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STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
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LETTER NO. PM-1175.0

MAR 28 1990

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OFC. OF ENVIRON... QUALITY CONT...

Dr. Marvin Miura
Director
Office of Environmental
Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Environmental Assessment for
Department of Health Laboratory Facility
Waimano, Oahu
D.A.G.S. Job No. 12-20-2561

Based on comments received during the agency and public consultation phase for the subject Environmental Assessment (EA), the Department of Accounting and General Services, pursuant to Chapter 343, HRS, and Title II, Chapter 200 (Administrative Rules, Department of Health), determines that the proposed action will have no significant environmental impact.

We respectfully request that this negative declaration be published in the OEQC Bulletin at your earliest convenience. Attached are four (4) copies of the Final Environmental Assessment and the OEQC publication form. Agency responses have been included within the Final Environmental Assessment.

If there are any questions on this negative declaration, please contact Mr. Earl Matsukawa of Wilson Okamoto and Associates, Inc. at 531-5261.

Very truly yours,

TEUANE TOMINAGA
State Public Works Engineer

HI/si
Attach.

80

1990-04-23-OA-FEA

FILE COPY

ENVIRONMENTAL ASSESSMENT

*DEPARTMENT OF HEALTH LABORATORY

Waimano,* Ewa, Oahu

Prepared for:

DEPARTMENT OF ACCOUNTING
AND GENERAL SERVICES
STATE OF HAWAII

JAMES K. TSUGAWA, AIA
and ASSOCIATES

Prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.
Engineers, Architects and Planners

December 1989

ENVIRONMENTAL ASSESSMENT

DEPARTMENT OF HEALTH

LABORATORY

WAIMANO, EWA, OAHU

Prepared for:
Department of Accounting and General Services
State of Hawaii

James K. Tsugawa, AIA and Associates

Prepared by:
Wilson Okamoto and Associates, Inc.
Engineers, Architects and Planners
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

December 1989

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PREFACE

This environmental document is prepared pursuant to the requirements of Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Hawaii Administrative Rules of the Department of Health, entitled Environmental Impact Statement Rules.

I. INTRODUCTION

I. INTRODUCTION

A. PROJECT LOCATION

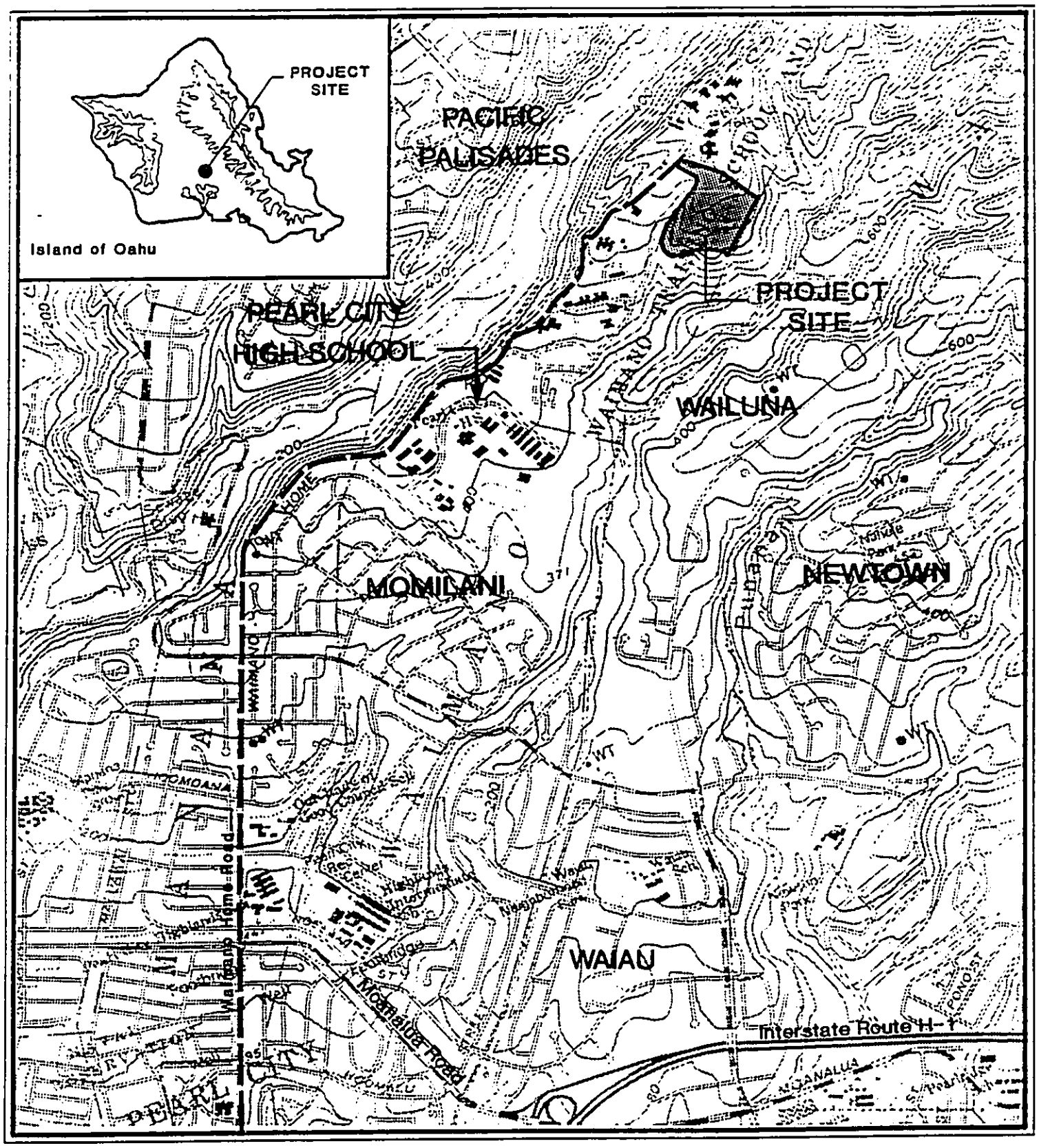
The State Department of Health (DOH) proposes to develop a laboratory facility at Waimano. The facility will be located on approximately 20 acres adjacent to the Waimano Training School and Hospital in upper Pearl City, within the Ewa District of Oahu, Hawaii. (See Figure I-1). The DOH project site is located on a portion of TMK parcel 9-7-25:1.

B. LAND OWNERSHIP

TMK parcel 9-7-25:1 is owned by the State of Hawaii and under the jurisdiction of the State Department of Health by Executive Order No. 1020. The parcel comprises 242.094 acres.

C. EXISTING LAND USE

The proposed Laboratory site will be located on the grounds of the Waimano Training School and Hospital. The site of the proposed Laboratory facility is a grassed area used for cattle and horse grazing by private month to month tenants of the DOH. Lantana, guava and ironwood trees border the site. An



DEPARTMENT OF HEALTH LABORATORY

LOCATION MAP

Fig. I-1

0 1500

Scale in Feet

N

prepared for:

DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.

HONOLULU, HAWAII

Table 1

Existing Building Use and Space Allocation

Program/Function	Net Square Feet (nsf)
Administration	1,478
Central Supply Services (formerly Media and Supply)	1,608
Chemistry	5,600
Environmental Microbiology	821
Virology	974
Medical Microbiology	1,488
Serology	318
Environmental Microbiology and Medical Microbiology	488
Air Surveillance and Analysis (Queen Emma Building)	4,648
Hall Storage	325
Basement Storage	109
Total Laboratory nsf	17,857

abandoned dairy and slaughterhouse and paved access road are located on the lower southern portion of the site. Oxidation ponds are found to the north.

D. SURROUNDING LAND USES

Land uses surrounding the site are the Waimano Training School and Hospital and Pearl City High School. Residential subdivisions situated on neighboring ridges in the vicinity of the proposed site include Pacific Palisades to the west, Wailuna and Newtown to the east and Momilani to the south. The Ewa Forest Reserve extends to the north of the project site.

II. DESCRIPTION OF THE PROPOSED PROJECT

II. DESCRIPTION OF THE PROPOSED PROJECT

A. PROJECT NEED

1. Current DOH Lab Facilities and Functions

The Laboratories Branch of the Department of Health (DOH) is currently housed on the fourth floor of Kinau Hale. Kinau Hale, located on the corner of Punchbowl and Beretania Streets in Honolulu, was constructed in the late 1950's and accommodates the Laboratories Branch as well as other DOH functions and offices. The Laboratories Branch occupies 13,100 net square feet (nsf) and 109 nsf of the basement for Basement Storage in Kinau Hale. The Air Surveillance and Analysis Program occupies 4,648 nsf of the Queen Emma Building for a total of 17,857 net square feet (nsf). Table 1 lists the current Laboratory Branch's building use and net square footage allocations for DOH programs and functions.

2. Deficiencies

The DOH Laboratory in Kinau Hale is overcrowded, substandard, inefficient and unsafe. Insufficient processing areas, the lack of sophisticated instrumentation, non-functional equipment, and an unsafe work environment result in slow turnaround time of laboratory analyses. The present facility lacks adequate

support utilities to perform newer analytic procedures necessary to support Department of Health programs. Many of these procedures cannot be performed in the labs because they require a large, stable supply of electrical power, specimen containment areas, space to accommodate specialized and sensitive equipment, and specialized waste disposal facilities. It is unrealistic that the 25 year old Kinau Hale facility could be renovated to address these needs.

The current proximity of the administrative offices to the analytical laboratories, which handle toxic materials and communicable diseases, is highly incompatible for safety and security reasons. Microbiological agents analyzed in certain laboratories, such as legionella, tuberculosis and human immunodeficiency viruses, require containment facilities lacking in Kinau Hale. Air conditioning systems and corridors in these laboratories and on the entire floor of the present facility were not designed to safely execute the proper ventilation and exhausting of these microbiological agents. Thus, many of the analytical procedures are not being performed safely and efficiently in the present facility.

B. Project Objectives

The Department of Health objectives for the proposed laboratory facility are as follows:

1. Accommodation of analytical work required by departmental programs.

2. Increased use of contract laboratory testing services whereby the DOH will retain services of private laboratories and regulate them by establishing rules and setting standards, performing periodic inspection and split sample checking of data to insure that all procedures are in compliance with contract terms.

3. Utilization of sophisticated instrumentation and techniques on a routine basis.

4. Automation of laboratory data to more efficiently retrieve information for analysis and cooperation with Mainland and Federal health agencies.

5. Increased assessment and training of private/public sector clinical and environmental laboratories.

6. Opportunity for "hands-on" laboratory experience to University of Hawaii at Manoa, School of Public Health students.

C. Proposed Project

1. Programs at the Proposed Facility

The proposed laboratory facility will address the needs of the medical and environmental sections and offer sufficient space for future laboratory expansion. It will allow the DOH to perform necessary analyses to support programs

providing regulatory, monitoring and enforcement actions for environmental activities; and to support the Department's public health activities.

The proposed laboratory facility will include programs to monitor hazardous materials, ground water and air toxins. The testing for any presence of volatile organic compounds and radioactive materials in water will also be administered by the DOH as mandated by the 1986 amendments to the Safe Drinking Water Act.

The total area for the proposed Laboratory facility is 109,044 gross square feet (gsf). Table 2 lists proposed building space allocations for the various DOH programs and functions. Of the total gsf, 61,400 net square feet (nsf) represents the actual laboratory branch program and/or function areas. The difference between the gsf and nsf areas is designated for circulation, mechanical and electrical rooms, vertical shafts, walls, partitions and structure, toilets, janitors' closets, etc. The proposed laboratory facility will provide for separate storage of small amounts of hazardous chemicals, flammable liquids, and gases that meet all applicable State and Federal safety and storage requirements.

Table 2

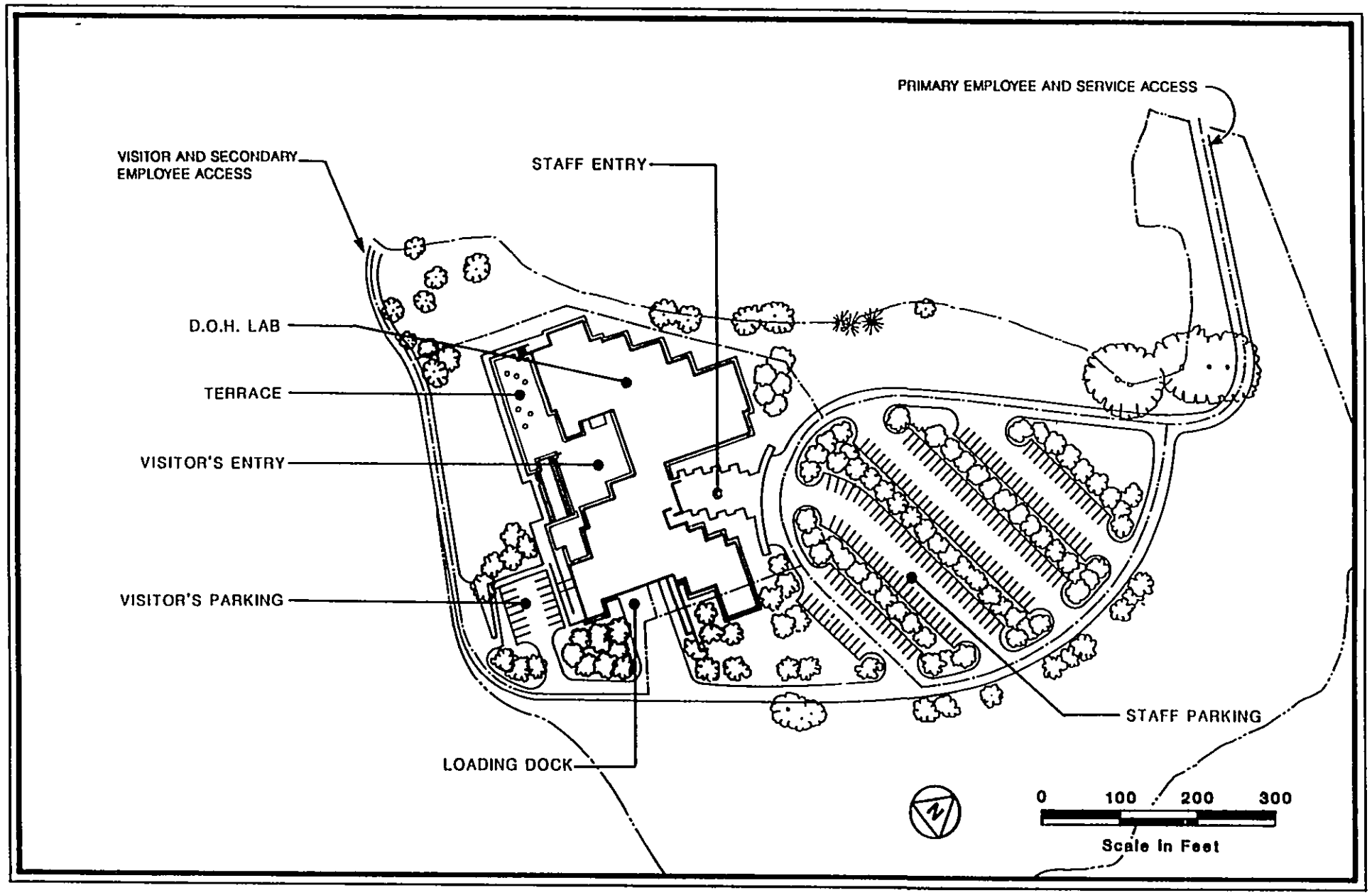
Proposed Building Use and Space Allocation

Program/Function	Net Square Feet (nsf)
Division Administration	2,110
Central Supply Services	12,300
Chemistry	16,920
Environmental Microbiology (formerly Sanitary Microbiology)	6,900
Virology	5,980
Medical Microbiology	8,160
Air Surveillance and Analysis (formerly Air Pollution)	9,030
Total net area	61,400 nsf
Total gross area	109,044 gsf

2. Site Layout

The project area consists of approximately 20 acres. Phase I of the DOH Laboratory facility will be located on the southwestern end of the project site. (See Figure II-1). The building will be oriented in a north-south direction with respect to the visitor entry which faces the south (makai). An east and west wing will be served by the central entry courtyard and lobby. Each wing will stand between one and three stories tall with a concrete and glass facade. The total floor area of the building will be 109,044 square feet, allocated as presented in Table 2. Distribution of various laboratory branches and support facilities within the proposed building is presented on Table 3.

