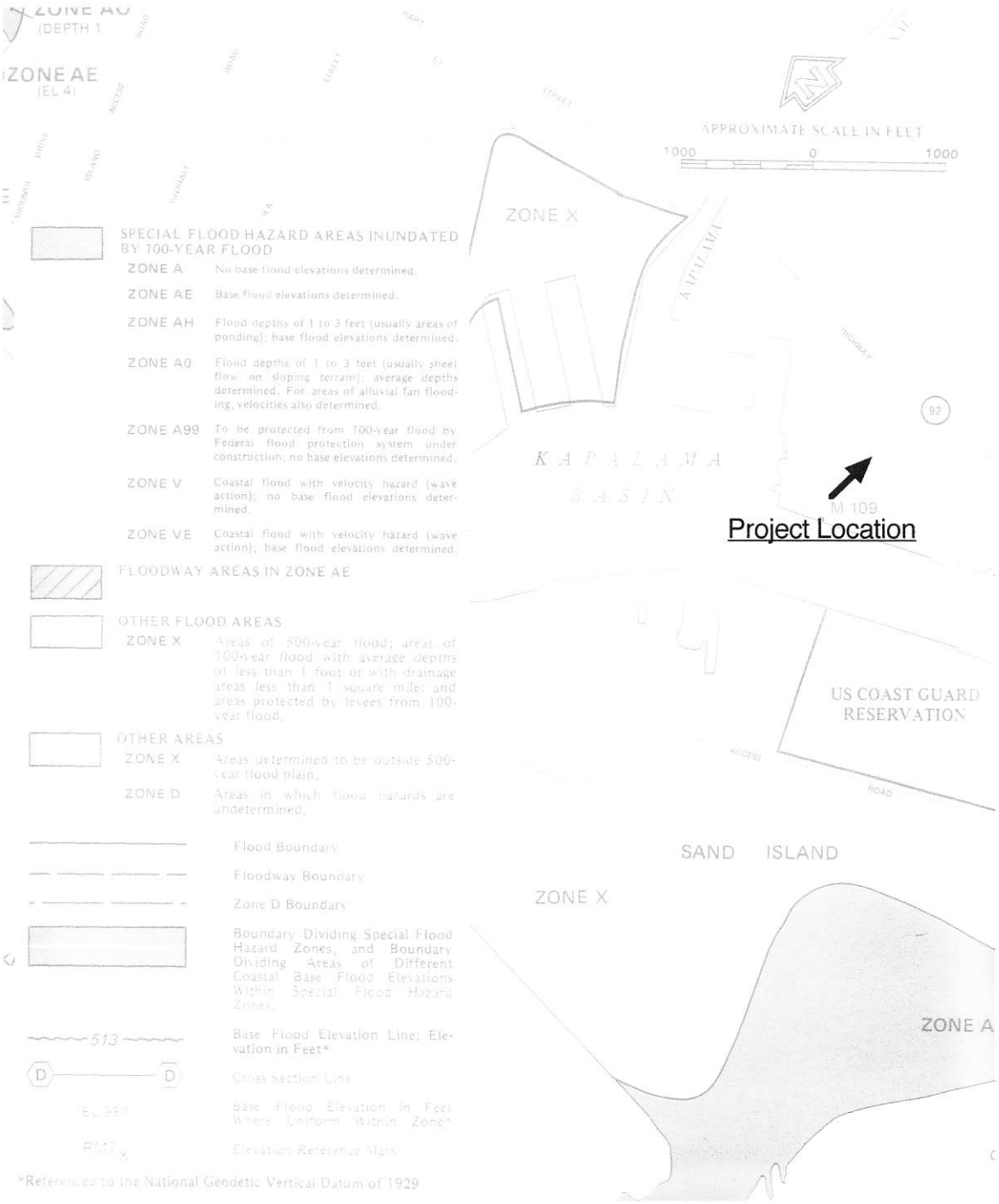

Figure 9: FIRM Map

Source: FEMA

IV. REASONS SUPPORTING FINDING OF NO SIGNIFICANT IMPACT

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

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

The proposed action will not involve the loss or destruction of any natural or cultural resource. The project site was previously completely developed and is devoid of any natural or cultural resources.

- Curtails the range of beneficial uses of the environment.

The proposed installation will not curtail any beneficial uses of the environment. The project area is not generally used by the public nor is it used as a recreational or cultural resource. Public access to the site is, in fact, restricted for safety and security reasons.

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

The proposed action is consistent with the goals and guidelines expressed in Chapter 343, Hawaii Revised Statutes. The proposed action is triggered by the use of State of Hawaii lands owned by the Department of Transportation. The subject Environmental Assessment has been developed in compliance with the Chapter 343.

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

The proposed action will make a positive contribution to the welfare of the County and State by creating employment during the construction period and will also benefit the State through increased tax revenue.

- Substantially affects public health.

The proposed improvements will not have a significant effect on public health. The project may promote health indirectly by providing a safe and secure area to store goods which may include consumables.

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

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

- Involves substantial degradation of environmental quality.

The proposed improvements will not involve the substantial degradation of environmental quality. The improvements proposed will have short-term impact on the environment; however, this is temporary in nature.

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

The proposed action is not a first phase of any larger action nor will it have a considerable effect on the environment. The project is expected to remain for the long-term and is not designed for larger expansion or other related development.

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

The proposed action will not affect any rare, threatened or endangered species of flora or fauna. The project site is not located near any wildlife refuge or sensitive environmental area.

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

The proposed action is not expected to impact air or water quality. Long-term noise levels may increase slightly due to the increased level of activity on the site. This impact is expected to be within acceptable levels of the surrounding industrial area.

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

Water quality will not be affected by the proposed action.

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

The proposed action will not affect any scenic vistas or view planes identified by the County or State.

- Require substantial energy consumption.

The project will not increase energy consumption. Energy utilization during the construction phase will increase through the use of fossil fuels used by construction vehicles. Operations of the facility will have minimal energy consumption. Skylights will provide lighting for the building and roof vents will be used for temperature control.

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

The project is not located in an area that will be adversely affected by hydrological hazards nor is the project anticipated to create any hazards to surrounding lands. Best Management Practices will be implemented to minimize or prevent erosion.

Anticipated Finding of No Significant Impact

Based on the above stated criteria, the applicant anticipates that the Department of Transportation (DOT) will determine that the proposed project will not have any significant adverse environmental impacts and that an Environmental Impact Statement will not be required for the proposed action. This Draft Environmental Assessment will be subject to public review and prescribed by Chapter 343 Hawaii Revised Statutes.

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

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

Department of Transportation
Harbors Division
State of Hawaii

Department of Planning and Permitting
City and County of Honolulu

Fire Department
City and County of Honolulu

Planning Department
City and County of Honolulu

Police Department
City and County of Honolulu

VI. LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS TO BE CONSULTED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT PROCESS

Date of Response

State of Hawaii Agencies

1. Dept. of Agriculture
2. Dept of Business, Economic Development and Tourism, Office of Planning
3. Dept of Health, Environmental Planning Office
4. Dept of Health, Clean Air Branch
5. Dept of Health, Clean Water Branch
6. Dept of Health, Noise, Radiation and Indoor Noise Branch
7. Dept of Land and Natural Resources
   Historic Preservation Division
8. Dept of Land and Natural Resources
   District Land Office
9. Dept. of Transportation Harbors Division
10. Office of Environmental Quality Control
11. Office of Hawaiian Affairs

City and County of Honolulu Agencies

1. Board of Water Supply
2. Department of Environmental Services
3. Department of Planning and Permitting
4. Department of Transportation Services
5. Fire Department
6. Police Department

Libraries

1. Hawaii State Library
2. Kalihi Public Library

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

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

Department of Transportation
Harbors Division
State of Hawaii

Department of Transportation
Highways Division
State of Hawaii

Department of Planning and Permitting
City and County of Honolulu

Fire Department
City and County of Honolulu

Planning Department
City and County of Honolulu

Police Department
City and County of Honolulu

VI. LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS TO BE CONSULTED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT PROCESS

Date of Response

State of Hawaii Agencies

1. Dept. of Agriculture
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3. Dept of Health, Environmental Planning Office
4. Dept of Health, Clean Air Branch
5. Dept of Health, Clean Water Branch
6. Dept of Health, Noise, Radiation and Indoor Noise Branch
7. Dept. of Health, Office of Hazard Evaluation and Emergency Response
8. Dept of Land and Natural Resources Historic Preservation Division
9. Dept of Land and Natural Resources District Land Office
10. Dept. of Transportation, Harbors Division
11. Dept. of Transportation, Highways Division
12. Office of Environmental Quality Control
13. Office of Hawaiian Affairs
14. University of Hawaii, Environmental Center

City and County of Honolulu Agencies

1. Board of Water Supply
2. Department of Environmental Services
3. Department of Planning and Permitting
4. Department of Transportation Services
5. Fire Department
6. Police Department

Libraries

1. Hawaii State Library
2. Kalihi Public Library

Other

1. URS Corporation, Iwilei District Project Coordinator

GEOTECHNICAL ENGINEERING EXPLORATION
NEW WAREHOUSE BUILDING FOR A`ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

W.O. 6045-00 OCTOBER 1, 2008

Prepared for

A`ALA SHIP SERVICE

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION.

