

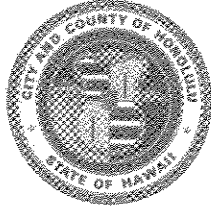
DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

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BENJAMIN B. LEE
CHIEF PLANNING OFFICER
ROLAND D. LIBBY, JR.
DEPUTY CHIEF PLANNING OFFICER

WM 4/91-1196

OFC. OF ENVIRON.
QUALITY CONTROL

May 14, 1991

Mr. Brian Choy, Acting Director
Office of Environmental Quality Control
Central Pacific Plaza
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Choy:

Acceptance Notice for the Proposed
Ewa Marina, Phase II
Ewa, Oahu--Folder Nos. 91/E-2, 91/E-3 and 91/E-SP-1
Final Environmental Impact Statement (Final EIS)

We are notifying you of our acceptance of the Final Environmental Impact Statement (Final EIS) for the second phase of the proposed Ewa Marina project, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

Pursuant to Section 11-200-23 (c), Chapter 200, Title 11 ("Environmental Impact Statement Rules") of the Administrative Rules, this acceptance notice should be published in the May 23, 1991 OEQC Bulletin.

We have attached our Acceptance Report of the Final EIS for the Ewa Marina, Phase II. Should you have any questions, please contact Bill Medeiros at 527-6089.

Sincerely,

A handwritten signature in black ink, appearing to read "Benjamin B. Lee", is written over the typed name and title.

BENJAMIN B. LEE
Chief Planning Officer

BBL:js

Attachment

cc: Nelson Lee
Tyrone T. Kusao, Inc.

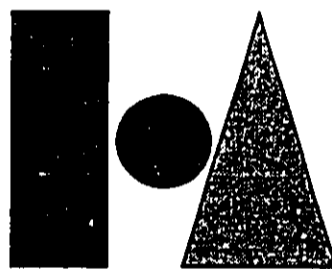
1991 - Oahu - FEIS - Ewa Marina II

Final Environmental Impact Statement

FILE COPY

**Ewa Marina,
Phase II**

Ewa, Oahu, Hawaii



HASEKO

HASEKO (Hawaii), Inc.

820 Mililani Street
Suite 820

Honolulu, Hawaii 96813

April 1991

Final Environmental Impact Statement

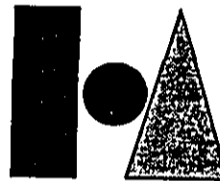
FILE COPY

Ewa Marina,

Phase II

Ewa, Oahu, Hawaii

Prepared For:



HASEKO

HASEKO (Hawaii), Inc.

Prepared By:

Tyrone T. Kusao, Inc.

1188 Bishop Street

Suite 2202

Honolulu, Hawaii 96813


Tyrone T. Kusao

April 1991

EWA MARINA, PHASE II

Final Environmental Impact Statement

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Prepared by Decision Analysts Hawaii, Inc., December, 1989.
- APPENDIX B.** IMPACT ON AGRICULTURAL
Prepared by Decision Analysts Hawaii, Inc., March, 1990
- APPENDIX C.** TRAFFIC IMPACT ASSESSMENT REPORT
Prepared by Pacific Planning & Engineering, Inc., January 21, 1991
- APPENDIX D.** UNDERGROUND INFRASTRUCTURE
Prepared by Belt Collins & Associates, November 1989
- APPENDIX E.** UPDATED SOCIAL IMPACT ASSESSMENT
Prepared by Earthplan, January, 1991
- APPENDIX F.** ENVIRONMENTAL NOISE IMPACT ASSESSMENT
Prepared by Darby & Associates, January 19, 1991
- APPENDIX G.** ENVIRONMENTAL IMPACT OF FERTILIZER, HERBICIDE AND PESTICIDE USE
Prepared by Murdoch & Green, September 9, 1989, Revised January 16, 1991
- APPENDIX H.** SURVEY OF THE AVIFAUNA AND FERAL MAMMALS
Prepared by Phillip L. Bruner, September 5, 1990
- APPENDIX I.** BOTANICAL SURVEY
Prepared by Char & Associates, September, 1989.
- APPENDIX J.** AIR QUALITY IMPACT
Prepared by J.W. Morrow, January 20, 1991
- APPENDIX K.** INTENSIVE ARCHAEOLOGICAL SURVEY AND TEST EXCAVATIONS
Prepared by Paul H. Rosendahl, Ph.D., Inc., January, 1991.

CHAPTER 1.0

INTRODUCTION AND SUMMARY.



EWA MARINA, PHASE II

Final Environmental Impact Statement

CHAPTER 1.0 INTRODUCTION AND SUMMARY.

1.1 Applicant and Project Summary.

1.1.1 The Applicant.

Haseko (Hawaii), Inc., (hereinafter "Haseko" or "applicant") is a Hawaii corporation established in 1973. Its place of business and mailing address are Haseko (Hawaii), Inc., 820 Millilani Street, Suite 820, Honolulu, Hawaii 96813. (Attn: Nelson W.G. Lee, Development Director.)

1.1.2. Brief Project Summary.

The proposed Ewa Marina, Phase II project will be a commercial-industrial, employment and recreation center containing uses supportive of recreational marine activities, such as hoists,



launching ramps, wash racks, ice and cold storage facilities, boat storage facilities, and businesses involved in the sale or repair of boats and boating accessories. It will also contain a clubhouse, visitor accommodation units, a conference center, a health center, a 27-hole golf course and a tennis complex. Phase II, which will be constructed on 403 acres of land mostly used for sugar cane production at the present time, will be an integral part of the 1,136-acre Ewa Marina Project which will also contain a manmade, 140-acre marina with 1,600 boat slips and 4,850 residential units.

1.2 Purpose of Environmental Impact Statement Document.

This Environmental Impact Statement (EIS) is prepared to identify and evaluate the existing conditions and potential impacts of the proposed Ewa Marina, Phase II development project on the natural and human environment.

The EIS is required as part of two applications to the City and County of Honolulu Department of General Planning to amend the Ewa Development Plan (DP) accordingly:

- An amendment to the Ewa DP Land Use Map to redesignate approximately 272 acres of land from "Agriculture" to "Park/Golf Course" use to facilitate and permit the development of a 27-hole golf course component of the Ewa Marina, Phase II project.



- Amendments to the City DP Common Provisions, the Ewa DP Special Provisions, and the Ewa DP Land Use Map as are necessary to permit approximately 114 acres of land within the Ewa Marina, Phase II project site to be developed into a mixed-use (commercial/industrial) component of the Ewa Marina Community Project.

This document is prepared in accordance with the provisions of Chapter 343, Hawaii Revised Statutes and Title 11, Chapter 200 of the State Health Department Administrative Rules which, together, set forth the requirements for the preparation of environmental impact statements.

1.3 Project Objectives.

The Ewa Marina Community Development Project has two phases of which the subject Phase II project is the second phase. Phase I, containing approximately 707 acres of land, is already classified for urban use. It will contain 4,850 dwelling units in a wide variety of homes, including affordable mid-rise apartments, townhouses, moderately priced single family homes as well as luxury homes fronting the ocean and a man-made, 140-acre marina.

The marina is the focal point of Phase I. Its 1,600 boat slips, 1,000 slips in two large basins and 600 slips dispersed along the waterway, will comprise the largest marina in the State. The marina will be professionally managed by a harbor master and appropriate water-traffic and security personnel, and will be available for use and enjoyment by all Hawaii resi-



dents and visitors. Certain critical development permits for Phase I have already been obtained.

Phase II, which is described in detail in this EIS, will complement the marina and residential area in Phase I by providing for commercial/industrial and recreational uses, accessory visitor accommodation facilities and other supportive uses to the marina.

1.4 Summary of Adverse Project Impacts.

Physical Environment.

Approximately 383 acres of lands currently under sugar cane cultivation by the Oahu Sugar Company will be removed from active production as a result of the project. However, this unavoidable impact will be offset by more than 2,000 jobs created by the mixed use complex and golf course and the fact that only 9% of the lands are classified as prime agricultural land.

Groundwater.

The possibility of leaching of nitrates from golf course fertilizers and pesticides will always exist, although this is considered low risk, due to mitigation measures to be employed in irrigation, fertilizer scheduling and other maintenance practices.



Flora and Fauna.

A fresh water feature located within a quarry area on the project site provides a feeding area for the native Black-crowned Night Heron. This feature is likely to be affected by construction activities on the golf course and may be an unavoidable adverse impact. To the extent practicable, golf course design and construction will seek to maintain this feature.

Air Quality

Project-generated traffic from the mixed use and golf course components will contribute to reduced air quality along major roadways serving the site. Although it is anticipated that State and Federal standards will be met for the time being, State standards may be exceeded in the future when other major planned developments in Ewa are completed. Coordinated public/private transportation planning and improvements in the region should ease traffic volumes along Fort Weaver Road in the future and thereby help mitigate this impact.

Noise Impact.

Noise exposure levels at the golf course and mixed use areas within the Phase II project site due to aircraft activities at the Honolulu International Airport and NASBP must be considered an unavoidable adverse impact, although noise levels will comply with State and Federal standards. Mitigation measures, i.e. construction techniques and attenuation improve-



ments, are proposed for the mixed use areas. It is not anticipated that traffic-generated noise impacts will be significant.

Archaeological Resources

Two sites have been identified within the project boundaries, and further data collection will be performed for one. It is not anticipated at this time that any further work will be necessary, but to the extent that this is a possibility, it is considered a potential impact.

Community Impact

Urbanization of the Phase II site as proposed will contribute to the transformation of the Ewa community from a rural, agricultural community to an urban area. However, this transformation is already underway with major new housing and other urban developments in Ewa and is expected to continue, with or without the project.

Wastewater Disposal

Approximately 0.5 mgd of wastewater will be generated by both components of the Phase II project. Until the City's Honolulu Wastewater Treatment Plant is expanded, this is considered an unavoidable adverse impact. Solid waste generated from the project will also increase demands on City solid waste disposal facilities in the area.



1.5 Summary of Proposed Mitigation Measures.

Physical Environment

Since proposed land alterations within the Phase II site, i.e. grading and drainage changes, are expected to improve conditions on the site, no long-term mitigation measures are proposed; however, in the short-term, there is potential for soil erosion. Customary mitigation measures will be taken during construction, including but not limited to cut and fill and re-grassing of golf course development areas; retention of existing ground cover until each area is ready for grading; sediment basins, detention ponds, and temporary berms where needed.

The fresh water feature located within the quarry area on the site will be protected and incorporated into the design of the golf course to the extent practicable in order to maintain this feeding area for the native Black-crowned Night Heron.

Short-term air quality impacts during construction will be mitigated by frequent watering of exposed soil areas and landscaping and roadway paving. Construction vehicles will be properly maintained to insure vehicle exhausts are adequately controlled, and construction vehicle movement during peak traffic hours will be minimized. Department of Health procedures will be followed and permits will be obtained for any other pollutant sources, such as the operation of asphalt concrete and concrete batch plants.



The primary long-term impact of the project will be associated with the motor vehicle traffic generated by it. An air quality impact analysis based on cumulative traffic volumes indicated that while there will be an increase in carbon monoxide levels along Fort Weaver Road with or without the project, state and federal air quality standards will continue to be met. A variety of mitigation measures can either be implemented or encouraged by the project developer. These include carpooling, development and use of public transit, limited parking facilities, and development of near-home employment opportunities.

Other potential air quality impacts resulting from increases in electrical demand, solid waste generation, and pesticide use will be addressed by design and site planning measures to reduce electrical demand, reducing waste generation, and insuring strict adherence to proper pesticide application procedures.

To mitigate potential noise impact from aircraft activity, all visitor accommodation spaces within the fitness center and other structures will be air-conditioned to minimize noise intrusion, as well as all meeting rooms, offices, etc., within noise-sensitive spaces, and the golf course clubhouse facilities. No mitigation measures are proposed for potential traffic-generated noise, since it is not expected to have a significant adverse impact.

As noted above, two archaeological sites have been identified, however, further data collection is proposed for only one and it is likely that the



sites are significant for information purposes only. Should any archaeological resources be encountered during construction, work will be stopped in the impacted area immediately and the Historic Preservation Office will be notified.

Public Facilities and Services

Although the proposed Phase II development will not unduly burden the existing transportation facilities in Ewa, it is recognized that overall population growth in the region will. Continued coordination with the State Department of Transportation in an effort to help remedy the anticipated transportation problems in the future will be required, and a fair share of the costs of needed improvements will be met by the applicant.

While the project will result in increased demand on existing sewer systems, all systems within the project site, and necessary off-site systems to convey the generated site wastewater of 2.1 mgd (Phase I and Phase II) will be constructed by the applicant to City standards and dedicated to the City.

To handle the estimated drainage flow, the golf course will be constructed with an open strip of land approximately 400 to 600 feet wide to direct storm runoff into the marina. Portions of the on-site flows from Phase II will be collected within the golf course area and swaled or piped and discharged into the marina. Runoff from the commercial area of Phase II will be collected on-site and also piped into the marina. All on-site and

off-site drainage systems will be designed to approved City standards, using the approved flow charts for the Ewa plain.

1.6 Summary of Alternatives Considered.

A no action alternative to the project is considered unfeasible because it would result in the continued under utilization of mostly marginal agricultural lands and would foreclose the substantial employment, economic development, recreational and open space development opportunities afforded by the Ewa Marina Phase II proposal.

Alternative uses considered for the site included housing and agricultural uses. Housing is inappropriate, because of development restrictions imposed by a perpetual air flight easement over 100 acres of the site; the additional traffic which would be generated by this type of use; the need to create local employment opportunities in close proximity to planned housing developments; and the need to use a portion of the site for critical storm and surface water drainage facilities.

Agricultural use is also considered an unfeasible alternative, because the suitability of soils within the site for agricultural production other than sugar cane is marginal and the economic feasibility of other agricultural uses is diminished by the considerable costs of irrigation and high land rents. Diversified agricultural use is not the preferred alternative, because of the availability of extensive amounts of prime lands and water sources in other parts of Oahu. Moreover, the 4,850 residential units component



of Ewa Marina has already been approved and continued sugarcane cultivation on the subject land would be inconvenient and incompatible.

The commercial-industrial mixed use complex and golf course alternative is considered the most suitable alternative, because it will complement the master-planned recreation-oriented Ewa Marina Phase I project; provide a stable, permanent base of employment within the Ewa community; yield substantial tax revenues to both State and City; and provide significant open space benefits and infrastructure improvements when completed.

1.7 Summary of Project Compatibility with Land Use Plans/Policies.

State Planning Policies:

The project is compatible with and supportive of the following Hawaii State Plan and Functional Plans policies and objectives:

It supports the State's economic and visitor industry policies to encourage labor-intensive activities, to provide steady employment for Hawaii's people, and to diversify our visitor market.

It is compatible with the State's policies for enhancing the visual and aesthetic enjoyment of scenic landscapes, since it will provide significant



open space, landscaping and greenbelt features to compliment the ocean-oriented Ewa Marina development as a whole.

By contributing to the development of a regional water system, a coordinated transportation facilities planning effort, and other major infrastructure improvements, the project will further the State's objectives for facility systems.

State recreational facilities and programs will be supported with the addition of the golf course and mixed use complex with its recreational and leisure-oriented features.

To fulfill State energy conservation objectives, the project's design and site planning will incorporate a number of electrical and mechanical energy-efficient features and will favor natural ventilation and lighting to the maximum extent possible.

City Planning Policies:

Although the issue will be determined ultimately by the City Council, the scale and special character of the proposed Ewa Marina, Phase II project (mixed use commercial/industrial/golf course complex) have prompted the City Department of General Planning to request that a General Plan Amendment for the project be submitted by the developer. Accordingly, the developer will be requesting such an amendment.



Amendments to the Ewa Development Plan Common and Special Provisions as well as to the Land Use and Public Facilities Maps required for State Provisions project implementation will be sought.

It is significant to note that the proposed Phase II project supports the long-range General Plan goal of encouraging development of the Ewa Development Plan area as the Secondary Urban Center. In addition, the project is clearly compatible with General Plan policies to direct major economic activity to the Secondary Urban Center of Ewa, to design surface drainage and flood-control systems in a manner which will help preserve their natural settings, and provide employment centers near residential developments.

The project will also help realize General Plan facility systems goals for water, sewers, and transportation systems and will contribute significantly to the Plan's physical development and urban design objectives for Ewa, i.e. major employment centers and green belt areas.

It should be noted that open space areas are given high priority in the City's Development Plan as well, and that the proposed golf course is consistent with Ewa DP policies in this regard. The project is in keeping with the DP's general principles and controls for parks, recreation and preservation areas, in addition to those policies and objectives directed toward transportation, wastewater treatment and drainage facilities.



The project's relationship to Special Management Area/Coastal Zone Management policies is summarized as follows:

While the project will result in an alteration of existing land forms during the course of development, there are no anticipated long-term adverse effects on coastal water, ecosystems or other coastal resources. No scenic or recreational amenities would be adversely affected and drainage improvements will mitigate the site's existing exposure to flood hazards and will allow the present quality of coastal waters to be maintained. There are no landslides or erosion hazards anticipated as a result of the project and while there are some probable environmental impacts from the project, these are not expected to adversely affect the Special Management Area or coastal resources.

1.8 Necessary Approvals and Permits Required

General Plan Amendment

Amendment to the City and County General Plan.

Development Plan Amendments

Applicable sections of the Development Plan Common and Ewa Special Provisions required to implement project.



Appropriate amendments to the Ewa Development Plan Land Use and Public Facilities Maps to permit the proposed golf course and mixed-use commercial/industrial activities.

Rezoning

Appropriate rezoning approvals to implement the Development Plan Land Use Map designation.

State Water Commission Approval

The State Water Code requires a Well Drilling/Withdrawal Permit from the State Water Commission before the developer may be allowed to drill groundwater wells within the project site.

Other Approvals

City subdivision, building and grading permits will be required in order to proceed with the project construction.

1.9 Summary of Unresolved Issues.

To the extent that the need for a General Plan amendment is necessary, this issue will ultimately be decided by the City Council. Thus, the need for an amendment constitutes an unresolved issue.



Although the proposed Ewa Marina, Phase II project will not exacerbate traffic conditions along Fort Weaver Road during peak traffic hours, the existing need for improvements to Fort Weaver Road and alternative north-south corridors linking the Ewa area with the H-1 Freeway presents an unresolved regional environmental issue having some impact on the project.

A comment received in response to the Draft EIS stated that "Review of this document was hampered by the lack of a site plan for the various elements stated above". We responded by stating that sufficient information and data were provided in the Draft EIS for assessing the project's environmental impacts in accordance with HRS Section 343-2 and Section 11-200-17 of the EIS Rules. It was also mentioned that the project plan is conceptual at this stage but should the respondent be interested in reviewing the conceptual plan with us, we would be willing to do so.

Similar to other large-scale projects, the site plan as well as other architectural drawings for this project will be submitted at the time of the rezoning application.



CHAPTER 2.0

DESCRIPTION OF PROPOSED PROJECT



CHAPTER 2.0 DESCRIPTION OF PROPOSED PROJECT

2.1 Regional Setting.

The Ewa Marina, Phase II project area is situated in the Ewa District on the Island of Oahu. The district encompasses the coral plain which stretches from Central Oahu at Waipahu and Pearl Harbor, around the southwestern corner of the Island to Nanakuli. The coral plain meets the moderately steep slopes of the southerly end of the Waianae mountain range, which form Ewa's mauka sector, and contains some of the finest agricultural lands in the State. Within the Ewa Marina, Phase II project area, however, only about 9% of the land is considered "prime" agricultural land under the recognized land classification systems in Hawaii.

In the Ewa district, current public policy calls for the establishment of a new secondary urban center in the West Beach-Makakilo area in order to accommodate most of the expected influx of population into the area between 1985 and the year 2005.

The major existing communities in the district are Makakilo, the Ewa Plantation Village, Ewa Villages, Iroquois Point Puuloa Military Housing, Honouliuli, Honokai Hale and Nanakai Gardens. Campbell Industrial Park and the Barbers Point Deep Draft Harbor are also in the district.



Developing and planned new communities within the district include West Loch (1,500 dwelling units) Kapolei Town Center, Kapolei Knolls (500 dwelling units), Ewa by Gentry (7,500 dwelling units), the Ko Olina Resort (5,200 dwelling units and 4,000 visitor units), Makakilo expansion (2,200 units) the State's Kapolei Villages (5,000 units) and, of course, the proposed Ewa Marina community comprised of Phase I (4,850 dwelling units) and Phase II, the subject project. *Exhibit A* shows the existing and planned communities within the district.

2.2 Project Background.

Plans for developing Ewa Marina have been under way for nearly 35 years, having been first conceived in the mid-1950s as part of Campbell Estate's master plan for the development of the Ewa plain. However, community support for developing the Ewa plain, including Ewa Marina, developed gradually over the years and was not fully achieved until the 1980s.

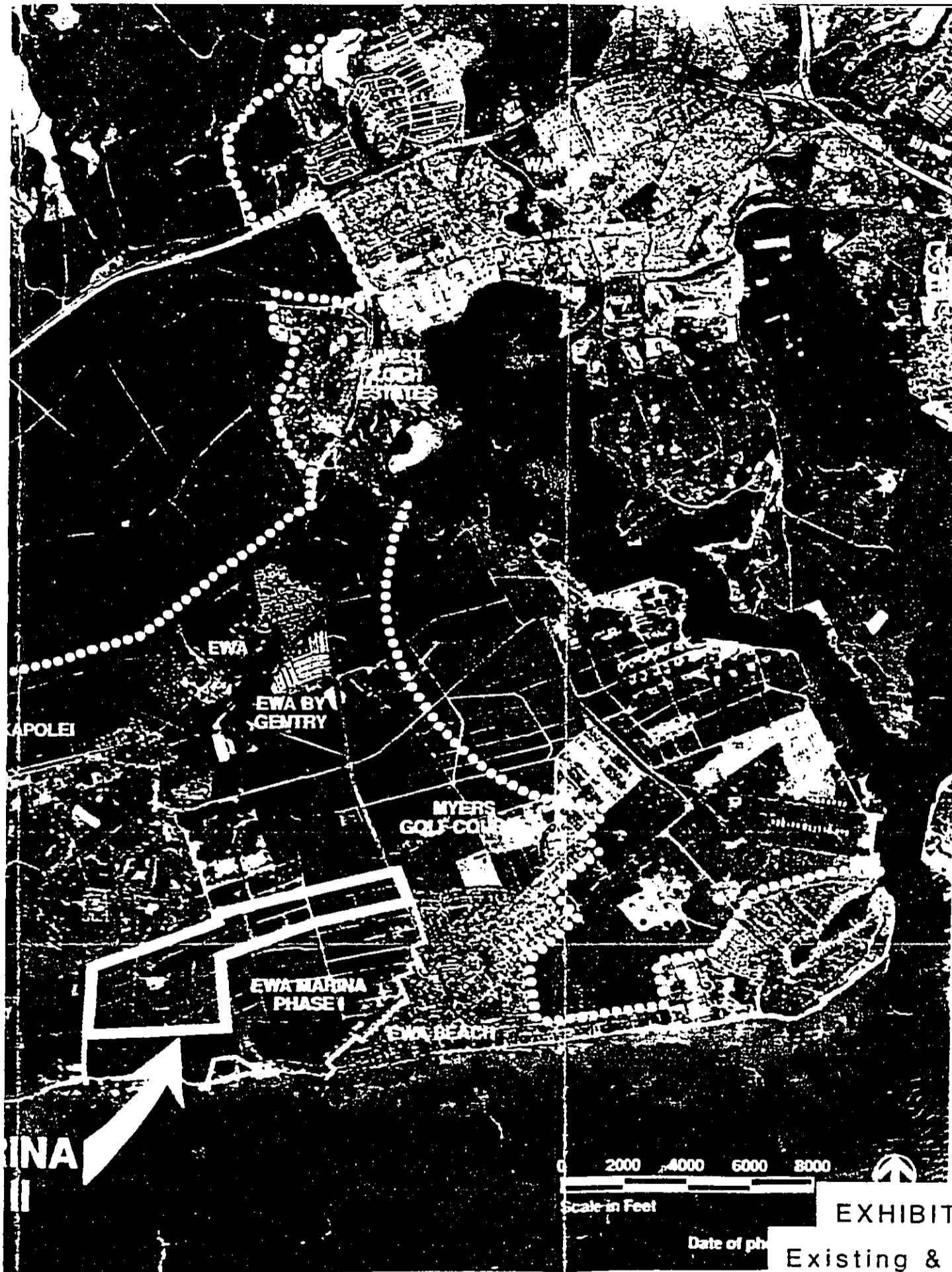
The development rights to the Ewa Marina site were purchased from Campbell Estate by MSM & Associates in the late 1970s. MSM however acquired the fee interest from the Estate for only some of the lands within Phase I of the Ewa Marina project (181 acres).

MSM developed a 2-phased master plan for the property, the first being nearly the same as the current Phase I plan for the project which received final State Land Use Commission "urban" districting in 1984 and City

RECEIVED AS FOLLOWS



RECEIVED AS FOLLOWS



INA
II

Scale in Feet

Date of ph

EXHIBITS "A"

Existing & Planned
Communities - Ewa



Development Plan approvals thereafter. The 181-acre portion located within Phase I bordering Fort Weaver Road has also received City zoning approval.

For the Phase II project site, MSM planned the development of about 2,350 homes to be added to the 4,850 homes it had planned for Phase I. In 1988, MSM sold its property interests and development rights in Ewa Marina to Haseko (Hawaii), Inc., the applicant.

After evaluating MSM's plans for Ewa Marina, the applicant resumed progress on the Phase I plans. Design and planning for the first housing increment in Phase I are under way and coordination with other public and private entities is proceeding. Permit applications for the 140-acre marina component of Phase I are being or will be pursued including the Army Corp. of Engineers permit for the marina's channel entrance, the State Land Board Conservation District Use Permit, a Shoreline Management Permit and a request for rezoning to the City in accordance with the Phase I master plan.

New information, including development restrictions on lands within the Phase II project site arising from an easement favoring the U.S. government, resulted in major revisions to the prior MSM plans which led to the current plans for Ewa Marina, Phase II which are described below.



2.3 Project Description For Ewa Marina, Phase II.

2.3.1. Project Location.

The project site is located at Honouliuli in the Ewa Development Plan area and is shown in *Exhibit B-1*. It lies south of Farrington Highway, about 20 miles west of Honolulu, between Fort Weaver Road and the Naval Air Station Barbers Point (NASBP).

The project site comprises a part of a larger Ewa Marina Project and lies on the outskirts of the leased lands under sugar cultivation by the Oahu Sugar Company plantation (OSCo). The site is within an area that has been designated for urbanization by the State Land Use Commission and the City General Plan's Secondary Urban Center (SUC). The SUC is expected to accommodate most of the anticipated new population and urban growth on the Island of Oahu through the year 2005.

2.3.2 Existing Uses.

Most of the site is now under lease to the OSCo for sugar cane cultivation and is so used. A small portion of the site containing approximately 20 acres has never been used for sugar cultivation and contains koa-haole overgrowth. OSCo's lease of the project site will expire in 1995, however, the project site could be with

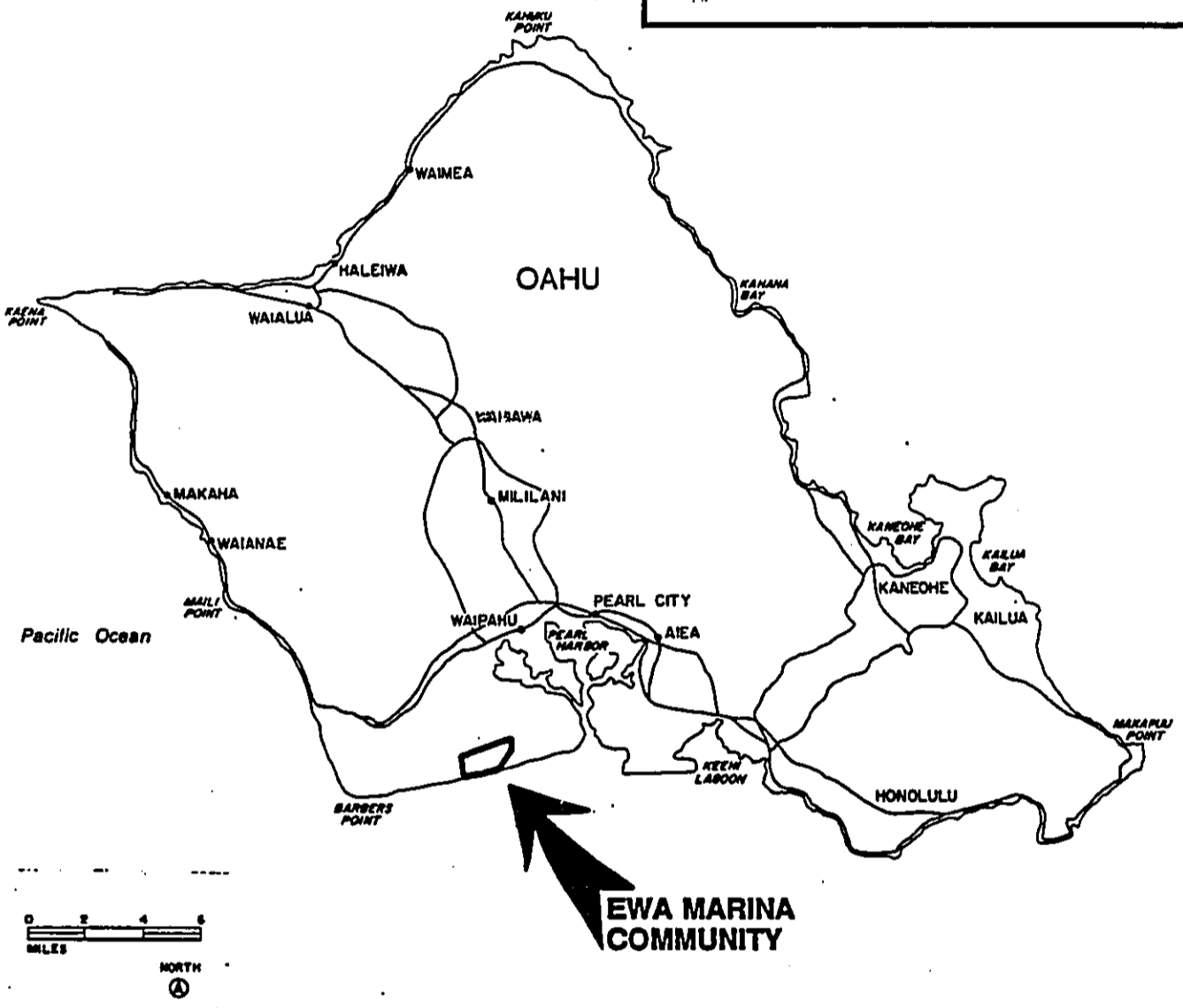
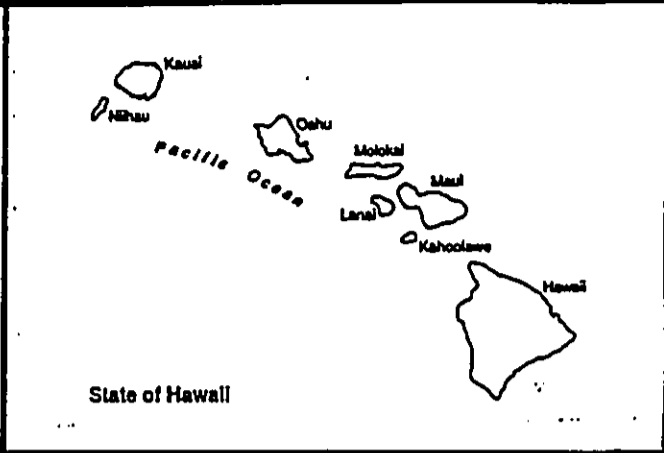


EXHIBIT B-1

Project Location Map

Prepared by: Belt Collins & Assoc.
Prepared for: HASEKO (Hawaii), Inc.
Date: November 1989



drawn from sugar cultivation earlier than 1995 under the Campbell Estate's development rights agreement with the applicant.

A portion of the project site is encumbered by an easement favoring the U.S. Government which prohibits certain urban uses, such as residential dwellings, within the project site. (See *Exhibit B-2*, attached.) The site is also subject to a combined day/night average sound level exposure of 55 to 70 Ldn from overflights to/from the Honolulu International Airport (HNA) and the NASBP airfields.

There are no urban uses or structures within the Phase II project site.

2.3.3 Surrounding Uses.

In the eastern half of the Ewa plain are the existing communities of Ewa Beach, the Iroquois Point Puulao Military Family Housing, Ewa Villages and Honouliuli. To the west are the existing communities of Makakilo, Honokai Hale and Nanakai Gardens, Campbell Industrial Park and Barbers Point Deep Draft Harbor.

New residential developments in close proximity to the project site include the Ewa Gentry (7,500 units) to the north, West Loch (1,500 units) to the northeast and the adjoining Ewa Marina, Phase I (4,850 units) to the south.

LAND COURT
 STATE OF HAWAII
 LAND COURT APPLICATION 1068

DESIGNATION OF EASEMENT
 AFFECTING LOT 237-A
 AS SHOWN ON MAP 241
 AND LOT 2395 AS SHOWN ON MAP 274
 AT HONOLULU, EWA, OAHU, HAWAII

WALTER R. THOMPSON
Walter R. Thompson
 Registered Land &
 Easement Surveyor
 May 28, 1989

239 Queen Street
 Honolulu, Hawaii
 May 28, 1989

OWNERS: TRUSTEES UNDER THE WILL AND OF THE
 ESTATE OF JAMES CAMPBELL, DECEASED
 OWNER'S CERTIFICATE OF TITLE: 15,790 - LOT 237-A
 182,919 - LOT 2395

APPROVED AND APPLIED BY ORDER OF THE JUSTICE
 OF THE LAND COURT GRANTED
 BY ORDER OF THE COURT

TESTIMONY OF THE LAND SURVEYOR

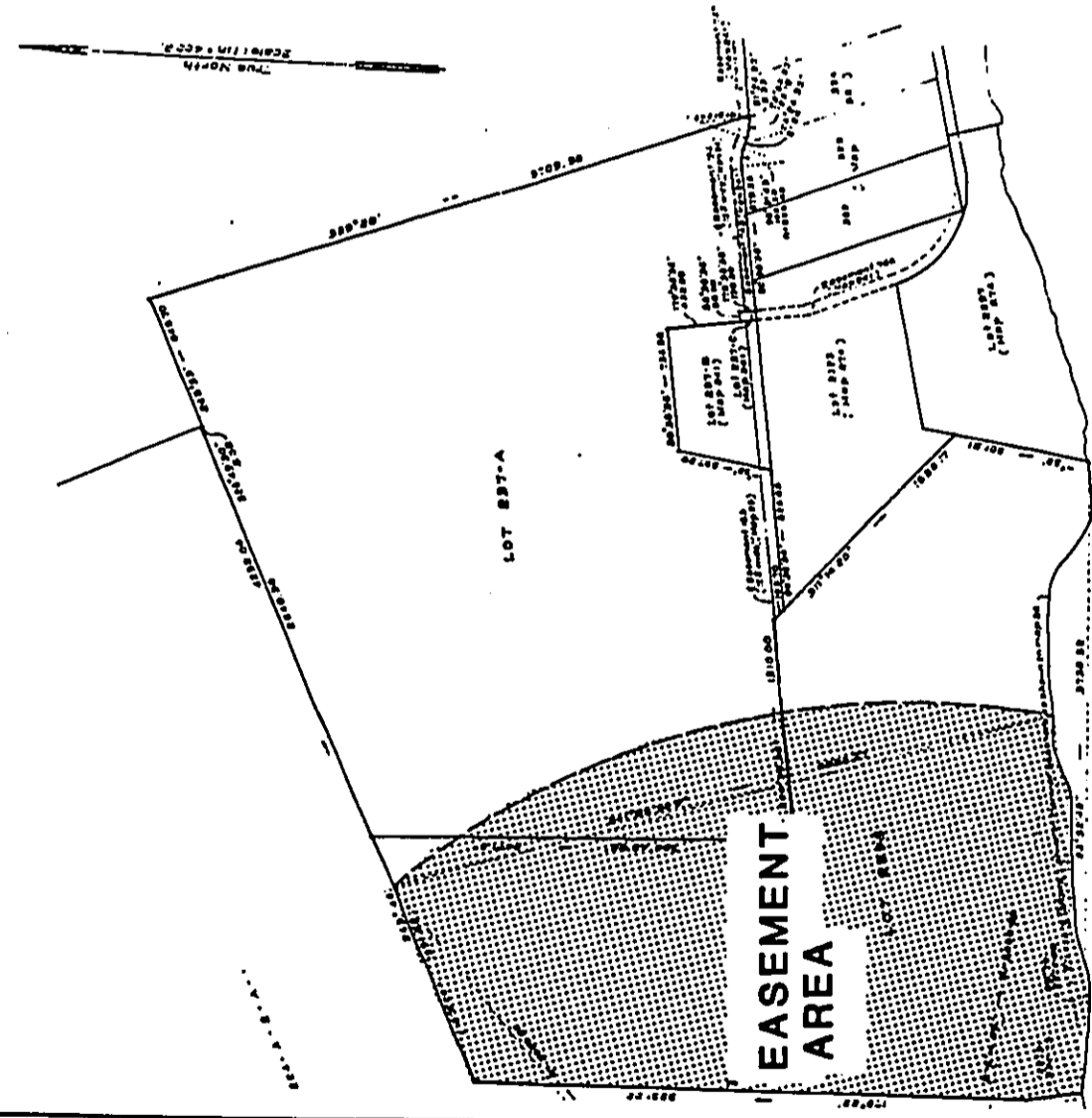


EXHIBIT "B-2"
 EASEMENT AREA MAP



Other proposed major developments in the Ewa plain include the Kapolei Town Center, the State's Kapolei Villages (5,000 units), Kapolei Knolls (500 units), expansion of Makakilo (2,200 units) and the Ko Olina Resort (5,200 residential units, 4,000 visitor units).

2.3.4 Project Description.

a. Conceptual Plan.

Phase II is part of an Ewa Marina Master Plan encompassing both Phases. Phase I will be a master-planned, recreation-oriented residential community containing 4,850 housing units which will be built around a major, man-made, 140-acre marina containing 1,600 boat slips.

The Phase II project will be a commercial-industrial, employment and recreation center containing uses supportive of recreational marine activities, such as hoists, launching ramps, wash racks, ice and cold storage facilities, boat storage facilities, and businesses involved in the sale or repair of boats and boating accessories. It will also contain a clubhouse, visitor accommodation units, a conference center, a health center, a 27-hole golf course and a tennis complex. Phase II, will be constructed on 403 acres of land mostly used for sugar cane production at the present time. Both phases will be harmo-



niously integrated into a residential/recreational/ commercial community with a greenbelt pathway system extending throughout the community and connecting these various community elements. *Exhibit C* is the proposed layout plan for the Ewa Marina project.

b. Project Details.

Proposed Mixed-Use Component.

This component of the Phase II project will contain approximately 114 acres of land within the 403-acre total Phase II project site. It will contain a mixed-use commercial-industrial job center with establishments providing goods and services relating to boating and water sport activities, a yacht club, restaurants, offices, a health and fitness center and visitor accommodation complexes, tennis courts, an exhibition center and conference facilities. The details of this component are as follows:

- **Commercial-Industrial Center:** A commercial center with a variety of shops, professional offices, theme restaurants and marine-related establishments located next to the marina and visitor accommodation complexes will contain 60,000 - 100,000 sq. ft. of space. Most restaurants and retail

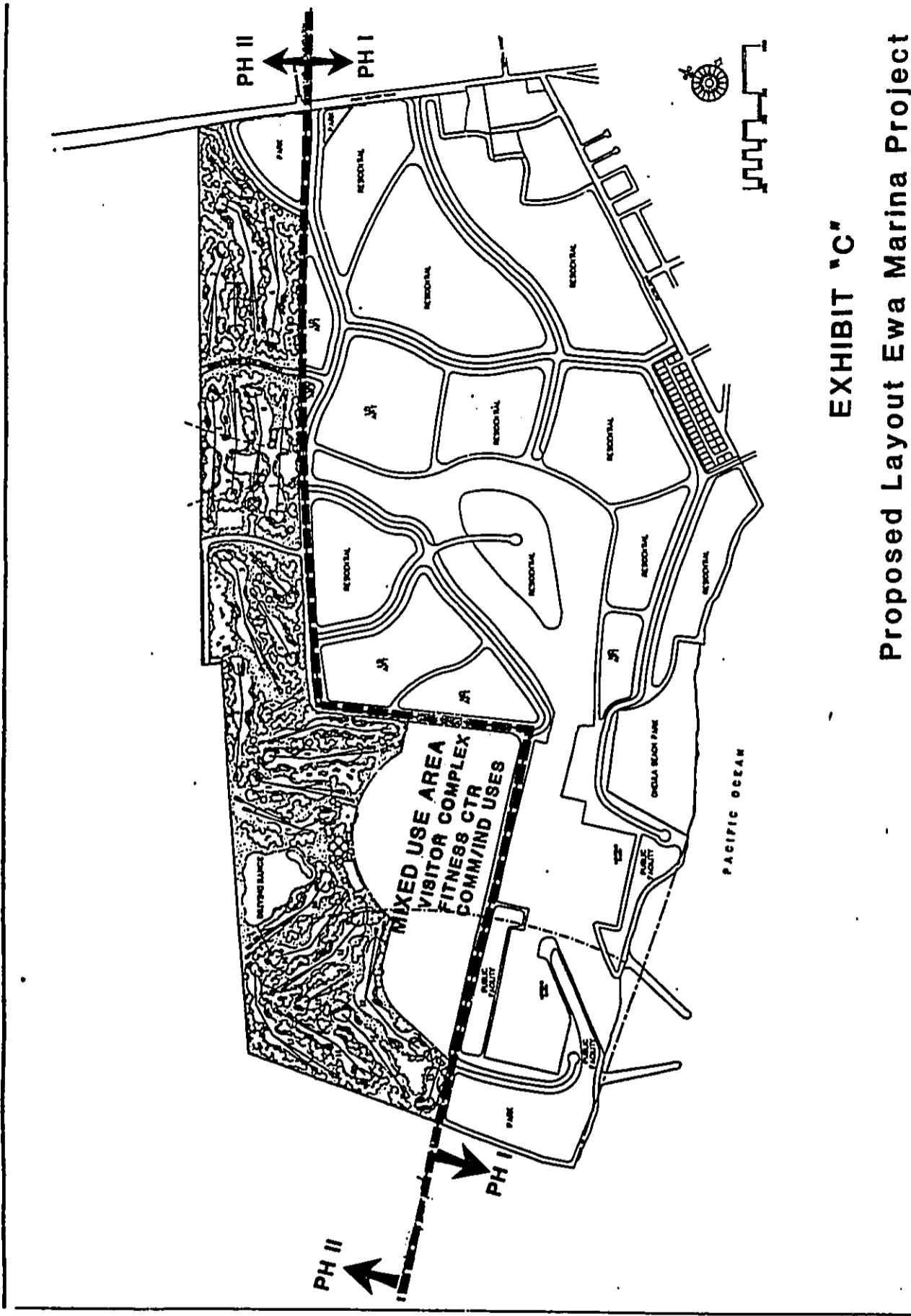


EXHIBIT "C"

Proposed Layout Ewa Marina Project



shops will be located along a harbor-front esplanade. A yacht club for residents and other nearby communities will be incorporated into this center. It will host a variety of boating events and functions.

Uses supportive of recreational marine activities such as hoists, launching ramps, ice and cold storage facilities, boat storage facilities and businesses involved in the sale of repair of boat and boating accessories will be included as part of this Center.

- **International Fitness Promotion Center (IFPC):** The IFPC will be a full-featured fitness and conditioning center with programs and facilities similar in concept to spas and fitness centers in Europe and on the mainland. It will focus on health-interested clientele and the corporate retreat market.

The International Fitness Promotion Center will be a 60,000 square foot facility providing a complete array of services and facilities to persons seeking preventive health care and fitness programming.



The IFPC will be one of the first of its kind in Hawaii. Guests at the IFPC will be enrolled in programs ranging from seven to fourteen (7-14) days in length and will be assisted by trained professionals who will provide individual health care assessments, fitness counseling and prescriptions, health education and training and fitness and exercise programs. Because the IFPC will not provide acute health care services, a State Health Department Certificate of Need is not required.

Visitor Accommodations Complex:

- **Specialty and Garden Suite Facilities.** These facilities will consist of several specialty visitor accommodation facilities and a complex of garden suites for individual desiring to purchase second homes. The complexes will be designed and marketed on the related themes of (1) recreation, including boating, golf, tennis and other outdoor activities; (2) fitness and conditioning; and (3) as a corporate retreat. Visitors at these facilities will have access to the exhibition center, the marina, the golf course, the championship tennis complex, other project amenities, outdoor recreational facili-



ties, the various uses contained in the commercial center and the programs and activities of the IFPC.

- **Exhibition Center and Conference Facilities.** An 8,000 sq. ft. exhibition center and related conference facilities will also be a part of the Visitor Accommodations Complex. It will support the corporate retreat visits and conferences at Ewa Marina and will also be available to Ewa residents and businesses for community functions.

- **Championship Tennis Facilities.** A championship tennis facility, containing 10 tennis courts and an 18,000 sq. ft. clubhouse will be built on a portion within the mixed use site subject to the easement favoring the U.S. Government.

A 150 feet building height limit for some of the uses within the mixed use component of Phase II will be sought. This will permit visual diversity within the mixed use area which is currently flat land and will not encroach upon the aforementioned easement to the U.S. Government.

The estimated cost for on- and off-site infrastructure and improvement costs for the mixed use project is \$300 million. Construction is anticipated to begin approximately in 1995-96



and will last for about 7 years thereafter before the mixed use component is completed.

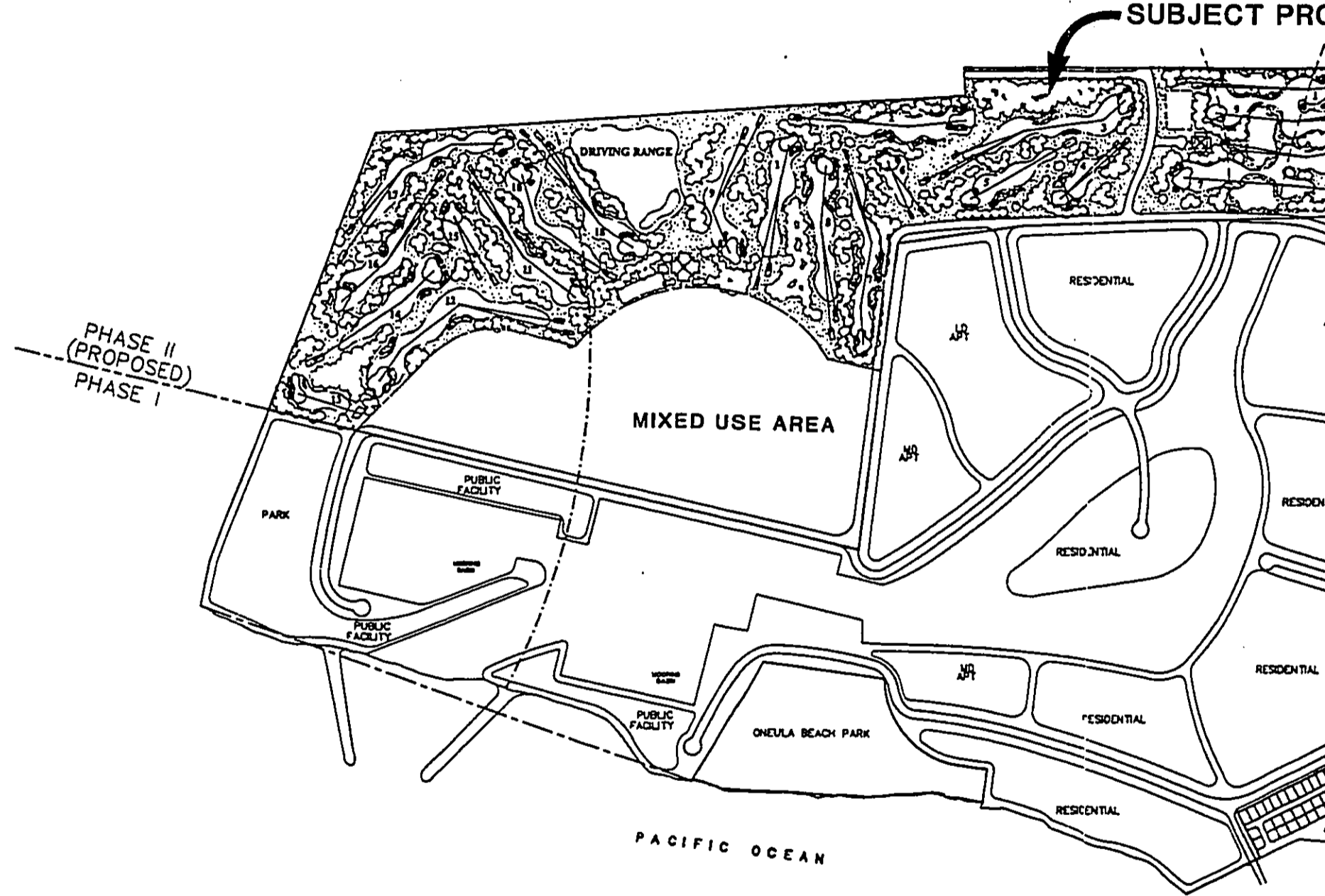
Golf Course Component:

This component of the Phase II project will occupy approximately 272 acres of the Phase II project site located directly mauka of the mixed use area and the lands within Phase I of the Ewa Marina Project. It will contain a 27-hole, semi-private golf course with a clubhouse and maintenance facilities for the permanent residents and visitors of Ewa Marina. *Exhibit D* presents the preliminary golf course layout.

Portions of the Phase II project site which will contain the golf course facilities are suited for such use for the following reasons. First, such lands are subject to the aforementioned overhead perpetual air flights easement favoring the U.S. Government which encumbers about 100 acres of the golf course site. The easement allows the proposed golf course use within the encumbered lands; however, it prohibits the development of residential dwellings, hotels and other transient lodging facilities, schools, hospitals, outdoor music shells, amphitheaters or sports stadiums.

The golf course will link the Kaloi flood control and drainage system to the marina and, eventually, the ocean by serving as

SUBJECT PROJECT



PHASE II
(PROPOSED)
PHASE I

PACIFIC OCEAN

PARK

PUBLIC FACILITY

MIXED USE AREA

DRIVING RANGE

RESIDENTIAL

RESIDENTIAL

ONEULA BEACH PARK

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL



HOH Associates, Inc.

SUBJECT PROPERTY

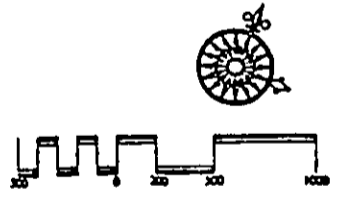
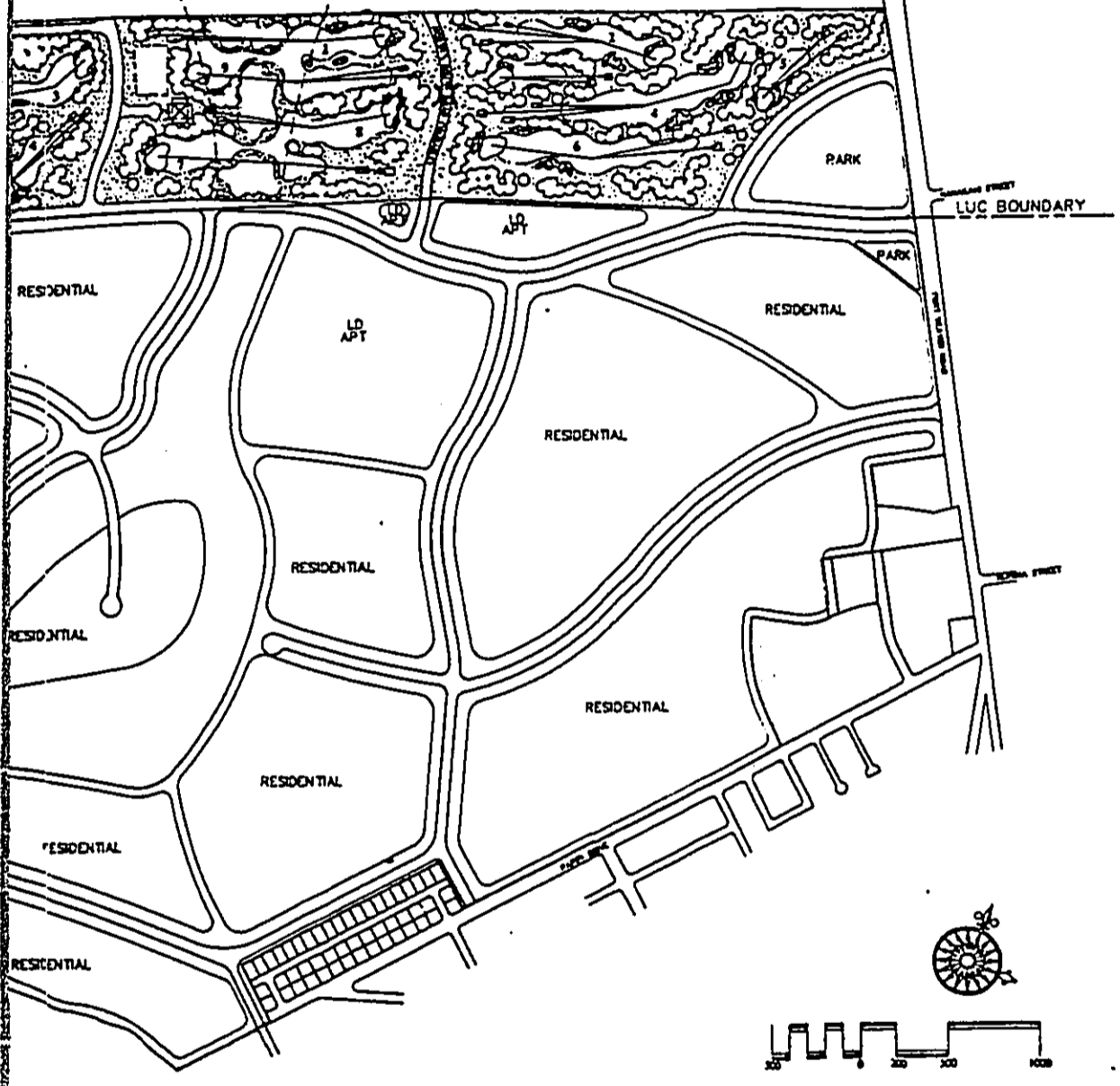
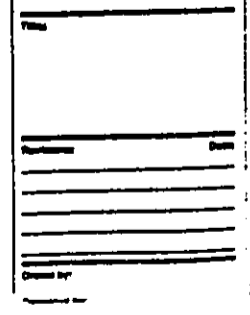


EXHIBIT "D"
PRELIMINARY GOLF
COURSE LAYOUT

Proposed 27 Hole Golf Course
EWA MARINA / PHASE II
Illustrative Plan





a receptacle for storm water flows from the upper portions of the Kalo'i Drainage Basin which begin in the Waianae foothills. A 400 - 600 feet wide open strip within the golf course will receive storm and surface water flows from the Basin and channel such flows to a drainage channel to be constructed in the Phase I area which will drain such flows into the marina.

Finally, a portion of the lands within the golf course site is subject to composite day/night average sound levels of 55 Ldns or greater as a result of flight activities at NASBP and HNL. Thus, such lands are inappropriate for residential and other types of urban , noise sensitive uses..

2.3.5 Project Supporting Facilities/Utilities/Services.

a. Access and Transportation.

Fort Weaver Road, the only major existing access route leading to/from the Ewa Marina Project (both Phases), is a north-south major arterial containing 4 traffic lanes along portions of its right-of-way and 2 traffic lanes along right-of-way portions located closer to Ewa Beach and the Ewa Marina site. Sec. 4.4.1 of this report and a Traffic Impact Study for the project in *Appendix C* describe the access and transportation system expected to serve the project site in greater detail.



The Kunia Road/H-1 Freeway Interchange provides access to the Freeway from Fort Weaver Road. The Farrington Highway/Fort Weaver Road Interchange provides access to Farrington Highway from Fort Weaver Road. Current planning and design efforts coordinated by the State Department of Transportation are attempting to select and implement an alignment for another major north-south roadway from the H-1 Freeway to serve the proposed major developments, including Ewa Marina, within the Ewa plain.

b. Water Supply.

Potable water for the Phase II project will be supplied via the Board of Water Supply's Waianae District water system. The system includes a 30-inch water main running along Farrington Highway between Waipahu and the Barbers Point 215-foot storage system and a 16-inch transmission main which branches off the 30-inch Farrington Highway main and runs the length of Fort Weaver Road to supply Honouliuli, Ewa Beach and Ewa Village with water. Sec. 4.4.2 of this report and a detailed project engineering study contained in *Appendix D* provide detailed descriptions of the anticipated potable water supply system to serve the Phase II project site.

An Ewa Water Master Plan (1987) approved by the Board of Water Supply (BWS) has allocated 3.2937 million gallons/day



(mgd) of potable water from the BWS system for Ewa Marina. The mixed use component of Phase II will use an estimated 700,000 - 710,000 mgd from that allocation; the golf course clubhouse will use an estimated 40,000 - 50,000 mgd from that allocation.

In accordance with the Water Master Plan, the applicant has already contributed over \$10 million toward development of a regional water system set forth in the Plan and expects to commit additional funds before the system is completed. Currently, a variety of new installations, including a 36-inch main under Fort Weaver Road, water reservoirs, wells and pumping systems pursuant to that Plan are near completion.

The non-potable, irrigation water needs for the project's golf course and certain landscaping features will be provided by existing groundwater resources within the site through existing wells near the project site which now provide drip irrigation water for the existing, 383 acres of sugar cane fields within the project. It is estimated that about 1.35 mgd of groundwater will be used by the project, a substantial reduction from the 2.5 mgd of groundwater currently used to irrigate the 383 acres of sugar cane currently within the project site.



c. Drainage.

The surface and storm water drainage plan for Ewa Marina includes two primary elements: a drainage conduit through a portion of the proposed golf course where the project site meets the makai portions of the existing Kalo Drainage Basin which will carry storm waters and surface flows within a 400 - 600 feet wide open drainage strip in the course; and a man-made drainage channel crossing the Phase I project site which will receive drainage flows out of the golf course drainage conduit and carry such flows into the marina. From there, surface and storm water flows will empty into the ocean.

Sec. 4.4.4 of this report and a project engineering study contained in *Appendix D* provide a detailed description of the drainage system plans for the Phase II project site.

d. Wastewater Collection & Disposal.

Wastewater from the golf course clubhouse/driving range and mixed use components of the Phase II project will be collected at these sources and flow through underground pipes to the sewage pump station planned in the Phase I project area. From there, it will be pumped through a large underground force main to the Honouliuli Wastewater Treatment



Plant. The Plant has a capacity of 25 mgd. It is expected that Plant capacity will be increased to 38 mgd by 1993.

Sec. 4.4.3 of this report and a project engineering study in *Appendix D* provides detailed descriptions of the proposed wastewater system services to the Phase II project site.

c. Solid Waste Collection/Disposal.

The mixed use component is expected to generate about 9 tons/day of solid waste; the golf course component is expected to generate about 2-3 tons/week of solid waste. Such waste will be placed in on-site dumpsters and collected by private haulers and transported to the City's H-power plant, Waimanalo Gulch Landfill and/or the Waipahu Incinerator for disposal.

f. Schools/Parks.

While the Phase II project will not generate any demand for additional facilities or services at the Ewa area public schools, any such unforeseen demand can be met by existing school sites such as Ewa Beach Elementary, Kaimiloa Elementary, Pohakea Elementary, Barbers Point Elementary, Iroquois Point Elementary, Ilima Intermediate and Campbell High Schools. New school sites are also being considered in Kapolei Village,



West Loch and Ewa Gentry and a school site has been set aside in the Phase I area to meet future needs.

The major park facility in Ewa Marina will be the nearby, 30-acre Oneula Beach Park owned by the City. Smaller parks and playgrounds, including the 17-acre Ewa Marina Gateway Park, will be scattered throughout Ewa Marina. The 140-acre marina will also be available for recreational use.

There also will be new parks in Ewa Gentry, Ewa Villages, Ko Olina, Kapolei Village, West Loch and Makakilo. A major regional park is also planned in the Kapolei development.

g. Police/Fire Protection.

Police from the Pearl City station regularly patrol the Ewa area which includes the Phase II project site. A new police station in nearby Kapolei is planned and Ewa will be designated as a new police district.

The City plans to relocate the existing Ewa Beach fire station into Phase I of the Ewa Marina project. Additionally, the existing fire stations at Makakilo and Waipahu and planned stations at Tenney Village, Kapolei and Ko Olina will provide backup fire protection services to the Phase II site.



h. Utilities.

Hawaiian Electric Company (HECO) will provide electrical power to the Phase II project uses and activities. HECO will construct a new substation to meet Ewa Marina demands. The Ewa Substation presently provides power to the area and is located mauka of the Phase II project site.

Hawaiian Telephone Company will provide telephone services to the Phase II project site through existing lines along Fort Weaver Road and through underground lines in the Phase II project site.



CHAPTER 3.0

ALTERNATIVES CONSIDERED.

CHAPTER 3.0 ALTERNATIVES CONSIDERED.

3.1 No Action Alternative.

A "No Action" alternative to the proposed Phase II project is considered unfeasible because it would result in the continued under utilization of mostly marginal agricultural lands and would foreclose the substantial employment, economic development, housing, recreational and open space development opportunities afforded by the Ewa Marina, Phase II project. The public benefits, including the considerable open space, recreational, water quality, employment, and transportation flow benefits to be derived from the project, far outweigh both the socio-cultural and minimal environmental costs of project development and the advantages of retaining the agricultural use of the Phase II project site.

Some long-term considerations also argue against the "No Action" alternative. The long-term future of sugar cane production by the Oahu Sugar Company will remain uncertain, whether or not the proposed Phase II project is developed, since it is subject to the unpredictable yet generally discouraging external factors such as Federal sugar price support and increasingly effective competition from sugar beet and high fructose corn-based sugar as well as from foreign sources.

Additionally, the long-standing City policy direction for the Ewa plain which calls for the establishment of a Second City in Ewa is not consistent



with the "No Action" alternative and will always present a formidable impetus for urban development of the project site and, equally important, the surrounding lands.

Finally, the conversion of the project site from sugar cultivation to urban/golf course use should not appreciably harm the sugar operations at Oahu Sugar Company as well as the future of diversified agriculture on Oahu as explained in *Chapter 4.0* of this report. Only 9% of the lands within the project site are classified as "prime" agricultural lands.

3.2 Alternative Uses.

3.2.1 Housing Alternative.

The feasibility of constructing housing on the project site was considered by the applicant and rejected for several reasons, including:

- development restriction imposed by a perpetual air flight easement over 100 acres of the site and favoring the U.S. Government which restricts such housing on the site;
- the additional traffic burden on existing highways which would be imposed by such additional housing;



- the considerable number of housing units being proposed throughout the Ewa district in other pending development projects, including Ewa Marina, Phase I;
- the need to create local job and business centers and opportunities within the Ewa Marina project to support its residential population and its marina complex; and
- the need to use portions of the Phase II site for critical storm and surface water drainage facilities which will protect other areas within and outside the Ewa Marina area from flooding exposure.

3.2.2 Agricultural Use.

Approximately 9% of the land is classified as "prime" agricultural land of importance to the State; the remainder of the Phase II site consists of "other" important agricultural lands which have only marginal productivity capacity. The suitability of the soils within the site for agricultural production other than sugar cane, therefore, is very marginal and the economic feasibility of such other agricultural use of the project site is further diminished by the considerable costs of irrigation of such crops and the high land rents being charged for much of the lands in the Ewa plains and the project site.



Diversified agriculture use of the Phase II project site is not preferable because:

- extensive amounts of prime agricultural lands and water sources have already been freed in other parts of Oahu from sugar cane and pineapple production making those better suited lands available for diversified crops;
- there is a probability that even more such lands and water resources will be freed due to the marginal profitability of sugar in Hawaii; and
- only a small amount of land and water is required to grow what are considered to be feasibly diversified crops and such land and water are already available in other sites elsewhere on Oahu which are better suited for such crops and for locational and climate reasons.
- finally, the continued sugar cane cultivation within the Phase II area will be incompatible with the residential development already approved for the Phase I area.

3.2.3. Selected Alternative.

Phase II of the Ewa Marina project will complement the master-planned, recreation-oriented residential/marina community in Phase I. The mixed use component with its commercial/industrial center, international fitness promotion center, accessory visitor accommodation complex, golf course, exhibition center and conference facilities, and championship tennis facilities will generate



the critical urban development and activities mass needed to support the marina and all planned marina-based recreational facilities.

In so doing, the Phase II component will spin off considerable job opportunities for Ewa Marina residents and other Ewa district residents and yield millions of dollars in State and City tax revenues annually while costing the State and City only a small fraction of the tax revenues gained in order provide the necessary public services to the Ewa Marina community.

Other public benefits of the Phase II project are also considerable. Phase II landscaping, greenbelt, golf course and infrastructure improvements, with an estimated cost of \$50 million, will benefit not only the Ewa Marina community, but also the Ewa area as a whole.

CHAPTER 4.0

DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

CHAPTER 4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS & MITIGATION MEASURES.

4.1 Physical Environment.

4.1.1 Geology, Physiography and Soils.

a. Existing Conditions.

The topography of the project site is essentially flat, having been used for sugar cane cultivation for many years. Its elevation averages about 20 feet above mean sea level (msl) with a slope of less than one percent (1%) on the average.

The project site consists primarily of five soil types:

- > CR Coral outcrop.
- > EmA Ewa silty clay loam, moderately shallow, 0 to 2 percent slopes.
- > EmB Ewa silty clay loam, moderately shallow, 2 to 6 percent slopes.



- Fd Fill land.

- MnC Malama stony silty clay loam, 0 to 12 percent slope.

Coral Outcrop (CR) consists of coral or cemented calcareous sand which were formed in shallow ocean water during the time the ocean stand was at a higher level. This type of soil is found on the western side of the project site.

Fill Land (Fd) consists of an area filled with material from dredging, excavation from adjacent uplands, garbage, and bagasse and slurry from sugar mills. Fill land is found in the center of the Phase II site.

Malama soils (MnC) and Ewa silty clays (EmA and EmB) are contained in the eastern section of the site. The Ewa soil series consists of well-drained soils in basins and on alluvial fans on Oahu and in the project site.

The predominate soil types – CR, Fd and MnC – comprise nearly 90 percent of the project area. Suitable agricultural activities associated with most of the affected soil types include sugar cane, truck crops, and pasture, although about 36 percent of the area is coral outcrop (CR) which is poorly suited for agriculture. *Table 1* shows the approximate acreage, possible agricultural uses, and two soil ratings (U.S.



Soil Conservation Service and Proposed Land Evaluation and Site Assessment (LESA) Ratings) for each of the soil types within the site:

Table 1
EWA MARINA, PHASE II, EIS
SOIL TYPES, ACREAGE, AGRICULTURAL USES, AND "SCS"
AND "LESA" SOIL RATINGS

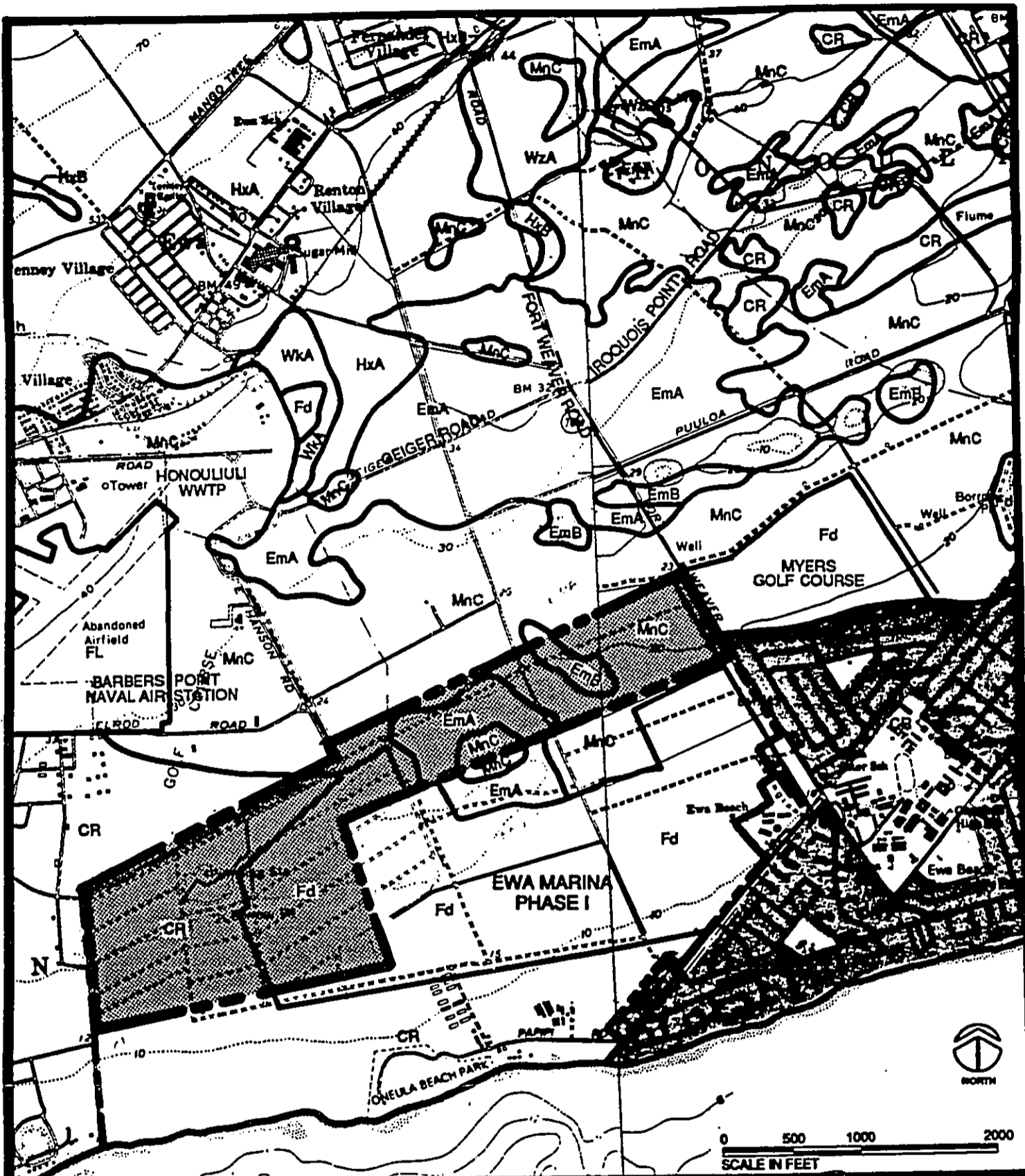
Soil Type	Acreage	Agricultural Use	SCS Rating	LESA Rating
CR	144	None	Vlls	12
Fd	125	Sugar cane	None	65
MnC	92	Sugar cane, truck crops, pasture	lls	66
EmA	35	Sugar cane, truck crops, pasture	lls	74
EmB	7	Sugar cane, truck crops, pasture	lle	74

* Assuming irrigation.

Source: U.S. Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, August, 1972.

Under the University of Hawaii, Land Study Bureau (LSB) soils rating system, which classifies soils into five levels ranging from level "A" representing the highest productivity class to level "E", the lowest productivity class, about 66 percent of the project site has soils rated "B", about 32 percent rated "C", and the remaining 2 percent unrated.

Although the various soil ratings systems in Hawaii fail to provide a consistent rating for the project site, it is estimated



Legend

- HxA Honouliuli clay, 0 to 2% slopes; HxB, 2 to 6% slopes
- WkA Waiakua silty clay, 0 to 3% slopes
- MnC Mamala stony silty clay loam, 0 to 12% slopes
- WzA Waipahu silty clay, 0 to 2% slopes; WzC, 6 to 12% slopes
- EmA Ewa silty clay loam, moderately shallow, 0 to 2% slopes; EmB, 2 to 6% slopes
- CR Coral outcrop
- Fd Fill land FL Fill land, mixed

**Ewa Marina Phase II Site
SCS SOILS MAP**

Prepared by: Belt Collins & Assoc.
Prepared for: HASEKO (Hawaii), Inc.
Date: November 1989

Source: U.S.D.A Soil Conservation Service, August 1972



that about one-third of the property is comprised of good soils.

b. Anticipated Impacts.

Significant project impacts on existing physiographic and soil conditions within the project site are expected to involve:

1. Grading activities associated with the development of the golf course, site preparation for the development of the mixed use area, and the construction of a drainage swale within the golf course as part of the Kaloi Drainage Basin system; and
2. Conversion of lands which are currently under sugar cane cultivation into a 27-hole golf course and the mixed use component of Ewa Marina, Phase II project. The project's impacts on sugar cane production and other possible agricultural uses within the site are discussed in other parts of this report. The ensuing discussion addresses only the project's grading plans for the site in terms of proposed land alterations to facilitate project development.

The overall grading concept for the Ewa Marina project, Phase I and II, is the excavation of the marina, with the excavated



material used to increase the elevation of the land surrounding the marina. The marina waste materials are particularly well suited for use in the golf course portion of Phase II, since the requirement for good material in a golf course is not as critical as it is for other types of uses such as roadways. In essence, the golf course portion of the project has been planned in part to aid in the overall grading balance and serves to keep much of the cut material within the project boundaries.

It is estimated that approximately 5.5 million cubic yards (cy) of material will be excavated from the Phase I marina portion of the development. Of this, an estimated 3.5 million cy will be used for the golf course and 500,000 cy for the commercial mixed use area. The remaining excavated materials will be used within Phase I of the Ewa Marina project.

The mauka project property line is proposed to be bermed as part of the golf course grading scheme. The berm will facilitate directing mauka water into the golf course channel that drains Kaloi Gulch.

Long-term soil erosion is not expected to be significant once the golf course is completed, due to the largely grassed areas and the implementation of the drainage plan. Moreover, the golf holes will be designed to be at a lower elevation than the surrounding residential and commercial development.



c. Mitigation measures.

Since the above-described proposed land alterations within the Ewa Marina, Phase II, project site are expected to improve existing drainage conditions within the project site by directing current storm water sheet flows over much of the site into a defined drainage channel through the golf course and the Phase I area into the marina; and since the project's master grading plan (encompassing grading and excavation work in Phases I and II) will create visually diverse land forms within currently flat lands and will allow project cut and fill materials to be kept within the project site, no mitigation measures are proposed with respect to the project's long-term impacts on existing geology, physiography and soil conditions within the Phase II project site.

However, in the short-term, there is potential for soil erosion. Measures will be taken during construction to mitigate any negative impacts due to erosion. These include: cut and fill consecutive areas of golf course development and grass them over before moving on to other areas; retain existing ground cover until each areas is ready to be graded; install sediment basins or detention ponds during construction, if needed; use temporary berms, ditches, etc., where needed; and use sprinklers as necessary.



4.1.2 Groundwater.

a. Existing Conditions.

Drip irrigation for approximately 800 acres of sugar cane lands within the whole Ewa Marina project area is supplied by brackish water withdrawn from the relatively shallow Ewa Limestone Aquifer situated below that project area. It is estimated that about 7 million gallons of groundwater (based on a usage rate of 0.9 mgd/100 acres and an estimated 775 net acres in actual sugar cane production) are currently used to irrigate existing sugar cane fields within the Ewa Marina project.

b. Anticipated Impacts.

Phase II of the Ewa Marina project contains approximately 383 acres of the above-mentioned total 800 acres currently in sugar cane production. Within Phase II, non-potable irrigation water for the golf course and areas used for project landscaping (i.e. roadway shoulders, open spaces, etc.) are expected to be withdrawn from groundwater contained within the Ewa Limestone Aquifer upon approval of such withdrawal from the State Water Commission. Potable water supply for the golf course clubhouse and the various uses planned within the mixed use component of Phase II are



expected to come from the City's Board of Water Supply System.

The 27-hole golf course is expected to use about 1.35 mgd of non-potable groundwater from the Ewa Limestone Aquifer and this water will come from the well (Pump 27) that is currently used by the Oahu Sugar Company (OSCo) to irrigate the area proposed for the golf course. However, the overall effect of the course on groundwater supplies within the aquifer will be a reduction in withdrawal rates within the entire Ewa Marina project area which will eventually total approximately 5.0 mgd of groundwater upon completion of the entire Ewa Marina Project. Construction of the Phase II project will eliminate the current withdrawal of 7.0 mgd of groundwater from the Aquifer for sugar cane irrigation and replace that withdrawal demand with a project groundwater withdrawal demand of about 2.0 mgd from the Aquifer (i.e. 1.35 mgd for the golf course plus 0.65 mgd for other land uses within the Ewa Marina project requiring only groundwater to meet their irrigation needs).

c. Mitigation measures.

The above before and after comparison shows that the change in land use within the Phase II project site from sugar cane production to the proposed mixed use/golf course project will



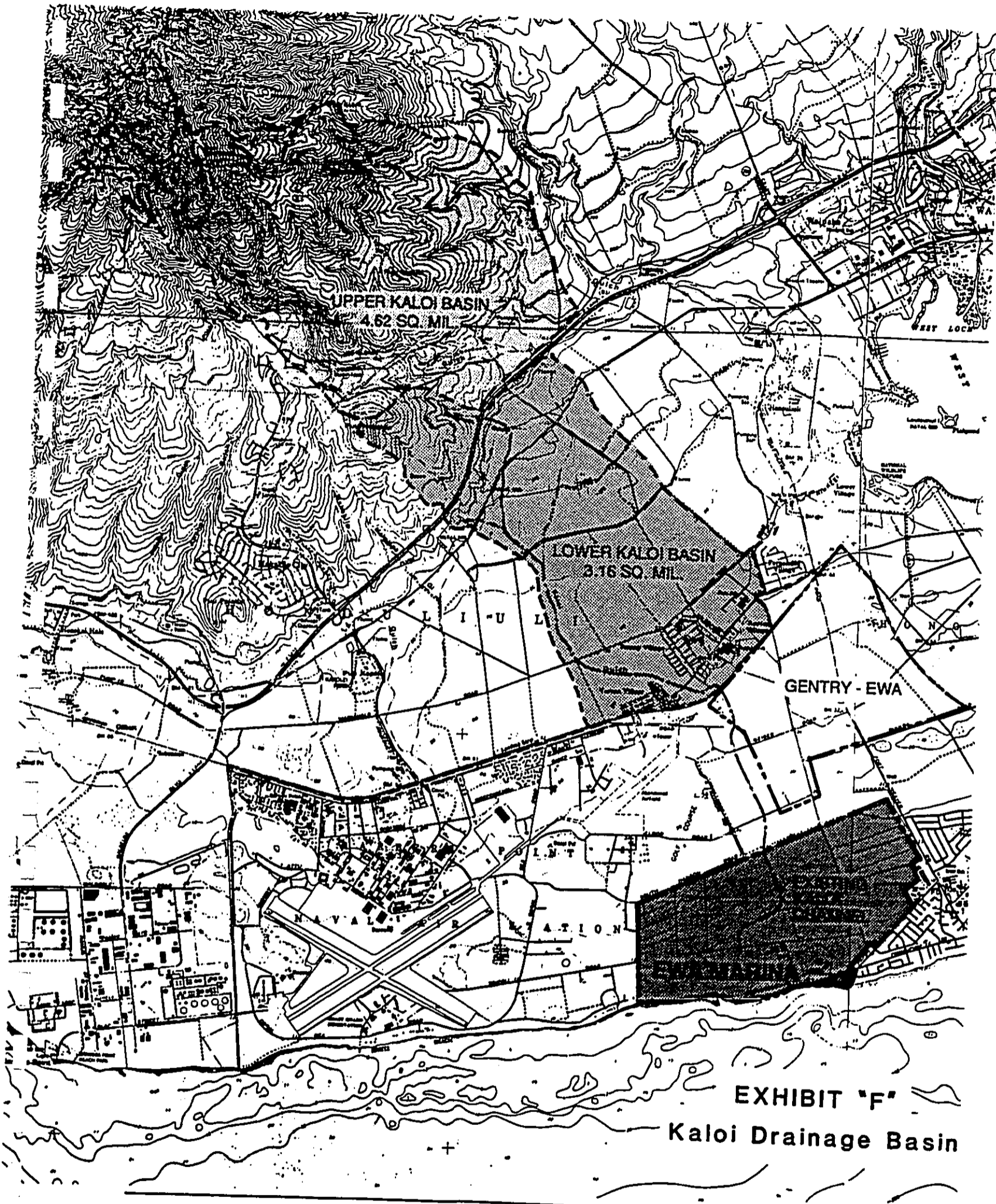
ultimately cause a decrease in the groundwater withdrawal rates from the Ewa Limestone Aquifer from 7.0 mgd to 2.0 mgd upon completion of the Ewa Marina Project. In light of this positive environmental impact of Phases I and II of the Ewa Marina Project, no mitigation measures are proposed with respect to groundwater impacts of Phase II.

4.1.3. Surface Water:

a. Existing Conditions.

The total Ewa Marina Project, including Phase II, is located within the Kaloi Drainage Basin. This 7.8 square mile watershed (above the Ewa Marina site) drains through a man-made gulch through portions of the marina site and eventually empties into the ocean. The ocean discharge is currently through sheet flows at the Kaloi Gulch outlet (located about midway through the Phase I area) and is partially disposed of through percolation through ground water depressions within the Phase II site.

Exhibit F shows the existing Kaloi Channel as it meanders through the Ewa Marina project site. The discharge volume at the mauka extremity of the project, which comprises the mauka boundary of the proposed golf course, is estimated at 10,400 cubic feet/second (cfs).





b. Anticipated Impacts.

A master drainage plan for the Ewa-Gentry project was approved by the City's Public Works Department in 1988. It sets the entrance flow into the Ewa Marina project. It is estimated that such storm water flows could reach 10,400 cfs.

The hydraulics for this drainage plan were established using the ocean as the ultimate discharge for the Gentry storm water flow and assumes a simple connection from that project to an ocean outlet which allows the Ewa Marina project area to serve as the middle portion of this major Kalo'i Drainage Basin conduit. The drainage plan for Phase II implements this concept.

Portions of the on-site storm water flows from the Phase II project will be collected within the proposed golf course area and swaled and/or piped and discharged into the Phase I area. In the case of the more urban type uses to be contained within the Phase II, mixed use area (i.e. fitness center, commercial uses, etc.), on-site flows will be collected within the site and piped into the marina.

The drainage plan for the project proposes the use of a strip of land within the golf course approximately 400 to 600 feet wide to serve as a surface and storm water drainage conduit



which will direct such water toward the marina and act as a buffer for sheet flows onto the rest of the Ewa Marina project site. This strip of golf course land will also filter out off-site silt from surface and storm water flows originating outside of the project site and the upper portions of the Kaloi Drainage Basin before such waters flow into the marina.

For a portion of the non-Kaloi Gulch surface water flows, the golf course will serve as a buffer for much of the water from the mauka sugar cane fields located between the Ewa-Gentry and Phase II projects.

All on-site and off-site drainage systems within the Phase II project will be designed to meet the pertinent drainage standards of the Department of Public Works.

The Phase II project is estimated to generate a surface water flow of 1,500 cfs. A channel will be constructed to carry surface water flows through Phases I and II of the Ewa Marina Project and will carry the flows entering the Phase II (golf course) area through the entire Marina project and into the proposed marina. This channel is being designed to handle all of the 100 year flood; therefore, there are no retention basins, other than those that might occur in the golf course, planned within all other portions of Phases I and II of the Ewa Marina project.



c. Mitigation measures.

The Ewa Marina drainage plan and proposed improvements will improve the current indiscriminate sheet flow drainage system within the project site, enable a filtering out of sediments from surface and storm water flows passing through the Ewa Marina project before such water enters the ocean, and reduce the risk of flooding within much of the Ewa Marina project site by directing surface and storm waters through the site into the proposed golf course open land drainage strip and the proposed drainage channel within the Phase I area. Because of these positive environmental impacts and the absence of any foreseeable negative environmental impacts arising from the implementation of the project's drainage plan, no mitigation measures with respect to surface and storm water drainage within the Phase II site are proposed.

4.1.4 Visual Attributes.

a. Existing Conditions.

As described above, the entire Phase II project site is relatively flat and, with the exception of a 20-acre site located within the western half of the project site and proposed golf course, has been cultivated for sugar cane production for several decades by the Oahu Sugar Company. The average slope



throughout the site is approximately one percent (1%). The site abuts the Navy's Barbers Point Golf Course and lands in sugar cane production along its northerly border, undeveloped lands along its westerly border, the undeveloped lands comprising Phase I of the Ewa Marina project along its southerly border and Fort Weaver Road along its easterly border. All of these adjoining lands are also flat. Because of these conditions, there are no ocean views or other scenic view planes from or through the Phase II project site.

b. Anticipated Impacts.

The proposed commercial mixed use area and golf course components of the Phase II project will change the visual appearance of the project site. The mixed use complex will contain a commercial center, international fitness promotion center and visitor complex which are intended to complement and support the proposed marina. A basic building height limit ceiling of 150 feet is proposed in order to diversify the building heights within the mixed use area and allow for contrast in building forms. The project site is subject to Federal Aviation Regulations (FAR) safety height criteria, because of its proximity to Naval Air Station Barbers Point (NASBP). According to the Department of the Navy, adjusting for the NASBP runway elevation, the inner horizontal safety surface would equate to an elevation of 183 feet (mean sea



level datum), which structures should not exceed. Structures will be designed to meet the safety height criteria and operational air space requirements of the adjoining NASBP and will not obstruct any scenic view plane with respect to neighboring properties.

As mentioned above, excavated fill from the marina will be deposited throughout the proposed golf course and graded into its landscape to create varied land forms and visual diversity throughout the course. The golf course site is essentially flat at the present time and comprised mostly of cultivated sugar cane fields. In addition, the excavated fill from the marina will also be used within the golf course to create earth berms which will buffer the course and much of the entire Ewa Marina project site from surface and storm water flooding and flows while further adding to the visual diversity of the course's land forms.

c. Mitigation measures.

No mitigation measure with respect to the visual attributes of the existing project site is proposed since there are no ocean views or other scenic view planes within and through the Phase II project site which will be adversely impacted by construction of the above-described mixed use structures and golf course.



4.1.5 Flora and Fauna.

a. Existing Conditions.

1. Birds and Mammals.

In September, 1989, a bird and mammal survey of the Phase II project site was conducted with the following findings and results.

Resident Endemic (Native) Land Birds.

No endemic land birds within the project site were recorded during the field survey. The only likely occasional endemic species in the area are the Hawaiian owl or Pucio (*Asio flammenus sandwichensis*) and the Hawaiian Stilt (*Himantopus mexicanus knudseni*) which may occasionally forage in the area.

Resident Indigenous (Native) Birds.

The only specie recorded on the site was the Black-crowned Night Heron (*Nycticorax nycticorax*). Tracks and scats of night heron were found near irrigation ditches within the area.



Resident Indigenous (Native) Seabirds.

No seabirds were found within the site during the survey and it is considered unlikely that any seabird would nest within the site due to an abundance of predators. Seabirds such as the Great Frigatebird (*Fregata minor*) were seen soaring overhead and may infrequently use the irrigation ditches within the area for drinking purpose although the vegetation surrounding the ditches probably discourage such visits to the ditches by these birds.

Migratory Indigenous (Native) Birds.

Only the Pacific Golden Plover (*Pluvialis fulva*) was found within the site during the survey. Plovers are likely the most common migratory bird species in Hawaii. They prefer open areas such as open fields and lawns. A total of 42 plovers were recorded within the site on one occasion and 49 plovers on another occasion during the survey.

The only other likely migratory specie that may occur within the site is the Ruddy Turnstone (*Arenaria interpres*) which are known to forage in plowed cane fields.

Exotic (Introduced) Birds.

A total of 17 species of exotic birds were found within the site during the field survey. The most abundant



species were the Zebra Dove (*Geopelia striata*), Red-vented Bulbul (*Pycnonotus cafer*), Chestnut Mannikin (*Lonchura malacca*), Nutmeg Mannikin (*Lonchura punctulata*), and Common Waxbill (*Estrilda astrild*). Exotic species not recorded on the actual survey but which potentially could occur at this locality include: Japanese Bush-warbler (*Cettia diphone*), Northern Mockingbird (*Mimus polyglottos*), Java Sparrow (*Padda oryzivora*) and Barn Owl (*Tyto alba*) (Bruner 1989). The habitat is probably too dry for Melodius laughing-thrush (*Garrulax canorus*).

Feral Mammals.

The only feral mammals observed during the survey were cats and the Small Indian Mongoose (*Herpestes auropunctatus*). It is likely that the numbers of rats, mice, cats and mongoose within the site are typical of their abundance in similar habitats on Oahu.

Records of the endemic and endangered Hawaiian Hoary Bat (*Lasurus cinereus semotus*) are sketchy although the specie has been reported on Oahu (Tomich, 1986). None were observed within the project site during the survey.



2. Vegetation.

Vegetation within the project site is described in three areas: (1) sugar cane fields; (2) kiawe forest; and (3) reservoir and quarry area.

Sugar Cane Fields.

Sugar cane growth covers approximately 95% of the Phase II project site. Very few weedy species are found in these fields.

Nut grass (*Cyperus rotundus*) grows within the cane fields. Weedy species associated with agricultural lands include false poinsettia (*Euphorbia cyathophora*), swollen finger grass (*Chloris barbata*), spider flower (*Cleome gynandra*), and wild bitter melon (*Momordica charantia*). Low-lying areas along the margins of the cane fields support false daisy (*Eclipta alba*), Leptochloa uniervia,, and fir-leaved celery (*Ciclospermum leptophyllum*).

The bottom of the Kaloi Drainageway, as it passes through the Phase II site, is lined with a dense mat of California grass (*Panicum maximum*) with scattered shrubs of koa-haole (*Leucaena eucacephala*) and castor bean (*Ricinus communis*).

Along the Naval Air Station property are swollen finger grass, Guinea grass, buffel grass (*Cenchrus ciliaris*), sourgrass (*Digitaria insularis*), and Bermuda grass (*Cynodon actylon*), weedy herbs and shrubs include pluchea hair spurge (*Pluchea symphytifolia*) golden crownbroad (*Verbestna encelioides*), hairy spurge (*Chamaesyce hirta*), slender mimosa (*Desmanthus virgatus*), 'uhaloa (*Waltheria indica*), spiny amaranth (*Amaranthus spinosus*), and 'ilima (*Sida allax*).

Kiawe Forest.

A closed canopy forest of kiawe trees (*Prosopis pallida*), 25 to 30 feet tall, is found along the southern boundary. In places, kao-haole forms a subcanopy layer 18 feet tall. Ground cover is almost exclusively Chinese violet (*Asystasis gangetica*).

Along the edges of the kiawa forest patches of rouge plant (*Rivinia humilis*), Guinea grass, sourgrass, and hairy abutilon (*Abutilon grandifolium*) can be found. A few small trees of the native coastal sandalwood or 'ili ahi a loc (*Santalum ellipticum*) are found scattered throughout this forest. Other natives found here include the kupala vine (*Sicyos pachycarpus*), kaunaoa pehu (*Cassytha filiformis*), 'ilie'e (*Plumbago zeylanica*), 'ilima, and kaoli 'awania (*Ipomoea indica*). None of

these native plants are considered threatened or endangered.

Reservoir and Quarry Vegetation.

A reservoir and pumphouse located makai of the NASBP is surrounded by California grass, shrubs of koa haole, Christmas berry (*Schinus terebinthifolius*), pluchea, Indian pluchea (*Pluchea indica*), and castor bean. Trees found in the surrounding vicinity include kiawa 'opiuma (*Pithecellobium dulce*), monkeypod (*Samanea saman*), kalamugai (*Moringa oleifera*), and African tulip (*Spathodea campanulata*). *Coccinea grandis*, a member of the cucumber or gourd family, is frequently found forming dense tangles over the shrubs.

A quarry near the reservoir contains scattered pockets of grasses and shrubs including swollen finger grass, Natal redtop (*Rhynchelytrum repens*), buffel grass, bristly foxtail (*Setaria verticillata*), Bermuda grass, pluchea, koa-haole, tree tobacco (*Nicotiana glauca*), 'ilima and 'uhaloa. *Leptochloa*, California grass, and *Eleocharis geniculata* occur around the margins of a pond within the quarry.

Of a total of 98 species occurring on the project site, 85 (87%) are introduced or exotic species; three (3%) are of Polynesian origin; and 10 (10%) are native. None of the



native species are endangered or threatened plant species; nor are any of them candidates or proposed for such status (U.S. Fish and Wildlife Service, 1985; Herbst, 1987).

There is little botanical interest or concern on the property since the majority of the site has been disturbed by agricultural activities.

b. Anticipated Impacts.

Birds and Mammals:

Based on the field survey, it is concluded that:

- The present environment within the site provides a limited range of habitats used by a typical array of exotic birds one would expect at this low elevation and type of environment.
- Pacific Golden Plover are presently common in open plowed fields but would decline in abundance following urbanization of the mixed use area.
- Doves and finches could decline after project completion; but House Sparrows and Common Myna should increase dramatically following project completion.

No significant negative impact on the birds and mammal species identified above is anticipated as a result of the



project since they are common in similar environments throughout the Islands.

Vegetation:

The project should not have a significant negative impact on the total island populations of the vegetation species contained within the project site because they occur in similar lowland situations throughout the Hawaiian Islands.

c. **Mitigation measures.**

Based on the foregoing information and discussions, no mitigation measures with respect to flora and fauna species found within the project site are proposed. However, the fresh water feature located within the quarry area will be protected and incorporated into the design of the golf course to the extent practicable in order to maintain this feeding area for the native Black-crowned Night Heron.

4.1.6 Air Quality.

a. **Existing Conditions.**

While there is no air monitoring station in the project area, air quality is believed to be in compliance with State and Federal



standards due to the essentially undeveloped nature of the area. The nearest major stationary sources at Campbell Industrial Park are downwind of the project site under the prevailing northeasterly tradewinds and thus would impact project site air quality only under infrequent southwesterly wind conditions. The State Health Department's Barbers Point air monitoring station, located some six miles southwest, indicates compliance with State and Federal standards despite being located adjacent to Campbell Industrial Park.

Air sampling conducted during peak traffic hours found carbon monoxide (CO) levels in the 2-4 milligrams per cubic meter (mg/m³) range along Fort Weaver Road in the vicinity of Geiger Road and the Palailai Interchange. Such levels are well within the State and Federal 1-hour standards of 10 mg/m³ and 40 mg/m³, respectively. Winds during the sampling were light but gusty with trade winds from the north-northwest and northeast.

On an annual basis, wind conditions in the area are predominated by brisk northeasterly tradewinds; however, there is a marked seasonal difference in the velocity and persistence of such winds. The tradewinds tend to decline in the fall and winter months turning into more light and variable winds, often with a more southerly component, which can contribute to higher pollutant concentrations.



b. **Anticipated Impacts/Mitigation Measures.**

During the construction phase, there will be short-term air quality impacts associated with site preparation (fugitive dust) and movement of construction vehicles (exhaust gases and particulates). Heavy construction vehicle traffic on nearby roadways can also reduce roadway capacity.

Fugitive dust can be mitigated by frequent watering of exposed soil areas and the earliest possible landscaping and roadway paving to minimize the length of time of soil exposure. EPA estimates that 50% reduction in fugitive dust emissions can be accomplished by twice daily watering. Construction vehicle exhausts are primarily controlled by proper maintenance of vehicle engines to insure efficient operation. The impact on Fort Weaver Road can be reduced by minimizing construction vehicle movement during peak traffic hours.

Off-site, short-term impacts associated with construction include the operation of asphalt concrete and concrete batch plants to provide the material for road building and foundations. Those plants will emit pollutants while they are producing products for the proposed project. Such plants must have Department of Health permits to operate and must have demonstrated their ability to meet Federal and State air quality standards in order to receive those permits; thus, the produc-



tion of materials for the Ewa Marina, Phase II project can be considered as part of their normal operation and in compliance with air pollution control rules.

The primary long-term impact of the project will be associated with the motor vehicle traffic generated by it. An air quality impact analysis based on cumulative traffic volumes indicated that while there will be an increase in carbon monoxide levels along Fort Weaver Road with or without the project, State and Federal air quality standards will continue to be met. A variety of mitigation measures can either be implemented or encouraged by the project developer. These include car pooling, development and use of public transit, limited parking facilities, and development of near-home employment opportunities.

The project will also cause an increase in electrical demand which in turn will result in greater emissions from power plants. This increase was estimated at less than 0.5% of Oahu's latest available emissions inventory. These emissions can be reduced by design and practices which reduce electrical demand.

The project will also generate solid waste which will likely be burned at the newly opened resource recovery facility, H-POWER, resulting in pollutant emissions. Measures aimed at



reducing waste generation, such as recycling and composting, would help mitigate both the solid waste and air pollution impacts.

Pesticide use associated with golf course maintenance will have a potential for air quality impact if the pesticides are improperly applied under strong wind conditions. Estimated concentrations of typical herbicides, insecticides, and fungicides uses on golf courses indicated concentrations well below standards and effects levels. The primary mitigation means is to insure that applicators adhere strictly to label instructions. Alternatively, other non-chemical means of pest control can be sought out and implemented.

4.1.7 Noise Quality.

a. **Existing Conditions.**

The existing acoustical environment at the project site is dominated during the day by noise generated by aircraft flight activities associated with the Honolulu International Airport (HNL) and Naval Air State Barbers Point (NASBP). Flight activities at the HNL affecting the site comprise civilian and military aircraft approaching to land on Runway 8L. Noise generated by touch-and-go activities, which overfly the project



site, dominate the overall noise from aircraft associated with the NASBP.

When no aircraft activities occur, noise generated by traffic on Fort Weaver Road is the dominant source at locations near Fort Weaver Road. At locations away from the road and when no aircraft activities occur, wind in the sugar cane is, at present, often the dominant sound.

According to the latest (1987) Ldn contour map for HNL, the project site is exposed to Ldn's ranging from about 50 to 63 dB (see *Exhibit G*). It is estimated that the site is exposed to Ldn's generated by NASBP flight operations of about 45 to 71 dB (See *Exhibit H*). The combined Ldn at the site; therefore, is estimated to range from about 55 to 71 dB (see *Exhibit I*). Aircraft noise measurements for the project were conducted in late 1989 and yielded the following results as regards the proposed mixed use commercial and golf course components of the Phase II project:

Mixed Use Location.

Ldn levels within this component area are largely dependent on the level of flight activities at the NASBP when there is significant "touch and go" aircraft events occurring there as demonstrated by measurements conducted for the project.

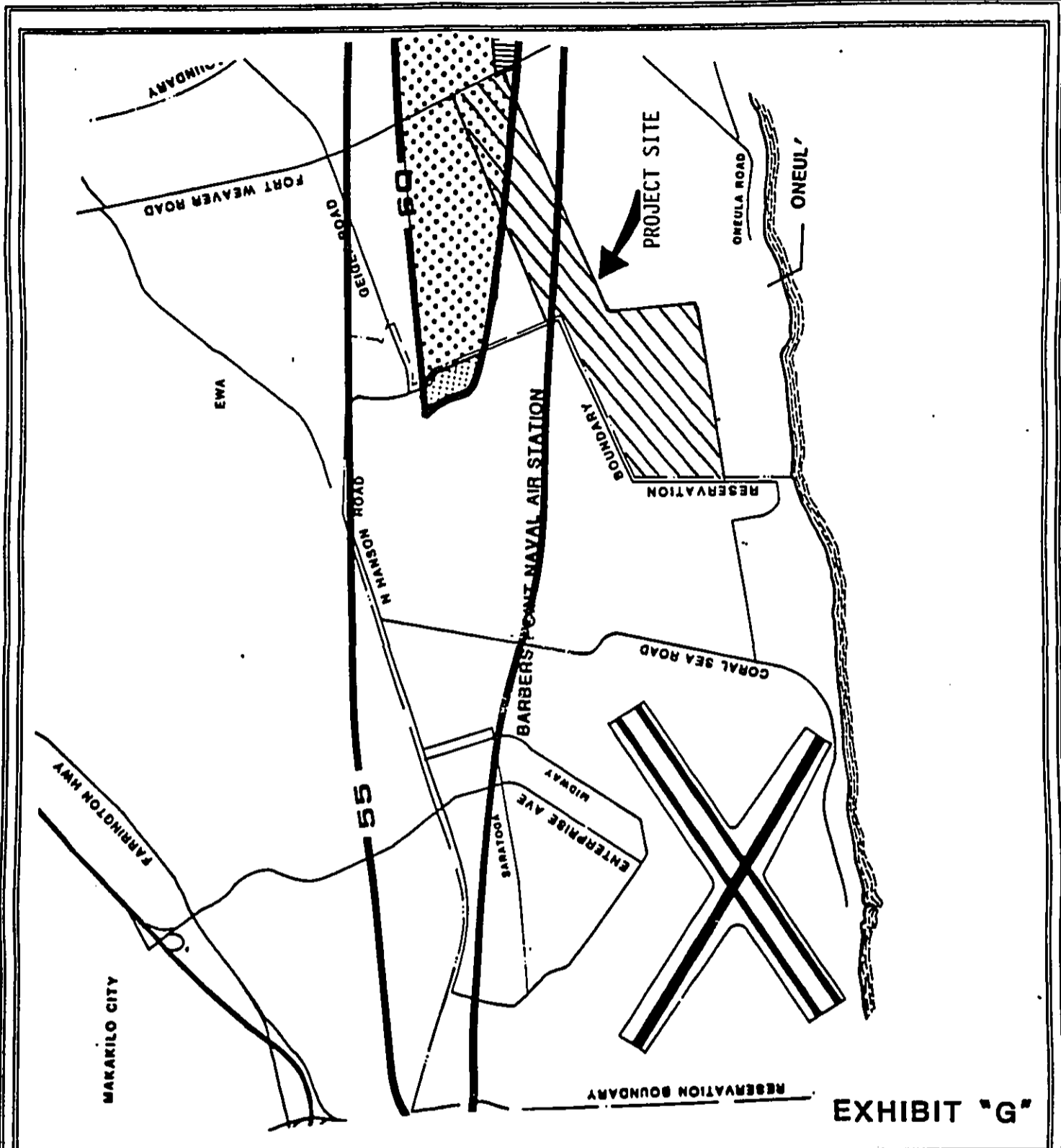


EXHIBIT "G"

DARBY & ASSOCIATES
ACOUSTICAL CONSULTANTS

LOCATION OF THE HNL'S
55 AND 60 dB Ldn CONTOUR
LINES RELATIVE TO THE
PROJECT SITE

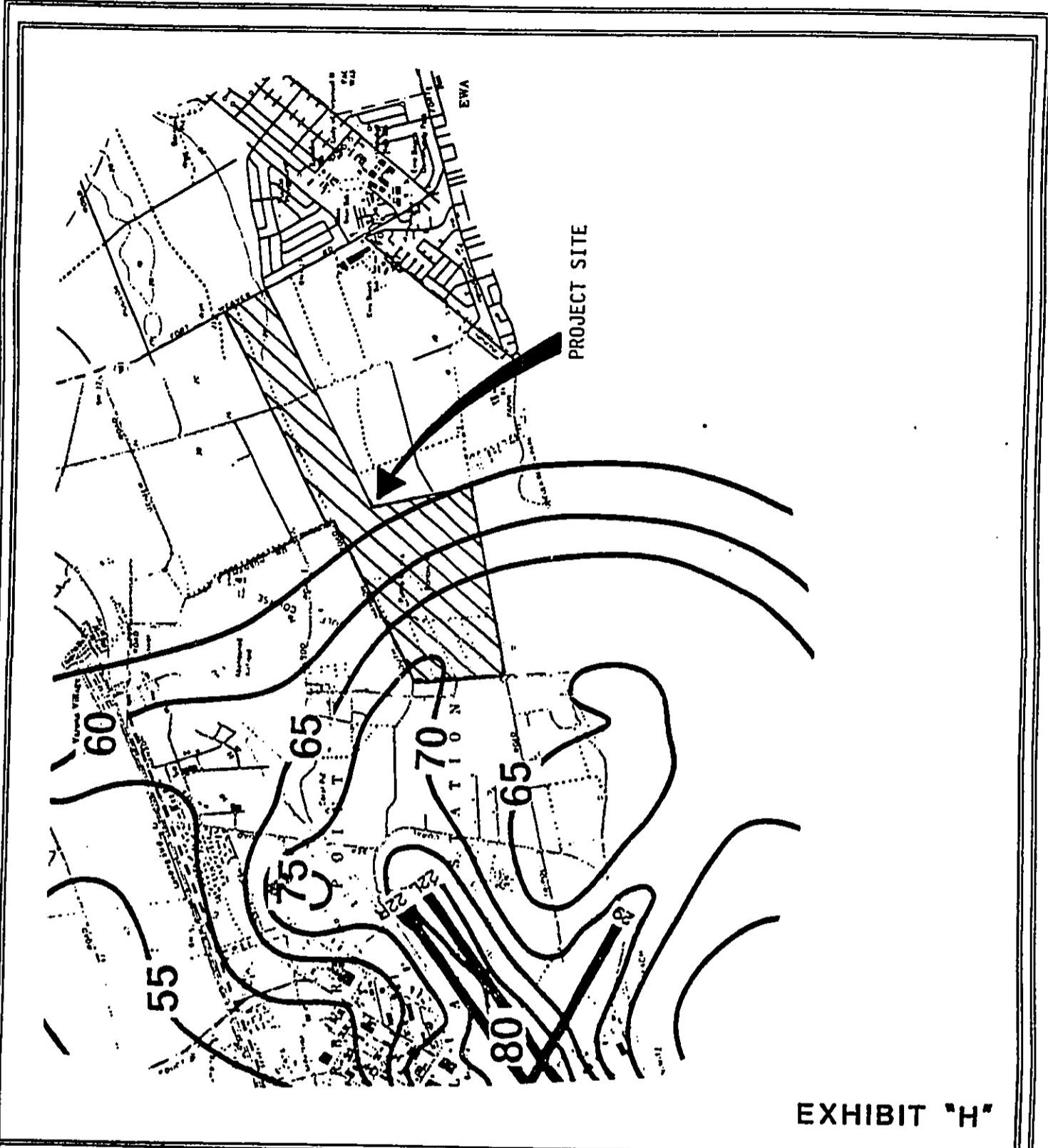


EXHIBIT "H"

DARBY & ASSOCIATES
ACOUSTICAL CONSULTANTS

LOCATION OF THE NASBP'S
Ldn CONTOUR LINES RELATIVE
TO THE PROJECT SITE

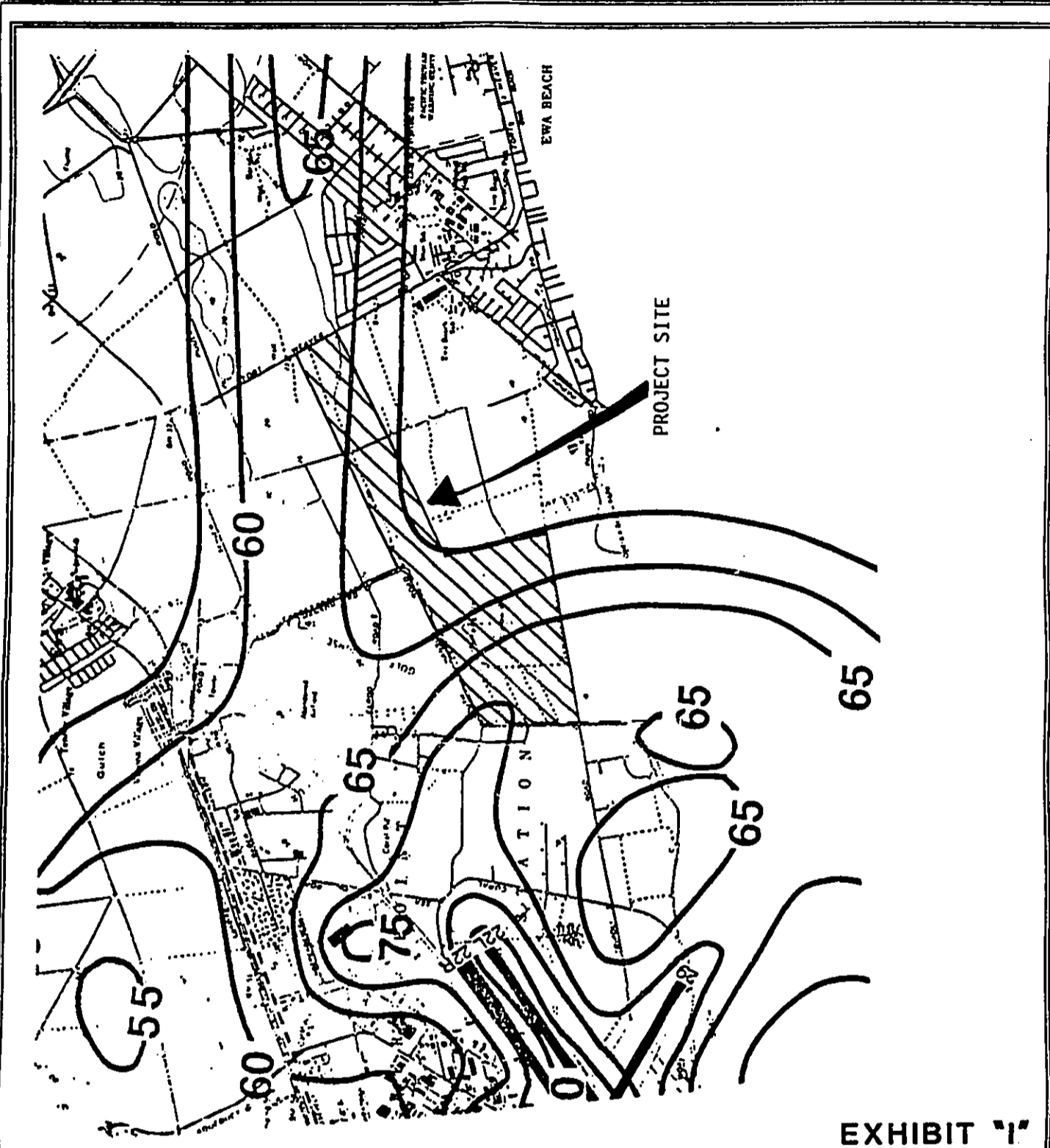


EXHIBIT "1"

DARBY & ASSOCIATES
ACOUSTICAL CONSULTANTS

LOCATION OF THE COMBINED
(HNL & NASBP) Ldn CONTOUR
LINES RELATIVE TO THE
PROJECT SITE

Higher Ldn levels from NASBP aircraft activities are associated with the relatively noisy KC-135 and F-15 aircraft.

Measurement of single event noise indices (Lmax and SEL) yielded separate findings for civilian and military aircraft activities:

Civilian trans-ocean and interisland flights had typical Lmax values of 64 to 69 dBA and 58 to 65 dBA. The typical SEL's ranged from 77 to 81 dBA for trans-ocean flights and 68 to 77 dBA for interisland flights.

While military aircraft flight associated with HNL accounted for only 8% of measured noise data, the KC-135 and F-15 generated noise reached an Lmax between 65 and 85 dBA and a SEL between 75 and 90 dBA. Military aircraft noise from NASBP ranged from inaudible to as high as 104 dBA Lmax and 108 dBA SEL from noise generated by the KC-135 and F-15 performing touch and go activities on track BP-04RT6.

Golf Course Location.

In general, noise from HNL bound aircraft is higher at the golf course locations than at the mixed use locations due to the proximity to the flight track leading over the Phase II site into



HNL. The Ldn's at the proposed golf course are estimated between 50 and 63 dB.

Civilian trans-ocean and interisland flights into HNL generated Lmax and SEL levels ranging from 60 to 76 dBA and 68 to 85 dBA, respectively. Lmax noise levels generated from military flights into HNL ranged from 70 to 87 dBA and their SEL's ranged from 81 to 96 dBA. It is estimated that noise levels as high as 104 dBA Lmax and 108 dbA SEL over the proposed golf course are generated from KC-135 and F-15 flight activities on BP-04RT6 at NASBP.

b. Anticipated Impacts.

Mixed Use Location.

Table 2 summarizes the Ldn noise impact assessment at the proposed mixed use site. The combined (HNL and NASBP) Ldn at the mixed use site for the mean year ranges from about 55 to 67 dB. The Ldn at the noise sensitive locations (fitness center and lodging units) within the mixed use area is less than 65 dB. This is in compliance with the State and Federal EPA's and Department of Housing and Urban Development (HUD)'s aircraft noise regulations of a maximum Ldn of 65 dB.

The lodging facilities will be located outside the 60 dB contour line for the HNL and, thus, noise levels within the vicinity of this structure will comply with State DOT aircraft noise guideline of a maximum of 60 dB Ldn for naturally ventilated buildings.

All lodging facilities within the mixed use area will comply with HUD's interior 45 dB goal provided they are air conditioned. It would be difficult to achieve an Ldn of 45 dB without air conditioning, especially at the proposed visitor lodging structure within the mixed use area.

Civilian trans-ocean and interisland flights into HNL over the project site generate Lmax and SEL levels ranging from 58 to 69 dBA and 68 to 81 dBA, respectively. The maximum SEL of 81 dBA is well within EPA's 98 dBA SEL guideline for speech interference and just exceeds its 80 dBA SEL guideline for sleep interference. This latter excess is not considered significant since there generally are no night time (10 pm to 7 am) activities on HNL arrival tracks 17 through 20 for any civilian aircraft.

HNL bound military aircraft generate a maximum SEL of 90 dBA (KC-135s and F-15s) which is below EPA's recommended 98 dBA guideline for speech interference and 10 dBA above its sleep interference guideline. However, since there are no



night time activities on the HNL arrival tracks 17 through 20 for the KC-135 and F-15 aircraft, noise generated by such arriving aircraft at HNL is not considered significant as regards impact on the mixed use area land use activities.

Three military aircraft, the C-5A, C-130 and C-141, occasionally arrive at HNL at night. However, such arrivals are relatively infrequent, therefore, the noise impacts on the mixed use land use activities are not considered significant.

On a relatively small number of occasions when KC-135 and F-15 aircraft perform flight activities at NASBP the noise impact at the mixed use site could be severe (i.e. reaching as high as 104 and 108 dBA, respectively. Such flight activities are extremely sporadic and high levels of such activities occur infrequently during the year.

Golf Course Location:

The proposed golf course site complies with all the specified criteria in the State DOT's "Noise Standards and Guidelines" except for the DOT's proposed Ldn limit of 65 dB. However, the majority of the site (about 75%) is outside of the 65 Ldn contour line. Also, an existing golf course is adjacent to the proposed course (the Navy Barber's Point Golf Course) and the aircraft noise is comparable at both sites.



Noise-Traffic:

The results of the calculations for the existing and future (year 2002), with and without the project at various segments of Fort Weaver Road and the Project Access Roads "A" and "B" reveal that the increases in the future noise levels due to project-related traffic are less than 1 dB. The overall future traffic noise level increase ranges from 2 to 7 dB.

Traffic data for the interior roads are not available, except for the portion of the project access road where it intersects the highway. Assuming that the traffic volume is highest at the intersection, it is estimated that the proposed residences in Phase I will be exposed to Ldn's of about 60 dB at a distance of 100 feet from the centerline of the roadway. With a setback distance of 50 feet or more, the traffic-generated Ldn is estimated to be less than 65 dB. It should be noted that traffic noise from Fort Weaver Road will not contribute significantly to the overall acoustical environment at any of the residences within the Ewa Marina Project.

Noise-Sugar Cane Operations:

Equipment used for harvesting and land preparation generate the only noise from cane operations. The nearest portion of the existing sugar cane field which will remain in the vicinity



of the project site is located next to the mauka border of the Phase II site and is located about 2,500 feet from the nearest noise sensitive area within the mixed use site. At such distances, noise levels from cane operation activities are estimated at less than 55 dBA which is well below applicable State Health Department noise standards for sugar cane operations (i.e. 70 dBA for 10 % of the time in any 20-minute period at the property line and conditional noise permits which allow 95 dBA at the property line in certain instances.)

**Table 2
EWA MARINA, PHASE II, EIS
SUMMARY OF Ldn NOISE IMPACT ASSESSMENT
AT SELECTED (LODGING, HOTEL AND GARDEN-SUITE
APARTMENTS) MIXED USE LOCATIONS**

LOCATION	CASE	Ldn (dB)
Health	Exterior level	59-62
Lodging	Interior level (w/ air cond.)	39-42
Hotel	Exterior level	62-65
	Interior level (w/ air cond.)	40-42
Garden-Suite Apartments	Exterior level	55-58
	Interior level (w/ air cond.)	35-38
	Interior level (natural air vent.)	43-53

Source: Darby & Assoc., *Aircraft Noise Impact Assessment Ewa Marina Phase II, Ewa Beach, Oahu, Table 3, September, 1989.*

c. Mitigation measures.

All visitor accommodation spaces within the fitness center and visitor accommodation structures, will be air conditioned to enable building windows to be kept closed and, thus, minimize noise intrusion. All such structures within noise sensitive spaces in such facilities (i.e. meeting rooms, offices, etc.) will be air conditioned.

To minimize speech and sleep interference, air conditioning within visitor accommodation and Garden-Suite Apartments will be provided to comply with HUD's 45 dB Ldn standard for living units.

Air conditioning of the golf course clubhouse will be provided to establish an acoustically comfortable environment, especially within clubhouse spaces used for meetings, banquets, instructional meetings, etc.

Portions of the project site are within the boundaries of the Air Installation Compatibility Use Zone (AICUZ) for NAS Barbers Point. Disclosure requirements of Hawaii Revised Statute, Title 25, Section 467-31 will apply and will be met prior to any sale, leasing or other transaction. In addition, all State Land Use Commission conditions regarding noise impacts will be met, including restrictions on construction

within areas exposed to noise levels of 65 Ldn or greater, provision of sound-attenuation in other noise sensitive areas, and the granting of right-of-flight and noise easements as may be prescribed by the State Department of Transportation.

4.2 Historic and Archaeological Resources.

4.2.1 Existing Conditions.

To determine what archaeological and historical resources existed in the project area, a surface and limited subsurface archaeological inventory survey of the entire project area was conducted. The survey is included in *Appendix K* of this report. The report has been forwarded to the State Department of Land and Natural Resources-Historic Preservation Program/State Historic Preservation Office (DLNR-HPP/SHPO) for review and confirmation of the preliminary assessments for the identified sites. The following is a summary of the information contained in that report. The report is also attached as *Appendix K*.

The Ewa Marina, Phase II area lies along the east-central segment of the Ewa coral plain, a Pleistocene elevated coralline reef that forms the leeward coastal lowlands of southwestern Oahu. The coastal lowlands is a semi-arid region of intense sunshine, warm dry tradewinds and little rainfall.

Many archaeological projects have been conducted on the Ewa coral plain, and these projects have identified numerous archaeological feature types: walls, pits, rocks, shelters, burials, hidden deposits, limestone sinks, platforms, enclosures, cairns, mounds, and others. Based on the feature types, their locations, dating analysis, and other archaeological data, it is generally concluded that prehistoric occupation on the coral plain was mostly temporary, seasonal, or specialized. The plain was used primarily for fishing and related activities, and for limited agriculture.

During the Phase II project area survey, two sites (3208 and 4293) were identified. Site 4293 is a complex consisting of two mounds and two C-shapes. Site 4293 is a platform. Site 3208 was interpreted as a historic/prehistoric habitation and agricultural site.

a. **Anticipated Impacts/Mitigation Measures.**

The basic purpose of an inventory survey is to identify all sites and features of potential archaeological significance present within a specified project area. An inventory survey is an initial level of archaeological investigation; it indicates the general nature and variety of archaeological remains present, and the general distribution and density of such remains.



Such a survey permits a general significance assessment of the archaeological resources and facilitates formulation of realistic recommendations and estimates for any further work that might be necessary or appropriate. Such work could include further data collection, test excavations, and possible subsequent mitigation – data recover research excavations, construction monitoring, interpretive planning and development, and/or preservation of selected sites and features.

Sites identified during the inventory survey were assessed in terms of (a) the National Register criteria for evaluation as outlined in the Code of Federal Regulations; (b) guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review"; and (c) PHRI CRM (Cultural Resources Management) value modes. All of the criteria are discussed in detail in the full report on the survey.

Based on the above criteria, Site 3208 and 4293 were assessed as significant for information content (CRM mode = research value). No further work was recommended for Site 4293. For Site 3208, further data collection was recommended. After further data collection, it is anticipated that no further work will be necessary on Site 3208.



4.3 Socio-Economic Factors.

4.3.1 Demographic Impacts.

a. Existing Conditions/Anticipated Impacts.

In 1985, the population in the Ewa Development Plan area was estimated at approximately 37,300 persons constituting 4.6% of Oahu's total population. The General Plan envisions a maximum of 132,900 residents within the Ewa DP area by the year 2010.

Since the Phase II project site is currently used for sugar cane cultivation, the proposed project will not displace any existing residential dwelling units (and households) within the site. Further, there will be no population increase within the site since no permanent housing units are proposed within Phase II.

In Phase I, approximately 4,850 residential dwelling units are proposed and, originally, Phase II was proposed to contain an additional 2,350 homes. However, this proposal was re-evaluated in light of the additional traffic burden such homes in Phase II would place on the existing Ewa roadways and major traffic corridors leading to/from the urban core areas of Oahu and because of the limitation on development within the



Phase II project site established by the U.S. Navy's Aircraft Installation Compatibility Use Zone ("AICUZ") and a settlement agreement between the former fee owner, Campbell Estate and the U.S. Navy affecting the project site.

The Ewa Marina Phase II project will establish a de facto visitor population within the project site upon completion and operation of the mixed use development. Specifically, a proposed visitor complex will be located within the mixed use area. It will contain a 500-room hotel and accessory uses to accommodate users of the marina and other visitors, a 400-unit facility to house those attending the International Fitness Promotion Center and a 600-unit garden suite apartment development. Assuming a 1-1.5 person/unit average daily occupancy rate and an 80 percent average occupancy rate for all three facilities, the daily de facto visitor population within the mixed use area would range between 1,200 to 1,800 visitors. (1,500 units x 80% x 1-1.5 persons = 1,200 - 1,800 persons.)

It is estimated that the golf course will contain approximately 200 persons (users and staff) during peak play periods. These are considered part of the project's "de facto" daily population since they are not area residents and will leave the course. Hence, the total, daily de facto population within the Phase II area is expected to range between 1,400 - 2,000 persons.

c. **Mitigation Measures.**

The cost of providing all public and private infrastructure, utility and facility services to the mixed use area in order to accommodate daily use demands for such facilities and services from visitor occupants within the above-described 1,500 units will be borne fully by the applicant/developer. Additionally, the applicant/developer is willing to pay its fair share of the costs of off-site public facility system and transportation improvements needed within the Ewa region in order to accommodate projected urban growth (including the Phase II project) within that region.

It is noted that, in a community survey conducted in 1990, respondents residing in the Ewa community generally viewed the development of the mixed use project component (including the accessory or ancillary visitor accommodation facilities) as generating a positive impact toward resolving current community problems regarding unemployment, image, economic progress, etc. (Earthplan, 1990)

Based on the foregoing, no mitigation measures are proposed with respect to the project's impact on local demographic conditions.

4.3.2 Character/Culture of the Neighborhood.

a. Existing Conditions/Anticipated Impacts.

The Phase II project site is bordered by sugar cane lands to the north, the Phase I project area to the south, the NASBP Golf Course to the north and west and Fort Weaver Road/the planned Myers Golf Course to the east. The nearest community, other than the NASBP, is the Ewa Beach Community.

The above-referenced community attitude survey of approximately 42 individuals, reflecting a cross section of the Ewa Beach Community population and community organizations profile, yielded the following pertinent findings as regards the community's view of the proposed Ewa Marina project, including the Phase II components:

- **Support for or acceptance of development of Ewa.** Collectively, those interviewed either strongly supported major development in the Ewa region or accepted it as inevitable. Three reasons formed the basis for this support/acceptance: (1) the need to improve the social image of Ewa Beach; (2) the need to increase the number of jobs in the area; and (3) public policy consensus for such growth.



- Addressing youth-related problems in Ewa Marina.
Next to traffic, youth-related problems were a prevalent community concern. Ewa Marina represented at least a partial solution to many of those interviewed. Also raised was the potential for Ewa Marina to exacerbate the youth problem because of economic disparity.

- Social interface and economic disparity. There was consensus that Ewa Marina would be an upscale project, attracting affluent people of different social backgrounds. While many welcomed the economic revitalization afforded by the project in terms of jobs and businesses, diversification of uses and new shopping areas and leisure activities, others were apprehensive about the project's impact on current Ewa Beach residents and social structure.

- Effect on property values. Most respondents felt that increases in property values were good; however, many also feared that Ewa Marina would indirectly displace renters and elderly people with fixed incomes.



b. Mitigation measures.

The development of Ewa Marina, Phases I and II, is only a relatively small part of a larger, regional transition in community character throughout the Ewa area being prompted by existing urban policy designations. Major housing developments such as Ewa Gentry, the City's West Loch Estates, the State's Kapolei Villages and Kapolei Knolls are already transforming the region from a rural, agricultural community to a predominantly suburban community. The Ko Olina Resort, the City of Kapolei and, of course, the proposed Ewa Marina will provide the corresponding jobs, and regional economic base to support such massive population changes. In the case of the Ewa Marina project, the newcomers who will move into the project or patronize its businesses will cause change in the social and economic character of the communities in the existing areas.

There will be considerable positive impacts generated by such change as well. Improvements will be made to community facilities such as water, sewer and utilities, and with the urbanization of the area, services such as police and fire protection, schools and health care facilities, and additional recreational facilities will be provided. On balance these improvements and other corresponding economic and social benefits generated by the project will more than offset any

perceived negative social impacts of the project. Hence, no mitigation measures with respect to socio-cultural impacts of the project are proposed herein.

4.3.3 Displacement.

The Phase II project will not displace any individual or existing businesses within the project site since there is no housing or other urban development. Accordingly, no mitigation measures are proposed.

4.3.4 Economic Growth.

a. Existing Conditions.

Presently, the only economic activity occurring within the project site is the for-profit cultivation of approximately 383 acres for commercial sugar cane production. No other urban commercial or industrial use exists within the site.

b. Anticipated Impacts.

Development of Ewa Marina, Phase II, will generate new business and employment opportunities within the community as described below:



Employment:

The project will generate over 2,200 jobs which represent substantial on-site employment. *Table 3* shows the anticipated numbers and distribution of new jobs among the proposed Phase II land uses. Added jobs in Phase I, which deal with harbor support and maintenance of parks and other landscaping, brings the total employment of Ewa Marina to over 2,300 jobs. This compares with approximately 13 field jobs and mill jobs supported by current sugar cane operations on the same land.



**Table 3
EWA MARINA, PHASE II, EIS
EWA MARINA, PHASE II COMPONENTS, SIZE AND
EMPLOYMENT**

Component	Approximate Size	Estimated Jobs
Visitor Accommodations:		
Hotels/Accessory Use	500 rooms	500
Fitness Center Hotel	400 rooms	400
Garden Suite/Second Home Apartments	600 rooms	600
		1,500
Commercial Area:		
Retail Shops/Commercial Center:	40,000 sq.ft.	160
Restaurants	44,000 sq.ft.	350
		510
International Fitness Center:	60,000 sq.ft.	60
Yacht Club	12,000 sq.ft.	40
Golf Course:		
Grounds.	27 holes	70
Clubhouse	22,000 sq.ft.	
Tennis Complex:		
Grounds	10 courts	50
Clubhouse	18,000 sq.ft.	
TOTAL:		2,230

Source: Decisions Analysts, Inc., *Ewa Marina, Phase II, Development Concept, Market Demand and Benefit Assessment*, December, 1989.

The jobs to be provided within Ewa Marina will range over a variety of types and pay levels, including entry level, semi-skilled, and management positions within the visitor complex, marina operations, commercial areas, the fitness center, parks, golf course, and tennis complex. Also, more skilled positions



will be available in this project because of job opportunities offered by the fitness center and marina operations.

Due to the long-term nature of the development, employment is expected to remain stable. Also the timing of new employment opportunities is likely to occur when they are needed since Ewa Marina, Phase II will be developed after most of the Ko Olina Resort is completed.

a. **Mitigation measures.**

Employment impacts will be positive in that many jobs will be created in the Ewa area. Moreover, the developers and operators of the various components of the project, as well as such groups as the West Oahu Employment Corporation, will provide education and training programs so that local residents will have the skills necessary to qualify for the available jobs.

Agriculture/Sugar Production:

a. **Existing Conditions/Anticipated Impacts.**

Approximately 383 acres of the 403 acres of land proposed for Ewa Marina, Phase II are sugar cane lands cultivated by Oahu Sugar Company, Ltd. (OSCo). The small amount of remaining



acreage is unsuitable for agriculture. About one-third of the soils are of good agricultural quality.

Impact on OSCo:

The loss of 383 acres of land translates into a loss of about 2,720 tons of sugar per year, or about 3.2 percent of OSCo's 1989 production of 86,059 tons. The associated annual loss in molasses output and energy production would be about 750 tons and 2.3 million kWh of electricity, respectively.

The loss in export earnings would be about \$1 million per year, based on 1989 prices. However, the loss in profits would be substantially less than the loss in export revenues since the costs associated with farming the land and processing the cane would be eliminated.

Water requirements for sugar would decline by about 3.7 mgd but this would be partially offset by the water required for the proposed project.

Approximately 7 field jobs and 6 factory jobs would be associated with the loss of 383 acres of cane land. However, the actual loss of employment may be less since specialized mill and field jobs would have to remain. Also, any loss of employment would likely occur by attrition.



In terms of the form of the plantation, the development of Ewa Marina, Phase II would conform to the preferred sequence for contracting the plantation, which is from the periphery of the plantation inward; lands at Ewa Marina are a long trucking distance from the mill, soils are inferior to those of inland fields, and yields are generally lower than average.

Further, the subject lands are far removed from the core of the plantation which OSCo plans to retain for its long-term survival, with Ewa Gentry lying between this core and Ewa Marina.

In the long-term the survival of OSCo is uncertain, primarily because of the potential for sugar prices which could be too low to allow profitable operations; the potential for new competition from new sweeteners; uncertainty over renewal of the major leases; and urbanization pressures, particularly from those projects which would affect the core of the plantation. However, these factors are unrelated to whether or not Ewa Marina, Phase II is developed.

Impact on the Growth of Diversified Agriculture:

Ewa Marina, Phase II would not adversely affect any existing diversified agricultural activity since none exists on the project site. The proposed project would, however, eliminate the



possibility of using these lands for diversified agriculture. Nevertheless, there would be no change in the amount of land available in Hawaii for diversified agriculture crops as a result of project development.

Also, the proposed project would not adversely affect the growth of diversified agriculture. There are four reasons for this assessment: (1) a vast amount of agricultural land and water in the State has been freed from sugar and pineapple production due to past plantation closings and reductions in operations – over 120,000 acres since 1968, including announced reduction plans – and most of this land has favorable soil ratings and remains available for diversified agriculture activities; (2) it is very probable that additional sugar cane acreage and water will be freed, given the existence of unprofitable sugar operations; (3) some, if not most, of the sugar companies would make their lands available for profitable replacement crops to the extent that such crops exist; and, in contrast, (4) land requirements to accommodate the growth of diversified agriculture are surprisingly modest compared to the available supply.

In addition, the greater the success of diversified agriculture, the greater the amount of land which will be released from sugar for diversified agriculture.



In summary, the factor limiting the growth of diversified agriculture is not the land supply - far more land has been and continues to be freed from plantation agriculture than can be absorbed by diversified agriculture and urban development. Rather, the limiting factors are (1) the market demand for those crops that can be grown profitably in Hawaii, and (2) for the case of small-scale (but not large-scale) farmers, subdivision requirements which limit their access to agricultural land. The proposed Ewa Marina, Phase II project would involve far too little land to affect the growth of diversified agriculture.

To an undetermined extent, Ewa Marina, Phase II would stimulate the growth of diversified agriculture by increasing the demand for plants and trees from nursery operations. Also, the golf course would provide an estimated 30 grounds-maintenance jobs involved with the cultivation of grasses and plants, applying fertilizers and chemicals, maintaining irrigation systems, etc. In terms of function, these jobs are similar to certain jobs in the agriculture industry, and require similar skills and training.

b. Mitigation Measures.

No mitigating measures will be necessary since Ewa Marina, Phase II conforms to the planned contraction of OSCo, and

the project will not adversely affect any existing diversified agricultural activity or the growth of diversified agriculture.

4.3.5 Government Revenues.

a. Existing Conditions.

Sugar production within the project site yields approximately \$7,000 per year in real property taxes to the City and County of Honolulu. No State excise tax revenues are generated from the sale of raw sugar from the acreage within the project site since such export sales are exempt for State excise taxes.

b. Anticipated Impacts.

Ewa Marina, Phase II will strengthen State and County finances by providing a substantial net increase in revenues. This positive impact, which is based on conservative assumptions, reflects the following:

- The developer will provide all on-site supporting infrastructure.
- The developer will provide nearly all the off-site infrastructure, including its fair share of exterior road and freeway improvements, water improve-



ments, and collector sewers and trunks connecting the project to the Honouliuli Sewage Treatment Plant Facilities.

- County debt service on capital improvements needed to support Ewa Marina, Phase II will be relatively modest, amounting to less than \$100,000 per year.
- County rollback (agricultural) tax revenues for converting the land from agriculture to urban will amount to about \$600,000.
- County revenues derived from property and other taxes on specialty hotels, hotel garden-suites, and commercial operations in Phase II are estimated to be about \$4.2 million annually at full project development and operation.
- County expenditures to support the Phase II development are expected to be only about \$800,000 per year at full development.
- For the State, excise tax revenues from sugar operations have been zero and corporate income taxes have been low due to marginal OSCo profits.



- State capital expenditures to support Ewa Marina, Phase II will be negligible.
- State revenues derived from taxes on construction will amount to about \$14.9 million over the project construction period.
- State revenues from excise, room, and other taxes on visitor and commercial operations in Phase II are estimated to be about \$9.7 million per year at full development.
- State expenditures to support Phase II at full development are expected to be only \$800,000 per year.

In summary, State and County revenues derived from Ewa Marina, Phase II will be substantial and more than sufficient to allow the government to easily afford the services required to accommodate the project and serve other community needs with the excess revenues. The City will receive about \$600,000 in rollback taxes and, at full development, will net about \$3.4 million per year from the project.

The State will receive about \$14.9 million in taxes on construction and, at full development, will net about \$8.9 million per year from the project. The large net revenues result from



the fact that Ewa Marina, Phase II will include a visitor complex.

c. **Mitigation Measures.**

No mitigating measures are necessary since both the State and County government will receive a financial "windfall" from the development and continuing operation of Ewa Marina, Phase II.

4.3.6 Community Benefits Package.

In fulfillment of the City Department of General Planning's Guidelines For Development Plan Amendments For Golf Course Development, the applicant has offered the following proposed community benefits to the City in relation to the proposed 27-hole Ewa Marina Golf Course component of the Phase II project:

- The applicant will provide one new non-tourism related employment opportunity for each of the visitor accommodation units (1,500) which are built in lieu of an affordable housing requirement for golf courses. The value of this community benefit is \$37,500,000.



- The applicant will make a minimum of 40 percent of the tee times available for public play at rates similar to those at privately owned golf courses which are open to public play. Only 30 percent are called for by the DGP Guidelines.

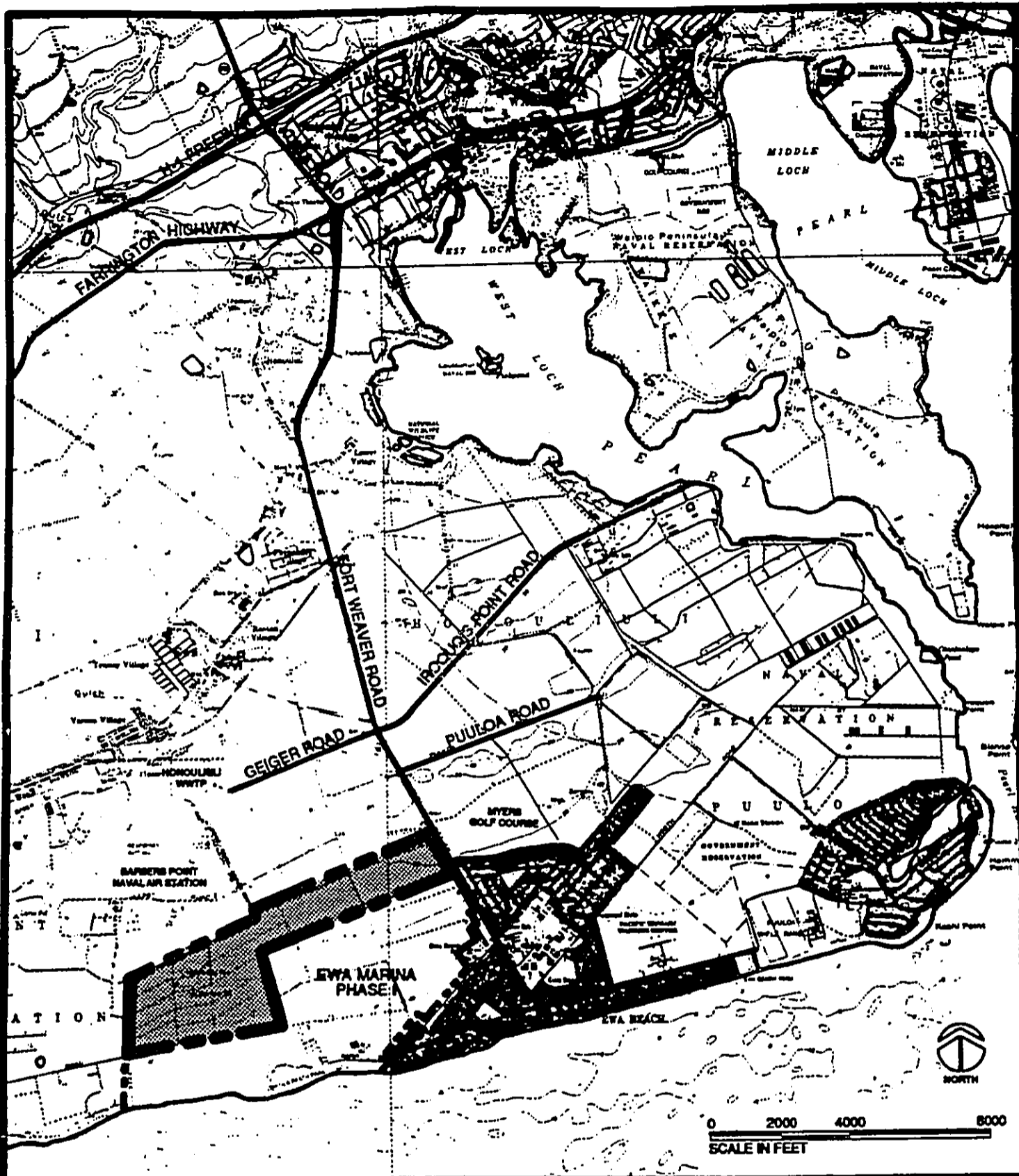
- The applicant's Ewa Marina Project will include parks and recreational facilities, such as the 17-acre Gateway Park and the 140-acre marina. Additionally, the applicant will contribute toward job-training programs in conjunction with its agreement to provide new employment opportunities. These considerations respond to the DGP Guidelines relating to recreational facilities, job training, etc.

4.4 Public Facilities and Services.

4.4.1 Transportation Facilities.

a. Existing Conditions.

Presently, the only road to the project and the Ewa Beach community is Fort Weaver Road. Fort Weaver Road extends from Ewa Beach in the south to Farrington Highway in the north. (See *Exhibit J*)



**EXHIBIT - J -
ROADS AND HIGHWAYS**

Prepared by: Belt Collins & Assoc.
Prepared for: HASEKO (Hawaii), Inc.
Date: November 1989



Fort Weaver Road is the major north-south roadway in the Ewa Region. It is a 4-lane road which travels from the Farrington Highway interchange to Ewa Beach in the south. At its intersection with the Geiger Road approach from the west and the Iroquois Road approach from the east, Fort Weaver Road is divided by a grassed median. Left and right turn pockets are provided for vehicles travelling in both directions. The posted speed limit is 45 mph to the Geiger/Iroquois Road intersection where it decreases to 35 mph south of the intersection.

At Hanakahi Street, south of the Geiger/Iroquois Road intersection, Fort Weaver Road becomes a 2-lane undivided rural collector road which is in the process of being widened to four lanes. The posted speed limit for this portion of the road is 35 mph.

A review of 1989 State Department of Transportation (DOT) traffic count data for stations 11-N (Fort Weaver Road at Kuhina Street), 11-P (Fort Weaver at Hanakahi Street), and 11-R (Fort Weaver at Papipi Road) indicated that the morning peak hour traffic generally occurs between 7:00 and 8:00 am and the afternoon peak hour between 3:00 and 4:00 pm, respectively.



Manual traffic counts were taken for the intersection of Fort Weaver Road at Hanakahi Street and Papipi Road on January 8, 1991 from 6:30 to 8:00 am and 3:00 to 5:00 pm. Manual counts were taken of passenger cars, trucks, buses, motorcycles and pedestrians by turning movements and approaches. The present counts were used as a baseline upon which future estimated traffic volumes were added.

When the counts were taken, work was ongoing to widen Fort Weaver Road during the hours of 8:30 am to 3:00 pm. Since the construction work did not require the closing of lanes and the work hours were generally outside of the peak traffic hours, the effect of the construction work on the traffic volumes were not considered significant. During the field counts, the weather was clear and the pavement was dry.

b. Anticipated Impacts/Mitigation Measures.

Analysis was conducted for three intersections along Fort Weaver Road to determine the relative impact of the proposed project on the local roadway system. The intersections studied were: (1) Fort Weaver Road and Access Road "A"; (2) Fort Weaver Road and Access Road "B"; and (3) Fort Weaver Road and Hanakahi Street.



Traffic was forecasted at these intersections by adding traffic generated from other planned or committed developments in the area that would impact the study intersections, including the Ewa Marina, Phase I (assumed to be completed by 2002), Ewa Beach Shopping Center Expansion and the Ewa by Gentry residential development.

The impact on each intersection was assessed by determining the level-of-service (LOS) for three conditions: existing 2002 forecast without the project, and 2002 forecast with the project traffic.

The proposed Ewa Marina, Phase II project will not have a major traffic impact on Fort Weaver Road based on this study's analysis. However, the Ewa Marina, Phase I project is expected to have a major traffic impact on Fort Weaver Road.

The Traffic Study conducted for Ewa Marina, Phase I by Kaku Associates indicates that despite the widening of Fort Weaver Road to a four-lane divided highway between the H-1 Freeway and Ewa Beach, a second north-south road parallel to Fort Weaver Road may be required between Ewa Marina and the H-1 Freeway.

The Kaku Associates report also recommends the following improvements:



- Provide double left-turn lanes out of the Ewa Marina project site at both access points on Fort Weaver Road, with separate left-turn and right-turn lanes on Fort Weaver Road itself for southbound traffic and left-turn lanes for north-bound traffic at these two intersections.

- Provide traffic signals at three locations; the intersection of Roads A and B with Fort Weaver Road, and the intersection of Road A and Road C within the Ewa Marina, Phase I development.

The 7,000 dwelling units proposed by Ewa Gentry, north of Ewa Marina, is also expected to have a major traffic impact on Fort Weaver Road. Parsons, Brinkerhoff, Quade and Douglas' 1987 traffic assessment report for the Ewa Gentry project recommends a four-lane north-south road between the Gentry project and the H-1 Freeway with a major interchange at the intersection with the H-1 Freeway, by the Year 1995.

Because of major developments planned for the Ewa region, the State Director of Transportation imposed a requirement for an Ewa Region Highway Master Plan to determine future arterial road. The State DOT has formed a Working Group, which includes the City Department of Transportation Services, major developers of the Ewa Region (including Haseko),



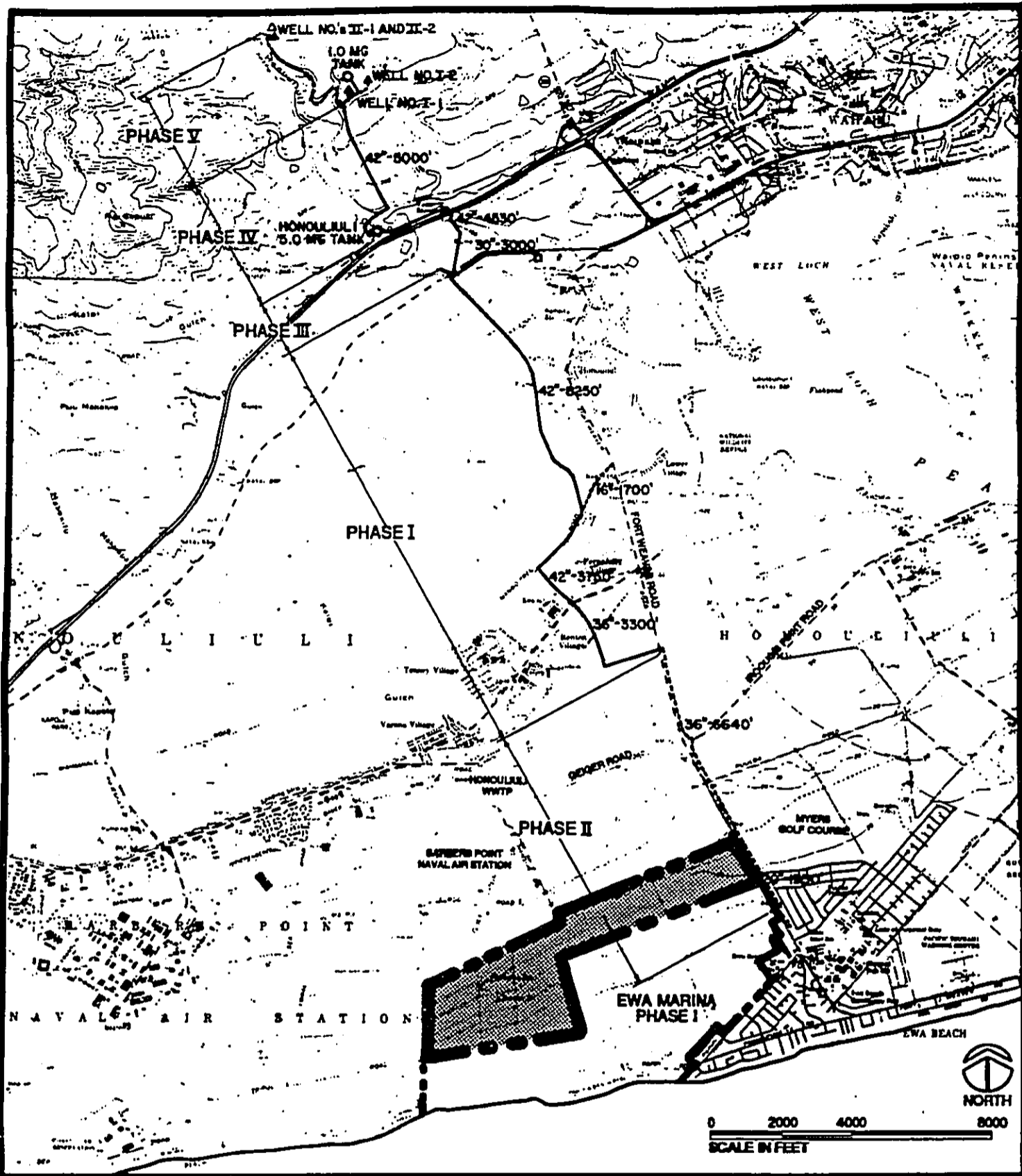
Campbell Estate and other State and City Planning agencies. The purpose of this Working Group is to identify future roadway needs and participate in the fair share costs to implement the required improvements for the Ewa Region. It is recommended that the results of the joint effort by the Developers, including Haseko, to develop a coordinated Master Plan be adopted for road improvements.

Assuming that all of the roadway improvements recommended by Kaku Associates and Parsons, Brinkerhoff, Quade and Douglas are implemented, no other mitigating actions are necessary, even with the Ewa Marina, Phase II project.

4.4.2 Water Supply.

a. Existing Conditions.

The site is located in the Waianae District of the Board of Water Supply (BWS) water system. Existing BWS infrastructure in the area include a 30-inch water main running along Farrington Highway between Waipahu and the NASBP 215-foot storage system and a 16-inch transmission main which branches off the 30-inch Farrington Highway main and runs the length of Fort Weaver Road to supply Honouliuli, Ewa Beach and Ewa Village with water.



Construction Status

- Work Completed
- - - - - Work Under Construction

EXHIBIT "K"
EWA PLAIN WATER DEVELOPMENT
CORP.— WATER FACILITIES MAP

Prepared by: Belt Collins & Assoc.
 Prepared for: HASEKO (Hawaii), Inc.
 Date: November 1989



The Ewa Water Master Plan of August 1987 sets forth guidelines for water use in the Ewa District and was approved by the BWS. In accordance therewith, more than \$10 million toward the development of a regional water system has been contributed by the applicant and the applicant expects to commit additional funds before the system is completed.

Currently, a variety of new installations, including a 36-inch main under Fort Weaver Road, water reservoirs, wells and pump systems are near completion. These developments are being coordinated by the Ewa Plain Water Development Corporation (EPWDC) of which the applicant is a member.

b. **Anticipated Impacts/Mitigation Measures.**

It is estimated that the mixed use component of the Phase II project will consume between 700,000 and 710,000 gallons of potable water/day out of a total supply of 3.3 mgd of potable water which Ewa Marina will receive under the Ewa Water Master Plan.

The planned golf course will use water from existing Oahu Sugar Company wells or from wells to be drilled within the Ewa Marina project area. The golf course is expected to require 1.35 mgd of non-potable water for irrigation purposes. This is far less than the 3.7 mgd now used by sugar cane pro-



duction. Even if some additional amount of non-potable water is needed for irrigation purposes within the remaining Ewa Marina project, the total amount required (including golf course irrigation) would be less than the 3.7 mgd used for sugar cane cultivation.

Originally, 4,850 residential units were planned in Ewa Marina, Phase I project, and 2,350 units in Phase II, for a total of 7,200 units. These were the numbers used in the potable water requirement analysis of the Ewa Marina Master Plan. Based on the number of planned units, the approved water plan shows a projected potable water use of 3.2937 mgd for the entire development, or about 1.0740 gpd for Phase II units.

Since the Ewa Water Master Plan was approved, the number of planned residential and/or visitor accommodation units in Ewa Marina, Phase II was reduced from 2,350 residential units to 1,500 visitor accommodation units. It is estimated that this reduction of 850 units corresponds to a reduction in potable water demand of approximately 300,000 gpd.

Applying the water system design criteria contained in the Ewa Water Master Plan, the additional potable water required for the golf clubhouse and associated landscaping, the 25 acres of commercial use and the 13.3 acres of parks and com-



mon areas amounts to about 260,000 gpd less than the 300,000 gpd above. Thus, development of Ewa Marina, Phase II will not cause the potable water demand, as projected in the approved water master plan, to be exceeded.

Lands located above the Underground Injection Control (UIC) will be given special consideration relative to water quality of potable water wells, and the project will be designed and developed so that such sources will not be adversely affected. Studies currently underway are being coordinated with the Department of Land and Natural Resources to ensure that no significant adverse effects occur.

Wells in the area will have concrete pads and full grouting to prevent seepage or flood waters from migrating down the well shafts. The potable and non-potable water systems will be carefully designed and operated and will be clearly labeled and separated by appropriately approved devices.

All State Department of Health conditions applicable to new golf course development will also be met.



4.4.3. Liquid and Solid Waste Disposal.

a. Existing Conditions.

The overall amount of wastewater generated by the Ewa Marina project (Phases I and II) is estimated at about 2.1 mgd. Of this amount, approximately 0.5 mgd is attributable to Phase II.

The City's Honouliuli Sewage Treatment Plan is located mauka of the project site near Geiger Road and will receive the wastewater flows from the Phase II project through an existing or to be built off-site system.

Features of this off-site system are an existing 84-inch sewer main located within Geiger Road and Iroquois Road mauka of the project; a lift station located immediately makai of the project (within Papipi Road) which has the capacity to serve a portion of the already approved and zoned Ewa Marina Phase I project, and the Honouliuli STP that has a current capacity of 25 mgd.

The City Public Works Department is in the process of planning for the expansion of the STP. It is anticipated that the STP will be increased to a total capacity of 38 mgd by 1993. In order to accommodate all of the development planned for



the Ewa region, additional capacity in the STP will be needed beyond that scheduled for 1993.

The proposed mixed use component is expected to generate about 9 tons/day of solid waste; the golf course component is expected to generate about 2-3 tons/week. Existing disposal sites, including the Kalaheo Landfill (Kailua), the Waimanalo Gulch Landfill near the Kahe Power Plant, the Waipahu Incinerator and the H-Power cogeneration facility near Campbell Industrial Park, can receive solid waste generated from the Phase II project.

b. **Anticipated Impacts/Mitigation Measures.**

While the project will result in increased demand on existing sewer systems, all systems within the project site, and necessary off-site systems to convey the generated site wastewater of 2.1 mgd (both Phases) will be constructed by the applicant to the City Public Works standards, connected to the 84-inch interceptor main within Geiger Road and dedicated to the City.

It should be noted that there is a 50-foot wide sewer easement for the Honouliuli Wastewater Treatment Plant outfall which runs through the project site. Only open space uses, such as landscaped areas, roadways, and golf holes, are being planned



within this easement. This will facilitate maintenance of the outfall, as well as simplify access and minimize disruption and environmental harm in the event of a line failure.

Private refuse collection contractors will be retained to collect and dispose of all solid wastes generated within the Phase II project site.

4.4.4 Drainage.

a. Existing Conditions.

Phase I and II of the Ewa Marina project are located within the Kaloι Drainage Basin. The 7.8 square mile watershed mauka of the Ewa Marina project site consists of the 4.64-square mile Upper Kaloι Basin and the 3.16-square mile Lower Kaloι Basin. Runoff from the southern slopes of the Waianae range flows through developed areas within the watershed, including the Ewa Gentry project, then across a portion of the project site and eventually enters the ocean. This runoff drains through a man-made gulch which meanders through portions of the Ewa Marina site and ocean discharge is through sheet flow at the Kaloι Gulch outlet, situated about midway through Phase I lands. Not all of the runoff reaches the ocean directly, as it partially percolates through groundwater depressions within the project site.

The Kaloi Gulch was constructed by OSCo many years ago and, in its current form, is inadequate to handle peak flow discharges. The discharge volume at the mauka boundary of the Ewa Marina project, or the approximate makai outlet of the Ewa Gentry project, is an estimated 10,400 cubic feet per second (cfs).

A master drainage plan for Ewa Gentry was approved by the City and County of Honolulu Department of Public Works in 1988. The plan defines the Ewa Marina area as the outlet for Ewa Gentry, with the ocean the ultimate discharge for the Gentry flow.

b. Anticipated Impacts/Mitigation Measures.

Ewa Marina, Phase II includes the construction of a 272-acre 27-hole golf course mauka of the marina to be developed in Phase I. This golf course and related amenities, along with the contemplated commercial development and infrastructure in the approximately 403 acres of Phase II, will generate an estimated flow of 1,500 cfs. The flow will be in addition to the 10,400 cfs from the Ewa Gentry outlet.

It should be noted that the drainage volume identified is the volume of flow as approved by the City Department of Public Works, and is for all upstream areas that would feed into the



Kaloi drainage basin, including the Ewa Villages and Ewa Gentry. The drainage is cumulative and accounts for flow from one development to the other on its way to the ocean.

To handle the total flow, the golf course will be constructed with an open strip of land approximately 400 to 600 feet wide to direct storm runoff into the marina. A major flood channel is being designed to handle a 100-year flood and therefore no retention basins are needed for the project outside those that might occur within the golf course itself. Although large retention ponds are not necessary per se to handle runoff from the golf course, retention basins within the golf course will probably be enlarged to accommodate the amount of water needed to maintain clarity within the marina offshore areas.

Portions of the on-site flows from Phase II will be collected within the golf course area and swaled or piped and discharged into the marina. Runoff from the mixed use-commercial area of Phase II will be collected on-site and also applied into the marina.

The grassed golf course will also serve as a buffer between the lands mauka of the project and the marina waters. A portion of the mauka flow that does not channel through the Kaloi Gulch, including water from the mauka sugar cane fields, will



be absorbed by the golf course. As a mitigative measure, the golf course will filter out silt that would otherwise enter the marina waters.

The location of a marina at the seaward end of the ten-plus square mile Kaloi Gulch drainage basis is consistent with recommendations contained in the *Statewide Sediment Basin Study* prepared by the Department of Land and Natural Resources and will help minimize the impact that already approved development on the Ewa Plain will have on coastal water quality. In order to continue to perform this function over time, accumulated silt will have to be periodically removed from the drainage swales that will carry runoff through the Phase II portion of the Ewa Marina project. These maintenance procedures are being coordinated with appropriate federal and state agencies and approvals from these agencies will include proper marina maintenance as a permit condition.

All on-site and off-site drainage systems will be designed to the approved standards set by the City Public Works Department. The developer will take precautions to create an appropriate drainage scheme for the project, using the approved flow charts for the Ewa plain. An essential element of an effective drainage scheme is the overall grading plan for the project.



4.4.5 Schools and Parks.

a. Existing Conditions.

Since the Phase II project will not involve the construction of permanent residential dwelling units, it will not create any additional burdens on existing schools in the Ewa district. Any unforeseen demands on public schools in the district which may be generated by the project can be met by the following existing public schools: Ewa Beach Elementary, Kaimiloa Elementary, Pohakea Elementary, Barbers Point Elementary, Iroquois Point Elementary, Ilima Intermediate and Campbell High Schools.

Elementary, intermediate and high schools are also being considered for location within the Kapolei Village, West Loch and Ewa Gentry projects. In addition, a school site has been set aside in the Phase I area.

The major park facility in the Ewa Marina project will be the nearby 30-acre Oneula Beach Park owned by the City. In addition, smaller parks and playgrounds, including a proposed 17-acre Gateway Park to the Ewa Marina project, will be scattered throughout the Ewa Marina community.



Nearby neighborhood parks are plentiful and will also be available. They include or will include parks located in Ewa Gentry, Ewa Beach, Ewa Villages, Ko Olina, Kapolei Village, West Loch, Makakilo and a beach park near the NASBP. A major regional park is also planned in the Kapolei development.

These nearby parks and those at Ewa Marina will provide ideal settings and facilities for organized recreational youth programs, such as soccer, football and softball, that are likely to evolve as the Ewa Marina and other communities begin to grow.

b. Anticipated Impacts/Mitigation Measures.

The proposed Ewa Marina will become a primary regional recreational facility and resource. It will encompass 140 acres of sheltered waterbays and waterways, and will provide berthing for 1,600 boats, an area for dry storage of boats, and launch facilities. Extensive recreational boating and berthing facilities will help satisfy the excess demand and burgeoning interests in boating activities on Oahu. Also, the harbor will serve as the site for fishing tournaments, diving excursions, various races (sailboats, power boats, kayaks, outrigger canoes, etc.), and other marine events.



Ewa Marina will also benefit boaters sailing out of the Ala Wai Harbor and Keehi Lagoon by providing an additional destination for day sails. The marina will provide the further benefit of reducing the demand on the State to build expensive boat slips.

The other components of the Phase II project will also yield recreational benefits. The International Fitness Promotion Center will provide a complete array of services and facilities to persons seeking preventive health care and fitness programs. Professional staff will provide individualized health care assessments, fitness counseling and prescriptions, health education and training and various fitness and exercise programs.

A proposed Ewa Marina Yacht Club will host yachting races, fun sails, annual boat parades, a learn-to-sail program for youths and various other boating events and functions.

The golf course and clubhouse complex will meet the well-known and strong demand for additional golfing facilities on Oahu and, especially, the demand for golf facilities generated from within the Ewa Marina project.



The proposed Championship Tennis Complex within the mixed use component (10 courts and a clubhouse) will provide recreational benefits similar to those from the golf course.

Finally, considerable open space and green space will be retained within the project, including the marina, Oneula Beach Park, the 17-acre Gateway Park, various neighborhood parks, the golf course, and landscaped areas along roadways and pathways in the entire project. At full development, over half of the acreage in the entire project (Phases I and II) will remain in open space. For Phase II, over 75 percent of the project will remain in open space.

4.4.6. Electricity and Telephone Services.

a. Existing Conditions.

Hawaiian Electric Company, Inc. (HECO) provides electrical power to the Ewa area. There are existing overhead systems located adjacent to the Oahu Railway and Land Company right-of-way north of the Ewa Marina Project, along the eastern border, and within Fort Weaver Road. HECO's Ewa substation is located north of the project. Additionally, the future Waiiau-CEIP 138 KV line is proposed to be located mauka of the Ewa Marina project area.



Hawaiian Telephone will provide telephone service to the project site. The telephone system will be installed in conjunction with the power system. Existing telephone service is available through telephone service lines along Fort Weaver Road. The telephone lines within the project will be installed in conduits and buried underground along the street rights-of-way.

b. Anticipated Impacts/Mitigation Measures.

The Ewa Marina project proposes to use both gas and electric power to serve residences and other uses in both Phases I and II of the project area. Gas will be used to operate water heaters, stoves and clothes dryers. Electricity will supply remaining energy needs.

Each unit within the Ewa Marina is expected to have an average electrical demand of 2 kilowatts. Therefore, with the proposed development of about 6,350 units and a load factor of 0.85, the estimated peak demand for all of the Ewa Marina site is 11-12 megawatts.

To meet this demand, HECO will develop a new transformer substation which will step down available electric power from existing transmission lines along the OR & L right-of-way for distribution to the Ewa Marina and other area projects. The

proposed substation will be located mauka of the Phase II area. Power distribution from the substation will be carried via circuits, which will be installed in underground conduits.

4.4.7 Police and Fire Protection.

Currently, officers from the Pearl City police station regularly patrol the area that includes the Phase II site. In order to meet the growing needs of the Ewa Plain communities, the police department plans to add a new station in nearby Kapolei and to designate Ewa as a new police district. It is expected, therefore, that adequate police protection for Phase II activities and users will be available.

To further ensure visitor safety within the Phase II area, the applicant will provide on-site security throughout the visitor complex and commercial areas of the Phase II project.

The City plans to relocate the existing Ewa Beach fire station into the Ewa Marina Project. The site is currently serviced by that existing station with back up service provided by the Waipahu and Makakilo Fire Stations. Other new facilities being planned for the Ewa area include (1) an engine company at Tenney Village; (2) a Kapolei engine-and-ladder company; and (3) a Ko Olina engine-and ladder company.

4.5 Golf Course Fertilizers, Pesticides & Herbicides .

A golf course fertilizer, herbicide and pesticide use study for the Phase II project was conducted in November, 1989, by Charles L. Murdoch, Ph.D and Richard E. Green, Ph.D to determine the environmental impacts of the use of such materials within the proposed golf course component of the project site. It is contained in *Appendix G* to this report and forms the basis for this section.

The findings and conclusions of the study are as follows:

- The nature of soils in the area is important to chemical movement to groundwater because the soil profile controls water retention and movement, and soil-chemical interactions determine both the retention and degradation of pesticides. The Phase II golf course area has Coral Outcrop and Fill Land in the west and central portions and soils classified as Haplustalls in the eastern portion. The entire area has moderate permeability, slow runoff and slight erosion hazard so that the principal mode of chemical movement to shoreline waters is by way of the groundwater. The Ewa and Mamala soils (Haplustalls) have sufficient depth and organic carbon content to provide a good barrier to pesticide movement to groundwater, but the Coral Outcrop areas have little soil and are, therefore, especially subject to chemical leaching.

- Chemical movement to groundwater can occur only if water recharge by rainfall or irrigation is sufficient to leach chemicals below the soil profile. At the Ewa site there is an annual water deficit (rainfall minus pan evaporation) of 70 inches, thus, chemical movement through the soil to groundwater will nor-



mally occur only if irrigation is sufficiently in excess of the water requirement for turf to cause leaching.

- Potential movement of both fertilizer elements and pesticides to groundwater was evaluated. Of the fertilizer nutrient elements, only nitrogen (nitrate) has the potential to contaminate groundwater in that nitrate is highly mobile, relatively stable and can have adverse effects at elevated concentrations in water. The total anticipated quantity of nitrogen to be applied on the golf course is about 22 tons N per year. Most of this (15 tons) would be applied to fairways. Although a large number of pesticides are registered for use on turf, only a few are used in sufficient quantity to be considered in the context of potential groundwater contamination. None of those used in relatively large quantities (i.e. MSMA, bensulide, chlorpyrifos and chlorothalonil) are sufficiently mobile or persistent to be considered a hazard to groundwater.