The new facility is a three-level structure which steps up the hillside to minimize excavation and use of retaining walls. The building mass follows the slope of the hillside which aids in reducing the perceived scale of this large facility. The building stands approximately 44 feet high from its lowest elevation at the visitor entry to the roof, exclusive of the elevator shaft (See Figure II-1 and Photo of Model in Figure II-2).



DEPARTMENT OF HEALTH LABORATORY

Fig. II-1

SITE PLAN

prepared for:

DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.

Table 3

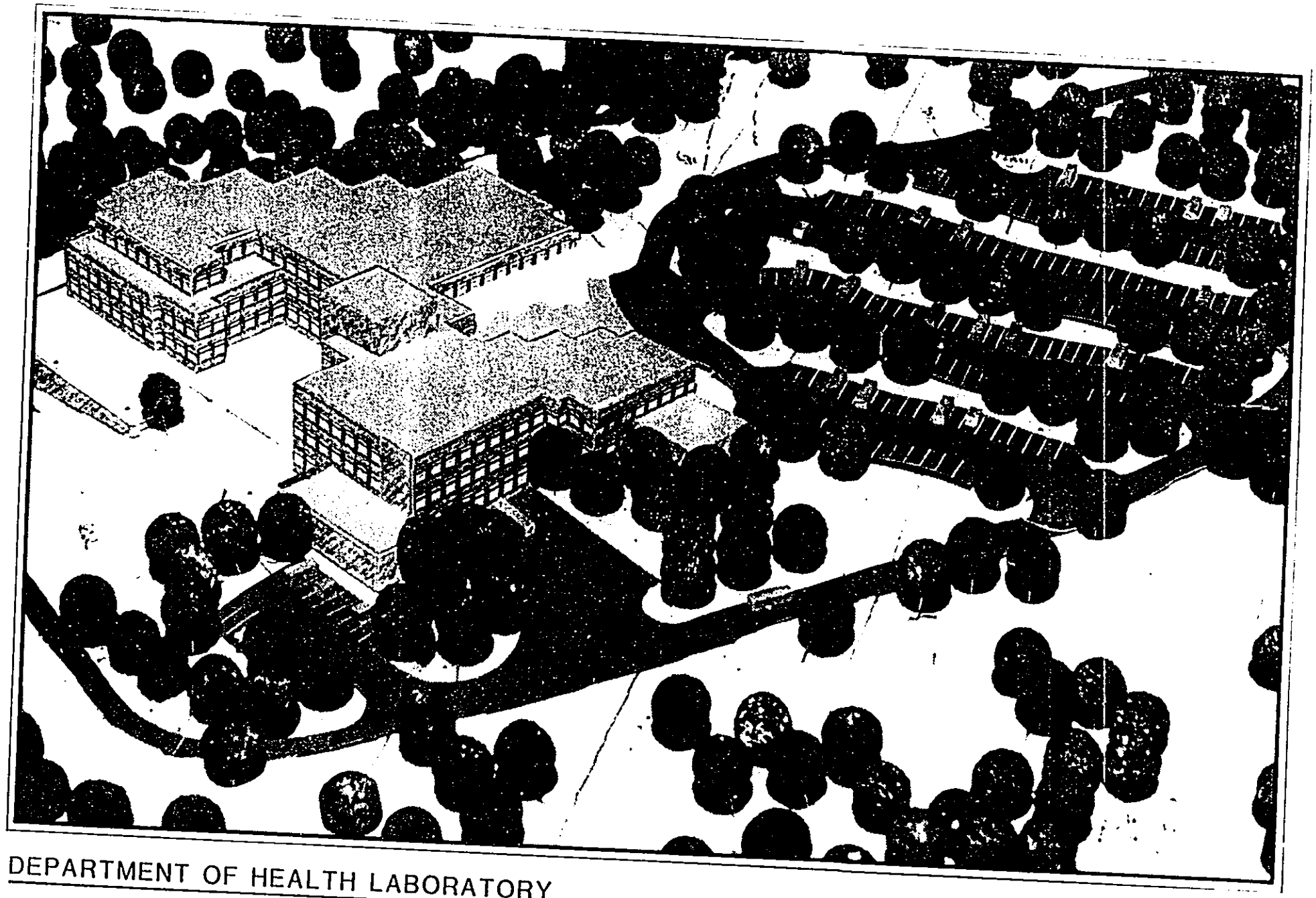
Laboratory Branches and Building Levels

Level 1 - Administration, Animal Facilities, Central Supply Services (Partial), Library, Kitchen/Lounge, Lecture/Multi-Purpose Room, Visitor Entrance, Loading Dock, Mechanical and Maintenance Rooms.

Level 2 - Environmental Microbiology, Virology, Central Supply Services (Partial), and Medical Microbiology.

Level 3 - Air Surveillance and Analysis, Chemistry, and Staff Entrance from Staff Parking.

Roof - Mechanical Cooling Tower, Fume Exhaust Fans.



DEPARTMENT OF HEALTH LABORATORY

Fig. II-2

PHOTO OF MODEL

prepared for:

DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.

The protruding wings of the building correspond to the lab suites within. The exterior walls are accentuated with tinted, recessed windows shaded by sunscreens to improve energy efficiency. At the same time, the recesses add texture, depth and interest to the exterior facade. The building's exterior wall colors will complement local earth colors.

Visitor parking, comprised of approximately 16 stalls, will be located east of the visitor entry. Approximately 190 stalls for employee parking will be provided to the north of the facility. The grounds will be landscaped to create a park-like setting complementing the forested areas to the east.

3. Vehicular Circulation

Vehicular access to the site will be provided via north and south roadways, both of which will intersect Waimano Home Road. The existing road leading to the southern portion of the site will be upgraded to serve as a one-way entrance to the site for visitors and employees. A new two-lane road intersecting Waimano Home Road will provide access to the northern end of the site. This road will serve as the major access, providing both entrance to and exit from the site for employee and service vehicles. The roadway will connect the proposed

Laboratory facility, the loading dock, and the future Phase II expansion area, as well as employee and public parking areas.

4. Site Preparation

In preparation for construction, the grading and grubbing of the project site will be limited to the building area. The remaining areas will be left in their natural state. Oxidation ponds currently in use to the north of the site will be abandoned and filled. The new facility will connect into the on-site sewage system serviced by the municipal sewer system. Soils foundation investigation will be performed to determine the recommended foundation system to support the new Laboratory facility.

5. Utilities

Electrical and telephone service shall be supplied by Hawaiian Electric Company and Hawaiian Telephone Company, respectively, from connections on Waimano Home Road. A new sewer connection being developed independent of the project will connect the proposed facility as well as the existing Waimano Home facility to the municipal sewer system. Water will be supplied from an existing self-contained State-owned and maintained water system, including a well,

reservoir and distribution network, within the Waimano Home facility. Gas for the facility will be delivered and stored in tanks. Drainage will be directed toward the ravine to the east of the project site and allowed to surface sheet flow along natural drainage courses.

6. Staff Changes

The existing DOH Laboratory has a current staff of approximately 80 employees. Future staffing is expected to increase to 159 in 1993 and 209 in 1998. Table 4 contains a breakdown of projected staffing requirements.

7. Future Expansion Requirements

Expansion of the facility is planned to occur toward the east of the proposed Laboratory facility. This expansion will approximately double the area of the proposed facility. Although the activities to be accommodated by possible expansion have not been determined, the DOH anticipates that future development will augment laboratory activities and house research facilities.

Table 4

Laboratory Staffing Needs 1989-1998

Branch	1989	1993	1998
Administration and Central Supply Services	15	29	45
Chemistry	28	42	56
Environmental Microbiology	4	16	24
Virology	13	21	24
Medical Microbiology	10	22	26
Air Surveillance and Analysis	10	29	34
Total	80	159	209

III. DESCRIPTION OF THE EXISTING ENVIRONMENT

III. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. GEOLOGY

Oahu, third largest of the Hawaiian Islands, is made up of two greatly eroded shield volcanoes, the Waianae and Koolau mountains.

The physiography of the upper Pearl City area is characterized by gulches which separate basaltic ridges projecting seaward from the southwestern slope of the Koolau Range. Colluvium deposited at the base of the gulches by erosion smooth the transition to stream deposited alluvium on the coastal plains.

B. TOPOGRAPHY

The project site is located on the southwest side of the Koolau Range with slopes generally ranging from five percent to 15 percent. The ground elevation of the site ranges from approximately 475 feet at its southwestern boundary to about 730 feet on the northern end of the site.

C. CLIMATE

The outstanding features of Oahu's climate are mild and equable temperatures throughout the year, moderate humidities, persistence of northeasterly trade winds, remarkable differences in rainfall within short distances and infrequency of severe storms.

Oahu's mountains influence rainfall and climate by obstructing, deflecting, and accelerating the flow of air. Warm, moist winds are forced to rise over windward coasts and slopes creating cloudiness and rainfall.

Annual rainfall for the project area ranges between 35 and 50 inches. Humidity is moderate from 58 to 71 percent. Temperature ranges from 70 degrees to 80 degrees during the winter months from October through April. The summer months from May through September have temperature ranges from 70 to 90 degrees. Winds are from the east-northeast averaging 10-20 miles per hour.

D. HYDROLOGY

1. Surface Water

Streams near the project area flow northeast to southwest down the leeward slope of the Koolau Range and empty into Pearl Harbor. They flow through narrow valleys and through hilly terrain and are fed by numerous tributaries.

The amount of runoff within each Leeward stream basin differs with rain intensity, geology and topography of the area. Direct runoff from light orographic rains is generally small. Infrequent severe storms can cause the amount of runoff to approach the volume of rainfall. The base flow of streams is maintained by groundwater resources.

In 1977, the U.S. Fish and Wildlife Service's Stream Channel Modification in Hawaii study classified perennial streams in four categories, based upon criteria of both the environmental quality and their appropriate uses as shown in Table 5.

Waimano Stream located near the proposed DOH Laboratory site is one of two tributaries of Waiawa Stream. Waimano, an intermittent stream, empties into the East Loch of Pearl Harbor near Waiau. Waiawa Stream flows to the ocean

Table 5

Stream Categories

- Pristine-Preservation - Streams with high environmental and biological quality. Intended uses for this category emphasize non-consumptive, non-degrading uses and no modification. Exploitive uses are intended only to the extent that they are non-degrading.

- Limited Consumptive - Streams with moderate to high quality water or natural values. Uses are controlled to prevent excessive modification.

- Exploitive-Consumptive - Streams with moderate to low natural (environmental-biological) and/or water quality (those which are well exploited, modified or degraded) and are intended for water related recreation activities.

- Construct-Alter - Streams with low environmental and biological quality which may be restricted to the public for health or safety reasons.

Source: U.S. Department of the Interior, Fish and Wildlife Service, Amadeo S. Timbol and John A. Maciolek. Stream Channel Modification in Hawaii, Part A: Statewide Inventory of Streams, Habitat Factors and Associated Biota, 1978.

throughout the year and is classified within the Construct-Alter category. The stream has been channelized and has 19 roadways of all types crossing its course.

2. Groundwater

High level ground water, isolated from seawater by dikes or other material of low permeability formed during the basaltic lava flows of the Koolau Volcanic Series, maintains the base flow of streams, man-made water development tunnels, and the draft of pumped wells. The direction of groundwater movement is predominantly southwestward from the mountains toward the ocean.

The proposed DOH Laboratory is situated on alluvium underlain by a dike complex. The permeability of near surface older alluvium is low. Older alluvium and a weathered zone of lava flows can form a nearly impermeable cap confining water in underlying unweathered lava.

A deep well and pump stations located off site from the proposed development supplies the 800,000 gallon capacity State owned reservoir located on the Waimano Training School and Hospital grounds. Waimano Training School and Hospital uses approximately 62,600,000 gallons annually.

The closest City and County of Honolulu Board of Water Supply line is approximately 6,000 feet from the proposed Laboratory site.

E. SOILS AND AGRICULTURAL POTENTIAL

1. Soil Classification

Soil series on the Island of Oahu are delineated on maps prepared by the U.S. Department of Agriculture, Soil Conservation Service (SCS). The project area incorporates the upper reaches of the Helemano-Wahiawa soil association, characterized by deep, moderately sloping, well drained soils with a fine texture. Helemano Silty Clay (HLMG) is found on the sides of V-shaped gulches on 30 to 90 percent slopes. In a representative profile, the surface layer is dark reddish-brown silty clay about 10 inches thick. The sub-soil, about 50 inches thick, is dark reddish-brown and dark-red silty clay that has subangular blocky structure. The substratum is soft, highly weathered basic igneous rock. The soil is neutral in the surface layer and neutral to slightly acid in the subsoil. Permeability is moderately rapid. Runoff is medium to very rapid, and the erosion hazard is severe to very severe. This soil is used for pasture, woodland, and wildlife habitat.