Teddy S T Kwok 4-30-10
SIGNATURE EXPIRATION DATE
OF THE LICENSE

GEOLABS, INC.
Geotechnical Engineering and Drilling Services
2006 Kalihi Street • Honolulu, HI 96819

Hawaii • California

GEOTECHNICAL ENGINEERING EXPLORATION
NEW WAREHOUSE BUILDING FOR
A`ALA SHIP SERVICE
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NEW WAREHOUSE BUILDING FOR A`ALA SHIP SERVICE
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W.O. 6045-00 OCTOBER 1, 2008

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GEOLABS, INC.
Geotechnical Engineering and Drilling Services

October 1, 2008
W.O. 6045-00

Mr. Rodney Tamamoto
A`ala Ship Service
869 N. Nimitz Highway
Honolulu, HI 96817

Dear Mr. Tamamoto:

Geolabs, Inc. is pleased to submit our report entitled "Geotechnical Engineering Exploration, New Warehouse Building for A`ala Ship Service, 869 North Nimitz Highway, Honolulu, Oahu, Hawaii" prepared in support of the design of the new warehouse project.

Our work was performed in general accordance with the scope of services outlined in our fee proposal dated March 13, 2008.

Please note that the soil samples recovered during our field exploration (remaining after testing) will be stored for a period of two months from the date of this report. The samples will be discarded after that date unless arrangements are made for a longer sample storage period. Please contact our office for alternative sample storage requirements, if appropriate.

Detailed discussion and specific design recommendations for the project are contained in the body of this report. If there is any point that is not clear, please contact our office.

Very truly yours,

GEOLABS, INC.

Clayton S. Mimura, P.E.
President

CSM:TK:mj

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2006 Kalihi Street • Honolulu, Hawaii 96819
Phone: (808) 841-5064 • Facsimile: (808) 847-1749 • E-mail: hawaii@geolabs.net
Hawaii • California

GEOTECHNICAL ENGINEERING EXPLORATION
NEW WAREHOUSE BUILDING FOR A`ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

W.O. 6045-00 OCTOBER 1, 2008

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Based on our field exploration, the subsurface conditions at the project site generally consist of relatively thin surface fills, on the order of about 2.5 to 4 feet thick, placed over soft and/or loose lagoonal deposits extending to depths of about 7 to 8 feet below the existing pavement surface. Below the lagoonal deposits, the borings encountered hard coral formation starting at depths of about 9 to 11.5 feet and extending to the maximum depth explored of approximately 53 feet below the existing pavement surface. Petroleum odor was detected based on olfactory method (smell) between depths of about 4 and 8 feet below the pavement surface in some of the borings drilled. At the time of our field exploration, we encountered groundwater levels at depths varying from approximately 4.1 to 4.5 feet below the existing pavement surface.

Based on the subsurface conditions encountered and the moderately high building loads anticipated for the warehouse structure, we believe that the relatively thin fill crust and the soft and/or loose lagoonal deposits encountered at the project site would not provide adequate foundation support for the warehouse structure supported on a shallow foundation system (such as spread footings and/or a mat foundation) without appreciable settlements. Therefore, we recommend supporting the new warehouse structure on a deep foundation system.

Due to the space constraint at the new warehouse location and the relatively shallow depths of the bearing stratum, we believe that the use of driven pile or drilled shaft foundations would not be practical and economical for the project development. Therefore, we recommend utilizing micropiles to support the new warehouse structure. We believe that a cased micropile system with a minimum grout bulb diameter of 7.5 inches and a pile length of 30 feet (minimum 20 feet embedment into the hard coral formation) may be used to develop an allowable compressive load capacity of up to 80 kips per pile. In addition, a permanent casing extending to the top of the coral formation should be provided, and the permanent casing should have an outside diameter (OD) of about 7.5 inches (same as the grout bulb size).

The text of this report should be referred to for detailed discussion and specific design recommendations.

END OF SUMMARY OF FINDINGS AND RECOMMENDATIONS

LIST OF PLATES

LIST OF APPENDICES

overlying soft and/or loose lagoonal deposits. We anticipated that the lagoonal deposits would be underlain by coralline detritus and/or formation at greater depths. Based on our experience at the site, special attention was given to the following areas for the foundation design of the new warehouse building at the site:

- Quality and thickness of the surface fill crust.
- Vertical extent and compressibility of the soft/loose lagoonal deposits.
- Quality, depth, and thickness of the coralline detritus and/or formation.

1.3 Purpose and Scope

The purpose of our field exploration was to obtain an overview of the surface and subsurface conditions to develop a generalized subsurface data set to formulate geotechnical recommendations for design of the new warehouse building project. In order to accomplish this, we conducted an exploration program consisting of the following tasks and efforts:

1. Research and review of available in-house geologic and soils information in the project vicinity.
2. Mobilization and demobilization of a truck-mounted drill rig and operators to and from the project site.
3. Drilling and sampling of three borings extending to depths ranging from about 47.5 to 53 feet below the existing pavement surface for a total of about 150.5 lineal feet of exploration.
4. Coordination of the field exploration and logging of the borings by our geologist.
5. Laboratory testing of selected soil samples obtained during our field exploration as an aid in classifying the materials encountered and evaluating their engineering properties.
6. Engineering analyses of the field and laboratory data to formulate geotechnical recommendations for the design of the foundations, slabs-on-grade, and site preparation for the project.
7. Preparation of this report summarizing our work on the project and presenting our findings and recommendations.

SECTION 1.0 - GENERAL

1.1 Introduction

This report presents the results of our geotechnical engineering exploration performed for the *New Warehouse Building for A`ala Ship Service* project in Honolulu on the Island of Oahu, Hawaii. The project location and general vicinity are shown on the Project Location Map, Plate 1.

This report summarizes our findings and geotechnical recommendations derived from our field exploration, laboratory testing, and engineering analyses. The recommendations provided herein are intended for the design of foundations, slabs-on-grade, and site preparation only. In addition, discussions on dewatering requirements are included in this report for information purposes. The findings and recommendations presented herein are subject to the limitations noted at the end of this report.

1.2 Project Considerations

Based on the information provided, the proposed project will involve the construction of a new warehouse building within the A`ala Ship Service property at 869 North Nimitz Highway in Honolulu on the Island of Oahu, Hawaii. The proposed warehouse site is presently occupied by a two-level storage rack.

The new warehouse building will be a single-story structure measuring 165 feet long and 60 feet wide with a total floor area of approximately 10,000 square feet. Based on information provided by the project structural engineer, the maximum column loads will be on the order of about 300 kips with wall loads of up to about 8.5 kips per lineal foot. Based on the existing topography at the project site, we anticipate that the finish floor elevation for the warehouse building will be set at or close to the existing grades. Detailed information for the proposed warehouse building development was not available at the time this report was prepared.

Based on our experience in the project vicinity, we anticipated that the subsurface conditions at the project site would consist of near-surface fill materials

8. Coordination of our overall work on the project by our senior engineer.

9. Quality assurance of our work and client/design team consultation by our principal engineer.

10. Miscellaneous work efforts such as drafting, word processing, and clerical support.

Detailed descriptions of our field exploration methodology and the Logs of Borings are presented in Appendix A. The results of the laboratory tests performed on selected soil samples retrieved from our field exploration are presented in Appendix B.

END OF GENERAL

SECTION 2.0 - SITE CHARACTERIZATION

2.1 Regional Geology

The Island of Oahu is composed largely of the weathered remnants of the Waianae and Koolau shield volcanoes. The older Waianae Volcano forms the bulk of the western third of the island while the younger Koolau Volcano forms the majority of the eastern two-thirds of the island. It is believed that Waianae Volcano became extinct while Koolau Volcano was still active, and its eastern flank is partially buried below Koolau lava in Central Oahu. When the building of the Waianae and Koolau Shield Volcanoes came to an end, only a slight embayment existed on the southern coast of Oahu.

The project site is generally on the coastal plain of Southern Oahu. The coastal plain was built on the eroded flanks of the Koolau Volcano, which forms the eastern two-thirds of the Island of Oahu. The coastal plain was built by extensive accumulation of alluvium derived from erosion of the volcano, interbedded with coral reefs and associated deposits.

During the Pleistocene Epoch (Ice Age), sea levels fluctuated in response to the cycles of continental glaciation. Most of the coastal plains were developed during the Pleistocene Epoch when the sea levels fluctuated significantly. As the glaciers grew and advanced, less water was available to fill the oceanic basins such that sea levels fell below the present stands of the sea. When the glaciers melted and receded, an excess of water became available such that the sea levels rose to above its present level.

The processes of erosion and deposition caused the top of the basaltic lava flows to be highly weathered and mantled by residual soils. During the Kaena stand of the sea (at approximately +90 feet MSL) of the Pleistocene Epoch, a delta of silt, sand, and gravel built out into the embayment near the project site. Therefore, the project site is generally underlain by deposits consisting of calcareous sediments and lagoonal deposits. Land development and reclamation projects within the last century have brought the project site to its present form.

2.2 Subsurface Conditions

Our field exploration program at the project site consisted of drilling and sampling three borings, designated as Boring Nos. 1 through 3, extending to depths of about 47.5 to 53 feet below the existing pavement surface. The approximate boring locations are shown on the Site Plan, Plate 2.