- Leaching of fertilizer nitrogen can be minimized by careful management practices: use of slow-release N sources and irrigation by a water balance method. Such practices have been shown to be highly successful in controlled studies in Texas and Florida. Most of the area to be developed for the Phase II golf course has sufficient soil depth with sufficient organic matter to provide a good medium for turf growth and retention of water and chemicals. Only the Coral Outcrop area at the western extreme of the property will require importation of soil to provide a suitable rooting depth for turf and an adequate barrier to pesticide movement. Although some nitrogen is likely to be leached to the shallow aquifer during high rainfall winter months, the small amounts would not constitute a hazard since the aquifer water is sufficiently saline to preclude its use for human consumption.



Based on these findings, Murdoch and Green conclude that:

- (1) chemical application to the proposed golf course will not adversely impact the quality of groundwater or shoreline water in the area, provided adequate care is exercised in (i) irrigation, and (ii) application of fertilizers and pesticides; and
- (2) no adverse impact on air quality or on birds which may frequent the golf course site from the application of fertilizers, herbicides and pesticides is anticipated.

a. Existing Conditions.

The proposed golf course site is presently cropped with sugar cane. The cane is drip irrigated, providing efficient use of water.

The principal fertilizer nutrients applied to the cane crops are N (nitrogen) and K (potassium); water soluble forms are applied through the drip system.

Pesticide use for insect and disease control in sugar cane culture is minimal since insects are controlled biologically. Fungicide is used only to treat seed pieces before planting (principally Benlate), thus, the quantities applied are small and localized. Only herbicides for weed control are applied to the soil as surface sprays, usually 2 or 3 times in the first six months after planting.



The groundwater aquifer at the site is a relatively shallow, slightly brackish, coralline aquifer. The aquifer is characterized (Mink and Lau, 1987) as being ecologically important, low salinity (250 to 1,000 mg/L chloride), irreplaceable, with high vulnerability to contamination. The surface elevation above mean sea level for the area to be developed is approximately 15 to 30 feet and, given the nearness of the coastline, it is likely that the groundwater surface is only 10 to 25 feet below the land surface.

b. Anticipated Impacts.

As is typical in most golf courses, the fertilizer elements to be applied to the proposed golf course in a turfgrass fertilization program are (N) nitrogen, (P) phosphorus and (K) potassium. These normally will be applied only to greens, tees, fairways and part of the roughs of the course.

Phosphorus attaches very tightly to soil colloids in most soils and moves little if any from the site of application. Thus, phosphorus fertilizers applied in the proposed golf course will not cause contamination to groundwater or surface drainage water.

Nitrogen applied in the ammonium form, however, is rapidly converted to the nitrate form (NO₃) which is not bound to the soil and moves readily with water. Because of high N uptake of turfgrasses, however, nitrogen will be used up rapidly after applica-



tion. Only under conditions where rainfall occurs soon after application of a soluble nitrogen source would there be excessive loss by surface runoff or by leaching below the root zone. This nitrogen movement could be avoided by applying slow release nitrogen fertilizer.

Occasionally, weed, insect and disease pest infestations of turf-grass within the proposed golf course may require application of chemical pesticides.

c. Mitigation Measures.

Normally, slow-release nitrogen fertilizers will be applied in the proposed golf course to eliminate the risk of leaching of nitrates into the groundwater of the Ewa Limestone Aquifer and the underground flow of the same to the ocean. The fertilizing practices at the golf course will conform to the best management practices of the golf course maintenance industry. Fertilizer applications will be timed to avoid heavy applications of soluble fertilizers during rainy periods.

The scheduling of golf course irrigation will be closely managed to assure non leaching of fertilizer/pesticide chemicals into the groundwater as a result of their application to the course. A U.S. Weather Bureau Class A evaporation pan will be used to measure



evaporation and guide the scheduling of golf course irrigation so that the risk of leaching is minimized.

A trained and qualified Golf Course Superintendent will manage the golf course in accordance with established industry management standards and the applicable rules and regulations of the State Health Department regarding golf course fertilizer, herbicide and pesticide applications and practices.

Fill from the Ewa Marina will be spread upon areas within the golf course site lacking adequate soil cover as identified by Murdoch and Green to provide such adequate cover for purposes of preventing the leaching of golf course fertilizer/pesticide chemicals.



CHAPTER 5.0

ENVIRONMENTAL IMPACTS EVALUATION & ANALYSES



CHAPTER 5.0 ENVIRONMENTAL IMPACTS EVALUATION & ANALYSES.

5.1 Unavoidable Adverse Project Impacts.

5.1.1 Physical Environment.

Approximately 383 acres of lands currently under sugar cane cultivation by the Oahu Sugar Company will be removed from active sugar cane production as a result of project development. It is expected that about 13 plantation field and mill jobs could be eliminated and the amount of productive sugar cane lands will be reduced as a result of such conversion. However, this unavoidable adverse impact will be offset by the more than 2,000 jobs which will be created when the mixed use complex and golf course are completed and by fact that only 9% of the lands in question are classified as "prime" agricultural land. The latter fact indicates that the conversion of the project site will not appreciably reduce the amount of prime agricultural lands on Oahu nor substantially reduce the sugar production levels of the Oahu Sugar Company.

5.1.2 Groundwater.

The infrequent possibility of leaching of nitrates from golf course fertilizers and pesticides will always exist although the risk of such

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING



CHAPTER 5.0 ENVIRONMENTAL IMPACTS EVALUATION & ANALYSES.

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5.1.2 Groundwater.

The infrequent possibility of leaching of nitrates from golf course fertilizers and pesticides will always exist although the risk of such



leaching is expected to be low due to mitigation measures to be employed by the applicant in golf course irrigation, fertilizer scheduling and other maintenance practices. To the extent that a risk of such leaching must be recognized, the infrequent leaching of insignificant amounts of fertilizer or pesticide chemicals must be viewed as a continuing possible unavoidable adverse impact of the project. However, sufficient mitigation measures in the maintenance of the golf course are planned and will be undertaken to avoid such leaching altogether.

5.1.3 Flora and Fauna.

A fresh water feature located within a quarry area within the project site provides a feeding area for the native Black-crowned Night Heron. It is likely that this feature will be affected by the construction of the golf course. To the extent that this feeding area is altered by golf course construction and ceases to be a feeding area for the Heron, its alteration may be an unavoidable adverse impact of the project. To mitigate this impact, maintenance of the water feature to the extent practicable in the design and construction of the golf course will be sought.

5.1.4 Air Quality.

Traffic generated by the mixed use and golf course components of the Phase II project will contribute to reduced air quality along the



major roadways serving the project site. State and Federal air quality standards will be met except in close proximity to the Kunia Road/H-1 Freeway Interchange in 1998 when the State standard may be exceeded by the accumulation of traffic volumes from completed major development projects in Ewa now in the planning and/or construction stages.

A coordinated public/private sector transportation planning and construction program is underway which will seek to establish, among other major transportation improvements for the region, a new north-south roadway linking the Ewa area with the H-1 Freeway which will ease traffic volumes along the Fort Weaver Road, the only major north-south roadway serving the Ewa area at the present time.

Electrical demand and solid waste disposal resulting from the project will cause an increase in county emissions; however, the increase will amount to less than 0.5 percent.

Phase II construction activities will have a short-term impact on local air quality due to additional construction vehicles activity and fugitive dust from construction activities.

5.1.5 Noise Impact.

Noise exposure levels at the golf course and mixed use areas within the Phase II project site due to aircraft take off and landing activities at the Honolulu International Airport and NASBP must be considered an unavoidable adverse impact of the project although noise levels within these areas will comply with State and Federal noise standards. Construction techniques and sound attenuation improvements within structures comprising the various planned uses in the mixed use area are expected to render such noise impacts insignificant within these structures.

It is not anticipated that traffic-generated noise impacts will be significant.

Noise levels at the golf course will generally comply with all Federal criteria specified in various land use compatibility guidelines, but about 25 percent of the course site is subjected to noise levels exceeding the State Department of Transportation's recommended Ldn of 65 dB due to proximity to air flight paths.

5.1.6 Archaeological Resources.

Two sites (3208 and 4293) have been identified, but have been assessed as significant solely for information content. As noted previously, further data collection will be performed at Site 3208.



It is not anticipated at this time that any further work will be necessary, however, in the unlikely event that this becomes a potentially adverse impact, all pertinent procedures for the protection of such resources will be strictly observed.

5.1.7 Community Impact.

Urbanization of the Phase II site as proposed will contribute to the transformation of the Ewa community from a rural, agricultural community to an urban/suburban area; however, this transformation is already under way with major new housing and other urban developments occurring in various parts of the Ewa plain and is expected to continue with or without the Ewa Marina, Phase II project.

5.1.8 Wastewater Disposal.

It is estimated that approximately 0.5 mgd of wastewater will be generated by both the mixed use and golf course components of the Phase II project. Until the treatment capacity of the City's Honouliuli Wastewater Treatment Plant is expanded from 25 mgd to 38 mgd as currently planned, this must be considered an unavoidable (albeit insignificant) adverse impact of the proposed project.



Solid waste generated from the mixed use component (9 tons/day) and golf course component (2-3 tons/week) of the Phase II project will place additional burdens on the City's solid waste disposal facilities (i.e. Waimanalo Gulch Landfill, Kalaheo Landfill, Waipahu Incinerator, H-Power Plant, etc.)

5.2 Irretrievable and Irreversible Commitments of Resources.

The Ewa Marina, Phase II project will result in an irreversible and irretrievable commitment of capital, labor, land and energy for the design and development of the project. Construction materials and human resources (labor) will be committed and land, when fully developed, will be irretrievably committed to the Phase II mixed use developments and other permanent uses of the land.

The proposed project will not adversely curtail potential use of land since, among the alternative uses considered for the project site – for example, housing and agricultural uses – the proposed golf course and mixed use commercial center are clearly the most appropriate use of the site in terms of long-range planning and public policies for the Ewa plain.

No natural resources on the project site will be committed and the socio-cultural resources in surrounding environs will be enhanced by the development of the project.



**5.3 Relationship Between Short-Term Uses Of The Environment
And Maintenance And Enhancement Of Long-Term
Productivity.**

Long-term productivity of the project site will be enhanced by the mixed use and golf course components of the Phase II project since these land use activities will support and complement the uses planned in Ewa Marina, Phase I and in existing and developing communities throughout the larger Ewa region. The Phase II project will also provide a significant beneficial impact in terms of substantially increased State and County tax revenues and a permanent and stable employment base for the surrounding Ewa area.

No reasonable land use options are foreclosed since other alternatives such as agricultural use would result in continued under utilization of only marginally-productive lands and would be contrary to the existing designations of urban uses for the site as prescribed by the Oahu General Plan "Second City" designation for the Ewa region and the State's classification of the Phase II project site as "Urban" District. As noted previously, housing on the site is not considered a reasonable option because of the numerous housing units already planned in the surrounding area and because of existing development constraints imposed by an air flight easement favoring the U.S. Government and encumbering much of the Phase II project site.



The maintenance and enhancement of the Ewa Marina area as a major, master-planned recreational / marine-industry / residential community is considered a long-term benefit for the Ewa community.

5.4 Summary of Unresolved Issues.

To the extent that the need for a General Plan amendment is necessary, this issue will ultimately be decided by the City Council. Thus, the need for an amendment constitutes an unresolved issue.

Although the proposed Ewa Marina, Phase II project will not exacerbate traffic conditions along Fort Weaver Road during peak traffic hours, the existing need for improvements to Fort Weaver Road and alternative north-south corridors linking the Ewa area with the H-1 Freeway presents an unresolved regional environmental issue having some impact on the project.

A comment received in response to the Draft EIS stated that "Review of this document was hampered by the lack of a site plan for the various elements stated above". We responded by stating that sufficient information and data were provided in the Draft EIS for assessing the project's environmental impacts in accordance with HRS Section 343-2 and Section 11-200-17 of the EIS Rules. It was also mentioned that the project plan is conceptual at this stage but should the respondent be interested in reviewing the conceptual plan with us, we would be willing to do so. Similar to other large-scale projects, the site plan as well as other architectural drawings for this project will be submitted at the time of the rezoning application.



CHAPTER 6.0

RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS FOR THE AFFECTED AREA



**CHAPTER 6.0 RELATIONSHIP OF PROPOSED ACTION TO
LAND USE PLANS, POLICIES AND CONTROLS FOR THE
AFFECTED AREA.**

6.1 Federal.

There are no Federal controls affecting development of the project site.

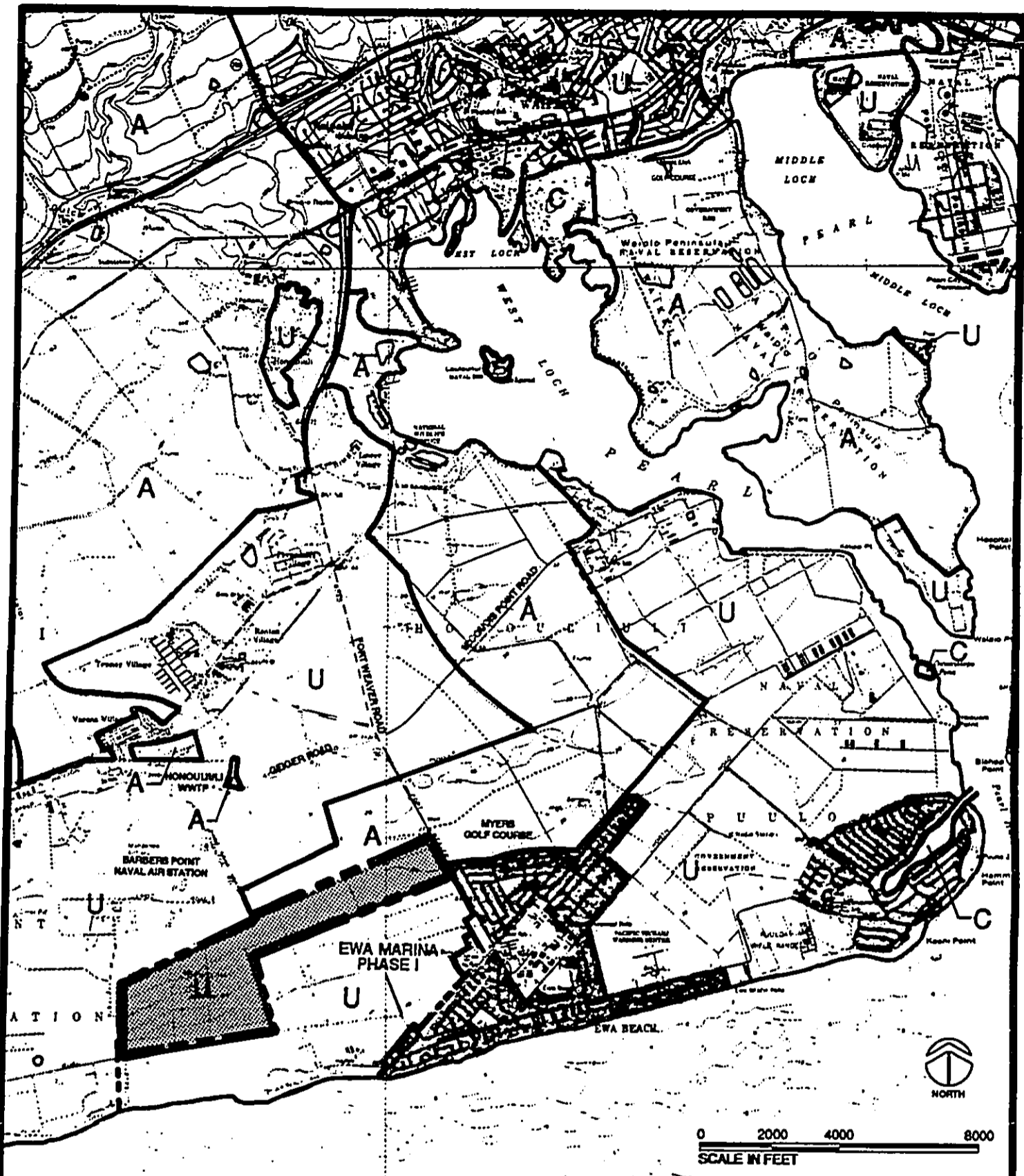
6.2 State.

6.2.1. State Land Use.

The project site is within a recently designated State Urban District, and all of the proposed uses are permitted within the Urban District. (see *Exhibit D*)

6.2.2. Hawaii State Plan.

The Hawaii State Planning Act, Hawaii Revised Statutes ("HRS"), Chapter 226, sets forth long-range goals, objectives, policies, and priority guidelines designated for the betterment and development of the State. Its overall goal is to achieve a strong, viable economy and viable physical environment that will promote the physical, social and economic well-being of Hawaii's individuals, families and communities. (H.R.S. Sec. 226-1.) The proposed develop



Legend

- U - Urban
- A - Agriculture
- R - Rural
- C - Conservation

EXHIBIT "L"
STATE LAND USE DISTRICTS

Prepared by: Belt Collins & Assoc.
 Prepared for: HASEKO (Hawaii), Inc.
 Date: November 1989
 Source: Land Use District Maps, 0-9, 0-5, 0-6 and 0-10
 Current as of November 1, 1990



ment promotes the following objectives and policies of the Hawaii State Plan:

Sec. 226-6. Objectives and policies for the economy - in general.

- (a) Planning for the State's economy in general shall be directed toward achievement of the following objectives:
 - (1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people.
 - (2) A steadily growing and diversified economic base that is not overly dependent on few industries.

Comment: The construction of the 1,600-slip marina in Phase I is expected to give rise to a new boating industry in Ewa. That, in turn, will create a demand for businesses engaged in boat repairs, the sale of marine equipment and supplies, the sale of ocean sports equipment, as well as a demand for businesses providing a variety of related services. Many of these new businesses will be located in the mixed-use complex planned for the site.

In addition to establishments required to service the boating and other water activities, the complex will also contain a health and fitness center providing its patrons with advice on proper nutrition and exercise programs. This center, like the marina, is also



expected to result in the creation of new employment opportunities.

The proposal will support the State's policy to encourage labor-intensive activities, to provide steady employment for Hawaii's people, and to diversify our visitor market. (Refer to visitor industry objectives/policies, which follow.)

Sec. 226-8. Objectives and policies for the economy - visitor industry.

- (a) Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy.
- (b) To achieve the visitor industry objective, it shall be the policy of this State to:
 - (1) Support and assist in the promotion of Hawaii's visitor attractions and facilities.
 - (2) Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people.

Comment: The project also satisfies the objectives and policies relating to the visitor industry in that the facilities and establishments at the mixed-use complex will be patronized by both local residents as well as visitors.



Sec. 226-12. Objectives and policies of the physical environment - scenic, natural beauty, and historic resources.

- (a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.
- (b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:
 - (3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.
 - (5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Comment: The development of the marina in Phase I will advance the State's objective of preserving views and vistas and enhancing the visual and aesthetic enjoyment of mountains, oceans, scenic landscapes and other natural features. The marina, which will be 140 acres in size, and the 272-acre golf course will add to the existing ocean landscape. These two amenities, along with the residential subdivision in Phase I and the mixed-use complex in Phase II, are all part of the entire, master-planned Ewa Marina Project.



Sec. 226-14. Objectives and policies for facility systems - in general.

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

Comments: By contributing to the development of a regional water system in the Ewa Plain, the project will further the State's objective to maximize the availability of water resources for domestic, commercial and recreational uses. Also, since the potable water consumption estimated for Phase II is equal to or less than the amount allocated to it under 1987 Ewa Water Master Plan, the proposal will be consistent with the State's policy of

development in accordance with an area's existing and potential water supply.

Sec. 226-15. Objectives and policies for facility systems - solid and liquid wastes.

- (b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:
 - (1) Encourage the adequate development of sewerage facilities that complement planned growth.

Comment: The applicant is and will continue working with the City to construct and dedicate additional on-site and off-site sewer facilities which will sufficiently provide for the demand of the projected Ewa Marina population.

Sec. 226-16. Objectives and policies for facility systems - water.

- (a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.
- (b) To achieve this facility systems water objective, it shall be the policy of his state to:
 - (1) Coordinate development of land use activities with existing and potential water supply.



- (2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.
- (3) Reclaim and encourage productive use of runoff water and wastewater discharges.
- (4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

Comment: The applicant is a member of the EPWDC, which is developing new water sources and storage and transmission systems for the Ewa area, and has expended in excess of \$10 million in developing potable water for Ewa Marina. Thus, the State's goals with respect to water are being met.

Sec. 226-17 Objectives and policies for facility systems - transportation.

- (a) Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:
 - (2) A statewide transportation system consistent with planned growth objectives throughout the State.
- (b) To achieve the transportation objective, it shall be the policy of this State to:
 - (2) Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives.



- (3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties.
- (6) Encourage transportation systems that serve to accommodate present and future development needs of communities.

Comment: The applicant will pay a fair share of the cost of improving existing highways and developing new transportation facilities to mitigate anticipated transportation impacts.

Sec. 226-23. Objectives and policies for socio-cultural advancement - leisure.

- (a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.
- (b) To achieve the leisure objective, it shall be the policy of this State to:
 - (4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.
 - (6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.



Comment: The 140-acre marina will provide a new recreational facility which will further the State's objectives relating to leisure activities and promote social-cultural advancement.

The Phase II project will have a strong recreational orientation with a park, facilities for golf and tennis, as well as an international fitness and conditioning center. The entire development will provide a wide range of activities and facilities to fulfill the recreational needs of a diverse population, consisting of residents and visitors alike.

Section 226-18, Hawaii Revised Statutes, establishes objectives relating to energy-efficient systems to be integrated with site planning and design of the project to the maximum extent feasible.

Promote the prudent use of power and fuel supplies through conservation measures including education and energy efficient practices and technologies.

Comments: The following proposals relating to energy-efficient systems will be integrated with site planning and design of the project to the maximum extent feasible:

The most significant energy use within the Phase II portion of Ewa Marina will be associated with the mixed use component. Golfing, which would occupy nearly all of the area devoted to recreational uses, would place a very small demand on the electrical system.



Development will be coordinated with the HECO, allowing the utility to insure the availability of adequate generation capacity. All necessary on-site electrical transmission and distribution facilities will be installed at the developer's expense. Thus, it is anticipated that an adequate supply of electrical energy will be available.

It is expected that lighting and air-conditioning will constitute the primary uses for electrical energy within the proposed development. Minimization of electrical energy use for lighting will require careful design to insure that maximum advantage is taken of the available natural light. Minimizing electrical energy for cooling will require designers to take full advantage of opportunities for natural ventilation and energy-efficient mechanical equipment.

The developer has developed a number of major properties in Hawaii over the past 17 years. In all of these, consulting engineers and architects were directed to favor natural ventilation and lighting and to take advantage of the latest developments in energy-efficient cooling and energy management systems to reduce consumption.

In addition, the following energy conservation measures will be taken into consideration during the site planning and building design to the maximum extent feasible:



Co-generation (self-generation) of power consumption needs using traditional oil or gas combustion facilities.

Natural gas rather than electrical appliances for end user facilities but certainly for common utilities such as hot water boilers.

Examine viability of power generation using non-fossil fuels.

Building orientation and massing to minimize heat loads for reduced air-conditioning requirements.

Lighting systems will utilize energy-efficient lamps.

The judicious use of renewable energy sources such as solar heat recovery and efficient fuels are all mandates that modern mechanical designs incorporate. For example, heat recovery from air conditioners will be strongly considered.

Energy management systems will be incorporated with emphasis on the control and proper cycling of large machinery.

6.2.3 State Functional Plans

Functional plans are the primary means of implementing the State Plan. The Functional Plans set forth the objectives, policies and programs to guide the State and County governments and the pri-



vate sector in implementing the State Plan. (H.R.S. Sec. 226-59 and 60.)

The following Functional Plan policy statements are relevant:

Land Use Planning. A(2) Policy:

Ensure that intended uses for the site respect community values and are compatible with the area's physical resources and recreational potential.

Comment: Development of Ewa Marina's proposed golf course and marina will allow a significant portion of the entire Ewa Marina project to remain in open area, thus, respecting the surrounding communities' needs to have scenic view planes available and, also, to be separated from OSCO's sugarcane plantation. Additionally, the golf course will help to preserve the area's non-potable water resources, because it will serve as a settlement basin for the storm waters which flow from the Waianae Mountain Range, thus allowing the aquifer to be recharged.

Recreation Facilities & Programs. C(1) Policy:

Maintain an adequate supply of recreation facilities and programs which fulfill the needs of all recreation groups.

Comments: Oahu has a shortage of golf courses available for public play. It also has a tremendous demand for berthing facilities



at the few boat harbors in existence. The golf course and the marina which are planned for the Ewa Marina project will help to alleviate the shortage of these much needed recreational facilities.

Energy Impacts

In addition, the proposed project will be designed to incorporate the most recent energy-efficient electrical and mechanical technology available to carry out the purposes of the State Energy Functional Plan, which is to guide the activities of agencies toward the implementation of the State Plan energy goals, objectives and priorities; provide a basis for the allocation of resources to carry out various State energy activities, and to deliver energy services; identify major interrelationships among energy planning and other functional areas; assist in clarifying and coordinating the roles and responsibilities of State and County government and the private sector; and identify the potential impact of energy development, conservation, and management action on energy consumption patterns and the ability of residents to actively participate in altering these patterns through individual initiative.

(Refer also to the discussion of the Hawaii State Plan, Section 226-18, HRS, proposals relating to energy efficiency, above.)



6.3 City & County of Honolulu.

6.3.1 Oahu General Plan.

The Oahu General Plan ("General Plan") is a statement of the City's long-range social, economic and environmental objectives and includes policies adopted by the City to achieve those objectives. One of the goals of the City's General Plan is to encourage development of the Ewa Development Plan area as a secondary urban center. As discussed below, the proposed Phase II project fulfills many of the General Plan's objectives and policies.

a. Population, Objective C:

To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.

Policy 2. Encourage the development within the secondary urban center at Kapolei and the Ewa and Central Oahu urban-fringe areas to relieve development pressures in the remaining urban-fringe and rural areas and to meet housing needs not readily provided in the primary urban center.

Policy 3. Manage physical growth and development in the urban-fringe and rural areas so that: (a) an



undesirable spreading of development is prevented;
and (b) their population densities are consistent
with the character of development and environ-
mental qualities desired for such areas.

Comments: The proposed project, Phase I and II, supports
the objective of directing population increases on Oahu to the
Ewa DP Area.

Ewa Marina will be a master-planned community which will
provide homes for 4,850 families, facilities for leisure-time
activities such as boating, golf and tennis, and numerous
employment opportunities, all in a physically attractive set-
ting. Prospective residents will be able to select from a variety
of homes, including affordable-mid-rise apartments, town-
houses, moderately priced single-family homes, and luxury
homes fronting the ocean, marina or golf course. At full
development, it is expected that Ewa Marina will house over
13,500 residents.

b. Economic Activity, Objective A:

To promote employment opportunities that will enable all the
people of Oahu to attain a decent standard of living.



Policy 1. Encourage the growth of diversification of Oahu's economic base.

Economic Activity, Objective G.

To bring about orderly economic growth on Oahu.

Policy 1. Direct major economic activity and government services to the primary and secondary urban centers.

Policy 2. Permit the moderate growth of business centers in the urban-fringe areas.

Comments: It is anticipated that the development of Ewa Marina's 140-acre marina component, with its 1,600 boat slips, will stimulate the growth of boating industry in Ewa, creating new opportunities for enterprises engaged in the sale and servicing of boats and other ocean-related supplies, sporting goods and equipment. Thus, the City's objectives of encouraging the diversification of Oahu's economic activity in the Ewa DP Area will be met.

Ewa Marina, Phase II, with its visitor accommodations, fitness and conditioning center, retail shops, restaurants, golf course and tennis complex and other related activities, is expected to



generate more than 2,000 on-site jobs. These will range from entry level employment to management positions, as well as those requiring skilled and semi-skilled personnel, and are expected to provide a permanent and stable employment base for the Ewa community.

c. **Natural Environment, Objective A.**

To protect and preserve the natural environment.

Policy 4. Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive land forms, and existing vegetation.

Policy 6. Design surface drainage and flood control systems in a manner which will help preserve their natural settings.

Objective B. To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

Policy 2. Protect Oahu's scenic views, especially those seen from highly developed and heavily travelled areas.



Policy 4. Provide opportunities for recreational and educational use and physical contact with Oahu's natural environment.

Comments: Ewa Marina is an important link in the Kaloï drainage system. As noted previously, storm water from the Waianae Mountain Range and lands mauka of Ewa Marina drain onto the site, carrying with it sediment and other contaminants. Left alone, this storm water would drain into the ocean, diminishing the quality of Oahu's coastal water.

The golf course proposed for the site and the marina planned for Phase I play an important role in the Kaloï drainage system. The golf course will serve as a settlement basin, allowing sediment and other contaminants to be removed through filtration before the storm water drains into the marina and ultimately into the ocean. In this manner, the development of the project will help to preserve the quality of the environment. Additionally, the golf course and the marinas will provide an attractive setting for the area and will enhance existing scenic view planes.

d. Housing, Objective C:

To provide the people of Oahu with a choice of living environments which are reasonably close to employment, recre-



ation, and commercial centers and which are adequately served by public utilities.

Policy 1. Encourage residential developments that offer a variety of homes to people of different income levels and to families of various sizes.

Policy 3. Encourage residential development near employment centers.

Comments: Ewa Marina Phase I will contain 4,850 housing units in a range of prices, including affordable mid-rise apartments, townhouses, moderately-priced homes, mid-range homes and luxury homes. Phase II will provide over 2,000 jobs for residents of the project and the surrounding area. As conceived, the project will provide both housing as well as employment opportunities for a wide segment of the population.

c. Transportation and Utilities, Objective A.

To create a transportation system which will enable people and goods to move safely, efficiently, and at a reasonable cost; serve all people, including the poor, the elderly, and physically handicapped; and offer a variety of attractive and convenient modes of travel.



Policy 4. Improve transportation facilities and services in the Ewa corridor and in the trans-Koolau corridors to meet the needs of Ewa and Windward communities.

Policy 5. Improve roads in existing communities to reduce congestion and eliminate unsafe conditions.

Objective B. To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.

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

Policy 6. Support programs to recover resources from solid-waste and recycle wastewater.

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

Policy 3. Plan for the timely and orderly expansion of utility systems.

Comments: Ewa Marina satisfies the transportation and utilities policies and objectives pertinent to the Ewa DP Area.



With respect to transportation, the applicant will participate in the implementation of the Ewa Highway Master Plan, or alternatively, will participate on fair share basis in the funding and construction of transportation improvements which are necessitated by the project.

With respect to utilities, the applicant has already contributed over \$10 million for the cost of developing new potable water sources, storage systems and transmission lines. Additionally, the applicant is installing new sewer mains and lines to dispose of wastewater from the project. In addition to benefiting Ewa Marina, these water and sewer lines will also benefit the existing Ewa Beach community.

The developer supports programs designed to recover resources and is also willing to construct an on-site sewage treatment plant, which will provide water to irrigate the golf course.

f. **Physical Development & Urban Design, Objective A.**

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

Policy 4. Require new developments to provide or pay the cost of all essential community services, including roads, utilities, schools, parks and emergency facilities that are intended to directly service the development.

Objective C. To develop a secondary urban center in Ewa with its nucleus in the Kapolei area.

Policy 2. Encourage the development of a major residential, commercial, and employment center within the secondary urban center.

Policy 3. Establish a green belt in the Ewa and Central Oahu areas of Oahu in the Development Plans.

Comments: The development of Ewa Marina is in keeping with the City's objectives and policies designating the Ewa DP Area for development of a major residential, commercial and employment center and establishing green belt areas. As indicated earlier, the applicant will pay a fair share of the costs of the facilities Ewa Marina will require.

In accordance with a suggestion by the City Department of General Planning, the developer is filing a request for an amendment to the General Plan to add a new policy to its



Physical Development and Urban Design Section concerning the proposed Ewa Marina project, including the Phase II components. The request is prompted because of the scale and special "marine industry" character of the project.

g. Public Safety, Objective B.

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

Policy 2. Require all developments in areas subject to floods and tsunamis is to be located and constructed in manner that will not create any health or safety hazard.

Comments: The flood control features of the golf course and the marina meet the City's objectives and policies relating to public safety. In addition to these contributions, the applicant is willing to participate with the City and State civil defense agencies and other developers in the area in formulating and implementing an emergency preparedness and evacuation plan.

h. Culture & Recreation, Objective D.

To provide a wide range of recreational facilities and services that are readily available to all residents of Oahu.

Policy 1. Develop and maintain community-based parks to meet the needs of the different communities on Oahu.

Policy 7. Provide for recreation programs which service a broad spectrum of the population.

Policy B. Encourage ocean and water-oriented recreation activities that do not adversely impact on the natural environment.

Policy 9. Require all new developments to provide their residents with adequate recreation space.

Policy 10. Encourage the private provision of recreation and leisure-time facilities and services.

Policy 13. Encourage the safe use of Oahu's ocean environments.



Comments: The marina, golf course, tennis complex and parks which will be developed at Ewa Marina are in keeping with the City's objectives and policies relating to the development of a wide range of recreational facilities for the Ewa community. The marina will provide numerous new opportunities for ocean and water-oriented recreational activities. Additionally, the project will contain parks, including a 17-acre Gateway Park, and facilities which were previously unavailable to area residents.

6.4 City Development Plan.

6.4.1 Common Provisions.

a. Definitions.

To implement the proposed General Plan amendment concerning City planning recognition of a regional marina, applicant requests an amendment to the Development Plan (DP) Common Provisions to include a land use category to be known as "Marina." This request will be considered by the City during its review and consideration of the pending Ewa Marina, Phase II DP amendment requests. A corresponding amendment to the Ewa DP Special Provisions will likewise be considered by the City.



b. **General Urban Design Principles and Controls.**

Open Space:

The proposed golf course and the marina are consistent with the objective of providing visual relief and contrast to the built-up, surrounding environment and will provide the physical boundary recommended by the DP, distinguishing Ewa Marina from other communities. It should be noted that maintenance of open space areas is given high priority under the Development Plan Common Provisions ("DP Common Provisions").

Vehicular and Pedestrian Routes.

The proposed golf course, which will border Fort Weaver Road, and the marina will meet the objective of providing landscaping along major vehicular routes as a means to increase the general attractiveness of the community. Together, the golf course and the marina will provide attractive landscaping and a pleasant scenery for motorists.



c. **General Principles and Controls for Parks, Recreation and Preservation Areas.**

Ewa Marina will contain a 17-acre Gateway Park, several smaller parks, and a 140-acre marina in addition to the proposed golf course. This is in conformance with policies and objectives of the DP Common Provisions. Additionally, the proposed golf course helps to fulfill the DP Common Provisions objective of providing a standard of one public or semi-public 18-hole golf course per 100,000 people. As indicated, 40% of the tee times will be made available to the general public and the residents of the Phase I residential subdivision and visitors to the commercial center.

d. **Identification of Areas, Site and Structures of Historical Significance.**

Most of the project site has been used for sugarcane cultivation for many years and, consequently, only two archaeological sites have been found. These two sites are located in the uncultivated haole koa forest. The applicant's archaeologist, however, has determined that these two sites are significant for information purposes only and do not merit preservation.

During the construction of Ewa Marina, should any archaeological resources such as artifacts, shell, bones or charcoal



deposits, human burial or rock or coral alignments, paving or walls of historic prehistoric significance be encountered, the applicant will immediately stop work in the impacted area and notify the Historic Preservation Division of the State Department of Land and Natural Resources.

e. **Thoroughfares, Highways and Streets.**

The applicant will consult with the Director of Transportation Services and the Chief Engineer to ensure that roadways in the development conform to applicable standards.

f. **Public Buildings and Public or Private Facilities for Utilities, Terminals and Drainage.**

Wastewater Treatment Facilities.

The Honolulu wastewater treatment plant is situated mauka of the Ewa Marina project and Increment 2 will satisfy the DP Common Provisions requirements that it be screened from incompatible use.

Drainage.

The proposed golf course will serve as a settlement basin for the flood and storm waters flowing through the Kaloi drainage



system and into the marina. This conforms to the DP Common provisions' objectives relating to drainage systems.

g. Sequencing Policies.

The proposed development will coincide with the City's objectives relating to the sequencing of public facilities. Since the applicant will be installing all of the infrastructure for the development, the City will be able to use its capital improvement budget to provide public facilities in other areas of Oahu.

h. Consistency with Ewa DP Special Provisions.

The proposed use for the project site is consistent with the Ewa DP's policies and objectives, which indicate that additional housing, commercial and recreational facilities should be developed in the area westerly of Ewa Beach, which is where the site is located. The proposed development is also consistent with both the open space and public view considerations contained in the Ewa DP.

As discussed above, an amendment to the Ewa DP Special Provisions to recognize the proposed Ewa Marina, Phase II project and further implement the proposed GP amendment



also discussed above will be reviewed and considered by the City.

i. Consistency with Ewa DP Land Use Map.

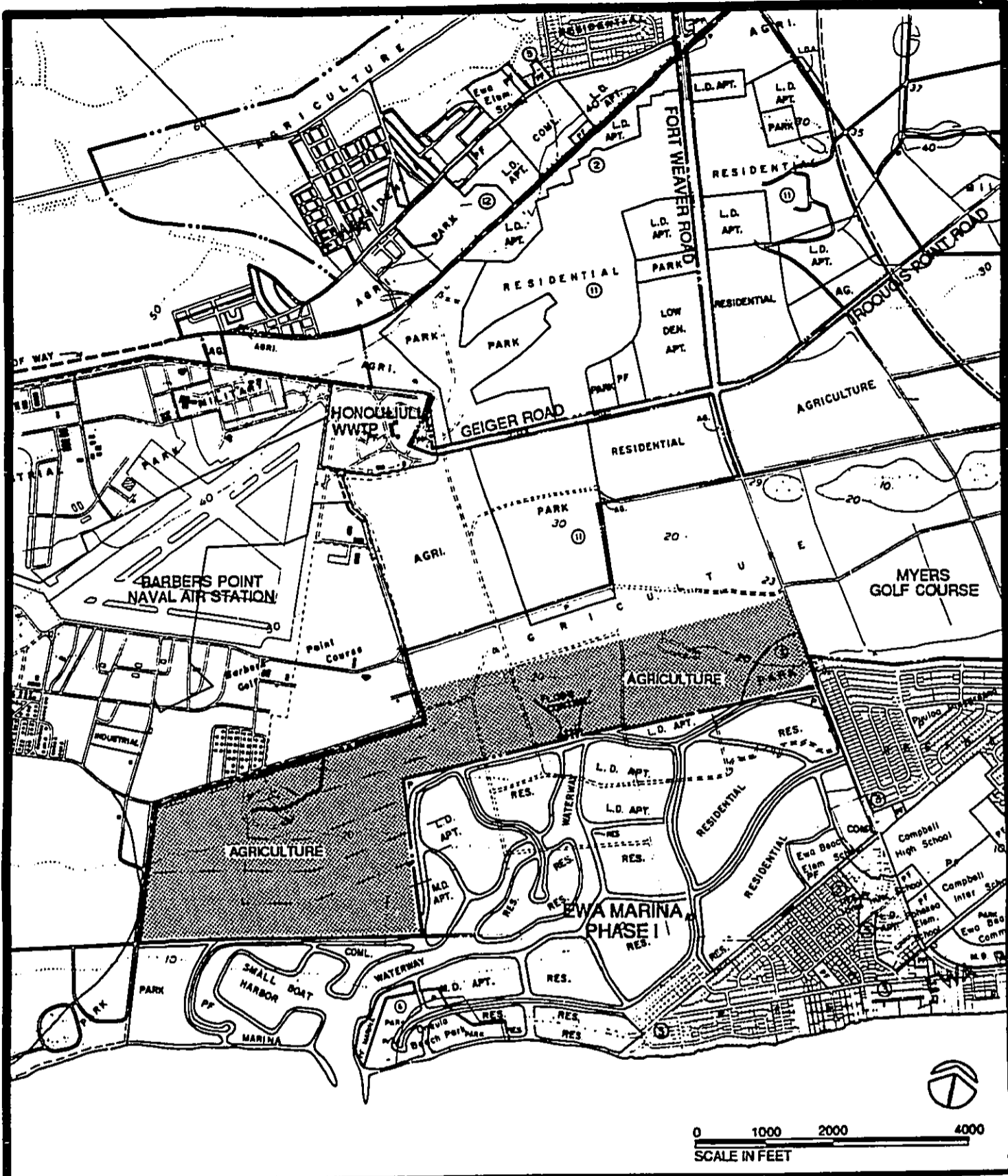
The Development Plan designation for the site is Agricultural (see *Exhibit M*). The applicant requests that the designation be amended to permit the proposed golf course and mixed-use component of the Ewa Marina project.

j. Consistency with Ewa DP Public Facilities Map.

With the exception of a roadway alignment, the Development Plan Public Facilities Map for Ewa (*Exhibit N*) does not show the public facilities planned for the site. This, however, is not inconsistent with the City's requirements since the applicant will be constructing all of the needed infrastructure and as such, will be submitting the required application for Public Facilities Map Amendments on an independent consideration basis.

6.5 City & County Zoning (Land Use Ordinance).

With the exception of the proposed park site adjoining Fort Weaver Road Zoned P-2, the remainder of the project site is currently zoned AG-2 General Agricultural District (see *Exhibit O*). On granting of the General Plan



Legend

----- State Land Use Boundary

**EXHIBIT "M"
DEVELOPMENT PLAN
LAND USE MAP**

Prepared by: Belt Collins & Assoc.
Prepared for: HASEKO (Hawaii), Inc.
Date: November 1989

Source: Development Plan Land Use Map, August 3, 1989

Public Facility	Government or Public Utility (within 6 years)	Government or Public Utility (beyond 6 years)	Private funding (no timing schedule)
Sewer System:			S..... S..... S
Drainage System:	D—D—D		D..... D..... D
Water System: Potable Non-Potable			PW.... PW.... PW NPW... NPW... NPW
Transportation System: Additional right of way and new streets Improved within existing right of way	■ ■ ■ ■ R ■ ■ ■ ■	■ ■ ■ ■ R ■ ■ ■ ■ ● ● ● ● R ● ● ● ●	□ □ □ □ R □ □ □ □
Public Facility Site Undetermined (In general area)	⊙ (STP)	⊙ (STP)	
Modify Existing Facility	▨ (STP/M)		

P - Park and Recreation FS - Fire Station SPS - Sewage Pump Station
 STP - Sewage Treatment Plant PW - Potable Water

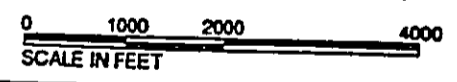
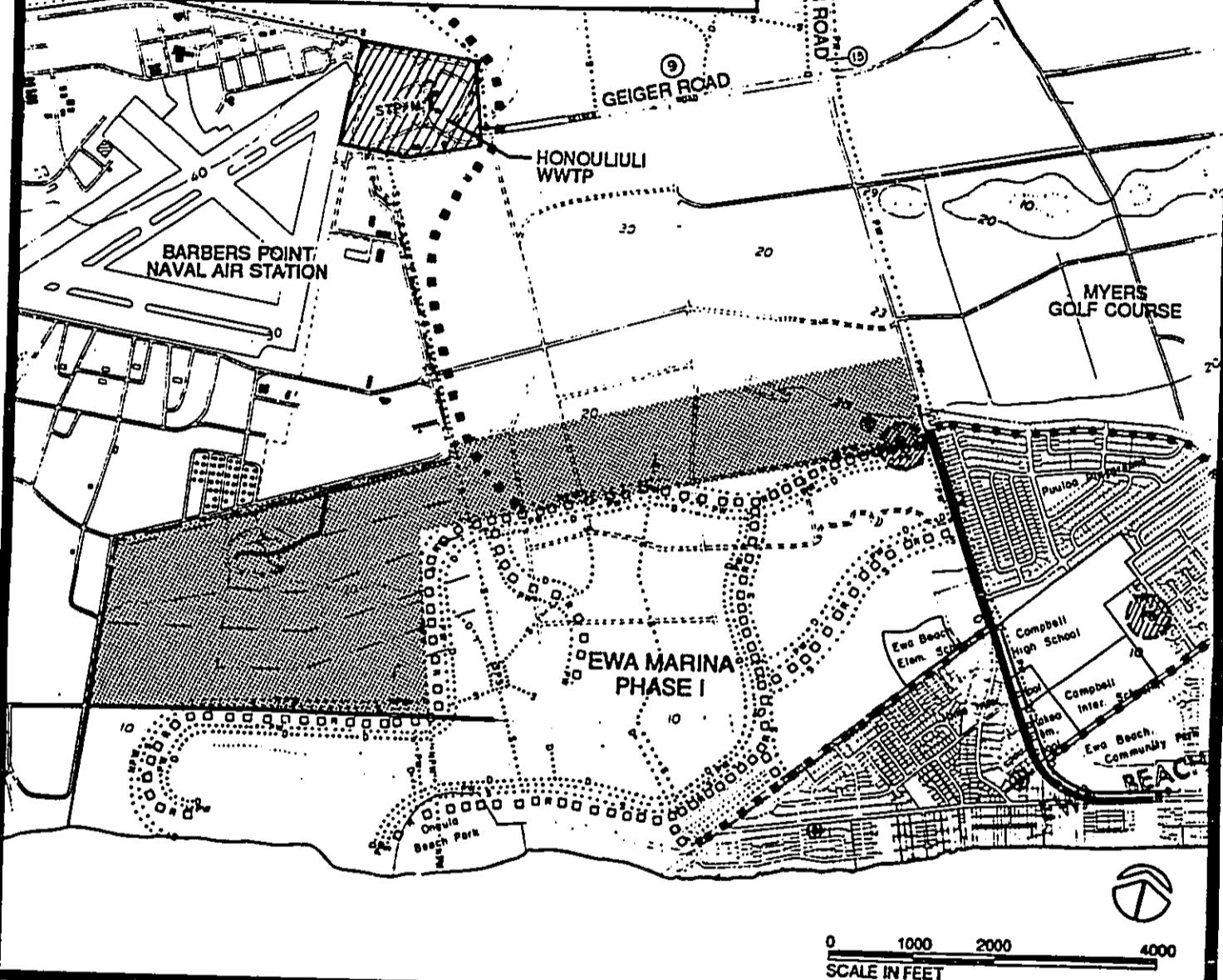
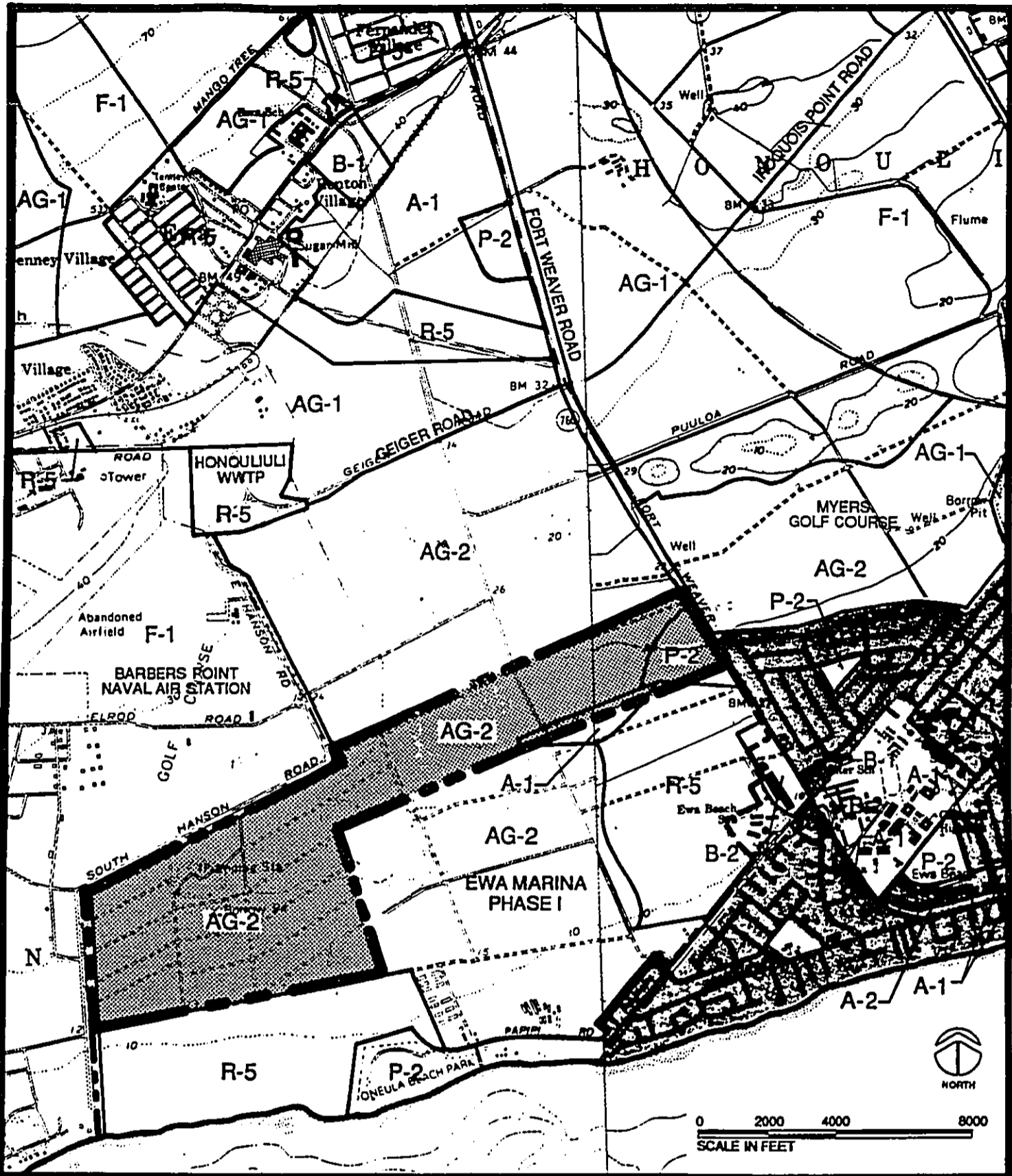


EXHIBIT "N"
DEVELOPMENT PLAN
PUBLIC FACILITIES MAP
 Prepared by: Belt Collins & Assoc.
 Prepared for: HASEKO (Hawaii), Inc.
 Date: November 1989
 Source: Development Plan Public Facilities Map, August 3, 1989



P-2	General Preservation	AG-1	Restricted Agricultural
F-1	Military and Federal Reservation	AG-2	General Agricultural
R-5	Residential		
A-1/A-2	Apartment		
B-1	Neighborhood Business		
B-2	Community Business		

EXHIBIT "O" COUNTY ZONING

Prepared by: Belt Collins & Assoc.
 Prepared for: HASEKO (Hawaii), Inc.
 Date: November 1989
 Source: Zoning Map No. 12, April 18, 1989



and Development Plan amendments requested, the applicant will seek appropriate rezoning changes for the site to implement the golf course and mixed-use proposals.

6.6 Special Management Area Guidelines.

a. Access to Public Beaches, Recreational Areas and Natural Reserves

No access to public beaches or recreational areas will be affected by the proposed project, and there are no natural reserves on or near the site which would be affected.

b. Location of Public Recreation Areas and Preserves

While there are numerous public parks and recreational areas in the vicinity of the project site, none will be affected; there are no preserves to be affected.

c. Provisions for Liquid and Solid Waste Disposition

As described elsewhere, provisions for the disposal of liquid waste will be made through the available public system and an additional on-site facility may also be provided; solid waste disposition will



be accomplished through a private firm and existing nearby City disposal sites.

d. Alterations to Existing Land Forms, Vegetation, Effects on Water Resources, Scenic and Recreational Amenities, Flood Danger, Landslides and Erosion

While there will be alteration to existing land forms during the course of development, it is not anticipated that these will have any long-term adverse effects on coastal water, ecosystems or other coastal resources. There are no scenic or recreational amenities which would be affected. The project site is identified on the Flood Insurance Rate Map as an area in which flood hazards are undetermined.

Urban development and drainage improvements being made upstream of Ewa Marina will significantly alter both the volume and course of the runoff that must be accommodated. The drainage program, as outlined in this document, will mitigate the site's exposure to flood hazards and will allow the present quality of coastal waters to be maintained. There are no landslides or erosion hazards anticipated as a result of the project.



e. Adverse Environmental or Ecological Effects and Elimination of Planning Options.

While there are some probable environmental impacts from the project, as described elsewhere, these are not expected to adversely affect coastal resources, nor will reasonable planning options be eliminated, since planning policy for the project site and surrounding area calls for urbanization in support of accommodating population growth in Ewa.

f. Consistency With the General Plan and Zoning

As discussed earlier, a General Plan amendment will be requested for the mixed-use commercial complex. On approval of General Plan and the required Development Plan Amendments, an appropriate zone change request will be made.

g. Dredging, Filling and other Alterations

As noted above, some alteration of land forms will be necessary, but they are not expected to impact adversely on the coastal zone or Special Management Area.



h. Reduction of Beaches or Other Recreational Areas

There will be no reduction of beaches or other recreational amenities in the community as a result of this project.

i. Access to Tidal and Submerged Lands.

There are no adverse access considerations as a result of the project.

j. Line of Sight Toward the Sea from the Coastal Highway

No significant coastal views will be affected by the project's proposed mid-rise structures.

k. Effects on Water Quality, Fishing Grounds, Wildlife Habitat and Agricultural Lands.

As noted above, no adverse effects on water quality are anticipated and there are no fishing grounds and wildlife habitats affected. Site the site has been under cultivation for many years, few feral animals will be affected, and the site does not contain any endangered plant species or other plant species which are not found in abundance elsewhere. A small portion of the site is rated prime agricultural lands of importance to the State, while the remainder



of the site consists of marginal agricultural lands. Soils are coral outcrop and fill and poorly suited for agriculture.



CHAPTER 7.0

CONSULTED PARTIES AND PARTICIPANTS IN THE DEIS PREPARATION PROCESS



CHAPTER 7.0 CONSULTED PARTIES AND PARTICIPANTS IN THE DEIS PREPARATION PROCESS

7.1 Consulted Parties

The Environmental Impact Statement Preparation Notice (EISPN) for the proposed Ewa Marina, Phase II was published in the OEQC Bulletin of December 23, 1990. The EISPN together with the Environmental Assessment report were delivered or mailed directly to the agencies and organizations listed below. The list contains parties believed to have an interest in the project.

Federal

Navy

U.S. Army Corps of Engineers

State

Department of Agriculture

Department of Health

Department of Land and Natural Resources

DLNR State Historic Preservation Officer

Department of Transportation



Office of State Planning

U.H. Environmental Center

City and County of Honolulu

Board of Water Supply

Department of Land Utilization

Department of General Planning

Department of Parks and Recreation

Department of Transportation Services

Fire Department

Police Department

Department of Public Works

Non-Government Agencies

Hawaiian Electric Company

Ewa Neighborhood Board



7.2 Participants in the DEIS Preparation Process

NAME	POSITION	HIGHEST POSITION	AREA OF EXPERTISE
Nelson W.G. Lee	Development Director Haseko	M.S. Business Management	Project Management
Phillip Bruner	Asst. Prof. of Biology BYU Hawaii	M.S. Zoology	Fauna
Berna Cabacungan	Principal Earthplan	B.A. English	Community Planning / Social Impact Assessment
Winona Char	President Char & Assoc.	M.S. Botany	Botany
Angela Fong	Attorney-at-Law	J.D. Law	Legal
Richard Green	Principal Murdoch & Green	Ph-D Soils/Physics	Fertilizer & Pesticide
Conrad Higashiona	Associate Pacific Planning and Engineering, Inc.	B.S. Engineering	Traffic Engineering
Tyrone T. Kusao	President Tyrone T. Kusao, Inc.	M.S. City & Regional Planning	Planning & Zoning Consultant
Mike Sang Lee	Sr. Consultant Darby and Associates	M.A. Mathematics	Acoustical Consultant
Barbara Moon	Staff Asst. to Tyrone Kusao Tyrone T. Kusao, Inc.	B.A. Journalism	Land Use Consultant
James W. Morrow	Environmental Management Consultant J.W. Morrow	M.S. Science	Air Quality
Bruce Steven Plasch	President / Decision Analysts Hawaii, Inc.	Ph.D. Engineering Economic Systems	Economics
Patrick A. Ribellia	Attorney-at-Law	J.D. Law	Urban Planning & Zoning Law
Paul H. Rosendahl	President / Principal Paul H. Rosendahl, Ph.D., Inc.	Ph.D. Anthropology / Archacology	Anthropology and Archacology
Joseph Vierra	Chief Operating Officer Belt Collins & Associates	B.S. Engineering	Civil Engineering



CHAPTER 8.0

COMMENTS DURING THE CONSULTATION PERIOD

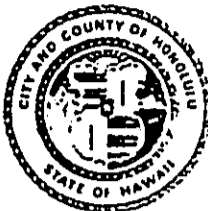


CHAPTER 8.0 COMMENTS DURING THE CONSULTATION PERIOD

The following pages contain (1) a copy of DGP's determination letter requiring a EIS, (2) the project notice in the OEQC Bulletin of December 23, 1990, (3) a copy of the Environmental Assessment Report, and (4) comments received and follow-up responses.

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FASI
DIRECTOR

BENJAMIN B. LEE
CHIEF PLANNING OFFICER
ROLAND D. LIBBY, JR.
DEPUTY CHIEF PLANNING OFFICER

WM

December 17, 1990

Honorable Bruce Anderson, Acting Director
Office of Environmental Quality Control
State of Hawaii
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Mr. Anderson:

Chapter 343, HRS
Environmental Impact Statement (EIS) Preparation
Notice for Amendment Applications from Agriculture to Resort,
Park (Golf Course) and to Commercial Industrial
Emphasis Mixed Use for the Proposed Ewa Marina Phase II
at Honouliuli (Ewa Beach), Ewa
Tax Map Keys 9-1-12: Portions of Parcels 5 and 6
Folder Nos. 91/E-2 (Golf Course) and
91/E-3 (Resort and Mixed Use)

The Department of General Planning has determined that the subject applicant action requires an EIS pursuant to Chapter 343, HRS, because the proposal, which involves applications for Development Plan amendments, may have a significant impact on the environment. This letter, together with the enclosed EIS Preparation Notice should be published in the OEOC Bulletin under the "Register of Chapter 343, HRS Documents."

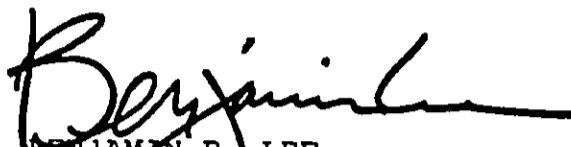
The contact person for this EIS will be:

Mr. Nelson W. G. Lee, Development Director
Haseko (Hawaii), Inc.
820 Mililani Street, Suite 820
Honolulu, Hawaii 96813

Honorable Bruce Anderson, Acting Director
Office of Environmental Quality Control
December 17, 1990
Page 2

This supercedes our previous letter dated December 3,
1990. If there are any questions, please contact Bill Medeiros
at 527-6089.

Sincerely,



BENJAMIN B. LEE
Chief Planning Officer

BBL:js

Encl.

cc: Nelson Lee
Tyrone Kusao

Note: This OEQC form 89-01 supercedes the previously submitted form dated 12/4/90.

DOCUMENT FOR PUBLICATION IN THE OEQC BULLETIN

Department of General Planning

DATE: 12/13/90

SUBMITTED BY: City and County of Honolulu

THE DOCUMENT IS A (CHECK ALL THAT APPLY): BE SURE TO ATTACH 4 COPIES

CHAPTER 205A DOCUMENT	<input type="checkbox"/>	NEGATIVE DECLARATION	<input type="checkbox"/>
CHAPTER 343 DOCUMENT	<input type="checkbox"/>	EIS PREPARATION NOTICE	<input checked="" type="checkbox"/>
NEPA DOCUMENT	<input type="checkbox"/>	DRAFT EIS	<input type="checkbox"/>
		FINAL EIS	<input type="checkbox"/>
		ACCEPTANCE NOTICE	<input type="checkbox"/>
		FONSI	<input type="checkbox"/>

IS THE DOCUMENT A SUPPLEMENTAL EIS? YES NO

TITLE OF PROPOSED ACTION OR PROJECT: Proposed Phase II Ewa Marina Development involving golf course and mixed use commercial complex.

LOCATION: ISLAND Oahu DISTRICT Ewa

ATTACH PROJECT LOCATION MAP(S)

Refer to Exhibit "H" of enclosed Development PI

TYPE OF ACTION (CHECK ONE): APPLICANT AGENCY

Amendment application report.

* NAME OF PROPOSING APPLICANT OR AGENCY: Haseko (Hawaii, Inc.)

NAME OF CONTACT: Nelson W. G. Lee, Development Director

ADDRESS: 820 Mililani Street, Suite 820

CITY: Honolulu STATE: Hawaii ZIP CODE: 96813

PHONE: (808) 522-5025 or ()

* NAME OF PREPARER OR CONSULTANT: Tyrone T. Kusao, Inc.

NAME OF CONTACT: 1188 Bishop Street, Suite 2507

ADDRESS:

CITY: Honolulu STATE: Hawaii ZIP CODE: 96813

PHONE: (808) 538-6652 or ()

* ACCEPTING AUTHORITY: Department of General Planning, City and County of Honolulu, 650 S. King Street, 8th Floor, Hon. Hi.

Attn: Mr. William Medeiros 96813

ESTIMATED PROJECT COST:

FEDERAL FUNDS \$

STATE FUNDS \$

COUNTY FUNDS \$

PRIVATE FUNDS \$ 325 Million

TOTAL \$ 325 Million (approx)

DOCUMENT PREPARATION COST:

NEG DEC/EA \$

DRAFT EIS \$

FINAL EIS \$

SUP DRAFT EIS \$

SUP FINAL EIS \$

TOTAL \$

EA TRIGGER (CHECK ALL THAT APPLY):

<input type="checkbox"/>	USE OF STATE OR COUNTY LANDS OR FUNDS
<input type="checkbox"/>	USE OF CONSERVATION DISTRICT LANDS
<input type="checkbox"/>	USE OF SHORELINE SETBACK AREA
<input type="checkbox"/>	USE OF HISTORIC SITE OR DISTRICT
<input type="checkbox"/>	USE OF LANDS IN THE WAIKIKI SPECIAL DISTRICT

***All comments to be sent to Accepting Authority with copies to Applicant and Consultant

OEQC FORM 89-01 (2/89)
PAGE 1 OF 2

- USE REQUIRING AN AMENDMENT TO A COUNTY GENERAL PLAN
- USE REQUIRING THE RECLASSIFICATION OF CONSERVATION LANDS
- CONSTRUCTION OR MODIFICATION OF HELICOPTER FACILITIES
- OTHER _____

BRIEF DESCRIPTION OF THE PROPOSED ACTION OR PROJECT WHICH WILL BE PUBLISHED IN THE OEQC BULLETIN (LIMIT OF 500 WORDS OR LESS): _____

The property for Phase II of the Ewa Marina project is bordered by Fort Weaver Road to the east, Barbers Point Naval Air Station to the west and sugar cane fields to the north. Directly adjoining to the south is the Phase I area of the Ewa Marina project.

The Ewa Marina project is a residential and commercial/industrial mixed use community focused around a large 1,600 slip recreational marina intended to serve the Ewa region. A total of 4,850 residential dwelling units, a mixed-use commercial job center, visitor complex and golf course are proposed for this development.

The developments within the Phase II area are comprised of a 27-hole golf course and a mixed-use commercial complex. The proposed semi-private golf course is for the use of the project's residents as well as visitors to the project. The course will serve as a buffer between the residential components and Oahu Sugar Company's nearby sugar cane fields and will provide open space and scenic view plane. Additionally, the golf course will constitute an essential part of the Kaloi Drainage System through which storm water from the slopes of the Waianae Mountain and the

(CONTINUE ON ANOTHER SHEET IF NECESSARY)

(continued on next page)

TAX MAP KEY(S):	<u>9-1-12</u>	<u>Pors. 5 & 6</u>	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

TOTAL ACREAGE: _____

FOR OEQC USE ONLY

DATE OF SUBMISSION:
 DATE OF PUBLICATION:
 LAST DAY FOR CONSULTED
 PARTY REQUEST:
 COMMENT PERIOD ENDS:
 ACCEPTANCE DATE:
 PUBLICATION DATE OF
 ACCEPTANCE:

OEQC # _____
 PLANNER: _____

OEQC FORM 89-01 (2/89)
 PAGE 2 OF 2

development mauka of Ewa Marina will flow through to the ocean.

The proposed mixed-use area will serve as a job center as well as a visitor complex. As an adjunct to the regional marina, it will contain establishments providing goods and services related to boating and watersports activities. It will also contain a yacht club, restaurants, office, a health and fitness center and visitor accommodations including lodging units, tennis courts, exhibition center and conference facilities.

OEQC BULLETIN



JOHN WAIHEE
GOVERNOR

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

DIRECTOR

VOLUME VII

DECEMBER 23, 1990

NO. 24

REGISTER OF CHAPTER 343, HRS DOCUMENTS

The OEQC Bulletin is a semi-monthly publication. The publication dates of the bulletin are the eighth and twenty-third of each month. Applicants should deliver an appropriate number of Draft and Final EISs to the accepting authority before submitting copies to OEQC for distribution and publication. Environmental Assessments should be submitted to the accepting authority directly. Based on the assessment, the accepting authority will submit to OEQC a determination of a Negative Declaration or a Preparation Notice for publication in the bulletin. Draft and Final Environmental Impact Statements must be received by the fifth and twentieth days of the month for publication in the respective issue. Negative Declarations and Preparation Notices must be received at least five working days prior to the publication date. All documents submitted for publication in the OEQC Bulletin should be delivered to the Office of Environmental Quality Control, 465 South King Street, Room 104, Honolulu, Hawaii 96813. To ensure proper processing of documents, please attach OEQC Bulletin Publication Form with all submittals. These forms can be obtained by calling OEQC at 548-6915.

EIS PREPARATION NOTICES

The following actions have been determined to have significant impacts upon the environment. Environmental Impact Statements will be prepared for these projects. A 30-day consultation period commences with the initial publication of these projects in the bulletin (see deadline dates). The purpose of soliciting comments during the consultation period is to establish the scope and the depth of coverage that the Draft EIS should have.

OAHU

EWA MARINA COMMUNITY DEVELOPMENT MIXED-USE COMMERCIAL COMPLEX

Location: Ewa, Oahu
TMK: 9-1-12:05 and 06

Please send your comments to:

Accepting Authority: Department of General Planning
Attn: William Medeiros
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

with a copy to:

Applicant: Haseko (Hawaii), Inc.
Attn: Nelson Lee,
Development Director
820 Milliani Street, Suite 820
Honolulu, Hawaii 96813

and a copy to:

Consultant: Tyrone Kusao, Inc.
1188 Bishop Street,
Suite 2507
Honolulu, Hawaii 96813

and a copy to OEQC.

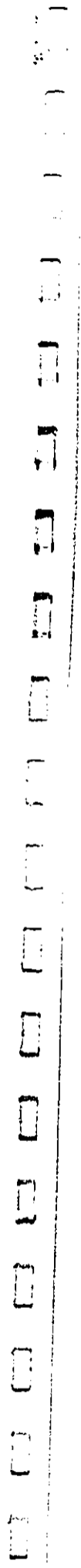
Deadline: January 22, 1991

The applicant requests such amendments to the Development Plan Common Provisions, the Ewa Development Plan Special Provisions and the Ewa Development Plan Land Use Map as are necessary to permit approximately 114 acres of land to be developed into mixed-use commercial complex component of the master-planned Ewa Marina Community Development Project (Ewa Marina).

Upon completion, Ewa Marina will consist of separate, but wholly complementary phases. Phase I, the makai portion, consists of approximately 707 acres and will contain 4,850 homes intended for permanent residents. These homes will be a mix of single and multi-family dwelling units, interspersed around a large marina and laced

with pedestrian and bicycle pathways and other open-area elements which will make the residential community architecturally and aesthetically pleasing.

Phase II, the mauka portion of Ewa Marina, is designated urban on the state's land use map and agriculture on the county's land use map. It consists of approximately 403 acres of land on which a 17-acre park, a golf course and mixed-use commercial complex will be built. The golf course, including a clubhouse and maintenance facilities, will be constructed on approximately 272 acres of land and is identified as Increment 1 of Ewa Marina, Phase II. The golf course will be integrated with Ewa Marina's residential community and will stretch from NASBP to Fort Weaver Road. Phase II will also contain a mixed-use commercial job center and visitor complex which is identified as Increment 2 of Ewa Marina, Phase II. It will be located between the golf course and marina on the approximately 114 acres of land which is the subject of this application.



RECEIVED

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GENERAL PLANNING
& COMMUNITY DEVELOPMENT
DIVISION

APPLICATION FOR
DEVELOPMENT PLAN AMENDMENTS

AND

ENVIRONMENTAL ASSESSMENT

**EWA MARINA COMMUNITY DEVELOPMENT
& MIXED-USE COMMERCIAL COMPLEX**

Prepared for: **HASEKO (HAWAII), INC.**

Prepared by: **KIEFER, OSHIMA, CHUN, FONG & CHUNG**

November 1990

SUITE 400
DAVIS PACIFIC CENTER
841 BROAD STREET
HONOLULU, HAWAII 96813

KIEFER, OSHIMA, CHUN, FONG & CHUNG
ATTORNEYS AT LAW

TELEPHONE
(808) 531-4200
TELEFAX
(808) 531-4444

November 19, 1990

Mr. Benjamin B. Lee
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Subject: Application for Development Plan Amendments and Environmental Assessment

Dear Mr. Lee:

On behalf of the applicant, Haseko (Hawaii), Inc., we are herewith submitting two copies of the application for various amendments to the Development Plan Common Provisions, Ewa Special Provisions, Land Use Map for Ewa and environmental assessment for approximately 114 acres of land in the Ewa Development Plan Area. We respectfully request that this application be processed during the 1991 Annual Amendment Review period.

Your assistance in processing the enclosed application will be appreciated. If you have any questions or comments or should you require more information, please do not hesitate to contact us.

Very truly yours,

**KIEFER, OSHIMA, CHUN,
FONG & CHUNG**


Angela Fong
Steven K. S. Chung

PREFACE

This document was prepared in conjunction with a request to:

- (1) Amend the Development Plan Common Provisions to include a land use category to be known as "Marina."
- (2) Amend the Ewa Development Plan Land Use Map to permit construction of the mixed-use commercial complex component of the Ewa Marina Community Development Project.
- (3) Amend the Development Plan Special Provisions for Ewa to include the mixed-use commercial complex component in the Ewa Marina Special Area and increase the height limitations to permit construction of apartments and hotels up to 150 feet high in the mixed-use commercial complex area.

This document contains the information required by the Rules of the Department of General Planning for Processing Amendments to the Development Plans of the City and County of Honolulu and it assesses the environmental and social impacts associated with the proposed development in compliance with Chapter 343, Hawaii Revised Statutes and Chapter 32, Article 1, Section 32-1.10, Development Plan Common Provisions.

**APPLICATION FOR
DEVELOPMENT PLAN AMENDMENTS**

AND

ENVIRONMENTAL ASSESSMENT

**EWA MARINA COMMUNITY DEVELOPMENT
MIXED-USE COMMERCIAL COMPLEX**

Prepared for: **HASEKO (HAWAII), INC.**

Prepared by: **KIEFER, OSHIMA, CHUN, FONG & CHUNG**

November 1990

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- A State Land Use Districts Map
 - B Development Plan Land Use Map
 - C Development Plan Public Facilities Map
 - D Existing Topography Map
 - E SCS Soils Map
 - F Aerial Photograph of Ewa
 - G Location Map
 - H Aerial Photograph of Ewa Marina
 - I Ewa Marina/Phase II Project Layout
 - J Roads and Highways
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 - L ALISH Map
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 - II Certificate of Compliance with the Social Impact Factors of the Development Plan Common Provisions
 - III Certificate of Compliance with the Notification Requirements of Ordinance 84-111
 - IV Notification of Affected Parties as Required by Ordinance 84-111

v

I. BACKGROUND

A. Essential Information

1. Applicant: Haseko (Hawaii), Inc., a Hawaii corporation
Contact: Mr. Nelson W. G. Lee, Development Director
820 Miliiani Street, Suite 820
Honolulu, Hawaii 96813
(808) 522-5025
2. Landowner: Haseko (Hawaii), Inc., a Hawaii corporation
3. Request:

Applicant requests such amendments to the Development Plan Common Provisions ("DP Common Provisions"), the Ewa Development Plan Special Provisions ("Ewa DP Special Provisions") and the Ewa Development Plan Land Use Map ("Ewa DP Map") as are necessary to permit approximately 114 acres of land ("the Property") to be developed into the mixed-use commercial complex component of the master-planned Ewa Marina Community Development Project ("Ewa Marina").

Upon completion, Ewa Marina will consist of separate, but wholly complementary phases. Phase I, the makai portion shown on the Ewa DP Map as the Ewa Marina Special Area, consists of approximately 707 acres and will contain 4,850 homes intended for permanent residents. These homes will be a mix of single and multi-family dwelling units, interspersed around a large marina and laced with pedestrian and bicycle pathways and other open-area elements which will make the residential community architecturally and aesthetically pleasing. Phase I already has the appropriate state and county land use designations and construction of the marina can start once appropriate permits are obtained from the state and county and the U.S. Army Corps of Engineers.

Phase II, the mauka portion of Ewa Marina, is designated urban on the state's land use map and agriculture on the county's land use map. It consists of approximately 403 acres of land on which a 17-acre park, a golf course and a mixed-use commercial complex will be built. The golf course, including a clubhouse and maintenance facilities, will be constructed on approximately 272 acres of land and is identified as Increment I of Ewa Marina, Phase II. The golf course will be integrated with Ewa Marina's residential community and will stretch from NASBP to Fort Weaver Road.

Phase II will also contain a mixed-use commercial job center and visitor complex which is identified as Increment 2 of Ewa Marina, Phase II. It will be located between the golf course and the marina on the approximately 114 acres of land which is the subject of this application. In order to facilitate and permit the development of the mixed-use commercial complex, Applicant requests:

- a. An amendment of the Development Plan Common Provisions to include a land use category to be known as "Marina."
- b. An amendment of the Ewa Development Plan Land Use Map ("Ewa DP Map") to redesignate the Property from "Agriculture" to "Commercial-Industrial Emphasis Mixed Use/Marina" use.
- c. An amendment of the Development Plan Special Provisions for Ewa ("Ewa DP Special Provisions") to include the Property in the Ewa Marina Special Area and to allow medium-density apartments and hotels up to 150 feet in height to be built.

4. Area: Approximately 114 acres.

5. Location:

The Property is located at Honouliuli in the Ewa Development Plan Area ("Ewa DP Area"). It lies south of Farrington Highway, about 20 miles west of Honolulu, between Fort Weaver Road and the Naval Air Station Barbers Point ("NASBP"). It is a portion of Phase II of the approximately 1,110-acre Ewa Marina project.

The Ewa DP Area has been designated by the City and County of Honolulu ("City") for development of a secondary urban complex and is expected to accommodate most of the anticipated increase in population on Oahu through the year 2005. In the eastern half of the Ewa DP Area are the existing communities of Ewa Beach, Iroquois Point Puuloa Military Family Housing, Ewa Villages and Honouliuli. In the western half of the Ewa DP Area are the existing communities of Makakilo, Honokai Hale and Nanakai Gardens. Also in this area are the James Campbell Industrial Park and the Barbers Point Harbor.

New residential developments in close proximity to the Property include the Ewa Gentry 7,500-unit subdivision to the north, the City's 1,500-unit West Loch development to the northeast, and Petitioner's adjoining Ewa Marina, Phase I.

Other proposed major developments in the Ewa DP Area include the Kapolei Town Center, the State of Hawaii's 5,000-unit Kapolei Villages planned community, Lusk Hawaii's 500-unit residential project Kapolei Knolls, the expansion of Makakilo by 2,200 units and the Ko Olina Resort, which will contain 5,200 resort residential units and 4,000 visitor units.

6. Address: The Property does not presently have an address.

7. TMK: (1) 9-1-12; portions of 5 and 6.

8. Existing Use:

The Property is presently being used for sugarcane cultivation by Oahu Sugar Company ("OSCO") under various leases which expire in 1995.

A portion of the Property is subject to an easement in favor of the United States of America which prohibits certain urban uses, such as permanent dwelling units. The Property is also subject to combined day/night average sound levels of 55 to 70 Ldn as a result of the flight activities at NASBP and Honolulu International Airport ("HIA").

9. State Land Use:

The Property is in the Urban District on the State land use map. (See Exhibit A, State Land Use Districts Map.)

10. Development Plan Designation:

a. Land Use Map: The Property is designated for "Agricultural" use on the Ewa DP Map. (See Exhibit B, Development Plan Land Use Map.)

b. Public Facilities Map: No symbols shown. (See Exhibit C, Development Plan Public Facilities Map.)

11. Zoning: The existing zoning for the Property is AG-2, General Agriculture.

B. Description of the Property

1. Property Boundary:
The Property is a part of Phase II of Ewa Marina which consists of approximately 403 acres of land bordered by Fort Weaver Road to the east, NASBP to the west and sugarcane fields to the north. Directly south of Phase II and the Property is the Ewa Marina Special Area.
2. Topography:
The Property is essentially flat, having been used for sugarcane cultivation for many years. Its elevation averages about 20 feet above mean sea level. (See Exhibit D, Existing Topography Map.)
3. Existing Use:
The Property is located on the outskirts of OSCO's sugar plantation, in an area that has been designated for urbanization by both the state and county governments. At the present time, most of the Property is under lease to OSCO for sugarcane cultivation. A small portion of the Property, however, is uncultivated, haole koa forest. The lease permits the land to be withdrawn from sugarcane cultivation earlier than its 1995 expiration date at Applicant's option.
4. Slope:
The Property is virtually flat, with a slope of less than one percent on the average.
5. Soils:
The U.S.D.A Soil Conservation Service, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, August 1972, indicates that the Property consists of Coral Outcrop and Fill Land. (See Exhibit E, SCS Soils Map.)
Coral Outcrop (CR) consists of coral or cemented calcareous sand which were formed in shallow ocean water during the time the ocean stand was at a higher level. This land type is found on the western side of the Property. Fill land (Fd) consists of an area filled with material from dredging, excavation from adjacent uplands, garbage, and bagasse and slurry from sugar mills. Fill land is found on the eastern side of the Property. The Property is classified "Other" under the Agricultural

Lands of Importance to the State of Hawaii (ALISH) classification system. (See Exhibit L, ALISH Map.)

The Flood Insurance Study prepared for the City and County of Honolulu indicates that the Property is located in Zone D, areas in which flood hazards are undetermined.

6. Location Map:
 - a. See, Exhibit F, Aerial Photograph of Ewa.
 - b. See, Exhibit G, Location Map.
7. Topography Map:
 - a. See, Exhibit D, Existing Topography.
 - b. See, Exhibit H, Aerial Photograph of Ewa Marina.
8. Project Layout:
See, Exhibit I, Ewa Marina/Phase II Layout.

II. DEVELOPMENT PROPOSAL

A. Applicant's Proposed Use of the Property

1. Proposed Mixed-Use Commercial Complex.
The Property will be developed into a mixed-use commercial job center and visitor complex. As an adjunct to the marina, it will contain establishments providing goods and services related to boating and watersports activities. It will also contain a yacht club, restaurants, offices, a health and fitness center and a visitor complex containing lodging units, tennis courts, an exhibition center and conference facilities.
 - a. Commercial Center. A commercial center with a variety of retail shops, professional offices, theme restaurants and marine-related establishments will be conveniently located next to the marina and the visitor accommodations. It will contain 60,000 to 100,000 square feet of space with most of the restaurants and retail shops located along a harbor-front esplanade. As designed, the center will provide an attractive setting for the retail operations and will be conveniently located for easy access

by residents, boaters and visitors. A yacht club for residents of Ewa Marina and other nearby communities will also be incorporated as part of the center. It will host a variety of boating events and functions, including yacht races, fun sails, annual boat parades and youth learn-to-sail programs.

b. International Fitness Promotion Center. Applicant envisions its International Fitness Promotion Center ("IFPC") to be one of the first of its kind in Hawaii. It will be a full-featured fitness and conditioning center with programs and facilities similar in concept to spas and fitness centers located in Europe and on the mainland. The IFPC's distinguishing features will be that it will focus on more than just overweight clientele and that it will be directed toward the corporate market. The 60,000-square-foot IFPC will include, among other facilities, aerobics and exercise studios, fully equipped weight rooms, racquetball, handball and other similar courts, swimming pools and a health food restaurant. Guests at the IFPC will be enrolled in programs ranging from seven to fourteen days in length and will be assisted by professionals who will provide individualized fitness and conditioning assessments, counseling, education and training. Because the IFPC will not provide acute health care services, a Certificate of Need from the Department of Health is not required.

c. Visitor Complex.

1) Specialty and Garden Suite Hotels. The visitor complex, consisting of several specialty hotels and a complex of garden suite hotels, will offer the primary source of employment in the Increment 2 development. The complex will be designed and marketed on the related themes of (i) recreation, including boating, golf, tennis and other outdoor activities, (ii) fitness and conditioning and (iii) as a corporate retreat. Arriving guests will be greeted at the planned Ewa Marina Reception Center and will have access to amenities such as an exhibition center, the marina, the golf course, the championship tennis complex and other outdoor recreational facilities. A nearby commercial center will have a variety of shops, restaurants, professional offices and a marine service center which will serve visitors as well as the Ewa Marina and surrounding communities. Visitors may also participate in the programs which the IFPC will offer.

2) Exhibition Center and Conference Facilities. An 8,000 square foot exhibition center and related conference facilities will also be part of Increment 2. Not only will it enhance the complex's appeal to the corporate and conference markets, but it will also be available to Ewa residents and businesses for community functions.

3) Championship Tennis Complex. A championship tennis complex, containing tennis courts and an 18,000-square-foot clubhouse, will be constructed in an area of the Property which is subject to the easement in favor of the United States Government. It will enhance the appeal of the community and add to the variety of recreational activities which will be available to the residents and visitors of Ewa Marina.

d. Height Limitations. Consistent with its plans to develop a commercial center in Ewa Marina, Applicant requests that height limits of up to 150 feet be allowed for the structures proposed for the Property. From an aesthetic point of view, this will allow for a greater contrast in building forms over the virtually flat project site. The 150-foot mark is also well below the operational air space requirement of the adjoining NASBP and it will not result in the obstruction of any scenic view plane with respect to neighboring properties.

The Barbers Point Golf Course is the nearest development on the mauka side of Phase II and the Ewa Gentry project, a considerable distance away, is the nearest residential development. Since the terrain mauka of Phase II is essentially flat, there are no ocean views or other scenic view planes with respect to these properties which will be obstructed by the mid-rise structures which are planned for the Property.

2. Legal and Physical Restrictions on the Use of the Property.

The Property is particularly well-suited for the proposed development because of certain legal and physical restrictions on its use.

First, a perpetual easement in favor of the United States of America encumbers almost 100 acres of land on the west and north side of Phase II adjacent to NASBP. This easement, which affects a significant portion of the Property, prohibits the development of residential dwellings, hotels and other transient lodging facilities, schools, hospitals, outdoor music shells, amphitheaters or sports

stadiums. Second, the Property is subject to composite day/night average sound levels of 55 Ldn or greater as a result of the flight activities at NASBP and HIA. This level of noise makes the development of single-family detached homes inappropriate, whether or not sound attenuation measures are employed.

The mixed-use commercial center is designed to comply with the easement and to recommended guidelines relating to noise impacts.

B. Development Timetable

Major approvals still necessary for development of the Property consist of the amendments requested by this application and appropriate zoning.

Central to the development of the entire Ewa Marina project, however, is the planned marina because of the important role it plays in the drainage system for the eastern Ewa DP Area. Storm waters descending from the southern slopes of the Waianae Mountain Range will be channeled from the other developments into the marina where, by the marina's design, they will be filtered and their velocity reduced so that the waters eventually reaching the ocean will have a minimal effect on the shoreline environment.

It is projected that construction of the marina will start in 1992, with the completion of major excavation and grading to be completed within two years. Pursuant to the master plan for the development of Ewa Marina, all of the required on-site infrastructure for the entire project will be installed prior to the construction of the above-ground structures. From a timing standpoint, therefore, it will be approximately five years from the date of this application before construction of the commercial complex will begin. Thereafter, it will take up to seven more years before the mixed-use commercial complex and all the residential housing units are completed.

C. Approximate Cost.

On-site and off-site infrastructure and improvement costs of Increment 2 are expected to total approximately \$300.0 million.

III. NEED FOR PROPOSED DEVELOPMENT.

A. Public Problem or Need.

1. Commercial Center

The development of Ewa Marina will give birth to a new boating industry in the Ewa DP Area. The 150-acre marina, with its 1,600

boat slips, will create a demand for boat repair facilities, businesses engaged in the sale of boats and other marine equipment and businesses offering instruction and services relating to various watersports activities. The marina will also create a need for a yacht club, restaurants, retail shops and other services. The proposed center will provide the commercial space from which these businesses will be able to operate. Thus, the proposed development will provide the Ewa DP Area with needed investment and employment opportunities.

2. Hotel

The marina which is planned for Phase I will also attract visitors from other islands, states and countries who will need lodging, dining, shopping and recreational facilities after they arrive. The mixed-use commercial complex will contain lodging units for these visitors, as well as the restaurants and other facilities which they will require.

3. International Fitness Promotion Center

The IFPC is intended to meet the growing need for facilities and programs designed to increase and improve an individual's health and longevity. As the population of the United States gradually ages and as medical costs continue to escalate, people are becoming more aware of the need to be responsible for managing their own health and physical well-being. This has increased the demand for facilities wherein an individual can receive a personal evaluation and a physical fitness and behavioral program can be prescribed. The IFPC will be directed at the growing market of individuals who seek to live healthier lives and to reduce their future health care costs.

4. Visitor Apartments

Applicant anticipates that the Ewa Marina project will attract primary home buyers as well as individuals seeking second homes. The apartments in Phase II will be available to satisfy the demand for second homes so that the housing units which are planned for Phase I can be purchased by individuals intending to be full-time residents of Ewa Marina.

B. Intended Market.

The facilities of Increment 2 will be available to the general public. It is anticipated, however, that the hotel accommodations will be used primarily by guests of Ewa Marina who arrive by boat or who are enrolled at the IFPC.

C. Designated Use vs. Proposed Use.

The Property is presently designated for agricultural use. However, the Property is within the Ewa DP Area, which has been designated for urbanization.

The Ewa DP Area encompasses the coral plain which stretches from the Central Oahu district boundary at Waipahu and Pearl Harbor, around the southwestern corner of Oahu, to Nanakuli. Relevant general plan policies for Ewa encourage the development of a secondary urban center in order to relieve existing development pressures in other areas of the island. Consistent with this goal, various types of urban developments have been identified for specified Ewa locations. With respect to the area where the Property is located, the Ewa DP designates the development of housing, commercial and recreational facilities.

IV. FEDERAL, STATE AND CITY PLANS AND PROGRAMS INVOLVED

A. Federal.

There are no federal programs which affect development of the Property.

B. State.

1. Hawaii State Plan

The Hawaii State Planning Act, Hawaii Revised Statutes ("HRS"), Chapter 226, sets forth long-range goals, objectives, policies and priority guidelines designed for the betterment and development of the State. Its overall goal is to achieve a strong, viable economy and a desirable physical environment that will promote the physical, social and economic well-being of Hawaii's individuals, families and communities. (H.R.S. Sec. 226-1.) The proposed development promotes the following objectives and policies of the Hawaii State Plan:

§ 226-6. Objectives and policies for the economy -- in general.

(a) Planning for the State's economy in general shall be directed toward achievement of the following objectives: (1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people. (2) A steadily growing and diversified economic base that is not overly dependent on a few industries.

Comment:

The construction of the 1,600-slip marina in Phase I is expected to give rise to a new boating industry in the Ewa DP Area. That, in turn, will create a demand for businesses engaged in boat repairs, the sale of marine equipment and supplies, the sale of ocean sports equipment, as well as a demand for businesses providing a variety of related services. Many of these new businesses will be located in the commercial complex planned for the Property.

In addition to the establishments which will be required to service the boating and other water activities, the commercial complex will also contain a health and fitness center providing its patrons with advice on proper nutrition and exercise programs. This center, like the marina, is also expected to result in the creation of new employment opportunities.

On the basis of the above, thus, it is seen that the development of the Property will be in accord with the policies and objectives of the State Plan relating to diversified employment opportunities.

§ 226-8. Objective and policies for the economy -- visitor industry.

(a) Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy. (b) To achieve the visitor industry objective, it shall be the policy of this State to: (1) Support and assist in the promotion of Hawaii's visitor attractions and facilities. (2) Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people.

• • •
(5) Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawaii's people.

Comment:

The development of the Property also satisfies the objectives and policies relating to the visitor industry as it is expected that the facilities and establishments at the commercial complex will be patronized by both local residents as well as visitors from abroad.

§ 226-12. Objective and policies for the physical environment -- scenic, natural beauty, and historic resources.

(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources. (b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

• • •

(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

• • •

(5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Comment:

The development of the marina in Phase I will advance the State's objective of preserving views and vistas and enhancing the visual and aesthetic enjoyment of mountains, oceans, scenic landscapes and other natural features. The marina, which will be 150 acres in size, and the 272-acre golf course will add to the existing ocean landscape. These two amenities, along with the residential subdivision in Phase I and the commercial complex in Phase II, are all part of the 1,110-acre, master-planned Ewa Marina project.

§ 226-14. Objective and policies for facility systems -- in general.

(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives. (b) To achieve the general facility systems objective, it shall be the policy of this State to:
(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.
(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.

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(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

Comment:

Applicant is a member of the Ewa Plain Water Development Corporation ("EPWDC"), which is developing new water sources and storage and transmission systems for the Ewa area. Already, Applicant has expended over \$10 million to develop potable water and transmission lines for Ewa Marina. Similarly, Applicant will pay its fair share to improve the transportation and waste disposal systems which service the Ewa Marina Project. By these endeavors, Applicant is contributing to the improvement of the state's and county's facility systems.

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

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(b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:

(1) Encourage the adequate development of sewerage facilities that complement planned growth.

Comment:

Applicant is willing to develop its own secondary sewage treatment plant to handle liquid waste produced by the development of its Ewa Marina project.

§ 226-16. Objective and policies for facility systems -- water.

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

(b) To achieve the facility systems water objective, it shall be the policy of this State to: (1) Coordinate development of land use activities with existing and potential water supply. (2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs. (3) Reclaim and encourage the productive use of runoff water and wastewater discharges. (4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

Comment:

Applicant is a member of the EPWDC, which is developing new water sources and storage and transmission systems for the Ewa area. Already, Applicant has expended in excess of \$10 million in developing potable water for Ewa Marina. Thus, the State's goals with respect to water is being met.

§ 226-17. Objectives and policies for facility systems -- transportation.

(a) Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:

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(2) A statewide transportation system consistent with planned growth objectives throughout the State.

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(b) To achieve the transportation objectives, it shall be the policy of this State to:

• • •

(2) Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives.

(3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties.

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(6) Encourage transportation systems that serve to accommodate present and future development needs of communities.

Comment:

Applicant will pay its fair share of the cost of improving existing highways and developing new transportation facilities to mitigate the impact of its Ewa Marina project. Applicant already participates in a group comprised of representatives from both government and private industry which is studying the types of improvements and facilities which will be needed to handle the additional traffic which will be generated by all the new projects in the Ewa region.

§ 226-23. Objective and policies for socio-cultural advancement -- leisure.

(a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

(b) To achieve the leisure objective, it shall be the policy of this State to:

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(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.

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(6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.

Comment:

The 150-acre marina will provide a new recreational facility which will accommodate the State's objectives relating to leisure activities which also promote socio-cultural advancement.

2. State Functional Plans

The Functional Plans, along with the County General Plans, are the primary means of implementing the State Plan. The Functional Plans set forth objectives, policies and programs to guide the State and County governments and the private sector in implementing the State Plan. (H.R.S. Sec. 226-59 and 60.)

The following Functional Plan policy statements are relevant:

Land Use and Planning A(2) Policy:

Ensure that intended uses for the site respect community values and are compatible with the area's physical resources and recreational potential.

Comment:

Development of Ewa Marina's proposed golf course and marina will allow a significant portion of the 1,110 acres to remain in open area, thus respecting the surrounding communities' needs to have scenic view planes available and, also, to be separated from OSCO's sugarcane plantation. Additionally, the golf course will help to preserve the area's non-potable water resources because it will serve as a settlement basin for the storm waters which flow from the Waianae Mountain Range, thus allowing the aquifer to be recharged.

Recreation Facilities & Programs C(1) Policy:

Maintain an adequate supply of recreation facilities and programs which fulfill the needs of all recreation groups.

Comment:

Oahu has a shortage of golf courses available for public play. It also has a tremendous demand for berthing facilities at the few boat harbors in existence. The golf course and the marina which are planned for the Ewa Marina project will help to alleviate the shortages of these much needed recreational facilities.

C. City.

1. General Plan

The Oahu General Plan ("General Plan") is a statement of the City's long-range social, economic and environmental objectives and includes broad policies adopted by the City to achieve those objectives. One of the goals of the City's General Plan is to encourage development of the Ewa DP Area as a secondary urban center which will accommodate approximately 12 to 13.3 percent of Oahu's total population by the year 2010.

As is discussed below, Applicant's proposed Ewa Marina development, of which the golf course is a major component, fulfills many of the General Plan's objectives and policies.

a. Population.

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Objective C. To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.

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Policy 2. Encourage the development within the secondary urban center at Kapolei and the Ewa and Central Oahu urban-fringe areas to relieve developmental pressures in the remaining urban-fringe and rural areas and to meet housing needs not readily provided in the primary urban center.

Policy 3. Manage physical growth and development in the urban-fringe and rural areas so that:

- a. An undesirable spreading of development is prevented; and

- b. Their population densities are consistent with the character of development and environmental qualities desired for such areas.

Comments:

The development of Ewa Marina is in keeping with the City's objective of directing population increases on Oahu to the Ewa DP Area.

Ewa Marina will be a master-planned community which will provide homes for 4,850 families, facilities for leisure-time activities such as boating, golf and tennis, and numerous employment opportunities, all in a physically attractive setting. Prospective residents will be able to select from a variety of homes, including affordable mid-rise apartments, townhouses, moderately priced single-family homes, and luxury homes fronting the ocean, marina or golf course. At full development, it is expected that Ewa Marina will house over 13,500 residents.

Economic Activity.

Objective A. To promote employment opportunities that will enable all the people of Oahu to attain a decent standard of living.

Policy 1. Encourage the growth and diversification of Oahu's economic base.

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Objective G. To bring about orderly economic growth on Oahu.

Policy 1. Direct major economic activity and government services to the primary and secondary urban centers.

Policy 2. Permit the moderate growth of business centers in the urban-fringe areas.

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Comments:

It is anticipated that the development of Ewa Marina's 150-acre marina component, with its 1,600 boat slips, will stimulate the growth of a boating industry in Ewa, creating new opportunities for enterprises engaged in the sale and servicing of boats and other ocean-related supplies, sporting goods and equipment. Thus, the City's objectives of encouraging the diversification of Oahu's economic base and permitting the growth of business centers and other economic activity in the Ewa DP Area will be met.

Natural Environment.

Objective A. To protect and preserve the natural environment.

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Policy 4. Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water-recharge areas, distinctive land forms, and existing vegetation.

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Policy 6. Design surface drainage and flood-control systems in a manner which will help preserve their natural settings.

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Objective B. To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

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Policy 2. Protect Oahu's scenic views, especially those seen from highly developed and heavily travelled areas.

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Policy 4. Provide opportunities for recreational and educational use and physical contact with Oahu's natural environment.

Comments:

Ewa Marina is an important link in the Kalo drainage system. As indicated earlier, storm water from the Waianae Mountain Range and the lands mauka of Ewa Marina drain onto the Property, carrying with it sediment and other contaminants. Left alone, this storm water would drain into the ocean, diminishing the quality of Oahu's coastal water.

The golf course proposed for the Property and the marina planned for Phase I play an important role in the Kalo drainage system. The golf course will serve as a settlement basin, allowing sediment and other contaminants to be removed through filtration before the storm water drains into the marina and ultimately into the ocean. In this manner, the development of the project will help to preserve the quality of the environment. Additionally, the golf course and the marina will provide an attractive setting for the area and will enhance existing scenic view planes.

Housing.

Objective C. To provide the people of Oahu with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by public utilities.

Policy 1. Encourage residential developments that offer a variety of homes to people of different income levels and to families of various sizes.

• • •

Policy 3. Encourage residential development near employment centers.

Comments:

Ewa Marina will contain 4,850 housing units in a range of prices, including affordable mid-rise apartments, townhouses, moderately-priced homes, mid-range homes and luxury homes. It will also provide over 2,000 jobs for residents of the project and the surrounding area. As conceived, thus, the project will provide both housing as well as employment opportunities for a wide segment of the population.

Transportation and Utilities.

Objective A. To create a transportation system which will enable people and goods to move safely, efficiently, and at a reasonable cost; serve all people, including the poor, the elderly, and the physically handicapped; and offer a variety of attractive and convenient modes of travel.

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Policy 4. Improve transportation facilities and services in the Ewa corridor and in the trans-Koolau corridors to meet the needs of Ewa and Windward communities.

Policy 5. Improve roads in existing communities to reduce congestion and eliminate unsafe conditions.

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Objective B. To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.

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

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Policy 6. Support programs to recover resources from solid waste and recycle wastewater.

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

Policy 3. Plan for the timely and orderly expansion of utility systems.

Comments:

Ewa Marina satisfies the transportation and utilities policies and objectives pertinent to the Ewa DP Area. With respect to transportation, Applicant will participate in the implementation of the Ewa Highway Master Plan or, alternatively, will

participate on a fair share basis in the funding and construction of transportation improvements which are necessitated by the development of the project.

With respect to utilities, Applicant has already contributed over \$10.0 million for the cost of developing new potable water sources, storage systems and transmission lines. Additionally, Applicant is installing new sewer mains and lines to dispose of wastewater from the project. In addition to benefiting Ewa Marina, these water and sewer lines will also benefit the existing Ewa Beach Community.

Applicant supports programs designed to recover resources and is willing to construct an on-site sewage treatment plant, which will provide water which can be used to irrigate the golf course.

f. Physical Development and Urban Design.

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

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Policy 4. Require new developments to provide or pay the cost of all essential community services, including roads, utilities, schools, parks, and emergency facilities that are intended to directly serve the development.

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Objective C. To develop a secondary urban center in Ewa with its nucleus in the Kapolei area.

Policy 2. Encourage the development of a major residential, commercial, and employment center within the secondary urban center.

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Policy 3. Establish a green belt in the Ewa and Central Oahu areas of Oahu in the Development Plans.

Comments:

The development of Ewa Marina is in keeping with the City's objectives and policies designating the Ewa DP Area for development as a secondary urban center, encouraging the development of a major residential, commercial and employment center and establishing a green belt area. As indicated earlier, Applicant will pay its fair share of the cost of the facilities Ewa Marina will require.

g. Public Safety.

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

• • •

Policy 2. Require all developments in areas subject to floods and tsunamis to be located and constructed in a manner that will not create any health or safety hazard.

Comments:

The flood control features of the golf course and the marina meet the City's objectives and policies relating to public safety. In addition to these contributions, Applicant is willing to participate with the city and state civil defense agencies and other developers in the area in formulating and implementing an emergency preparedness and evacuation plan.

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h. Culture and Recreation.

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Objective D. To provide a wide range of recreational facilities and services that are readily available to all residents of Oahu.

Policy 1. Develop and maintain community-based parks to meet the needs of the different communities on Oahu.

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Policy 7. Provide for recreation programs which service a broad spectrum of the population.

Policy 8. Encourage ocean and water-oriented recreation activities that do not adversely impact on the natural environment.

Policy 9. Require all new developments to provide their residents with adequate recreation space.

Policy 10. Encourage the private provision of recreation and leisure-time facilities and services.

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Policy 11. Encourage the safe use of Oahu's ocean environments.

Comments:

The marina, golf course, tennis complex and parks which will be developed at Ewa Marina are in keeping with the city's objectives and policies relating to the development of a wide range of recreational facilities for the Ewa community. The marina will provide numerous new opportunities for ocean and water-oriented recreational activities. Additionally, the project will contain parks, including a 17-acre Gateway Park, and facilities which were previously unavailable to area residents.

2. Development Plan

a. Consistency with Common Provisions.

1) General Urban Design Principles and Controls.

a) Open Space.

The proposed golf course and the marina are consistent with the objective of providing visual relief and contrast to the built-up, surrounding environment and will provide the physical boundary recommended by the DP, distinguishing Ewa Marina from other communities. Applicant

notes that maintenance of open space areas is given high priority under the Development Plan Common Provisions ("DP Common Provisions").

b) Vehicular and Pedestrian Routes.

The proposed golf course, which will border on Fort Weaver Road, and the marina will meet the objective of providing landscaping along major vehicular routes as a means to increase the general attractiveness of the community. Together, the golf course and the marina will provide attractive landscaping and a pleasant scenery for motorists.

2) General Principles and Controls for Parks, Recreation and Preservation Areas.

a) Ewa Marina will contain a 17-acre Gateway Park, several smaller parks, and a 150-acre marina in addition to the proposed golf course. This is in conformance with policies and objectives of the DP Common Provisions. Additionally, the proposed golf course helps to fulfill the DP Common Provision objective of providing a standard of one public or semi-public 18-hole golf course per 100,000 people. As indicated, 40% of the tee times will be made available to the general public and the remainder of the tee times will be allocated to the residents of the Phase I residential subdivision and visitors to the commercial center.

3) Identification of Areas, Sites and Structures of Historical Significance.

Most of the Property has been used for sugarcane cultivation for many years and, consequently, only two archaeological sites have been found. These two sites are located in the uncultivated haole koa forest. Applicant's archaeologist, however, has determined that these two sites are significant for informational purposes only and do not merit preservation. During the construction of Ewa Marina, should any archaeological resources such as artifacts, shell, bones or charcoal deposits, human burial, or rock or coral alignments,

paving or walls of historic or prehistoric significance be encountered, Applicant will immediately stop work in the impacted area and notify the Historic Preservation Division of the State Department of Land and Natural Resources.

4) Thoroughfares, Highways and Streets.

Applicant will consult with the Director of Transportation Services and the Chief Engineer to ensure that roadways in the development conform to applicable standards.

5) Public Buildings and Public or Private Facilities for Utilities, Terminals and Drainage.

a) Wastewater Treatment Facilities.

The Honouliuli wastewater treatment plant is situated mauka of the Ewa Marina project and Increment 2 will satisfy the DP Common Provisions requirement that it be screened from incompatible uses.

b) Drainage.

The proposed golf course will serve as a settlement basin for the flood and storm waters flowing through the Kaloi drainage system and into the marina. This conforms to the DP Common Provisions' objectives relating to drainage systems.

6) Sequencing Policies.

The proposed development will coincide with the City's objectives relating to the sequencing of public facilities. Since Applicant, at its own cost, will be installing all of the infrastructure for the development, the City will be able to use its capital improvement budget to provide public facilities in other areas of Oahu.

b. Consistency with Ewa DP Special Provisions.

The proposed use for the Property is consistent with the Ewa DP's policies and objectives, which indicate that additional housing, commercial and recreational facilities should be developed in the area westerly of Ewa Beach, which is where the Property is located. The proposed development is also consistent with the open space, public view and height considerations contained in the Ewa DP.

c. Consistency with Development Plan Land Use Map.

The Development Plan designation for the Property is Agriculture. Applicant requests, however, that the designation be amended in order for the planned mixed-use commercial complex component of Applicant's Ewa Marina project to be built.

d. Consistency with Public Facilities Map.

The Development Plan Public Facilities Map for Ewa ("Ewa Public Facilities Map") does not indicate that any public facilities are planned for the Property. This, however, is not inconsistent with development of the proposed commercial center since Applicant, at its own expense, will be constructing all of the needed infrastructure.

V. IMPACTS

A. Demographic Impacts.

1. Residential Population.

Since most of the Property is currently used for sugarcane cultivation, there will be no displacement of any residential population. Further, there will not be a population increase on the Property since no housing is proposed for this portion of the Ewa Marina project. It is anticipated that employees for the golf course and the commercial center will reside in Phase I, the nearby Ewa Beach Community, and the new residential subdivisions being developed in the Ewa DP Area.

2. Visitor Population.

The visitor facilities which are planned for the Property, will result in an increase of visitors to the Ewa DP Area. This will be beneficial to the economy.

3. Character or Culture of the Neighborhood.

The Property is bordered by sugarcane lands to the north and Phase I of Applicant's proposed Ewa Marina development to the south. On the west, the Property borders on the NASBP golf course and across Fort Weaver Road on the east is the planned Myers golf course. The nearest community, other than NASBP, is the Ewa Beach Community.

The character of the Ewa Beach Community is already in transition because of the designation of Ewa as a secondary urban center and the approved development of the Ewa Marina Special Area. Housing developments such as Ewa Gentry and West Loch Estates are already transforming the area from a rural, agricultural community to a predominantly suburban community. Inevitably, the newcomers who are moving into the new subdivisions being developed will cause a change in the social and economic characteristics of the communities in the existing area. However, improvements will be made to facilities, such as water, sewer and utilities, and with the urbanization of the area, services, such as police and fire protection, schools and health care establishments, will also be improved. Whether or not the proposed mixed-use commercial center is built, therefore, the character and culture of the existing neighborhood will change.

Applicant's proposed commercial complex will actually mitigate the impact of the changes to the area by providing new economic opportunities for the existing area residents.

4. Displacement.

The proposed commercial complex will not displace any individual since the Property does not presently contain any housing units but it will result in less land being available for OSCO's sugar operations. The resulting impact will be slight, however, because OSCO already intends to reduce the size of its plantation and because its lease will expire in 1995 in any event. With the withdrawal of the Property, the sugar plantation will become compact rather than scattered and will result in shorter and less expensive trucking distances to the mill. Since the Property is located on the outskirts of the plantation, there will be no adverse impact on OSCO's irrigation system and cane haul

roads. Moreover, because development of the site will result in the elimination of inferior-quality plantation lands, average yields for the plantation may actually increase.

The long-term future of OSCO will remain uncertain whether Applicant develops the Property or not because of flat sugar prices with operating costs that increases with inflation, the uncertainty of continued federal price supports and the fact that all of OSCO's leases will expire by the mid-1990s.

5. Other Social Impacts.

Applicant is not aware of any other social impacts.

B. Economic Impacts.

1. Economic Growth.

Development of the proposed commercial complex will aid economic growth in the Ewa area.

In the past, sugar played an important role in the Ewa economy. Sugar, however, is becoming increasingly less viable as an industry in Hawaii because of worldwide competition and decreasing levels of federal support. In sharp contrast, the commercial complex will provide stable employment opportunities associated with the marina.

2. Employment.

As indicated previously, the commercial complex will provide over 2,000 new employment opportunities for residents of Ewa Marina, Ewa Beach and other communities. In contrast, fewer than 30 jobs will be lost as a result of the contraction of the sugar plantation.

3. Government Revenues (Taxes).

The State and County will experience a substantial increase in revenue as a result of the development of the Property. For the County, recent property tax revenues from sugar operations have been very low, less than \$7,000 per year. Similarly, for the State, revenue has been negligible because sugar is exempt from excise taxes and also because OSCO's operations have only been marginally profitable.

In contrast, if the Property is developed as planned, the County will receive approximately \$500,000.00 in rollback taxes. Additionally,

there will be a substantial increase in property tax revenues since the golf course and improvements will have a much higher value. It is estimated that after completion, property taxes generated from the mixed-use commercial complex will amount to several million dollars a year. The State will likewise gain considerable revenue from excise taxes which will be collected.

In comparison to the revenue gain, the State and County capital improvement expenditures for the Property will be relatively modest because Applicant will be providing its own on-site infrastructure and will be contributing its fair share of the cost of off-site improvements.

4. Location Vis-a-Vis Intended Market.

As indicated, the intended market for the mixed-use commercial complex will be the residents and visitors of Ewa Marina and the general public.

C. Housing Impacts

Development of Ewa Marina's mixed-use commercial complex will have no impact on housing.

D. Public Services

1. Access and Transportation.

Fort Weaver Road is currently the only north-south road affording ingress and egress to the Property. Fort Weaver Road is a 4-lane, divided highway from its intersection with Farrington Highway south to Hanakali Road. From that point southward to Ewa Beach, it is a 2-lane rural road. This southern section is scheduled for widening to 4 lanes in 1990. The Kunia Interchange provides access to the H-1 Freeway from Fort Weaver Road. (See Exhibit J, Roads and Highways.) In contrast to the other developments in the Ewa DP Area, development of the Property is not expected to cause a significant increase in traffic along Fort Weaver Road or the H-1 Freeway during peak traffic hours. The main source of traffic to and from the Property will be employees traveling to or from work and golfers arriving or leaving the golf course throughout the day and these motorists will not add significantly to traffic congestion.

Although the proposed development will not unduly burden the existing transportation facilities in the Ewa area, Applicant recognizes that the

overall population growth in the region will do so; thus, Applicant has been working with the State Department of Transportation in an effort to help remedy the anticipated transportation problems and is willing to pay its fair share of such improvements as are necessary.

2. Water.

The Project is located within the Waianae District of the Board of Water Supply ("BWS") water system. Existing BWS infrastructure in the area includes a 30-inch water main running along Farrington Highway between Waipahu and the Barbers Point 215-foot storage system and a 16-inch transmission main which branches off the 30-inch Farrington Highway main and runs the length of Fort Weaver Road to supply Honouliuli, Ewa Beach and Ewa Village with water.

The Ewa Water Master Plan of August 1987 sets forth guidelines for water use in the Ewa District and was approved by the Board of Water Supply. In accordance with the Ewa Water Master Plan, Applicant has already contributed over \$10 million towards the development of a regional water system and expects to commit additional funds before the system is completed. Currently, a variety of new installations, including a 36-inch main under Fort Weaver Road, water reservoirs, wells and pumping systems are near completion. These developments are being coordinated by the Ewa Plain Water Development Corporation ("EPWDC"), of which Applicant is a member. (See, Exhibit K, Ewa Plain Water Development Corp.--Water Facilities Map.)

It is estimated that the commercial complex will consume between 700,000 and 710,000 gallons of potable water per day out of the total supply of 3,2937 MGD of potable water which Ewa Marina will receive under the Ewa Water Master Plan.

Previously, the master plan for Ewa Marina proposed the development of 2,350 housing units on the Property. By replacing these units with the proposed golf course and the commercial complex, the potable water consumption for Ewa Marina will be reduced by over ten percent (10%) or over 300,000 gallons per day. Thus, even with the development of the commercial complex, projected potable water requirements for Phase II will remain at or below the level which was originally approved in the Ewa Water Master Plan.

3. Wastewater.

Wastewater from the proposed commercial complex will be collected at the source and flow through underground pipes to the sewage pump station that is planned in the Phase I area. From there, it will be pumped through a large underground force main to the Honouliuli Wastewater Treatment plant.

The Honouliuli Wastewater Treatment Plant presently has a capacity of handling 25 mgd of wastewater. This is believed to be insufficient to handle the wastewater which will be generated by the Property as well as other developments in the area. It is expected, however, that capacity at the plant will be increased to 38 mgd by 1993.

4. Drainage.

The Ewa Marina project is located within the Kaloi Drainage Basin where storm run-off from the southern slopes of the Waianae range naturally flows through other development areas and then across a large swath of land on the Property. As additional sugarcane lands mauka of Ewa Marina are converted to urban uses, potential flooding and drainage problems will likely be aggravated. The issue of drainage, therefore, presents a serious concern to both Applicant as well as the developers of other projects.

Storm flows from the Kaloi Basin are presently being channeled through an existing man-made gulch which meanders through the Ewa Gentry development (located mauka of Ewa Marina) and over portions of the Ewa Marina project. Through sheet flow released at the gulch outlet (about midway through Phase I), and through ground water percolation, the storm waters eventually reach the ocean.

Potentially, storms may generate as much as 10,400 cubic feet of water per second. To handle this flow, the master plan for Ewa Marina calls for the construction of a golf course on the Property with a strip of open land 400 to 600 feet wide. This open space will serve to direct potential flood water toward the marina and also to act as a buffer for the rest of the project. In addition, a channel will be constructed which will allow the storm water entering the golf course to empty into the marina. In designing and constructing the channel, consideration will be given to the volume of water originating off-site from the Ewa Gentry project and other projects, as well as from the Ewa Marina project itself. The golf course will also filter out off-site silt which would otherwise enter the marina waters.

5. Solid Waste.

The commercial complex will generate 9 tons per day of solid waste. This will be placed in on-site dumpsters and collected by private haulers and transported to the City & County of Honolulu's nearby HPOWER facility for disposal. Applicant proposes to have the waste disposed of at the Kalahao Landfill in Kaliua, the Waimanalo Gulch Landfill near Kahe Power Plant or the Waipahu Incinerator.

6. Schools.

As the Property will not house permanent residents, it will not create any burden on the existing or proposed educational facilities in the area. However, any unforeseen needs can be met by the following public schools which already exist: Ewa Beach Elementary, Kaimiloa Elementary, Pohalea Elementary, Barbers Point Elementary, Iroquois Point Elementary, Ilima Intermediate and Campbell High School. Elementary, intermediate and high schools are also being considered for location at Kapolei Village, West Loch, and Ewa Gentry. In addition, a site has also been set aside on Phase I of Ewa Marina in the event that an increase in population requires that another educational facility be erected.

7. Parks.

The major park facility in Ewa Marina will be the nearby, 30-acre Oneula Beach Park owned by the City. In addition to this City park, smaller parks and playgrounds, including the 17-acre, Ewa Marina Gateway Park, will be scattered throughout Ewa Marina. The 150-acre marina, of course, will also be available.

Nearby neighborhood parks are plentiful and will also be available. They include or will include parks located in Ewa Gentry, Ewa Beach, Ewa Villages, Ko Olina, Kapolei Village, West Loch, Makakilo and a beach park near the Naval Air Station. A major regional park is also planned in the Kapolei development.

8. Police.

Police from the Pearl City police station regularly patrol the area which includes the Property. Moreover, in order to meet the demand for police protection which the new developments in the Ewa DP Area will require, a new police station in nearby Kapolei is planned and Ewa will be designated as a new police district.

9. Fire.

The City plans to relocate the existing Ewa Beach fire station onto Phase I of Ewa Marina. When this is done, adequate fire protection will be available. Additionally, the existing fire stations at Makakilo and Waipahu and the planned stations at Tenney Village, Kapolei, and Ko Olina will be available to provide backup services.

10. Utilities.

a. Electric

Hawaiian Electric Company ("HECO") will provide electrical power to the Property. HECO will be constructing a new substation to meet the new demands which Ewa Marina and other developments in the area will generate and to supplement the service already being provided by the Ewa and the Honouliuli substations which are located mauka of the Property.

b. Telephone

Hawaiian Telephone Company will provide telephone services to the Property through existing lines along Fort Weaver Road and through underground lines in the project area.

11. List of Agencies Consulted.

Applicant has consulted with various state and county agencies in connection with its application for the State Land Use Boundary Amendment for Phase II. However, Applicant has not consulted with any agency specifically with reference to this application.

E. Environmental Impacts

1. Noise.

The Property is currently subjected to overflights, noise, and other intrusions, associated with aircraft utilizing the runways of HIA and NASBP. The existing combined (due to HIA and NASBP operations) day-night average sound level (Ldn) at the Property is estimated to range from about 55 Ldn to over 70 Ldn.

The Property is also subject to restrictions pursuant to an easement in favor of the United States of America. The easement prohibits the

construction of homes or other noise sensitive improvements, such as residential units.

2. Air Quality.

The principal source of short-term air quality impact will be construction activity. Construction vehicles will increase automotive pollutant concentrations along the principal access roads in the vicinity of the Property. They will also reduce the capacity of roadways and lower average travel speeds. This, in turn, will contribute to additional air pollution emissions. Furthermore, site preparation, earth moving, building, and on-site road construction will create particulate emissions.

Air samples were taken at two roadway intersections during September 1989. The sampling indicates that under a "worst case" analysis, development of the Property will not cause carbon monoxide concentrations at the Fort Weaver Road-Geiger Road intersection to exceed either federal or state standards during the morning and afternoon peak hours. With respect to Kunia Road at the H-1 Freeway, the sampling revealed that state standards will be exceeded by 1998 even if the Property is not developed.

3. Compatibility with Surrounding Environment.

Since the proposed mixed-use commercial complex is a component of the master-planned Ewa Marina project, it naturally will be designed to be architecturally and aesthetically compatible with its surrounding environment.

4. Historic and Archaeological Resources.

No cultural features exist on the majority of the Property which has been under sugarcane cultivation for decades. However, in the 20 acres of uncultivated land on the western side of the Property, 2 archaeological sites have been found. These sites, T-80 and T-84, were assessed as significant solely for information content.

5. Natural Features.

a. Water Resources.

Applicant will establish a groundwater monitoring plan and system in accordance with State Department of Health guidelines as part of its efforts to minimize the Ewa Marina project's impact on water resources in the area.

b. Flood Plain Management.

The project site identified on the Flood Insurance Rate Map (Community-Panel 150001-0135-B) as an area in which flood hazards are undetermined. Urban development and drainage improvements being made upstream of Ewa Marina will significantly alter both the volume and course of the runoff that must be accommodated. The drainage program discussed earlier will mitigate the Property's exposure to flood hazards.

c. Wetlands Protection.

There are no wetland areas on the property.

d. Coastal Zone Management

The project does not involve a Federal permit, and so is not subject to the consistency requirements of the CZM program. It is, however, subject to the Hawaii Coastal Zone Management Act, Chapter 205(a) of the Hawaii Revised Statutes, which establishes state policies for actions affecting the coastal zone.

Development of the Property will have minimal or no impact on the goals and objectives of the Coastal Zone Management Act, primarily because it is located substantially inland from the shoreline. Consequently, there are no beaches, surfing sites or other coastal resources or recreational activities which need to be considered.

As discussed earlier, storm run-off will pass over the Property on its way to the ocean and the Property, therefore, will be designed to allow this water to be channelled and drained into the marina planned for Phase I. This will allow sediment to be filtered before the storm waters reach the ocean. In this manner, the present quality of the coastal waters will be maintained.

The Property does not contain any coastal ecosystems of significant biological or economic importance. Features which will be built into the Property such as the wide drainage swale that will convey water from areas inland of the Property, through to the Phase I area, will actually minimize the effect of the volume and quality of the storm run-off from the site.

Consequently, there will be no adverse effect to the coastal water or ecosystems.

The Property does not abut the shoreline and is not in a tsunami or storm wave inundation area. It is also not in a potential subsidence hazard area. Drainage facilities included in the Property, such as the wide drainage swale across the golf course, will ensure that the Property will be in compliance with the requirements of the National Flood Insurance Program.

e. Unique Natural Features.

There are no unique natural features on the Property.

f. Vegetation and Animal Life (Flora and Fauna).

Since the Property has been under cultivation for many years, few feral animals which would normally be found on the Property are present. Thus, the development's impact on such animals will be minimal. There will, however, be a reduction in the present population of doves, finches and pacific golden plovers, but the number of sparrows and common mynahs is expected to increase.

Likewise, due to the years of sugarcane cultivation, the Property does not contain any endangered plant species or other plant species which are not found in abundance elsewhere. The land, therefore, is of little botanical interest and developing it will not have a negative impact on rare or endangered flora in the State.

g. Agricultural Lands.

A small portion of the Property is rated prime agricultural lands of importance to the State ("ALISH"), while the remainder of the Property consists of other important agricultural lands. (See Exhibit L, ALISH Map.)

The soil on the subject property consists of coral outcrop and fill land. While agricultural activity usually associated with these soil types include cultivation of sugarcane, raising of truck crops and maintenance of pasture lands, in actuality the property is coral outcrop and poorly suited for agriculture. (See Exhibit E, SCS Soils Map.)

The immediate effect of developing the Property will be a reduction in the amount of land available to OSCO for its sugar production. However, because the subject property is located on the outskirts of the plantation, OSCO's irrigation system and cane haul roads will not be affected. Moreover, with the withdrawal of the Property, the sugar plantation will become more compact, resulting in shorter, and less expensive trucking distances to the mill. Furthermore, because development of the Property will result in the elimination of inferior-quality plantation lands, average yields for the plantation may actually increase.

The long-term future of OSCO will remain uncertain whether Applicant develops the Property or not. This is so because of flat sugar prices which are combined with operating costs that increase with inflation, the uncertainty of continued federal price supports and the fact that all of Oahu Sugar's leases will expire by the mid-1990s.

The development of the Property will also not adversely affect diversified agriculture. The reasons are as follows: (i) extensive amounts of prime-agricultural lands and water sources have already been freed in other parts of Oahu from sugarcane and pineapple production, thereby making those other lands available for diversified agriculture, (ii) there is a probability that even more lands and water will be freed from sugarcane production due to the marginal profitability of sugar, (iii) most sugar producers would make their lands available for more profitable replacement crops, to the extent that such other crops become available; and (iv) only a small amount of land and water is required to grow those crops which do have a realistic potential for being economically feasible. Thus, given that the supply of available agricultural lands greatly exceeds the demand, the development of the Property will not hinder the growth of diversified agriculture in Hawaii.

h. Open Space.

By design, Ewa Marina will be a project with substantial greenbelt and open space areas. The 272-acre golf course, the 150-acre marina, the 17-acre Gateway park, alone, amount to almost 40 percent of the total project acreage.

6. Hazards.

The Property is impacted by the noise emanating from aircraft operations at NASBP and at HIA. Composite day-night averaged noise levels on the Property from these operations range from 55 Ldn on the eastern side of the Property to 65 Ldn on the western side. In addition to the exposure to aircraft noise, the western side of the Property is subject to potential accidents from aircraft leaving or arriving at NASBP.

In order to mitigate the noise and accident potential impacts of the flight operations from NASBP, the United States of America acquired an easement over approximately 100 acres on the western side of the Property. Within this easement area, development of houses, apartments or similar types of structures in which people would congregate are not permitted. Applicant's planned uses within this area will be compatible with the easement.

F. Alternatives Considered.

Applicant has considered using the Property for the development of housing units. Upon consideration of the demands on water resources and the area's existing transportation system, the lack of employment opportunities, the Property's exposure to aircraft operations at NASBP and HIA, and the fact that tens of thousands of other housing developments are already planned for the Ewa DP Area, including Applicant's own Ewa Marina, Phase I component, Applicant concluded that the proposed use of the Property was a better choice.

Use of the Property for traditional agricultural operations, such as raising food crops or animals or cultivating decorative plants and flowers, was not considered because the Ewa DP designates the area in which the Property is located for the development of housing, commercial and recreational facilities.

G. Proposed Mitigation Measures.

The master plan for the development of Ewa Marina already incorporates the measures which are necessary to mitigate the impacts discussed in this application and environmental assessment. Consequently, no additional mitigative measures are needed.

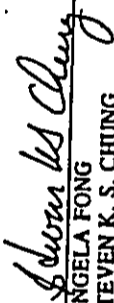
VII. CONCLUSION AND REQUEST

WHEREFORE, Applicant respectfully requests that the Development Plan Common Provisions, the Development Plan Special Provisions for Ewa and the Ewa Development Plan Land Use Map be amended in the manner proposed by this application.

DATED: Honolulu, Hawaii, November 19, 1990.

HASEKO (HAWAII) INC.

By 
NELSON W. G. LEE
Its Development Director


ANGELA FONG
STEVEN K. S. CHUNG
Attorneys for Applicant
HASEKO (HAWAII), INC.

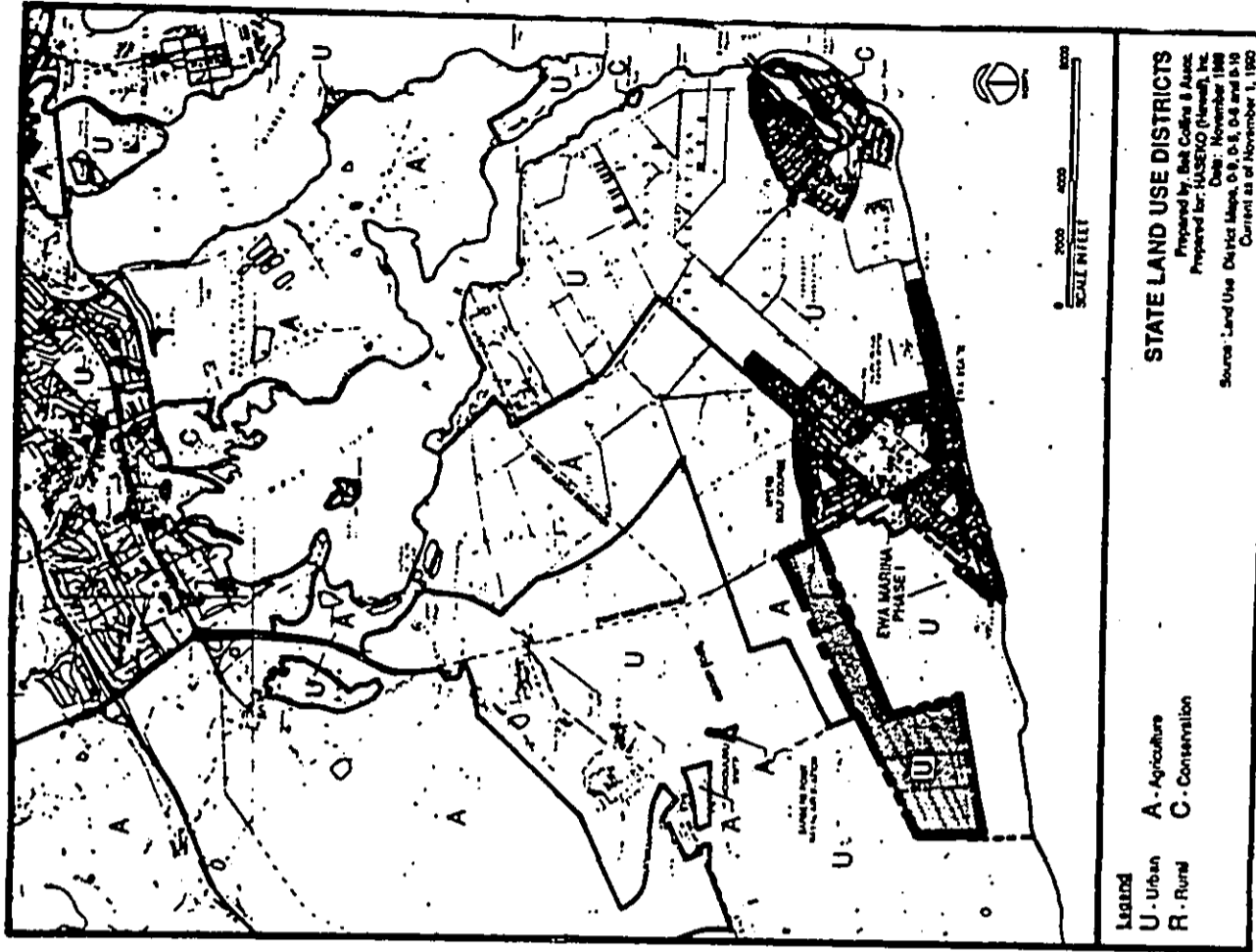


EXHIBIT A

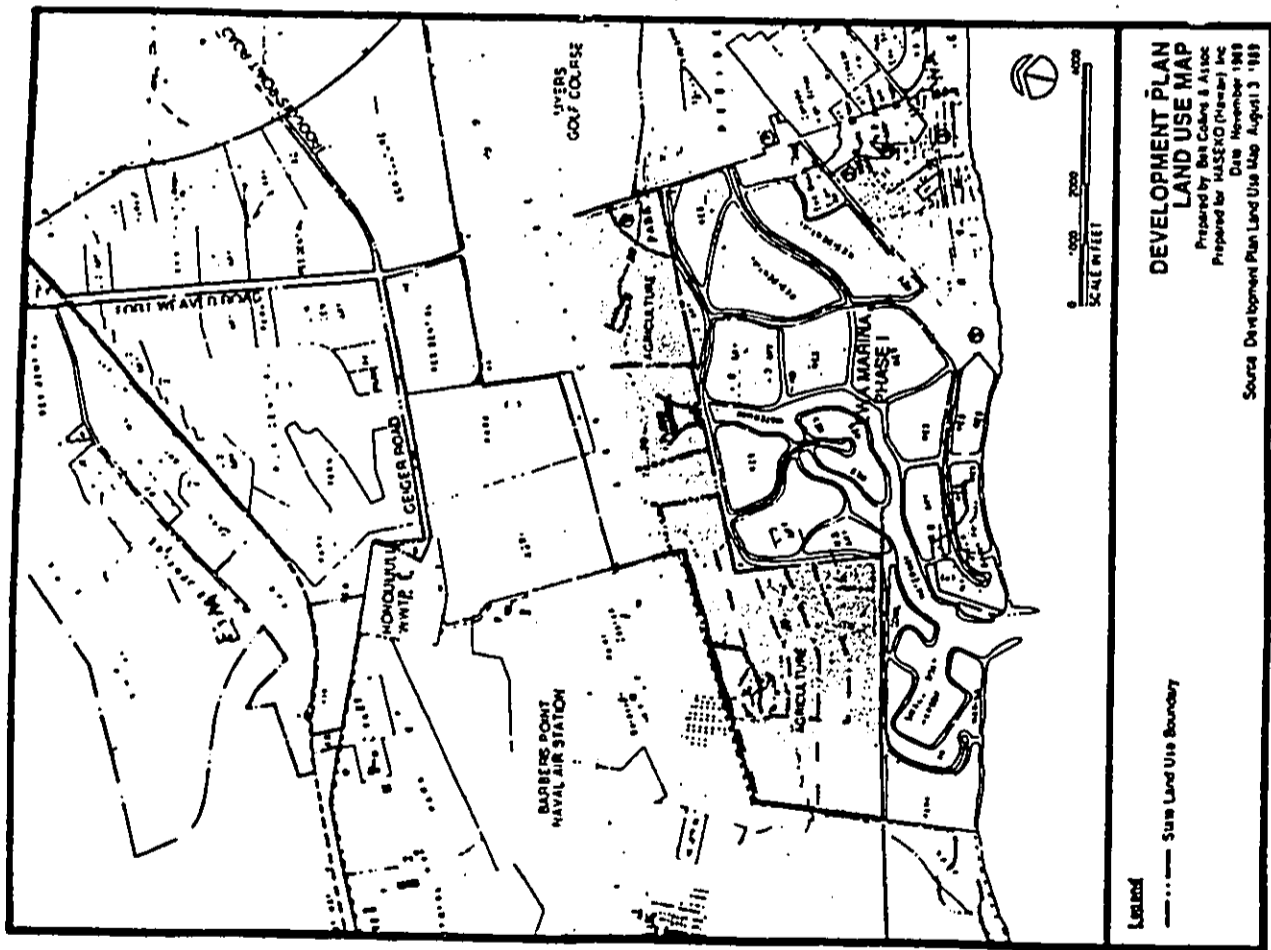


EXHIBIT B

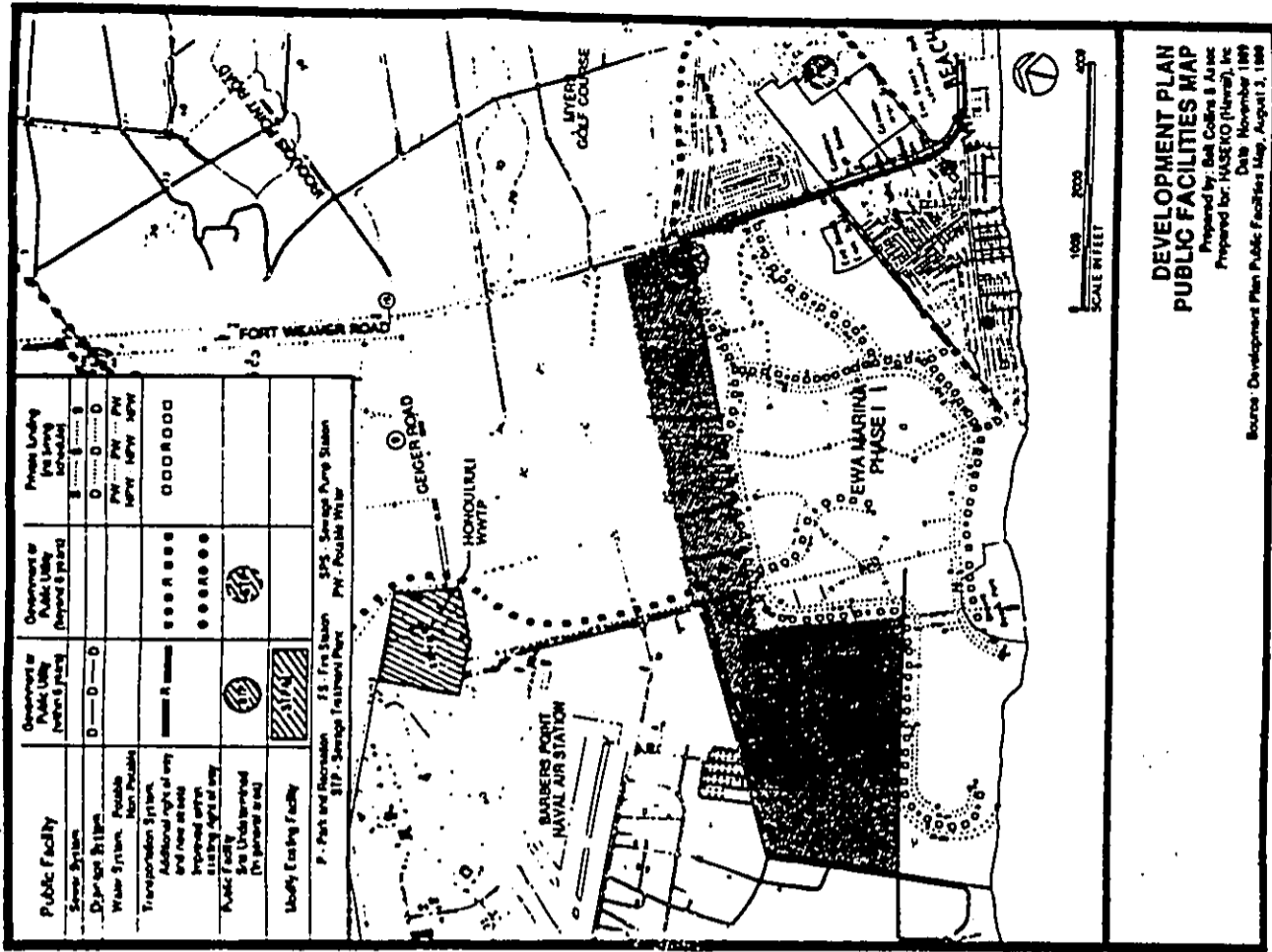


EXHIBIT C

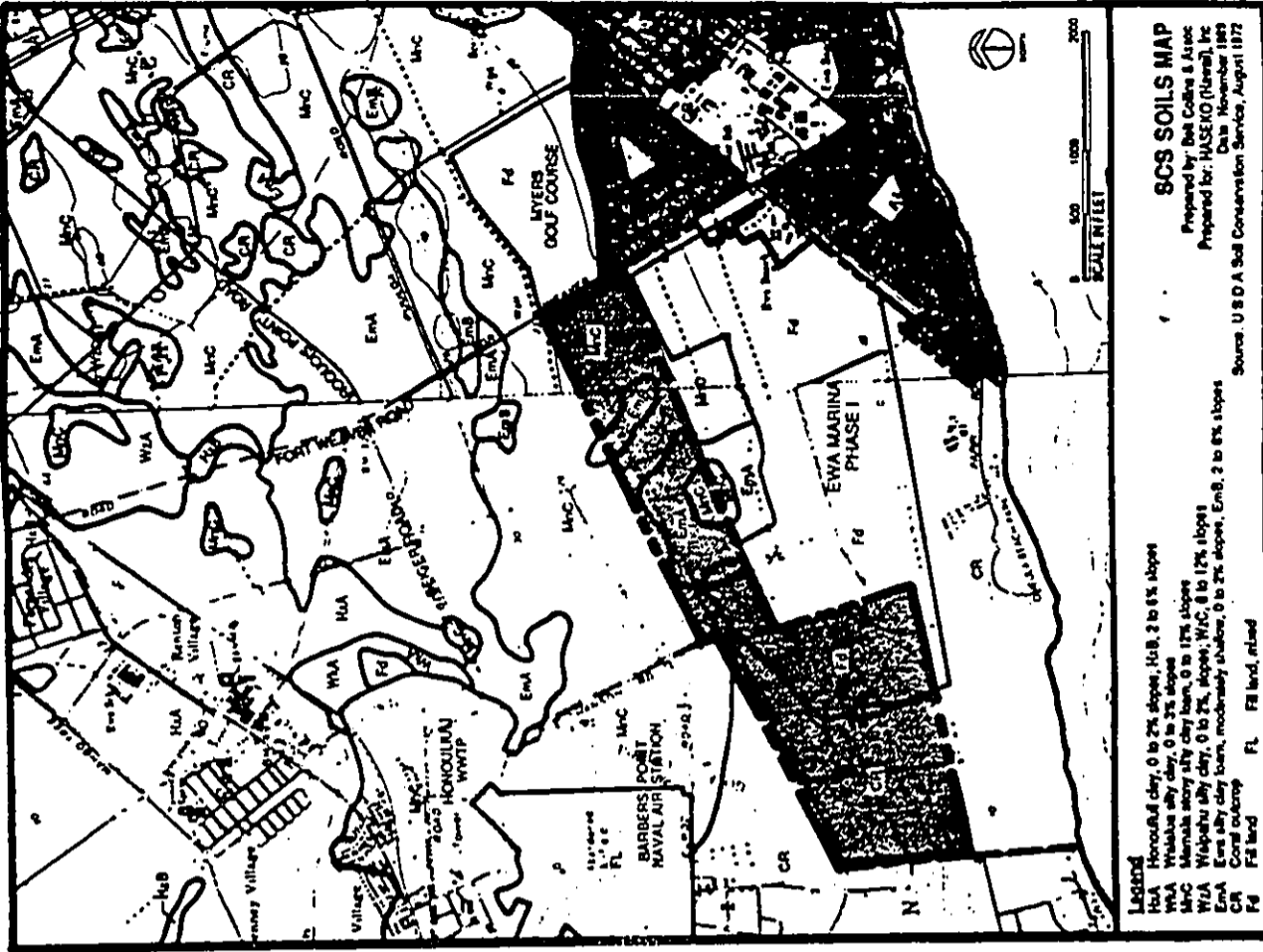
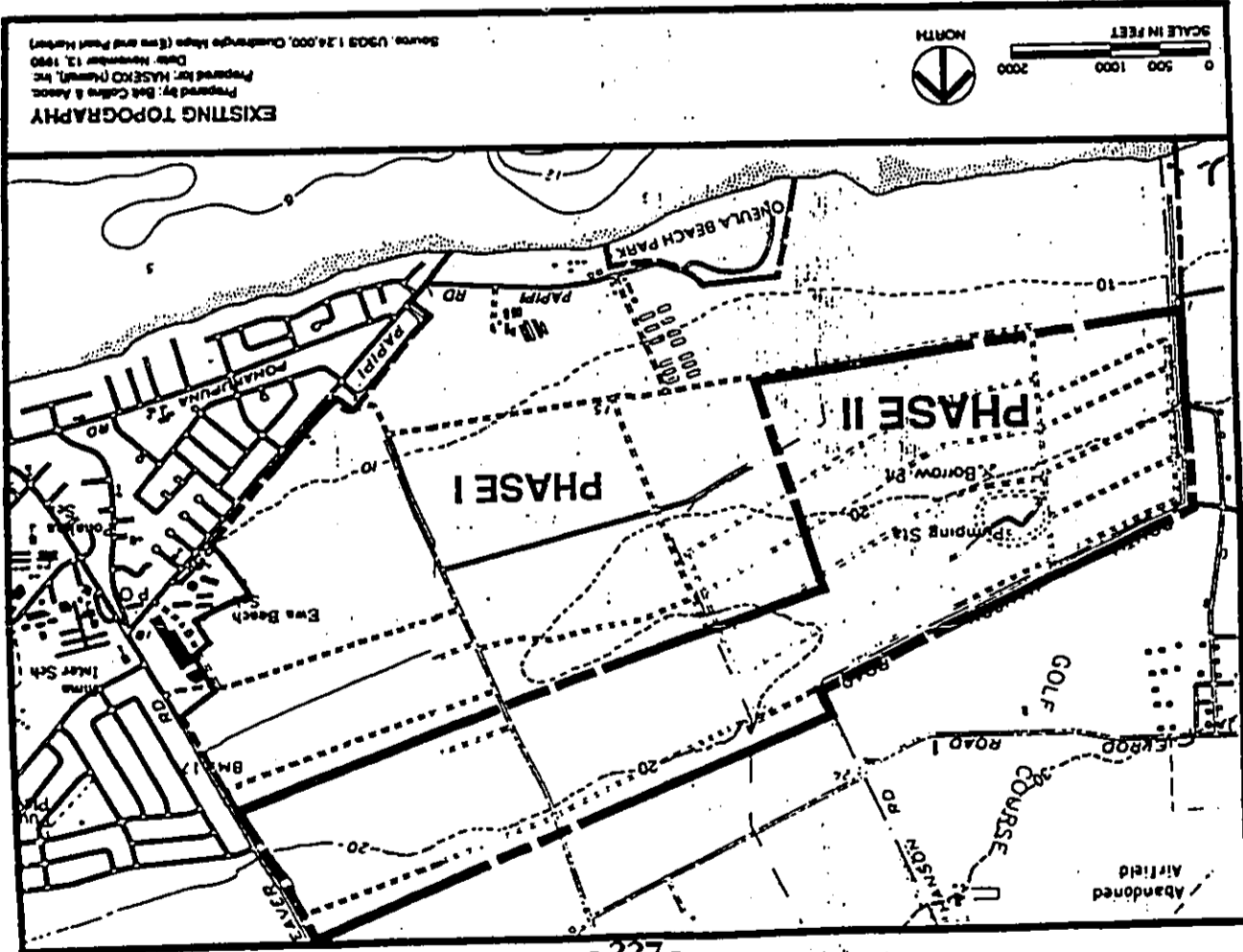


EXHIBIT E

EXHIBIT D

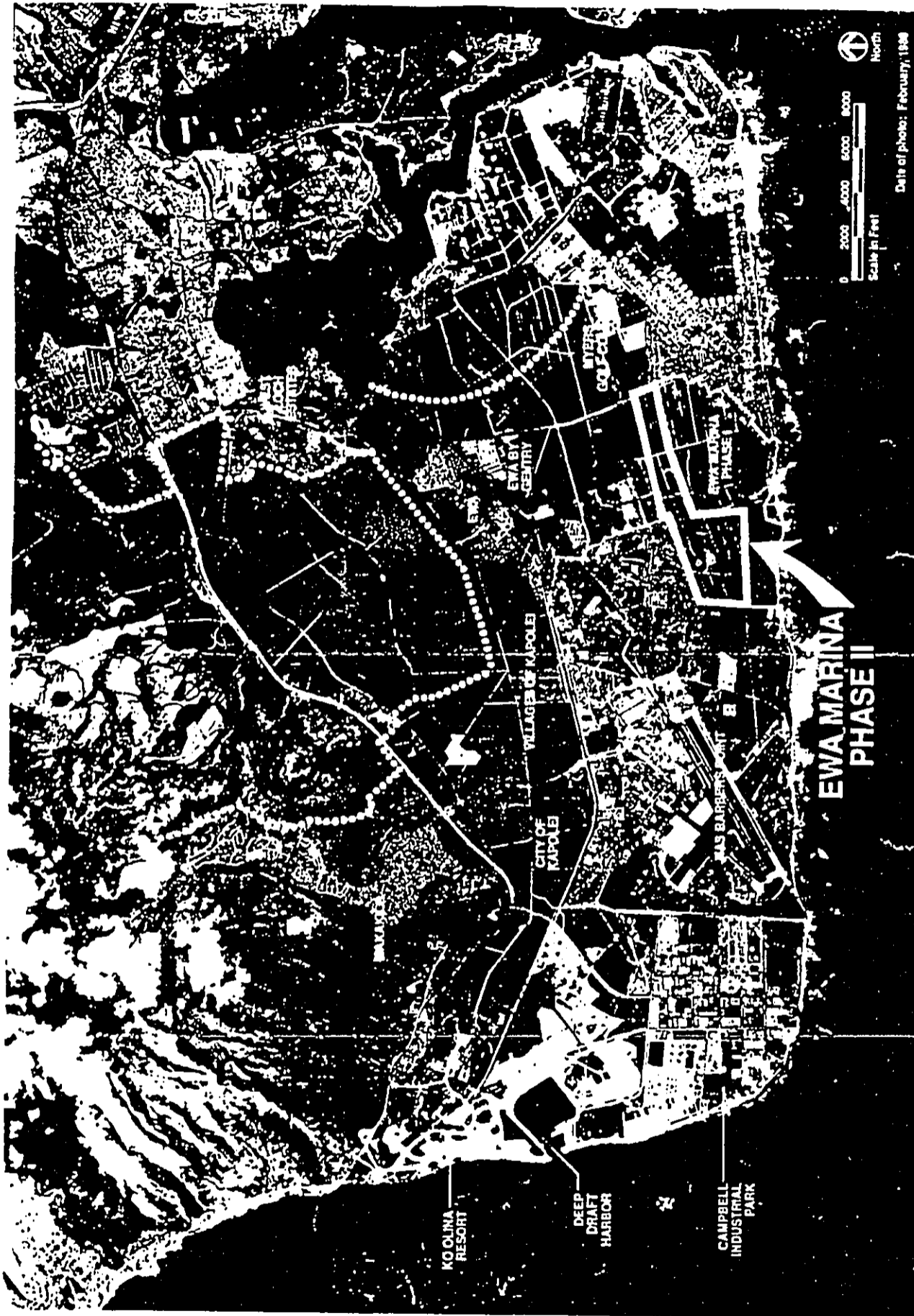
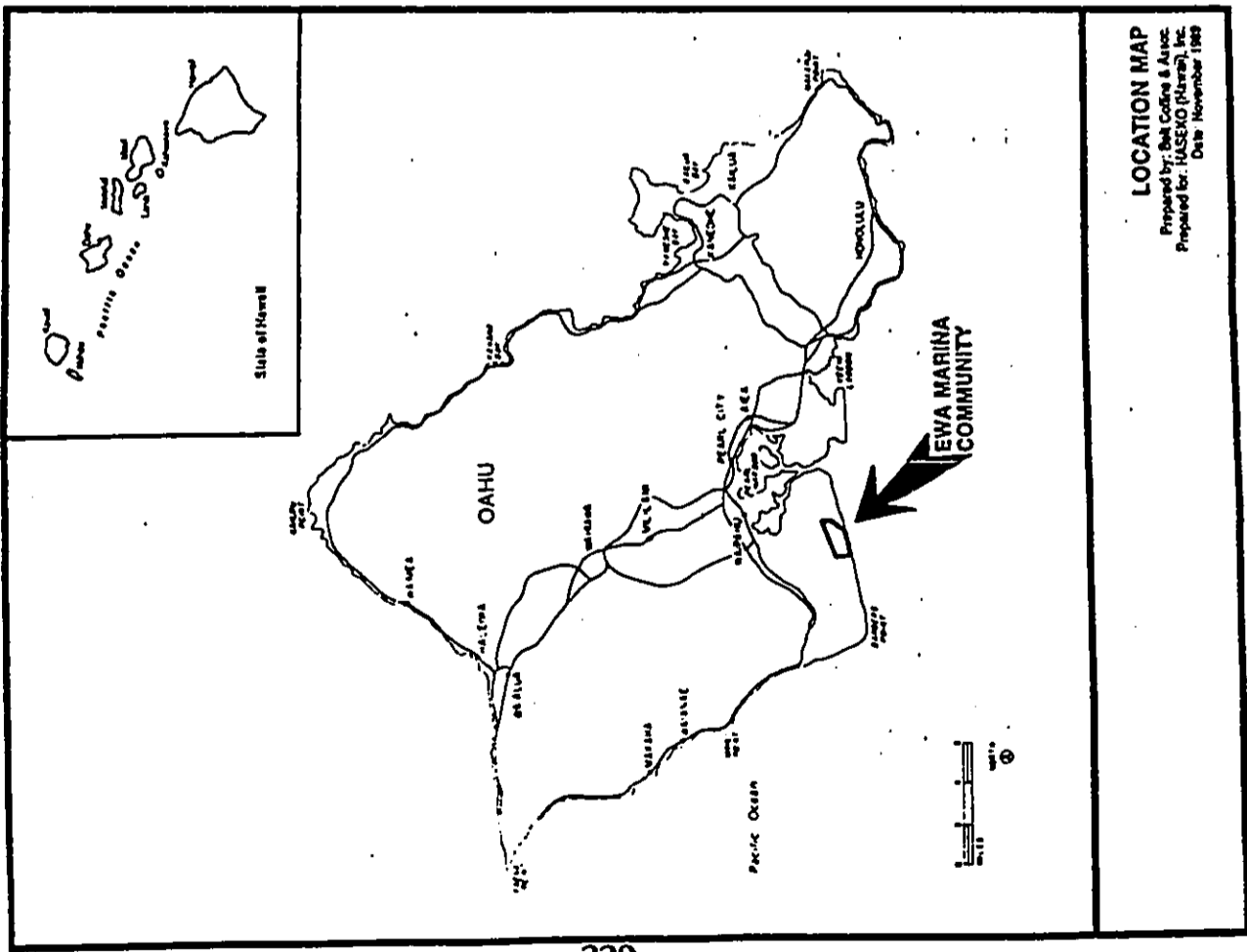
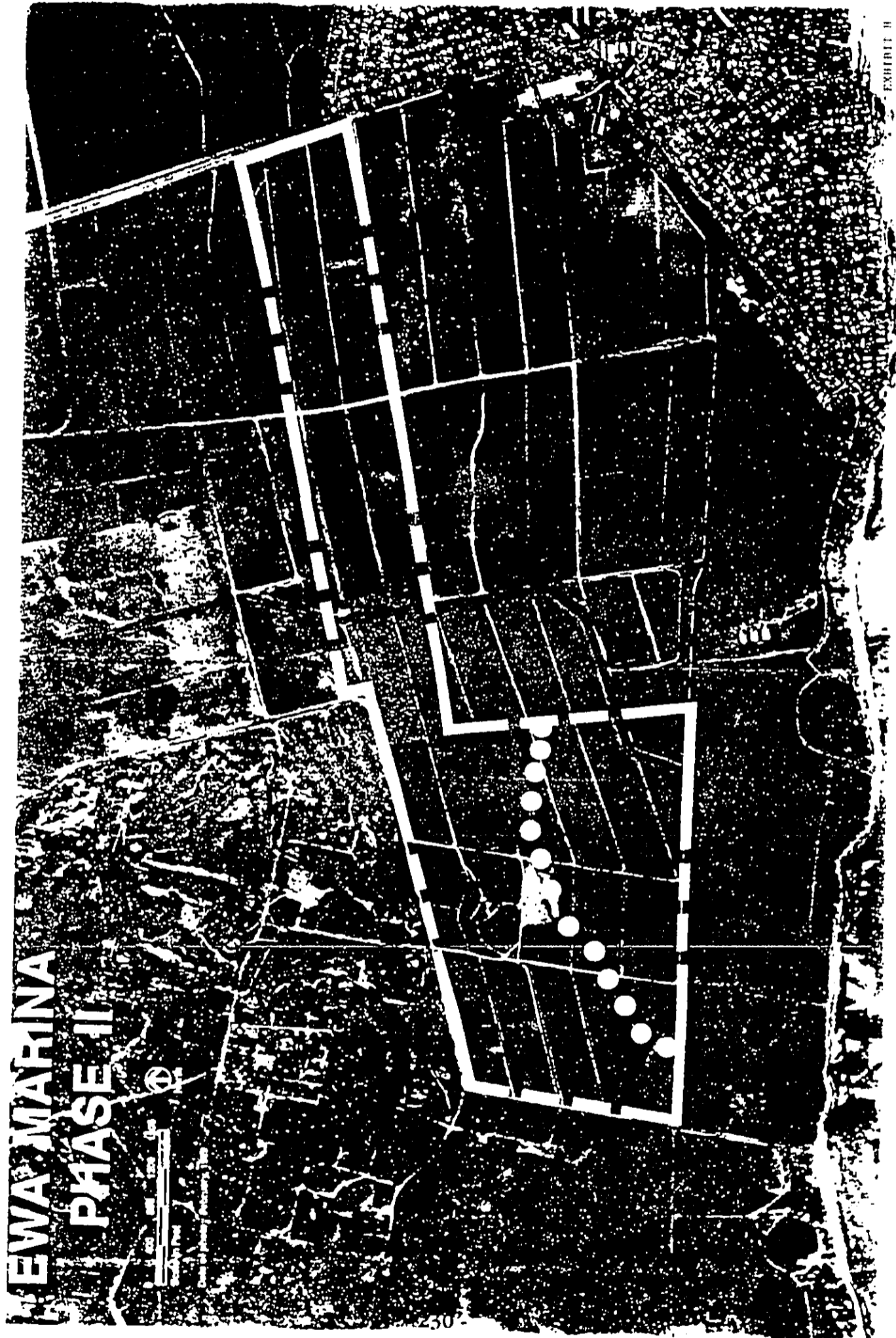


EXHIBIT I



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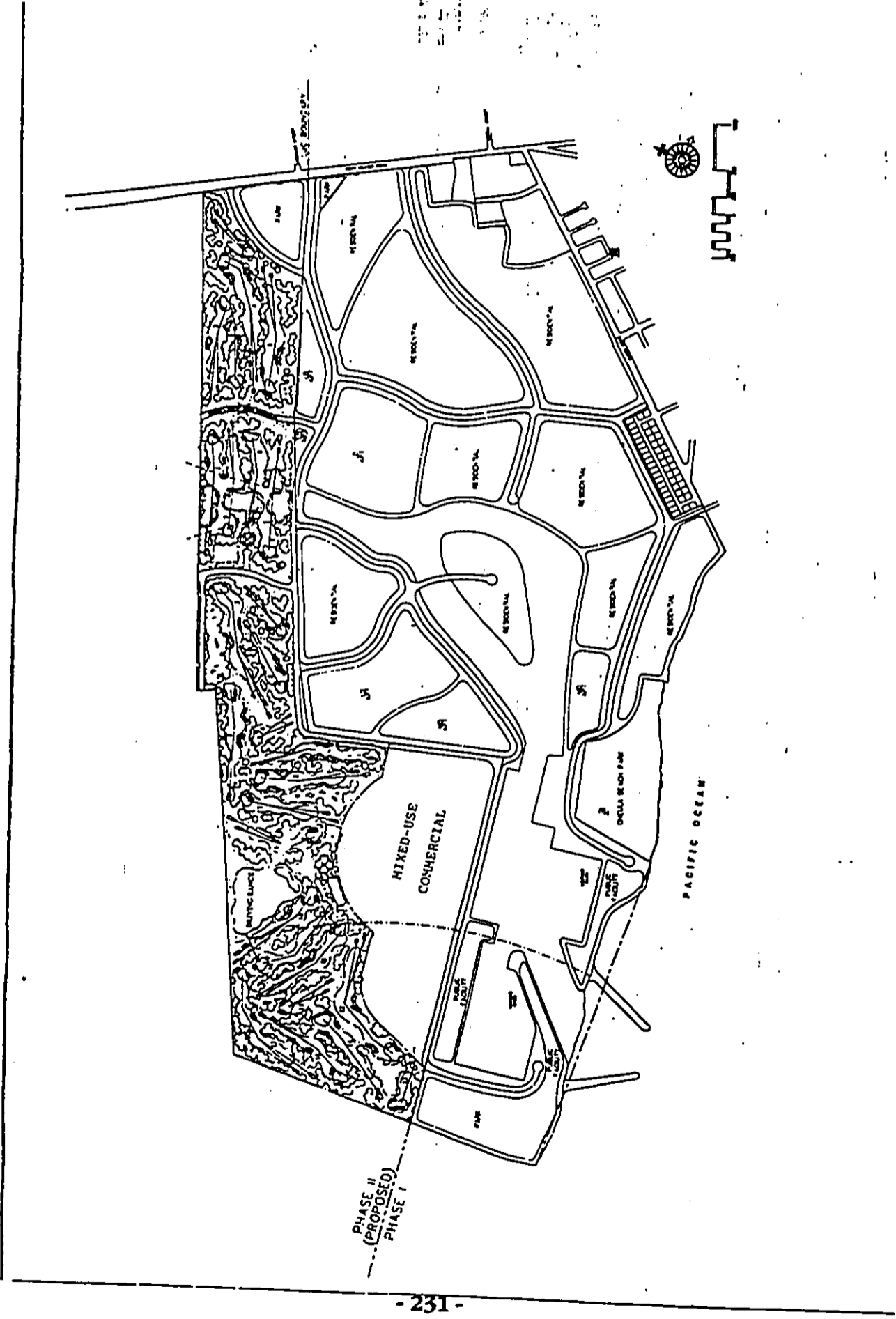


EXHIBIT I

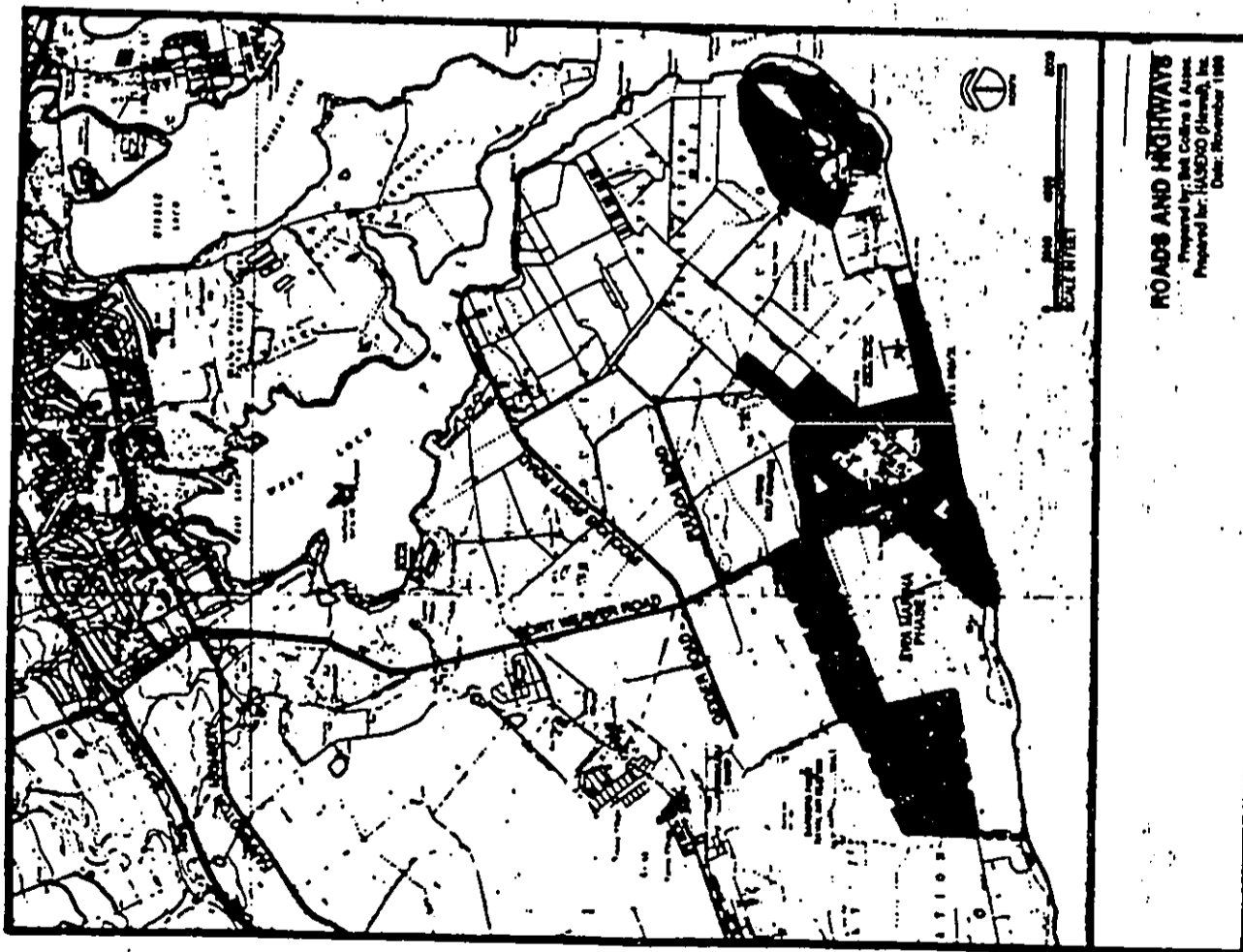
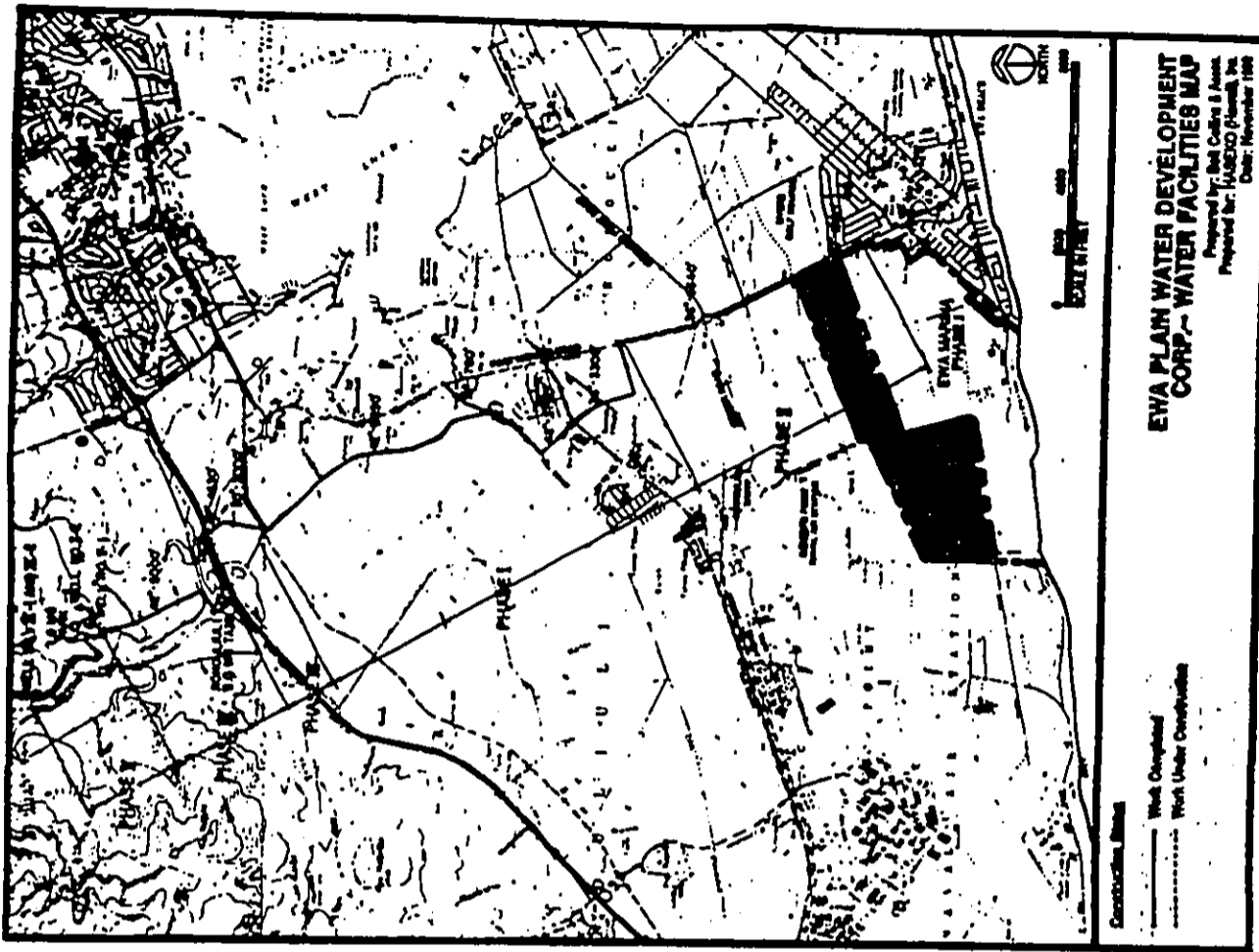


EXHIBIT K

DGP REF. NO.: Eva DP Land Use Map
 MAP REF. NO.: Eva
 AREA: Approximately 114.0 acres
 TRK: (1)9-1-12: portions of 5 and 6

EVA DEVELOPMENT PLAN AREA
 DEVELOPMENT PLAN LAND USE AMENDMENTS
 BEING CONSIDERED

Amendment/Project Information

- Amendment Request:
1. Amend DP Common Provisions to include "Marina" as land use category.
 2. Redesignation of approximately 114.0 acres from Agriculture to Commercial-Industrial, Emphasis Mixed-Use/Marina.
 3. Expansion of Eva Marina Special Area to include the 114.0 acres and increase pertinent height limitations to permit medium-density apartment buildings and hotels up to 150 feet high to be constructed.