Wahiawa Silty Clay (WaC) consists of well drained soils on the uplands of Oahu with 8 to 15 percent slopes. These soils developed in residuum and old alluvium derived from basic igneous rock. They are nearly level to moderately steep. Elevations range from 500 to 1,200 feet. Rainfall amounts to 40 to 60 inches annually; most of it occurs between November and April. The mean annual soil temperature is 71 degrees Fahrenheit. Wahiawa soils are geographically associated with Kunia, Lahaina, Leilehua and Manana soils. These soils are used for sugarcane, pineapple, pasture and homesites. The natural vegetation consists of bermuda grass, guava, honohono, koa haole, and lantana. Runoff is medium and the erosion hazard is moderate.

2. Agricultural Lands of Importance (ALISH)

The State Department of Agriculture has identified Agricultural Lands of Importance for the State of Hawaii (ALISH) and categorizes these into three groups. "Prime" agricultural lands are those which have the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern farming methods. "Unique" agricultural lands have a special combination of soil quality, location, growing season, and moisture supply currently used to produced sustained high quality and/ or high yields of a specific crop when treated and managed

according to modern farming methods. For example, specialty crops such as taro farming or aquaculture development may be very productive in areas which may not be desirable for traditional farming crops. "Other" important agricultural lands include those which have not been rated "prime" or "unique". These lands are also of statewide or local importance, however, they exhibit properties, such as seasonal wetness, erodibility, limited rooting zone, slope, flooding or drought prone conditions which exclude them from the "prime" or "unique" categories.

The DOH property on which the Waimano Training School and Hospital is situated has been developed for urban use. The proposed laboratory site is classified as prime agricultural land by the State Department of Agriculture.

3. LAND STUDY BUREAU

The Detailed Land Classification - Island of Oahu conducted by the University of Hawaii Land Study Bureau classifies lands for overall suitability for agricultural use. Classification is indicated by a five-class productivity rating with A representing the class of highest productivity and E the lowest. Urban lands are designated U.

The site of the proposed DOH laboratory is designated B-121. Lands bordering the DOH proposed facilities are designated C-122, E-107 and Urban. Land type B-121 consists of deep, well drained, moderately fine textured, nonstony Wahiawa soil with slopes from 0 to 10 percent. Land type C-122 consists of deep, well drained, moderately fine textured, nonstony Wahiawa soil with slopes from 11 to 20 percent. Land type E-107 consists of rough broken land, with slope ranging from 36 to 80 percent, and elevation from 0 to 2,000 feet.

F. FLORA

A field survey of the site to inventory and assess the botanical/floral resources was conducted by Char and Associates, Botanical/Environmental Consultants on March 7, 1989. The primary objectives of the study were to 1) provide a general description of the vegetation; 2) inventory the terrestrial, vascular flora; and 3) search for threatened or endangered plants protected by federal and/or state laws. The report is included in Appendix B and summarized below.

Because the project site was used for grazing cattle for a long period of time, the vegetation has been greatly modified and there is little of botanical interest on the site. A number of range grasses and forbs were sown to improve pasturage. The site is dominated by introduced vegetation species as the project

site was used for grazing cattle. An overgrown guava orchard can be found on the site. There are no native plant communities remaining on the site. A list of all the plants inventoried during the field study is included in Appendix B at the end of this report.

G. FAUNA

The DOH property could provide habitats or be frequented by mammals known to exist in the region which include feral cats (Felis catus), feral dogs (Canis familiaris), mongoose (Herpestes auropunctatus), rats (Rattus exulans, Rattus rattus) and house mice (Mus musculus domesticus).

Introduced birds found in the guava mixed forest and urban areas of Pearl City and Pacific Palisades include the cardinal (Cardinalis cardinalis), barred doves (Geopelia striata), ricebird (Lonchura punctulata) and white-eye (Rosterops j. japonicus). Birds common to major urban areas also include the mynah (Acridotheres t. tristis), golden plover (Pluvialis dominica fulva) and house sparrow (Passer domesticus). Native birds such as the Elepaio (Chasiempis sandwichensis gayi), pueo (Asio flammeus sandwichensis) and Iiwi (Vestiaria coccines) may be found in the guava mixed forest which lie beyond the property. The pueo is identified as an endangered species on Oahu under Regulation 6, of

the State Department of Land and Natural Resources Administrative Rules and Regulations.

According to the report entitled Stream Channel Modification in Hawaii, Part A: Statewide Inventory of Streams, Habitat Factors and Associated Biota, stream fauna found in the upper reaches of Waimano Stream include guppies (Poecilia reticulata), Shortfin mollies (Poecilia mexicana), gobies (Awaous stamineus) and Tilapia (Tilapia mossambica).

H. FLOOD HAZARD AREAS

Areas prone to flood hazards are delineated on the Federal Flood Insurance Rate Map (FIRM) prepared for the City and County of Honolulu by the U.S. Department of Housing and Urban Development and Federal Insurance Administration. Flood hazard for the project site has not been determined by the Federal Insurance Administration. A FIRM map has not been prepared for the site.

I. HISTORICAL AND ARCHAEOLOGICAL SITES

An archaeological reconnaissance survey of the project area was conducted in March 1989 by Paul Rosendahl, Inc. The report is included in Appendix A with the findings from the report summarized.

No evidence of traditional Hawaiian cultural sites was encountered during the field work. The literature review for the area resulted in negative findings. There are no known archaeological sites on the property.

J. NOISE

The proposed DOH Laboratory site is located within the suburban community of Pearl City. Noise levels in Pearl City are much lower than those for the highly urbanized Downtown and Waikiki areas of Oahu.

With respect to interior noise levels, the proposed air conditioned facilities should provide at least 15 decibels of noise attenuation, reducing the interior L-10 noise rating to at most 50, within the acceptable range for category E activities, which includes hospitals.

K. AIR QUALITY

The air quality of the Pearl City area is comparatively better than that of the Honolulu area due to the presence of the northeast tradewinds which predominate throughout the year and blow pollutants from inland areas out to sea. Problems of poor air quality may be more likely to occur when tradewinds diminish or give way to southerly winds. Localized problems of poor air quality may occur under adverse Kona conditions, in areas of intense industrial development or along heavily used vehicle corridors.

L. SCENIC AND VISUAL RESOURCES

The DOH property is located on the southwestern slope along the ridgeline to the south of Waimano Stream on the leeward side of the Koolau Mountain Range. Scenic views from the site include Pearl Harbor, Ford Island, Aiea, Pearlridge, Waiau, Waimalu, Pearl City, Pacific Palisades, the Ewa plain, the Leilehua plain, the Waianae and Koolau Ranges.

M. WETLAND AREAS

The proposed project is not located near a wetland area and is not anticipated to impact such areas.

IV. SOCIO-ECONOMIC ENVIRONMENT

IV. SOCIO-ECONOMIC ENVIRONMENT

A. ECONOMY

The city of Honolulu is highly urbanized and serves as the major commercial, financial and governmental center of the State of Hawaii. Pearl City may be described as a suburban community to Honolulu which also includes commercial and industrial establishments providing a variety of goods and services. Major shopping centers in the area are Pearlridge Shopping Center, Pearl City Shopping Center, Pearl Kai Shopping Center, Westridge Center and Waimalu Shopping Center.

Two major employment centers located within the region are Pearl Harbor Naval Base and the Pearlridge Shopping Center.

B. POPULATION

Demographic data of the Pearl City area were extracted from the 1980 Census of the Population and the State of Hawaii Data Book. The resident population of the City and County of Honolulu has increased approximately 20.9 percent from 630,528 in 1970 to 762,565 in 1980. The 1985 estimated resident population of the City and County of Honolulu was 811,096, a 6.7 percent increase over the 1980 population.

The proposed facility is located within the Pearl City neighborhood. The resident population in 1980 was 42,577. There were 11,140 households in the area with approximately 3.8 persons per household. The 1985 estimated resident population was 46,487 a 9.2 percent increase over 1980.

C. PUBLIC SERVICES

1. Transportation System

The project site presently has no existing public access. In the future, the site will be accessible to the public and employees from one and two lane roads adjoining Waimano Home Road. Restricted access to the proposed Laboratory site will be provided by a lower southwest road. All existing roads need to be upgraded to provide safe access to the Laboratory facility and to minimize conflicts with Waimano Training School and Hospital facility.

Interstate H-1, Moanalua Road, Kamehameha Highway and Waimano Home Road provide access to Waimano Home Training School and Hospital. Interstate H-1 is a 12 lane limited access facility running east-west. Kamehameha Highway is an arterial roadway encircling the eastern half of Oahu from Honolulu to Central Oahu, the North Shore, Koolauloa and Koolaupoko. The section of Kamehameha Highway through Aiea and Pearl City is a six lane

divided highway parallel to Interstate H-1. Moanalua Road services many residential units and commercial uses along the corridor connecting Pearl City with Aiea. Within the local communities, Moanalua Road provides an alternative route to the regional Interstate H-1, Moanalua Freeway and Kamehameha Highway.

Public transportation to Waimano Training School and Hospital is provided by the City and County of Honolulu, Department of Transportation Services (DTS) which operates The Bus on a supply and demand basis, subject to availability of resources. The Bus route 54 runs between Honolulu and Pearl City. A City bus stop is located along Waimano Home Road near Pearl City High School.

2. Water System

The primary water source for the DOH Laboratory facility is an existing well system on the property. Total reservoir capacity is 800,000 gallons, sufficient for the proposed Laboratory facility.

3. Sewage Treatment and Disposal

The existing on-site sewage system serving Waimano Training School and Hospital is a series of oxidation ponds privately maintained by the Department of Health. Plans to connect the entire Waimano Training School and Hospital facility to the municipal sewage system, independent of the proposed Laboratory facility, are currently being implemented. Use of the oxidation ponds shall be terminated.

4. Power, Telephone and Cable Television Systems

Electrical and telephone services in Pearl City are provided by the Hawaiian Electric Company and Hawaiian Telephone Company, respectively. Gas energy is supplied by Gasco, Inc. All companies are headquartered in Honolulu. Cable television service is provided by Oceanic Cablevision.

The Hawaiian Electric Company (HECO) generates electric power from its Kahe and Waiau generating stations for the project site. HECO plans to extend the above ground system to service the Waimano Training School and Hospital facility. Presently, there are no gas or oil lines service the site. However, gas is delivered and stored in tanks at the Waimano Training School and Hospital facility.

5. Drainage System

Drainage at the Waimano Training School and Hospital facility is directed toward natural drainage courses in the area. There are no municipal drainage systems serving the facility.

6. Health Care Services

Health care services for residents of the Pearl City area consist of medical clinics and physician offices. Presently, the hospitals closest to the project site are the Pali Momi Medical Center, Wahiawa General Hospital and Kaiser-Permanente Moanalua Medical Center. The closest ambulance service is located at the Pearl City Fire Station and is provided by the City and County of Honolulu Department of Health.

A new hospital facility which has been approved by the State Department of Health will be located in Waipahu (St. Francis Medical Center West). St Francis Hospital is currently in the process of constructing this new 136 bed facility and medical plaza (St. Francis Medical Center West and St. Francis Medical Plaza West, respectively) in the Ewa-Waipahu area on Fort Weaver Road, across from the West Loch Estates development. The 136 bed hospital will provide both

emergency room service and ambulance service. The facility is currently nearing completion and is expected to be operational by Fall of 1989.

The Leeward Community Health Center located in Pearl City is a State Department of Health facility. The Center consists of the Dental Health Division, Family Health Services Division, Health Promotion and Education Office, Mental Health Division and Public Health Nursing Branch.

7. Police and Fire Protection

Pearl City is within Police District 3 which serves the area between Red Hill and Kaena Point. Police District 3 is headquartered at the City and County of Honolulu Police Department's Pearl City Station, which is staffed by 161 police officers who rotate on three shifts. Each shift has approximately 50 to 60 officers assigned to patrol three areas: Waianae Coast, Waipahu-Ewa Beach and Aiea-Pearl City.

Fire protection services are provided by the City and County of Honolulu Fire Department's Pearl City Station.

8. Educational Facilities

Public education facilities for the Pearl City area include:

Pearl City High School

Momilani Elementary School

Pearl City Highlands Elementary School

Highlands Intermediate School

Pearl City Elementary School

Lehua Elementary School

Manana Elementary School

Higher education is offered by Leeward Community College and West Oahu College in Pearl City. Leeward Community College, a two year college, is part of the State's Community College program under the University of Hawaii System. West Oahu College, a four year liberal arts college is located on the Leeward Community College campus.

The public library serving the area is the Pearl City Regional Library, a State Department of Education, Office of Library Services facility.

9. Parks and Recreational Facilities

The Pearl City area offers a host of public recreational facilities including Pearl City Recreation Center, Pacheco Playground, Pearl City Kai Playground, Pacific Palisades Entrance Park, Pacific Palisades Playground, Palisades Tennis Courts, Manana Neighborhood Park, Manana Playground and Manana Kai Park.

10. Solid Waste Collection and Disposal

Municipal solid waste collection and disposal services are provided by the Refuse Collection and Disposal Division of the City and County of Honolulu, Department of Public Works. Refuse is collected twice a week.

Laboratory solid waste will be stored in the building and transported to a dumpster or off-site incinerator. Liquid wastes will be processed through a chemical dilution/neutralization system. Radioisotope waste and chemical waste will be stored in a holding room at the loading dock area and disposed of in an approved manner.

V. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

V. RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

The plans and policies relating to the proposed Department of Health (DOH) Laboratory facility are numerous, ranging from broad program guidance offered by the Hawaii State Plan and State Health Functional Plan (Draft, 1988) to land use controls governing development of the site. The DOH Laboratory facility will be developed in consonance with various governmental land use plans, policies and regulatory controls. The following is a review of these plans and policies.

A. RELATED PLANS AND POLICIES

1. Hawaii State Plan

The purpose of the Hawaii State Plan established by Chapter 226, Hawaii Revised Statutes is to:

- improve the effectiveness of public and private actions
- improve coordination among different agencies and levels of government
- provide for wise use of Hawaii's resources and to guide the future development of the State.