Based on our field exploration, the subsurface conditions at the project site generally consist of relatively thin surface fills placed over lagoonal deposits. The surface fills generally consist of medium dense silty gravel extending down to about 2.5 to 4 feet below the existing pavement surface. The lagoonal deposits below the relatively thin surface fills encountered in the borings drilled generally consist of soft organic clays and loose silty coralline gravel. The lagoonal deposits extended to depths of about 7 to 8 feet below the existing pavement surface.

Below the lagoonal deposits, the borings encountered a thin layer of medium dense cinder sands and coralline detritus materials overlying hard coral formation (starting at depths of about 9 to 11.5 feet) extending to the maximum depth explored of approximately 53 feet below the existing pavement surface. In addition, we wish to point out that petroleum odor was detected based on olfactory method (smell) between depths of about 4 and 8 feet below the pavement surface in some of the borings drilled at the project site. Therefore, special treatment may likely be required for the handling and disposal of excavated contaminated soils during the project construction.

At the time of our field exploration, we encountered groundwater in all of the borings drilled at depths varying from approximately 4.1 to 4.5 feet below the existing pavement surface. It should be noted that groundwater levels could fluctuate depending on tidal fluctuations (due to the proximity of the project site to the Pacific Ocean), seasonal precipitation, groundwater withdrawal and/or injection, and other factors.

Detailed descriptions of the materials encountered and water levels observed in the borings drilled are presented on the Logs of Borings in Appendix A. The results of the laboratory tests performed on selected soil samples are presented in Appendix B.

2.3 Seismic Design Considerations

Based on the International Building Code, 2003 Edition (IBC 2003), the project site may be subject to seismic activity and seismic design considerations will need to be addressed. The following sections provide discussions on the seismicity and soil profile for seismic design at the project site.

2.3.1 Earthquakes and Seismicity

In general, earthquakes that occur throughout the world are caused by shifts in the tectonic plates. In contrast, earthquake activity in Hawaii is linked primarily to volcanic activity. Therefore, earthquake activity in Hawaii generally occurs before or during volcanic eruptions. In addition, earthquakes may result from the underground movement of magma that comes close to the surface but does not erupt. The Island of Hawaii experiences thousands of earthquakes each year, but most are so small that they can only be detected by sensitive instruments. However, some of the earthquakes are strong enough to be felt, and a few cause minor to moderate damage.

In general, earthquakes associated with volcanic activity are most common on the Island of Hawaii. Earthquakes that are directly associated with the movement of magma are concentrated beneath the active Kilauea and Mauna Loa Volcanoes on the Island of Hawaii. Because the majority of the earthquakes in Hawaii (over 90 percent) are related to volcanic activity, the risk of high seismic activity and degree of ground shaking diminishes with increased distance from the Island of Hawaii. The Island of Hawaii has experienced numerous earthquakes greater than Magnitude 5 (M5+); however, earthquakes are not confined only to the Island of Hawaii.

To a lesser degree, the Island of Maui has experienced numerous earthquakes greater than Magnitude 5. Therefore, moderate to strong earthquakes have occurred in the County of Maui. The effects of earthquakes occurring on the Islands of Hawaii and Maui may be felt on the Island of Oahu. For example, several small landslides occurred on the Island of Oahu as a result of the Maui Earthquake of

1938 (M6.8). In addition, some houses on the Island of Oahu were reportedly damaged as a result of the Lanai Earthquake of 1871 (M7+).

Due to the relatively short period of documented earthquake monitoring in the State of Hawaii, information pertaining to earthquakes that were felt on the Island of Oahu may not be complete. In general, we are not aware of reported earthquakes greater than Magnitude 6 occurring on the Island of Oahu over the last 150 years of recorded history. Based on available information, we understand that an earthquake of about Magnitude 5.6 occurred on June 28, 1948 in the vicinity of the Island of Oahu, possibly along the hypothesized and controversial Diamond Head Fault feature.

The Diamond Head Fault feature is believed to extend northeasterly away from the southeastern tip of the Island of Oahu. The Diamond Head Fault feature may be related to the widely documented Molokai Fracture Zone located on the sea floor in the vicinity of the Hawaiian Islands. Despite only the moderate tremor intensity, the resulting damage was reportedly widespread and included broken windows, ruptured masonry building walls, and a broken underground water main. In addition, some areas on the Island of Oahu, including the Tantalus, Iwilei, and Tripler areas, reported more intense ground shaking, severe enough to have cracked reinforced concrete.

2.3.2 Soil Profile

Our field exploration generally encountered surface fills and lagoonal deposits overlying hard coral formation extending to the maximum depth explored of approximately 53 feet below the existing pavement surface. Based on the average penetration resistance (N-values) of the subsurface materials encountered below the foundation subgrade level and the geology of the area, we believe that the project site may be classified as a "Stiff Soil Profile." Therefore, we believe that the seismic design of the warehouse structure may be designed based on a Site Class D soil profile type based on the International Building Code (Table No. 1615.1.1), 2003 Edition.

END OF SITE CHARACTERIZATION

SECTION 3.0 - DISCUSSION AND RECOMMENDATIONS

Based on our field exploration, the subsurface conditions at the project site generally consist of relatively thin surface fills, on the order of about 2.5 to 4 feet thick, placed over lagoonal deposits of soft organic clays and loose silty gravel extending to depths of about 7 to 8 feet below the existing pavement surface. Below the lagoonal deposits, the borings encountered hard coral formation starting at depths of about 9 to 11.5 feet and extending to the maximum depth explored of approximately 53 feet below the existing pavement surface. Petroleum odor was detected based on olfactory method (smell) between depths of about 4 and 8 feet below the pavement surface in some of the borings drilled at the project site. Therefore, special treatment may likely be required for the handling and disposal of excavated contaminated soils during the project construction. At the time of our field exploration, we encountered groundwater in all of the borings drilled at depths varying from approximately 4.1 to 4.5 feet below the existing pavement surface.

Based on the subsurface conditions encountered and the moderately high building loads anticipated for the warehouse structure, we believe that the relatively thin fill crust and the soft and/or loose lagoonal deposits encountered at the project site would not provide adequate foundation support for the warehouse structure supported on a shallow foundation system (such as spread footings and/or a mat foundation) without appreciable settlements (on the order of about 3 to 4 inches). Consideration was given to the removal of the soft and/or loose lagoonal deposits below the shallow footing foundations and replacement with compacted select granular fill materials to provide a bearing/stabilization layer for the building loads. However, this would entail substantial foundation work below the groundwater table as well as removal of the contaminated soils that require special treatment and disposal, which may not be viable from an economical standpoint. Therefore, we recommend supporting the new warehouse structure on a deep foundation system as discussed below.

Due to the space constraint at the new warehouse building location and the relatively shallow depths of the bearing stratum, we believe that the use of driven pile or drilled shaft foundations would not be practical and economical for the project

development. Therefore, we recommend utilizing micropiles to support the new warehouse building. We believe that a cased micropile system with a minimum grout bulb diameter of 7.5 inches and a pile length of about 30 feet (minimum 20 feet embedment into the hard coral formation) may be used to develop an allowable compressive load capacity of up to 80 kips per pile. In addition, a permanent casing extending to the top of the coral formation (about 10 to 12 feet below the existing pavement surface) should be provided, and the permanent casing should have an outside diameter (OD) of about 7.5 inches (same as the grout bulb size).

Detailed discussion and our geotechnical recommendations for design of the project are presented in the following sections.

3.1 Micropile Foundations

Based on the anticipated building loads and the subsurface conditions encountered at the project site, we believe that appreciable foundation settlements, on the order of about 3 to 4 inches, would occur if the new warehouse structure is supported on a shallow foundation system. Therefore, we recommend utilizing a deep foundation system to support the new warehouse structure planned. Considering the space constraints and the relatively shallow depths of the bearing stratum, we believe that the use of driven pile or drilled shaft foundations would not be practical and economical for the project development. Therefore, we recommend using cased micropile foundations to support the new warehouse structure planned.

In general, the cased micropile foundation system consists of a small diameter (usually less than 12 inches), drilled and grouted, pile with steel reinforcing. The micropile foundation typically is constructed by drilling a hole (with or without casing), placing reinforcing steel in the hole, and grouting the hole. Micropiles are desirable because they can be installed readily in access restrictive environments and in numerous soil types and ground conditions. In addition, the micropile installation generally causes minimal disturbance to adjacent structures, the adjacent soils, and the environment.

Based on the subsurface conditions encountered at the project site, we recommend utilizing a micropile system with a grout bulb diameter of 7.5 inches to support the new structural elements. Based on the subsurface conditions encountered at the project site, we recommend designing each micropile based on an allowable compressive load capacity of 40 tons (80 kips). The allowable compressive load capacity of the micropiles is for supporting dead-plus-live loads and may be increased by one-third (1/3) for transient loads, such as wind or seismic forces. To provide an allowable compressive load capacity of 40 tons (80 kips), we recommend embedding the micropiles a minimum of 20 feet into the hard coral formation. The micropiles would derive its vertical support primarily from skin friction between the grout and the surrounding hard coral formation starting at depths of about 10 to 12 feet below the existing pavement surface.

Based on the subsurface conditions at the project site, we recommend casing the micropiles (permanent casing) at the top. The permanent casing should have an outside diameter (OD) of about 7.5 inches (same as the grout bulb size), and the permanent casing should extend to the top of the coral formation starting at depths of about 10 to 12 feet below the existing pavement surface. The load supporting capacity of micropiles is highly dependent on the installation procedures of the micropiles. Therefore, the actual production micropile lengths should be established after completion of a load test program. Due to possible variation in the length of the micropiles, unit prices should be obtained during bidding for add-ons, shorter micropiles, etc.