Location: Honolulu, between Naval Air Station Barbers Point and Fort Weaver Road and adjacent to Eva Marina Special Area.

Address(es) of Subject Area--Where Applicable: N/A

Owner/Developer: Haseko (Hawaii) Inc. Requested By: Haseko (Hawaii) Inc.

Basis for Request: To allow development of mixed-use commercial complex component of the master-planned 1,110-acre Eva Marina Community Development Project.

Type of Project: Mixed-use commercial complex, including yacht club, fitness center, retail operations, hotel rooms and tennis courts.

Impact on Provision of Housing: This component of the Eva Marina project does not include housing.

APPENDIX I

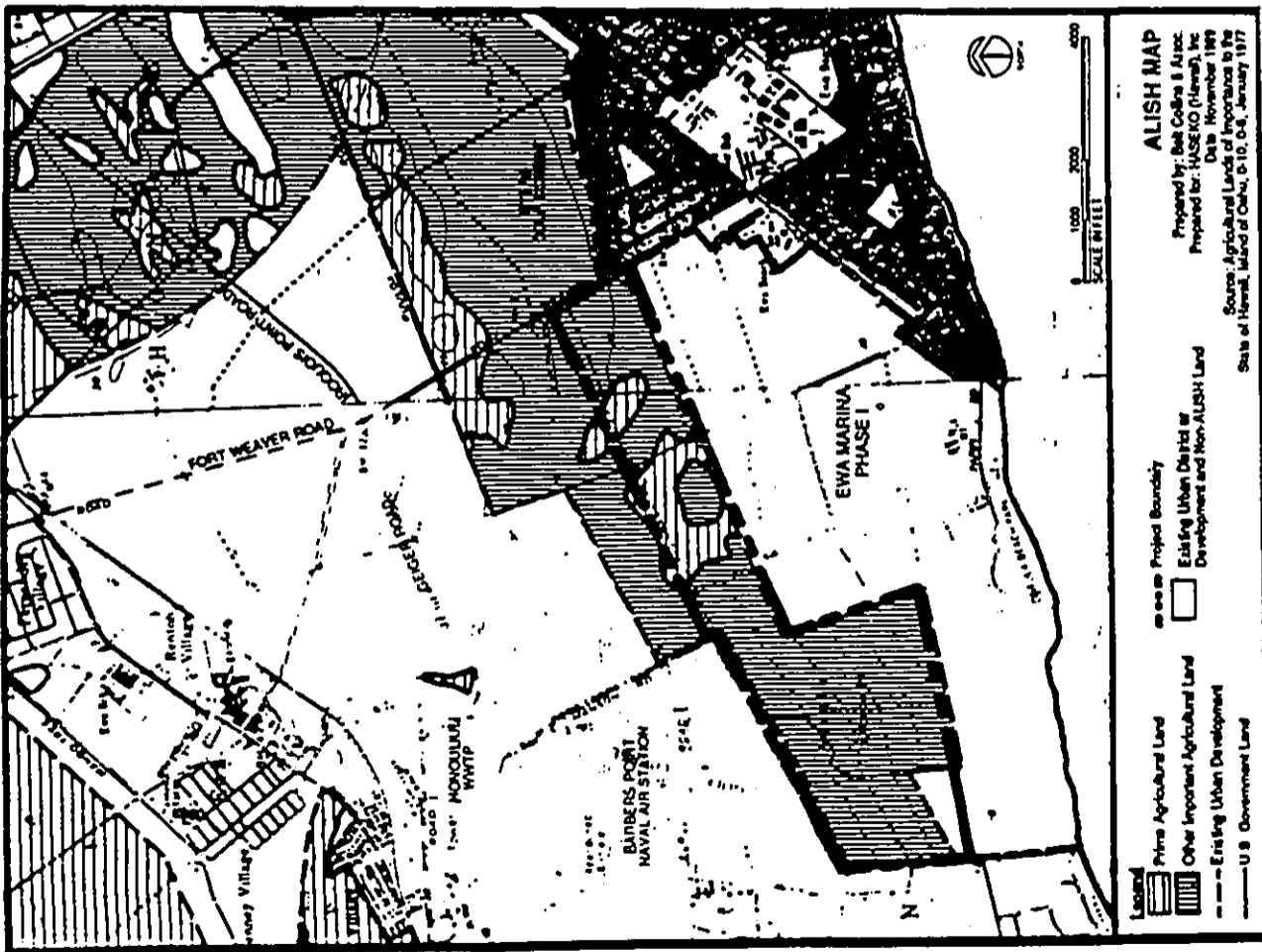



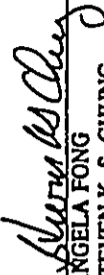
EXHIBIT L

**CERTIFICATE OF COMPLIANCE
WITH THE SOCIAL IMPACT FACTORS
OF THE DEVELOPMENT PLAN COMMON PROVISIONS**

In conformance with Section 32-1.12 of the Development Plan Common Provisions, Applicant hereby certifies that the social impact factors listed in Section 32-1.10(b) of the Development Plan Common Provisions have been given careful consideration. Studies and/or reports concerning all of the relevant impact factors have been prepared by qualified consultants and are available for review or, if required, will be incorporated in an environmental impact statement. This application and environmental assessment incorporates the findings contained in the studies and/or reports.

DATED: Honolulu, Hawaii, November 19, 1990.
HASEKO (HAWAII) INC.

By 
NELSON W. G. LEE
Is Development Director


ANGELA FONG
STEVEN K. S. CHUNG
Attorneys for Applicant
HASEKO (HAWAII), INC.

Existing Conditions	Present Plan/Zoning Designations
Land Use: Sugarcane fields	State Land Use: Urban
Structures Number: None Type: N/A Height: N/A	DP Public Facilities Map: No public project designated
	DP Special Provisions: Adjacent to Eva Marina Special Area
	Zoning: AG-2, General

ALISH:
Soil Features:
The land is considered under the ALISH classification system as "other."
Possible Constraints:
Portion of the property is subject to restrictive easement in favor of United States Government which prohibits residential development.

CERTIFICATE OF COMPLIANCE WITH THE
NOTIFICATION REQUIREMENTS OF ORDINANCE 84-111

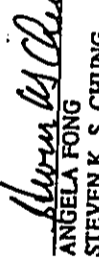
Ordinance 84-111 states: No application for Development Plan Land Use Map amendment shall be accepted for processing unless the applicant notifies, by mail, all owners, lessees, sub-lessees and residents of the affected property and of each abutting parcel.

I hereby certify that I have complied with the notification requirements of Ordinance 84-111.

DATED: Honolulu, Hawaii, November 19, 1990.

HASEKO (HAWAII) INC.

By 
NELSON W. G. LEE
Its Development Director


ANGELA FONG
STEVEN K. S. CHUNG
Attorneys for Applicant
HASEKO (HAWAII), INC.

NOTIFICATION OF AFFECTED PARTIES
AS REQUIRED BY ORDINANCE 84-111

James Campbell Trust Estate
828 Fort Street Mall, Suite 500
Honolulu, Hawaii 96813

Oahu Sugar Company, Ltd.
P. O. Box O
Waipahu, Hawaii 96797

Barbers Point Naval Air Station
Attn: Ms. Myra R. Innings
AICUZ Officer (Code OOH)
Land Use Coordinator
Naval Air Station
Barbers Point, Hawaii 96862-5050

Ewa Neighborhood Board
c/o Chairperson Jane Ross
92-783 Laaloa Place
Makaloa, Hawaii 96707

Ewa Beach Community Association
P. O. Box 2003-0003
Ewa Beach, Hawaii 96706

APPENDIX III

pol/cr.haa

concom.haa

APPENDIX IV

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PLANNING
DIVISION
HONOLULU

APPLICATION FOR EWA MARINA
DEVELOPMENT PLAN LAND USE MAP AMENDMENT

AND

AND

ENVIRONMENTAL ASSESSMENT

EWA MARINA COMMUNITY DEVELOPMENT

GOLF COURSE COMPONENT

Prepared for: HASEKO (HAWAII), INC.

Prepared by: KIEFER, OSHIMA, CHUN, FONG & CHUNG

November 1990

KIEFER, OSHIMA, CHUN, FONG & CHUNG
ATTORNEYS AT LAW

SUITE 400
DAVIS PACIFIC CENTER
841 BISHOP STREET
HONOLULU, HAWAII 96813

TELEPHONE
(808) 531-4300
TELECOPIER
(808) 531-8486

November 15, 1990

Mr. Benjamin B. Lee
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Subject:

Application for Development Plan Land Use Map Amendment to Allow
Golf Course Use and Environmental Assessment, Ewa Marina, Phase
II, Increment I Component, TMK (1) 9-1-12: portions of 5 and 6,
Ewa, Hawaii

Dear Mr. Lee:

On behalf of the applicant, Haseko (Hawaii) Inc., we are herewith submitting two copies of the application for Development Plan amendment and environmental assessment for approximately 272 acres of land in the Ewa Development Plan Area. This document also addresses those items which are required for golf course applications pursuant to your agency's guidelines. We respectfully request that this application be processed during the 1991 Annual Amendment Review period.

Your assistance in processing the enclosed application will be appreciated. If you have any questions or comments or should you require more information, please do not hesitate to contact us.

Very truly yours,

KIEFER, OSHIMA, CHUN,
FONG & CHUNG



Angela Fong
Steven K. S. Chung

PREFACE

This document was prepared in conjunction with a request to amend the Ewa Development Plan Land Use Map to permit the construction of the golf course component of the Ewa Marina Community Development Project. It contains the information required by the Rules of the Department of General Planning for Processing Amendments to the Development Plans of the City and County of Honolulu, it assesses the environmental and social impacts associated with the proposed development in compliance with Chapter 343, Hawaii Revised Statutes and Chapter 32, Article 1, Section 32-1.10, Development Plan Common Provisions, and it contains the information required by the Department of General Planning Guidelines For Development Plan Amendments For Golf Course Development.

**APPLICATION FOR EWA
DEVELOPMENT PLAN LAND USE MAP AMENDMENT
AND
ENVIRONMENTAL ASSESSMENT
EWA MARINA COMMUNITY DEVELOPMENT
GOLF COURSE COMPONENT**

Prepared for: **HASEKO (HAWAII) INC.**
Prepared by: **KIEFER, OSHIMA, CHUN, FONG & CHUNG**

November 1990

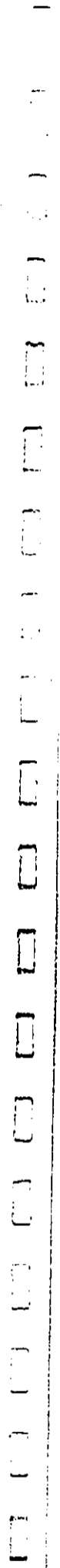


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 - C Development Plan Public Facilities Map
 - D Existing Topography Map
 - E SCS Soils Map
 - F Aerial Photograph of Ewa
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 - II Completed Project Evaluative Form
 - III Summary of Community Benefits
 - IV Certificate of Compliance with the Social Impact Factors of the Development Plan Common Provisions
 - V Certificate of Compliance with the Notification Requirements of Ordinance 84-111
 - VI Notification of Affected Parties as Required by Ordinance 84-111

I. BACKGROUND

A. Essential Information

1. Applicant: Haseko (Hawaii), Inc., a Hawaii corporation
Contact: Mr. Nelson W. G. Lee, Development Director
820 Milliani Street, Suite 820
Honolulu, Hawaii 96813
(808) 522-5025
2. Landowner: Haseko (Hawaii), Inc., a Hawaii corporation
3. Request: Applicant requests an amendment to the Ewa Development Plan Land Use Map ("Ewa DP Map") to redesignate approximately 272 acres of land ("the Property") from "Agriculture" to "Park/Golf Course" use to facilitate and permit the development of the 27-hole golf course component of the master-planned 1,110-acre Ewa Marina Community Development Project ("Ewa Marina").
4. Area: Approximately 272 acres.
5. Location: The Property is located at Honouliuli in the Ewa Development Plan Area ("Ewa DP Area"). It lies south of Farrington Highway, about 20 miles west of Honolulu. It is bordered by Fort Weaver Road to the east, the Naval Air Station Barbers Point ("NASBP") to the west and Oahu Sugar Company ("OSCO") sugarcane fields to the north. To the south and adjoining the Property is Phase I of Ewa Marina, which is identified in the Development Plan Special Provisions for Ewa ("Ewa DP Special Provisions") as the Ewa Marina Special Area.

The Ewa DP Area has been designated by the City and County of Honolulu ("City") for development of a secondary urban center and is expected to accommodate most of the anticipated increase in population on Oahu through the year 2005. In the eastern half of the Ewa DP Area are the existing communities of Ewa Beach, Iroquois Point, Punahoa Military Family Housing, Ewa Villages and Honouliuli. In the western half of the Ewa DP Area are the existing communities of Mabakilo, Honokai Hale and Nanakai Gardens. Also in this area are the James Campbell Industrial Park and the Barbers Point Harbor.

New residential developments in close proximity to the Property include the Ewa Gentry 7,500-unit subdivision to the north, the City's

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

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New residential developments in close proximity to the Property include the Ewa Gentry 7,500-unit subdivision to the north, the City's

1,500-unit West Loch development to the northeast, and Applicant's adjoining Ewa Marina, Phase I.

Other proposed major developments in the Ewa DP Area include the Kapolei Town Center, the State of Hawaii's 5,000-unit Kapolei Villages planned community, Lusk Hawaii's 500-unit residential project Kapolei Knolls, the expansion of Makakilo by 2,200 units and the Ko Olina Resort, which will contain 5,200 resort residential units and 4,000 visitor units.

6. Address: The Property does not presently have an address.

7. TMK: (1) 9-1-12: portions of 5 and 6.

8. Existing Use:

Presently, 252 acres of the Property is used for sugarcane cultivation by OSCO under various leases which expire in 1995. Approximately 20 acres of land on the western side of the Property, adjoining NASBP, is uncultivated haole koa forest.

The use of the Property is limited by three significant constraints. First, almost 100 acres of the Property is subject to an easement in favor of the United States of America which prohibits certain urban uses, such as permanent dwelling units, but which does allow a golf course. Second, the Property is directly in the path of a major drainage system through which storm run-off of up to 10,400 cubic feet per second may pass. Third, the Property is subject to combined day/night average sound levels of 55 to 70 Ldn as a result of the flight activities at NASBP and Honolulu International Airport ("HIA").

9. State Land Use:

The Property is in the Urban District on the State land use map. (See Exhibit A, State Land Use Districts Map.)

10. Development Plan Designation:

a. Land Use Map: The Property is designated for "Agricultural" use on the Ewa DP Map. (See Exhibit B, DP Land Use Map.)

b. Public Facilities Map: No symbols shown. (See Exhibit C, Development Plan Public Facilities Map.)

11. Zoning: The existing zoning for the Property is AG-2, General Agriculture.

B. Description of the Property

1. Property Boundary:

The Property is bordered by Fort Weaver Road to the east, NASBP to the west and sugarcane fields to the north. Directly south of the Property is the Ewa Marina Special Area.

2. Topography: The Property is essentially flat, having been used for sugarcane cultivation for many years. Its elevation averages about 20 feet above mean sea level. (See Exhibit D, Existing Topography Map.)

3. Existing Use: The Property is located on the outskirts of OSCO's sugar plantation, in an area that has been designated for urbanization by both the state and county governments. At the present time, approximately 20 acres is uncultivated, haole koa forest and approximately 252 acres is being used by OSCO for sugarcane cultivation. The OSCO lease, which expires in 1995, permits the land to be withdrawn from sugarcane cultivation earlier than 1995 at Applicant's option.

4. Slope: The Property is virtually flat, with a slope of less than one percent on the average.

5. Soils: The U.S.D.A. Soil Conservation Service, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, August 1972, indicates that the Property consists of Coral Outcrop, Fill Land, and soils of the Mamala Series and Ewa Series. (See Exhibit E, SCS Soils Map.)

Coral Outcrop (CR) consists of coral or cemented calcareous sand which were formed in shallow ocean water during the time the ocean stand was at a higher level. This land type is found on the western side of the Property. Fill land (F0) consists of an area filled with material from dredging, excavation from adjacent uplands, garbage, and bagasse and slurry from sugar mills. Fill land is found in the center of the Property. The eastern section of the Property has soils of the Mamala Series and Ewa Series. Mamala stony sily clay loam, 0 to 12 percent slopes (MnC), commonly has stones, mostly coral rock fragments, in the surface layer and in the profile. The Ewa Series consists of well-drained soils in basins and on alluvial fans on the islands of Maui and Oahu. Portions of the Property consist of EmA soils and EmB soils.

The Land Study Bureau classification for about two-thirds of the Property is "B"; about one-third is classified "C"; and a small portion is unratified. Approximately one-tenth of the Property is classified "Prime" under the Agricultural Lands of Importance to the State of Hawaii (ALISIP) classification system. The remaining lands are classified "Unique" and "Other".

The Flood Insurance Study prepared for the City and County of Honolulu indicates that the Property is located in Zone D, areas in which flood hazards are undetermined. Urban development and drainage improvements being made north of Ewa Marina will increase the volume of the runoff which must be accommodated on the Property.

6. Location Map:

- a. See, Exhibit F, Aerial Photograph of Ewa.
- b. See, Exhibit G, Location Map.

7. Topography Map:

- a. See, Exhibit D, Existing Topography.
- b. See, Exhibit H, Aerial photograph of Ewa Marina.

8. Project Layout: See, Exhibit I, Ewa Marina/Phase II Proposed 27-Hole Golf Course.

II. DEVELOPMENT PROPOSAL

A. Applicant's Proposed Use of the Property

1. Proposed 27-hole, Golf Course Component of Ewa Marina.

The Property will be developed into a 27-hole, semi-private golf course for the permanent residents and visitors of Ewa Marina, a residential and a commercial emphasis, mixed use community focused around a large, 1600-slip recreational marina intended to serve the Ewa DP Area.

2. Relationship to Ewa Marina Master Plan.

Upon completion, Ewa Marina will consist of separate, but wholly complementary phases. Phase I, the makai portion shown on the Ewa DP Map as the Ewa Marina Special Area, consists of approximately 707 acres and will contain 4,850 homes intended for permanent residents. These homes will be a mix of single and multi-family dwelling units, interspersed around a large marina and lined with pedestrian and bicycle pathways and other open-area elements which will make the residential community architecturally and aesthetically pleasing. Phase I already has the appropriate land use designations and construction of the marina can start once permits are obtained from the state, county and the U.S. Army Corps of Engineers.

Phase II, the mauka portion of Ewa Marina, is designated urban on the state's land use map and agriculture on the county's land use map. Phase II, consisting of approximately 403 acres, will contain two separate components. First, it will contain a 27-hole golf course, with a clubhouse and maintenance facilities, which, for purposes of identification will be referred to as Increment I of Phase II. The golf course will be integrated with Ewa Marina's residential community and will stretch from NASBP to Fort Weaver Road. Second, Phase II will contain a mixed use commercial job center and visitor complex, which will be located on the western half of Phase II, between the golf course and the marina. County approval for this portion of Ewa Marina, which will be referred to as Increment 2 of Phase II, will be applied for separately from this Application.

3. Legal and Physical Restrictions on the Use of the Property.

The Property is particularly well-suited for use as a golf course because of certain legal and physical restrictions on its use.

First, a perpetual easement in favor of the United States of America encumbers almost 100 acres of land on the west and north side of the Property adjacent to NASBP. This easement prohibits the development of residential dwellings, hotels and other transient lodging facilities, schools, hospitals, outdoor music shells, amphitheaters or sports stadiums. One of the few uses permitted by the easement is a golf course.

Second, the proposed golf course is an important link in the Kaloi flood control and drainage system. Storm water from the Waianae Mountain Range and other properties mauka of Ewa Marina, reaching levels of up to 10,400 cubic feet per second, flows over Property and towards

the ocean, carrying with it sediment and other contaminants. The proposed golf course will serve as a buffer, reducing the velocity of the flow, and will channel the water into a settlement area where some of the sediment and other contaminants will be removed through filtration. From the golf course, the storm water will drain into the marina, where more of the sediment and contaminants will settle. Thus, before reaching the ocean, the storm water will have been cleansed of much of its impurities. For this drainage scheme to work, a large portion of the Property, 400 to 600 feet wide, will have to be dedicated and kept as open area.

Third, the Property is subject to composite day/night average sound levels of 55 Ldn or greater as a result of the flight activities at NASBP and HIA. This level of noise makes the development of single-family detached homes inappropriate, whether or not sound attenuation measures are employed. Use as a golf course, however, is very appropriate.

In addition to the above, a golf course will serve as a buffer between NASBP and the residential component of Ewa Marina. Furthermore, it will shield Ewa Marina's residents from the noise, dust, smoke and chemical contaminants associated with the sugarcane growing and harvesting operations in the area.

B. Development Timetable

Major approvals still necessary for development of the Property consist of an amendment of the Ewa DP Map and appropriate zoning which will allow construction of the golf course.

Central to the development of the entire Ewa Marina project, however, is the planned marina. It plays an important role, in the development of Ewa Marina, and also in the development of Ewa Gentry and other residential and non-residential developments mauka of Ewa Marina because it is an integral part of the drainage system for the eastern Ewa DP Area. Storm waters descending from the southern slopes of the Waianae Mountain Range will be channeled from the other developments into the marina where, by the marina's design, they will be filtered and their velocity reduced so that the waters eventually reaching the ocean will have a minimal effect on the shoreline environment.

The golf course planned for the Property will be an integral element in the construction of the marina. It is estimated that a total of 5 to 6 million cubic yards of coral will be excavated from the marina area and re-deposited on other parts of Ewa Marina as part of an overall master grading plan. The golf

course will accept a substantial portion of this excavated material and consequently should be developed in advance or concurrently with the marina. Furthermore, plans for the marina require that the golf course, which will serve as a settlement basin, be completed before the marina can be finished. It is projected that construction of the marina will start in 1992, with the completion of major excavation and grading to be completed within two years. The master grading of the golf course, consequently, will be completed by 1994 and the golf course will be ready for play possibly in 1995.

C. Approximate Cost.

On-site and off-site costs of the golf course are expected to total approximately \$25.0 million.

III. NEED FOR PROPOSED DEVELOPMENT.

A. Public Problem or Need.

1. The proposed golf course is an integral part of the master-planned Ewa Marina project.

The proposed golf course is one of the major components of the master-planned Ewa Marina project, which will also contain 4,850 residential units, a marina and a mixed-use commercial job center and visitor complex. The golf course will serve as a necessary buffer between the residential component and OSCO's nearby sugarcane fields and it will also provide open space and a scenic view plane for the project and for the adjoining NASBP and nearby Ewa Beach communities.

2. The proposed golf course is an integral part of the Kaloi drainage system.

The golf course is an essential part of the Kaloi drainage system through which storm water flowing from the slopes of the Waianae Mountain Range and the developments mauka of Ewa Marina will pass on the way to the ocean. The golf course will serve as a buffer, reducing the velocity of up to 10,400 cubic feet per second of storm water, and as a settlement basin, cleansing the storm water of sediment and other impurities which might otherwise contaminate Ewa's coastal waters.

3. The proposed golf course will provide a golf facility for Ewa Marina residents, visitors to the marina and the general public.

The sport of golf is experiencing significant growth both nationally and in Hawaii. On Oahu, the demand for golf facilities is not being met because there are only five municipal golf courses available to the island's 800 - 900,000 residents. This falls short of the Development Plan's standard of one public or semi-public 18-hole golf course for every 100,000 people. Even if private courses which are open to public play are considered, there is still a great shortage of tee times available. A recent study indicates that by the year 2000, the burgeoning demand for golf facilities on Oahu will provide a market for an additional 31 golf courses.

Applicant's proposed golf course is intended to meet the local resident demand for golf facilities. Primarily, it is intended to serve the needs of the approximately 4,850 residential households who will live in Phase I of Applicant's Ewa Marina development. It is expected that these residents, alone, will be able to utilize the proposed golf course to its maximum capacity. The golf course, however, will also be available to visitors to the Increment 2 mixed-use center and 40% of the tee times will be made available to the golfing public.

B. Intended Market.

As indicated above, Applicant expects that users of the proposed golf course will be the residents of Phase I of the Ewa Marina development, visitors to the mixed-use center, and members of the golfing public.

C. Designated Use vs. Proposed Use.

The Property is presently designated for agricultural use. However, the Property is within the Ewa DP Area, which has been designated for urbanization.

The Ewa DP Area encompasses the coral plain which stretches from the Central Oahu district boundary at Waipahu and Pearl Harbor, around the southwestern corner of Oahu, to Nanakuli. Relevant general plan policies for Ewa encourage the development of a secondary urban center in order to relieve existing development pressures in other areas of the island. Consistent with this goal, various types of urban developments have been identified for specified Ewa locations. With respect to the area where the Property is located, the Ewa DP designates the development of housing, commercial and recreational facilities.

IV. FEDERAL, STATE AND CITY PLANS AND PROGRAMS INVOLVED

A. Federal.

There are no federal programs which affect development of the Property.

B. State.

1. Hawaii State Plan

The Hawaii State Planning Act, Hawaii Revised Statutes ("HRS"), Chapter 226, sets forth long-range goals, objectives, policies and priority guidelines designed for the betterment and development of the State. Its overall goal is to achieve a strong, viable economy and a desirable physical environment that will promote the physical, social and economic well-being of Hawaii's individuals, families and communities. (H.R.S. Sec. 226-1.) The proposed development promotes the following objectives and policies of the Hawaii State Plan:

§ 226-6. Objectives and policies for the economy -- in general.

(a) Planning for the State's economy in general shall be directed toward achievement of the following objectives: (1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people. (2) A steadily growing and diversified economic base that is not overly dependent on a few industries.

Comment:

The curtailment of OSCO's sugar operations as a result of the decreasing size of the plantation and the expiration of the sugar leases in the mid-1990s will create a need for new employment opportunities. The development of Phase II of Ewa Marina will provide over 2,000 new jobs to workers displaced by the closing of OSCO's sugar operations and to area residents.

Development of the golf course is also compatible with the objectives and policies for the economy in general because it will be another resource in the state's economic base. As golf grows in popularity worldwide, more people will base their vacation decisions on the availability and the uniqueness of the golf courses available at the various visitor destinations. The development of the Ewa Marina golf course will contribute towards making Hawaii one of the premier golf

destinations in the world and will assist in attracting visitors to the islands.

• • •

§ 226-7. Objectives and policies for the economy -- agriculture.

(a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:

(12) Facilitate the transition of agricultural lands in economically unfeasible agricultural production to economically viable agricultural uses.

Comment:

Sugarcane cultivation is not the most economically viable use of the Property. In fact, OSCO is already planning to curtail its sugar operations in this portion of the Ewa DP Area, which has already been designated for urbanization on both the state and county levels.

While a golf course may not be considered a traditional agricultural activity, it does possess similar physical characteristics and it does make significant use of trees, flowering plants and other types of foliage. Most importantly, a golf course is an economically viable activity.

• • •

§ 226-8. Objective and policies for the economy -- visitor industry.

(a) Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy. (b) To achieve the visitor industry objective, it shall be the policy of this State to:

(1) Support and assist in the promotion of Hawaii's visitor attractions and facilities. (2) Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaii's.

• • •

(5) Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawaii's people.

Comment:

Golf, as a sport, is reaching new heights in popularity worldwide. In order for Hawaii to remain competitive as a vacation destination for golfers, Hawaii needs to have sufficient golfing facilities. Development of the proposed golf course will help fill the existing void.

§ 226-12. Objective and policies for the physical environment -- scenic, natural beauty, and historic resources.

(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources. (b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

• • •

(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

• • •

(5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Comment:

Development of the golf course will advance the State's objective of preserving views and vistas and enhancing the visual and aesthetic enjoyment of mountains, oceans, scenic landscapes and other natural features. The golf course will have well-maintained, grassy fairways, water features, landscaping and a variety of trees and, in conjunction with the marina, will make Ewa Marina's landscape very attractive and visually pleasing.

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

(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives: (1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.

• • •

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

• • •

(2) Promote the proper management of Hawaii's land and water resources. (3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.

• • •

(5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards, and disasters. (6) Encourage design and construction practices that enhance the physical qualities of Hawaii's communities. (7) Encourage urban developments in close proximity to existing services and facilities.

Comment:

Storm water from the Waianae Mountain Range, reaching levels of up to 10,400 cubic feet per second, inundates the Property as it drains towards the Pacific Ocean, carrying with it sediment and other debris. Development of the golf course will be an effective tool in reducing the threat of erosion and other damage from flooding, while at the same time preserving the quality of Oahu's coastal waters.

§ 226-14. Objective and policies for facility systems -- in general.

(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water,

transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives. (b) To achieve the general facility systems objective, it shall be the policy of this State to: (1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans. (2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.

• • •

(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

Comment:

Applicant is a member of the Ewa Plain Water Development Corporation ("EPWDC"), which is developing new water sources and storage and transmission systems for the Ewa area. Already, Applicant has expended over \$10 million to develop potable water and transmission lines for Ewa Marina. Similarly, Applicant will pay its fair share to improve the transportation and waste disposal systems which service the Ewa Marina Project. By these endeavors, Applicant is contributing to the improvement of the state's and county's facility systems.

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

(b)(1) Encourage the adequate development of sewerage facilities that complement planned growth.

Comment:

Applicant is willing to develop its own secondary sewage treatment plant to handle liquid waste produced by the development of its Ewa Marina project.

§ 226-16. Objective and policies for facility systems -- water.

(a) Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the

provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities. (b) To achieve the facility systems water objective, it shall be the policy of this State to:

- (1) Coordinate development of land use activities with existing and potential water supply.
- (2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.
- (3) Reclaim and encourage the productive use of runoff water and wastewater discharges.
- (4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

Comment:

Applicant is a member of the EPWDC, which is developing new water sources and storage and transmission systems for the Ewa area. Already, Applicant has expended in excess of \$10 million in developing potable water for Ewa Marina. Additionally, development of Applicant's golf course will result in less use of non-potable water than OSCO's existing sugar cultivation operations. Thus, the State's goals with respect to water is being met.

§ 226-17. Objectives and policies for facility systems transportation.

(a) Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:

• • •

(2) A statewide transportation system consistent with planned growth objectives throughout the State. (b) To achieve the transportation objectives, it shall be the policy of this State to:

• • •

(2) Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives. (3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties.

• • •

(6) Encourage transportation systems that serve to accommodate present and future development needs of communities.

Comment:

Applicant will pay its fair share of the cost of improving existing highways and developing new transportation facilities to mitigate the impact of its Ewa Marina project. Applicant already participates in a group comprised of representatives from both government and private industry which is studying the types of improvements and facilities which will be needed to handle the additional traffic which will be generated by all the new projects in the Ewa region.

§ 226-23. Objectives and policies for socio-cultural advancement -- leisure.

(a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

• • •

(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.

• • •

(6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.

Comment:

Development of Applicant's proposed golf course will serve both the need for additional facilities to accommodate the leisure time needs of Oahu's residents as well as the goal of retaining Oahu's natural scenic and open space resources.

2. State Functional Plans

The Functional Plans, along with the County General Plans, are the primary means of implementing the State Plan. The Functional Plans

set forth objectives, policies and programs to guide the State and County governments and the private sector in implementing the State Plan. (H.R.S. Sec. 226-59 and 60.)

The following Functional Plan policy statements are relevant:

Land Use and Planning, A(2) Policy:

Ensure that intended uses for the site respect community values and are compatible with the area's physical resources and recreational potential.

Comment:

Development of the proposed golf course will allow the Property to remain in open area, thus respecting both Ewa Marina's and the Ewa Beach Community's need to have scenic view planes available and, also, to be separated from OSCO's sugarcane plantation. Additionally, the golf course will help to preserve the area's non-potable water resources because it will serve as a settlement basin for the storm waters which flow from the Waianae Mountain Range, thus allowing the aquifer to be recharged, and it will actually need less water for irrigation than OSCO's existing sugarcane fields.

Recreation Facilities & Programs, C(1) Policy:

Maintain an adequate supply of recreation facilities and programs which fulfill the needs of all recreation groups.

Comment:

As indicated earlier, Oahu is experiencing a shortage of golf facilities. The development of Applicant's proposed golf course will assist in alleviating this shortage.

C. City:

I. General Plan

The Oahu General Plan ("General Plan") is a statement of the City's long-range social, economic and environmental objectives and includes broad policies adopted by the City to achieve those objectives. One of the goals of the City's General Plan is to encourage development of the Ewa DP Area as a secondary urban center which will accommodate

approximately 12 to 13.3 percent of Oahu's total population by the year 2010.

As is discussed below, Applicant's proposed Ewa Marina development, of which the golf course is a major component, fulfills many of the General Plan's objectives and policies.

a. Population.

• • •

Objective C. To establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony.

• • •

Policy 2. Encourage the development within the secondary urban center at Kapolei and the Ewa and Central Oahu urban-fringe areas to relieve developmental pressures in the remaining urban-fringe and rural areas and to meet housing needs not readily provided in the primary urban center.

Policy 3. Manage physical growth and development in the urban-fringe and rural areas so that:

- a. An undesirable spreading of development is prevented; and
- b. Their population densities are consistent with the character of development and environmental qualities desired for such areas.

Comments:

The development of Ewa Marina is in keeping with the City's objective of directing population increases on Oahu to the Ewa DP Area.

Ewa Marina will be a master-planned community which will provide homes for 4,850 families, facilities for leisure-time activities such as boating, golf and tennis, and numerous employment opportunities, all in a physically attractive setting. Prospective residents will be able to select from a variety of homes, including affordable mid-rise apartments, townhouses, moderately priced single-family homes, and luxury homes

fronting the ocean, marina or golf course. At full development, it is expected that Ewa Marina will house over 13,500 residents.

b. Economic Activity.

Objective A. To promote employment opportunities that will enable all the people of Oahu to attain a decent standard of living.

Policy 1. Encourage the growth and diversification of Oahu's economic base.

• • •

Objective G. To bring about orderly economic growth on Oahu.

Policy 1. Direct major economic activity and government services to the primary and secondary urban centers.

Policy 2. Permit the moderate growth of business centers in the urban-fringe areas.

• • •

Comments:

It is anticipated that the development of Ewa Marina's 150-acre marina component, with its 1,600 boat slips, will stimulate the growth of a boating industry in Ewa, creating new opportunities for enterprises engaged in the sale and servicing of boats and other ocean-related supplies, sporting goods and equipment. Thus, the City's objectives of encouraging the diversification of Oahu's economic base and permitting the growth of business centers and other economic activity in the Ewa DP Area will be met.

c. Natural Environment.

Objective A. To protect and preserve the natural environment.

• • •

Policy 4. Require development projects to give due consideration to natural features such as slope, flood and erosion

hazards, water-recharge areas, distinctive land forms, and existing vegetation.

• • •

Policy 6. Design surface drainage and flood-control systems in a manner which will help preserve their natural settings.

• • •

Objective B. To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

• • •

Policy 2. Protect Oahu's scenic views, especially those seen from highly developed and heavily travelled areas.

• • •

Policy 4. Provide opportunities for recreational and educational use and physical contact with Oahu's natural environment.

Comments:

Ewa Marina is an important link in the Kalo'i drainage system. As indicated earlier, storm water from the Waianae Mountain Range and the lands mauka of Ewa Marina drain onto the Property, carrying with it sediment and other contaminants. Left alone, this storm water would drain into the ocean, diminishing the quality of Oahu's coastal water.

The golf course proposed for the Property and the marina planned for Phase I play an important role in the Kalo'i drainage system. The golf course will serve as a settlement basin, allowing sediment and other contaminants to be removed through filtration before the storm water drains into the marina and ultimately into the ocean. In this manner, the proposed golf course will help to preserve the quality of the environment. Additionally, the proposed golf course, with its well-manicured fairways and greens and its trees and other foliage, will provide an attractive setting for the area and will enhance existing scenic view planes.

d.

Housing.

Objective C. To provide the people of Oahu with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by public utilities.

Policy 1. Encourage residential developments that offer a variety of homes to people of different income levels and to families of various sizes.

• • •

Policy 2. Encourage residential development near employment centers.

Comments:

Ewa Marina will contain 4,850 housing units in a range of prices, including moderately-priced homes, mid-range homes and luxury homes. It will also provide over 2,000 jobs for residents of the project and the surrounding area. As conceived, thus, the project will provide both housing as well as employment opportunities for a wide segment of the population.

Transportation and Utilities.

Objective A. To create a transportation system which will enable people and goods to move safely, efficiently, and at a reasonable cost; serve all people, including the poor, the elderly, and the physically handicapped; and offer a variety of attractive and convenient modes of travel.

• • •

Policy 4. Improve transportation facilities and services in the Ewa corridor and in the trans-Koolau corridors to meet the needs of Ewa and Windward communities.

Policy 5. Improve roads in existing communities to reduce congestion and eliminate unsafe conditions.

• • •

Objective B. To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.

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

• • •

Policy 6. Support programs to recover resources from solid-waste and recycle wastewater.

• • •

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

Policy 3. Plan for the timely and orderly expansion of utility systems.

Comments:

Ewa Marina satisfies the transportation and utilities policies and objectives pertinent to the Ewa DP Area. With respect to transportation, Applicant will participate in the implementation of the Ewa Highway Master Plan or, alternatively, will participate on a fair share basis in the funding and construction of transportation improvements which are necessitated by the development of the project.

With respect to utilities, Applicant has already contributed over \$10.0 million for the cost of developing new potable water sources, storage systems and transmission lines. Additionally, Applicant is installing new sewer mains and lines to dispose of wastewater from the project. In addition to Ewa Marina, these water and sewer lines will benefit the existing Ewa Beach Community.

Applicant supports programs designed to recover resources and is willing to construct an on-site sewage treatment plant, which will provide water which can be used to irrigate the golf course.

f. Physical Development and Urban Design.

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

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Policy 4. Require new developments to provide or pay the cost of all essential community services, including roads, utilities, schools, parks, and emergency facilities that are intended to directly serve the development.

• • •

Objective C. To develop a secondary urban center in Ewa with its nucleus in the Kapelei area.

Policy 2. Encourage the development of a major residential, commercial, and employment center within the secondary urban center.

• • •

Policy 3. Establish a green belt in the Ewa and Central Oahu areas of Oahu in the Development Plans.

Comments:

The development of Ewa Marina is in keeping with the City's objectives and policies designating the Ewa DP Area for development as a secondary urban center and encouraging the development of a major residential, commercial and employment centers in this area. As indicated earlier, Applicant will pay its fair share of the cost of the facilities Ewa Marina will require.

g. Public Safety.

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

• • •

Policy 2. Require all developments in areas subject to floods and tsunamis to be located and constructed in a manner that will not create any health or safety hazard.

Comments:

The flood control features of the golf course and the marina meet the City's objectives and policies relating to public safety. In addition to these contributions, Applicant is willing to participate with the city and state civil defense agencies and other developers in the area in formulating and implementing an emergency preparedness and evacuation plan.

• • •

h. Culture and Recreation.

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Objective D. To provide a wide range of recreational facilities and services that are readily available to all residents of Oahu.

Policy 1. Develop and maintain community-based parks to meet the needs of the different communities on Oahu.

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Policy 7. Provide for recreation programs which service a broad spectrum of the population.

Policy 8. Encourage ocean and water-oriented recreation activities that do not adversely impact on the natural environment.

Policy 9. Require all new developments to provide their residents with adequate recreation space.

Policy 10. Encourage the private provision of recreation and leisure-time facilities and services.

• • •

Policy 13. Encourage the safe use of Oahu's ocean environments.

Comments:

The marina, golf course and parks which will be developed at Ewa Marina are in keeping with the city's objectives and policies relating to the development of a wide range of recreational facilities for the Ewa community. The marina will provide numerous new opportunities for ocean and water-oriented recreational activities. Additionally, the project will contain parks, including a 17-acre Gateway Park, and facilities which were previously unavailable to area residents.

2. Development Plan

a. Consistency with Common Provisions

1) General Urban Design Principles and Controls.

a) Open Space.

The proposed golf course is consistent with the objective of providing visual relief and contrast to the built-up, surrounding environment and will provide the physical boundary recommended by the DP, distinguishing Ewa Marina from other communities. Applicant notes that maintenance of open space areas, such as golf courses, is given high priority under the Development Plan Common Provisions ("DP Common Provisions").

b) Vehicular and Pedestrian Routes.

The proposed golf course will meet the objective of providing landscaping along major vehicular routes as a means to increase the general attractiveness of the community. The proposed golf course will border on Fort Weaver Road, which is presently the main traffic corridor providing ingress and egress to Ewa Beach and Ewa Marina. Development of the golf course, thus, will provide attractive landscaping for the roadway and pleasant scenery for motorists.

2) General Principles and Controls for Parks, Recreation and Preservation Areas.

a) Ewa Marina will contain a 17-acre Gateway Park, several smaller parks, and a 150-acre marina in addition to the proposed golf course. This is in conformance with policies and objectives of the DP Common Provisions. Additionally, the proposed golf course helps to fulfill the DP Common Provision objective of providing a standard of one public or semi-public 18-hole golf course per 100,000 people. As indicated, 40% of the ice times will be made available to the general public and the remainder of the ice times will be allocated to the residents of the Phase I residential subdivision and visitors to the commercial center.

3) Identification of Areas, Sites and Structures of Historical Significance.

Approximately 252 acres of the Property have been used for sugarcane cultivation for many years and, consequently, there are no archaeological sites on this portion of the Property. With respect to the 20 acres of haole koa forest, an archaeological survey which Applicant commissioned disclosed no sites of significance meriting preservation. Nevertheless, should any archaeological resources such as artifacts, shell, bones or charcoal deposits, human burial, or rock alignments, paving or walls of historic or prehistoric significance be encountered, Applicant will immediately stop work in the impacted area and notify the Historic Preservation Division of the State Department of Land and Natural Resources.

4) Thoroughfares, Highways and Streets.

Applicant will consult with the City's Chief Engineer and the State Department of Transportation to ensure that roadways in the development conform to applicable standards.

5) Public Buildings and Public or Private Facilities for Utilities, Terminals and Drainage.

a) Wastewater Treatment Facilities.
The Honolulu wastewater treatment plant is situated mauka of the Ewa Marina project. The proposed golf course will satisfy the DP Common Provisions requirement that wastewater treatment facilities be screened from incompatible uses by means of buffer areas or landscaping.

b) Drainage.
The proposed golf course will serve as a settlement basin for the flood and storm waters flowing through the Kalo drainage system and into the marna. This conforms to the DP Common Provisions' objectives relating to drainage systems.

6) Sequencing Policies.
The proposed development will coincide with the City's objectives relating to the sequencing of public facilities. Since Applicant, at its own cost, will be installing all of the infrastructure for the development, the City will be able to use its capital improvement budget to provide public facilities in other areas of Oahu.

b. Consistency with Ewa DP Special Provisions.
The proposed golf course use for the Property is consistent with the Ewa DP's policies and objectives, which indicate that additional housing, commercial and recreational facilities should be developed in the area westerly of Ewa Beach, which is where the Property is located. The proposed development is also consistent with the open space, public view and height considerations contained in the Ewa DP.

c. Consistency with Development Plan Land Use Map.
The Development Plan designation for the Property is Agriculture. It is Applicant's request, however, to have the designation amended to Park/Golf Course in order for the

planned 27-hole golf course component of Applicant's Ewa Marina project to be built.

d. Consistency with Public Facilities Map.
The Development Plan Public Facilities Map for Ewa ("Ewa Public Facilities Map") does not indicate that any public facilities are planned for the Property. This, however, is not inconsistent with development of the proposed golf course since Applicant, at its own expense, will be constructing all of the needed infrastructure.

Although Applicant will install all of the needed infrastructure for its project, Applicant does request that the Ewa Public Facilities Map be amended in two respects. First, the Kalo drainage system stops at the makai side of the Ewa Gentry development and Applicant requests that the Ewa Public Facilities Map be amended to connect the drainage system with the Property. Second, it is Applicant's intention to use Pump 27 as a non-potable water source for irrigation of the golf course and Applicant, therefore, requests that the Ewa Public Facilities Map be amended to allow this use.

V. IMPACTS

A. Demographic Impacts.

1. Residential Population.

Since most of the Property is currently used for sugarcane cultivation, there will be no displacement of any residential population. Further, there will not be a population increase on the Property since no housing is proposed for this portion of the Ewa Marina project. It is anticipated that employees for the golf course and the commercial center in Increment 2 will reside in Phase 1, the nearby Ewa Beach Community, and the new residential subdivisions being developed in the Ewa DP Area.

2. Visitor Population.

Although there are no visitor facilities on the Property, Applicant does propose to eventually develop visitor accommodation units in the Increment 2 area.

3. Character or Culture of the Neighborhood.

The Property is bordered by sugarcane lands to the north and Phase I of Applicant's proposed Ewa Marina development to the south. On the west, the Property borders on the NASBP golf course and across Fort Weaver Road on the east is the planned Myers golf course. The nearest community, other than NASBP, is the Ewa Beach Community. Any impact which the proposed golf course will have on the Ewa Beach Community will be slight, if at all.

The character of the Ewa Beach Community is already in transition because of the designation of Ewa as a secondary urban center and the approved development of the Ewa Marina Special Area. Housing developments such as Ewa Gentry and West Loch Estates are already transforming the area from a rural, agricultural community to a predominantly suburban community. Inevitably, the newcomers who are moving into the new subdivisions being developed will cause a change in the social and economic characteristics of the communities in the existing area. However, improvements will be made to facilities, such as water, sewer and utilities, and with the urbanization of the area, services, such as police and fire protection, schools and health care establishments, will also be improved. Whether or not the proposed golf course is built, therefore, the character and culture of the existing neighborhood will change.

Applicant's proposed golf course will actually mitigate the impact of the changes to the area by maintaining a large amount of land in open space, thereby providing a buffer between Ewa Beach and some of the new developments.

4. Displacement.

The proposed golf course will not displace any individual since the Property does not presently contain any housing units but it will result in less land being available for OSCO's sugar operations. The resulting impact will be slight, however, because OSCO already intends to reduce the size of its plantation and because its lease will expire in 1995 in any event. With the withdrawal of the Property, the sugar plantation will become compact rather than scattered and will result in shorter and less expensive trucking distances to the mill. Since the Property is located on the outskirts of the plantation, there will be no adverse impact on OSCO's irrigation system and cane haul roads. Moreover, because development of the golf course site will result in the elimination of inferior-quality plantation lands, average yields for the plantation may actually increase.

The long-term future of OSCO will remain uncertain whether Applicant develops the golf course or not because of flat sugar prices with operating costs that increases with inflation, the uncertainty of continued federal price supports and the fact that all of OSCO's leases will expire by the mid-1990s.

5. Other Social Impacts.

Applicant is not aware of any other social impacts.

B. Economic Impacts.

1. Economic Growth

Development of the proposed golf course will aid economic growth in the Ewa area.

In the past, sugar played an important role in the Ewa economy. Sugar, however, is becoming increasingly less viable as an industry in Hawaii because of worldwide competition and decreasing levels of federal support. In sharp contrast, the golf industry is growing in strength as the sport gains in popularity worldwide. In terms of economic viability, therefore, a golf course is a good alternative to sugar.

In addition to economic stability, a golf course also stimulates growth in businesses such as nurseries, fertilizer distributors, providers of tools and equipment used for golf course maintenance, sellers of golfing items. Development of a golf course on the Property, therefore, will be good for Ewa's economy.

2. Employment

Development of the proposed golf course will provide employment opportunities in two ways. First, during the construction of the facility, a significant number of construction and landscaping jobs will be available. Thereafter, when the facility is completed, permanent jobs will be provided by the golf course operations.

3. Government Revenues (Taxes)

The State and County will experience a substantial increase in revenue as a result of the development of the Property. For the County, recent property tax revenues from sugar operations have been very low; less

than \$7,000 per year. Similarly, for the State, revenue has been negligible because sugar is exempt from excise taxes and also because OSCO's operations have only been marginally profitable.

In contrast, if the Property is developed as planned, the County will receive approximately \$500,000.00 in rollback taxes. Additionally, there will be a substantial increase in property tax revenues since the golf course and improvements will have a much higher value. It is estimated that after completion, property taxes generated from the golf course will amount to several million dollars a year. The State will likewise gain considerable revenue from excise taxes which will be collected on the golf course operations.

In comparison to the revenue gain, the State and County capital improvement expenditures for the Property will be relatively modest because Applicant will be providing its own on-site infrastructure and will be contributing its fair share of the cost of off-site improvements.

4. Location Vis-a-Vis Intended Market

As indicated, the intended market for the golf course will be the residents and visitors of Ewa Marina and the general public.

C. Housing Impacts

Development of Ewa Marina's golf course will have no impact on housing.

D. Public Services

1. Access and Transportation

Fort Weaver Road is currently the only north-south road affording ingress and egress to the Property. Fort Weaver Road is a 4-lane, divided highway from its intersection with Farrington Highway south to Hanakahi Road. From that point southward to Ewa Beach, it is a 2-lane rural road. This southern section is scheduled for widening to 4 lanes in 1990. The Kunia Interchange provides access to the H-1 Freeway from Fort Weaver Road. (See, Exhibit J, Roads and Highways.) In contrast to the other developments in the Ewa DP Area, development of the Property is not expected to cause a significant increase in traffic along Fort Weaver Road or the H-1 Freeway during peak traffic hours. The main source of traffic to and from the Property will be employees traveling to or from work and golfers arriving or leaving the golf course throughout the day and these motorists will not add significantly to traffic congestion.

Although the proposed golf course will not unduly burden the existing transportation facilities in the Ewa area, Applicant recognizes that the overall population growth in the region will do so; thus, Applicant has been working with the State Department of Transportation in an effort to help remedy the anticipated transportation problems and is willing to pay its fair share of such improvements as are necessary.

Water.

The Project is located within the Waianae District of the Board of Water Supply ("BWS") water system. Existing BWS infrastructure in the area includes a 30-inch water main running along Farrington Highway between Waipahu and the Barbers Point 215-foot storage system and a 16-inch transmission main which branches off the 30-inch Farrington Highway main and runs the length of Fort Weaver Road to supply Honouliuli, Ewa Beach and Ewa Village with water.

The Ewa Water Master Plan of August 1987 sets forth guidelines for water use in the Ewa District and was approved by the Board of Water Supply. In accordance with the Ewa Water Master Plan, Applicant has already contributed over \$10 million towards the development of a regional water system and expects to commit additional funds before the system is completed. Currently, a variety of new installations, including a 36-inch main under Fort Weaver Road, water reservoirs, wells and pumping systems are near completion. These developments are being coordinated by the Ewa Plain Water Development Corporation ("EPWDC"), of which Applicant is a member. (See, Exhibit K, Ewa Plain Water Development Corp.--Water Facilities Map.)

a. Potable Water.

It is estimated that the golf course and related facilities (the golf clubhouses, cart house, etc.) will consume between 40,000 and 50,000 gallons of potable water per day (.040 to .050 MGD) out of the total supply of 3,2937 MGD of potable water which Ewa Marina will receive under the Ewa Water Master Plan.

Previously, the master plan for Ewa Marina proposed the development of 2,350 housing units on the Property. By replacing these units with the proposed golf course, the potable water consumption for Ewa Marina will be reduced by over ten percent (10%) or over 300,000

gallons per day. Thus, even with the development of the golf course, projected potable water requirements for Phase II will remain at or below the level which was originally approved in the Ewa Water Master Plan.

b. Non-Potable Water.

It is anticipated that the golf course will require approximately 1.35 MGD of irrigation water and that this water will be drawn from the well (Pump 27) that OSCO is currently using to irrigate sugarcane in the same area. This well is located within the boundary of the proposed golf course, and OSCO's need for the water that it now supplies will cease when the land is withdrawn from sugar. Historically, OSCO's pumpage from this well has been about twice the amount that would be needed for the proposed golf course. Hence, it is certain that the source will be adequate for the golf course's needs.

3. Wastewater

Wastewater from the golf course will be generated at the clubhouses and driving range. This will be collected at the source and flow through underground pipes to the sewage pump station that is planned in the Phase I area. From there, it will be pumped through a large underground force main to the Honouliuli Wastewater Treatment plant.

The Honouliuli Wastewater Treatment Plant presently has a capacity of handling 25 mgd of wastewater. This is believed to be insufficient to handle the wastewater which will be generated by the Property as well as other developments in the area. It is expected, however, that capacity at the plant will be increased to 38 mgd by 1993.

4. Drainage

The Ewa Marina project is located within the Kaloi Drainage Basin where storm run-off from the southern slopes of the Waianae range naturally flows through other development areas and then across a large swath of land on the Property. As additional sugarcane lands mauka of Ewa Marina are converted to urban uses, potential flooding and drainage problems will likely be aggravated. The issue of drainage, therefore, presents a serious concern to both Applicant as well as the developers of other projects.

Storm flows from the Kaloi Basin are presently being channeled through an existing man-made gulch which meanders through the Ewa Gentry development (located mauka of Ewa Marina) and over portions of the Ewa Marina project. Through sheet flow released at the gulch outlet (about midway through Phase I), and through ground water percolation, the storm waters eventually reach the ocean.

Potentially, storms may generate as much as 10,400 cubic feet of water per second. To handle this flow, the master plan for Ewa Marina calls for the construction of a golf course on the Property with a strip of open land 400 to 600 feet wide. This open space will serve to direct potential flood water toward the marina and also to act as a buffer for the rest of the project. In addition, a channel will be constructed which will allow the storm water entering the golf course to empty into the marina. In designing and constructing the channel, consideration will be given to the volume of water originating off-site from the Ewa Gentry project and other projects, as well as from the Ewa Marina project itself. The golf course will also filter out off-site silt which would otherwise enter the marina waters.

5. Solid Waste

The golf course will generate a very limited amount of solid waste. Landscape cuttings from the golf course will be disposed of on-site, either by leaving it on the course where cut or in compost pits. Solid waste from the golf course clubhouse and driving range is expected to amount to approximately 2-3 pounds per customer per day. Assuming an average of 300 customers per day, 600 to 900 pounds per day, or 2-3 tons per week of solid waste may be generated. This will be placed in on-site dumpsters and collected by private haulers and transported to the City & County of Honolulu's nearby HPOWER facility for disposal. Applicant proposes to have the waste disposed of at the Kalaheo Landfill in Kailua, the Waimanalo Gulch Landfill near Kahe Power Plant or the Waipahu Incinerator.

6. Schools

As the Property will not house permanent residents, it will not create any burden on the existing or proposed educational facilities in the area. However, any unforeseen needs can be met by the following public schools which already exist: Ewa Beach Elementary, Kaimiloa Elementary, Pohakea Elementary, Barbours Point Elementary, Iroquois Point Elementary, Ilima Intermediate and Campbell High School. Elementary, intermediate and high schools are also being considered for location at Kapolei Village, West Loch, and Ewa Gentry. In addition,

a site has also been set aside on Phase I of Ewa Marina in the event that an increase in population requires that another educational facility be erected.

7. Parks

The major park facility in Ewa Marina will be the nearby, 30-acre Oneula Beach Park owned by the City. In addition to this City park, smaller parks and playgrounds, including the 17-acre, Ewa Marina Gateway Park, will be scattered throughout Ewa Marina. The 150-acre marina, of course, will also be available.

Nearby neighborhood parks are plentiful and will also be available. They include or will include parks located in Ewa Gentry, Ewa Beach, Ewa Villages, Ko Olina, Kapolei Village, West Loch, Makakilo and a beach park near the Naval Air Station. A major regional park is also planned in the Kapolei development.

8. Police

Police from the Pearl City police station regularly patrol the area which includes the Property. Moreover, in order to meet the demand for police protection which the new developments in the Ewa DP Area will require, a new police station in nearby Kapolei is planned and Ewa will be designated as a new police district.

9. Fire

The City plans to relocate the existing Ewa Beach fire station onto Phase I of Ewa Marina. When this is done, adequate fire protection will be available. Additionally, the existing fire stations at Makakilo and Waipahu and the planned stations at Tenney Village, Kapolei, and Ko Olina will be available to provide backup services.

10. Utilities

a. Electric

Hawaiian Electric Company ("HECO") will provide electrical power to the Property. HECO will be constructing a new substation to meet the new demands which Ewa Marina and other developments in the area will generate and to supplement the service already being provided by the Ewa and the Honouliuli substations which are located mauka of the Property.

b. Telephone

Hawaiian Telephone Company will provide telephone services to the Property through existing lines along Fort Weaver Road and through underground lines in the project area.

11. List of Agencies Consulted

Applicant has consulted with various state and county agencies in connection with its application for the State Land Use Boundary Amendment for Phase II. However, Applicant has not consulted with any agency specifically with reference to this application.

E. Environmental Impacts

1. Noise

The Property is currently subjected to overflights, noise, and other intrusions, associated with aircraft utilizing the runways of HIA and NASBP. The existing combined (due to HIA and NASBP operations) day-night average sound level (Ldn) at the Property is estimated to range from about 55 Ldn to over 70 Ldn.

The Property is also subject to restrictions pursuant to an easement in favor of the United States of America. The easement prohibits the construction of homes or other noise sensitive improvements, such as residential units, in an area approximately 100 acres in size on the western portion of the Property.

2. Air Quality

The principal source of short-term air quality impact will be construction activity. Construction vehicles will increase automotive pollutant concentrations along the principal access roads in the vicinity of the Property. They will also reduce the capacity of roadways and lower average travel speeds. This, in turn, will contribute to additional air pollution emissions. Furthermore, site preparation, earth moving, building, and on-site road construction will create particulate emissions.

Air samples were taken at two roadway intersections during September 1989. The sampling indicates that under a "worst case" analysis, development of the Property will not cause carbon monoxide concentrations at the Fort Weaver Road-Geiger Road intersection to exceed either federal or state standards during the morning and

afternoon peak hours. With respect to Kunia Road at the H-1 Freeway, the sampling revealed that state standards will be exceeded by 1998 even if the Property is not developed.

3. Pesticide and Fertilizer Use.

With respect to pesticide use on the golf course, the potential for significant airborne concentrations of pesticides is relatively slight when consideration is given to the dilution factor in application solutions plus the coarse spray that is normally used to assure adequate coverage in the desired area and avoidance of drift. However, should a user improperly apply these pesticides under wind conditions which would contribute to drift, then there would be an increased possibility of downwind exposure of property and people.

If proper procedures are followed in the application of pesticides to the golf course, this should result in little adverse impact on air quality. Since pesticide particles do become airborne and disseminated when spraying occurs during high wind conditions, Applicant will spray only when the weather permits and in the late afternoons or early morning hours when the golf course is not in use. Additionally, Applicant will employ a well-qualified golf course superintendent who will be responsible for sound management practices with regard to fertilizer and pesticide application.

4. Historic and Archaeological Resources.

No cultural features exist on the majority of the Property which has been under sugarcane cultivation for decades. However, in the 20 acres of uncultivated land on the western side of the Property, 2 archaeological sites have been found. These sites, T-80 and T-84, were assessed as significant solely for information content.

5. Natural Features.

a. Water Resources.

The golf course will be maintained with various fertilizers and pesticides. The use of these chemicals, however, will not have a negative impact on the environment.

With proper management of fertilizers and pesticides and appropriate irrigation practices, the chemicals used on the golf course will not adversely impact the quality of the groundwater or shoreline waters in the area. Moreover, even if water

contamination were somehow to occur, the effect would be minimal because the groundwater aquifer beneath the subject property is brackish and, therefore, no negative impact would come from the leaching of any chemicals. Even if leaching were to occur, because of the dynamic groundwater flow toward the ocean, it is unlikely that contaminants would accumulate in the aquifer. Moreover, any chemical contaminant that managed to reach the ocean would quickly be reduced to an undetectable level by the vigorous shoreline wave action.

Applicant will establish a groundwater monitoring plan and system in accordance with State Department of Health guidelines as part of its efforts to minimize the golf course's impact on water resources in the area.

b. Flood Plain Management.

The project site identified on the Flood Insurance Rate Map (Community-Panel 150001-0135:B) as an area in which flood hazards are undetermined. Urban development and drainage improvements being made upstream of the golf course will significantly alter both the volume and course of the runoff that must be accommodated. The drainage program discussed earlier will mitigate the Property's exposure to flood hazards.

c. Wetlands Protection.

There are no wetland areas on the property.

d. Coastal Zone Management

The project does not involve a Federal permit, and so is not subject to the consistency requirements of the CZM program. It is, however, subject to the Hawaii Coastal Zone Management Act, Chapter 205(a) of the Hawaii Revised Statutes, which establishes state policies for actions affecting the coastal zone.

Development of the Property will have minimal or no impact on the goals and objectives of the Coastal Zone Management Act, primarily because it is located substantially inland from the shoreline. Consequently, there are no beaches, surfing sites or other coastal resources or recreational activities which need to be considered.

As discussed earlier, storm run-off will pass over the Property on its way to the ocean and the Property, therefore, will be designed to allow this water to be channelled and drained into the marina planned for Phase I. This will allow sediment to be filtered before the storm waters reach the ocean. In this manner, the present quality of the coastal waters will be maintained.

The Property does not contain any coastal ecosystems of significant biological or economic importance. Features which will be built into the Property such as the wide drainage swale that will convey water from areas inland of the Property, through to the Phase I area, will actually minimize the effect of the volume and quality of the storm run-off from the site. Consequently, there will be no adverse effect to the coastal water or ecosystems.

The Property does not abut the shoreline and is not in a tsunami or storm wave inundation area. It is also not in a potential subsidence hazard area. Drainage facilities included in the Property, such as the wide drainage swale across the golf course, will ensure that the Property will be in compliance with the requirements of the National Flood Insurance Program.

e. Unique Natural Features.

There are no unique features on the Property.

f. Vegetation and Animal Life (Flora and Fauna).

Since the Property has been under cultivation for many years, few feral animals which would normally be found on the Property are present. Thus, the development's impact on such animals will be minimal. There will, however, be a reduction in the present population of doves, finches and pacific golden plovers, but the number of sparrows and common mynahs is expected to increase.

Likewise, due to the years of sugarcane cultivation, the Property does not contain any endangered plant species or other plant species which are not found in abundance elsewhere. The land, therefore, is of little botanical interest and developing it will not have a negative impact on rare or endangered flora in the State.

g. Agricultural Lands.

About 9% of the Property is rated "A" or prime agricultural lands of importance to the State ("ALISH"), while the remainder of the Property consists of other important agricultural lands. (See Exhibit L, ALISH Map.)

The soil on the subject property consists of coral outcrop, fill land, Mamala stony silty clay loam, and moderately shallow Ewa silty clay loam. Suitable agricultural activity associated with most of these soil types include cultivation of sugarcane, raising of truck crops and maintenance of pasture lands. Actually, 36% of the area is coral outcrop and poorly suited for agriculture. (See Exhibit E, SCS Soils Map.)

The immediate effect of developing the Property will be a reduction in the amount of land available to OSCO for its sugar production. However, because the subject property is located on the outskirts of the plantation, OSCO's irrigation system and cane haul roads will not be affected. Moreover, with the withdrawal of the Property, the sugar plantation will become more compact, resulting in shorter, and less expensive trucking distances to the mill. Furthermore, because development of the Property will result in the elimination of inferior-quality plantation lands, average yields for the plantation may actually increase.

The long-term future of OSCO will remain uncertain whether Applicant develops the Property or not. This is so because of flat sugar prices which are combined with operating costs that increase with inflation, the uncertainty of continued federal price supports and the fact that all of Oahu Sugar's leases will expire by the mid-1990s.

The development of the Property will also not adversely affect diversified agriculture. The reasons are as follows: (i) extensive amounts of prime-agricultural lands and water sources have already been freed in other parts of Oahu from sugarcane and pineapple production, thereby making those other lands available for diversified agriculture, (ii) there is a probability that even more lands and water will be freed from sugarcane production due to the marginal profitability of sugar, (iii) most sugar producers would make their lands available for more profitable replacement crops, to the extent that such other crops become available; and (iv) only a small amount of land

and water is required to grow those crops which do have a realistic potential for being economically feasible. Thus, given that the supply of available agricultural lands greatly exceeds the demand, the development of the Property will not hinder the growth of diversified agriculture in Hawaii.

h. Open Space.

Development of the Property as a golf course will keep the land in open space.

6. Hazards.

a. Nuisances and Site Safety.

Due to the proximity of OSCO's sugarcane fields, the Property is exposed to the fertilizers and pesticides used by the plantation and to noise, dust, smoke and other pollutants generated during harvesting. Use of the Property for a golf course is compatible with OSCO's sugar operations.

b. Airport Clear Zone (APZ).

The Property is impacted by the noise emanating from aircraft operations at NASBP and at HIA. Composite day-night averaged noise levels on the Property from these operations range from 55 Ldn on the eastern side of the Property to 70 Ldn on the western side. In addition to the exposure to aircraft noise, the western side of the Property is subject to potential accidents from aircraft leaving or arriving at NASBP.

In order to mitigate the noise and accident potential impacts of the flight operations from NASBP, the United States of America acquired an easement over approximately 100 acres on the western side of the Property. Within this easement area, development of houses, apartments or similar types of structures in which people would congregate are not allowed. A golf course, however, is one of the few uses which is permitted.

F. Alternatives Considered.

Applicant has considered using the Property for the development of housing units. Upon consideration of the demands on water resources and the area's existing transportation system, the lack of employment opportunities, the Property's exposure to aircraft operations at NASBP and HIA, the Property's

location in the path of the Kalo drainage system and the fact that tens of thousands of other housing developments are already planned for the Ewa DP Area, including Applicant's own Ewa Marina, Phase I component, Applicant concluded that use of the Property for a golf course was a better choice.

Use of the Property for traditional agricultural operations, such as raising food crops or animals or cultivating decorative plants and flowers, was not considered because the Ewa DP designates the area in which the Property is located for the development of housing, commercial and recreational facilities.

G. Proposed Mitigation Measures.

The master plan for the development of Ewa Marina already incorporates the measures which are necessary to mitigate the impacts discussed in this application and environmental assessment. Consequently, no additional mitigative measures are needed.

VI. DEPARTMENT OF GENERAL PLANNING GUIDELINES FOR DEVELOPMENT PLAN AMENDMENTS FOR GOLF COURSE DEVELOPMENT

A. Social Impact

1. Provide affordable housing. Contribute land, units or cash. The number of units shall be in relationship to the land area of the proposed golf course, including expansions and additions to existing courses.

• • •

Comment:

Phase II of Ewa Marina, containing the golf course and the mixed-use commercial center, will not contain any traditional housing. Instead, up to 1,500 visitor accommodation units are planned. In accordance with Applicant's representations to the State, Applicant will provide one new non-tourism related employment opportunity for each of these visitor accommodation units which are built in lieu of an affordable housing requirement. The value of this job creation requirement is \$37,500,000.

2. Reserve a minimum of 30 percent of the fee times for Oahu residents and/or provide public play at municipal rates.

Comment:

Applicant will make a minimum of 40 percent of the fee times available for public play at rates similar to those at privately owned golf courses which are open to the public.

3. Provide for the relocation of existing uses and residents. Ensure adequate, affordable and convenient housing for employees.

Comment:

Since OSCO's sugar plantations are being reduced in size in order to make the operations more economical, there is no need to relocate OSCO's sugar fields. Similarly, since there are no homes on the Property, there is no need to relocate any residents.

It is anticipated that housing for employees of the golf course and the commercial center will be available in the Phase I portion of Ewa Marina, in the surrounding Ewa Beach community and in the tens of thousands of new homes being built in the Ewa DP Area.

4. Provide other community benefits such as child care, park and ride, fire, police, community center or recreational facilities; elderly housing; job training; scholarships.

Comment:

Applicant's Ewa Marina Project will include parks and recreational facilities, such as the 17-acre Gateway Park and the 150-acre marina. Additionally, Applicant will be contributing toward job-training programs in conjunction with its agreement to provide new employment opportunities.

B. Economic Impact

Provide a forecast of the impact of the project on the value of land in the area and indicate the impact on future real property taxes. Propose a plan which would compensate for any negative impact.

Comment:

Applicant does not anticipate that development of the golf course will have a significant impact on the value of land in the surrounding area. To the west of the Property is NASBP which is exempt from property taxes. To the north are sugarcane lands being cultivated by OSCO under leases from Campbell

Estate. While the development of the golf course may ultimately have an impact on the value of Campbell Estate's fee interest, it should not result in any increase in the property taxes which OSCO pays for growing sugarcane.

Constituting the eastern boundaries of the proposed golf course are Fort Weaver Road and Ewa Marina's proposed 17-acre Gateway Park. On the other side of Fort Weaver Road is the Myers Golf Course, which should also experience no change in land values. Finally, to the south of the Property are the planned marina, commercial center and residential development which, like the golf course, are all part of Applicant's Ewa Marina project.

C. Environmental Quality and Other Physical and Infrastructure Impacts

1. Establish a groundwater monitoring plan and system in accordance with State Department of Health guidelines.

Comment:

Applicant is committed to complying with these guidelines.

2. Develop water facilities based on a comparative affordable housing development of the proposed golf course acreage; for example, the water demand for 720 affordable housing units may total .5 mgd. That demand may be satisfied by developing wells or reservoirs yielding .5 mgd to the Board of Water Supply or an equivalent cash payment.

Comment:

As indicated previously, Applicant is a member of EPWDC and has already contributed in excess of \$10 million towards the development of new water facilities.

3. Promote water conservation by utilizing sewage effluent and non-potable water for irrigation in the following order of priority:

• • •

Comment:

Applicant intends to irrigate the golf course by using only non-potable, sub-surface water. Alternately, Applicant is willing to develop a secondary sewage treatment plant on the project site and to use the treated water for irrigation.

4. Contribute to wastewater improvements based on a comparative affordable housing development of the proposed golf course acreage; for example, the sewerage requirements for 720 affordable units may total .5 mgd. That demand may be addressed by connecting existing housing to the City's sewer system, contributions towards wastewater treatment plants or sewer upgrade, or an equivalent cash payment to the Department of Public Works.

Comment:

Applicant is willing to contribute its fair share to needed wastewater improvements. As indicated previously, Applicant is installing a new sewer main to handle the load generated by Ewa Marina which is not accommodated by the existing 84-inch sewer main located within Geiger Road and Iroquois Road mauka of the Property.

5. Design the golf course to maximize the use of natural drainage, to recharge the aquifer and to alleviate the need for stream channelization and other formal drainage systems in nearby areas.

Comment:

As discussed previously, the golf course will serve an important link in the Kaloi drainage system and will act as a settlement basin, allowing the sub-surface aquifer to be recharged.

6. Utilize the course as a buffer between potentially incompatible uses, such as separating residential areas from sugarcane fields, or use land on which environmental hazards preclude more intensive uses (e.g. blast zones, aircraft accident potential zones, flood plains). In turn, provide buffers to safeguard surrounding inhabitants from errant golf balls.

Comment:

The golf course is intended to serve as a buffer between the sugarcane fields to the north and Phase I of Ewa Marina. It also is the most feasible use available because of the impact of the aircraft operations at the adjoining NASBP and the impact from storm water flowing from the Kaloi drainage system.

7. Preserve significant view planes and vistas, especially from the vantage point of major public thoroughfares and places.

Comment:

Development of the golf course, of course, will allow view planes and vistas from Fort Weaver Road to be preserved. Combined with the marina, the golf course will present an extremely attractive landscape.

8. Integrate the golf course with a large master-planned residential project (with 60% affordable housing) or resort development in order to maximize opportunities for optimum siting features.

Comment:

The golf course is an integral part of Ewa Marina, which will contain 4,850 residential units, a 150-acre marina and waterways, and a mixed-use commercial center.

9. Protect and/or support existing wetlands and fish and wildlife habitats.

Comment:

There are no wetlands or fish and wildlife habitats on the Property which need to be protected.

10. Protect streams, rivers and coastal waters from runoff. Protect and preserve natural vegetation to the greatest extent practicable. Provide landscaping with indigenous flora appropriate to the setting and in recognition of water conservation principles.

Comment:

As discussed, in previous sections of this application and environmental assessment, the development of the proposed golf course will contribute towards the preservation of the purity of the coastal waters off of Ewa because it will serve as a settlement basin, filtering out sediment and other impurities which the storm water from the Kaloi drainage system will carry to the ocean.

Applicant's botanical survey indicates that, as a result of years of sugarcane cultivation, there are few plant species on the property and of the ones found, none are endangered. A few coastal sandalwood trees have been found in the uncultivated area of the Property, however, and Applicant will attempt to utilize these trees in its development.

11. Provide for the employment of a well-qualified Golf Course Superintendent (preferably a Certified Golf Course Superintendent) to be responsible for sound management practices with regard to fertilizer and pesticide application. Provide monitoring and reporting of types and applications. Prepare contingency plans to rectify potentially harmful occurrences due to accidents, injudicious use or other management failures.

Comment:

Applicant will be employing a well-qualified superintendent who will be responsible for sound management practices regarding fertilizer and pesticide uses. Applicant will also implement a monitoring program.

12. Design for compatibility of the proposed golf course with both existing and planned surrounding uses.

Comment:

As indicated, the proposed golf course is part of the master plan design for the 1,110-acre Ewa Marina development. It will be a large, well-maintained open space area which, along with the marina, will make the project very attractive.

13. Provide a traffic impact study and mitigative measures such as contributions to the rapid transit program, road widening, turning lanes or signalization.

Comment:

Applicant has already commissioned a traffic impact study and is taking mitigative measures, such as participating in the Ewa Highway Master Plan and committing to paying its fair share for traffic facility improvements necessitated by its project.

14. Provide land for use as public parks to the City with a minimum of 10% of the total land area of the proposed golf course.

Comment:


Applicant's Ewa Marina project will contain a 150-acre marina and several parks, including the 17-acre Gateway Park, thereby providing more park-type recreational facilities than the guidelines suggest.

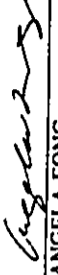
VII. CONCLUSION AND REQUEST

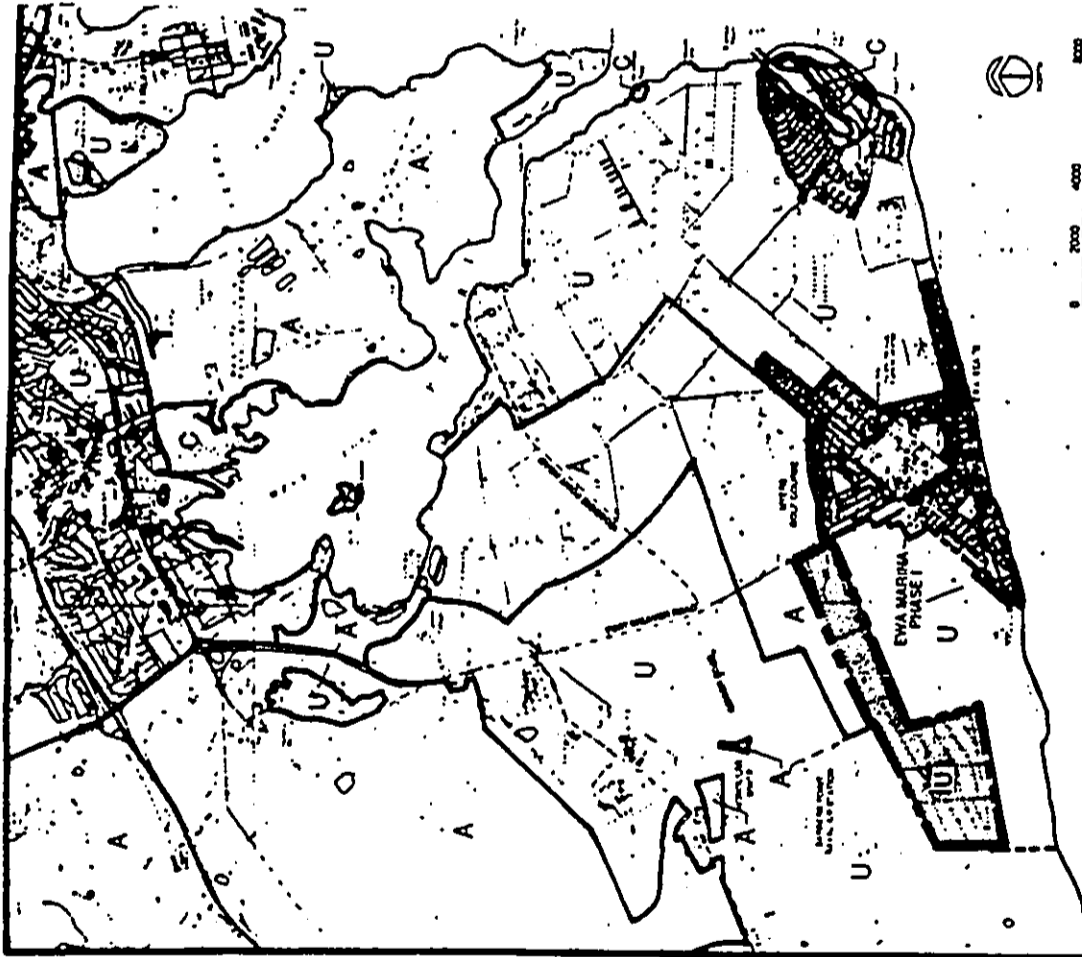
WHEREFORE, Applicant respectfully requests that the Ewa Development Plan Land Use Map be amended in the manner proposed by this application.

DATED: Honolulu, Hawaii, November 15, 1990

HASEKO (HAWAII) INC.

By: 
NELSON W. G. LEE
Its Development Director

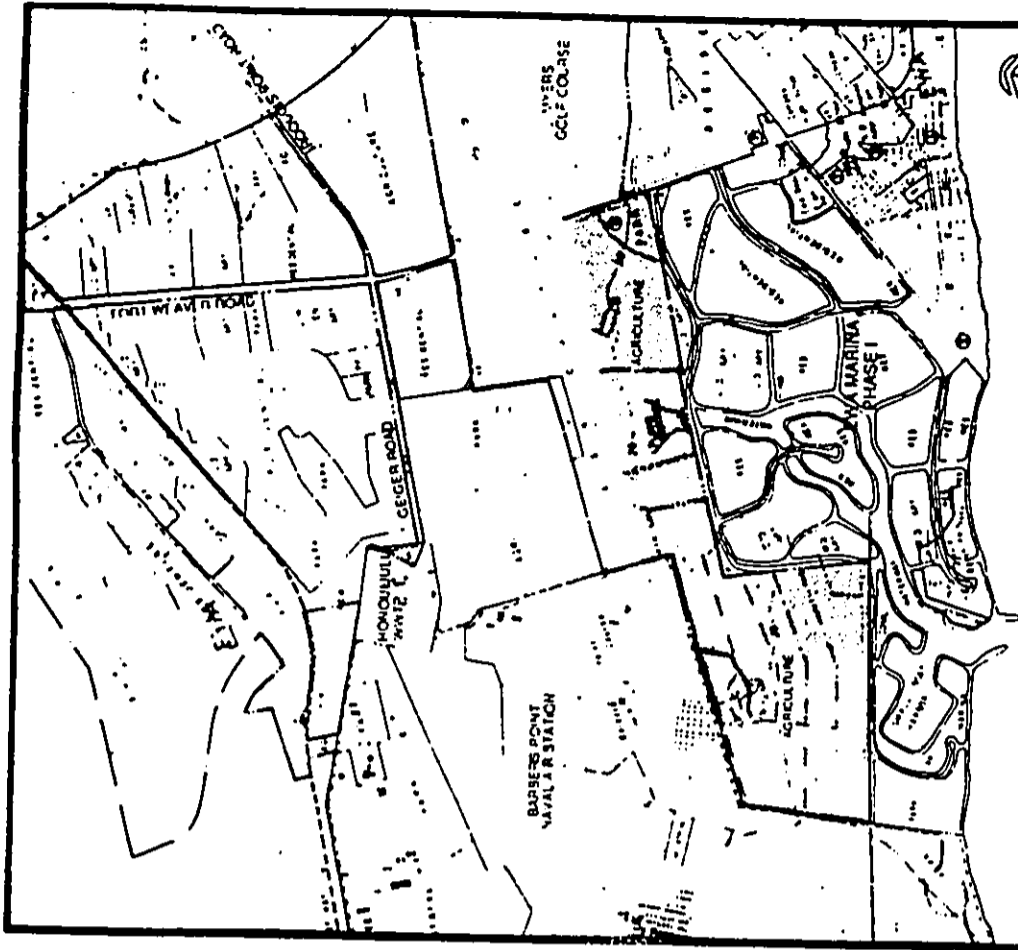

ANGELA FONG
STEVEN K. S. CHUNG
Attorneys for Applicant
HASEKO (HAWAII), INC.



STATE LAND USE DISTRICTS
 Prepared by: Bill Collins & Assoc.
 Prepared for: HASEKO (Hawaii), Inc.
 Date: November 1988
 Source: Land Use District Maps, 0-9, 0-5, 0-8 and 0-10
 Current as of November 1, 1990

LEGEND
 U - Urban
 R - Rural
 A - Agriculture
 C - Conservation

EXHIBIT A



DEVELOPMENT PLAN LAND USE MAP
 Prepared by: Bill Collins & Assoc.
 Prepared for: HASEKO (Hawaii), Inc.
 Date: November 1989
 Source: Development Plan Land Use Map, August 3, 1989

LEGEND
 --- State Land Use Boundary

EXHIBIT B

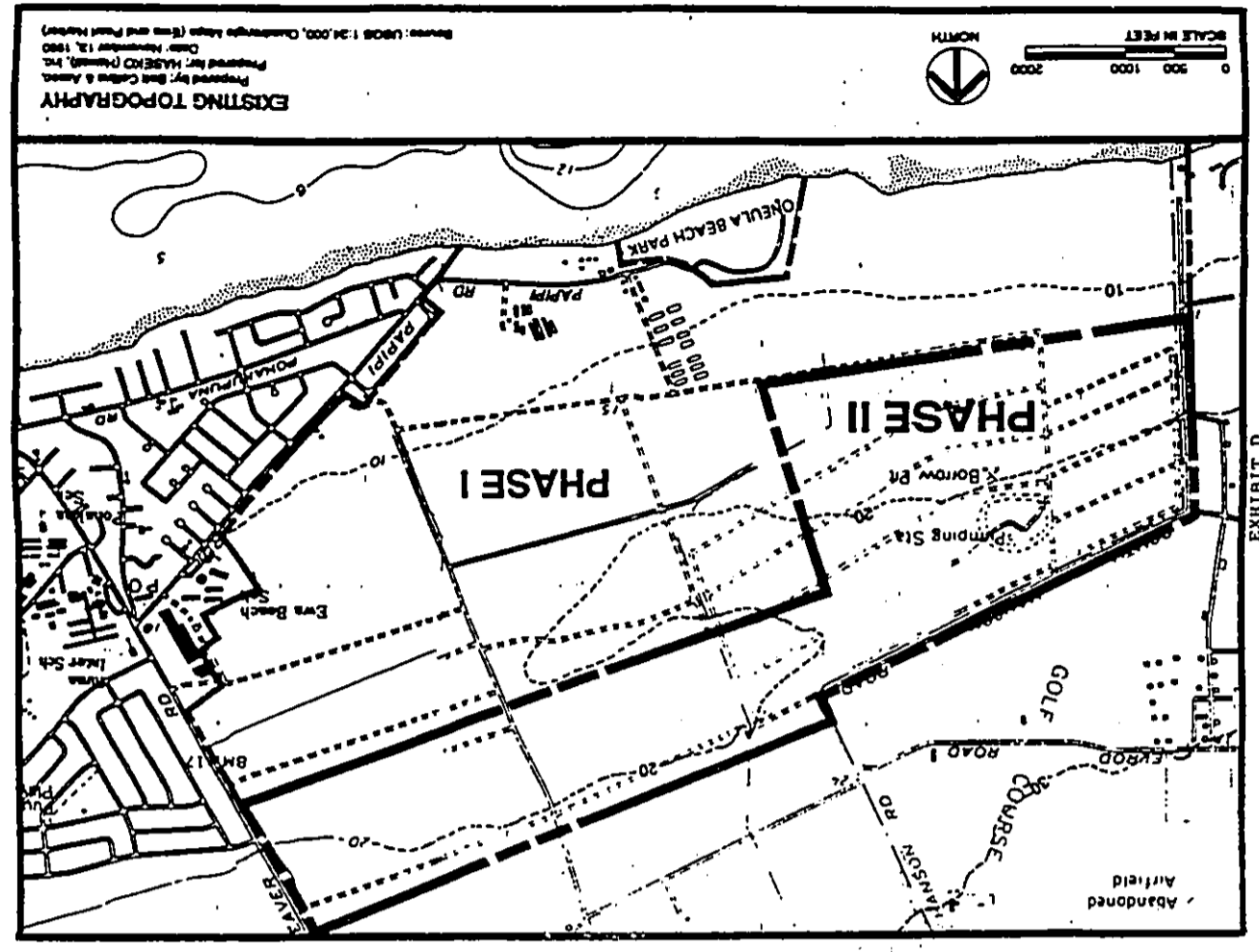


EXHIBIT D

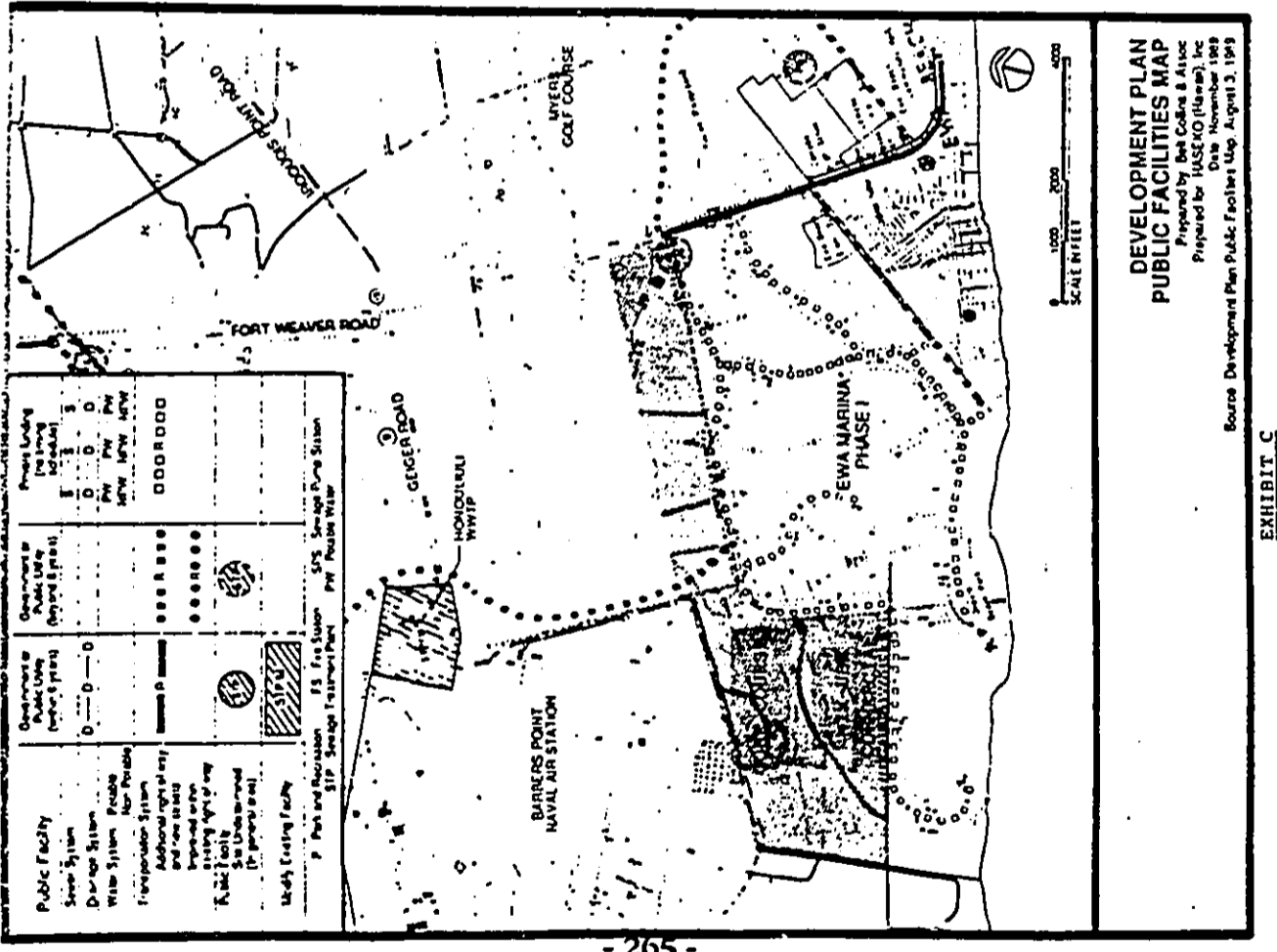


EXHIBIT C

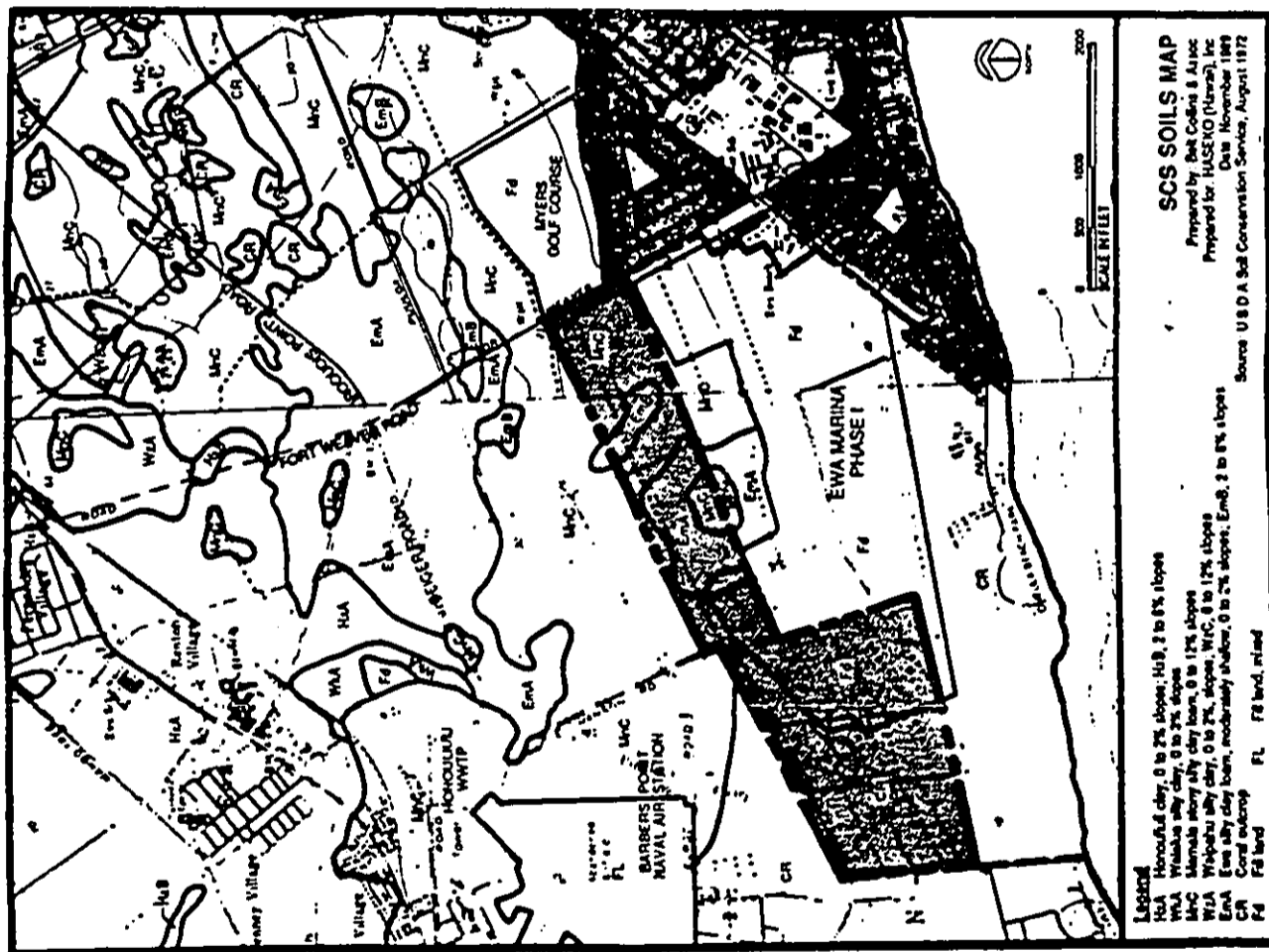
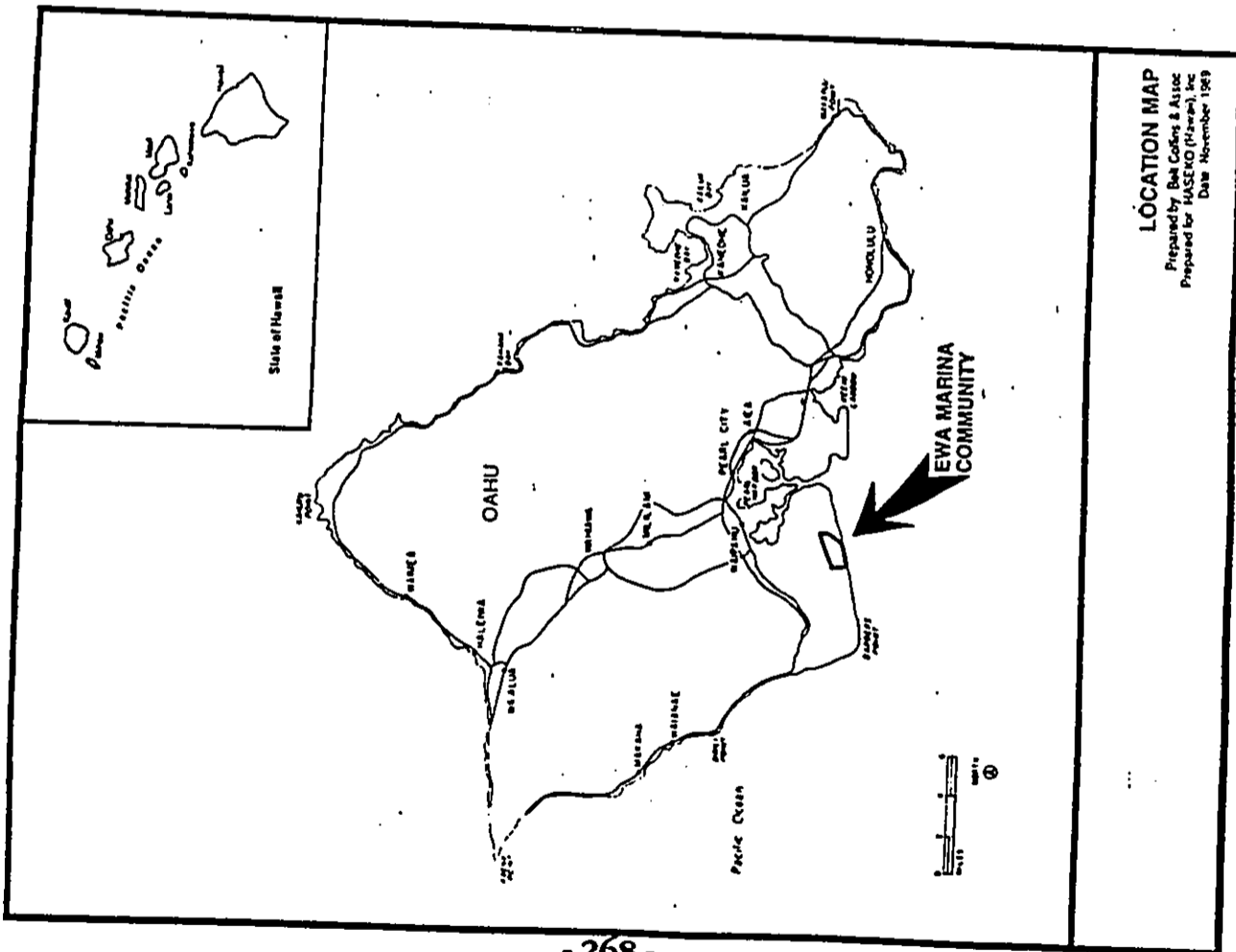


EXHIBIT E



EXHIBIT F

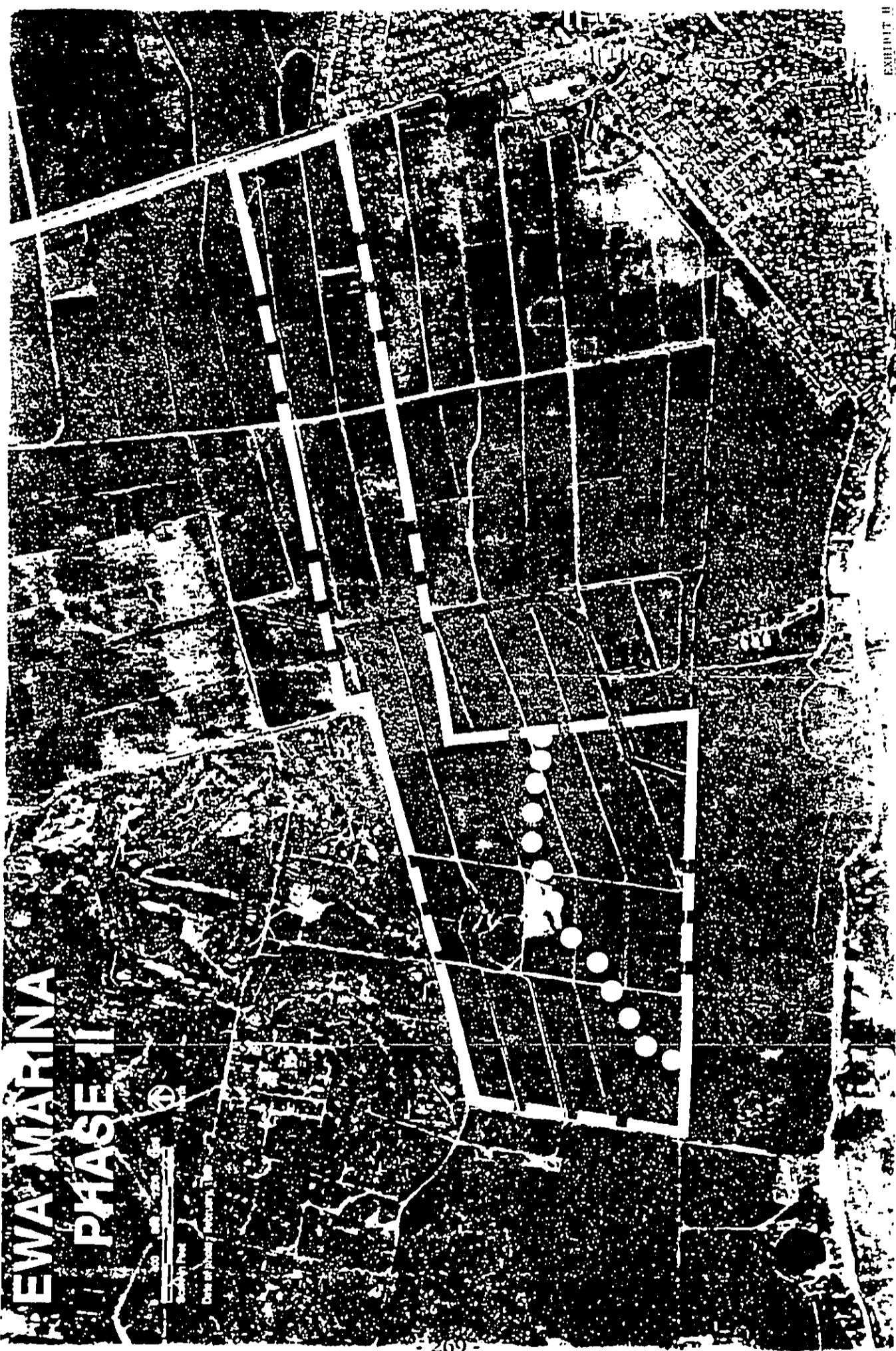


LOCATION MAP

Prepared by Bill Coffey & Assoc
 Prepared for HASEMO (Hawaii), Inc
 Date November 1989

EXHIBIT G

RECEIVED AS FOLLOWS



EWA MARINA
PHASE II

EXHIBIT II

RECEIVED AS FOLLOWS

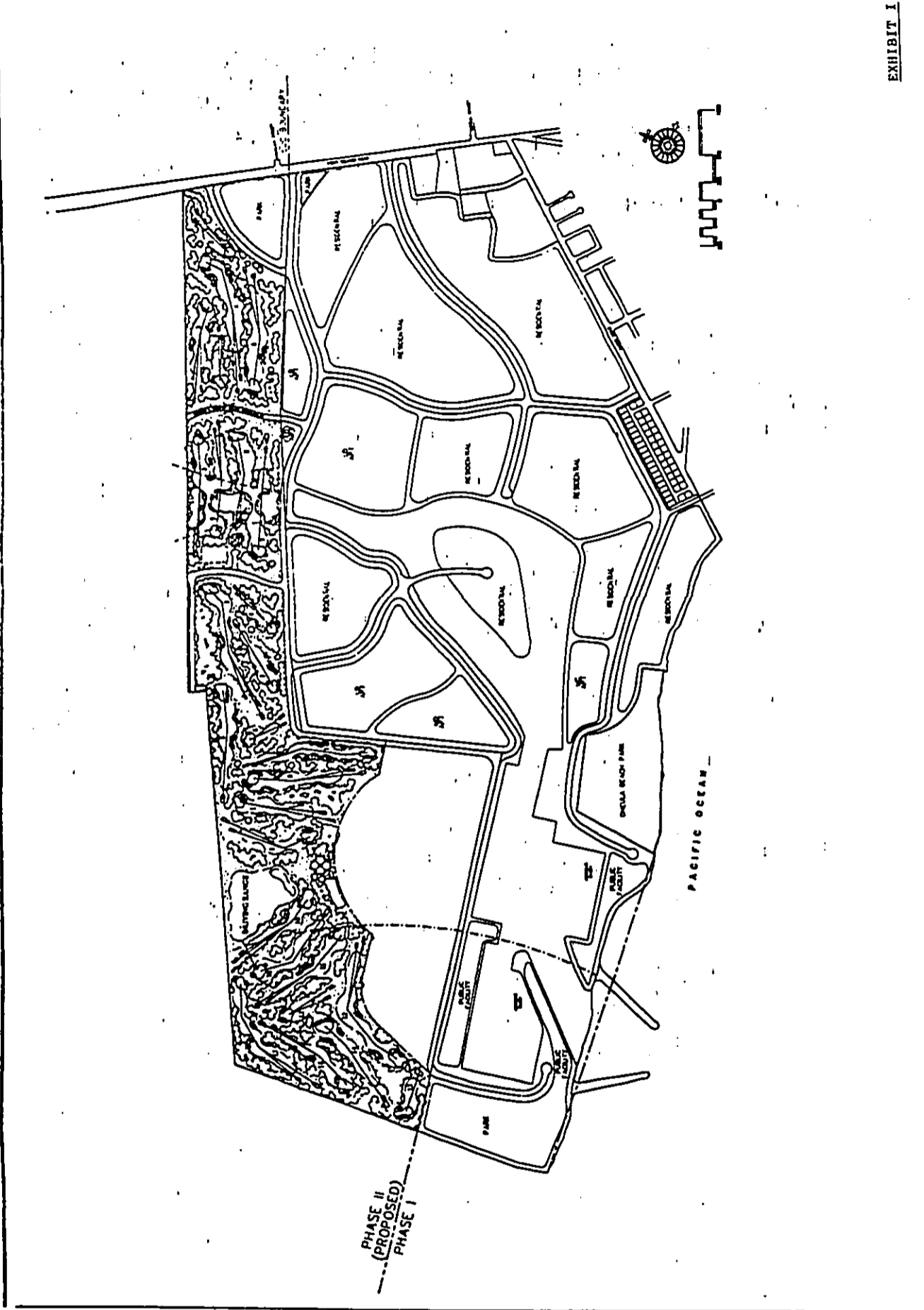
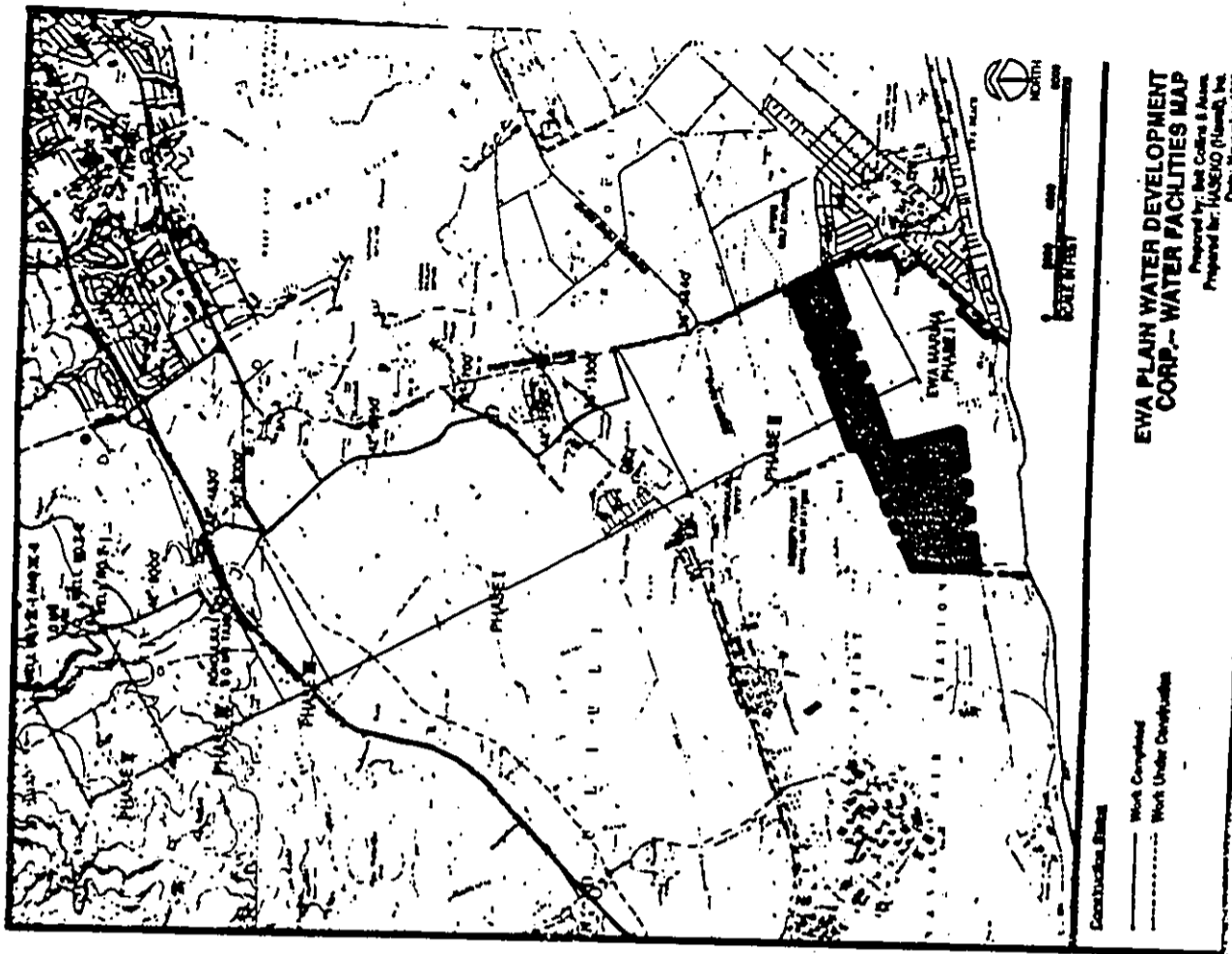
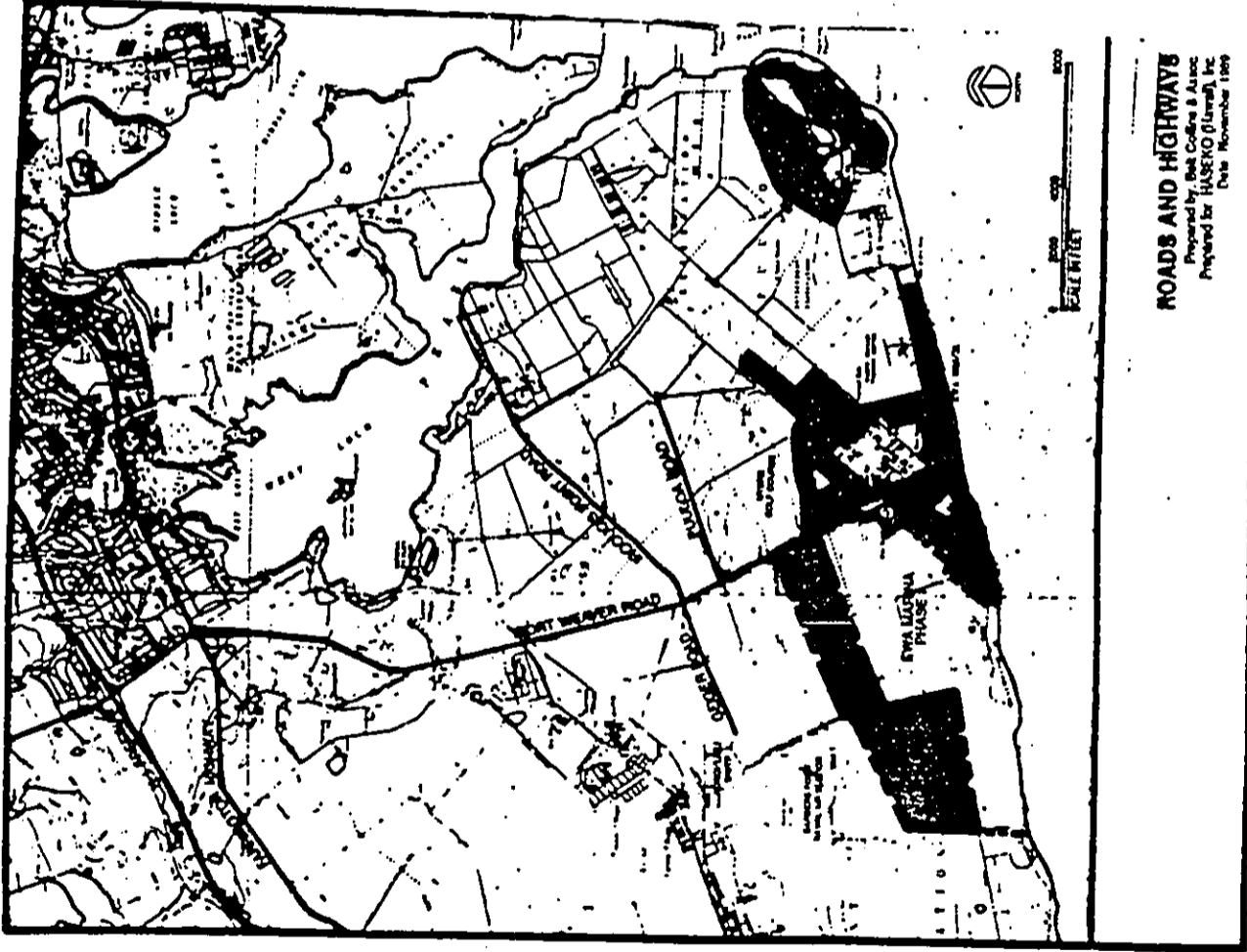


EXHIBIT I

RECEIVED AS FOLLOWS



DGP REF. NO.: Eva DP Land Use Map
 MAP REF. NO.: Eva
 NB AREA: Approximately 272.0 acres
 AREA: (1)9-1-12: portions of 5 and 6

EWA DEVELOPMENT PLAN AREA
 DEVELOPMENT PLAN LAND USE AMENDMENTS
 BEING CONSIDERED

Amendment/Project Information

Amendment Request: Redesignation of approximately 272.0 acres from Agriculture to Park/Golf Course on Eva DP Land Use Map.
 Location: Honolulu, between Naval Air Station Barbers Point and Fort Weaver Road and adjacent to Eva Marina Special Area.
 Address(es) of Subject Area--Where Applicable: N/A

Owner/Developer: Haseko (Hawaii) Inc. Requested By: Haseko (Hawaii) Inc.
 Basis for Request: To allow development of golf course component of the master-planned 1,110-acre Eva Marina Community Development Project.

Type of Project: 27-hole golf course, integrated with 4,850 residential units, 150-acre marina and a mixed-use commercial center
 Impact on Provision of Housing: This component of the Eva Marina project does not include housing.

Existing Conditions Present Plan/Zoning Designations

Land Use: Sugarcane fields State Land Use: Urban
 Structures Number: None DP Public Facilities Map: No public project designated
 Type: N/A DP Special Provisions: Adjacent to Eva Marina Special Area
 Height: N/A
 ALISH zoning: AG-2, General Agriculture

Soil Features: Classified B and C by the Land Study Bureau. About 9% of the land is considered "prime" and the remainder is considered "unique" and "other."
 Possible Constraints: One-third of the property is subject to restrictive easement in favor of United States Government which prohibits residential development. Other portions of the property are in the path of the Kalol drainage system.

APPENDIX 1

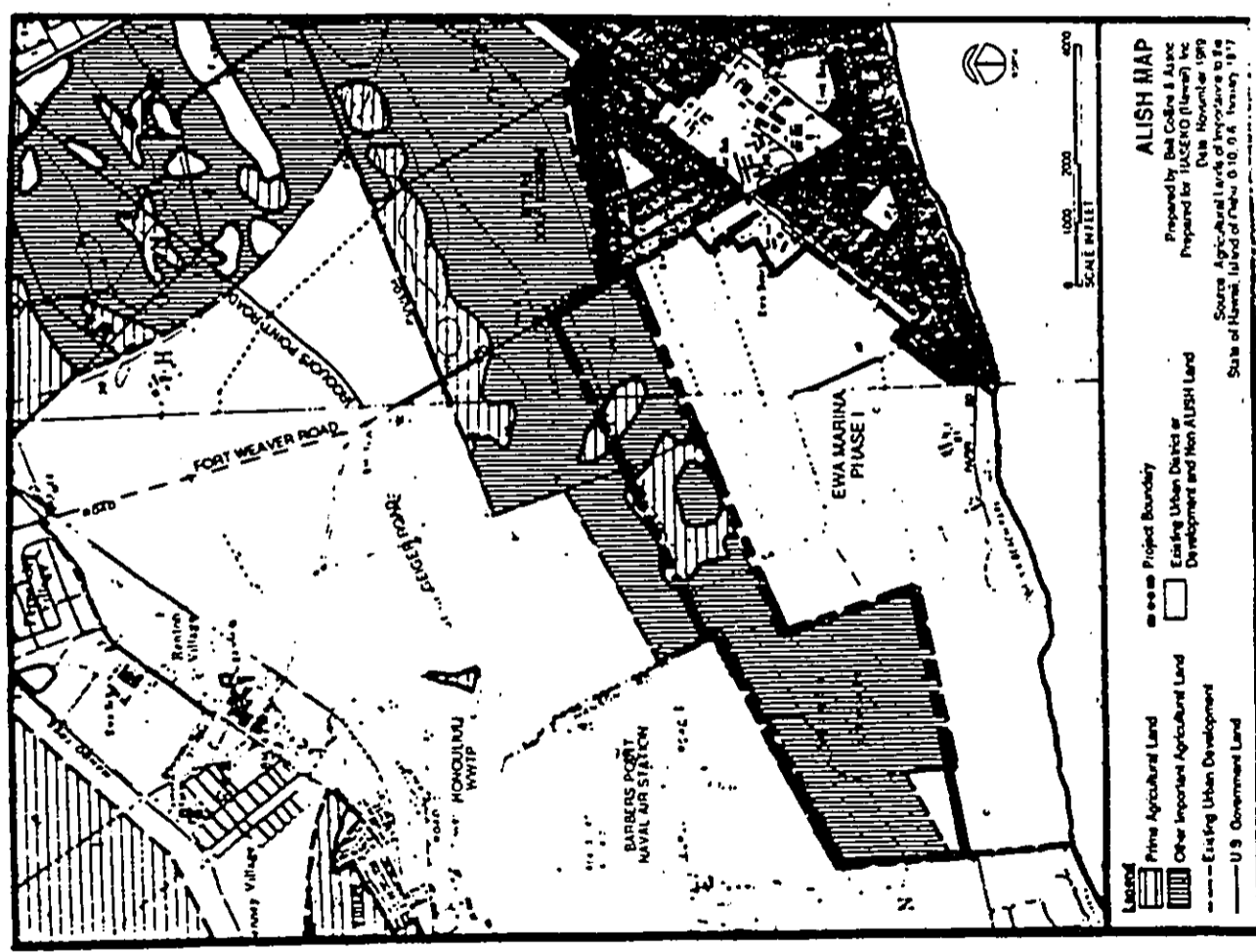


EXHIBIT 1

DEPARTMENT OF GENERAL PLANNING
AUGUST 3, 1990

III. REVIEW CRITERIA

A. LAND USE IMPLICATIONS

PROPOSED GOLF COURSE PROJECT: EVALUATIVE CRITERIA

Proposed Golf Course: Ewa Marina Golf Course
 DP Area: Ewa No. of Acres: 272.0
 Developer: Haseko (Hawaii), Inc., a Hawaii corporation
 Tax Map Key: (1) 9-1-12: portions of 5 and 6

I. APPROVALS NEEDED AND PROCESSING STATUS

Zoning:	Designation Needed _____	Date Application Submitted _____
Dev. Plan:	Designation Needed <u>Park/Golf Course</u>	Date Applied <u>11/15/90</u>
SLUC:	Classification Needed <u>Urban</u>	Date Application Submitted <u>N/A</u>
Other:	_____	_____

Comments:

II. GENERAL CHARACTERISTICS

New Golf Course X Expansion _____ No. of Holes 27
 Ownership: Private X Public _____
 Operation: Private Membership _____ Semi-private X Public _____
 Type of Course: Stand Alone _____ Integrated X
 Existing DP Designation Agriculture use
 Existing Zoning AG-2, General Agriculture
 Existing State Land Use District Urban

APPENDIX II

1. Golf course is: (select one category or subcategory only)	YES	NO
(a) Integral part of resort complex	_____	<u>X</u>
(b) Integral part of planned development with	_____	_____
(i) 60% or more of the housing units are affordable to families at or below 120% of median income	_____	<u>X</u>
(ii) 30% of the housing is affordable to families at or below 120% of median income and 30% is affordable to families between 120%-140% of median income	_____	<u>X</u>
(iii) 30% of the housing is affordable to families between 120%-150% of median income	_____	<u>X</u>
(iv) market priced housing	<u>X</u>	_____
(c) Integral part of resort and housing planned development	_____	<u>X</u>
2. Golf course functions:	_____	_____
(a) as buffer between potentially incompatible uses (e.g., blast zones, industrial from housing, shoreline buffer, agricultural uses from urban, especially residential, etc.)	<u>X</u>	_____
(b) to use land on which environmental hazards preclude more intensive uses (e.g., flood areas, blast zones, AICUZ over 60, steep slopes, etc.)	<u>X</u>	_____
(c) other - specify: _____	_____	_____

B. LAND USE APPROVALS RECEIVED/IMPACT ON AGRICULTURAL USE

	YES	NO	YES	NO
1. Portions of proposed golf course sites are:				
(a) In State Urban District or Conservation District	X		X	
(b) designated Parks/Golf Course on DP		X		X
(c) zoned Resort or P-2		X		X

APPLIES ONLY IF IN STATE AGRICULTURE DISTRICT

2. Proposed golf course is not located on Land Study Bureau A or B soils.				
3. Proposed golf course site is located on land: (select one category only)	N/A			
(a) which is not currently in use for agricultural production				
(b) which has not been used for agricultural production within the last 5 years				

C. ENVIRONMENTAL IMPACT

1. Proposed golf course does not impact sensitive areas or is not in proximity to:				
marshes		X		
water quality, AA or AAA		X		
2. Subsurface water type available is:				
(a) basal water (aquifer)		X		
(b) caprock water				
(i) fresh	X			
(ii) brackish				
(c) dike water		X		
(d) other				
3. Golf course is located below the No-Pass Line.		X		

4. Developer has established a groundwater monitoring plan and system.	X		X	
5. Irrigated areas will be no closer than 500 feet from potable water wells and reservoirs.	X		X	
6. Irrigated areas will be no closer than 100 feet from any private residence.				X
7. There are holding/mixing ponds in the design.				X
8. Electric, not gas, golf carts will be used.	X		X	
9. Management programs have been developed in applying fertilizer or pesticides and				
(a) provide for the employment of a well qualified Golf Course Superintendent and/or other professional staff	X		X	
(b) provide monitoring and reporting of types and applications	X		X	
10. Recharge Area: golf course is located in area characterized by less than 50- average annual rainfall or above caprock				
11. Less than 50% of the project site will be completely cleared and grubbed.	X		X	
12. Alterations to the topography:				
(a) % slope of existing topography	0			
(b) amount of cut and fill that will take place:				
Cut	0			
Fill	0			
(c) result of alterations to topography will be:				
(i) significant i.e.,				
(ii) moderate i.e.,				
(iii) slight i.e.,			X	

B. LAND USE APPROVALS RECEIVED/IMPACT ON AGRICULTURAL USE

	YES	NO
1. Portion(s) of proposed golf course sites are:		
(a) in State Urban District or Conservation District	X	
(b) designated Parks/Golf Course on DP		X
(c) zoned Resort or P-2		X

APPLIES ONLY IF IN STATE AGRICULTURE DISTRICT

2. Proposed golf course is not located on Land Study Bureau A or B soils.		
3. Proposed golf course site is located on land: (select one category only)	N/A	
(a) which is not currently in use for agricultural production		
(b) which has not been used for agricultural production within the last 5 years		

C. ENVIRONMENTAL IMPACT

1. Proposed golf course does not impact sensitive areas or is not in proximity to:

marshes		X
water quality, AA or AAA		X
2. Subsurface water type available is:		
(a) basal water (aquifer)		X
(b) caprock water		
(i) fresh	X	
(ii) brackish		
(c) dike water		X
(d) other _____		

3. Golf course is located below the No-Pass Line.

	X
--	---

YES

NO

4. Developer has established a groundwater monitoring plan and system.	X	
5. Irrigated areas will be no closer than 500 feet from potable water wells and reservoirs.	X	
6. Irrigated areas will be no closer than 100 feet from any private residence.		X
7. There are holding/mixing ponds in the design.		X
8. Electric, not gas, golf carts will be used.	X	
9. Management programs have been developed in applying fertilizer or pesticides and		
(a) provide for the employment of a well qualified Golf Course Superintendent and/or other professional staff	X	
(b) provide monitoring and reporting of types and applications	X	
10. Recharge Area: Golf course is located in area characterized by less than 50" average annual rainfall or above caprock	X	
11. Less than 50% of the project site will be completely cleared and grubbed.		X
12. Alterations to the topography:		
(a) % slope of existing topography <u>0%</u>		
(b) amount of cut and fill that will take place:		
Cut <u>0</u>		
Fill <u>0</u>		
(c) result of alterations to topography will be:		
(i) significant i.e., _____		
(ii) moderate i.e., _____		
(iii) slight i.e., _____	X	

		YES	NO	YES	NO
D. INFRASTRUCTURE					
1. To irrigate the golf course: (select one category only)					
(a)	nearly all potable water is used	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
(b)	approximately a 50-50 mix of potable and non-potable water sources are used	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
(c)	nearly all non-potable water is used	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
2. Net water usage is less than 100,000 gallons per day of potable water.					
		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. Sewage effluent is used for irrigation.					
		<input type="checkbox"/>	<input checked="" type="checkbox"/>		
4. No new wells are needed to support golf course					
		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
5. Golf course will be connected to a public or centralized sewage system.					
		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
6. There is adequate existing road access to course.					
		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
E. COMMUNITY BENEFIT					
1. The availability of public play and green fees at the golf course will be:					
(a)	100% public play at municipal golf course prices	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
(b)	50% public play with green fees at municipal golf course prices	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
(c)	30% public play at municipal golf course prices	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
2. The cash value of community benefits is approximately the following amount:					
(a)	\$100 million	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
(b)	\$75 million	<input type="checkbox"/>	<input type="checkbox"/>		
(c)	\$50 million	<input type="checkbox"/>	<input type="checkbox"/>		
(d)	\$25 million	<input type="checkbox"/>	<input type="checkbox"/>		
(e)	Less than \$25 million	<input type="checkbox"/>	<input type="checkbox"/>		
(Note: Community benefits include off-site improvements to service the community, park dedication beyond requirements, cash contribution in lieu of providing affordable housing, other direct cash contributions, etc.)					

SUMMARY OF COMMUNITY BENEFITS

At a minimum, Applicant's Ewa Marina Community Development Project will result in the following benefits to the community:


1. Affordable Housing	\$ 10,000,000
2. Golf tee times for public play at affordable rates	20,000,000
3. Park lands, park facilities and recreational marina	75,000,000
4. Transportation facilities	5,000,000
5. New employment opportunities	37,500,000
6. Water facilities	10,000,000
Total community benefits	157,500,000


**CERTIFICATE OF COMPLIANCE
WITH THE SOCIAL IMPACT FACTORS
OF THE DEVELOPMENT PLAN COMMON PROVISIONS**

In conformance with Section 32-1.12 of the Development Plan Common Provisions, Applicant hereby certifies that the social impact factors listed in Section 32-1.10(b) of the Development Plan Common Provisions have been given careful consideration. Studies and/or reports concerning all of the relevant impact factors have been prepared by qualified consultants and are available for review or, if required, will be incorporated in an environmental impact statement. This application and environmental assessment incorporates the findings contained in the studies and/or reports.

DATED: Honolulu, Hawaii, November 15, 1990

HASEKO (HAWAII) INC.

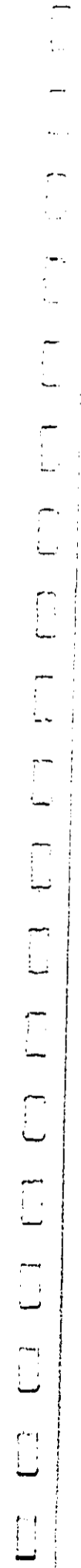
By 
NELSON W. G. LEE
Its Development Director


ANGELA FONG
STEVEN K. S. CHUNG
Attorneys for Applicant
HASEKO (HAWAII), INC.

APPENDIX III

APPENDIX IV

golfsa.haw



RECEIVED AS FOLLOWS

**NOTIFICATION OF AFFECTED PARTIES
AS REQUIRED BY ORDINANCE 84-111**

James Campbell Trust Estate
828 Fort Street Mall, Suite 500
Honolulu, Hawaii 96813

Oahu Sugar Company, Ltd.
P. O. Box 0
Waipahu, Hawaii 96797

Barbers Point Naval Air Station
Attn: Ms. Myra R. Innings
AICUZ Officer (Code 0011)
Land Use Coordinator
Naval Air Station
Barbers Point, Hawaii 96862-5050

Ewa Neighborhood Board
c/o Chairperson Jane Ross
92-783 Laaloa Place
Makakilo, Hawaii 96707

Ewa Beach Community Association
P. O. Box 2003-0003
Ewa Beach, Hawaii 96706

Seibu Hawaii
2237 Kuhio Avenue, Room 304
Honolulu, Hawaii 96815


**CERTIFICATE OF COMPLIANCE WITH THE
NOTIFICATION REQUIREMENTS OF ORDINANCE 84-111**


Ordinance 84-111 states: No application for Development Plan Land Use Map amendment shall be accepted for processing unless the applicant notifies, by mail, all owners, lessees, sub-lessees and residents of the affected property and of each abutting parcel.

I hereby certify that I have complied with the notification requirements of Ordinance 84-111.

DATED: Honolulu, Hawaii, November 15, 1990

HASEKO (HAWAII) INC.

By 
NELSON W. G. LEE
Its Development Director


ANGELA FONG
STEVEN K. S. CHUNG
Attorneys for Applicant
HASEKO (HAWAII), INC.

APPENDIX V

golfts.haw

APPENDIX VI

RECEIVED AS FOLLOWS

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001



William A. Bonnet
Manager
Environmental Department

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS (808) 538-8853
RES (808) 353-1336
FAX (808) 531-4282

January 28, 1991

February 1, 1991

Mr. Tyrone T. Kusao
1188 Bishop Street
Suite 2507
Honolulu, Hawaii 96813

Mr. William A. Bonnet
Manager, Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Kusao:

Subject: Ewa Marina Phase II EIS

Subject: Ewa Marina Phase II

In response to your letter of January 22, 1991 and as discussed with your office on January 28, Hawaiian Electric Company would appreciate being among the consulted parties as this project moves through the environmental review process. Our specific comments are still being gathered and will be transmitted to you under separate cover.

This is to acknowledge receipt of your January 28, 1991 letter in response to our EISP material. You will be a consulted party for this EIS and a copy of the Draft EIS will be forwarded to you as soon as it is published.

We certainly appreciate your taking time to review the submitted material and providing us with your comments.

Very truly yours,

Sincerely,

Tyrone T. Kusao

TTK:afk

An HEI Company

RECEIVED AS FOLLOWS

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

830 SOUTH KING STREET
HONOLULU, HAWAII 96813 • PHONE 523-4433



FLANNERY FARM
MAYOR

DONALD A. CLEGG
DIRECTOR
LORETTA K. CHEE
DEPUTY DIRECTOR

LU 01/91-0480(ASK)

February 1, 1991

Mr. Tyrone Kusao
1188 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Environmental Assessment (EA)
Eva Marina Mixed-Use Commercial Complex
TAX MAP KEY: 9-1-12: PORTIONS OF 5 AND 6

The Department of Land Utilization has reviewed the subject document and offers the following comments:

1. Are noise levels consistent with government environmental and health regulations? What impacts will noise levels have on proposed uses?
2. Where will potable water for the project come from? Is there sufficient quantity to satisfy the project demands without endangering the quality of the source.
3. The EA stated that the golf course will be irrigated with non-potable water. What quantity of water will be used for this purpose. Will the quantity and quality of the source be adequate to meet the irrigation requirement? What permits or government approvals are required to allow use of this source.
4. Will there be sufficient capacity in the Honouliuli WTP to accommodate the demand for wastewater treatment?
5. Because the subject property and the makai area are relatively undeveloped rainfall and storm water percolates into the ground. Proposed Phase I and II will likely increase impervious surfaces reducing natural percolation and possibly increasing ocean

Mr. Tyrone Kusao
Page 2
February 1, 1991

runoff. Page 20 of the Mixed-Use Commercial Complex EA states that the proposed project will improve near shore water quality. Evidence supporting this claim should be provided.

The applicant should describe the constituents of golf course runoff and how these chemicals combined with runoff within the drainage basin will impact marina and near shore water quality. How will the ecology of the marina and near shore water be effected by runoff?

The Draft EIS should state how many visitor units are proposed.

How much traffic will the proposed project generate and what are the traffic impacts?

The Land Study Bureau - Detailed Land Classification indicates that the site has a productivity rating B and C. The EA states that the property is rated as prime agricultural lands of importance to the state and other important agricultural lands by the State ("ALISH") and concludes that the property is poorly suited for agricultural use. The land is currently used for agriculture. The applicant should explain the conclusion that the property is poorly suited for agriculture.

The Draft Environmental Impact Statement should identify clearly the portion of the project that is being described. References to Phase I, Phase II and "Eva Marina" are inconsistently used.

Maps showing the 100-acre easement in favor of the United States of America should be provided. Is the golf course the only portion of the project which will be within this easement area?

Thank you for the opportunity to review the subject project. Should you have any questions regarding the above you may contact the Environmental Affairs Branch at 523-4077.

Very truly yours,

Donald Clegg

DONALD A. CLEGG
Director of Land Utilization

DAC:lg

RECEIVED AS FOLLOWS

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BUSH STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS. HOUR: 508-6853
RES. HOUR: 508-1338
FAX HOUR: 508-4282

February 1, 1991

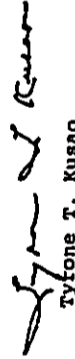
Mr. Donald A. Clegg
Director
Department of Land Utilization
City and County of Honolulu
650 S. King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: Ewa Marina Phase II EIS (Your File No. LU 01/91-0480(ASK))
This is to acknowledge receipt of your February 1, 1991 letter in response to our EISP material.

We have reviewed all of your comments and will address them in the DEIS. Your assistance in reviewing the submitted material and your response thereto are greatly appreciated.

Very truly yours,


Tyrone T. Kusao

TTK:afk

1188 BUSH STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS. HOUR: 508-6853
RES. HOUR: 508-1338
FAX HOUR: 508-4282

RECEIVED AS FOLLOWS

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
830 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FARM
DIRECTOR

JOSEPH M. MAGALDI, JR.
DIRECTOR

TE-358
PL91.1.023

January 30, 1991

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
Suite 2507
1188 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Subject: Ewa Marina Phase II
Environmental Assessment
TMK: 9-1-12: Portions 5 and 6

This is in response to your letter of January 22, 1991 requesting our review and comments on the subject project.

We understand that an updated traffic impact study is being prepared for this project. This report should be submitted to our office for review.

In addition, a roadway master plan should be prepared which should establish roadway alignments for all major streets within this development. The plan should include the proposed right-of-way widths and roadway cross sections based on anticipated traffic demand. From our review of the illustrative plans, it appears that certain segments of the proposed roadway system may not meet our minimum design criteria for major streets.

Should you have any questions, please contact Wayne Nakamoto of my staff at 523-4190.

Sincerely,

JOSEPH M. MAGALDI, JR.
DIRECTOR

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS (808) 538-8659
RES (808) 363-1308
FAX (808) 531-4998

February 1, 1991

Mr. Joseph M. Magaldi, Jr.
Director
Department of Transportation Services
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Attention: Mr. Wayne Nakamoto

Dear Mr. Magaldi:

Subject: Ewa Marina Phase II EIS

This is to acknowledge receipt of your January 30, 1991 letter in response to our EISP material.

The updated traffic impact study will be appended to the Draft EIS document presently under preparation. As soon as the document is published, we will forward a copy to your office. With respect to the roadway master plan, I will be forwarding your comments to the appropriate project consultant for follow-up action.

We certainly appreciate your taking the time to review the submitted material and your responses thereon.

Very truly yours,

Tyrone T. Kusao

TTK:afk

RECEIVED AS FOLLOWS

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813



January 30, 1991

FRANK FAS Mayor
DONNA B GOH Chairman
SISTER DAVYLA AICHROCK OSF
Vice Chairman
SAM CALLEJO
EDWARD Y HIRATA
WALTERO WATSON JR
MAURICE H YAMAGUCHI
KAZUHIYASHIDA
Manager and Chief Engineer

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS (808) 538-6654
RES (808) 359-1338
FAX (808) 531-4262

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
1188 Bishop Street, Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Subject: Your Letter of January 22, 1991 Regarding Preparation of the Draft Environmental Impact Statement (DEIS) for the Proposed Ewa Marina Phase II Development, TMK: 2-1-12: Pgs. 5 and 6.

Thank you for giving us the opportunity to review and comment on the proposed Ewa Marina Phase II developments as a consulted party in preparing the DEIS.

The developer should coordinate the installation of the off-site water system facilities with the Ewa Plain Water Development Corporation and obtain the necessary water allocations from them.

An on-site water system master plan should be submitted for our review and approval. The developer should use non-potable water for irrigation of the golf course, roadways and parks.

We may submit other comments regarding the proposed developments when final development plans and the water master plan are submitted to us.

We reserve making comments on the construction of the marina until the developer submits the study we understand is being conducted on the effects of the marina on groundwater resources in that area.

If you have any questions, please contact Bert Kulioka at 527-5235.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

February 1, 1991

Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 S. Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Hayashida:

Subject: Ewa Marina Phase II EIS

This is to acknowledge receipt of your January 30, 1991 letter in response to our EISPN material. Please be assured that I will be following up on your comments with the developer and the appropriate consultants involved in the project.

Your assistance in reviewing the submitted material and providing us with your response is sincerely appreciated.

Very truly yours,

Tyrone T. Kusao

TTK:afk

RECEIVED AS FOLLOWS

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU

910 SOUTH KING STREET
HONOLULU HAWAII 96813



FRANK P. KAHU
MAYOR

WALTER M. OZAMA
DIRECTOR
ALVIN C. AU
DEPUTY DIRECTOR

January 31, 1991

Tyrone T. Kusao, Inc.
1188 Bishop Street
Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kuqiao:

Subject: Applications for Development Plan Amendments and Environmental Assessments for Ewa Marina Community Development Mixed-Use Commercial Complex and Golf Course
Tax Map Key: 9-1-12

We have reviewed the applications for the Development Plan and Environmental Assessments for the Ewa Marina Development and make the following comments and recommendations.

We have determined that the public recreational system proposed for the Ewa Marina Community Development Phases I and II have not been adequately addressed. The applicant will need to discuss with my staff, details toward the development of a public park system to meet City standards and requirements. The number, types, location and size of public parks, public accesses to and along the shoreline required to serve the project this size must be established now as it will affect the land uses which are being proposed in the Master Plan and Development Plan Amendments.

These recreational issues must be satisfactorily resolved before Development Plan Amendments for the project are to be approved by the City.

Tyrone T. Kusao, Inc.
January 31, 1991
Page 2

Please contact Jason Yuen of our Advance Planning Branch at 527-6315 to discuss the recreational needs and requirements for the Ewa Marina Development.

Sincerely,

WALTER M. OZAMA, Director

WMO:s1

Attachment: 1/11/90 letter
cc: Department of General Planning

RECEIVED AS FOLLOWS

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
430 SOUTH KING STREET
HONOLULU, HAWAII 96813



SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER
C. MICHAEL STREET
In reply refer to:
ENV 91-31(449)

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

2202
1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS (808) 536-8852
FEE (808) 595-1338
FAX (808) 531-4882

February 4, 1991

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
1188 Bishop Street, Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Subject: Environmental Assessment for Proposed
Ewa Marina Phase II Project Involving
Mixed Uses and Golf Course
TMK: 9-1-12: Portions of 5 and 6

We have reviewed the subject documents and have the following comments:

1. Will the proposed sewage pump station in Phase I be privately owned and operated?
2. Connection to the Honolulu Wastewater Treatment Plant will not be allowed until the treatment plant is expanded and EPA and the State Department of Health permit the city to discharge more than 25 mgd of primary treated effluent through the ocean outfall. If secondary treatment is required, the expansion and upgrade work will not be completed until 1995.

Very truly yours,

C. Michael Street
SAM CALLEJO
Director and Chief Engineer

February 23, 1991

Mr. Sam Callejo
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

Dear Mr. Callejo:

Environmental Impact Statement Preparation Notice (EISPN)
Ewa Marina Phase II

This will acknowledge receipt of your February 4, 1991 letter regarding the EISPN for the above project.

It is anticipated that sewage disposal for Ewa Marina will be accomplished through connection to the municipal system.

The Draft EIS (DEIS) for the project contains a discussion of infrastructure requirements anticipated, including proposals for wastewater disposal and future expansion of the Honolulu Wastewater Treatment Plant. The DEIS also includes an infrastructure report by Belt Collins and Associates, which is included as Appendix D therein.

We certainly appreciate your taking the time to review the submitted material and will respond to any additional comments you may have during EIS process.

Very truly yours,

Tyrone T. Kusao
Tyrone T. Kusao

cc: Department of General Planning
City and County of Honolulu
Nelson Lee
Haseko (Hawaii), Inc.

RECEIVED AS FOLLOWS

2202
1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS. HOURS 808-531-1338
RES. HOURS 808-531-4092
FAX HOURS 808-531-4092

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

February 23, 1991

The Honorable William W. Paty
Chairperson
Board of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Environmental Impact Statement Preparation Notice (EISPN)
Eva Marina Phase II

This will acknowledge your February 5, 1991 letter regarding the above EISPN. The Department of Land and Natural Resources was included as a consulted party in the EIS process as you requested.

Any future comments you may have will be appreciated and will be incorporated into the Final EIS.

Thank you for your interest and if you should have any questions, please feel free to contact me.

Very truly yours,

Tyrone T. Kusao
Tyrone T. Kusao

cc: Department of General Planning
City and County of Honolulu
Nelson Lee
Haseko (Hawaii), Inc.

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
SERVICES
WILLIAM W. PATY
RUSSELL M. FURUKAWA
AGRICULTURE DEVELOPMENT
COASTAL RESOURCES
ENVIRONMENTAL UTILITIES
CONSTRUCTION AND
COMPLIANCE
CONSERVATION AND WILDLIFE
HISTORIC PRESERVATION
PLANNING
LAND MANAGEMENT
STATE PLANS
WATER AND LAND DEVELOPMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96813

REPIOCEA:JN

File No.: 91/298/299
Doc. No.: 97162

FEB 5 1990

Tyrone T. Kusao, Inc.
1188 Bishop Street, Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

We are currently reviewing the Environmental Assessments recently submitted to us for both the Eva Marina Phase II and the Lualualei Golf Course projects. We understand that the draft Environmental Impact Statement for these projects will be available shortly. Please include us as a consulted party in the EIS process for both projects. We would appreciate receiving five copies of each draft EIS in order to expedite our review.

Very truly yours,

William W. Paty
William W. Paty

cc: OEDC

JOHN WAIHEE
GOVERNOR



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

February 8, 1991

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE
ILIMA A. FUKUMASA
DEPUTY TO THE CHAIRPERSON

FAX: 548-6100

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

Mr. Tyrone Kusao
February 8, 1991
Page -2-

with inflation" and (2) "uncertainty of continued federal price supports" (Application for Golf Course Component, page 39). It should be noted that the 1990 Farm Bill which maintains the 18-cent loan rate, the inclusion of a minimum import quota, and a provision for marketing allocations has been signed into law as of November 1990.

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
1188 Bishop Street,
Suite 2507
Honolulu, HI 96813

Dear Mr. Kusao:

Subject: Application for Eva Development Plan Amendments, Development Plan Common Provisions, and Environmental Assessments for Eva Marina Community Development; Phase II Project Involving Mixed-Use Commercial and 27-Hole Golf Course
TKM: 9-1-12: por. 5 & 6 - Eva, Oahu
Acreage: 403 acres (golf course - 272 acres) (mixed use commercial - 114 acres)

We have reviewed the information contained in your letter of January 22, 1991, and attachments for the subject proposals and have the following comments.

In our comment to the State Land Use District boundary amendment petition (see copy of our memorandum to the Office of State Planning, dated February 1, 1990) which involved most of the subject site, we challenged the petitioner's assertions that the effects on Oahu Sugar Company (OSCO) and diversified agriculture resulting from the development of the property would be limited. The petitioner's request was nevertheless eventually approved by the State Land Use Commission.

From our information, the raw sugar production from the affected OSCO sugarcane fields (portions of 71, 87, and the entirety of 88) are less than the average of the plantation as a whole. However, average yield alone does not determine the economic viability of OSCO. If the plantation is not able to produce enough sugarcane from its remaining acreage to keep the mill operating even in a single-mill configuration, the potential for having a higher average yield (Application for Mixed-Use Commercial Complex, page 29) means little.

According to the application "the long-term future of OSCO will remain uncertain." This assumption was based in part on: (1) "flat sugar prices combined with operating costs that increase

Our comment regarding the subject proposal's impact on diversified agriculture is the same as that made in our February 1, 1990, memorandum to the Office of State Planning (see attached copy).

In response to the Department of General Planning's "Guidelines for Development Plan Amendments for Golf Course Development," Social Impact, item 3, "provide for the relocation of existing uses and residents," the application states that "since OSCO's sugar plantations are being reduced in size in order to make the operations more economical, there is no need to relocate OSCO's sugar fields." This implies that OSCO is reducing its cultivated acreage voluntarily. There is no evidence in the application that OSCO has responded to this statement or has been asked about the possibility of relocating affected production to new areas. We expect that the Draft Environmental Impact Statement will clarify this issue. We would also like to suggest that among the possible forms of community benefits to be considered should be those that are beneficial to agriculture.

Finally, if it is not already arranged for, we suggest that the applicant allow OSCO to continue cultivation and harvesting of affected sugarcane fields until such time as the area is actually needed for development.

We look forward to reviewing the Draft EIS when it becomes available. Thank you for the opportunity to comment.

Sincerely,

Yukio Kitagawa
YUKIO KITAGAWA,
Chairperson, Board of Agriculture

Attachment

c: Department of General Planning
Department of Land Utilization
Office of Environmental Quality Control
Office of State Planning (Attn: Land Use Division)



Mr. Harold S. Masumoto
February 1, 1990
Page -2-

February 1, 1990

MEMORANDUM

To: Mr. Harold S. Masumoto, Director
Office of State Planning

Subject: Petition for Amendment to the State Land Use
District Boundaries
A89-651 (Haseko (Hawaii), Inc.)
Agricultural to Urban
Ewa Marina Community Development Project, Phase II
TRK: 9-1-12: 5, 6, and por. 23. Ewa, Oahu
Area: approximately 389 acres

The Department of Agriculture has reviewed the subject
petition and offers the following comments.

According to the petition, the petitioner is seeking to
construct an employment and commercial center consisting of
several hotels, a fitness center, golf course, tennis complex,
retail shops, restaurants, and professional shops. The site is
leased to Oahu Sugar Company (OSC) and is largely in sugarcane
cultivation. Our information indicates that the affected
portions of OSC Fields 71 and 87, and the entirety of Field 88,
are drip-irrigated.

The subject area is immediately north of the Ewa Marina,
Phase I site (approximately 635 acres).

References to the Agricultural Lands of Importance to the
State of Hawaii (ALISH) system, the Land Study Bureau's Detailed
Land Classification for Oahu, and the Soil Conservation Service
Soil Survey for Oahu are correct.

SPECIFIC COMMENTS

Impact on Oahu Sugar Company

Page 28 of the petition indicates that the short- and
intermediate-term effects of developing the subject property

will be limited because the affected lands are: (1) of inferior
quality, and (2) on the outskirts of the plantation, resulting
in a more compact plantation with no effect on OSC's irrigation
system and cane haul roadways. The long-term future of OSC
"will remain uncertain whether Petitioner develops Phase II or
not. This is so because of flat sugar prices which are combined
with operating costs that increase with inflation, the
uncertainty of continued federal price supports and the fact
that all of Oahu Sugar's leases will expire by the mid-1990's."
(Petition, page 29). From the information provided in Exhibit K
("Proposed Ewa Marina, Phase II: Impact on Agriculture,"
Decision Analysts Hawaii, Inc.; August, 1989), the subject
project, and the other projects affecting OSC operations that
are planned or have received State and/or County zoning
approvals, will eventually have a very significant adverse
impact on OSC.

The projected cumulative intermediate (to the year 1995)
impact of multiple project development in Central Oahu and Ewa
of about 2,000 acres (Exhibit K, page 10) will not diminish the
full impact of the eventual urbanization of sugarcane cultivated
lands. The intermediate impact will reduce OSC acreage under
cultivation to 11,490, which is perilously close to the minimum
acreage needed for the plantation to remain economically viable
in a single mill configuration (estimated to be about 10,669
acres at 14.06 tons of sugar per acre per year, based on 1987
yield figures, or 11,284 acres based on 1988 yield figures).

In the long run, the significant impact on OSC will be that
cultivable acreage available to OSC after full development of
the planned and proposed projects (about 7,700 acres) will be
far below the minimum acreage needed to remain economically
viable in a single-mill operation and much less than the acreage
required for the present double-mill configuration. Annual
sugar yields (expressed in tons of sugar per acre or TSA) would
have to increase by about 47 percent over the 1988 OSC average
yield (13.16 TSA) to about 19.4 TSA for the 7,700 acres to
produce the 67,500 tons of raw sugar required of a single-mill
operation (based on the harvestable acreage assumption of
Exhibit K, Table 3).

In either case, OSC will be forced to modify its operations
and increase the yields from its remaining fields to forestall
the inevitable situation when the company finds it no longer
economic to remain in operation.

Mr. Harold S. Masumoto
February 1, 1990
Page -3-

Consistency with State Plans

From the above discussion, it is clearly evident that the project is inconsistent with the objectives, policies and guidelines relating to agriculture in the Hawaii State Plan and the State Agriculture Functional Plan (June, 1985) (Exhibit K, Table 6, pages 25-26).

Impact on Diversified Agriculture

The petition states that "The redistricting of Phase II will not adversely affect diversified agriculture" (page 29). This conclusion is based on the supposed relative abundance of arable lands formerly in sugarcane and pineapple abundance of the supposed availability of these lands for profitable replacement crops and the small amount of lands and water required to grow diversified crops.

Exhibit K states that the Land Evaluation and Site Assessment (LESA) Commission projections for acreage needed for diversified agriculture are "...excessively high" (page 20) and that the total additional acreage needed to accommodate diversified agriculture to the year 1995 is about 1,500 acres for the State as compared to the LESA estimate of 2,314 for Oahu alone (Exhibit K, page 20). In fact, the additional acreage required on Oahu for diversified crops by 1995 (including export crops) is closer to 5,100 acres, based on the LESA report. The LESA Commission purposefully took a more optimistic and broad view of the future of diversified agriculture in Hawaii than does the petition. In the determination and protection of the availability of agriculturally suitable lands, it is the State's duty to assure it is appropriate that the State take a conservative, long-range view and maintain what appears to be a surplus of productive lands as compared to the petition's findings. Incremental losses of a resource like arable lands, if left uncontrolled, will have a devastating and irreversible cumulative effect on the viability of agriculture, and in particular, Oahu Sugar Company. Once agricultural lands are urbanized there is no return. This cannot be overemphasized.

To summarize, we are convinced that agriculture will be adversely affected by the proposed development. Therefore, using the project site for the proposed use would be inconsistent with applicable objectives, policies, priority guidelines, and implementing actions of the Hawaii State Plan (as amended) and the adopted State Agriculture Functional Plan (1985) as they relate to sugarcane and diversified agriculture.

Mr. Harold S. Masumoto
February 1, 1990
Page -4-

CONCLUSION

The Department of Agriculture strongly recommends that both the subject project's immediate impacts and its contribution to the long-term cumulative impact of ongoing, planned, and proposed urban development adversely affecting the Oahu Sugar Company be seriously considered by the Land Use Commission in their deliberations.

Thank you for the opportunity to comment.

Yukio Kitagawa
YUKIO KITAGAWA

Chairperson, Board of Agriculture

cc: Department of General Planning

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813
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February 19, 1991

The Honorable Yukio Kitagawa
Chairperson, Board of Agriculture
P.O. Box 22159
Honolulu, Hawaii 96823-2159

Dear Mr. Kitagawa:

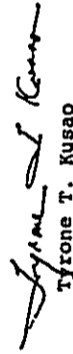
Subject: Ewa Marina Phase II EIS

This is to acknowledge receipt of your February 8, 1991 letter in response to our EISPN material.

For our Draft EIS, we had the firm of Decision Analysts Hawaii, Inc., agricultural consultant, prepare a report titled Proposed Ewa Marina, Phase II: Impact On Agriculture, which is attached as Appendix B therein. I will be referring your letter to Decision Analysts Hawaii, Inc. for appropriate follow-up action on those items requiring attention.

We certainly appreciate your taking time to review the submitted material and providing us with your comments.

Very truly yours,


Tyrone T. Kusao

TTK:afk

cc: Department of General Planning
(Bill Medeiros)
Haseko (Hawaii), Inc.
(Nelson Lee)

March 25, 1991

The Honorable Yukio Kitagawa
Chairman, Board of Agriculture
P.O. Box 22159
Honolulu, Hawaii 96823-2159

Dear Mr. Kitagawa:

Subject: Ewa Marina Phase II EIS

Following up on my letter to you dated February 19, 1991, I am forwarding Decision Analysts Hawaii, Inc. response to your comments contained in your letter of February, 8 1991.

Should there be questions, please feel free to contact Bruce Plasch (373-9364) or myself.

Very truly yours,


Tyrone T. Kusao

TTK:afk

cc: Haseko (Hawaii), Inc.
Department of General Planning
City and County of Honolulu

Mr. Yukio Kitagawa
March 22, 1991
Page 2

DECISION ANALYSTS HAWAII, INC.
BRUCE STEVEN PLASCH, President

QUANTITATIVE CONSULTING SERVICES • Economic • Financial • Demographic • Statistical

March 22, 1991

Mr. Yukio Kitagawa, Chairperson
Board of Agriculture
State of Hawaii
1428 S. King Street
Honolulu, HI 96812

RE: Ewa Marina, Phase II: Responses to Comments by the Department of Agriculture,
Letter of February 8, 1991 and Attached Memorandum of February 1, 1990

Dear Chairperson Kitagawa:

I am responding to your letter of February 8, 1991 to Mr. Tyrone Kusso, and to the attached memorandum of February 1, 1990 to Mr. Harold Masumoto regarding the impact of Ewa Marina, Phase II on agriculture. Responses to your comments follow.

1. Letter, page 1, ¶ 3

a. Comment

If the plantation is not able to produce enough sugarcane from its remaining acreage to keep the mill operating even in a single-mill configuration, the potential for having a higher average-yield means little.

b. Response

OSCo plans to reduce processing capacity by operating a single mill rather than two mills in parallel, with a corresponding reduction in the size of the plantation from about 12,222 acres in early 1990 to an eventual size of about 8,000 acres. Generally, fields to be retained will be those with good soils and a short to moderate hauling distance to the mill. OSCo anticipates that production will be sufficient to maintain required economies of scale. As discussed in Appendix B, this reduction in sugar operations is a consequence of the State and County policy to develop Ewa as a secondary urban center—a policy which carries with it the implication that sugarcane lands in the Ewa area will be urbanized. Furthermore, if all planned and proposed developments are approved and are in fact built, and all major leases to the remaining fields are renewed, then OSCo would retain over 8,000 acres from which to assemble an efficient plantation.

Regarding Ewa Marina, Phase II, the loss of sugarcane fields conforms to the preferred sequence for contracting the plantation, which is from the periphery of the plantation inward. Lands at the site of the proposed development are a long trucking distance from the mill; soils are inferior to those of inland fields; and yields are generally lower than the average yields of the plantation. The subject fields lie outside of the area which OSCo plans on retaining as part of a smaller plantation.

1655 Kameole Street • Honolulu, Hawaii 96821 • (808) 373-9364

2. Letter, page 1, last ¶

a. Comment

According to the application "the long-term future of OSCo will remain uncertain." This assumption was based in part on: (1) "flat sugar prices combined with operating costs that increase with inflation" and (2) "uncertainty of continued federal price supports" (Application for Golf Course Component, page 39). It should be noted that the 1990 Farm Bill which maintains the 18-cent loan rate, the inclusion of a minimum import quota, and a provision for marketing allocation has been signed into law as of November 1990.

b. Response

As discussed in Appendix B, "Impact on Agriculture," the long-term future of OSCo is uncertain because of (1) the very real possibility that one or more major leases will not be renewed, (2) the possibility that sugar prices will decline and/or market share will be lost due to competition from new low-cost sweeteners, and (3) land will be lost to urbanization beyond existing plans and proposals, provided that the plantation survives lease negotiations and competition from new sweeteners.

In the short-term, the 1990 Farm Bill supports sugar prices at 18 cents per pound, with no adjustment for inflation.

3. Letter, page 2, ¶ 2

a. Comment

In response to the Department of General Planning's "Guidelines for Development Plan Amendments for Golf Course Development," Social Impact, Item 3, "Provide for the relocation of existing uses and residents," the application states that "Since OSCo's sugar plantations are being reduced in size in order to make the operations more economical, there is no need to relocate OSCo's sugar fields." This implies that OSCo is reducing its cultivated acreage voluntarily. There is no evidence in the application that OSCo has responded to this statement or has been asked about the possibility of relocating affected production to new areas. We expect that the Draft Environmental Impact Statement will clarify this issue. We would also like to suggest that among the possible forms of community benefits to be considered should be those that are beneficial to agriculture.

b. Response

As mentioned in Item 1, the reduction in OSCo's operations results from the State and County policy to develop Ewa as a secondary urban center—a policy which carries with it the implication that sugarcane lands in the Ewa area will be urbanized. A reduction in sugar operations is required because replacement fields are not available.

Regarding agricultural benefits of the proposed development, the golf course will provide an estimated 30 grounds-maintenance jobs involved with cultivating grasses and plants, applying fertilizers and chemicals, maintaining irrigation systems, etc. In terms of function, these jobs are similar to certain jobs in the agriculture industry, and require similar skills and training. This number of agricultural-type jobs exceeds the 7 field jobs associated with cultivating sugarcane on the subject property.

Regarding the exaction of community benefits to support agriculture because the subject lands are being farmed, such an exaction would create an incentive for other land owners to follow their lands rather than to lease them to farmers.

Mr. Yukio Kitagawa
March 22, 1991
Page 3

4. Letter, page 2, ¶ 3

a. Comment

Finally, if it is not already arranged for, we suggest that the applicant allow OSCO to continue cultivation and harvesting of affected sugarcane fields until such time as the area is actually needed for development.

b. Response

Consistent with this suggestion, the developer intends to allow OSCO to continue cultivating and harvesting the affected sugarcane fields until such time as the area is actually needed for development. Since sugarcane is a 2-year crop, the last harvest could occur as much as 2 years before the scheduled development.

5. Memorandum, pages 1 and 2, Impact on Oahu Sugar Company

a. Comment

From the information provided in Exhibit K ("Proposed Ewa Marinas, Phase II: Impact on Agriculture," Decision Analysis Hawaii, Inc.; August, 1989), the subject project, and the other projects affecting OSC operations that are planned or have received State and/or County zoning approvals, will eventually have a very significant adverse impact on OSC.

The projected cumulative intermediate (to the year 1995) impact of multiple project development in Central Oahu and Ewa of about 2,000 acres (Exhibit K, page 10) will not diminish the full impact of the eventual urbanization of sugarcane cultivated lands. The intermediate impact will reduce OSC acreage under cultivation to 11,490 which is perilously close to the minimum acreage needed for the plantation to remain economically viable in a single mill configuration (estimated to be about 10,669 acres at 14.06 tons of sugar per acre per year, based on 1987 yield figures, or 11,284 acres based on 1988 yield figures).

In the long run, the significant impact on OSC will be that cultivable acreage available to OSC after full development of the planned and proposed projects (about 7,700 acres) will be far below the minimum acreage needed to remain economically viable in a single-mill operation and much less than the acreage required for the present double-mill configuration. Annual sugar yields (expressed in tons of sugar per acre of TSA) would have to increase by about 47 percent over the 1988 OSC average yield (13.16 TSA) to about 19.4 TSA for the 7,700 acres to produce the 67,500 tons of raw sugar required of a single-mill operation....

In either case, OSC will be forced to modify its operations and increase the yields from its remaining fields to forestall the inevitable situation when the company finds it no longer economic to remain in operation.

b. Response

This year-old analysis is out of date and conflicts with the long-term plans of OSCO (see Item 1 and Appendix B). Of significance, one of the lowest-cost producers in the State is the combined Olokele Sugar Co., Ltd. and Gay & Robinson, Inc. plantations—the combined land area amounts to less than 7,500 acres.

Mr. Yukio Kitagawa
March 22, 1991
Page 4

6. Memorandum, page 3, Impact on Diversified Agriculture

a. Comment

The petition states that "The redistricting of Phase II will not adversely affect diversified agriculture" (page 29). This conclusion is based on the supposed relative abundance of arable lands formerly in sugarcane and pineapple cultivation, the supposed availability of these lands for profitable replacement crops and the small amount of lands and water required to grow diversified crops.

Exhibit K states that the Land Evaluation and Site Assessment (LESA) Commission projections for acreage needed for diversified agriculture are "...excessively high" (page 20) and that the total additional acreage needed to accommodate diversified agriculture to the year 1995 is about 1,500 acres for the State as compared to the LESA estimate of 2,314 for Oahu alone (Exhibit K, page 20). In fact, the additional acreage required on Oahu for diversified crops by 1995 (including export crops) is closer to 5,100 acres, based on the LESA report. The LESA Commission purposefully took a more optimistic and broad view of the future of diversified agriculture in Hawaii than does the petition. In the determination and protection of "important agricultural lands," it is the State's duty to assure the availability of agriculturally suitable lands. Therefore, it is appropriate that the State take a conservative, long-range view and maintain what appears to be a surplus of productive lands as compared to the petition's findings. Incremental losses of a resource like arable lands, if left uncontrolled, will have a devastating and irreversible cumulative effect on the viability of agriculture.... Once agricultural lands are urbanized there is no return. This cannot be overemphasized.

b. Response

This summary of the analysis of the land market for diversified agriculture is incomplete and inaccurate. First, the supply of land available to profitable crops is very large, and includes most of the 120,000 acres that have been or will soon be released from sugar and pineapple production since 1968. In addition, land continues to be released from plantation agriculture at a rate which far exceeds the demand from diversified agriculture. Furthermore, if rapid growth of diversified agriculture occurs, this would accelerate the release of land from sugar operations since most plantation operators are searching for profitable replacement crops.

The conclusion that a very small amount of prime agricultural land and water is required to accommodate the growth of diversified agriculture crops is based on the LESA projections, rather than on the more realistic projections discussed in the report. Based on the LESA analysis, less than 9,000 acres of prime agricultural land are required Statewide per 12-year period. However, actual growth in diversified agriculture has been much slower than that projected in the LESA report.

In summary, the limiting factor to the growth of diversified agriculture is not the land supply, but rather the market demand for those crops which can be grown profitably in Hawaii; for small farmers, an additional limiting factor is the expensive subdivision requirements. The proposed Ewa Marina, Phase II involves far too little land to affect the above conclusions, and would therefore not affect adversely the State-wide growth of diversified agriculture.

Mr. Yudio Kilagawa
March 22, 1991
Page 5

7. Memorandum, page 3, Consistency with State Plans, 1st and last ¶s

a. Comment

... It is clearly evident that the project is inconsistent with the objectives, policies and guidelines relating to agriculture in the Hawaii State Plan and the State Agricultural Functional Plan ...

... We are convinced that agriculture will be adversely affected by the proposed development. Therefore, using the project site for the proposed use would be inconsistent with applicable objectives, policies, priority guidelines, and implementing actions of the Hawaii State Plan (as amended) and the adopted State Agriculture Functional Plan (1985) as they relate to sugarcane and diversified agriculture.

b. Response

As discussed in Appendix B, the proposed Ewa Marina, Phase II (1) would conform to the planned contraction of OSCo, with the subject lands being far removed from the core of the plantation which OSCo plans to retain for its long-term survival; (2) would not adversely affect any existing diversified agricultural activities; (3) would not affect the amount of land available for diversified agriculture; (4) would not limit the growth of diversified agriculture since, in other parts of the State, far more agricultural land has been released from plantation agriculture than has been absorbed by other activities; and (4) would contribute to the economy, including the addition of a number of agricultural-type jobs. In view of these findings, the project would not conflict with the major thrust of the Hawaii State Plan, the State Agriculture Functional Plan, and the General Plan of the City and County of Honolulu. This thrust in all three plans calls for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured. The thrust of these plans is not to preserve prime agricultural lands simply for the sake of preserving them—preservation is to occur only if a potential need for these agricultural lands exists.

However, about one-third of the project would conflict with the lower-level State agricultural guidelines which call for Agricultural Lands of Importance to be protected from development.

We appreciate your comments on the impacts of Ewa Marina, Phase II. If you have any questions or additional comments, please call me or Mr. Kusso.

Sincerely,

Bruce S. Plasch

Bruce S. Plasch
President

BP:fp

cc: T. Kusso

JOHN C. LEVIN, M.D.
DIRECTOR OF HEALTH



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 2178
HONOLULU, HAWAII 96811

February 11, 1991

JOHN C. LEVIN, M.D.
DIRECTOR OF HEALTH

In Reply, please refer to:
EMD

Mr. Tyrone T. Kusao
Page 2
February 11, 1991

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
1188 Bishop Street, Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR PROPOSED EWA MARINA
PHASE II PROJECT INVOLVING MIXED USES AND GOLF COURSE
HONOLULU (EWA BEACH), OAHU
THK: 9-1-12: POR. 5, POR. 6

Thank you for the opportunity to review and comment on the subject documents. We have examined the Development Plan Amendment Application and Environmental Assessment report and have the following comments to offer:

Drinking Water

- 1) As new sources of water are developed, it will be necessary to comply with the Department's Administrative Rules, Title 11, Chapter 20, "Potable Water Systems." Section 11-20-29 of Chapter 20 requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to their use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.
- 2) The Department's Administrative Rules, Title 11, Chapter 20, "Potable Water Systems," Section 11-20-30 requires that new or substantially modified distribution systems for public water systems be approved by the Director. However, if the water system is under the jurisdiction of the City and County of Honolulu, the Board of Water Supply will be responsible for the review and approval of the plans.
- 3) The proposed development is situated above the Department's Underground Injection Control (UIC) line. Land areas located above the UIC line are generally considered to contain underground sources of drinking water. Our maps indicate that there is a domestic water well less than 1/2 mile from the project site

- 4) It is essential that any proposed wells in the project area be designed and constructed to prevent the possibility of groundwater contamination. For example, each well should have a concrete pad and full grouting to prevent seepage or floodwaters from migrating down the well shaft.
- 5) The standard golf course conditions (attached) apply to this project.
- 6) The potable and non-potable water systems must be carefully designed and operated to prevent cross-connections and backflow conditions. The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow preventers to avoid contaminating the potable water supply.