The Statewide Planning System was established to guide the State toward the priority directions to fulfill the goals, policies and objectives of the State Plan.

The proposed DOH Laboratory facility is consistent with the following State Plan objectives and policies.

- o Fulfillment of basic individual health needs of the general public.

- o Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.

To achieve the health objectives, it shall be the policy of this State to:

- o Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems, including substance abuse.

- o Encourage improved cooperation among public and private sectors in the provision of health care to accommodate the total health needs of individuals throughout the State.

- Encourage public and private efforts to develop and promote statewide and local strategies to reduce health care and related insurance costs.

- Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.

- Provide programs, services, and activities that ensure environmentally healthful and sanitary conditions.

- Improve the State's capabilities in preventing contamination by pesticides and other potentially hazardous substances through increased coordination, education, monitoring, and enforcement.

2. State Functional Plans

The Statewide Planning System requires the development of State Functional Plans which are approved by the Governor. The State Functional Plans guide the implementation of State and County actions in the areas of agriculture, conservation lands, education, employment, energy, health, higher education, historic preservation, housing, human services, recreation, tourism, transportation,

water resources and other areas as designated by the Governor. The State Functional Plans delineate specific strategies of policies and priority actions that should be addressed in the short term. There is increased emphasis on the implementation of programs and actions. The purposes of the State Functional Plans with respect to Chapter 226, as amended by Act 336, Session Laws Hawaii (SLH) 1987 are to:

- Identify major statewide priority concerns;
- Define current strategies for the functional area;
- Provide the direction and strategies for departmental policies, programs and priorities;
- Provide a guide for the allocation of resources to carry out various State activities in coordination with County activities; and
- Assist the reconciling and coordinating of State and County roles and responsibilities in the implementation of the Hawaii State Plan.

State Functional Plans are intended to act in a coordinated fashion with County General Plans and Development Plans. Chapter 226, Hawaii Revised Statutes, as amended by Act 336, SLH 1987, states that County General Plans and Development Plans shall be used as a basis in the formulation of State Plans. Conversely, the law also states that the counties shall use approved State Functional Plans as guidelines in formulating, amending and implementing the County General Plans and Development Plans.

3. State Health Functional Plan

The Hawaii State Health Functional Plan, revised in 1989, reflects the changing priorities and new administrative direction within the Department of Health. The focus of the State Health Functional Plan and priority issues are as follows.

- There is new emphasis on preventive health. In addition to new infectious diseases such as AIDS and Hepatitis B, chronic diseases threaten the health care system with long term bankruptcy. For these diseases treatment is often costly, extended and intensive. Prevention strategies need to be undertaken to avoid massive future health costs.

- Presently access to health care is available to most of Hawaii's people. However, some groups lack such access; Hawaiians who are specially impacted with poor health status; the 'gap group' of people who do not have accessibility to care because of inability to share in insurance mechanisms; and special populations such as persons with severe, disabling mental illness who are hard to reach and often do not accept treatment - all require special emphasis.

- Hawaii's environment is among the most pristine in the nation and must be protected.

- The Department of Health requires upgrading its administrative and leadership capabilities.

These priorities are expressed in six major objectives which are discussed in this section under Department of Health 'issue areas'. Each issue area expresses the problem, the objective of the State concerning the problem, State policies addressing possible strategies, and the recommended action found in the State Health Functional Plans. The following are the two issue areas related to the DOH laboratory facility at Waimano.

Issue Area 5: Environmental Health and Protection

Problem: Hawaii's environment and health is threatened by pollution of air, land and water resources. The quality of air and recreational and drinking waters in Hawaii is generally excellent. These natural resources serve to both enhance the health of Hawaii's people as well as to attract visitors to our state. We are fortunate that industries producing large amounts of toxic wastes have not been located in Hawaii. However, the generation of power, agriculture, and other activities which occur in Hawaii do have a significant impact upon the environment. The disposal of wastewater and solid waste from expanding urban areas is a major problem and continued vigilance is necessary to ensure adequate protection of Hawaii's fragile environment.

Objective 5: Environmental programs to protect and enhance the environment. Continued development of new environmental protection and health services programs to protect, monitor, and enhance the quality of life in Hawaii.

Policy 5B: New Laboratory.

The DOH will construct a new comprehensive State Laboratory facility.

Action: Construct a new comprehensive State Laboratory facility.

Issue Area 6: Responsiveness to State Public Health DOH Organization.

Problem: The past organizational structure of the Department of Health is not efficient for providing leadership to address today's and tomorrow's current and emerging health issues.

The Department of Health is the largest line agency in the State government with 5,300 employees, a budget exceeding $220 million and program responsibilities for the entire range of public health services, normally the purview of local governments in most Mainland jurisdictions.

Directions of the Governor Waihee's Administration require a proactive Health Department. This entails the development of organizations which will enable the

department to be responsive to the community's needs, aware of problems related to the community's health status and prepared to develop appropriate responses to emerging health needs before those needs become crises. This will dictate, not only involvement in the community to develop consensus around new policy directions, but also the institution of forward looking analyses of health problems. Becoming proactive and developing and maintaining the community's support necessary for major health initiatives requires major changes in the organization of the Health Department.

The Department's organization will be accomplished by the creation of six new organizational entities called Administrations, overseen by a Deputy Director. Basically each Administration is a policy level unit of organization at the highest level of a government agency. The Administration, as a focal point for departmental management, leadership, and communication, combines programs with similar and common missions and functions. These Administrations are: Personal Health Services,

Health Promotion and Disease Prevention, Behavioral Health Services, Environmental Health, Community Hospitals and Health Resources.

This reorganization, in combination with upgrading in administration capacity, will allow the department to assume the role of leader in public health.

Objective 6: A more responsive DOH to improve the Department of Health's ability to meet the public health needs of the State of Hawaii in the most appropriate, beneficial and economical way possible.

Policy: Expand health services through increased use of health resources. The Department of Health will maximize utilization of all available resources for health programs and services.

Action: Acquire adequate work space/areas to meet the needs of new and existing health programs.

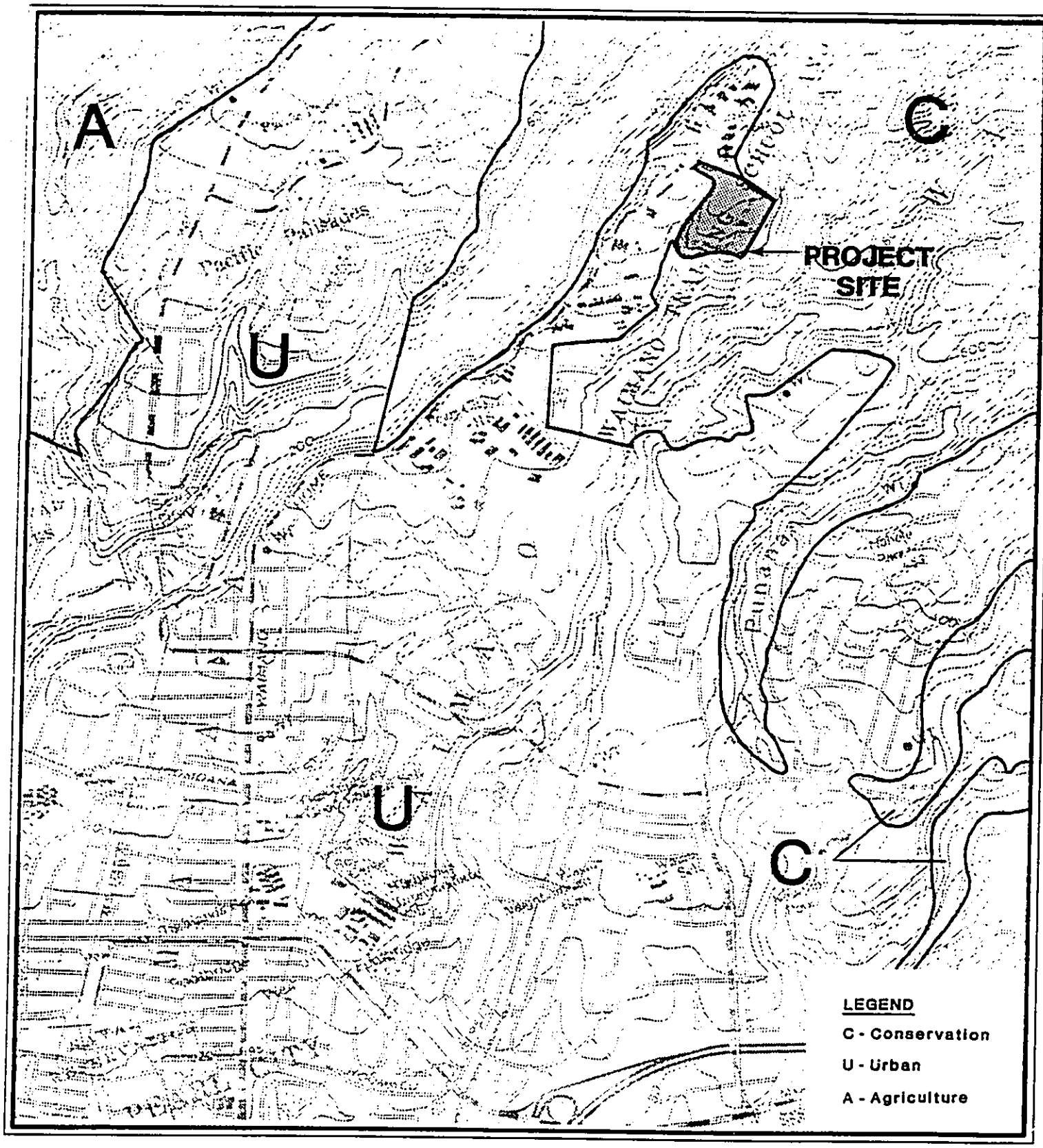
B. LAND USE PLANS AND POLICIES

1. State Land Use District

Pursuant to the Hawaii Land Use Law (Chapter 205, HRS), the State Land Use Commission has classified all lands in the State into four land use districts: Urban, Agriculture, Conservation and Rural. The proposed Department of Health Laboratory Site is within the Urban designation. (See Figure V-1)

The mountainous areas to the north of the site are designated Conservation. Inasmuch as the proposed development would be permitted under the urban designation, no boundary amendment to reclassify the site, special permit, or Conservation District Use Application process would be required.

Future expansion of the facility into areas designated Conservation District will require a State Land Use District Boundary Amendment. Alternatively, use of the Conservation District may be sought through a Conservation District Use Application.



DEPARTMENT OF HEALTH LABORATORY

STATE LAND USE CLASSIFICATION

Fig. V-1

0 1500

Scale in Feet

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prepared for:

DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.

HONOLULU, HAWAII

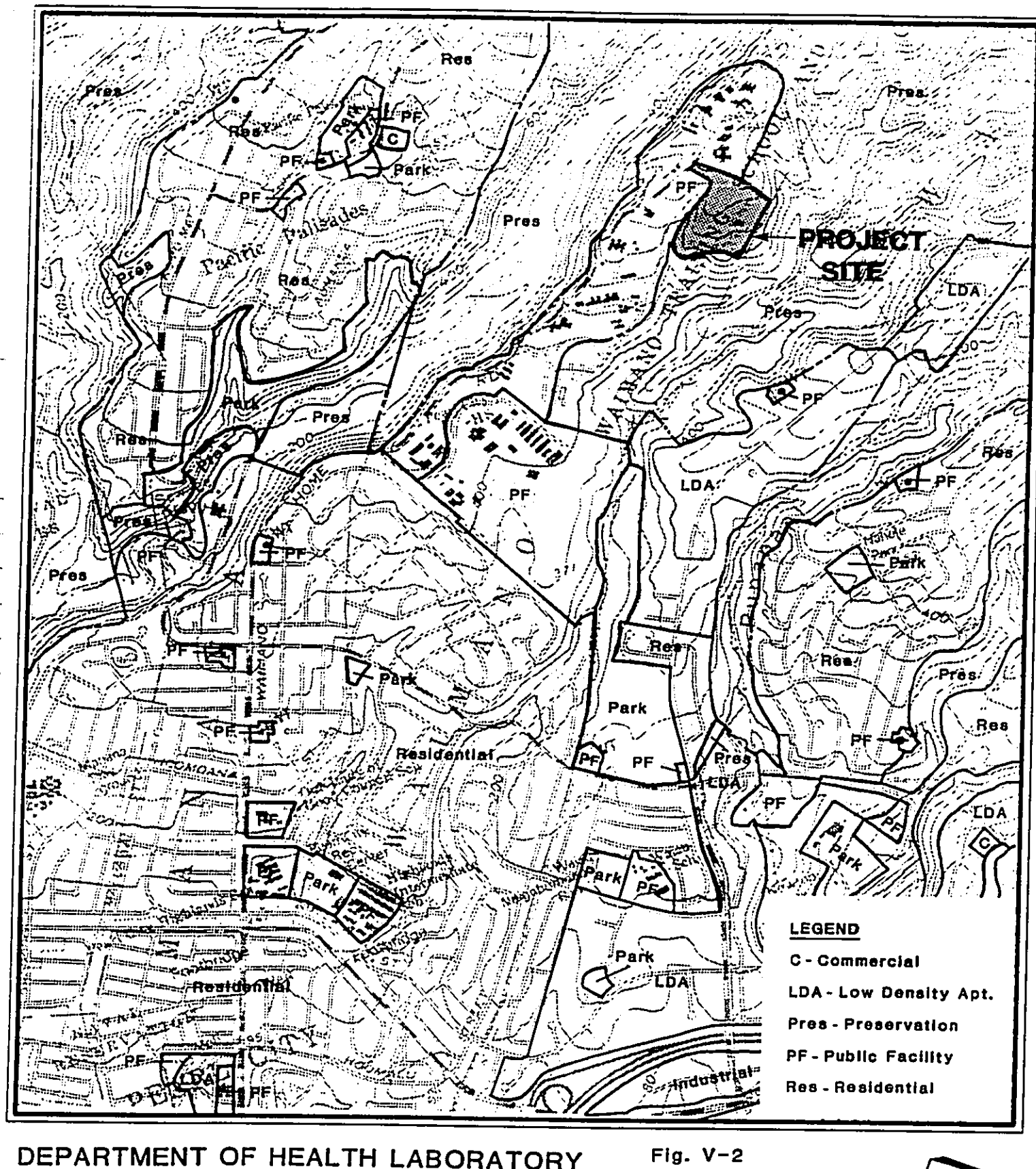
2. City and County of Honolulu General Plan

The General Plan specifies long term objectives and policies for planning Oahu's future, guiding both the quantity and quality of future growth. According to the General Plan, the project site lies in the Primary Urban Center which encompasses communities from Waikiki to Waipio on the Ewa side of Oahu.