3.1.1 Micropile Load Test Program

It should be noted that the compressive load capacity of the micropiles is highly dependent on the drilling procedures and the grouting methods employed by the contractor to install the micropile. Therefore, the compressive load capacity of the micropile may vary considerably between different contractors and micropile foundation systems. In order to determine whether the contractor's methods of micropile installation are adequate and to determine the ultimate compressive load capacity, we recommend performing one pre-production compressive load test on a

3.1.2 Lateral Load Resistance

It should be noted that the micropile foundation system provides low lateral load resistance due to the relatively small diameter of the micropile. Therefore, the lateral load resistance contributed by the vertical micropiles should be neglected. Lateral loads imposed on the new structure foundations may be resisted primarily by passive pressure resistance against the vertical faces of the pile cap and grade beams and by shear acting along the sides of the pile caps and grade beams.

Passive pressure resistance against the vertical faces of the pile cap and grade beams may be estimated using an equivalent fluid pressure of 350 pounds per square foot per foot of depth (pcf) above the groundwater level and 175 pcf below the groundwater level. Additional resistance to lateral loads may be provided by shear resistance between the sides of the pile caps and grade beams and the adjacent soils. A side shear resistance of up to 150 pounds per square foot (psf) may be used for transient loads such as wind or seismic forces only.

3.1.3 Micropile Foundation Settlements

Settlements of the micropile foundations will result primarily from elastic compression of the pile member and subgrade response. We estimate the total settlement of the pile-supported foundations to be 0.5 inches or less with differential settlements between columns supported on micropiles not exceeding about one-half of the total settlement. We believe that these settlements are essentially elastic and should occur as the loads are applied.

3.1.4 Construction Considerations

A specialty subcontractor, experienced in the construction of a cased micropile foundation system, should perform the micropile installation. Based on the subsurface conditions at the project site, it should be noted that hard drilling into the coral formation will be encountered.

Due to the specialized nature of the micropile foundation construction, observation of the micropile foundation installation system and testing of the micropiles should be designated a "Special Inspection" item. Therefore, observation of the micropile

sacrificial micropile. In general, the purpose of the pre-production load test on a micropile is to fulfill the following objectives:

- To examine the adequacy of the methods and equipment proposed by the contractor to install the micropiles to the depths required
- To assess the contractor's method of drilling and grout injection

In general, the pre-production load test should be performed in accordance with ASTM D 1143 (Standard Loading Procedure). Based on experience, we believe that the load test should be conducted no earlier than 7 days after completion of the micropile installation to allow the grout adequate time to cure. Two additional micropiles may be used for reaction during the compressive load testing of the pre-production load test micropile. The reaction micropiles may be installed to depths as deep as the load test micropile to provide adequate reaction in uplift (to be determined by the contractor).

The load test micropile should be loaded gradually to at least 200 percent of the allowable design load in compression. We recommend holding the maximum test load (200 percent of the design load) for a minimum of 4 to 8 hours depending on the recorded movements of the load test micropile. The pre-production load test is an integral part of the design of the micropile foundation system. Therefore, a Geolabs representative should observe the pre-production load test.

In addition to the pre-production load test, we also recommend performing pullout tests (proof tests) on selected micropiles during construction to confirm the load carrying capacity of the installed micropiles. We recommend testing a minimum of 10 percent of the total number of micropiles (or minimum of four micropiles) for pullout. The pullout tests should consist of subjecting the micropile to at least 150 percent of the design loads, and the maximum test load should be held for at least 10 or 60 minutes. Pullout tests on the micropiles also are integral parts of the design of the micropile foundation system.

installation operations by Geolabs (Special Inspector) is necessary to confirm our design assumptions and should be designated a "Special Inspection" item in accordance with Section 1704 of IBC 2003.

3.2 Slabs-On-Grade

Based on the existing topography and the anticipated finished floor elevation, we envision the concrete slabs-on-grade required for the project will be supported on the existing ground conditions. In general, the subgrades for the concrete slabs-on-grade should be properly prepared prior to the placement of reinforcing steel and concrete. Therefore, we recommend scarifying the subgrades for the warehouse slab to a depth of about 8 inches, moisture-conditioning to above the optimum moisture content, and recompacting to a minimum of 95 percent relative compaction. New fills, if needed, should be placed in general accordance with the recommendations provided in the "Site Preparation" section herein. New fills needed to raise the site to the finished subgrades will induce ground settlements as a result of consolidation of the underlying compressible lagoonal deposits. Therefore, we recommend placing the new fills as soon as practical to allow the anticipated ground settlements to occur prior to slab-on-grade construction.

For support of the interior building slabs (not subjected to vehicular traffic), we recommend providing a minimum 4-inch thick layer of cushion fill consisting of open-graded gravel (ASTM C 33, No. 67 gradation) below the slabs. The open-graded gravel cushion fill would serve as a capillary moisture break and would provide uniform support of the slabs. To reduce the potential for future moisture infiltration through the slab and subsequent damage to floor coverings, an impervious moisture barrier is recommended on top of the cushion fill layer. It also is recommended the interior wall design incorporate some flexibility to accommodate a small amount of possible ground movements.

Where the building slabs will be subjected to vehicular traffic, such as forklifts, we recommend providing a 6-inch layer of aggregate subbase below the slabs in lieu of the 4-inch thick gravel cushion fill layer. The moisture barrier may also be omitted for slabs

subjected to vehicular traffic. The aggregate subbase should consist of crushed basaltic aggregates compacted to a minimum of 95 percent relative compaction.

For the design of structural slabs supported on 6 inches of aggregate subbase, a modulus of subgrade reaction of about 200 pounds per square inch per inch of deflection (pci) may be used for the compacted aggregate subbase. Where slabs are intended to function as rigid pavements for forklift traffic, a minimum slab thickness of 6 inches may be used for preliminary design purposes. In addition, provisions should be made for proper load transfer across the slab joints that will be subjected to vehicular traffic.

The thickened edges of slabs adjacent to unpaved areas should be embedded at least 12 inches below the lowest adjacent grade. It should be emphasized that the areas adjacent to the slabs should be backfilled tightly against the edges of the slabs with low expansion, relatively impervious soils. These areas also should be graded to divert water away from the slabs and to reduce the potential for water ponding around the slabs.

3.3 Site Preparation

Based on the anticipated finished floor elevation for the new warehouse building, we envision that minimal site grading work will be required to attain the finished floor elevation. As previously indicated, placement of new fills at the project site will induce consolidation of the soft and/or loose lagoonal deposits underlying the site. Therefore, it is important that the new fills, if needed, be placed as soon as practical to allow the majority of the estimated ground settlements to occur prior to construction of improvements, such as the utility line and ground floor slab construction, to reduce the potential for adverse effects resulting from ground settlements. In addition, the following recommendations are intended to provide guidelines for the site preparation work.

At the on-set of earthwork, the area within the contract grading limits should be thoroughly cleared. Construction debris and other deleterious materials should be removed and disposed properly off-site. Soft and/or yielding areas encountered during clearing below areas designated to receive fills should be over-excavated to expose firm

and/or dense materials, and the resulting excavation should be backfilled with well-compacted fills. The excavated soft and/or organic soils should be properly disposed off-site and/or used in landscape areas, where appropriate. Contract documents should include additive and deductive unit prices for over-excavation and compacted fill placement to account for variations in the over-excavation quantities.

After clearing, existing structures and pavements that are to be demolished should be completely removed. Over-excavations resulting from demolition should be backfilled with compacted general fill materials. Existing utilities to be abandoned should be removed, and the resulting excavation should be properly backfilled with general fill material placed in 8-inch loose lifts and compacted to a minimum of 90 percent relative compaction. Utilities to be abandoned in-place under the proposed improvements should be backfilled by pumping lean concrete (or controlled low strength materials) under low pressure.

After clearing and demolition, areas at grade or areas designated to receive fills should be scarified to a depth of about 8 inches, moisture-conditioned to above the optimum moisture content, and compacted to a minimum of 95 percent relative compaction. Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density as determined by ASTM D 1557. Optimum moisture is the water content (percentage by weight) corresponding to the maximum dry density.

Imported materials required for site filling should consist of select granular fill materials, such as crushed coral and/or basaltic gravel. The materials should be well graded from coarse to fine with particles no greater than 3 inches in largest dimension. In addition, the materials also should contain between 10 and 30 percent particles passing the No. 200 sieve. The materials should have a California Bearing Ratio (CBR) value of 20 or higher and a swell value of 1 percent or less when tested in accordance with ASTM D 1883.

Fill and backfill materials required for the project construction should be placed in level lifts not exceeding 8 inches in loose thickness, moisture-conditioned to above the

optimum moisture content, and compacted to a minimum of 95 percent relative compaction. Fill or backfill below the water level should consist of free-draining granular materials, such as open-graded gravel (ASTM C 33, No. 67 gradation), up to a minimum of 12 inches above the groundwater level. If fill or backfill below the water level is placed on clayey materials, we recommend wrapping the open-graded gravel in a non-woven filter fabric, such as Mirafi 180N or equivalent. Imported fill materials should be tested by Geolabs for conformance with these recommendations prior to delivery to the project site for the intended use.