Wastewater

- 1) The subject project is within the proposed critical wastewater disposal area as determined by the Oahu Wastewater Advisory Committee. The subject project is also located above the UIC line. No cesspools will be allowed as a means of wastewater disposal.
- 2) At this time, the details of the wastewater treatment and disposal are general in nature. It is stated in the plan that an expansion of the Honolulu Wastewater Treatment Plant is anticipated in 1993. Therefore, it is recommended that the proposed facility be connected to a municipal sewer system.

Very truly yours,

John C. Levin
JOHN C. LEVIN, M.D.
Director of Health

Enclosure



STATE OF HAWAII
DEPARTMENT OF HEALTH

April, 1990 (Version 3)

EIGHT (8) CONDITIONS APPLICABLE TO THIS NEW GOLF COURSE DEVELOPMENT

1. The owner/developer and all subsequent owners shall establish a groundwater monitoring plan and system which shall be presented to the State Department of Health for its approval. The groundwater monitoring plan and system shall minimally describe the following components:
 - a. A monitoring system tailored to fit site conditions and circumstances. The system shall include, and not be limited to, the use of monitoring wells, lysimeters and vadose zone monitoring technologies. If monitoring wells are used, the monitoring wells shall generally extend 10 to 15 feet below the water table.
 - b. A routine groundwater monitoring schedule of at least once every six (6) months and more frequently, as required by the State Department of Health, in the event that the monitoring data indicates a need for more frequent monitoring.
 - c. A list of compounds which shall be tested for as agreed to by the State Department of Health. This list may include, but not be limited to the following: total dissolved solids; chlorides; PH; nitrogen; phosphorus; or any other compounds associated with fertilizers, biocides or effluent irrigation.
2. Baseline groundwater/vadose zone water data shall be established as described in this paragraph. Once the monitoring system and list of compounds to be monitored for have been determined and approved by the State Department of Health, the owner/developer shall contract with an independent third-party professional (approved by the State Department of Health) to establish the baseline groundwater/vadose zone water quality and report the findings to the State Department of Health. Testing of the analyses of the groundwater shall be done by a certified laboratory.
3. If the data from the monitoring system indicate the presence of the measured compound and/or the increased level of such compound, the State Department of Health can require the owner/developer or subsequent owner to take immediate mitigating action to stop the cause of the contamination. Subsequently, the developer/owner or subsequent owner shall mitigate any adverse effects caused by the contamination.

-2-

4. Owner/developer shall provide sewage disposal by means of connection to the public sewer system; or by means of a wastewater treatment works providing treatment to a secondary level with chlorination. Effluent from this wastewater treatment works may be used for golf course irrigation, subject to Condition #3. The entire system shall be approved by the State Department of Health in conformance with Administrative Rules Title 11, Chapter 62, Wastewater Treatment Systems, effective December 10, 1988.
5. If a wastewater treatment works with effluent reuse becomes the choice of wastewater disposal, then the owner/developer and all subsequent owners shall develop, and adhere to a Wastewater Reuse Plan which shall address as a minimum, the following items:
 - a. **Management Responsibility.** The managers of the irrigation system using reclaiming wastewater shall be aware of the possible hazards and shall evaluate their system for public health, safety, and efficiency. They must recognize that contact with the reclaimed wastewater from treated domestic sewage poses potential exposure to pathogenic organisms which commonly cause infectious diseases (bacteria, viruses, protozoa, and helminths or worms).
 - b. **General Recommendations**
 - 1) Irrigated areas should be no closer than 500 feet from potable water wells and reservoirs.
 - 2) Irrigated areas should be no closer than 200 feet from any private residence.
 - 3) Application rates should be controlled to minimize ponding. Excess irrigation tailwater in the reclaimed wastewater irrigation area shall be contained and properly disposed. An assessment should be made of the acceptable time and rate of application based on factors such as type of vegetation, soil, topography, climate and seasonal variations.
 - 4) Effluent holding/mixing ponds shall be designed to prevent the infiltration of the wastewater into the subsurface. The holding/mixing ponds shall be made impervious.
 - 5) Irrigation shall be scheduled such that the public is not in the vicinity and the soil is sufficiently dry to accept the irrigation water.
 - 6) Permanent fencing or barriers shall be erected around polishing or holding ponds to prevent public entry or stray feral and tame animals from gaining access to the ponds.

7) Adequate irrigation records shall be maintained. Records should include dates when the fields are irrigated, rate of application, total application and climatic conditions. Records should also include any operational problems, diversions to emergency storage or safe disposal and corrective or preventive action taken.

8) The holding/mixing ponds shall be periodically monitored for the purpose of detecting leakage into the subsurface. If leakage is detected, corrective action shall be immediately taken.

c. Adequate Notice. Appropriate means of notification shall be provided to inform the employees and public that reclaimed wastewater is being used for irrigation on the site.

1) Posting of conspicuous signs with sufficient letter size for clear visibility with proper wording should be distributed around the use areas.

2) Signs shall be securely fastened. Periodic surveillance shall be conducted to assure permanent posting at all times. Immediate replacements shall be made when necessitated by deterioration, vandalism or misuse.

d. Adequate Employee Education. Employees or users should be cautioned and warned of the potential health hazards associated with the ingestion of reclaimed wastewater being used at the site.

1) Employees should be warned that the ingestion of reclaimed wastewater is unsafe.

2) Employees should be protected from direct contact of the reclaimed wastewater. If necessary, protective clothing should be provided.

3) Employees should be informed of the following:

- The irrigation water is unsafe for drinking or washing.
- Avoid contact of the water or soil with any open cuts or wounds.
- Avoid touching the mouth, nose, ear or eyes with soiled hands, clothes or any other contaminated objects.
- Be aware that inanimate objects such as clothes or tools can transport pathogenic organisms.
- Always wear shoes or boots to protect feet from the pathogenic organisms in the soil or irrigation water.

6. Releases from underground storage tanks (USTs) used to store petroleum products for fueling golf carts, maintenance vehicles, and emergency power generators pose potential risks to groundwater.

Should the owner/developer/operator plan to install USTs that contain petroleum or other regulated substances, the owner/developer/operator must comply with the federal UST technical and financial responsibility requirements set forth in Title 40 of the Code of Federal Regulations Part 280. These federal rules require, among other things, owners and operators of USTs to meet specific requirements in the detection, release response and corrective action. Also, the owner/developer/operator must comply with all State UST rules and regulations pursuant to Chapter 342-L 'Underground Storage Tanks' of the Hawaii Revised Statutes.

In consideration of the above-mentioned remarks, the Department of Health recommends that the owner/developer/operator implement facility plan alternatives that exclude the installation and operation of UST systems (e.g., the preferential use of electric golf carts, use of above-ground storage of fuel oil for emergency power generators, etc.), or, if USTs are utilized, that secondary containment be considered.

7. Buildings designated to house the fertilizer and biocides shall be bermed to a height sufficient to contain a catastrophic leak of all fluid containers. It is also recommended that the floor of this room be made waterproof so that all leaks can be contained within the structure for cleanup.

8. A golf course maintenance plan and program will be established based on "Best Management Practices (BMP)" in regards to utilization of fertilizers and biocides as well as the irrigation schedule. BMP's will be revised as an ongoing measure. The golf course maintenance plan will be reviewed by the State Department of Health prior to implementation.

If there are any questions regarding the eight (8) conditions mentioned here, please contact Mr. James K. Ikeda at 543-8304. We ask you cooperation in the protection of Hawaii's valuable groundwater resource.

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

February 28, 1991

John C. Lewin, M.D.
Director of Health
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Lewin:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Ewa Marina Phase II (Your File Reference: EMD)

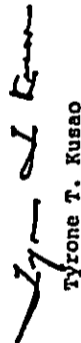
This will acknowledge receipt of your February 11, 1991 letter regarding the EISPN for the above project.

You provided comments on the following:

1. Drinking Water. An engineering report addressing the requirements of Chapter 20, "Potable Water Systems," Section 11-20-19, will be submitted for your approval and to the City's Board of Water Supply, as appropriate. With regard to your additional comments in this regard (Items 3 through 6), I will be referring your letter to Belt Collins & Associates for appropriate follow-up. Belt Collins has prepared an infrastructure report for the Draft EIS (DEIS), which will be included as Appendix D therein.
2. Wastewater. No cesspools are planned for the project as a means of wastewater disposal, and the intent is to connect to a municipal sewer system. Details are general in nature at this time, however, we will continue to coordinate the treatment and disposal of wastewater with governmental agencies during the approval and permit processes.

We certainly appreciate your taking the time to review the submitted material and providing us with your comments.

Very truly yours,


Tyrone T. Kusao

TTK:afk
cc: Dept. of General Planning

2202
1188 BISHOP STREET, SUITE 2000
HONOLULU, HAWAII 96813

TEL: (808) 538-8600
FAX: (808) 538-1338
FAX: (808) 531-4552

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96813



FRANK P. FAN
SAYRE

IRIEGEIVE
LIONEL E. CAMARA
FIRE CHIEF
DONALD B. CHANG
DEPUTY FIRE CHIEF
FEB 22 1991

HASEKO (HAWAII), INC.
EWA MARINA

February 20, 1991

Mr. Nelson W. G. Lee, Development Director
Haseko (Hawaii), Inc.
820 Millitant Street, Suite 820
Honolulu, Hawaii 96813

Dear Mr. Lee:

Chapter 343, HRS
Environmental Impact Statement (EIS) Preparation
Notice for Amendment Applications from Agriculture to Resort,
Park (Golf Course) and to Commercial Industrial
Emphasis Mixed Use for the Proposed Ewa Marina Phase II
at Honolulu (Ewa Beach), Ewa
Tax Map Keys 9-1-12; Portions of Parcels 5 and 6
Folder Nos. 91/E-2 (Golf Course) and
91/E-3 (Resort and Mixed Use)

We have reviewed the subject material provided and have no additional comments to page 34, item #9.

Access for fire apparatus, water supply and building construction shall be in conformance to existing codes and standards.

Should you have any questions, please contact Captain August Range of our Fire Prevention Bureau at 943-3165.

Very truly yours,

Lionel E. Camara
LIONEL E. CAMARA
Fire Chief

AR:ny

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2307
HONOLULU, HAWAII 96813
BUS: (808) 536-8658
FAX: (808) 536-1308
FAX: (808) 531-4282

March 4, 1991

Mr. Lionel E. Camara
Fire Chief
Honolulu Fire Department
1455 South Beretania Street, Room 305
Honolulu, Hawaii 96814

Dear Chief Camara:

Environmental Impact Statement Preparation Notice (EISPN)
Ewa Marina Phase II

This will acknowledge receipt of your February 20, 1991, letter providing comments on the EISPN for the above project.

All existing codes and standards will be met for fire apparatus access, water supply and building construction.

Thank you for taking the time to review the submitted materials and for your comments.

Very truly yours,

Tyhone T. Kusao
Tyhone T. Kusao

cc: Department of General Planning

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
1435 SOUTH KING ST. SUITE 100
HONOLULU, HAWAII 96813-3001 (808) 943-3111



FRANK P. PAI
MAYOR

MICHAEL S. NAKAMURA
CHIEF
MARCO M. KAWAJANI
DEPUTY CHIEF

OUR REFERENCE KN-1K

February 4, 1991

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
1188 Bishop Street, Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Subject: Environmental Impact Statement (EIS) for Proposed
Ewa Marina Phase II Project Involving Mixed Uses
and Golf Course

We have reviewed the material for the above project and would
like to offer the following comments.

Our department's ability to service the area will be enhanced
greatly if the district station and two substations (one of which
is planned for the Ewa Marina) mentioned on page 3 are developed.

Thank you for the opportunity to comment.

Sincerely,

MICHAEL S. NAKAMURA
Chief of Police

By *Chester E. Hughes*
CHESTER E. HUGHES
Assistant Chief of Police
Support Services Bureau

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

February 21, 1991

Mr. Michael S. Nakamura
Chief of Police Department
Honolulu Police Department
1455 S. Beretania Street
Honolulu, Hawaii 96814

Dear Chief Nakamura:

Subject: Ewa Marina Phase II EIS

This is to acknowledge receipt of your letter dated
February 4, 1991 in response to our EISPN material. We
concur with your statement regarding your department's
ability to improve services with the addition of stations
in the Ewa District.

We certainly appreciate your taking time to review the
submitted material and your response thereon.

Very truly yours,

Tyrone T. Kusao
Tyrone T. Kusao

TTK:afk

cc: Department of General Planning



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
600 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-2007
February 20, 1991

EDWARD Y. HIRATA
DIRECTOR
DEPUTY DIRECTORS
AL PAKO
JOYCE T. OMBRE
JEANNE K. SCHULTZ
CALVIN M. TSUDA
BY REFERENCE TO

HWY-PS
2.5581

Mr. Tyrone T. Kusao
Page 2
February 20, 1991
HWY-PS 2.5581

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
1188 Bishop Street, Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Preparation of Draft Environmental Impact Statement
Ewa Marina Phase II Project Involving Mixed Uses and
Golf Course

Thank you for your letter of January 22, 1991 requesting our
comments on the proposed development.

We have the following comments:

1. A single TIAR should be prepared for the proposed golf course and commercial complex. It should examine the impacts of the proposed development on their accesses to Fort Weaver Road. In addition, the special transportation needs of visitors/tourists to the commercial complex should also be identified.
2. The Developer should implement the improvements which will mitigate the traffic impacts of the development on the Fort Weaver Road accesses. Any special roadway improvements to accommodate the tourist vehicular traffic should be provided to the fullest extent possible.
3. Provision for the proposed North-South Connector Road should be reflected in the plans for Ewa Marina Phase II. The right-of-way will be a minimum of 150 feet and no at-grade golf crossings will be permitted.
4. Coordination with adjacent developers should be done during the project's planning/design phases to assure that these internal infrastructure (sewer, water, drainage, roadway, utilities, etc.) connections are properly designed and implemented.

5. The Developer should abide with the conditions set forth in the Ewa Roadway Master Planning Study regarding regional roadway requirements.

Very truly yours,

Edward Y. Hirata
Director of Transportation

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

2202
1180 BISHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813
BUS. HOUR: 838-6850
RES. HOUR: 328-1338
FAX: 808-521-4252

March 29, 1991

Mr. Edward Y. Hirata
Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hirata:

Subject: Draft Environmental Impact Statement (DEIS)
Ewa Marina, Phase II

This is in response to your February 20, 1991 letter regarding the above project. For your convenience, we are responding to your comments in the order they were presented.

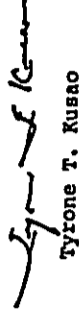
1. A single Traffic Impact Assessment Report (TIAR) has been prepared by Pacific Planning and Engineering, Inc. for the proposed golf course and mixed use complex and is included as an appendix to the EIS. The report studies impacts of the project on accesses to Fort Weaver Road and includes visitors/tourists traffic to the commercial complex. If additional clarification is necessary with respect to visitors/tourists transportation needs, the matter will be studied further.
2. All required improvements to mitigate traffic impacts on Fort Weaver Road accesses will be implemented, as well as any special roadway improvements to accommodate tourist vehicular traffic.
3. The developer is committed to paying a fair share for regional highway projects required by the Ewa Region Highway Master Plan and acknowledges that the North-South Road is a potentially required project. Rights-of-way will be set aside in the project site and no at-grade crossings with golf cart paths will be built in these areas.
4. Coordination will be maintained with adjacent developers during project planning and design to ensure that internal infrastructure connections are designed properly.

Mr. Edward Y. Hirata
March 29, 1991
Page 2

5. As noted above, Item #3, the developer will continue to participate in the Ewa Region Highway Master Plan study and will participate in future regional roadway requirements.

Thank you for your comments, and if you should have questions or wish additional information on the above, please contact me.

Very truly yours,



Tyrone T. Kusao

TTK:tafk

cc: Department of General Planning
Haseko (Hawaii), Inc.



DEPARTMENT OF THE NAVY
 COMMANDER
 NAVAL BASE PEARL HARBOR
 BOX 110
 PEARL HARBOR, HAWAII 96820

BY REPLY REFER TO

11000
 Ser 00F(203A)/0215
 15 FEB 1991

Tyrone T. Kusao, Inc.
 Planning and Zoning Consultant
 1188 Bishop Street, Suite 2507
 Honolulu, HI 96813

Dear Mr. Kusao:

ENVIRONMENTAL ASSESSMENTS FOR PROPOSED EMA MARINA
 PHASE II PROJECT INVOLVING MIXED USES AND GOLF COURSE

We have reviewed the subject environmental assessments (dated November 1990) forwarded by your letter of January 22, 1991, and have the following comments to offer:

a. Height of Structures. Federal Aviation Regulations (FAR) stipulate safety height criteria represented by several surfaces through which objects around an airfield should not penetrate. As shown by enclosure (1), the proposed development is located within the safety surfaces associated with Naval Air Station (NAS) Barbers Point, the lowest of which is the inner horizontal surface where the top of objects should not exceed 150 feet above the elevation of the runway. Adjusting for the runway elevation at NAS Barbers Point, the inner horizontal surface would equate to an elevation of 183 feet (mean sea level datum).

The EIS should discuss the applicant's request that height limits of up to 150 feet be allowed for structures proposed for the project in relation to the FAR height surfaces criteria. Furthermore, the height limits should be referenced to a fixed datum, such as mean sea level, rather than a height above a varying ground level.

b. Aircraft Noise. Enclosure (2), prepared from the Navy's July 1989 Air Installations Compatible Use Zones (AICUZ) noise contours report for NAS Barbers Point, indicates that the western portion of the parcel lies between the 55 and 70 Ldn noise contours of the AICUZ footprint that depicts noise generated by NAS Barbers Point aircraft operations. By Hawaii Revised Statute, Title 25, Section 467-31, the State of Hawaii requires that if a given property lies within the boundaries of a military AICUZ, licensed real estate brokers and salesmen are obligated to disclose that fact to prospective buyers, lessees, and tenants, prior to any sale, leasing, or other transaction.

The EIS should address this disclosure requirement in relation to the proposed project. The EIS should further discuss whether the noise exposure will be acceptable for the proposed uses; and if not, what mitigation measures would be appropriate. The EIS should also address the conditions regarding noise imposed by the State Land Use Commission when it granted the approval for the land use change to support the project.

Subj: ENVIRONMENTAL ASSESSMENTS FOR PROPOSED EMA MARINA PHASE II PROJECT INVOLVING MIXED USES AND GOLF COURSE

c. Restrictive Easement. The United States has acquired a restrictive easement limiting land use in a portion of the parcel. The development as proposed is, with respect to the NAS Barbers Point aircraft noise and accident environment, consistent with the agreement reached between the Navy and the Campbell Estate regarding compatibility with aircraft operations.

d. Drainage. Both assessments state that storms may generate as much as 10,400 cubic feet of water per second that must be handled by the drainage system designed for the project. The EIS should address whether the amount of runoff to be accommodated accounts for the proposed development itself, as well as all the upstream areas that would feed into the Kaloi Drainage Basin, including (but not limited to) the Ewa Villages, Ewa Gentry, and the area between Ewa Gentry and Ewa Marina. This item is a concern for the Navy because of the cumulative effect of the drainage has not been adequately accounted for from one development to another on its way to the ocean, it may result in negative effects to NAS Barbers Point as an adjacent landowner.

Thank you for the opportunity to review and comment on the subject documents. We would appreciate being included as a reviewing party of the environmental impact statement being prepared for the proposed project. Our Navy point of contact is Mr. Bill Liu, telephone 471-3324.

Sincerely,

W. K. Liu

W. K. LIU
 Assistant Base Civil Engineer
 By direction of
 the Commander

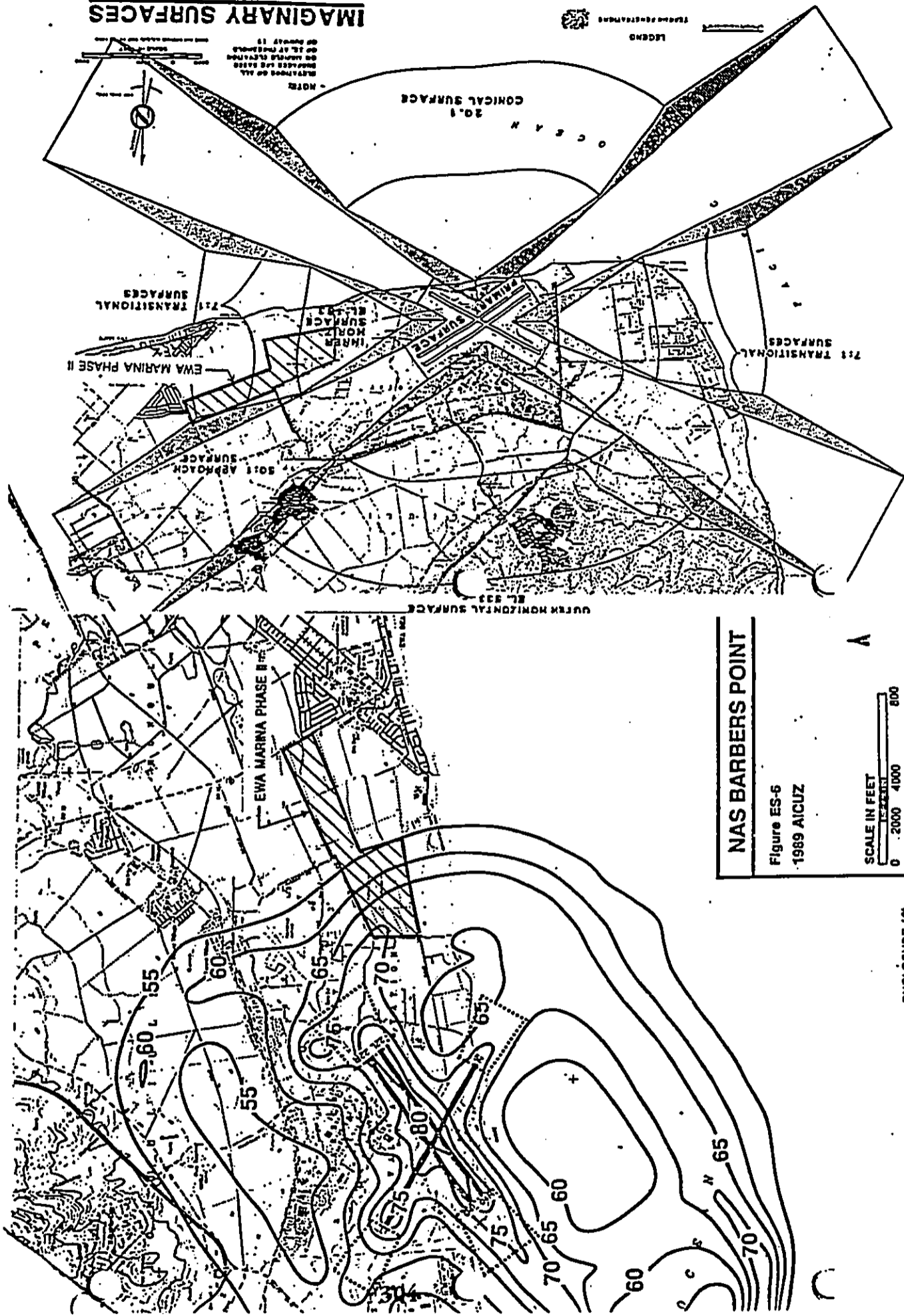
Encl:

- (1) Imaginary Surfaces at NAS Barbers Point
- (2) 1989 AICUZ Footprint for NAS Barbers Point

Copy to:

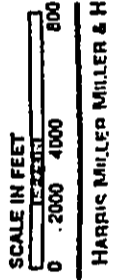
Department of General Planning
 (William Medeiros)
 Office of Environmental Quality Control
 HASEKO (Hawaii), Inc. (Nelson Lee)

IMAGINARY SURFACES



NAS BARBERS POINT

Figure ES-6
1989 AICUZ



TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

2202
1188 BISHOP STREET, SUITE 888
HONOLULU, HAWAII 96813
BUS (808) 538-8607
RES (808) 355-1338
FAX (808) 531-4592

February 28, 1991

Mr. W. K. Liu
Assistant Base Civil Engineer
Department of the Navy
Naval Base Pearl Harbor
BOX 110
Pearl Harbor, Hawaii 96860

Dear Mr. Liu:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Ewa Marina Phase II
(Your File Reference: 11000 Ser 00F(203A)/0215)

This will acknowledge receipt of your February 15, 1991 letter regarding the EISPN for the above project.

You provided comments on the following:

1. Height of Structures. The relationship of the proposed height of 150 feet for structures on the project site and Federal Aviation Regulations is discussed in the EIS, and will be referenced to a fixed datum as you suggested, e.g. mean sea level (MSL).
2. Aircraft Noise. For our Draft EIS (DEIS), we had the firm of Darby & Associates prepare an "Environmental Noise Impact Assessment", which is attached as Appendix F therein. I will be referring your letter to Darby & Associates for appropriate follow-up on those items requiring attention.
3. Restrictive Easement. The compatibility of project plans for Phase II with aircraft operations is discussed in the EIS and the restrictive easement is described.
4. Drainage. For the DEIS, the firm of Belt Collins & Associates prepared a report related to various infrastructure concerns, including drainage (Appendix D to the DEIS). I will be referring your letter to Belt Collins for appropriate follow-up in this area as well.

Mr. W. K. Liu
February 28, 1991
Page 2

We certainly appreciate your taking the time to review the submitted material and providing us with your comments.

Very truly yours,



Tyrone T. Kusao

TTK:afk
cc: Dept. of General Planning

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

2202
1100 BISHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813

BUS (808) 538-0852
RES (808) 538-1308
FAX (808) 531-4252

March 29, 1991

Mr. W. K. Liu
Assistant Base Civil Engineer
Department of the Navy
Naval Base Pearl Harbor
Box 10
Pearl Harbor, Hawaii 96860

Dear Mr. Liu:

Draft Environmental Impact Statement (DEIS)
EVA MARINA, PHASE II

This is a follow-up response to your February 15, 1991, letter commenting on the above project.

We have previously responded to your concerns regarding height of structures and the restrictive easement on the project site.

With regard to aircraft noise, the Final EIS will contain a description of all disclosure requirements for noise-sensitive areas and these requirements will be met.

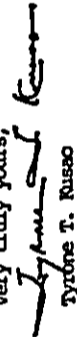
Regarding your questions and comments on the proposed drainage plan, the following additional information is provided.

The drainage volume identified is the volume of flow as approved by the City and County of Honolulu, Department of Public Works, and is for all upstream areas that would feed into the Kaiol drainage Basin, including the Eva Villeges and Eva Gentry. The drainage is cumulative and accounts for flow from one development to the other on its way to the ocean.

The 10,400 cfs is the cumulative flow as it leaves the Eva Gentry project. The developer of the Eva Marina will be responsible for this approved flow as well as for any additional flow from the Eva Marina project and the Campbell lands mauka of the Eva Marina project.

Thank you for your comments, and if you should have any questions or wish additional information, please contact me.

Very truly yours,


Tyrone T. Russo

cc: Dept. of General Planning
Haseko (Hawaii), Inc.

CHAPTER 9

Comments and Responses During the Preparation of the Final EIS



CHAPTER 9 COMMENTS AND RESPONSES DURING THE PREPARATION OF THE FINAL EIS

Sixty (60) copies of the Draft Environmental Impact Statement for Ewa Marina, Phase II were received by the Office of Environmental Quality Control on February 5, 1991. Notice of the DEIS was published in the February 8, 1991 OEQC Bulletin and sixty copies of the report were distributed to interested public agencies, organizations and individuals. The original plus one (1) copy of the DEIS were delivered to the accepting agency, the Department of General Planning, City and County of Honolulu. Additionally, Haseko (Hawaii), Inc. delivered 10 copies of the draft EIS to community organizations and elected officials. A total of 18 agencies and organizations provided comments by March 25, 1991, the deadline date, in response to the Draft EIS. All comments were responded to with both comments and responses reprinted on the following pages. Agencies and organizations submitting comments to the Draft Ewa Marina, Phase II EIS are as follows:

City and County of Honolulu

Building Department

Fire Department

Department of Land Utilization

Police Department

Department of Public works



State of Hawaii

Department of Accounting and General Services

Department of Business and Economic Development and
Tourism (Energy Program Administration)

Department of Defense

Office of Environmental Quality Control

Health Department

Department of Land and Natural Resources 3/1/91

Department of Land and Natural Resources 3/12/91

Office of State Planning

University of Hawaii 2/14/91

University of Hawaii 3/21/91

Federal

U.S. Department of the Army, Corp of Engineers

Private

Hawaiian Electric 2/19/91

Hawaiian Electric 2/26/91

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS. (808) 538-6652
RES. (808) 395-1338
FAX (808) 521-4292

February 4, 1991

Dr. Bruce S. Anderson
Acting Director
Office of Environmental Quality Control
465 S. King Street, Room 104
Kekuanaoa Building
Honolulu, Hawaii 96813

Dear Dr. Anderson:

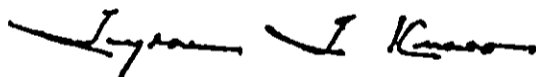
Subject: Ewa Marina, Phase II Draft Environmental
Impact Statement, Ewa, Oahu, Hawaii.

Enclosed herein are 60 copies of the subject Draft EIS for
publication in your February 8, 1991 Bulletin and
distribution by your agency.

Please be advised that we have also forwarded the original
draft document plus one (1) copy to the City Department of
General Planning, the accepting authority.

Your assistance in processing the Draft EIS is greatly
appreciated and should there be questions please contact me
at this office.

Very truly yours,



Tyrone T. Kusao

TTK:afk
cc: Mr. Nelson Lee
Haseko (Hawaii), Inc.
Mr. Benjamin B. Lee
Department of General Planning

OFFICE OF
QUALITY
91 FEB -5 10:40
RECEIVED

OEQC BULLETIN



JOHN WAIHEE
GOVERNOR

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

DIRECTOR

VOLUME VIII

FEBRUARY 8, 1991

NO. 3

REGISTER OF CHAPTER 343, HRS DOCUMENTS

The OEQC Bulletin is a semi-monthly publication. The publication dates of the bulletin are the eighth and twenty-third of each month. Applicants should deliver an appropriate number of Draft and Final EISs to the accepting authority before submitting copies to OEQC for distribution and publication. Environmental Assessments should be submitted to the accepting authority directly. Based on the assessment, the accepting authority will submit to OEQC a determination of a Negative Declaration or a Preparation Notice for publication in the bulletin. Draft and Final Environmental Impact Statements must be received by the fifth and twentieth days of the month for publication in the respective issue. Negative Declarations and Preparation Notices must be received at least five working days prior to the publication date. All documents submitted for publication in the OEQC Bulletin should be delivered to the Office of Environmental Quality Control, 465 South King Street, Room 104, Honolulu, Hawaii 96813. To ensure proper processing of documents, please attach OEQC Bulletin Publication Form with all submittals. These forms can be obtained by calling OEQC at 548-6915.

OEQC BULLETIN
February 8, 1991

OAHU

EWA MARINA, PHASE II

Location: Ewa, Oahu
TMK: 9-1-12:05 and 06

Please send your comments to:

Accepting Authority: Department of General Planning
Attn: William Medeiros
650 South King Street,
8th Floor
Honolulu, Hawaii 96813

with a copy to:

Applicant: Haseko (Hawaii), Inc.
Attn: Nelson Lee,
Development Director
820 Mililani Street, Suite 820
Honolulu, Hawaii 96813

and a copy to:

Consultant: Tyrone Kusao, Inc.
1188 Bishop Street,
Suite 2507
Honolulu, Hawaii 96813

and a copy to OEQC.

Deadline: March 25, 1991

The Ewa Marina Community Development Project has two phases of which the subject Phase II project is the second phase. Phase I, containing approximately 707 acres of land, is already classified for urban use. It will contain 4,850 dwelling units in a wide variety of homes, including affordable mid-rise apartments, townhouses, moderately priced single family homes as well as luxury homes fronting the ocean and a man-made 140 acre marina.

Phase II is part of an Ewa Marina Master Plan encompassing both Phases. Phase I will be a master-planned, recreation-oriented residential community containing 4,850 housing units which will be build around a major, man-made, 140-acre marina containing 1,600 boat slips.

The Phase II project will be commercial-industrial, employment and recreation center containing uses supportive of recreational marine activities, such as hoists launching ramps, wash racks, ice and cold storage facilities, boat storage facilities, and businesses involved in the sale or repair of boats and boating accessories. It will also contain a clubhouse, visitor accommodation units, a conference center, a health center, a 27-hole golf course and a tennis complex.

OEQC BULLETIN
February 8, 1991

Phase II, will be constructed on 403 acres of land mostly used for sugar cane production at the present time. Both phases will be harmoniously integrated into a residential/recreational/commercial community with a greenbelt pathway system extending throughout the community and connecting these various community elements.

DISTRIBUTION LIST

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TITLE: EWA MARINA, PHASE II
 LOCATION: Ewa, Oahu, Hawaii - TMK: 9-1-12 Por 5 & 6
 PROPOSING AGENCY/APPLICANT: Haseko (Hawaii, Inc.)
 ACCEPTING AUTHORITY/APPROVING AGENCY: City & County of Honolulu
 PUBLICATION DATE: 02/08/91 Dept of General Planning
 DEADLINE FOR COMMENTS: 03/25/91

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(a)*Copy desired only if project involves agency's responsibility

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1188 Bishop Street, Suite 2507
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Attn: Tyrone T. Kusao

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Dept. of Water Supply		
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Dept. of Water Supply		
Kauai Community College Library		
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American Lung Association	1	
Hawaiian Electric Company	1	
Office of Hawaiian Affairs	1	
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Legislative Reference Bureau	1	

(b)** Copy desired only if project is in respective county.
- 313 -

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<u>Aiea Haina Library</u>		
<u>Ewa Beach Community-School Library</u>	1	(Sent by T. Kusar)
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<u>Kahuku Community-School Library</u>		
<u>Kailua Library</u>		
<u>Kalihi-Palama Library</u>		
<u>Liliha Library</u>		
<u>Manoa Library</u>		
<u>McCully-Moiliili Library</u>		
<u>Mililani Library</u>		
<u>Wahiawa Library</u>		
<u>Waialua Library</u>		
<u>Waianae Library</u>		
<u>Waikiki-Kapahulu Library</u>		
<u>Waimanalo Community-School Library</u>		
<u>Waipahu Library</u>		
HAWAII		
<u>Bond Memorial (Kohala) Library</u>		
<u>Holualoa Library</u>		
<u>Honokaa Library</u>		
<u>Kailua-Kona Library</u>		
<u>Keaau Community-School Library</u>		
<u>Kealahou Library</u>		
<u>Laupahoehoe Community-School Library</u>		
<u>Mountain View Community-School Library</u>		
<u>Pahala Community-School Library</u>		
<u>Pahoa Community-School Library</u>		
<u>Thelma Parker Memorial Library/Waimea Area Library</u>		
MAUI		
<u>Kahului Library</u>		
<u>Lahaina Library</u>		
<u>Makawao Library</u>		
MOLOKAI		
<u>Molokai Library</u>		
LANAI		
<u>Lanai Community-School Library</u>		
KAUAI		
<u>Hanapepe Library</u>		
<u>Kapaa Library</u>		
<u>Koloa Community-School Library</u>		
<u>Waimea Library</u>		

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813

BUS. (808) 538-6652
RES. (808) 395-1338
FAX (808) 521-4292

February 4, 1991

Mr. Benjamin B. Lee
Chief Planning Officer
City and County of Honolulu
650 S. King Street, 8th Floor
Honolulu, Hawaii 96813

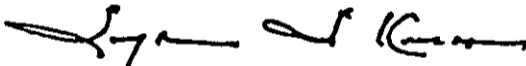
Dear Mr. Lee:

Subject: Ewa Marina, Phase II Draft Environmental
Impact Statement, Ewa, Oahu, Hawaii.

In compliance with Section 11-200-20 of the EIS Rules and your agency's requirement, enclosed herein are the original draft document plus one (1) copy of the subject Draft EIS. Please be advised that we have submitted sixty (60) copies of this document to the State Office of Environmental Quality Control to-day for publication in their February 8, 1991 bulletin.

Your assistance in the matter is sincerely appreciated and should there be questions, please contact me at this office.

Very truly yours,



Tyrone T. Kusao

TTK:afk

cc: Mr. Nelson Lee ✓
Haseko (Hawaii), Inc.
Dr. Bruce Anderson ✓
Office of Environmental Quality Control

EIS/DP AMENDMENT DISTRIBUTION BY HASEKO

Ewa Neighborhood Board Planning/Zoning Committee
• 4 copies

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Naval Air Station Barbers Point
• Acuz Officer/Commanding Officer

TYRONE T. KUSAO, INC.
UPZoning and Zoning Consultant

2202
1188 BISHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813
BUS HOUR 538-6853
RES HOUR 385-1338
FAX HOUR 381-4282

February 19, 1991

PB 91-131

February 13, 1991

MEMO TO: BENJAMIN LEE, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING
ATTN: WILLIAM MEDEIROS
FROM: HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT
SUBJECT: EWA MARINA, PHASE II

We have reviewed the Environmental Impact Statement (EIS) for the subject project and have no comments to offer.

James Harada
HERBERT K. MURAOKA
Director and Building Superintendent

JH:jo
cc: J. Harada
Haseko (Hawaii Inc.)
Tyrona T. Kusao, Inc.
Office of Environmental Quality Control

Mr. Herbert K. Muraoka
Director and Building Superintendent
Building Department
City and County of Honolulu
650 S. King Street, 2nd Floor
Honolulu, Hawaii 96813

Dear Mr. Muraoka:

Subject: Ewa Marina, Phase II, Draft EIS

Thank you for your memorandum dated February 13, 1991 to the Department of General Planning, City and County of Honolulu, concerning the above-referenced report.

Your memorandum will be reproduced in the Final EIS together with this response.

Very truly yours,

Tyone T. Kusao
Tyone T. Kusao

TTK:afk

cc: Haseko (Hawaii), Inc.
James Harada
Office of Environmental Quality Control
Department of General Planning

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96814



FRANK F. ZEM
MAYOR

LIONEL L. CAMERA
FIRE CHIEF
DONALD S. M. CHANG
DEPUTY FIRE CHIEF

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS (808) 538-6653
FEB (808) 535-1339
FAX (808) 531-4282

March 4, 1991

February 26, 1991

TO: BENJAMIN B. LEE, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

ATTN: WILLIAM J. MEDEIROS

FROM: DONALD S. M. CHANG, ACTING FIRE CHIEF

SUBJECT: EWA MARINA, PHASE II
THK: 9-1-12: POR 5 & 6

Mr. Donald S. M. Chang
Acting Fire Chief
Honolulu Fire Department
1455 South Beretania Street, Room 305
Honolulu, Hawaii 96814

Dear Mr. Chang:

Draft Environmental Impact Statement (DEIS)
Ewa Marina Phase II

This will acknowledge receipt of your February 26, 1991, letter providing comments on the DEIS for the above project. Thank you for taking the time to review the submitted materials.

We have reviewed the subject material provided and have no additional comments.

Should you have any questions, please contact Battalion Chief Attilio Leonard of our Administrative Services Bureau at 943-3838.

Very truly yours,

Tyrone T. Kusao

DONALD S. M. CHANG
Acting Fire Chief

AKL:ny

cc: Nelson Lee (Haseko (Hawaii, Inc.))
Tyrone T. Kusao, Inc.
Office of Environmental Quality Control

cc: Department of General Planning
Haseko (Hawaii), Inc.
(Nelson Lee)

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

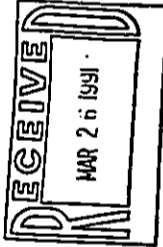
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • PHONE: 523-4433



FRANK P. JAW
MAYOR

DONALD A. CLEGG
DIRECTOR
LORETTA C. CHIE
DEPUTY DIRECTOR

LU 02/91-0823 (ASK)



March 25, 1991

Mr. Benjamin Lee,
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 S. King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Lee:

Draft Environmental Impact Statement (DEIS)
Eva Marina Mixed-Use Commercial Complex
Tax Map Key: 9-1-12: portions of 5 and 6

The Department of Land Utilization has reviewed the subject document and offers the following comments:

1. Will the asphalt concrete and concrete batch plant mentioned on page 8 of the DEIS be a permanent facility?
2. The DEIS describes the project as a mixed-use commercial/industrial project. Described uses are resort or accessory develop to resort uses. What industrial activities are proposed? If the applicant does intend to develop industrial uses, these uses and their potential impacts should be described.
3. What is the status of the Eva Water Master Plan? What is the relationship of the projects water supplies to this plan?
4. The EA stated that the golf course will be irrigated with non-potable water. Will the quantity and quality of the source be adequate to meet the irrigation requirement?
5. Will there be sufficient capacity in the Honouliuli WWTP to accommodate the demand for wastewater treatment?

Page 2
Mr. Benjamin Lee
March 25, 1991

6. The EA document suggests that the golf course will serve as a settlement basin for runoff which will eventually empty into the marina. As the marina has yet to obtain required approvals, the applicant should consider a drainage plan which does not rely on development of the proposed marina.
7. Relative to the impact of traffic on air quality, page 9 and 74 of the DEIS states that the developer can implement or encourage carpooling, public transit etc. Does the developer intend to implement these programs?
8. Section 1.8 "Necessary Approvals and Permits Required" found on page 15 of the DEIS should specify the land use changes being sought.
9. Noise impacts are discussed based on the type and volume of existing air traffic at Honolulu International and Naval Air State Barbers Point. Are changes in air traffic anticipated? How might noise levels be mitigated?
10. Maps showing the 100-acre easement in favor of the United States of America should be provided. Is the golf course the only portion of the project which will be within this easement area?
11. Page 106 of the DEIS states that the applicant will provide one new non-tourism related employment opportunity for each of the visitor accommodation units (1,500). Where will these job opportunities be provided?
12. The DEIS states that ground water or shoreline water will not be impacted based on an analysis which focused on chemical applications, existing soil conditions and average rainfall. The drainage plan for the project proposes to use a strip of land within the golf course approximately 400 to 600 feet wide to serve as a surface and storm water drainage conduit which will direct such water toward the marina. This area will accept surface and storm water flows from the upper portions of the Kaloi Drainage Basin. Was this aspect considered in determining that there would be no impact on marina or offshore water quality?
13. The EIS should discuss the potential impact development of the Marina may have on the ground water and off-shore water.

Page 3
Mr. Benjamin Lee
March 25, 1991

Thank you for the opportunity to review the subject project.
Should you have any questions regarding the above you may contact
the Environmental Affairs Branch at 523-4077.

Very truly yours,

Donald A. Clegg

DONALD A. CLEGG
Director of Land Utilization

DAC:lg

cc: Haseko (Hawaii, Inc.)
Mr. Tyrone T. Kusao

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

March 27, 1991

Mr. Donald A. Clegg, Director
Department of Land Utilization
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Draft Environmental Impact Statement (DEIS)
Ewa Marina, Phase II

This is in response to your letter of March 25, 1991,
commenting on the DEIS for the above project. For your
convenience, we will respond to your comments in the order
presented.

1. The asphalt concrete and concrete batch plant will not
be a permanent facility and will be used strictly during the
construction period.

2. The proposed industrial uses are described on page 26 of
the DEIS. In elaboration, these uses are boating support
facilities, typical of most full-service maritime commercial
centers and will include cry dock facilities for storage,
boat repair and boat maintenance. Other standard facilities
would include launching ramps, fuel docks, wash racks, ice
and cold storage facilities, hoists, etc. It should be
noted that these are benign industrial uses, directly
related to the marina and not expected to have any
significant, permanent, long-term environmental impacts.

3. The Ewa Water Master Plan, the developer's contribution
toward the development of a regional water system, existing
water facilities, and the anticipated effects on water
supply are described on pages 113-117 of the DEIS. The
developer has contributed over \$10 million toward the
development of a regional water system and expects to commit
additional funds before the system is completed.

4. The quantity and quality of the non-potable water to be
used for irrigation of the Golf course is expected to be
adequate. This is discussed on pages 115-116 of the DEIS.

5. As discussed on pages 117-119 of the DEIS, present
capacity of the Honolulu Wastewater Treatment Plant is 25
mgd. This is expected to be increased to 38 mgd by 1993,
with an ultimate capacity of 51 mgd. This project will be

1188 BAKER STREET, SUITE 2307
HONOLULU, HAWAII 96813
DLR (808) 538-6632
RES (808) 355-1338
FAX (808) 531-4282

phased accordingly and coordination with the City's Department of Public Works will continue on both the public and private improvements which may be necessary to accommodate anticipated demands.

6. The project area, as noted in the DEIS, is part of the Kaloi Drainage Basin. Use of the marina as part of the overall drainage system is the least environmentally damaging alternative. In addition, it will serve as a major recreational facility. The State and City previous approvals of the land use boundary changes and Development plan amendments, respectively, include the marina. If, for some unforeseen reason, the marina is not approved, an alternative drainage plan will be considered.

7. The developer is participating in the Leeward Oahu Transportation Management Association, which is a regional program for transportation management, with other developers and landowners in this area. The developer has committed to participating in the funding and construction of improvements at project access points (and other on-site and off-site transportation improvements necessitated by the project) and continues to coordinate these plans with the State Department of Transportation. These plans will include optimizing the use of both existing and proposed transportation systems. (Refer to pages 112-113 of the DEIS and Appendix C.)

8. Section 1.6, "Necessary Approvals and Permits Required", page 15 of the DEIS, describes these approvals in general terms. Pages 3-4 of the DEIS describe in specific terms the requested Development Plan amendments. It is also noted that appropriate zone changes, P-2 General Preservation District for the golf course and IMX-1 Industrial-Commercial Mixed Use District for the mixed use area, will be sought when prior approvals are obtained.

9. Changes in air traffic are anticipated, but these changes cannot be precisely described at this time. Appropriate mitigation measures aimed at potential noise impacts will be taken. Mitigation measures based on the noise quality study performed by Darby & Associates are described on page 88 of the DEIS and elaborated upon in Appendix F.

10. A map showing the 100-acre easement in favor of the United States of America has been included in the Final EIS. In addition to the golf course, a portion of the mixed use area is included within this area.

11. With regard to "non-tourism related employment" the phrase refers to jobs not related to hotels or residential condominiums intended for use as transient accommodations, or recreational, entertainment or other facilities and

services used primarily by tourists. These jobs may be provided on-site at the project or off-site at other projects currently being developed by Hasako or future developments by Hasako.

12. No significant adverse impacts on marina or offshore water quality are anticipated as a result of the proposed drainage plan. This was also covered in the EIS for Ewa Marina, Phase I.

13. As noted above, potential impact from development of the marina on ground water and off-shore water was fully discussed in the Phase I. EIS

Thank you for your comments, and if you should have questions or wish additional information, please contact me.

Very truly yours,



Tyrone T. Kusao

cc: Department of General Planning
Hasako Hawaii, Inc.

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1035 SOUTH BERKELEY AVENUE
HONOLULU, HAWAII 96813 AREA CODE (808) 931-3111



FRANK F. FASI
MAYOR

MICHAEL S. NAKAMURA
CHIEF
HAROLD M. HAWAIIAN
DEPUTY CHIEF

OUR REFERENCE KN-LK

March 15, 1991

TO: BENJAMIN E. LEE, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

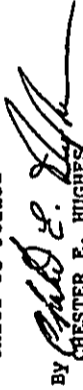
FROM: MICHAEL S. NAKAMURA, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: EWA MARINA PHASE II, DRAFT ENVIRONMENTAL IMPACT
STATEMENT, EWA, OAHU, HAWAII, TRK 9-1-12 FOR 5 & 6

After reviewing the materials for the above project we have nothing to add to our February 4, 1991 response to the Ewa Marina Phase II assessment reports.

Thank you for the opportunity to comment.

MICHAEL S. NAKAMURA
Chief of Police

BY 
CHESTER E. HUGHES
Assistant Chief of Police
Support Services Bureau

cc: Haseko (Hawaii) Inc.
Tyrone T. Kusao, Inc.
OEQC

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

March 22, 1991

Mr. Michael S. Nakamura
Chief of Police
Honolulu Police Department
1455 S. Beretania Street
Honolulu, Hawaii 96814


Dear Chief Nakamura:

Subject: Ewa Marina, Phase II, Draft EIS

Thank you for your memorandum dated March 15, 1991 to the Department of General Planning, City and County of Honolulu, concerning the above-referenced report.

Your memorandum will be reproduced in the Final EIS together with this response.

Very truly yours,


Tyrone T. Kusao

TTKrafk

cc: Haseko (Hawaii), Inc.
Department of General Planning
Office of Environmental Quality Control

2202
1188 BISHOP STREET, SUITE 2000
HONOLULU, HAWAII 96813
BUS. (808) 838-8833
FES. (808) 383-1338
FAX (808) 591-4222

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
850 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK P. FARR
MAYOR

SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER
C. MICHAEL STRAET
DEPUTY DIRECTOR

In reply refer to:
ENV 91-44(448)

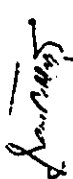
February 21, 1991

MEMORANDUM
TO: BENJAMIN B. LEE, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING
FROM: SAM CALLEJO, DIRECTOR AND CHIEF ENGINEER
SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
EVA MARINA, PHASE II
TMK: 9-1-12: PORTIONS OF 5 AND 6

We have reviewed the subject DEIS and have the following comments:

1. A drainage master plan should be submitted to our Drainage Section, Division of Engineering, for review and approval.
2. If roadway system within the project is to be dedicated to the City and County of Honolulu, it should be designed and constructed in accordance with the City standards.
3. The City has a 50-foot wide easement through the property for the Barbers Point Sewer Outfall. Any potential impact to the outfall during the dredging of the marina should be addressed.
4. The location of the proposed low and medium density apartments should be verified so that none of the buildings will be built over the easement.
5. Also, connection to the Honolulu Wastewater Treatment Plant will not be allowed until the plant is expanded and the EPA and the State Department of Health allow the City to discharge more than 25 mgd of primary treated effluent. If secondary treatment is required, the expansion and upgrade will not be completed until 1997.

cc: Haseko (Hawaii, Inc.)
Tyrone T. Kusao, Inc.
DBQC


SAM CALLEJO
Director and Chief Engineer

TYRONET. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS. HOUR: 808-6852
RES. HOUR: 808-1338
FAX HOUR: 808-4282

March 4, 1991

Mr. Sam Callejo
Director and Chief Engineer
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Callejo:

Draft Environmental Impact Statement (DEIS)
Eva Marina Phase II

This will acknowledge receipt of your February 21, 1991, letter providing comments on the DEIS for the above project.

A master plan for drainage will be submitted to your department for review and approval and roadway systems within the project site will be designed and constructed to City standards.

I have also referred a copy of your comments to Belt Collins & Associates for information and follow-up, as appropriate, with regard to the Barbers Point Sewer Outfall easement.

Thank you for taking the time to review the submitted materials and for your comments.

Very truly yours,


Tyrone T. Kusao

cc: Belt Collins & Associates
Department of General Planning
Haseko (Hawaii), Inc.
(Neilson Lee)

TYRONET T. KUSAO, INC.
Planning and Zoning Consultant

March 29, 1991

1188 BISHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813
BLR BOB 838-8853
RES BOB 368-1328
FAX BOB 821-4282

Mr. Sam Callejo
March 29, 1991
Page 2

Mr. Sam Callejo
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 S. King Street, 11th Floor
Honolulu, Hawaii 96813

Dear Mr. Callejo:

Subject: Draft Environmental Impact Statement (DEIS)
Eva Marina, Phase II

This is in response to your February 21, 1991 comments on the DEIS for the above project.

A drainage master plan will be submitted to your Division of Engineering for review and approval.

All roadways within the project site will be designed and constructed to meet City standards and dedicated.

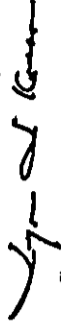
With regard to the 50-foot wide sewer outfall easement and any potential impact during dredging of the marina, the outfall will be considered in designing the marina, the preparing plans for this Phase I area have been in contact with your Wastewater Division staff and have developed an engineering concept for dealing with the outfall's crossing of the marina.

Further, encroachment into the easement will be avoided and only open space uses, such as landscaped areas, roadways, and golf holes, are being planned within it. This will facilitate maintenance of the outfall, simplify access, and minimize disruption and potential environmental harm in the event of a line failure.

Finally, the need for planned expansion of the Honolulu Wastewater Treatment plant is recognized and development will be phased accordingly.

Thank you for your comments, and if you should have any questions or wish additional information on the project, please contact me.

Very truly yours,



Tyrone T. Kusao

TTK:afk

cc: Haseko (Hawaii), Inc.
Department of General Planning
OFQC

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BIRCHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813
BUS. HOUR: 538-8853
RES. HOUR: 383-1338
FAX HOUR: 531-4882

February 19, 1991

Mr. Teuane Tominaga
State Public Works Engineer
Public Works Division
State Department of Accounting
and General Services
1151 Punchbowl Street
Honolulu, Hawaii 96813

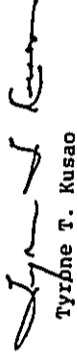
Dear Mr. Tominaga:

Subject: Ewa Marina, Phase II, Draft EIS

Thank you for your letter dated February 12, 1991 to the Department of General Planning, City and County of Honolulu, concerning the above-referenced report.

Your letter will be reproduced in the Final EIS together with this response.

Very truly yours,



Tyrone T. Kusao

TTK:afk

cc: Haseko (Hawaii), Inc.
Department of General Planning
Office of Environmental Quality Control

(P)1134.1

FEB 12 1991

City and County of Honolulu
Department of General Planning
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Attention: Mr. William Medeiros

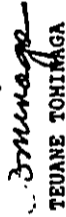
Gentlemen:

Subject: Ewa Marina, Phase 2
Draft EIS

Thank you for the opportunity to review the subject document. We have no comments to offer.

Should there be any questions, please contact Mr. Ralph Yukumoto of the Planning Branch at 548-7192.

Very truly yours,



TEUANE TOMINAGA
State Public Works Engineer

RY:jk

cc: Haseko (Hawaii), Inc.
Tyrone T. Kusao, Inc.
Office of Environmental Quality Control



DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

EVERETT DIVISION, 315 MERCHANT ST., 8th FL., HONOLULU, HAWAII 96813 PHONE: (808) 541-4868 FAX: (808) 541-5243

JOHN WABER
COMMISSIONER
MURRAY E. JOWELL
DIRECTOR
BARBARA KELLER
DEPUTY DIRECTOR
DENNY DECKER

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
TEL: (808) 535-0852
FEB: (808) 535-1325
FAX: (808) 531-4538

91:921e

March 25, 1991

Department of General Planning
City and County of Honolulu
650 S. King Street, 8th Floor
Honolulu, Hawaii 96813

Attention: Mr. William Medeiros

Dear Mr. Medeiros:

Subject: Draft Environmental Impact Statement (DEIS) for
Ewa Marina, Phase II

The Energy Division has received the above DEIS and has the following
comments:

We appreciate the attention that will be paid by the developer to the
incorporation of energy-efficient systems into the site-planning and building
designs for this project (pp. 153-155).

We note that natural gas will be used to operate residential water
heaters, stoves and clothes dryers, and common utilities such as hot water
boilers (pp. 126, 155). We would like to apprise the developer that new,
high-efficiency gas water heaters are available and should be considered for
inclusion in this project.

Thank you for this opportunity to comment.

Sincerely,

Tom Obuchi

Mr. Maurice H. Kaya
Energy Program Administrator

MHK/PE:do

cc: Haseko (Hawaii, Inc.)
Tyron T. Kusao, Inc.
Office of Environmental Quality Control

March 27, 1991

Mr. Maurice H. Kaya
Energy Program Administrator
Department of Business, Economic Development
and Tourism
335 Merchant Street, Room 110
Honolulu, Hawaii 96813

Dear Mr. Kaya:

Subject: Ewa Marina Phase II EIS

This is to acknowledge receipt of your March 25, 1991
comment letter on the Draft EIS for Phase II of the Ewa
Marina project. We have taken note of your comment
concerning the new, high-efficiency gas water heaters.

Thank you for taking time to review the submitted document
and your comments therein.

Very truly yours,

Tyrone T. Kusao

Tyrone T. Kusao

TKK:afk
cc: Department of General Planning
City and County of Honolulu
Haseko (Hawaii), Inc.

STATE OF HAWAII
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH SERVICES
PO BOX 22088 HONOLULU, HI 96822

February 11, 1991

Engineering Office

Mr. William Medeiros
Dept of General Planning
City and County of Honolulu
650 S. King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Medeiros:

Ewa Marina, Phase II

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Sincerely,

Jerry H. Matsuda
Lieutenant Colonel
Hawaii Air National Guard
Contracting & Engineering Officer

cc: Mr. Nelson W.G. Lee
Haseko (Hawaii, Inc.)
Mr. Tyrone T. Kusao, Inc.
Office of Environmental
Quality Control

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

2202
1188 BISHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813
BUS (808) 538-6832
FES (808) 265-1338
FAX (808) 531-4282

February 19, 1991

Lt. Col. Jerry M. Matsuda
Contracting & Engineering Officer
Hawaii Air National Guard
Department of Defense
State of Hawaii
3949 Diamond Head Road
Honolulu, Hawaii 96816-4495

Dear Lt. Col. Matsuda:

Subject: Ewa Marina, Phase II, Draft EIS

Thank you for your letter dated February 11, 1991 to the Department of General Planning, City and County of Honolulu, concerning the above-referenced report.

Your letter will be reproduced in the Final EIS together with this response.

Very truly yours,

Tyrone T. Kusao
Tyrone T. Kusao

TTK:afk

cc: Haseko (Hawaii), Inc.
Office of Environmental Quality Control
Department of General Planning

MAR-19-91 TUE 15:43 GENERAL PLANNING

P. 02/03

3/11-50

JOHN HARRIS
04/1/91



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
411 SOUTH KING STREET, ROOM 114
HONOLULU, HAWAII 96813

February 15, 1991

City and County of Honolulu
Department of General Planning
Attn: Mr. William Medeiros
650 South King Street
Honolulu, HI 96813

Dear Mr. Medeiros:

SUBJECT: Draft Environmental Impact Statement for the Ewa Marina, Phase II

We have reviewed the document listed above and have no comments to offer at this time.
Thank you for the opportunity to submit comments on this project.

Sincerely,

William Medeiros

W/ Bruce S. Anderson, Ph.D.

Bruce S. Anderson, Ph.D.
Acting Director

TELEPHONE NO.
594-4413



TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

2202
1188 BISHOP STREET, SUITE 2002
HONOLULU, HAWAII 96813
BUS (808) 538-6852
RES (808) 555-1338
FAX (808) 531-4282

March 22, 1991

Bruce S. Anderson, Ph.D.,
State of Hawaii
Office of Environmental Quality Control
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

Subject: Draft Environmental Impact Statement for
Ewa Marina, Phase II

Dear Dr. Anderson:

This is to acknowledge receipt of your February 15, 1991 response letter to our Draft EIS. We wish to thank you for taking time to review the Draft EIS and your comments thereon.

Very truly yours,

Tyrone T. Kusao

Tyrone T. Kusao

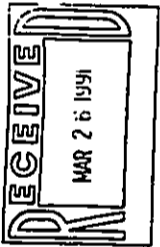
TTK:afk
cc: Haseko (Hawaii), Inc.
Dept. of General Planning
City and County of Honolulu

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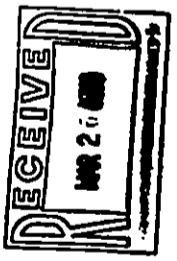
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OFFICE OF ENVIRONMENTAL QUALITY CONTROL
HONOLULU, HAWAII

328



COPY



March 14, 1991

P0309HT

Mr. William Medeiros
Department of General Planning
City & County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Medeiros:

Subject: Draft Environmental Impact Statement
Ewa Marina, Phase II
Ewa, Oahu, Hawaii
February 1991

The Environmental Management Division (EMD), Department of Health has reviewed the subject Draft Environmental Impact Statement and provides the following comments from the identified branches of the EMD:

Clean Water Branch

1. A stormwater National Pollutant Discharge Elimination System (NPDES) permit application is required for the proposed construction activity as it involves the clearing, grading and excavation of more than five acres of total land area. This application should be submitted to the Director of Health at least 90 days before the date on which construction is to commence.
2. Pursuant to Department of Health Administrative Rules, Chapter 11-54-09.1, a Water Quality Certification may be required for the construction of the boat-launching ramps.
3. An NPDES permit may be required for point source discharges from the proposed boat repair business. This NPDES application should be submitted at least 180 days prior to operation of the facility. The possible impacts to the environment associated with the operation of this facility should also be addressed in the subject document.

Mr. William Medeiros

-2-

March 14, 1991

4. Runoff from the golf course may cause water quality standards in the area of the proposed marina to be violated. The final general grading and the use of pesticides, herbicides, and time-released fertilizers are major concerns with respect to runoff from the golf course. Demonstration of compliance with state water quality standards for nutrients, pesticides and herbicides should be addressed.

Wastewater Branch

1. The subject project is located in the proposed Critical Wastewater Disposal Area, as determined by the Oahu Wastewater Advisory Committee. No cesspools will be allowed. Also, it has been determined that the subject project is within the County sewer service system; therefore, no on-site wastewater treatment systems will be allowed.
2. The Department concurs with the stated proposed plan to transmit the wastewater flows from the Ewa Marine Phase II project to the City's Honolulu Sewage Treatment Plant.

Safe Drinking Water Branch

1. As new sources of water are developed, it will be necessary to comply with the Department's Administrative Rules, Chapter 11-20, "Potable Water Systems." Section 11-20-29 of this Chapter requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to their use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set forth in Section 11-20-29.
2. The Department's Administrative Rules, Chapter 11-20, "Potable Water Systems," Section 11-20-30 requires that new or substantially modified distribution systems for public water supplies be approved by the Director. However, if the water system is under the jurisdiction of the City and County of Honolulu, the Board of Water Supply will be responsible for the review and approval of the plans.
3. The proposed development is situated above the Department's Underground Injection Control (UIC) line. Land areas located inland of the UIC line are generally considered to contain underground sources of drinking water. Our maps indicate that there is a domestic water well less than 1/2 mile from the project site (State well no. 1901-02). Operation of the non-potable water wells must not adversely affect the quality of this or any other drinking water wells, especially with regards to chlorides and salinity.

Mr. William Medeiros

-3-

March 14, 1991

4. It is essential that any proposed well in the project area be designed and constructed to prevent the possibility of groundwater contamination. For example, each well should have a concrete pad and full grouting to prevent seepage or floodwaters from migrating down the well shaft.
5. The Department's standard golf course conditions should apply to this project. A copy of the eight conditions (version 3) is enclosed.
6. The potable and non-potable water systems must be carefully designed and operated to prevent cross-connections and backflow conditions. The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow preventers to avoid contaminating the potable water supply.

If you should have any questions on the NPDES stormwater or point source discharge requirements, please contact Steven Chang at 543-8309. Should you have questions on wastewater disposal issues, please contact Dennis Tulang at 543-8294. Questions regarding groundwater protection may be addressed to William Hong at 543-8258.

Very truly yours,

John C. Lemlin

JOHN C. LEMLIN, M.D.
Director of Health

Enclosure: Standard Golf Course Conditions
cc: Haseko (Hawaii), Inc. (w/o encl.)
Tyrone T. Kusao, Inc. (w/encl.)



STATE OF HAWAII
DEPARTMENT OF HEALTH

April, 1990 (Version 3)

EIGHT (8) CONDITIONS APPLICABLE TO THIS NEW GOLF COURSE DEVELOPMENT

1. The owner/developer and all subsequent owners shall establish a groundwater monitoring plan and system which shall be presented to the State Department of Health for its approval. The groundwater monitoring plan and system shall minimally describe the following components:
 - a. A monitoring system tailored to fit site conditions and circumstances. The system shall include, and not be limited to, the use of monitoring wells, lysimeters and vadose zone monitoring technologies. If monitoring wells are used, the monitoring wells shall generally extend 10 to 15 feet below the water table.
 - b. A routine groundwater monitoring schedule of at least once every six (6) months and more frequently, as required by the State Department of Health, in the event that the monitoring data indicates a need for more frequent monitoring.
 - c. A list of compounds which shall be tested for as agreed to by the State Department of Health. This list may include, but not be limited to the following: total dissolved solids; chlorides; PH; nitrogen; phosphorus; or any other compounds associated with fertilizers, biocides or effluent irrigation.
2. Baseline groundwater/vadose zone water data shall be established as described in this paragraph. Once the monitoring system and list of compounds to be monitored for have been determined and approved by the State Department of Health, the owner/developer shall contract with an independent third-party professional (approved by the State Department of Health) to establish the baseline groundwater/vadose zone water quality and report the findings to the State Department of Health. Testing of the analyses of the groundwater shall be done by a certified laboratory.
3. If the data from the monitoring system indicate the presence of the measured compound and/or the increased level of such compound, the State Department of Health can require the owner/developer or subsequent owner to take immediate mitigating action to stop the cause of the contamination. Subsequently, the developer/owner or subsequent owner shall mitigate any adverse effects caused by the contamination.

4. Owner/developer shall provide sewage disposal by means of connection to the public sewer system; or by means of a wastewater treatment works providing treatment to a secondary level with chlorination. Effluent from this wastewater treatment works may be used for golf course irrigation, subject to Condition #2. The entire system shall be approved by the State Department of Health in conformance with Administrative Rules Title 11, Chapter 62, Wastewater Treatment Systems, effective December 10, 1988.
5. If a wastewater treatment works with effluent reuse becomes the choice of wastewater disposal, then the owner/developer and all subsequent owners shall develop and adhere to a Wastewater Reuse Plan which shall address as a minimum, the following items:
 - a. Management Responsibility. The managers of the irrigation system using reclaiming wastewater shall be aware of the possible hazards and shall evaluate their system for public health, safety, and efficiency. They must recognize that contact with the reclaimed wastewater from treated domestic sewage poses potential exposure to pathogenic organisms which commonly cause infectious diseases (bacteria, viruses, protozoa, and helminths or worms).
 - b. General Recommendations
 - 1) Irrigated areas should be no closer than 500 feet from potable water wells and reservoirs.
 - 2) Irrigated areas should be no closer than 200 feet from any private residence.
 - 3) Application rates should be controlled to minimize ponding. Excess irrigation tailwater in the reclaimed wastewater irrigation area shall be contained and properly disposed. An assessment should be made of the acceptable time and rate of application based on factors such as type of vegetation, soil, topography, climate and seasonal variations.
 - 4) Effluent holding/mixing ponds shall be designed to prevent the infiltration of the wastewater into the subsurface. The holding/mixing ponds shall be made impervious.
 - 5) Irrigation shall be scheduled such that the public is not in the vicinity and the soil is sufficiently dry to accept the irrigation water.
 - 6) Permanent fencing or barriers shall be erected around polishing or holding ponds to prevent public entry or stray feral and tame animals from gaining access to the ponds.

- 7) Adequate irrigation records shall be maintained. Records should include dates when the fields are irrigated, rate of application, total application and climatic conditions. Records should also include any operational problems, diversions to emergency storage or safe disposal and corrective or preventive action taken.
- 8) The holding/mixing ponds shall be periodically monitored for the purpose of detecting leakage into the subsurface. If leakage is detected, corrective action shall be immediately taken.
- c. Adequate Notice. Appropriate means of notification shall be provided to inform the employees and public that reclaimed wastewater is being used for irrigation on the site.
 - 1) Posting of conspicuous signs with sufficient letter size for clear visibility with proper wording should be distributed around the use areas.
 - 2) Signs shall be securely fastened. Periodic surveillance shall be conducted to assure permanent posting at all times. Immediate replacements shall be made when necessitated by deterioration, vandalism or misuse.
- d. Adequate Employee Education. Employees or users should be cautioned and warned of the potential health hazards associated with the ingestion of reclaimed wastewater being used at the site.
 - 1) Employees should be warned that the ingestion of reclaimed wastewater is unsafe.
 - 2) Employees should be protected from direct contact of the reclaimed wastewater. If necessary, protective clothing should be provided.
 - 3) Employees should be informed of the following:
 - The irrigation water is unsafe for drinking or washing.
 - Avoid contact of the water or soil with any open cuts or wounds.
 - Avoid touching the mouth, nose, ear or eyes with soiled hands, clothes or any other contaminated objects.
 - Be aware that inanimate objects such as clothes or tools can transport pathogenic organisms.
 - Always wear shoes or boots to protect feet from the pathogenic organisms in the soil or irrigation water.

6. Releases from underground storage tanks (USTs) used to store petroleum products for fueling golf carts, maintenance vehicles, and emergency power generators pose potential risks to groundwater.
Should the owner/developer/operator plan to install USTs that contain petroleum or other regulated substances, the owner/developer/operator must comply with the federal UST technical and financial responsibility requirements set forth in Title 40 of the Code of Federal Regulations Part 280. These federal rules require, among other things, owners and operators of USTs to meet specific requirements in the detection, release response and corrective action. Also, the owner/developer/operator must comply with all State UST rules and regulations pursuant to Chapter 342-L, 'Underground Storage Tanks' of the Hawaii Revised Statutes.

In consideration of the above-mentioned remarks, the Department of Health recommends that the owner/developer/operator implement facility plan alternatives that exclude the installation and operation of UST systems (e.g., the preferential use of electric golf carts, use of above-ground storage of fuel oil for emergency power generators, etc.), or, if USTs are utilized, that secondary containment be considered.

7. Buildings designated to house the fertilizer and biocides shall be bermed to a height sufficient to contain a catastrophic leak of all fluid containers. It is also recommended that the floor of this room be made waterproof so that all leaks can be contained within the structure for cleanup.
8. A golf course maintenance plan and program will be established based on "Best Management Practices (BMP)" in regards to utilization of fertilizers and biocides as well as the irrigation schedule. BMP's will be revised as an ongoing measure. The golf course maintenance plan will be reviewed by the State Department of Health prior to implementation.

If there are any questions regarding the eight (8) conditions mentioned here, please contact Mr. James K. Ikeda at 543-8304. We ask you cooperation in the protection of Hawaii's valuable groundwater resource.

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1108 BUSINESS CENTER DRIVE, SUITE 2202
HONOLULU, HAWAII 96813

PHONE (808) 538-8833
FAX (808) 531-4282

March 28, 1991

Dr. John C. Lewin, MD.,
Director of Health
State Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Lewin:

Draft Environmental Impact Statement (DEIS)
EWA MARINA, PHASE II

This is in response to your letter of March 14, 1991, providing comments on the above DEIS. This response was prepared by our engineering consultant, Belt Collins and Associates. For your convenience, we will respond in the order your comments were presented.

Clean Water Branch

Thank you for the information concerning the permits and water quality certification which will be required. Applications for these will be submitted as soon as the necessary design details are available.

With regard to the maintenance of water quality within the marina, studies conducted indicate that groundwater quality is actually likely to improve as a result of the switch from sugar cane cultivation to a golf course. We are forwarding under separate cover, a report by Charles L. Murdock, Ph.D., and Richard E. Green, Ph.D., titled "Environmental Impact of Fertilizer, Herbicide and Pesticide Use" as well as a copy of "Ewa Marina Water Quality Studies", by Moffatt & Nichol, Engineers. The latter analysis of water quality impacts which was performed using a computer model indicates that water quality standards applicable inside the proposed marina will be met.

Wastewater Branch

Thank you for concurring with the plans to dispose of wastewater from the proposed project at the Honouliuli Wastewater Treatment Plant.

Safe Drinking Water Branch

The water system for the project will comply with the provisions of Chapter 11-20. Since the system will be dedicated to the Honolulu Board of Water Supply, plans for it will be submitted to the Board for review and approval.

It is recognized that there is a need to protect existing sources of potable water. A comprehensive model of groundwater beneath the Ewa Plain has been developed. The developer is sharing the information developed for the model with the State Department of Land and Natural Resources and other resource management agencies. Results to date indicate that the project can be developed without adversely affecting sources of potable water, and it is recognized that a definitive demonstration of this will be necessary before necessary approvals are granted.

All wells in the project area will be designed to prevent contamination. The Department of Health's conditions relative to golf course development have been provided to the developer, will be adhered to, and potable and non-potable water systems will be designed to prevent cross-connections and backflow conditions.

We appreciate the time taken to review the submitted materials and if you should have questions or wish additional information, please contact Mr. Joe Vieira (521-5361) of Belt Collins and Associates, our engineering consultant.

Very truly yours,



Tyrone T. Kusao

cc: Department of General Planning
Haseko (Hawaii), Inc.

JOHN WILLIAMS
DIRECTOR OF LAND



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 81
HONOLULU, HAWAII 96813

WILLIAM W. MITT, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

INVEST
KEVIN W. JAMES
MAHAU TACHIBANA
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AGRICULTURE DEVELOPMENT
PROGRAM
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FORESTRY AND WILDLIFE
PLANNING AND ADMINISTRATION
PROGRAMS
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

REP:OCEA:JN

1981

File No.: 91-299
Doc. No.: 9901E

Tyrone T. Kusao, Inc.
1188 Bishop Street
Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Subject: Environmental Impact Statement (EIS) for Proposed Ewa Marina Phase II Project Involving Mixed Uses & Golf Course, Ewa Beach, Oahu. TWR: 9-1-12; Por. 5 & 6. Folder Nos. 91/E-2 (Golf Course) and 91/E-3 (Resort & Mixed Use)

Thank you for giving our Department the opportunity to comment on this matter. We have received the materials you submitted and have the following comments.

Our Department's Aquatic Resources Division indicates that although the scale of the proposed development is large (390 acres), it is somewhat removed from the shoreline (1,500 feet), and, as such, the potential for adverse impacts to the marine environment is anticipated to be minimal.

In addition, the Division encourages the applicant to consider both the short-term (construction-related) and long-term (operational) measures which would curb erosion, reduce sediment volumes in run-off and from planned drainages, and promote the judicious use of chemicals (pesticides, herbicides, and fertilizers).

The Historic Preservation Division comments that last fall, Haseko Hawaii, Inc. submitted the archaeological survey for the entire Ewa Marina project area to our Historic Preservation Office. They are currently revising portions of the archaeological inventory survey report and will be resubmitting it for our review. Thus, we will be considering the entire project area in our review. We have no comments on this EIS at this time.

Mr. Tyrone Kusao

-2-

Doc. No.: 9901E

Thank you for your cooperation in this matter. Please feel free to call me or Roy Schaefer at our Office of Conservation and Environmental Affairs, at 548-7837, if you have questions.

Very truly yours,

William W. Mitt
William W. Mitt



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 871
HONOLULU, HAWAII 96813

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPT. HEADS
- DEBRA W. ANNE
- MANUVA TADONOKI
- DEB T. KOCHI
MANUFACTURING DEVELOPMENT
PROGRAM
AGRICULTURE
CONSERVATION AND
ENVIRONMENTAL AFFAIRS
RESOURCES EMPLOYMENT
PROGRAM
PLANNING AND
HISTORIC PRESERVATION
PROGRAM
LAND MANAGEMENT
DIVISION
PLANNING AND
LAND DEVELOPMENT

File No.: 91-313
Doc. No.: 9927E

MAR 12 1991

REPROCEA:JN

The Honorable Benjamin Lee
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813
Attn: Mr. William Medeiros

Dear Mr. Lee

Subject: Draft Environmental Impact Statement (EIS) - Ewa
Marina, Phase II Ewa, Oahu, Hawaii TMK: 9-1-12 por. 5
and 6

Thank you for giving our Department the opportunity to comment on this matter. We have reviewed the materials you submitted and have the following comments.

Our Department's Division of Forestry and Wildlife comments that the draft EIS addresses our botanical concerns very thoroughly and therefore we have no comments at this time. We do, however, look forward to reviewing the Final EIS to this project.

The Division of Aquatic Resources notes that although the scale of the proposed development is large (390 acres), it is somewhat removed from the shoreline (1,500 feet), and, as such, the potential for adverse impacts to the marine environment is anticipated to be minimal.

The Division encourages the applicant to consider both the short-term (construction-related) and long-term (operational) measures which would curb erosion, reduce sediment volumes in run-off and from planned drainages, and promote the judicious use of chemicals (pesticides, herbicides, and fertilizers).

Honorable Benjamin Lee -2- Doc. No.: 9927E

The Department's Historic Preservation Division notes that last fall, Haseko Hawaii, Inc. submitted the archaeological survey for the entire Ewa Marina project area to our Historic Preservation Division office. They are currently revising portions of the archaeological inventory survey report and will be resubmitting it for our review. Thus, we will be considering the entire project area in our review. We have no comments on this Draft EIS at this time.

Thank you for your cooperation in this matter. Please feel free to call me or Roy Schaefer at our Office of Conservation and Environmental Affairs, at 548-7837, if you have questions.

Very truly yours,

William W. Paty

cc: Haseko (Hawaii, Inc.)
Throne T. Kusao, Inc.
OEOC



TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813

TEL: (808) 538-8802
FAX: (808) 538-1338
FAX: (808) 531-4282

March 13, 1991

Mr. William W. Paty, Chairperson
Board of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Draft Environmental Impact Statement (DEIS)
Eva Marina, Phase II

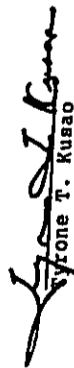
This will acknowledge your letters of March 1 and 12, 1991,
commenting on the above project.

The applicant will employ all mitigation measures described
in the DEIS text and Appendices D, and G, to reduce sediment
volumes, curb erosion, and minimize potential impacts from
the use of chemicals for the proposed golf course. These
will include both construction-related measures and those
needed to minimize long-term impacts.

Continued coordination with regard to the archaeological
inventory survey will be maintained throughout the
development review and approval process with the Historic
Preservation office.

Thank you for taking the time to review and comment on the
DEIS, and if you should have any further questions, please
contact me.

Very truly yours,



Tyrone T. Kusao

cc: Department of General Planning
Haseko Hawaii, Inc.



OFFICE OF STATE PLANNING

Office of the Governor
STATE CAPITOL, HONOLULU, HAWAII 96813 TELEPHONE (808) 548-1400

1188 BUSHOP STREET, SUITE 2307
HONOLULU, HAWAII 96813
BUS. HOUR: 8:30-5:00
FEB. HOUR: 8:30-1:30
FAX (808) 551-4992

Ref. No. P-1757

February 27, 1991

The Honorable Benjamin B. Lee
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Lee:

Subject: Draft Environmental Impact Statement, Ewa Marina, Phase II,
Ewa, Oahu

We have reviewed the above-referenced document relative to Coastal Zone Management objectives and policies and have the following comments for your consideration.

The marina should be protected from contaminants and sedimentation from the golf course and other inland uses that may adversely affect water quality. The DEIS states that drainage will be handled by overland flow to the marina, and that a buffer area about 400-feet wide will serve to trap sediment prior to storm water entering the marina. However, the EIS should describe the buffer area in more detail, such as the topography, and whether it will be used for any other use. The EIS should also list additional management practices for urban uses to protect water quality within the marina.

Thank you for allowing us the opportunity to comment on the DEIS. If you have any questions, please contact Lorene Maki of my staff at 548-3961.

Sincerely,
Harold S. Masumoto
Harold S. Masumoto
Director

cc: Haseko (Hawaii) Inc.
v Tyrone T. Kusao, Inc.
Office of Environmental Quality Control

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

March 13, 1991

Mr. Harold S. Masumoto, Director
Office of State Planning
State Capitol
Honolulu, Hawaii 96813

Dear Mr. Masumoto:

Draft Environmental Impact Statement (DEIS)
Ewa Marina, Phase II

Thank you for your February 27, 1991, letter commenting on the DEIS for the above project.

The applicant will ensure that all mitigation measures with regard to potential contaminants and sedimentation, as described in the DEIS text (Chapter 4.) and Appendices D. and G., will be taken. In addition, I have referred your letter and comments regarding proposed drainage improvements and potential impacts on water quality to Belt Collins & Associates for follow-up, as appropriate.

Thank you for taking the time to review and comment on the DEIS, and if you should have further questions, please contact me.

Very truly yours,

Tyrone T. Kusao
Tyrone T. Kusao

cc: Department of General Planning
Haseko Hawaii, Inc.
Belt Collins & Associates

2202
1188 DENOP STREET, SUITE 2202
HONOLULU, HAWAII 96813

TEL: (808) 533-6552
FAX: (808) 533-1334
FAX: (808) 531-4292

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

March 29, 1991

Mr. Harold S. Masumoto, Director
Office of State Planning
State Capitol
Honolulu, Hawaii 96813

Dear Mr. Masumoto:

Draft Environmental Impact Statement (DEIS)
EWA MARINA, PHASE II

This is a follow-up response to your letter of February 27, 1991, commenting on the above project.

The developer shares your interest in protecting the marina from contaminants and minimizing the amount of sediment to reach it. The effects that the proposed golf course might have on water quality were thoroughly evaluated as part of the State Land Use District boundary amendment process. We are transmitting, under separate cover, a copy of the report by Charles L. Murdoch, Ph.D. and Richard E. Green, Ph.D., which addresses this concern. As you know, the State Department of Health has established a comprehensive set of golf course management practices, and the golf holes on the Ewa Marina site must comply with these requirements. Compliance will help insure that there is no significant adverse impact on water quality as a result of golf course operation and maintenance.

Maintenance of adequate drainage and water quality during storm events has also been a principal concern in the design process. The drainage concept proposed for the project accommodates all runoff from upland areas and minimizes the Phase II area's contribution to peak flows. A copy of a report by Tom Nance, Water Resources Engineering, will also be sent to you under separate cover, and will provide elaboration on this subject.

A third report, "Ewa Marina Water Quality Studies", prepared by Moffatt and Nichol, Engineers, contains an analyses which indicates that State water quality standards applicable to the marina will be met. (A copy of this report will be sent to you under separate cover as well.) This location of a marina at the seaward end of the ten-plus square mile Kalo'i Gulch drainage basin is consistent with the recommendations contained in the "Statewide Sediment Basin Study", prepared by the Department

of Land and Natural Resources. It will help minimize the impact that already approved development on the Ewa Plain will have on coastal water quality. In order to continue to perform this function over time, accumulated silt will have to be periodically removed from the drainage swales that will carry runoff through the Phase II portion of the Ewa Marina project. These maintenance procedures are being discussed with appropriate governmental agencies, and approvals from these agencies will include marina maintenance as a permit condition. The Final EIS for the Phase II area will note the need for this maintenance.

Thank you for your comments, and if you should have any questions or wish additional information, please contact me.

Very truly yours,



Tyrone T. Kusao

cc: Department of General Planning
Haseko (Hawaii), Inc.



University of Hawaii at Manoa

Environmental Health and Safety Office
2525 Maile Way, Bldg. 2
Honolulu, Hawaii 96822
Telephone (808) 940-0000

February 14, 1991

Tyrone T. Kusao
1188 Bishop Street, Suite 2507
Honolulu, HI 96813

Dear Mr. Kusao:

Subject: EIS for proposed Lualualei Golf Course
EIS for Proposed Ewa Marina Phase II Project Involving
Mixed Uses and Golf Course

I do not wish to be a consulted party for these projects. Thank
you for the opportunity to comment.

Sincerely,

Roy Takekawa
Roy Takekawa, CIH, NPH
Director

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

2202
1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS: 808/385-8833
RES: 808/385-1338
FAX: 808/385-2822

March 22, 1991

University of Hawaii at Manoa
Environmental Health and Safety Office
2525 Maile Way, Building 2
Honolulu, Hawaii 96822

Attention: Mr. Roy Takekawa, Director

Subject: Draft EIS for Ewa Marina, Phase II

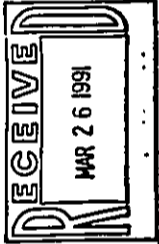
Dear Mr. Takekawa:

This is to acknowledge receipt of your February 14, 1991
response letter to our Draft EIS. We wish to thank you
for taking the time to review the submitted material and
your comments thereon.

Very truly yours,

Tyrone T. Kusao
Tyrone T. Kusao

TTK:afk
cc: Haseko (Hawaii), Inc.
Dept. of General Planning
City and County of Honolulu



University of Hawaii at Manoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 956-7461

March 21, 1991
RE:0573

Mr. William Madeiros
Department of General Planning
City and County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Madeiros:

Draft Environmental Impact Statement (EIS)
Ewa Marina Phase II
Ewa, Oahu

The above referenced project entails a mixed use development consisting of an 84,000 square foot commercial-industrial center, a 12,000 square foot yacht club, a 60,000 square foot fitness promotion center, 200 rooms situated in two hotels, a 600 room apartment/condominium complex, a 10 court tennis complex with clubhouse, and a 27 hole golf course with accompanying clubhouse.

The Environmental Center has reviewed this Draft EIS with the assistance of Paul Ekern, (Emeritus) Agronomy and Soils; and Lee Iytle, Environmental Center.

General Comment

Review of this document was hampered by the lack of a site plan for the various elements stated above. Chapter 200, Title 11 state that an EIS must contain "a detailed description of the proposed action." The location on the site of the structures, parking, recreational features, roads, and access points constitutes such detail. These are important determinants of impacts and as well as mitigative measures. Of particular concern are the locations, vis-a-vis the Ewa channel, of the impervious surfaces and landscaped areas. The final EIS should correct this deficiency.

AN EQUAL OPPORTUNITY EMPLOYER

Mr. William Madeiros
March 21, 1991
Page 2

Project Description (Section 2.3.4, page 26-34)

The Draft EIS fails to state explicitly that the project proposes 1500 rooms in three separate hotels, counting the 'garden suite apartments'. It is not until page 97 that 'Table 3' provides this information. Further, in some parts of the description, the 600 apartments are classified as visitor accommodations yet on page 97 they are described as 'second homes'. Will these units be available for purchase or long term lease? If so, then they should be treated as a high density residential complex and assessed as such in the EIS.

Water Supply (page 35-36)

There is no support provided for the estimate of 1.35 mgd ground water use on these pages or in the appendix. The figure appears to be low for the scale of irrigation anticipated, particularly during peak summer months.

Irrigation (page 40)

This section omits discussion of the natural gas supplier, yet page 170 states that gas will be an energy source for the project.

Geology, Physiography and Soils (pages 40-54)

This section states that 4 million cubic yards of material will be imported onto this site, yet no finished grade plan is provided. Construction related impacts of this extensive earth moving activity also is missing.

Groundwater (page 55-57)

The .05 mgd/100 acre use rates for agricultural activities appears to be an accurate average figure. However, since the Ewa area historically experienced the highest plantation groundwater utilization rates, this figure appears to be low. No data are provided to support the .65 mgd utilization rate for 'other uses' besides the golf course.

What effect will the continued reduction in the fresh water recharge rate from irrigation have on salt water intrusion? Appendix G-3 states that the shift from furrow to drip irrigation already has led to an increase in cap rock salinity, and that further reductions will increase that intrusion. Given this situation, the mitigative measures section should discuss the positive effects of incorporating a retention system and holding a large portion of the 1,500 cfs surface flows (page 120) generated by the project onsite.

Appendix G inlets that the golf course will be irrigated with a sprinkler system. When combined with the high salinity of the water source used, the possibility of foliar burn is high. Further, pan evaporation rates in the Ewa area are quite significant (estimated to be as high as 95 inches per year). This could have serious implications for the use of a sprinkler irrigation system which would result in an average water deficit as high as 60 inches per year. The Final EIS should elaborate on this issue and present mitigative measures for potential losses to ground water supplies.

Mr. William Medeiros
March 21, 1991
Page 3

Community Benefits Package (page 106)

What is meant by 'non-tourism related employment'? If these jobs are critical to the functioning of project elements, they would be included in any event and therefore should not be treated as part of the community benefit package. Further, if the 600 garden apartments can be occupied year-round by a 'second home' owner or lessee, then what is the justification for waiving the affordable housing requirement?

Public Facilities: Water Supply (pages 116-117)

The statement on water savings is not clear. Does the last paragraph in that section mean that the entire project requires 40,000 gpd or 260,000 gpd of potable water?

Electricity Services (page 126)

Given its climatological characteristics, the Eva area has a high potential for the use of solar energy subsystems. The mitigative measures section should elaborate on this possibility.

Thank you for the opportunity to comment on this document.

Yours truly



John T. Hardsen, Ph.D.
Environmental Coordinator

cc: OJCC

Neilson W.G. Lee, Honolulu
Tyreke T. Nuisio
Reyer Pujolka
Paul Ekern
Lee Lyttle

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

March 28, 1991

John T. Harrison, Ph.D.
Environmental Coordinator
Environmental Center
Crawford 317
2550 Capua Road
Honolulu, Hawaii 96822

Dear Dr. Harrison:

Draft Environmental Impact Statement (DEIS)
Ewa Marina, Phase II

Thank you for your letter dated March 21, 1991, commenting on the DEIS for the above project. This response was prepared with the assistance of our engineering consultant, Belt Collins & Associates. For your convenience, we will respond to your comments in the order presented.

1. General Comment.

The Draft EIS was prepared in accordance with the provisions of Chapter 343, HRS and EIS rules and contains sufficient information needed for evaluation and review of the environmental impacts (see specifically, HRS Section 343-2 and Section 11-200-17 of the EIS Rules).

You asked for a site plan which depicts specific locations of various elements of the project, such as structures, parking, roads, etc. Phase II of the project is in the planning stage and the Draft EIS was prepared in conjunction with Haseko's applications for the City's Development Plan Amendments. Such a detailed site plan is not available; however, we would like to meet with you at your convenience to go over our preliminary conceptual plan and further discuss any other comments and/or questions you may have on this project.

2. Project Description.

It is anticipated that the 600 visitor accommodation units described as "garder suite apartments" will be used by buyers as second/vacation homes and/or placed in rental pool arrangements. Consequently, this is not considered a high density residential complex as implied by your comments.

2

3. Water Supply.

The irrigation water use estimate contained in the report is based on an average irrigation rate of 900,000 gallons per day for an 18-hole golf course times the 27 golf holes that are planned for the Phase II area. The 900,000 gallons 18 holes/day rate is derived from knowledge of average water use at similar types of courses in Hawaii.

4. Utilities.

It is anticipated that the commercial uses in the Phase II area may choose to use natural gas for some of their energy needs. This will be trucked to small storage tanks on the individual parcels. At this point, Haseko does not know which supplier will be used.

5. Geology, Physiography and Soils.

No detailed mass grading plan has been developed for the project as yet. However, the general grading concept has been established, and the discussion presented in the Draft EIS was based on that.

The concept calls for disposing of approximately 80 percent of the 5,000,000 cubic yards of material excavated during construction within the Phase II area. The remainder would be used to shape the finished grade within the Phase I portion of the Ewa Marina project. The eastern end central portions of the Phase II area will be graded to drain toward Keioi Gulch. Runoff from the western portion of the development will be collected and channeled through numerous small drains into the marina. Potential construction-related impacts in this regard and mitigation measures are discussed on pages 52-54 of the DEIS and, as noted above, are based on the general grading concept.

6. Groundwater.

The Draft EIS estimates average irrigation water use of 0.9 mgd rather than the 0.95 mgd rate cited in your letter. This is based on data from the Oahu Sugar Company sources that are actually used. The 0.65 mgd non-potable use that is estimated for other areas is based on the Ewa Marina Water Master Plan (Appendix D., Table 12 and page 3).

The Ewa caprock aquifer exists because of the fresh water that flows into it from mauka lands. A substantial portion of the inflow is the result of past and current irrigation practices by the Oahu Sugar Company (OSCO) and computer modeling conducted for this project shows that the cessation of irrigation on mauka lands (which would occur if OSCO closed) would have a substantial adverse effect on the quality of the water in the caprock. This has little to do with what occurs on the land within the Phase II area, and

Similarly, establishing a large retention basin within the Ewa Marina site is not a practical means of maintaining the quality of the aquifer.

With respect to the potential for foliar burn, the salinity of the water in the caprock aquifer is in the range of that used successfully on other golf courses in the State. The Keauhou golf course, for example, has used irrigation water with chlorides in excess of 1,200 ppm for many years on its Bermuda Grass. Other species suitable for golf course use are even more salt tolerant.

7. Community Benefits Package.

The phrase "non-tourism related employment" refers to jobs not related to hotels or residential condominiums intended for use as transient accommodations, or recreational, entertainment or other facilities, or used primarily by tourists. These jobs may be provided on-site at the project or off-site at other projects currently being developed by Hasako or future developments by Hasako. Therefore they are not considered as being "critical to the functioning of the project elements."

With regard to the 600 garden suite apartments, please refer to our previous discussion on these visitor accommodation units.

8. Public Facilities: Water Supply

The portion of the discussion referred to in the comment addresses water use in the mixed-use portion of the Phase II area. It concludes that potable water use will be on the order of 700,000 - 740,000 gallons per day. The change in use and density (from 2,350 residential units to 1,500 visitor accommodation units) has resulted in a decrease in average daily water use in the Phase II area of approximately 300,000 gallons per day. At the same time, the new commercial and industrial uses, recreational facilities, and other miscellaneous uses will consume approximately 260,000 gallons per day. Overall, then, the water use under the revised plan would be about 40,000 gallons per day less than forecast in the original water master plan for the Ewa Marina project!

9. Electricity Services.

The Land Use Ordinance, the City and County of Honolulu Building Code, and the State Energy Plan encourage energy-efficient practices. Because of the relatively high insulation on the Ewa Plain, there is a better-than-average potential for the use of solar energy systems. Hasako will continue to consider the use of such systems wherever they are appropriate.

We appreciate your taking the time to review the submitted materials, and if you should have questions or wish additional information, please contact me.

Very truly yours,



Tyrone T. Kusao

cc: Department of General Planning
Hasako Hawaii, Inc.



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-5400

REPLY TO
ATTENTION OF:

February 25, 1991

Planning Division

Mr. Tyrone T. Kusao
Tyrone T. Kusao, Inc.
1188 Bishop Street, Suite 2507
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Thank you for the opportunity to review the applications and environmental assessments for the two portions of the proposed Ewa Marina Phase II Project: (1) Mixed-Use Commercial Complex and (2) Golf Course Component. The following comments are offered:

a. A Department of the Army permit is not required for the Phase II project. However, if a federal Environmental Impact Statement is prepared for Phase I, indirect impacts associated with Phase II may have to be considered.

b. As indicated in both documents (Mixed Use Commercial Complex, page 5; and Golf Course Component, page 4), the Phase II project site is in Zone D (areas in which flood hazards are undetermined).

Sincerely,

CK
Kisuk Cheung
Director of Engineering

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
BUS. HOURS: 808-968-5400
FAX: 808-583-1338
FAX: 808-581-4692

March 4, 1991

Mr. Kisuk Cheung
Director of Engineering
Department of the Army
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858

Dear Mr. Cheung:

Environmental Impact Statement Preparation Notice (EISPN)
Ewa Marina Phase II

This will acknowledge receipt of your February 25, 1991, letter providing comments on the EISPN for the above project.

Thank you for taking the time to review the submitted materials and for confirming information contained therein.

Very truly yours,

Tyrone T. Kusao

Tyrone T. Kusao

cc: Department of General Planning

ENV 2-1
JA/G



William A. Bonnet
Manager
Environmental Department

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1188 BISHOP STREET, SUITE 2202
HONOLULU, HAWAII 96813
TEL (808) 536-8853
RES (808) 381-1338
FAX (808) 531-4282

February 19, 1991

Mr. Tyrone T. Kusao
1188 Bishop Street
Suite 2202
Honolulu, Hawaii 96813

Dear Mr. Kusao:

Subject: Environmental Impact Statement (EIS) For Proposed
Ewa Marina Phase II Project Involving Mixed Uses
and Golf Course

We have reviewed the subject EIS and have no comments at this time on the proposed project. HECO shall reserve comment pertaining to the protection of existing power lines bordering the project area when construction plans are finalized.

Sincerely,

February 26, 1991

Mr. William A. Bonnet
Manager, Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. Bonnet:

Draft Environmental Impact Statement (DHIS)
Ewa Marina Phase II

Thank you for your February 19, 1991 letter regarding the DHIS for the above project.

Although you have no comments at this time, we will continue to coordinate our project plans with you during the development approval and permit processes.

In the meantime, if you should have questions or wish additional information, please feel free to contact me.

Very truly yours,

Tyrone T. Kusao

cc: Department of General Planning
City and County of Honolulu
Nelson Lee
Haseko (Hawaii) Inc.

ENV 2-1
JA/G

TYRONE T. KUSAO, INC.
Planning and Zoning Consultant

1168 BISHOP STREET, SUITE 2507
HONOLULU, HAWAII 96813
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February 26, 1991

William A. Bonnet
Manager
Environmental Department

Mr. William A. Bonnet
Department of General Planning
City & County of Honolulu
650 S King St., 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Medeiros

Subject: Draft Environmental Impact Statement for Ewa Marina
Phase II, Ewa, Oahu, Hawaii

We have reviewed the subject DEIS, and have the following comments:

- (1) Page 40. At present, only the EWA Substation provides power to the area. Honouliuli Substation serves the Waste Water Treatment Plant.
- (2) Page 126. Demand does not match given figures:
(2 kW/unit) X (6350 units) X (0.85 load factor)
= 11 MW (not 16 MW)
- (3) HECO estimates the peak demand at 12 MW.

We have no further comments at this time. HECO shall reserve comments pertaining to the protection of existing power lines bordering the development area when construction plans are finalized.

Sincerely,



cc: Nelson W.G. Lee
Haseko Hawaii, Inc.
Tyrone T. Kusao
Tyrone T. Kusao, Inc.

An HEI Company

March 4, 1991

Mr. William A. Bonnet
Manager, Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

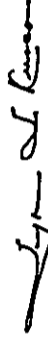
Dear Mr. Bonnet:

Draft Environmental Impact Statement (DEIS)
Ewa Marina Phase II

This will acknowledge receipt of your February 26, 1991, letter providing comments on the DEIS for the above project. Revisions will be made based on your comments, and a copy of your letter will be included in the Final EIS.

Thank you for taking the time to review the submitted materials and for your comments.

Very truly yours,



Tyrone T. Kusao

cc: Department of General Planning
Haseko (Hawaii), Inc.
(Nelson Lee)



APPENDIX A

Development Concept, Market Demand And Benefit Assessment

Prepared by Decision Analysts Hawaii, Inc., December, 1989

***EWA MARINA COMMUNITY, PHASE II:
Development Concept, Market Demand
and Benefit Assessment***

PREPARED FOR:
HASEKO (Hawaii), Inc.

PREPARED BY:
Decision Analysts Hawaii, Inc.

December 1989

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EWA MARINA COMMUNITY, PHASE II: DEVELOPMENT CONCEPT, MARKET DEMAND AND BENEFIT ASSESSMENT

INTRODUCTION

The Ewa Marina Community ("Ewa Marina") is master planned to become a 1,100-acre residential community that, in addition to providing housing, will offer employment, recreational activities, and convenient shopping and dining for a large number of Oahu families. As its name implies, the marina will serve as the focal point of the community for both the residential and commercial areas. Furthermore, the community will have a strong recreational orientation that will include boating, beach and ocean activities, golf, tennis, and other recreational opportunities. Families will live in homes of assorted types and prices, and desirable employment opportunities will be provided at low-profile specialty hotels and a complex of hotel garden-suites, a fitness and conditioning center, commercial areas, and recreational facilities.

In comparison to existing developments on Oahu, Ewa Marina will be similar to:

- *Hawaii Kai* in that the homes will be built around a harbor and commercial areas, and employment will be available in the immediate area, but the residents of Ewa Marina will have greater access to recreational activities and more employment options, and the restaurants and shops of Ewa Marina will have a more pervasive nautical theme;
- the *Ala Wai Harbor* in that a full-featured small-boat harbor will be built, but Ewa Marina will have about twice as many boat slips and will also offer commercial charters and boat rentals to residents and visitors; and
- the *Kahala Hilton Hotel* in that the visitor units will be located in a residential neighborhood and will have conference facilities, golf, tennis and employment opportunities in the immediate neighborhood, except that Ewa Marina will have buildings that are less prominent, and it will also have a complex of hotel garden-suites, a fitness and conditioning center, hotel room rates that are more moderately priced than the Kahala Hilton, and recreational facilities that will be available to the general public.

FIGURE

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1. Growth in the Number of Visitor Units for Hawaii, Oahu and the Neighbor Islands: 1967 to 1988	14

EWA MARINA COMMUNITY, PHASE II: DEVELOPMENT CONCEPT, MARKET DEMAND AND BENEFIT ASSESSMENT

INTRODUCTION

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- the *Ala Wai Harbor* in that a full-featured small-boat harbor will be built, but Ewa Marina will have about twice as many boat slips and will also offer commercial charters and boat rentals to residents and visitors; and
- the *Kahala Hilton Hotel* in that the visitor units will be located in a residential neighborhood and will have conference facilities, golf, tennis and employment opportunities in the immediate neighborhood, except that Ewa Marina will have buildings that are less prominent, and it will also have a complex of hotel garden-suites, a fitness and conditioning center, hotel room rates that are more moderately priced than the Kahala Hilton, and recreational facilities that will be available to the general public.

The project will be developed in two separate and independent phases. Phase I—which covers 727.5 acres of the makai portion of the property and for which major development approvals have been received—includes a large residential community, parks, the marina, a heavily landscaped network of roads and pathways, and a dual water system for conserving potable water. The proposed second phase of Ewa Marina, which will cover about 403 acres of the mauka portion of the property, will be the commercial and employment center. It will include specialty hotels and a complex of hotel garden-suites, an exhibition center and conference facilities, a commercial center, a fitness and conditioning center, a golf course, a championship tennis complex, additional roads and pathways, and an extension of the dual water system.

The sections which follow provide a brief history of the project, a more detailed description of the components of Phase I, a discussion of planning concerns and problems which affected the land-use design of Phase II, a more detailed description of the components of Phase II and a discussion of why they were selected, a discussion of the market demand for the components of Phase II, and an assessment of the benefits of the project.

EWA MARINA, PHASE I

As mentioned above, the plan which HASEKO inherited for Ewa Marina, Phase I has changed little in concept from the original plan. The major alteration has been to relocate the mouth of the marina in order to preserve existing surfing sites, thereby mitigating concerns raised during public hearings. A description of the components of this plan, for which major permits and approvals have been received, is given below.

Residential Community

Phase I of Ewa Marina will house about 4,850 families in a variety of homes, including affordable mid-rise apartments, townhouses, moderately priced single-family homes, and luxury homes fronting the ocean, marina, and golf course. The homes will be arranged in attractive settings with relatively low densities ranging from 5 to 25 units per acre. At full development, the homes are expected to house about 15,000 residents who will live close to and will have convenient access to the marina, Oneula Beach Park, a district park, and the small neighborhood parks in Phase I, as well to the restaurants, stores, golf course, tennis facilities, and employment opportunities proposed for Phase II.

Parks

The major park facility associated with Ewa Marina will be the 30-acre Oneula Beach Park. This park, which is owned by the City & County of Honolulu, will occupy the middle third of the beach frontage of Ewa Marina, and will be used and enjoyed by residents throughout the Ewa area and beyond. Beach parks typically include picnic areas, outdoor showers, restrooms, and various recreational facilities.

A second major park, the 17-acre Gateway Park, will be sited to enhance the entrance to Ewa Marina for those travelers who arrive via Fort Weaver Road. It will be a "district" park intended for residents of Ewa Marina and other nearby communities. District parks are designed to serve about 25,000 residents, and typically include play areas for children, basketball courts, volleyball courts, softball fields, tennis courts, a football/soccer field, restrooms, and a recreation building. Although Gateway Park will be located on land which is designated for Phase II, it is really a component of Phase I in terms of the population served and its permit status. At the County level, Gateway Park has been included in the Ewa Development Plan. At the State level, a park is a permitted use within its current agricultural districting.

In addition to the beach and district parks, smaller parks and playgrounds will be scattered throughout the residential portion of Ewa Marina.

tives for achieving affordable housing and ways in which Ewa Marina, Phase I can satisfy the State's housing requirements. It is anticipated that the construction of affordable housing could begin as early as 1990.

With regard to a water source, construction has begun on a 36-inch waterline along Fort Weaver Road that will carry water to Ewa Marina by early 1990. HASEKO is a member of the Ewa Plain Water Development Corporation (EPWDC), and has contributed over \$10 million toward the development of the regional water system.

With respect to the marina, applications for various permits and approvals for constructing the marina are being prepared and will soon be submitted. These include an application to the Army Corps of Engineers regarding the siting of the marina entrance, a Conservation District Use Application (CDUA) to the State Board of Land and Natural Resources, a Shoreline Management Application (SMA) to the City & County of Honolulu, and a request to the City & County of Honolulu for appropriate zoning.

However, new information learned with the passage of time revealed major problems in the original plan for Phase II, which resulted in a need for major revisions to this portion of the plan. These problems and the resulting revisions to Phase II are described below following a more detailed description of the plans for Phase I.

EWA MARINA, PHASE I

As mentioned above, the plan which HASEKO inherited for Ewa Marina, Phase I has changed little in concept from the original plan. The major alteration has been to relocate the mouth of the marina in order to preserve existing surfing sites, thereby mitigating concerns raised during public hearings. A description of the components of this plan, for which major permits and approvals have been received, is given below.

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In addition to the beach and district parks, smaller parks and playgrounds will be scattered throughout the residential portion of Ewa Marina.

Marina

As its name "Ewa Marina" suggests, the focal point of the project is the marina. The 150 acres of sheltered waterbays and waterways have been designed carefully to offer a full-featured, internationally recognized, and environmentally sensitive marina that will provide residents with direct access to the water. The marina will have the capacity to harbor 1,600 boats, which will make it the largest marina in the State. About 1,000 boat slips will be located in two basins, while the remaining 600 boat slips will be dispersed along the waterway system. In addition, a major boat-launching area adjacent to Oneula Beach Park will provide easy access to the water by park users. A second launching area will include a boat hoist and on-trailer dry storage for small boats. The marina will be professionally managed, and will have a harbor master, appropriate water-traffic and marina security, a supply and service dock (fuel, water, ice, bait, other provisions and waste pumpout), and full marine facilities, services and commercial areas. The marina could also accommodate a ferry terminal if a commuter ferry system is introduced in the future.

The marina will provide extensive recreational boating and berthing facilities to help satisfy the unmet demand for, and burgeoning interest in, boating activities on Oahu. These facilities will be built for use by and enjoyment of Ewa Marina residents and other nearby communities, as well as by visitors. In addition to private boats, the marina will harbor rental boats, cruise boats, commercial dive boats, and sailing and fishing boats for charter. Also, the harbor will serve as a site for various races (sailboats, power boats, kayaks, outrigger canoes, etc.), fishing tournaments, and other marine events of interest to both residents and visitors.

Although the marina will be privately owned, the waterways, many of the boat slips, the boat ramps, support facilities, and rental craft will be available for use by the general public.

Circulation System

A network of heavily landscaped roads, pedestrian paths, and bicycle paths will be laced throughout the project and along the periphery of the marina waterway. This network will connect all residential, commercial, visitor, and recreational elements of the community.

Water System

Ewa Marina will have a dual water system: potable water for human consumption, and brackish water for watering plants. This dual system will help conserve Oahu's potable water supply.

EWA MARINA, PHASE II

Overview

The development concerns discussed above were addressed by placing a portion of the marina in the AICUZ, relocating the Phase I homes to the eastern part of the project outside the AICUZ, changing Phase II of the plan to include low-intensity uses of the land within the AICUZ and the area subject to flooding, and adding activities which promise a large number of desirable jobs. The Phase II components include specialty hotels and a complex of hotel garden-suites, an exhibition center and conference facilities, harbor-front retail shops, harbor-front restaurants, a fitness and conditioning center, a yacht club, a golf course, a championship tennis complex, an extension of the roadways and pathways, and an extension of the dual water system. Details of each component of Phase II are presented in Table 1 and are discussed below, and an explanation is provided for the reasons why each component was included in the project, and the anticipated market demand.

Specialty Hotels and Hotel Garden-Suites

Visitor Components

Phase II includes speciality hotels and a complex of hotel garden-suites which will be designed and marketed based on three related themes: (1) boating, golf, tennis and other recreation; (2) fitness and conditioning; and (3) a corporate retreat. Components of the visitor complex will include:

- the Ewa Marina Reception Center for arriving guests;
- two 200-room hotels and conference facilities, featuring the marina, golf and other recreational activities, and aimed at the corporate market;
- two 250-room all-suite hotels which emphasize fitness and conditioning, and related recreation;
- a complex of 600 hotel garden-suites for family visitors and corporate retreats;
- water-oriented activities adjacent to the visitor complex;
- an exhibition center (see below); and
- associated commercial activities (see below).

The visitor complex and related facilities will be designed to present a low-density, low-rise profile having a considerable setback, but some of the buildings will reach 150 feet in height (about the same as the Kahala Hilton Hotel) in order to provide some contrast in building forms over the virtually flat project site. With this design, the visitor complex will complement the marina and commercial area of Ewa Marina, rather than becoming the focal

tunities, thereby requiring many workers to commute daily to areas outside Ewa. The most recent but still preliminary projections indicate a shortage of over 3,000 jobs in the Ewa area by the year 2005.¹

The original plan for Ewa Marina, Phase II would have added 2,350 homes to the Ewa area, which translates into over 3,500 additional commuters. Thus, as originally conceived, Phase II would have added considerably to traffic congestion, particularly on the H-1 Freeway between Ewa and downtown Honolulu. This is regarded as a very serious problem since the H-1 Freeway is already heavily congested, and recently approved projects in Ewa and Central Oahu will exacerbate existing traffic difficulties.

1. This is based on preliminary projections prepared by the consultant for Campbell Estate which indicates that, between the years 1985 and 2005, an estimated 23,500 additional homes will be built in the Ewa area. This translates to over 35,000 additional workers in the Ewa area, based on the Oahu average of about 1.5 jobs per home. However, the added employment projected for the area is less than 32,000 jobs.

EWA MARINA, PHASE II

Overview

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**Table 1. Ewa Marina, Phase II:
Components, Size and Estimated Employment**

Component	Approximate Size		Estimated Jobs
Land Area:			
Developed	107.7	acres	
Open Space (golf course, park, etc.)	<u>295.3</u>	acres	
Total	403.0	acres	
Visitor Accommodations:			
Hotels (four)	900	rooms	900
Hotel Garden-Suites	600	units	<u>600</u>
Total	1,500	units	1,500
Commercial Area:			
Retail Shops and Marine Service Center	40,000	sq. ft.	160
Restaurants (5)	44,000	sq. ft.	<u>350</u>
Total	84,000	sq. ft.	510
International Fitness Promotion Center	60,000	sq. ft.	60
Yacht Club	12,000	sq. ft.	40
Golf Course:			
Grounds	27	holes	70
Clubhouse	22,000	sq. ft.	
Tennis Complex:			
Grounds	10	Courts	50
Clubhouse	18,000	sq. ft.	<u> </u>
TOTAL			2,230

On Oahu, the growth in the number of new hotel rooms and condominium units in rental pools has averaged about 1,234 rental unit rooms per year over the past two decades (see Figure 1). However, the market demand is probably considerably stronger than this growth rate would indicate since zoning has restricted hotel development in Waikiki, while major resorts outside Waikiki have been approved only within the past few years. In addition, the growth in the *reported* number of visitor units has been artificially slowed over the past few years because many condominium units have been removed from rental pools even though many of the units are still being used by transient visitors (e.g., employees of corporations that own units for corporate retreats, and visitors taking advantage of uncounted rental pools operated outside Hawaii).

Based on the historic development trends for Oahu, about a dozen years would be required to absorb the nearly 15,000 visitor units planned and proposed for Oahu (see Table 2). However, it cannot be assumed that all proposed projects will receive approval, and market absorption is expected to be more rapid than the historic growth rate inasmuch as development in the past was paced by approvals, rather than by market demand.

The Market Appeal of Ewa Marina Visitor Complex

Ewa Marina—due to its location, design, and attributes—is expected to have a very strong appeal to a wide variety of visitors. It will be located on the water on the south side of Oahu in an area having high sunlight and low rainfall. Furthermore, the Oahu location will provide visitors to Ewa Marina access to the many attractions offered on the capital island (see above). However, when compared to Waikiki, the development will be master-planned, with much lower densities, smaller buildings, more greenery and, overall, a far more attractive appearance. In addition, Ewa Marina will offer a unique combination of major activities and attractions, including:

- the State's largest marina and corresponding opportunities of hosting international powerboat and sailboat races, and major fishing tournaments;
- water activities such as day and evening boat cruises, fishing charters, day sailing, dive boats, boating and kayaking, outrigger canoe rides, and various water sports;
- berthing facilities for visiting mariners;
- access to the adjacent Oneula Beach Park and related swimming, surfing, canoeing, and other beach and water activities;
- a world-class 27-hole golf course;
- a championship 10-court tennis complex;

A visitor complex having 1,500 visitor units was chosen because this is the number which is generally regarded within the visitor industry as being sufficiently large to support the various restaurants, specialty shops, boat rentals and charters, and other recreational activities needed to enhance the appeal of a visitor center to travelers. Residents will also benefit from the presence of the restaurants, shops, and recreational activities, which would not exist to the same extent in the absence of the visitors.

Finally, the plan for the complex provides visitors with convenient access to the water, while retaining Oneula Beach Park primarily for residents.

Market Demand for the Visitor Complex

A strong demand is expected for the 900 hotel rooms and 600 hotel garden-suites at Ewa Marina. Such an expectation reflects the continuing strength of the Oahu visitor market, and the special collection of activities that will be offered at Ewa Marina combined with the marketing theme for the specialty hotels and hotel garden-suites.

The Strength and Appeal of the Oahu Visitor Market

The strength of the Oahu visitor market is reflected in the fact that percentage occupancy rates of hotel rooms on Oahu, including condominiums in rental pools, have consistently been high, ranging from the low 70s during national recessions to the high 80s during healthy economic periods. Furthermore, Oahu occupancy rates exceed those on the Neighbor Islands: in 1987, the average hotel occupancy was 87 percent for Oahu, 61 percent for Hawaii, 76 percent for Maui, 74 percent for Kauai, and 45 percent for Moloka'i.²

The strong appeal of Oahu hotels is due partially to the fact that Oahu offers a large collection of attractions, including: the Bernice P. Bishop Museum, the Contemporary Arts Center, Diamond Head, Dole Cannery tours, Foster Botanic Gardens, Hanauma Bay, the Hawaii Maritime Center, the Honolulu Academy of Arts, the Honolulu Zoo, Iolani Palace, the Mission Houses Museum, the Mormon Temple grounds, the National Memorial Cemetery of the Pacific, the Pacific Submarine Museum, Paradise Park, the Polynesian Cultural Center, Sea Life Park, the U.S.S. Arizona Memorial, the U.S.S. Bowfin World War II Submarine Exhibit, Waimea Falls Park, and many others. Consistent with the large number of attractions on Oahu, the State *Data Book* lists approximately the same number of attractions on Oahu as are on all the other islands combined.³ Because of its large population of both residents and visitors, Oahu can support more attractions than is the case on the Neighbor Islands.

2. DBED, *The State of Hawaii Data Book*, 1988, November 1988, p. 616.

3. Ibid, p. 220.

On Oahu, the growth in the number of new hotel rooms and condominium units in rental pools has averaged about 1,234 rental unit rooms per year over the past two decades (see Figure 1). However, the market demand is probably considerably stronger than this growth rate would indicate since zoning has restricted hotel development in Waikiki, while major resorts outside Waikiki have been approved only within the past few years. In addition, the growth in the *reported* number of visitor units has been artificially slowed over the past few years because many condominium units have been removed from rental pools even though many of the units are still being used by transient visitors (e.g., employees of corporations that own units for corporate retreats, and visitors taking advantage of uncounted rental pools operated outside Hawaii).

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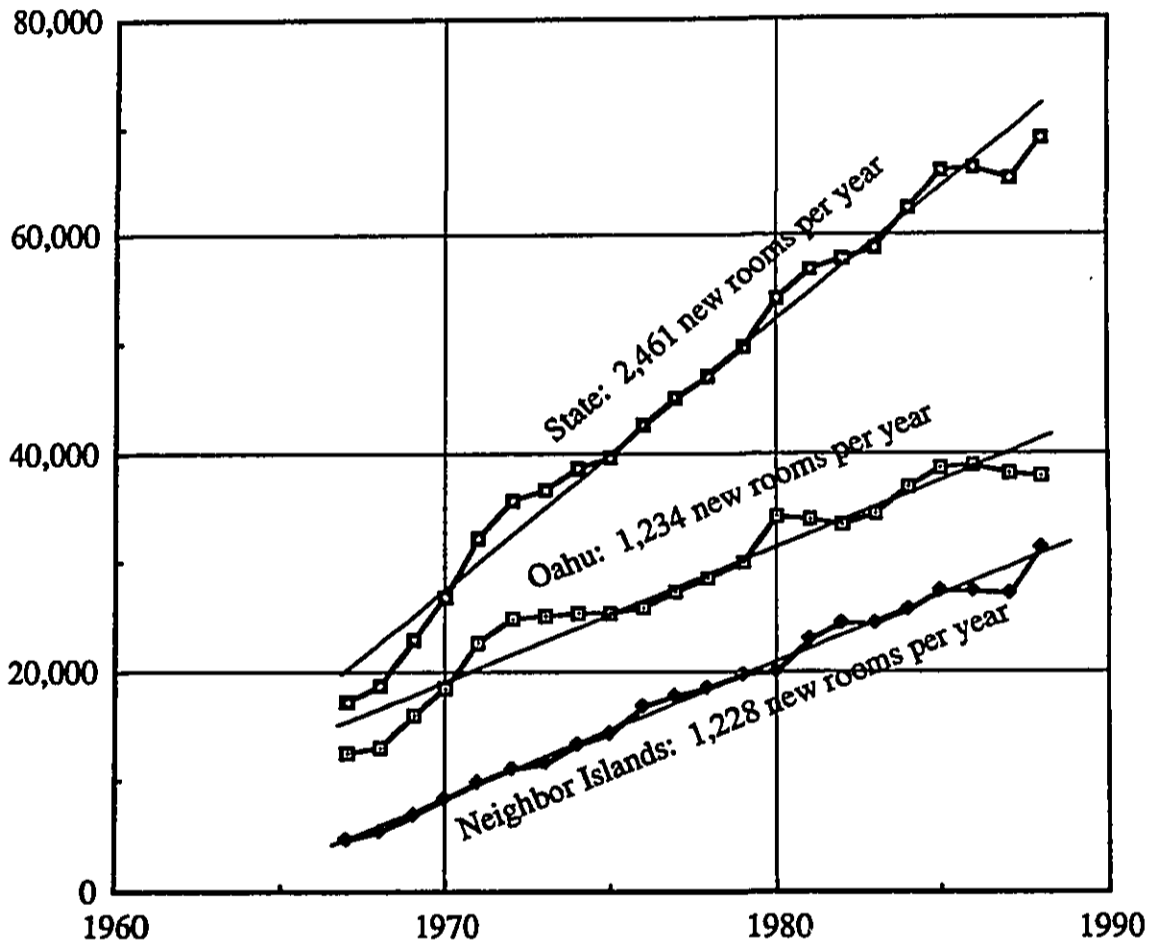
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- the State's largest marina and corresponding opportunities of hosting international powerboat and sailboat races, and major fishing tournaments;
- water activities such as day and evening boat cruises, fishing charters, day sailing, dive boats, boating and kayaking, outrigger canoe rides, and various water sports;
- berthing facilities for visiting mariners;
- access to the adjacent Oneula Beach Park and related swimming, surfing, canoeing, and other beach and water activities;
- a world-class 27-hole golf course;
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Figure 1. Growth in the Number of Visitor Units
for Hawaii, Oahu and the Neighbor Islands:
1967 to 1988.

Hotel Rooms and
Condominium Units in Rental Pools



Source: Department of Business and Economic Development, *The State of Hawaii Data Book, 1988*, November 1988, p. 613.

ki and the Neighbor Islands offer over 10 square feet per hotel room, with many offering over 20 square feet.⁴

In addition to use by visitors, it is expected that the exhibition center and conference facilities will be used on occasion by Ewa residents and businesses for special functions.

Commercial Center

A harbor-front commercial center having a nautical theme will serve as the central feature of Ewa Marina, and will feature shopping, dining, entertainment, and recreation within a complex of retail shops, a marine service center, and several restaurants. The commercial area is expected to include clothing stores, gift shops, ice-cream and/or flavored yogurt stores, hair salons, a convenience market, a drug and variety store, banks, savings and loans, realty offices, professional offices, etc. The marine service center is expected to include offices for yacht sales and brokerage, marine surveyors, and insurers; stores for displaying and selling small boats, yachting clothes, charts, publications, electronic equipment, rigging, hardware, paint supplies; a laundry service; facilities for launching and hauling boats out of the water; boat repair bays; repair shops for engines, electronic equipment, wood, fiberglass and aluminum; a sail and canvas loft; etc.

This center will be from 60,000 to 100,000 square feet in size, with about half of the area occupied by the various theme restaurants. Most of the restaurants and retail shops will be located along a harbor-front esplanade that will provide an attractive setting as well as a convenient location to serve residents, boaters, and visitors.

The ambiance of the center will reflect that of a commercial complex for residents rather than a complex for visitors because most of the patrons at the various restaurants and stores are expected to be residents from Ewa Marina and surrounding communities rather than visitors: at full development, Ewa Marina alone will house about 15,000 residents versus only 2,200 visitors.

The commercial center was included in Ewa Marina because it will :

- provide considerable employment which, in turn, will contribute to less commuter traffic outside the project;
- provide shopping and entertainment facilities within Ewa Marina which, in turn, will reduce travel outside the area by shoppers; and
- enhance the appeal of Ewa Marina to both residents and visitors.

4. Derived from Hawaii Visitors Bureau, *1989 Meeting Planner*.

- exhibition space and conference facilities;
- the International Fitness Promotion Center;
- about five harbor-front restaurants; and
- shopping in an attractive waterfront setting.

In view of the activities offered, Ewa Marina is expected to appeal to the many visitors interested in boating and other water sports, golf, tennis, beach activities, sightseeing on Oahu, health-oriented vacations, and business meetings and conferences. Furthermore, the hotel rooms will be moderately priced so as to be competitive with those in Waikiki. Also, corporations that own hotel garden-suites within Ewa Marina are expected to encourage their employees to visit Ewa Marina in order to take advantage of the visitor facilities and programs, particularly the company-owned hotel garden-suites, meeting facilities, and fitness-promotion programs.

Relationship to Ko Olina Resort

Ewa Marina is expected to benefit by, as well as benefit, the nearby Ko Olina Resort. Visitors to both developments will have a larger selection of water and boating activities, golf courses, restaurants, and other activities. Furthermore, the separate marketing of the hotels in the two projects will enhance the image of the Ewa area as an exciting, full-featured visitor destination.

Development Period

As indicated in Table 2, the 1,500 visitor units at Ewa Marina represent a little over 1 year of growth in Oahu's visitor market based on historic trends. Development is expected to occur rapidly in the late 1990s and early 2000s after permits are obtained for the marina channel entrance and the various components of Phase II, and the marina is dredged and built. Since the development is expected to occur after the major development at Ko Olina Resort and the Kuilima Resort, this will enhance the success of the project.

Exhibition Center and Conference Facilities

An 8,000-square-foot exhibition center and conference facility will be provided in order to enhance the appeal of the Ewa Marina specialty hotels and hotel garden-suites to the corporate and conference markets. This exhibition center, which is of a modest size, will accommodate the number of visitors corresponding to 1,500 visitor units. The exhibition space amounts to slightly more than 5 square feet per unit. Most major hotels in Waiki-

ki and the Neighbor Islands offer over 10 square feet per hotel room, with many offering over 20 square feet.⁴

In addition to use by visitors, it is expected that the exhibition center and conference facilities will be used on occasion by Ewa residents and businesses for special functions.

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- provide shopping and entertainment facilities within Ewa Marina which, in turn, will reduce travel outside the area by shoppers; and
- enhance the appeal of Ewa Marina to both residents and visitors.

4. Derived from Hawaii Visitors Bureau, *1989 Meeting Planner*.

The demand for the commercial facilities is expected to be substantial and to exceed the planned 60,000 to 100,000 square feet of commercial space. Typically, the demand for a neighborhood commercial center amounts to about 9 square feet of space per resident.⁵ For Ewa Marina, this translates into about 155,000 square feet of commercial space, based on a population of 15,000 residents and 2,200 daily visitors. However, actual demand for commercial space is likely to exceed this estimate for two reasons. First, it is anticipated that many residents from existing and new communities in Ewa and Central Oahu will patronize the harbor-front restaurants, boating stores, retail shops, etc.—a particularly high demand is expected from residents who will own boats kept at Ewa Marina. Second, visitors shop more than residents do, and so generate a demand for over 9 square feet of commercial space per visitor. For example, a restaurant is usually required for each 150 visitor units. With 1,500 visitor units at Ewa Marina, this translates into a demand for about 10 restaurants, or about 85,000 square feet of space based on 8,500 square feet per restaurant.

International Fitness Promotion Center

The International Fitness Promotion Center (IFPC), a major complement to the specialty hotels and hotel garden-suites, is envisioned as a full-featured fitness and conditioning center similar in concept to health spas on the mainland and in Europe, except that (1) fitness promotion programs will be broad in scope rather than focusing simply on overweight clientele, and (2) marketing will be expanded to encourage corporations to include the IFPC into their health program for use by executives and employees. Located in attractive low-rise buildings in a garden setting, the IFPC facilities will include registration and concierge desks, administrative office space, professional staff offices, evaluation rooms with limited diagnostic equipment, counseling offices, aerobics and exercise studios, fully equipped weight room(s), racquetball courts, handball courts, a volleyball court, a basketball court, a heated exercise pool, lap pools, steam rooms, saunas, whirlpools, massage rooms, a small auditorium, seminar and conference rooms, study rooms, a video library, and a health-food restaurant and kitchen. The IFPC will be located next to one or more all-suite hotels, which will also have a health and fitness theme. Guests at the IFPC, most of whom will be enrolled in 3-, 7-, or 14-day programs, will also have convenient access to the marina, golf, and tennis facilities. Professional staff will provide indi-

5. Derived from data on Waipio Shopping Center and the commercial portions of the nearby Gentry Business Park.

Golf Course and Clubhouse

A golf course—one of the few uses permitted within the AICUZ—will be located along the western and northern boundaries of Ewa Marina. The golf facilities will consist of a 27-hole golf course, a driving range, and a clubhouse having a floor area of approximately 20,000 square feet. The golf course was included in the project because it will serve a number of beneficial and important functions. The golf course will:

- provide an additional recreational activity for Ewa Marina residents, as well as for those living in nearby communities;
- provide attractive open space and greenery;
- provide an attractive entrance to Ewa Marina;
- provide an acceptable “noise buffer” between Ewa Marina and BPNAS;
- buffer residents from the noise, dust, smoke, and drift of airborne chemicals associated with adjoining sugar operations located upwind of Ewa Marina;
- provide a needed drainage channel to handle occasional floodwaters entering the project;
- enhance the appeal and success of Ewa Marina to visitors, particularly in view of the strong and growing interest in golf; and
- provide employment which, in turn, will reduce commuter traffic from what would otherwise be the case.

The demand for golf courses is very strong, as indicated by the fact that over 40 new golf courses are proposed for Oahu, including a number of stand-alone golf courses for use by both residents and visitors. The strong demand reflects the fact that no new golf courses have opened on Oahu since 1977, while the resident and visitor populations have grown considerably and golfing has grown increasingly popular. Nevertheless, in the short term, a number of new public and semiprivate golf courses located on the Ewa Plain will outpace residential development on the Ewa Plain.

Championship Tennis Complex

The championship tennis complex is another permitted activity within the AICUZ. The complex, which will consist of ten tennis courts and a clubhouse, will provide benefits similar to those of a golf course. The complex will:

- add an additional recreational activity for residents and visitors;
- enhance the appeal and success of Ewa Marina to visitors;
- gainfully utilize a portion of the required “noise buffer” between Ewa Marina and BPNAS; and

health by proper diet, exercise and stress management, an individual leads a more enjoyable and productive life, and medical costs are reduced. The increased awareness of the benefits of good health is reflected in the growing popularity of health spas and fitness retreats.⁷ Fourth, the number of corporate health-promotion programs has been growing rapidly as employers realize that they can increase the profitability of their companies through a program which teaches health-promotion activities. Such programs make their executives and employees healthier and happier, increase morale, reduce absenteeism, and increase productivity while reducing medical costs and health-insurance premiums.

Hawaii is well-placed to take advantage of the growing market in preventive health care and fitness since the Islands are regarded as a healthful place to live, as evidenced by the fact that Hawaii's residents live longer than residents in any other state in the nation, and Hawaii offers a plethora of healthy recreational activities in a comfortable environment. Ewa Marina will be particularly well-suited to provide fitness and conditioning services because of its warm and inviting climate, and its concentration of land and water recreational activities.

The IFPC will be marketed primarily to companies as a corporate retreat for their employees to learn or revitalize their knowledge of the precepts of preventive health care and fitness. The IFPC will also be available to other visitors and residents who wish to improve their physical condition and knowledge of preventive health care.

For further details about the IFPC and the market for fitness and conditioning programs, see the companion report, *Ewa Marina International Fitness Promotion Center Business Plan*, by Coopers & Lybrand's National Real Estate Consulting Group, 1989.

Yacht Club

A yacht club for residents of Ewa Marina and other nearby communities will host yachting races, fun sails, annual boat parades, a learn-to-sail program for young people, and a variety of other boating events and functions. Of the 1,600 slips in Ewa Marina, about 25 percent will be for use by the yacht club.

Facilities will include 300 to 500 boat slips, an area for dry storage of boats, boat repair facilities, shower facilities, meeting rooms, offices, a dining area, a kitchen, and a bar.

The total number of slips in the harbor and the number of slips provided for use by the yacht club will be sufficient to easily support the yacht club. For example, the 823-slip Ala Wai Harbor supports two yacht clubs: the Waikiki Yacht Club with 135 slips and the Hawaii Yacht Club with 25 slips. Also, the Kaneohe Yacht Club functions with just 167 slips.

7. The growing popularity of fitness retreats was featured on the NBC Evening News, October 6, 1989.

Golf Course and Clubhouse

A golf course—one of the few uses permitted within the AICUZ—will be located along the western and northern boundaries of Ewa Marina. The golf facilities will consist of a 27-hole golf course, a driving range, and a clubhouse having a floor area of approximately 20,000 square feet. The golf course was included in the project because it will serve a number of beneficial and important functions. The golf course will:

- provide an additional recreational activity for Ewa Marina residents, as well as for those living in nearby communities;
- provide attractive open space and greenery;
- provide an attractive entrance to Ewa Marina;
- provide an acceptable “noise buffer” between Ewa Marina and BPNAS;
- buffer residents from the noise, dust, smoke, and drift of airborne chemicals associated with adjoining sugar operations located upwind of Ewa Marina;
- provide a needed drainage channel to handle occasional floodwaters entering the project;
- enhance the appeal and success of Ewa Marina to visitors, particularly in view of the strong and growing interest in golf; and
- provide employment which, in turn, will reduce commuter traffic from what would otherwise be the case.

The demand for golf courses is very strong, as indicated by the fact that over 40 new golf courses are proposed for Oahu, including a number of stand-alone golf courses for use by both residents and visitors. The strong demand reflects the fact that no new golf courses have opened on Oahu since 1977, while the resident and visitor populations have grown considerably and golfing has grown increasingly popular. Nevertheless, in the short term, a number of new public and semiprivate golf courses located on the Ewa Plain will outpace residential development on the Ewa Plain.

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- add an additional recreational activity for residents and visitors;
- enhance the appeal and success of Ewa Marina to visitors;
- gainfully utilize a portion of the required “noise buffer” between Ewa Marina and BPNAS; and

- provide employment which, in turn, will reduce commuter traffic from what would otherwise be the case.

Based on other tennis facilities in Hawaii, a tennis complex of 10 courts is typical for a community and hotels where tennis forms a key recreational component and an attraction for marketing.

Circulation System

The heavily landscaped system of roads, pedestrian paths, and bicycle paths in Phase I of Ewa Marina will be extended to Phase II in order to provide residents with ready access to the recreational and commercial areas.

Water System

The dual potable and brackish water systems which help conserve potable water will be extended throughout Phase II of Ewa Marina.

Support Services

To help insure the availability of jobs to Ewa residents, and thereby contribute to reduced daily commuting to jobs outside the Ewa area, the developer and operators of the various facilities and programs will help support local training programs corresponding to the types and number of jobs anticipated at Ewa Marina. Furthermore, child-care facilities will be made available in the commercial area of the development if needed.

Development Schedule

A 12-year development schedule is anticipated for Ewa Marina, Phase II (see Table 3).

The marina will encompass 150 acres of sheltered waterbays and waterways, and will provide berthing for 1,600 boats, an area for dry storage of boats, and launch facilities. Extensive recreational boating and berthing facilities will help satisfy the excess demand and burgeoning interest in boating activities on Oahu. Also, the harbor will serve as the site for fishing tournaments, diving excursions, various races (sailboats, power boats, kayaks, outrigger canoes, etc.), and other marine events.

Ewa Marina will also benefit boaters sailing out of the Ala Wai Harbor and Keehi Lagoon by providing an additional destination for day sails—currently, few safe moorings exist in the area. The marina will provide the further benefit of reducing the demand on the State to build expensive boat slips.

Employment

Consistent with the plan for Phase II of Ewa Marina, the project will generate over 2,200 jobs, which represents substantial on-site employment (see Table 1). Added jobs in Phase I, which deal with harbor support and maintenance of parks and other landscaping, brings the total employment of Ewa Marina to over 2,300 jobs. This compares to less than 30 field and mill jobs supported by current sugar operations on the same land.

The jobs to be provided within Ewa Marina will range over a variety of types and pay levels, including entry level, semi-skilled, skilled, and management positions within the visitor complex, marina operations, commercial areas, the IFPC, parks, golf course, and tennis complex. Also, more skilled positions will be available than are provided by a typical resort because of the job opportunities offered by the IFPC and marina operations. Salary levels and, where applicable, tip income will allow most employees of Ewa Marina to purchase or rent homes at Ewa Marina and other nearby communities, particularly for those families having two adult wage earners. Furthermore, due to the long-term nature of the development, employment is expected to remain stable. Also, the timing of new employment opportunities is likely to occur when they are needed since Ewa Marina, Phase II will be developed after most of Ko Olina Resort is completed.

Off-site employment to support Ewa Marina residents, visitors, and boaters is expected to be substantial, with many of these positions being located within the City of Kapolei, the Kapolei Business Center, and Campbell Industrial Park. In addition, tax revenues derived from the project (see below) will support considerable government employment.

Moreover, Ewa Marina—combined with new boating facilities at the Ko Olina Resort and Keehi Lagoon—is expected to contribute significantly to the growth of a small boating industry in the Ewa area since the marina will be the largest one in the State.

BENEFIT ASSESSMENT

Ewa Marina will be an attractive community where residents can live, work, shop, and play, and one in which residents can take great pride. Phase I will provide benefits primarily in terms of housing and recreation. Although it will be separate and independent, Phase II will provide partial financing of infrastructure by visitors, desirable employment, less commuter traffic, additional recreation, buffering of homes from aircraft noise and adjacent sugar operations, flood control, and open space and greenery. Furthermore, the entire development will have a favorable impact on the environment compared to that of the present land use, while the dual water system will help conserve water.

Housing

The major benefit provided by Ewa Marina, Phase I will be housing for 4,850 families. Residents will directly benefit by being able to live in new homes in an attractive setting. As mentioned previously, the choice of homes will cover a range of types and prices, including affordable mid-rise apartments, townhouses, moderately priced single-family homes, and luxury homes on the water or fronting the golf course. Ten percent of the homes will be affordable to families making 80 percent of the median family income, or less.

Residents of Ewa Marina will also benefit in that much of the cost for the marina and infrastructure will be borne by the specialty hotels and hotel garden-suites rather than being added to the prices of the homes.

Residents outside the project will also benefit in terms of the general impact on Oahu's housing market, since the increased supply of homes, the increased choices for homebuyers, and the increased competition among homebuilders can be expected to contribute somewhat to moderating rising housing prices. Even the addition of luxury homes will benefit the market for more affordable housing by reducing the incentive to demolish perfectly fine moderately priced homes elsewhere in order to provide land for luxury homes—such demolition is occurring throughout east Honolulu.

Recreation

Ewa Marina will provide major recreational benefits to residents within the project and in other nearby communities. The major recreational activities within Phase I are the marina, the County's 30-acre Oneula Beach Park, and the 17-acre Gateway Park. In addition, smaller parks and playgrounds will be scattered throughout the residential portion of the project. Phase II will provide support facilities and services for the marina, the golf course, and the championship tennis complex.

The marina will encompass 150 acres of sheltered waterbays and waterways, and will provide berthing for 1,600 boats, an area for dry storage of boats, and launch facilities. Extensive recreational boating and berthing facilities will help satisfy the excess demand and burgeoning interest in boating activities on Oahu. Also, the harbor will serve as the site for fishing tournaments, diving excursions, various races (sailboats, power boats, kayaks, outrigger canoes, etc.), and other marine events.

Ewa Marina will also benefit boaters sailing out of the Ala Wai Harbor and Keehi Lagoon by providing an additional destination for day sails—currently, few safe moorings exist in the area. The marina will provide the further benefit of reducing the demand on the State to build expensive boat slips.

Employment

Consistent with the plan for Phase II of Ewa Marina, the project will generate over 2,200 jobs, which represents substantial on-site employment (see Table 1). Added jobs in Phase I, which deal with harbor support and maintenance of parks and other landscaping, brings the total employment of Ewa Marina to over 2,300 jobs. This compares to less than 30 field and mill jobs supported by current sugar operations on the same land.

The jobs to be provided within Ewa Marina will range over a variety of types and pay levels, including entry level, semi-skilled, skilled, and management positions within the visitor complex, marina operations, commercial areas, the IFPC, parks, golf course, and tennis complex. Also, more skilled positions will be available than are provided by a typical resort because of the job opportunities offered by the IFPC and marina operations. Salary levels and, where applicable, tip income will allow most employees of Ewa Marina to purchase or rent homes at Ewa Marina and other nearby communities, particularly for those families having two adult wage earners. Furthermore, due to the long-term nature of the development, employment is expected to remain stable. Also, the timing of new employment opportunities is likely to occur when they are needed since Ewa Marina, Phase II will be developed after most of Ko Olina Resort is completed.

Off-site employment to support Ewa Marina residents, visitors, and boaters is expected to be substantial, with many of these positions being located within the City of Kapolei, the Kapolei Business Center, and Campbell Industrial Park. In addition, tax revenues derived from the project (see below) will support considerable government employment.

Moreover, Ewa Marina—combined with new boating facilities at the Ko Olina Resort and Keehi Lagoon—is expected to contribute significantly to the growth of a small boating industry in the Ewa area since the marina will be the largest one in the State.

Fiscal Impacts on Government

Ewa Marina, Phase II will strengthen State and County finances by providing a substantial net increase in revenues (see Appendix A for detailed calculations). This positive impact, which is based on conservative assumptions, reflects the following:

- the developer will provide all the on-site supporting infrastructure;
- the developer will provide nearly all the off-site infrastructure, including its fair share of exterior road and freeway improvements, water improvements, and collector sewers and trunks connecting the project to Honouliuli Wastewater Treatment Plant;
- for the County, recent property tax revenues from sugar operations (the current land use) have been very low, less than \$7,000 per year for the property;
- County debt service on capital improvements needed to support Ewa Marina, Phase II will be relatively modest, amounting to less than \$100,000 per year;
- County rollback taxes for converting the land from agriculture to urban will amount to about \$600,000;
- County revenues derived from property and other taxes on the specialty hotels, hotel garden-suites, and commercial operations in Phase II are estimated to be about \$4.2 million per year at full development;
- County expenditures to support the Phase II development are expected to be only \$800,000 per year at full development;
- for the State, excise tax revenues from sugar operations have been zero since sugar is exempt from excise taxes, while corporate income taxes have been relatively low due to the marginal profitability of Oahu Sugar Company, Ltd.;
- State expenditures on capital improvements to support Ewa Marina, Phase II will be negligible;
- State revenues derived from taxes on construction will amount to about \$14.9 million over the 12-year construction period;
- State revenues derived from excise, room, and other taxes on visitor and commercial operations in Phase II are estimated to be about \$9.7 million per year at full development; and
- State expenditures to support Phase II at full development are expected to be only \$800,000 per year (the same as that of the County).

APPENDIX A

**EWA MARINA, PHASE II:
IMPACT ON STATE AND COUNTY FINANCES**

Water

Ewa Marina, Phases I and II will require an estimated 3.3 million gallons per day (mgd) of potable water for consumption by residents and visitors, plus another 2 mgd of brackish water to irrigate the golf course, parks, and other landscaped areas. This compares to an estimated 7 mgd of brackish water currently used to irrigate sugarcane now grown on the property.

The new water system for Ewa Marina will also benefit residents of Ewa Beach in that water pressure to their homes will be increased.

Environmental Impacts

Waste from Ewa Marina will be disposed of properly, with little impact on the environment: wastewater will be pumped to Honouliuli Wastewater Treatment Plant, and solid waste will be trucked to the HPOWER facility. Cars and trucks, however, will discharge pollutants, but the amount of pollution should be less than that discharged in those communities that require more commuting due to a lack of nearby employment opportunities.

Water pollution is likely to increase somewhat because of pollutants from boats and some waterfront homes.

However, other forms of pollution will be reduced dramatically after sugarcane is no longer farmed on the property. The cultivation of cane generates considerable pollutants in the form of dust from planting and harvesting, soil runoff when the land is cleared for planting, noise from trucks and harvesting equipment, airborne chemicals, and smoke and ash when cane is burned before harvesting.

Open Space and Greenery

Even though Ewa Marina will contain a large number of homes, a commercial area, four small hotels, and a complex of 600 hotel garden-suites, considerable open space and greenery will be retained within the project, including the marina, Oneula Beach Park, the Gateway Park, various neighborhood parks, the golf course, and landscaped areas along the roads and pathways. At full development, over half of the acreage in the entire project (Phases I and II) will remain in open space. For Phase II, about 75 percent of the project will remain in open space. When the yards around the homes within Phase I and the landscaped grounds around the buildings in Phase II are included, then the amount of open space increases even further.

APPENDIX A

**EWA MARINA, PHASE II:
IMPACT ON STATE AND COUNTY FINANCES**

**Table A-1.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: GROWTH ASSUMPTIONS
(continued)**

Item	Amount	
VISITOR EXPENDITURES		
Hotel Room Rents (\$100 per room, 80% occupancy)	\$ 26.3	million per year
Hotel Garden-Suite Rents (\$150 per unit, 75% occupancy)	17.5	million per year
Total Room Revenues	<u>\$ 43.8</u>	million per year
Onsite Expenditures, Excluding Room Rents (60% of expenditures other than room rents)	33.9	million per year
Offsite Expenditures	<u>22.6</u>	million per year
Total Visitor Expenditures (\$125 per visitor per day)	\$ 100.4	million per year
RETAIL SALES		
Visitor Expenditures	\$ 100.4	million per year
Retail Shops (\$300 per sq. ft.)	12.0	million per year
Restaurants (\$350 per sq. ft.)	15.4	million per year
Yacht Club (\$250 per sq. ft.)	3.0	million per year
International Fitness Promotion Center (\$310 per sq. ft.)	18.6	million per year
Golf (250 rounds per day at \$50 per round)	4.6	million per year
Tennis	2.0	million per year
Total	<u>\$ 155.9</u>	million per year
Adjustment for Double Counting (Less Onsite Visitor Expenditures, Excluding Room Rents)	<u>-33.9</u>	million per year
Total Retail Sales	\$ 122.0	million per year

**Table A-1.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: GROWTH ASSUMPTIONS**
(continued)

Item	Amount	
OPERATING EMPLOYMENT		
Visitor Accommodations:		
Hotels (1 job per room)	900	jobs
Hotel Garden-Suites (1 job per unit)	600	jobs
Retail Shops (4 jobs per 1000 sq. ft.)	160	jobs
Restaurants (8 jobs per 1000 sq. ft.)	352	jobs
Yacht Club (3.33 jobs per 1,000 sq. ft.)	40	jobs
International Fitness Promotion Center (1 job per 1,000 sq. ft.)	60	jobs
Golf Course	70	jobs
Tennis Complex	50	jobs
Total Employment	<u>2,232</u>	jobs
Payroll (\$25,000 per job)	\$ 55.8	million per year
INCREASED PROPERTY TAX BASE (1989 \$):		
Visitor Accommodations:		
Hotels (\$150,000 per room)	\$ 135.0	million
Hotel Garden-Suites (\$200,000 per unit)	120.0	million
Total Hotel Value	<u>\$ 255.0</u>	million
Retail Shops (\$200 per sq. ft.)	8.0	million
Restaurants (\$250 per sq. ft.)	11.0	million
Yacht Club (\$300 per sq. ft.)	3.6	million
International Fitness Promotion Center (\$300 per sq. ft.)	18.0	million
Golf Course (\$750,000 per hole)	20.3	million
Clubhouse (300 per sq. ft.)	4.4	million
Tennis Complex (\$50,000 per court)	0.5	million
Tennis Club (\$300 per sq. ft.)	5.4	million
Total Commercial Value	<u>\$ 71.2</u>	million
Total Assessed Property Value	<u>\$ 326.2</u>	million

**Table A-1.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: GROWTH ASSUMPTIONS
(continued)**

Item	Amount	
VISITOR EXPENDITURES		
Hotel Room Rents (\$100 per room, 80% occupancy)	\$ 26.3	million per year
Hotel Garden-Suite Rents (\$150 per unit, 75% occupancy)	17.5	million per year
Total Room Revenues	<u>\$ 43.8</u>	million per year
Onsite Expenditures, Excluding Room Rents (60% of expenditures other than room rents)	33.9	million per year
Offsite Expenditures	<u>22.6</u>	million per year
Total Visitor Expenditures (\$125 per visitor per day)	\$ 100.4	million per year
RETAIL SALES		
Visitor Expenditures	\$ 100.4	million per year
Retail Shops (\$300 per sq. ft.)	12.0	million per year
Restaurants (\$350 per sq. ft.)	15.4	million per year
Yacht Club (\$250 per sq. ft.)	3.0	million per year
International Fitness Promotion Center (\$310 per sq. ft.)	18.6	million per year
Golf (250 rounds per day at \$50 per round)	4.6	million per year
Tennis	2.0	million per year
Total	<u>\$ 155.9</u>	million per year
Adjustment for Double Counting (Less Onsite Visitor Expenditures, Excluding Room Rents)	<u>-33.9</u>	million per year
Total Retail Sales	\$ 122.0	million per year

**Table A-2.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: REVENUES**
[In 1989 dollars.]

Item	Amount
COUNTY	
Rollback Taxes (\$1,400 per acre).	\$ 0.6 million
Full Development:	
Property Taxes:	
Hotel (\$10.71 per \$1,000 assessed value)	\$ 2.7 million per year
Commercial (\$9.45 per \$1,000 assessed value)	0.7 million per year
Total Property Tax Revenues	\$ 3.4 million per year
Other Revenues (\$352 per visitor) [1]	0.8 million per year
Total County Revenues	\$ 4.2 million per year
STATE	
Excise Taxes on Construction Expenditures (with pyramiding, 5.5% of Construction Cost)	\$ 14.9 million
Full Development:	
Excise Taxes (with pyramiding, 5.5% of Retail Sales)	\$ 6.7 million per year
Hotel Room Taxes (5% of Total Room Revenues)	2.2 million per year
Other Revenues (\$381 per visitor) [2]	0.8 million per year
Total State Revenues	\$ 9.7 million per year
TOTAL STATE AND COUNTY REVENUES (Excluding roll-back taxes and State revenues from construction activity.)	\$ 13.9 million per year

1. Includes all General Fund revenues other than property taxes. The multiplier is derived from "The Executive Program and Budget, Fiscal Year 1990" for fiscal year 1987/88, and adjusted for inflation.
2. Includes all General Fund revenues other than excise and personal income taxes. The multiplier is derived from "State of Hawaii Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 1988," and adjusted for inflation.

**Table A-1.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: GROWTH ASSUMPTIONS**
[In 1989 dollars.]

Item	Amount	
NEW DEVELOPMENT		
Land Area:		
Developed	107.7	acres
Open Space (golf course, park, etc.)	295.3	acres
Total	<u>403.0</u>	acres
Visitor Accommodations:		
Hotels	900	rooms
Hotel Garden-Suites	600	units
Total	<u>1,500</u>	units
Retail Shops	40,000	sq. ft.
Restaurants (5)	44,000	sq. ft.
International Fitness Promotion Center	60,000	sq. ft.
Yacht Club	12,000	sq. ft.
Golf Course	27	holes
Clubhouse	22,000	sq. ft.
Tennis Complex	10	Courts
Tennis Club	18,000	sq. ft.
VISITOR POPULATION		
Hotels (1.8 visitors per room, 80% occupancy)	1,300	daily visitors
Hotel Garden-Suites (2 visitors per unit, 75% occupancy)	900	daily visitors
Total Visitors	<u>2,200</u>	daily visitors
CONSTRUCTION ACTIVITY		
Duration of Construction	12	years
Average Construction Employment	240	jobs
Average Payroll (\$38,600 per job)	\$ 9.3	million per year

**Table A-4.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: SUMMARY**
[In 1989 dollars.]

Item	Amount
COUNTY, Full Development:	
Rollback Taxes	\$ 0.6 million
Full Development:	
Revenues	\$ 4.2 million per year
Expenditures:	
Debt Service	\$ 0.1 million per year
O&M and Services	0.7 million per year
Total County Expenditures	\$ 0.8 million per year
Net County Revenues	\$ 3.4 million per year
STATE:	
Excise Taxes on Construction	\$ 14.9 million
Full Development:	
Revenues	\$ 9.7 million per year
Expenditures:	
Debt Service	\$ 0.0 million per year
O&M and Services	0.8 million per year
Total State Expenditures	\$ 0.8 million per year
Net State Revenues	\$ 8.9 million per year
STATE AND COUNTY, Full Development:	
Revenues	\$ 13.9 million per year
Expenditures	1.6 million per year
Net State and County Revenues	\$ 12.3 million per year

**Table A-1.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: GROWTH ASSUMPTIONS**
[In 1989 dollars.]

Item	Amount	
NEW DEVELOPMENT		
Land Area:		
Developed	107.7	acres
Open Space (golf course, park, etc.)	295.3	acres
Total	<u>403.0</u>	acres
Visitor Accommodations:		
Hotels	900	rooms
Hotel Garden-Suites	600	units
Total	<u>1,500</u>	units
Retail Shops	40,000	sq. ft.
Restaurants (5)	44,000	sq. ft.
International Fitness Promotion Center	60,000	sq. ft.
Yacht Club	12,000	sq. ft.
Golf Course	27	holes
Clubhouse	22,000	sq. ft.
Tennis Complex	10	Courts
Tennis Club	18,000	sq. ft.
VISITOR POPULATION		
Hotels (1.8 visitors per room, 80% occupancy)	1,300	daily visitors
Hotel Garden-Suites (2 visitors per unit, 75% occupancy)	900	daily visitors
Total Visitors	<u>2,200</u>	daily visitors
CONSTRUCTION ACTIVITY		
Duration of Construction	12	years
Average Construction Employment	240	jobs
Average Payroll (\$38,600 per job)	\$ 9.3	million per year

**Table A-1.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: GROWTH ASSUMPTIONS**
(continued)

Item	Amount	
OPERATING EMPLOYMENT		
Visitor Accommodations:		
Hotels (1 job per room)	900	jobs
Hotel Garden-Suites (1 job per unit)	600	jobs
Retail Shops (4 jobs per 1000 sq. ft.)	160	jobs
Restaurants (8 jobs per 1000 sq. ft.)	352	jobs
Yacht Club (3.33 jobs per 1,000 sq. ft.)	40	jobs
International Fitness Promotion Center (1 job per 1,000 sq. ft.)	60	jobs
Golf Course	70	jobs
Tennis Complex	50	jobs
Total Employment	2,232	jobs
Payroll (\$25,000 per job)	\$ 55.8	million per year
INCREASED PROPERTY TAX BASE (1983 \$):		
Visitor Accommodations:		
Hotels (\$150,000 per room)	\$ 135.0	million
Hotel Garden-Suites (\$200,000 per unit)	120.0	million
Total Hotel Value	\$ 255.0	million
Retail Shops (\$200 per sq. ft.)	8.0	million
Restaurants (\$250 per sq. ft.)	11.0	million
Yacht Club (\$300 per sq. ft.)	3.6	million
International Fitness Promotion Center (\$300 per sq. ft.)	18.0	million
Golf Course (\$750,000 per hole)	20.3	million
Clubhouse (300 per sq. ft.)	4.4	million
Tennis Complex (\$50,000 per court)	0.5	million
Tennis Club (\$300 per sq. ft.)	5.4	million
Total Commercial Value	\$ 71.2	million
Total Assessed Property Value	\$ 326.2	million

**Table A-3.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: EXPENDITURES**
[In 1989 dollars.]

Item	Amount
MAJOR CAPITAL IMPROVEMENTS	
County:	
Parks [1]	\$ -- million
Police Station (private security provided)	--
Fire Station (no additional facility required)	--
Interior Roads (paid by developer)	--
Exterior Roads (fair share paid by developer)	--
Water Wells, Mains, Pumps, and Storage Tanks (fair share paid by developer)	--
Drainage (paid by developer)	--
Collector Sewers and Trunks (paid by developer)	--
Wastewater Treatment Plant Expansion (3.5% share of \$25 million)	0.9 million
Solid Waste Disposal (privately financed via user charges)	--
Total County Capital Improvements	\$ 0.9 million
County Annual Debt Service (7%, 20-year bond)	\$ 0.1 million per year
State:	
School Improvements (none required)	\$ -- million
Road Improvements (fair share paid by developer)	--
Freeway Improvements (fair share paid by developer)	--
Total State Capital Improvements	\$ 0.0 million
State Annual Debt Service	\$ 0.0 million per year
Total State and County Annual Debt Service	\$ 0.1 million per year
OPERATIONS AND MAINTENANCE (O&M), FULL DEVELOPMENT	
County O&M (\$309 visitor) [2]	\$ 0.7 million per year
State O&M (\$375 per visitor) [3]	0.8 million per year
Total State and County O&M	\$ 1.5 million per year

1. Although land for a district park will be provided in Ewa Marina Phase II, the park will serve residents throughout the Ewa area and is not needed to support Phase II since it does not include a residential component.
2. Derived from "The Executive Program and Budget, Fiscal Year 1990" for fiscal year 1987/88, and adjusted for inflation.
3. Derived from "State of Hawaii Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 1988," and adjusted for inflation.

**Table A-2.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: REVENUES**
[In 1989 dollars.]

Item	Amount
COUNTY	
Rollback Taxes (\$1,400 per acre).	\$ 0.6 million
Full Development:	
Property Taxes:	
Hotel (\$10.71 per \$1,000 assessed value)	\$ 2.7 million per year
Commercial (\$9.45 per \$1,000 assessed value)	0.7 million per year
Total Property Tax Revenues	\$ 3.4 million per year
Other Revenues (\$352 per visitor) [1]	0.8 million per year
Total County Revenues	\$ 4.2 million per year
STATE	
Excise Taxes on Construction Expenditures (with pyramiding, 5.5% of Construction Cost)	\$ 14.9 million
Full Development:	
Excise Taxes (with pyramiding, 5.5% of Retail Sales)	\$ 6.7 million per year
Hotel Room Taxes (5% of Total Room Revenues)	2.2 million per year
Other Revenues (\$381 per visitor) [2]	0.8 million per year
Total State Revenues	\$ 9.7 million per year
TOTAL STATE AND COUNTY REVENUES	\$ 13.9 million per year
(Excluding roll-back taxes and State revenues from construction activity.)	

1. Includes all General Fund revenues other than property taxes. The multiplier is derived from "The Executive Program and Budget, Fiscal Year 1990" for fiscal year 1987/88, and adjusted for inflation.
2. Includes all General Fund revenues other than excise and personal income taxes. The multiplier is derived from "State of Hawaii Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 1988," and adjusted for inflation.

**Table A-3.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: EXPENDITURES**
[In 1989 dollars.]

Item	Amount
MAJOR CAPITAL IMPROVEMENTS	
County:	
Parks [1]	\$ -- million
Police Station (private security provided)	--
Fire Station (no additional facility required)	--
Interior Roads (paid by developer)	--
Exterior Roads (fair share paid by developer)	--
Water Wells, Mains, Pumps, and Storage Tanks (fair share paid by developer)	--
Drainage (paid by developer)	--
Collector Sewers and Trunks (paid by developer)	--
Wastewater Treatment Plant Expansion (3.5% share of \$25 million)	0.9 million
Solid Waste Disposal (privately financed via user charges)	--
Total County Capital Improvements	\$ 0.9 million
County Annual Debt Service (7%, 20-year bond)	\$ 0.1 million per year
State:	
School Improvements (none required)	\$ -- million
Road Improvements (fair share paid by developer)	--
Freeway Improvements (fair share paid by developer)	--
Total State Capital Improvements	\$ 0.0 million
State Annual Debt Service	\$ 0.0 million per year
Total State and County Annual Debt Service	\$ 0.1 million per year
OPERATIONS AND MAINTENANCE (O&M), FULL DEVELOPMENT	
County O&M (\$309 visitor) [2]	\$ 0.7 million per year
State O&M (\$375 per visitor) [3]	0.8 million per year
Total State and County O&M	\$ 1.5 million per year

1. Although land for a district park will be provided in Ewa Marina Phase II, the park will serve residents throughout the Ewa area and is not needed to support Phase II since it does not include a residential component.
2. Derived from "The Executive Program and Budget, Fiscal Year 1990" for fiscal year 1987/88, and adjusted for inflation.
3. Derived from "State of Hawaii Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 1988," and adjusted for inflation.

**Table A-4.— EWA MARINA, PHASE II, IMPACT ON STATE
AND COUNTY FINANCES: SUMMARY**
[In 1989 dollars.]

Item	Amount
COUNTY, Full Development:	
Rollback Taxes	\$ 0.6 million
Full Development:	
Revenues	\$ 4.2 million per year
Expenditures:	
Debt Service	\$ 0.1 million per year
O&M and Services	0.7 million per year
Total County Expenditures	\$ 0.8 million per year
Net County Revenues	\$ 3.4 million per year
STATE:	
Excise Taxes on Construction	\$ 14.9 million
Full Development:	
Revenues	\$ 9.7 million per year
Expenditures:	
Debt Service	\$ 0.0 million per year
O&M and Services	0.8 million per year
Total State Expenditures	\$ 0.8 million per year
Net State Revenues	\$ 8.9 million per year
STATE AND COUNTY, Full Development:	
Revenues	\$ 13.9 million per year
Expenditures	1.6 million per year
Net State and County Revenues	\$ 12.3 million per year



APPENDIX B

Impact On Agricultural

Prepared by Decision Analysts Hawaii, Inc., March, 1990

***PROPOSED EWA MARINA, Phase II:
Impact on Agriculture***



DECISION ANALYSTS HAWAII, INC.

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Consistency with State and County Plans

The proposed Ewa Marina, Phase II (1) would conform to the planned contraction of OSCo, with the subject lands being far removed from the core of the plantation which OSCo plans to retain for its long-term survival; (2) would not adversely affect any existing diversified agricultural activities; (3) would not affect the amount of land available for diversified agriculture; (4) would not limit the growth of diversified agriculture since, in other parts of the State, far more agricultural land has been released from plantation agriculture than has been absorbed by other activities; and (4) would contribute to the economy, including the addition of a number of agricultural-type jobs. In view of these findings, the project would not conflict with the major thrust of the Hawaii State Plan, the State Agriculture Functional Plan, and the General Plan of the City and County of Honolulu. This thrust in all three plans calls for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured. The thrust of these plans is not to preserve prime agricultural lands simply for the sake of preserving them—preservation is to occur only if a potential need for these agricultural lands exists.

However, about one-third of the project would conflict with the lower-level State agricultural guidelines which call for Agricultural Lands of Importance to be protected from development.

tition from new sweeteners; uncertainty over renewal of the major leases; and urbanization pressures, particularly from those projects which would affect the core of the plantation. However, these factors are unrelated to whether or not Ewa Marina, Phase II is developed.

Impact on the Growth of Diversified Agriculture

Ewa Marina, Phase II would not adversely affect any existing diversified-agriculture activity since none exists on the property. The proposed project would, however, eliminate the possibility of using these lands for diversified agriculture. Nevertheless, there would be no change in the amount of land available in Hawaii for diversified-agriculture crops.

Also, the proposed project would not adversely affect the growth of diversified agriculture. There are four reasons for this assessment: (1) a vast amount of agricultural land and water in the State has been freed from sugar and pineapple production due to past plantation closings and reductions in operations—over 120,000 acres since 1968, including announced reduction plans—and most of this land has favorable soil ratings and remains available for diversified-agriculture activities; (2) it is very probable that additional sugarcane acreage and water will be freed, given the existence of unprofitable sugar operations; (3) some, if not most, of the sugar companies would make their lands available for profitable replacement crops to the extent that such crops exist; and, in contrast, (4) land requirements to accommodate the growth of diversified agriculture are surprisingly modest compared to the available supply.

In addition, the greater the success of diversified agriculture, the greater the amount of land which will be released from sugar for diversified agriculture.

In summary, the factor limiting the growth of diversified agriculture is *not the land supply*—far more land has been and continues to be freed from plantation agriculture than can be absorbed by diversified agriculture and urban development. Rather the limiting factors to the growth of diversified agriculture are (1) the *market demand* for those crops that can be grown profitably in Hawaii, and (2) for the case of small-scale (but not large-scale) farmers, *subdivision requirements* which limit their access to agricultural land. The proposed Ewa Marina, Phase II would involve far too little land to affect the growth of diversified agriculture.

To an undetermined extent, Ewa Marina, Phase II would stimulate the growth of diversified agriculture by increasing the demand for plants and trees from nursery operations. Also the golf course would provide an estimated 30 grounds-maintenance jobs involved with the cultivation of grasses and plants, applying fertilizers and chemicals, maintaining irrigation systems, etc. In terms of function, these jobs are similar to certain jobs in the agriculture industry, and require similar skills and training.

Consistency with State and County Plans

The proposed Ewa Marina, Phase II (1) would conform to the planned contraction of OSCo, with the subject lands being far removed from the core of the plantation which OSCo plans to retain for its long-term survival; (2) would not adversely affect any existing diversified agricultural activities; (3) would not affect the amount of land available for diversified agriculture; (4) would not limit the growth of diversified agriculture since, in other parts of the State, far more agricultural land has been released from plantation agriculture than has been absorbed by other activities; and (4) would contribute to the economy, including the addition of a number of agricultural-type jobs. In view of these findings, the project would not conflict with the major thrust of the Hawaii State Plan, the State Agriculture Functional Plan, and the General Plan of the City and County of Honolulu. This thrust in all three plans calls for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured. The thrust of these plans is not to preserve prime agricultural lands simply for the sake of preserving them—preservation is to occur only if a potential need for these agricultural lands exists.

However, about one-third of the project would conflict with the lower-level State agricultural guidelines which call for Agricultural Lands of Importance to be protected from development.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

- (2) *Agricultural Lands of Importance in the State of Hawaii (ALISH)*, by the SCS, University of Hawaii (UH) College of Tropical Agriculture and Human Resources, and the State of Hawaii, Department of Agriculture.

This system classifies lands into three categories: (a) prime agricultural land which is land that is best-suited for the production of crops because of its ability to sustain high yields with relatively little input and with the least damage to the environment; (b) unique agricultural land which is non-prime agricultural land that is currently used for the production of specific high-value crops; and (c) other agricultural land which is non-prime and non-unique agricultural land that is of importance to the production of crops. Approximately 9 percent of the land in the proposed development area is rated as "prime" agricultural land.

- (3) *Overall Productivity Rating*, by the UH Land Study Bureau (LSB).

This classification rates soils according to five levels, with "A" representing the class of highest productivity and "E" the lowest. About 66 percent of the petition area has soils rated "B," about 32 percent rated "C," and the remaining 2 percent unrated.

- (4) *Proposed Land Evaluation and Site Assessment (LESA) System*, by the State of Hawaii Land Evaluation and Site Assessment Commission

Based on soil quality, locational attributes, improvements, nearby activities, and land-use plans, this proposed classification system would designate a sufficient amount of the better agricultural lands to meet projected agricultural goals. If the LESA classification approach were applied to the proposed site, about 33 percent of the designated lands would be termed "important agricultural lands" (IAL), which would include all lands having a rating of 66 or over, out of a possible total of 100. The ratings for each soil type are shown in Table 1. However, the designations would be subject to change based on a change in nearby activities and a change in County land-use plans. Also, the designation could be changed if an overriding public benefit were demonstrated.

Although these soil-rating systems fail to provide a consistent rating for the project site, it is estimated that about one-third of the property is comprised of good soils.