The proposed DOH Laboratory facility will be consistent with the intent of the General Plan. It will essentially maintain an existing use and will not significantly intensify development in the area nor will it create a demand for more development in the area.

3. City and County of Honolulu Development Plan

Eight Development Plans were established to provide detailed schemes for "implementing and accomplishing the objectives and policies of the General Plan." The Development Plans guide the desired sequence, patterns and characteristics of future development. The Ewa Development Plan maps indicate the planned distribution and intensity of land uses and public facilities as shown in Figure V-2 and V-3 respectively. Specific urban design considerations in this area emphasize open space, public views and height controls.



DEPARTMENT OF HEALTH LABORATORY

CITY & COUNTY OF HONOLULU DEVELOPMENT PLAN LAND USE MAP

prepared for:

DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

Fig. V-2

0 1500

Scale in Feet

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prepared by:

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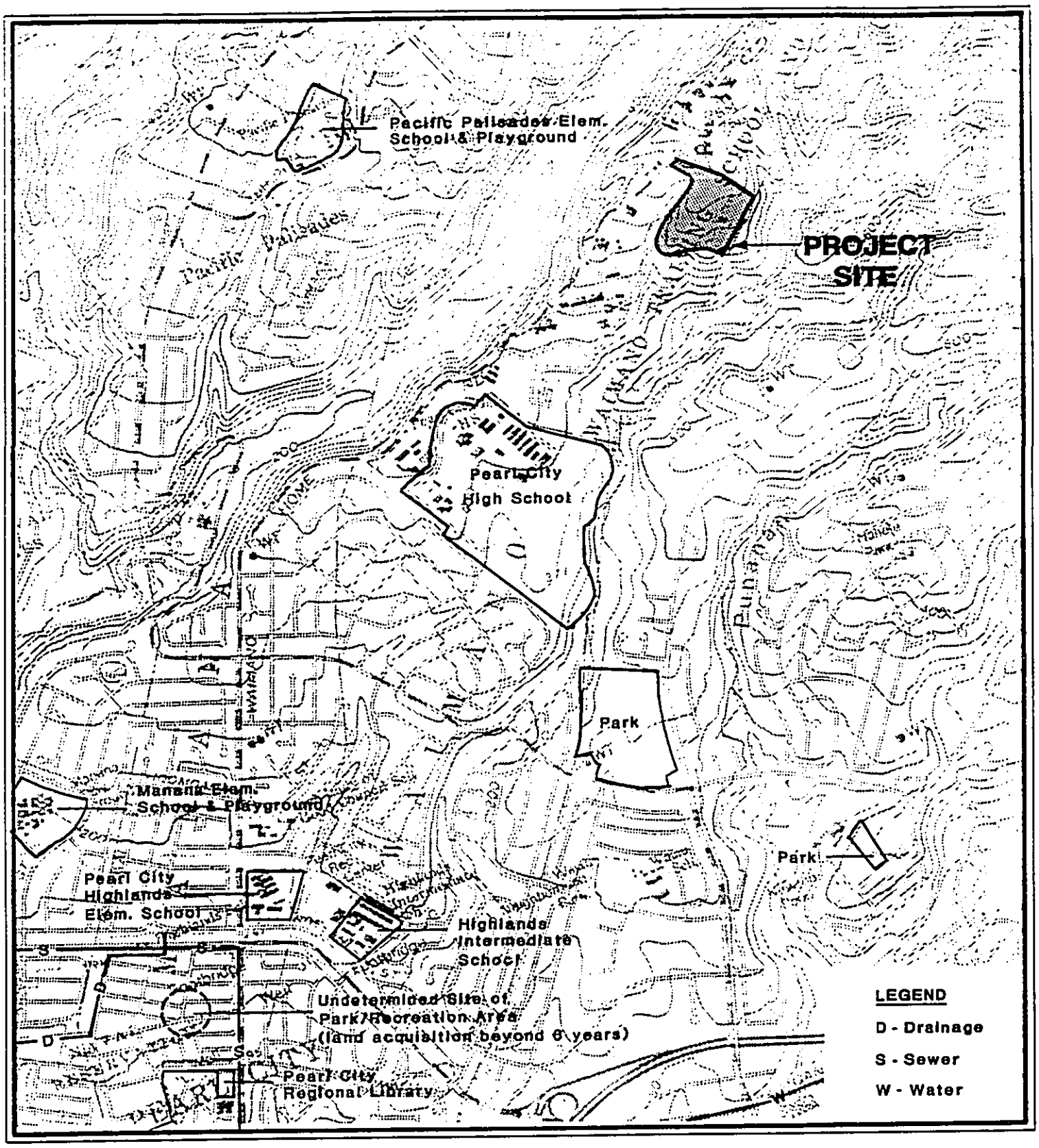
HONOLULU, HAWAII



DEPARTMENT OF HEALTH LABORATORY

CITY & COUNTY OF HONOLULU DEVELOPMENT PLAN
PUBLIC FACILITIES MAP

prepared for:
DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

Fig. V-3

0 1500
Scale in Feet

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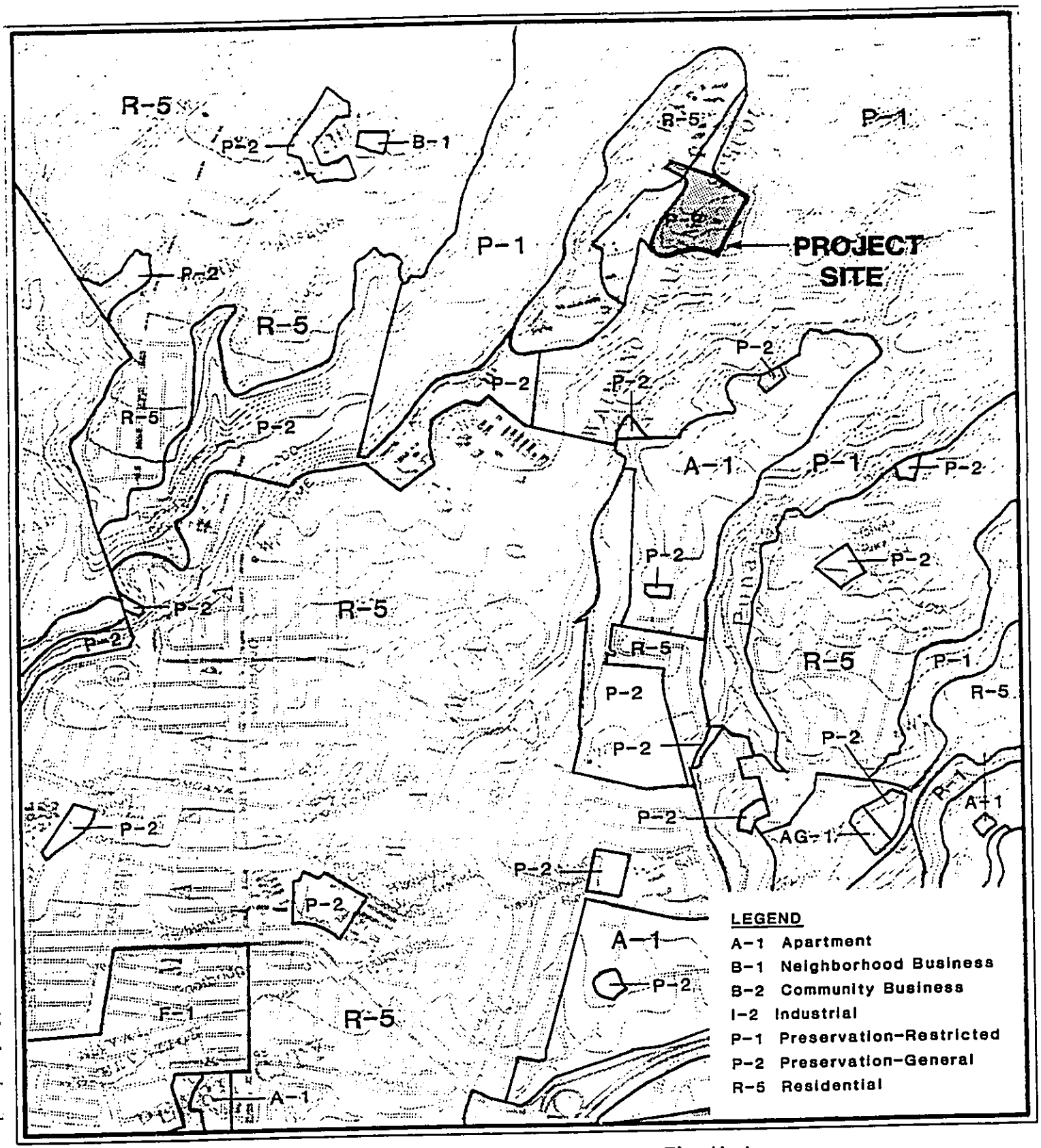
prepared by:
WILSON OKAMOTO & ASSOCIATES, INC.
HONOLULU, HAWAII

The proposed project site is designated as a public facility - in keeping with the institutional uses of Waimano Training School and Hospital. Therefore, no amendment to the Development Plan will be required for the proposed facility. With respect to the urban design principles, the proposed Laboratory facility is configured to maintain a low profile by following the sloping contour of the site. Ample space is provided within and around the facility to preserve open space.

4. City and County of Honolulu Zoning

The proposed Department of Health Laboratory facility site is zoned P-2. (See Figure V-4). According to the City and County of Honolulu Land Use Ordinance, the intent of the P-2 District is to preserve and manage open space and recreation lands and lands of scenic and other natural resource value. Public facilities are permitted in a P-2 District.



DEPARTMENT OF HEALTH LABORATORY

LAND USE ORDINANCE MAP (LUO)

Fig. V-4

0 1500

Scale in Feet

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prepared for:

DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.

HONOLULU, HAWAII

VI. POTENTIAL IMPACTS AND MITIGATIVE MEASURES

VI. POTENTIAL IMPACTS AND MITIGATIVE MEASURES

A. POTENTIAL SHORT TERM IMPACTS

1. Water Quality

The project site is located three miles from the ocean at an elevation of approximately 650 feet above sea level. There are no surface water bodies or perennial streams located on the site. Consequently, eroded soil and airborne dust are not anticipated to have an adverse impact on surface water quality.

Clearing and grading operations at the project site may expose the soil to rain, which is frequent in the upper Pearl City area and may create the potential for erosion and runoff. The Wahiawa Silty Clay series consists of well drained soils. Runoff is medium and the erosion hazard is moderate on 8 to 15 percent slopes.

To minimize soil exposure to potential erosion, grading will be limited to the extent necessary to accommodate the proposed improvements. Compliance with County grading, erosion and sediment control ordinances will further minimize the potential for adverse effects on the water quality of perennial streams in the vicinity.

All grading will be in accordance with the City and County of Honolulu Grading Ordinance and the recommendations of a soils engineer. As required, erosion control such as temporary desilting basins, berms, swales, grassing and watering will be employed during grading operations. These measures will be determined in the preparation of an erosion control plan which will be submitted for review and approval by appropriate government agencies.

2. Flora and Fauna

The vegetation on the project site to be displaced by the proposed development is dominated by guava, lantana and ironwood trees. No endemic or rare and endangered species were identified and no native ecosystems will be affected by construction and development activities. Earthwork operations will displace existing flora in the limited areas designated for grading. However, the landscaping plan will encourage existing vegetation which is not removed to blend in with the buildings, roadways and parking areas. Introduced species make up almost all of the plant cover and the development is not expected to have a significant negative impact on the total island populations of the species involved.

The fauna on the project site consists of species commonly found in other areas of Oahu. Development of the DOH Laboratory facility will modify or destroy

the present habitats of non-native wildlife such as feral cat (Felis catus), feral dog (Canis familiaris), mongoose (Herpestes auropunctatus), rat (Rattus exulans, R. rattus), gecko and skink. The loss of these habitats will not result in any significant impact to the overall species population on the island of Oahu.

The proposed project will not encroach on the Ewa Forest Reserve to the north of the project site where native flora and fauna are more likely to occur. The pueo prefers open grasslands and forested upland areas. These forests are not within the construction area and will not be impacted by the development.

3. Archaeology/Historic Resources

An archaeological survey of the project area was conducted in March 1989 by Paul Rosendahl, Inc. The report is included in Appendix A. No evidence of traditional Hawaiian cultural sites was encountered during archaeological field work. The literature review for the area resulted in negative finds. There are no known archaeological sites on the property.

During any construction activity involving the extensive modification of the land surface, there is always the possibility, however remote, that previously unknown or unexpected subsurface cultural features or deposits might be encountered. In

such a situation, construction will be halted and immediate archaeological consultation shall be sought from the Department of Land and Natural Resources State Historic Preservation Office.

4. Traffic

During construction, trucks, heavy equipment and other vehicles will use existing roads to transport materials and to access construction areas. The increased traffic from construction related vehicles is not anticipated to be significant, but may cause some minor inconveniences in the immediate vicinity for the duration of the construction. If required, flagmen shall be employed to ensure traffic safety.

5. Air Quality

Ambient air quality is expected to temporarily decrease as a result of construction related activities. Fugitive dust will be generated by construction and grading activities. Also during construction, emissions from engine exhaust (primarily consisting of carbon monoxide and nitrogen oxides) will also occur both from onsite construction equipment and from vehicles used by construction workers traveling to and from the project.

To mitigate fugitive dust emissions from construction activities, compliance with State of Hawaii Air Pollution Control Regulations regarding establishment of a regular dust-watering program and covering of dirt hauling trucks will be adhered to.

Increased concentrations of vehicular emissions due to the disruption of traffic by construction equipment and/or commuting construction workers will be alleviated by transporting equipment and personnel to the site during off peak traffic hours.

6. Noise

Noise levels in the immediate vicinity of the project site will increase as a result of operating heavy vehicles and other power equipment during construction. It shall be the contractor's responsibility to minimize noise by complying with Title 11, State Department of Health Administrative Rules, Chapter 42-Vehicular Noise Control for Oahu and Chapter 43-Community Noise Control for Oahu. Accordingly, the contractor shall be responsible for properly maintaining mufflers and other noise attenuating equipment. A noise permit will be required if it is anticipated that noise levels will exceed allowable limits as specified in the regulations.