A Geolabs representative should monitor site preparation operations to observe whether undesirable materials are encountered during the scarification process and to confirm whether the exposed soil conditions are similar to those encountered in our field exploration.

3.4 Dewatering

Based on our field exploration, groundwater was encountered at depths of about 4.1 to 4.5 feet below the existing pavement surface across the project site. Due to the relatively shallow groundwater levels encountered at the project site, we anticipate that some of the underground utility lines to be installed likely will extend below the groundwater table. Therefore, dewatering of some of the excavations will be necessary for the utility line installations.

In general, the dewatering operation should be conducted in such a manner that dewatering will not cause areal ground subsidence, which may cause potential damage to the nearby existing structures. As previously indicated, we wish to point out that petroleum odor was detected in some of the borings drilled at the project site between depths of about 4 and 8 feet below the pavement surface. Therefore, special treatment will likely be required for the handling and disposal of the dewatered effluent during the project construction. Therefore, consideration should be given to a dewatering system that includes a deep cut-off wall to reduce the volume of water to be removed within the excavation and to reduce the areal extent of groundwater drawdown outside of the trench excavation.

Because the excavation dewatering may involve discharge of groundwater from the dewatering operation into adjacent drainage systems, a National Pollutant Discharge Elimination System (NPDES) permit may be necessary. It should be noted that it is likely not possible to dispose of the dewatered effluent with a petroleum odor into the municipal drainage system. The contractor should consult their independent consultant or the State of Hawaii, Department of Health for the latest regulations and information pertaining to the NPDES permit application.

3.4.1 Subsurface Soil Permeability

Based on our borings, the near-surface fills generally consist of medium dense silty gravel extending to about 2.5 to 4 feet below the existing pavement surface. The surface fills were underlain by soft and/or loose lagoonal deposits consisting of soft organic clays and loose silty coralline gravel. It should be noted that in-situ permeability tests were not conducted for this project.

The permeability of the subsoils at the site may be considered moderately permeable based on the materials encountered. However, the actual subsurface soil permeability may range broadly and also vary locally in terms of orders of magnitude. Therefore, the contractor should pay special attention to the site-specific dewatering plan for the proposed excavations (especially excavations extending more than 5 feet below the groundwater level).

3.4.2 Dewatering Method

Dewatering for construction is the responsibility of the contractor. The selection of equipment and methods of dewatering should be left up to the contractor, and he/she should be aware that modifications to the dewatering system may be required during construction depending on the conditions encountered. The dewatering method selected should have minimal impact on the groundwater level surrounding the proposed excavation. As previously indicated, the underlying lagoonal deposit at the project site may be moderately permeable and capable of transmitting moderate quantities of water.

It is our opinion that the definition of "Dewatering" in the contract documents should be written to include all works or systems required to lower the natural groundwater table and/or to exclude the water from the excavations to allow construction of the proposed structures under safe and dry conditions. These works or systems may include, but are not limited to, grouting, cut-off walls, tremie concrete plugs or any combination of the above and/or other possible methods.

It should be noted that the subsurface conditions within the excavation depths at the site consist of loose silty coralline gravel, which are considered to be moderately permeable soils. Because the project is in a developed area, the dewatering operation should be conducted in such a manner that the dewatering will not cause areal ground subsidence, which may cause potential damage to the existing structures and underground utilities (adjacent utility easement). Therefore, consideration should be given to a dewatering system that includes a cut-off wall.

3.4.3 Dewatering Considerations

We suggest considering the following three basic criteria in selection of a suitable method of dewatering.

a. The dewatering method should result in the least disturbance or damage to existing structures, utilities, roads, and environment.

b. The dewatering method should maintain stability of, and provide safe and dry working conditions in, the excavation.

c. The dewatering method should be sufficiently flexible to allow modifications to accommodate various ground conditions.

3.4.4 Dewatering Precaution and Monitoring

The potential impact of the dewatering system selected on depressing the natural groundwater table must be carefully evaluated by the contractor prior to dewatering. The contractor should retain a qualified geotechnical engineer to design and evaluate the dewatering system used.

The contractor should be solely responsible for the impact and safety of the dewatering operations. His/her qualified representative, who should be required to

be continuously present on-site during dewatering activities, will have the best opportunity to promptly observe the effects of dewatering during construction and to implement, as soon as possible, necessary precautionary or remedial measures including, but not limited to, slowing down or stopping the dewatering operations.

Where encountered at the bottom of excavations, permeable granular soils may be susceptible to piping and "quick" conditions. The dewatering operations should be carried-out without creating a "quick" condition or softening at the excavation bottoms. Therefore, the project dewatering operations should be performed without pumping out soil fines (pumping clear water only) and should be coordinated with the shoring installation such that the excavation stability is not adversely affected. Excessive pumping, which removes soil fines, may result in a "blowing" or heaving of the excavation bottom or sides.

Special caution also should be taken to avoid dewatering utility trenches connected to excavations. If this occurs, the granular bedding and/or backfill in the utility trenches could act as subdrains and cause significant areal groundwater drawdown resulting in settlements and potential damage to utility lines and/or other adjacent existing structures.

3.5 Underground Utility Trenches

We envision that some new utility lines and connections will be installed for the proposed project. Due to the anticipated depths of the excavations for the utility lines, some of the utility line trenches will likely extend below the groundwater table and will likely encounter soft and/or loose soils at the bottom of the trenches. In general, we recommend providing granular bedding consisting of 6 inches of open-graded gravel (ASTM C 33, No. 67 gradation) for uniform support below the pipes underlain by firm and/or stiff subsurface conditions.

Where soft and/or loose soils are encountered at or near the invert of the pipes, an additional 18 to 24 inches of open-graded gravel wrapped in a non-woven filter fabric (Mirafi 180N or equivalent) should be provided below the bedding layer for more uniform support. Free-draining granular materials, such as open-graded gravel, also should be

used for the initial trench backfill up to about 12 inches above the pipes or about 12 inches above the groundwater level to provide adequate support around the pipes. It is critical to use the free-draining materials to reduce the potential for formation of voids below the haunches of pipes and to provide adequate support around the sides of the pipes.

The upper portion of the trench backfill from the level 12 inches above the pipes or groundwater level to the top of the subgrade may consist of the excavated on-site soils, provided that they are free of deleterious materials and free of particles larger than 6 inches in maximum dimension. Due to the relatively shallow groundwater table, the excavated on-site soils may require aeration to reduce the moisture content of the soils prior to being re-used as backfill materials.

The trench backfill should be moisture-conditioned to above the optimum moisture, placed in maximum 8-inch level loose lifts, and mechanically compacted to a minimum of 90 percent relative compaction to reduce the potential for appreciable future ground subsidence. Where trenches will be located below areas subjected to vehicular traffic, the upper 3 feet of the trench backfill below the pavement grade should be compacted to a minimum of 95 percent relative compaction.

3.6 Drainage

The finished grades outside the new warehouse structure should be sloped to shed water away from the slabs and foundations and to reduce the potential for ponding. In addition, it is advised to install gutter systems around the structures and to divert discharge away from the foundation, slabs, and pavement areas. Excessive landscape watering near the foundations and slabs should be avoided. Planters next to foundations and slabs should also be avoided or have concrete bottoms and drains to reduce the potential for excessive water infiltration into the subsurface.

These drainage requirements are essential for the proper performance of the above foundation and slab recommendations because ponded water could cause subsurface soil saturation and subsequent heaving or loss of strength. In addition, the foundation excavations should be backfilled properly against the walls or slab edges

immediately after setting of the concrete to reduce the potential for significant water infiltration into the subsurface.

In addition, drainage swales should be provided as soon as possible and should be maintained to drain surface water runoff away from the foundations and slabs.

3.7 Design Review

Preliminary and final drawings and specifications for the project should be forwarded to Geolabs for review and written comments prior to bid solicitation. This review is necessary to evaluate conformance of the plans and specifications with the intent of the foundations and earthwork recommendations provided herein. If this review is not made, Geolabs cannot be responsible for misinterpretation of our recommendations.

3.8 Construction Monitoring

Geolabs should be retained to provide geotechnical engineering services during construction. The critical items of construction monitoring that require "Special Inspection" include the following:

- Review of micropile installation submittals
- Observation of the micropile load testing
- Observation of the production micropile installation
- Observation of the subgrade preparation and earthwork operations

A Geolabs representative also should monitor other aspects of the earthwork construction to observe compliance with the design concepts, specifications, or recommendations and to expedite suggestions for design changes that may be required in the event that subsurface conditions differ from those anticipated at the time this report was prepared. The recommendations provided herein are contingent upon such observations.

If the actual exposed subsurface conditions encountered during construction are different from those assumed or considered in this report, then appropriate design modifications should be made.

END OF DISCUSSION AND RECOMMENDATIONS

CLOSURE

The following plates and appendices are attached and complete this report:

Plate 1	-	Project Location Map
Plate 2	-	Site Plan
Appendix A	-	Field Exploration
Plate A	-	Log Legend
Plates A-1 thru A-3	-	Logs of Borings
Appendix B	-	Laboratory Testing
Plates B-1 thru B-3	-	Laboratory Test Data

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Respectfully submitted,

GEOLABS, INC.