(1) *Land Capability Grouping by the United States Department of Agriculture Soil Conservation Service (SCS).*

This classification system rates soils according to eight levels, ranging from the highest classification level, I, to the lowest level, VIII. Assuming that the land is irrigated, these ratings are shown in Table 1. Soil types EmA and EmB—which cover about 11 percent of the proposed project—have land capability ratings of IIs and IIe, respectively. The II indicates that the soils have moderate limitations that reduce the choice of plants that can be grown successfully, or indicates that moderate conservation practices are required. Subclassification “s” indicates that the limitation is due to stoniness, unfavorable texture, shallowness, or low water-holding capacity; subclassification “e” indicates a risk of erosion. Soil MnC, which covers 23 percent of the project, has a land capability rating of IIIs, which indicates that the soils have severe limitations that reduce the options on plants, require special conservation practices, or both. Soil type CR, coral outcrop, covers about 36 percent of the project, and has a land capability rating of VIIIs, which indicates that the soil has severe problems which makes it generally unsuited for agriculture. Soil type Fd, fill land, which covers about 31 percent of the area, has no land capability rating.

Table 1.— PROPOSED EWA MARINA, PHASE II:
SOIL TYPES, ACREAGE, AGRICULTURAL USES,
AND SCS AND LESA RATINGS

Soil Type	Acreage	Agricultural Uses	SCS Rating ¹	LESA Rating
CR	144	None	VIIIs	12
Fd	125	Sugarcane	None	65
MnC	92	Sugarcane, Truck Crops, Pasture	IIIs	66
EmA	35	Sugarcane, Truck Crops, Pasture	IIs	74
EmB	7	Sugarcane, Truck Crops, Pasture	IIe	74

1. Assuming that the soils are irrigated.

Source: United States Department of Agriculture, Soil Conservation Service, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, August 1972.

- (2) *Agricultural Lands of Importance in the State of Hawaii (ALISH)*, by the SCS, University of Hawaii (UH) College of Tropical Agriculture and Human Resources, and the State of Hawaii, Department of Agriculture.

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Although these soil-rating systems fail to provide a consistent rating for the project site, it is estimated that about one-third of the property is comprised of good soils.

IMPACT ON OSCo¹

Background Information

Production

OSCo, a subsidiary of Amfac/JMB Hawaii (Amfac), first milled sugar in 1899, and is now the third largest sugar operation in the State. In 1989, it produced 86,059 tons of raw sugar (about 9.3 percent of the State's total 1988 sugar production) and 23,669 tons of molasses. In addition, it produced 71.8 million kWh of electrical energy, and sold 18.9 million kWh to Hawaiian Electric Co.

Land Area

In early 1990, OSCo cultivated 12,222 acres of sugarcane lands which covered portions of Central Oahu on each side of Kunia Road above Pearl Harbor, and portions of the Ewa Plain to the west of Pearl Harbor. OSCo took over the Ewa lands from Ewa Plantation in 1970.

In the early 1980s, an additional 6,000 acres of OSCo lands were in production. Most of these lands—about 4,200 acres—were fallowed voluntarily because they are (1) mauka lands which incurred high pumping costs; or (2) lands close to the ocean where soils tend to be inferior, yields low, and hauling costs high because of their distance from the mill. A few hundred acres close to the ocean have since been urbanized. An additional 2,000 acres of sugarcane lands have been withdrawn by landowners and developers for homes and other urban uses.

Land Ownership

All of the land which OSCo cultivates is leased. The principal landowners are The Estate of James Campbell whose lease to OSCo expires in 1995, Robinson Estate whose lease to OSCo expires in 1996, and the U.S. Navy whose lease to OSCo expires in 1995. The Campbell Estate lands include most of the Ewa Plain and Central Oahu lands above the H-1 Freeway and west of Kunia Road. The Robinson Estate lands are in Central Oahu above the H-1 Freeway and between Kunia Road and Waikele Stream. Navy lands include Waipio Peninsula, and most of the eastern portion of the Ewa Plain.

To a major extent, the control of OSCo lands recently has passed or is in the process of being passed from the two major estates to developers, including about 3,300 acres of Campbell Estate land and over 1,500 acres of Robinson Estate land. The new landowners include about a half-dozen private companies, plus the State of Hawaii and the City & County of Honolulu. In addition, the State of Hawaii has proposed to purchase an additional 3,100 acres of land in the central portion of the Ewa Plain from Campbell Estate, with the intention of "banking" it for eventual housing developments. If this purchase comes about, the State will play a pivotal role in determining the future of OSCo.

1. Unless otherwise noted, the material in this section was obtained from OSCo, landowners, or developers.

The conversion from a two-mill operation to a one-mill operation will reduce land requirements to about two-thirds of that needed for a two-mill operation. The core of the plantation would include:

- the central portion of the Ewa plain (land which the State plans to buy from Campbell Estate as a land bank for future housing);
- Navy lands on the Ewa plain which are within the blast zone for West Loch;
- Navy lands on the Waipio Peninsula which are within the blast zone for West Loch;
- Kunia lands of Robinson Estate which are to the east of Kunia Road and above transmission power lines in the area; and
- Kunia lands of Campbell Estate which lie to the west of Kunia Road.

In addition OSCo plans to replant 586 acres of land which it had fallowed in the early 1980s; this is Kunia land owned by Campbell Estate and located in the Waianae foothills. Also, OSCo would continue to farm other sugarcane lands which have been identified for development until such time as they are withdrawn for development. However, fields which become small, isolated, and/or surrounded by homes may be fallowed prior to their withdrawal for development.

Direct Impact of the Proposed Ewa Marina, Phase II on OSCo

The direct impact of the proposed Ewa Marina, Phase II on OSCo would be that 389 acres of land would be removed from sugarcane production. Assuming a yield of 14 tons per acre for the subject land and a two-year crop, the loss of 389 acres of land translates into a loss of 2,720 tons of sugar per year, or about 3.2 percent of the 1989 production of 86,059 tons. The associated loss in molasses output would be 750 tons, based on a molasses yield equal to 27.5 percent of the sugar yield. Based on the 1989 ratio of energy generation to sugar, the loss in energy production would be 2.3 million kWh of electricity.

The loss in export earnings would be about \$1 million per year, based on 1989 prices of \$358.83 per ton of sugar and \$36.48 per ton of molasses. However, the impacts on profits would be less than the loss in export earnings since the cost of farming the land and processing the cane would be eliminated.

Water requirements for sugar would decline by about 3.7 mgd, based on a requirement of 9,500 gallons per day (gpd) per acre of sugar. However, this savings would be partially offset by the water required for the proposed project.

Approximately 7 field jobs and 6 factory jobs would be associated with 389 acres of cane land, assuming the early 1990 ratio of labor to land. However, the actual loss of employment may be less, since specialized mill and field jobs would have to remain. Also, any loss of employment would likely occur by attrition. Offsetting this employment loss would be an employment gain of about 30 agricultural-type jobs associated with maintaining 272 acres of golf-course greenery. The net gain would be at least 23 agricultural-type jobs.

replacement crops as possible before OSCo could be forced by outside economic factors to cease operations. Key components of the plan were:

- continue to improve the economic efficiency of OSCo by increasing sugar yields and reducing production costs (both of which have been improved substantially since 1981);
- urbanize Waikele (the only OSCo land owned by Amfac) in order to derive revenues to help support and justify continued sugar operations; and
- experiment with a variety of crops (papaya, sweet corn, potatoes, forage and feed crops, coffee, etc.) in order to find profitable replacement crops for sugar.

An important component of OSCo's cost-reduction efforts has been the continued decline in its labor force: 804 jobs in early 1981, about 600 jobs in early 1986, and 427 jobs in early 1990. The reduction in employment has been accomplished by attrition—that is, employees who retire or leave OSCo for other voluntary reasons generally are not replaced.

Of interest, nearly all sugarcane operators throughout the world are pursuing a similar strategy of trying to improve efficiency by increasing yields and reducing production costs while searching for alternative crops.⁶

Current OSCo Plans

In response to the loss of land to urbanization, OSCo plans to reduce processing capacity by operating a single mill rather than two mills in parallel, as is currently the case. The conversion to a single mill is planned for 1991. By the year 1994, production is projected to decline to about 63,000 tons per year, compared to OSCo's historic production level of about 90,000 to 95,000 tons per year. Based on 1988 production by other plantations, OSCo would fall from being the third largest sugar operation to being the fifth largest. It is further projected that the plantation will retain 9,858 acres after land is removed for urbanization, and that yields will be 13.7 tons of raw sugar per harvested acre.

The conversion to a single mill will require new investment in the plantation; however, given the lower production levels due to decreased acreage, the average cost per ton of sugar is expected to be lower with one mill running at full capacity than would be the case if two mills were running below capacity. Overall, however, the single mill is expected to result in a marginally higher cost of production when compared to the average cost per ton under the existing two-mill operation running at full capacity. In terms of labor savings, conversion to a single-mill operation will save about six jobs at the mill; in addition the lower acreage will reduce field employment.

6. James B. Brown, *The International Sugar Industry, Developments and Prospects*.

The conversion from a two-mill operation to a one-mill operation will reduce land requirements to about two-thirds of that needed for a two-mill operation. The core of the plantation would include:

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In terms of the form of the plantation, the development of Ewa Marina, Phase II would conform to the preferred sequence for contracting the plantation, which is from the periphery of the plantation inward; lands at Ewa Marina are a long trucking distance from the mill, soils are inferior to those of inland fields, and yields are generally lower than average. Furthermore, the subject lands are far removed from the core of the plantation which OSCo plans to retain for its long-term survival, with Ewa Gentry lying between this core and Ewa Marina.

Outlook For OSCo

The continued survival of OSCo will depend on a number of factors. One of the most important of these will be continued Federal price supports for sugar that are sufficiently high to justify continued operations, and continued—if not greater—success in reducing production costs to a level that will allow profitability. OSCo's success in increasing its yields and downsizing the plantation to compensate for lands lost to urbanization will also be important. The agricultural quality of the lands which remain, and the form of the plantation will also play a significant part in OSCo's survival. As mentioned, the preferred contraction of the plantation is from the periphery inward because this would result in a compact plantation and high-quality lands: a more compact plantation reduces trucking and other costs, while higher-quality lands contribute to higher yields. After the major leases expire in the mid-1990s, continued sugar operations also will depend on OSCo's success in negotiating favorable lease terms. These issues are discussed below for two time periods: 1994 which is the year before the major leases become due, and the longer term of about two decades.

Outlook to 1994

Short-Term Outlook for Sugar Prices

The survival of OSCo will depend greatly on the price of sugar. In the world market, the average price of sugar is expected to remain well below the production costs for all countries because most sugar is traded in controlled and/or subsidized markets, while surplus sugar is dumped onto the world market for sale at a loss. Dramatic price increases have followed a 6- to 9-year cycle, with prices increasing when world production falls short of consumption. However, a number of fundamental developments have taken place in sugar and in related industries in the past two decades which appear to have altered the pattern of sugar prices, thereby reducing peak prices and extending the periods of low prices. These changes include: the decline or stagnation of sugar consumption in some developed countries; market inroads made by the liquid sweetener high-fructose corn syrup (HFCS); the availability of substantial sugar reserves in the form of sugarcane now devoted to ethanol production; major gains in sugarbeet production in several European countries which were traditionally cane sugar importers; the appearance of the European Economic Community (ECC) as a major exporter of refined

Table 1. PLANNED AND PROPOSED DEVELOPMENTS
AFFECTING OSCo ACREAGE: 1990

Project	Sugarcane Acreage
Ewa Marina, Phase II	389
Ewa Marina, Phase I (partially approved)	410
Kapolei Golf Course Addition, State of Hawaii	58
Villages of Kapolei, State of Hawaii (approved)	375
Kapolei Business-Industrial Park	145
Royal Kunia, Phases II	838
Ewa Gentry (partially approved)	311
City of Kapolei, Campbell Estate (partially approved)	641
Ko Olina Resort (approved)	281
West Loch Estates, City and County of Honolulu (approved)	151
Kunia Golf Course	190
Eventual Remnant Property	94
Total	3,883

Source: Land use applications and discussions with Oahu Sugar Co., Ltd.

Acreage Requirement

As indicated in Table 2, OSCo's requirements for land will depend on its success in increasing its yields: the higher the yield, the less land that is required to produce a given amount of sugar. At 13.32 tons per harvested acre (the yield in 1989), about 10,140 acres of land are required to produce 63,000 tons of sugar per year. If the average yield is increased to 15 tons per acre, then the acreage requirement drops to about 9,600 acres.

Average sugar yields fluctuate from year to year but, over the long term, yields have increased gradually. For example, yields increased from 11.3 tons per harvested acre in 1979, to 14.06 tons in 1987, or an increase of 24.4 percent over 8 years. However, the 1989 yield was only 13.32 tons per acre. The past increases in OSCo's yields resulted from the conversion to drip irrigation, fallowing low-yield fields, the introduction of improved varieties of the sugarcane plant, and other improvements. Under ideal conditions, OSCo achieved the world-record yield of 21.63 tons per acre from one of its Kunia fields. For the future, increasing yields are expected to occur as a result of contracting operations to higher-quality fields (al-

The economic forces which create urbanization pressures on OSCo are very strong:

- Financial returns from urban land uses far exceed those from agricultural uses.
- OSCo is near the new or growing employment centers of Ko Olina Resort, Barbers Point Harbor, Campbell Industrial Park, the City of Kapolei, and downtown Honolulu.
- Because of OSCo's proximity to the H-1 Freeway, its lands are within reasonable travel distance of these new and growing employment centers.
- Water supplies would become available for other uses if it were freed from sugar production.
- OSCo land is near the Honouliuli waste-treatment facility.
- Construction costs would be low in comparison to areas that require extensive grading or removal of existing structures.

In contrast, redevelopment of downtown Honolulu suffers from the high expense and displacement problems required to remove existing structures, the cost and inconvenience of redeveloping inadequate infrastructure, less desirable high-rise housing compared to single-family homes, and occasional strong community opposition. Hawaii Kai suffers from a lack of major employment growth centers, the relatively small amount of land available for further single-family housing, commuter traffic problems, and community opposition to further development. Similarly, the Windward side suffers from a lack of growing employment centers, commuter traffic problems, and community opposition to further development.

In view of these factors, the City & County of Honolulu has designated the Ewa area as a "Secondary Urban Center" which will be developed to accommodate a major portion of Honolulu's future growth. This policy carries with it the implication that sugarcane lands in the Ewa area will be urbanized.

Development Plans and Proposals

Developments approved and proposed for the Ewa/Central-Oahu area which would affect OSCo acreage are shown in Table 1. As indicated, an estimated 3,883 acres of OSCo's remaining sugarcane land has been proposed for development.

In this listing of major developments, it should be noted that the landowner for the proposed Kunia Golf Course lacks land withdrawal rights before the lease expires in 1996. Also, this and other projects lack development approvals. Furthermore, lands for some projects are to be withdrawn gradually from sugar production as they are needed for development, while lands for other projects have been or will be withdrawn during a single harvesting cycle. Projects in this latter category include those by the State and by a few private developers.

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AFFECTING OSCo ACREAGE: 1990

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Kunia Golf Course	190
Eventual Remnant Property	94
Total	3,883

Source: Land use applications and discussions with Oahu Sugar Co., Ltd.

Acreage Requirement

As indicated in Table 2, OSCo's requirements for land will depend on its success in increasing its yields: the higher the yield, the less land that is required to produce a given amount of sugar. At 13.32 tons per harvested acre (the yield in 1989), about 10,140 acres of land are required to produce 63,000 tons of sugar per year. If the average yield is increased to 15 tons per acre, then the acreage requirement drops to about 9,600 acres.

Average sugar yields fluctuate from year to year but, over the long term, yields have increased gradually. For example, yields increased from 11.3 tons per harvested acre in 1979, to 14.06 tons in 1987, or an increase of 24.4 percent over 8 years. However, the 1989 yield was only 13.32 tons per acre. The past increases in OSCo's yields resulted from the conversion to drip irrigation, fallowing low-yield fields, the introduction of improved varieties of the sugarcane plant, and other improvements. Under ideal conditions, OSCo achieved the world-record yield of 21.63 tons per acre from one of its Kunia fields. For the future, increasing yields are expected to occur as a result of contracting operations to higher-quality fields (al-

Table 2. OSCo ACREAGE REQUIREMENTS BY YIELD LEVEL

Yield (tons of raw sugar per harvested acre)	Acreage ¹
11.3 (1979 average yield)	11,951
13.32 (1989 average yield)	10,139
13.7 (projected 1994 yield)	9,858
14.06 (1987 average yield)	9,605
14.5	9,314
15.0	9,003
15.2 (required yield to accommodate planned and proposed urbanization)	8,950
15.5	8,713
21.63 (record yield for one field)	6,244

1. A one- mill operation of 63,000 tons of raw sugar per year is assumed, with 6.7 percent of the acreage set aside for seed cane, and one-half of the remaining acreage harvested annually.

though this is offset by the loss of some high-quality fields), introducing improved varieties of cane, improving farming practices, adding chemical ripeners, introducing more efficient harvesters, etc.

In view of the development pressures on OSCo, management projects that the plantation will retain 9,858 acres in 1994—an estimate which appears reasonable given typical approval and development periods. The core of the plantation would consist of the lands previously described (see p. 6), and with production projected to be 63,000 tons per year based on a 13.7 tons per harvested acre.

The operation of OSCo to 1994 depends upon continued U.S. sugar price supports that are sufficient enough to justify continued sugar operations in Hawaii. Also, it must be recognized that it will become increasingly difficult to manage the survival of a shrinking plantation.

Long-Term Outlook

After the major leases expire in 1995 and 1996, the future of OSCo becomes increasingly uncertain, as discussed below.

IMPACT ON GROWTH OF DIVERSIFIED AGRICULTURE

The development of Ewa Marina, Phase II is a commitment of prime agricultural land to a non-agricultural use. For the purposes of this discussion, prime agricultural land is loosely defined to mean any high-quality agricultural land capable of providing high yields for a variety of crops, and would include about one-third of the lands currently cultivated in the petition area. This commitment raises the question of whether Ewa Marina, Phase II would affect adversely the development of diversified agriculture—either immediately or over the long term. Before addressing this question, the impact on *existing* diversified agriculture activities, *potential* crops, and the *demand* for and the *supply* of prime agricultural land for diversified agriculture are clarified below.

Impact on Existing Diversified Agricultural Activities

Since nearly all of the project area is planted in sugarcane the proposed development would not directly affect any existing diversified agriculture activity.

Potential Diversified-Agriculture Crops

Given the relatively sunny conditions, soils, and other agronomical conditions in Ewa, crops and agricultural activities suited for Ewa include: avocados, Chinese bananas, snap beans, bittermelon, sweet corn, cucumbers, daikon, long eggplant, round eggplant, semi-head lettuce, limes, dry onions, green onions, Chinese peas, sweet peppers, potatoes, sweet potatoes, pumpkins, radishes, Italian squash, oriental squash, tomatoes, watermelon, seed crops, forage crops, flowers, and potted foliage. Given the high land rents which prevail in the area, it is uncertain which of these crops would be profitable, assuming the Hawaii market exceeds that which is already supplied by producers elsewhere in the State.

Demand for Prime Agricultural Land

From an island-wide or Statewide perspective, the proposed development would involve too little prime agricultural land to affect the growth of diversified agriculture. The highest projections known to the consultant for the growth of diversified agriculture are those prepared by the Land Evaluation and Site Assessment (LESA) Commission. These projections—which are shown in Tables 3 and 4 for the State and Oahu, respectively—were prepared in 1985. The projections represent an attempt to quantify the amount of agricultural land that will be required to (1) accommodate resident-plus-visitor population growth, (2) increase food and animal-feed self-sufficiency, and (3) increase crop exports.

Long-Term Impact of Ewa Marina, Phase II on OSCo

The factors which will determine the long-term survival of OSCo are unrelated to whether or not Ewa Marina, Phase II is developed.

12 11 10 9 8 7 6 5 4 3 2 1

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Table 4.— LESA AGRICULTURAL ACREAGE REQUIREMENTS,
STATE OF HAWAII: 1983 AND 1995

Crop or Activity	1983	1995	Increase
Crops and Activities which Generally Do Not Require Prime Agricultural Lands			
Beef/cattle ^{1,2}	765,450	365,090	--
Livestock:			
Dairy	1,000	1,182	182
Eggs/Poultry	281	515	234
Swine	<u>600</u>	<u>1,050</u>	<u>450</u>
Subtotal for Livestock	1,881	2,747	866
Unique Crops:			
Aquaculture	500	4,500	4,000
Coffee	2,000	5,700	3,700
Flowers/Nursery	1,786	3,040	1,254
Papaya	2,120	11,850	9,730
Taro/Watercress	400	527	127
Subtotal for Unique Crops	6,806	25,617	18,811
Macadamia Nuts	15,800	27,000	11,200
Crops and Activities which Generally Do Require Prime Agricultural Lands			
Plantation:			
Sugarcane ^{2,3}	194,300	177,700	-16,600
Pineapple	<u>36,000</u>	<u>36,049</u>	<u>49</u>
Subtotal for Plantation	230,300	213,749	-16,551
Other:			
Guava	965	1,400	435
Seed Corn	730	1,060	330
Bananas	1,100	2,200	1,100
Feed/Forage ^{2,4}	8,705	12,495	3,790
Fruits	635	1,156	521
Vegetables/Melons ⁵	<u>4,340</u>	<u>7,022</u>	<u>2,682</u>
Subtotal for Other Crops	16,475	25,333	8,858
Contingency ⁶	--	<u>29,500</u>	<u>29,500</u>
TOTAL	1,036,712	689,036	--
TOTAL, Excluding Beef/Cattle	271,262	323,946	52,684

Table 5.— LESA AGRICULTURAL ACREAGE REQUIREMENTS,
CITY AND COUNTY OF HONOLULU: 1983 AND 1995

Crop or Activity	1983	1995	Increase
Crops and Activities which Generally Do Not Require Prime Agricultural Lands			
Beef/cattle ^{1,2}	18,200	10,090	--
Livestock:			
Dairy	340	40	62
Eggs/Poultry	250	390	140
Swine	<u>144</u>	<u>200</u>	<u>56</u>
Subtotal for Livestock	734	992	258
Unique Crops:			
Aquaculture	300	2,400	2,100
Flowers/Nursery	495	850	355
Papaya	70	170	100
Taro/Watercress	<u>60</u>	<u>85</u>	<u>25</u>
Subtotal for Unique Crops	925	3,505	2,580
Crops and Activities which Generally Do Require Prime Agricultural Lands			
Plantation:			
Sugarcane ²	27,200	25,300	-1,900
Pineapple	<u>11,829</u>	<u>11,800</u>	<u>-29</u>
Subtotal for Plantation	39,029	37,100	-1,929
Other:			
Guava	--	242	242
Seed Corn	125	180	55
Bananas	540	836	296
Feed/Forage ^{2,3}	1,741	2,912	1,171
Fruits	90	200	110
Vegetables/Melons ⁴	<u>1,155</u>	<u>1,595</u>	<u>440</u>
Subtotal for Other Crops	3,651	5,965	2,314
Contingency ⁵	--	<u>4,756</u>	<u>4,756</u>
TOTAL	62,539	62,408	--
TOTAL, Excluding Beef/Cattle	<u>44,339</u>	<u>52,318</u>	<u>7,979</u>

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TOTAL, Excluding Beef/Cattle	<u>44,339</u>	<u>52,318</u>	<u>7,979</u>

**Table 5.— LESA AGRICULTURAL ACREAGE REQUIREMENTS,
CITY AND COUNTY OF HONOLULU: 1983 AND 1995
(continued)**

1. Includes marginal grazing and pasture lands. The 1983 figure includes arid zones and other areas having low carrying capacity, while the 1995 figure does not.
2. Often includes land in a holding operation awaiting discovery of profitable uses.
3. Includes some pasture.
4. Overstated in that the acreage figures are for harvested acres, rather than for the amount of land required (i.e., the acreage requirements for a crop harvested twice a year should be halved).
5. Based on 10% of all acreage other than that for beef/cattle. This contingency amounts to double counting in that the LESA projections are already high. Also, the contingency figure allows for an additional 17,770 acres for expansion of sugarcane, even though the sugar industry is expected to decline, not expand.

Many of the lands freed, to be freed, or which can be freed from sugar and pineapple production have excellent agricultural qualities and climatic conditions, and are well-suited for a variety of crops. Also, water is available for most of these lands, particularly those lands which have been freed from sugar production.

Additional lands which have been made available for diversified agriculture are in government-sponsored agricultural parks throughout the State. Lands for agricultural activities which do not require prime agricultural land include pasture land, land for livestock operations, and "unique" lands as classified by ALISH (see page 3). Unique lands are not prime agricultural lands, but are important lands for certain crops, the principal examples are the coffee lands in Kona, and certain lava lands in Puna which are particularly well-suited for growing papaya. The supply of unique lands is quite large and is distinct from the supply of prime agricultural lands.

Availability of Land to Small-Scale Farmers

Even though considerable agricultural land exists in the State, small agricultural parcels are seldom available to small-scale farmers under long-term leases because land-use regulations and the political environment make it unprofitable and too risky to the landowner to lease out small farm parcels. Agricultural use constitutes a low-value use of the land and, correspondingly, farmers pay relatively low lease rents. At the same time, in order to rent land to small-scale farmers, landowners are required to subdivide the property. Applicable County subdivision regulations (designed for rural estates) require expensive electrical power, paved rather than gravel roads, and buried rather than surface water lines. Thus the combination of low rents and expensive subdivision requirements makes it unprofitable for the landowner to subdivide land into parcels for small farms. For example, rather than developing the State agricultural park in Kahuku, it would have been—as surprising as it may seem—less expensive for the State to give each farmer in the park \$100,000.¹³

In addition, there is the risk that when the leases expire, small-scale farmers will turn to the Legislature in an attempt to prevent landowners from raising lease rents, or to prevent landowners from evicting them in favor of a higher and more profitable use of the landowner's land—this often occurs in long-term leases for land on which small-scale farmers have built homes (e.g., Waihole-Waikane, Kona, Waianae, Kalama Valley). Such an economic environment favors leases to large-scale operators (including cooperatives consisting of many small-

13. This is based on 220 usable acres divided into 24 lots, a land cost to the State of \$50 per acre per year; improvement costs of \$3.4 million for developing the farm plots (electric power, roads, etc.); rents received from farmers of \$300 per acre per year; an 8-percent discount rate based on State bonds; and a 30-year term for the bond and the lease. Improvements are not to County standards.

6,600 acres on Oahu and 20,700 on the Neighbor Islands).⁹⁻¹¹ In addition, Hamakua Sugar Co., Inc. has announced that it will sell 8,000 acres of land on the Big Island in order to reduce its debt; Ka'u Agribusiness Co., Inc. has announced that it will contract operations by 4,200 acres; McBryde Sugar Co., Ltd. is converting 5,000 acres of its sugarcane land to diversified agriculture; The Lihue Plantation Co., Ltd. has announced plans to contract operations by over 3,300 acres; and Dole Pineapple has announced plans to phase out its 7,000-acre pineapple operation on Lanai. Also, in order to accommodate urbanization, Oahu Sugar Co., Ltd. and Pioneer Mill Co., Ltd. are in the process of gradually contracting operations by about 4,000 acres and 1,400 acres, respectively. Total acreage released from plantation agriculture in Hawaii since 1968, or scheduled to be released by the year 2000, amounts to over 120,000 acres. This is about 4.7 times the 25,644 acres in sugarcane on Oahu in 1988, and more than the entire acreage in sugarcane on Kauai, Oahu, and Maui.¹²

Much of the land which has been freed from sugar and pineapple production has been or is scheduled to be converted to urban, diversified-agriculture, and aquaculture uses. After making allowances for these conversions, uncommitted acreage which remains available to diversified agriculture and aquaculture amounts to many tens of thousands of acres. Much of this land is fallow, in pasture, or in some other low-value land-holding operation.

The Statewide supply of prime agricultural land that is fallow may increase given the real possibility of future sugar plantation closings. Some of Hawaii's sugar plantations are unprofitable but remain in operation today only because they are committed to lease and/or energy contracts which make closing prohibitively expensive. However, these contracts will eventually come to an end.

Furthermore, a portion of the sugarcane land is in holding awaiting the discovery of profitable replacement activities; this land forms part of the supply of prime agricultural land available to profitable diversified-agriculture crops. Also, the greater the success of large-scale diversified agriculture, the greater the amount of land which will be released for diversified agriculture. Recent examples of sugarcane land being released for other crops include: macadamia nut orchards on land released from Mauna Kea Agribusiness Co., Inc.; macadamia nut and citrus orchards on land released from Ka'u Agribusiness Co., Inc.; macadamia nut orchards and pineapple operations on land released from Wailuku Agribusiness Co., Inc.; coffee orchards on land released by McBryde; seed corn and nursery operations on land released from HC&S; and seed corn operations on land released from Kekaha Sugar Co., Ltd.

9. Hawaiian Sugar Planters' Association, *Hawaiian Sugar Manual 1988*.

10. Hawaii Agricultural Statistics Service, *Statistics of Hawaiian Agriculture 1987*.

11. Robert C. Schmitt, *Historical Statistics of Hawaii*.

12. Hawaiian Sugar Planters' Association, *Hawaiian Sugar Manual 1989*, Honolulu, Hawaii.

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scale farmers), short-term and illegal leases of unsubdivided land, subdivision of the land into rural estates for sale to buyers who can afford the costs of the subdivision requirements, or leaving the land fallow.

In summary, the shortage of small parcels of land for farmers is a serious problem. Nevertheless, a vast supply of prime agricultural land does exist and is available for those profitable diversified agriculture activities that are large in scale, or for which the subdivision requirements are somehow circumvented.

Outlook for Diversified Agriculture

Based on the above assessment, ample prime agricultural land will be available to easily accommodate the Statewide requirements of diversified agriculture. This conclusion derives from the following: (1) a vast amount of prime agricultural land and water is available Statewide, having been freed from sugar and pineapple production in recent years; (2) it is very possible that additional sugarcane acreage and water will be freed, given the existence of unprofitable sugar operations; (3) some, if not most, of the sugar operations would make their lands available for profitable replacement crops to the extent that such crops exist; and, in contrast, (4) land requirements for diversified agriculture are surprisingly modest. In other words, the limiting factor is not the *land supply*, but rather the *market demand* for those crops that can be *grown profitably* in Hawaii and, for small farms, *expensive subdivision requirements*. The proposed Ewa Marina, Phase II involves too little land to affect this conclusion, and would therefore not affect adversely the Statewide growth of diversified agriculture.

Consistency with Overseas Long-Term Trends

The increased availability of prime agricultural land in Hawaii compared to that of prior decades results from some very long-term and accelerating trends that are occurring throughout the United States, Europe, and many developed and developing market economies.¹⁴ For example, U.S. farmers are paid by the government not to farm their land. This has resulted in 30 million acres of agricultural land lying fallow in 1984.¹⁵ In Europe, quotas are used to limit production. The principal agricultural problem has been overproduction, which has occurred as a result of the tremendous success of increasing yields, coupled with a slowing of the population growth rate. Because yields increase faster than population growth, resources must be freed gradually from agriculture in order to maintain balanced markets, and to increase income to the farmers who remain. Otherwise agricultural products glut the market; this is followed by low prices, a decline in farmers' income, and bankruptcies.

14. Dvoskin, Dan, "Excess Capacity and Resource Allocation in Agriculture, 1940-1985," *Agricultural Outlook*, U.S. Department of Agriculture, Economic Research Service, October 1986.

15. Norman E. Borlaug and Christopher R. Dowsell, "World Revolution in Agriculture."

Table 6.-- **SELECTED STATE AND COUNTY OBJECTIVES,
POLICIES, AND GUIDELINES RELATED
TO AGRICULTURAL LANDS**

HAWAII STATE PLAN (Chapter 226, Hawaii Revised Statutes, as amended):

Section 226-7 Objectives and policies for the economy--agriculture.

- (a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:
 - (1) Continued viability in Hawaii's sugar and pineapple industries.
 - (2) Continued growth and development of diversified agriculture throughout the State.
- (b) To achieve the agricultural objectives, it shall be the policy of the State to:
 - (6) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.

Section 226-103 Economic priority guidelines.

- (c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:
 - (1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.
- (d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:
 - (1) Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.

Section 226-104 Population growth and land resources priority guidelines.

- (b) Priority guidelines for regional growth distribution and land resource utilization:
 - (2) Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

CONSISTENCY WITH STATE AND COUNTY PLANS

The proposed Ewa Marina, Phase II (1) would conform to the planned contraction of OSCo, with the subject lands being far removed from the core of the plantation which OSCo plans to retain for its long-term survival; (2) would not adversely affect any existing diversified agricultural activities; (3) would not affect the amount of land available for diversified agriculture; (4) would not limit the growth of diversified agriculture since, in other parts of the State, far more agricultural land has been released from plantation agriculture than has been absorbed by other activities; and (4) would contribute to the economy, including the addition of a number of agricultural-type jobs. In view of these findings, the project would not conflict with the major thrust of the Hawaii State Plan, the State Agriculture Functional Plan, and the General Plan of the City and County of Honolulu. This thrust in all three plans calls for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture (see Table 6). To accomplish this, an adequate supply of agriculturally suitable lands and water must be assured. The thrust of these plans is not to preserve prime agricultural lands simply for the sake of preserving them—preservation is to occur only if a potential need for these agricultural lands exists.

However, about one-third of the project would conflict with the lower-level State agricultural guidelines which call for Agricultural Lands of Importance to be protected from development.

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POLICIES, AND GUIDELINES RELATED
TO AGRICULTURAL LANDS**
(continued)

STATE AGRICULTURAL FUNCTIONAL PLAN (June 1985)

(Functional plans are guidelines for implementing the State Plan, and are not adopted by the State Legislature.)

- B. Objective: Achievement of Productive Agricultural Use of Lands Most Suitable and Needed for Agriculture.
 - (5) Policy: Provide greater protection to agricultural lands in accordance with the Hawaii State Constitution.
 - (c) Implementing Action: Identify important agricultural lands to promote diversified agriculture, increased agricultural self-sufficiency, and assure the availability of agriculturally suitable lands.
 - (d) Implementing Action: Until standards and criteria to conserve and protect important agricultural lands are enacted by the Legislature, important agricultural lands should be classified in the State Agricultural District and zoned for agricultural use, except where, by the preponderance of the evidence presented, injustice or inequity will result or overriding public interest exists to provide such lands for other objectives of the Hawaii State plan.

**CITY AND COUNTY OF HONOLULU
GENERAL PLAN, Objectives and Policies (Resolution No. 87-211)**

Economic Activity

- Objective C. To maintain the viability of agriculture on Oahu.
 - Policy 4. Provide sufficient agricultural land in Ewa, Central Oahu, and the North Shore to encourage the continuation of sugar and pineapple as viable industries.
 - Policy 5. Maintain agricultural land along the Windward, North Shore, and Waianae coasts for truck farming, flower growing, aquaculture, livestock production, and other types of diversified agriculture.

TRAFFIC IMPACT ASSESSMENT REPORT

for

EWA MARINA PHASE II

Ewa, Oahu, Hawaii

TMK: 9-1-12: Portions 5 & 6 and Parcel 23

January 21, 1991

Prepared for:

Haseko (Hawaii), Inc.

Prepared by:

Pacific Planning & Engineering, Inc.

1221 Kapiolani Boulevard, Suite 740

Honolulu, Hawaii 96814

U.S. Department of Agriculture, Soil Conservation Service in cooperation with The University of Hawaii Agricultural Experiment Station, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai*, State of Hawaii, Washington, D.C., August 1972.



APPENDIX C

Traffic Impact Assessment Report

Prepared by Pacific Planning & Engineering, Inc., January 21, 1991

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EXECUTIVE SUMMARY

Pacific Planning & Engineering, Inc. (PPE) was engaged to undertake a traffic impact study to identify and assess future traffic impacts caused by the proposed Ewa Marina Phase II development. This Report identifies and evaluates the probable impacts of traffic generated by the proposed development in the year 2002 when the project is expected to be completed and occupied.

Introduction

The Ewa Marina is a master planned recreation-oriented development in the Ewa region on approximately 1,100 acres of land. The community would include single and multi-family residential units, a 1,600 slip marina, two resort hotels and a resort condominium, a championship tennis club, 27-hole golf course, and a variety of commercial centers to support the residents of the community. This development will create jobs in hotel or resort-type operations in the Ewa area.

Development of the Ewa Marina community is planned in two phases. The first phase will develop portions of the community in the marina area while facilities for the resort and its activities will be developed in the second phase.

Phase I includes the development of 4,850 residential units and 1,600 slip marina on approximately 727 acres. Phase I is in the process of obtaining the necessary government approvals to begin construction and is expected to be completed by 2009. A traffic study on the impacts of this phase was completed in March 1986 by Kaku Associates.

EXECUTIVE SUMMARY

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Project Description

HASEKO (Hawaii), Inc. is proposing to develop Ewa Marina Phase II as an employment and commercial center on 389 acres of land. The development is expected to be completed and operational by the year 2002.

The commercial center will consist 50,000 square feet of retail shops, professional offices, theme restaurants and marina related establishments including a yacht club located next to the marina. The 60,000 square foot International Fitness Promotion Center will be a full-featured fitness and conditioning center which will focus on the corporate market.

The visitor complex will consist of a 500 room hotel, a 400 room facility to accommodate users of the International Fitness Center, and a 600 unit garden suite condominium development. The visitor complex will include an exhibition center and related conference facilities and a championship tennis facility. A major portion of the land area of the project will be used to develop an 27-hole golf course which will cover 272 acres.

Methodology

Analysis was conducted for three intersections along Fort Weaver Road to determine the relative impact of the proposed project on the local roadway system. The intersections under study are as follows:

- Fort Weaver Road and Access Road "A"
- Fort Weaver Road and Access Road "B"
- Fort Weaver Road and Hanakahi Road

PROJECT DESCRIPTION

HASEKO (Hawaii), Inc. is proposing to develop Ewa Marina Phase II as an employment and commercial center. The Phase II development is located on 389 acres of land. Figure 1 shows the project location and the roadway network in the vicinity.

Phase II is planned as the commercial component of the Ewa Marina community. Figure 2 shows the general site plan of Phase II. The following land uses and their acreage are being proposed for Phase II.

Table 1. Land Uses for Ewa Marina Phase II Project

<u>Land Use</u>	<u>Acres</u>
600 Visitor Condominium	24
International Fitness Promotion Center (incl. accommodations for 400)	19
Hotels (500 units)	26
Theme Retail and Restaurant Complex	8
Tennis and Yacht Club	10
Parks	17
27 Hole Golf Course	272
Common Area Amenity	6
Roads, Streets, Utilities	<u>21</u>
Total Acres	403

The commercial center will consist of retail shops, professional offices, theme restaurants and marina related establishments including a yacht club located next to the marina.

2. Provide traffic signals at three locations; the intersection of Roads A and B with Fort Weaver Road, and the intersection of Road A and Road C within the Ewa Marina Phase I development.

The 7,000 dwelling units proposed by Ewa Gentry, north of Ewa Marina, is also expected to have a major traffic impact on Fort Weaver Road. Parsons, Brinkerhoff, Quade and Douglas' 1987 traffic assessment report for the Ewa Gentry project recommends a four-lane north-south road between the Gentry project and H-1 Freeway with a major interchange at the intersection with the H-1 Freeway, by the Year 1995.

Because of major developments planned for the Ewa region, the State Director of Transportation imposed a requirement for an Ewa Region Highway Master Plan to determine future arterial road. The State Department of Transportation has formed a Working Group, which includes the City Department of Transportation Services, major developers of the Ewa Region (including Haseko), Campbell Estate and other State and City Planning agencies. The purpose of this Working Group is to identify future roadway needs and participate in the fair share costs to implement the required improvements for the Ewa Region. It is recommended that the results of the joint effort by the Developers, including Haseko, to develop a coordinated Master Plan be adopted for road improvements.

Assuming that all of the roadway improvements recommended by Kaku Associates and Parsons, Brinkerhoff, Quade and Douglas are implemented, no other mitigating actions are necessary, even with the Ewa Marina Phase II project.

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The commercial center will consist of retail shops, professional offices, theme restaurants and marina related establishments including a yacht club located next to the marina.

The International Fitness Promotion Center will be a structure containing 60,000 square feet of floor space. It will be a full-featured fitness and conditioning center which will focus on the corporate market. The specific facilities within the center include aerobic and exercise studios, fully equipped weight rooms, raquetball, handball, and other similar courts, swimming pools and a health food restaurant.

The visitor complex will consist of a 500 room hotel, a 400 room facility to accommodate users of the International Fitness Center, and a 600 unit garden suite condominium development. The visitor complex will also include an 8,000 square feet exhibition center and related conference facilities and a championship tennis facility comprised of 10 courts and an 18,000 square feet clubhouse.

A major portion of the land area of the project will be used to develop an 27-hole golf course which will cover 272 acres.

EXISTING CONDITIONS

An inventory of existing conditions was conducted to better ascertain the potential traffic impact of the proposed project. The review included the land uses in the area, roadway facilities, and existing traffic conditions.

Land Uses

The project site is presently being used for agricultural purposes. Adjacent to the project site at the corner of Fort Weaver Road and Papipi Road is the Ewa Beach Shopping Center. The Ewa Beach community is located southeast of the project site while Barbers Point Naval Air Station is to the west.

Much of the land to the north is currently in sugar cane production. Further north, towards the H-1 Freeway, the residential developments such as Soda Creek, Palm Villas, and West Loch Estates are either completed or currently under construction. Directly south of the project site is the Pacific Ocean.

Roadway Facilities

Presently, the only road to the project and the Ewa Beach community is Fort Weaver Road. Fort Weaver Road extends from Ewa Beach in the south to Farrington Highway in the north. Figure 1 shows the roadway network in the vicinity of the project site.

Fort Weaver Road is the major north-south roadway in the east Ewa region. It is a four-lane road from the Farrington Highway interchange to

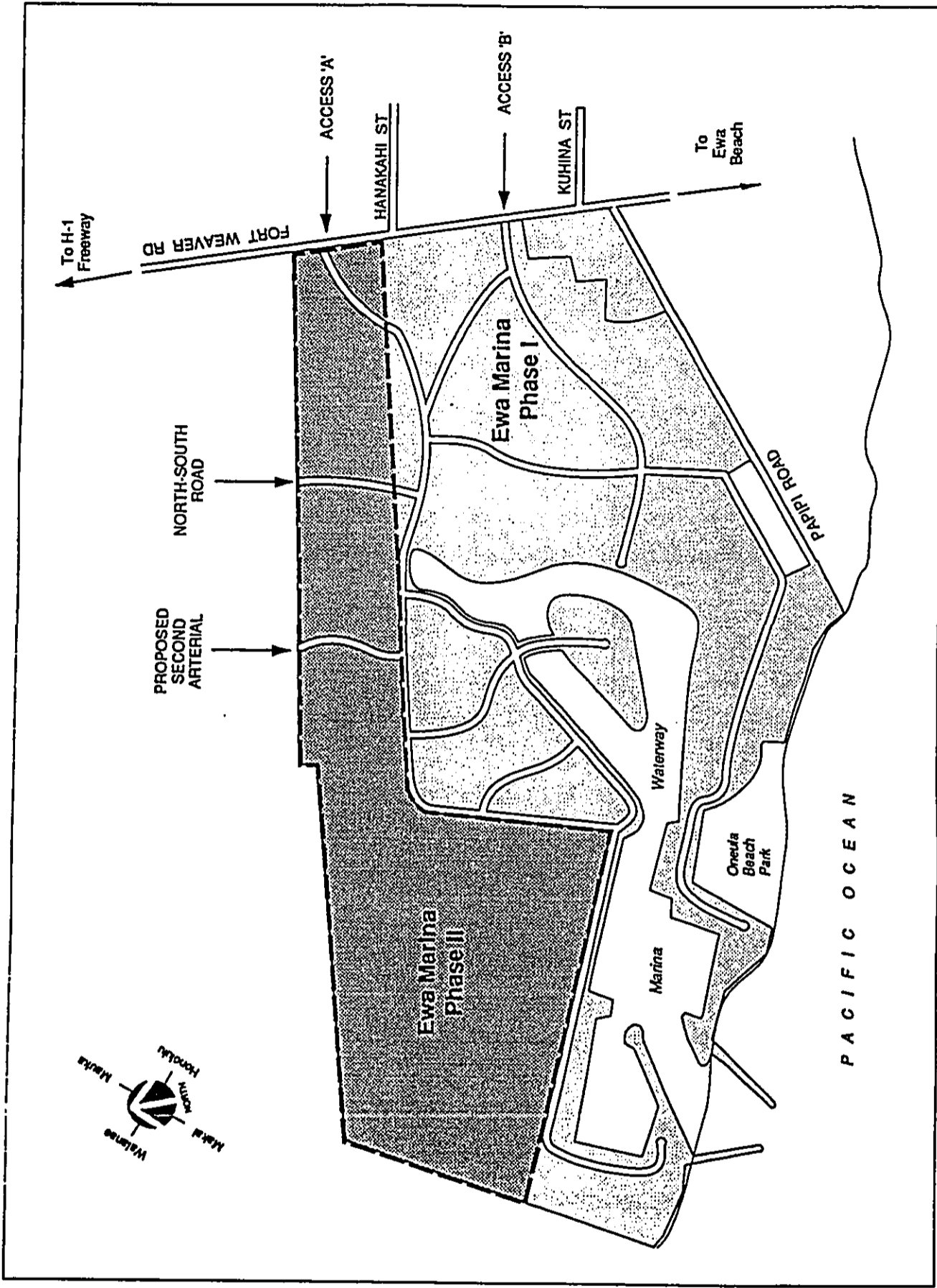


Figure 2. Site Plan

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Roadway Facilities

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Fort Weaver Road is the major north-south roadway in the east Ewa region. It is a four-lane road from the Farrington Highway interchange to

Hanakahi Street in the south. The posted speed limit varies from 35 to 45 miles per hour (mph).

From Hanakahi Street to Ewa Beach, Fort Weaver Road is a two-lane undivided rural collector road which is currently being widened into a four-lane divided highway. The widening of Fort Weaver Road is expected to be completed by early 1992. The posted speed limit for this portion of the road is 25 mph.

Traffic Conditions

A review of 1989 State Department of Transportation (DOT) traffic count data for stations 11-N (Fort Weaver at Kuhina Street), 11-P (Fort Weaver at Hanakahi Street), and 11-R (Fort Weaver at Papipi Road) indicated that the morning peak hour traffic generally occurs between 7:00 and 8:00 am and the afternoon peak hour between 3:00 and 4:45 pm, respectively.

Manual traffic counts were taken for the intersection of Fort Weaver Road at Hanakahi Street and Papipi Road on January 8, 1991 from 6:30 to 8:00 am and 3:00 to 5:00 pm. Manual counts were taken of passenger cars, trucks, buses, motorcycles and pedestrians by turning movements and approaches. The present counts were used as a baseline upon which future estimated traffic volumes were added. Figures 3 and 4 depict the present volumes and movements of traffic at the Fort Weaver Road-Hanakahi Street and Fort Weaver-Papipi Road intersections.

When the counts were taken, work was on-going to widen Fort Weaver during the hours of 8:30 am to 3:00 pm. Since the construction work did not require the closing of lanes and the work hours were generally outside of the peak traffic hours, the effect of the construction work on the traffic

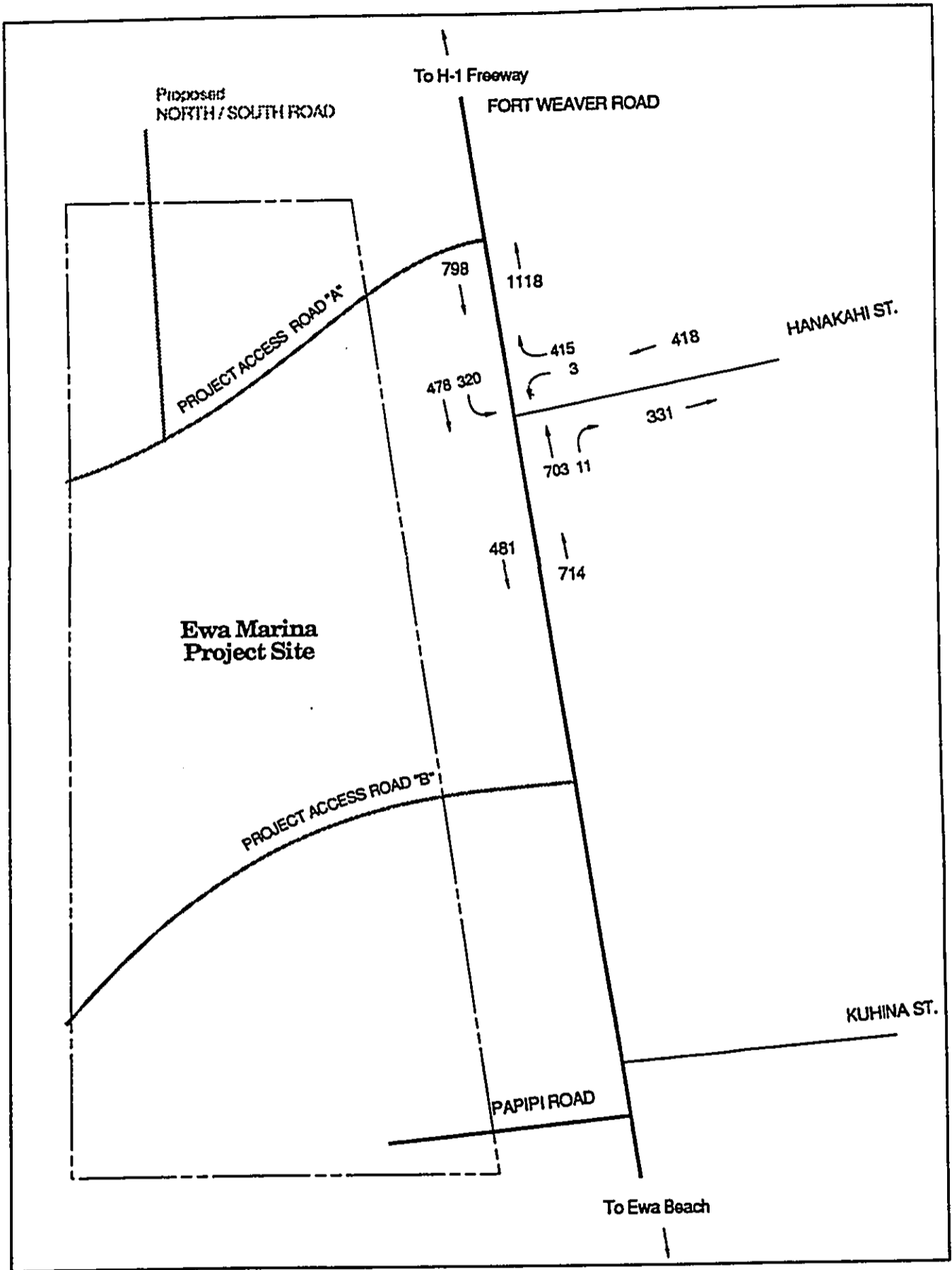


Figure 3. Existing Morning Peak Hour Traffic Volumes

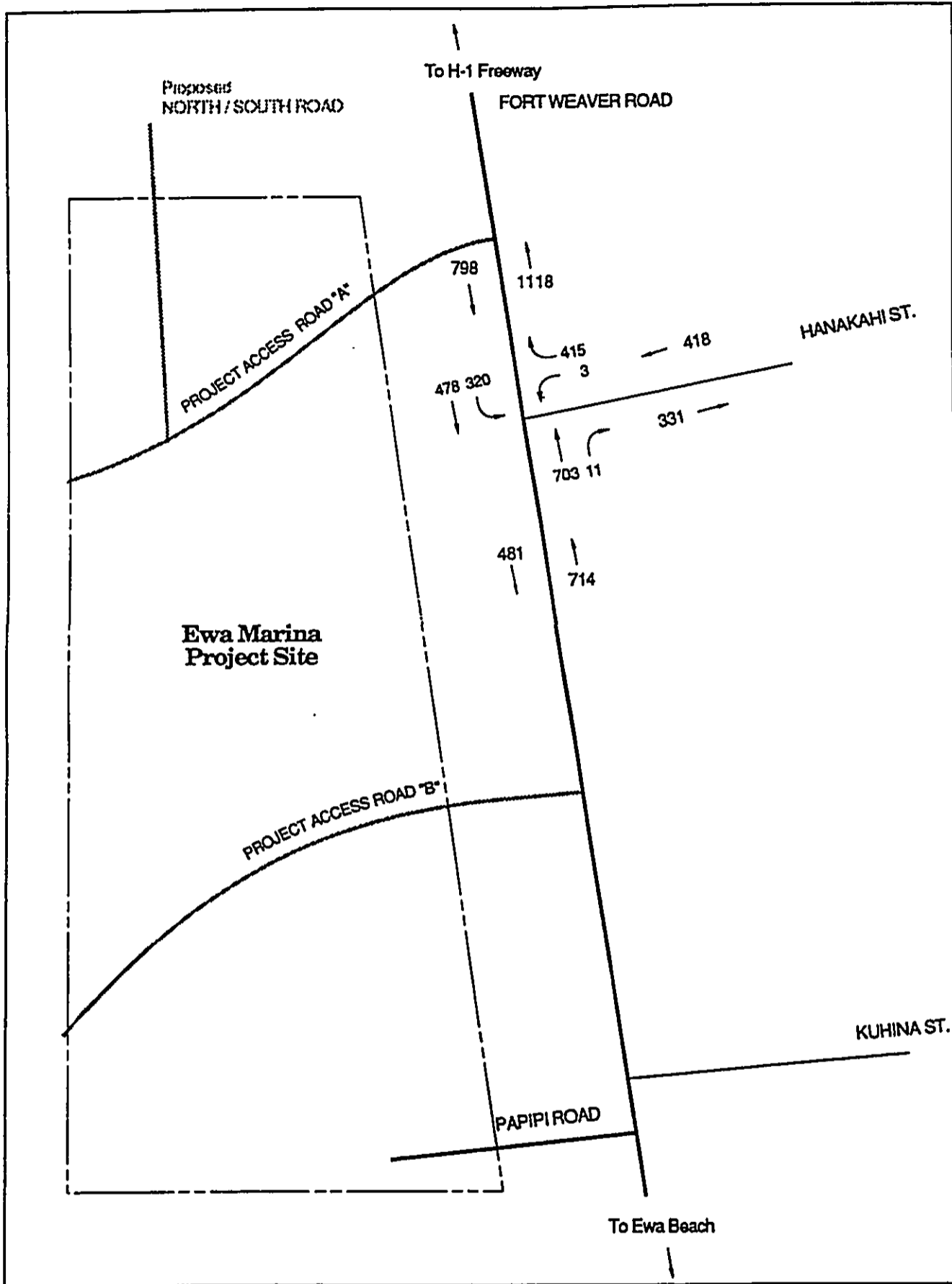


Figure 3. Existing Morning Peak Hour Traffic Volumes

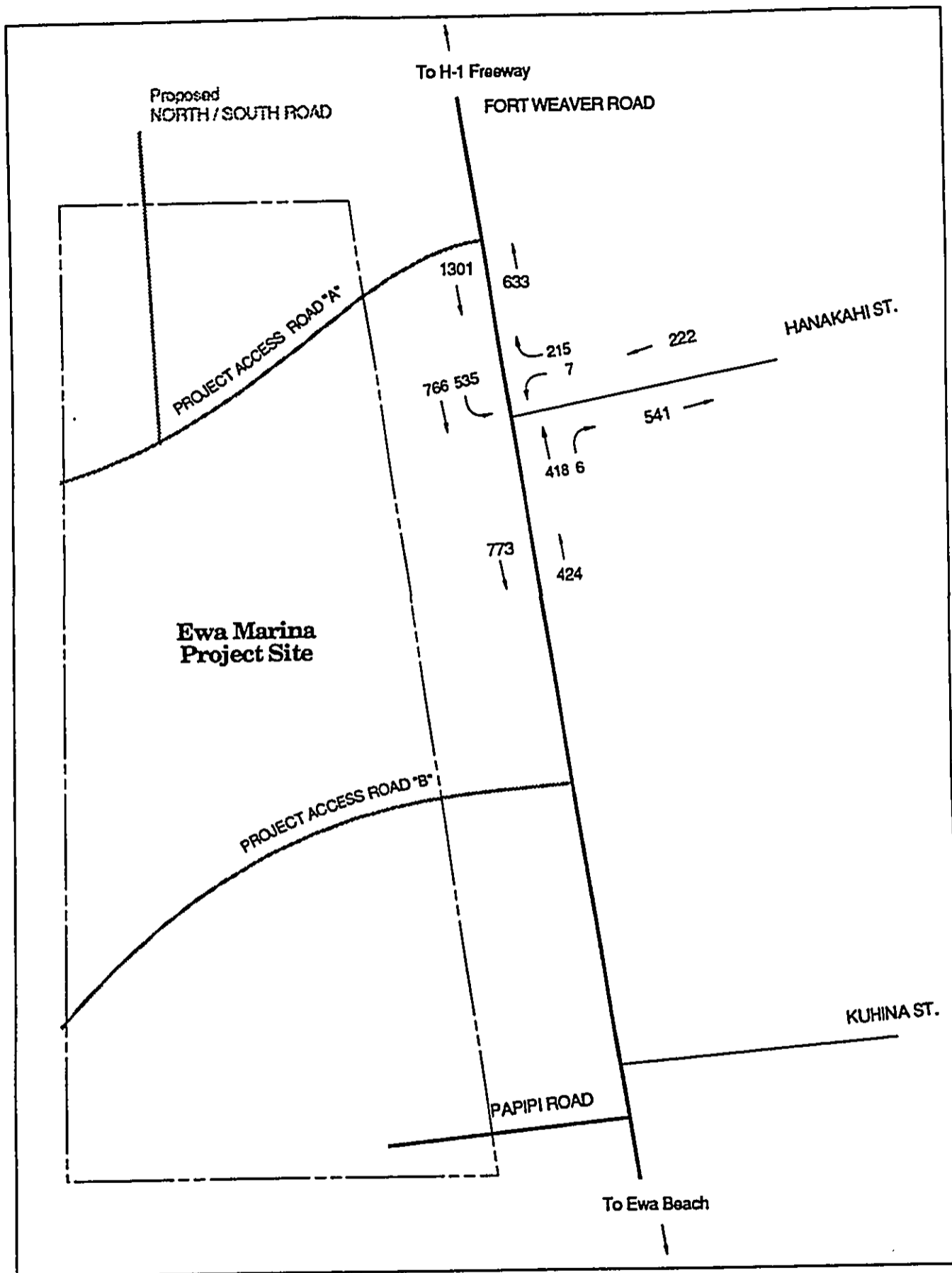


Figure 4. Existing Afternoon Peak Hour Traffic Volumes

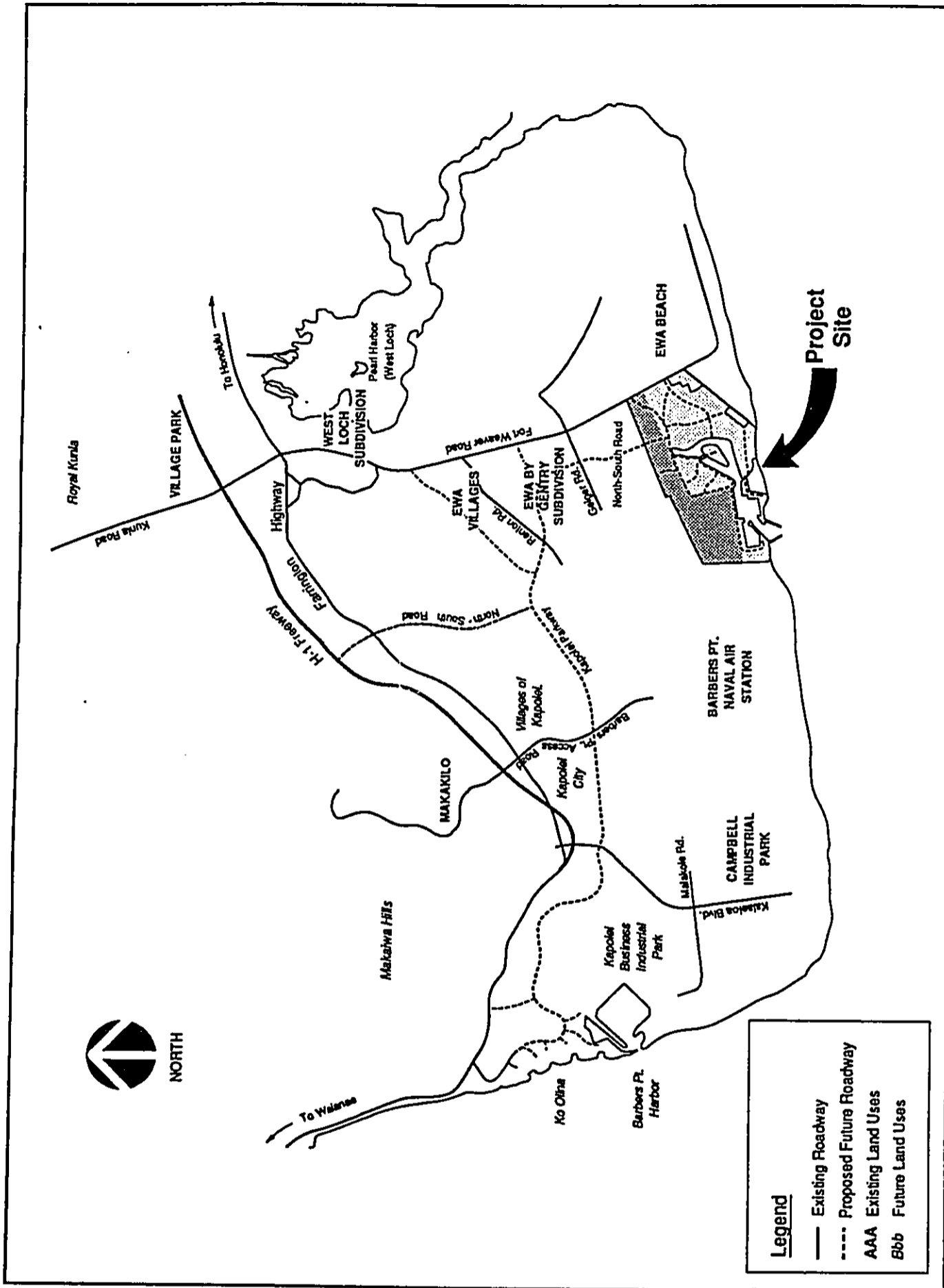


Figure 5. Roadway Network

The Ewa Region Highway Master Plan is being developed to identify roadway system improvements necessary to accommodate forecasted future traffic and allocate the cost for improvements to the developers in the region.

Based on current developer plans in the region, highway improvements such as a North-South Road and Kapolei Parkway were assumed to be built by the year 2002. Figure 5 shows the proposed roadways that were assumed to be completed by 2002.

The North-South Road would extend to the north from Ewa Marina through the Gentry development and connect up to Farrington Highway and the H-1 Freeway. Above the Gentry development, the North-South Road will connect to the proposed Kapolei Parkway which would take traffic to Kapolei City and Campbell Industrial Park.

Future Intersection Improvements

Improvements to the existing intersection of Ft. Weaver Road with Hanakahi Street is currently under construction and expected to be completed by 1992. Based upon available information, the State Department of Transportation plans to signalize the intersection and provide a left-turn storage lane.

Future improvements to the study intersections of Ft. Weaver Road with Project Access Roads A and B are planned and are expected to be completed by 2002. Based upon a traffic study conducted for Ewa Marina Phase I by Kaku Associates the following improvements were recommended:

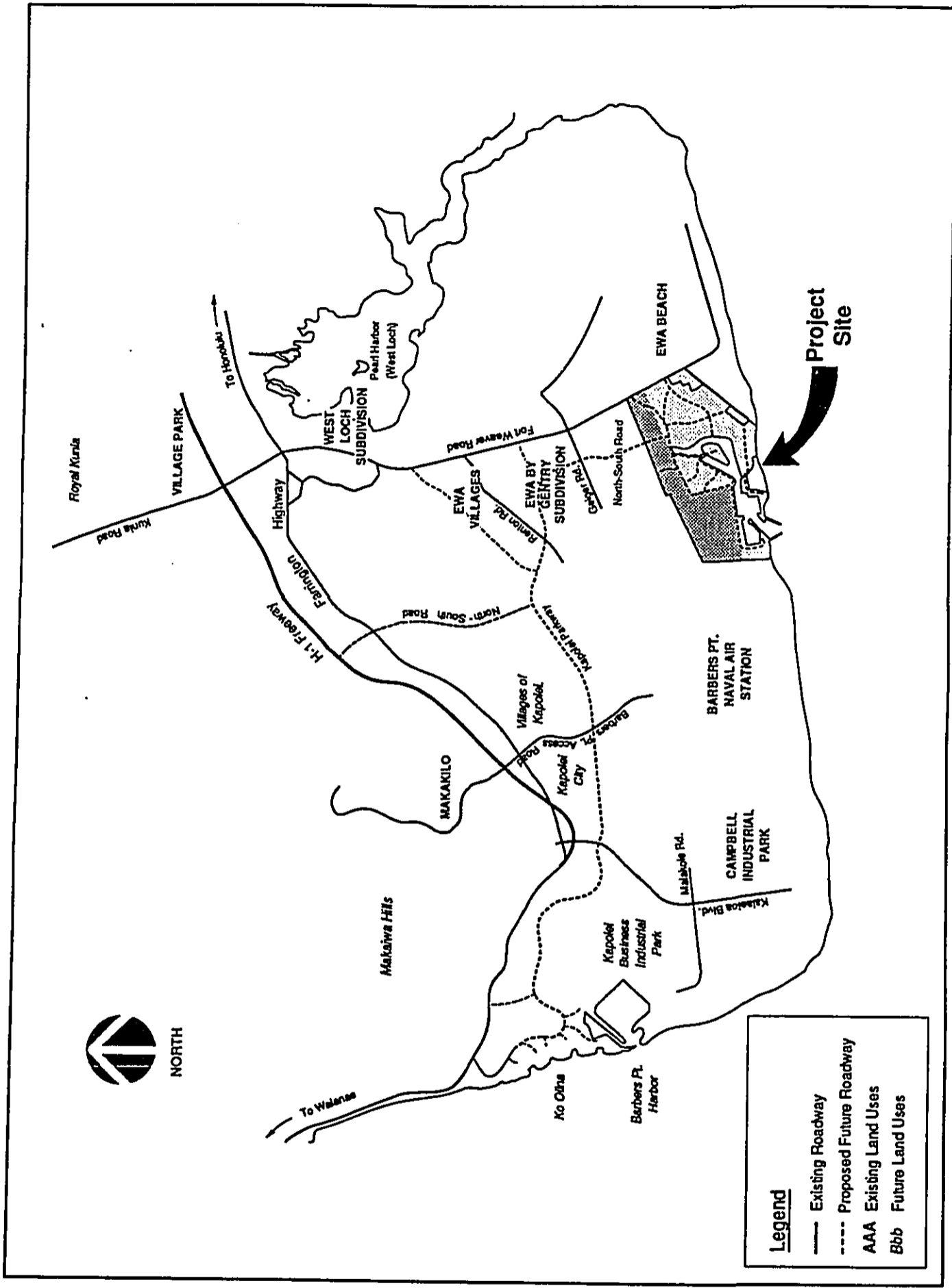


Figure 5. Roadway Network

1. Provide double left-turn lanes out of the Ewa Marina project site at both access points on Fort Weaver Road, with separate left-turn and right-turn lanes on Fort Weaver Road itself for southbound traffic and left-turn lanes for northbound traffic at these two intersections.

2. Provide traffic signals at the intersections of both access roads with Fort Weaver Road.

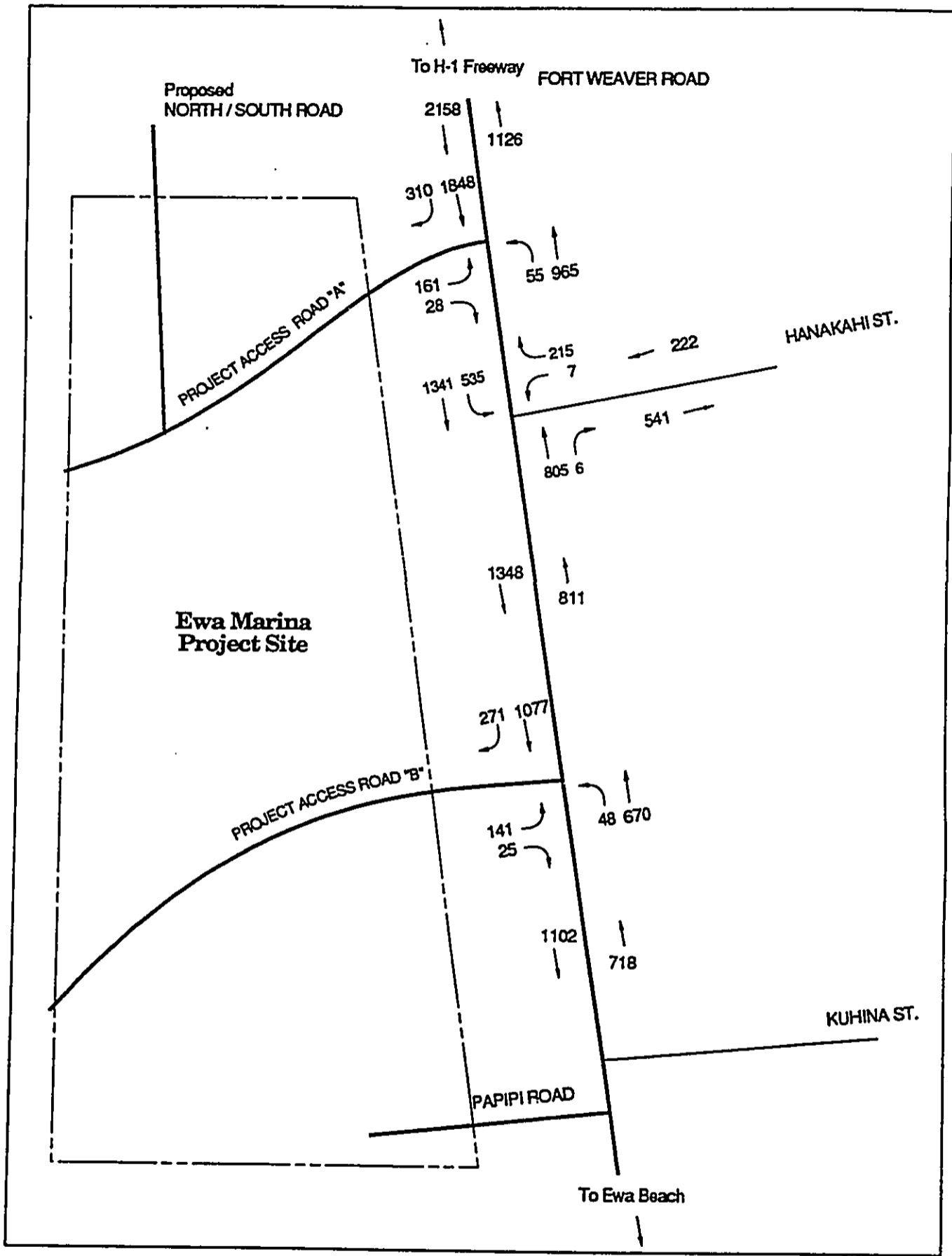


Figure 7. 2002 Forecast Afternoon Peak Hour Traffic Without Project

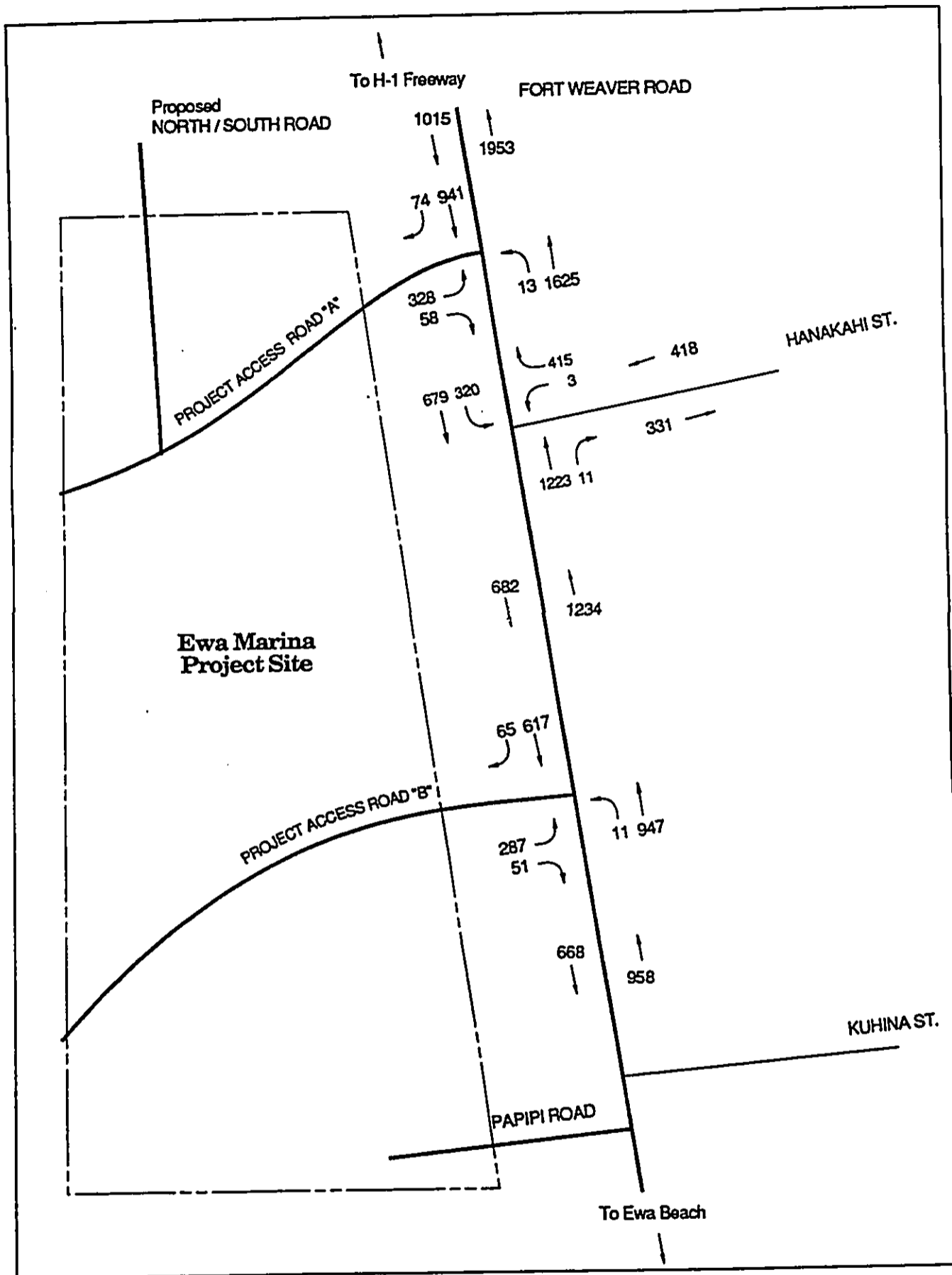


Figure 6. 2002 Forecast Morning Peak Hour Traffic Without Project

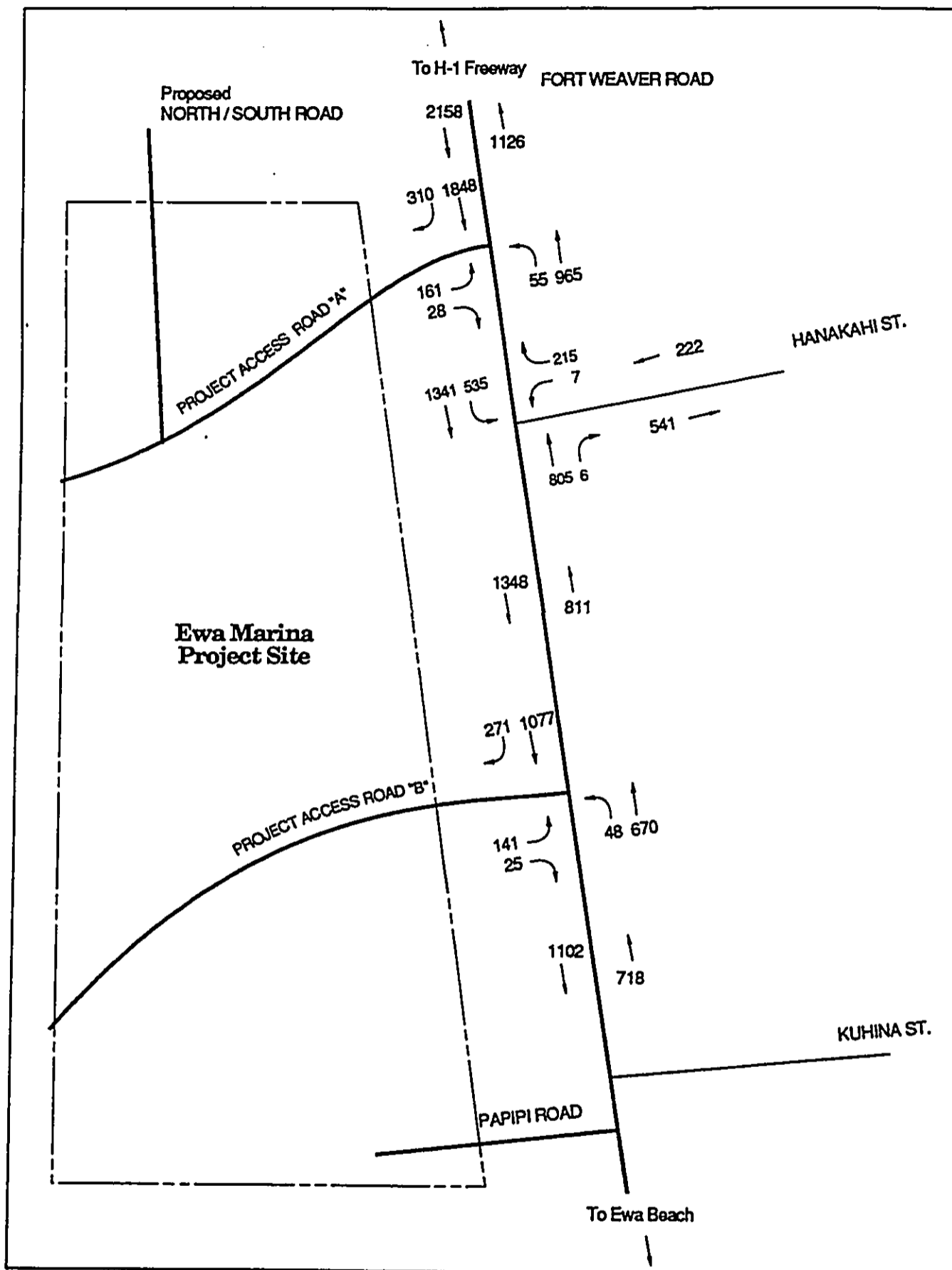


Figure 7. 2002 Forecast Afternoon Peak Hour Traffic Without Project

Table 2. Trip Generation for Future Developments

<u>Land Use</u>	<u>Quantity</u>	<u>unit</u>	<u>Morning Peak Hour</u>		<u>Afternoon Peak Hour</u>	
			<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Ewa Marina Phase I						
Single-Family	737	DU	147	405	464	273
Residential Condominium	4113	units	288	1552	1563	781
Marina	1660	slips	100	50	166	116
Ewa Beach Shopping Center						
Shopping Center	80	1000 sf	107	46	272	283

The trip distribution step assigns trips to their expected origins and destinations. The trips generated by the future developments were distributed based on the distribution of population and employment on Oahu.

The traffic assignment step assign trips to a specific route on the roadway network that will take the driver from origin to destination. Traffic was assigned based on the estimated shortest path of travel time from origins to destinations. Traffic from the Ewa Marina Phase I development was assigned 50% to the North-South Road and 50% to Fort Weaver Road during the morning peak hour and 55% and 45% respectively during the afternoon peak hour. 100% of the traffic from the Ewa Beach Shopping Center was assigned to Fort Weaver Road. The trip distribution and assignment for these projects are summarized in Table 3.

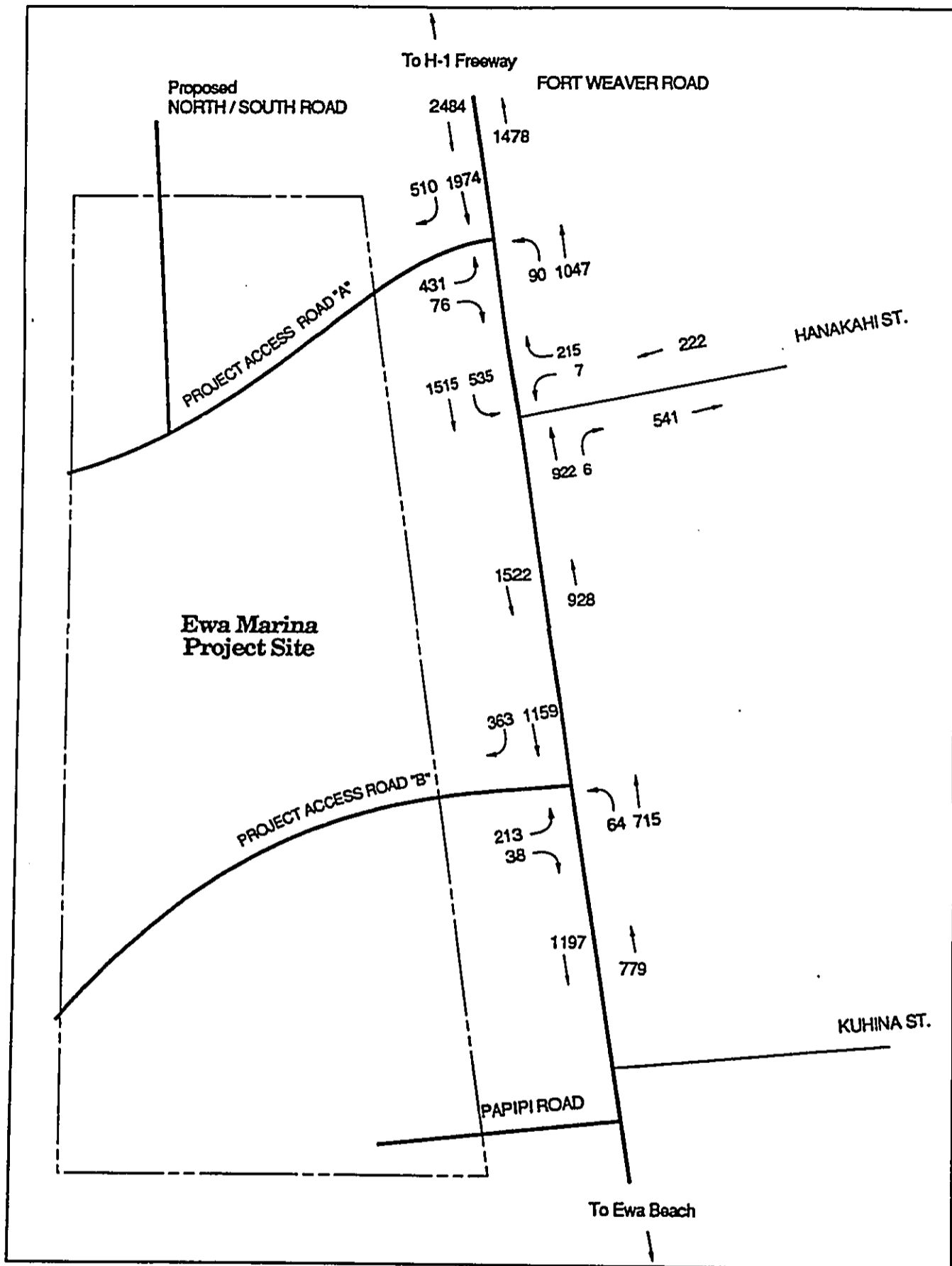


Figure 9. 2002 Forecast Afternoon Peak Hour Traffic With Project

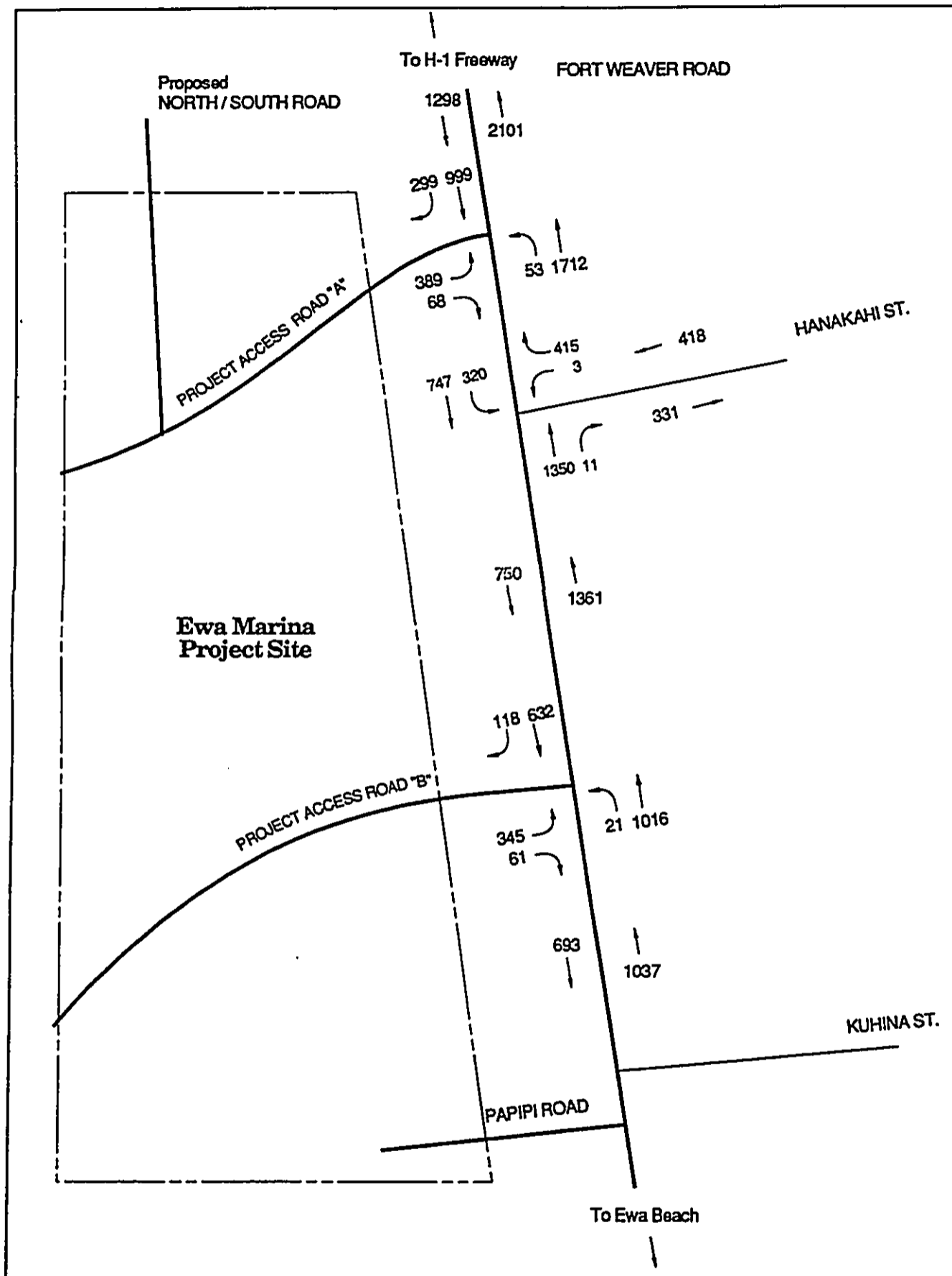


Figure 8. 2002 Forecast Morning Peak Hour Traffic With Project

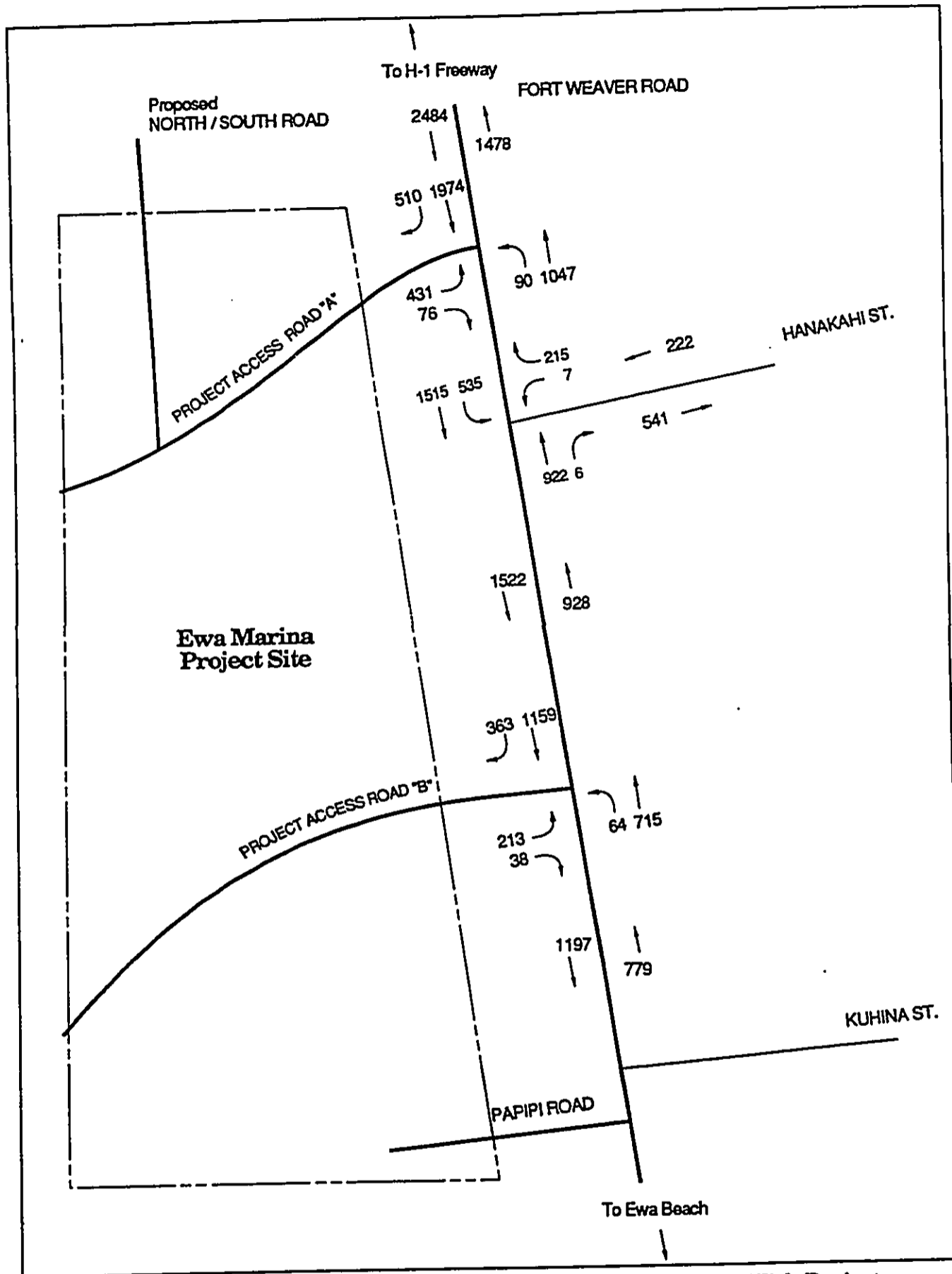


Figure 9. 2002 Forecast Afternoon Peak Hour Traffic With Project

Table 4. Trip Generation for Ewa Marina Phase II

<u>Land Use</u>	<u>Quantity</u>	<u>unit</u>	<u>Morning Peak Hour</u>		<u>Afternoon Peak Hour</u>	
			<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Hotels (incl. Fitness and Conference Center Facilities)						
	900	rooms	255	144	189	315
Hotel (Garden Suites)	600	rooms	150	150	126	210
Retail Shops	40	1000 sf	65	65	170	177
Restaurants	44	1000 sf	253	187	342	256
Yacht Club	12	1000 sf	9	1	53	24
Tennis Complex	10	courts	7	7	20	20
Golf Course	272	acres	57	14	8	98
Park	17	acres	<u>8</u>	<u>33</u>	<u>107</u>	<u>36</u>
		Total	774	510	1016	1136

The trip distribution step assigns trips to their expected origins and destinations. Trips to and from the proposed project during the weekday were distributed based on the distribution of population and employment on Oahu. It was estimated that 76% of the traffic generated will be going North, 13% South and 11% will be trapped within the Ewa Marina community during the morning peak hour. During the afternoon peak hour 75% of the project traffic will head North, 13% South and 12% will be trapped within the Ewa Marina community.

Traffic was assigned based on the estimated shortest path of travel time from origins to destinations. Traffic from the Ewa Marina Phase II development was assigned 50% to the North-South Road and 50% to Fort Weaver Road during the morning peak hour and 55% and 45% respectively during the afternoon peak hour. The project trip distribution and assignment are summarized in Table 5.

TRAFFIC IMPACTS ANALYSIS

Analyses were conducted for the study intersections of Ft. Weaver Road with Hanakahi Street and Project Access Roads "A" and "B". The study intersections were analyzed for existing conditions, 2002 forecasts without project, and 2002 forecasts with project traffic conditions. The analysis for forecast traffic conditions were based upon planned improvements to the roadway network.

Analysis Methods

The study intersections were analyzed for both weekday peak hours using methods described in the Highway Capacity Manual (Special Report 209, 1985) for signalized and unsignalized intersections. Impacts resulting from the project were measured by the change in level-of-service (LOS) at the study intersections. Level-of-Service is divided into six categories ranging from LOS A to LOS F. A detailed description of each LOS category for both signalized and unsignalized intersections are provided in Appendix A.

Existing conditions at the intersection of Ft. Weaver Road with Hanakahi Street was analyzed for both peak hours using the methodology for unsignalized intersections. This analysis method is based on the estimated number of vehicle turning movements which could proceed through a conflicting traffic stream. The LOS is determined by the amount of vehicle reserve capacity available for a particular turning movement. A lower amount of reserve capacity indicates a poorer LOS.

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Forecast conditions by the year 2002 without and with the project for the study intersections of Ft. Weaver Road with Hanakahi Street and Project Access Roads "A" and "B" were analyzed using the Operational Analysis method for signalized intersections due to the planned signalization of the study intersections. The operational analysis measures the traffic operational conditions at the intersection in terms of level-of-service (LOS) based upon the average delay per vehicle. Longer delays per vehicle indicate poorer LOS.

Analysis Results

The results of the analysis for existing conditions at the intersection of Ft. Weaver Road with Hanakahi Street for the morning and afternoon peak hours are shown on Table 6.

Table 6. Unsignalized Intersection Analysis Results
Existing 1990 Conditions

<u>Intersection</u>	<u>Turning Movement</u>	<u>Morning Peak Hour</u>	<u>Afternoon Peak Hour</u>
Ft. Weaver Road with Hanakahi Street			
Ft. Weaver Road	LT	C	F
Hanakahi Street	LT	F	F
	RT	F	F

The results of the operational analysis for 2002 forecast conditions at the study intersections are shown on Table 7. The results of the analysis for the intersection of Ft. Weaver Road with Hanakahi Street is based upon information of intersection design plans by the State Department of

Transportation. The analysis for the intersections of Ft. Weaver Road with Project Access Roads "A" and "B" were based upon recommended improvements in the Ewa Marina Phase I traffic study by Kaku Associates. An estimated signal cycle length of 78 seconds was used for the analysis.

**Table 7. Operational Analysis for Signalized Intersections
2002 Forecast Conditions**

<u>Intersection</u>	2002 Without Project		2002 With Project	
	<u>Morning Peak Hour</u>	<u>Afternoon Peak Hour</u>	<u>Morning Peak Hour</u>	<u>Afternoon Peak Hour</u>
FT. WEAVER WITH PROJECT ACCESS ROAD A				
Eastbound (Access Rd. A)	C	C	C	C
Northbound (Ft. Weaver)	B	B	B	B
Southbound (Ft. Weaver)	B	B	B	B
Overall Intersection LOS	B	B	B	B
FT. WEAVER WITH HANAKAHI STREET				
Westbound (Hanakahi)	D	D	D	D
Northbound (Ft. Weaver)	C	C	D	D
Southbound (Ft. Weaver)	B	B	B	B
Overall Intersection LOS	B	B	C	B
FT. WEAVER WITH PROJECT ACCESS ROAD B				
Eastbound (Access Rd. B)	C	C	C	C
Northbound (Ft. Weaver)	A	B	B	B
Southbound (Ft. Weaver)	B	B	B	B
Overall Intersection LOS	B	B	B	B

Study Intersections

Intersection of Ft. Weaver Road with Project Access Road A

- *By 2002 without project*, the intersection will operate at LOS C or better during both weekday morning and afternoon peak hours.
- *By 2002 with project*, the intersection will continue to operate at LOS C or better during both weekday peak hours. The average delays per vehicle will increase slightly.

Intersection of Ft. Weaver Road with Hanakahi Street

- *Presently*, turning movements from Hanakahi Street at this unsignalized intersection experience extremely long traffic delays (LOS F) during both morning and afternoon peak hours. Drivers attempting left-turns from Ft. Weaver Road experience average traffic delays (LOS C) during the morning and extremely long (LOS F) delays during the afternoon peak hour.
- *By 2002 without project*, this intersection will be signalized and operate at LOS D or better during both weekday peak hours.
- *By 2002 with project*, the intersection will generally continue to operate at LOS D or better during both weekday peak hours. Delays per vehicle will increase slightly.

Intersection of Ft. Weaver Road with Project Access Road B

- *By 2002 without project*, the intersection will operate at LOS C or better during both weekday morning and afternoon peak hours.
- *By 2002 with project*, the intersection will continue to operate at LOS C or better during both weekday peak hours. The average delays per vehicle will increase slightly.

CONCLUSIONS AND RECOMMENDATIONS

The proposed Ewa Marina Phase II development project will not have a major traffic impact on Fort Weaver Road based on this study's analysis. However, the Ewa Marina Phase I is expected to have a major traffic impact on Fort Weaver Road.

The Traffic Study conducted for Ewa Marina Phase I by Kaku Associates indicates that despite the widening of Fort Weaver Road to a four-lane divided highway between the H-1 Freeway and Ewa Beach, a second north-south road parallel to Fort Weaver Road may be required between Ewa Marina and the H-1 Freeway by 1995.

The Kaku report also recommends the following improvements:

1. Provide double left-turn lanes out of the Ewa Marina project site at both access points on Fort Weaver Road, with separate left-turn and right-turn lanes on Fort Weaver Road itself for southbound traffic and left-turn lanes for northbound traffic at these two intersections.
2. Provide traffic signals at three locations; the intersection of Roads A and B with Fort Weaver Road, and the intersection of Road A and Road C within the Ewa Marina Phase I development.

The 7,000 dwelling units proposed by Ewa Gentry, north of Ewa Marina, is also expected to have a major traffic impact on Fort Weaver Road. Parsons, Brinkerhoff, Quade and Douglas' 1987 traffic assessment report for the Ewa Gentry project recommends a four-lane north-south road between the Gentry project and H-1 Freeway with a major interchange at the intersection with the H-1 Freeway, by the Year 1995.

Because of major developments planned for the Ewa region, the State Director of Transportation imposed a requirement for an Ewa Region Highway Master Plan to determine future arterial road. The State Department of Transportation has formed a Working Group, which includes the City Department of Transportation Services, major developers of the Ewa Region (including Haseko), Campbell Estate and other State and City Planning agencies. The purpose of this Working Group is to identify future roadway needs and participate in the fair share costs to implement the required improvements for the Ewa Region. It is recommended that the results of the joint effort by the Developers, including Haseko, to develop a coordinated Master Plan be adopted for road improvements.

Assuming that all of the roadway improvements recommended by Kaku Associates and Parsons, Brinkerhoff, Quade and Douglas are implemented, no other mitigating actions are necessary, even with the Ewa Marina Phase II project.

APPENDIX A

LEVEL-OF-SERVICE DEFINITIONS
FOR
SIGNALIZED INTERSECTIONS
AND
UNSIGNALIZED INTERSECTIONS

DEFINITION OF LEVEL-OF-SERVICE
FOR
SIGNALIZED INTERSECTIONS

Level of service for signalized intersections is defined in terms of *delay*. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period.

Level-of-service A describes operations with very low delay, i.e., less than 5.0 sec per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level-of-service B describes operations with delay in the range of 5.1 to 15.0 sec per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level-of-service C describes operations with delay in the range of 15.1 to 25.0 sec per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level-of-service D describes operations with delay in the range of 25.1 to 40.0 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or a high v/c ratios (volume of cars to capacity of intersection). Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level-of-service E describes operations with delay in the range of 40.1 to 60.0 sec per vehicle. This is considered to be the limit of acceptable delay.

These high delay values generally indicate poor progression, long cycle length, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level-of-service F describes operations with delay in excess of 60.0 sec per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

DEFINITION OF LEVEL-OF-SERVICE
FOR
UNSIGNALIZED INTERSECTIONS

For unsignalized intersections, the traffic most impacted will be the minor or cross-street with the stop or yield control. The major roadway will have the right-of-way. The level-of-service is the amount of delay expected for the average vehicle desiring to cross or enter the major road. The following gives a general description of the measure.

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with level-of-service A representing the best operating conditions and level-of-service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is slight decline in the freedom to

maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level-of-service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating

conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level-of-service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)



APPENDIX D

Underground Infrastructure

Prepared by Belt Collins & Associates, November 1989

EWA MARINA PHASE II
UNDERGROUND INFRASTRUCTURE REPORT
WATER - SEWER - DRAINAGE - ELECTRICAL - TELEPHONE

Prepared for
HASEKO (Hawaii), Inc.

Prepared by
Belt Collins & Associates

November 1989

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UNDERGROUND INFRASTRUCTURE

Water - Sewer - Drainage - Electrical - Telephone

Underground Infrastructure

(Water - Sewer - Drainage - Electrical - Telephone)

The underground utility systems consist of the necessary infrastructure to serve all of the Ewa Marina project. These facilities were developed to serve a certain density, unit count if you will, on the Ewa plain. Further, these utility schemes were developed for the whole of the EWA MARINA project and not just the current aspect (Phase II) of this project. Therefore, much of the discussion herein relates to utilities that are sized for all of the Ewa Marina site rather than just this phase (II) of the project. Of importance is the fact that the whole of this project (the already Land Use Commission approved Phase I & the current Phase II application) envisions no change in density. Accordingly, the originally envisioned site elements do not change in overall scheme, nor do they get larger as a result of this phase of the Ewa Marina Development. In essence the overall density of the Ewa Marina project as scoped out in the early 1980's is the same project today relative to infrastructure - it has merely been phased differently, if not modestly reduced in scale.

The essential element of Phase II from the standpoint of infrastructure is the inclusion of a golf course as a land use tool to both buffer the effect of the Airport Installation Compatibility Use Zone (AICUZ) area and provide for a primary drainage transition from the major offsite gulch (Kaioi) to the marina located in Phase I. By way of explanation, the drainage which enters the Marina project comes from an already approved (City & County of Honolulu - Department of Public Works) drainage scheme within the Ewa-Gentry project (the subject of a previously approved Land Use Commission application). Accordingly, the Ewa Marina project has adopted this already approved drainage flow and proposes to pass the required volume through the golf course and into the marina. This was the overall idea for drainage in the region and is being adopted in this phase (II) of Ewa Marina and by extension into the Phase I marina undertaking.

The potable water system for the area (Phase I & Phase II) is a coordinated effort between a variety of developments within the area (from West Beach to Kapolei through Gentry-Ewa and to Ewa Marina) and the Department of Water Supply. The Ewa Plain Water Development Corporation (EPWDC), of which Ewa Marina is a member, is the responsible entity for water development in the area. Both phases of the Ewa Marina project are included in the overall system as currently proposed and approved by the Department of Water Supply.

The irrigation system (non-potable) for the area will come from brackish wells on site. The essential user of this resource will be the golf course. The net effect of the replacement within the Phase II area of golf course for sugar cane will actually reduce the water usage in the area. And, when Phase I cane lands are added (taken out actually) into the equation, a further reduction in overall brackish usage occurs.

The proposed sewage treatment system for the Ewa Marina flows is likewise a municipally operated apparatus that serves more than the Ewa Marina project. The City and County of Honolulu operated Honouliuli Sewage Treatment Plant will be the recipient of the sewage flows from the whole of the region, including that generated by both the already approved Phase I project (the marina and other urban related activity) and Phase II (the proposed golf course and associated site support urban uses).

A more detailed breakdown of the various infrastructure elements follows:

- **Potable Water** - Included as part of this discussion on the potable water system is the EWA WATER MASTER PLAN of August 1987 (latest revision) as approved by the Board of Water Supply on October 15, 1987. This document is the system plan for all users in the area and serves as the guideline for the water consumption expected by the Ewa Marina project. The previously approved Phase I (marina) project estimated a water demand for 4,850 units with Phase II, as originally planned, to add some 2,350 units for a total project demand of 7,200 units. Or, in terms of the water demands outlined in the approved study, a potable water usage of **3.2937 million gallons per day (mgd)**. Of this amount, the currently contemplated Phase II project expects a unit count of 1,500 plus a golf clubhouse. Or, a unit reduction of approximately 850 units with a corresponding water cutback of about **300,000 gallons per day**. Because this potential reduction is less than ten percent of the total allowed usage, we suggest that no change be made in the general distribution of flows as shown in the approved master plan. The relative point here is that with the proposed Phase II project (the subject of this application), the total venture (Phase I & Phase II) is about the same size as previous, if not just a little smaller in scale.

Currently a variety of pipeline installations, including a 36 inch main in Fort Weaver Road, water reservoirs, wells and pumping systems are under construction. These developments are to deliver water to the various projects in the Ewa Plain. Haseko has already contributed \$10,000,000 to these efforts and will need to commit additional funds for her complete development to be realized in accordance with the EWA WATER MASTER PLAN schedule.

The master plan for the area also included other water uses. In the case of the Ewa Marina project (both Phase I + Phase II), the **Private Non-Potable system** was estimated at **0.7733 mgd**. This non-potable use was to be supplied by shallow wells in the Ewa Limestone Aquifer. This non potable use was intended primarily for park, potential roadway areas, and other types of irrigation usage within the Ewa Marina site. Because the large open space associated with a golf course was not part of the early Ewa Marina development, two things occur which will impact the project.

1. The overall demand for non-potable water will increase as a result of the 27 hold golf course addition. This development will be discussed in the following section on non-potable use for the course.

2. The actual utilization contemplated for parks, roads and the like will actually decrease from the 0.7733 mgd stated in the master plan.

This actually larger demand will be mitigated effectively by the large amount of cane field withdrawn from the area as development progresses. To see this we now turn to the golf course irrigation use.

- o **Golf Course Irrigation** - The addition of a 27 hole golf course with its attendant usage of some 1.35 mgd of non-potable water, will cause the overall withdrawal from the Ewa Limestone Aquifer as a result of the total Ewa Marina project to change somewhat. Although the overall effect will be a reduction in withdrawal rates within the project area. To understand this, we will need to look at both what is occurring at the present time and then compare this to what will happen after the whole of the Ewa Marina project is completed.

1. There are a total of approximately 800 acres of cane lands in the whole of the Ewa Marina project. Of these, about 375 acres are located within Phase II, with the remainder (425 acres) located within the Phase I area. If we allow for some portion of these to be deducted as non irrigated areas of roadway and use the figure of 0.9 mgd/100 acres as the irrigation demand for cane lands in the area, we arrive at about 7.0 mgd of current usage (775 acres X 0.9 mgd/100 acres). That is, that about 7,000,000 gallons of water are used for cane irrigation purposes within the whole of the Ewa Marina project at the current time.
2. Using the above mentioned golf course irrigation number of 1.35 mgd and adding to this number an estimated 0.65 mgd (estimated by reducing the 0.7733 mgd master plan number by about 20 % to account for reductions in proposed roadway irrigation use caused by the golf course) gives a gross non-potable irrigation usage of 2,000,000 gallons per day.

From the above **before and after** comparisons, it is easy to see that the change in land venue over time causes a **decrease** in the withdrawal rates from the Ewa Limestone Aquifer. This reduction will amount to some 5.0 mgd by the time the whole of the Ewa Marina project is finished.

One other point needs to be kept in mind when viewing the progress of the change from agricultural uses to urban uses within the Ewa Marina area and these can be summed up as follows:

1. All proposed wells for irrigation usage within Ewa Marina (and all other developments as well) will first have to apply to the State Water Commission for permission to drill a well. As part of this procedure, the Water Commission will need to review the location of the well and may require other information before allowing the drilling to proceed.

2. After the well is drilled, all pertinent information (pump tests - withdrawal rates - salinity values, etc.) will need to be supplied to the Water Commission in order to obtain permission (Water Use Permit) to actually outfit the well and use it for watering areas within the site. In this fashion, the commission is kept continually aware of the effect of water uses in the area.

In short, the process of obtaining permission to use water for any purpose within the Ewa Marina project does not end at the Land Use level, but rather continues during the entire life of the project. Should the commission decide that the wells should be moved to a different location within the site, or that other options need to be explored, then these other alternatives will need to be looked at. Nonetheless the process of removing some 7.0 mgd of sugar cane irrigation and replacing it with some 2.0 mgd of urban type non-potable uses seems to us to be a large mitigative measure for reduction of water use within the Ewa plain.

- o **Sewer System** - The overall amount of wastewater generated by the Ewa Marina project (both phases) is estimated at about 2,100,000 gallons per day. Of this amount, some 1.6 mgd is attributable to Phase I (the already approved scheme), with the remaining 0.5 mgd being the Phase II (subject of this application) contribution. The Honouliuli Sewage Treatment Plant, operated by the City & County of Honolulu, is located mauka of the project site near Geiger Road and will be the home for the flows generated by the Ewa Marina project.

The more salient features of this offsite system are an existing 84-inch sewer main located within Geiger Road and Iroquois Road mauka of the project. A lift station located immediately makai of the project (within Papipi Road) that has the capacity to serve a portion of the already approved and zoned Ewa Marina Phase I project. And the Honouliuli Sewage Treatment Plant that has a current capacity of 25 million gallons per day. By way of information, the City Department of Public Works is in the process of planning for the expansion of this facility. The expectation is that by 1993, the plant will be increased to a total size of 38 million gallons per day. In order to accommodate all of the developments planned for the Ewa area, additional capacity will be needed beyond that scheduled for 1993.

All systems within the project site, including necessary offsite systems to convey the generated site sewage of 2.1 million gallons per day will be constructed by the developer to the standards of the City Department of Public Works. Further, these new systems will be connected to the 84-inch interceptor main within Geiger Road and, upon completion, dedicated to the City & County of Honolulu.

Another possibility, albeit remote, is that the project could conceivably treat and dispose of its own effluent. You will note that the non-potable irrigation demand of 2.0 mgd almost exactly equates to the 2.1 mgd of effluent generated by the project. This approximate balancing of need (2.1 mgd of effluent) with demand (2.0 irrigation usage) allows for an onsite symmetry that

would not other-wise be available. Given this scenario, the project could take care of its own stuff (operate its own Sewage Treatment Plant) should the government (Honouliuli) alternative not be available for some unknown reason.

- **Drainage** - The total Ewa Marina project is located within the Kaloι Drainage Basin. This 7.8 square mile watershed (area above the Ewa Marina site) drains through a man-made gulch through portions of the marina site and eventually empties into the ocean. This ocean discharge is currently through sheet flow at the Kaloι Gulch outlet (about midway through the Ewa Marina Phase I project) and is partially disposed of through percolation through ground water depressions within the site. This man-made gulch was constructed by Oahu Sugar Company many years ago and is inadequate to handle current day peak discharges of flow. **Figure 1.** shows this existing Kaloι Channel as it meanders through the Ewa Marina site. The discharge volume at the mauka extremity of the Ewa Marina project (approximately the makai outlet of the Gentry-Ewa project) is estimated at **10,400 cubic feet per second (cfs)**. **Figure 2** shows the Floodway location as it enters the Ewa Marina - Phase II mauka boundary.

A master drainage plan for Gentry-Ewa was approved by the City & County of Honolulu Department of Public Works in April of 1988. This approval defines the entrance flow into the Ewa Marina area, as the **10,400 cfs** flow approved for the outlet of Gentry is for all practical purposes the inlet to Ewa Marina (Phase II). The hydraulics for the Gentry-Ewa drainage plan were established using the ocean as the ultimate discharge for the Gentry flow. This scenario assumes a simple connection from one project (Gentry) to an ocean outlet and allows for the marina to serve as the middle portion of this major drainage conduit. This project (Phase II) as well as the Phase I marina will utilize these approved drainage numbers in developing the necessary drainage channel to outlet the Kaloι Gulch major drainage flows. **Figure 3** depicts the **Ewa Curve** so to speak for the peak flow rates within Kaloι Gulch that will be utilized for the Ewa Marina site. This chart gives, in effect, the **100 year flood values** for the Ewa Plain.

Portions of the onsite flows from the Phase II project will be collected within the golf course area and swaled and/or piped and discharged into the Phase I marina. Or, in the case of the more urban types of uses (fitness center, etc.), collected within the site and piped into the marina. For a portion of the offsite non Kaloι Gulch flow, the golf course acts as a buffer for much of the water from the mauka cane fields (The area between the Gentry and Ewa Marina sites is in cane). All onsite and offsite systems will be designed to the appropriate drainage standards of the Department of Public Works.

While there is no essential difference in the overall density for all of the Ewa Marina project, there is a potential mitigative measure in overall water quality due to the fact that the proposed Phase II golf course almost completely surrounds the Phase I marina area. Thereby affording an opportunity for the course to filter out some of the offsite silt as it runs by in the flood waters.

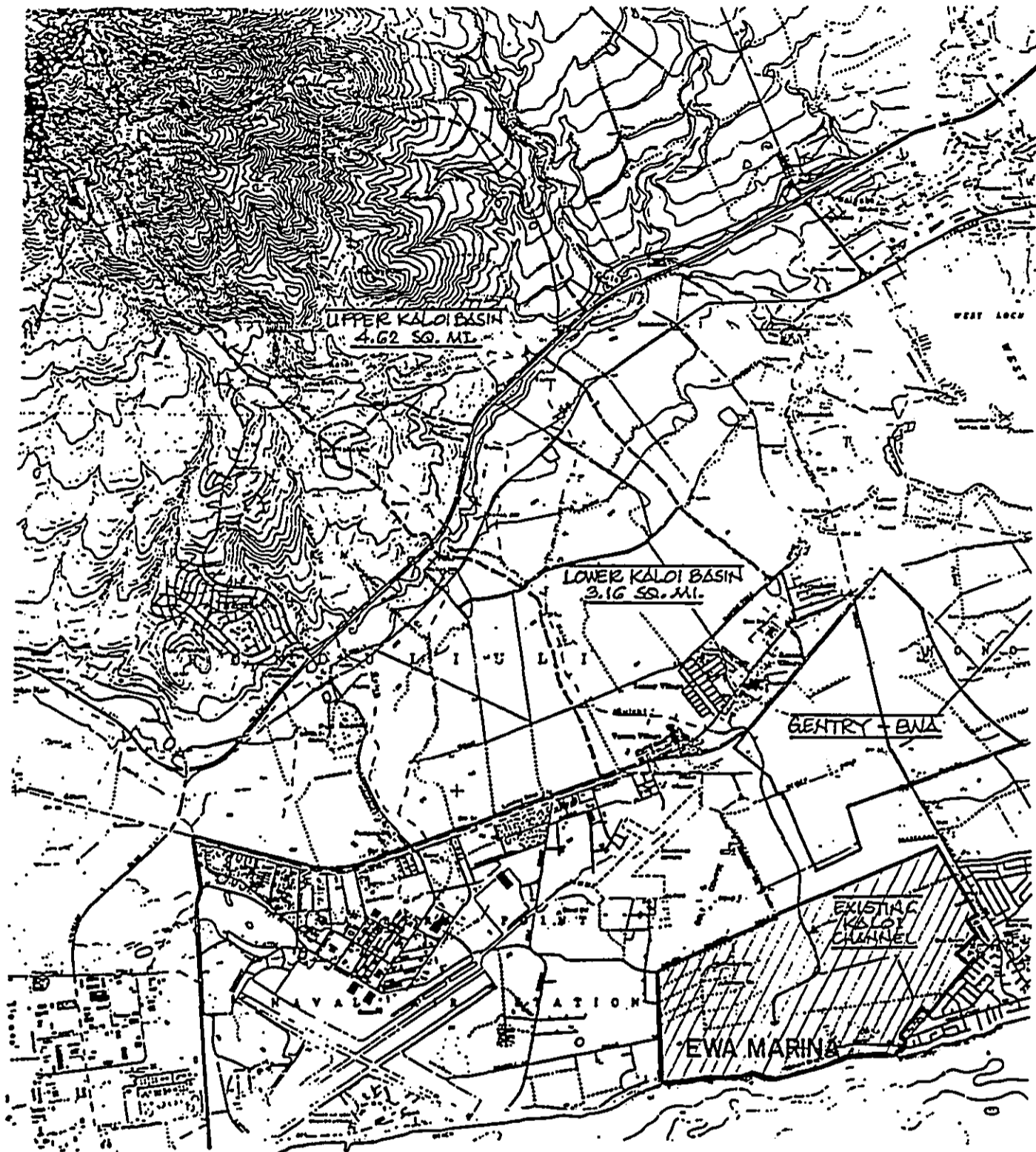
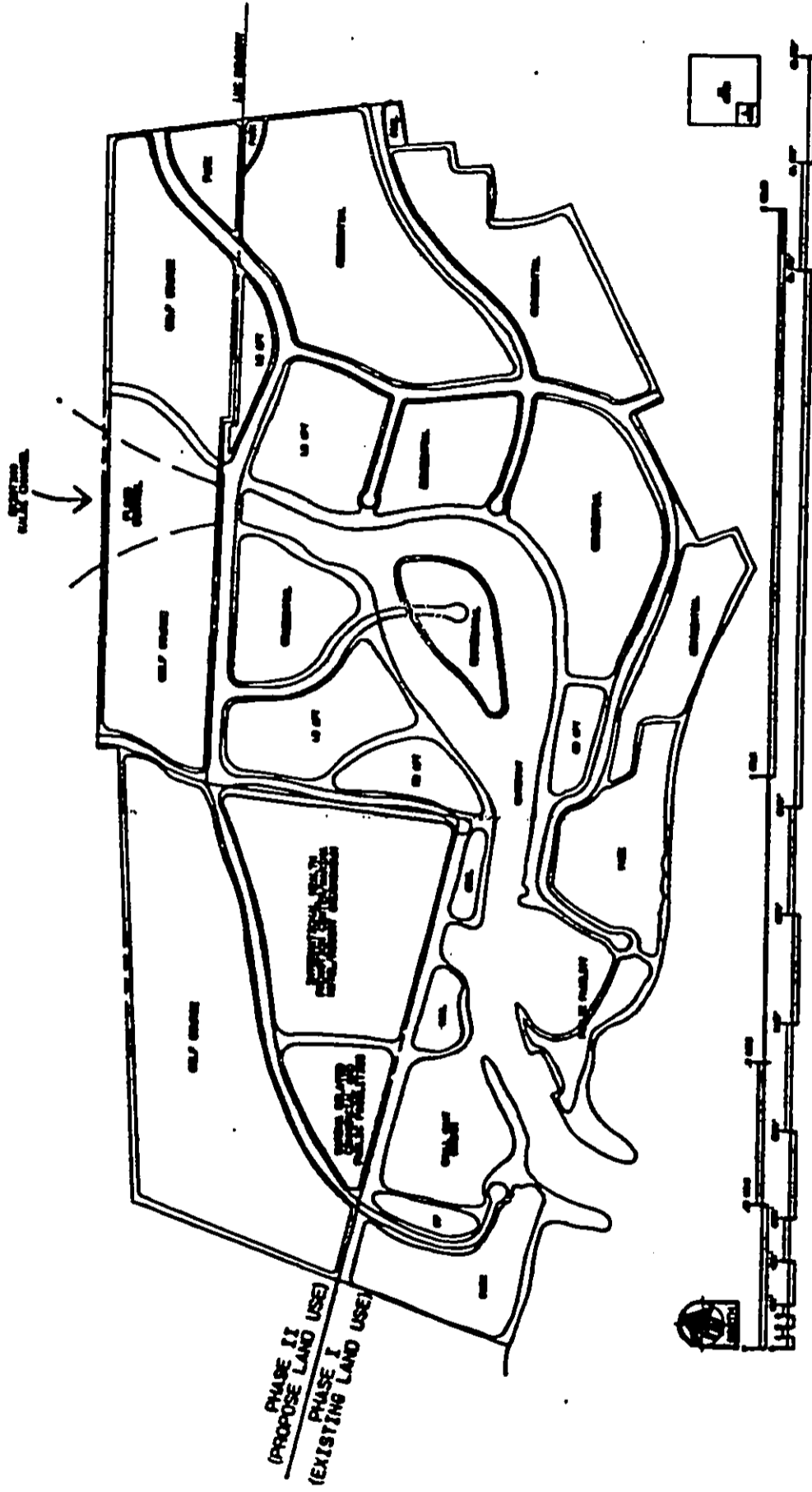


Figure 1

Sub-Basins of the Kaloi Watershed



**FIGURE 2
BWA MARINA COMMUNITY
PHASE II - DEVELOPMENT CONCEPT**

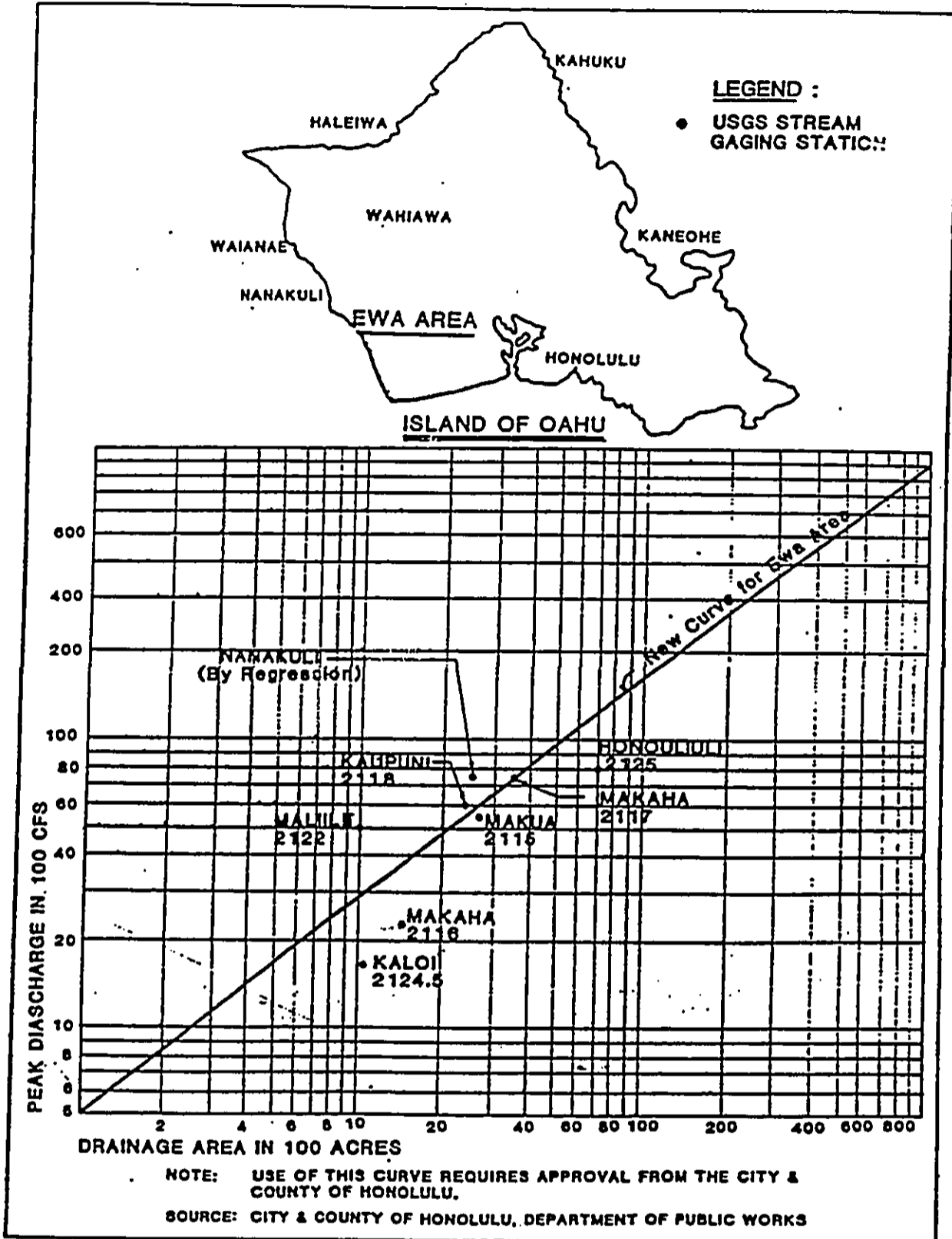


Figure 3

The Phase II project with 389 acres of area will generate a flow of 1,500 cfs. The channel that leads from the offsite Gentry Kaloι Gulch outlet, through the Phase I golf course and into the Phase II marina will be designed to handle this flow. Because the major flood channel is being designed to handle all of the 100 year flood, there are no retention basins, other than those that might occur in the golf course, planned within the Ewa Marina area.

One of the essential elements in the creation of an onsite drainage scheme that works properly deals with the overall grading concept for the area. To this end, the Phase II portion of the Ewa Marina project is tied to the Phase I marina in the following fashion.

- **Grading** - The major grading concept for the Ewa Marina project was the excavation of the marina, with the excavated material being used to raise the elevation of the land surrounding the marina. This idea for marina waste material extends particularly well to the Phase II golf course, where the requirement for good material is not as severe as it is for roadway and residential lot embankment as required in Phase I. This golf aspect of the Phase II project has worked out to aid the overall grading balance and serves to keep the majority of site cut material within the project boundaries.

An added benefit of the golf course grading is that the mauka property line is proposed to be bermed as part of the golf grading scheme. The reason for this is to allow the berm to direct all mauka waters into the golf course channel that drains Kaloι gulch. In this fashion, drainage development of the middle lot (between Gentry & Ewa Marina) does not need to occur in order for the overall drainage to work well in the area.

Finally, we will develop a drainage master plan for the Ewa Marina project along the lines of the concepts outlined herein and utilizing the approved flow charts for the Ewa plain at the time that the various County approval processes require their submission. Notwithstanding this, the logic employed herein is based on the already approved drainage plans for the mauka area (Gentry).

- **Electrical and Telephone** - Hawaiian Electric Company, Inc. (HECO) provides electrical power to the Ewa area. There are existing overhead systems located adjacent to the Oahu Railway and Land Company right-of-way north of the Ewa Marina project, along the eastern boundary, and within Fort Weaver Road. HECO's Ewa substation and Honouliuli substation are also located north of the project. Additionally, the future Waiau-CEIP 138 KV line is proposed to be located mauka of the Ewa Marina project area.

The Ewa Marina project proposes to use both gas and electric power to serve residences in both Phases I and II of the project area. Gas will be used to operate water heaters, stoves and clothes dryers. Electricity will supply remaining energy needs.

Each unit within the Ewa Marina is expected to have an average electrical demand of 2 kilowatts. Therefore, with the proposed development of about 6,350 units and a load factor of 0.85, the expected peak demand for all of the Ewa Marina site is approximately 16 megawatts.

To meet this demand, Hawaiian Electric Company, Inc. (HECO) will develop a new transformer substation which will step down available electric power from existing transmission lines along the Oahu Railway and Land Company right-of-way for distribution to the Ewa Marina and other area projects. The proposed substation will be located mauka of the Phase II area. Power distribution from the substation will be carried via circuits, which will be installed in underground conduits.

Hawaiian Telephone will provide telephone service to the project. The telephone system will be installed in conjunction with the power system. Existing telephone service is available through telephone service lines along Fort Weaver Road. The telephone lines within the project will be installed in conduits and buried underground along the street rights-of-way.

**Ewa Water Master Plan
(Revised)**

by
Belt Collins & Associates

for the
**Ewa Plain Water Development Corporation
828 Fort Street Mall, Suite 500
Honolulu, Hawaii 96813**

Revision Date: August 1987

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843



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KAZU HAYASHIDA
Manager and Chief Engineer

October 15, 1987

Mr. Tom Nance
Belt, Collins & Associates
606 Coral Street
Honolulu, Hawaii 96813

Dear Mr. Nance:

Subject: Your Letter of October 2, 1987 on the Revised Ewa
Water Master Plan

The concerns raised in our letter of September 22, 1987 have been addressed to our satisfaction. We, therefore, approve the water master plan as revised.

If you have any questions, please call Herbert H. Minakami at 527-6183.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

THE ESTATE OF JAMES CAMPBELL

EWA WATER MASTER PLAN

June, 1984

Revised April, 1985; July, 1985; and August, 1987

The initial Ewa Water Master Plan commissioned in 1984 by The Estate of James Campbell, as the major fee owner of the Ewa plains, established a water facilities plan to accommodate all planned developments for the Ewa area. The primary objectives of the plan then and now are:

1. To coordinate and manage all water facilities to achieve maximum utilization of resources, both in terms of phased facilities development costs and the government agency review process;
2. To achieve maximum utilization of water resources through the dual system concept and development phasing;
3. To coordinate and manage water resource utilization to assure a confirmed source to meet both urban and agricultural needs; and
4. To set the framework for water infrastructure development to coincide with the County's General Plan and development plans for the Ewa plain.

Pursuant to this plan, an Ewa Water Facilities Agreement was established on December 5, 1985. This Agreement in turn provided for the creation of a nonprofit Ewa Plain Water Development Corporation (EPWDC). The current members of the EPWDC include:

West Beach Estates (as developers of Ko Olina Resort)

Tom Gentry (as developer of the former Ewa Plantation project)

The Estate of James Campbell (for Ewa Marina and JCIP)

The current members of the Corporation are committed to the first phase of improvements and to pay their proportionate share of the cost of these improvements.

The first phase includes the development of the Honouliuli Well Field, one 1.0 MG and one 5.0 MG storage tanks, booster line along Farrington Highway, transmission line down Fort Weaver Road, and the Barbers Point Non-Potable Well Field and 1.5 MG Reservoir.

The accompanying percentage prorations for the first phase of the estimated total cost for construction and engineering of approximately \$19 million are:

West Beach Estates	25%
Campbell Estate	45%
Tom Gentry	30%

Participation in the development of subsequent phases of improvements will be at the election of each participant.

This plan also includes projects which are not being developed by the current participating members of the EPWDC. These nonparticipating projects are included here for planning purposes. At the discretion of EPWDC, water system capacity to serve these projects may be purchased on a pro rata share basis.

While this revised plan incorporates the latest projections provided by the members (Gentry, Ko Olina, and The Estate of James Campbell) of the Ewa Plain Water Development Corporation, the plan includes long-range land use/development considerations which go beyond the participating members of the Ewa Water Facilities Agreement. The primary considerations for changes to the plan include the Hawaii Housing Authority/Kapolei Villages; Finance Realty's Makakilo; Kapolei Town Center; fill-in residential projects in Ewa; the Ewa Beach Ohana zoning needs; and the Lusk project.

The goal of the plan is to achieve a coordinated short- and long-range facilities construction plan. This is necessary to economically oversize facilities which will be needed beyond short-term planning horizons. The Estate, as master fee owner, will continue to facilitate and coordinate the implementation and management of the goals of the water plan which are beyond and outside the scope of the current participants of the Ewa Plain Water Development Corporation.

The water source wells will be within the Waianae and Koolau Aquifers which are within the Pearl Harbor Ground Water Control Area administered by the Department of Land and Natural Resources, State of Hawaii, and applications will be submitted to the Department of Land and Natural Resources and Board of Water Supply as the needed arises.

The Estate and EPWDC believe that the revised Ewa Water Master Plan meets the objectives of both the government and private sectors for a coordinated water plan for the Ewa plain as currently envisioned. The Master Plan may be subject to further revisions as changing circumstances require.

cg:0928x
8/19/87

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INTRODUCTION

The Ewa Water Master Plan is a compilation of projected water use and a plan for the construction of offsite water facilities to serve development projects on the Ewa Plain. This revision of the Master Plan was undertaken to include projects which are new or have been substantially modified since the previous plan of October 1985 was completed. These additions and changes are:

- addition of Kapolei Town Center, a new project of Campbell Estate at the foot of Makakilo;
- addition of Kapolei Village, the proposed City and Hawaii Housing Authority 4000-unit residential project to be located on the east side of Kapolei Town Center;
- reconfiguration of the Ewa Plantation project under the new name of Gentry-Ewa;
- addition of the Gentry-Hoaeae residential and industrial project on Hoaeae peninsula;
- addition of the proposed 500-unit West Loch Residential Community to be developed by the City and County;
- addition of the proposed Ewa Golf Course and adjacent golf course residential projects located along the east side of Fort Weaver Road;
- addition of the Lusk Hawaii project in Ewa Beach;
- provision of additional transmission capacity to Ewa Beach to allow for Ohana zoning and other growth; and
- revision of the development schedules for West Beach Estates, James Campbell Industrial Park, expansion of Makakilo, and the Ewa Marina project.

Figure 1 shows the areal extent of projects included in this master plan and Table 1 lists their ultimate water requirements. Total water use is projected to be 31.6 million gallons per day (MGD). Of this amount, 24.3 MGD would be supplied by potable and non-potable systems owned and operated by the Board of Water Supply (BWS). The remaining 7.3 MGD would be provided by private, non-potable irrigation systems. These water requirements are based on application of BWS design criteria to the development schedule of each project. The schedules have either been submitted directly to Belt Collins & Associates or are contained in the following the reports:

- "Master Plan, Dual Water System Study for West Beach Estates, James Campbell Industrial Park, and Deep Draft Harbor" by Community Planning, Inc., February 28, 1985;
- "Water Master Plan for Barbers Point Deep Draft Harbor and Camp Malakole Industrial Subdivision" by R.M. Towill Corporation, December 1986.

Where development schedules in these reports differ those in this plan, the schedules herein supersede the earlier reports.

DESIGN CRITERIA

Dual water systems will be used wherever practical for projects on the Ewa Plain. Design criteria developed by BWS for the dual system concept are listed on Table 2. In addition to these criteria, the following design guidelines have also been used to develop the master plan:

1. Private, non-potable systems will be developed wherever possible for irrigation use. Most of these will utilize shallow wells drawing water from the limestone aquifer. An exception will be the West Beach golf course irrigation systems which will utilize deep wells to the underlying basalt aquifer.
2. Single-family residential development will be supplied exclusively by the potable system. This choice reflects comments by the Department of Health as well as marketing and liability concerns of the developers.

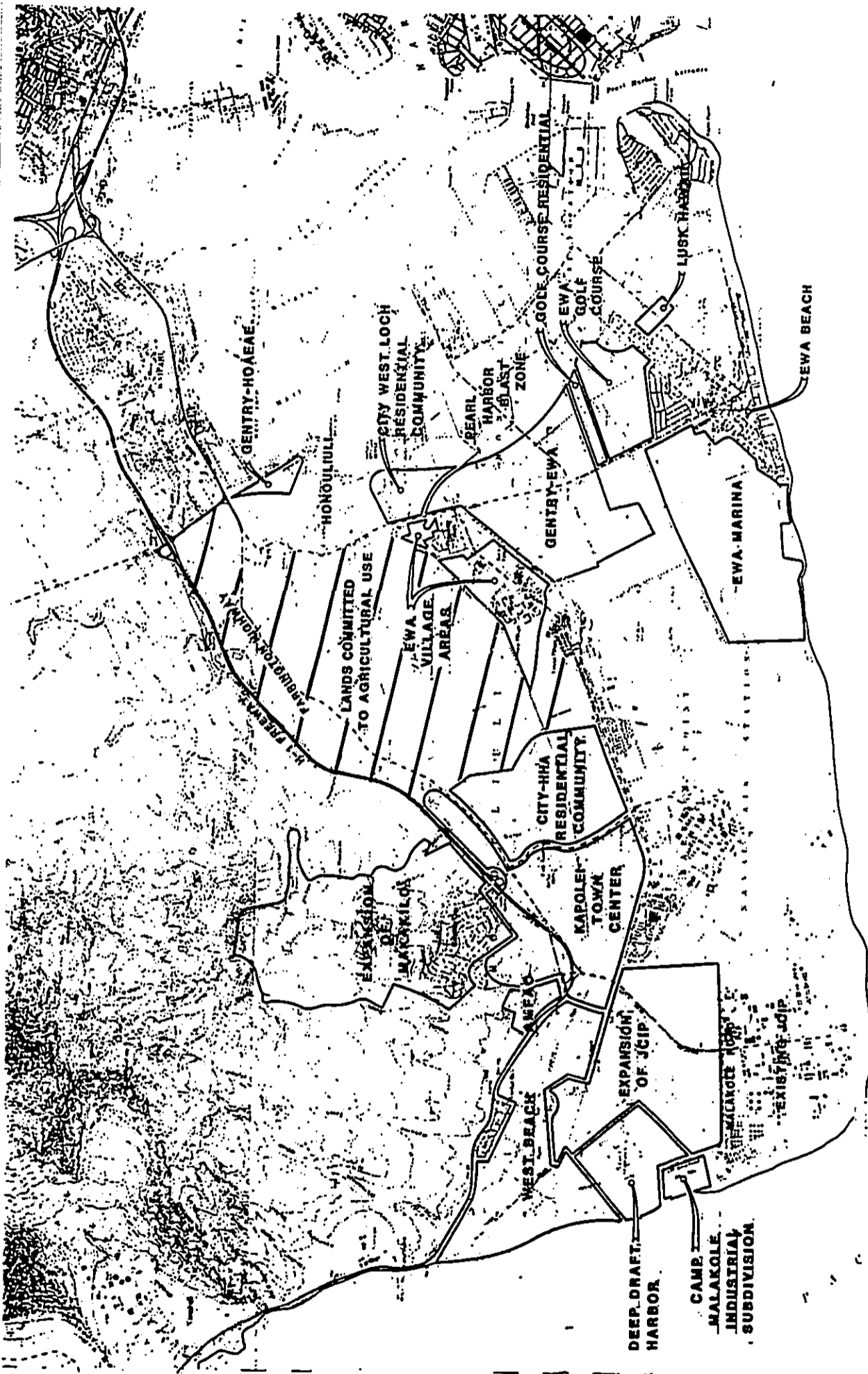


FIGURE 1. DEVELOPMENT INCLUDED IN THE REVISED EWA WATER MASTER PLAN

Table 1

Ultimate Water Requirements for
Projects Included in the Revised Ewa Water Master Plan

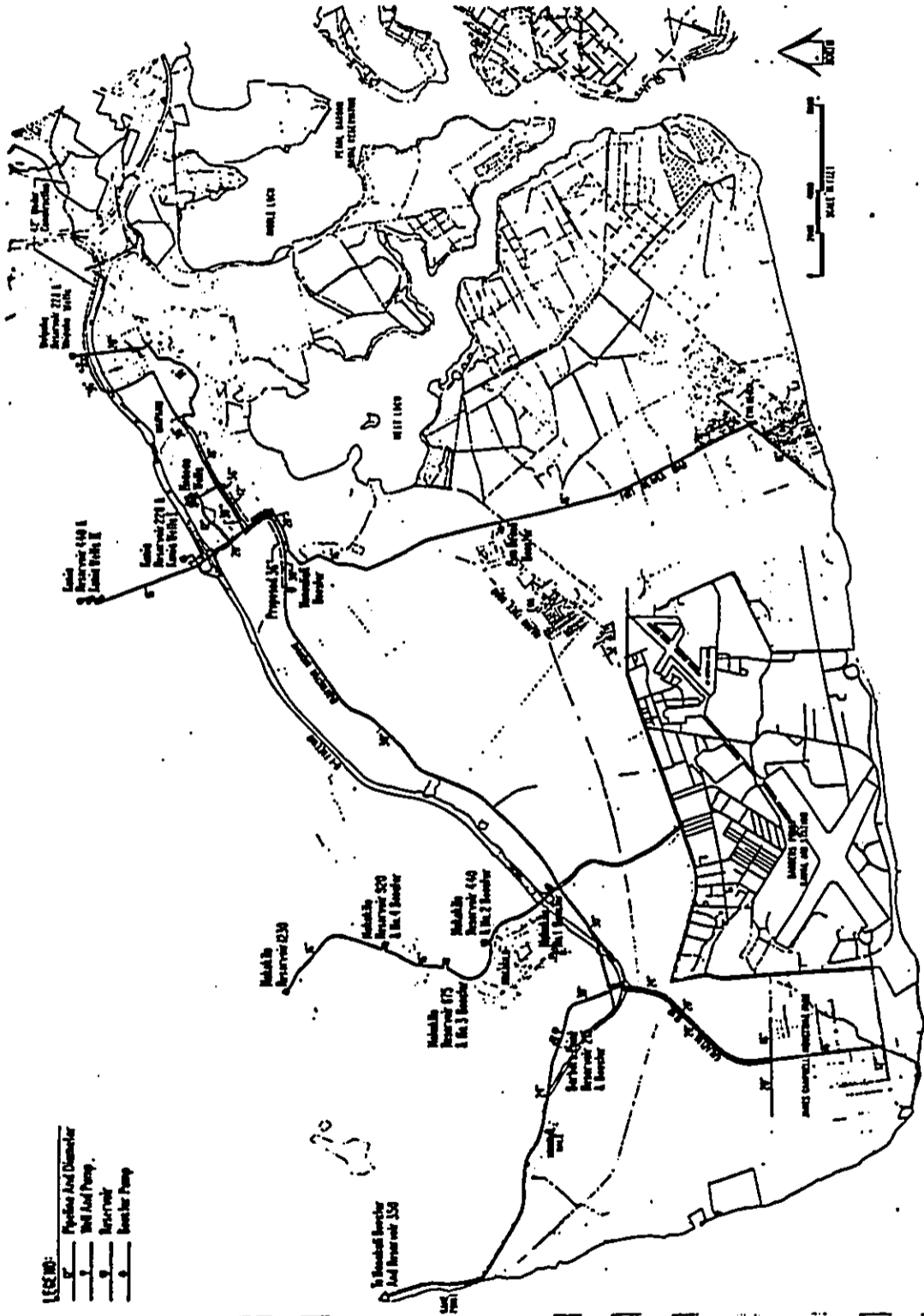
Included Projects	BWS Systems		Private Non-Potable Systems (MGD)	Total Water Use (MGD)
	Potable (MGD)	Non-Potable (MGD)		
West Beach	3.1866	1.7971	1.4000	6.3837
Expansion of JCIP**	1.6659	2.6668		4.3327
Kapolei Town Center	1.8417		1.1572*	2.9989
Kapolei Village (City-HHA)	2.0486		0.9532*	3.0018
Expansion of Makakilo	1.5043		0.7000***	2.2043
Gentry-Ewa	3.2317		0.8595*	4.0912
Gentry-Hoaeae	0.6000			0.6000
Ewa Marina	3.2937		0.7733*	4.0670
City West Loch Residential Community	0.2500			0.2500
Ewa Village Areas	1.4726		0.3841*	1.8567
Ewa Golf Course	0.0150		1.0500*	1.0650
Golf Course Residential	0.3000			0.3000
Lusk Hawaii	0.4050			0.4050
Total For All Projects	19.8151	4.4639	7.2773	31.5563

*Identifies private, non-potable systems to be supplied by shallow wells in the Ewa Limestone Aquifer.

**Figures for the expansion of JCIP include Barbers Point Deep Draft Harbor, Camp Malakole Industrial Subdivision, and the AMFAC Visitor Attraction.

***The irrigation source for the Makakilo Golf Course will be private but a decision on the source to be used has not been made.

LEGEND:
 --- Pipeline And Diameter
 --- 36" And Pump
 --- Reservoir
 --- Booster Pump



RESERVOIRS:

Name	Capacity (MG)	Flow Elevation (FT. MSL)	Supply Elevation (FT. MSL)
Waialae 221.1	1.5	263	228
Kaun 228	1.5	268	228
Kaun 440	1.5	420	440
Waialae 440	1.0	420	440
Waialae 675	2 of 6.5 each	637	675
Waialae 820	1.5	900	820
Waialae 1230	2.0	1200	1230
Waialae 1440	4.0	1465	1440
Waialae 205	5.0	185	205

SUPPLY WELLS:

Name	Number Of Wells	Boiled Capacity (GPM)	FWCA Certified Capacity (MGD)
Waipahoehoe	4	500	2.50
Waipahoehoe	2	500	2.55
Waipahoehoe	4	750	3.50
Waipahoehoe	2	750	3.53
Waipahoehoe	2	750	3.65
Waipahoehoe	2	750	4.02

BOOSTER PUMP STATIONS:

Name	Number Of Pumps	Boiled Capacity (GPM)	FWCA Certified Capacity (MGD)
Waialae Line Booster	4	4500	1.80
Waialae Line Booster	1	4500	1.80
Waialae No. 1 Booster	3	2500	1.00
Waialae No. 2 Booster	3	2000	0.80
Waialae No. 3 Booster	3	1750	0.70
Waialae No. 4 Booster	3	1500	0.60
Waialae No. 5 Booster	3	2000	0.80

FIGURE 2
 MAJOR ELEMENTS OF THE HONOLULU
 BOARD OF WATER SUPPLY SYSTEM IN 1964
 Revised
 May 27, 1965

Table 3
Water Supply Requirements of Existing Ewa Development

Service Area	Design Flowrates (In MGD)			Basis of Design Amounts
	Average Day	Maximum Day	Peak	
Ewa Village				BWS Design Criteria
Fernandez Village (360 SF Units)	0.1800	0.2700	0.5400	
Elderly & Expandable Housing (220 Units)	0.1100	0.1650	0.3300	
TOTALS	0.2900	0.4350	0.8700	
Ewa Beach	2.2000	3.2000	5.5000	BWS measurements at the Honouliuli line booster
Makakilo				BWS design criteria applied to current community size
1,909 SF Residential	0.9545	1.4318	2.8635	
1,122 MF Residential	0.4488	0.6732	1.3464	
18.4 Ac. Park	0.0736	0.1104	0.2208	
2.5 Ac. Commercial	0.0075	0.0112	0.0225	
Public/Civic Uses	0.0085	0.0128	0.0255	
Schools: 2 With 1,500 Students	0.0900	0.1350	0.2700	
Landscape Areas	0.0155	0.0232	0.0465	
TOTALS	1.5984	2.3976	4.7952	
JCIP (Below Malakole Road)				Based on actual flow measurements. About 3,000 GPAD and 1.5/3.0 factors
Standard Oil	2.2000	2.5000	3.0000	
Remain Tenants	3.0800	4.6200	9.2400	
TOTALS	5.2800	7.1200	12.2400	
Honokai Hale Subd. (286 SF Units)	0.1430	0.2150	0.4290	BWS Design Criteria
Transmission to Nanakuli				BWS' 1981 "Municipal Water Use Plan" and discussions with BWS personnel
Up to 1989	5.0000	7.5000	N/A	
1989 Thru 1990	2.0000	3.0000	N/A	
After 1990	1.0000	1.5000	N/A	

Notes:

- JCIP flow figures have been taken from M&E Pacific's 1978 "Water System Master Plan for James Campbell Industrial Park":

Total Acres = 1,320

At 4,000 GPAD, Average Day = 5.28 MGD
Use @ 250-Ac. Standard Oil Lot = 2.20

Balance For Remaining 1,070 Ac. = 3.08 MGD

Equivalent Use Rate For Remaining Area: $3,080,000 \div 1,070 = 2,880$ GPD/Acre

Peaking factors for Standard Oil are also taken from the 1978 Master Plan. The computed use rate for remaining tenants is more than twice the actual usage rate, making it a conservative design figure.

- Transmission amounts to Nanakuli assume that supply by Makaha wells will reduce this requirement by 3.0 MGD in 1989 and that development of Waianae wells will reduce it by another 1.0 MGD in 1991.

park, various public service facilities, and two schools. The design flowrate for this development is 1.6 MGD. Existing pipelines, booster pumps, and storage tanks have been sized for existing and future development based on an all potable system. Because of this commitment, it will not have a dual system.

The existing development area of JCIP encompasses the 1320 acres makai of Malakole Road. Actual water use of the present tenants is about 3.5 MGD but the design flowrate for the entire area below Malakole Road is 5.28 MGD. Currently, there is one large user, Standard Oil on a 250-acre site, and a number of smaller tenants occupying 765 acres. About 300 acres are vacant. Standard Oil uses an average of 2.2 MGD without substantial variation during the day or throughout the year. Other tenants average about 1300 gallons per acre per day. JCIP usage patterns were studied for the preparation of a 1978 master plan by M&E Pacific, Inc. These findings and design recommendations, previously reviewed by BWS, are summarized on Table 3 and have been incorporated in this plan.

In addition to JCIP, other supply to the west side of the Ewa plain is for Honokai Hale and for transmission to Nanakuli and Waianae. Honokai Hale is a subdivision of 286 single-family residential units. Transmission to Nanakuli is accomplished by booster pumping from the Barbers Point 215 tanks. The amount currently averages about 5.0 MGD and reaches a daily maximum of 7.5 MGD. BWS plans to outfit wells in Makaha in the late 1980s and to develop wells in Waianae thereafter. A portion of the supply from these wells will be used to reduce transmission to Nanakuli. Specific dates for outfitting these wells have not been set. However, a reasonably flexible scenario for the reduction of transmission based on BWS plans and discussions with its personnel has been assumed for this master plan.

PROJECTED WATER REQUIREMENTS

Projected water requirements for projects included in the Master Plan are presented in Tables 4 through 14. These water requirements are generally given in five-year intervals, although some of the projects have requirements listed year-by-year with five-year totals.

Table 4

Projected Water Requirements for the West Beach Project

Year	Land Use	No. of Units	Area (Acres)	Average Water Use		Average Daily Demand	
				Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1988 to 1990	Resort/Hotel	2,170		0.4405	0.3190	0.5295	0.3819
	Parks		51.4	0.0308	0.1748	0.0370	0.2098
	Golf Course No. 1*		170.5	0.1023		0.1228	
	Circulation		39.5		0.0435		0.0435
	Low Density Apartments	595		0.1642	0.0738	0.1969	0.0887
	Marina		18.1	0.0453	0.0151	0.0543	0.0181
	HCC**		21.8	0.0272	0.0454	0.0327	0.0545
Subtotals for 1988-1990		2,765	301.3	0.8103	0.6716	0.9732	0.7965
1991 to 1995	Commercial		12.0	0.0360		0.0360	
	Resort/Hotel	1,830		0.3715	0.2690	0.4465	0.3221
	Low Density Apartments	755		0.2084	0.0936	0.2499	0.1125
	High Rise Apartments	2,880		0.5961	0.2679	0.7143	0.3225
	Golf Course No. 2		170.0	0.1023		0.1228	
	Beach Club		2.2	0.0055	0.0183	0.0066	0.0022
	School (300 Students)		6.9	0.0105	0.0190	0.0126	0.0228
Subtotals for 1991-1995		5,465	191.1	1.3303	0.6678	1.5887	0.7821
1996 to 2000	Low Density Apartments	150		0.0414	0.0186	0.0496	0.0224
	High Rise Apartments	820		0.1697	0.0763	0.2034	0.0918
	Commercial		5.8	0.0174		0.0174	
Subtotals for 1996-2000		970	5.8	0.2285	0.0949	0.2704	0.1142
Post 2000	Design Allocation for Future Development			0.8175	0.3628	0.9810	0.4354
Cumulative Totals		9,200	498.2	3.1866	1.7971	3.8133	2.1282

*Golf courses will be irrigated by private, on-site wells. This irrigation amount is not included herein.

**Hawaiian Cultural Center indicated only for accounting purposes. Prorata cost associated to HCC water demand is to be borne by Campbell Estate.

Table 5

Projected Water Requirements for
Planned Expansion of James Campbell Industrial Park,
the Deep Draft Harbor, Camp Malakole Industrial Subdivision,
and Amfac's Visitor Attraction

Period	Land Use	Acres	Average Water Use		Average Daily Demand	
			Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1988-90	JCIP	50	0.0592	0.1408	0.0710	0.1690
	Deep Draft Harbor	18	0.0158		0.0158	
	Subtotals for 1988-90	68	0.0750	0.1408	0.0868	0.1690
1991-95	JCIP	75	0.0888	0.2112	0.1066	0.2534
	Deep Draft Harbor	63	0.0554		0.0554	
	Malakole Industrial Subdivision	40	0.1600		0.1600	
	Amfac Visitor Attraction*		0.0700		0.0700	
	Subtotals for 1991-95	178	0.3742	0.2112	0.3920	0.2534
1996-00	JCIP	100	0.1184	0.2816	0.1421	0.3379
	Deep Draft Harbor	63	0.0555		0.0555	
	Subtotals for 1996-00	163	0.1739	0.2816	0.1976	0.3379
2001-05	JCIP	150	0.1776	0.4224	0.2131	0.5069
Beyond 2005	JCIP	485	0.5742	1.3658	0.6892	1.6388
	Option Areas 8 & 9 (840 MF Units)	84	0.2318	0.1042	0.2780	0.1252
	Business Park	50	0.0592	0.1408	0.0711	0.1690
	Subtotals Beyond 2005	619	0.8652	1.6108	1.0383	1.9330
Cumulative Totals		1,178	1.6659	2.6668	1.9278	3.2002

*Irrigation and other non-potable supply requirements for the Amfac Visitor Attraction, which amount to 0.232 MGD, will be provided by Dahu Sugar Company's EP 10 wells and pumps. This amount has not been included in the table above.

Table 6

Projected Potable Water Requirements for the Expansion of Makakilo

Year	Development Type						Average Daily Demand	
	SF Resid. (Units)	Townhouse (Units)	Apartments (Units)	Commercial (Acres)	Park (Acres)	Other Uses (GPD)	Annual Amount (MGD)	Cumulative Total (MGD)
1988	379	110	279				0.3172	0.3172
1989	297	46	114		5.9	6,000	0.2307	0.5479
1990	119	47	119	5			0.1290	0.6769
1991	242	66	119		3.5		0.1971	0.8740
1992	253	66	92				0.1805	1.0545
1993	202	66	220		5.3	20,000	0.2346	1.2891
1994	300	67	128				0.2152	1.5043
Totals	1,792	468	1,071	5	14.7	26,000	1.5043	1.5043

Note: The total for single family residential units includes Ridgeline Parcel C (185 units) and Palehua East Parcel D (475 units).

Table 7

Projected Water Requirements for the
440-Foot Service Zone of Kapolei Town Center

Period	Land Use	No. of Resid. Units	Land Area (Acres)	Floor Space (1,000 Ft ²)	Average Water Use		Average Daily Demand	
					Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1988-90	Business Park		3.4	50	0.0136		0.0136	
	Commercial		10.6	70	0.0318		0.0318	
	Parking		3.8		0.0038		0.0038	
	Office		2.3	40	0.0138		0.0138	
	Civic		5.0	20	0.0150		0.0150	
	Circulation		0.5		0.0005		0.0005	
	Subtotals for 1988-90		25.6	180	0.0785		0.0785	
1991-95	Business Park		5.9	90	0.0236		0.0236	
1996-00	Single Family	400	50		0.2000		0.2000	
	Multi-Family	350	35		0.1400		0.1400	
	Teleport		10		0.0300		0.0300	
	Commercial		34	200	0.1020		0.1020	
	Palailai Regional Park		81		0.0486	0.2754*	0.0583	
	Circulation		5		0.0050		0.0050	
	Subtotals for 1996-00	750	215	200	0.5256	0.2754	0.5353	0.3305
2001-05	Commercial		16	265	0.0480		0.0480	
eyond 2005	Multi-Family	520	52		0.2080		0.2080	
Cumulative Totals		1,270	314.5	735	0.8837	0.2754	0.8934	0.3305

*The amount of non-potable supply shown here for the Palailai Regional Park will be provided by private sources.

Table 8

Projected Water Requirements for the
228-Foot Service Zone of Kapolei Town Center

Period	Land Use	No. of Resid. Units	Land Area (Acres)	Floor Space (1,000 Ft ²)	Average Water Use		Average Daily Demand	
					Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1988-90	Civic		4.2	20	0.0012	0.0050	0.0014	0.0060
1991-95	Office		11.8	157	0.0094	0.0142	0.0113	0.0170
	Civic		2.3	100	0.0060	0.0028	0.0072	0.0033
	Park/Open Space		20		0.0120	0.0680	0.0144	0.0816
	Circulation		10			0.0100		0.0100
	Subtotals for 1991 to 1995		44.1	257	0.0274	0.0950	0.0329	0.1119
1996-00	Mixed Use	260	26		0.0718	0.0322	0.0861	0.0387
	Business Park		3.1	100	0.0060	0.0040	0.0072	0.0048
	Commercial		3.0	25	0.0054	0.0036	0.0065	0.0043
	Office		17	270	0.0306	0.0204	0.0367	0.0245
	Civic		6.6	130	0.0119	0.0079	0.0143	0.0095
	Park/Open Space		30		0.0180	0.1020	0.0216	0.1224
	Circulation		20			0.0200		0.0200
	Subtotals for 1996 to 2000	260	105.7	525	0.1437	0.1901	0.1724	0.2242
2001-05	Mixed Use	200	20		0.0552	0.0248	0.0662	0.0298
	Single Family	340	57		0.1700		0.1700	
	Multi-Family	400	40		0.1104	0.0496	0.1324	0.0596
	Business Park		9.4	138	0.0111	0.0265	0.0133	0.0318
	Commercial		17	200	0.0306	0.0204	0.0367	0.0245
	Office		18.3	320	0.0329	0.0220	0.0395	0.0264
	Civic		8.4	185	0.0151	0.0101	0.0181	0.0121
	Voc. Ed. School (3000 Students)		27		0.1050	0.0750	0.1260	0.0900
	Elem. School (300 Students)		7		0.0105	0.0075	0.0126	0.0090
	Park/Open Space		20.1		0.0121	0.0683	0.0145	0.0820
	Circulation		60			0.0060		0.0060
	Subtotals for 2001 to 2005	940	284.2	843	0.5529	-0.3102	0.6293	0.3712
Beyond 2005	Business Park		10.5	95	0.0189	0.0126	0.0227	0.0151
	Office		56.9	1,316	0.1024	0.0683	0.1229	0.0819
	Commercial		34.0	374	0.0612	0.0408	0.0734	0.0490
	Civic		17.5	405	0.0315	0.0210	0.0378	0.0252
	Park		31.4		0.0188	0.1068	0.0226	0.1281
	Circulation		32.0			0.0320		0.0320
	Subtotals Beyond 2005		182.3	2,190	0.2328	0.2815	0.2794	0.3313
Cumulative Totals		1,200	620.5	3,835	0.9580	0.8818	1.1154	1.0446

Table 9

Projected Water Requirements for Kapolei Village
(City-HHA Project)

Period	Land Use	No. of Units	Area (Acres)	Average Water Use		Average Daily Demand	
				Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1988-90	Single Family Residential	405	61.1	0.2025	.	0.2025	
	Multi-Family Low Rise	45	3.0	0.0124	0.0056	0.0149	0.0067
	Multi-Family High Rise	120	6.0	0.0248	0.0112	0.0298	0.0134
	Park/Open Space		16.7	0.0100	0.0568	0.0120	0.0681
	Golf Course		144.2		0.5768		0.5768
	Golf Course Clubhouse		3.0	0.0150		0.0150	
	Commercial		7.5	0.0135	0.0090	0.0162	0.0108
	Civic		10.5	0.0189	0.0126	0.0227	0.0151
	Roadway		17.0		0.0170		0.0170
	Subtotals for 1988-90		570	269.0	0.2971	0.6890	0.3131
1991-95	Single Family Residential	1,628	239.1	0.8140		0.8140	
	Multi-Family Low Rise	255	16.9	0.0704	0.0316	0.0844	0.0380
	Multi-Family High Rise	120	6.0	0.0248	0.0112	0.0298	0.0134
	Park/Open Space		5.9	0.0035	0.0201	0.0042	0.0241
	Schools (1600 Students)		21.0	0.0560	0.0400	0.0672	0.0480
	Commercial		5.3	0.0095	0.0064	0.0114	0.0076
	Roadway		48.8		0.0488		0.0488
	Subtotals for 1991-95		2,003	343.0	0.9782	0.1581	1.0110
1996-00	Single Family Residential	1,253	177.2	0.6265		0.6265	
	Multi-Family Low Rise	180	11.9	0.0497	0.0223	0.0596	0.0268
	Park/Open Space		5.1	0.0031	0.0173	0.0037	0.0208
	Civic		7.5	0.0135	0.0090	0.0162	0.0108
	Schools (2300 Students)		31.0	0.0805	0.0575	0.0966	0.0690
	Subtotals for 1996-00		1,433	232.7	0.7733	0.1061	0.8026
Cumulative Totals		4,006	844.7	2.0486	0.9532	2.1267	1.0152

Table 10

Projected Water Requirements for the Ewa Village Areas

Period	Land Use	No. of Units	Area (Acres)	Average Water Use		Average Daily Demand	
				Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1991-95	Tenney & Renton Villages	275	90.3	0.1375		0.1375	
	Ewa School (800 Students)		9.7	0.0480		0.0480	
	Lanakila Baptist School (250 Students)	11.0	0.0150		0.0150		
	Multi-Family	180	12	0.0497	0.0223	0.0596	0.0268
	Park (Existing)		7	0.0280			
Subtotals for 1991-95		455	130	0.2782	0.0223	0.2881	0.0268
1996-00	Single Family	560	91.9	0.2800		0.2800	
	Multi-Family	450	45	0.1242	0.0558	0.1490	0.0670
	Commercial		25	0.0450	0.0300	0.0540	0.0360
	Subtotals for 1996-00		1,010	161.9	0.4492	0.0858	0.4830
2001-05	Single Family	360	60	0.1800		0.1800	
Beyond '05	Multi-Family	1,920	19	0.5299	0.2381	0.6355	0.2861
	Commercial		18	0.0324	0.0216	0.0389	0.0259
	Park/Open Space		4.8	0.0029	0.0163	0.0035	0.0196
	Subtotals Beyond 2005		1,920	41.8	0.5652	0.2760	0.6779
Cumulative Totals		3,745	393.7	1.4726	0.3841	1.6290	0.4614

Table 11
Projected Water Requirements for the Gentry-Ewa Project

Year	L a n d U s e				Average Water Use		Average Daily Demand	
	Single Family (Units)	Multi-Family (Units)	Park (Acres)	School (Acres/Students)	Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1988	413	87			0.2305	0.0108	0.2353	0.0130
1989	137	363	7		0.1729	0.0688	0.1937	0.0826
1990	310	190	7		0.2116	0.0474	0.2229	0.0568
Subtotals to 1990	860	640	14		0.6150	0.1270	0.6519	0.1524
1991	280	220			0.2007	0.0273	0.2128	0.0327
1992	280	220		6/300	0.2112	0.0348	0.2254	0.0418
1993	280	220			0.2007	0.0273	0.2128	0.0327
1994	255	245			0.1951	0.0304	0.2086	0.0365
1995	255	245			0.1951	0.0304	0.2086	0.0365
Subtotals, 1991-95	1,350	1,150		6/300	1.0028	0.1502	1.0682	0.1802
1996	255	245	15		0.2041	0.0814	0.2194	0.0977
1997	255	245			0.1951	0.0304	0.2086	0.0365
1998	255	245			0.1951	0.0304	0.2086	0.0365
1999	286	214			0.2021	0.0265	0.2138	0.0319
2000	333	167			0.2126	0.0207	0.2218	0.0249
Subtotals, 1996-00	1,384	1,116	15		1.0090	0.1894	1.0722	0.2275
2001	333	167	100		0.2726	0.3607	0.2938	0.4329
2002	333	167			0.2126	0.0207	0.2218	0.0249
2003	188	93			0.1197	0.0115	0.1248	0.0139
2004								
2005								
Subtotals, 2001-05	854	427	100		0.6049	0.3929	0.6404	0.4717
Cumulative Totals	4,448	3,333	129	6/300	3.2317	0.8595	3.4327	1.0318

- Notes:**
1. Development west of Fort Weaver and north of Geiger Road will begin in 1988 and be completed in 1993.
 2. Development east of Fort Weaver Road and north of Iroquois Road will begin in 1994 and be completed in 1999.
 3. Development south of Geiger and Iroquois Road will take place in the 1999-2003 period.