7. Safety

Necessary measures to assure public safety will be implemented throughout all phases of construction. When construction is not ongoing (nights, weekends, and holidays), construction areas will be secured by adequate safety signs, signals, and/or other safety devices as required by State and County regulations.

8. Economy

Short term economic benefits associated with construction include employment opportunities and multiplier effects.

B. POTENTIAL LONG TERM IMPACTS

1. Water Quality

The proposed Department of Health facilities, parking lot and roadway are anticipated to slightly increase rainfall runoff from built-up areas and pavement. However, properly sited drainage improvements will channel additional runoff into existing natural drainage courses toward the eastern ravine so as to minimize any adverse impacts such as erosion, flooding of downslope areas or increased stream siltation.

Erosion and sediment control measures of the U.S. Soil Conservation Service suitable for use in the construction of the project will be implemented. Permanent runoff mitigation measures such as grassed swales, grated inlets, drainage culverts, and other suitable appurtenances will afford on-site control.

2. Flora and Fauna

A field survey of the site to inventory and assess the botanical/floral resources was conducted by Char and Associates, Botanical/Environmental Consultants in March 1989. The vegetation in the project site is dominated by guava, lantana and ironwood trees. No endemic or rare and endangered species were found despite a careful search and no native ecosystems will be affected by the proposed project.

Development of the proposed facility will result in minimal loss of vegetation. However, introduced species make up almost all of the plant cover and the development is not expected to have a significant negative impact on the total island populations of the species involved.

There are no rare or endangered species currently inhabiting the site. There have been no published studies for Hawaii that report on habitat modification and the resultant change in species' abundance.

The proposed development will not encroach on the Ewa Forest Reserve to the north of the project site where native flora and fauna may occur.

3. Scenic and Visual Resources

The proposed Laboratory facility is designed to maintain a low profile against the slope leading up to the Waimano Training School and Hospital facilities. The tallest portion of the structure rises three stories and is not visible from public vantage points along Waimano Home Road due to the topography and forested areas surrounding the site.

It is unlikely that the new buildings would be significantly more visible than the existing structures. The planned facilities will be constructed at descending elevation below the Waimano Training School and Hospital grounds. The landscaping will provide additional screening and preserve the forest like setting in the open areas. Replacement of the uncontrolled vegetative growth in designated areas on the site with new landscaping material will provide scenic relief for adjoining areas.

4. Traffic

The proposed DOH Laboratory facility is not anticipated to generate a significant volume of traffic. Related traffic likely to contribute to peak loads during the "rush hour" will be limited to commuting staff. Presently, the DOH Laboratory has 80 employees on its staff, which is projected to increase to 159 in 1993 and to 209 in 1998.

The traffic impact of commuting staff on highway arteries leading to the proposed facility will be positive, albeit negligibly, with respect to the existing DOH Laboratory Facility in Honolulu. During the morning peak hours, staff commuting to the proposed facility from Leeward and Central Oahu and the North Shore would exit eastbound traffic in Pearl City and would no longer contribute to the traffic congestion from Pearl City to Honolulu. This would be a positive impact. Staff commuting from areas west of Pearl City would continue to contribute to traffic eastbound into Honolulu and would also add to traffic westbound out of Honolulu to Pearl City. The latter leg, however, would be against the primary direction of traffic flow and would not generally contribute to existing traffic congestion. This situation would be reversed during the evening peak hour and result in similar tradeoffs which should have a slightly positive impact, overall, on the traffic situation.

Roadways leading to the proposed facility from arterials will need to accommodate more traffic during the morning and evening peak hours as commuting staff arrive and depart from the facility, respectively. In both cases, however, the staff generated traffic will be moving in an opposite direction from the primary flow of traffic. Deliveries of supplies for the facility will add additional traffic, including truck traffic, to arterials and roadways leading to the proposed Laboratory facility. This should not aggravate any existing congestion since most deliveries would occur during off-peak hours. Since the existing Waimano Home facility already receives such deliveries, associated traffic would not be out of character for the area.

The proposed roadway leading to the Laboratory facility will establish a safe and efficient circulation pattern within the project site and area as a whole. Roadways will conform to Subdivision Rules and Regulations of the City and County of Honolulu. Laboratory access will attempt to minimize conflicts with Waimano Training School and Hospital operations.

5. Air Quality

Air quality impacts of the project from electrical power demand and solid waste disposal are expected to be negligible. The level of traffic generated by the

proposed facility will not significantly impact air quality since most traffic will be moving in the opposite direction of the primary commuter traffic. Elevated automobile emission due to slower moving traffic should be minimized.

6. Noise

Long term impacts from noise surrounding the project site are not expected to be of concern. Following construction, activities within the project area itself will not be generating any noise of potential concern to neighboring residential areas. Inasmuch as the new DOH Laboratory facility will accommodate uses comparable to those of the Waimano Training School and Hospital, no increase in noise level is expected.

7. Economy and Employment

Inasmuch as the proposed Laboratory is intended to relocate the existing Department of Health Laboratory from Punchbowl Street, no immediate expansion of job opportunities is anticipated. Expanded program requirements and related staffing increases are expected in the next ten years at the proposed Laboratory facility. (See Chapter II, Table 3)

8. Population

The proposed DOH Laboratory facility will not directly impact the population levels in the Pearl City area. The facility would provide employment in proximity to the growing communities on the Ewa plain. The proposed project is therefore compatible and supportive of the increase in population planned for Ewa as part of the Secondary Urban Center thrust.

9. Public Services

The proposed DOH Laboratory Facility is located above Pearl City and will utilize available public services for police, fire protection, and solid waste removal in the area. The increased demand generated by the development is unlikely to impair the delivery of these services. The proposed DOH Laboratory Facility will not create a demand on school or recreational facilities in the area.

10. Utilities

The proposed Laboratory facility will not adversely affect the existing utility systems. Utility service for the proposed development will be coordinated with the respective public and private utility companies.

a. Water

The water system privately owned by the Department of Health on the Waimano Training School and Hospital grounds has been determined adequate to accommodate the demands of the proposed Laboratory facility.

b. Sewage

The existing onsite sewage system serving Waimano Training School and Hospital will be upgraded in the very near future. The DOH property will be connected to the City Wastewater Management System on the grounds of the Waimano Training School and Hospital. The sewer system will be able to accommodate the increased demands created by the proposed Laboratory facility.

c. Electrical

Hawaiian Electric is in the process of extending its overhead to service the entire Waimano Training School and Hospital facility, as well as adequately serve the energy needs of the proposed Laboratory facility. No major development of off-site facilities will be required to adequately service the power requirements of the new Laboratory facility.

d. Telephone

Telephone service for the new facility will be provided by Hawaiian Telephone Company. Early coordination regarding the facility's telephone needs will be initiated by DOH Laboratory administration to insure timely availability of service.

11. Community Character and Land Use Compatibility

The proposed use of the Department of Health property for the Laboratory facility will be a continuation of the existing institutional use of the site.

VII. ALTERNATIVES TO THE PROPOSED ACTION

VII. ALTERNATIVES TO THE PROPOSED ACTION

The proposed project site was selected through a review of available State-owned land appropriate for the facility. Use of land not owned by the State was considered unfeasible due to significant acquisition costs. Alternative designs for the facility were coordinated with the State Department of Accounting and General Services and the State Department of Health.

The No-action alternative was discounted since renovation of the present DOH laboratory at Kinau Hale to meet present and future requirements was deemed unfeasible.

VIII. AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONSULTED

VIII. AGENCIES, ORGANIZATIONS AND INDIVIDUALS TO BE CONSULTED

The following agencies, organizations and individuals shall be consulted in the preparation of this environmental assessment.

City and County of Honolulu Agencies

Department of General Planning

Department of Land Utilization

Department of Public Works

Department of Transportation Services

Board of Water Supply

State of Hawaii Agencies

Department of Health

Department of Land and Natural Resources

Office of State Planning

Office of Environmental Quality Control

Organizations

Neighborhood Board No. 21, Pearl City

Pearl City Community Association

Individuals

Honorable Eloise Tungpalan, State Senator

44th Representative District

Honorable Arnold Morgado, Councilman

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REFERENCES

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APPENDIX A

APPENDIX A
ARCHAEOLOGY REPORT

PAUL H. ROSENDAHL, Ph.D., Inc.
Consulting Archaeologist

Report 572-041089

ARCHAEOLOGICAL INVENTORY SURVEY
WAIMANO HOME DEPARTMENT OF HEALTH FACILITY

Land of Waimano, Ewa District
Island of Oahu

by

Peter M. Jensen, Ph.D.
Associate Senior Archaeologist

Prepared for

Wilson Okamoto & Associates, Inc.
P.O. Box 3530
Honolulu, Hawaii 96811

April 1989

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SUMMARY

At the request of Mr. Earl Matsukawa of Wilson Okamoto & Associates, Inc., Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an archaeological inventory survey of the c. 20 ac Waimano Home Department of Health Facility project area. The field work was conducted March 23-24, 1989, and involved a complete coverage (100%) intensive-level surface reconnaissance survey of the entire project area. The objectives of the survey were to (a) identify all sites and site complexes present within the project area, (b) evaluate the potential significance of all identified archaeological remains, (c) determine the possible impacts of potential future developments upon the identified remains, and (d) define the general scope of any subsequent archaeological work that might be deemed necessary or appropriate.

No evidence of traditional Hawaiian cultural sites was encountered during the course of the field work. Background literature and LCA review resulted in identification of land ownership history, but identified no specific information concerning site locations.

Evidence of recent activity was encountered in the form of (1) an active sewer pond and associated pipes and ditches, (2) foundation remains and standing structures (involving both cinder block and stick-frame construction) related to an abandoned slaughter house, and (3) abandoned sections of both dirt, as well as paved, access roads. None of these contemporary features was recorded during the present project, and none is considered eligible for inclusion on the National Register of Historic Places or is otherwise considered a significant resource.

In consideration of the negative findings resulting from both background literature review and pedestrian field survey, no further archaeological work is necessary in the project area.

CONTENTS

INTRODUCTION

BACKGROUND

At the request of Mr. Earl Matsukawa of Wilson Okamoto & Associates, Inc., Paul H. Rosendahl, Ph.D., Inc. (PHRI) has completed an archaeological inventory survey of the c. 20 ac Waimano Home Department of Health Facility project area. The parcel is located on the south ridge above Waimano Stream, within Waimano Ahupua'a, Ewa District, Island of Oahu. The basic objective of the survey was to provide information appropriate to and sufficient for the preparation of County grading and other development permits, in conformity with plans for future development of these lands.

The survey was conducted March 23-24, 1989, under the supervision of PHRI Associate Senior Archaeologist Dr. Peter M. Jensen, assisted by PHRI Field Archaeologists Robert Noah and Kala Mossman. Approximately 30 man-hours of labor were expended conducting the survey field work.

The present report comprises the final report of the current project. The report includes a scope of work, a brief description of the project area, review of relevant literature, and a discussion of the field methods and procedures utilized. The report concludes with presentation of field work findings and recommendations.

SCOPE OF WORK

The basic purpose of an archaeological inventory survey, formerly referred to as a reconnaissance survey, is to identify--to discover and locate on available maps--all sites and features of potential archaeological significance present within a specified project area. An inventory survey constitutes the initial level of archaeological investigation. It is extensive rather than intensive in scope, and is conducted primarily to determine the presence or absence of archaeological resources. This level of survey indicates both the general nature and variety of archaeological remains present, and the general distribution and density of such remains. It permits a general significance assessment of the archaeological resources, and facilitates formulation of realistic recommendations and estimates for any subsequent mitigation work as might be necessary or appropriate. Such mitigative work could include intensive data collection involving detailed recording of sites and features, and selected test excavations; in addition, mitigation could also include more extensive and intensive data recovery excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

In consideration of the above, the basic objectives of the present inventory survey were fourfold: (a) to identify (find and locate) all sites and site complexes present within the Waimano project area; (b) to evaluate the potential general significance of all identified archaeological remains; (c) to determine the possible impacts of proposed future developments upon the identified remains; and (d) to define the general scope of any subsequent intensive data collection and/or other mitigation work that might be necessary or appropriate.

Based on a review of readily available background literature, on familiarity with the project area, and on extensive knowledge of the current requirements of pertinent review authorities, the following specific tasks were determined to constitute an adequate and appropriate scope of work for the proposed inventory survey:

1. Conduct limited archaeological and historical documentary background research involving review and evaluation of previous archaeological research undertaken within the immediate vicinity;

2. Conduct a complete coverage (100%) intensive-level surface reconnaissance survey of the project area; and

3. Analyze background and field data, and prepare an appropriate report.

The inventory survey was conducted in accordance with the standards for inventory-level survey recommended by the Hawaii State Department of Land and Natural Resources-Historic Sites Section/State Historic Preservation Office (DLNR-HSS/SHPO). These standards are currently being used by the State of Hawaii as guidelines for the review and evaluation of archaeological inventory survey reports submitted in conjunction with various development permit applications. In keeping with these standards, the significance of all identified archaeological remains was to be assessed in terms of the National Register criteria for evaluation, outlined in the Code of Federal Regulations (36 CFR Part 60). The Hawaii State DLNR-HSS uses these criteria for evaluating site significance. Sites determined to be potentially significant for information content fall under Criterion D, which defines significant resources as ones which "have yielded, or may be likely to yield, information important in prehistory or history." Sites potentially significant as representative examples of site types are evaluated under Criterion C, which defines significant resources as those which "embody the distinctive characteristics of a type, period, or method of construction...or that represent a significant and distinguishable entity whose components may lack individual distinction.

Sites with potential cultural significance were to be evaluated under guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (ACHP 1985). The guidelines

define cultural value as "...the contribution made by an historic property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historical depth" (1985:1). The guidelines further specify that "[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value" (1985:7).

In order to facilitate future client management decisions regarding site treatments, sites were to be further evaluated in terms of three value modes which are derived from the previously mentioned state and federal evaluation criteria. The archaeological sites were to be evaluated in terms of potential scientific research, interpretive, and/or cultural values. Research value refers to the potential of archaeological resources for producing information useful in the understanding of culture history, past lifeways, and cultural processes at the local, regional, and interregional levels of organization. Interpretive value refers to the potential of archaeological resources for public education and recreation. Cultural value refers to the potential of archaeological resources to preserve and promote cultural and ethnic identity and values.