By Teddy S.T. Kwok
Teddy S.T. Kwok, P.E.
Senior Project Engineer

By Clayton S. Mimura
Clayton S. Mimura, P.E.
President

CSM:TK:mj

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SECTION 4.0 - LIMITATIONS

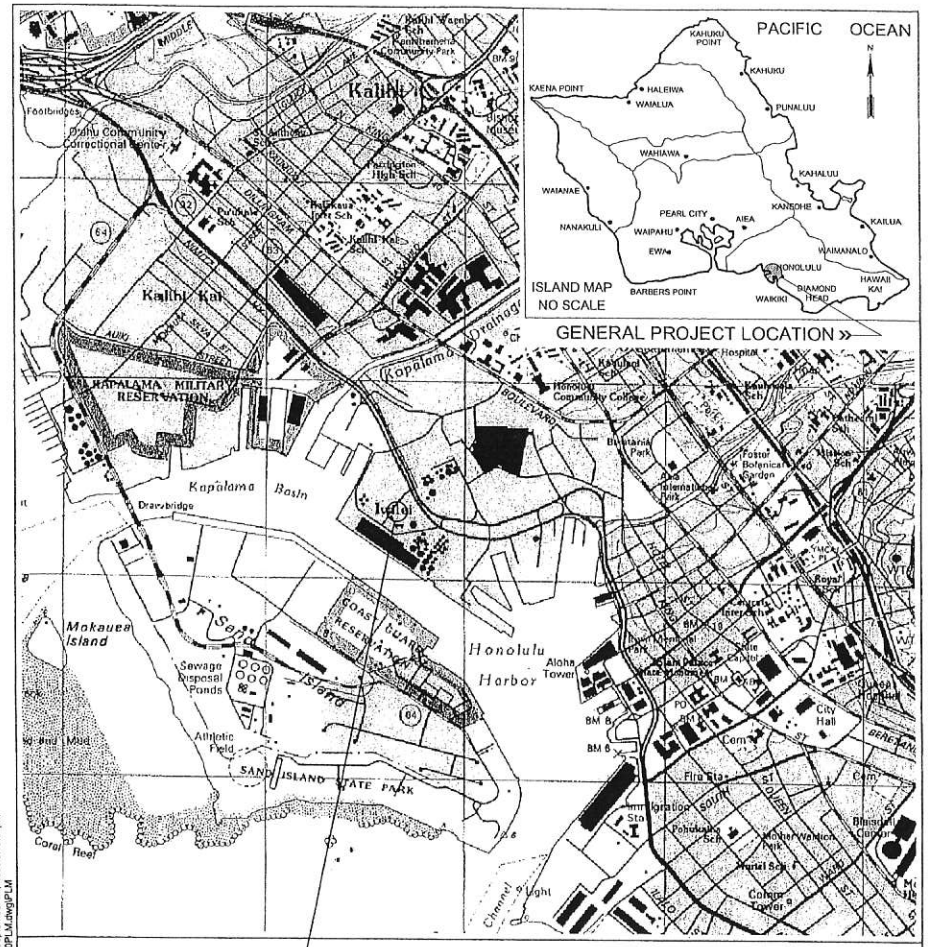
The analyses and recommendations submitted in this report are based, in part, upon information obtained from the field borings. Variations of subsurface conditions between and beyond the borings may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, it will be necessary to re-evaluate the recommendations provided herein.

The boring locations indicated herein are approximate, having been taped from features shown on the Site Plan transmitted by Ushijima Architects, Inc. on September 23, 2008. The physical locations of the borings should be considered accurate only to the degree implied by the method used.

The stratification lines shown on the graphic representations of the borings depict the approximate boundaries between soil and/or rock types and, as such, may denote a gradual transition. Water level data from the borings were measured at the times shown on the graphic representations and/or presented in the text of this report. These data have been reviewed and interpretations made in the formulation of this report. However, it must be noted that fluctuation may occur due to variation in tides, rainfall, temperature, and other factors.

This geotechnical engineering exploration report has been prepared for the exclusive use of A`ala Ship Service for specific application to the *New Warehouse Building for A`ala Ship Service* project in accordance with generally accepted geotechnical engineering principles and practices. No warranty is expressed or implied.

This report has been prepared solely for the purpose of assisting the architect and engineers in the design of the project. Therefore, this report may not contain sufficient data, or the proper information, to serve as a basis for construction cost estimates. A contractor wishing to bid on this project is urged to retain a competent geotechnical engineer to assist in the interpretation of this report and/or in the performance of additional site-specific exploration for bid estimating purposes.



PROJECT LOCATION MAP

NEW WAREHOUSE BUILDING FOR A`ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

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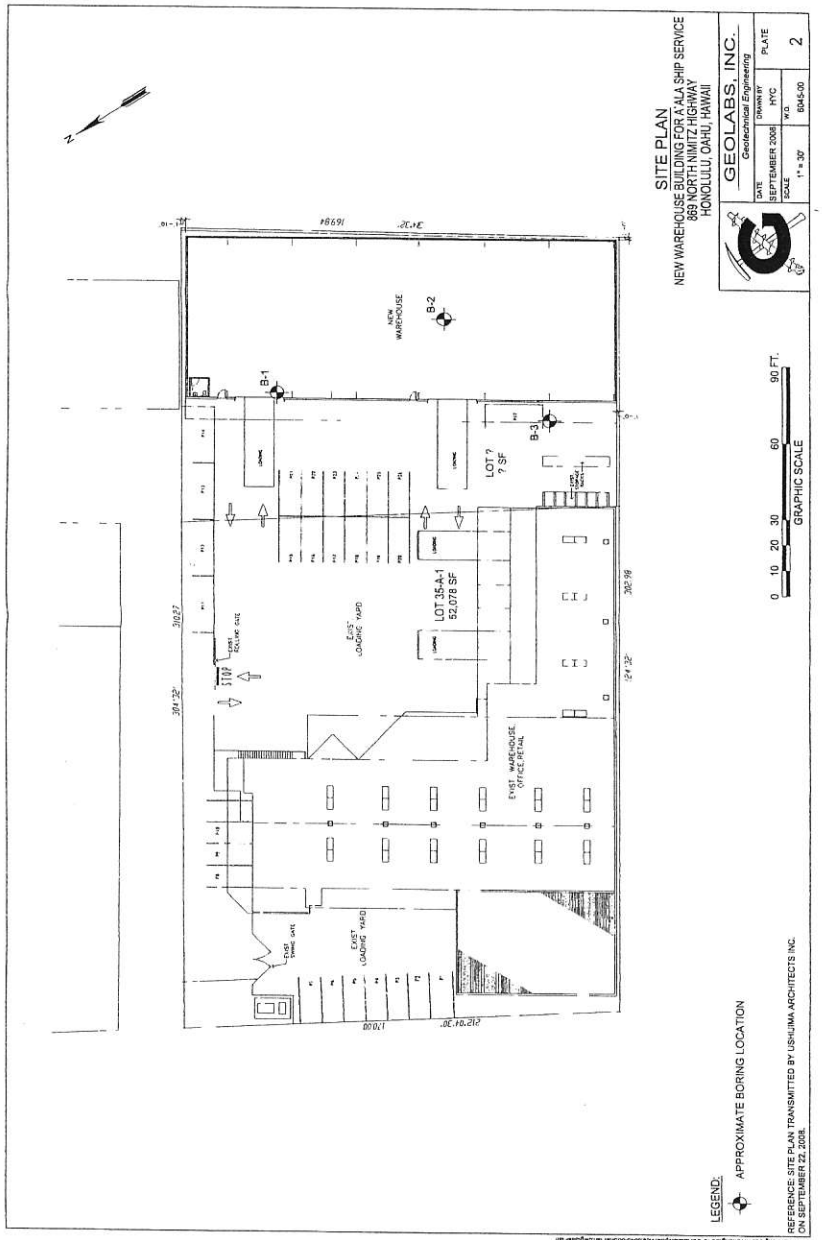
DATE	DRAWN BY	PLATE
JULY 2008	HYC	1
SCALE	W.O.	
1" = 2,000'	6045-00	

User: HENRY File Created: July 15, 2008 File Last Updated: September 24, 2008 3:18:39pm
File: T:\Drafting-99\04\Working\6045-00\AlaShipService\6045-00PLM.dwg\P.LM

PLATES

APPENDIX A

Field Exploration



The Rock Quality Designation (RQD) is also a subjective guide to the relative quality of rock masses. RQD is defined as the percentage of the core run that is sound material in excess of 4 inches in length without discontinuities, discounting drilling induced fractures or breaks. If 2.5 feet of sound material is recovered from a 5.0-foot core run, the RQD would be 50 percent and would be shown on the Logs of Borings as RQD = 50%. Generally, the following is used to describe the relative quality of the rock, based on the "Practical Handbook of Physical Properties of Rocks and Minerals."

Rock Quality	RQD (%)
Very Poor	0 – 25
Poor	25 – 50
Fair	50 – 75
Good	75 – 90
Excellent	90 – 100

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APPENDIX A

Field Exploration

We explored the subsurface conditions at the project site by drilling and sampling three borings, designated as Boring Nos. 1 through 3, extending to depths ranging from about 47.5 to 53 feet below the existing pavement surface. The borings were drilled using a truck-mounted drill rig equipped with continuous flight augers and rotary coring tools. The approximate boring locations are shown on the Site Plan, Plate 2.