Table 12
 Projected Water Requirements for Ewa Marina

Year	Land Use	No. of Units	Acres	Average Water Use		Average Daily Demand	
				Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1990	Single Family Park	200	5.7	0.1000 0.0034	0.0194	0.1000 0.0041	0.0233
	Subtotals for 1990	200	5.7	0.1034	0.0194	0.1041	0.0233
1991	Multi-Family Commercial/Public	300	2.0	0.0828 0.0036	0.0372 0.0024	0.0993 0.0043	0.0447 0.0029
1992	Single Family	450		0.2250		0.2250	
1993	Single Family	170	30.0	0.0850	0.0533 0.1020	0.0850	0.0641 0.1224
	Multi-Family Park	430		0.1187 0.0180		0.1423 0.0216	
1994	Single Family	85		0.0425	0.0626	0.0420	0.0752
	Multi-Family	505		0.1394		0.1672	
1995	Single Family	150	14.5	0.0750	0.0496 0.0493	0.0750	0.0596 0.0592
	Multi-Family Park	400		0.1104 0.0087		0.1324 0.0104	
Subtotals for 1991-95		2,490	46.5	0.9091	0.3564	1.0045	0.4281
1996	Single Family Multi-Family	110 490		0.0550 0.1352	0.0608	0.0550 0.1622	0.0730
1997	Single Family	85	4.3	0.0425	0.0701 0.0146	0.0430	0.0842 0.0175
	Multi-Family Park	565		0.1559 0.0026		0.1870 0.0031	
1998	Multi-Family	534		0.1474	0.0662	0.1768	0.0796
1999	Single Family	114		0.0570	0.0231	0.0570	0.0277
	Multi-Family	186		0.0513		0.0616	
2000	Single Family	76		0.0380	0.0080	0.0380	0.0096
	Marina (1600 Boats)			0.0680		0.0816	
Subtotals for 1996-00		2,160	4.3	0.7529	0.2428	0.8653	0.2916
2001-05	Single Family Park	500	27.5	0.2500 0.0165	0.0935 0.0612	0.2500 0.0198	0.1122 0.0734
	Commercial		51	0.0918		0.1102	
Subtotals for 2001-05		500	58.5	0.3583	0.1547	0.3800	0.1856
Beyond 2005	Single Family	2,340		1.1700		1.1700	
Cumulative Totals		7,690	115	3.2937	0.7733	3.5239	0.9286

Table 13

Projected Water Requirements for
Other Ewa Development Along Fort Weaver Road

Period	Land Use	No. of Units	Area (Acres)	Average Water Use		Average Daily Demand	
				Potable (MGD)	Non-Potable (MGD)	Potable (MGD)	Non-Potable (MGD)
1988-90	West Loch (SF) Residential	250	50	0.1250		0.1250	
	Golf Course (SF) Residential	300	55	0.1500		0.1500	
	Ewa Golf Course		270	0.0150	1.0500	0.0150	1.0500
	Subtotals for 1988-90	550	375	0.2900	1.0500	0.2900	1.0500
1991-95	West Loch (SF) Residential	250	50	0.1250		0.1250	
	Golf Course (SF) Residential	300	54	0.1500		0.1500	
	Lusk Hawaii (300 SF, 30 MF)	330	49.3	0.1620		0.1620	
	Subtotals for 1991-95	880	153.3	0.4370		0.4370	
1996-00	Lusk Hawaii (450 SF, 45 MF)	495	74.6	0.2430		0.2430	
Cumulative Totals		1,925	602.9	0.9700	1.0500	0.9700	1.0500

Table 14

Projected Water Requirements of the Gentry-Hoaeae Peninsula

Year	Land Use	Number of Residential Units	Area (Acres)	Average Daily Demand (MGD)
1989	Multi-Family	500	27	0.2000
1990	Multi-Family	500	27	0.2000
	Industrial		50	0.2000
Totals		1000	104	0.6000

OVERVIEW OF THE SERVICE AREAS AND SYSTEMS INCLUDED IN THE PLAN

The Master Plan includes offsite wells, tanks, and transmission pipelines for potable and non-potable improvements which will be dedicated to BWS. Facilities for private, non-potable systems are not included here. The plan begins with a presentation of potable system improvements in the following order: source wells in Upper Honouliuli; transmission along the Farrington Highway corridor; the Honouliuli 228-foot service zone; the JCIP-Kapolei Town Center service zone; the Makakilo-Kapolei Town Center 440-foot service zone; and the West Beach service area. Proposed offsite potable water facilities are shown on Figure 3.

Only one non-potable system will be dedicated to BWS and is thereby included in the Master Plan. This system will supply the non-potable requirements of West Beach and expansion of JCIP. It is presented herein as the Barbers Point 215 Non-Potable System. All other non-potable systems will remain private. Although their projected water requirements are shown on Tables 4 through 14 for reference purposes, infrastructure for these systems are not included in this master plan.

SOURCE WELLS IN UPPER HONOULIULI

New potable supply requirements are listed by development stage on Table 15. Initially, 3.5 MGD is required for development through 1990. The ultimate potable requirement will reach 19.8 MGD upon completion of all projects. The intention is to provide this supply, at least initially, from wells in Upper Honouliuli. Development of these wells is subject to meeting BWS water quality criteria and to obtaining State Department of Land and Natural Resources (DLNR) approval for use of the groundwater. The first well, designated Honouliuli Well 1 on Figure 3, has been drilled and will be outfitted with a 1750 GPM pump. Further well development will be undertaken incrementally as demands require.

The next wells developed will be arrayed with appropriate spacing in a northwest direction up into Honouliuli Gulch. All wells will be at about 400-foot elevation and pump directly into the proposed 1.0 MG tank which would

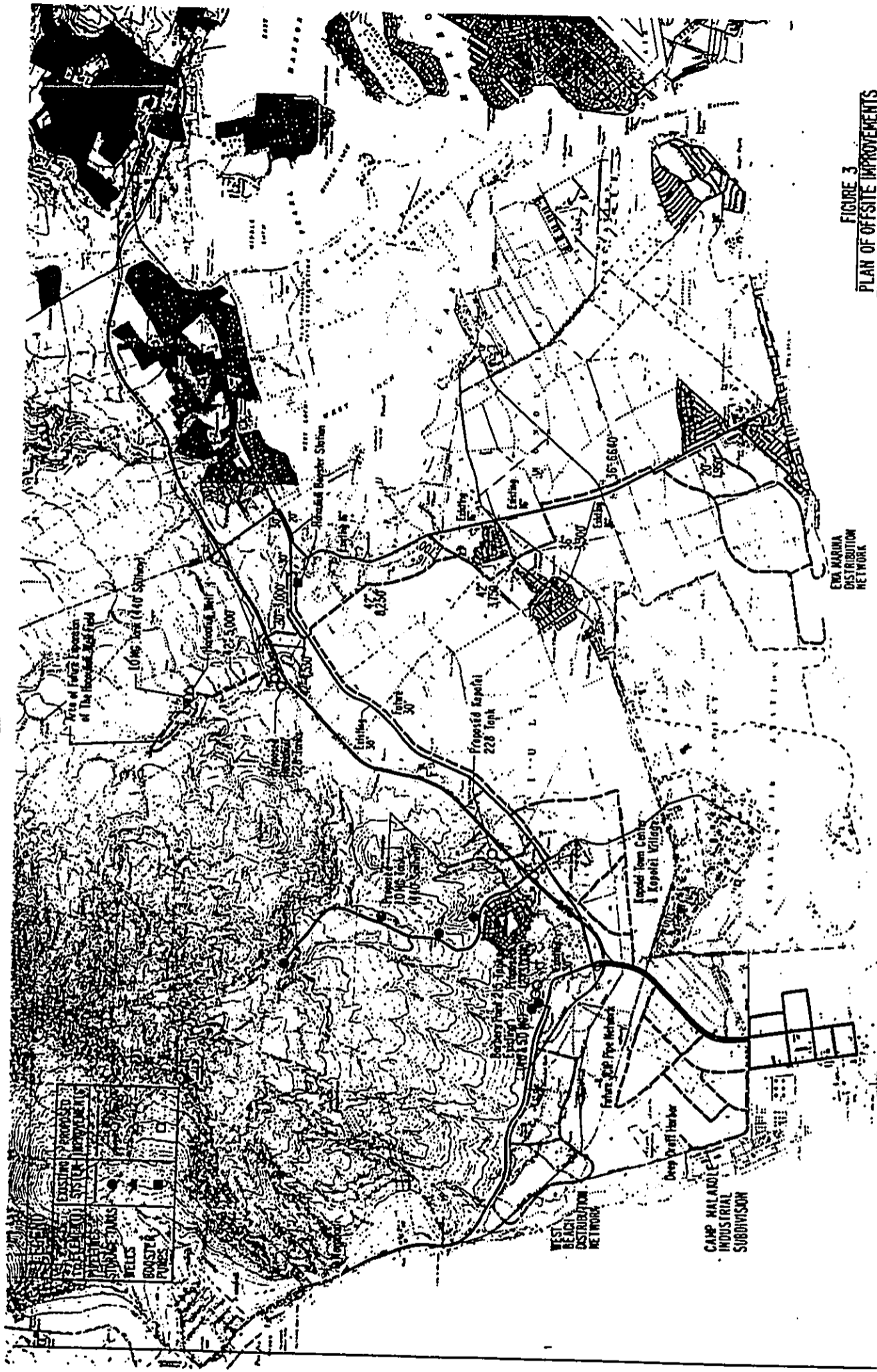


FIGURE 3
 PLAN OF OFFSITE IMPROVEMENTS
 TO THE BMS POTABLE WATER SYSTEM

ENVA MARINA
 DISTRIBUTION
 NETWORK

WEST
 BEACH
 DISTRIBUTION
 NETWORK

CAMP MALABOTE
 INDUSTRIAL
 SUBDIVISION

EXISTING & PROPOSED
 SYSTEM IMPROVEMENTS
 EXISTING 30"
 MAIN LINES
 PROPOSED 30"
 MAIN LINES
 EXISTING 15"
 MAIN LINES
 PROPOSED 15"
 MAIN LINES
 EXISTING 6"
 MAIN LINES
 PROPOSED 6"
 MAIN LINES
 EXISTING
 WELLS
 PROPOSED
 WELLS
 EXISTING
 PUMPS
 PROPOSED
 PUMPS

Area of Future Expansion
 of The Proposed West Field

10 MG Tank (140' Diameter)

Proposed Well #1
 25' 3000'

Proposed Well #2
 25' 3000'

Revised Booster Station

10 MG Tank (140' Diameter)

Proposed Kapotei
 228 Tank

10 MG Tank (140' Diameter)

Proposed Kapotei
 228 Tank

10 MG Tank (140' Diameter)

Proposed Kapotei
 228 Tank

10 MG Tank (140' Diameter)

Proposed Kapotei
 228 Tank

10 MG Tank (140' Diameter)

Proposed Kapotei
 228 Tank

Table 15
Incremental New Potable Supply Requirements

P r o j e c t	Required Potable Supply in MGD by Development Increment				
	1988-90	1991-95	1996-00	2001-05	Beyond 2005
Honouliuli 228-Foot Service Zone					
Ewa Village Areas		0.2782	0.4492	0.1800	0.5652
Gentry-Ewa	0.6150	1.0028	1.0090	0.6049	
Ewa Marina	0.1034	0.9091	0.7529	0.3583	1.1700
Gentry-Hoaeae	0.6000				
City West Loch Residential Community	0.1250	0.1250			
Ewa Golf Course	0.0150				
Golf Course Residential	0.1500	0.1500			
Lusk Hawaii		0.1620	0.2430		
JCIP-Kapolei Town Center 228-Foot Service Zone					
JCIP	0.0750	0.3742	0.1739	0.1776	0.8652
Kapolei Town Center	0.0012	0.0274	0.1437	0.5529	0.2328
Kapolei Village (City-HHA Project)	0.2971	0.9782	0.7733		
Kapolei Town Center 440-Foot Service Zone					
Makakilo	0.0785	0.0236	0.5256	0.0480	0.2080
West Beach	0.6769	0.8274			
West Beach	0.8103	1.3303	0.2285	0.8175	
Totals for Increment	3.5474	6.1882	4.2991	2.7392	3.0412
Cumulative Totals	3.5474	9.7356	14.0347	16.7739	19.8151

Note: Figures in this table are projected water use, not average daily demand.

have 420-foot floor and 440-foot spillway elevations. These wells will be in the Waianae Subzone of DLNR's Pearl Harbor Ground Water Control Area (PHGWCA). Based on DLNR's assessment of sustainable yield and the present level of permitted uses, this subzone has an unallocated groundwater supply of 6.4 MGD. A portion of this may be allocated to future Honouliuli wells.

Future potable source development in the Honouliuli well field may also occur to the east or mauka. Another alternative source of supply would be to utilize BWS wells outside the Ewa area. The ultimate choices will be determined by the fate of Oahu Sugar Company, by evolving DLNR regulations for the PHGWCA, and by source development undertaken by BWS. However, sizes of pipelines in the Honouliuli well field have been selected assuming substantial well development will occur in this area.

TRANSMISSION ALONG THE FARRINGTON HIGHWAY CORRIDOR

Transmission from existing BWS wells in Waipahu to development on the west side of Ewa Plain occurs via the 30-inch Farrington Highway main. Tables 16 and 17 present the future transmission requirements from the Honouliuli Booster Station to Makakilo and from Makakilo to the Barbers Point 215 tanks, respectively. These requirements will ultimately exceed the capacity of the 30-inch main.

The hydraulic analysis presented on Figure 4 depicts transmission for projected requirements through 1995. For the range of flow conditions that may occur (from zero to peak demand at nodes), the existing 30-inch can convey 20.8 to 22.4 MGD with three of the four Honouliuli booster pumps operating. This capacity is adequate for projected development until about 1995. When transmission requirements exceed this capacity, a parallel main in the Farrington Highway corridor will be required.

Figure 5 presents a hydraulic analysis for projected transmission requirements beyond 2005. The analysis assumes the following: installation of a parallel 30-inch main from the Honouliuli Booster Station to Makakilo; four Honouliuli booster pumps operating; and installation of a new storage tank above Kapolei Town Center. It should be noted that the assumption of four booster pumps operating for the analysis also means that upgrading of the Honouliuli Booster Station may be required. With installation of the Kapolei

Table 16

Maximum Day Transmission Requirements From the Monouiliuli Booster Station to Makakilo Drive

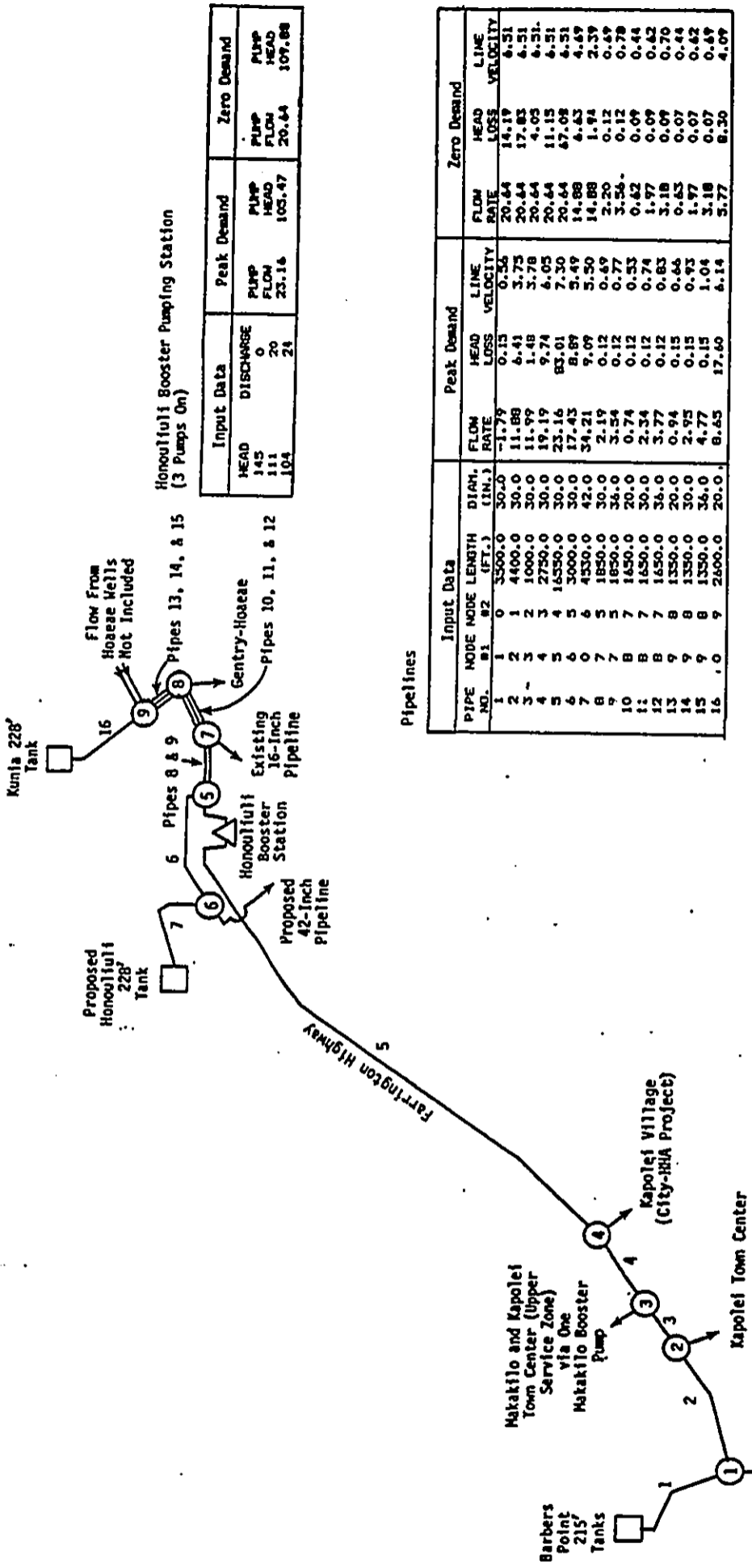
Development Period	BWS (MGD)	West Beach (MGD)	Expansion of JCIP (MGD)	Kapolei Town Center		Expansion of Makakilo (MGD)	Kapolei Village City-NHA (MGD)	Totals	
				228' Service Zone (MGD)	440' Service Zone (MGD)			Development Period (MGD)	Cumulative (MGD)
Existing	17.2544							17.2544	17.2544
1988-90	(-4.5000)	1.4598	0.1302	0.0021	0.1178	1.0154	0.4697	-1.3050	15.9494
1991-95	(-1.5000)	2.3830	0.5880	0.0494	0.0354	1.2411	1.5165	4.3134	20.2628
1996-00		0.4056	0.2964	0.2586	0.8030		1.2039	2.9675	23.2303
2001-05		1.4715	0.3197	0.9440	0.0720			2.8072	26.0375
Beyond 2005			1.5575	0.4191	0.3120			2.2886	28.3261

Note: Existing BWS transmission requirements include export to Manakuli, Monokai Hale, JCIP, and Makakilo. Its decreasing requirements in the 1988-90 and 1991-95 periods will be the result of new sources in Waianae and Makaha.

Table 17

Maximum Day Transmission Requirements From Makakilo Drive to the Barbers Point Tanks

Development Period	BWS (MGD)	West Beach (MGD)	JCIP (MGD)	Totals	
				Development Period (MGD)	Cumulative (MGD)
Existing	17.2544			17.2544	17.2544
1988-90	(-4.5000)	1.4598	0.1302	-2.9100	14.3444
1991-95	(-1.5000)	2.3830	0.5880	1.4710	15.8154
1996-00		0.4056	0.2964	0.7020	16.5174
2001-05		1.4715	0.3197	1.7912	18.3086
Beyond 2005			1.5575	1.5575	19.8661



Honouliuli Booster Pumping Station
(3 Pumps On)

Input Data		Peak Demand		Zero Demand	
HEAD	DISCHARGE	PUMP HEAD	PUMP FLOW	PUMP HEAD	PUMP FLOW
145	0	23.16	105.47	20.64	107.88
111	20				
104	24				

Pipelines

Input Data			Peak Demand			Zero Demand		
PIPE NO.	NODE #1	NODE #2	DIAM. (IN.)	HEAD LOSS	LINE VELOCITY	FLOW RATE	HEAD LOSS	LINE VELOCITY
1	0	1	3500.0	0.15	0.56	20.64	14.19	6.51
2	1	2	4400.0	6.41	3.75	20.64	17.83	6.51
3	2	3	1000.0	1.48	3.78	20.64	4.03	6.51
4	4	3	2750.0	9.74	6.05	20.64	11.15	6.51
5	5	4	16350.0	83.01	7.30	20.64	67.08	4.51
6	6	5	3000.0	17.43	5.49	14.88	1.94	2.59
7	0	6	4530.0	34.21	5.50	14.88	1.94	2.59
8	7	5	1850.0	2.19	0.49	2.20	0.12	0.59
9	7	5	1850.0	3.54	0.74	3.56	0.12	0.78
10	8	7	1650.0	0.74	0.33	0.42	0.09	0.44
11	8	7	1650.0	0.12	0.12	0.74	0.09	0.42
12	8	7	1650.0	0.12	0.12	1.97	0.09	0.42
13	9	8	1350.0	0.94	0.63	3.18	0.09	0.70
14	9	8	1350.0	2.95	0.93	1.97	0.07	0.42
15	9	8	1350.0	4.77	1.04	3.18	0.07	0.49
16	0	9	2600.0	17.60	6.14	5.77	8.30	4.09

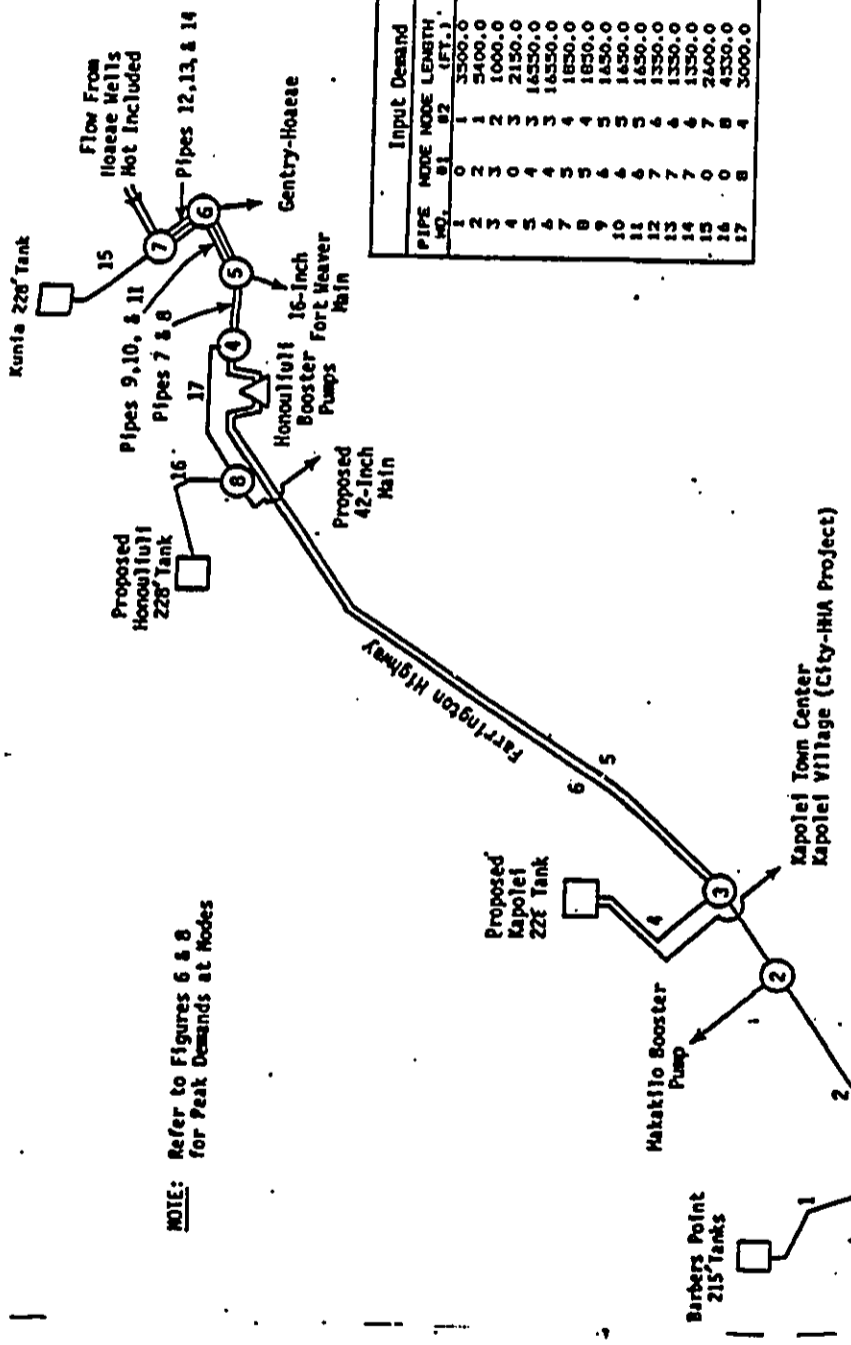
Nodes

Input Data		Peak Demand		Zero Demand	
JUNCTION NO.	ELEVATION (FT.)	DEMAND	HYDRAULIC GRADE	DEMAND	HYDRAULIC GRADE
1	90.0	13.7	214.8	0.0	229.2
2	110.0	0.1	221.3	0.0	247.0
3	100.0	7.2	222.7	0.0	251.1
4	105.0	4.0	232.5	0.0	242.2
5	95.0	0.0	210.0	0.0	219.4
6	175.0	16.8	218.9	0.0	228.1
7	85.0	1.1	210.1	0.0	219.5
8	50.0	1.8	210.4	0.0	219.6
9	77.0	0.0	210.4	0.0	219.7

Figure 4
Hydraulic Analysis of Farrington Highway
Transmission Through 1995

**Honouliuli Booster Pumps
(4 Pumps On)**

Input Data		Peak Demand		Zero Demand	
HEAD	DISCHARGE	PUMP FLOW	PUMP HEAD	PUMP FLOW	PUMP HEAD
145	0	19.15	112.59	20.58	107.92
111	20	19.15	112.59	20.58	107.92
93	28.4				



NOTE: Refer to Figures 6 & 8 for Peak Demands at Nodes

Pipe Network

Input Demand			Peak Demand			Zero Demand		
PIPE NO.	MODE	DIAM. (IN.)	FLOW RATE	HEAD LOSS	LINE VELOCITY	FLOW RATE	HEAD LOSS	LINE VELOCITY
1	0	3500.0	2.25	0.23	0.71	-14.14	8.99	5.07
2	1	5400.0	15.78	13.31	4.97	14.14	13.88	5.09
3	0	1000.0	-22.78	4.94	7.24	14.14	7.57	5.09
4	0	2150.0	-13.32	5.02	4.83	-25.02	12.44	7.89
5	4	18350.0	19.15	58.37	6.04	20.58	44.70	6.49
6	4	18350.0	19.15	58.37	6.04	20.58	44.70	6.49
7	5	18350.0	4.09	0.37	1.43	7.10	0.43	1.35
8	4	18350.0	7.20	0.39	1.29	4.40	0.31	1.37
9	4	18350.0	4.44	0.39	1.58	4.33	0.31	1.24
10	4	18350.0	1.42	0.37	1.01	1.25	0.31	0.88
11	6	1650.0	8.20	0.41	1.79	4.33	0.25	1.37
12	7	1350.0	5.07	0.41	1.60	3.92	0.25	1.24
13	4	1350.0	14.88	48.03	10.55	11.50	29.79	8.15
14	0	2400.0	43.23	28.38	10.17	29.44	4.98	4.77
15	0	4350.0	27.60	20.83	8.70	29.44	23.79	9.33
16	0	3000.0						
17	4	3000.0						

Node Demands and Pressures

Input Data		Peak Demand		Max. Day Plus Fire Flow	
JUNCTION NO.	ELEVATION (FT.)	DEMAND	PRESSURE (PSI)	DEMAND	PRESSURE (PSI)
1	90.0	18.0	54.1	0.0	58.1
2	100.0	7.2	53.3	0.0	59.7
3	100.0	0.0	57.6	0.0	60.9
4	95.0	0.0	36.3	0.0	44.3
5	85.0	2.4	40.8	0.0	48.8
6	50.0	1.8	56.1	0.0	44.1
7	77.0	0.0	44.6	0.0	52.5
8	175.0	35.7	10.7	0.0	19.7
					221.0

Figure 5
Hydraulic Analysis of Farrington Highway Transmission for Development Beyond 2005

tank, distribution to Kapolei Town Center and Kapolei Village will be primarily from this tank rather than the 30-inch transmission main. (The tank is dealt with in a subsequent section.) Although the choice of pipe size for the parallel transmission main and additional pump capacity at the Honouliuli Booster Station can be deferred until more definite patterns of development are established, the results are instructive. For the range of flow conditions that may occur (from zero to peak demand at nodes), the transmission rate is 38.3 to 41.2 MGD, far greater than actually required. Further, the existing 30-inch main between Makakilo and the Barbers Point 215 tanks will be adequate for the projected scale of development. The parallel main needs to be extended only as far as Makakilo.

HONOULIULI 228-FOOT SERVICE ZONE

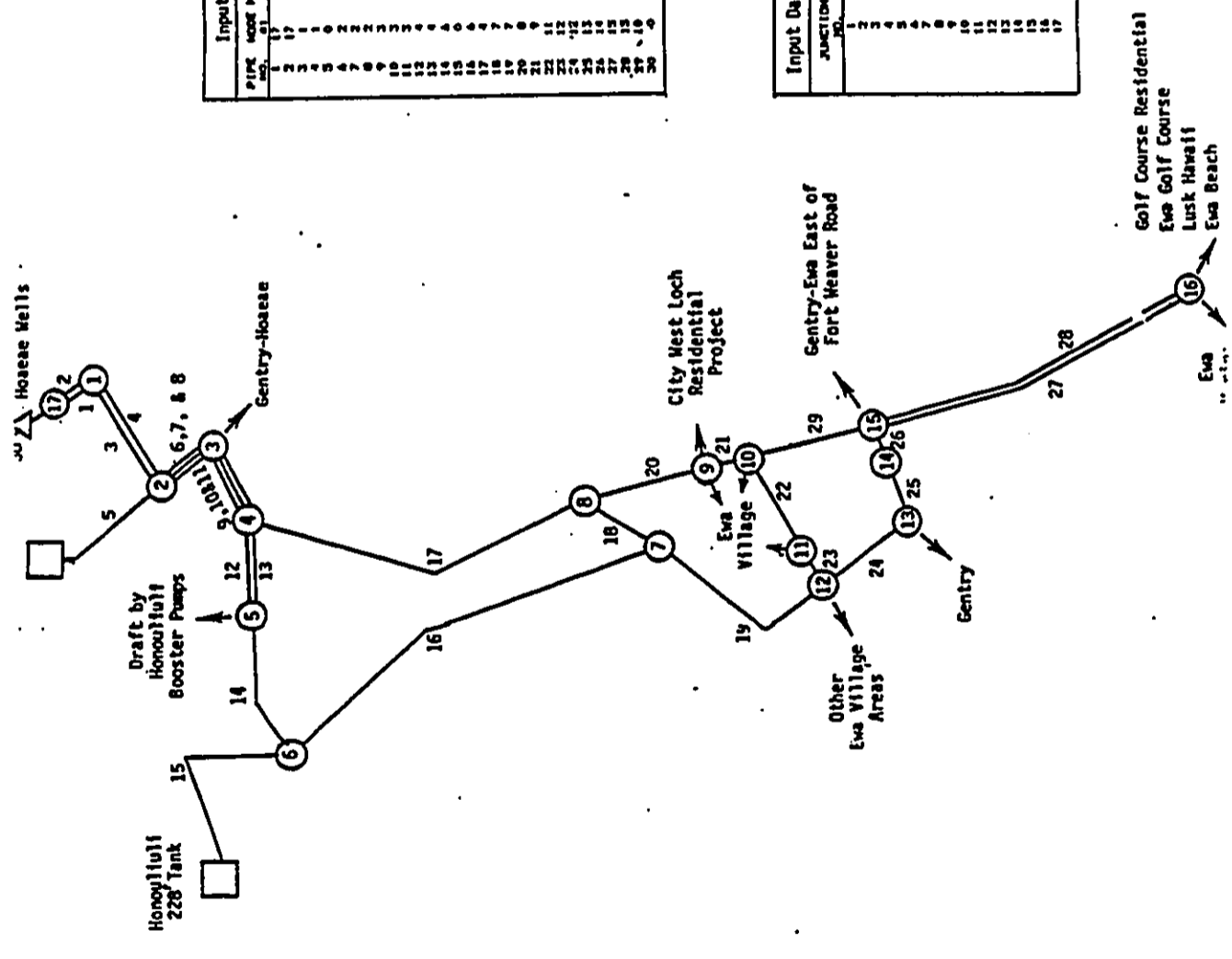
A new 5.0 MG tank with 228-foot spillway is proposed above H-1 Freeway in Honouliuli. A 1.0 MG tank with 440-foot spillway is also proposed adjacent to the Honouliuli wells; it will be directly linked to the 5.0 MG Honouliuli 228 to provide a combined 6.0 MG storage capacity initially. These facilities are required for distribution to the following projects: Ewa Village Areas; Gentry-Ewa; Ewa Marina; Ewa Golf Course; and Gentry-Hoaeae. They will also deliver water to the Honouliuli Booster Station for transmission to West Beach, Kapolei Town Center, Kapolei Village, and expansion of JCIP and Makakilo.

Figure 6 presents the hydraulic analysis for selected pipe sizes to serve this area. The hydraulic grade line at nodes within the pipe network establish available pressures for each project. For the peak flow computation, more than 60.0 psi is available at connection points. Several key aspects of the analysis deserve specific mention:

- A capacity of 1.0 MGD average day (3.0 MGD peak flow) has been set aside for BWS for future growth in Ewa Beach. Pipeline number 27 on Figure 6, the 6640-foot segment along Fort Weaver Road, has been oversized from 30- to 36-inch to accommodate this. Other pipelines can accommodate this allowance without oversizing.
- The velocity in Pipeline 15, the 42-inch line from the 5.0 MG tank to Farrington Highway, exceeds BWS' 6.0 feet per second design criterion.

HOSEA WELLS PUMPS (3 @ 1750 GPM & 1 @ 1500 GPM)

Input Data		Peak Demand		Max. Day + Fire	
HEAD	SIRO-MODE	FLOW	HEAD	FLOW	HEAD
415	0	19.45	200.04	19.45	207.48
230	9.45	19.72	200.04	19.45	207.48
172	11				



Pipe Network

PIPE NO.	NODE NO.	Input Data			Peak Demand			Max. Day Plus Fire Flow		
		LENGTH (FT.)	DIAM. (IN.)	FLOW (MGD)	HEAD LOSS (PSI)	LINE VELOCITY (FPS)	FLOW (MGD)	HEAD LOSS (PSI)	LINE VELOCITY (FPS)	
1	1	1000.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
2	1	1600.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
3	1	2000.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
4	2	2400.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
5	2	2800.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
6	2	3200.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
7	2	3600.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
8	2	4000.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
9	2	4400.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
10	2	4800.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
11	2	5200.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
12	2	5600.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
13	2	6000.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
14	2	6400.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
15	2	6800.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
16	2	7200.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
17	2	7600.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
18	2	8000.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
19	2	8400.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
20	2	8800.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
21	2	9200.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
22	2	9600.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
23	2	10000.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
24	2	10400.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
25	2	10800.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
26	2	11200.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
27	2	11600.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
28	2	12000.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
29	2	12400.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	
30	2	12800.0	36.0	0.78	1.05	3.16	0.74	1.00	1.45	

Node Demands & Pressures

JUNCTION NO.	ELEVATION (FT.)	Peak Demand		Max. Day Plus Fire Flow	
		DEMAND (MGD)	PRESSURE (PSI)	DEMAND (MGD)	PRESSURE (PSI)
1	75.0	0.0	58.1	0.0	81.4
2	77.0	0.0	57.0	0.0	80.3
3	90.0	1.8	48.4	0.0	90.3
4	82.0	0.0	42.3	0.0	54.3
5	82.0	0.0	42.3	0.0	54.3
6	172.0	0.0	15.4	0.0	19.7
7	172.0	0.0	15.4	0.0	19.7
8	225.0	0.0	59.9	0.0	48.1
9	425.0	0.0	72.7	0.0	81.0
10	425.0	0.0	72.7	0.0	81.0
11	425.0	0.0	72.7	0.0	81.0
12	425.0	0.0	72.7	0.0	81.0
13	425.0	0.0	72.7	0.0	81.0
14	425.0	0.0	72.7	0.0	81.0
15	425.0	0.0	72.7	0.0	81.0
16	425.0	0.0	72.7	0.0	81.0
17	425.0	0.0	72.7	0.0	81.0
18	425.0	0.0	72.7	0.0	81.0
19	425.0	0.0	72.7	0.0	81.0
20	425.0	0.0	72.7	0.0	81.0
21	425.0	0.0	72.7	0.0	81.0
22	425.0	0.0	72.7	0.0	81.0
23	425.0	0.0	72.7	0.0	81.0
24	425.0	0.0	72.7	0.0	81.0
25	425.0	0.0	72.7	0.0	81.0
26	425.0	0.0	72.7	0.0	81.0
27	425.0	0.0	72.7	0.0	81.0
28	425.0	0.0	72.7	0.0	81.0
29	425.0	0.0	72.7	0.0	81.0
30	425.0	0.0	72.7	0.0	81.0

Figure 6
Hydraulic Analysis of the Honouliuli Service Area

Since this construction project is already out to bid, the 42-inch size will not be changed. It is recognized that a parallel relief line may ultimately be required when and if the peak demands shown on Figure 6 materialize.

Initial storage requirements will be met by construction of a 1.0 MG tank with 440-foot spillway and a 5.0 MG tank with 228-foot spillway. These will provide sufficient storage until sometime between 1990 and 1995. When additional storage is required, a second 5.0 MG tank with 228-foot spillway will be constructed.

JCIP-KAPOLEI TOWN CENTER SERVICE ZONE

JCIP, Kapolei Town Center, and Kapolei Village, the City-HHA residential community, can be interconnected to create a single service zone. For an interim development period to approximately 1995, it is proposed to serve Kapolei Town Center and Kapolei Village by direct connections to the 30-inch Farrington main. As shown by the hydraulic analysis on Figure 7, adequate service pressure can be achieved with water supplied from both the Barbers Point 215 tanks and the Honouliuli 228 tank.

For the interim development period to approximately 1995, it is proposed to meet the storage requirements of Kapolei Town Center (228-foot zone) and Kapolei Village with the excess capacity in the existing Barbers Point 215 tanks. Based on this premise, Table 18 indicates that additional storage will be required just prior to 1995. At that time, it is proposed to construct a new Kapolei 228 tank located above H-1 Freeway and east of Makakilo Drive. The requirement for additional storage would ultimately be 5.9 MGD (also shown on Table 18). The choice to construct one tank or provide the storage requirement incrementally will depend on the actual rate of development. The choice should be deferred until the need for new storage is imminent.

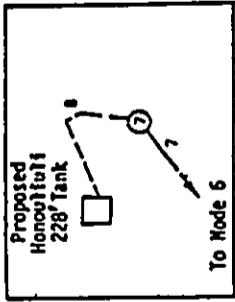
Figure 8 presents a hydraulic analysis of this service area for the ultimate scale of development with the new Kapolei 228 tank (or tanks) in place. The future pipe network linking JCIP, Kapolei Town Center, and Kapolei shown schematically on Figure 8 is approximate since the alignment of roadways in these projects has not been established. Pipes shown on Figure 8 are based on preliminary concept plans. The 228-foot spillway elevation of the

Table 18

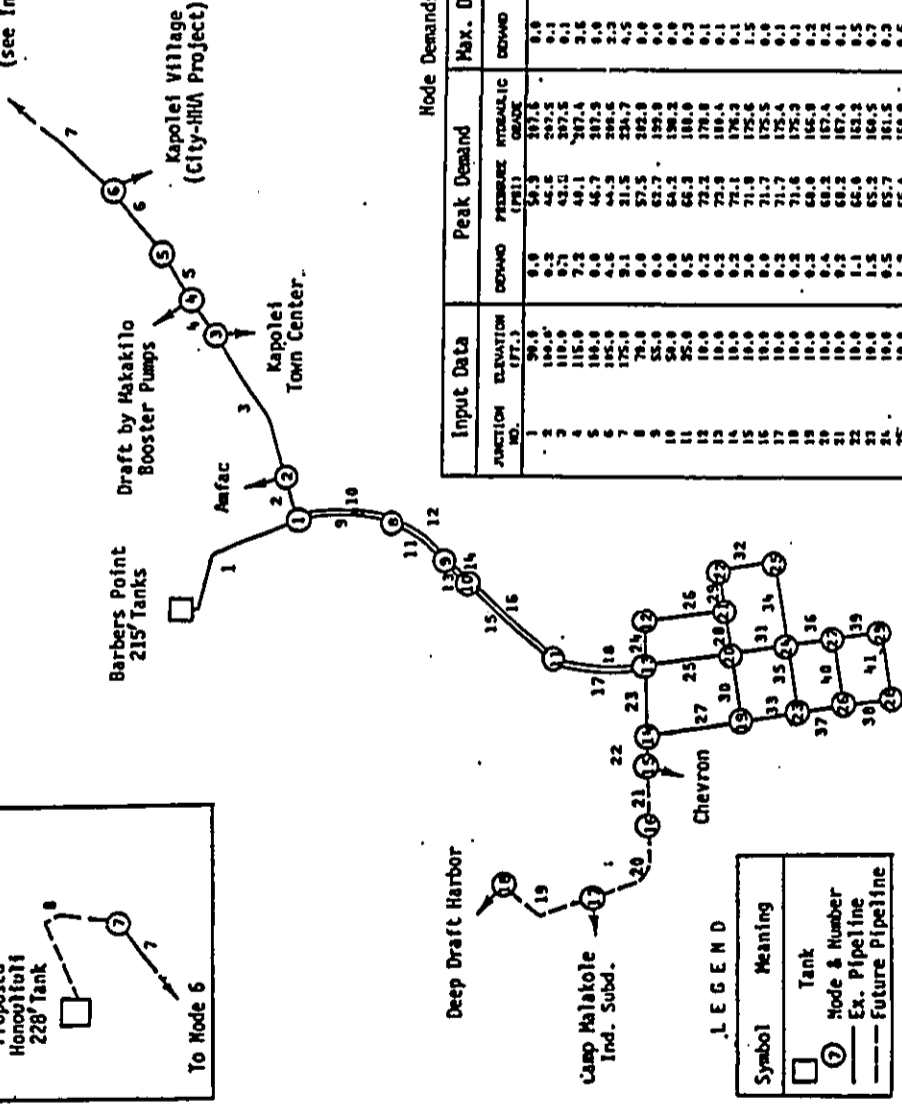
Maximum Day Storage Requirements
of the JCIP-Kapolei Town Center Service Zone

Development	Cumulative Storage Requirement in Million Gallons					
	Existing	1990	1995	2000	2005	Ultimate
JCIP	7.1200	7.2502	7.8382	8.1346	8.4542	10.0117
Kapolei Town Center		0.0021	0.0514	0.3100	1.2540	1.6731
Kapolei Village		0.4696	1.9862	3.1900	3.1900	3.1900
Totals	7.1200	7.7219	9.8758	11.6346	12.8982	14.8748

INSET



Along Farrington Hwy.
To Node 7
(see Inset at left)



LEGEND

□	Tank
○	Node & Number
---	Ex. Pipeline
---	Future Pipeline

Node Demands and Pressures

Input Data		Peak Demand		Max. Day + Fire Flow	
JUNCTION NO.	ELEVATION (FT.)	DEMAND (MGD)	HYDRAULIC GRADE (PSI)	DEMAND (MGD)	HYDRAULIC GRADE (PSI)
1	59.0	0.0	27.3	0.0	31.3
2	104.0	0.0	44.0	0.0	42.5
3	110.0	0.0	44.0	0.0	41.5
4	110.0	0.0	44.0	0.0	42.2
5	115.0	0.0	46.0	0.0	43.0
6	105.0	0.0	44.0	0.0	41.5
7	175.0	0.0	31.5	0.0	32.5
8	79.0	0.0	52.5	0.0	51.0
9	55.0	0.0	62.0	0.0	60.0
10	50.0	0.0	62.0	0.0	60.0
11	35.0	0.0	62.0	0.0	60.0
12	16.0	0.0	72.0	0.0	70.0
13	16.0	0.0	72.0	0.0	70.0
14	16.0	0.0	71.0	0.0	69.0
15	16.0	0.0	71.0	0.0	69.0
16	16.0	0.0	71.0	0.0	69.0
17	16.0	0.0	71.0	0.0	69.0
18	16.0	0.0	71.0	0.0	69.0
19	16.0	0.0	71.0	0.0	69.0
20	16.0	0.0	71.0	0.0	69.0
21	16.0	0.0	71.0	0.0	69.0
22	16.0	0.0	71.0	0.0	69.0
23	16.0	0.0	71.0	0.0	69.0
24	16.0	0.0	71.0	0.0	69.0
25	16.0	0.0	71.0	0.0	69.0
26	16.0	0.0	71.0	0.0	69.0
27	16.0	0.0	71.0	0.0	69.0
28	16.0	0.0	71.0	0.0	69.0
29	16.0	0.0	71.0	0.0	69.0
30	16.0	0.0	71.0	0.0	69.0
31	16.0	0.0	71.0	0.0	69.0
32	16.0	0.0	71.0	0.0	69.0
33	16.0	0.0	71.0	0.0	69.0
34	16.0	0.0	71.0	0.0	69.0
35	16.0	0.0	71.0	0.0	69.0
36	16.0	0.0	71.0	0.0	69.0
37	16.0	0.0	71.0	0.0	69.0
38	16.0	0.0	71.0	0.0	69.0
39	16.0	0.0	71.0	0.0	69.0
40	16.0	0.0	71.0	0.0	69.0
41	16.0	0.0	71.0	0.0	69.0

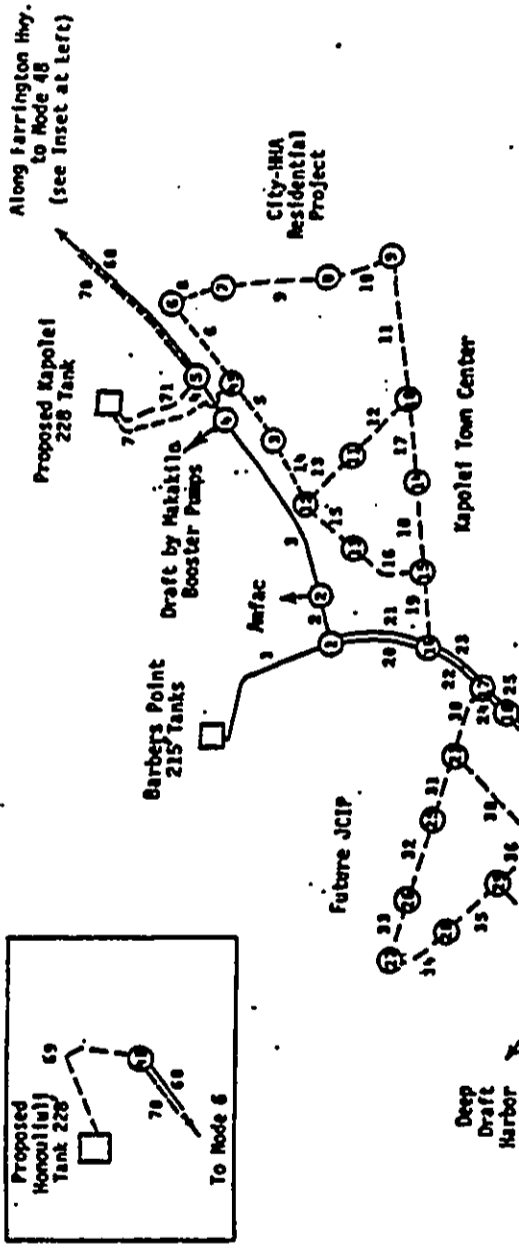
Pipe Network

PIPE NO.	MODE	LENGTH (FT.)	Input Data		Peak Demand		Max. Day + Fire	
			BIOM. (MGD)	VELOCITY (FT./SEC)	BIOM. (MGD)	VELOCITY (FT./SEC)	BIOM. (MGD)	VELOCITY (FT./SEC)
1	1	500.0	20.0	0.55	20.0	0.55	20.0	0.55
2	1	500.0	20.0	0.55	20.0	0.55	20.0	0.55
3	2	2000.0	20.0	0.40	20.0	0.40	20.0	0.40
4	2	1000.0	20.0	0.40	20.0	0.40	20.0	0.40
5	4	1000.0	20.0	0.40	20.0	0.40	20.0	0.40
6	5	1750.0	20.0	0.74	20.0	0.74	20.0	0.74
7	7	12550.0	20.0	16.12	20.0	16.12	20.0	16.12
8	7	4500.0	20.0	3.20	20.0	3.20	20.0	3.20
9	1	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
10	1	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
11	0	3500.0	20.0	3.20	20.0	3.20	20.0	3.20
12	0	3500.0	20.0	3.20	20.0	3.20	20.0	3.20
13	5	700.0	20.0	0.37	20.0	0.37	20.0	0.37
14	5	700.0	20.0	0.37	20.0	0.37	20.0	0.37
15	10	3500.0	20.0	4.75	20.0	4.75	20.0	4.75
16	10	3500.0	20.0	4.75	20.0	4.75	20.0	4.75
17	11	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
18	11	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
19	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
20	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
21	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
22	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
23	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
24	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
25	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
26	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
27	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
28	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
29	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
30	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
31	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
32	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
33	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
34	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
35	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
36	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
37	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
38	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
39	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
40	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75
41	12	2100.0	20.0	4.75	20.0	4.75	20.0	4.75

Figure 7
Hydraulic Analysis of the JCIP-Kapolei Town Center
Service Area Through 1995

Pipe Network				
Input Data				
LINE NO.	FROM NODE	TO NODE	LENGTH (FEET)	HEAD LOSS (FEET)
1	1	2	200.0	0.00
2	2	3	150.0	0.00
3	3	4	100.0	0.00
4	4	5	150.0	0.00
5	5	6	100.0	0.00
6	6	7	150.0	0.00
7	7	8	100.0	0.00
8	8	9	150.0	0.00
9	9	10	100.0	0.00
10	10	11	150.0	0.00
11	11	12	100.0	0.00
12	12	13	150.0	0.00
13	13	14	100.0	0.00
14	14	15	150.0	0.00
15	15	16	100.0	0.00
16	16	17	150.0	0.00
17	17	18	100.0	0.00
18	18	19	150.0	0.00
19	19	20	100.0	0.00
20	20	21	150.0	0.00
21	21	22	100.0	0.00
22	22	23	150.0	0.00
23	23	24	100.0	0.00
24	24	25	150.0	0.00
25	25	26	100.0	0.00
26	26	27	150.0	0.00
27	27	28	100.0	0.00
28	28	29	150.0	0.00
29	29	30	100.0	0.00
30	30	31	150.0	0.00
31	31	32	100.0	0.00
32	32	33	150.0	0.00
33	33	34	100.0	0.00
34	34	35	150.0	0.00
35	35	36	100.0	0.00
36	36	37	150.0	0.00
37	37	38	100.0	0.00
38	38	39	150.0	0.00
39	39	40	100.0	0.00
40	40	41	150.0	0.00
41	41	42	100.0	0.00
42	42	43	150.0	0.00
43	43	44	100.0	0.00
44	44	45	150.0	0.00
45	45	46	100.0	0.00
46	46	47	150.0	0.00
47	47	48	100.0	0.00
48	48	49	150.0	0.00
49	49	50	100.0	0.00
50	50	51	150.0	0.00
51	51	52	100.0	0.00
52	52	53	150.0	0.00
53	53	54	100.0	0.00
54	54	55	150.0	0.00
55	55	56	100.0	0.00
56	56	57	150.0	0.00
57	57	58	100.0	0.00
58	58	59	150.0	0.00
59	59	60	100.0	0.00
60	60	61	150.0	0.00
61	61	62	100.0	0.00
62	62	63	150.0	0.00
63	63	64	100.0	0.00
64	64	65	150.0	0.00
65	65	66	100.0	0.00
66	66	67	150.0	0.00
67	67	68	100.0	0.00
68	68	69	150.0	0.00
69	69	70	100.0	0.00
70	70	71	150.0	0.00

Figure 8
 Hydraulic Analysis of the JCIP-Kapalei Town Center
 Service Area for Development Beyond 2005



Node Demands and Pressures				
Input Data				
NODE NO.	DEMAND (MGD)	ELEVATION (FEET)	HEAD LOSS (FEET)	RESIDUAL HEAD (FEET)
1	0.0	160.0	0.0	160.0
2	0.0	150.0	0.0	150.0
3	0.0	140.0	0.0	140.0
4	0.0	130.0	0.0	130.0
5	0.0	120.0	0.0	120.0
6	0.0	110.0	0.0	110.0
7	0.0	100.0	0.0	100.0
8	0.0	90.0	0.0	90.0
9	0.0	80.0	0.0	80.0
10	0.0	70.0	0.0	70.0
11	0.0	60.0	0.0	60.0
12	0.0	50.0	0.0	50.0
13	0.0	40.0	0.0	40.0
14	0.0	30.0	0.0	30.0
15	0.0	20.0	0.0	20.0
16	0.0	10.0	0.0	10.0
17	0.0	0.0	0.0	0.0
18	0.0	10.0	0.0	10.0
19	0.0	20.0	0.0	20.0
20	0.0	30.0	0.0	30.0
21	0.0	40.0	0.0	40.0
22	0.0	50.0	0.0	50.0
23	0.0	60.0	0.0	60.0
24	0.0	70.0	0.0	70.0
25	0.0	80.0	0.0	80.0
26	0.0	90.0	0.0	90.0
27	0.0	100.0	0.0	100.0
28	0.0	110.0	0.0	110.0
29	0.0	120.0	0.0	120.0
30	0.0	130.0	0.0	130.0
31	0.0	140.0	0.0	140.0
32	0.0	150.0	0.0	150.0
33	0.0	160.0	0.0	160.0
34	0.0	170.0	0.0	170.0
35	0.0	180.0	0.0	180.0
36	0.0	190.0	0.0	190.0
37	0.0	200.0	0.0	200.0
38	0.0	210.0	0.0	210.0
39	0.0	220.0	0.0	220.0
40	0.0	230.0	0.0	230.0
41	0.0	240.0	0.0	240.0
42	0.0	250.0	0.0	250.0
43	0.0	260.0	0.0	260.0
44	0.0	270.0	0.0	270.0
45	0.0	280.0	0.0	280.0
46	0.0	290.0	0.0	290.0
47	0.0	300.0	0.0	300.0
48	0.0	310.0	0.0	310.0
49	0.0	320.0	0.0	320.0
50	0.0	330.0	0.0	330.0
51	0.0	340.0	0.0	340.0
52	0.0	350.0	0.0	350.0
53	0.0	360.0	0.0	360.0
54	0.0	370.0	0.0	370.0
55	0.0	380.0	0.0	380.0
56	0.0	390.0	0.0	390.0
57	0.0	400.0	0.0	400.0
58	0.0	410.0	0.0	410.0
59	0.0	420.0	0.0	420.0
60	0.0	430.0	0.0	430.0
61	0.0	440.0	0.0	440.0
62	0.0	450.0	0.0	450.0
63	0.0	460.0	0.0	460.0
64	0.0	470.0	0.0	470.0
65	0.0	480.0	0.0	480.0
66	0.0	490.0	0.0	490.0
67	0.0	500.0	0.0	500.0
68	0.0	510.0	0.0	510.0
69	0.0	520.0	0.0	520.0
70	0.0	530.0	0.0	530.0
71	0.0	540.0	0.0	540.0

Kapolei tank is matched to that of the 5.0 MG Honouliuli tank. The analysis assumes that distribution to Kapolei Town Center and Kapolei Village would ultimately be from the Kapolei tank rather than from the 30-inch transmission main.

MAKAKILO-KAPOLEI TOWN CENTER 440-FOOT SERVICE ZONE

The portion of Kapolei Town Center located above the service zone of the Kapolei 228 tank will be integrated into the existing Makakilo-440 service zone. Initial development can be supplied by connecting to the 16-inch main in Makakilo Drive. When storage requirements for Makakilo and Kapolei Town Center in this service zone exceed the 1.0 MG capacity of the Makakilo-440 tank, a new 440-foot tank would be constructed. A location in Ridgeline Parcel D is proposed (see Figure 9). Current development plans indicate that the new tank should be 1.0 MG (refer to Table 19). At that time, the possible need to upgrade Makakilo Booster Station No. 1 will be evaluated. In the future, areas above the tank in Ridgeline Parcel D will be developed, requiring that a 675-foot service zone be established. Its supply would be provided by a pump station at the 440-foot tank.

Existing improvements in the 440-foot service pressure zone and at the Makakilo Booster Station No. 1 were built by Finance Realty for Makakilo City. Proposed joint use by Kapolei Town Center has been agreed to by Finance Realty.

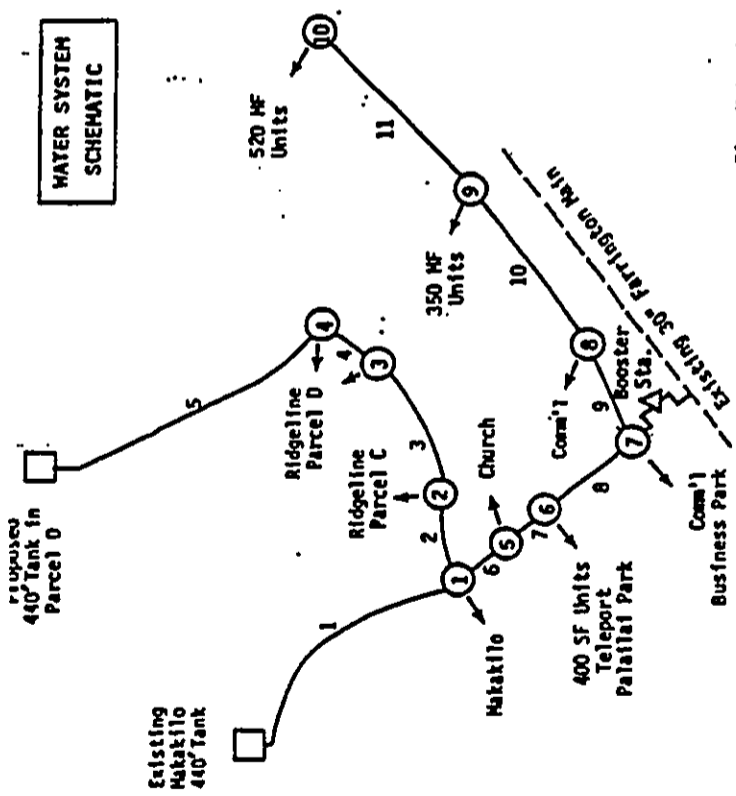
WEST BEACH SERVICE AREA

West Beach potable water requirements will be supplied separately from new tanks to be located next to the existing Barbers Point 215 tanks. Initial construction will include a 3.0 MG tank and 24-inch pipeline along Farrington Highway to the project. A second 3.0 MG tank will be constructed later. Sizing for these improvements and for onsite distribution pipelines is detailed in the February 1985 master plan by Community Planning, Inc. and will not be repeated here.

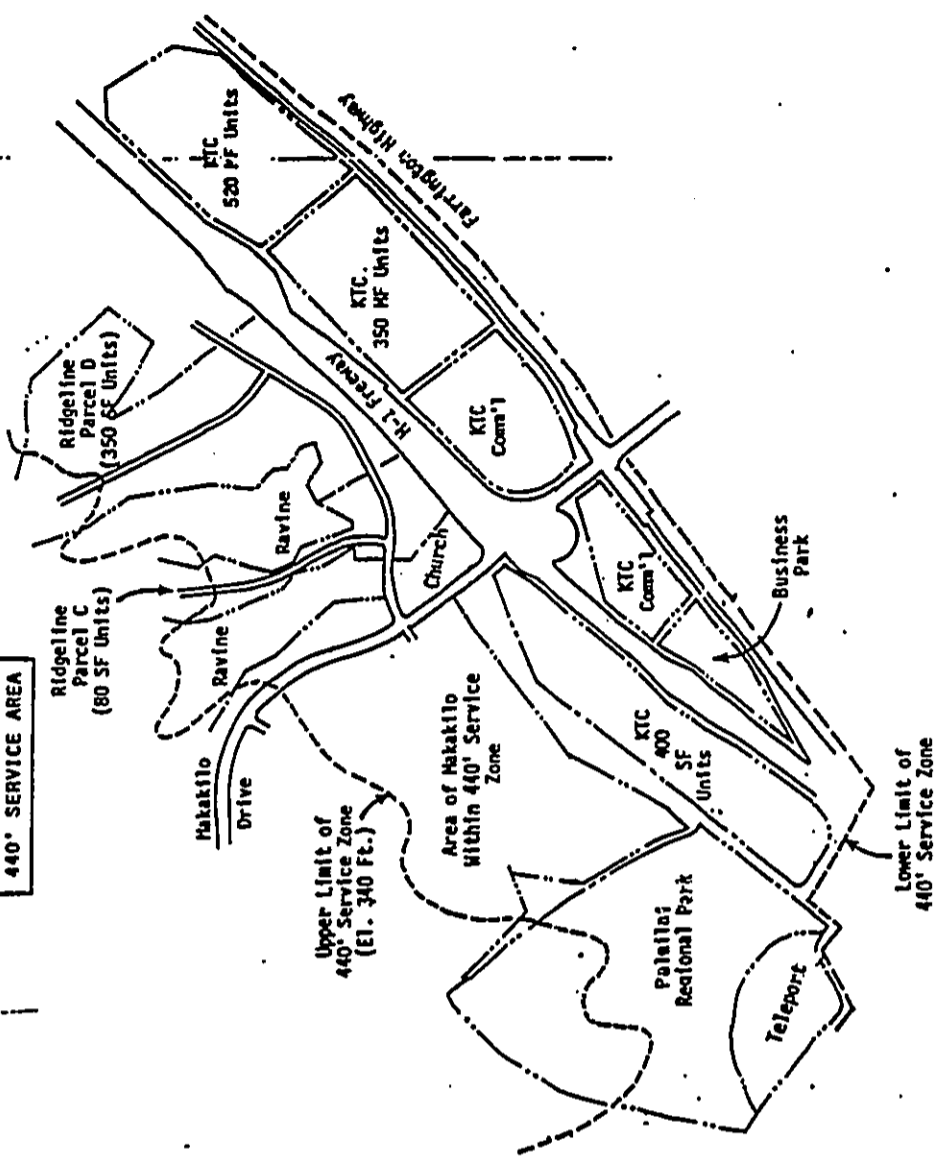
BARBERS POINT 215 NON-POTABLE SYSTEM

The Barbers Point 215 non-potable system will supply the non-potable water uses of West Beach and expansion of JCIP. The system will be comprised of new brackish water wells, non-potable storage tanks with 215-foot spillway elevations, and distribution pipelines. The February 1985 master plan by Community Planning, Inc. was based on less expansion of JCIP than is currently

WATER SYSTEM SCHEMATIC



440' SERVICE AREA



Pipe Network

Input Data		Peak Demand		Max. Day + Fire Flow	
PIPE NO.	SIZE (IN.)	FLOW RATE (MGD)	HEAD LOSS (FT)	FLOW RATE (MGD)	HEAD LOSS (FT)
1	24.0	1.25	1.25	1.25	1.25
2	24.0	1.25	1.25	1.25	1.25
3	24.0	1.25	1.25	1.25	1.25
4	24.0	1.25	1.25	1.25	1.25
5	24.0	1.25	1.25	1.25	1.25
6	24.0	1.25	1.25	1.25	1.25
7	24.0	1.25	1.25	1.25	1.25
8	24.0	1.25	1.25	1.25	1.25
9	24.0	1.25	1.25	1.25	1.25
10	24.0	1.25	1.25	1.25	1.25
11	24.0	1.25	1.25	1.25	1.25

Node Demands and Pressures

Input Data		Peak Demand		Max. Day + Fire Flow	
JUNCTION NO.	ELEVATION (FT)	DEMAND (MGD)	HEAD LOSS (FT)	DEMAND (MGD)	HEAD LOSS (FT)
1	120.0	0.0	0.0	0.0	0.0
2	120.0	0.0	0.0	0.0	0.0
3	120.0	0.0	0.0	0.0	0.0
4	120.0	0.0	0.0	0.0	0.0
5	120.0	0.0	0.0	0.0	0.0
6	120.0	0.0	0.0	0.0	0.0
7	120.0	0.0	0.0	0.0	0.0
8	120.0	0.0	0.0	0.0	0.0
9	120.0	0.0	0.0	0.0	0.0
10	120.0	0.0	0.0	0.0	0.0
11	120.0	0.0	0.0	0.0	0.0

Figure 9
Hydraulic Analysis of the Makakillo-Kapolei Town Center 440-foot Service Area

Table 19

Existing and Future Supply Requirements for Makakilo by Service Pressure Zone

Service Pressure Zone (Feet)	Stage of Development	Type of Development					Average Demand (MGD)	
		Number of Residential Units			Commercial (Acres)	Park (Acres)		Other (GPD)
		Single Family	Townhouse	Apartments				
1,230	Existing	607	341			8.5	0.4739	
	Future	602	218	359		5.3	0.5530	
	Totals	1,209	559	359		13.8	1.0269	
920	Existing	126	494	138		5.7	64,000	0.4026
	Future	524	250	712	5.0	3.5		0.6758
	Totals	650	744	850	5.0	9.2	64,000	1.0784
675	Existing	733	149		2.5	2.1	34,500	0.4765
	Future	203					20,000	0.1215
	Totals	936	149		2.5	2.1	54,500	0.5980
440	Existing	443				2.1		0.2299
	Future Makakilo	33				5.9	6,000	0.0461
	Parcel C	80						0.0400
	Parcel D	350						0.1750
	Future Kapolei Town Center	400	870		60.6	81.0	105,300	0.8934
	Totals	1,306	870		60.6	81.0	111,300	1.3844

Table 20

Summary of the Supply and Storage Requirements
of the Barbers Point Non-Potable System

Supply Requirements

Development Increment	Average Daily Water Use		Total Required Supply	
	West Beach (MGD)	JCIP (MGD)	Development Increment (MGD)	Cumulative (MGD)
1988-90	0.6716	0.1408	0.8124	0.8124
1991-95	0.6678	0.2112	0.8790	1.6914
1996-00	0.0949	0.2816	0.3765	2.0679
2001-05	0.3628	0.4224	0.7852	2.8531
Beyond 2005		1.6108	1.6108	4.4639

Storage Requirements of the 215' System

Development Increment	Average Daily Water Demand		Total Storage Requirement	
	West Beach (MGD)	JCIP (MGD)	Development Increment (MG)	Cumulative (MG)
1988-90	0.7965	0.1690	0.9655	0.9655
1991-95	0.7821	0.2534	1.0355	2.0010
1996-00	0.1142	0.3379	0.4521	2.4531
2001-05	0.4354	0.5069	0.9423	3.3954
Beyond 2005		1.9330	1.9330	5.3284



APPENDIX E

Updated Social Impact Assessment

Prepared by Earthplan, January, 1991

Ewa Marina Phase 2

Updated Social Impact Assessment

**Prepared for HASEKO (Hawaii), Inc.
by Earthplan**

January 1991

Ewa Marina Phase 2
Social Impact Assessment: Summary

1

This social impact assessment of the Ewa Marina Phase 2 was prepared by Earthplan for the EIS accompanying the application for amendments to the Ewa Development Plan.

This social impact assessment provides a profile of the existing community to establish the social context in which project impacts may occur. This baseline data is extended by identifying the possible future scenarios for the community independent of the proposed project.

Potential community issues and concerns are identified, based on historical trends to date. In terms of social impacts, this social impact assessment presents discussions on (1) the change in land use pattern; (2) impacts of specific components; and (3) public services and facilities.

2 PROFILE OF THE EXISTING COMMUNITY

2.1 EXISTING COMMUNITIES IN THE STUDY AREA

The Study Area for this report is the Ewa Development Plan area. In the eastern half of the Ewa region are the communities of Ewa Beach, the Iroquois Point Puuloa Military Family Housing (IPP Military Family Housing), Ewa Villages and Honouliuli. The Naval Air Station Barbers Point (NASBP) is located in the south-central area of Ewa and abuts the western boundary of Ewa Marina Phase 2.

In the western half of the Ewa region are the residential communities of Makakilo, Honokai Hale and Nanakai Gardens, as well as the James Campbell Industrial Park and Barbers Point Harbor. Oahu's largest sugar producer, Oahu Sugar Company (OSCO) cultivates approximately 8,000 acres in the Ewa region.

2.2 EMPLOYMENT

Figures 1 and 2 present estimates of jobs in the Ewa region in 1985. Figure 1 shows that military jobs were the largest category of employment, with about 39 percent of the total 11,121 Ewa region jobs. Figure 2 confirms this by showing that almost half of Ewa's jobs were located at the Naval Air Station, Barbers Point. The area from Ewa Villages to Honokai Hale contained over one-fifth of Ewa's total jobs; almost half of Ewa's industrial jobs are in this area, with the presence of the Campbell Industrial Park. Makakilo, a predominantly residential community, contained only three percent of Ewa's total jobs.

2.3 POPULATION AND HOUSING

Between 1980 and 1989, Oahu's population grew about ten percent, from 762,564 in 1980 to 841,600 persons in 1989. Most of the island's 282,330 dwelling units in 1989 were used for residential purposes; only about three percent of these were resort condominium units. In 1980, approximately 52 percent of the islandwide residential units were single-family residences; this share decreased slightly to 49.6 percent in 1989.

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Population growth in the Ewa region was proportionally smaller than the Oahu population increase. *Figure 3* shows that the Ewa region grew from 36,324 persons in 1980 to 39,338 persons in 1989, for an eight percent population increase. Most of the 1980s growth occurred between 1985 and 1989. In terms of average annual growth rates, the Ewa region experienced strong growth in the 1970s, remained virtually stable between 1980 and 1985, and started to grow again between 1985 to 1989, as indicated in *Table 1*.

Figure 4 illustrates the growth patterns of the separate communities. In the 1970s, most of Ewa's growth occurred in Ewa Beach, where the population almost tripled during that decade and remained around 12,300 persons thereafter. Makakilo's population more than doubled between 1970 and 1989 for a recent population of about 10,000 persons. Growth in the Ewa to Honokai Hale/Nanakai Gardens region has been slow but steady since 1970; since 1985, however, growth has been accelerating due to the addition of Ewa Gentry units.

Table 2 indicates that, in 1989, the Ewa region contained 10,192 housing units. About 60 percent are single-family units, while only 17 percent are multi-family units. Approximately 23 percent of Ewa's housing units are in military housing. Compared to the islandwide household size of 2.9 persons in 1989, Ewa had an average of 3.8 persons per household.

2.4 OTHER POPULATION CHARACTERISTICS

Compared to islandwide proportions, Ewa had the following characteristics in 1980 (*Table 3*):

- * slightly younger than the rest of the island, with a median age of 25.6 (Oahu: 28 years);
- * significantly higher proportions of Caucasians and Filipinos, a moderately higher proportion of Hawaiians, and fewer Japanese and Chinese people.
- * fewer people born in Hawai'i and more people born in other parts of the United States;
- * slightly less educated, with 12.4 percent completing four-year college (Oahu: 21.7 percent)
- * lower mean family income.

2.4 PROFILE OF COMMUNITIES NEAREST THE PROJECT SITE

Ewa Beach and the IPP Military Family Housing are in proximity of the project site. Compared to the rest of Ewa, the following are characteristics of these communities:

- * large and stable populations, with about 23,000 people in 1989, 13,800 of which lived in Ewa Beach;
- * nominal decrease in population and housing between 1980 and 1989; a total of 6,000 units are located here;

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- * military activities are the only major employment generator, and provided slightly over half of the total regional jobs;
- * younger than the islandwide and Ewa region populations, with the median age at NASBP and IPP Military Family Housing significantly lower.

3 POLICIES AND PROPOSALS WHICH WILL AFFECT THE COMMUNITY'S FUTURE

The three major forces which have shaped the existing Ewa community are national defense needs, the growth of large-scale sugar cultivation and the growth of suburban community. Public policies add a fourth major force in shaping Ewa. Government efforts are directing large-scale residential growth to this area, and construction is already underway for new planned communities.

Ewa Marina Phase 2 is being proposed as part of this community in transition. This social impact assessment reviewed public policies and proposed changes to understand what is anticipated to occur in Ewa independent of the proposed project. Based on a review of these policies and proposals, the following scenario is likely to occur without Ewa Marina Phase 2:

1. Significant increase in residential population. Development proposals would add over 33,000 residential units to the Ewa region. The population could increase by over 92,000 people, as shown on *Table 5*. This population increase implies that the current proposals for residential growth could accommodate a population three times that of the current Ewa population.
2. Significant increase in employment. Market study projections indicate that job opportunities within the planning region are projected to increase about 600 percent over a twenty year period (Leventhal, 1986).
3. Establishment of city-related mixed uses and secondary urban center in "western" Ewa. Kapolei City, Ko Olina and the James Campbell Industrial Park, all situated in the western half of the Ewa Development Plan area, are major employment generators -- which essentially create the city-like environment in the secondary urban center.
4. Intensification of residential uses in eastern Ewa. The City and County of Honolulu General Plan designates the eastern half of Ewa, generally the area along Fort Weaver Road, as Ewa's urban-fringe and this area is intended primarily for residences.
5. Retention of military uses.
6. Land-banking in eastern Ewa.

4 POSSIBLE COMMUNITY ISSUES ON EWA MARINA PHASE 2

This section discusses *preliminary* social issues on Ewa Marina Phase 2. Whereas social impacts are those changes which are likely to occur, social issues are community concerns which arise *in response* to a proposed action. Social issues often shift over time, as people's priorities, environment and lifestyles change.

To identify community issues on the project, Earthplan analyzed five sources of information, as follows:

- * Issues raised by the Ewa Neighborhood Board No. 23 over a three-year period, from July 1987 to October 1990;
- * Findings of the Secondary Urban Center Community Advisory Committee;
- * Results of the Statewide Tourism Impact Core Survey;
- * Findings of a 1989 survey and study conducted by Omnitrak; and
- * Earthplan's 1990 study on community issues and concerns on Ewa Marina.

This section identifies issues which have been raised, as well as likely issues and concerns based on our analysis of the above information. As HASEKO continues to present the project to the community, the preliminary issues presented in this section need to be re-evaluated and re-assessed based on reactions to the project.

Preliminary social issues related to Phase 2 are as follows:

1. **Approval of the general concept.**

The Ewa Neighborhood Board, which is an elected group of community representatives, has supported the overall Ewa and Kapolei development and, specifically, Ewa Marina. The Ewa Beach Community Association has also testified in support of the project. Generally, this Neighborhood Board and Community Association tended to support developments, providing that (1) the proposal is consistent with the Kapolei Master Plan of The Estate of James Campbell and (2) the proposal addresses the necessary infrastructure and public service requirements. Survey findings confirm this support among the general community.

This ongoing support stems from the project's long-standing history in Ewa Beach and the community's expectation that the project will occur. The community will likely be consistent in their support of the *concept* of Ewa Marina Phase 2, although specific components, particularly the visitor complex, have raised concerns.

2. Reaction to the proposed visitor complex.

Ewa organizations have long supported Ko Olina, which is predominantly resort, and this was confirmed by Omnitrak (1989). The findings of the statewide tourism impact core survey (Section 4.1.3) suggest that the nearby communities will and are reacting to the proposed visitor complex in a manner consistent with (1) respondents in the 1989 survey and (2) islandwide reactions to the visitor industry.

Nearby residents would likely have mixed reactions to the introduction of a visitor complex in their neighborhood. They would appreciate the jobs and economic development, but would be concerned about effects on the cost of housing, traffic and crime. Underlying their concern would be the image of Waikiki, and their apprehension that Ewa Beach might be somehow be transformed into that type of urban community. Section 5.3 discusses the impacts of this project component on nearby communities.

3. Provision of employment opportunities.

Findings of the aforementioned surveys and community issues study indicate that nearby residents continue to value the jobs and economic value of proposed developments. Ewa Marina Phase 2 will be a major employment generator in the eastern half of the Ewa region, and many nearby residents will likely acknowledge the value of this project aspect.

4. Desire for job training programs.

In their desire for more job opportunities in the immediate area, nearby residents would probably want to see some developer-sponsored or participation in programs which would help nearby residents qualify for these jobs. Nearby residents would probably want a part of these programs incorporated in curriculum of Campbell High School, in light of the concern over youth-related crime and the quality of the curriculum. Such a situation would contribute to familiarity and a sense of ownership with Ewa Marina Phase 2.

5. Increasing awareness of infrastructure problems.

Nearby residents are likely to take a more cautious look at development compared to the initial acceptance and support of Ewa development in general. Whereas Kapolei and Ewa Marina Phase 1 were proposed at a time where community changes were at a minimum, Phase 2 is being proposed in the context of ongoing housing construction, infrastructure improvements and an evolving population. Thus, nearby residents are already experiencing some of the effects of growth, such as a longer waiting time in

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traffic. They would understandably want to see current problems -- particularly traffic -- solved rather than exacerbated as new development projects are implemented.

6. Effect on the project on police protection and crime.

Crime is the one the region's major problem. The proposed project will increase the number of people in the area, in terms of employees and visitors, and some Ewa residents would likely evaluate the project's impact and provisions for police protection.

7. Need for additional golf courses.

The Omnitrak survey indicated that more playgrounds and parks were much more desirable than golf courses. Also, the development of more golf courses was not favored. Hence, the nearby residents may question the need for the proposed golf course, particularly in light of the numerous golf courses being proposed in other developments. This concern may be offset, however, by the proposed provision of recreational facilities at the Phase 1 Gateway Park.

8. Competition for public facilities and services.

The proposed project may require additional police and fire protection. Since they are currently lobbying for such facilities, nearby Ewa and Ewa Beach communities may appreciate this overall effect, as well as the developer-sponsored provision of recreational facilities.

The regional Ewa community, however, generally expects that Ewa Marina will be a residential community, and major public services are to be targeted for Kapolei instead. In the Community Advisory Committee on the Secondary Urban Center 1987 report, committee members preferred that most of the recreational facilities be provided in Kapolei. Specifically, they recommended to delete the proposed Makakilo District park and transfer Ewa Beach and Ewa proposed park funds to the Kapolei Regional Park. This position indicates that some of the regional members may view the urban uses of Ewa Marina Phase 2 as competing for public monies with Kapolei.

5 POTENTIAL SOCIAL IMPACTS OF EWA MARINA PHASE 2

5.1 CHANGE IN LAND USE PATTERN

The eastern half of the Ewa region, generally the area along both sides of Fort Weaver Road, is intended primarily for residences. The proposed projects of West Loch, Ewa Gentry and Ewa Marina Phase 1 would result in a strong suburban character, with all other uses established to serve the nearby residents.

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The resort and commercial uses proposed for Ewa Marina Phase 2 would essentially change this land use pattern by creating an urban center in the midst of predominantly residential uses. Although Ewa Marina Phase 2 would be at a much smaller scale than the City of Kapolei, the proposed project would essentially serve as an urban center for the eastern half of the Ewa region. The effects of this change in land use pattern are as follows:

1. The project would be the major employment generator of the eastern half of the Ewa region -- Ewa Marina Phase 2 would create approximately 2,030 full-time-equivalent (FTE) jobs in this area. No other projects in the eastern half of Ewa are expected to achieve this magnitude of employment.
2. Existing Ewa Beach and Ewa Village residents will have a major job site in proximity to their residences -- The proposed project will provide jobs near the existing communities, thus adding convenience and decreased commuting time for existing residents who choose to work at Ewa Marina Phase 2.
3. The Mixed-Use Commercial Complex of Ewa Marina Phase 2 will provide additional shopping and service convenience to existing residents -- The proposed project will increase the area's commercial amenities and therefore decrease dependency on facilities in the western half of Ewa.
4. By creating another urban center, the project will help nearby residents in justifying increased public services and facilities -- Currently, the public facilities being planned for the eastern portion of Ewa will be designed to serve residential uses, which imply a smaller scale than the urban-oriented facilities in the City of Kapolei. Ewa Marina Phase 2 will likely result in a greater need for public services and facilities. Such increased requirements could potentially strain the public service system and compete with residential needs. On the other hand, the proposed project will also help nearby residents in justifying higher levels of public services and facilities. The community will, in turn, have direct access to these upgraded public services and facilities.
5. The proposed project may be inconsistent with the urban-fringe designation identified by the City and County of Honolulu General Plan -- Urban-fringe areas are to be developed and maintained as predominantly residential areas characterized by generally low rise, low-density development. The proposed project is not primarily intended to serve nearby residents, although the commercial center will have that effect.
6. Ewa Marina Phase 2 will result in two visitor destinations in the Ewa region -- The proposed project will result in two visitor destinations at opposite ends of the Ewa region. Although both will be operate separately and cater to different market segments, a potential effect of these non-contiguous and distant visitor destinations is the independent creation of visitor-related facilities linking the two destinations. Major planning effort has been made to achieve orderly and manageable development in the Ewa region. To avoid this type of arbitrary hotel development, public officials will need to establish and uphold planning policies prohibiting such development. Note that, with the presence of Ko Olina, the possibility of independent hotel development still exists and, thus, this situation could occur with or without Ewa Marina Phase 2.

5.2 IMPACTS OF SPECIFIC PROJECT COMPONENTS

Probable Non-Project Changes. By 2010, the Ewa region could accommodate a population two to three times that of the current Ewa population. By the time Ewa Marina Phase 2 is implemented, the existing community will therefore have been undergoing a gradual adaptation to this major influx of new people. Some of the changes which may have occurred prior to project implementation are as follows:

1. **Population and cultural diversification** -- Before the onset of Phase 2, the residential profile of the Ewa area, including the eastern half, will have begun to reflect more of a cross-section of the islandwide community, given the housing mix of various residential projects. With these changes will come cultural diversity. Adaptation will begin with competition for jobs at the new clubhouses and commercial centers, shared use of new shopping centers, altered make-up of schools and community organizations and shared new recreation areas.
2. **Disruption of the slow-paced lifestyle** -- The initial impact of impending change is a change in the current slow-paced lifestyle which characterizes the Ewa Beach and Ewa Villages communities. In that the majority of Ewa Beach residents currently favor development, this implies a willingness to alter the current lifestyle.

Nevertheless, the existing communities may experience difficulty in adjusting to the changes which are likely to develop, such as an increase in traffic and crime; disturbance of community cohesion due to economic disparities; crowding at recreational and commercial facilities; and transitional effects of new schools.

3. **Competition for public, particularly recreational, facilities** -- As the other developments in the Ewa region, including Ewa Marina Phase 1, Ewa will be frequented by visitors and islandwide residents. In the immediate vicinity, new people will visit the area's recreational facilities, including beach parks, public marina and the new Ko Olina beaches.
4. **Shift in employment patterns and increased job competition** -- By the time Ewa Marina Phase 2 is implemented, the Ewa region will already have experienced an increased diversity in types of employment, particularly at the City of Kapolei, nearby clubhouses at golf courses, day care centers, schools and new hotels. The new residents of Ewa Marina, Gentry, West Loch and other developments will also be competing for the same jobs.
5. **Introduction of visitor industry to the Ewa region** -- Ewa residents will have begun to adapt to having a resort community at Ko Olina in their region. Many residents, including those in nearby Ewa Beach, will have visited the restaurants and shops and some will be employees at these facilities.

Mixed-Use Commercial Complex. The proposed Mixed-Use Commercial Complex will be a major feature of Ewa Marina. Its potential effects on the community will depend to a large extent on how the then-existing Ewa community will have

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adapted to likely non-project changes identified in the previous section. This section presents some considerations on how this project component may change, affect and enhance the existing community.

1. The Mixed-Use Commercial Complex will increase the de facto population in Ewa -- Although the project will not directly increase the residential population, it will contribute to the influx of new people by accommodating visitors and attracting non-Ewa residents. The 1,500-unit visitor component of Ewa Marina Phase 2 could have an average daily occupancy of 2,295 overnight visitors. Ewa Marina Phase 2 would create approximately 2,030 full-time-equivalent (FTE) jobs in this area. Further, Oahu-wide residents will likely be attracted to the proposed facilities, such as restaurants and shopping area.
2. The proposed visitor complex is symbolic of positive and negative aspects of tourism -- Regardless of the specialty nature of the proposed visitor accommodations, it is highly likely that Ewa residents will apply their own stereotypes and expectations to the Phase 2 Mixed-Use Commercial Complex.

In the 1988 statewide tourism impact study, Hawai'i and Ewa respondents felt very positive about the benefits of tourism; they believe that tourism benefits outweigh its problems. They appreciated contributions to Hawai'i's employment base, as well as amenities which can be shared by residents. Hawai'i and Ewa respondents also believed, however, that tourism had negative impacts on existing major community problems. They felt that tourism made the cost of housing and traffic worse, and this sentiment was especially strong in areas where there was a high density of visitor units.

It is very likely that the proposed visitor complex may be viewed as both a community asset, as well as the cause of problems. Problems which may be particularly associated with the visitor complex are (1) traffic and (2) changes in outdoor resources.

3. Visitors will tend to remain at self-contained area -- Regardless of the type of development at the project site, there will be an increase in traffic. The estimated visitor contribution to this situation is the subject of the traffic impact study, but it is helpful to examine trends for visitors to travel in cars or busses to off-site locations and thus generate traffic. Tourists tend to remain on-site at the larger resorts, except for occasional side trips around the island or into Honolulu or Waikiki. Compared to Waikiki tourists who rent cars and visit off-site recreation areas, rural resort visitors leave their destination area at about 15 percent total per day. It is expected that with the hotels and commercial complex at Marina Phase 2, a similar pattern would prevail, particularly in light of the targeted niche markets.
4. Nearby outdoor recreation areas may be frequented by project visitors -- In the Kuilima experience (Community Resources and Lyman, 1984), visitors from the resort complex do not frequent public recreation areas near the resort site but prefer going some distance, such as Waikiki when they do travel off-site. At Ewa Marina, however, the project's water and marina orientation will attract visitors who would be interested in using the nearby Oneula Beach Park and other shoreline resources.

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The effects of the influx of new people will likely be felt by adolescents and young adults who will find their recreation areas, surfing spots and beaches infringed upon by those wanting these areas for alternate activities. Loitering at beach parks, partying after hours, loud music and cars, and military-local interface invite confrontations which will lead to resident complaints.

5. Existing residents will experience increased interaction with visitors -- this can be both positive and negative -- According to the statewide tourism impact study, Ewa residents experience low levels of interaction with tourists now. Whenever there was interaction, the experience tended to be pleasant even in the high density visitor areas.

On a personal level, the diversity of visitors, mainland and foreign born, can be a culturally enriching experience for workers and nearby residents. There is also a tendency for Hawai'i residents to view visitors as a class, however. There is a sense of competition, particularly in high-density visitor areas, of whether the area is "our place" or "their place." This type of impersonal class distinction become increasingly problematic when communication barriers increase.

6. There is a potential for economic disparity as long as residents view a tourist as a symbol of something -- The presence of affluent and corporate executives could create a us-them perception in the minds of some residents. This perception might become a focal aggravation to the extent that Hawai'i-born residents are committed to employment within the visitor industry or are excluded from employment because of lack of skills or training. Research has shown that, as the economic dependency on tourism increases, there is not necessarily a corresponding increase "Aloha Spirit" toward the industry. As people feel that they are losing political and economic control over their fate to absentee power-brokers in the industry, residents are more likely to direct their animosity toward the visible tourist, who becomes a *symbol* of the power structure.

7. The Mixed-Use Commercial Complex will expand the area's recreational resources -- The visitor complex will include a tennis complex and fitness center. These facilities can be welcomed assets to the community, providing there is sufficient means for the average resident to access these facilities. At the tennis complex, the developer should consider community-oriented programs such low membership or use rates for residents and junior or school-based tennis education programs. At the fitness center, there should be programs to encourage local companies to use the center.

Golf Course. The golf course component of the Phase 2 will improve the recreational resources in the area. Nearby residents will be able to choose among a number of golf courses proposed for the Ewa region. To ensure community access to the Phase 2 golf course, programs such as junior golf lessons, kama'aina rates and group discounts should be evaluated.

Employment. Although the nearby slow-paced communities will probably have evolved into a more active, diverse and urban environment by the time Ewa Marina Phase 2 is implemented, the *existing context* for this project is this relatively

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rural neighborhood. Because of this current situation, and the introduction of resort uses, this social impact assessment discusses employment-related issues common to recent developments of large luxury hotel/resorts in relatively rural residential areas. This discussion is intended to stimulate awareness of potential community issues related to the resort component of Ewa Marina Phase 2.

This study looks at community issues found in four resorts, including (1) Mauna Kea Resort and its providing first-time employment opportunities for many women; (2) Mauna Lani and its initial use of in-migrants for management positions; (3) Kuilima and ethnicity-based competition for jobs; and (4) the rapid exposure to in-migrants in the workplace in Lanai.

The common thread of difference between the proposed project and these other resort developments is that Ewa is programmed to be a secondary urban center, with major employment centers to alleviate pressures on primary urban center. Hence, cultural and population diversification, in-migration of non-Ewa residents and the loss of rural qualities will occur without Ewa Marina Phase 2. Ewa Marina Phase 2 therefore will not be the major source of change, nor will it dictate the pace of change for the region.

5.4 IMPACTS OF PUBLIC SERVICES AND FACILITIES

Police Protection and Tourist-Related Crime. The project site is located in District III, which extends from Red Hill to Kaena Point and Kipapa Ridge, and is handled by the Pearl City Police Station. Currently, there are three shifts of one police officer dispatched to each of the four beats in a 24-hour period; hence twelve beat officers operate in Ewa within a 24-hour period.

In terms of short-term plans, the Police Department is requesting funds for two officers per shift. Long-term plans include adding a new full-service station in Kapolei, with the establishment of Ewa and the Waianae Coast as a new district. In addition, two substations, one in Ko Olina and the other in Ewa Beach, are proposed by the Police Department.

A discussion of tourist-related crime is presented in the social impact assessment. In general, Ewa Marina Phase 2 can assist in mitigating visitor-related crime by (1) creating a safe physical environment, (2) providing on-site security and (3) tourist education.

Fire Protection. The project site is currently being serviced by the Ewa Beach Fire Station, and back up service is provided by the Waipahu and Makakilo Fire Stations.

The Fire Department plans to relocate this facility at Ewa Marina Phase 2, across from Hanakahi Street, at the proposed Gateway Park. Fire officials are currently discussing these plans with HASEKO (Hawaii), Inc. The relocated Ewa Beach Fire Station will be an engine company, with five firefighters working in a 24-hour period.

Other new facilities being planned for the Ewa area include (1) an engine company at Tenney Village to be constructed in a six-year time frame; (2) a Kapolei engine-and-ladder company; and (3) a Ko Olina engine-and-ladder

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company. The engine-and-ladder companies will have eleven firefighters working in a 24-hour period. The relocation of the Ewa Beach Fire Station and the other new facilities are in preliminary stages at this time.

Based on preliminary project information, the existing and proposed fire protection facilities are anticipated to be adequate to serve the Ewa Marina Phase 2.

Education and Child Care. The proposed project will not house permanent residents and is therefore not expected to impact the educational facilities in the area.

The project may require child care services because of the number of on-site jobs generated by the proposed uses. The extent of this requirement depends on, first, the availability of other child care facilities which can serve employees of the proposed project and, second, the actual employee requirements and preferences expressed when the facility is in operation.

Currently three sites have been committed for child care facilities: West Loch and Royal Kunia both have a 5.3 acre site for a park-and-ride facility with a 30,000 square foot child care center. Ko Olina has one acre for child care and other public facilities. In addition, three potential child care centers are being explored in Kapolei.

At present, there is no rule of thumb in projecting child care needs and requirements for specific development proposals have been determined on a case-by-case basis. Options to address child care needs at Ewa Marina Phase 2 include (1) providing a site for a child care facility and (2) employer-based options. The latter includes major employer subsidy of on-site care, pre-tax contributions to qualified employees, and a direct voucher provided by employers to employees who demonstrate their use of qualified child care facilities.

Medical and Emergency Services. Three hospitals are within reasonable travelling distance of the project site, including the Kaiser Foundation Health Plan in Moanalua, the Pali Momi Medical Center near the Pearl Ridge Shopping Center, and the St. Francis Hospital-West is located in the Ewa Plains. In addition, the area contains numerous medical clinics and doctors' offices. As Kapolei City progresses, additional medical facilities will be required to serve the increased population. The proposed project is expected to be adequately served by the existing and additional medical facilities.

Emergency services are provided by City ambulances located in Aiea. Further, the Waipahu Fire Station contains an ambulance unit which serves Pearl City, Waipahu, Ewa Beach, Makakilo and parts of Waianae. Also eight-hour service is provided to the Makakilo Fire Station by the Waipahu unit. Further, all of the proposed fire stations for the Ewa region will contain facilities for ambulances.

Ewa Marina Phase 2

Updated Social Impact Assessment

**Prepared for HASEKO (Hawaii), Inc.
by Earthplan**

January 1991

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1 INTRODUCTION AND BACKGROUND

1.1 DESCRIPTION OF THIS REPORT

1.1.1 Purpose Of This Report

HASEKO (Hawaii), Inc. proposes to develop Ewa Marina in Ewa, Oahu. To encompass a total of 1,100 acres, Ewa Marina is envisioned as a recreation-oriented community with 4,850 residential units, 1,600 boat slips to be accommodated in marina basins and waterway systems, golf courses, and a variety of commercial centers and visitor accommodations related to the residential and recreational activities.

The project is to be implemented in two phases. Phase 1 includes the marina and residential components. Major land use approvals have been secured and HASEKO (Hawaii), Inc. is currently seeking Federal, State and City permits for the marina configuration, location and construction. Planning and design for the first housing increment are also in process.

Phase 2 includes the remaining uses, including the golf courses and mixed-used commercial complex. Phase 2 received Urban designation in 1990. HASEKO (Hawaii), Inc. is currently seeking amendments to the Ewa Development Plan Common and Special Provisions and Land Use Map.

This social impact assessment was prepared in conjunction with the applications to amend the Ewa Development Plan.

1.1.2 Report Preparation and Update of Previous Social Impact Assessment

This report was prepared by Earthplan whose office is located at 81 South Hotel Street, Suite 211. Berna Cabacungan, principal of Earthplan, was the project manager, and principal researcher and writer.

Earthplan prepared a social impact assessment for Phase 2 in October 1989; that report was part of the petition to the State Land Use Commission. This report expands upon the original assessment and updates information when available.

1.1.3 Report Organization

This report contains five major sections. The remaining portions of Section 1 describes Ewa Marina Phase 2 and discusses the social impact assessment purpose and function.

Section 2 provides a profile of the existing community to establish the social context in which project impacts may occur. Information includes employment, population, housing and other social characteristics.

Section 3 explores the Study Area's future without the proposed project. This information extends the baseline data by identifying the possible future scenarios for the community independent of the proposed project. Public policies and major public and private developments are included in this analysis.

Section 4 identifies potential community issues and concerns on this project based on historical trends to date.

Section 5 identifies potential social impacts of the Ewa Marina Phase 2. This section identifies the likely effects of the project on the nearby communities, in terms of (1) the change in land use pattern; (2) the impacts of specific project components; and (3) public services and facilities.

1.2 PROJECT DESCRIPTION

As a whole, Ewa Marina is a recreation-oriented development with residential, commercial, resort and recreational components linked by an extensive greenbelt system. As noted earlier, the first phase of this two-phase project involves primarily the marina and residential uses.

Ewa Marina Phase 2 covers approximately 403 acres. This phase will provide the recreational facilities, commercial establishments and visitor accommodations for the rest of the planned community, as well as for the Ewa region. No residential units are planned for Phase 2. Project components are as follows:

1. 27-hole Golf Course.

The proposed golf course project site encompasses approximately 272 acres. Intended to serve the residents and visitors, this golf course is a major component in the recreational orientation of Ewa Marina. The proposed golf course is intended to meet the local resident demand, particularly of Phase I residents, for golf facilities. This facility will also be available to visitors to the Phase 2 commercial mixed-use center.

The proposed golf course will be located along the northern and western boundaries of the project site. In addition to being an important recreational resource, it will function as an integral part of the Kalo drainage system and serve as a necessary buffer between the residential component and nearby mauka sugarcane fields.

2. Mixed-Use Commercial Complex.

The Mixed-Use Commercial Complex will be located on approximately 87 acres. This part of Ewa Marina is envisioned as an important complementary feature of the marina. It will contain establishments providing goods and services related to boating and water sports activities. Other facilities being proposed for this complex are intended as enhancements which would focus around the transportation and recreational qualities of the marina. The Mixed-Use Commercial Complex includes the following components:

- * Commercial Center -- Located near the marina and proposed visitor accommodations, a commercial center will contain restaurants and retail shops along the waterfront, as well

as offices and marine-related establishments. The marina will create a need for boat repair facilities, businesses engaged in the sale of boats and marine equipment, and services related to ocean recreation. There will also be a yacht club for residents of Ewa Marina and other nearby communities. It will host a variety of boating events and functions, including yacht races, fun sails, annual boat parades and youth educational programs.

- * *International Fitness Promotion Center (IFPC)* -- This project component is a precedent-setting full-featured fitness and conditioning center. The IFPC will be directed toward the corporate market and will offer comprehensive programs to assist corporate executives and employees in assessing, educating and motivating individualized health promotion through behavioral and lifestyle changes.
- * *Visitor Complex* -- Phase 2 includes overnight lodging which will be marketed in the themes of recreation, fitness and conditioning and corporate retreats. The marina will attract visitors from other islands, states and countries. These visitors will need overnight lodging and 1,500 units in hotels and garden suites are proposed to meet that need.

Another aspect of the visitor complex include an exhibition center and conference facilities which will be available to corporate and conference markets and for community functions. Further, a championship tennis complex will add to the recreational value of the project.

1.3 SOCIAL IMPACT ASSESSMENTS AND ITS APPLICATION IN THIS PROJECT

Social impact assessment is a field of applied social science which has to do with the development and disclosure of social information relevant to (1) informing the decision-making process, and/or (2) developing management actions to deal with problematic social outcomes of a proposed project. It *draws* sometimes from social science, but other times from organizational development, political analysis, or simple journalism.

Commonly identified uses of social impact assessments include (1) understanding the ability of a community or group to adapt to changing conditions; (2) defining the problems or clarify the issues involved in a proposed change; (3) illuminating the meaning and importance of anticipated change, and (4) identifying mitigation opportunities or requirements.

The emphasis of this process varies, based on the particular land use characteristics of a project, the extent of development in nearby areas and the requirements of the different permit processes.

This report serves as the mechanism to identify potential social impacts in the process of applying for amendments to the Land Use Map of the Ewa Development Plan.

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In the overall social impact assessment *process*, however, this report can be useful in further and ongoing community dialogue between HASEKO (Hawaii), Inc. and the affected parties. The ongoing nature of this process can lead to an informed community and project team, possible project modifications, and, ideally, consensus on proposed actions.

2 PROFILE OF THE EXISTING COMMUNITY

This section provides information on the "existing community" to establish a baseline of information, upon which potential social impacts can be identified and examined.

Section 2.1 defines the study area used in this report. In Section 2.2, this study area is described in terms of in-area employment, population and housing trends and certain socio-economic characteristics. The Naval Air Station, Barbers Point, Ewa Beach, and the IPP Military Family Housing are described further in Section 2.3.

2.1 STUDY AREA DESCRIPTION

The project site is located in the Ewa region, or Development Plan area. From north to south, the Ewa region extends from the lower slopes of the Waianae mountain range to the coastline. From west to east, Ewa extends from Kahe Point to the West Loch of Pearl Harbor.

Historically, three major forces have shaped the existing Ewa community. These include national defense needs, the growth of large-scale sugar cultivation and the growth of suburban community. The result of these influences is a region with pockets of military and residential communities separated by vast agricultural fields.

The Study Area for this report is the Ewa Development Plan area and the following describes the different areas and uses in this region:

- * Ewa Beach is in the southeastern section of the Ewa region, and is directly east and southeast of the project site. This is an older residential community, with a small commercial center along Fort Weaver Road.
- * The Iroquois Point Puuloa Military Family Housing (IPP Military Family Housing) is located at the southeastern portion of the Ewa region. This community houses Navy, Army and Marine personnel.
- * Ewa Villages is in the east central portion of Ewa and located north of the project site. This community comprises the existing Varona, Tenney, Renton and Fernandez plantation villages.
- * Also north of the project site is the new community of Ewa Gentry. Already built are Soda Creek Increment 1 (459 units), Palm Villa Increment 1 (352 units) and Palm Court Increment 1 (220 units).
- * Honouliuli is in the northeastern portion of Ewa. This community includes a mixture of residential uses, few support commercial establishments, and small-scale agricultural operations.

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- * **West Loch** is located in the northeastern portion of the Ewa region. Its 593-unit Phase 1 was completed in late 1990.
- * Located in the south-central area of Ewa, the **Naval Air Station Barbers Point (NASBP)** covers 3,672 acres and abuts the western boundary of Ewa Marina Phase 2. The station's mission is to support aviation activities and units of the Navy. Aircraft operations are conducted on a 24-hour basis and consist primarily of fixed-winged propeller aircraft with most flights conducted during the daylight hours. The station has three major runways (U. S. Navy, 1985).
- * **James Campbell Industrial Park** is located in the western and southwestern area of the Ewa region. Approximately 1,360 acres of this 2,400-acre industrial park are currently in use. Major park tenants include two oil refineries, a concrete manufacturing plant, a cattle feed lot operation, large building material supply yards, and a motor vehicle raceway park.
- * Located on the lower slopes of the Waianae Range, **Makakilo** is a 23-year old residential community offering mid-priced, single family and multi-family housing, and support public and commercial facilities. Most of the 2,800 residential units (as of December 1989) are single-family units.
- * **Honokai Hale and Nanakai Gardens** are two contiguous and older residential communities located in the western portion of Ewa.
- * **Barbers Point Harbor** is a new state-owned harbor located on the west coast of the Ewa region. Being developed by the State Department of Transportation, Harbors Division, the harbor is partially complete.
- * **Ko Olina Phase 1** is under construction and is located between Farrington Highway, Honokai Hale/Nanakai Gardens and the ocean. The development program includes 5,200 residential units and 4,000 visitor units. Already completed is an 18-hole golf course and currently under construction are (1) a 500-slip marina, (2) four newly-created sandy beaches, (3) a Hawaiian cultural center, (4) two shopping centers and (5) restaurants.
- * Oahu's largest sugar producer, **Oahu Sugar Company (OSCO)** cultivates approximately 8,000 acres in the Ewa region. Nearly all of the Ewa land under cultivation are leased from the Estate of James Campbell with a lease expiration date of 1995.

For the purposes of describing Ewa, the two sources of information include 1980 census information and estimates provided by Traffic Assessment Zones as available at the City Department of General Planning, Planning Information Branch. The following indicates the delineation of communities and areas, based on these sources:

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Traffic Assessment Zone (TAZ) 138 includes the portion of Ewa Beach west of Fort Weaver Road, hereby referred to as *West Ewa Beach*, and is conterminous with Census Tract 84.

TAZ 137 is referred to as *East Ewa Beach*, and covers the communities to the east of Fort Weaver Road, and includes the IPP Military Family Housing, and the portion of Ewa Beach generally east of Fort Weaver Road. TAZ 137 covers the same area as Census Tract 83.

TAZ 142, hereby referred to as *Ewa to Honokai Hale*, includes the Ewa Villages, Honokai Hale / Nanakai Gardens, Honouliuli and the James Campbell Industrial Park. This zone is conterminous with Census Tract 86.02.

TAZ 139 is the *Naval Air Station Barbers Point*, or *NASBP*, and covers the same area as Census Tract 85.

TAZ 140 includes Makakilo and is a portion of Census Tract 86.01. Note that this Census Tract also includes Kunia.

2.2 OVERVIEW OF EWA

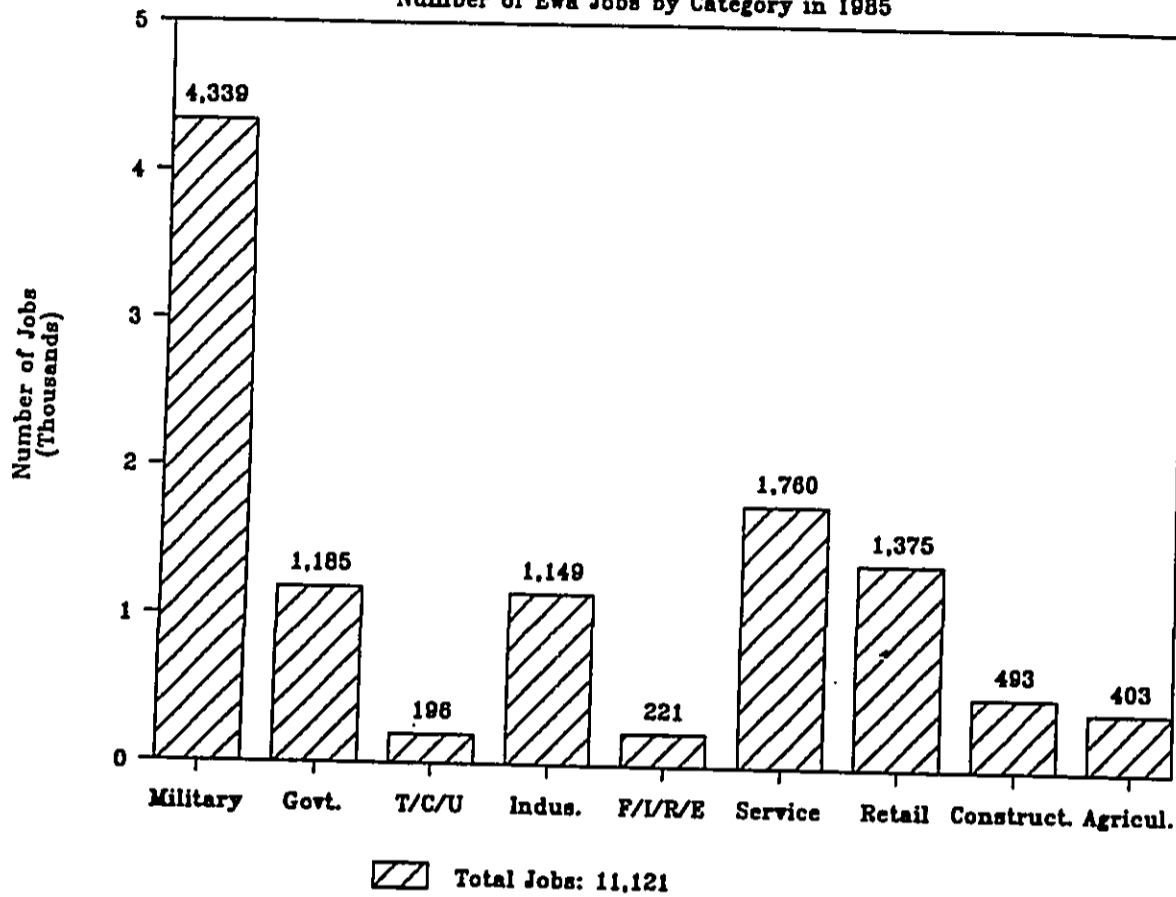
2.2.1 Employment Profile

Figures 1 and 2 present estimates of jobs in the Ewa region in 1985. *Figure 1* shows that the region's primary employment generator is military activity. Military jobs were the largest category, with about 39 percent of the total 11,121 Ewa region jobs. Service jobs were the next largest category; 16 percent of the total jobs were service-related.

Figure 2 indicates how the area's 11,121 jobs are allocated by area. Highlights are as follows:

1. About half of the jobs in the Ewa region were located at the NASBP. As expected, this area accounted for virtually all of the area's military jobs.
2. The area from Ewa Villages to Honokai Hale contained over one-fifth of Ewa's total jobs. Almost half of Ewa's industrial jobs are in this area, with the presence of the Campbell Industrial Park.
3. Makakilo, a predominantly residential community, contained only three percent of Ewa's total jobs.
4. West Ewa Beach contained 17 percent of Ewa's total jobs and East Ewa Beach contained eight percent.

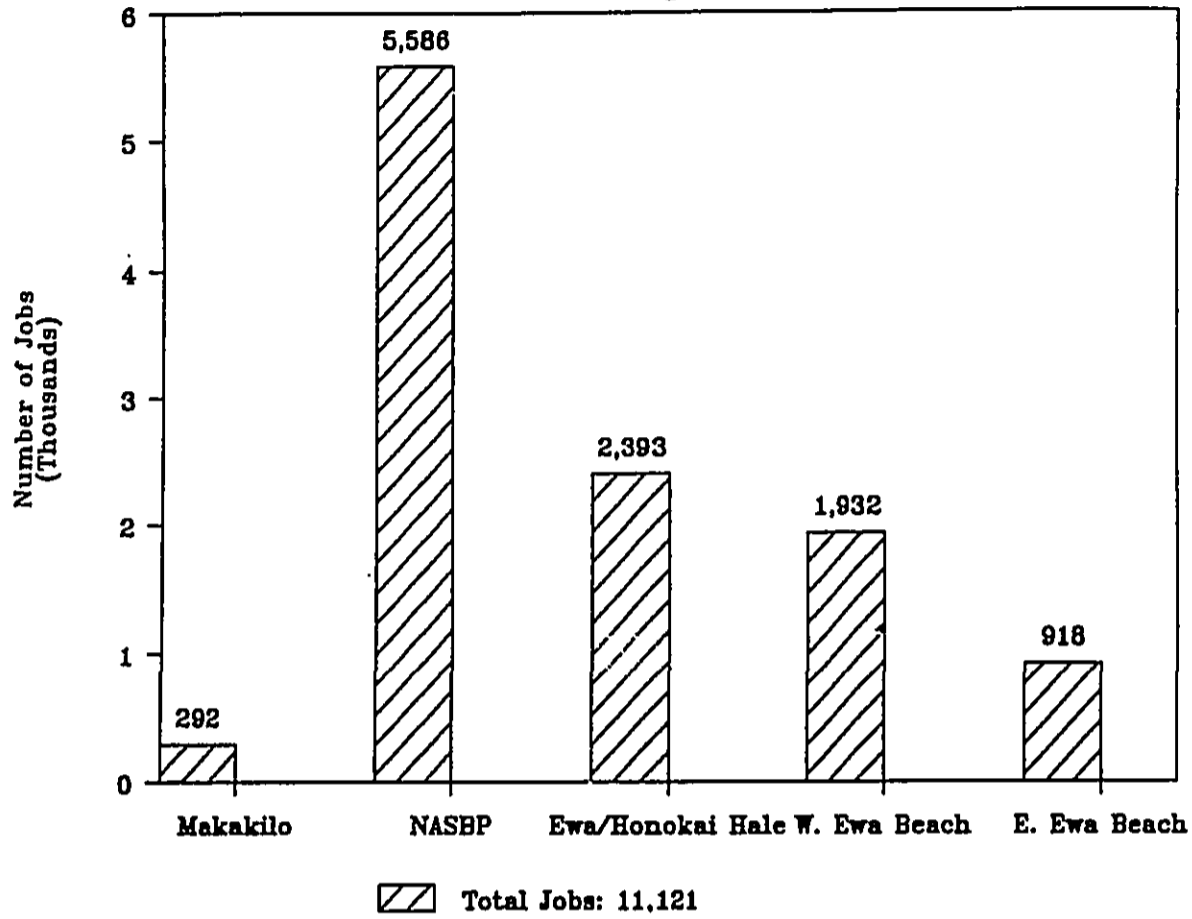
Figure 1
Number of Ewa Jobs by Category in 1985



T/C/U: Transport, Communications and Utilities
F/I/R/E: Finance, Insurance, Real Estate

Source: City and County of Honolulu Department of General Planning, Planning Information Branch. 1985 Adjusted Employment (Jobs) by DGP Sector by TAZ. October 1987.

Figure 2
Distribution of Ewa Region Jobs in 1985



Source: City and County of Honolulu Department of General Planning, Planning Information Branch. Traffic Assessment Zones. October 1987.

2.2.2 Population And Housing Trends

Between 1980 and 1989, Oahu's population grew by about ten percent, from 762,564 in 1980 to 841,600 persons in 1989 (City Department of General Planning, Planning Information Branch, 1990). Housing characteristics are characterized as follows:

- * There were 282,330 dwelling units in 1989. Most of the dwelling units were used for residential purposes; only about three percent of these were resort condominium units.
- * The 1989 dwelling unit count represents a ten percent increase over the 1980 unit count of 255,499 dwelling units.
- * In 1980, approximately 52 percent of the islandwide residential units were single-family residences. With the increase in multi-family units, the share of single family residences decreased slightly to 49.6 percent in 1989 (City Department of General Planning, Planning Information Branch, 1990).

Population growth in the Ewa region was proportionally smaller than the Oahu population increase. *Figure 3* shows that the Ewa region grew from 36,324 persons in 1980 to 39,338 persons in 1989, for an eight percent population increase (as compared to Oahu's ten percent). As the graph illustrates, very little growth was experienced in the first five years of this last decade. Most of the recent growth occurred between 1985 and 1989.

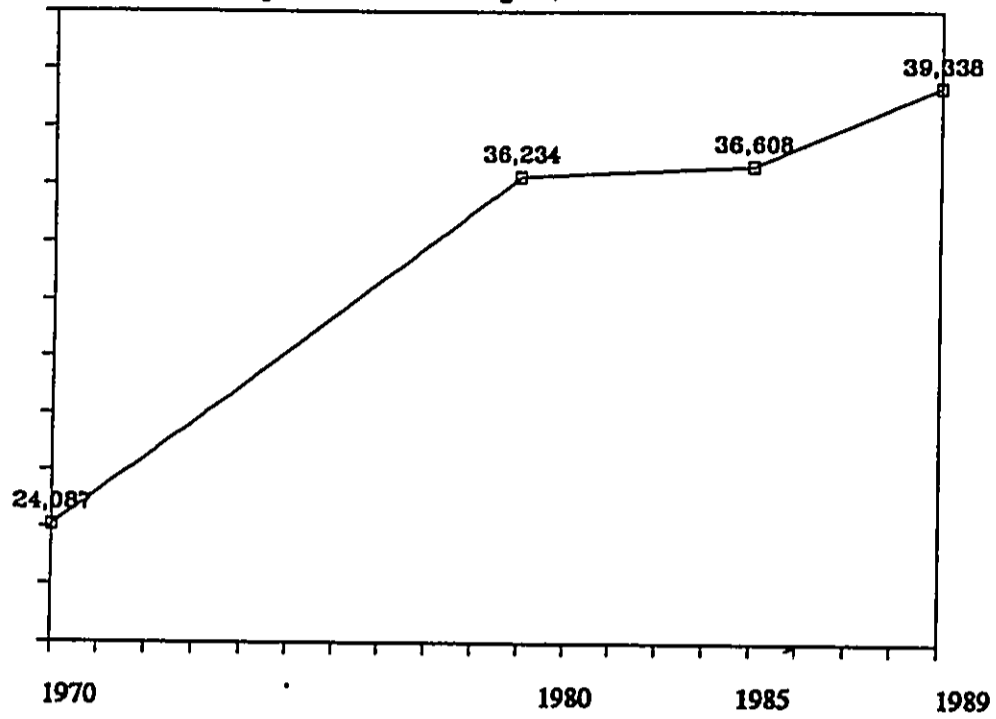
In terms of average annual growth rates, the Ewa region experienced strong growth in the 1970s, remained virtually stable between 1980 and 1985, and started to grow again between 1985 to 1989. As indicated in *Table 1*, the Ewa region grew 4.2 percent a year during the 1970s. This is very high, compared to Oahu's 1.9 percent.

In the early 1980s, while Oahu's population grew at a rate of 1.2 percent a year, the Ewa region experienced almost no increase in population. In the latter part of the 1980s, Oahu's average annual growth rate continued to decline to one percent a year. For the Ewa region, however, with the new projects being developed, the population has increased at an average annual rate of 1.8 percent between 1985 and 1989.

Figure 4 illustrates the growth patterns of the separate communities:

- * In the 1970s, most of Ewa's growth occurred in Ewa Beach, where the population almost tripled during that decade and remained around 12,300 persons thereafter.
- * Makakilo's population more than doubled between 1970 and 1989. The latest estimate indicate that about 10,000 people live in that community.
- * Growth in the Ewa to Honokai Hale/Nanakai Gardens region has been slow but steady since 1970; since 1985, however, growth has been accelerating due to the addition of Ewa Gentry units.

Figure 3
Population of Ewa Region, 1970-1989

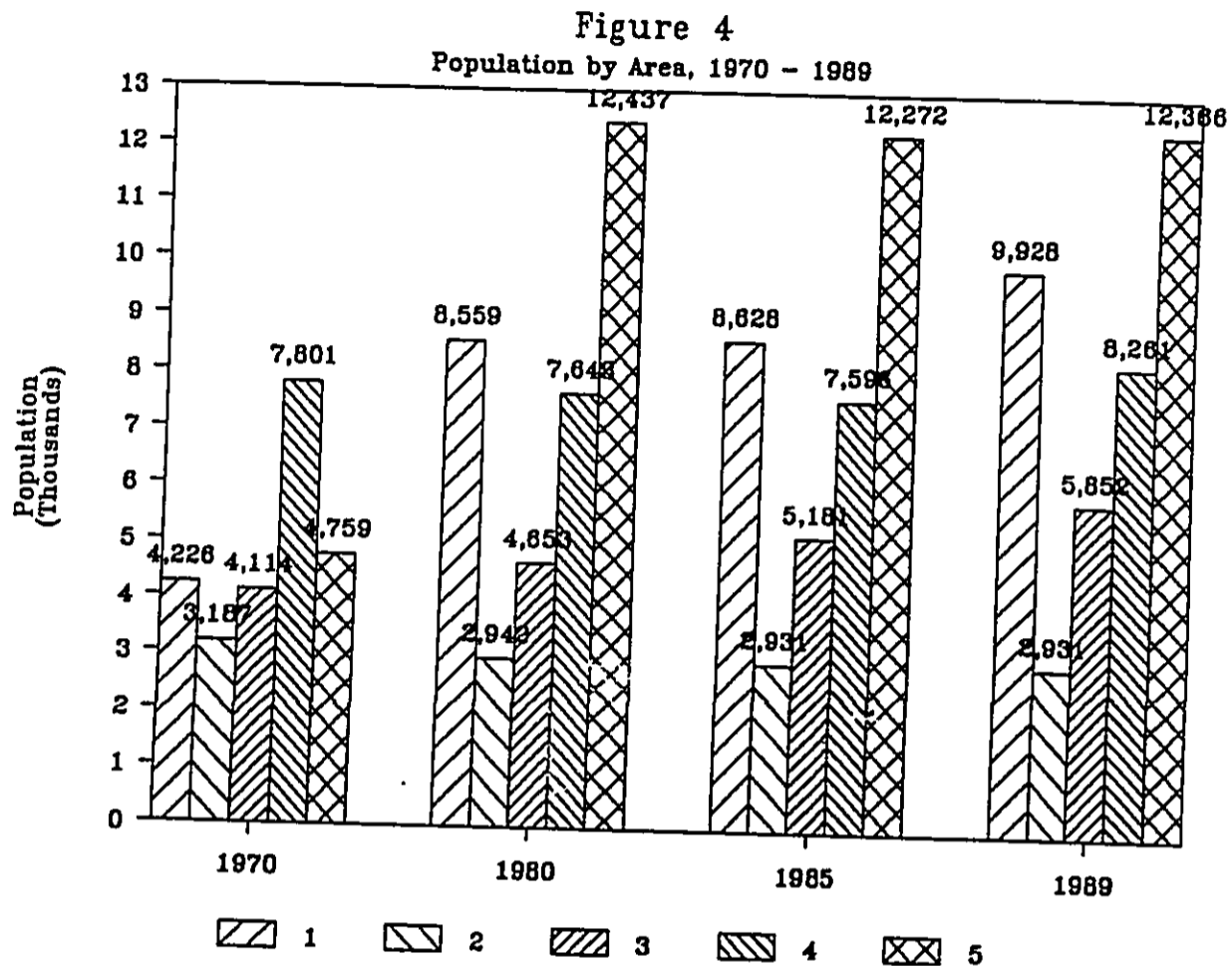


Sources: 1970 and 1980 figures are compilations of Census Tracts 83 through 86.02 based on U. S. Bureau of the Census, 1983. Population figures for 1985 and 1989 are estimates compiled for Traffic Zones 137 through 140, based on the City and County of Honolulu, Department of General Planning, 1987 and 1990.

Ewa Marina Phase 2
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**Average Annual Growth Rates for
the City and County of Honolulu, the Ewa Region and
Ewa Sub-Areas, 1970 through 1989**

	1970 to 1980	1980 to 1985	1985 to 1989	1970 to 1989
City and County of Honolulu	1.9%	1.2%	1.0%	1.5%
Total Ewa Region	4.2%	0.5%	1.8%	2.8%
Makakilo	7.3%	1.5%	3.6%	4.6%
NASBP	-0.8%	-0.2%	no change	-0.4%
Ewa to Honokai Hale	1.2%	2.1%	3.1%	1.9%
West Ewa Beach	-0.2%	-0.1%	2.1%	0.3%
East Ewa Beach	10.1%	-0.3%	0.1%	5.1%



- 1 -- Makakilo, which is part of Census Tract 86.02 and Traffic Zone 140
- 2 -- Naval Air Station, Barbers Point, which is Census Tract 85 and Traffic Zone 139
- 3 -- Ewa to Honokai Hale, which is Census Tract 86.01 and Traffic Zone 142
- 4 -- West Ewa Beach, which is Census Tract 84 and Traffic Zone 138
- 5 -- East Ewa Beach, which is Census Tract 83 and Traffic Zone 137

Sources: U. S. Bureau of the Census, 1983; City and County of Honolulu Department of General Planning, 1987 and 1990

- * The other Ewa communities have experienced very little or no growth.

Table 2 indicates that, in 1989, the Ewa region contained 10,192 housing units. About 60 percent are single-family units, while only 17 percent are multi-family units. Approximately 23 percent of Ewa's housing units are in military housing. Historically, the average household size in Ewa is larger than the islandwide household size. Compared to the islandwide household size of 2.9 persons in 1989, Ewa had an average of 3.8 persons per household.

Housing characteristics of specific communities are as follows:

- * West Ewa Beach is dominated by single-family units and its average household size was similar to that of the total Ewa region. About one-fifth of the total Ewa population lived in West Ewa Beach.
- * Slightly over half of East Ewa Beach's residential units are military housing because of the presence of the Iroquois Point/Puuloa Military housing. East Ewa Beach had the largest average household size (4.2 persons), and, with over 12,300 residents, contained over 30 percent of the total Ewa population.
- * NASBP housing is all military-related, and one-fifth of the total population lived in group living quarters or barracks. This military installation had the smallest household size with an average of 2.7 persons. Approximately 2,900 people, which is only seven percent of Ewa's population, lived here.
- * The Ewa to Honokai Hale/Nanakai Gardens region is dominated by single-family units. This area had a large average household size of 4.1 persons, and, with an estimated population of 5,852, accounted for 15 percent of the total Ewa population.
- * Makakilo is the most diverse in terms of civilian housing types. Almost 38 percent of its housing units are in multi-family structures. Its average household size was similar to that of the total Ewa region. With about 9,928 persons in 1989, Makakilo accounted for 25 percent of the total Ewa population.

Table 2
 Housing Information by
 Ewa Region and Sub-Areas, 1989

	Oahu		Total Ewa Region		Makakilo	NASBP	Ewa to Honokai Hale	West Ewa Beach	East Ewa Beach
	Total Population	841,600	39,338	9,928	2,931	5,852	8,261	12,366	
Persons Living in Households	95.6%	97.9%	99.7%	78.8%	99.6%	99.7%	98.8%		
Persons in Group Living Quarters	4.4%	2.1%	0.3%	21.2%	0.4%	0.3%	1.2%		
Total Housing Units	282,330	10,192	2,826	854	1,406	2,211	2,895		
Single Family Units	49.6%	60.3%	62.5%	0.0%	92.7%	94.1%	34.4%		
Multi-Family Units	43.7%	16.8%	37.5%	0.0%	7.3%	5.9%	14.4%		
Military Housing	6.8%	22.9%	0.0%	100.0%	0.0%	0.0%	51.2%		
Percent Occupied	97.3%	97.6%	97.3%	98.5%	97.3%	97.3%	98.1%		
Average Household Size (does not include persons in group living quarters)	2.9	3.8	3.5	2.7	4.1	3.7	4.2		

Source: City and County of Honolulu Department of General Planning, Planning Information Branch, 1990. Percentages computed by Earthplan.

2.2.3 Other Population Characteristics

Table 3 compares social and economic characteristics of Oahu, the entire Ewa Development Plan area, and each sub-area. Based on 1980 census information, the following are highlights of this comparison:

1. Age.

As a whole Ewa is slightly younger than the rest of the island. In 1980, the median age on Oahu was 28 years of age, as compared to Ewa's 25.6 years of age. There were major differences between the different communities. The oldest community was the Ewa to Honokai Hale area, whose median age was 33.1 years of age. By comparison, and as expected, the military bases contained much younger populations with median ages of 22.1 in Naval Air Station Barbers Point and 21.3 in the East Ewa Beach/IPP Military Family Housing.

2. Ethnicity.

Compared to the islandwide population, Ewa has significantly higher proportions of Caucasians and Filipinos, and a moderately higher proportion of Hawaiians. On the other hand, there were proportionally fewer Japanese and Chinese people. The Naval Air Station Barbers Point and East Ewa Beach/IPP Military Family Housing had large segments of Caucasians, who accounted for almost three-quarters of the former installation. High proportions of Filipinos were found in Ewa to Honokai Hale (53.7 percent), Ewa Beach (20.8 percent), Makakilo (19.9 percent) and East Ewa Beach/IPP Military Family Housing (24.8 percent).

3. Place of Birth.

Ewa had proportionally (1) fewer people born in Hawaii, (2) more people born in other parts of the United States, and (3) slightly less foreign-born residents. The differences between the communities are notable. Ewa Beach, Ewa and Honokai Hale all had significantly higher proportions of people born in Hawaii than the Oahu-wide population. The Naval Air Station Barbers Point and East Ewa Beach/IPP Military Family Housing had relatively higher percentages of people born in other parts of the United States. One-third of the Ewa to Honokai Hale area population was born in another country.

4. Education.

In 1980, Ewa residents were slightly less educated than the islandwide community. Compared to the 21.7 percent of Oahu residents completing a four-year college, Ewa has only 12.4 percent. Among the different communities, the percentage of people who completed a four-year college ranged from seven percent in the Ewa to Honokai Hale area to 18.4 percent in Makakilo.

Table 3
Selected Social and Economic Characteristics
Oahu, Ewa and Sub-Areas, 1980

	Oahu	Ewa D. P. Area	Makakilo	NASBP	Ewa to Honokai Hale	West Ewa Beach	East Ewa B. & Iroquois Pt.
Resident Population							
1970	629,176	24,087	4,226	3,187	4,114	7,801	4,759
1980	762,565	36,234	8,559	2,942	4,653	7,643	12,437
percent change	21.2%	50.4%	102.5%	-7.7%	13.1%	-2.0%	161.3%
Median Age	28.0	25.6	25.9	22.1	33.1	24.8	21.3
Ethnicity							
Caucasian	33.1%	44.5%	44.1%	73.9%	11.0%	37.5%	47.4%
Japanese	24.9%	8.8%	10.6%	1.5%	19.1%	11.8%	5.1%
Chinese	6.9%	2.0%	2.9%	0.2%	1.0%	2.4%	1.1%
Filipino	12.6%	24.4%	19.9%	11.5%	53.7%	20.8%	24.8%
Hawaiian	10.5%	12.4%	12.6%	1.1%	8.3%	14.2%	12.4%
Other	11.8%	7.5%	9.9%	11.8%	6.8%	13.3%	9.6%
Place of Birth							
Born in Hawaii	55.1%	49.5%	53.5%	8.6%	62.8%	61.4%	44.1%
Other U.S. Born	30.1%	36.0%	37.2%	78.5%	4.1%	26.8%	42.7%
Foreign Born	14.8%	14.5%	9.3%	12.9%	33.1%	11.8%	13.2%
Education (selected persons 25+ years)							
8 years or less	14.4%	14.3%	8.4%	4.0%	39.1%	14.3%	9.2%
Completed high school	35.5%	43.0%	46.1%	54.8%	26.9%	43.9%	45.8%
College	21.7%	12.4%	18.4%	8.7%	6.9%	9.1%	13.2%
Potential Labor Force	574,903	23,862	5,878	2,193	3,296	5,325	7,260
In labor Force							
Civilian	59.1%	49.5%	56.4%	12.5%	56.3%	58.8%	41.5%
Military	11.5%	27.0%	12.9%	63.2%	2.2%	6.2%	25.0%
Mean Family Income	\$27,318	\$21,000	\$26,059	\$10,377	\$21,465	\$22,789	\$18,015
Families Below Poverty Level	7.5%	7.2%	3.1%	10.5%	7.2%	8.5%	7.4%
Housing Vacancy Rate	8.2%	3.4%	9.9%	5.2%	2.4%	1.2%	2.3%
Persons Per Household	3.31	3.96	3.66	3.81	4.07	3.77	4.37
Owner-Occupied Units	49.9%	50.2%	70.5%	0.0%	26.6%	60.0%	42.9%

Makakilo is Census Tract 86.01, which also includes Kunia

NASBP is in Census Tract 85

Ewa to Honokai Hale is in Census Tract 86.02

West Ewa Beach is in Census Tract 84

East Ewa Beach and Iroquois Point Puuloa Navy Housing is in Census Tract 83

Source: U.S. Bureau of the Census, 1983

5. Mean Family Income.

As a whole, Ewa's mean family income in 1980 of \$21,000 was lower than Oahu's \$27,318. The mean family income ranged from \$10,377 in Naval Air Station Barbers Point to \$26,059 in Makakilo.

2.3 PROFILE OF NASBP, EWA BEACH, AND IPP MILITARY FAMILY HOUSING

The communities nearest Ewa Marina Phase 2 are NASBP, "East" Ewa Beach and the IPP Military Family Housing. Although the military housing is farther west, this community is included because (1) it shares the same major thoroughfares and (2) employment and census information combines east Ewa Beach and this community. Because of the proximity and potential for interaction with Ewa Marina Phase 2, these communities are further described.

Population and Housing. NASBP housed approximately 2,931 people in 1989. An estimated 20,627 persons lived in Ewa Beach and at the IPP Military Family Housing. Hence, about 23,000 people lived in communities nearest to Ewa Marina Phase 2. Almost 6,000 housing units are situated in these communities.

Employment. Of the three areas, the NASBP contained the largest number of jobs and accounted for 52 percent of Ewa's total jobs. NASBP contained over 5,500 jobs in 1985, and three-fourths of these were military.

Reflecting a strong residential character, Ewa Beach and IPP Military Family Housing provided only about one-fifth of Ewa's total jobs in 1985. The largest category of jobs was in service. West Ewa Beach had 35 percent of its jobs in this category; East Ewa Beach/IPP Military Family Housing, 59 percent. As expected, East Ewa Beach/IPP Military Family Housing had a relatively large segment of military jobs. Retail and industrial jobs accounted for, collectively, 45 percent of the total West Ewa Beach employment.

Social and Economic Characteristics. The communities nearest the project site tend to be younger than the islandwide and Ewa region populations. Compared to the Ewa regional median age of 25.6 years, NASBP was the youngest community with a median age of 22.1 years.

Compared to the islandwide (33.1 percent) and regional (44.5 percent) proportions of Caucasians, 73.9 percent of NASBP residents were Caucasian. Almost half of the IPP Military Family Housing residents are Caucasian. Both West Ewa Beach and IPP Military Family Housing have, proportionally, about twice as many Filipinos than the islandwide population.

Only 8.6 percent of NASBP residents were born in Hawaii, as compared to 49.5 percent of the regional population; over three-quarters of NASBP residents were born in other parts of the United States. West Ewa Beach had a relatively high proportion (61.4 percent) of Hawaii-born residents, when compared to Oahu (55.1 percent) and the Ewa region (49.5 percent). On the other hand, IPP Military Family Housing tended to have fewer Hawaii-born residents (44.1 percent) and more residents born in other part of the United States.

3 POLICIES AND PROPOSALS WHICH WILL AFFECT THE COMMUNITY'S FUTURE

The three major forces which have shaped the existing Ewa community are national defense needs, the growth of large-scale sugar cultivation and the growth of suburban community. Public policies add a fourth major force in shaping Ewa. Government efforts are directing large-scale residential growth to this area, and construction is already underway for new planned communities. Ewa Marina Phase 2 is being proposed as part of this community in transition.

This section examines public policies and proposed changes to understand what is anticipated to occur in Ewa independent of the proposed project. Section 3.1 describes public policies for Ewa, and identifies proposed amendments to the Ewa Development Plan. Section 3.2 provides an overview of the projects which will help shape the secondary urban center. In Section 3.3, a description of a likely scenario *without* Ewa Marina Phase 2 is provided.

3.1 DIRECTION OUTLINED IN GENERAL AND DEVELOPMENT PLAN POLICIES

The City and County of Honolulu General Plan encourages the development within the secondary urban center at Kapolei and the Ewa and Central Oahu urban-fringe areas to relieve developmental pressures in the remaining urban-fringe and rural areas and to meet housing needs not readily provided in the primary urban center.

Consistent with this policy is the General Plan's residential population distribution for the year 2010. As shown in *Table 4*, Ewa is targeted to accommodate 12 to 13.3 percent of the total islandwide population. These proportions translate to a range of 119,940 to 132,934 persons in Ewa. The 2010 target population means that Ewa's population is anticipated to increase over three times the 1989 population.

The project site lies within Ewa's urban-fringe area. The City and County of Honolulu General Plan targets such urban-fringe areas as "desirable places to live," and the following policies are intended to meet this objective:

Objective D. Policy 1 -- Develop and maintain urban-fringe areas as predominantly residential areas characterized by generally low rise, low-density development which may include significant levels of retail and service commercial uses as well as satellite institutional and public uses geared to serving the needs of the households.

Objective D. Policy 2 -- Coordinate plans for developments within the Ewa and Central Oahu urban-fringe areas with the State and Federal governments and with the sugar, pineapple, and other emerging agricultural industries.

Objective D. Policy 3 -- Establish a green belt in the Ewa and Central Oahu areas of Oahu in the Development Plans (City Council, January 23, 1989).

Table 4
Population Projections by Development Plan Area, 2010

	General Plan Distribution of Residential Population (1)	2010 Population Range Based on Series M-K Projections (2)
Primary Urban Center	45.1% - 49.8%	450,774 - 497,751
Ewa	12.0% - 13.3%	119,940 - 132,934
Central Oahu	14.9% - 16.5%	148,926 - 164,917
East Honolulu	5.3% - 5.8%	52,974 - 57,971
Koolaupoko	11.0% - 12.2%	109,945 - 121,939
Koolauloa	1.3% - 1.4%	12,994 - 13,993
North Shore	1.6% - 1.8%	15,992 - 17,991
Waianae	3.8% - 4.2%	37,981 - 41,979
Total Oahu	95.0% - 105.0%	949,525 - 1,049,475

Notes:

- (1) City Council, *Resolution Relating to Amending the General Plan of the City and County of Honolulu, No. 88-404, Cd-1, FD-1
- (2) Table 18 of the State of Hawaii Data Book 1988 provides a population projection of 999,500 persons for the City and County of Honolulu in 2010

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The current Ewa Development Plan designates Ewa Marina Phase 1 as the *Ewa Marina Special Area*. This area excludes Phase 2, and is to contain "a mixture of Residential, Low Density Apartment, Medium Density Apartment, Commercial, Public Facility (including a marina), park and Preservation (waterway and flood control areas)" (City Council, Honolulu City Council. *Development Plan Special Provisions for Ewa, Ordinance No. 81-80, amended by Ord. Nos. 83-26, 84-57, 85-61, 87-123, 89-16*).

There are currently four land use changes included in the 1990 Annual Amendment Review package for the Ewa Development Plan Land Use Map. These proposals are (1) the Kapolei Business-Industrial Park; (2) the expansion of Barbers Point Harbor; (3) a re-configuration of land uses in Ewa Gentry; and (4) a re-configuration and redistribution of land uses in Ko Olina Phase 2. These proposals are further discussed in the next section.

3.2 MAJOR DEVELOPMENT PROPOSALS IN THE STUDY AREA

As the major landowner in Ewa, the Estate of James Campbell has taken the lead in preparing the master plan for this region. The first Ewa Master Plan was prepared in 1955 and revised in the early 1960s. In a 1974 update of this plan, the concept of a self-contained city began to evolve. The planning firm of Helber, Hastert & Kimura, Planners prepared an update of this plan, in 1984, and identified a major "City Center" located between Makakilo, Campbell Industrial Park and NASBP.

In 1986, the Honolulu City Council subsequently amended the Ewa Development Plan to adopt the Estate's Master Plan land use pattern in the "City Center" area. After the Estate commissioned a detailed implementation plan for the 890-acre City Center, then re-named Kapolei, the State Land Use Commission granted incremental approval of a 135-acres "First Increment" in mid-1988 (Helber, Hastert & Kimura, Planners, 1989).

The most recent master plan for this region was prepared in May 1989. Note that, as with all long-range plans, the plan represents a process which is in constant flux in that it anticipates and reacts to economic, social, environmental and political forces. The following summarizes the development projects anticipated for the Ewa region, beginning with the projects closest to Makaiwa Hills. Except where indicated, this information was extracted from the most recent Kapolei Master Plan (Helber, Hastert and Kimura, Planners, 1989).

Ewa Gentry. Located north of the project site, this 1,000-acre planned community will ultimately contain 7,500 residential units, a golf course and community facilities, such as schools, parks and greenways. The project area has been granted Urban designation, and 531 acres have received necessary Development Plan approvals for a total of 5,300 residential units. Approximately 1,030 units have already been built and Increment 2 of Palm Villa is soon to commence.

Ewa Villages. The City and County of Honolulu is preparing a master plan which will include the Ewa Villages, Renton and Tenney Villages and a golf course. The total area is approximately 470 acres and 870 residential units will be programmed. Part of the master plan will

address the development and revitalization of Tenney and Renton Villages and Ewa Elementary School to create the design character of a plantation village (Office of Environmental Quality, 1990).

West Loch. West Loch is being developed by the City and County of Honolulu Department of Housing and Community Development in two phases. A lottery for the 1,007-unit second phase was held in late 1990. Other Phase 2 components include a neighborhood park, elementary school, park-and-ride and day care facilities, and a commercial area. Implementation for Phase 2 is anticipated to begin in August 1991.

Kapolei Town Center, the City of Kapolei, and the Kapolei Shopping Center. Located south of the project site and encompassing approximately 879 acres, the Kapolei Town Center is the major nucleus of the long range Kapolei Master Plan. The 570-acre City of Kapolei, or Kapolei Town Center Core, is a triangular shaped parcel located at the heart of this larger project area. The development concept for the City is (1) to provide an urban nucleus in and around which secondary land uses can be located and (2) to provide a self-contained economic center which will accommodate the employment needs of Oahu's growing population.

The overall development program calls for about two million square feet of office space on approximately 100 acres of land; one million square feet of commercial space on 113 acres of land; and 860,000 square feet of public facilities. The latter includes 333,000 square feet of light industrial uses on 23 acres, 173 acres of park and 127 acres of open space/circulation. Approximately 3,040 residential units are also proposed in the overall development program (Helber, Hastert & Kimura, Planners, 1988).

The overall project is expected to be implemented in three phases.

- Phase 1 is the implementation of the 30-acre Kapolei Shopping Center; sitework has begun.
- Phase 2 encompasses 135 acres, 67 of which would be for commercial and office uses. Approximately 39.5 acres would be used for circulation and open space; 19.5 acres, for public facility; and 9.5 acres for light industrial uses (Helber, Hastert & Kimura, Planners, 1988). The State Land Use Commission has reclassified these lands to the Urban district. Ordinance 89-141 provides the appropriate Development Plan designations.
- Phase 3 is the remaining proposed uses and will be developed in response to market demands.

Ko Olina Phase 2. The Ko Olina Phase 2 project site encompasses 372.6 acres. The project is intended to complement the resort, residential and recreational uses of Phase 1, which is currently under construction. The project includes 1,500 low-density apartments,

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2,000 medium-density apartments, a golf course and support facilities, and a shopping center with retail-commercial development and a low-rise garden office complex (West Beach Estates, June 1990).

Kapolei Business-Industrial Park. Approximately 1,040 acres of the existing 2,400-acre industrial park, located southeast of the Makaiwa Hills project site, has yet to be developed. Development of this land is adjacent to the OR&L right-of-way and will be limited to light industrial uses, compatible with uses in the neighboring Ko Olina and Kapolei City projects. Sufficient appropriately-zoned lands are available for industrial expansion in the near term.

Currently before the City Council is a proposal to amend the Ewa Development Plan Land Use Map for the Kapolei Business Park. Involving the re-designation of approximately 552.1 acres, this project includes 56 acres to be used by the State for future expansion of Barbers Point Harbor, 53.3 acres for industrial uses, 423.6 acres for intensive industrial uses and 19.2 acres intended for commercial use (Wanket, 1989). This project is being evaluated for amendments to the Ewa Development Plan.

Makakilo Expansion. Expansion plans include adding between 2,000 and 3,000 residential units over the next ten to 15 years. Also, a golf course is planned for the slopes of Puu Makakilo. The developer, Finance Realty, is marketing a number of different home-styles in various areas of the development and is currently constructing a bridge to Palailai. Near the Makaiwa Hills project site is the West Cliff project. Currently, 107 single-family units in West Cliff are under construction; ultimately between 700 to 900 residential units will be built in this area.

Kapolei Villages. To be developed by the State of Hawaii Housing Finance and Development Corporation, this residential community is located east of the project site. The development concept emphasizes a major residential component of 4,300 units with a 60/40 percent balance between affordable and market units. Other components of this 830-acre project site are intended to serve the residential population and include recreation, parks and open space on 22 percent of the entire site, civic uses on two percent, schools on six percent, and commercial uses on one percent (R. M. Towill Corporation, February 1988). This project received Urban designation from the State Land Use Commission, and the first increment, Kumu Iki, is being completed.

Kapolei Knolls. The Lusk Company proposes to develop 79.5 acres located north of Kapolei Villages into a residential community. The plan calls for 500 single-family residential units and a park (Environmental Communications, Inc., 1988). Development Plan approvals are already secured.

East Kapolei. The State Board of Land and Natural Resources proposes to acquire 2,284 acres, located in the eastern portion of the Ewa Plain, from the Estate of James Campbell. The State intends to reserve this land for future uses and no changes will be made to the

existing land uses at this time. The land is currently in sugar cane cultivation; the State will lease the land to Oahu Sugar Company to allow continued agriculture (R. M. Towill Corporation, 1990).

3.3 LIKELY SCENARIO WITHOUT THE EWA MARINA PHASE 2

As indicated in Sections 3.1 and 3.2, the Ewa Development Plan area is targeted for major growth and numerous projects are paving the way to achieve the objectives for a secondary urban center. *Without the Ewa Marina Phase 2*, the following scenario is likely to occur:

1. Significant increase in residential population.

The target population for Ewa is between 119,940 to 132,934 persons in 2010. This implies that public policy intends that the Ewa region more than triple in population over the next twenty years.

Table 5 presents an estimated Ewa population of 131,400 persons by the year 2010. The basis for this estimate is a total 2010 housing count of 43,367 (the sum of an estimated 10,192 residential units in 1989, the 28,304 units allowed by the Ewa Development Plan and the 4,871-unit Kapolei Village project). A household size of 3.03 was assumed. Although Ewa currently has relatively large households, it is believed that, as the region develops, Ewa's households will decrease in size to resemble characteristics in similar communities such as Central Oahu and East Honolulu.

2. Significant increase in employment.

Market study projections estimate that job opportunities within the planning region are projected to increase about 600 percent over a twenty year period (Leventhal, 1986).

3. Establishment of city-related mixed uses and secondary urban center in "western" Ewa.

Kapolei City, Ko Olina and the James Campbell Industrial Park, all situated in the western half of the Ewa Development Plan area, are major employment generators -- which essentially create the city-like environment in the "secondary urban center," as defined by the City and County of Honolulu General Plan. The nearby residential communities include the Kapolei Villages, Makakilo, Honokai Hale/Nanakai Gardens and Makaiwa Hills.

4. Intensification of residential uses in eastern Ewa.

The City and County of Honolulu General Plan designates the eastern half of Ewa, generally the area along Fort Weaver Road, as Ewa's urban-fringe and this area is intended primarily for residences. All other uses will be established to serve the nearby residents.

Table 5
Estimated Ewa Population Growth
Independent of Ewa Marina Phase 2

1989 Existing Residential Units (1)	10,192
Additional Residential Units Allowed in Development Plan (2)	33,175
Total Existing and Potential Residential Units	43,367

Estimated 2010 Resident Population (3)	131,402
1989 Residential Population (4)	39,338
Anticipated Increase in Residential Population Between 1989 and 2010	92,064

Percent Increase Between 1989 and 2010 Population	234.0%
Average Annual Growth Rate Between 1989 and 2010	5.9%

Notes:

(1) *Based on estimate provided by the City Department of General Planning, Planning Information Branch in "1989 Population by Traffic Zones," dated June 28, 1990.*

(2) *Based on the following estimate of residential units:*

<i>Ewa Gentry.....</i>	<i>5,300</i>
<i>Ewa Marina.....</i>	<i>4,791</i>
<i>West Loch.....</i>	<i>1,496</i>
<i>Ko Olina Phases 1 and 2.....</i>	<i>9,500</i>
<i>Kapolei Town Center.....</i>	<i>2,300</i>
<i>Kapolei Knolls.....</i>	<i>500</i>
<i>Kapolei Village (not designated on the Ewa D.P., but is included as an approved project).....</i>	<i>4,871</i>
<i>Makakilo.....</i>	<i>3,817</i>
<i>Other (assumption based on residentially-designated land located in Ewa Beach, Ewa Villages and Honouliuli that is not included in any specific development proposals).....</i>	<i>600</i>
<i>Total.....</i>	<i>33,175</i>

Source: Volume 2 of "Development Plan Status Review for Fiscal Year 1989" produced by the City Department of Planning, September 1989; and personal communication with Steve Young, City Department of General Planning)

(3) *Based on household size of 3.03. Ewa currently has relatively large households. As the region develops, however, it is expected that household sizes will decrease to resemble characteristics in Central Oahu and East Honolulu.*

(4) *Based on estimate provided by the City Department of General Planning, Planning Information Branch in "1989 Population by Traffic Zones," dated June 28, 1990.*

5. Retention of military uses.

The NASBP and the IPP Military Family Housing will likely continue their operations.

6. Land banking in eastern Ewa.

The State is working towards reserving over 2,000 acres in eastern Ewa for future uses.

4 POSSIBLE COMMUNITY ISSUES ON EWA MARINA PHASE 2

This section explores potential community issues and concerns on Ewa Marina Phase 2. Section 4.1 discusses issues and concerns independent of the proposed project. Section 4.2 identifies preliminary community issues on Ewa Marina Phase 2.

4.1 ISSUES AND CONCERNS INDEPENDENT OF THE PROJECT

The following references were used to explore existing community issues and concerns:

- Section 4.1.1 -- Issues raised by the Ewa Neighborhood Board No. 23.
- Section 4.1.2 -- Findings of the Secondary Urban Center Community Advisory Committee
- Section 4.1.3 -- The Statewide Tourism Impact Core Survey
- Section 4.1.4 -- Findings of a survey and study previously commissioned by HASEKO (Hawaii), Inc.
- Section 4.1.5 -- Earthplan's previous study on community issues and concerns regarding Ewa Marina

4.1.1 Neighborhood Board Issues

The Neighborhood Board system is a formal mechanism for citizen input to public entities regarding islandwide City policies, specific community problems and other matters, and proposed changes. The types of issues addressed by a Neighborhood Board and subsequent actions often reflect values and concerns of the constituent population. To understand the values, concerns and issues of Ewa residents, this study examined the minutes of the Ewa Neighborhood Board No. 23 over a three-year period, from July 1987 to October 1990.

Over the past three years, the Ewa Neighborhood Board No. 23 addressed the following types of problems:

1. **Problems typically associated with stable, active and predominantly residential communities. These included:**
 - controlling and minimizing crime,
 - improving the quality and facilities in the public education system,
 - improving roadway infrastructure and circulation,
 - monitoring and improving recreational facilities, and
 - improving the delivery of ambulance, police and fire protection services.

The Ewa Neighborhood Board appeared to be very active in and aware of community affairs. As a whole, the Board maintained an ongoing working relationship with the Ewa Beach, Makakilo and Honokai Hale Community Associations. In fact, many of the Board members were active participants in these neighborhood groups.

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This Neighborhood Board also worked closely with public officials in advocating community improvements.

2. **Potential effects of proposed developments.** This Neighborhood Board is unique among the other neighborhood boards in that Ewa is a community in constant transition. New communities and development proposals were discussed at virtually every meeting during this two-year period. Construction activities on previously vacant or agricultural land are evidence that the existing physical, social and economic environments will evolve into the secondary urban center. Hence, the awareness of, and expectations for, change exist among the Neighborhood Board members.

Generally, this Neighborhood Board tended to support these developments, providing that (1) the proposal is consistent with the Kapolei Master Plan of The Estate of James Campbell and (2) the proposal addresses the necessary infrastructure and public service requirements. Within this three-year period, the Board supported or had no objections to the following projects:

- Urban designation of 130 acres in Kapolei;
- The 27-hole Golf Course by The Myers Company;
- Kapolei Knolls;
- Ewa Gentry;
- 64-acre expansion of the James Campbell Industrial Park;
- Puuloa Golf Course;
- City's proposal to remove the vehicle shredder facility from the Ewa Development Plan Public Facilities Map;
- Kapolei Town Center (with request to see overall plan);
- Rezoning of 96 acres in Kapolei City to B-2;
- Ko Olina Phase 2 (with stipulations regarding Kamokila Park relocation);
- Preservation designation for Midden Beach; and
- Continuing the use of Hawaii Raceway Park at the James Campbell Industrial Park until lease termination.

Issues and concerns within the last year are as follows:

Gang Violence -- The Board was very concerned about increased gang violence and drug abuse in schools and parks and at the shopping center.

Transportation and Traffic -- The Board was instrumental in new bus stops and more busses serving the Ewa area. Members monitored current needs for improved roadway facilities and continued to urge good planning measures in preparing for Ewa's growth. They supported a fixed rail system with a terminus at Waiawa and possible expansion to Ko Olina.

Height Changes -- The Board generally supported height increases at Kapolei and Makakilo, providing the new height limits are consistent with the FAA.

Concern Over Some Proposals -- While the Board continued to support proposed developments which were consistent with the Kapolei Master Plan, members raised concern over some proposals which may affect nearby residents. The Board was concerned about potential heavy industrial use at the proposed Kapolei Business-Industrial Park, as well as noise and light impacts of a proposed Ko Olina Tennis Center. The Board could not reach a majority in supporting or opposing a proposal to establish a temporary dirigible testing site at Makaiwa. Further, even though the Board supported the existing and temporary Hawaii Raceway Park, members encouraged that a permanent site be found outside the Ewa region.

4.1.2 The Secondary Urban Center Community Advisory Committee

The Estate of James Campbell assembled the Community Advisory Committee on the Secondary Urban Center. Comprising representatives of Ewa community organizations, this group provided community input into the Estate's planning process.

In 1987, a series of community workshops were held to define community issues and needs for community services and facilities. The workshops focussed discussions in:

- * **governmental services**, including programs and facilities for transportation, police and fire protection, medical and emergency rescue, civil defense and governmental offices;
- * **education**, including programs and facilities for child care, preschool, and secondary, higher and continuing education; and
- * **recreation/culture/art**.

The following summarizes the recommendations of these efforts, as reported in **Ewa Secondary Urban Center: Workshops on Community Facility Needs and Solutions** (Phillips Brandt Reddick and Associates (Hawaii), Inc., 1987):

1. Governmental Services.

Police protection: supported fully-operational police station in the Ewa (Kapolei) Town Center

Health care facilities: recommended siting of emergency ambulance service to be reassessed in terms of future needs, and that this service be located near the proposed Ewa (Kapolei) Town Center

Public transportation services: supported transit line extending to Ko Olina, recommended more evaluation of viable water transportation and recommended shuttle service linking main shopping areas and transit terminals

Secondary City Hall/auxiliary State offices: supported the location of a civic center in the Ewa (Kapolei) Town Center; recommended a secondary City Hall providing a full range of services and auxiliary state offices

Civil defense services: recommended that a civil defense communication center be located in the Ewa (Kapolei) Town Center to include emergency rescue services and a helipad

2. Education.

- recommended setting aside relatively level and "expandable" sites for all schools; move West Oahu College to the second city; locate high technology and adult education programs at the James Campbell Industrial Park; provide adequate space for resource teachers and the arts; schools should be within walking and biking distance from residences; provide water sports at West Beach (Ko Olina) marina; set aside sites for day care centers; provide adult education programs in high schools and colleges; provide sites for private schools; develop aquaculture facility at the Barbers Point Harbor

3. Recreation/culture/art.

- provide active recreation and cultural facilities at the planned Kapolei Regional Park; delete the proposed Makakilo District park; transfer Ewa Beach and Ewa proposed park funds to the Kapolei Regional Park; locate a central library and museum adjacent to the Kapolei Regional Park; develop a public golf course in Ewa

Where appropriate, these recommendations have been incorporated in plans for the Kapolei Town Center (Helber, Hastert & Kimura, Planners, 1988).

4.1.3 Statewide Tourism Impact Core Survey

A comprehensive study of the effects of tourism on the people and environment is currently being undertaken by the State Department of Business and Economic Development (DBED). In 1985, the State Legislature directed this department to initiate a Tourism Impact Management System (TIMS). Coopers and Lybrand was contracted to (1) review and analyze the costs and benefits of tourism; (2) develop and establish a system to monitor the continued growth of tourism; and (3) to make recommendations to assure that tourism development and activities enhance the quality of life for Hawaii's residents.

Coopers and Lybrand (1986) developed a framework to measuring and monitoring the industry's impacts through the Tourism Impact Management System (TIMS). This framework included the following four approaches:

1. DBED Tourism Data Book, a collection of relevant data;

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2. Community Journal, including (1) content analysis of major tourism-related issues, (2) white papers by community action groups, (3) synopses of public hearing, and (4) synopses of Environmental Impact Statements;
3. Professionally Conducted Surveys, including a CORE survey and special surveys; and
4. Intermittent studies (Coopers and Lybrand, 1986).

Of particular relevance to Ewa Marina Phase 2 is the CORE survey, the function of which is to facilitate ongoing monitoring of the attitudes of Hawaii's residents towards tourism. For HASEKO (Hawaii), the findings of this survey will be helpful in identifying Ewa residents' attitudes towards tourism, and, indirectly, in indicating possible reaction to Ewa Marina Phase 2.

This is a statewide telephone survey of 3,904 households. The survey contains 60 questions designed to measure resident attitudes and opinions regarding tourism and development in general. The survey was conducted in 23 sub-areas, six of which are on Oahu. One of these areas is "West Beach," which included Ewa, Ewa Beach, Makakilo and Waipahu.

At the time of the survey, the Ewa region was considered a "low-density" area in that there was a 0-ratio of visitor units to resident population.

1. **Travel and Use of Tourist Facilities.**

Compared to the statewide proportions, there was less tendency among Ewa region residents to have gone to a restaurant in a tourism area in the past 30 days. There was also a lesser tendency to stay in a Hawaii resort and to take vacations outside Hawaii.

2. **Perception About Tourism Jobs.**

In the Ewa region, there was a greater tendency for respondents to feel that (1) most visitor industry jobs pay pretty well, though (2) most tourism jobs don't have much chance for advancement. Though many felt there was a wide variety of jobs in Hawaii's visitor industry, it was also felt that tourism jobs have poor work hours.

There was also a greater tendency for Ewa respondents to feel that "most visitor industry managers are people from Hawai'i these days," and that good tourism management training is available in Hawai'i.

3. **Contact With Visitors and Nature of Visitor Relationship.**

As expected, unlike the "High Density" tourism area, there was less tendency for one's job to have "much contact with visitors." Ewa Beach residents saw tourists outside their job with much less frequency than statewide residents. When Ewa

respondents did see tourists, most (88 percent) felt that the experience was "usually pleasant." They enjoyed seeing visitors they haven't met before in mostly commercial/indoor situations (37 percent) and outdoor recreation (30 percent).

4. Impact of Tourism on Personal Lives.

When asked if there have been any recent situations when tourists interfered with their lives, 96 percent of the Ewa region residents responded "no." Over half of the Ewa region respondents felt that the smaller tourist activities in their area made their lives either a "lot more pleasant" or "somewhat more pleasant;" eleven percent felt that there was some degree of unpleasantness associated with these tourist activities. Thirty percent felt there was no effect, which is slightly high compared to the statewide 23 percent.

Respondents were asked "in the past five years, have you ever just stopped going to some favorite place because you felt it had been taken over by tourists?" Statewide, 72 percent replied "no." In the Ewa region, 80 percent replied in the negative. The type of place no longer frequented by the remaining 20 percent tended to be an "outdoor place."

On a statewide level, 60 percent of the respondents felt that tourism was good for the respondent and the family; 30 percent felt there was no effect. In the Ewa region, 56 percent felt that tourism was good, with 33 percent feeling that tourism had no effect. The key way in which tourism was good for the Ewa region respondent and family was jobs and economic issues, which is consistent with state-wide responses.

5. Impact of Tourism on the Community.

In Ewa, 77 percent of the respondents agreed with the statement that "Overall, tourism has brought more benefits than problems to this island." Eighty-four percent felt that tourism made the availability of jobs better, and 54 percent felt that tourism helped in the preservation of native Hawaiian culture. On the other hand, Ewa region residents tended to feel that tourism made both the quality of beach parks and the cost of housing worse; the majority also felt that tourism exacerbated the traffic and crime problems.

Thirty-seven percent of Ewa region respondents felt that tourism had no effect on the number of people living in "your part of the island, with the remaining responded split between whether tourism made it better (27 percent) or worse (29 percent).

Thirty-five percent felt that tourism made the beauty of the area better, while 45 percent felt that tourism had no effect. The majority felt that tourism made the overall standard of living better and that it made shopping, restaurants and entertainment better.

6. Community's "Big Problem."

Respondents were asked if certain elements were a problem in their part of the island. In the Ewa region, over half of those interviewed considered the cost of housing and traffic as "big problems." Crime and population growth were also considered big problems by over 40 percent of those interviewed.

It is noted that 46 percent felt that development's destruction of the beauty of the area was "not a problem," and neither was the pollution of ocean or natural areas.

7. The Future of Tourism.

Ewa region respondents (73 percent) tended to want to keep all future resorts close to existing hotels. Fifty-nine percent felt that taxes generated by tourism should go for public improvements in visitor areas. Over 60 percent believed that "in my part of the island it is more important to keep things the way they are than have more tourism jobs."

Further, 68 percent felt that "it is time to stop building new hotels on this island," even though 55 percent felt "We need more tourism jobs on this island."

4.1.4 HASEKO-sponsored Survey And Study

In early 1989, HASEKO (Hawaii), Inc. commissioned Hill and Knowlton / Communications Pacific, Inc. to identify general community issues and concerns and gauge community reaction to the overall Ewa Marina. Unlike the Neighborhood Board issues and the Community Advisory Committee on the Secondary Urban Center, these efforts focussed on Ewa Beach, the community nearest to the project site.

The data gathering occurred in two phases:

1. A telephone survey of 403 persons in the Ewa Beach area, conducted by Omnitrak Research and Marketing; and
2. In-depth personal interviews with 13 business, government and community leaders in Ewa Beach.

The findings of the Omnitrak survey were intended to serve as a benchmark for understanding the current community environment. For percentages based on the entire sample of 403 responses, the maximum estimate of the sampling error is \pm 5 percent. The following summarizes survey findings:

1. Satisfaction with life in Hawaii.

Overall, Ewa Beach residents appear satisfied with life in Hawaii, and this level of satisfaction corresponds with Oahu as a whole. More than half, or 55 percent, of the respondents are "very satisfied," as compared to Oahu's 57 percent. Three percent were "very dissatisfied" (Table 1, Omnitrak, 1989).

Almost 60 percent of the respondents also felt that life today is better than it was five years ago (*Ibid.*, Table 2).

2. Outlook on future quality of life.

The future outlook on the quality of life in five years is positive among Ewa Beach residents, despite a major concern about the infiltration of crime and drugs in their community. Two-thirds of the respondents anticipate life will be better in five years (*Ibid.*, Table 3).

3. Most important community problem.

Almost half cite crime and drugs as the most important problems facing their community. This was followed by traffic and education. Oahu-wide residents had different priorities, however, and their problems ranked traffic first, housing second and education third (*Ibid.*, Table 4).

4. Priority for government.

Although affordable housing was not a top problem for respondents, they appeared to recognize this as a major problem facing the islandwide community. Twenty-seven percent felt that "reduc[ing] housing costs" was a priority for government, followed by 22 percent citing "creat[ing] more jobs" (*Ibid.*, Table 7).

5. Environmental priority.

Water quality was the most important environmental priority for 84 percent of the respondents. The distant second most important environmental priority was water and beach access (*Ibid.*, Table 10).

6. Attitude towards development.

Ewa Beach residents had a favorable attitude towards development, with 61 percent tending to favor more development (*Ibid.*, Table 5). This overall favorable attitude extends to support for specific Ewa developments, such as a marina in Ewa (71 percent) and the second city (70 percent). Ko Olina is also supported, with two-thirds of all respondents in favor of development.

Respondents tended to be more favorable towards a development if the project provided basic community needs, including job opportunities (90 percent), medical facilities (90 percent) and a school or college (80 percent).

For those who opposed development, 38 percent cited "overpopulated/too many people" as the reason to stop development (*Ibid.*, Table 6).

7. Growth trade-offs.

Slightly more people (45 percent) favored growth to create jobs, rather than saving the environment (40 percent) (*Ibid.*, Table 8).

8. Preference for types of recreational facilities.

Respondents tended to favor the development of more playgrounds (79 percent) and parks (78 percent). Almost half favored more boat ramps and marinas and 17 percent favored more golf courses (*Ibid.*, Table 11).

Further, over two-thirds of the respondents "strongly opposed" the development of more private golf courses in Hawaii (*Ibid.*, Table 12). The possibility of public play at private golf courses did not sway two-thirds of the respondents (*Ibid.*, Table 13).

9. Attitudes and perceptions toward foreign investment.

Almost half of Ewa Beach residents, or 45 percent, felt "very unfavorable" towards Japanese companies investing in Hawaii. Overall, Hawaii-owned companies scored higher than Japanese-owned companies on specific attributes relating to image. Specifically, these attributes included balancing self-interest with community interest, honesty, responsiveness, and environmental concerns (*Ibid.*, Tables 15 and 17).

Hill and Knowlton/Communications Pacific, Inc. conducted interviews with 13 business, government and community leaders in Ewa Beach to further explore current community concerns. Highlights of the comments from the interviewees are as follows:

1. The problems with crime were viewed as a systemic problem.

Interviewees felt that part of the solution to crime, drugs, school vandalism and arson lies in (1) additional police presence and protection and (2) ongoing recreational facilities and programs to provide activities and gathering place for young people.

Further, it was felt that the existing quality of public education, which is tainted by school-related crime and "government neglect," result in low test scores and diminished job opportunities in the future. Hence, this contributes to the crime problem by providing few alternatives for young people.

2. Traffic congestion is expected to increase.

Community leaders feared that continued growth and development will worsen traffic conditions. Imperative solutions included another north-south route and mass transit.

4.1.5 Previous Study on Community Issues and Concerns on Ewa Marina

Earthplan prepared a social impact assessment for Ewa Marina Phase 2 in October 1989. The social impact assessment identified potential social impacts, as well as possible community issues. The source of the issues analysis included published reports, Neighborhood Board minutes, and a HASEKO-sponsored community survey. When that report was published, the Mixed-Use Commercial Complex of Phase 2 had not been publicized yet, and the issues analysis was therefore a conjecture of how the Ewa community might feel about that aspect of the project, or the modified project as a whole.

In April 1990, HASEKO (Hawaii), Inc. retained Earthplan to further study community issues and concerns about the entire Ewa Marina. This study expanded the information base on community issues and included field interviews specifically dealing with the *currently proposed Ewa Marina*. Earthplan interviewed 42 people for that study. Two groups were targeted: (1) a "general community" group, and (2) a recreation group. These groups were considered distinct for the purpose of this report because of the different networks.

Responses are presented in terms of (1) the *nature*, or an explanation, of a concern and (2) the *extent* of a concern. The extent of a concern is assessed relative to other concerns and is based on frequency of mention and stated priorities. A statistical poll was not conducted and findings are therefore not presented in terms of percentages.

1. Support for or acceptance of development in Ewa.

Collectively, those interviewed either strongly supported major development in the Ewa region, or accepted it as inevitable. Three reasons formed the bases for this support/acceptance: (1) the need to improve the social image of Ewa Beach; (2) the need to increase the sheer number of jobs in this area; and (3) public policy consensus for such growth.