PROJECT AREA DESCRIPTION

The Waimano project area consists of approximately 20 acres of moderately sloping land located along the ridgeline located on the south side of Waimano Stream (Figure 1). The stream represents but one of numerous examples which descend roughly northeast to southwest down the leeward slope of the Koolau Range and empty into the East Loch of Pearl Harbor. Waimano Stream itself enters the Harbor near present-day Waiau, at a point located approximately two miles southwest of the project area.

Waimano Ahupuaa is bordered on the north by Manana Ahupuaa and on the south by Waiau Ahupuaa. Waimano stream and valley represent the only system incorporated into Waimano Ahupuaa. The steep sides of the valley show the effect of the relatively high rainfall which characterizes this area, which ranges from just under 50 inches per year at the lower end of the Waimano Stream Valley (within the vicinity of the present project area), to nearly 150 inches per year in the upper valley segments. Although now an intermittent stream, the system may have been perennial prior to the dramatic changes to native vegetation cover which accompanied late prehistoric agricultural, and subsequent historic, developments.

The present project area incorporates the upper reaches of the Helemano-Wahiawa soil association (Foote et al. 1972), which is characterized by deep, moderately sloping, well-drained soils with a fine texture. Prior to human disturbance, such areas typically supported a wide diversity of native plant and avian species. Prehistoric agriculture, including especially the intensive clearing and burning which occurred during the late prehistoric period, initiated a process of species elimination which has continued essentially uninterrupted through

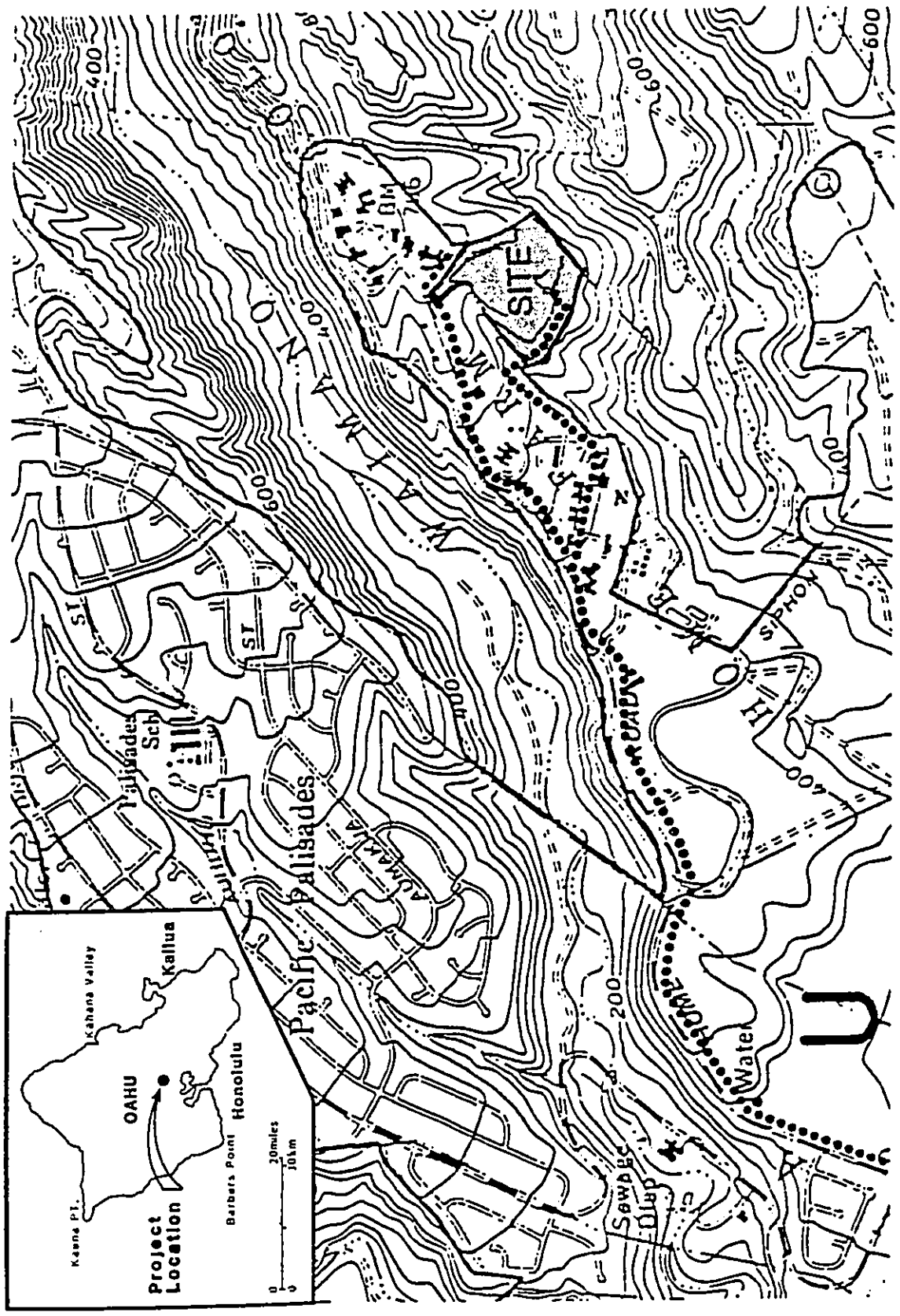

FIGURE 1. Project Area Location Map

the historic period. Presently, the project area is dominated by a greatly simplified association of introduced grasses, guava (Psidium guajava L.) and eucalyptus trees, and dense stands of lantana (Lantana camara L.) and Christmas-berry (Schinus terebinthifolius sp.). The observed association corresponds generally with Hosaka's (1933) "Guava" vegetation zone, identified at roughly the same elevation zone along Kipapa Gulch, located to the north of the project area.

PREVIOUS ARCHAEOLOGICAL RESEARCH AND HISTORIC LITERATURE REVIEW

There has been only limited previous archaeological work undertaken within Waimano. A survey undertaken in September of 1980 by Connolly (1980) involving slightly more than four acres at the Manana Kai neighborhood park site at Pearl City failed to reveal any surface evidence of prehistoric Hawaiian culture. These findings were explained in terms of the impacts of previous agricultural and other development activities. Closer to the present project area, two surveys have been conducted by personnel from DLNR. In February of 1978, Agnes Griffin and Marth Yent conducted a pedestrian reconnaissance of a portion of Waimano Gulch involving lands located 500 m northeast of the present project area between Waimano Home Farm Colony and Pacific Palisades (memorandum from Griffin and Yent to Robert Fletcher, dated February 13, 1978). The survey work centered on the valley floor and both sides of the stream bed. Several agricultural features were identified at the base of the valley, where the slope is gentle and abuts the floodplain of Waimano Stream. Walled terraces, indicating probable dryland agricultural components, were observed, although no evidence for irrigation or water diversion was noted. Additional habitation structures were identified, including platforms and a possible ahu. All of the archaeological features identified within the valley were flagged, and tentative feature numbers were assigned. The researchers also recommended further archaeological study in order to properly evaluate these components.

Griffin and Yent undertook additional reconnaissance work in April 1979 at a point located several hundred meters downstream from their 1978 survey area. During the 1979 survey, the stream bed and land on both sides of the bed were investigated, resulting in the identification of several stone structures which had previously been identified by planners from Division of State Parks. These stone structures were determined to represent trestle walls and other components associated with an old railroad system which was probably owned by Oahu Sugar Company and which was in operation by about the turn-of-the-century (memorandum from Griffin and Yent to Robert Fletcher, dated April 17, 1979). Several potential research questions were identified for future study.

None of the sites or feature complexes identified by Griffin and Yent during the above referenced surveys are located within, adjacent to, or close to the present project area, and none will be affected by the current proposal for further development of the Waimano Home Department of Health Facility.

Although archaeological information concerning Waimano is limited (McCallister does not even mention the area in his early general survey of Oahu (McCallister 1933), there seems little doubt that the area was extensively utilized in both prehistoric as well as early historic times. This hypothesis is based in part on a reference encountered in Campbell's historic account (Nov. 1809; cited in Sterling and Summers 1978:16). Regarding Hawaiian agricultural activities near the mouth of Waimano Stream, Campbell observed numerous agricultural plots, terraces, and water transport systems. Campbell also apparently visited a Mr. William Stevenson, a native of Great Britain who had married a Hawaiian woman and was raising a family along the ridge on the east side of Waimano Stream at a point about five miles from the stream's mouth; however, no record of the specific location of Stevenson's homestead was recorded.

Considerable archaeological research has been undertaken in nearby ahupuaa, most notably within the south Halawa Valley within Moanalua Ahupuaa. Here, several major archaeological projects were completed in the early to mid-1970s (Ayres 1970; Denison and Forman 1971; Crozier 1972, 1974). Collectively, these projects have documented evidence of prehistoric habitation and agriculture extending a considerable distance inland from Pearl Harbor. Dating samples recovered from upland walled permanent habitation complexes confirm occupation of the area from the thirteenth through seventeenth centuries.

In an effort to further evaluate the history of land ownership and historic activities undertaken within the project area, the Land Commission Awards for Waimano were examined, with the following results. Of the ten LCAs granted for the ahupua'a of Waimano, eight are very small parcels, ranging from 0.481 acres to 3.233 acre (Indices 1929:780). One was granted to a John Stevenson for 519.191 acres, and the rest went to Victoria Kamamalu, sister of Kamehamehas IV and V and well as half sister of Ruth Keelikolani, who held the bulk of crown lands that later were passed to Bernice Pauahi Bishop the provider of Bishop Estate's land. There is no indication of the acreage Kamamalu gained in Waimano, but as the bulk of Waimano today is owned by Bishop Estate, who have historically cultivated sugar in the ahupua'a, it can be assumed that it was a substantial amount. A check with the DLNR-HSS Survey Division and the Hawaii State Archives did not reveal what became of Stevenson's 519 acres nor were any testimonies found that would reveal the nature of activities in the project area during the Mahele. The project area was traced to be Land Court Award 9725, which was listed as Government land at the time of the Mahele and has never been privately owned (per. comm. Survey Div., DAGS). Two LCAs that were thought to be within the project area, #7713 Apana 47 and 11029, were determined to be far from the project area, makai and close to the Pearl Harbor lochs (per. comm. Survey Div., DAGS).

FIELD METHODS

Survey field work was conducted March 23-24, 1989 under the supervision of PHRI Associate Senior Archaeologist Dr. Peter M. Jensen, assisted by PHRI Field Archaeologists Robert Noah and Kala Mossman. The field work consisted of an inventory survey and detailed recording of sites and features. No subsurface evaluations were undertaken.

The field survey was conducted by walking systematic transects across 100% of the undeveloped and ungraded portions of the project area, with transect spacing maintained at 10 to 15 meter intervals. Ground surface visibility ranged from poor to excellent, varying with vegetation cover. Much of the project parcel is covered in dense stands of guava trees, prohibiting movement but not necessarily hindering ground surface visibility. Limited areas of dense grasses were encountered; the grasses posed the greatest obstacle to direct inspection of the ground surface. Open pastureland, particularly within the easternmost portion of the project area, had been largely cleared of trees and other vegetation, except grass, which had been cropped by grazing cattle. Except for the small areas covered with dense stands of high grass, all of the project area was examined and all survey objectives were satisfactorily achieved.

Detailed recording was to be completed for all sites encountered; the recording was to include site and feature dimensions, delineation of surface and subsurface midden deposits where present, and preparation of scaled maps and drawings of individual features. Sites were to be described on standard PHRI site and feature record forms, and distinctive features would be mapped to scale and photographed using 35 mm black-and-white film.

Once identified and recorded, the locations of all archaeological sites and features were to be determined using a combination of aerial photographs and metric tape and compass, and the locations were to be plotted onto a master project area map. Each recorded site and/or the primary feature within each site complex was to be marked with pink and blue flagging tape, as well as an aluminum tag bearing the site number, date, the letters "PHRI," and the PHRI project number (89-572). PHRI temporary site numbers (prefixed by "T-") were to be assigned to all recorded sites, with SIHP permanent site numbers requested at the conclusion of field work.

FINDINGS

No evidence of traditional Hawaiian cultural sites was encountered during the course of field work. A background literature and LCA review resulted in identification of land ownership history, but no specific information concerning site locations was found. Evidence of recent (i.e., modern) activity was encountered in the form of (a) an active sewer

pond and associated pipes and ditches, (b) foundation remains and standing structures (involving both cinder block and stick-frame construction) related to an abandoned slaughter house and dairy operation, and (c) abandoned sections of dirt access roads, as well as a single section of an earlier primary paved road providing access along the ridge above Waimano Stream. As none of the recent features were considered significant or eligible for inclusion on the National Register of Historic Places, they were not recorded.

CONCLUSION

In consideration of the negative findings resulting from both the background literature review and the pedestrian field survey, no further work is recommended for the project area.

The evaluations and recommendation presented within this final report have been based on a surface inventory survey of the project area. There is always the possibility, however remote, that potentially significant, unidentified surface structural remains, subsurface cultural features, or subsurface deposits will be encountered in the course of future archaeological investigations or subsequent development activities. In such situations, archaeological consultation should be sought immediately.

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APPENDIX B

APPENDIX B
BOTANICAL REPORT

BOTANICAL SURVEY

DOH FACILITY AT WAIMANO

'EWA DISTRICT, O'AHU

by

Winona P. Char

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March 1989

BOTANICAL SURVEY
DOH FACILITY AT WAIMANO
'EWA DISTRICT, O'AHU

INTRODUCTION

The State Department of Health (DOH) proposes to develop a laboratory facility at Waimano. The facility will be located on a ±20-acre parcel adjacent to the Waimano Training School and Hospital. Elevation on the irregularly-shaped parcel ranges from about 475 ft. near its southwestern boundary to about 730 ft. on the northern end of the site. The ±20-acre parcel was used for grazing dairy cattle at one time but the pastureland is now largely overgrown with guava shrubs. The abandoned dairy and slaughterhouse as well as a paved access road are found on the lower southern portion of the site. Oxidation ponds are found near the northern end of the site.

A field survey of the site to inventory and assess the botanical (or floral) resources was conducted on 07 March 1989. The primary objectives of the study were to 1) provide a general description of the vegetation; 2) inventory the terrestrial, vascular flora; and 3) search for threatened or endangered plants protected by federal and/or state laws.