Our geologist classified the materials encountered in the borings by visual and textural examination in the field and monitored the drilling operations on a near-continuous basis. Soils were classified in general conformance with the Unified Soil Classification System, as shown on Log Legend, Plate A. Graphic representations of the materials encountered are presented on the Logs of Borings, Plates A-1 through A-3.

Relatively "undisturbed" soil samples were obtained from the borings drilled in general accordance with ASTM D 3550, Ring-Lined Barrel Sampling of Soils, by driving a 3-inch OD Modified California sampler with a 140-pound hammer falling 30 inches. In addition, some samples were obtained from the borings drilled in general accordance with ASTM D 1586, Penetration Test and Split-Barrel Sampling of Soils, by driving a 2-inch OD standard penetration sampler using the same hammer and drop. The blow counts needed to drive the sampler the second and third 6 inches of an 18-inch drive are shown as the "Penetration Resistance" on the Logs of Borings at the appropriate sample depths.

Pocket penetrometer tests were performed on selected cohesive soil samples retrieved in the field. The pocket penetrometer test provides an indication of the unconfined compressive strength of the soil sample. Pocket penetrometer test results are presented on the Logs of Borings at the appropriate sample depths.

Core samples of the basalt/coral/volcanic tuff formations encountered at the site were obtained using diamond core drilling techniques in general accordance with ASTM D 2113, Diamond Core Drilling for Site Investigation. Core drilling is a rotary drilling method that uses a hollow bit to cut into the formation. The material left in the hollow core of the bit is mechanically recovered for examination and description.

Recovery (REC) is used as a subjective guide to the interpretation of the relative quality of rock masses. Recovery is defined as the actual length of material recovered from a coring attempt versus the length of the core attempt. For example, if 3.7 feet of material is recovered from a 5.0-foot core run, the recovery would be 74 percent and would be shown on the Logs of Borings as REC = 74%.

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Log of Boring **1**

Approximate Ground Surface Elevation : N/A

Laboratory			Field								
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	13				18					GM	4-inch **ASPHALTIC CONCRETE** 3-inch **CONCRETE SLAB** Tan **SILTY GRAVEL** with sand, medium dense, moist (fill)
	79	53			4					OH	Tannish gray-black **ORGANIC CLAY** with silt, soft, wet (swamp deposit)
	50				4		5			GM	Light gray **SILTY GRAVEL (CORALLINE)**, loose (lagoonal deposit)
			20	0						SP	Black poorly graded **SAND**, medium dense (cinder)
										GM	Light gray **SILTY GRAVEL (CORALLINE)** with cobbles, medium dense (coralline detritus)
	24		84	11	50/5" Ref.		10				Grayish white to white **CORAL**, closely fractured, slightly weathered, hard
			40	7			15				
			100	43			20				grades to moderately fractured locally
			68	15			25				
			45	0			30				
							35				

Date Started:	July 9, 2008	Water Level: ▽ 4.1 ft. 7/9/08 0945 HRS	Plate
Date Completed:	July 9, 2008		
Logged By:	S. Latronic	Drill Rig: MOBILE B-80	A - 1.1
Total Depth:	47.5 feet	Drilling Method: 4" Auger & HQ Coring	
Work Order:	6045-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 6045-00.GPJ GEOLABS.GDT 9/24/08

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Log Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS	GRAVELS	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	LESS THAN 5% FINES	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
		MORE THAN 12% FINES	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		LESS THAN 5% FINES	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
		MORE THAN 12% FINES	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
50% OR MORE OF MATERIAL PASSING THROUGH NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT 50 OR MORE	MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

LEGEND

	(2-INCH) O.D. STANDARD PENETRATION TEST	LL	LIQUID LIMIT
	(3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX
	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)
	GRAB SAMPLE	PEN	POCKET PENETROMETER (tsf)
	CORE SAMPLE	UC	UNCONFINED COMPRESSION (psi)
		▽	WATER LEVEL OBSERVED IN BORING

Plate **A**

LOG LEGEND 6045-00.GPJ GEOLABS.GDT 9/25/08

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Log of Boring **2**

Approximate Ground Surface Elevation : N/A

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
										GW GM	8-inch **CONCRETE SLAB** 4-inch **BASE COURSE**
LL=0 PI=0	19				18						Tan **SILTY GRAVEL** with sand, medium dense, moist (fill)
	11	95			13						
							5			GM	Tan to gray **SILTY GRAVEL (CORALLINE)**, loose, wet (coralline detritus)
	34				14	0.3				OH	Tannish gray to black **ORGANIC CLAY** with silt, soft (swamp/estuarine deposit)
	90 48	48			14						
										SP	grades with gravel, hydrocarbon contamination observed
			50	0			10				Black poorly graded **SAND**, medium dense (cinder)
											White **CORAL**, closely fractured, slightly weathered, hard
			73	37							
							15				
			78	17							
							20				
			57	8							
							25				
			17	0							
							30				grades with weakly cemented sandstone (coralline) seams
			10	0	25/0" Ref.						
							35				

Date Started:	July 8, 2008	Water Level: ▽ 4.5 ft. 7/8/08 1000 HRS	Plate
Date Completed:	July 8, 2008		
Logged By:	S. Latronic	Drill Rig: MOBILE B-80	A - 2.1
Total Depth:	53 feet	Drilling Method: 4" Auger & HQ Coring	
Work Order:	6045-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 6045-00.GPJ GEOLABS.GDT 9/24/08

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869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

Log of Boring **1**

(Continued from previous plate)

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
			87	45			40				
			53	12			45				locally interbedded with weakly cemented sandstone (coralline)
											Boring terminated at 47.5 feet
							50				
							55				
							60				
							65				
							70				

Date Started:	July 9, 2008	Water Level: ▽ 4.1 ft. 7/9/08 0945 HRS	Plate
Date Completed:	July 9, 2008		
Logged By:	S. Latronic	Drill Rig: MOBILE B-80	A - 1.2
Total Depth:	47.5 feet	Drilling Method: 4" Auger & HQ Coring	
Work Order:	6045-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG 6045-00.GPJ GEOLABS.GDT 9/24/08

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Log of Boring **3**

Approximate Ground Surface Elevation : N/A

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	19				16					GM	3-inch **ASPHALTIC CONCRETE** Tan **SILTY GRAVEL** with sand, medium dense, moist (fill)
LL=68 PI=42	102				2	0.3				OH	Tannish gray to black **ORGANIC CLAY** with silt, soft, moist to wet (swamp/estuarine deposit)
	75	46			13		5			MH	Light gray **CLAYEY SILT** with gravel, soft to medium stiff, strong hydrocarbon presence (estuarine deposit)
	41				5					GM	
	55									SP	Light gray **SILTY GRAVEL (CORALLINE)**, loose, slight hydrocarbon presence (lagoonal deposit)
			100	11			10				Black poorly graded **SAND**, medium dense (cinder) White **CORAL**, closely fractured, slightly weathered, hard
			42	0							
	34		53	21	50/2" Ref.		15				
			100	37			20				
							25				grades to moderately fractured locally
			57	17			30				
			53	0			35				

Date Started:	July 7, 2008	Water Level: ▽ 4.2 ft. 7/7/08 1030 HRS	Plate
Date Completed:	July 8, 2008		
Logged By:	S. Latronic	Drill Rig: MOBILE B-80	A - 3.1
Total Depth:	50 feet	Drilling Method: 4" Auger, 3" Casing, & HQ Coring	
Work Order:	6045-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG_6045-00.GPJ_GEOLABS.GDT_9/24/08

GEOLABS, INC.
Geotechnical Engineering

NEW WAREHOUSE BUILDING
FOR A`ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

Log of Boring **2**

(Continued from previous plate)

Laboratory: Other Tests	Laboratory: Moisture Content (%)	Laboratory: Dry Density (pcf)	Field: Core Recovery (%)	Field: RQD (%)	Field: Penetration Resistance (blows/foot)	Field: Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
	20				28						grades to severely fractured
			44	0			40				
			68	30			45				
			83	33			50				
							55				Boring terminated at 53 feet
							60				
							65				
							70				

Date Started:	July 8, 2008	Water Level: ▽ 4.5 ft. 7/8/08 1000 HRS	Plate
Date Completed:	July 8, 2008		
Logged By:	S. Latronic	Drill Rig: MOBILE B-80	A - 2.2
Total Depth:	53 feet	Drilling Method: 4" Auger & HQ Coring	
Work Order:	6045-00	Driving Energy: 140 lb. wt., 30 in. drop	

BORING_LOG_6045-00.GPJ_GEOLABS.GDT_9/24/08

APPENDIX B

Laboratory Testing

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NEW WAREHOUSE BUILDING
FOR A`ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