2. Traffic, infrastructure and public services.

When it came to development, traffic was *the problem* for both the general community and recreation groups. Impacts on the water and sewerage systems were also cited by the general community group as problems, but not as frequently as the traffic problem, and mostly by Neighborhood Board members and Ewa region

residents. Some people also warned that public services would be strained; most seemed confident that government would plan for these changes, however.

3. Knowledge and acceptance of Ewa Marina.

All those interviewed knew about Ewa Marina, and only a couple of non-Ewa recreation group interviewees did not know the exact location of the project site. Even though some people did not like specific project components, or were concerned about project-related impacts, there was nevertheless acceptance that Ewa Marina will happen. Project supporters -- who were mostly in the general community group -- expressed frustration at the slow pace of implementation.

4. Desire for shoreline and beach improvements.

Most of those interviewed associated Ewa Marina with beach park improvements, and they welcomed these changes. These improvements were of higher priority for Ewa Beach residents and Neighborhood Board members, than for Ewa region residents. Almost all of the recreation group interviewees appreciated beach park improvements.

The only concern which qualified support for such improvements was project-generated impacts on surfing and ocean food-gathering activities. These concerns were expressed mostly by recreation group interviewees, and less so by the general community group.

In addition to beach park improvements, on-site urban recreational uses and public access to these uses and facilities were desired mostly by Ewa Beach residents of both interview groups.

5. Addressing the youth-related problems in Ewa Marina and other future developments.

Next to traffic, youth-related problems was a prevalent community concern. Ewa Marina represented at least a partial solution to many of those interviewed. Also raised was the potential for Ewa Marina to exacerbate the youth problem because of economic disparity.

The youth problem was more of a priority for the general community group, particularly Ewa Beach residents and Ewa Neighborhood Board members.

6. Social interface and economic disparity.

There was consensus that Ewa Marina would be an upscale project, attracting affluent people of different social backgrounds. On one hand, many welcomed the economic revitalization afforded by the project, in terms of jobs and business opportunities. They also liked the diversification of uses proposed for the project

and were looking forward to new shopping areas and leisure facilities. At the same time, there was apprehension about how the current Ewa Beach residents and social structure would evolve with this new project.

Social-related impacts tended to be a greater concern of Ewa region residents and Ewa Neighborhood Board members, rather than of Ewa Beach residents. This may be because the Ewa Beach residents had a greater tendency to view Ewa Marina as part of the solution, rather than as the problem.

7. Effect on property values.

While most of the interviewees felt that increases in property values were good, many also feared that Ewa Marina would indirectly displace renters and elderly people with fixed incomes. Ewa Neighborhood Board tended to express this concern more frequently than others.

8. Impact on surfing and ocean food-gathering activities.

Almost all of those interviewed were familiar with the makai end of the project site because they have picnicked, surfed, fished or gathered seaweed at the Oneula Beach Park. Many no longer frequented the site because they feel the area is dirty and dangerous. Ewa Marina is seen as a way to clean the area up and deter alleged crime at the site. Also of importance is the project's potential for altering the ecosystem and negatively affecting these recreational activities.

Concerns about these types of impacts were expressed by all in the recreation group, and occasionally by those in the general community group.

9. Specific project components.

Interviewees seemed to like Ewa Marina as a whole, and few recommended changes to project components. Boat slips and public boat ramps were appreciated, as were the shopping center and recreational facilities. Recommended changes targeted two components. First, the marina channel alignment was a concern because it might eliminate a surfing site. Second, a few simply did not like the visitor-oriented component and suggested its elimination. Both types of changes were suggested by recreation group interviewees.

10. Agriculture.

A couple of Neighborhood Board members indicated that they have second thoughts about eliminating the agricultural industry because of the then-controversial Oahu Sugar Company vs. Mayor Frank Fasi conflict.

Concerns of the Interview Groups

General Community Group -- *Ewa Beach residents* tended to see the Ewa Marina as a partial solution to some of its current problems. Some of the obvious project-generated impacts (traffic, property values) were less of a priority than they were for residents of other Ewa communities.

High priorities for *Ewa region residents* included potential social problems, such as economic disparity and territoriality and the need for more jobs in the area. Traffic and other infrastructure problems were also frequently mentioned.

Most *Ewa Neighborhood Board members* were familiar with the project, and could envision Ewa Marina as an integral part of development in Ewa. Two different types of concerns characterized reactions of Neighborhood Board members. First, there were the development advocates who supported change in the Ewa Development Plan area because of economic opportunities; Ewa Marina was viewed as an essential ingredient. Second, there were those who were social-oriented and ecology-minded. Although they accepted the project, they voiced concerns which they wanted addressed.

Recreation Group -- Compared to their general community group counterparts, *Ewa Beach residents* in the recreation group had less of a tendency to focus on the solutions afforded by Ewa Marina and were more critical of traffic impacts and the project's resort component. As expected, they were extremely concerned about possible effects on surfing sites and fishing grounds.

The *non-Ewa* interviewees of the recreation group shared the high level of concern about boating safety, and public boat ramps and more boat slips were welcomed. The project's impact on ocean food gathering was not mentioned, but surfing was a high priority concern. This group also expressed concerns about typical development controversies -- traffic and property values.

4.2 PRELIMINARY COMMUNITY ISSUES ON EWA MARINA PHASE 2

This section discusses *preliminary* social issues on Ewa Marina Phase 2. Whereas social impacts are those changes which are likely to occur, social issues are community concerns which arise *in response* to a proposed action. Social issues often shift over time, as people's priorities, environment and lifestyles change.

This section identifies issues which have been raised, as well as likely issues and concerns based on our analysis of available information presented in Section 4.1. As HASEKO continues to present the project to the community, the preliminary issues presented in this section need to be re-evaluated and re-assessed based on reactions to the project.

Preliminary social issues related to Phase 2 are as follows:

1. Approval of the general concept.

The Ewa Neighborhood Board, which is an elected group of community representatives, has supported the overall Ewa and Kapolei development and, specifically, Ewa Marina. The Ewa Beach Community Association has also testified in support of the project. Generally, this Neighborhood Board and Community Association tended to support developments, providing that (1) the proposal is consistent with the Kapolei Master Plan of The Estate of James Campbell and (2) the proposal addresses the necessary infrastructure and public service requirements. Survey findings confirm this support among the general community.

This ongoing support stems from the project's long-standing history in Ewa Beach and the community's expectation that the project will occur. The community will likely be consistent in their support of the *concept* of Ewa Marina Phase 2, although specific components, particularly the visitor complex, have raised concerns.

2. Reaction to the proposed visitor complex.

Ewa organizations have long supported Ko Olina, which is predominantly resort, and this was confirmed by Omnitrak (1989). The findings of the statewide tourism impact core survey (Section 4.1.3) suggest that the nearby communities will and are reacting to the proposed visitor complex in a manner consistent with (1) respondents in the 1989 survey and (2) islandwide reactions to the visitor industry.

Nearby residents would likely have mixed reactions to the introduction of a visitor complex in their neighborhood. They would appreciate the jobs and economic development, but would be concerned about effects on the cost of housing, traffic and crime. Underlying their concern would be the image of Waikiki, and their apprehension that Ewa Beach might be somehow be transformed into that type of urban community. Section 5.3 discusses the impacts of this project component on nearby communities.

3. Provision of employment opportunities.

Findings of the aforementioned surveys and community issues study indicate that nearby residents continue to value the jobs and economic value of proposed developments. Ewa Marina Phase 2 will be a major employment generator in the eastern half of the Ewa region, and many nearby residents will likely acknowledge the value of this project aspect.

4. Desire for job training programs.

In their desire for more job opportunities in the immediate area, nearby residents would probably want to see some developer-sponsored or participation in programs which would help nearby residents qualify for these jobs. Nearby residents would probably want a part of these programs incorporated in curriculum of Campbell High School, in light of the concern over youth-related crime and the quality of the curriculum. Such a situation would contribute to familiarity and a sense of ownership with Ewa Marina Phase 2.

5. Increasing awareness of infrastructure problems.

Nearby residents are likely to take a more cautious look at development compared to the initial acceptance and support of Ewa development in general. Whereas Kapolei and Ewa Marina Phase 1 were proposed at a time where community changes were at a minimum, Phase 2 is being proposed in the context of ongoing housing construction, infrastructure improvements and an evolving population. Thus, nearby residents are already experiencing some of the effects of growth, such as a longer waiting time in traffic. They would understandably want to see current problems -- particularly traffic -- solved rather than exacerbated as new development projects are implemented.

6. Effect on the project on police protection and crime.

Crime is the one the region's major problem. The proposed project will increase the number of people in the area, in terms of employees and visitors, and some Ewa residents would likely evaluate the project's impact and provisions for police protection.

7. Need for additional golf courses.

The Omnitrak survey indicated that more playgrounds and parks were much more desirable than golf courses. Also, the development of more golf courses was not favored. Hence, the nearby residents may question the need for the proposed golf course, particularly in light of the numerous golf courses being proposed in other developments. This concern may be offset, however, by the proposed provision of recreational facilities at the Phase 1 Gateway Park.

8. Competition for public facilities and services.

The proposed project may require additional police and fire protection. Since they are currently lobbying for such facilities, nearby Ewa and Ewa Beach communities may appreciate this overall effect, as well as the developer-sponsored provision of recreational facilities.

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The regional Ewa community, however, generally expects that Ewa Marina will be a residential community, and major public services are to be targeted for Kapolei instead. In the Community Advisory Committee on the Secondary Urban Center 1987 report, committee members preferred that most of the recreational facilities be provided in Kapolei. Specifically, they recommended to delete the proposed Makakilo District park and transfer Ewa Beach and Ewa proposed park funds to the Kapolei Regional Park. This position indicates that some of the regional members may view the urban uses of Ewa Marina Phase 2 as competing for public monies with Kapolei.

5 POTENTIAL SOCIAL IMPACTS OF EWA MARINA PHASE 2

This section identifies potential social impacts related to the Ewa Marina Phase 2. Section 5.1 describes the project effects of changing the land use pattern in Ewa. In Section 5.2, impacts of specific project components, including the Mixed-Use Commercial Complex, the golf course and employment, are discussed. Section 5.3 presents impacts to public services and facilities.

5.1 CHANGE IN LAND USE PATTERN IN EWA

As indicated in Section 3.3, without Ewa Marina Phase 2, the eastern half of the Ewa, generally the area along both sides of Fort Weaver Road, is intended primarily for residences. The proposed projects of West Loch, Ewa Gentry and Ewa Marina Phase 1 would result in a strong suburban character, with all other uses established to serve the nearby residents. These other uses includes three commercial areas (existing at Ewa Beach, and planned at Ewa Gentry and West Loch), public facilities and golf courses.

The Mixed-Use Commercial Complex and proposed golf course proposed for Ewa Marina Phase 2 would essentially change this land use pattern by introducing a commercial center and visitor-related activities to Ewa's eastern suburban community. The proposed project would therefore create an urban center in the midst of predominantly residential uses. Although Ewa Marina Phase 2 would be at a much smaller scale than the City of Kapolei, the proposed project would essentially serve as an urban center for the eastern half of the Ewa region. The effects of this change in land use pattern are as follows:

1. **The project would be the major employment generator of the eastern half of the Ewa region.**

Ewa Marina Phase 2 would create approximately 2,030 full-time-equivalent (FTE) jobs in this area (Decision Analysts Hawai'i, Inc., draft report, October 1989). No other projects in the eastern half of Ewa are expected to achieve this magnitude of employment.

2. **Existing Ewa Beach and Ewa Village residents will have a major job site in proximity to their residences.**

Current Ewa Beach residents have expressed a preference for projects which generate employment. The proposed project will achieve this objective near the existing communities, thus adding convenience and decreased commuting time for existing residents who choose to work at Ewa Marina Phase 2.

3. **The Mixed-Use Commercial Complex will provide additional shopping and service convenience to existing residents.**

The proposed project will increase the area's commercial amenities and therefore decrease dependency on facilities in the western half of Ewa. Competition with existing commercial

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facilities at Ewa Beach is also possible, however, and it is recommended that HASEKO (Hawaii), Inc. work with the community to identify desired commercial uses.

- 4. By creating another urban center, the project will help nearby residents in justifying increased public services and facilities.**

Currently, major public facilities are being planned for the western half of the Ewa region, particularly in the City of Kapolei. While some facilities are being planned for the eastern portion of Ewa, these facilities will be designed to serve residential uses, which imply a smaller scale than the urban-oriented facilities in the City of Kapolei.

Ewa Marina Phase 2 will likely result in a greater need for public services and facilities, such as increased police protection, because of the intensification of land uses and people activities. Such increased requirements could potentially strain the public service system and compete with residential needs. On the other hand, the proposed project will also help nearby residents in justifying higher levels of public services and facilities. The community will, in turn, have direct access to these upgraded public services and facilities.

- 5. The proposed project will deviate from the urban-fringe designation identified by the City and County of Honolulu General Plan.**

The City and County of Honolulu General Plan sets forth a policy to develop and maintain urban-fringe areas as predominantly residential areas characterized by generally low rise, low-density development. Allowable development includes significant levels of retail and service commercial uses as well as satellite institutional and public uses geared to serving the needs of the households. The proposed project is not intended solely or primarily serve nearby residents, although the commercial center will have that effect. Thus, Ewa Marina Phase 2 will deviate from the urban-fringe character of the area.

- 6. Ewa Marina Phase 2 will result in two areas offering visitor accommodations and facilities in the Ewa region.**

Current Development Plan policies call for the West Beach Special Area to serve as a water-oriented residential and resort community, which is known as Ko Olina. This area is identified as "a secondary resort destination area containing up to 4,000 visitor units within the areas designated for Resort use" (Honolulu City Council, *Development Plan Special Provisions for Ewa, Ordinance No. 81-80, amended by Ord. Nos. 83-26, 84-57, 85-61, 87-123, 89-16*).

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Ewa Marina Phase 2 will add a self-contained visitor destination to the Ewa region. As described in Section 1.2, the 1,500-unit Mixed-Use Commercial Complex will be designed for specific market groups.

These two visitor destinations would be located at the westernmost (Ko Olina) and eastern (Ewa Marina Phase 2) ends of the Ewa region. Although both will be operate separately and cater to different market segments, a potential effect of these non-contiguous and distant visitor destinations is the independent creation of visitor-related facilities linking the two destinations. In the future, other developers may propose additional visitor units near Ko Olina and Ewa Marina Phase 2, the long-term effect of which would be "strip" hotel development along major thoroughfares.

From a land use and planning standpoint, this sprawling effect would be highly undesirable. Major planning effort has been made to achieve orderly and manageable development in the Ewa region. To avoid this type of arbitrary resort development, public officials will need to establish and uphold planning policies prohibiting such development.

Note that, with the presence of Ko Olina, the possibility of independent hotel and resort development still exists and, thus, this situation could occur with or without Ewa Marina Phase 2.

5.2 IMPACTS OF SPECIFIC PROJECT COMPONENTS

5.2.1 Probable Non-Project Changes

Section 3 presents the General Plan target population range of 119,940 to 132,934 persons in 2010. This population increase implies that the current proposals for residential growth could accommodate a population three times that of the current Ewa population.

By the time Ewa Marina Phase 2 is implemented, the existing community will therefore have been undergoing a gradual adaptation to this major influx of new people. Some of the changes which may have occurred prior to project implementation are as follows:

1. Population and cultural diversification.

When compared to the islandwide community, the existing Ewa community tends to be slightly younger, and contain significantly higher proportions of Caucasians and Filipinos. Ewa had proportionally (1) fewer people born in Hawai'i, (2) more people born in other parts of the United States, and (3) slightly less foreign-born residents. Residents of Ewa tended to be less educated than the islandwide community, and the mean family income was lower.

Before the onset of Phase 2, the residential profile of the Ewa area, including the eastern half, will have begun to reflect more of a cross-section of the islandwide community. Residents of Ewa Beach will already have experienced a diversity of new residents from nearby residential development. Though many of these developments will offer affordable housing, many of the new residents will be part of the market housing segment and will therefore have incomes above the current median income level for the Ewa area.

With these changes will come cultural diversity. Adaptation will begin with competition for jobs at the new clubhouses and commercial centers, shared use of new shopping centers, altered make-up of schools and community organizations and shared new recreation areas.

2. Disruption of the slow-paced lifestyle.

The initial impact of impending change is a change in the current slow-paced lifestyle which characterizes the Ewa Beach and Ewa Villages communities. Omnitrak (1989) has indicated that the majority of Ewa Beach residents favor development; this implies a willingness to alter the current lifestyle.

Nevertheless, the existing communities may experience difficulty in adjusting to the changes which are likely to develop. Some of these changes include (1) the potential increase in crime; (2) disturbance of community cohesion due to economic disparities; (3) crowding at recreational and commercial facilities; (4) increased traffic; and (5) transitional effects of new schools.

3. Competition for public, particularly recreational, facilities.

As the other developments in the Ewa region, including Ewa Marina Phase 1, Ewa will be visited by visitors and islandwide residents.

In the immediate vicinity, new people will visit the expanded and improved Oneula Beach Park and the marina. With a portion of the marina intended for public launching, non-Ewa residents who use Waianae, Keehi and windward launching facilities may find the Ewa marina more convenient. The improved and expanded Oneula Beach Park and the new Ko Olina beaches will attract visitors from Waikiki seeking recreation areas outside Waikiki will visit by rent-a-car, on tour bus, or diving tours.

4. Shift in employment patterns and increased job competition.

By the time Ewa Marina Phase 2 is implemented, the Ewa region will already have experienced an increased diversity in types of employment. Many current Ewa residents who are currently working outside Ewa will have jobs closer to home. Many unemployed and

currently employed people working in other parts of Oahu will seek jobs in the City of Kapolei, nearby clubhouses at golf courses, day care centers, schools and new Ko Olina hotels.

The new residents of Ewa Marina, Gentry, West Loch and other developments will also be competing for the same jobs. This period of adjustment to a new lifestyle will be difficult for many Hawai'i-born residents who need jobs but lack training. As evidenced in the Kuilima situation, typically those service jobs demanding good verbal skills and cultural savoir faire, e.g. bartenders, waitresses, maitre d'hotel, are taken by foreign or mainland in-migrants.

A potential for further confounding the frustrations of old residents will be working under new management from a different cultural group.

5. Introduction of visitor industry to the Ewa region.

By the time Ewa Marina Phase 2 is underway, the visitor industry will have been introduced to the Ewa region. Cultural diversification will increase as residents interact with non-Hawai'i residents at Ko Olina and at restaurants and shopping malls. Also, many residents will have visited the restaurants and shops and some will be employees at these facilities.

5.2.2 Mixed-Use Commercial Complex

The proposed Mixed-Use Commercial Complex will be a major feature of Ewa Marina. Its potential effects on the community will depend to a large extent on how the then-existing Ewa community will have adapted to likely non-project changes identified in the previous section. This section presents some considerations on how this project component may change, affect and enhance the existing community.

1. The Mixed-Use Commercial Complex will increase the de facto population in Ewa.

Although the project will not directly increase the residential population, it will contribute to the influx of new people by accommodating visitors and attracting non-Ewa residents. Based on an average annual occupancy rate of 85 percent, and an average party size of 1.8 persons, the 1,500-unit visitor component of Ewa Marina Phase 2 could attract an estimated 2,295 overnight visitors. Ewa Marina Phase 2 would create approximately 2,030 full-time-equivalent (FTE) jobs in this area (Decision Analysts Hawai'i, Inc., draft report, October 1989). Further, Oahu-wide residents will likely be attracted to the proposed facilities, such as restaurants and shopping area.

2. The proposed visitor complex is symbolic of positive and negative aspects of tourism.

Regardless of the specialty nature of the proposed visitor accommodations, it is highly likely that Ewa residents will apply their own stereotypes and expectations to the Phase 2 Mixed-Use Commercial Complex. Based on the 1988 statewide tourism impact study, Ewa region respondents were generally consistent with statewide respondents in their opinions about tourism.

Hawai'i and Ewa respondents felt very positive about the benefits of tourism; they believe that tourism benefits outweigh its problems. They appreciated contributions to Hawai'i's employment base, as well as amenities which can be shared by residents.

Hawai'i and Ewa respondents also believed, however, that tourism had negative impacts on existing major community problems. They felt that tourism made the cost of housing and traffic worse, and this sentiment was especially strong in areas where there was a high density of visitor units. Where there were many visitor units, respondents were most likely to say that tourism made all sorts of things worse. Conversely, quiet rural areas were more likely to say tourism had improved the pace of life or social relationships, while the more urbanized areas said that these same things had been harmed by tourism (Community Resources, Inc., 1989).

It is very likely that the proposed visitor complex may be viewed as both a community asset, as well as the cause of problems. Problems which may be particularly associated with the visitor complex are (1) traffic and (2) changes in outdoor resources. Both are discussed below.

3. Visitors will tend to remain at self-contained area.

Regardless of the type of development at the project site, there will be an increase in traffic. The estimated visitor contribution to this situation is the subject of the traffic impact study, but it is helpful to examine trends for visitors to travel in cars or busses to off-site locations and thus generate traffic.

Tourists tend to remain on-site at the larger visitor destinations, except for occasional side trips around the island or into Honolulu or Waikiki. Compared to Waikiki tourists who rent cars and visit off-site recreation areas, rural resort visitors leave their destination area at about 15 percent total per day (Community Resources and Lyman, 1984). It is expected that with the hotels and commercial complex at Marina Phase 2, a similar pattern would prevail, particularly in light of the targeted niche markets.

4. Nearby outdoor recreation areas may be frequented by project visitors.

In the Kuilima experience (Community Resources and Lyman, 1984), visitors from the resort complex do not frequent public recreation areas near the resort site but prefer going some distance, such as Waikiki when they do travel off-site. At Ewa Marina, however, the project's water and marina orientation will attract visitors who would be interested in using the nearby Oneula Beach Park and other shoreline resources.

It is likely that the effects of the influx of new people will be felt by adolescents and young adults who will find their recreation areas, surfing spots and beaches infringed upon by those wanting these area for alternate activities. Adolescents are typically the most vocal and demonstrative toward tourists who infringe on what are considered local recreation areas. Though most young people may welcome the excitement of new faces, visitors, new residents and military will undoubtedly frequent these same areas and compete for recreation space. This could compel youth gangs or other locals to establish their territory either through incidents of confrontation or opportunistic crimes or misdemeanors. Loitering at beach parks, partying after hours, loud music and cars, and military-local interface invite confrontations which will lead to resident complaints.

5. Existing residents will experience increased interaction with visitors -- this can be both positive and negative.

According to the aforementioned statewide tourism impact study (Community Resources, Inc., 1989), Ewa residents experience low levels of interaction with tourists now. Whenever there was interaction, the experience tended to be pleasant even in the high density visitor areas.

On a personal level, the diversity of visitors, mainland and foreign born, can be a culturally enriching experience for workers and nearby residents. Opportunities to meet these people at work or in recreation or commercial areas will prove stimulating if mutual respect for the other's differences is demonstrated.

There is also a tendency for Hawai'i residents to view visitors as a class, however. There is a sense of competition, particularly in high-density visitor areas, of whether the area is "our place" or "their place." This type of impersonal class distinction become increasingly problematic when communication barriers increase.

For example, though Japanese visitors are generally perceived to be respectful of local cultural differences, their tendency to move in large groups and to isolate themselves could be misinterpreted. Large bus loads of non-English speakers visiting

a golf course, restaurant or beach park might test the patience of many local employees or residents present. These things will take time and understanding as is true elsewhere in Hawai'i.

6. **There is a potential for economic disparity as long as residents view a tourist as a symbol of something.**

The presence of affluent and corporate executives could create a us-them perception in the minds of some residents. This perception might become a focal aggravation to the extent that Hawai'i-born residents are committed to employment within the visitor industry or are excluded from employment because of lack of skills or training. Research has shown that, as the economic dependency on tourism increases, there is not necessarily a corresponding increase "Aloha Spirit" toward the industry. As people feel that they are losing political and economic control over their fate to absentee power-brokers in the industry, residents are more likely to direct their animosity toward the visible tourist, who becomes a *symbol* of the power structure.

7. **The Mixed-Use Commercial Complex will expand the area's recreational resources.**

The visitor complex will include a tennis complex and fitness center. These facilities can be welcomed assets to the community, providing there is sufficient means for the average resident to access these facilities. At the tennis complex, the developer should consider community-oriented programs such low membership or use rates for residents and junior or school-based tennis education programs. At the fitness center, there should be programs to encourage local companies to use the center.

5.2.3 Golf Course

Golf courses have become related to or symbolic of other issues. In a recent study of Hawaii's golf course industry, land use policies and water impacts were the most frequently raised issues. Land use policies which dealt with the compatibility and relationship to land use policies were the most frequent type of issue raised at Honolulu public hearings. In a review of 20 EISs on golf courses, impacts on water quality and supply were raised the most.

Community issues and concerns were the second most frequent category of golf course concerns in both testimony and EISs. Concerns included land competition with affordable housing, increased property values and taxes and impacts on a rural lifestyle. Another growing concern is foreign investment; cultural differences are exacerbated by potential exclusion and/or "pricing-out," as well as related displacement (Ordway, 1990).

The golf course component of the Phase 2 will improve the recreational resources in the area. Nearby residents will be able to choose among a number of golf courses proposed for the Ewa region. To ensure community access to the Phase 2

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golf course, programs such as junior golf lessons, kama'aina rates and group discounts should be evaluated.

5.2.4 Employment

Although the nearby slow-paced communities will probably have evolved into a more active, diverse and urban environment by the time Ewa Marina Phase 2 is implemented, the *existing context* for this project is this relatively rural neighborhood. Because of this current situation, and the introduction of resort uses, this social impact assessment discusses employment-related issues common to recent developments of large luxury hotel/resorts in relatively rural residential areas. This discussion is intended to stimulate awareness of potential community issues related to the resort component of Ewa Marina Phase 2.

This study looks at community issues found in four resorts, as follows:

First-time Employment Opportunities For Many Women: Mauna Kea -- The opening of the Mauna Kea in 1965 created first-time employment opportunities for many women living in North Kohala. The entry of women into the provider role within their families and their enhanced self-esteem threatened some marriages (Cottingham, 1969).

Implications for Ewa Marina Phase 2 -- In 1980, the Ewa region has a high potential female participation rate in the labor force and a high unemployment rate for females. With or without the proposed project, and considering the major employment targeted for the Ewa area, the Ewa communities may experience social problems similar to that of South Kohala.

Two factors offset this possibility, however. First, the Mauna Kea hotel was the only major alternative employment in 1960 to the area's faltering sugar industry. That is not the case with Ewa, where residents have access to islandwide employment and women who choose to work may commute to other parts of the island. Second, the census data is dated, and women have increasingly entered the labor force in the 1980s. Hence, the upcoming 1990 census will be a more accurate portrayal of the current proportion of women in the work force.

Hawaii-born Versus In-migrants For Management Positions: Mauna Lani -- Although management personnel at Mauna Lani were initially mostly in-migrants from the mainland or off-island, the hotel has found that Hawaii-born employees (65 percent of total) are stable workers adding Hawaiian ambience and more inclined to be career oriented (55 percent in management positions) (Community Resources, 1987).

Implications for Ewa Marina Phase 2 -- Job opportunities proposed by Ewa Marina Phase 2 will likely be welcomed. This support may be tempered, however, if residents observe that in-migrants are being hired for the higher-paying positions. The current low unemployment rate and labor shortage may contribute to pressures to hire non-residents. Although the developer cannot guarantee jobs to a

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specific geographic community, developer-sponsored or participation in job training programs would help nearby residents qualify for these jobs.

Ethnicity-based Competition for Jobs: Kuilima -- When the Kuilima Resort was expanding, positions were sought by many Pacific islanders, immigrants, part-Hawaiians and Filipinos in the area as well as other immigrant groups outside the area. Disputes over perceived favoritism along ethnic lines emerged, and recently unemployed Kahuku Sugar Plantation workers were concerned about non-local residents getting jobs (Community Resources, 1984).

Implications for Ewa Marina Phase 2 -- Both the Koolauloa and Ewa regions share similarities with relatively few and large ethnic groups. It is expected, however, that by the time the proposed project is implemented, Ewa will have begun to reflect more of a cross-section of the islandwide community. Residents of Ewa Beach will already have experienced a diversity of new residents from nearby residential developments. It is therefore highly unlikely that the proposed project will cause ethnic-based job competition similar to Kuilima.

Rapid Exposure To In-migrants In The Workplace: Lanai -- Recently Lanai residents undergoing a transition from a homogenous pineapple plantation to a more cosmopolitan resort community showed signs of stress from such a rapid adaptation. Though developers expressed concern that local residents become part of the work-force, the rapid exposure to in-migrants during the construction phase manifested negative reactions by residents through family problems, excessive drinking and drug use. Castle and Cooke commissioned a study by the University of Hawai'i School of Social Work to address such social problems. Findings show that, although there is general support for resort development on the island, the perceived costs are increased crime, decreased family values and cohesion, decreased community values and cohesions, and increased financial problems (University of Hawai'i School of Social Work, 1990).

Implications for Ewa Marina Phase 2 -- Ewa Marina Phase 2 differs from the Lanai resort in terms of source of change and isolation. Whereas the Lanai Development Company is the major source of change for Lanai, the Ewa Marina Phase 2 is only one of the many proposed developments in the Ewa region. Further, the Ewa region already has access to employment and social activities in other parts of Oahu and is not geographically or socially isolated.

The common thread of difference between the proposed project and these other resort developments is that Ewa is programmed to be a secondary urban center, with major employment centers to alleviate pressures on primary urban center. Hence, cultural and population diversification, in-migration of non-Ewa residents and the loss of rural qualities will occur without Ewa Marina Phase 2. Ewa Marina Phase 2 therefore will not be the major source of change, nor will it dictate the pace of change for the region.

5.3 IMPACTS ON PUBLIC SERVICES AND FACILITIES

5.3.1 Police Protection

Ewa's Crime Statistics

In 1988, there were a total of 410,719 reported offenses on the island of Oahu. Approximately 12.3 percent were Part 1 offenses, which includes the violent crimes such as murder, forcible rape, robbery, and auto theft. Twenty one percent of the total reported offenses were Part 2 offenses, which partially include arson, fraud, vandalism, substance abuse and stolen goods. The bulk of these reported offenses, over two-thirds, were vehicular accidents and miscellaneous reports.

As part of District III, the Ewa region is in Beats 325 (Honokai Hale/Nanakai Gardens and Makakilo), 326 (Ewa Villages, Honouliuli and NASBP) and 327 (James Campbell Industrial Park, Ewa Beach and IPP Military Family Housing). An additional beat, 325A, was recently included.

With 82,359 reported offenses in 1988, District III accounted for 20 percent of the total islandwide reported offenses. The breakdown of the District III's reported offenses was similar to the islandwide proportions.

Overall, Beats 325, 326 and 327 accounted for 12.8 percent of the total District III reported offenses in 1988.

These beats had a lower proportion of the more violent Part 1 reported offenses, with 11.1 percent of the total reported offenses, but a higher proportion of Part 2 offenses with 22 percent of the total (Honolulu Police Department, not dated).

Existing and Proposed Police Facilities

District III, which extends from Red Hill to Kaena Point and Kipapa Ridge, is handled by the Pearl City Police Station.

Currently, there are three shifts of one police officer dispatched to each of the four beats in a 24-hour period; hence twelve beat officers operate in Ewa within a 24-hour period.

In terms of short-term plans, the Police Department is requesting funds for two officers per shift. Long-term plans include adding a new full-service station in Kapolei, with the establishment of Ewa and the Waianae Coast as a new district. This means that the District III would cover the area from Red Hill to Kunia Road, and the new district would extend from Kunia Road to Kaena Point. If this occurs, the Kapolei station would be the headquarters for five beats in Ewa and eight beats along the Waianae Coast (personal communication with Lieutenant Melvin Chastain, Administrative Lieutenant for District III, Pearl City Police Station, October 23, 1990).

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In addition, two substations are proposed by the Police Department. One would be located in Ko Olina, near a proposed fire station. The other would be located near the proposed relocation site of the Ewa Beach Fire Station at Ewa Marina (personal communication with Kyle Nakasone, Research Analyst, Honolulu Police Department, November 20, 1990).

Tourist-Related Crime

A correlation exists between increased growth of tourism and increases in certain categories of crime against tourists. These categories include property crimes, robbery, rape and aggravated assault (Pizam, 1982). A report of the relationship between crime and tourism in Honolulu over a 23-year period found that the number of tourist present was significantly related to all major crimes except murder and auto theft. Tourism proved a significant predictor of crime in Honolulu. Research also strongly suggested, however, that a distinction be drawn between tourism-generated criminal activity and the easy assertion of the lucrative tourist as an easy victim (Chesney-Lind, et al., 1983)

The study showed tourists were more likely victims of property crimes and robbery. The crime - tourist relationship was significantly high for non-violent crimes of larceny, robbery and burglary. Tourists in Honolulu were slightly (11 percent) more likely rape victims than residents. A significant relationship was also found between tourism and assault.

Some of the reasons for tourism-related crime are as follows:

1. Many property crimes result from taking advantage of tourists' carelessness. Tourists are generally less careful with their belongings when on vacation.
2. Tourists frequently engage in risk-taking they would otherwise not have taken. Behavior displaying their vulnerability to victimization include drinking too much too late, night strolls on beaches and visits to parts of the community considered dangerous by residents. Fujii and Mak (1979) found such risk-taking partially accounted for high rate of rape among tourists.
3. When the victim is a tourist, there is less tendency to follow through with prosecution. This is particularly true in cases of rape, where 62.7 percent of the arrests involved visitor victims, but 57.9 percent of the those arrested were released without charge (Criminal Justice Data Center, 1983).
4. The individual tourist can become a symbol and target of resident animosity felt toward the visitor industry.

The increase in the tourist population is inevitable, given public policy to support the visitor industry. The increase in tourists due to Ewa Marina Phase 2 will therefore not alter the current trend in visitor-related crime.

Tourist-related crime is more prevalent in areas frequented by the general public, as in Waikiki. The specialty nature of proposed facilities are not expected to be conducive to large numbers of the general public.

The proposed project can further assist in mitigating visitor-related crime as follows:

1. ***Creation of a safe physical environment.*** The on-site facilities should be designed to minimize visitor-related crime by featuring effective security devices and to avoid secluded, dark spaces.
2. ***On-site security.*** The size and complexity of the proposed complex warrants security personnel to monitor the different areas.
3. ***Tourist education.*** The visitor industry is already informing tourists on crime prevention. The project developer could participate in these programs.

5.3.2 Fire Protection

The project site is currently being serviced by the Ewa Beach Fire Station, and back up service is provided by the Waipahu and Makakilo Fire Stations. The Fire Department plans to relocate this facility at Ewa Marina Phase 2, across from Hanakahi Street. Specifically, the targeted site is the proposed Gateway Park. Fire officials are currently discussing these plans with HASEKO (Hawaii), Inc. The relocated Ewa Beach Fire Station will be an engine company, with five firefighters working in a 24-hour period.

Other new facilities are also being planned to accommodate Ewa growth. Budget requests have been submitted for facilities at Ko Olina and the James Campbell Industrial Park. The Ko Olina Phase 1 facility would be an engine and ladder company, with twelve firefighters per shift. The James Campbell Industrial Park fire station is envisioned as a future battalion headquarters with an engine and ladder company; 15 firefighters would serve each shift. Another fire station is planned at Ewa Villages, but no time frame has been determined.

Based on preliminary project information, the existing and proposed fire protection facilities are anticipated to be adequate to serve the Ewa Marina Phase 2.

5.3.3 Education And Child Care

As Kapolei develops, the need for child care services within the region will increase as more and more people live and work in the Second City. Three sites in the area already have been committed for child care purposes. First, West Loch has a 5.3 acre site for a park-and-ride facility with a 30,000 square foot child care center. This is scheduled for implementation in Phase 2. Second, Ko Olina has one acre for child care and other public facilities. Third, Royal Kunia, which is just outside Ewa in Central Oahu, has similar provisions included in its master plan.

In addition, three potential child care centers are being explored in Kapolei. One site is located in the City of Kapolei, with the other two in Kapolei Villages.

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Ewa Marina Phase 2 will increase the regional demand for child care services because of employment generated by the proposed regional shopping center. Currently, there is no rule of thumb in projecting child care needs and requirements for specific development proposals have been determined on a case-by-case basis.

The extent of the increase in demand for child care services generated by Phase 2 is unknown at this time. Also undetermined is the degree to which proposed child care centers may meet this requirement.

Options to address child care needs include (1) providing a site for a child care facility and (2) employer-based options. The latter includes major employer subsidy of on-site care, pre-tax contributions to qualified employees, and a direct voucher provided by employers to employees who demonstrate their use of qualified child care facilities.

5.3.4 Medical And Emergency Services

Three hospitals are within reasonable travelling distance of the project site. The Kaiser Foundation Health Plan has a relatively new central hospital in Moanalua. The Pali Momi Medical Center is located near the Pearl Ridge Shopping Center, and the St. Francis Hospital-West is located in the Ewa Plains. In addition, the area contains numerous medical clinics and doctors' offices.

As Kapolei City progresses, additional medical facilities will be required to serve the increased population. The proposed project is expected to be adequately served by the existing and additional medical facilities.

Emergency services are provided by City ambulances located in Aiea. Further, the Waipahu Fire Station contains an ambulance unit which serves Pearl City, Waipahu, Ewa Beach, Makakilo and parts of Waianae. Also eight-hour service is provided to the Makakilo Fire Station by the Waipahu unit. Twenty-four hour ambulance service at the Makakilo Fire Station is currently in the planning stage.

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APPENDIX F

Environmental Noise Impact Assessment

Prepared by Darby & Associates, January 19, 1991

D.L. ADAMS ASSOCIATES, LTD.



J89-23
January 19, 1991

HASEKO (HAWAII), Inc.
820 Mililani Street
Suite 610
Honolulu, Hawaii 96813

Attention: Mr. Nelson Lee

Subject: Environmental Noise Impact Assessment, Ewa Marina Phase II, Ewa Beach, Oahu

Dear Mr. Lee:

We have reviewed the plans of the proposed project and field noise measurements and analyses have been performed to assess the potential noise impact at the project site and its surroundings. The following is provided as a result of our study:

1. SUMMARY OF FINDINGS

- 1.1 The existing acoustical environment at the project site is normally dominated during the daytime by the predictable pattern of civilian aircraft operations associated with Honolulu International Airport (HNL). Under typical tradewind conditions, aircraft fly over the project site from 7 am to 7 pm during their final approach into HNL.
- 1.2 Noise exposure levels at the subject site during the daytime hours are also affected by the far less predictable military aircraft operations associated with both HNL and the adjacent Naval Air Station Barbers Point (NASBP).
- 1.3 There are normally far fewer aircraft movements affecting the project site between 7 pm and 7 am than during the daytime hours. The average sound levels during the evening and nighttime period are, therefore, significantly lower than those during the daytime hours.
- 1.4 The highest noise exposure levels at the site are generated by a relatively small number of noisy military aircraft (KC-135 and F-15) operations at NASBP.

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- 1.5 The proposed noise sensitive buildings within the mixed use portion of the project (health lodging, hotel and condominium building) will be exposed to noise levels less than the U.S. Environmental Protection Agency (EPA) and Department of Housing and Urban Development (HUD) exterior noise standards of 65 dB Day-Night Average Sound Level (Ldn). The Ldn at the condominium building also complies with the State Department of Transportation (DOT)'s more restrictive noise exposure guideline of 60 dB Ldn for naturally ventilated dwelling units.
- 1.6 Provided that the proposed noise sensitive buildings are air-conditioned, enabling building windows to be kept closed to minimize noise intrusion, interior noise exposure levels should comply with the HUD's interior goal of 45 dB Ldn. Furthermore interior noise levels should, in general, also comply with the appropriate single event noise criteria.
- 1.7 Noise exposure levels at the golf course generally comply with all federal criteria specified in various land use compatibility guidelines, but about 25% of the golf course site is subjected to levels exceeding the State DOT's preliminary recommended Ldn of 65 dB.
- 1.8 The existing residential areas located near Fort Weaver Road have setback distances ranging from about 50 to 200 feet. The residential areas closest to Fort Weaver Road are located makai of Hanakahi Street, and they are estimated to be exposed to current Ldn of about 69 dB. The existing 65 dB Ldn contour line for this segment of Fort Weaver Road is estimated to be located at a distance of about 90 feet from the centerline of the road. For the segment of Fort Weaver Road mauka of the Project Access Road 'A', the existing 65 dB Ldn contour line is estimated to be located at a distance of about 210 feet from the centerline.
- 1.9 The relative increase in future (year 2002) traffic noise levels due to the project is estimated to be less than 1 dB. This is not considered a significant noise impact.
- 1.10 The overall future traffic noise increase is estimated to be range from about 2 to 7 dB, regardless of the project development. The future 65 dB contour lines move further away from Fort Weaver Road from about 90 to 135 feet, again, regardless of the project development.
2. PROJECT DESCRIPTION -- The proposed Ewa Marina Phase II includes the following developments:

- o Common Area Amenity -- 6.3 acres
- o Commercial (Mix Uses) -- 87.0 acres
 - * Condo/Hotels (600 Garden Suites) -- 24.0 acres
 - * International Fitness Promotion Center (including accommodations for 400) -- 18.8 acres
 - * Hotels (500 units) -- 26.3 acres
 - * Retail/Restaurants/Marine Service Center -- 8.0 acres
 - * Tennis and Yacht Club -- 10.0 acres
- o Roads, Streets, Utilities -- 20.7 acres
- o Parks -- 17.0 acres
- o Golf Course -- 272.0 acres

Of the above described uses, the residential portions of the mixed use (i.e. condominiums, hotels, etc.) and the golf course will be addressed in the assessment of noise impact. Refer to Figures 1 and 2 for the vicinity map and the site plan.

3. NOISE STANDARDS AND GUIDELINES

- 3.1 Aircraft Noise Standards and Guidelines -- Aircraft noise regulations set forth by the U.S. Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD) specify 65 dB Day-Night Average Sound Level (Ldn) as a maximum allowable level for residential and other noise sensitive areas. The State Department of Transportation (DOT) sets a more stringent guideline of 60 dB Ldn for aircraft noise. HUD also has a design goal of 45 dB for the interior spaces of dwelling units.

There are also several proposed guidelines for aircraft noise involving the use of additional noise indices for single events, such as Sound Exposure Level (SEL) and the maximum noise level (Lmax). These guidelines are proposed primarily because the Ldn alone does not fully describe the extent of aircraft noise impact, especially in terms of speech and sleep interference. The recommended single-event guidelines are summarized below:

- o The EPA recommends that SEL's of 98 and 80 dBA be used as criteria for speech and sleep interference, respectively. Although not specifically stated, these must refer to exterior levels. (Reference 1)
- o Wyle Laboratories, an independent firm of consultants conducting a soundproofing program for homes in the vicinity of major airports throughout the U.S., recommends an interior design guideline of 60 to 65 dB SEL. (Reference 2)
- o Various Airport Land Use Commissions in the state of California have specified recommended Lmax levels within the interior spaces of residential dwellings. The specified levels are 50 dBA in sleeping areas during all hours of the day as well as 55 and 60 dBA in other living areas during nighttime and daytime hours, respectively. (Reference 3)

Land-use compatibility guidelines provided by federal and local agencies include recommended noise exposure levels for golf courses. These guidelines, in general, specify that areas exposed to an Ldn ranging up to 70 to 80 dB are compatible for golf course uses if related structures with noise sensitive use have adequate sound mitigation measures. The State DOT Draft Document (Reference 4), however, specifies an Ldn of 65 dB as a maximum compatible level.

- 3.2 Traffic Noise Standards and Regulations -- HUD's Site Acceptability Standards specify an exterior Ldn of 65 dB as an acceptable level without any special noise mitigation measures (Reference 5). For residential developments located within a zone where the Ldn is between 65 and 70 dB, the standards require the construction to provide a minimum of 5 dB attenuation in addition to "attenuation provided by buildings as commonly constructed in the area, and requiring open windows for ventilation." A minimum of 10 dB attenuation is required for residential projects exposed to an Ldn of 70 to 75 dB. The HUD document also states that the future noise level projections should be those considered "representative of conditions that are expected to exist at a time at least 10 years beyond the date of the project or action under review."

4. ASSESSMENT OF THE EXISTING ACOUSTICAL CONDITION

The existing acoustical environment at the project site is dominated during the daytime by noise generated by aircraft flight activities associated with the Honolulu International Airport (HNL) and Naval Air Station Barbers Point (NASBP). Refer to Figure 1 for the location of the project site with respect to these airports.

Flight activities at the HNL which affect the project site comprise civilian and military aircraft approaching to land on Runway 8L. Noise generated by touch-and-go activities, which overfly the project site, dominate the overall noise from aircraft associated with the NASBP. Refer to Figures 3 through 8 for the location of the flight tracks involved.

When no aircraft activities occur, noise generated by traffic on Fort Weaver Road is the dominant source at locations near Fort Weaver Road. At locations away from the road and when no aircraft activities occur, wind in the sugar cane is, at present, often the dominant sound. Occasionally, noise from sugar cane field operations, such as harvesting and land preparation dominates the acoustical environment.

4.1 Aircraft Noise

- A. Ldn from Contour Maps -- The flight operations at both HNL and NASBP affect the existing and future Ldn levels at the project site. Table 1 provides a summary of the following Ldn discussion. According to the latest (1987) Ldn contour map for HNL (Reference 6), the project site is exposed to Ldn's ranging from about 50 to 63 dB (see Figure 9). The latest Air Installation Compatible Use Zone (AICUZ) for NASBP (Reference 7) provides Ldn contour maps for NASBP operations alone and for the combined effect of HNL and NASBP operations. The referenced AICUZ study provides Ldn contour maps for two scenarios, namely, the 1987 annual average Ldn and a "mean year" Ldn, which averages the operations between 1983 and 1987 at NASBP. Using the mean year Ldn contour map, it is estimated that the project site is exposed to Ldn's generated by flight operations at NASBP of about 45 to 71 dB (see Figure 10). The combined Ldn at the project site (due to HNL and NASBP operations) is estimated to range from about 55 to 71 dB (see Figures 11 and 12). The estimated Ldn from the noise measurement results is discussed below in the "Results of the Measurements" section.
- B. Aircraft Noise Measurements -- On August 14 and 15, 1989, noise measurements were obtained at ten locations within the project site to assist in evaluating the existing aircraft noise. Figure 13 shows the location of the measurement positions. The measurements comprised continuous measurements of the hourly average noise levels for each of the two measurement periods (11:00 am to 7:00 pm, 8-14-89 and 7:00 am to 4:00 pm, 8-15-89) at one location, and single event measurements (Lmax and SEL) at separate times at all ten locations. During the measurements, a total of 239 aircraft events were observed and/or measured. Appendix I provides a

complete listing of the data obtained together with details of the acoustical instrumentation used. Note that some aircraft events were inaudible or barely audible above the ambient level, and, therefore, measurements of the noise from these events were not feasible. A typical trade-wind condition (ENE, 5-10 knots) prevailed during the measurements.

C. Results of the Measurements -- The measurement data have been analyzed and the results are summarized in Table 2. Note that the measurement positions and aircraft types have been grouped as follows:

o Measurement Positions

- * mixed use -- measurement positions 1 through 5
- * golf course -- measurement positions 6 through 10

o Aircraft Types

- * civilian trans-ocean flights
- * civilian interisland flights
- * military aircraft associated with HNL
- * military aircraft associated with NASBP

a. Mixed Use Locations

The Ldn levels for the two measurement days were estimated using the hourly average noise levels obtained at measurement Position 3. Our findings confirmed that the Ldn is largely dependent on the level of flight activities at the NASBP. For example, on the first day of the measurements (Aug. 14, 1989), during which a total of 95 aircraft events were measured and/or observed, only 7 (7%) were associated with NASBP. The Ldn for the first day at measurement Position 3 is estimated to be about 52 to 53 dB. This Ldn was primarily generated by the flight activities at HNL and is in agreement with the HNL Ldn contour map shown in Figure 9. However, 68 aircraft events (48%) out of a total of 141 aircraft events recorded during the second day of the measurements were flights from NASBP. The estimated Ldn for the second day is about 68 dB at Position 3. Although the increased level of activity at the NASBP contributed to this high Ldn level, it was primarily due to the

touch-and-go activities of two relatively noisy aircraft (KC-135 and F-15) which flew directly over the measurement site (Appendix II provides the calculation of these estimated Ldn's.)

The civilian trans-ocean and interisland flights occurred most frequently during the site noise measurements (53% of all measured and/or observed aircraft events) with typical Lmax values of 64 to 69 dBA and 58 to 65 dBA, respectively. The typical SEL's were in the range of 77 to 81 dBA for the trans-ocean and 68 to 77 dBA for the interisland flights.

The military aircraft flight activities associated with HNL accounted for only about 8% of all measured data at these locations. However, aircraft types such as KC-135 and F-15 generated relatively high levels of noise with an Lmax of between 65 and 85 dBA and an SEL of between 75 and 90 dBA. The remaining 39% of the aircraft movements measured and/or observed were the military flight activities associated with the NASBP. The noise levels generated by these activities were largely dependant upon the flight tracks, with the noise ranging from inaudible to levels as high as 104 dBA Lmax and 108 dBA SEL. The highest noise levels were generated by KC-135 and F-15 aircraft performing touch-and-go activities on track BP-04RT6. A total of eleven such activities (about 15% of the total military flights at NASBP) were measured with Lmax and SEL values ranging from about 75 to 104 and 80 to 108 dBA, respectively. Although these were all touch-and-go activities on track BP-04RT6, such wide ranges exist primarily because of different altitudes and turning radii. About 35% of the measured and/or observed flight activities associated with the NASBP were inaudible or below the ambient sound level, mainly due to the large distances from the noise measurement positions.

During the Kona wind condition, which occurs approximately 5 to 10% of the time, the aircraft flight patterns reverse their directions. The nearest flight tracks from HNL to the project site are the departure tracks 11 and 13 (see Figure 4.) As can be seen from the figure, the departures do not overfly the project site and the distances involved are relatively large. The noise levels associated with these activities should be no greater than those generated by the typical tradewind condition landings. The flight activities associated with the NASBP during the Kona wind condition would, in general, generate lower noise levels than those during the typical tradewind condition.

b. Golf Course Locations

In general, noise from HNL bound aircraft is higher at the golf course locations than at the mixed use locations due to the proximity to the flight track. Using the HNL aircraft noise contour map, the Ldn's at the proposed golf course are estimated to be between 50 and 63 dB. These predicted noise exposure levels are thought to be reasonably accurate since the Ldn's estimated using the measured data at the mixed use locations are in agreement with the HNL's Ldn contour map. Note that there were no hourly average noise levels obtained at the golf course site. During a busy day at NASBP with KC-135 and F-15 performing the BP-04RT6 touch-and-go's (such as those observed on the second measurement day), the Ldn at the golf course site may be comparable to the 68 dB measured at Position 3.

The civilian trans-ocean and interisland flights into HNL generated Lmax and SEL levels ranging from about 60 to 76 dBA and 68 to 85 dBA, respectively. The Lmax levels generated by the HNL bound military aircraft were in the range of about 70 to 87 dBA and the SEL's ranged about 81 to 96 dBA. Only one aircraft operation at NASBP was measured, and it generated an Lmax and an SEL of 58 dBA and 66 dBA, respectively. Although not measured at the golf course sites, the above described touch-and-go operations on track BP-04RT5 by KC-135 and F-15 aircraft are estimated to generate comparable noise levels as those measured at the mixed use locations. That is, such activities would cause noise levels as high as 104 dBA Lmax and 108 dBA SEL.

- 4.2. Traffic Noise -- The existing acoustical environment at locations near Fort Weaver Road is dominated by traffic noise. A noise measurement made over a 10-minute period during the late afternoon (5 to 6 pm) on August 14, 1989, at a distance of 90 feet from the center of Fort Weaver Road, yielded an average hourly level (Leq[1 hour]) of 68 dBA.

The setback distances of existing residential structures located near Fort Weaver Road vary from about 50 feet to 200 feet. To enable estimates to be made of the existing noise levels at various distances from Fort Weaver Road, the above-mentioned noise measurement result was used to calibrate the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (Reference 8). This calibrated model was then used in conjunction with the existing traffic data provided in Reference 9. The calculations were performed for the two following segments of the roadway: 1.) mauka of the Project Access Road 'A',

4-lane divided roadway with 45 to 50 mph average speed; 2.) makai of Hanakahi Street, 2-lane undivided roadway with 25 to 30 mph average speed. The results of the calculations are presented in Figures 14 and 15.

As can be seen from the above figures, at a location 50 feet from Fort Weaver Road makai of Hanakahi Street, the existing Ldn level is about 69 dB. For this section of Fort Weaver Road, receptors located at a distance of 90 feet or greater are currently exposed an Ldn of 65 dB or less. The existing 65 dB contour line for the section of Fort Weaver Road mauka of the Project Access Road 'A' is estimated to be located at a distance of 210 feet from the centerline of the roadway.

5. ASSESSMENT OF POTENTIAL NOISE IMPACT

5.1. Aircraft Noise

A. Mixed Use Locations

- a. Ldn Levels -- Table 3 provides a summary of Ldn noise impact assessment at the mixed use portion of the project. The combined (HNL and NASBP) Ldn at the mixed use site for the mean year ranges from about 55 to 67 dB. The Ldn at the noise sensitive locations (health spa lodging, hotel, and condominium building) within the mixed use site is less than 65 dB (see Figure 12). This is in compliance with the and EPA and HUD's aircraft noise regulation of a maximum Ldn of 65 dB. It is uncertain at this stage of the project development whether the condominium units will be naturally ventilated or air-conditioned. Nevertheless, the condominium building will be located outside the 60 dB Ldn contour line, and, therefore, it complies with the State DOT's aircraft noise guideline of a maximum of 60 dB Ldn for naturally ventilated dwelling units.

A typical home in Hawaii with natural ventilation provides an exterior-to-interior noise reduction of about 5 to 12 dBA, whereas an air-conditioned home with all exterior doors and windows closed would typically provide a noise reduction of about 20 dBA. Therefore, all dwelling units within the mixed use site will comply with HUD's 45 dB Ldn goal, provided they are air-conditioned. It would be difficult, if not possible, to achieve interior Ldn 45 dB Ldn without air-conditioning, especially at the transient lodging buildings.

b. Single Event Noise Indices, Lmax and SEL

- i. Civilian Aircraft - HNL -- The civilian trans-ocean and interisland flights generate Lmax and SEL values ranging from about 58 to 69 dBA and 68 to 81 dBA, respectively. The maximum SEL of 81 dBA is well within the 98 dBA SEL guideline proposed by EPA for speech interference. Although the SEL of 81 dBA marginally exceeds the 80 dBA SEL criterion for sleep interference, it is not considered a significant impact since, according to the latest flight activity information provided in Reference 10, there are no nighttime (10 pm to 7 am) activities on the arrival flight tracks 17 through 20 for any of the civilian aircraft. Enclosure 1 provides the listing of aircraft and their flight activity information. Furthermore, the Informal Runway Use Program and Noise Abatement Procedures for Honolulu Airport specify that arrivals on flight tracks 17 through 20 are not allowed during the evening or nighttime (7 pm to 7 am). Refer to Enclosure 2 for an excerpt from the noise abatement procedures.

As stated earlier, an exterior-to-interior noise reduction of about 5 to 12 dBA is provided by a naturally ventilated home, whereas an air-conditioned home with all exterior doors and windows closed would typically provide a noise reduction of about 20 dBA. Therefore, the Lmax generated by the civilian trans-ocean and interisland aircraft would be about 46 to 65 dBA inside a naturally ventilated condominium unit and about 38 to 49 dBA inside an air-conditioned unit. The interior SEL would range from about 56 to 76 dBA for naturally ventilated units and about 48 to 61 dBA for air-conditioned units. These predicted aircraft noise levels inside air-conditioned units comply with all of the aircraft noise guidelines discussed earlier. However, for naturally ventilated units, the interior noise levels are marginally acceptable, with high-end numbers exceeding the specified criteria.

Noise levels that would be experienced during aircraft departures under Kona wind conditions would be no greater than those generated during the tradewind condition landings. Therefore, no additional noise impact is expected during Kona wind departures.

- ii. Military Aircraft - HNL -- The HNL bound military aircraft generate a maximum SEL of 90 dBA, which is below the EPA's

recommended guideline of 98 dBA for speech interference. Although the 90 dBA SEL, which is generated by KC-135 and F-15 aircraft, is 10 dBA above the sleep interference criterion of 80 dBA SEL, according to the flight activity information (Enclosure 1) there are currently no nighttime activities on the arrival flight tracks 17 through 20 for the KC-135 and F-15. Therefore, noise generated by HNL bound KC-135 and F-15 aircraft is not considered to cause any significant impact at the mixed use portion of the site.

However, there are three military aircraft types, namely, C-5A, C-130, and C-141, which perform nighttime arrivals at HNL via tracks 17, 18 and 19. Among the above three aircraft types, the C-5A is considered to be the noisiest. It is estimated that such an event would generate an Lmax of about 76 dBA and an SEL of about 85 dBA at the mixed use site. As stated earlier, a naturally ventilated home provides a noise reduction of about 5 to 12 dBA, whereas an air-conditioned house with all exterior doors and windows closed would provide a noise reduction of about 20 dBA. Therefore, a C-5A approach would generate Lmax and SEL values of about 64 to 71 dBA and about 73 to 80 dBA, respectively, inside a naturally ventilated unit. The interior Lmax for an air-conditioned home would be about 56 dBA and the SEL would be about 65 dBA. The interior noise levels for naturally ventilated units exceed the levels specified in the recommended guidelines, whereas, the air-conditioned units marginally comply with the guidelines. Note that the nighttime daily annual average for the C-5A is 0.01 or a total of about 3 to 4 operations per year (or, on the average, once every 3 to 4 months.) Therefore, although the noise levels generated by these events exceed the guidelines, at the mixed use site, such a rare occurrence is not considered to be a significant noise impact.

The noise levels generated by the other two aircraft types, C-130 and C-141 are lower than that of C-5A by about 11 to 19 dBA. The interior Lmax levels generated by these aircraft are estimated to be about 45 to 60 dBA and about 37 to 45 dBA for naturally ventilated units and air-conditioned units, respectively. The interior SEL levels would range from about 54 to 69 dBA for naturally ventilated units and about 46 to 54 dBA for an air-conditioned units. The total annual number of nighttime

operations for each of the two aircraft is about 3 to 15, or, on the average, once every 24 days to 4 months. Although the estimated high-end interior noise levels exceed the recommended guidelines for a naturally ventilated unit, due to their infrequent occurrence, they are not considered to have any significant impact at the mixed use portion of the project.

As noted earlier, noise levels due to aircraft departures during the Kona wind condition are no greater than those generated by the arrivals during the tradewind condition.

- iii. Military Aircraft Operations at NASBP -- As stated earlier, the noise generated by military aircraft operations associated with NASBP varies over a wide range from inaudible to levels exceeding 100 dBA. Due to this wide variation, it is inappropriate to assign "typical" Lmax and SEL values.

The measurement results indicate that noise levels generated by KC-135 and F-15 aircraft on a touch-and-go pattern BP-04RT6 are the most severe with Lmax and SEL levels reaching as high as 104 and 108 dBA, respectively. According to the flight operation information provided in the AICUZ, the daily annual average for such an event is about 3.4 for the KC-135 and about 1.8 for the F-15 (see Enclosure 1). It should be noted that these numbers are obtained by dividing the total annual operations by the number of days in a year and, therefore, they are by no means representative of typical daily operations. It has been our experience that, for military bases, the flight activity patterns are extremely sporadic. That is, there could be several days or even weeks during which certain flights do not occur. On the other hand, there can be a small number of days on which there are extremely high levels of activity. Thus, on the relatively small number of occasions when KC-135 and F-15 aircraft perform the flight pattern described above, the noise impact at the mixed use site would be severe.

According to the AICUZ, there are also other aircraft types which perform the touch-and-go pattern BP-04RT6 and other departure and arrival patterns, which, according to the flight track map, would overfly the mixed use site. It is estimated that none of these activities would generate noise levels greater than those generated by

KC-135 and F-15 aircraft performing the above described touch-and-go activity.

The most active aircraft at NASBP is the P-3, which performs, on an annual average, about 17 to 18 BP-04RT6 touch-and-go's per day during the daytime hours and about 4 during the nighttime. Although no such event was measured, a P-3 takeoff event on track BP-04LD2, which has a similar flight track profile to that of BP-04RT6, was measured and the results indicate that the Lmax and the SEL are about 77 and 85 dBA, respectively. These levels are comparable to those generated by the noisier civilian trans-ocean aircraft measured at the site. There may be days during which the touch-and-go operations by P-3 aircraft on track BP-04RT6 exceed the above daily annual average, and the noise impact on such occasions may be significant at the mixed use portion of the project, unless the residential areas are air-conditioned.

Noise exposure during the Kona wind condition is expected to be less than that experienced during tradewind condition. Therefore, no additional noise impact exists during the Kona wind days.

- B. Golf Course Locations -- According to the land-use compatibility guideline discussed in the "NOISE STANDARDS AND GUIDELINES" section, the proposed gold course site complies with the all the specified criteria except for the State DOT's proposed Ldn limit of 65 dB. However, as can be seen in Figure 12, the majority of the golf course site (about 75%) lies outside of the 65 Ldn contour line. It should also be noted that there is an existing golf course adjacent to the proposed golf course site and that the aircraft noise is comparable at both sites.

- 5.2 Traffic Noise -- Traffic noise calculations were performed using the previously mentioned calibrated traffic noise prediction model along with traffic data provided in Reference 9. The results of the calculations for the existing and future (year 2002), with and without the project at various segments of Fort Weaver Road and the Project Access Road 'A' and 'B', are summarized in Table 4. The levels are for an arbitrary distance of 100 feet from the centerline of the roadways. As can be seen from the table, the increases in the future noise levels due to project-generated traffic are less than 1 dB. This is not considered a significant noise impact. The overall future traffic noise level increase ranges from about 2 to 7 dB.

As stated earlier, the existing homes located directly adjacent to Fort Weaver Road (at a distance of about 50 feet) are currently exposed to an Ldn of about 69 dB. It is understood that, in the near future, Fort Weaver Road makai of Hanakahi Street will be widened. This will, of course, change the existing setback distances, as well as possibly changing other parameters used in noise prediction such as speed, vehicle mix, topography, etc. Assuming that the future condition for this segment of Fort Weaver Road is the same as the existing condition of the road mauka of the Project Access Road 'A', the future 65 dB Ldn contour line is estimated to be at a distance of about 225 feet from the centerline of the roadway, i.e., 135 feet further away from its existing location of 90 feet, regardless of the project development. At locations mauka of the Project Access Road 'A', the future 65 dB Ldn contour line is estimated to be located at a distance of about 300 feet, about 90 feet further away from the existing 210 feet location, again, regardless of the project development.

Traffic data for the interior roads are not available, except for the portion of the project access road where it intersects the highway. Assuming that the traffic volume is highest at the intersection, the proposed residences in the project are estimated to be exposed to Ldn's of about 60 dB at a distance of 100 feet from the centerline of the roadway. With a setback distance of 50 feet or more, the traffic-generated Ldn is estimated to be less than 65 dB. Note that traffic noise from Fort Weaver Road will not contribute significantly to the overall acoustical environment at any of the residences within the project.

- 5.3. Sugar Cane Operations -- The primary source of noise generated by sugar cane activities is the equipment used during the cane harvesting and land preparation. Typically, sugar cane fields are harvested every two years. The equipment involved operates 24 hours per day and includes bulldozers (push rakes) and clam-shell cranes loading trucks. Land preparation for planting occurs typically every six years and involves a sequence of operations such as harrowing, plowing, leveling, and stone removal.

According to the State Department of Health (DOH)'s Community Noise Control for Oahu (Title 11, Chapter 43) [Reference 11], sugar cane operations are allowed to generate 70 dBA for 10% of the time in any 20-minute period at the property line. However, the regulations also allow conditional permits for agricultural field preparation and harvesting as long as 95 dBA is not exceeded at the property line.

The nearest portion of the existing sugar cane field which will remain in the vicinity of the project site is located adjacent to the northern property line of the project, and is located at a minimum distance of about 2500' from the nearest noise sensitive area. It is estimated that, at such distances, the sugar cane operations would generate noise levels typically less than 55 dBA during periods of heavy activity (harvesting and land preparation). Although a noise level of 55 dBA may be intrusive during the nighttime hours when the ambient levels drop considerably, the noise generated by sugar cane operations is not expected to cause any significant overall impact because of their infrequent occurrence (only a few days every two to six years).

Thus, the field operations of land preparation every six years and harvesting every two years should not cause any change in the annual average Ldn at the proposed noise sensitive areas. It should also be noted that there are no major cane haul roads in the vicinity of the proposed noise sensitive areas.

6. PRELIMINARY NOISE IMPACT MITIGATION MEASURES

In order to comply with the aircraft noise standard and recommended guidelines and to minimize any annoyance caused by aircraft events, the preliminary mitigation measures described below should be implemented. Note that these are only preliminary recommendations since the precise layout of the development and relevant architectural drawings are not yet available.

- 6.1 All accommodation spaces within the health lodging and the hotel buildings should be air-conditioned to enable building windows to be kept closed and, thus, minimize noise intrusion. Without air-conditioning, the HUD's interior goal of 45 dB Ldn is not expected to be met at these locations. Air-conditioning should be considered at other noise sensitive spaces within these transient lodging areas such as offices and meeting rooms.
- 6.2 In order to minimize speech and sleep interference, air-conditioning should also be considered at the residential areas within the condominium buildings. Without air-conditioning, it will be difficult to achieve the HUD's interior goal of 45 dB Ldn in these areas.
- 6.3 Air-conditioning of the golf course clubhouse should provide a more acoustically comfortable environment (particularly if the clubhouse is used for any meetings, banquets, or instructional gatherings). It is understood that there are no residential quarters involved with the proposed golf course.

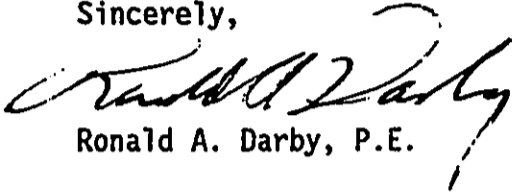
HASEKO (HAWAII), Inc.
January 19, 1991

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* * *

This concludes our final version of the environmental noise impact assessment on the subject project. Please feel free to call us should you have any questions or comments.

Sincerely,



Ronald A. Darby, P.E.



Mike S. Lee

MSL;RAD:msl

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TABLE 1. SUMMARY OF DAY-NIGHT AVERAGE SOUND LEVELS, Ldn.

LOCATION	NOISE SOURCE	Ldn (dB)	REMARKS
MIXED USE	HNL	50-53	HNL Ldn CONTOUR MAP
	NASBP	55-67	NASBP AICUZ
	COMBINED	55-67	NASBP AICUZ
	COMBINED	52-68	ESTIMATED Ldn FOR THE TWO DAY MEASUREMENT PERIOD USING THE MEASURED DATA
GOLF COURSE	HNL	50-53	HNL Ldn CONTOUR MAP
	NASBP	45-67	NASBP AICUZ
	COMBINED	55-71	NASBP AICUZ
	COMBINED	50-68	ESTIMATED Ldn FOR THE TWO DAY MEASUREMENT PERIOD USING THE MEASURED DATA

TABLE 2. SUMMARY OF THE MEASUREMENT RESULTS

POS. TYPE	POS. NO. (TOTAL AIRC. EVENTS)	AIRCRAFT CATEGORY (NUMBER/PERCENT) *1	Lmax (dBA)		SEL (dBA)	
			TYPICAL VALUE	RANGE OF THE MEAS. VALUES	TYPICAL VALUE	RANGE OF THE MEAS. VALUES
MIXED USE	1 (42)	CIVILIAN TRANS-OCEAN (14/33%) INTERISLAND (8/19%) MILITARY AIRC. TO HNL (5/12%) MILITARY AIRC. @ NASBP (15/36%)	68-69 63-65 NA *2 NA	64-73 60-69 62-83 INAUDIBLE-81	81 76-77 NA NA	76-83 72-78 74-90 INAUDIBLE-92
	2 (39)	CIVILIAN TRANS-OCEAN (11/28%) INTERISLAND (5/13%) MILITARY AIRC. TO HNL (2/5%) MILITARY AIRC. @ NASBP (21/54%)	65-67 NA NA NA	60-74 57-63 79-85 INAUDIBLE-80	78 NA NA NA	74-85 68-73 88-93 INAUDIBLE-88
	3 (71)	CIVILIAN TRANS-OCEAN (24/34%) INTERISLAND (14/20%) MILITARY AIRC. TO HNL (5/7%) MILITARY AIRC. @ NASBP (28/39%)	66 64-65 NA NA	62-71 58-69 63-77 INAUDIBLE-104	78 75 NA NA	75-81 70-77 74-85 INAUDIBLE-108
	4 (11)	CIVILIAN TRANS-OCEAN (3/27%) INTERISLAND (6/55%) MILITARY AIRC. TO HNL (1/9%) MILITARY AIRC. @ NASBP (1/9%)	64 58 NA NA	61-65 54-61 64 *3 81 *3	74 68 NA NA	71-76 65-72 75 *3 89 *3
	5 (28)	CIVILIAN TRANS-OCEAN (9/32%) INTERISLAND (8/29%) MILITARY AIRC. TO HNL (3/11%) MILITARY AIRC. @ NASBP (8/29%)	65-66 59 NA 57-58	61-73 54-65 65 *3 51-60	77 71 NA 66-67	76-84 66-74 77 *3 62-69

*1 -- NUMBER OF EACH AIRCRAFT CATEGORY MEASURED AND/OR OBSERVED AND THE PERCENTAGE RELATIVE TO THE TOTAL NUMBER OF AIRCRAFT EVENTS FOR EACH POSITION

*2 -- NOT APPLICABLE DUE TO A LOW NUMBER OF EVENTS MEASURED AND/OR OBSERVED OR DUE TO A WIDE RANGE OF THE MEASURED VALUES

*3 -- LIMITED NUMBER OF DATA OBTAINED (LESS THAN 5)



TABLE 2. SUMMARY OF THE MEASUREMENT RESULTS (Continued)

POS. TYPE	POS. NO. (TOTAL AIRC. EVENTS)	AIRCRAFT CATEGORY (NUMBER/PERCENT) *1	Lmax (dBA)		SEL (dBA)	
			TYPICAL VALUE	RANGE OF THE MEAS. VALUES	TYPICAL VALUE	RANGE OF THE MEAS. VALUES
GOLF COURSE	6 (5)	CIVILIAN TRANS-OCEAN	NA *2	68-70 *3	NA	77-81 *3
		INTERISLAND	NA	60-62 *3	NA	72-73 *3
		MILITARY AIRC. TO HNL	NEO *4	NEO	NEO	NEO
		MILITARY AIRC. @ NASBP	NA	58	NA	66 *3
	7 (3)	CIVILIAN TRANS-OCEAN	NA	71-76 *3	NA	81-84 *3
		INTERISLAND	NA	65 *3	NA	75 *3
		MILITARY AIRC. TO HNL	NEO	NEO	NEO	NEO
		MILITARY AIRC. @ NASBP	NEO	NEO	NEO	NEO
	8 (3)	CIVILIAN TRANS-OCEAN	NEO	NEO	NEO	NEO
		INTERISLAND	NA	62-67 *3	NEO	NEO
		MILITARY AIRC. TO HNL	NA	87 *3	NA	74-76 *3
		MILITARY AIRC. @ NASBP	NEO	NEO	NEO	96 *3
	9 (16)	CIVILIAN TRANS-OCEAN	71-72	67-74	81-82	79-85
		INTERISLAND	NA	61-67 *3	NA	68-75 *3
		MILITARY AIRC. TO HNL	NA	82 *3	NA	90 *3
		MILITARY AIRC. @ NASBP	NEO	NEO	NEO	NEO
	10 (12)	CIVILIAN TRANS-OCEAN	73-74	70-75	84	81-85
		INTERISLAND	NA	69-74 *3	NA	79-81 *3
		MILITARY AIRC. TO HNL	NA	70 *3	NA	81 *3
		MILITARY AIRC. @ NASBP	NEO	NEO	NEO	NEO

*1 -- NUMBER OF EACH AIRCRAFT CATEGORY MEASURED AND/OR OBSERVED AND THE PERCENTAGE RELATIVE TO THE TOTAL NUMBER OF AIRCRAFT EVENTS FOR EACH POSITION

*2 -- NOT APPLICABLE DUE TO A LOW NUMBER OF EVENTS MEASURED AND/OR OBSERVED OR DUE TO A WIDE RANGE OF THE MEASURED VALUES

*3 -- LIMITED NUMBER OF DATA OBTAINED (LESS THAN 5)

*4 -- NO EVENT OCCURRED

TABLE 3. SUMMARY OF Ldn NOISE IMPACT ASSESSMENT AT THE RESIDENTIAL UNITS (HEALTH LODGING, HOTEL, AND CONDOMINIUM)

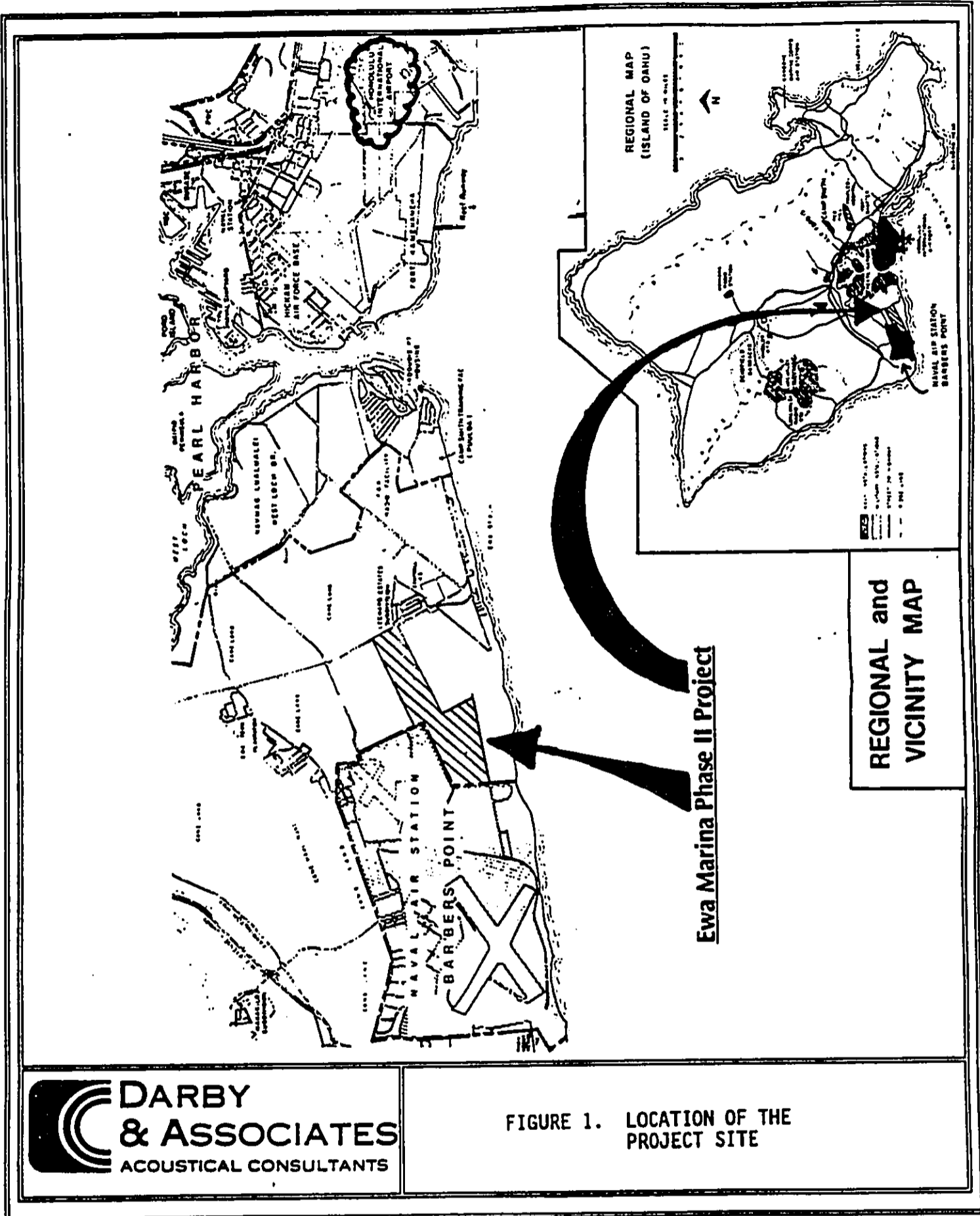
LOCATION	CASE	Ldn (dB)
HEALTH LODGING	EXTERIOR LEVEL	59-62
	INTERIOR LEVEL WITH AIR-CONDITIONING	39-42
HOTEL	EXTERIOR LEVEL	62-65
	INTERIOR LEVEL WITH AIR-CONDITIONING	42-45
CONDOMINIUM	EXTERIOR LEVEL	55-58
	INTERIOR LEVEL WITH AIR-CONDITIONING	35-38
	INTERIOR LEVEL NATURAL VENTILATION	43-53

TABLE 4
EXISTING AND FUTURE (2002) TRAFFIC NOISE LEVELS
AT SELECTED LOCATIONS

Condition	Locations (see Figure 16)					
	1	2	3	4	5	6
Existing a.m. Peak	69.8	69.8	64.4	64.4	--	--
Future a.m. Peak Without Project	71.7	71.7	69.9	69.1	59.0 *	57.6 **
Future a.m. Peak With Project	72.3	71.5	70.3	69.4	60.5	58.8
Increase in Future a.m. Peak Due to Project	0.6	-0.2	0.4	0.3	1.5	1.2
Increase in a.m. Peak Due Project and Future Traffic Growth	2.5	1.7	5.9	5.0	--	--
Existing p.m. Peak	67.8	67.8	61.9	61.9	--	--
Future p.m. Peak Without Project	70.1	70.1	68.3	67.4	57.0 *	56.4 **
Future p.m. Peak With Project	70.9	69.9	68.8	67.9	60.0	57.9
Increase in Future p.m. Peak Due to Project	0.8	-0.2	0.5	0.3	3.0	1.5
Increase in p.m. Peak Due Project and Future Traffic Growth	3.1	2.1	6.9	6.0	--	--

* -- Project Access Road 'A' of Phase I of the Ewa Marina Project; different intersection point at Fort Weaver Road than the Phase II Access Road 'A'.

** -- Project Access Road 'B' of Phase I of the Ewa Marina Project; same access road as Phase II Access Road 'B'.



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FIGURE 1. LOCATION OF THE PROJECT SITE

Ewa Marina Phase II Project

REGIONAL and VICINITY MAP

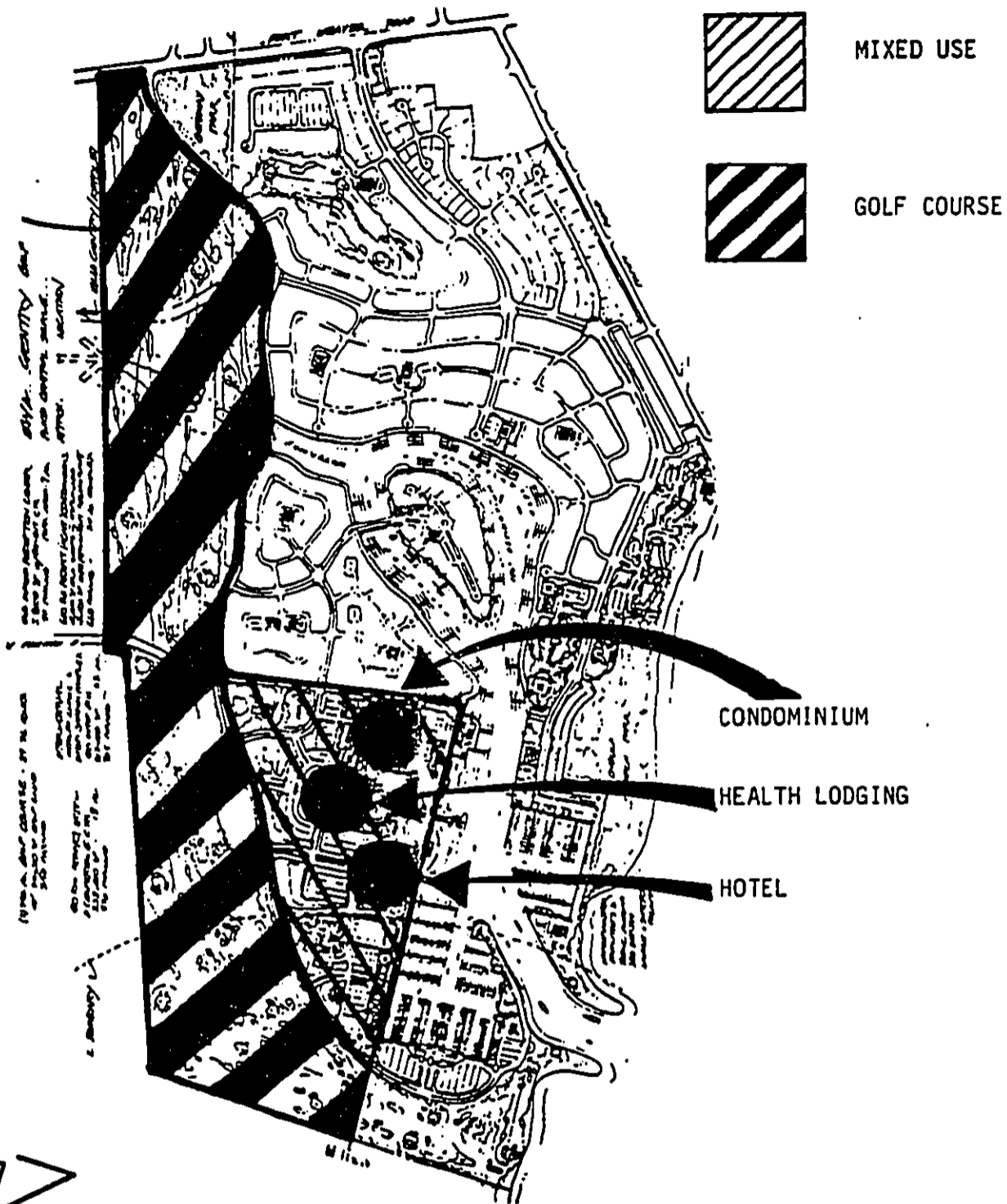
REGIONAL MAP (ISLAND OF OAHU)

SCALE: 1:50,000

N

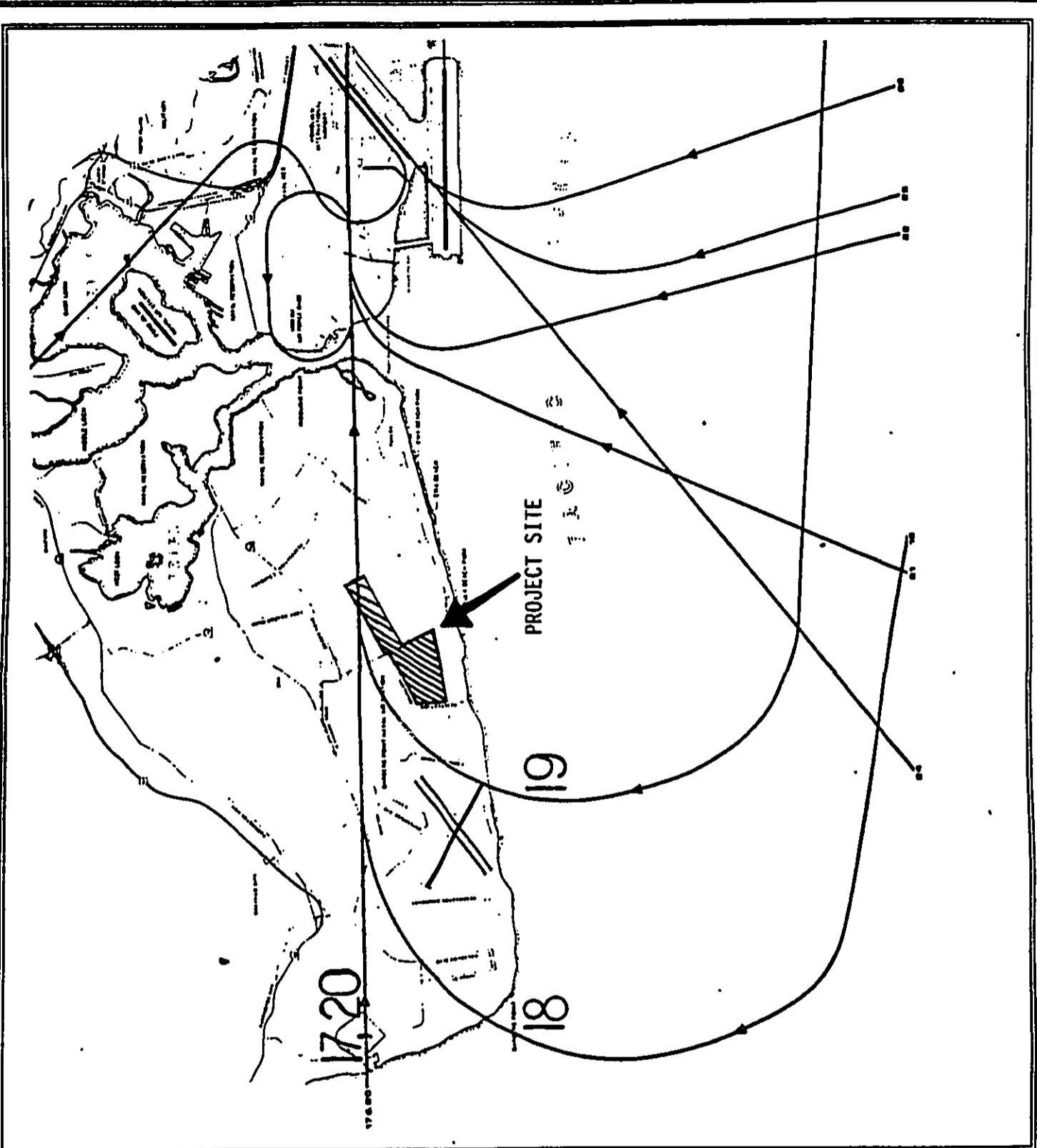
LEGEND
 - - - - - PROJECT BOUNDARY
 - - - - - EXISTING STRUCTURES
 - - - - - EXISTING ROADS
 - - - - - EXISTING UTILITIES

NAVAL AIR STATION
BARBERS POINT



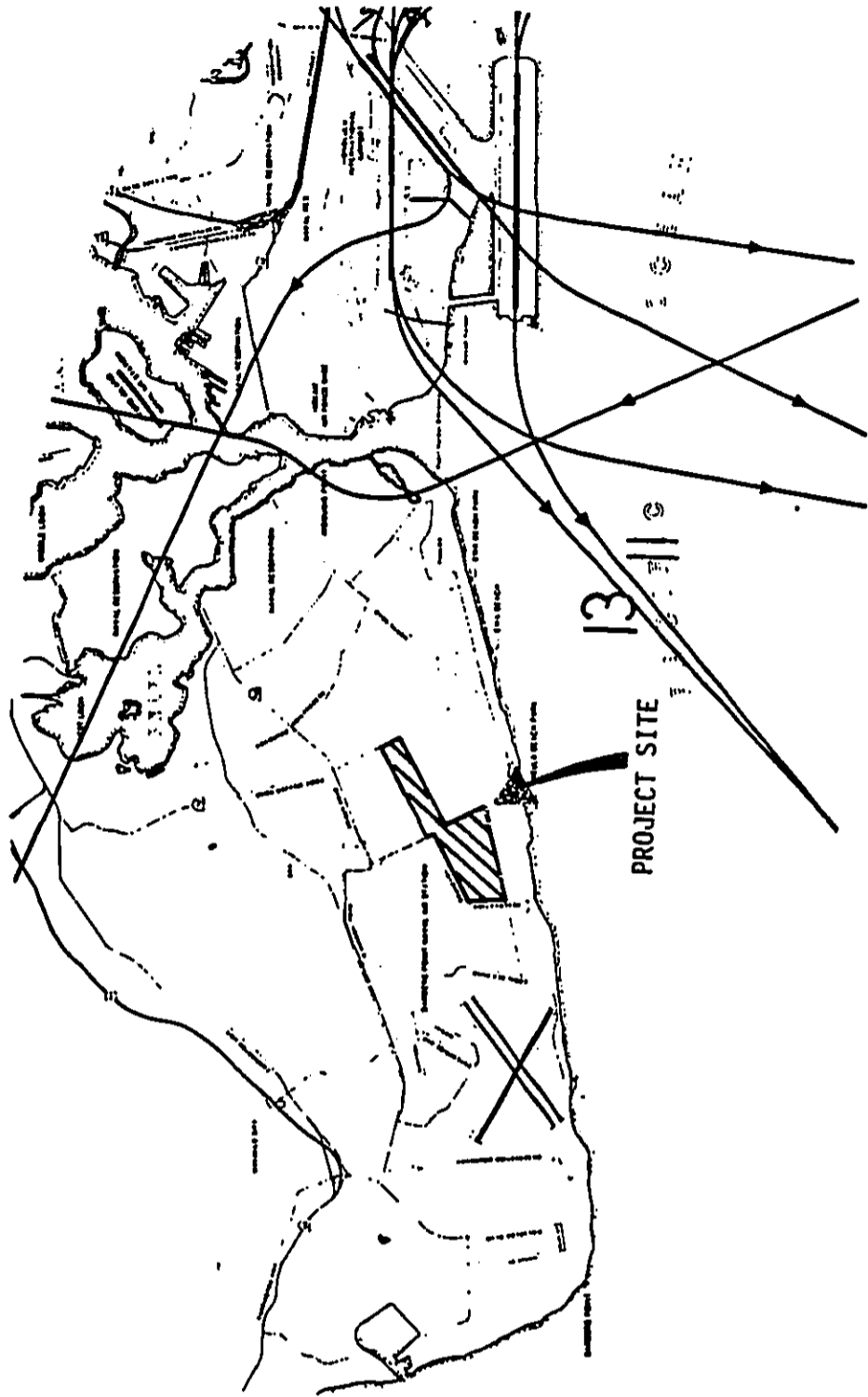
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FIGURE 2. LOCATION OF MIXED USE AND GOLF COURSE PORTION OF THE PROJECT SITE AND VARIOUS DEVELOPMENTS WITHIN THE SITES



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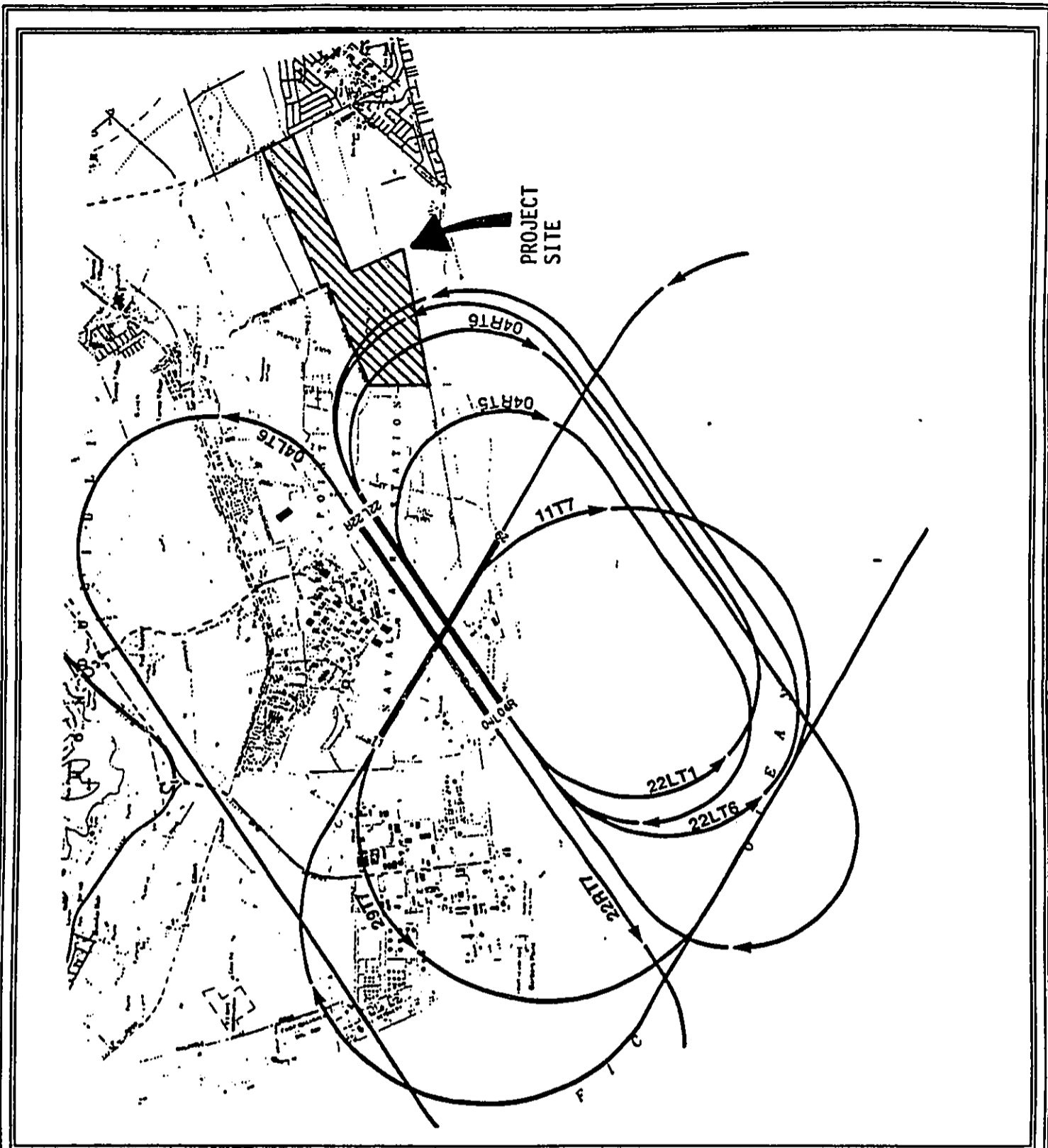
FIGURE 3. HNL ARRIVAL FLIGHT TRACKS



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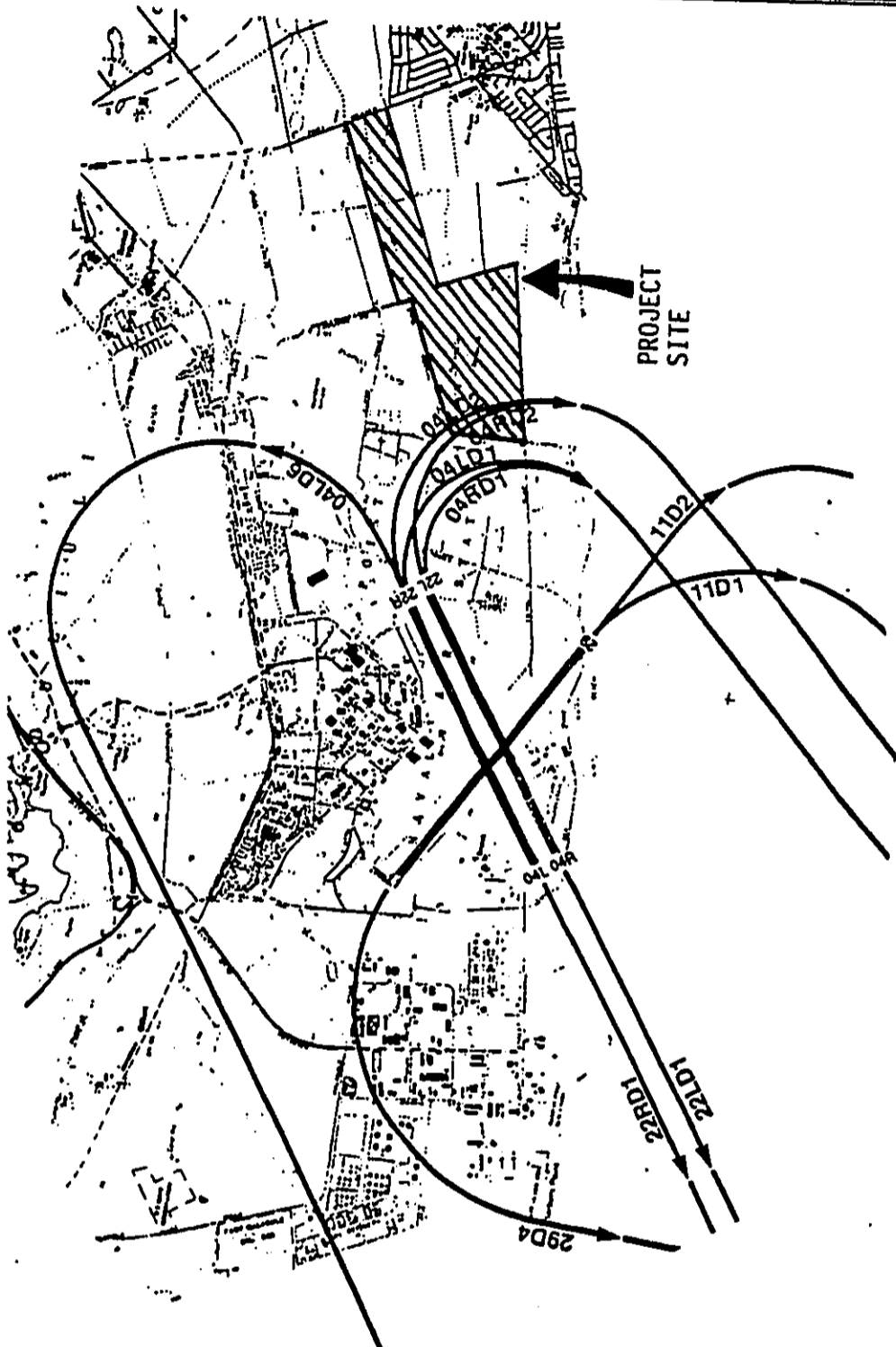
FIGURE 4. HNL DEPARTURE FLIGHT TRACKS

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



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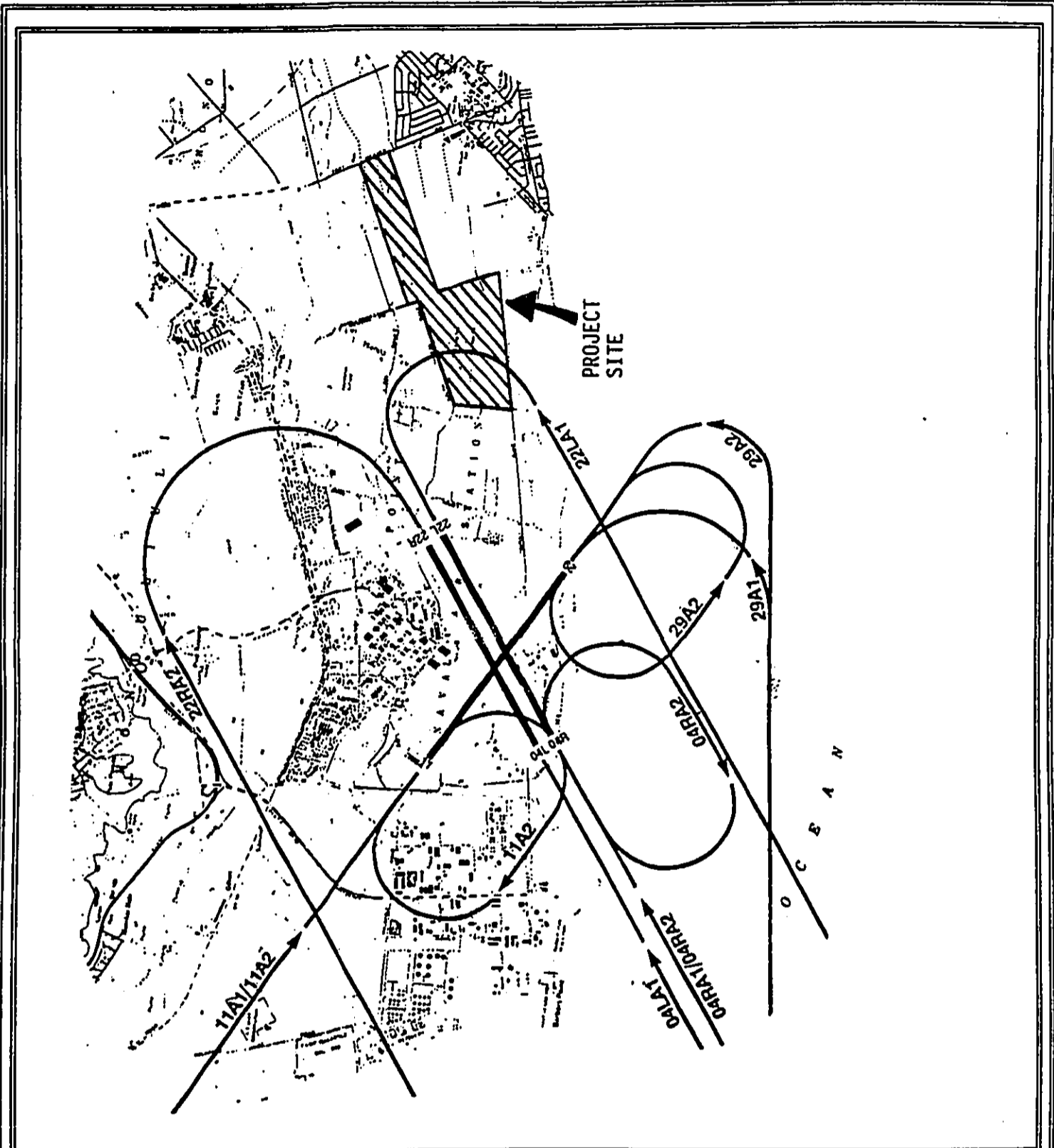
FIGURE 5. NASBP TOUCH-AND-GO FLIGHT TRACKS



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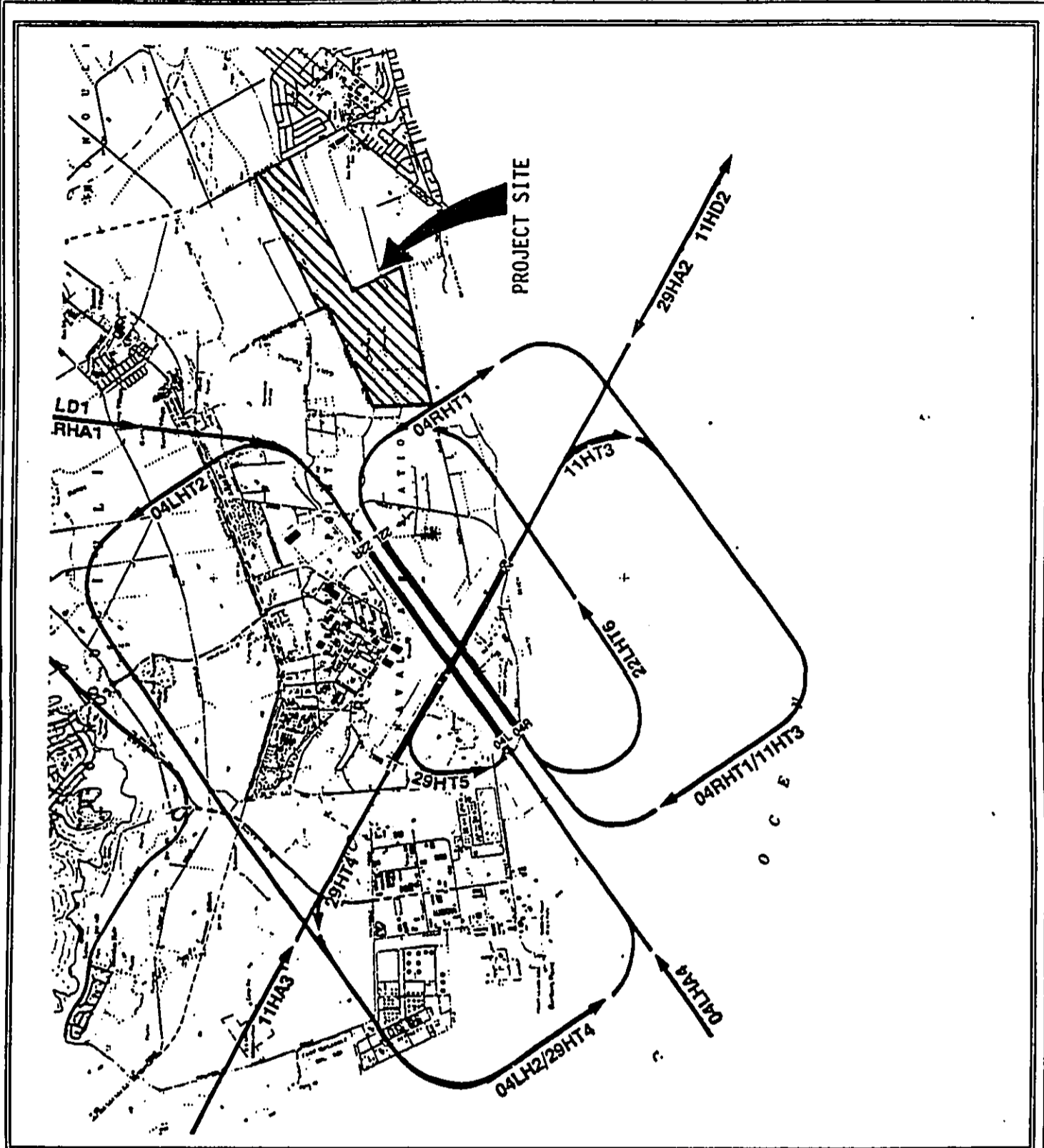
FIGURE 6. NASBP FIXED WING DEPARTURE FLIGHT TRACKS

02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



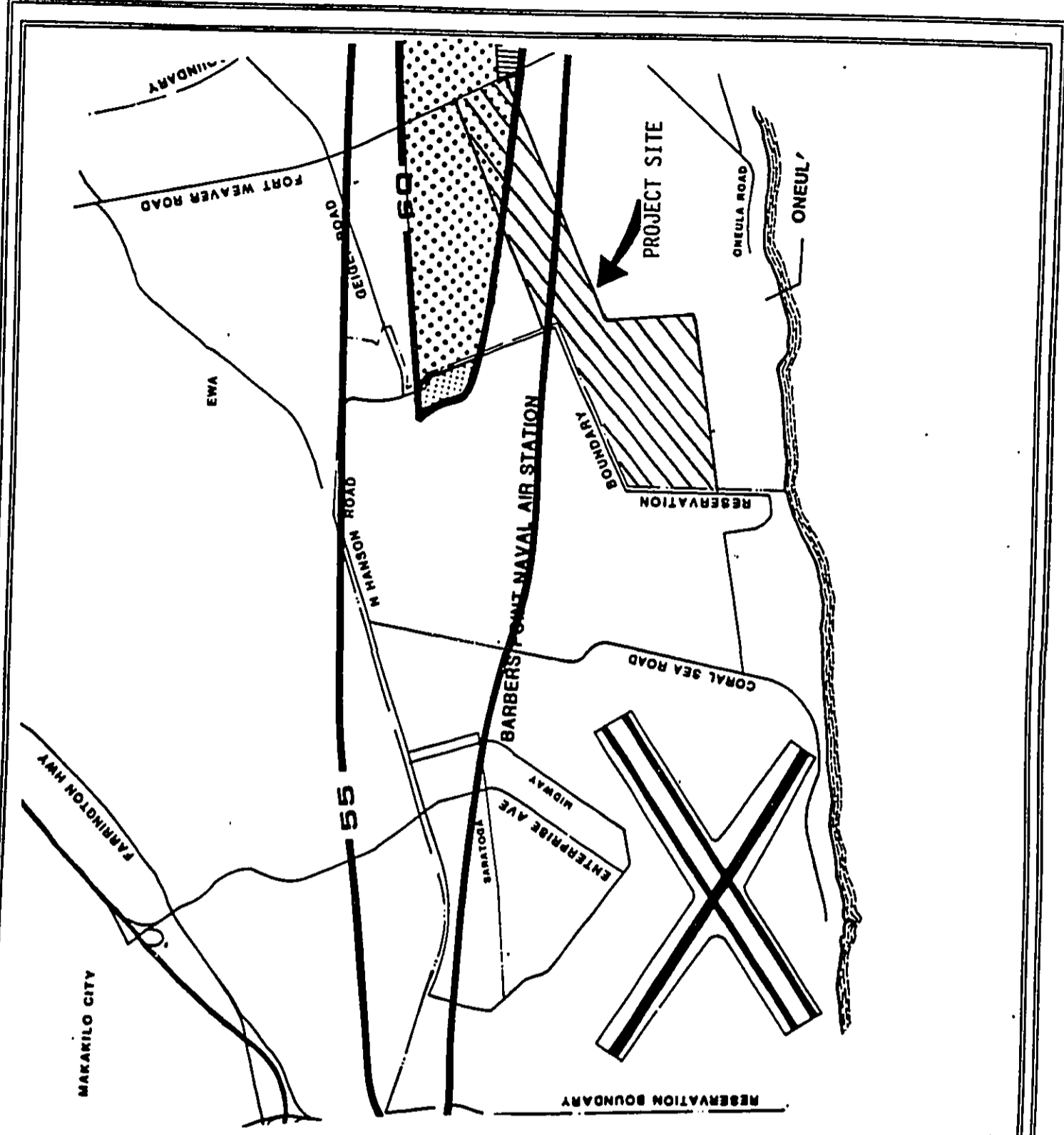

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FIGURE 7. NASBP FIXED WING
 ARRIVAL FLIGHT
 TRACKS



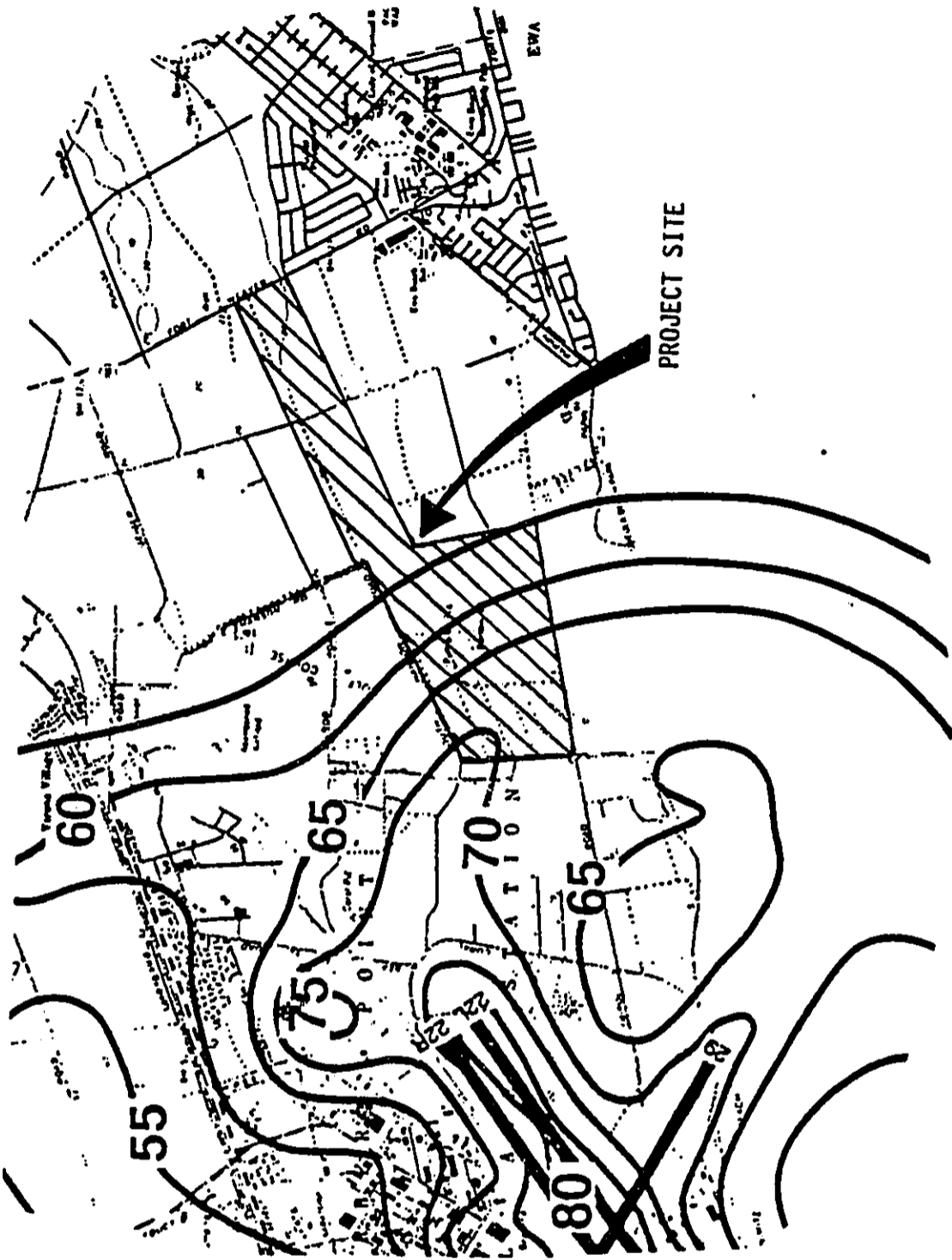
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FIGURE 8. NASBP ROTARY WING FLIGHT TRACKS



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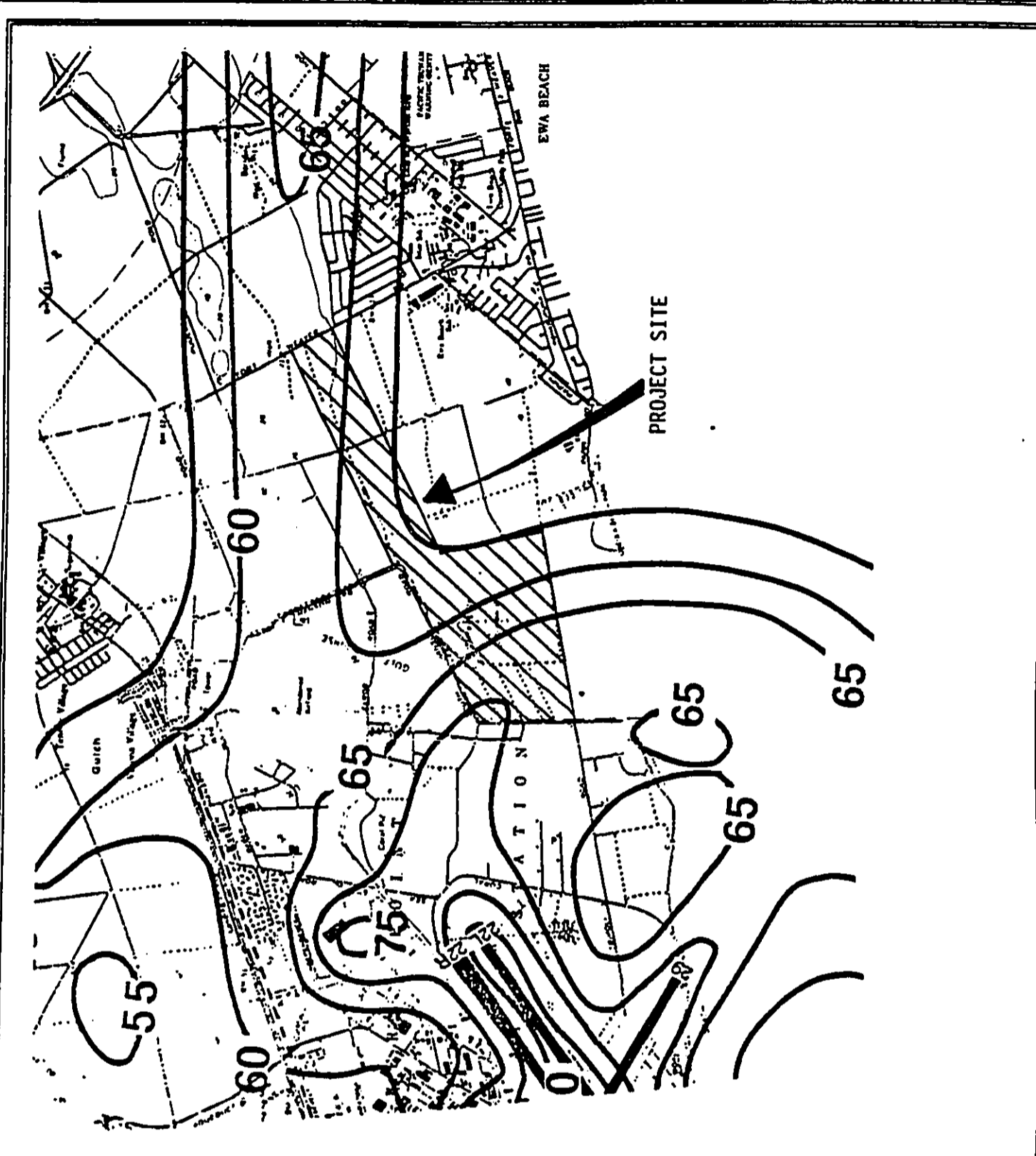
FIGURE 9. LOCATION OF THE HNL'S 55 AND 60 dB Ldn CONTOUR LINES RELATIVE TO THE PROJECT SITE



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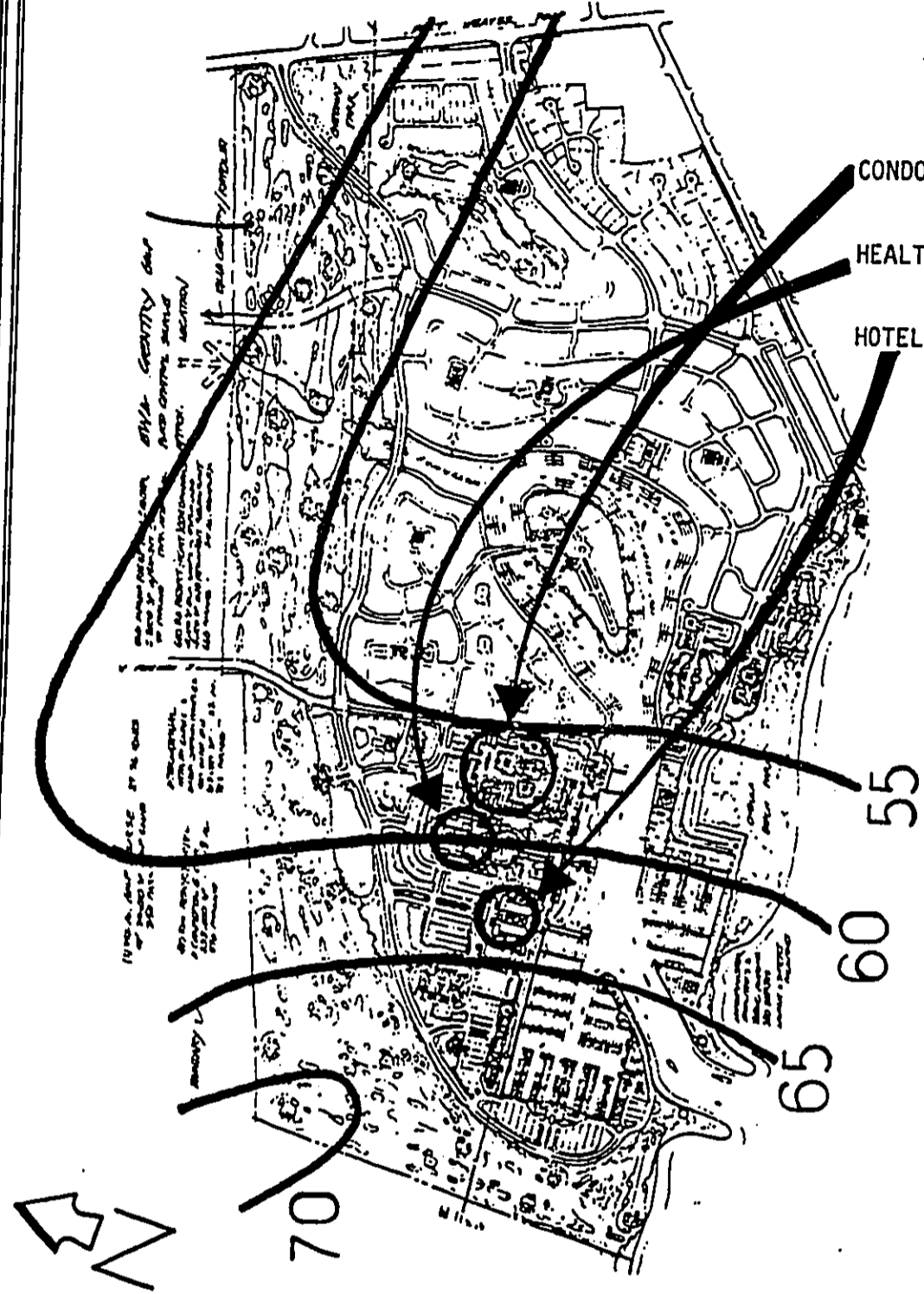
FIGURE 10. LOCATION OF THE NASBP'S Ldn CONTOUR LINES RELATIVE TO THE PROJECT SITE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



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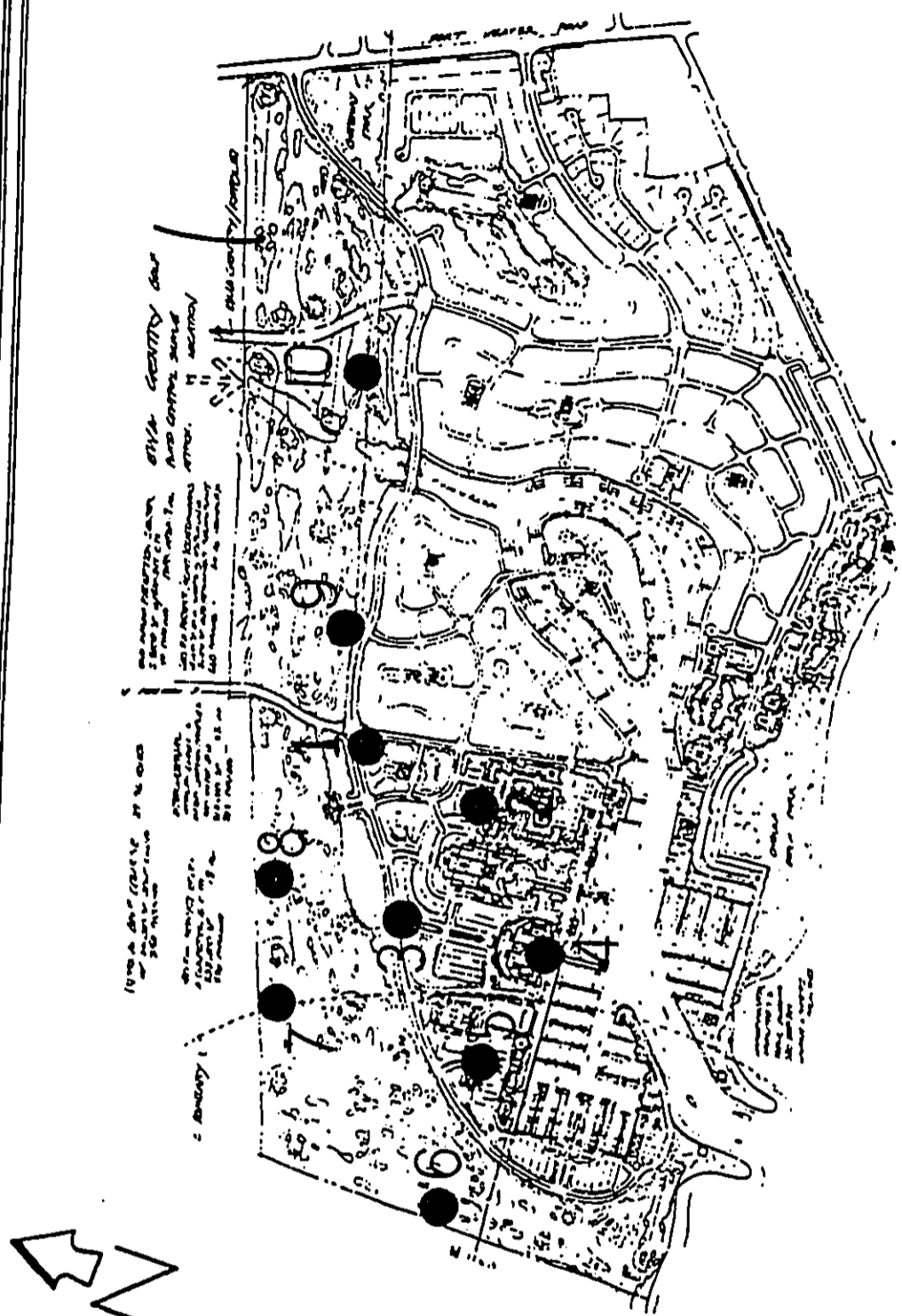
FIGURE 11. LOCATION OF THE COMBINED (HNL & NASBP) Ldn CONTOUR LINES RELATIVE TO THE PROJECT SITE



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FIGURE 12. LOCATION OF THE COMBINED (HNL & NASBP) Ldn CONTOUR LINES RELATIVE TO MIXED USE AND GOLF COURSE LOCATIONS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

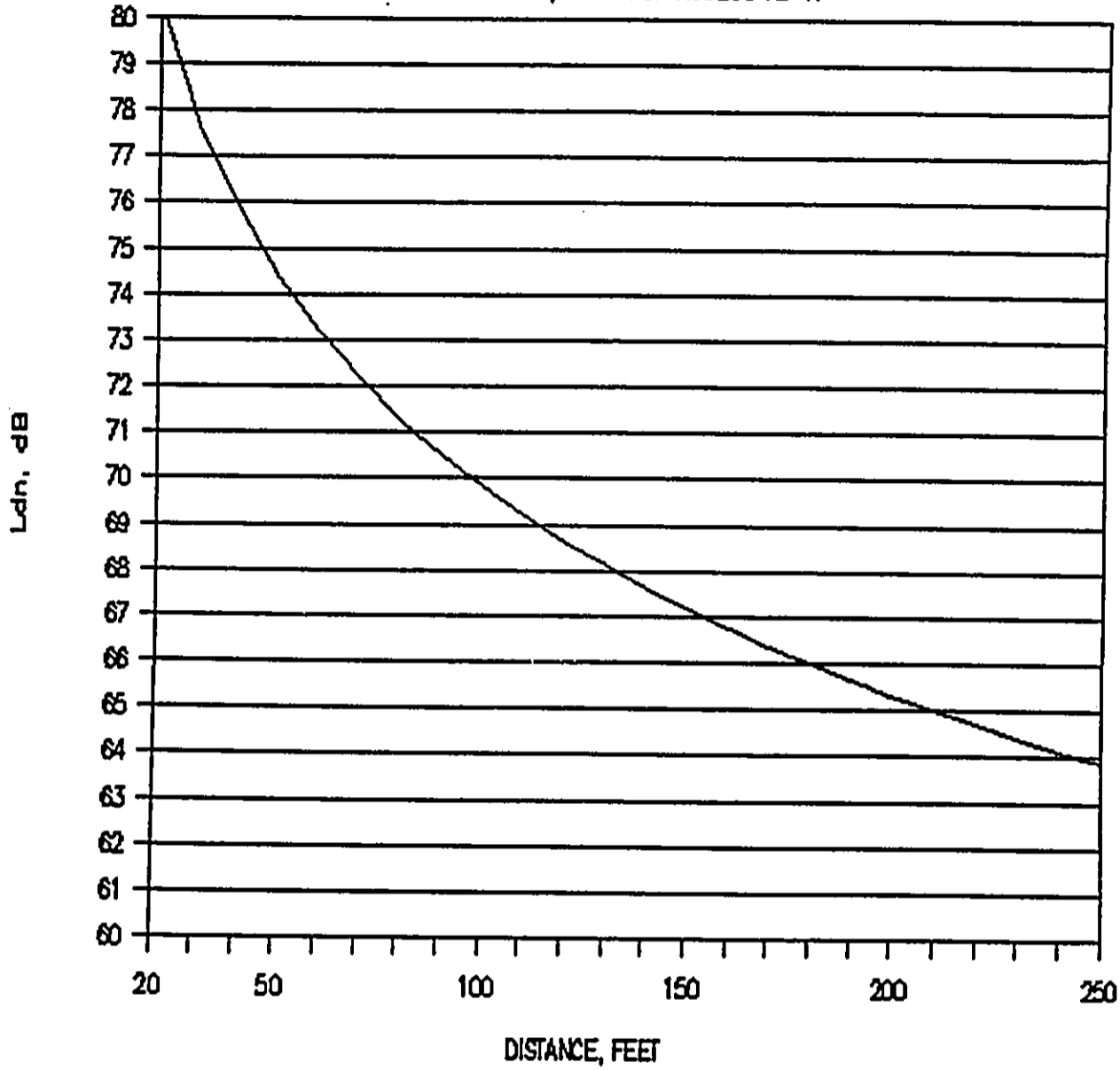



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FIGURE 13. LOCATION OF THE MEASUREMENT POSITIONS

EXISTING Ldn vs DISTANCE

FORT WEAVER RD., MAUKA OF ACCESS RD 'A'



D.L. ADAMS ASSOCIATES, LTD.

dba

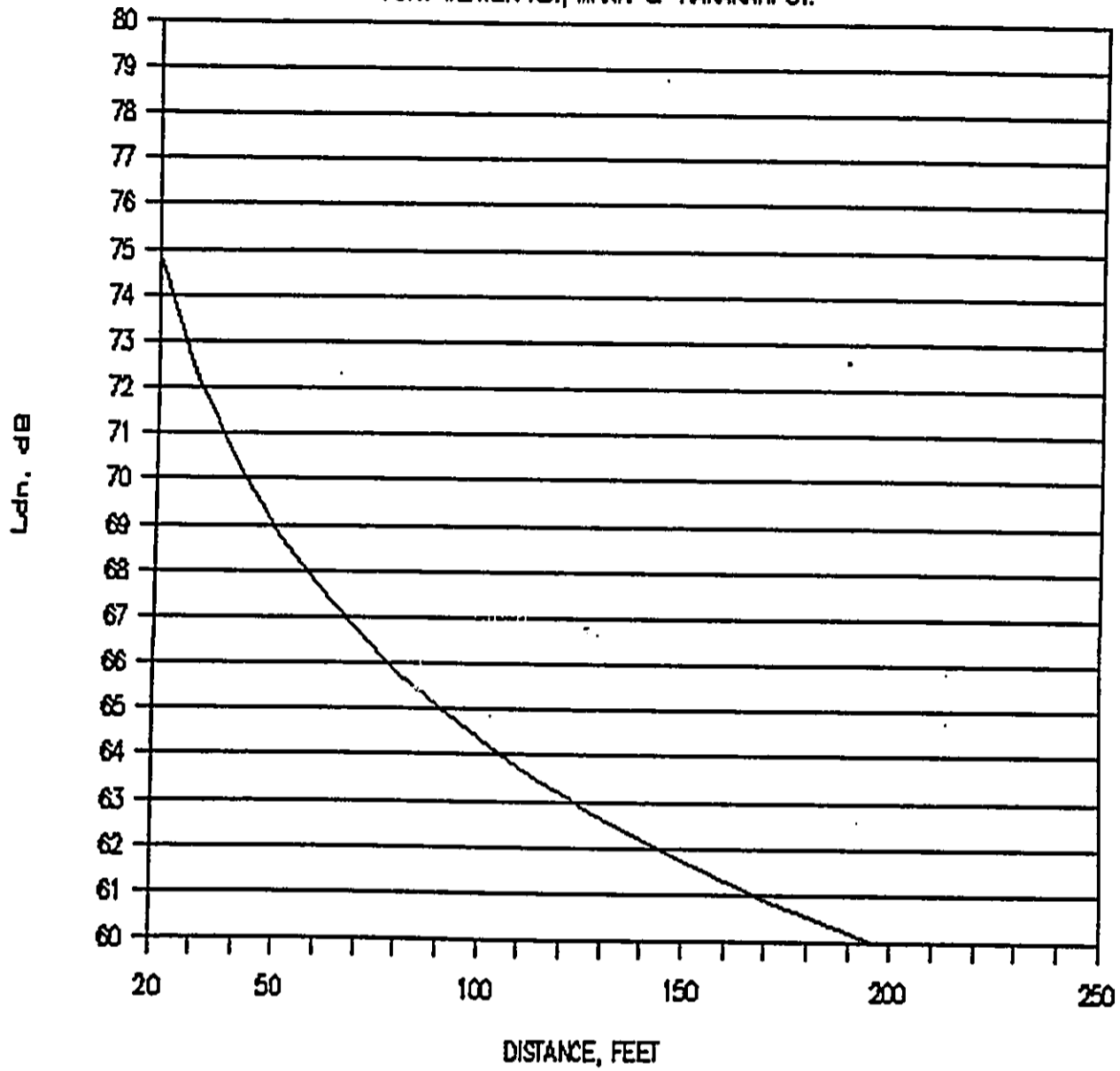


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FIGURE 14. GRAPHIC PRESENTATION OF THE EXISTING Ldn VS DISTANCE FROM THE CENTERLINE OF FORT WEAVER ROAD, MAUKA OF THE PROJECT ACCESS ROAD 'A'.

EXISTING Ldn vs DISTANCE

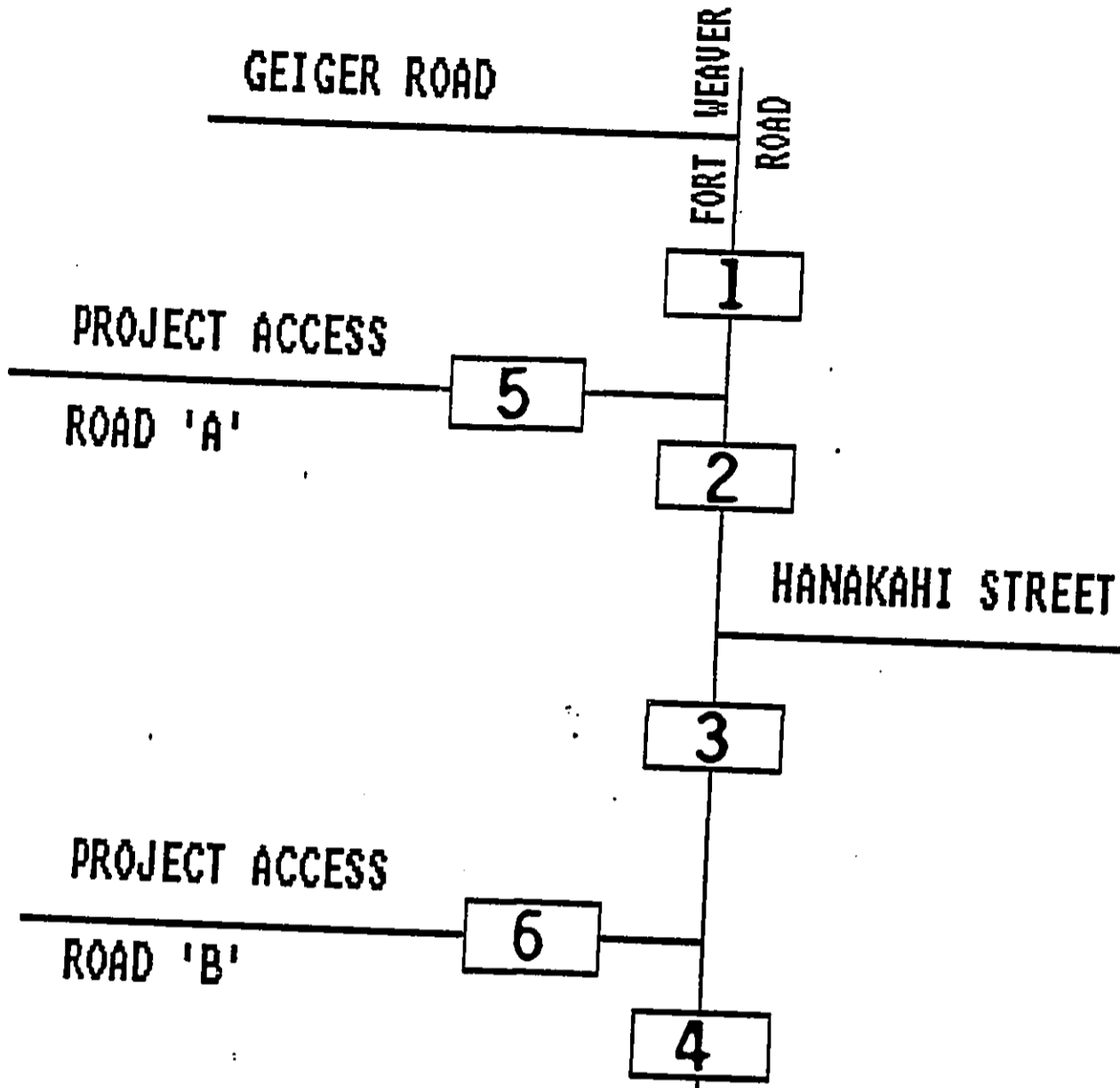
FORT WEAVER RD., MAKAI OF HANAKAHI ST.



D.L. ADAMS ASSOCIATES, LTD.
dba

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FIGURE 15. GRAPHIC PRESENTATION OF THE EXISTING Ldn VS DISTANCE FROM THE CENTERLINE OF FORT WEAVER ROAD, MAKAI OF HANAKAHI ST.



D.L. ADAMS ASSOCIATES, LTD.
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FIGURE 16. IDENTIFICATION OF THE SEGMENTS OF THE ROADWAYS SELECTED FOR TRAFFIC NOISE CALCULATIONS

12 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

ENCLOSURE 1

DAILY ANNUAL AVERAGE NUMBER OF FLIGHT ACTIVITIES

HNL

AVERAGE DAILY AIRCRAFT DEPARTURES BY FLIGHT TRACK



AIRCRAFT	DAY/NIGHT	TOTAL	FLIGHT TRACKS															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
B747-100	DAY	8.00	4.72	2.40										0.28				
	NIGHT	2.13	1.28	0.62										0.08				0.60
B747-200	DAY	15.95	6.54	7.66										0.93				
	NIGHT	7.16	1.86	4.51										0.56				
B747SP	NIGHT	0.20	0.18											0.02				
DC10-10	DAY	14.96	13.31															
	NIGHT	10.40	6.66	2.60													0.34	1.30
DC10-30	DAY	11.02	9.04	0.77													0.16	0.68
	NIGHT	2.42	2.15															1.10
CONCORDE	DAY	0.02	0.02															
B757	DAY	0.02	0.02															
B727-100	DAY	0.17																
	NIGHT	0.45						0.15										
B707-320	DAY	0.38						0.40										
L1011-5	DAY	2.89	2.57					0.34										
L1011	DAY	5.54	4.93															
DC8-60	DAY	2.97	2.64															
DC8-70	DAY	0.06	0.05															
YS11	DAY	34.26																
	NIGHT	4.23																
F28	DAY	6.60																
	NIGHT	0.82																
B737	DAY	58.97	2.95															
	NIGHT	11.18	0.67															
DHC7	DAY	31.47																
DC9-10	DAY	15.80	1.90															
	NIGHT	1.56	0.23															
DC9-50	DAY	29.63	3.85															
	NIGHT	3.66	0.51															
DC9-80	DAY	11.86	1.42															
	NIGHT	1.17	0.18															
DHC6	DAY	23.18																
	NIGHT	7.32																
BEECH 58	DAY	40.16																
CESS. COND. II	DAY	107.3																
GA SINGLE PROP	DAY	17.61																
GA TURBO FAN	DAY	1.46																
GA TURBO JET	DAY	2.38																
CL600	DAY	0.23																
C-130	DAY	2.90	0.87	0.84	0.87													
	NIGHT	0.72	0.17	0.48														
C-141	DAY	7.38	1.62	4.95														
	NIGHT	3.47	0.76	2.33														
KC-135	DAY	3.37	0.74	2.26														
	NIGHT	0.21	0.05	0.14														
C-5A	DAY	1.55	0.69	0.69														
	NIGHT	0.39	0.17	0.17														
KC-10	DAY	0.21	0.09	0.09														
	NIGHT	0.01	0.01															
F-4	DAY	4.41	0.66	0.97	2.29													
F-15	DAY	3.47	0.31	0.76	2.01													
A-7	DAY	0.47	0.21	0.21														
P-3	DAY	0.84																

NAS BARBERS POINT
TOUCH AND GO OPERATIONS BY FIXED WING AIRCRAFT
MEAN YEAR WITHOUT TACAMO

RUNWAY	TRACK	AIRCRAFT	OPERATIONS		RUNWAY TOTAL	
			DAY	NIGHT	DAY	NIGHT
04L	04T6	C130	3.508	0.408		
04L	04T6	P3	48.876	5.688		
04L	04T6	C135	0.348	0.048		
04L	04T6	F4	0.046	0.000		
04L	04T6	A4	0.180	0.000	52.958	6.144
04R	04T5	C130	0.628	0.154		
04R	04T5	P3	8.746	2.136		
04R	04T5	F4	0.438	0.000		
04R	04T5	A10	0.144	0.000		
04R	04T5	F15	1.804	0.000		
04R	04T5	A4	1.696	0.324		
04R	04T6	C130	1.256	0.306		
04R	04T6	P3	17.492	4.270		
04R	04T6	C135	3.438	0.960		
04R	04T6	F4	0.438	0.000		
04R	04T6	A10	0.144	0.000		
04R	04T6	F15	1.804	0.000		
04R	04T6	A4	1.696	0.324	39.724	8.474
11	11T7	C130	0.512	0.010		
11	11T7	P3	7.120	0.144		
11	11T7	C135	0.728	0.000		
11	11T7	F4	0.172	0.000		
11	11T7	A4	0.674	0.000	9.206	0.154
22L	22T1	C130	0.134	0.010		
22L	22T1	P3	1.858	0.150		
22L	22T1	F4	0.046	0.000		
22L	22T1	A4	0.182	0.022		
22L	22T6	C130	0.296	0.022		
22L	22T6	P3	3.718	0.302		
22L	22T5	F4	0.046	0.000		
22L	22T5	A4	0.182	0.022	6.462	0.528
22R	22T7	C130	0.462	0.008		
22R	22T7	P3	6.438	0.102		
22R	22T7	F4	0.020	0.000		
22R	22T7	A4	0.088	0.014	7.008	0.124
29	29T7	C130	0.138	0.012		
29	29T7	P3	1.924	0.152		
29	29T7	C135	0.064	0.000		
29	29T7	F4	0.014	0.000		
29	29T7	A4	0.046	0.000	2.186	0.164

NAS BARBERS POINT
DEPARTURES BY FIXED WING AIRCRAFT
MEAN YEAR WITHOUT TACAMO

RUNWAY	TRACK	AIRCRAFT	OPERATIONS		RUNWAY TOTAL	
			DAY	NIGHT	DAY	NIGHT
04L	04D1	C130	0.130	0.017		
04L	04D1	F4	0.002	0.000		
04L	04D1	A4	0.019	0.000		
04L	04D1	P3	0.578	0.076		
04L	04D2	C130	0.389	0.051		
04L	04D2	F4	0.007	0.000		
04L	04D2	A4	0.058	0.000		
04L	04D2	P3	1.732	0.229		
04L	04D2	C135	0.007	0.002		
04L	04D6	C130	0.130	0.017		
04L	04D6	F4	0.002	0.000		
04L	04D6	A4	0.019	0.000	3.073	0.392
04R	04D1	C130	0.162	0.022		
04R	04D1	F4	0.059	0.000		
04R	04D1	A10	0.273	0.000		
04R	04D1	F15	0.113	0.000		
04R	04D1	A4	0.443	0.022		
04R	04D1	P3	0.578	0.076		
04R	04D2	C130	0.488	0.065		
04R	04D2	F4	0.177	0.000		
04R	04D2	A10	0.819	0.000		
04R	04D2	F15	0.339	0.000		
04R	04D2	A4	1.330	0.066		
04R	04D2	P3	1.732	0.229		
04R	04D2	C135	0.075	0.050	6.588	0.530
11	11D1	C130	0.896	0.095		
11	11D1	F4	0.052	0.000		
11	11D1	A4	0.385	0.011		
11	11D1	P3	3.189	0.338		
11	11D2	F4	0.052	0.000		
11	11D2	A4	0.385	0.011		
11	11D2	C135	0.089	0.006	5.048	0.461
22L	22D1	C130	0.300	0.084		
22L	22D1	F4	0.043	0.000		
22L	22D1	A4	0.324	0.039		
22L	22D1	P3	1.070	0.298		
22L	22D1	C135	0.003	0.000	1.740	0.421
22R	22D1	C130	0.300	0.084		
22R	22D1	P3	1.070	0.298		
22R	22D1	C135	0.003	0.000	1.373	0.382
29	29D4	C130	0.040	0.002		
29	29D4	P3	0.141	0.007		
29	29D4	F4	0.009	0.000		
29	29D4	A4	0.066	0.004	0.256	0.013

NAS BARBERS POINT
ARRIVALS BY FIXED WING AIRCRAFT
MEAN YEAR WITHOUT TACAMO

RUNWAY	TRACK	AIRCRAFT	OPERATIONS		RUNWAY TOTAL	
			DAY	NIGHT	DAY	NIGHT
04L	04A1	C130	1.027	0.260		
04L	04A1	F4	0.031	0.000		
04L	04A1	A4	0.235	0.000		
04L	04A1	P3	3.658	0.924		
04L	04A1	C135	0.012	0.002	4.963	1.186
04R	04A1	C130	1.027	0.260		
04R	04A1	F4	0.048	0.000		
04R	04A1	A4	0.355	0.131		
04R	04A1	P3	3.658	0.924		
04R	04A1	C135	0.138	0.053		
04R	04A2	F4	0.237	0.000		
04R	04A2	A10	1.094	0.000		
04R	04A2	F15	0.452	0.000		
04R	04A2	A4	1.769	0.033	8.778	1.401
11	11A1	C130	0.247	0.007		
11	11A1	F4	0.008	0.000		
11	11A1	A4	0.055	0.000		
11	11A1	P3	0.880	0.023		
11	11A1	C135	0.028	0.000		
11	11A2	F4	0.042	0.000		
11	11A2	A4	0.314	0.000	1.574	0.030
22L	22A2	C130	0.188	0.012		
22L	22A2	F4	0.015	0.000		
22L	22A2	A4	0.117	0.000		
22L	22A2	P3	0.668	0.041	0.988	0.053
22R	22A2	C130	0.188	0.012		
22R	22A2	F4	0.015	0.000		
22R	22A2	A4	0.117	0.000		
22R	22A2	P3	0.668	0.041	0.988	0.053
29	29A1	C130	0.040	0.006		
29	29A1	A4	0.012	0.003		
29	29A1	P3	0.145	0.012		
29	29A2	F4	0.004	0.000		
29	29A2	A4	0.034	0.010	0.235	0.031

NAS BARBERS POINT
HELICOPTER OPERATIONS
MEAN YEAR WITHOUT TACAMO

RWYWAY	TRACK	AIRCRAFT	OPERATIONS		RWYWAY TOTAL	
			DAY	NIGHT	DAY	NIGHT
04L	04HA4	SH2	1.886	0.655		
04L	04HA4	H60	0.241	0.062		
04L	04HA4	H53	0.239	0.083		
04L	04HA4	CH47	1.586	0.405		
04L	04HA4	HH65	1.508	0.386		
04L	04HA4	H1/OH58	0.594	0.153		
04L	04HD1	SH2	1.473	0.556		
04L	04HD1	H60	0.256	0.068		
04L	04HD1	H53	0.186	0.070		
04L	04HD1	CH47	1.683	0.437		
04L	04HD1	HH65	1.600	0.416		
04L	04HD1	H1/OH58	0.632	0.164		
04L	04HT2	SH2	4.960	1.062		
04L	04HT2	H60	0.366	0.070		
04L	04HT2	H53	0.644	0.120		
04L	04HT2	CH47	2.396	0.464		
04L	04HT2	HH65	2.328	0.442		
04L	04HT2	H1/OH58	0.898	0.174	23.478	5.787
04R	04HT1	SH2	15.566	4.288		
04R	04HT1	H60	1.336	0.302		
04R	04HT1	H53	1.940	0.362		
04R	04HT1	CH47	8.772	3.308		
04R	04HT1	HH65	8.338	3.142		
04R	04HT1	H1/OH58	3.292	1.242	39.244	13.044
11	11HA3	SH2	0.569	0.027		
11	11HA3	H60	0.031	0.001		
11	11HA3	H53	0.072	0.003		
11	11HA3	CH47	0.207	0.003		
11	11HA3	HH65	0.196	0.004		
11	11HA3	H1/OH58	0.077	0.001		
11	11HD2	SH2	0.990	0.136		
11	11HD2	H60	0.070	0.006		
11	11HD2	H53	0.125	0.018		
11	11HD2	CH47	0.462	0.039		
11	11HD2	HH65	0.438	0.037		
11	11HD2	H1/OH58	0.273	0.014		
11	11HT3	SH2	3.932	0.150		
11	11HT3	H60	0.126	0.020		
11	11HT3	H53	0.496	0.020		
11	11HT3	CH47	0.836	0.138		
11	11HT3	HH65	0.814	0.130		
11	11HT3	H1/OH58	0.314	0.030	9.928	0.797
22R	22HA1	SH2	0.323	0.091		
22R	22HA1	H60	0.093	0.015		
22R	22HA1	H53	0.065	0.012		
22R	22HA1	CH47	0.618	0.102		
22R	22HA1	HH65	0.586	0.097		
22R	22HA1	H1/OH58	0.231	0.039		
22R	22HD4	SH2	0.443	0.081		
22R	22HD4	H60	0.040	0.004		
22R	22HD4	H53	0.055	0.010		
22R	22HD4	CH47	0.267	0.029		
22R	22HD4	HH65	0.234	0.028		
22R	22HD4	H1/OH58	0.101	0.011	3.276	0.519
22L	22HT6	SH2	6.804	1.778		
22L	22HT6	H53	0.860	0.224	7.664	2.002
29	29HA2	SH2	0.095	0.019		
29	29HA2	H60	0.003	0.001		
29	29HA2	H53	0.012	0.002		
29	29HA2	CH47	0.019	0.008		
29	29HA2	HH65	0.018	0.007		
29	29HA2	H1/OH58	0.008	0.003		
29	29HD3	SH2	0.166	0.019		
29	29HD3	H60	0.003	0.002		
29	29HD3	H53	0.020	0.002		
29	29HD3	CH47	0.017	0.015		
29	29HD3	HH65	0.015	0.014		
29	29HD3	H1/OH58	0.007	0.006		
29	29HT4	SH2	2.134	0.326		
29	29HT4	H60	0.042	0.000		
29	29HT4	H53	0.268	0.040		
29	29HT4	CH47	0.284	0.000		
29	29HT4	HH65	0.274	0.000		
29	29HT4	H1/OH58	0.106	0.000		
29	29HT5	SH2	15.144	3.958		
29	29HT5	H53	1.916	0.494	20.551	4.916

ENCLOSURE 2

The following is an excerpt from the Informal Runway Use program and Noise Abatement Procedures for Honolulu Airport (Reference 6.):

Between 7:00 pm and 7:00 am HST. All heavy and large aircraft shall utilize runways 4R/L. Large aircraft 3 engines or less may use runway 8L upon pilot request or to facilitate traffic between 7 pm and 10 pm only, a channel visual approach shall be used. Approximate radar vector patterns to be utilized are as depicted on" Figures 1.10-15 and 1.10-16. "(Straight in approaches to 8L not authorized)

When heavy aircraft request the use of runway 8L during the above periods or large aircraft request the use of 8L after 10 pm, the aircraft should be advised that the runway is noise sensitive and to advise intentions. If the pilot still elects to land on 8L, the supervisor shall document the arrival in the Daily Record of Facility Operation (7230.4).

Touch-and-go operations for large aircraft and above are authorized on runways 8R/26L only.