SURVEY METHODS

Existing topographic maps and orthophotoquads were examined to determine access, terrain characteristics, boundaries and reference points, and vegetation patterns. The paved road to the abandoned dairy and slaughterhouse area provided the main access. From the dairy and along the paved road, a number of dirt roads

and recently bulldozed trails cross the project site and provided more thorough coverage of the site.

Notes were made on plant associations and distribution, substrate types, topography, exposure, etc. Species identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium and for comparison with the taxonomic literature.

DESCRIPTION OF THE VEGETATION

The former pasturelands are now largely overgrown with guava shrubs (Psidium guajava). The composition of the guava shrubland varies according to how long ago that portion of the pasture was abandoned. For example, the lower southwestern paddock, makai of the paved access road, was probably abandoned first as it supports more woody components. Tree and shrub species from the surrounding forested areas have invaded the former pastureland; these include Java plum (Syzygium cumini), Formosa koa (Acacia confusa), Christmasberry (Schinus terebinthifolius), lantana (Lantana camara), and kolomona (Senna surattensis). The Java plum and Formosa koa may be up to 18 to 20 ft. tall. The guava shrubs range from 12 to 15 ft. tall. Vines of liliko'i (Passiflora edulis) and huehue haole (Passiflora suberosa) may be occasionally observed.

Mauka (north) of the access road the guava shrubs are shorter, 10 to 12 ft. tall, and the tree components are missing. In a few places, rows of guava shrubs are somewhat evident.

Ground cover within the guava shrubland consists of a mixture of grasses, small shrubs (or subshrubs), and forbs. Among the most frequently encountered species are Spanish clover, Hilo grass (Paspalum conjugatum), Vasey grass (Paspalum urvillei), West

Indian dropseed (Sporobolus indicus), puahilahila (Mimosa pudica), Bermuda grass (Cynodon dactylon), two crabgrass species (Digitaria ciliaris, Digitaria sp.), Cuba jute (Sida rhombifolia), and cocklebur (Xanthium strumarium).

Along the northwest portion of the project site is a more or less well-maintained paddock which is used for grazing horses. This open, grassy pasture area supports carpet grass (Axonopus fissifolius), three-flowered beggarweed (Desmodium triflorum), Spanish clover, golden beardgrass (Chrysopogon aciculatus), crabgrasses, and West Indian dropseed.

The abandoned dairy and slaughterhouse area supports a number of ornamental species as well as the plants from the guava shrub-land. Among the ornamental, landscape, and fruit trees are Norfolk Island pine (Araucaria heterophylla), fern tree (Filicum decipiens), Eucalyptus sp., coconut (Cocos nucifera), mango (Mangifera indica), purple bougainvillea (Bougainvillea spectabilis), taro vine (Epipremnum pinnatum), Plumeria, and Chinese banyan (Ficus microcarpa).

On infrequently maintained areas near the oxidation ponds, species like Spanish needle (Bidens pilosa), virgate mimosa (Desmanthus virgatus), sourgrass (Digitaria insularis), prickly sida (Sida spinosa), and little bell (Ipomoea triloba) form fairly large-sized weedy patches. On the maintained areas around the ponds, vegetation consists primarily of wedelia (Wedelia trilobata) and Bermuda grass.

Around the perimeter of the ±20-acre project site, vegetation consists primarily of tall stands of Java plum, Eucalyptus sp., Formosa koa, and ironwwod (Casuarina cunninghamiana) with Christmasberry forming dense thickets beneath the trees. Also common in these mixed introduced forests are patches of lantana. Ground cover plants are usually sparse and leaf litter and fallen

twigs typify the understory.

DISCUSSION AND RECOMMENDATIONS

Because the project site was used for grazing cattle for a long period of time, the vegetation has been greatly modified and there is little of botanical interest on the site. A number of range grasses and forbs were sown to improve pasturage. What appears to be an overgrown guava orchard can also be found on the site. Because of the past uses of the project site, the vegetation is dominated by introduced species. There are no native plant communities remaining on the site.

A list of all the plants inventoried during the field studies is presented at the end of this report. Of a total of 100 species encountered, 93 are introduced; 4 are indigenous, that is, they are native to the Hawaiian Islands and elsewhere throughout the Pacific; and 3 are originally of Polynesian introduction. The four indigenous species ('uhaloa, pandanus, golden beardgrass, and popolo) are found throughout the islands in similiar habitats. Some, like the 'uhaloa and the popolo, are considered "weedy" natives as they prefer more open, disturbed areas. None of these species is officially listed as threatened or endangered; nor are any proposed or candidate for such status (U.S. Fish and Wildlife Service 1985; Herbst 1987).

Development of the proposed facility will result in the loss of vegetation. However, introduced species make up almost all of the plant cover and the development is not expected to have a significant negative impact on the total island populations of the species involved.

SPECIES CHECKLIST
DOH FACILITY AT WAIMANO

On the following pages is a list of all the vascular plant species inventoried on the project site during the course of the survey. The plants are divided into four groups: Ferns, Gymnosperms, Monocots, and Dicots. Within each group, the plants are arranged alphabetically within families and genera. For each species, the scientific name with author citation is provided, as well as the common English or Hawaiian name, when known, and the biogeographic status. Taxonomy and nomenclature of the Ferns follow Lamoureux (1984); the Gymnosperms follow St. John (1973); and the flowering plants (Monocots and Dicots) follow Wagner et al. (in press), in most cases.

The following abbreviations are used:

Scientific name

- sp. = species not determined due to lack of sufficient material
- var. = variety

Status

- I = indigenous, native to the islands and to other geographic areas
- P = Polynesian introduction, brought to the islands by the early Polynesian settlers prior to Western contact (1778)
- X = introduced or exotic, brought to the islands accidentally or intentionally after Western contact by later immigrants.

SCIENTIFIC NAME	COMMON NAME	STATUS
FERNS		
NEPHROLEPIDACEAE (Sword Fern Family)		
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	hairy sword fern	X
GYMNOSPERMS		
ARAUCARIACEAE (Araucaria Family)		
Araucaria heterophylla (Salisb.) Franco	Norfolk Island pine	X
MONOCOTS		
ARACEAE (Philodendron Family)		
Epipremnum pinnatum (L.) Engl.	taro vine, pothos	X
ARECACEAE (Palm Family)		
Cocos nucifera L.	coconut, niu	P
COMMELINACEAE (Spiderwort Family)		
Commelina diffusa N.L. Burm.	honohono	X
CYPERACEAE (Sedge Family)		
Cyperus rotundus L.	nutgrass, nutsedge	X
Kyllinga brevifolia Rottb.	green kyllinga, kili'o'opu	X
Kyllinga nemoralis (J.R. Forster & G. Forster) Dandy ex Hutch. & Dalziel	white kyllinga, kili'o'opu	X
PANDANACEAE (Pandanus Family)		
Pandanus tectorius S. Parkinson ex Z.	pandanus, hala	I?
POACEAE (Grass Family)		
Axonopus fissifolius (Raddi) Kuhlm.	carpet grass	X
Brachiaria mutica (Forssk.) Stapf	California grass	X
Chloris divaricata R. Br.	stargrass	X
Chrysopogon aciculatus (Retz.) Trin.	golden beardgrass, manienie 'ula	I?
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X
Digitaria ciliaris (Retz.) Koeler	large crab grass	X
Digitaria insularis (L.) Mez ex Ekman	sourgrass	X
Digitaria sp.	crabgrass	X

SCIENTIFIC NAME	COMMON NAME	STATUS
Echinochloa colona (L.) Link	jungle rice	X
Eleusine indica (L.) Gaertn.	wiregrass, manienie ali'i	X
Panicum maximum Jacq.	Guinea grass	X
Paspalum conjugatum Berg.	Hilo grass, mau'u Hilo	X
Paspalum fimbriatum Kunth	fimbriate paspalum	X
Paspalum urvillei Steud.	Vasey grass	X
Pennisetum purpureum Schumach.	elephant grass, Napier grass	X
Rhynchelytrum repens (Willd.) Hubb.	Natal grass	X
Sporobolus indicus (L.) R. Br.	West Indian dropseed	X
DICOTS		
ACANTHACEAE (Acanthus Family)		
Justicia betonica L.	white shrimp plant	X
AMARANTHACEAE (Amaranth Family)		
Amaranthus spinosus L.	spiny amaranth, pakai kuku	X
ANACARDIACEAE (Mango Family)		
Mangifera indica L.	mango	X
Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X
ANNONACEAE (Custard-apple Family)		
Annona muricata L.	soursop, guanabana	X
APIACEAE (Parsley Family)		
Centella asiatica (L.) Urban	Asiatic pennywort, pohe kula	X
Ciclospermum leptophyllum (Pers.) Sprague	fir-leaved celery	X
APOCYNACEAE (Dogbane Family)		
Plumeria hybrid	plumeria, frangipani	X
ASCLEPIADACEAE (Milkweed Family)		
Asclepias physocarpa (E. Mey.) Schlechter	balloon plant	X
ASTERACEAE (Sunflower Family)		
Ageratum conyzoides L.	maile hohono	X
Bidens pilosa L.	Spanish needle, beggar's tick	X
Calyptocarpus vialis Less.	hierba del cabello	X

SCIENTIFIC NAME	COMMON NAME	STATUS
Eclipta alba (L.) Hassk.	false daisy	X
Emilia coccinea (Sims) G. Don	Flora's paintbrush	X
Sonchus oleraceus L.	sow thistle, pualele	X
Taraxacum officinale W.W. Weber	common dandelion, laulele	X
Tridax procumbens L.	coat buttons	X
Vernonia cinerea var. parviflora (Reinw.) DC	little ironweed	X
Wedelia trilobata (L.) Hitchc.	wedelia	X
Xanthium strumarium var. canadense (Mill.) Torr. & A. Gray	cocklebur	X
BRASSICACEAE (Mustard Family)		
Lepidium virginicum L.	lepidium, pepper-grass	X
BUDDLEJACEAE (Butterfly Bush Family)		
Buddleia asiatica Lour.	dogtail, huelo 'ilio	X
CASUARINACEAE (Ironwood Family)		
Casuarina cunninghamiana Miq.	ironwood	X
CONVOLVULACEAE (Morning-glory Family)		
Ipomoea triloba L.	little bell	X
CUCURBITACEAE (Gourd Family)		
Cucurbita pepo L.	pumpkin	X
EUPHORBIACEAE (Spurge Family)		
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	X
Phyllanthus debilis Klein ex Willd.	niruri	X
FABACEAE (Pea Family)		
Acacia confusa Merr.	Formosa koa	X
Calliandra inaequilatera Rusby	lehua-haole	X
Chamaecrista nictitans (L.) Moench.	partridge pea, lauki	X
Crotalaria incana L.	fuzzy rattlepod, kukaehoki	X
Desmanthus virgatus (L.) Willd.	slender mimosa, virgate mimosa	X
Desmodium incanum DC	Spanish clover, ka'imi	X
Desmodium triflorum (L.) DC	three-flowered beggarweed	X
Leucaena leucocephala (Lam.) de Wit	koa-haole	X
Macroptilium lathyroides (L.) Urban	wild bean, cow pea	X
Mimosa pudica var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass, puahilahila	X

SCIENTIFIC NAME	COMMON NAME	STATUS
Senna septemtrionalis (Viv.) H. Irwin & Barneby	kolomona	X
Senna surattensis (N.L. Burm.) H. Irwin & Barneby	kolomona	X
LAMIACEAE (Mint Family)		
Hyptis pectinata (L.) Poit.	comb hyptis	X
LAURACEAE (Laurel Family)		
Persea americana Mill	avocado, alligator pear	X
LYTHRACEAE (Loosestrife Family)		
Cuphea carthagenensis (Jacq.) Macbride	tarweed, Colombian cuphea	X
MALVACEAE (Mallow Family)		
Sida rhombifolia L.	Cuba jute	X?
Sida spinosa L.	prickly sida	X
MORACEAE (Mulberry Family)		
Ficus microcarpa L.f.	Chinese banyan	X
MYRTACEAE (Myrtle Family)		
Eucalyptus sp.	gum tree	X
Eugenia uniflora L.	Suriname cherry	X
Psidium cattleianum Sabine	strawberry guava, waiawi 'ula'ula	X
Psidium guajava L.	guava, kuawa	X
Syzygium cumini (L.) Skeels	Java plum	X
NYCTAGINACEAE (Four-o'clock Family)		
Bougainvillea spectabilis Willd.	purple bougainvillea	X
ONAGRACEAE (Evening Primrose Family)		
Ludwigia octovalvis (Jacq.) Raven	primrose willow, kamole	P?
OXALIDACEAE (Wood Sorrel Family)		
Oxalis corniculata L.	yellow wood sorrel, 'ihi'ai	P?
Oxalis corymbosa DC	pink wood sorrel, 'ihi-pehu	X
PASSIFLORACEAE (Passion Flower Family)		
Passiflora edulis Sims	passion fruit, liliko'i	X
Passiflora suberosa L.	huehue haole	X

SCIENTIFIC NAME	COMMON NAME	STATUS
PORTULACACEAE (Purslane Family)		
Portulaca oleracea L.	pigweed, 'ihi	X
RUBIACEAE (Coffee Family)		
Paederia scandens (Lour.) Merr.	maile pilau	X
Spermacoce assurgens Ruiz ex Pav.	buttonweed	X
RUTACEAE (Rue Family)		
Citrus aurantifolia (Christm.) Swingle	lime	X
Citrus limonia Osbeck	lemon	X
SAPINDACEAE (Soapberry Family)		
Cardiospermum halicacabum L.	ballon vine, poniu	X?
Filicum decipiens (Wight & Arnott) Thwaites ex J.D. Hook.	fern tree	X
SOLANACEAE (Nightshade Family)		
Lycopersicon esculentum Mill.	cherry tomato	X
Solanum americanum Mill.	popolo	I?
Solanum capsicoides All.	kikania lei	X
Solanum linnaeanum Hepper & P. Jaeger	apple-of-Sodom	X
Solanum mauritianum Scop.	pua nana honua	X
STERCULIACEAE (Cacao Family)		
Waltheria indica L.	'uhaloa, hi'aloa	I?
URTICACEAE (Nettle Family)		
Pilea microphylla (L.) Liebm.	artillery plant, rockweed	X
VERBENACEAE (Verbena Family)		
Lantana camara L.	lantana, lakana	X
Stachytarpheta dichotoma (Ruiz Pav.) Vahl	owi, oi	X
Stachytarpheta urticifolia (Salisb.) Sims	owi, oi	X
Verbena litoralis Kunth	owi, oi	X

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