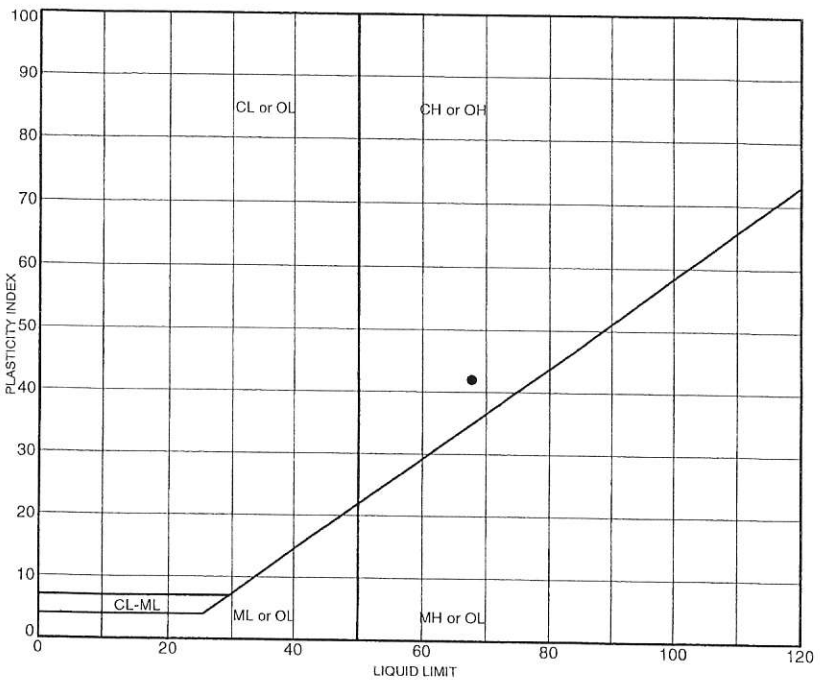
Log of Boring 3

Laboratory			Field								
Other Tests	Moisture Content (%)	Dry Density (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample	Graphic	USCS	Description
											(Continued from previous plate)
			57	0			40				
			40	7			45				
			58	0			50				Boring terminated at 50 feet
							55				
							60				
							65				
							70				

Date Started:	July 7, 2008	Water Level: ▽	4.2 ft. 7/7/08 1030 HRS
Date Completed:	July 8, 2008		
Logged By:	S. Latronic	Drill Rig:	MOBILE B-80
Total Depth:	50 feet	Drilling Method:	4" Auger, 3" Casing, & HQ Coring
Work Order:	6045-00	Driving Energy:	140 lb. wt., 30 in. drop

Plate A - 3.2

BORING_LOG 6045-00.GPJ GEOLABS.GDT 9/24/08



	Sample	Depth (ft)	LL	PL	PI	Description
●	B-3	2.5-4.5	68	26	42	Tannish gray to black organic clay (OH)

G_ATTERBERG 6045-00.GPJ GEOLABS.GDT 9/25/08

GEOLABS, INC.
GEOTECHNICAL ENGINEERING
W.O. 6045-00

ATTERBERG LIMITS TEST RESULTS - ASTM D 4318

NEW WAREHOUSE BUILDING
FOR A`ALA SHIP SERVICE
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HONOLULU, OAHU, HAWAII

Plate
B - 1

APPENDIX B

Laboratory Testing

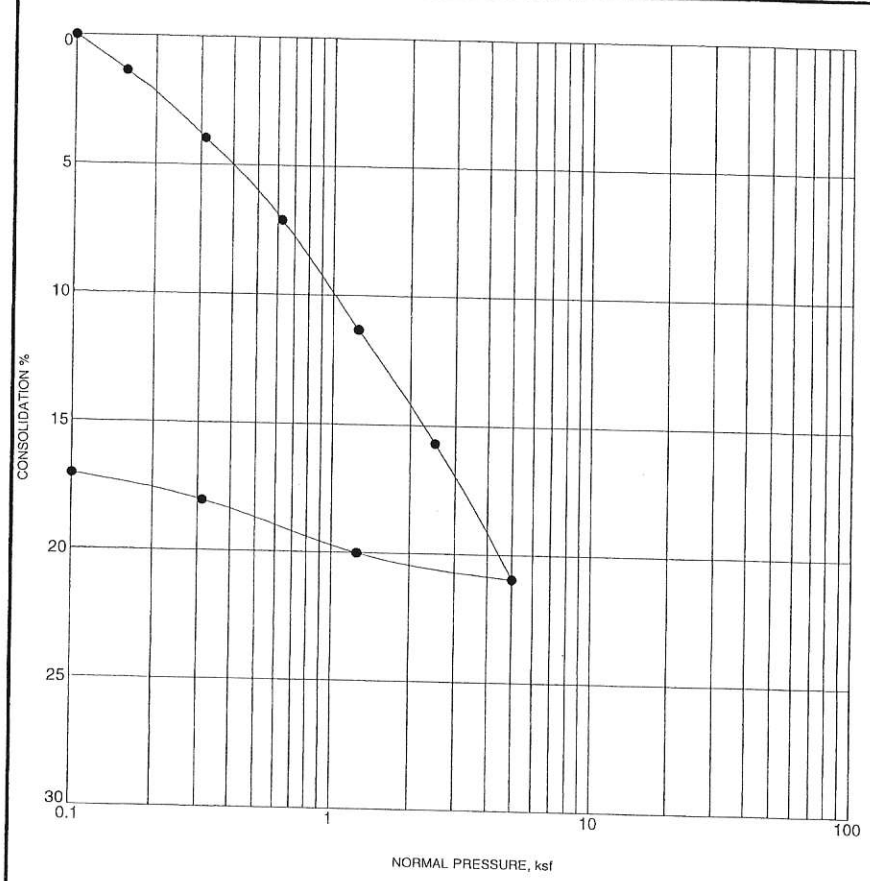
Moisture Content (ASTM D 2216) and Unit Weight (ASTM D 2937) determinations were performed on selected soil samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Borings at the appropriate sample depths.

One Atterberg Limits test (ASTM D 4318) was performed on a selected soil sample to evaluate the liquid and plastic limits. The test results are summarized on the Logs of Borings at the appropriate sample depth. Graphic presentations of the test results are provided on Plate B-1.

One Sieve Analysis test (ASTM C 117 & C 136) was performed on a selected soil sample to evaluate the gradation characteristics of the soils and to aid in soil classification. Graphic presentation of the grain size distribution is provided on Plate B-2.

One Consolidation test (ASTM D 2435) with time rates of consolidation was performed on a soil sample to evaluate the compressibility characteristics of the soft materials encountered. The consolidation test results are presented on Plate B-3.

(h:\6000Series.\6045-00.tk1 – p36)



	Initial	Final
water content, %:	87.5	65.3
dry density, pcf:	50.6	61.1

Sample: B-1
Depth: 3.0 - 5.0 feet
Description: Tannish gray to black organic clay

G_CONSOL 6045-00.GPJ GEOLABS.GDT 9/25/08

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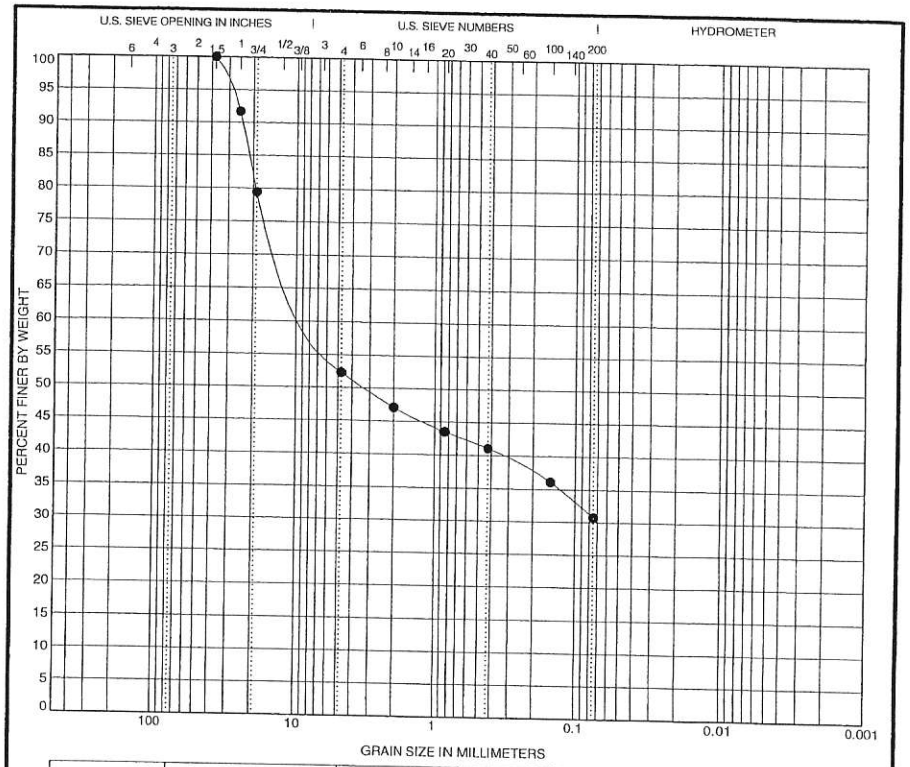
CONSOLIDATION TEST - ASTM D 2435
NEW WAREHOUSE BUILDING
FOR A`ALA SHIP SERVICE
869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

Plate
B - 3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	B-2	1.0-2.5	Tan silty gravel (GM) with sand					

	Sample	Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine
●	B-2	1.0-2.5	37.5	7.042			47.7	21.5	30.8

G_GRAIN SIZE 6045-00.GPJ GEOLABS.GDT 9/25/08

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GRAIN SIZE DISTRIBUTION - ASTM C 117 & C 136
NEW WAREHOUSE BUILDING
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869 NORTH NIMITZ HIGHWAY
HONOLULU, OAHU, HAWAII

Plate
B - 2