APPENDIX I

LISTING OF THE INSTRUMENTATION
AND
THE AIRCRAFT DATA

INSTRUMENTATION LISTING

1. Larson Davis Laboratory (LDL) Model 800B
Precision Integrating Sound Level Meters, Type 1
S/N 0486B0 600, 0385B0276
2. Bolt Beranek Newman (BBN) Model 614
Portable Noise Monitor, S/N 790713
2. ACO 1/2" Condenser Microphone 7012, S/N 8872
3. LDL 1" Condenser Microphone, S/N 2575-1111
4. GenRad 1/2" Electret Microphone, S/N 11478
5. LDL Preamplifiers, S/N 826B0448, 826B0442
6. BBN Preamplifier 368A, S/N 136
7. QUEST Calibrator, Model CA-22
S/N J-8120014, 94 dB @ 1000 Hertz

TABLE I-1. LISTING OF THE MEASURED AND/OR OBSERVED AIRCRAFT EVENTS
IN CHRONOLOGICAL ORDER

EVENT NO.	DATE	TIME	MEASUREMENT POS. NO. *1	AIRCRAFT TYPE	FLIGHT PATTERN *2	Lmax dBA	SEL dBA
1	8-14-89	11:09	3	DC-9	HNL-APPR. 8L *3	68.5	75.4
2	8-14-89	11:16	3	DC-8	HNL-APPR. 8L	66.5	77.9
3	8-14-89	11:17	3	L-1011	HNL-APPR. 8L	67.3	78.4
4	8-14-89	11:18	3	L-1011	HNL-APPR. 8L	66.8	78.8
5	8-14-89	11:20	3	DC-10	HNL-APPR. 8L	65.5	78.1
6	8-14-89	11:30	3	B-737	HNL-APPR. 8L	61.5	73.6
7	8-14-89	11:33	3	B-737	HNL-APPR. 8L	63.0	74.2
8	8-14-89	11:37	3	DC-10	HNL-APPR. 8L	62.5	75.8
9	8-14-89	11:38	3	DC-8	HNL-APPR. 8L	65.0	75.7
10	8-14-89	11:39	3	L-1011	HNL-APPR. 8L	65.9	78.5
11	8-14-89	11:40	3	B-737	HNL-APPR. 8L	63.5	74.8
12	8-14-89	11:41	3	DC-8	HNL-APPR. 8L	69.0	77.4
13	8-14-89	11:43	3	B-747	HNL-APPR. 8L	70.5	80.6
14	8-14-89	11:53	3	B-737	HNL-APPR. 8L	67.8	74.9
15	8-14-89	11:58	3	DC-9	HNL-APPR. 8L	64.5	75.0
16	8-14-89	11:59	3	DC-8	HNL-APPR. 8L	65.0	77.6
17	8-14-89	12:25	2	SH-2	BP-04RHT1 *3	80.0	87.5
18	8-14-89	12:29	2	L-1011	HNL-APPR. 8L	68.3	78.9
19	8-14-89	12:33	2	B-737	HNL-APPR. 8L	58.3	70.4
20	8-14-89	12:40	2	DC-9	HNL-APPR. 8L	58.8	71.6
21	8-14-89	12:41	2	B-747	HNL-APPR. 8L	67.8	78.3
22	8-14-89	12:44	2	DC-10	HNL-APPR. 8L	66.5	77.9
23	8-14-89	12:47	2	B-737	HNL-APPR. 8L	63.0	73.1
24	8-14-89	13:08	7	DC-10	HNL-APPR. 8L	75.8	84.4
25	8-14-89	13:20	6	P-3	BP-04RT5	58.3	65.5
26	8-14-89	13:23	6	DC-9	HNL-APPR. 8L	62.3	72.5
27	8-14-89	13:24	6	L-1011	HNL-APPR. 8L	67.8	76.6
28	8-14-89	13:25	6	B-737	HNL-APPR. 8L	59.8	72.6
29	8-14-89	13:30	6	L-1011	HNL-APPR. 8L	70.3	80.9
30	8-14-89	13:44	8	B-737	HNL-APPR. 8L	61.5	73.8
31	8-14-89	13:45	8	DH-6	HNL-APPR. 8L	66.8	75.9
32	8-14-89	13:47	NOT MEASURED	DC-10	HNL-APPR. 8L	NOT MEASURED	NOT MEASURED
33	8-14-89	13:50	8	C-5A	HNL-APPR. 8L	87.3	95.6
34	8-14-89	13:55	3	DC-10	HNL-APPR. 8L	63.8	75.8
35	8-14-89	13:58	3	DC-9	HNL-APPR. 8L	64.8	75.8
36	8-14-89	14:04	3	B-737	HNL-APPR. 8L	62.0	71.8
37	8-14-89	14:06	3	L-1011	HNL-APPR. 8L	65.5	78.9
38	8-14-89	14:16	10	DC-10	HNL-APPR. 8L	74.5	84.8
39	8-14-89	14:25	10	DC-8	HNL-APPR. 8L	70.0	82.7
40	8-14-89	14:26	10	DC-10	HNL-APPR. 8L	69.8	81.4

*1 -- REFER TO FIGURE 13 OF THE TEXT FOR THE LOCATION OF THESE MEASUREMENT POSITIONS

*2 -- REFER TO FIGURES 3 TO 8 FOR THE DESCRIPTION OF THESE FLIGHT PATTERNS

*3 -- HNL-APPR. 8L -- ARRIVAL FLIGHT TRACK 17 THROUGH 20

TABLE I-1. LISTING OF THE MEASURED AND/OR OBSERVED AIRCRAFT EVENTS
IN CHRONOLOGICAL ORDER

EVENT NO.	DATE	TIME	MEASUREMENT POS. NO. *1	AIRCRAFT TYPE	FLIGHT PATTERN *2	Lmax dBA	SEL dBA
41	8-14-89	14:30	10	DC-9	HNL-APPR. 8L *3	69.3	80.5
42	8-14-89	14:31	10	L-1011	HNL-APPR. 8L	73.8	84.9
43	8-14-89	14:33	10	DC-10	HNL-APPR. 8L	72.8	84.2
44	8-14-89	14:37	10	DC-10	HNL-APPR. 8L	72.0	83.4
45	8-14-89	14:40	10	DC-9	HNL-APPR. 8L	74.0	79.6
46	8-14-89	14:45	10	DC-9	HNL-APPR. 8L	69.3	79.3
47	8-14-89	14:47	10	L-1011	HNL-APPR. 8L	74.0	84.3
48	8-14-89	14:56	10	C-5	HNL-APPR. 8L	70.5	81.4
49	8-14-89	14:58	10	L-1011	HNL-APPR. 8L	73.5	85.1
50	8-14-89	15:10	9	DC-9	HNL-APPR. 8L	61.0	68.4
51	8-14-89	15:21	9	DC-10	HNL-APPR. 8L	67.5	78.8
52	8-14-89	15:23	9	DC-10	HNL-APPR. 8L	73.0	83.7
53	8-14-89	15:25	9	B-737	HNL-APPR. 8L	64.8	75.4
54	8-14-89	15:28	9	B-737	HNL-APPR. 8L	66.5	74.6
55	8-14-89	15:31	9	DC-10	HNL-APPR. 8L	74.0	83.8
56	8-14-89	15:32	9	DC-10	HNL-APPR. 8L	71.0	81.4
57	8-14-89	15:36	9	DC-10	HNL-APPR. 8L	71.8	81.1
58	8-14-89	15:40	9	KC-135	HNL-APPR. 8L	82.0	90.0
59	8-14-89	15:48	9	DC-10	HNL-APPR. 8L	71.5	83.3
60	8-14-89	15:54	9	DC-10	HNL-APPR. 8L	71.3	81.4
61	8-14-89	15:55	9	B-737	HNL-APPR. 8L	62.3	74.6
62	8-14-89	15:58	9	DC-10	HNL-APPR. 8L	71.8	82.3
63	8-14-89	16:00	9	DC-10	HNL-APPR. 8L	69.0	80.3
64	8-14-89	16:04	9	DC-10	HNL-APPR. 8L	71.5	81.4
65	8-14-89	16:05	9	B-747	HNL-APPR. 8L	74.0	84.9
66	8-14-89	16:15	3	L-1011	HNL-APPR. 8L	70.0	81.1
67	8-14-89	16:19	3	DC-10	HNL-APPR. 8L	64.8	74.9
68	8-14-89	16:33	4	DC-9	HNL-APPR. 8L	61.0	71.9
69	8-14-89	16:45	4	CH-47	BP-29HA2	80.8	89.1
70	8-14-89	16:50	4	B-737	HNL-APPR. 8L	58.3	67.8
71	8-14-89	16:52	4	C-5	HNL-APPR. 8L	64.3	74.9
72	8-14-89	16:54	4	B-747	HNL-APPR. 8L	64.6	76.0
73	8-14-89	16:55	4	DC-8	HNL-APPR. 8L	61.0	71.3
74	8-14-89	16:56	4	DC-9	HNL-APPR. 8L	57.5	69.3
75	8-14-89	16:57	4	DC-9	HNL-APPR. 8L	56.6	68.4
76	8-14-89	17:00	4	B-737	HNL-APPR. 8L	54.3	65.3
77	8-14-89	17:06	4	DC-10	HNL-APPR. 8L	65.0	73.6
78	8-14-89	17:07	4	B-737	HNL-APPR. 8L	58.3	68.3
79	8-14-89	17:30	NOT MEASURED	DC-10	HNL-APPR. 8L	NOT MEASURED	NOT MEASURED
80	8-14-89	17:35	NOT MEASURED	DH-7	HNL-APPR. 8L	NOT MEASURED	NOT MEASURED

*1 -- REFER TO FIGURE 13 OF THE TEXT FOR THE LOCATION OF THESE MEASUREMENT POSITIONS

*2 -- REFER TO FIGURES 3 TO 8 FOR THE DESCRIPTION OF THESE FLIGHT PATTERNS

*3 -- HNL-APPR. 8L -- ARRIVAL FLIGHT TRACK 17 THROUGH 20

TABLE I-1. LISTING OF THE MEASURED AND/OR OBSERVED AIRCRAFT EVENTS
IN CHRONOLOGICAL ORDER

EVENT NO.	DATE	TIME	MEASUREMENT POS. NO. #1	AIRCRAFT TYPE	FLIGHT PATTERN #2	Lmax dBA	SEL dBA
81	8-14-89	17:40	NOT MEASURED	DC-9	HNL-APPR. 8L *3	NOT MEASURED	NOT MEASURED
82	8-14-89	17:45	NOT MEASURED	DC-10	HNL-APPR. 8L	NOT MEASURED	NOT MEASURED
83	8-14-89	18:18	3	DC-9	HNL-APPR. 8L	66.0	76.8
84	8-14-89	18:19	3	DC-10	HNL-APPR. 8L	66.0	77.6
85	8-14-89	18:20	3	B-737	HNL-APPR. 8L	59.0	70.1
86	8-14-89	18:21	3	C-5	HNL-APPR. 8L	58.5	79.7
87	8-14-89	18:21	3	A-4	BP-11T7	53.5	59.9
88	8-14-89	18:22	3	C-5	HNL-APPR. 8L	63.3	77.3
89	8-14-89	18:24	3	A-4	BP-11T7	<= AMBIENT	<= AMBIENT
90	8-14-89	18:26	3	A-4	BP-11T7	55.0	62.6
91	8-14-89	18:34	3	DC-9	HNL-APPR. 8L	65.3	75.4
92	8-14-89	18:35	3	DC-10	HNL-APPR. 8L	64.8	76.9
93	8-14-89	18:38	3	B-737	HNL-APPR. 8L	58.8	71.1
94	8-14-89	18:44	3	B-737	HNL-APPR. 8L	59.5	70.6
95	8-14-89	19:01	3	P-3	BP-04LD6	57.8	67.6
96	8-15-89	7:07	3	B-747	HNL-APPR. 8L	65.8	79.8
97	8-15-89	7:16	3	DC-9	HNL-APPR. 8L	NOT MEASURED	NOT MEASURED
98	8-15-89	7:24	3	B-747	HNL-APPR. 8L	66.5	78.5
99	8-15-89	7:31	3	B-747	HNL-APPR. 8L	69.0	80.5
100	8-15-89	7:32	3	L-1011	HNL-APPR. 8L	63.3	76.4
101	8-15-89	7:37	2	B-747	HNL-APPR. 8L	62.8	75.9
102	8-15-89	7:52	2	P-3	BP-04LT6	NOT MEASURED	NOT MEASURED
103	8-15-89	7:56	2	P-3	BP-04LT6	55.3	63.6
104	8-15-89	8:01	2	P-3	BP-04LT6	NOT MEASURED	NOT MEASURED
105	8-15-89	8:06	2	P-3	BP-04LT6	55.8	63.0
106	8-15-89	8:10	2	P-3	BP-04LT6	57.8	65.0
107	8-15-89	8:12	2	P-3	BP-04RT5	<= AMBIENT	<= AMBIENT
108	8-15-89	8:14	2	A-4	BP-11T7	61.6	70.3
109	8-15-89	8:16	2	P-3	BP-04LT6	<= AMBIENT	<= AMBIENT
110	8-15-89	8:18	2	P-3	BP-04LD2	76.8	85.4
111	8-15-89	8:21	2	P-3	BP-04LT6	59.0	67.3
112	8-15-89	8:25	2	P-3	BP-04RT5	<= AMBIENT	<= AMBIENT
113	8-15-89	8:30	2	P-3	BP-04LT6	55.5	65.9
114	8-15-89	8:40	2	P-3	BP-04LT6	56.0	63.6
115	8-15-89	8:42	2	C-12	BP-04LD2	61.3	68.9
116	8-15-89	8:45	2	P-3	BP-04LT6	<= AMBIENT	<= AMBIENT
117	8-15-89	8:51	2	C-12	BP-04LD2	63.9	70.3
118	8-15-89	9:01	3	P-3	BP-11T7	INAUDIBLE	INAUDIBLE
119	8-15-89	9:03	3	P-3	BP-11T7	54.5	61.3
120	8-15-89	9:05	3	F-15	BP-04LD1	80.0	86.6

*1 -- REFER TO FIGURE 13 OF THE TEXT FOR THE LOCATION OF THESE MEASUREMENT POSITIONS

*2 -- REFER TO FIGURES 3 TO 8 FOR THE DESCRIPTION OF THESE FLIGHT PATTERNS

*3 -- HNL-APPR. 8L -- ARRIVAL FLIGHT TRACK 17 THROUGH 20

TABLE I-1. LISTING OF THE MEASURED AND/OR OBSERVED AIRCRAFT EVENTS
IN CHRONOLOGICAL ORDER

EVENT NO.	DATE	TIME	MEASUREMENT POS. NO. *1	AIRCRAFT TYPE	FLIGHT PATTERN *2	Lmax dBA	SEL dBA
121	8-15-89	9:06	3	SH-2	BP-OTHER1	57.0	68.6
122	8-15-89	9:10	3	C-12	BP-04LD2	58.8	65.9
123	8-15-89	9:14	3	P-3	BP-04LT6	57.3	68.3
124	8-15-89	9:19	3	C-12	BP-04RT5	59.3	67.8
125	8-15-89	9:28	3	C-12	BP-04RT6	70.8	78.2
126	8-15-89	9:51	3	F-15	BP-11T7	<= AMBIENT	<= AMBIENT
127	8-15-89	9:52	3	SH-2	BP-04RHT1	<= AMBIENT	<= AMBIENT
128	8-15-89	9:53	3	SH-2	BP-04RHT1	<= AMBIENT	<= AMBIENT
129	8-15-89	9:54	3	SH-2	BP-04RHT1	<= AMBIENT	<= AMBIENT
130	8-15-89	9:55	3	SH-2	BP-04RHT1	<= AMBIENT	<= AMBIENT
131	8-15-89	10:00	1	2 F-15	HNL-APPR. 8L *3	80.5	86.2
132	8-15-89	10:07	1	DC-9	HNL-APPR. 8L	66.0	77.9
133	8-15-89	10:12	1	B-737	HNL-APPR. 8L	60.0	72.1
134	8-15-89	10:15	1	DC-8	HNL-APPR. 8L	69.3	80.9
135	8-15-89	10:19	1	B-747	HNL-APPR. 8L	73.0	83.4
136	8-15-89	10:24	1	B-737	HNL-APPR. 8L	60.5	73.6
137	8-15-89	10:26	1	L-1011	HNL-APPR. 8L	69.5	82.0
138	8-15-89	10:30	1	P-3	BP-04LT6	57.3	68.3
139	8-15-89	10:34	1	P-3	BP-04LT6	57.0	68.4
140	8-15-89	10:44	1	P-3	BP-04LT6	61.5	68.4
141	8-15-89	10:48	1	P-3	BP-11T7	INAUDIBLE	INAUDIBLE
142	8-15-89	10:50	1	P-3	BP-04LT6	64.5	73.6
143	8-15-89	10:50	1	L-1011	HNL-APPR. 8L	69.5	81.6
144	8-15-89	10:52	1	B-737	HNL-APPR. 8L	63.3	76.5
145	8-15-89	10:55	1	P-3	BP-04LT6	NOT MEASURED	NOT MEASURED
146	8-15-89	10:57	1	DC-10	HNL-APPR. 8L	67.3	78.9
147	8-15-89	10:58	1	DC-9	HNL-APPR. 8L	68.5	77.3
148	8-15-89	11:00	1	DC-10	HNL-APPR. 8L	71.5	82.0
149	8-15-89	11:03	1	DC-10	HNL-APPR. 8L	66.3	79.3
150	8-15-89	11:07	1	P-3	BP-11T7	<= AMBIENT	<= AMBIENT
151	8-15-89	11:10	1	DC-8	HNL-APPR. 8L	68.6	80.8
152	8-15-89	11:12	1	L-1011	HNL-APPR. 8L	67.8	80.1
153	8-15-89	11:14	1	KC-135	HNL-APPR. 8L	82.8	89.9
154	8-15-89	11:16	1	DC-9	HNL-APPR. 8L	66.4	76.5
155	8-15-89	11:17	1	DC-10	HNL-APPR. 8L	68.3	80.8
156	8-15-89	11:19	1	P-3	HNL-APPR. 8L	61.8	74.3
157	8-15-89	11:19	1	P-3	BP-11T7	INAUDIBLE	INAUDIBLE
158	8-15-89	11:23	1	B-737	HNL-APPR. 8L	64.8	76.8
159	8-15-89	11:25	1	L-1011	HNL-APPR. 8L	67.3	78.3
160	8-15-89	11:27	1	DC-10	HNL-APPR. 8L	64.0	76.0

*1 -- REFER TO FIGURE 13 OF THE TEXT FOR THE LOCATION OF THESE MEASUREMENT POSITIONS

*2 -- REFER TO FIGURES 3 TO 8 FOR THE DESCRIPTION OF THESE FLIGHT PATTERNS

*3 -- HNL-APPR. 8L -- ARRIVAL FLIGHT TRACK 17 THROUGH 20

TABLE I-1. LISTING OF THE MEASURED AND/OR OBSERVED AIRCRAFT EVENTS
IN CHRONOLOGICAL ORDER

EVENT NO.	DATE	TIME	MEASUREMENT POS. NO. *1	AIRCRAFT TYPE	FLIGHT PATTERN *2	Lmax dBA	SEL dBA
161	8-15-89	11:30	1	P-3	BP-11T7	<= AMBIENT	<= AMBIENT
162	8-15-89	11:32	1	KC-135	HNL-APPR. 8L *3	74.5	86.0
163	8-15-89	11:34	1	F-15	HNL-APPR. 8L	64.8	74.8
164	8-15-89	11:35	1	B-747	HNL-APPR. 8L	69.0	82.4
165	8-15-89	11:36	1	P-3	BP-11T7	<= AMBIENT	<= AMBIENT
166	8-15-89	11:37	1	P-3	BP-04RT5	INAUDIBLE	INAUDIBLE
167	8-15-89	11:40	1	DC-10	HNL-APPR. 8L	64.3	77.3
168	8-15-89	11:40	1	P-3	BP-11T7	INAUDIBLE	INAUDIBLE
169	8-15-89	11:44	1	P-3	BP-04LD1	58.0	68.1
170	8-15-89	11:45	1	P-3	BP-11T7	INAUDIBLE	INAUDIBLE
171	8-15-89	11:47	1	B-737	HNL-APPR. 8L	63.3	75.5
172	8-15-89	11:51	1	2 F-15	BP-04RD1	81.0	91.6
173	8-15-89	11:52	1	P-3	BP-11T7	<= AMBIENT	<= AMBIENT
174	8-15-89	12:16	5	P-3	BP-11T7	59.3	68.8
175	8-15-89	12:17	5	L-1011	HNL-APPR. 8L	65.8	75.7
176	8-15-89	12:21	5	P-3	BP-11T7	57.8	66.6
177	8-15-89	12:26	5	L-1011	HNL-APPR. 8L	72.8	83.7
178	8-15-89	12:31	5	P-3	BP-11T7	57.8	68.3
179	8-15-89	12:33	5	DC-10	HNL-APPR. 8L	63.3	77.4
180	8-15-89	12:34	5	L-1011	HNL-APPR. 8L	65.0	77.1
181	8-15-89	12:35	5	UNKNOWN	HNL-DEPARTURE	60.0	70.3
182	8-15-89	12:36	5	B-737	HNL-APPR. 8L	58.8	67.4
183	8-15-89	12:38	5	P-3	BP-11T7	56.5	66.1
184	8-15-89	12:48	5	KC-135	HNL-APPR. 8L	65.3	77.1
185	8-15-89	12:53	5	DC-9	HNL-APPR. 8L	62.8	74.1
186	8-15-89	12:58	5	DC-8	HNL-APPR. 8L	65.5	78.2
187	8-15-89	13:03	5	P-3	BP-11T7	60.0	68.1
188	8-15-89	13:07	5	SH-2	BP-OTHER1	52.0	64.9
189	8-15-89	13:10	5	B-737	HNL-APPR. 8L	57.0	66.6
190	8-15-89	13:17	5	L-1011	HNL-APPR. 8L	65.5	76.0
191	8-15-89	13:23	5	B-737	HNL-APPR. 8L	56.8	66.8
192	8-15-89	13:24	5	P-3	BP-11T7	50.8	61.8
193	8-15-89	13:25	5	GA	HNL-APPR. 8L	59.8	70.8
194	8-15-89	13:29	5	DC-9	HNL-APPR. 8L	59.5	71.1
195	8-15-89	13:35	5	DC-9	HNL-APPR. 8L	65.3	73.6
196	8-15-89	13:40	5	P-3	BP-11T7	<= AMBIENT	<= AMBIENT
197	8-15-89	13:44	5	DC-8	HNL-APPR. 8L	60.8	75.9
198	8-15-89	13:45	5	DC-10	HNL-APPR. 8L	66.0	76.9
199	8-15-89	13:50	5	DC-9	HNL-APPR. 8L	61.3	71.4
200	8-15-89	13:54	5	B-737	HNL-APPR. 8L	54.0	66.0

*1 -- REFER TO FIGURE 13 OF THE TEXT FOR THE LOCATION OF THESE MEASUREMENT POSITIONS

*2 -- REFER TO FIGURES 3 TO 8 FOR THE DESCRIPTION OF THESE FLIGHT PATTERNS

*3 -- HNL-APPR. 8L -- ARRIVAL FLIGHT TRACK 17 THROUGH 20

TABLE I-1. LISTING OF THE MEASURED AND/OR OBSERVED AIRCRAFT EVENTS
IN CHRONOLOGICAL ORDER

EVENT NO.	DATE	TIME	MEASUREMENT PGS. NO. *1	AIRCRAFT TYPE	FLIGHT PATTERN *2	Lmax dBA	SEL dBA
201	8-15-89	13:55	5	DC-10	HNL-APPR. 8L *3	65.0	75.6
202	8-15-89	14:00	7	B-737	HNL-APPR. 8L	65.0	75.4
203	8-15-89	14:02	7	DC-10	HNL-APPR. 8L	70.8	81.1
204	8-15-89	14:06	3	C-130	HNL-APPR. 8L	63.0	74.3
205	8-15-89	14:09	3	DC-8	HNL-APPR. 8L	65.3	76.8
206	8-15-89	14:19	2	DC-10	HNL-APPR. 8L	65.3	76.4
207	8-15-89	14:24	2	DC-10	HNL-APPR. 8L	67.4	78.4
208	8-15-89	14:35	2	DC-10	HNL-APPR. 8L	65.3	78.2
209	8-15-89	14:45	2	CH-47	BP-OTHER1	56.0	65.0
210	8-15-89	14:46	2	CH-47	BP-04LHT2	55.6	64.7
211	8-15-89	14:50	2	L-1011	HNL-APPR. 8L	63.3	75.6
212	8-15-89	14:55	2	DC-10	HNL-APPR. 8L	73.6	85.1
213	8-15-89	14:57	2	B-737	HNL-APPR. 8L	57.5	68.3
214	8-15-89	15:04	2	L-1011	HNL-APPR. 8L	65.0	77.9
215	8-15-89	15:04	2	P-3	BP-11T7	INAUDIBLE	INAUDIBLE
216	8-15-89	15:05	2	P-3	BP-11T7	INAUDIBLE	INAUDIBLE
217	8-15-89	15:07	2	UNKNOWN	HNL-DEPARTURE	66.0	76.6
218	8-15-89	15:10	2	KC-135	HNL-APPR. 8L	79.0	87.9
219	8-15-89	15:11	2	DC-10	HNL-APPR. 8L	60.0	74.4
220	8-15-89	15:15	2	2 F-15	HNL-APPR. 8L	84.5	93.1
221	8-15-89	15:17	2	DC-9	HNL-APPR. 8L	57.8	69.9
222	8-15-89	15:24	3	DC-10	HNL-APPR. 8L	68.8	78.1
223	8-15-89	15:27	3	KC-135	BP-04RT6	>90	>100.1
224	8-15-89	15:29	3	DC-9	HNL-APPR. 8L	64.8	75.8
225	8-15-89	15:31	3	DC-10	HNL-APPR. 8L	65.8	77.9
226	8-15-89	15:32	3	F-15	BP-04RT6	75.9	82.3
227	8-15-89	15:33	3	3 F-15	HNL-APPR. 8L	75.3	85.4
228	8-15-89	15:35	3	KC-135	BP-04RT6	87.8	94.8
229	8-15-89	15:37	3	F-15	BP-04RT6	102.8	108.3
230	8-15-89	15:40	3	F-15	BP-04RT6	75.5	80.3
231	8-15-89	15:42	3	KC-135	BP-04RT6	84.3	92.9
232	8-15-89	15:44	3	F-15	HNL-APPR. 8L	65.8	74.6
233	8-15-89	15:47	3	DC-10	HNL-APPR. 8L	63.5	75.5
234	8-15-89	15:50	3	KC-135	BP-04RT6	91.0	97.1
235	8-15-89	15:54	3	KC-135	BP-04RT6	101.0	105.6
236	8-15-89	15:59	3	KC-135	BP-04RT6	102.8	107.9
237	8-15-89	16:05	3	KC-135	BP-04RT6	103.8	108.3
238	8-15-89	16:05	3	KC-135	BP-04RT6	97.5	103.3
239	8-15-89	16:13	3	KC-135	BP-04RT6	76.8	83.8

*1 -- REFER TO FIGURE 13 OF THE TEXT FOR THE LOCATION OF THESE MEASUREMENT POSITIONS

*2 -- REFER TO FIGURES 3 TO 8 FOR THE DESCRIPTION OF THESE FLIGHT PATTERNS

*3 -- HNL-APPR. 8L -- ARRIVAL FLIGHT TRACK 17 THROUGH 20

APPENDIX II

DAY-NIGHT AVERAGE SOUND LEVEL (L_{dn}) CALCULATIONS

Ldn CALCULATION

LOCATION: POSITION 1 (SEE FIGURE 13 FOR THE LOCATION)
PROJECT NO.: 89-23
MEAS. DATE: AUGUST 14, 1989
WEATHER: SKY: PARTLY CLO UDY
WIND: ENE. 5-10 KNOTS

REMARKS: HOURLY LEVELS BETWEEN 7 AM AND 10 AM
AND 8 PM AND 7 AM ARE ESTIMATED VALUES

HOUR	AVERAGE HOURLY NOISE LEVEL dBA
07 - 08	52.0
08 - 09	53.0
09 - 10	52.0
10 - 11	53.0
11 - 12	52.3
12 - 13	51.7
13 - 14	55.8
14 - 15	52.5
15 - 16	52.6
16 - 17	52.1
17 - 18	49.6
18 - 19	49.5
19 - 20	46.3
20 - 21	43.0
21 - 22	43.0
22 - 23	43.0
23 - 00	43.0
00 - 01	43.0
01 - 02	43.0
02 - 03	43.0
03 - 04	43.0
04 - 05	43.0
05 - 06	43.0
06 - 07	43.0

AVERAGE
DAY-NIGHT SOUND LEVEL, Ldn: 52 dB

 **DARBY
& ASSOCIATES**
ACOUSTICAL CONSULTANTS

Ldn CALCULATION

LOCATION: POSITION 1 (SEE FIGURE 13 FOR THE LOCATION)
PROJECT NO.: 89-23
MEAS. DATE: AUGUST 15, 1989
WEATHER: SKY: PARTLY CLO UDY
WIND: ENE. 5-10 KNOTS

REMARKS: HOURLY LEVELS BETWEEN 5 PM AND 7 AM
ARE ESTIMATED VALUES

HOUR	AVERAGE HOURLY NOISE LEVEL dBA
07 - 08	51.0
08 - 09	49.5
09 - 10	52.1
10 - 11	64.5
11 - 12	56.8
12 - 13	52.5
13 - 14	50.2
14 - 15	53.8
15 - 16	80.5
16 - 17	73.8
17 - 18	50.0
18 - 19	49.0
19 - 20	46.3
20 - 21	43.0
21 - 22	43.0
22 - 23	43.0
23 - 00	43.0
00 - 01	43.0
01 - 02	43.0
02 - 03	43.0
03 - 04	43.0
04 - 05	43.0
05 - 06	43.0
06 - 07	43.0

AVERAGE
DAY-NIGHT SOUND LEVEL, Ldn: 68 dB

 **DARBY
& ASSOCIATES**
ACOUSTICAL CONSULTANTS



APPENDIX G

Environmental Impact Of Fertilizer, Herbicide And Pesticide Use

**Prepared by Murdoch & Green, September 9, 1989,
Revised January 16, 1991**

ENVIRONMENTAL IMPACT

OF

FERTILIZER, HERBICIDE AND
PESTICIDE USE

ON THE PROPOSED

EWA MARINA, PHASE II GOLF COURSE

A REPORT TO

Belt Collins & Associates

September 9, 1989

Revised January 16, 1991

PREPARED BY

Charles L. Murdoch, Ph. D

Richard E. Green, Ph. D.

EXECUTIVE SUMMARY

Overview and Conclusions

This report addresses the potential environmental impact of fertilizer and pesticide application on the Ewa Marina, Phase II Golf Course. Key elements of the analysis are (1) determination of the quantities of applied chemicals (pesticides and fertilizer) which are likely to be used throughout the year, (2) compilation of soil, geologic and climatic information which will aid in the assessment of chemical movement, (3) estimation of water balance from rainfall, irrigation and evapotranspiration, (4) compilation of pesticide properties which may be of environmental significance, (5) computation of the Attenuation Factor for pesticides used on golf courses, using properties of the chemicals and soil properties, in order to determine the likelihood of chemical movement to groundwater, (6) estimation of the impact of chemicals in groundwater on the quality of coastal waters into which groundwater discharges at the shoreline, and (7) comparison of the potential impact of chemicals applied in management of the proposed golf course with that of the existing sugarcane culture.

The proposed Ewa Marina Phase II development, most of which consists of a 27-hole, 300 acre golf course, is located west and northwest of the Ewa Beach Community. The entire Ewa Plain consists predominantly of coastal plain deposits. The entire area is very level, such that runoff is not a matter of concern.

The nature of soils in the area is important to chemical movement to groundwater because the soil profile controls water retention and movement, and soil-chemical interactions determine both the retention and degradation of pesticides. The golf course area has Coral Outcrop and Fill Land in the west and central portions and soils classified as Haplustalls in the eastern portion. The entire area has moderate permeability, slow runoff and slight erosion hazard, so that the principal mode of chemical movement to shoreline waters is by way of the groundwater. The Ewa and Mamala soils (Haplustalls) have sufficient depth and organic carbon content to provide a good barrier to pesticide movement to groundwater, but the Coral Outcrop areas have little soil and are, therefore, especially subject to chemical leaching.

The relevant groundwater aquifer in this assessment is the near-surface coralline aquifer, which Mink and Lau (1987) have designated as ecologically important, irreplaceable and highly vulnerable to contamination. It

is separated from the deeper volcanic aquifer by low-permeability caprock of sedimentary origin. There is no apparent hydraulic connection between the coral aquifer and the deeper (about 1000 feet) basal aquifer. The flow toward the coastline in the shallow aquifer is thought to be about 230 gallons per day per foot of shoreline.

Chemical movement to groundwater can occur only if water recharge by rainfall or irrigation is sufficient to leach chemicals below the soil profile. At the Ewa site there is an annual water deficit (rainfall minus pan evaporation) of 70 inches, thus chemical movement through the soil to groundwater will normally occur only if irrigation is sufficiently in excess of the water requirement of turf to cause leaching.

Potential movement of both fertilizer elements and pesticides to groundwater was evaluated. Of the fertilizer nutrient elements, only nitrogen (nitrate) has the potential to contaminate groundwater in that nitrate is highly mobile, relatively stable and can have adverse effects at elevated concentrations in water. The total anticipated quantity of nitrogen to be applied on the golf course is about 22 tons N per year. Most of this (15 tons) would be applied to fairways. Although a large number of pesticides are registered for use on turf, only a few are used in sufficient quantity to be considered in the context of potential groundwater contamination. None of those used in relatively large quantities (e.g. MSMA, bensulide, chlorpyrifos and chlorothalonil) are sufficiently mobile or persistent to be considered a hazard to groundwater.

Leaching of fertilizer nitrogen can be minimized by careful management practices: use of slow-release N sources and irrigation by a water balance method. Such practices have been shown to be highly successful in controlled studies in Texas and Florida. Most of the area to be developed has a sufficient depth of soil with sufficient organic matter to provide a good medium for turf growth and retention of water and chemicals. Only the coral outcrop area at the western extreme of the property will require importation of soil to provide a suitable rooting depth for turf and an adequate barrier to pesticide movement. Although some nitrogen is likely to be leached to the shallow aquifer during high-rainfall winter months, the small amounts would not constitute a hazard since the aquifer water is sufficiently saline to preclude its use for human consumption.

Most of the proposed golf course site is presently cropped with sugar cane. A comparison of chemical application practices on sugarcane and on a golf course is appropriate to assess the relative risk to groundwater

quality from the two types of land use. If sugarcane culture uses 300 pounds of N per acre for the first year of the two-year growing cycle, this constitutes 49.5 tons of N on 330 acres (approximately the area which will be taken from sugarcane for the proposed development). The golf course will require approximately 22 tons N per year. Over a 2-year sugarcane crop cycle the N application would be similar for the two uses of the area. Since all the N is applied to sugarcane during the first year of the cycle, the N leaching potential for sugarcane culture is much greater because of the large amount of soluble N applied during the first year. Pesticide use for insect and disease control in sugarcane is minimal, since insects are controlled biologically and fungicide use is limited to treatment of seed pieces. Herbicides are applied to the soil as surface sprays, usually two or three times in the first 6 months after planting. The principal herbicides used in the Ewa area are atrazine and either ametryn or diuron. Atrazine has been found in groundwater on Oahu, but at concentrations below the Health Advisory Level established by EPA.

Considering the vast expanse of sugarcane grown in the Ewa area over the past several decades and the associated chemical inputs during this period, and noting the absence of significant water quality problems, with either groundwater or coastal water, we conclude that the limited chemical inputs on a golf course will not have a negative impact on groundwater or surface water. The practices recommended in the development and management of the golf course will further contribute to the protection of water quality.

Recommendations

1. Irrigation management is critical to the conclusions reached above. If excessive irrigation water is applied, the likelihood of nitrate movement to groundwater is increased. For this reason we recommend that either computerized environmental monitoring instruments or a U.S. Weather Bureau Class A evaporation pan be used to estimate evapotranspiration and to schedule irrigation application in the management of the proposed golf course.
2. Judicious use of pesticides and fertilizers is essential, especially in the early establishment of turf, since pesticides and nitrogen will be more likely to move before an extensive root system and thatch layer are developed.

3. As nitrogen has the greatest potential for movement to groundwater, special attention must be given to nitrogen management. Either fertigation, whereby a small amount of soluble nitrogen is applied through the irrigation system and turf is watered only when required, or use of slow-release N sources, such as IBDU, ureaformaldehyde, sulfur-coated soluble fertilizers, etc., should be practiced to reduce the potential for leaching of fertilizer N to groundwater.

4. Topsoil is to be stockpiled during grading operations and replaced in a uniform layer over the finish-graded area to insure maximum organic carbon content of the soil to reduce pesticide movement.

5. An adequate buffer space, with tall vegetation, should separate the golf course from housing areas, the clubhouse and other public areas.

6. As our conclusions are based on the assumption that sound management practices will be followed with regard to fertilizer and pesticide application and irrigation, we recommend that a well qualified Golf Course Superintendent (preferably certified) be given the responsibility of managing the golf course.

I. INTRODUCTION

The development and operation of the proposed golf course will require application of fertilizers to supply essential nutrients to turfgrasses and ornamental plants and pesticides (including herbicides, fungicides and insecticides) to control their associated weed, disease, and insect pests. These chemicals may be subject to movement from the site of application. The principal focus of this assessment is the potential impact of agricultural chemicals on the groundwater and shoreline water within and near the site. Also, a comparison is made of the potential impact of chemicals used in management of the proposed golf course with that of the present sugarcane culture. Assessments of other potential environmental impacts are provided in the Appendices; these assessments are supplementary to the principal issue (water quality) and they apply to nearly all golf courses, that is they are not site specific. The additional assessments include (1) the impact on migratory birds and endangered Hawaiian water birds and (2) impact on air quality.

II. APPROACH

This assessment is based on previously published or unpublished reports on soils, rainfall, evaporation, groundwater, and pesticide behavior in soils, and on our experience with chemical use on golf courses and the fate of agricultural chemicals in Hawaii soils.

Key elements of the analysis are (1) determination of the quantities of applied chemicals (pesticides and fertilizer nutrients) which are likely to be used throughout the year, (2) compilation of soil, geologic and climatic information which will aid in the assessment of chemical movement, (3) estimation of water recharge from irrigation and rainfall, (4) compilation of pesticide properties which may be of environmental significance, (5) computation of attenuation factors for pesticides used in greatest quantities on golf courses, using properties of the chemicals and soil properties, in order to determine the likelihood of chemical movement to groundwater, (6) estimation of the impact of chemicals in groundwater on the quality of coastal waters into which groundwater discharges at the shoreline, (7) comparison of the potential impact of chemicals applied in management of the proposed golf course with that of the existing sugarcane culture.

III. ANALYSIS OF RELEVANT FACTORS WHICH MAY IMPACT ON CHEMICAL MOVEMENT

A. Site Factors

1. Geology, Soils, Topography

The proposed Ewa Marina Phase II development is located west and northwest of the Ewa Beach Community. The east boundary, most of which consists of a golf course, is adjacent to Fort Weaver Road where the road runs northwest toward Ewa town out of Ewa Beach. The entire Ewa plain consists predominantly of coastal plain deposits, which are an accumulation of interlayered coral reef deposits, coralline debris and alluvium that has built up on the flanks of the Waianae and Koolau volcanoes. Details of the geology and aquifer structure in the Ewa plain are provided in a report by Dames and Moore (1986). The entire area is very level, such that runoff is not a matter of concern.

The total area of the Ewa Marina Community Development, Phase II is about 400 acres, with 330 acres designated for the golf course. The soils (described by Foote et al., 1972) consist of three basic types, each occupying about one-third of the total area:

- a) Coral Outcrop, on the western end of the site. This material is not really a soil but rather a relatively unweathered, exposed reef outcrop. Its cropping capability class is VIII without irrigation, suggesting that this material is not suitable for cropping. Coral outcrops are quite permeable and low in organic matter. Most of this land type has been converted to Fill Land in recent years.
- b) Fill Land, in the west and central portion of the site. This material does not constitute a natural soil either. It is essentially coral outcrop that has been intentionally covered by sediment from eroded upland areas or from sugar mill waste. The soil layer is generally shallow (one-half to two feet) and may be rather high in organic matter. The fill land has a crop capability classification of III with irrigation and IV without irrigation, indicating severe limitations for cropping.
- c) Soils classified as Haplustalls; the Ewa and Mamala soils occupy the eastern portion of the site. Both of these soil series are formed in alluvium deposited over coral limestone and consolidated calcareous sand. The Mamala soil is generally quite shallow, with about 8 inches for the A horizon and 11 inches for the B horizon. The Ewa soil is somewhat deeper, 18 inches (A) and 42 inches (B). Both soils at this site are associated with nearly level topography. The permeability is moderate, runoff is slow and the erosion hazard is slight (Foote et al., 1972). With irrigation, the Ewa and Mamala soils have capability classifications of II and III, respectively, suggesting that they are quite

amenable to cropping and should be well adapted to turf. Organic carbon contents of 1.5 and 2.0% for the surface horizons of two Ewa soils (Soil Conservation Service, 1976) suggest that most pesticides would have restricted mobility in this soil, due to sorption on organic matter.

2. Climate and Hydrology

Median annual rainfall at the project site is approximately 600 mm (24 inches) with monthly highs of 75 mm (3 inches) in December and January and a low of 5 mm (0.2 inches) in June (Giambelluca, et al., 1986). Pan evaporation for the area is approximately 2,500 mm (99 inches) with monthly highs of approximately 267 mm (10.5 inches) in July and August and a low of approximately 125 mm (5 inches) in January (Ekern and Chang, 1985). Thus without irrigation there is a water deficit of more than 70 inches annually.

The relevant groundwater aquifer in this assessment is the near-surface coralline aquifer, which is separated from the deeper volcanic aquifer by low-permeability caprock of sedimentary origin. The volcanic materials under the site are at a depth of about 1000 feet (Dames and Moore, 1986), with no apparent hydraulic connection with the coral aquifer in the vicinity of the development. Both relatively fresh and brackish waters are found at the shallow depths within the uppermost coralline aquifer (Dames and Moore, 1986). The flow in this aquifer is generally toward the coastline; the flow rate is thought to be about 230 gallons per day per foot of shoreline. Hydraulic conductivities in the coralline aquifer are quite high, but hydraulic gradients are low. The effective porosity appears to be about 10%.

An analysis by Dames and Moore (1986) suggests that a change in sugarcane culture from furrow irrigation to drip irrigation in the past 10 to 15 years has resulted in a significant reduction in recharge from irrigation return flow with an associated increase in chlorides. In 1986 the chloride level in waters from several Oahu Sugar Co. wells was about 1000 mg/L, which is unsuitable for potable water (maximum acceptable level is 250 mg/L) and marginal for irrigation unless mixed with higher quality water.

The aquifer classification system of Mink and Lau (1987) designates the coralline aquifer at this site by the code 30203116 (12211), which indicates, in addition to the type and location of the aquifer, that the aquifer is ecologically important, irreplaceable and highly vulnerable to contamination.

B. Management Factors

1. Fertilizers

Fertilizers are applied to golf courses to supply those essential nutrients which are used in large amounts and which are deficient in most soils. In typ-

ical soils, the elements which are normally applied in a turfgrass fertilization program are nitrogen (N), phosphorus (P), and potassium (K). Fertilizers are normally applied to only the greens, tees, fairways, and part of the roughs of a golf course. Typical areas in these types of turfgrasses are estimated in the discussion below.

Turfgrasses use much more N than other elements. Based on turfgrass clipping composition, it has been shown that the turfgrasses grown in Hawaii use about twice as much N as K and about 4 times as much N as P.

The primary fertilizer elements of concern for contamination of ground and surface waters are nitrogen and phosphorus. Phosphorus is attached very tightly to soil colloids in most soils and moves little if any from the site of application. Phosphorus, therefore, will not cause contamination of drainage water. Ammonium nitrogen (NH_4) likewise moves little in soils. Nitrogen applied in the ammonium form, however, is rapidly converted to the nitrate form (NO_3) which is not bound to the soil and moves readily with water. Because of high N uptake by turfgrasses, however, nitrogen will be used rapidly after application. Only under conditions where rainfall occurs soon after application of a soluble nitrogen source would there be excessive loss by surface runoff or by leaching below the root zone. This nitrogen movement could be avoided by applying a slow-release nitrogen fertilizer.

Fertilizer use rates for the different golf course areas are shown in Table 1. Complete fertilizers (ones containing N, P, and K) are usually applied. Because nitrogen is applied in larger quantities and also because it is the only fertilizer element likely to cause contamination of ground or surface waters, only nitrogen application rates are given.

Table 1. Approximate fertilizer use rates for different areas of a typical 27-hole golf course in Hawaii.

Type of turf	Area (acres)	Fertilizer amount (lb. N/1000 sq. ft.)	Application frequency	Total annual application (tons N)
Greens	4.5	0.5	2 weeks	1.3
Tees	4.5	1.0	3 weeks	1.7
Fairways	75.0	1.5	8 weeks	15.9
Roughs	45.0	1.0	3 months	3.9
Total	129.0			22.8

Nitrate loss by leaching can be greatly reduced by utilizing slow-release N sources. These include isobutyldienediurea (IBDU), ureaformaldehyde (UF), and sulfur coated soluble fertilizers. A study by Brown et al. (1982) on highly porous sand golf greens in Texas compared the amount of nitrogen lost by leaching from various nitrogen sources. Irrigation was applied at relatively high rates to provide leaching opportunity. Results of their study showed

that over a five-month period, approximately 23% of the nitrogen applied as a soluble N source (ammonium nitrate) was leached. Only 1.4% of the N applied as IBDU and 1.5% as UF leached.

More recently, Snyder et al. (1984) showed that irrigation of golf course turf on sandy soils in Florida by tensiometer control (water was only applied when the soil moisture tension reached 0.01 MPa) resulted in leaching of 0.3 to 6% of the N applied as a soluble fertilizer (ammonium nitrate) through the irrigation system (fertigation). Fertigation with ammonium nitrate on a daily basis without regard to soil moisture conditions resulted in leaching of 15 to 47% of the applied N. Tensiometer controlled irrigation and separate surface application of slow-release fertilizer (sulfur coated urea) resulted in leaching of 0.3 to 11.2% of the applied nitrogen. High N leaching losses in the Florida study were associated with high rainfall months (Feb. and March) in Florida. During low rainfall months, leaching losses were minimal except where daily irrigation and fertilization with ammonium nitrate were used. In the Ewa plains where there is a large ET deficit even during the wettest months of the year, there will be little leaching potential if careful irrigation practices are used.

2. Pesticides

There are a number of weed, insect and disease pests of turfgrasses in Hawaii which sometimes require application of chemical pesticides. They are normally applied only in response to outbreaks of pests. A typical pesticide program for golf courses in Hawaii is given in Table 2 below. There are several chemicals which may be substituted for certain ones in this suggested program. Properties of the chemicals listed in Table 2 (Hartley and Kidd, 1983), as well as those of other chemicals labeled for use on turf in Hawaii, are given in Appendix Table 1.

Table 2. A typical pesticide program for a 27-hole golf course in Hawaii.

Turfgrass area	Area (acres)	Chemical	Frequency	Rate/application	Annual total
I. Herbicides					
A. Greens	4.5	MSMA	6 times/year	2 lb. ai/acre	54 lb. ai [†]
		bensulide	2 times/year	12 lb ai/acre	108 lb. ai
B. Tees	4.5	MSMA	6 times/year	2 lb. ai./acre	54 lb. ai
		Trimec®	3 times/year	1 pint/acre	1.7 gal.
C. Fairways	75	bensulide	2 times/year	12 lb. ai./acre	108 lb. ai
		MSMA	6 times/year	2 lb. ai./acre	900 lb. ai
		Trimec®	3 times/year	1 pint/acre	28.5 gallons
D. Roughs	45	metribuzin	2 times/year	0.75 lb. ai./acre	112.5 lb. ai.
		MSMA	2 times/year	2.0 lb. ai./acre	92 lb. ai.
		metribuzin	1 time/year	0.5 lb. ai./acre	22.5 lb. ai.
II. Insecticides					
A. Greens	4.5	chlorpyrifos	As needed	1 lb. ai./acre	Approx. 27 lb. ai.
B. Tees	4.5	chlorpyrifos	As needed	1 lb. ai. acre	Approx. 27 lb. ai.
C. Fairways	Spot treatments	chlorpyrifos	As needed	1 lb. ai./acre	Approx. 75 lb. ai.
III. Fungicides					
A. Greens	4.5	metalaxyl	As needed	1.3 lb. ai./acre	Approx. 37.5 lb. ai.
		chlorothalonil	As needed	8 lb. ai./acre	Approx. 108 lb. ai.
B. Tees	4.5	metalaxyl	As needed	1.3 lb. ai./acre	Approx. 37.5 lb. ai.
		chlorothalonil	As needed	8 lb. ai./acre	Approx. 108 lb. ai.
C. Fairways	Spot treatments	chlorothalonil	As needed	8 lb. ai./acre	Approx. 375 lb.ai.

[†] ai. = active ingredient

3. Irrigation

a. Water Requirements of Turfgrasses

Because rainfall is not uniformly distributed throughout the year, all golf courses are irrigated to supplement rainfall. Golf courses usually have permanent sprinkler irrigation systems with sophisticated controllers. Many are computer controlled, so that each sprinkler head on the golf course can be adjusted from a computer terminal to apply a selected amount of water on each cycle. Additionally, state-of-the-art golf course irrigation systems include environmental monitoring instruments and computer programs which will calculate water requirements and program the irrigation control system to apply only the amount of water required.

Golf greens are constructed of sand (or mixes dominated by sand); the water holding capacity is less than for other areas containing soil. Golf greens must therefore be watered more frequently than other areas.

Typical evapotranspiration rates for well-watered turf in the Ewa area range from approximately 0.15 to 0.4 inches per day, depending on temperature, the amount of sunlight, relative humidity, wind speed and the amount of available water in the soil. Soils store approximately 0.5 to 2.5 inches of available water per foot of depth, depending on soil texture. Sands hold less, clays hold more. Irrigation should be applied when about one-half the available water has been used. The effective rooting depth for mown turf is approximately one foot. Therefore, turfgrasses will need to be watered every day to about once a week depending upon the type of soil and the water use rate.

IV. ENVIRONMENTAL IMPACT OF CHEMICALS APPLIED TO THE PROPOSED GOLF COURSE

A. Runoff

There is little likelihood of chemical movement from the site of application to the shoreline by runoff because of the permeability of the soils, level topography, and the relatively low rainfall of the area.

B. Groundwater

The groundwater aquifer of concern at this site is the relatively shallow, slightly brackish, coralline aquifer. The aquifer is characterized (Mink and Lau, 1987) as being ecologically important, low salinity (250 to 1000 mg/L chloride), irreplaceable, with high vulnerability to contamination. The surface elevation above mean sea level for the area to be developed is approximately 15 to 30 feet, and given the nearness of the coastline, it is likely that the groundwater surface is only 10 to 25 feet below the land surface. The shallowness of the aquifer, the permeability of the near-surface materials (both coral and soils), and low organic carbon content of the coral outcrop areas are all conducive to the penetration of mobile chemicals to groundwater under conditions of high recharge. However, the coral outcrop area exists only at the western extreme of the property, about one-fourth mile from the shoreline. Development of turfed areas on this material will require importing soil, which will reduce the potential for leaching of fertilizer nutrients and pesticides. The fill land and Ewa/Mamala soil areas make up most of the development area; these will have sufficient organic matter to retard pesticide movement (discussed in more detail in the next section). Closely controlled irrigation of the golf course will usually be sufficiently deep and limit water recharge and, consequently, also reduce the likelihood of chemical leaching. In the event fertilizer nitrogen were to be leached to groundwater during periods of high rainfall, the concentrations would not be sufficiently high to adversely affect groundwater quality, since these waters are already brackish and valuable only for irrigation.

V. COMPARISON OF GOLF COURSE WITH EXISTING SUGARCANE

A. Existing conditions

The proposed golf course site is presently cropped with sugarcane. The cane is drip irrigated, providing efficient use of applied water. The principal fertilizer nutrients applied are N and K; water soluble forms are applied through the drip system. Typical quantities applied are about 300 pounds of N and 400 pounds of K_2O , with most of the fertilizer being applied during the first year of the crop. As mentioned previously, only nitrate (NO_3) is considered a potential pollutant of groundwater. However, there is no evidence that NO_3 levels in the Pearl Harbor aquifer have been seriously impacted by NO_3 leaching from sugarcane fields (Green and Young, 1970). Use of drip irrigation in recent years has probably reduced irrigation recharge to the aquifer, thus reducing the quantity of leached N.

Pesticide use for insect and disease control in sugarcane culture is minimal, since insects are controlled biologically. Fungicide is used only to treat seed pieces before planting (principally Benlate), thus the quantities applied are small and localized. Only herbicides for weed control are applied to the soil as surface sprays, usually two or three times in the first 6 months after planting. Herbicide practices have not changed substantially in the past 20 years, with the exception of the adoption of the use of glyphosate (Roundup) for in-field post-emergence spot spraying and control of weeds in field boundaries, ditches, and roadsides. The principal pre-emergence herbicides used in the Ewa area are usually atrazine and either ametryn or diuron. Typical quantities applied are 6 pounds active ingredient (ai.) per acre per crop.

Studies on Oahu several years ago (Green et al., 1977) indicated that diuron was transported from sugarcane and/or pineapple fields to the West Loch of Pearl Harbor via Waikele stream. While the herbicide could not be detected in water, it was found at low levels in sediments from both the stream and the bay. The quantities of diuron in sediments were thought to be too low to be of environmental consequence. Neither atrazine or ametryn was found in either water or sediments.

In the last few years, atrazine has been detected in water from several wells in central Oahu (Hawaii State Department of Health, 1988). The concentrations are all less than 1 part per billion (ppb), well below levels considered safe for potable waters, but these and other results illustrate that atrazine has leached below the root zone, probably because of the excessive water applied with furrow irrigation in the past. It is likely that drip irrigation, which provides better water control, has reduced chemical leaching in comparison with furrow irrigation.

B. Proposed golf course

Fertilizer, pesticide and irrigation applications to the proposed golf course have been discussed previously. Golf course management is much more intense than sugarcane management. At first glance it would appear that more fertilizers are being applied to the golf course than to sugarcane because of the higher application rates to turfgrasses per unit area. After closer examination, however, it is shown that, because only a small portion of the area is fertilized, total fertilizer use on the entire area will be less for a golf course. If sugarcane culture uses 300 pounds of N per acre for the first year of the two-year growing cycle, this results in about 49.5 tons of N on 330 acres (approximately the area which will be taken from sugarcane for the proposed golf course). However, because only a relatively small portion of the golf course is actually fertilized, golf course culture, as shown in Table 1 above, will require only approximately 22.8 tons of N each year. Since all the N is applied to sugarcane during the first year of the cycle, the N leaching potential for sugarcane culture is much greater because of the large amount of soluble N applied during the first year.

Because the area treated with pesticides on a golf course is small, the total amount of pesticide applied is relatively small also. The pesticides used in golf course management are mostly of very low toxicity (Appendix Table 1). Most are either rapidly degraded in soil and/or are sorbed tightly to organic matter or soil colloids and move little from the site of application. The pesticides in Appendix Table 1 which are most likely to move below the root zone are metribuzin, mecoprop, dicamba, simazine, and trichlorfon. The relative mobility of these chemicals and a comparison with the mobility of chemicals commonly used in sugarcane can be quantified by computation of the Attenuation Factor (AF) of each chemical for an appropriate set of conditions. Attenuation of chemical movement by the soil includes both retardation of movement due to sorption on soil organic matter and degradation in the soil by both biological and chemical pathways. The AF numerical index (Rao et al., 1985) is presently being evaluated (Khan and Liang, 1989; Loague et al., 1989) for use in an assessment methodology which the State of Hawaii will use in pesticide regulation. The AF index can have numerical values from AF = 0 (total attenuation) to AF = 1 (no attenuation). By definition, AF is the fraction of chemical remaining in the soil after a single application when the recharge is sufficient to carry the chemical to the bottom of a soil layer of a given depth (for example, 50 cm). For soil and water recharge conditions of practical interest in Hawaii, AF values for the five chemicals which are most likely to move beyond a depth of 50 cm are shown in Table 3. AF values range from 2.1×10^{-6} for simazine (lowest contamination potential) to 7.1×10^{-3} for trichlorofon (highest contamination potential). For comparison, atrazine, a herbicide used extensively in sugarcane in Hawaii has $AF = 1.4 \times 10^{-8}$, suggesting that all of the chemicals listed in Table 3 are more likely to reach groundwater than is atrazine. Since atrazine has been detected at low levels in

groundwater on Oahu, one must conclude that, under similar use patterns and management as exist with atrazine use in sugarcane, the chemicals in Table 3 could also reach the groundwater. However, some additional considerations must be taken into account. Atrazine has been used for 25 to 30 years over tens of thousands of acres of land, most of which was furrow irrigated until the past 10 years. Furrow irrigation is highly inefficient in that much of the applied water is thought to penetrate below the root zone and thus recharge the groundwater. Present drip irrigation of sugarcane has greatly reduced recharge, as indicated in the groundwater assessment by Dames and Moore (1986), but the impact on present atrazine movement is unknown. Irrigation control on golf courses is even more refined than drip irrigation, so that chemical leaching can be reduced by limiting the amount of water recharge from irrigation. Also, the amounts of the chemicals in Table 3 which are used on golf courses are relatively small. Trichlorfon is not used in Hawaii to our knowledge, although it is labeled. Mecoprop and dicamba are components of the herbicide Trimec®; total annual mecoprop and dicamba application for the golf course will be approximately 14.4 and 3.6 lb., respectively. The total amount of metribuzin applied will be approximately 113 lb. annually. Simazine is used on few golf courses in Hawaii. If used, simazine application would not exceed 150 lb. annually for the entire golf course.

Everything considered, fertilizer and pesticide movement to groundwater at the Ewa Marina Phase II site is possible but not likely with good management of chemicals and irrigation, and importation of soil with adequate organic carbon content where required.

Table 3. Attenuation factors (AF) for the most mobile pesticides used on golf courses.†.

Pesticide	AF
Metribuzin	3.5×10^{-6}
Mecoprop	1.3×10^{-3}
Dicamba	7.1×10^{-5}
Simazine	2.1×10^{-6}
Trichlorfon	7.1×10^{-3}

†Based on the following conditions: soil organic carbon content = 1.5%; soil bulk density = 1.2 g/cm^3 ; soil water content = 35% by volume; water recharge = 0.1 cm/day; depth of penetration = 50 cm.

C. Impact on Migratory Birds and Endangered Hawaiian Waterbirds.

See Appendix B.

D. Impact on Air Quality.

See Appendix C.

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Appendix Table A-1. Properties of pesticides used on turf in Hawaii.

Pesticide common name	Trade name (s)	Oral LD-50 (mg/kg body wt)*	Toxicity to fish and wildlife*	Soil sorption Index (Koc)**	Water solubility (mg/l)**	Half-life in soil (days)**	Leaching potential**
I. Herbicides							
MSMA							
glyphosate	WeedHoe etc.	1800	Low	10000	1000000	100	Small
metribuzin	Roundup, Kleenup	150	Mod. to birds, none to fish	10000	1000000	30	Small
2,4-D	Sencor	2200	Moderate	41	1220	30	Large
meoprop	part of mixtures	370-700	High to fish	109	300000	10	Medium
dicamba	ditto	700-1500	Low	3	660000	21	Large
oryzalin	ditto	1000-2000	Non toxic to fish	2	800000	14	Large
oxadiazon	Surflan	10000	Mod. to birds, toxic to fish	2700	2.5	60	Small
propyzamide	Ronstar	8000	Toxic to fish	990	0.7	30	Small
simazine	Kerb	5620-8350	Low	138	3.5	75	Large
chlorthal-dimethyl	Princep	>5000	Low	5000	0.5	30	Small
bensulfide	Dacthal	>3000	Low	10000	25	60	Small
paraquat dichloride	Betason, Betamac	770	Mod. to fish	100000	1000000	3600	Small
benfluralin	Ortho Paraquat CL	150	Mod. to birds, none to fish	11000	0.1	30	Small
II. Insecticides							
chloropyrifos	Belan	10000	Low to birds, high to fish	2	40	7	Small
benflocarb	Dursban	135-163	High	6070	2	27	Large
carbaryl	Ficam	40-156	High	2	2	30	Small
trichlorfon	Sevin	400-850	Moderate	229	40	7	Small
	Dylox	450-630	Moderate	2	154000	27	Large
III. Fungicides							
anilazine	Dyrene	<5000	Low	3000	10	1	Small
benomyl	Benlate	9590	Low	2100	2	100	Small
chlorothalonil	Daconil 2787	>10000	Low to birds, mod. to fish	1380	0.6	20	Small
iprodione	Chipco 26019 RP	3500	Low	500	13	20	Small
mancozeb	Dithane M-45	>8000	Low	1000	0.5	35	Small
quintozene	PCNB, Terrachlor	12000	Non-toxic	1000	0.44	21	Small
thiram	Tersan	7500	Low	363	30	20	Medium
tridimefon	Bayleton	568	Low	273	260	21	Medium
metoloxyl	Subdue	669	Non-toxic	16	7100	7	Medium
thiophanate-methyl	Cleary 3336	7500	Low	1000	3.5	0	Small

*From: Hartley, Douglas and Hamish Kidd (Eds.) 1983. The Agrochemicals Handbook. Unwin Bros., Ltd. Old Working., Surrey, England.

**From: Wauchope, R. D. 1988. U. S. D. A.-ARS Interim Pesticide Properties Database. Version 1.0. Unpublished

Appendix Table A-2. Toxicity classes of pesticides.

Class	Description	Warning Statement	Oral LD50
1	Highly Toxic Skull & Crossbones	Poison,	1-50
2	Moderately Toxic	Danger	51-500
3	Low Toxicity	Warning	500-5,000
4	Very Low Toxicity	Caution	>5,000

APPENDIX B

IMPACT ON MIGRATORY BIRDS AND ENDANGERED HAWAIIAN WATERBIRDS.

The fertilizers, herbicides, and fungicides used in golf course maintenance pose little or no hazard to birds frequenting the grassed areas or ponds associated with golf courses. Fertilizers are relatively non-toxic unless ingested in large amounts. All herbicides and fungicides used in golf course maintenance in Hawaii are of low to moderate toxicity (Appendix Table 1). The only chemicals used in golf course maintenance in Hawaii which are highly toxic to birds are the organic phosphate insecticides, especially chlorpyrifos.

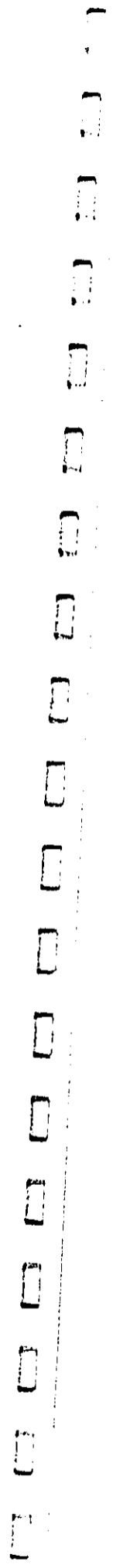
Although chlorpyrifos is toxic to birds, it is strongly adsorbed on the thatch layer of turf and moves little from the site of application. One reason for its weakness in controlling soil infesting insects is the inability to get the insecticide through the thatch layer to the depth needed to contact these insects. Recent studies (Sears and Chapman, 1980; Tashiro, 1980) have shown that chlorpyrifos applied to turfgrasses does not penetrate more than 2 to 3 centimeters in the soil. In addition to resistance to movement in the soil, it has been shown that it is rapidly degraded in the soil, both by hydrolysis and microbial action (Miles et al. 1979).

Because of the adsorption of organic phosphate insecticides on organic layers in turf and their rapid break down, there is little chance of their movement from grassed areas into the ponds associated with the proposed golf course. Label instructions for application of these pesticides (which turfgrass managers are required by law to follow) specifically prohibit their direct application to streams and ponds.

The likelihood of bird injury by pesticides used in maintenance of the proposed golf course can be reduced by proper application of pesticides with reduced toxicity to birds. Appendix Table 1 shows that carbaryl and trichlorfon are less toxic to birds than chlorpyrifos. In most cases these insecticides may be substituted for chlorpyrifos with little loss of effectiveness.

Golf courses are frequently visited by birds. As far as we are aware, there have been no reported incidents of bird kill in Hawaii from chemicals applied in golf course management. Waterfowl and fish appear to thrive in ponds and water hazards on golf courses in Hawaii. Many golf courses cultivate white amur fish in the ponds to control algae. Mosquito fish are generally stocked to prevent mosquito problems. We are aware of no incidents of fish or waterfowl injury from chemicals applied to golf courses.

The labeling of herbicides and pesticides by EPA for particular uses, enforced by the Hawaii Department of Agriculture, is perhaps the best assurance of protection of humans and wildlife from their hazards. All pesticides must be applied in compliance with federal and state laws regulating their use. Hazards to both humans and wildlife are included in the decision to label a pesticide for specific uses, including use on golf courses, and in developing regulations on allowable application procedures of the pesticide for various uses.



APPENDIX C

IMPACT ON AIR QUALITY

Most herbicides and pesticides used on golf courses are of relatively low mammalian toxicity, with LD₅₀ values ranging from hundreds to several thousand mg/kg body weight (Appendix Table 1). None of the chemicals listed in Table 2 above are highly volatile. A measure of volatility is the vapor pressure (VP). The compounds used in highest quantity, for which vapor pressure data is readily available, are chlorothalonil (VP=1.3 x 10⁻⁵ atm at 25° C) and chlorpyrifos (VP=2.4 x 10⁻⁸ atm at 25° C). In comparison, DBPC, which is known to be volatile, has a vapor pressure of 1.2 x 10⁻³ atm at 21° C, i.e. at least 100 times the vapor pressure of chlorothalonil and 100,000 times the vapor pressure of chlorpyrifos. In addition, pesticides are applied on golf courses in dilute sprays (50 to 100 gallons of spray solution per acre) to open areas. For these reasons there is little likelihood of volatility once the pesticides are applied.

If properly applied, there is also little potential for drift of spray particles from golf course spray equipment. The greatest danger of significant drift of pesticides is from aerial application. Golf course pesticides are applied with ground spray equipment. Boom height of spray equipment is less than one meter. Low spray pressures (20 to 40 psi) and coarse spray droplets further reduce the hazard of airborne fine droplets. Droplets larger than 100 micrometers diameter are not highly subject to drift.

Most of the spray volume from typical flat-fan nozzles used in agricultural spray equipment is from droplets larger than 100 micrometers. Table 3 below shows a typical distribution of droplet sizes for a flat-fan nozzle (the type used in most golf course spray equipment). At the low concentrations used in pesticide application, this would not result in significant quantities of pesticides being carried downwind. High wind speed would increase the likelihood of drift of fine spray droplets, however, because high wind speed distorts spray patterns and results in poor coverage; spraying in periods of high wind is not common practice. Table 4 below shows the percent of spray application volume deposited at 4 and 8 feet downwind and the distance downwind for the volume to drop to 1% or below for flat-fan nozzles under different conditions. Even under high wind conditions (almost 10 mph) and spraying at 40 psi, the distance downwind at which 1% or less of the total spray volume was deposited was only 17 feet.

Appendix Table C-1. Droplet size range for a typical flat-fan nozzle at 20 and 40 psi. (from Hofman et al., 1986)

Droplet size range (microns)	Percent of spray volume	
	20 psi	40 psi
0-21	0.1	0.4
21-63	3.0	10.4
63-105	10.7	20.1
105-147	16.2	25.4
147-210	36.7	35.3
210-294	27.5	7.7
>294	5.8	0.7

Appendix Table C-2. Percent of spray volume deposited at 4 and 8 feet downwind and the distance in feet for the volume of spray solution to drop to 1% of the total spray volume (from Hofman et al., 1986).

Nozzle ht.	Pressure (psi)	Wind speed (mph)	Percent deposited		Distance to drop to 1% of volume
			4ft.	8ft.	
14	40	3.5	3.1	0.6	7.0
27	40	3.5	5.9	1.5	13.0
18	30	5.3	9.3	2.2	14.0
18	25	9.9	10.3	3.1	15.5
18	40	9.9	9.1	3.6	17.0

To facilitate spray operations and to comply with label instructions of some pesticides, spray applications are only made in late afternoon or early morning hours when golfers are not on the golf course. This reduces the risk of exposure of people to airborne spray particles. Sufficient buffer space with tall vegetation between the golf course and housing sites and facilities (such as the clubhouse) which will be used by people will further reduce the chance of exposure to airborne pesticide particles.

The greatest danger of airborne pesticides is to the applicators of pesticides themselves. Mixing of wettable powder formulations and being in close proximity to airborne spray particles, particularly when operating spray equipment in a downwind position, places spray operators in particularly vulnerable positions. EPA and OSHA have strict standards which specify

APPENDIX H

Survey Of The Avifauna And Feral Mammals

Prepared by Phillip L. Bruner, September 5, 1990

**SURVEY OF THE AVIFAUNA AND FERAL MAMMALS
AT THE EWA MARINA PROPERTY, EWA, OAHU**

**Prepared for
Belt Collins and Associates**

by

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5 September 1989

SURVEY OF THE AVIFAUNA AND FERAL MAMMALS
AT THE EWA MARINA PROPERTY, EWA, OAHU

INTRODUCTION

The purpose of this report is to summarize the findings of a two day (29 August, 1 September 1989) bird and mammal field survey at the Ewa Marina Property, Ewa, Oahu (see Fig. 1). Also included are references to pertinent literature as well as unpublished reports.

The objectives of the field survey were to:

- 1- Document what bird and mammal species occur on the property or may likely occur given the range of habitats available.
- 2- Provide some baseline data on the relative abundance of each species.
- 3- Supplement these findings with published and/or unpublished data.
- 4- Evaluate the possible changes that might occur in the bird and mammal populations following the proposed development on the property.

GENERAL SITE DESCRIPTION

The proposed project property is located on the west shore of Oahu at Ewa (see Fig.1). The site presently contains sugar cane fields with some scrubby second growth vegetation along the W and NW boundaries as well as along edges of cultivated fields. Aside from sugar cane the dominant plants in the area are: Kiawe (Prosopis pallida) and Koa Haole (Leucaena leucocephala). An old coral quarry and several large ditches of fresh water are also found on the property.

Weather during the field survey was clear with some cloudy periods in the afternoons. Winds were moderate NE trades.

STUDY METHODS

Field observations were made with the aid of binoculars and by listening for vocalizations. These observations were concentrated during the peak activity periods of early morning and late afternoon. Attention was also paid to the presence of tracks and scats as indicators of bird and mammal activity.

At various locations (see Fig.1) eight minute counts were made of all birds seen or heard. Between these count stations

walking tallys of birds seen or heard were also kept. These counts provide the basis for the population estimates given in this report.

Observations of feral mammals were limited to visual sightings and evidence in the form of scats and tracks. No attempts were made to trap mammals in order to obtain data on their relative abundance and distribution.

Scientific names used herein follow those given in the most recent American Ornithologist's Union Checklist (A.O.U. 1983), Hawaii's Birds (Hawaii Audubon Society 1984), Field Guide to the Birds of Hawaii and the Tropical Pacific (Pratt et al. 1987), Mammal species of the World (Honacki et al. 1982) and Hawaiian Coastal Plants (Merlin 1980).

RESULTS AND DISCUSSION

Resident Endemic (Native) Land Birds:

No endemic land birds were recorded during the course of the field survey. The only likely endemic species which might occasionally forage in the area are the Hawaiian Owl or Pueo (Asio flammeus sandwichensis) and the Hawaiian Stilt (Himantopus mexicanus knudseni). Pueo are diurnal and can be found in upland

forest as well as lowland grasslands and agricultural fields. Stilt are opportunistic and will forage in flooded fields where they search for invertebrate prey. They may also utilize shallow areas of the wide ditches located in the old quarry section of the site.

Resident Indigenous (Native) Birds:

The only indigenous species recorded on the property was the Black-crowned Night Heron (Nycticorax nycticorax). Tracks and scats of night heron were found around the aforementioned ditch area. Water in these ditches was very clear and fish were abundant.

Resident Indigenous (Native) Seabirds:

Seabirds typically nest on offshore islands which are free from disturbance by dogs, cats, mongooses and rats. However, there are areas on the main islands where predators lack access and nesting can be successful (Bruner 1988). No seabirds were found during the survey and it is unlikely any would nest at this site due to an abundance of predators. Seabirds such as the Great Frigatebird (Fregata minor) were seen soaring overhead. Frigates only drink fresh water by flying low over the surface of ponds and other open bodies of fresh water and skimming the water with their lower bill. The ditches may infrequently be used for this purpose although they would be a challenge for frigates due to

the surrounding vegetation and the narrow flight path that would have to be followed in order to gain access to this resource.

Migratory Indigenous (Native) Birds:

Only one species of migratory shorebird was found during the survey - Pacific Golden Plover (Pluvialis fulva). Plover are probably the most common migratory species in Hawaii. They prefer open areas such as mud flats, fields and lawns. Plover arrive in Hawaii in early August and depart to their arctic breeding grounds during the last week of April. Johnson et al. (1981) and Bruner (1983) have shown plover are extremely site-faithful on their wintering grounds and many establish foraging territories which they vigorously defend. Such behavior makes it possible to acquire a fairly good estimate of the abundance of plover in any one area. These populations likewise remain relatively stable over many years. A total of 42 plover were recorded on day one of the survey and 49 on the final survey day. Time did not permit a determination of how many of these plover were territorial residents and how many were passing through the area on their migration further south. These plover were seen on haul cane roads and in recent cleared fields. The only other likely migratory species that may occur on the property is the Ruddy Turnstone (Arenaria interpres). This species also forages in plowed cane fields and on lawns as well as along the intertidal zone.

Exotic (Introduced) Birds:

A total of 17 species of exotic birds were found during this field survey. Table 1 shows the species recorded on this survey and their relative abundance. The most abundant species were Zebra Dove (Geopelia striata), Red-vented Bulbul (Pycnonotus cafer), Chestnut Mannikin (Lonchura malacca), Nutmeg Mannikin (Lonchura punctulata) and Common Waxbill (Estrilda astrild). Exotic species not recorded on the actual survey but which potentially could occur at this locality include: Japanese Bush-warbler (Cettia diphone), Northern Mockingbird (Mimus polyglottos), Java Sparrow (Padda oryzivora) and Barn Owl (Tyto alba) (Bruner 1989). The habitat is probably too dry for Melodious Laughing-thrush (Garrulax canorus).

Red-vented Bulbul have become one of Oahu's most abundant species in recent years. The adaptability of this species to a wide variety of habitats and their remarkable population expansion have been well documented (Williams 1983, Williams and Giddings 1984, and Williams and Evenson 1985).

Java Sparrow have also experienced a population increase and expansion in recent years (Pratt et al. 1987). Their occurrence at this site was not unexpected.

The discovery of Eurasian Skylark (Alauda arvensis), a species which is uncommon on Oahu was surprising. This species is common in higher elevation grassland/pastures on Maui and the Big Island (Hawaii).

Feral Mammals:

The only feral mammals observed during the survey were cats and the Small Indian Mongoose (Herpestes auropunctatus). Without a trapping program it is difficult to conclude much about the relative abundance of rats, mice, cats and mongooses at this site, however, it is likely that their numbers are typical of what one would find elsewhere in similar habitat on Oahu.

Records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) are sketchy but the species has been reported from Oahu (Tomich 1986). None were observed on this field survey. However, bats have been observed in lowland, coastal and urbanized habitat elsewhere in Hawaii (Bruner 1985).

CONCLUSION

A brief field survey can at best provide a limited perspective of the wildlife present in any given area. Not all species will necessarily be observed and information on their use of the site must be sketched together from brief observations and the available literature. The number of species and the relative abundance of each species may vary throughout the year due to available resources and reproductive success. Species which are migratory will quite obviously be a part of the ecological picture only at certain times during the year. Exotic species sometimes prosper for a time only to later disappear or become a less significant

part of the ecosystem (Williams 1987). Thus only long term studies can provide the insights necessary to acquire a complete understanding of the bird and mammal populations in a particular area. However, when brief studies are coupled with data gathered from other similar studies the value of the conclusions drawn are significantly increased.

The following are some broad conclusions related to bird and mammal activity on this property:

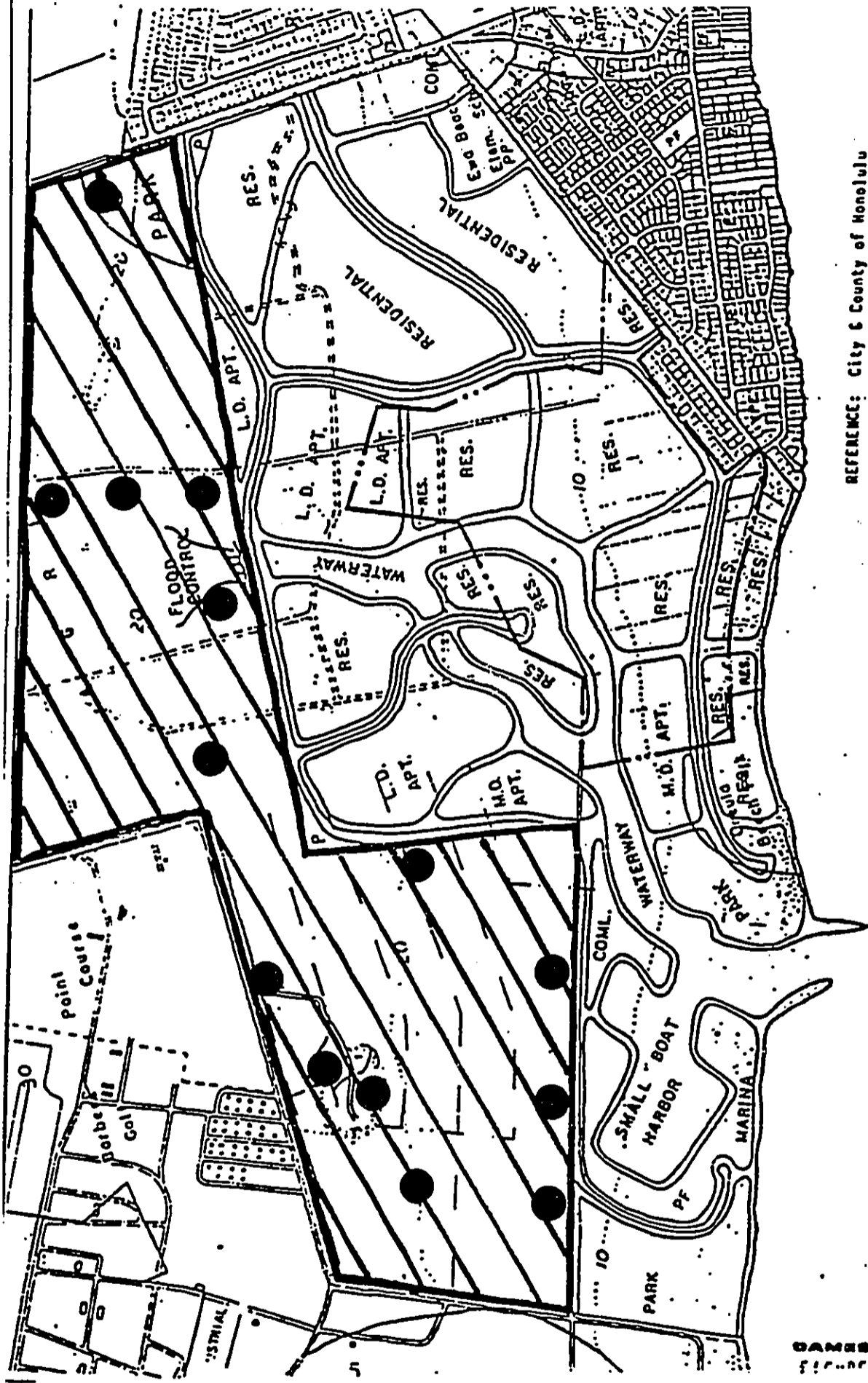
- 1- The present environment provides a limited range of habitats which are utilized by the typical array of exotic birds one would expect at this elevation and in this type of environment on Oahu.
- 2- The large fresh water ditches located in the old quarry area provide foraging opportunities for the native Black-crowned Night Heron. If possible this attractive feature of the property should be protected as a small park and wetland.
- 3- Pacific Golden Plover are presently common in the open plowed fields but would decline in abundance following urbanization.
- 4- Doves and finches could decline in abundance as a result of habitat changes brought by the proposed development. House Sparrows (Passer domesticus) and Common Myna (Acridotheres tristis) should increase dramatically in abundance following urbanization.
- 5- In order to obtain more data on mammals, a trapping program

would be required. The brief observations of this survey did not reveal any unusual mammal activity.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

would be required. The brief observations of this survey did not reveal any unusual mammal activity.



REFERENCE: City & County of Honolulu

Fig. 1 Project site with eight minute count stations shown as solid circles.

TABLE 1

Relative abundance of exotic birds at the Ewa Marina Property, Ewa, Oahu.

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE*
Ring-necked Pheasant	<u>Phasianus colchicus</u>	R = 1
Cattle Egret	<u>Bubulcus ibis</u>	R = 1
Spotted Dove	<u>Streptopelia chinensis</u>	C = 8
Zebra Dove	<u>Geopelia striata</u>	A = 14
Common Myna	<u>Acridotheres tristis</u>	U = 2
Red-vented Bulbul	<u>Pycnonotus cafer</u>	A = 10
Northern Cardinal	<u>Cardinalis cardinalis</u>	U = 2
Red-crested Cardinal	<u>Paroaria coronata</u>	C = 5
Japanese White-eye	<u>Zosterops japonicus</u>	C = 6
House Sparrow	<u>Passer domesticus</u>	U = 2
House Finch	<u>Carpodacus mexicanus</u>	C = 9
Eurasian Skylark	<u>Alauda arvensis</u>	R = 3
Red Avadavat	<u>Amandava amandava</u>	U = 4
Common Waxbill	<u>Estrilda astrild</u>	A = 16
Chestnut Mannikin	<u>Lonchura malacca</u>	A = 10
Nutmeg Mannikin	<u>Lonchura punctulata</u>	A = 15
White-rumped Shama	<u>Copsychus malabaricus</u>	R = 1

* (see page 12 for key to symbols)

KEY TO TABLE 1

Relative abundance = number of individuals observed during walking survey or frequency on eight minute counts in appropriate habitat.

A = abundant (10+) on 8 min. counts

C = common (5-10) on 8 min. counts

U = uncommon (less than 5) on 8 min. counts

R = recorded but not on 8 min. counts (number which follows is the total recorded over the course of the entire survey)

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APPENDIX I

Botanical Survey

Prepared by Char & Associates, September, 1989

BOTANICAL SURVEY
'EWA MARINA PHASE II PROJECT
'EWA DISTRICT, ISLAND OF O'AHU

by

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Prepared for: BELT COLLINS & ASSOCIATES

September 1989

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BOTANICAL SURVEY
'EWA MARINA PHASE II PROJECT
'EWA DISTRICT, ISLAND OF O'AHU

INTRODUCTION

The 'Ewa Marina project is located on the shoreline immediately west of 'Ewa Beach, O'ahu. Phase I of the project lies along the makai (seaward) side and encompasses approximately 730 acres of land. Phase II lies along the mauka (inland) boundary and consists of approximately 400 acres. It is bound by the 'Ewa Gentry development to the north; Fort Weaver Road to the east; Phase I of 'Ewa Marina to the south; and the Barbers Point Naval Air Station to the west.

At present, the majority of the site is under active sugar cane cultivation by O'ahu Sugar Company, Ltd. Uncultivated areas occur around a reservoir and pumphouse and a quarry. A rather dense kiawe forest is found along a portion of the southern boundary.

Field studies to assess the botanical resources on the site were conducted in August 1989. The primary objectives of these studies were to (1) describe the major vegetation types; (2) inventory the terrestrial, vascular flora; and (3) search for threatened and endangered species on the project site.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area.

Topographic maps and recent aerial photographs were examined to determine access, terrain characteristics, vegetation patterns, and potential logistical and technical problems. Access onto most of the site was provided by a number of cane haul roads which transit the property; areas which were less disturbed as around the reservoir, quarry, and kiawe forest were surveyed more intensively as such areas are more likely to harbor native plant communities or rare plant species.

A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, exposure, etc. Plants which could not be positively identified in the field were collected for later determination in the herbarium and for comparison with the taxonomic literature.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions under which the survey was conducted. A survey taken during the wetter months and under varying environmental conditions would no doubt yield slight variations in the species checklist especially of the weedy, annual taxa.

DESCRIPTION OF THE VEGETATION

The kiawe forest and reservoir area on the project site were included in the U. S. Fish and Wildlife Service (USFWS) sponsored 'Ewa Plains Botanical Survey (Char and Balakrishnan 1979). The main objectives of that survey were to map the distribution of threatened and endangered species as well as remnant native plant communities on the 'Ewa Plains. Two officially listed endangered plants were found on the Barbers Point Naval Air Station and Campbell Industrial Park; they are the 'Ewa Plains 'akoko (Chamaesyce [Euphorbia] skottsbergii) and Achyranthes rotundata (Char and Balakrishnan 1979; Traverse Group, Inc. 1988). Other studies conducted on adjoining areas include the flora study for Phase I of the 'Ewa Marina project (Char 1980)

and a recent survey for the 'Ewa Gentry development (Char & Linney 1988).

No threatened or endangered plants, protected by the federal and/or state governments, were found on the project site during the USFWS survey nor have any plants been found on the adjacent Phase I portion of the project or on the 'Ewa Gentry site.

In this report, vegetation on the project site is described from three areas: (1) cane fields; (2) kiawe forest; and (3) the reservoir and quarry area.

1. Cane Fields

Sugar cane (Saccharum officinarum) fields in various stages of growth cover more than 85% of the property. The fields show up as different toned mosaics on the aerial photograph. This variation results from the different densities of the growing cane -- recently planted fields form an open, low prairie structure, while closer to harvest time the fields form a closed, tall prairie structure.

Very few weedy species can be found within the fields themselves; only the ever present nut grass (Cyperus rotundus) has adapted well to growing under the dense cane. The majority of the weedy species are found in more open situations as along the margins of fields, cane haul roads, and irrigation ditches and drainageways. Weedy species associated with agricultural lands include false poinsettia (Euphorbia cyathophora), swollen finger grass (Chloris barbata), spider flower (Cleome gynandra), and wild bitter melon (Momordica charantia). Low-lying areas along the margins of fields, where drip irrigation lines are leaking, may be filled with standing water. These areas support a greater variety of species and moisture-loving plants such as false daisy (Eclipta alba), Leptochloa uninervia, and fir-leaved celery (Ciclospermum leptophyllum).

A large drainageway, part of the Kaloi Channel, runs through the property. The bottom of the drainage is lined with a dense mat of California grass (Brachiaria mutica); the banks support Guinea grass (Panicum maximum) with scattered shrubs of koa-haole (Leucaena leucocephala) and castor bean (Ricinus communis).

Adjacent to the Naval Air Station, is a weedy buffer zone which is infrequently maintained. Vegetation consists of a mixture of various grass species and weedy herbs and shrubs. Grasses found here include swollen finger grass, Guinea grass, buffel grass (Cenchrus ciliaris), sourgrass (Digitaria insularis), and Bermuda grass (Cynodon dactylon); weedy herbs and shrubs include pluchea (Pluchea symphytifolia), golden crownbeard (Verbesina encelioides), hairy spurge (Chamaesyce hirta), slender mimosa (Desmanthus virgatus), 'uhaloa (Waltheria indica), spiny amaranth (Amaranthus spinosus), and 'ilima (Sida fallax).

2. Kiawe Forest

A closed canopy forest of kiawe trees (Prosopis pallida), 25 to 30 ft. tall, is found along the southern boundary. In places, koa-haole forms a subcanopy layer 18 ft. tall. Ground cover is almost exclusively Chinese violet (Asystasia gangetica), a trailing perennial herb which forms dense mats over the ground and fallen trees.

Along the edges of the forest or in areas where the trees are less dense, patches of rouge plant (Rivinia humilis), Guinea grass, sourgrass, and hairy abutilon (Abutilon grandifolium) can be found. A few small trees of the native coastal sandalwood or 'ili-ahi-a-loe (Santalum ellipticum) are found scattered through this forest. Other natives found here include the kupala vine (Sicyos pachycarpus), kaunaoa-pehu (Cassytha filiformis), 'ilie'e (Plumbago zeylanica), 'ilima, and koali-'awania (Ipomoea indica). None of these native plants are considered threatened or endangered.

3. Reservoir and Quarry Vegetation

A reservoir and pumphouse which services the Oahu Sugar Company's cane fields is found makai of the Naval Air Station. Vegetation is dense around the irregularly-shaped reservoir pond, and consists of thick mats of California grass with large patches of shrubs and scattered trees. Locally abundant are shrubs of koa-haole, Christmas berry (Schinus terebinthifolius), pluchea, Indian pluchea (Pluchea indica), and castor bean. Trees found in this area include kiawe, 'opiuma (Pithecellobium dulce), monkey-pod (Samanea saman), kalamungai (Moringa oleifera), and African tulip (Spathodea campanulata). Coccinea grandis, a member of the cucumber or gourd family, is frequently found forming dense tangles over the shrubs. A small, unauthorized dump site containing lawn trimmings, household goods, various appliances, lumber, old cars, etc., is found nearby.

A quarry which now appears to be infrequently used is found near the reservoir. The quarry bottom is largely bare with scattered pockets of grasses and shrubs; these include swollen finger grass, Natal redtop (Rhynchelytrum repens), buffel grass, bristly fox-tail (Setaria verticillata), Bermuda grass, pluchea, koa-haole, tree tobacco (Nicotiana glauca), 'ilima, and 'uhaloa. A small pond with a few guppies in it is found on the quarry floor; leptochloa, California grass, and Eleocharis geniculata occur around the margins of the pond.

DISCUSSION AND RECOMMENDATIONS

Vegetation on the 'Ewa Marina Phase II project site consists primarily of actively cultivated fields of sugar cane. A reservoir and pumphouse are also associated with this agricultural activity. A quarry, now infrequently mined for coralline material, is found nearby. Both reservoir and quarry areas are vegetated largely by introduced weedy scrub species. A rather dense kiawe forest occupies a smaller portion of the project site along its southern

boundary.

Of a total of 98 species occurring on the project site, 85 (87%) are introduced or exotic species; three (3%) are of Polynesian origin; and 10 (10%) are native. Among the native plants, eight are indigenous, i.e. native to the Hawaiian Islands and elsewhere, and two are endemic, i.e. native only to the islands. The coastal sandalwood or 'ili-ahi-a-loe (Santalum ellipticum) and the kupala vine (Sicyos pachycarpus) are the two endemic species. Coastal sandalwood is found in dry shrubland and forest, often persisting in areas invaded by exotics; it occurs on all the main islands. Kupala is widespread in herb and shrubland coastal communities, dry forest and alien vegetation such as koa-haole or kiawe shrubland. It occurs primarily on lower leeward slopes of all the main islands (Wagner et al in press).

None of the native species are officially listed as threatened or endangered by the federal and/or state governments; nor are any of them candidate or proposed for such status (U. S. Fish and Wildlife Service 1985; Herbst 1987).

There is little of botanical interest or concern on the property as the majority of the site has been disturbed by agricultural activities. The proposed development should not have a significant negative impact on the total island populations of the species involved as they occur in similiar lowland situations throughout the islands.

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PLANT SPECIES CHECKLIST -- 'Ewa Marina Phase II

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of two groups: Monocots and Dicots. Taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (in press). In most cases, common English and/or Hawaiian names given follow St. John (1973) or Porter (1972).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name, when known.
3. Biogeographic status. The following symbols are used:
 - E = endemic = native only to the Hawaiian Islands
 - I = indigenous = native to the islands and also to one or more other geographic area(s)
 - P = Polynesian = plants of early Polynesian introduction prior to Western contact (1778); not native
 - X = introduced or alien = all those plants brought to the islands intentionally or accidentally after Western contact; not native.
4. Presence (+) or absence (-) of a particular species within each of three vegetation types recognized on the project site (see text for discussion):
 - C = Cane Fields
 - K = Kiawe Forest
 - R = Reservoir and Quarry Vegetation

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>	<u>Vegetation Type</u>		
			<u>C</u>	<u>K</u>	<u>R</u>
MONOCOTS					
ARECACEAE (Palm Family)					
Cocos nucifera L.	coconut, niu	P	-	-	+
COMMELINACEAE (Spiderwort Family)					
Commelina benghalensis L.	hairy honohono	X	-	+	+
CYPERACEAE (Sedge Family)					
Cyperus rotundus L.	nutgrass, nut sedge	X	+	-	+
Eleocharis geniculata (L.) Roem. & Schult.	eleocharis	X	-	-	+
POACEAE (Grass Family)					
Brachiaria mutica (Forssk.) Stapf	California grass	X	+	-	+
Cenchrus ciliaris L.	buffel grass	X	+	+	+
Chloris barbata (L.) Sw.	swollen finger grass, mau'u'ulei	X	+	+	+
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	+	+	+
Digitaria insularis (L.) Mez ex Ekman	sourgrass	X	-	+	+
Eleusine indica (L.) Gaertn.	wire grass	X	+	-	-
Eragrostis tenella (L.) P. Beauv. ex Roem. & Schult.	lovegrass	X	-	+	+
Leptochloa uninervis (K. Presl.) Hitc. & Chase	leptochloa	X	+	-	+
Panicum maximum Jacq.	Guinea grass	X	+	+	+
Panicum maximum var. trichoglume Eyles ex Robyns	green panicgrass	X	+	+	-
Rhynchelytrum repens (Willd.) Hubb.	Natal redtop	X	-	-	+
Saccharum officinarum L.	sugar cane, ko	P	+	-	+
Setaria verticillata (L.) P. Beauv.	bristly foxtail	X	+	+	+

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>	<u>Vegetation Type</u>		
			<u>C</u>	<u>K</u>	<u>R</u>
DICOTS					
ACANTHACEAE (Acanthus Family)					
Asystasia gangetica (L.) T. Anderson	Chinese violet	X	+	+	+
AMARANTHACEAE (Amaranthus Family)					
Achyranthes aspera L.	achyranthes	X	-	+	+
Alternanthera sessilis (L.) DC	khaki weed	X	-	-	+
Amaranthus spinosus L.	spiny amaranth, pakai kuku	X	+	-	+
Amaranthus viridus L.	slender amaranth, pakai	X	+	-	-
ANACARDIACEAE (Mango Family)					
Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X	-	+	+
APIACEAE (Carrot Family)					
Ciclospermum leptophyllum (Pers.) Sprague	fir-leaved celery	X	+	-	-
APOCYNACEAE (Dogbane Family)					
Catharanthus roseus (L.) G. Don	periwinkle	X	-	-	+
ASTERACEAE (Sunflower Family)					
Ageratum conyzoides L.	maile hohono	X	+	+	+
Calyptocarpus vialis Less.	hierba del cabello	X	-	-	+
Conyza bonariensis (L.) Cronq.	hairy horseweed, ilioha	X	+	+	-
Conyza canadensis (L.) Cronq.	Canada fleabane, ilioha	X	+	+	+
Crassocephalum crepidioides (Benth.) S. Moore	crassocephalum	X	+	-	+
Eclipta alba Hassk.	false daisy	X	+	-	+
Emilia coccinea (Sims) G. Don	emilia	X	+	-	-
Emilia fosbergii Nicolson	Flora's paintbrush, red pualele	X	+	-	+
Flaveria trinervia (Spreng.) C. Mohr.	flaveria	X	-	-	+

Scientific Name	Common Name	Status	Vegetation Type		
			C	X	R
<i>Pluchea indica</i> (L.) Less.	Indian pluchea	X	+	-	+
<i>Pluchea symphytifolia</i> (Mill.) Gillis	pluchea	X	+	+	+
<i>Pluchea X fosbergii</i> Cooperr. & Galang	hybrid pluchea	X	-	-	+
<i>Sonchus oleraceus</i> L.	sow thistle, pualele	X	+	-	+
<i>Tridax procumbens</i> L.	coat buttons	X	-	-	+
<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.	golden crownbeard	X	+	+	+
<i>Xanthium strumarium</i> var. <i>canadense</i> (Mill.) Torr. & A. Gray	cocklebur	X	+	-	-
BIGNONIACEAE (Bignonia Family)					
<i>Spathodea campanulata</i> P. Beauv.	African tulip	X	+	-	+
BORAGINACEAE (Heliotrope Family)					
<i>Heliotropium curassavicum</i> L.	kipukai, nena	I	-	-	+
<i>Heliotropium procumbens</i> var. <i>depressum</i> (Cham.) Fosb.		X	-	+	+
CAPPARACEAE (Caper Family)					
<i>Cleome gynandra</i> L.	spider flower, honohina	X	+	-	+
CHENOPODIACEAE (Goosefoot Family)					
<i>Atriplex semibaccata</i> R. Br.	Australian saltbush	X	+	-	+
<i>Atriplex suberecta</i> Verd.	saltbush	X	+	-	+
<i>Chenopodium murale</i> L.	'aheahea	X	+	+	+
CONVOLVULACEAE (Morning-glory Family)					
<i>Ipomoea indica</i> (J. Burm.) Merr.	koali-'awania	I	-	+	+
<i>Ipomoea obscura</i> (L.) Ker-Gawl.	field bindweed	X	+	-	+
<i>Ipomoea triloba</i> L.	little bell	X	+	-	+
<i>Jacquemontia ovalifolia</i> (Choisy) H. Hallier	pa'u-o-Hi'i-aka	I	-	-	+
<i>Merremia aegyptia</i> (L.) Urb.	hairy merremia, koali kua hulu	X?	-	+	+

Scientific Name	Common Name	Status	Vegetation Type		
			C	K	R
CUCURBITACEAE (Gourd Famil)					
<i>Coccinia grandis</i> (L.) Voight	coccinia	X	+	+	+
<i>Cucurbita</i> sp.	squash	X	+	-	-
<i>Momordica charantia</i> L.	wild bittermelon	X	+	+	+
<i>Sicyos pachycarpus</i> Hook. & Arnott	kupala	E	-	+	-
EUPHORBIACEAE (Spurge Family)					
<i>Chamaesyce hirta</i> (L.) Millsp.	hairy spurge, garden spurge	X	+	+	+
<i>Chamaesyce hypericifolia</i> (L.) Millsp.	graceful spurge				
<i>Chamaesyce prostrata</i> (Aiton) Small	prostrate spurge	X	+	-	+
<i>Euphorbia cyathophora</i> J. A. Murray	false poinsettia	X	-	-	+
<i>Euphorbia heterophylla</i> L.	spurge	X	+	-	+
<i>Ricinus communis</i> L.	castor bean, koli	X	+	-	+
FABACEAE (Pea Family)					
<i>Acacia farnesiana</i> (L.) Willd.	klu	X	+	+	+
<i>Grotalaria incana</i> L.	fuzzy rattlepod, kukae hoki	X	+	-	+
<i>Desmanthus virgatus</i> (L.) Willd.	virgate mimosa, slender mimosa				
<i>Leucaena leucocephala</i> (Lam.) de Wit	koa-haole	X	+	+	+
<i>Macroptilium lathyroides</i> (L.) Urban	cow pea	X	-	-	+
<i>Pithecellobium dulce</i> (Roxb.) Benth.	'opiuma	X	-	-	+
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	kiawe, algaroba				
<i>Samanea saman</i> (Jacq.) Merr.	monkeypod	X	+	-	+
<i>Senna surattensis</i> (N.L. Burm.) H. Irwin & Barneby	kolomona, kalamona	X	-	-	+
LAMIACEAE (Mint Family)					
<i>Leonotis nepetifolia</i> (L.) R. Br.	lion's-ear	X	+	-	+
LAURACEAE (Laurel Family)					
<i>Cassytha filiformis</i> L.	kaunaoa-pehu	I	-	+	-

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>	<u>Vegetation Type</u>		
			<u>C</u>	<u>K</u>	<u>R</u>
MALVACEAE (Mallow Family)					
Abutilon grandifolium (Willd.) Sweet	hairy abutilon cheese weed	X X	+ -	+ -	+ +
Malva parviflora L.	false mallow, hauuoi	X	+	+	+
Malvastrum coromandelianum (L.) Garcke	'ilima	I	+	+	+
Sida fallax Walp.	Cuba jute	X	-	+	+
Sida rhombifolia L.	prickly sida	X	+	-	+
Sida spinosa L.					
MORACEAE (Mulberry Family)					
Ficus microcarpa L. f.	Chinese banyan	X	-	+	+
MORINGACEAE (Moringa Family)					
Moringa oleifera Lam.	horseradish tree, kalamungai	X	-	-	+
NYCTAGINACEAE (Four-o'clock Family)					
Boerhavia coccinia Mill.	red-flowered coccinia	X	-	-	+
PASSIFLORACEAE (Passion Flower Family)					
Passiflora foetida L.	red-fruited passion flower, pohapoha	X	-	-	+
PHYTOLACCACEAE (Pokeweed Famil)					
Rivinia humilis L.	rouge plant, coral berry	X	-	+	+
PLUMBAGINACEAE (Leadwort Family)					
Plumbago zeylanica L.	'illie'e	I	-	+	-
POLYGONACEAE (Buckwheat Family)					
Antigonon leptopus Hook. & Arnott	Mexican creeper, chain-of- hearts	X	-	-	+
PORTULACACEAE (Purslane Family)					
Portulaca oleracea L.	common purslane, pigweed	X	+	-	+

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>	<u>Vegetation Type</u>			
			<u>C</u>	<u>K</u>	<u>R</u>	<u>R</u>
RUBIACEAE (Coffee Family) Morinda citrifolia L.	noni	P	-	+	-	-
SANTALACEAE (Sandalwood Family) Santalum ellipticum Gaud.	'ili-ahi-a-loe, coast sandalwood	E	-	+	-	-
SOLANACEAE (Nightshade Family) Capsicum annuum L. Lycopersicon pimpinellifolium (Jusl.) Mill.	chili pepper, nioi	X	-	+	-	-
Nicandra physaloides (L.) Gaertn. Nicotiana glauca R.C. Graham Solanum americanum Mill. Solanum seaforthianum Andr.	wild tomato, currant tomato apple-of-Peru tree tobacco popolo blue potato vine	X X X I? X	- + - + -	+ - - - +	+ - - + -	+ - + + -
STERCULIACEAE (Cocoa Family) Waltheria indica L.	'uhaloa, hi'aloa	I?	+	+	-	+
ZYGOPHYLLACEAE (Caltrop Family) Tribulus terrestris L.	puncture vine	X	+	-	-	-

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



APPENDIX J

Air Quality Impact

Prepared by J.W. Morrow, January 20, 1991

AIR QUALITY IMPACT REPORT

EWA MARINA II

January 20, 1991

PREPARED FOR

HASEKO (Hawaii), Inc.

PREPARED BY

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1. INTRODUCTION

HASEKO (Hawaii), Inc. is proposing to develop the second phase of the Ewa Marina project, referred to as Ewa Marina II. The project is located in leeward Oahu between Ewa Beach and Naval Air Station Barbers Point (Figure 1). It will consist of the following major components:

- Condominium/hotels (600 garden suites)
- International Fitness Promotion Center (with accommodations for 400)
- Hotels (500 units)
- Retail/restaurants/marine service center
- Tennis and Yacht Club
- Golf course

The purpose of this report is to assess the air quality impact of the proposed development. The project can be considered an "indirect source" of air pollution as defined in the federal Clean Air Act [1] since it will attract mobile sources of air pollution, i.e., motor vehicles. Thus, much of the focus of this analysis is on the project's ability to generate traffic and the resultant impact on air quality. Air quality impact was evaluated for existing (1990) and future (2002) conditions.

The following direct and indirect impacts have also been addressed:

- offsite impacts due to electrical generation
- refuse disposal at a resource recovery facility
- pesticides use at the golf course
- onsite and offsite construction impacts

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards is presented in Table 1 [2,3]. Note that Hawaii's standards are not divided into primary and secondary standards as are the Federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to

soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values [4].

Some of Hawaii's standards are clearly more stringent than their Federal counterparts but, like their Federal counterparts, may be exceeded once per year. It should also be noted that in April, 1986, the Governor signed amendments to Chapter 59 (Ambient Air Quality Standards) making the State's standards for particulate matter and sulfur dioxide the same as national standards. In the case of particulate matter, however, this uniformity did not last long. On July 1, 1987, the EPA revised the Federal particulate standard to apply only to particles 10 microns or less in diameter (PM-10) [5], leaving the State once again with standards different than the Federal ones.

In the case of the automotive pollutants [carbon monoxide (CO), oxides of nitrogen (NO_x), and photochemical oxidants (Ox)], there are only primary standards. Until 1983, there was also a hydrocarbons standard which was based on the precursor role hydrocarbons play in the formation of photochemical oxidants rather than any unique toxicological effect they had at ambient levels. The hydrocarbons standard was formally eliminated in January, 1983 [6].

The U.S. Environmental Protection Agency (EPA) is mandated by Congress to periodically review and re-evaluate the Federal standards in light of new research findings [7]. The last review resulted in the relaxation of the oxidant standard from 160 to 235 micrograms/cubic meter (ug/m³) [8]. The carbon monoxide (CO), particulate matter, sulfur dioxide (SO₂), and nitrogen dioxide (NO₂) standards have been reviewed, but no new standards were proposed.

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [9]. There simply can be no visible emissions from fugitive dust sources.

3. EXISTING AIR QUALITY

3.1 General. The State Department of Health maintains a network of air monitoring stations around the state to gather data on the following regulated pollutants:

- o total suspended particulates (TSP)
- o particulate matter <10 microns (PM-10)
- o sulfur dioxide (SO₂)

- o carbon monoxide (CO)
- o ozone (O3)
- o lead (Pb)

In the case of TSP, PM-10, and SO₂, measurements are made on a 24-hour basis to correspond with the averaging period specified in the standards. Samples are collected once every six days in accordance with U.S. Environmental Protection Agency (EPA) guidelines. Carbon monoxide and ozone, however, are measured on a continuous basis due to their short-term (1-hour) standards. Lead concentrations are determined from the TSP samples which are sent to an EPA laboratory for analysis. Note that the lead standard is a quarterly average.

While there is no Department of Health (DOH) air monitoring station in the immediate vicinity of the project site, there has been a station at the Campbell Industrial Park, some 6 miles to the southwest, for many years. The DOH also monitors air quality at its downtown Honolulu building some 10 miles east of the Ewa Marina project.

3.2 Department of Health Monitoring Sites. Recent data from the Barbers Point and Honolulu stations are summarized in Tables 2 - 5. The data indicate that total suspended particulate (TSP) and sulfur dioxide (SO₂) standards are being met. In fact, much of the time sulfur dioxide concentrations are below the detectable limit of the measurement method being employed. Carbon monoxide (CO) levels are also below State standards most of the time with only occasional exceedances.

Photochemical oxidants are secondary pollutants formed in the atmosphere largely as a result of anthropogenic emissions of hydrocarbons and oxides of nitrogen. Since there are no ambient standards for hydrocarbons, there is no monitoring. In the case of NO₂, the State ceased routine monitoring in 1976. As indicated by federal and state standards, ozone is monitored at Sand Island as a surrogate for photochemical oxidants. Recent monitoring data from that station indicate that the state's 1-hour standard is being met over 99% of the time.

As noted above, the State also has been having particulate samples analyzed for lead content, and Table 5 summarizes ambient lead levels in recent years. Generally, airborne lead levels have declined as expected due to the federal program for gradual phaseout of leaded gasoline. Particulate lead accumulated over the years in roadside soils and plants, however, will remain indefinitely in the area and provide inhalation exposure whenever dust is re-entrained in the air as a result of scouring winds or mechanical disturbance due to vehicular motion.

3.3 Onsite Carbon Monoxide Sampling. In September 1989, air sampling was conducted along Fort Weaver Road at Geiger Road and the Kunia Interchange.

In each case, the actual sampling site was within 10 meters of the road edge and on the west side due to the winds prevailing at the time. A continuous carbon monoxide (CO) instrument was set up and operated during the a.m. and p.m. peak traffic hours based on the results of the traffic impact study [10]. An anemometer and vane were installed to record onsite surface winds. A simultaneous manual count of traffic along Fort Weaver Road was also made. The variability of each of the parameters measured during the peak hours is clearly seen in Figures 2 - 5.

A summary of the average values is presented in Table 6. Onsite surface winds were generally northwesterly and almost parallel to Fort Weaver Road during the a.m. periods, but turned to northeasterly during the afternoon hours. Wind speeds were quite low during a.m. and p.m. periods ranging from 0.5 - 2.2 meters per second (m/sec). Atmospheric stability was neutral in the morning and slightly to moderately unstable during the afternoon.

Peak-hour measurements were again made in December 1990 as part of this most current analysis. Procedures were essentially the same as in 1989 with the exception that the sampling site at the Geiger Road intersection was moved from the northwest to the southwest side of the intersection due to traffic and wind conditions.

A summary of the 1-hour average results are included with the 1989 data in Table 6. At the Kunia intersection on 19 - 20 December, winds were from the north-northwest during both the a.m. and p.m. periods (Figures 6 and 7). At the Geiger Road intersection on 20 - 21 December, winds turned more northeasterly (Figures 8 and 9). Wind speeds on all three days were somewhat higher than during the 1989 sampling and atmospheric stability was predominantly neutral; thus CO levels were slightly lower.

4. CLIMATE & METEOROLOGY

4.1 Temperature & Rainfall. The National Climatic Data Center in its 1982 annual summary for Honolulu notes that:

"Hawaii's equable temperatures are associated with the small seasonal variation in the amount of energy received from the sun and the tempering effect of the surrounding ocean. The range of temperature averages only 7 degrees between the warmest months (August and September) and the

coolest months (January and February) and about 12 degrees between day and night. Daily maximums run from the high 70's in winter to the mid-80's in summer, and daily minimums from the mid-60's to the low 70's. However, the Honolulu Airport area has recorded as high as 93 degrees and as low as 53" [11].

Based on historical records from the National Weather Service at Honolulu International Airport and the U.S. Navy at Barbers Point Naval Air Station, rainfall in the project area averages about 20 inches per year [11,12]. In accordance with Thornwaite's scheme for climatic classification, the area is considered a semiarid steppe [13].

4.2 Surface Winds. Meteorological records were reviewed from the Honolulu International Airport and Hickam Air Force Base (AFB). It is quite evident that northeast tradewinds predominate during much of the year (Table 7). A closer examination of the data, however, indicates that low velocities (less than 10 mph) occur frequently and that the "normal" northeasterly tradewinds tend to breakdown in the Fall giving way to more light, variable wind conditions through the Winter and on into early Spring. It is during these times that Honolulu generally experiences elevated pollutant levels. This seasonal difference in wind conditions can be seen clearly in Figures 10 and 11.

Of particular interest from an air pollution standpoint were the stability wind roses prepared for the period January 1955 to December 1968 at Hickam Air Force Base [14]. These data indicated that stable conditions, i.e., Pasquill-Gifford stability categories E and F [15], occur about 28% of the time. It is under such conditions that the greatest potential for air pollutant buildup from groundlevel sources exists.

5. HIGHWAYS AND TRAFFIC

As noted previously the principal access road to the project site is Fort Weaver Road which exists as a 4-lane divided highway from its intersection with Farrington Highway south to Hanakahi Road. From that point southward to Ewa Beach, it is a 2-lane rural roadway scheduled, however, for eventual widening to four lanes. Current speed limits are 45 mph from Farrington Highway to the Geiger Road intersection, 35 mph from Geiger to Hanakahi Road, and 25 mph from Hanakahi to Ewa Beach. Photographs of the existing conditions at the Geiger Road intersection and Kunia Interchange are presented in Figures 12 and 13.

At the Farrington Highway intersection, Fort Weaver Road becomes Kunia Road and extends northward to the major interchange with the H-1 Freeway and thence north to Wahiawa. The speed limit is 45 mph on Kunia Road to the Kunia Interchange and is 55 mph on

the H-1 Freeway.

The traffic data provided by Pacific Planning & Engineering, Inc. [10] focused on the Fort Weaver Road south of Geiger Road. Traffic data from that study and State Department of Transportation (DOT) counts [16] indicated a.m. and p.m. peak hours in the 5:30 - 7:30 a.m. and 3:30 - 5:00 p.m. range, respectively. Traffic counts made in conjunction with the air sampling conducted for this project were generally consistent with those data. Projections for future traffic volumes at the two subject intersections were taken from the Pacific Planning & Engineering, Inc. data.

6. MOBILE SOURCE IMPACT

6.1 Emission Factors. Automotive emission factors for carbon monoxide (CO) were generated for calendar years 1990 and 2002 using the Mobile Source Emissions Model (MOBILE-3) [17]. To localize emission factors as much as possible, the August, 1988 age distribution for the City & County of Honolulu [18] was input in lieu of the national statistics normally used.

6.2 Microscale Analysis. Analyses such as this generally involve estimation of concentrations of non-reactive pollutants. This is due to the complexity of modeling pollutants which undergo chemical reactions in the atmosphere and are subject to the effects of numerous physical and chemical factors which affect reaction rates and products. For projects involving motor vehicles as the principal air pollution source, carbon monoxide is normally selected for modeling because it has a relatively long half-life in the atmosphere (about 1 month) [19], and it comprises the largest fraction of automotive emissions.

In this instance, a microscale screening analysis was performed for the Fort Weaver Road intersections with proposed Access Roads "A" and "B" analyzed in the traffic study. The updated version of an EPA guideline model CALINE-4 [20,21] was employed with an array of receptors spaced at distances of 10 - 30 meters from the road edge. Because of the growing level of urbanization and traffic in the area, a background CO concentration of 1.0 milligram per cubic meter (mg/m³) was assumed.

Worst case meteorological conditions were selected for the a.m. and p.m. peak traffic hours. A wind speed of 1 meter per second, an acute wind/road angle, stable atmosphere (Pasquill-Gifford Class "F") in the a.m. and neutral atmosphere (Pasquill-Gifford Class "D") [15], were all selected to maximize concentration estimates in the vicinity of the intersections. Review of the traffic data and preliminary modeling indicated that northeasterly winds were most likely to produce the maximum

CO concentrations near the intersections under study; thus, these wind directions were input for the modeling.

Maximum one-hour carbon monoxide (CO) concentrations were then computed for the peak traffic hours. The analyses were performed for existing conditions (1990) and future conditions (2002) both with and without the proposed project. The results are summarized in Figures 10 and 11.

7. OFF-SITE STATIONARY SOURCE IMPACT

7.1 Electrical Generation. The estimated 18.5 million kilowatt hours of annual electrical demand by full buildout of the proposed facilities will necessitate the generation of electricity by power plants. Currently, most of Oahu's electrical energy is generated at Hawaiian Electric Company's (HECO) Kahe Generating Station located near Nanakuli on the leeward coast of Oahu. This is currently a six-unit, approximately 650-megawatt facility firing low-sulfur fuel oil. A seventh 150-megawatt unit was proposed by HECO [22], but two out-of-state companies proposed and are now building a gas turbine and coal-fired power plant at Campbell Industrial Park to sell power to the utility [23]. For the purposes of this analysis, oil-firing was assumed. Estimates of annual emissions were computed based on EPA emission factors and the fuel required to meet a 18.5 million Kwhr demand. The results are presented in Table 8.

7.2 Solid Waste Disposal. The refuse generated by the residents of the 1,500 hotel and condominium units as well as the commercial establishments in Ewa Marina II will require disposal. Presently, about 80% of Oahu's refuse is being landfilled with the remaining 20% being burned at the Waipahu Incinerator [24]. With the recent opening of the City's new resource recovery facility (HPOWER) at Campbell Industrial Park, most refuse will be pre-processed and burned leaving less mass to be landfilled. This facility was originally designed to handle most of Oahu's domestic refuse (1,800 tons/day). Estimates of annual emissions attributable to the combustion of Ewa Marina II refuse at that facility are included in Table 8.

8. OTHER LONG-TERM IMPACTS

8.1 Agricultural Burning. Burning of sugar cane fields prior to harvest is a long-standing practice in Hawaii's sugar industry. Unfortunately, however, as urbanization closes in around agricultural operations, it is inevitable that complaints about air pollution will arise. Cane fires result in the emission of particulates, carbon monoxide, and trace amounts of other organics. This was most recently demonstrated in an EPA study of cane burning on Maui [25]. Concentrations of particulates can

reach high levels within about one mile of the fires [26]. A complete quantitative characterization of cane smoke, however, has yet to be performed. Fortunately, fires are generally infrequent and only last about 20 - 30 minutes.

8.2 Campbell Industrial Park. The industrial sources at Campbell Industrial Park obviously affect air quality in the Ewa area. The maximum concentrations of total suspended particulates (TSP) and sulfur dioxide, however, are in compliance with existing federal and state air quality standards. Neither monitoring nor computer modeling show violations of the current standards. Historically, there has been a problem meeting the State's TSP standard, and even with adoption of the less stringent federal standards, this may continue to be a problem as levels in the past have on occasion even exceeded those standards. As noted in Section 2, the state and federal particulate standards are once again different and while recent monitoring data indicate that the federal PM-10 standard is being met, the state TSP standard continues to be threatened. SO₂ standards are being gradually approached as new sources come in and existing sources expand. The impending completion of the City's resource recovery facility and the future construction of a gas turbine and coal-fired power plant as well as other as yet unidentified sources in the industrial park will all contribute additional increments of regulated and unregulated pollutants to the Ewa air. The responsible government agencies will have to watch the situation closely to insure that standards continue to be complied with.

8.3 Pesticide Use. The use of pesticides is routinely required at golf courses in order to maintain fairways and greens. Typical pesticide use at a 27-hole golf course was obtained from another report previously prepared for this project [27].

The herbicides MSMA, glyphosate, metribuzin, and bensulide all have relatively low mammalian toxicities with oral LD₅₀ values on the order of hundreds or thousands of milligrams active agent per kilogram body weight (mg/kg) [28, 29]. MSMA and metribuzin have OSHA air standards of 0.5 mg/m³ and 5 mg/m³, respectively [29]. These are 8-hour time-weighted averages.

The insecticide chlorpyrifos is a moderately toxic organophosphate which can affect the normal functioning of mammalian nervous systems through its inhibition of the enzyme cholinesterase. It has oral LD₅₀ values in the range of 60 - 82 mg/kg. The OSHA standard for airborne concentrations of chlorpyrifos is 0.2 mg/m³ as an 8-hour average [29].

The fungicides metalaxyl and chlorothalonil have relatively low acute toxicities with oral LD₅₀ values in the hundreds and thousands of mg/kg [29]. Chlorothalonil, however, has also demonstrated some carcinogenic potential in animals [29].

If properly used in accordance with label instructions, all of the aforementioned chemicals should present no hazard to the properties or owners of properties adjoining the proposed golf course. In fact, the greatest risk in using such chemicals is generally to the users themselves if they do not strictly follow label instructions. This is because the user may come in contact with the concentrated product while nearby properties and people may only be exposed to the greatly diluted and dispersed application solution.

The potential for significant airborne concentrations of these chemicals is relatively slight when one considers the dilution factor in application solutions plus the coarse spray that is normally used to assure adequate coverage in the desired area and avoidance of drift. Should a user improperly apply these chemicals under wind conditions which would contribute to drift, then there would be an increased possibility of downwind exposure of property and people. In order to assess the possible impact of such an event on people, a dispersion modeling analysis was performed for each of the chemicals. The results of this modeling are summarized in Table 10.

9. CONSTRUCTION IMPACT

The principal source of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along the principal access roads as well as in the vicinity of the project site itself. During off-peak hours, the additional construction vehicle traffic should not exceed road capacities although the presence of large trucks can reduce a roadway's capacity as well as lower average travel speeds thereby contributing to additional air pollution emissions.

The site preparation and earth moving will create particulate emissions as will building and on-site road construction. Construction vehicles movement on unpaved on-site roads will also generate particulate emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50 [30].

Since a significant fraction of the onsite soils were silty clay loams, in all probability having silt content comparable to the 30% cited above, and the computed P/E Index for the area is 24 implying drier conditions than in the EPA case, it may be assumed that there is a potential for fugitive dust problems.

In addition to the onsite impacts attributable to construction activity, there will also be offsite impacts due to the operation of concrete batching plants needed for construction. Since it is also too early to identify specific facilities that will be providing the concrete, the discussion of air quality impacts is necessarily generic.

Design and operating features of a typical concrete batching plant were obtained for this analysis. This plant (Rex Transit Mix Batch Plant, Model LO GO 5) [31], is a portable unit capable of producing up to 100 cubic yards of concrete per hour.

Assuming 8 hours/day operation and published EPA emission factors [30] for both direct plant emissions and fugitive dust emissions, estimates of worst case ambient impact were derived using the PTPLU screening model [32]. Ninety percent control of particulate emissions from the plant itself and 60% control of fugitive dust emissions from the process were assumed. One-hour concentration estimates were adjusted to 8-hour averages using an EPA-recommended factor [33] and then to 24-hour averages based on a weighted averaging technique. The worst case concentration of total suspended particulates (TSP) was thus estimated to be 105 micrograms/cubic meter (ug/m³) due to the plant operation.

Since it is not known where exactly the plant(s) will be located and thus what the background concentration of TSP will be, it is somewhat difficult to predict cumulative concentrations for comparison with standards. However, if the batch plant's 105 ug/m³ were assumed to be all < 10 microns and were added to the second highest 24-hour PM-10 concentration (42 ug/m³) from the 1989 DOH Barbers Point data, the sum would still comply with the federal 24-hour standard of 150 ug/m³.

10. DISCUSSION OF RESULTS

10.1 Microscale Analysis. The 1-hour "worst case" concentration estimates at both the proposed Access Road "A" and "B" intersections with Fort Weaver Road (Figures 14 and 15) indicate compliance with federal and state 1-hour CO standards under both current and projected peak traffic conditions. The general trend is towards increasing CO levels despite the effect of lower new vehicle emissions resulting from the federal motor vehicle emissions control program. This is due primarily to the change from a free-flow road segment to an intersection with some queuing at approaches. The difference between the "with" and "without" project scenarios is in the range of 3-65% with the "with project" scenario showing the higher CO levels during peak hours.

Compliance with the federal and state 8-hour standards can also be determined by applying an EPA-recommended "persistence" factor

of 0.6 to the 1-hour maximum CO values [34]. When using this approach, any CO concentration greater than 8.4 mg/m³ would indicate exceedance of the State's 8-hour standard. Similarly, any 1-hour concentration over 15.7 mg/m³ would indicate exceedance of the federal 8-hour standard. In this case, the results indicate no exceedances of state or federal 8-hour standards with or without the project.

10.2 Stationary Source Impacts. The emissions estimates for electrical generation and solid waste disposal may be compared to the 1980 county emissions inventory in Table 9 in order to provide some perspective on their significance. The project's contribution to county emissions appears to be less than 0.5%.

10.3 Other Long-Term Impacts. As noted in Section 8, there will be at times exposure to the smoke from agricultural field burning. Until urbanization entirely replaces sugar cane cultivation in the Ewa District, this will result in some human exposure and complaints about cane fire smoke. The State Department of Health and federal EPA have indicated that they are continuing efforts to better characterize the exposure and potential health effects [35]. Depending on the results of those efforts, the smoke exposure may be reduced or eliminated before cane cultivation ceases in Ewa.

In the case of industrial air pollution sources at Campbell Industrial Park, the likelihood of those sources significantly affecting Ewa Marina seems rather low given the distance (about 5 miles) and low frequency of winds which would carry source emissions toward the development. A screening of the 1967-71 wind data from Barbers Point indicated that winds heading from the industrial park towards Ewa Marina occurred about 1% of the time.

The estimated downwind pesticide concentrations presented in Table 10 indicate the level of human exposure possible under adverse conditions of high wind speed and proximity to the source. Downwind pesticide concentration estimates were low (microgram quantities versus the milligram quantities in toxic effects studies) and of short duration (5 - 10 minutes per acre treated upwind). Because of the number of variables, e.g., nozzle pressure, spray height, spray volumes, wind speed, etc, these estimates have an error factor of 2 to 3. True concentrations could be up to 3 times greater or 1/3 as much. In either case, the concentrations and duration of exposure suggest low risk. Only in the case of a carcinogen might there be some basis for questioning the "acceptability" of the concentration.

10.4 Short-Term Impact. Since as noted in Section 9, there is a potential for fugitive dust due to the dry climate and fine soils, it will be important for adequate dust control measures to

be employed during the construction period. Dust control could be accomplished through frequent watering of unpaved roads and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50%. The soonest possible landscaping of completed areas will also help. Use of dust screens may be necessary when excavation and other construction activities occur in close proximity to existing dwellings.

11. Conclusions and Mitigation

11.1 Conclusions. Based on the foregoing analysis, the following conclusions may be drawn:

- o Traffic generated by the proposed project will contribute to reduced air quality along the major roadways serving the area. State and federal air quality standards will be met.
- o Electrical demand and solid waste disposal resulting from the project will cause an increase in county emissions amounting to less than 0.5%.
- o Project residents may at times be affected by emissions from the surrounding environment, specifically:
 - agricultural field burning which should decline as urbanization replaces agriculture in Ewa;
 - Campbell Industrial Park which has a low probability to due prevailing wind directions; and
 - pesticide use which should be minimal if label instructions are complied with.
- o Construction activities will have a short-term impact on local air quality due to the additional construction vehicle activity and fugitive dust from construction activities.

11.2 Mitigation

11.2.1 Motor vehicle activity: The types of measures that could help reduce the predicted traffic-related adverse impacts include:

- o additional highway improvements to increase capacity
- o development and use of a mass transit system
- o increased bus service to the project area

- o encouragement of car-pooling
- o limited parking facilities to encourage use of public transportation
- o development of employment opportunities near Ewa Marina
- o implementation of an inspection/maintenance (I/M) program to reduce individual motor vehicle emissions

While many of these measures would have to be initiated by government, the project developer can encourage such initiatives as well as implement those measures within his own capability.

11.2.2 Electrical generation: Measures that will reduce offsite emissions at electrical power plants and save energy include the following recommendations of the State Department of Business, Economic Development and Tourism:

- o east/west orientation of streets for the long dimensions of houses to minimize heat gains in the morning and afternoon.
- o adequate system of walkways and bikeways to encourage walking and bicycling between home, school, park and commercial areas.
- o selection and placement of landscape materials to provide shading for minimization of heat gains in the morning and afternoon.
- o maximize shading of paved areas by trees, awnings, trellises, roofing or houses.
- o use drought-resistant plants for landscaping to reduce energy use associated with irrigation.
- o install operable windows and orient opening towards prevailing winds.
- o install eaves (minimum 30 inches), louvers, trellises, or shade screen to shade windows, especially on west, south, and east sides.
- o include attics ventilated by devices such as louvers at or near the roof ridge.
- o include radiant barriers in attics.
- o use light colored finishes on roofs and walls.

- o install heat pump water heaters, or
- o install solar water heaters or provide for future installation by pre-plumbing and pre-wiring.
- o install the most energy efficient appliances.
- o install ceiling fans or provide for future installation by pre-wiring.
- o install time switches to high-usage applications or equipment such as electric water heaters.
- o install fluorescent lights with high efficiency ballasts.

11.2.3 Solid waste disposal: The following measures will help reduce emissions resulting from burning of solid wastes:

- o provide a recycling program for the project
- o provide a composting facility for the project

11.2.4 Pesticide use at golf course: The following measures will help reduce any possible air quality impacts associated with pesticide use:

- o full compliance with label use instructions
- o use of integrated pest control measures
- o minimize pesticide use
- o maximize use of non-chemical pest control measures
- o use of low-toxicity/nonpersistent chemicals

11.2.5 Construction impacts: The following measures will help reduce the short-term impacts associated with construction activities:

- o compliance with state/county dust control requirements
- o covers for open trucks transporting dusty materials
- o frequent watering of exposed soil areas
- o soonest possible landscaping of exposed soil areas
- o concrete and asphalt plants in compliance with DOH permits

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TABLES

TABLE 1

SUMMARY OF STATE OF HAWAII AND FEDERAL
AMBIENT AIR QUALITY STANDARDS

POLLUTANT	SAMPLING PERIOD	FEDERAL STANDARDS		STATE STANDARDS
		PRIMARY	SECONDARY	
1. Total Suspended Particulate Matter (TSP) (micrograms per cubic meter)	Annual Geometric Mean	--	--	60
	Maximum Average in Any 24 Hours	--	--	150
2. PM-10 (micrograms per cubic meter)	Annual	50	50	--
	Maximum Average in Any 24 Hours	150	150	--
3. Sulfur Dioxide (SO ₂) (micrograms per cubic meter)	Annual Arithmetic Mean	80	--	80
	Maximum Average in Any 24 Hours	365	--	365
	Maximum Average in Any 3 Hours		1,300	1,300
4. Nitrogen Dioxide (NO ₂) (micrograms per cubic meter)	Annual Arithmetic Mean	100		70
5. Carbon Monoxide (CO) (milligrams per cubic meter)	Maximum Average in Any 8 Hours	10		5
	Maximum Average in Any 1 Hour	40		10
6. Ozone (O ₃) (micrograms per cubic meter)	Maximum Average in Any 1 Hour	235		100
7. Lead (Pb) (micrograms per cubic meter)	Maximum Average in Any Calendar Quarter	1.5		1.5

TABLE 2

AIR MONITORING DATA
BARBERS POINT, OAHU
1974-89

YEAR	PARTICULATES*			SO ₂			NO ₂		
	RANGE	MEAN	>AQS	RANGE	MEAN	>AQS	RANGE	MEAN	>AQS
1974	23-132	47	1	<5-10	<5	0	<20-40	25	0
1975	13-137	52	1	<5-11	<5	0	< 5-25	11	0
1976	12-101	40	1	<5-7	<5	0	< 5-29	14	0
1977	25-134	54	1	<5-18	<5	0	-----	--	-
1978	22-127	48	1	<5-40	<5	0	-----	--	-
1979	23-223	76	10	<5-27	<5	0	-----	--	-
1980	29-158	53	2	<5-10	<5	0	-----	--	-
1981	26-188	51	2	<5-40	<5	0	-----	--	-
1982	15- 63	41	0	<5-12	<5	0	-----	--	-
1983	28-193	--	2	<5-95	--	1	-----	--	-
1984	17-112	50	1	<5-<5	<5	0	-----	--	-
1985*	24-138	57	3	<5-25	<5	0	-----	--	-
1986*	7-66	26	0	<5-10	<5	0	-----	--	-
1987*	10-40	22	0	<5-13	<5	0	-----	--	-
1988*	10-48	24	0	<5-19	<5	0	-----	--	-
1989*	10-44	25	0	<5-20	<5	0	-----	--	-

- NOTES: 1. Particulates = 1974-84, total suspended particulates (TSP)
1985-89, particulate matter <10 microns (PM-10)
2. SO₂ = sulfur dioxide
3. NO₂ = nitrogen dioxide
4. >AQS = number of violations of state air quality standard
5. All concentrations are in micrograms per cubic meter of air.
6. Sampling station was moved from Barbers Point Lighthouse to the Chevron Refinery site due to salt spray from the ocean on 17 March 1972.
7. The samplers were elevated to a rooftop on 7 August 1979.
8. Source: State Department of Health

TABLE 3

SUMMARY OF AEROMETRIC DATA COLLECTED
AT THE DEPARTMENT OF HEALTH BUILDING

1978 - 1987

TOTAL SUSPENDED PARTICULATES	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
(24-hr values, ug/m3)										
Period of sampling (mos.):	12	12	12	8	12	12	12	12	12	12
Number of samples:	60	8	61	35	55	56	60	59	57	53
Range of values:	14-53	22-62	23-103	23-75	11-42	14-58	11-48	10-48	11-61	14-59
Mean of values:	29	32	37	40	29	26	25	24	25	25
Number of times State AQS exceeded:	0	0	1	0	0	0	0	0	0	0
SULFUR DIOXIDE										
(24-hr values, ug/m3)										
Period of sampling (mos.):	12	12	12	8	12	12	12	12	12	12
Number of samples:	61	57	58	38	50	56	58	53	57	54
Range of values:	<5-44	<5-42	<5-60	<5-44	<5-38	<5-16	<5-45	<5-45	<5-6	<5-11
Mean of values:	18	22	18	19	11	<5	<5	<5	<5	<5
Number of times State AQS exceeded:	0	0	0	0	0	0	0	0	0	0
PHOTOCHEMICAL OXIDANTS										
(Daily 1-hr maxima, ug/m3)										
Period of sampling (mos.):	10	12	11	12	12	12	12	12	12	12
Number of samples:	284	337	295	314	335	348	296	341	348	342
Range of values:	10-84	10-80	10-84	10-104	0-151	0-123	0-104	8-198	10-88	4-84
Mean of values:	33	39	38	37	32	46	44	43	39	38
Number of times State AQS exceeded:	0	0	0	1	2	2	1	3	0	0

TABLE 4

SUMMARY OF AEROMETRIC DATA COLLECTED
AT THE DEPARTMENT OF HEALTH BUILDING

1971 - 1987

NITROGEN DIOXIDE	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980-87
(24-hr values)										
Period of sampling (mos.):	10	12	12	12	12	3	n.d.	n.d.	n.d.	n.d.
Number of samples:	83	113	99	90	91	22				
Range of values:	<20-159	<20-236	<20-95	<20-95	16-70	12-63				
Mean of values:	56	56	46	37	33	35				
Number of times State AQS exceeded:	1	2	0	0	0	0				

CARBON MONOXIDE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
(Daily 1-hr maxima)										
Period of sampling (mos.):	12	8	n.d.	n.d.	n.d.	6	12	12	12	12
Number of samples:	365	208				169	318	342	348	345
Range of values:	0-20.7	0-17.3	Station moved to	Station moved to		0-8.6	0.6-10.9	0.0-10.4	0.2-13.5	0.3-11.1
Arithmetic mean	3.1	3.0		Kaimuki		2.4	2.4	1.5	2.2	1.7
Number of days State AQS exceeded:	19	10	10			0	1	1	3	1

TABLE 5
LEAD MONITORING DATA
HONOLULU, OAHU
1970-89

AVERAGE CONCENTRATION
(micrograms/cubic meter)

YEAR	1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
1970	0.78	0.81	0.65	0.92
1971	1.65	0.63	0.65	1.05
1972	--	0.75	0.65	0.48
1973	0.52	0.52	0.72	0.55
1974	0.84	0.61	0.70	0.92
1975	0.65	0.81	0.59	1.05
1976	0.91	0.65	0.99	1.00
1977	0.89	0.59	0.48	0.80
1978	--	--	--	0.72
1979	0.39	0.25	0.26	0.42
1980	0.41	0.23	0.21	0.20
1981	0.25	--	--	--
1982	0.21	0.16	0.09	0.21
1983	n/a	n/a	n/a	n/a
1984	0.3	0.2	0.2	0.3
1985	0.1	0.03	0.02	0.1
1986	0.1	0.0	0.0	0.0
1987	0.0	0.0	0.0	0.0
1988	0.0	0.0	0.0	0.01
1989	0.0	0.02	0.01	n/a

Source: Department of Health

TABLE 6
 ONSITE CARBON MONOXIDE SAMPLING RESULTS
 FORT WEAVER ROAD
 SEPTEMBER 1989 AND DECEMBER 1990

<u>Date</u>	<u>Day of Week</u>	<u>Time</u>	<u>Location</u>	<u>Side</u>	<u>CO</u> <u>mg/m3</u>	<u>Onsite Weather</u>	
						<u>WD</u> <u>deg [s.d.]</u>	<u>WS</u> <u>m/s</u>
21 Sep 89	Thu	6:35 - 7:35 am	Geiger Rd	West	4.2	309 [72]	1.0
		3:45 - 4:45 pm	Geiger Rd	West	4.2	40 [19]	2.2
28 Sep 89	Thu	6:35 - 7:35 am	Kunia Int	West	4.3	338 [14]	0.5
		3:20 - 4:20 pm	Kunia Int	West	4.4	58 [24]	0.6
19 Dec 90	Wed	3:15 - 4:15 pm	Kunia Int	West	2.9	75 [14]	1.6
20 Dec 90	Thu	6:15 - 7:15 am	Kunia Int	West	2.8	85 [17]	1.4
		3:30 - 4:30 pm	Geiger Rd	South- west	3.1	39 [14]	2.4
21 Dec 90	Fri	6:30 - 7:30 am	Geiger Rd	South- west	1.9	47 [13]	2.9

TABLE 7

ANNUAL FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION
HONOLULU INTERNATIONAL AIRPORT

Direction	Wind Speed (Kts)						TOTAL
	0 - 3	4 - 7	8 - 12	13 - 18	19 - 24	>24	
N	0.0149	0.0261	0.0075	0.0020	0.0002	0.0000	0.0506
NNE	0.0114	0.0219	0.0106	0.0046	0.0005	0.0000	0.0490
NE	0.0114	0.0449	0.0829	0.0853	0.0204	0.0018	0.2466
ENE	0.0088	0.0637	0.1559	0.1209	0.0224	0.0014	0.3731
E	0.0039	0.0179	0.0329	0.0210	0.0023	0.0001	0.0782
ESE	0.0021	0.0056	0.0050	0.0015	0.0003	0.0001	0.0146
SE	0.0021	0.0059	0.0091	0.0049	0.0006	0.0002	0.0228
SSE	0.0023	0.0074	0.0123	0.0038	0.0008	0.0002	0.0268
S	0.0025	0.0104	0.0127	0.0033	0.0005	0.0003	0.0296
SSW	0.0011	0.0041	0.0053	0.0017	0.0003	0.0000	0.0125
SW	0.0007	0.0031	0.0058	0.0022	0.0003	0.0001	0.0122
WSW	0.0006	0.0017	0.0031	0.0022	0.0005	0.0001	0.0082
W	0.0019	0.0030	0.0021	0.0009	0.0002	0.0001	0.0082
WNW	0.0027	0.0051	0.0012	0.0003	0.0001	0.0000	0.0094
NW	0.0084	0.0153	0.0031	0.0008	0.0003	0.0000	0.0279
NNW	0.0087	0.0166	0.0041	0.0012	0.0002	0.0000	0.0308
TOTAL:	0.0835	0.2527	0.3534	0.2567	0.0496	0.0043	1.0002

TABLE 8

Estimates of Annual Emissions Due to
 Electrical Generation and Solid Waste Disposal
 Ewa Marina II
 2002

Pollutant	Emissions (T/Yr)	
	Electrical Generation	Solid Waste Disposal
Nitrogen oxides	67.6	3.6
Sulfur oxides	51.2	0.7
Particulate Matter	5.2	0.3
Carbon monoxide	3.2	3.2
Hydrocarbons	0.6	0.2

TABLE 9

1980 EMISSIONS INVENTORY
CITY & COUNTY OF HONOLULU

SOURCE CATEGORY	EMISSIONS (Tons/Year)				
	PM	SOx	NOx	CO	HC
Steam Electric Power Plants	2092	36,736	12,455	1,065	184
Gas Utilities	14	0	199	0	0
Fuel Combustion in Agricultural Industry	1088	579	358	0	31
Refinery Industry	622	7,096	2,149	266	2,584
Petroleum Storage	0	0	0	0	1,261
Metallurgical Industries	28	96	40	0	0
Mineral Products Industry	6,884	1,883	597	0	31
Municipal Incineration	42	145	2,029	0	184
Motor Vehicles	1,413	1,014	17,270	239,198	22,853
Construction, Farm and Industrial Vehicles	184	193	2,507	3,729	338
Aircraft	382	145	1,751	5,594	1,476
Vessels	42	386	438	533	123
Agricultural Field Burning	1,399	0	0	15,982	1,692
TOTAL:	14,191	48,274	39,792	266,367	30,758

SOURCE: State Department of Health

TABLE 10

ESTIMATES OF DOWNWIND PESTICIDE CONCENTRATIONS

Product	Active Agent Concentration (ug/m ³)
MSMA	10
Bensulide	63
Trimec	5
Metribuzin	4
Glyphosate	8
Chlorpyrifos	5
Metalaxyl	7
Chlorothalonil	42

Conditions: Windspeed: 4.5 m/sec
 Stability category: D (neutral)
 Downwind distance: 100 m
 Exposure duration: 5 - 10 minutes
 Treated area: 1 acre
 Application height: 0.5 m
 Active agent drift: 0.4%

FIGURES

FIGURE 1
PROJECT LOCATION

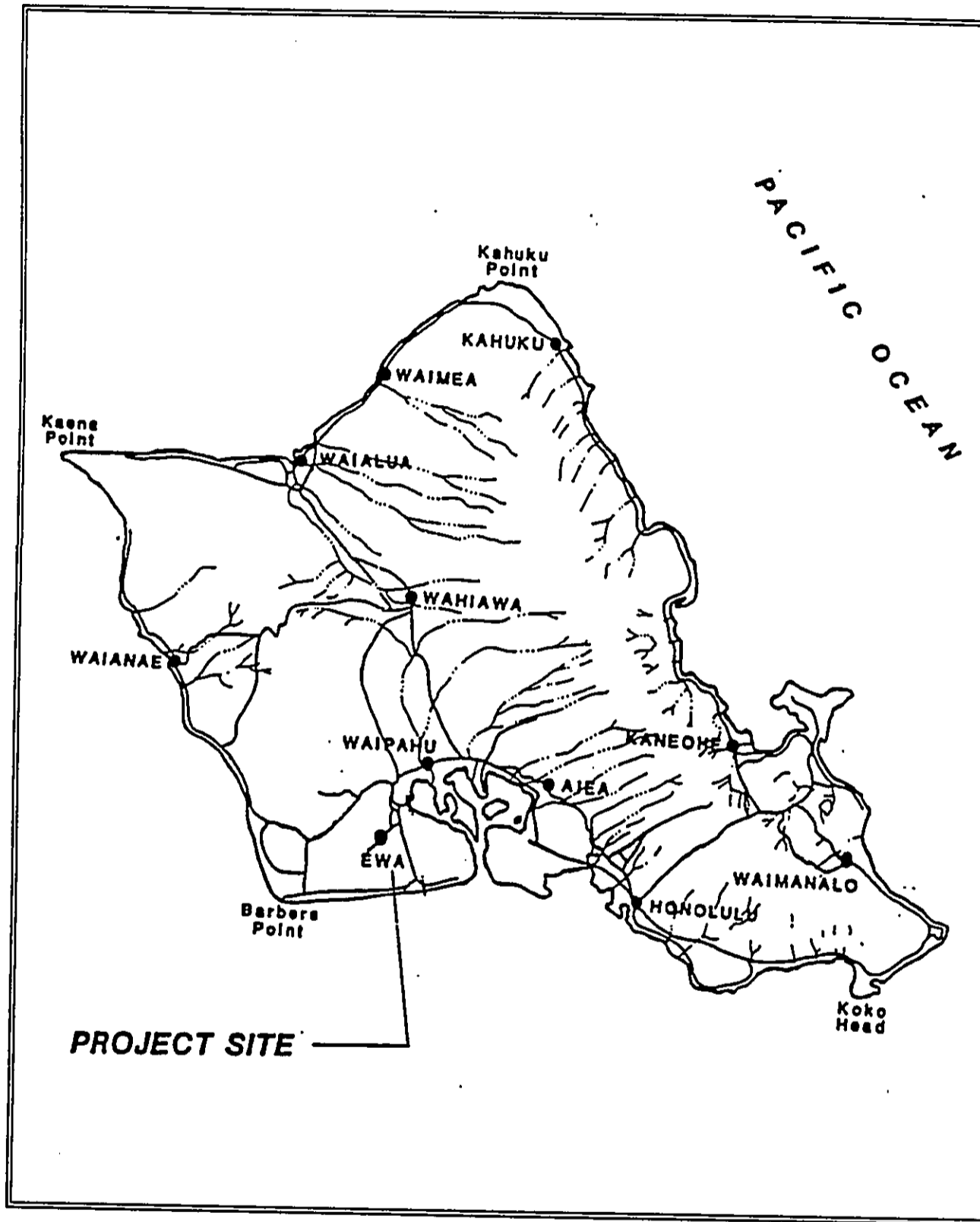
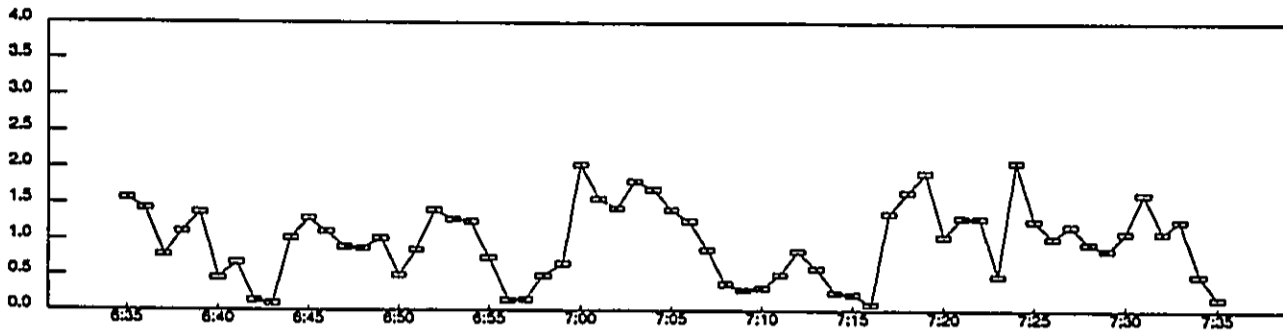
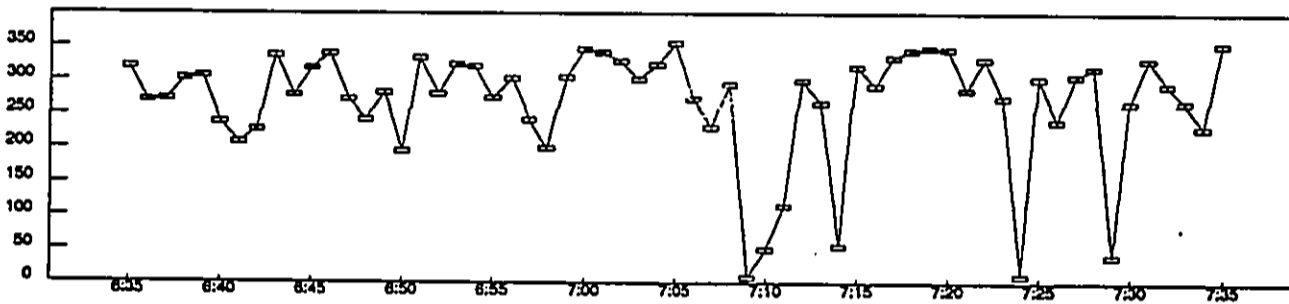


FIGURE 2
A.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT GEIGER ROAD
SEPTEMBER 21, 1989

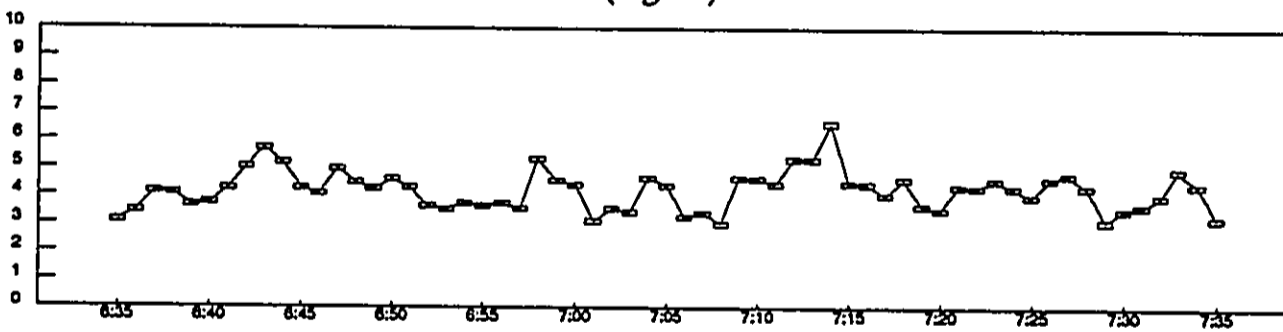
Wind Speed (m/sec)



Wind Direction (deg)



CO (mg/m³)



Traffic (5-min count)

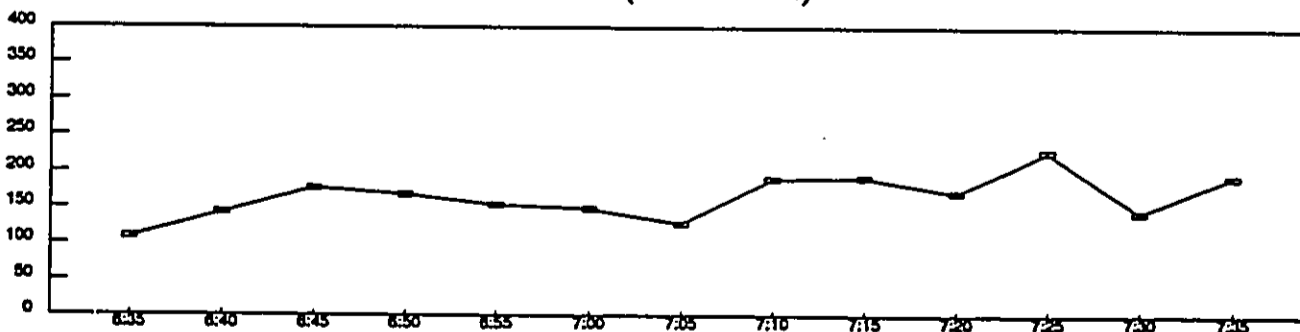


FIGURE 3
P.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT GEIGER ROAD
SEPTEMBER 21, 1989

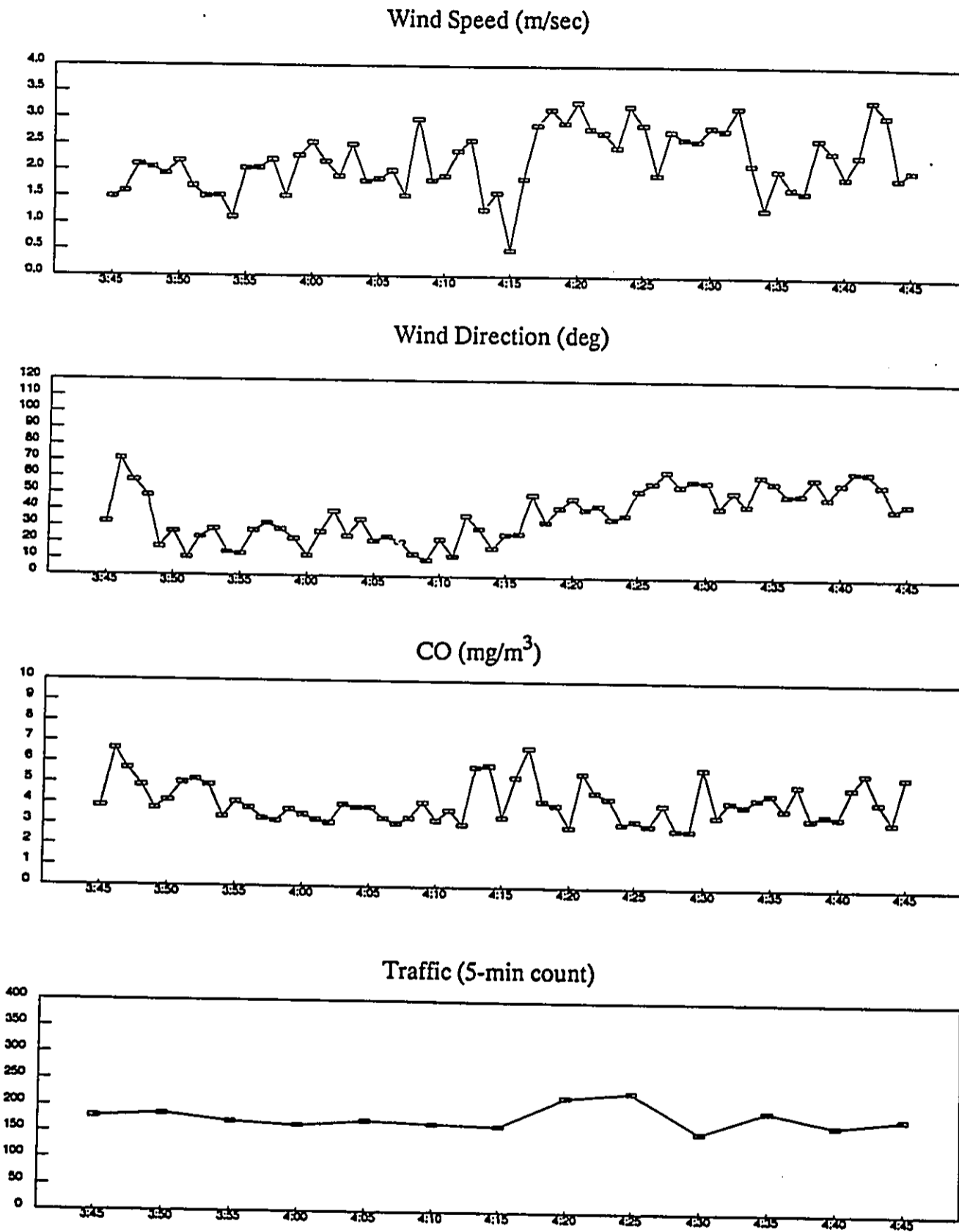
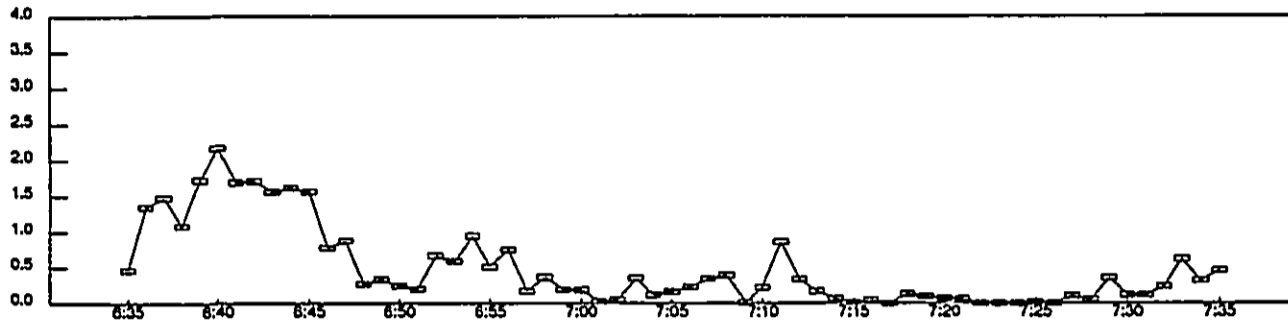
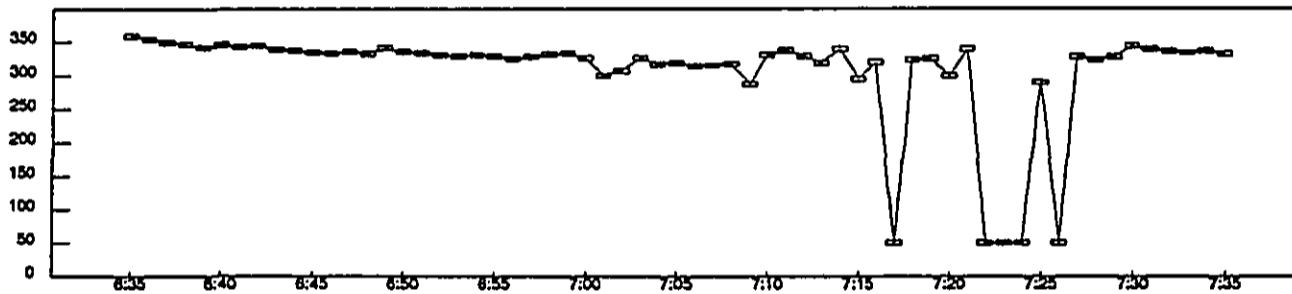


FIGURE 4
A.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT KUNIA INTERCHANGE
SEPTEMBER 28, 1989

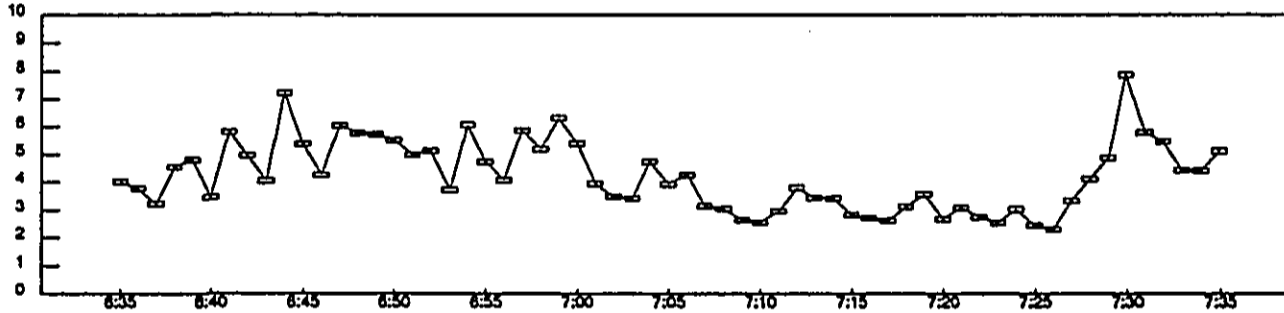
Wind Speed (m/sec)



Wind Direction (deg)



CO (mg/m³)



Traffic (5-min count)

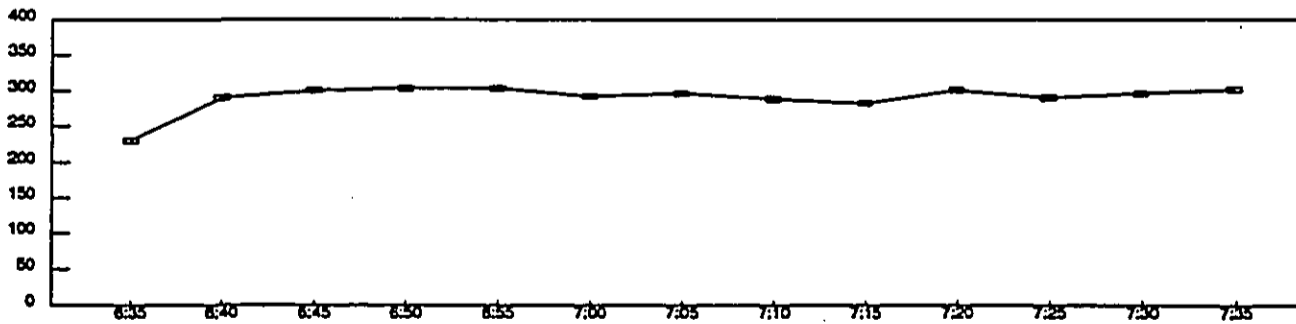
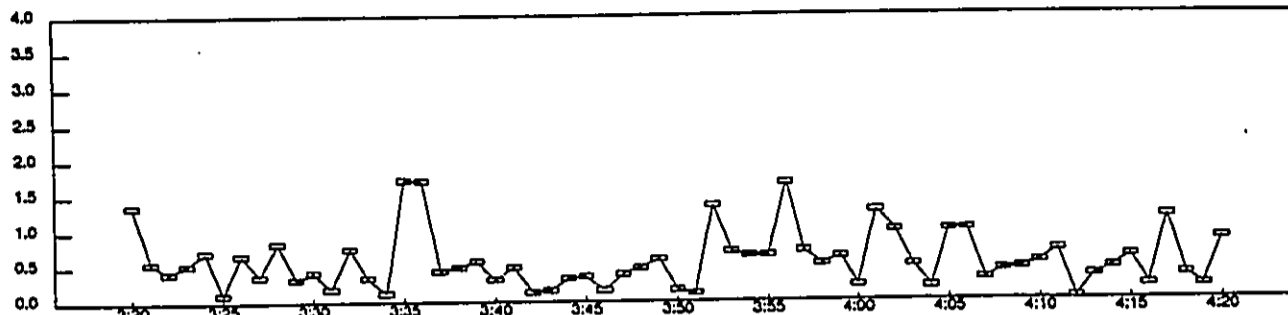
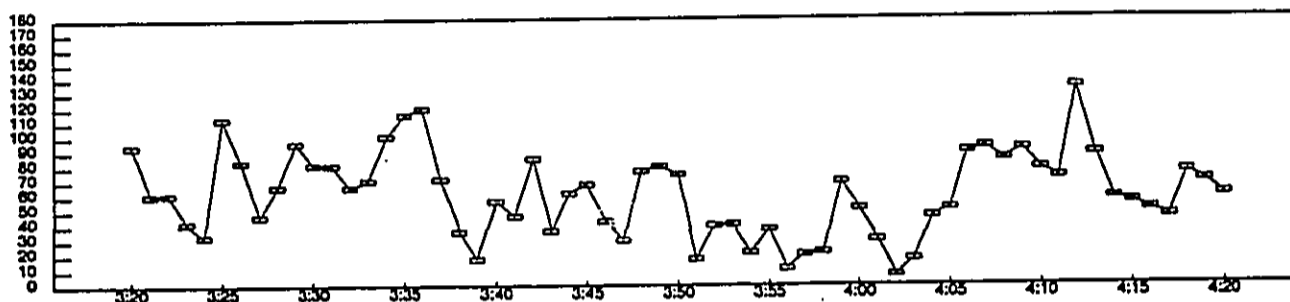


FIGURE 5
P.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT KUNIA INTERCHANGE
SEPTEMBER 28, 1989

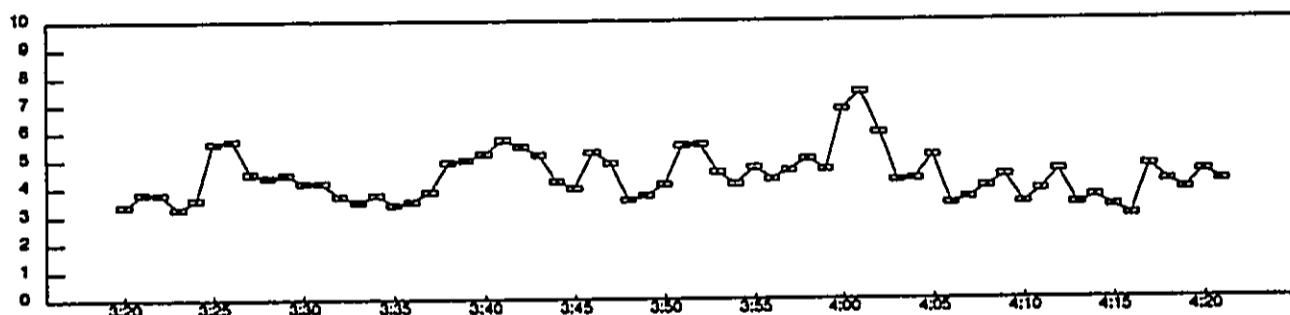
Wind Speed (m/sec)



Wind Direction (deg)



CO (mg/m³)



Traffic (5-min count)

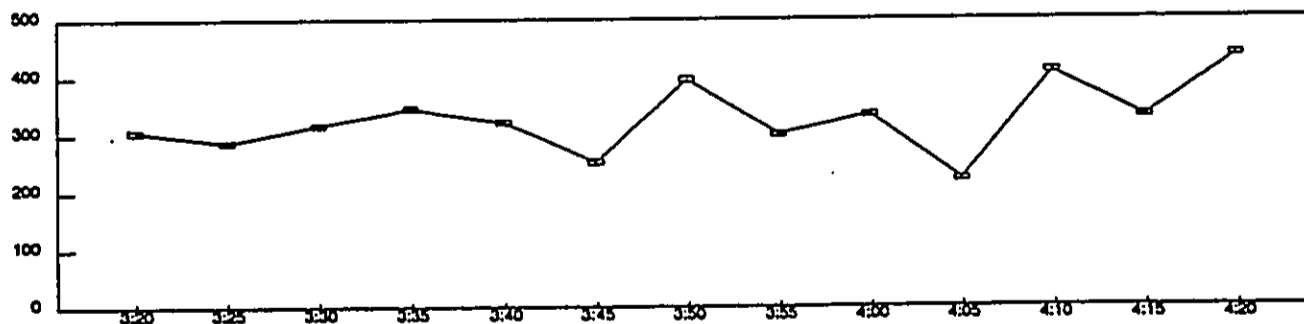
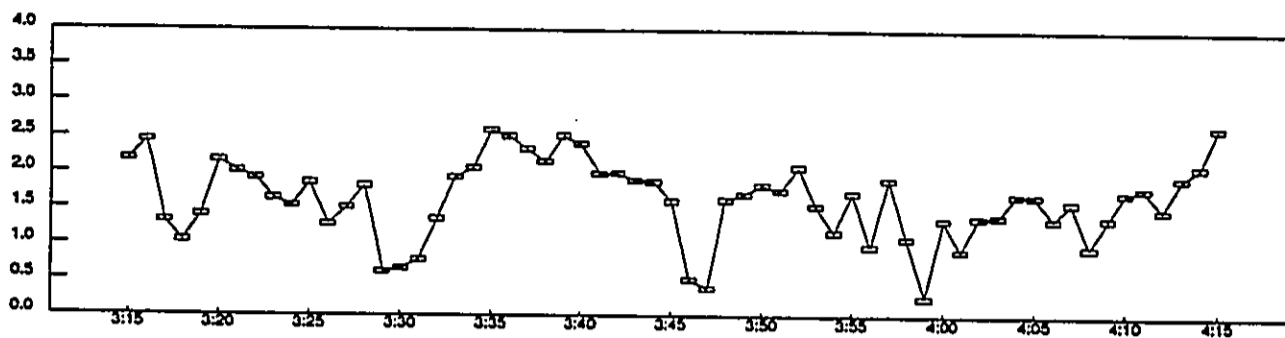
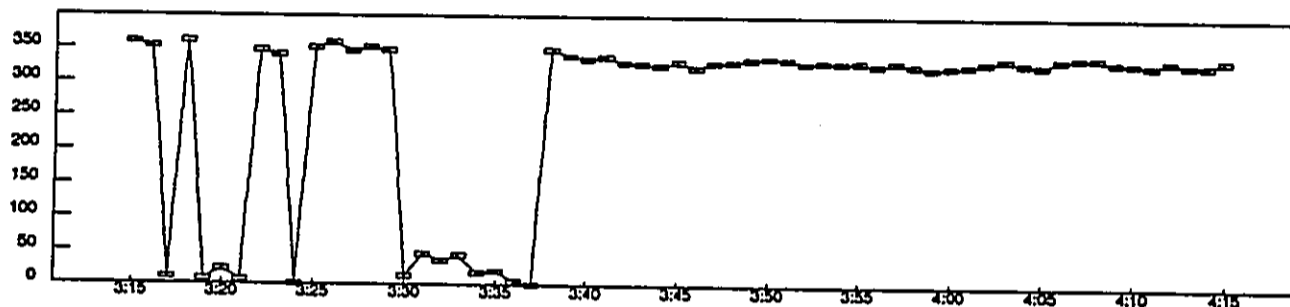


FIGURE 6
P.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT KUNIA INTERCHANGE
DECEMBER 19, 1990

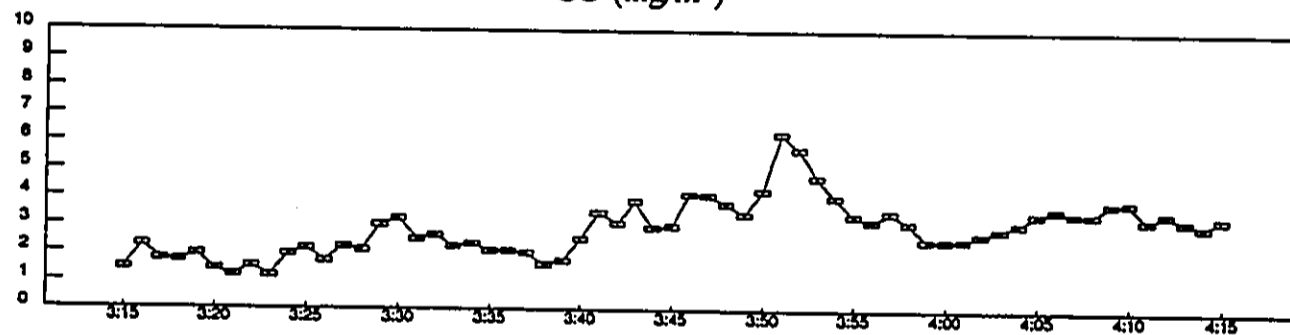
Wind Speed (m/sec)



Wind Direction (deg)



CO (mg/m³)



Traffic (5-min count)

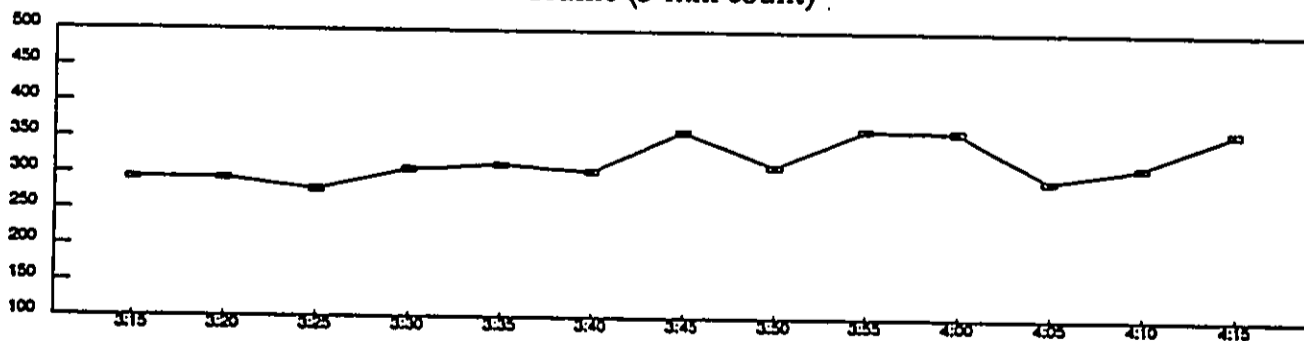


FIGURE 7
A.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT KUNIA INTERCHANGE
DECEMBER 20, 1990

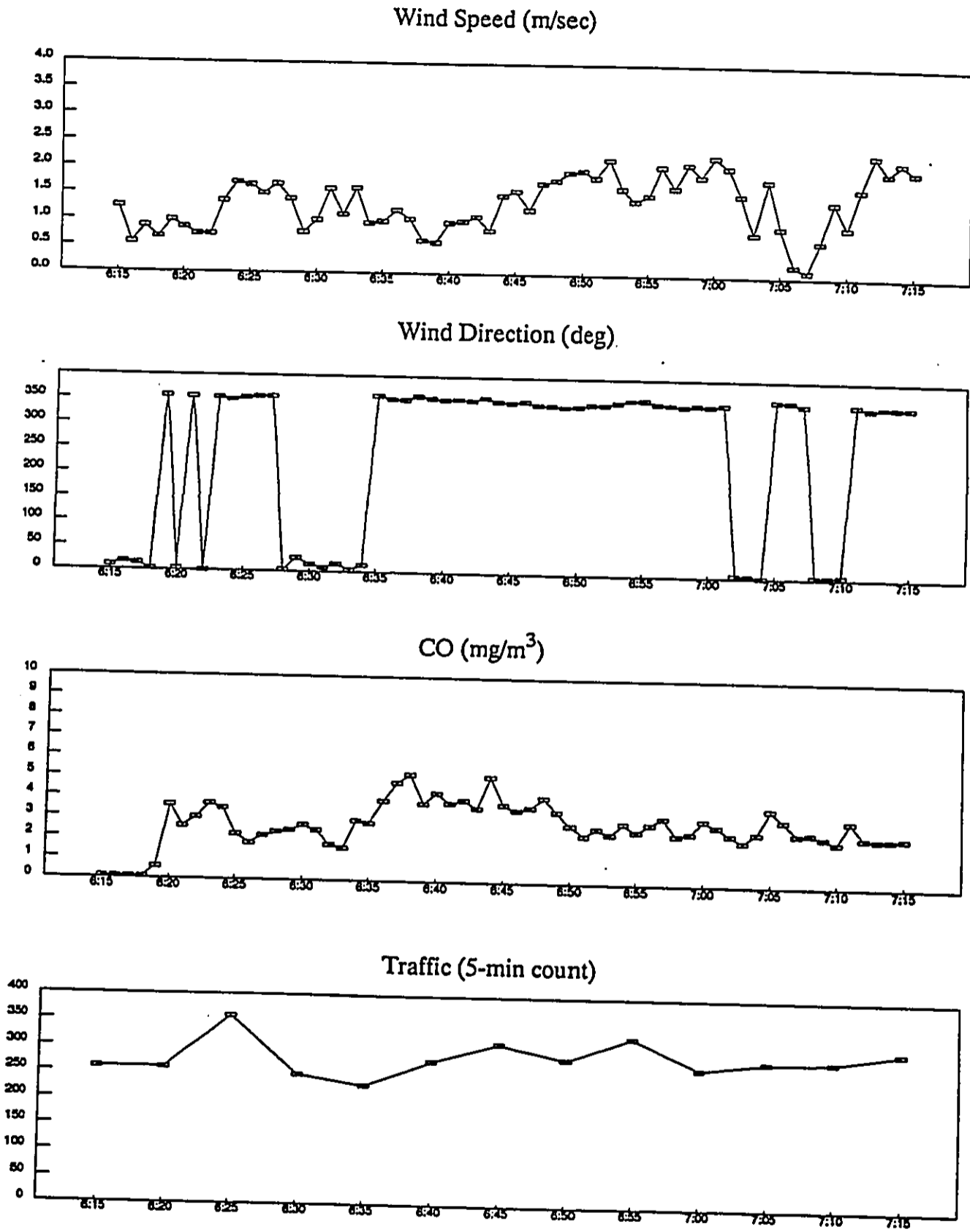


FIGURE 8
P.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT GEIGER ROAD
DECEMBER 20, 1990

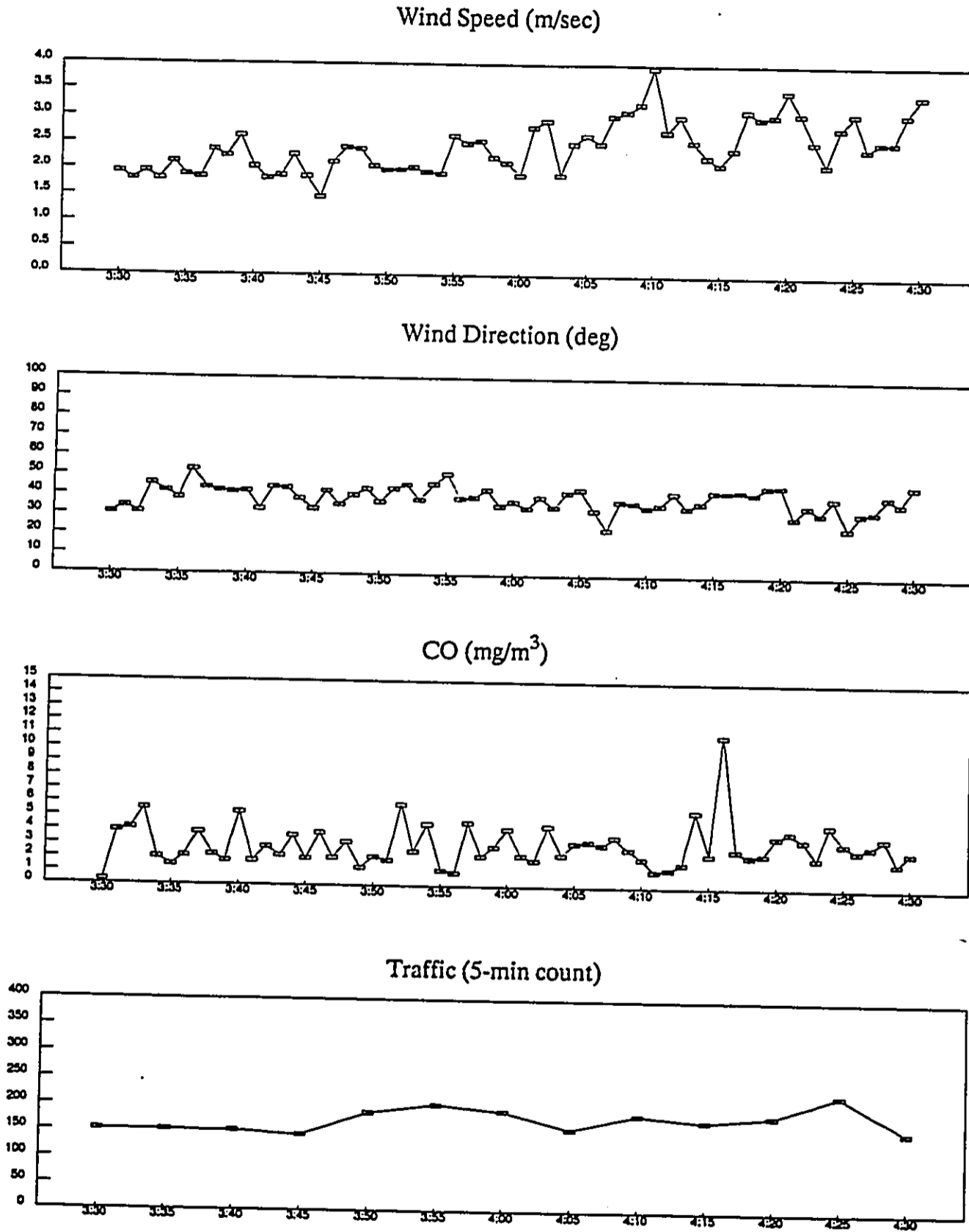


FIGURE 9
A.M. PEAK HOUR CONDITIONS
FORT WEAVER ROAD AT GEIGER ROAD
DECEMBER 21, 1990

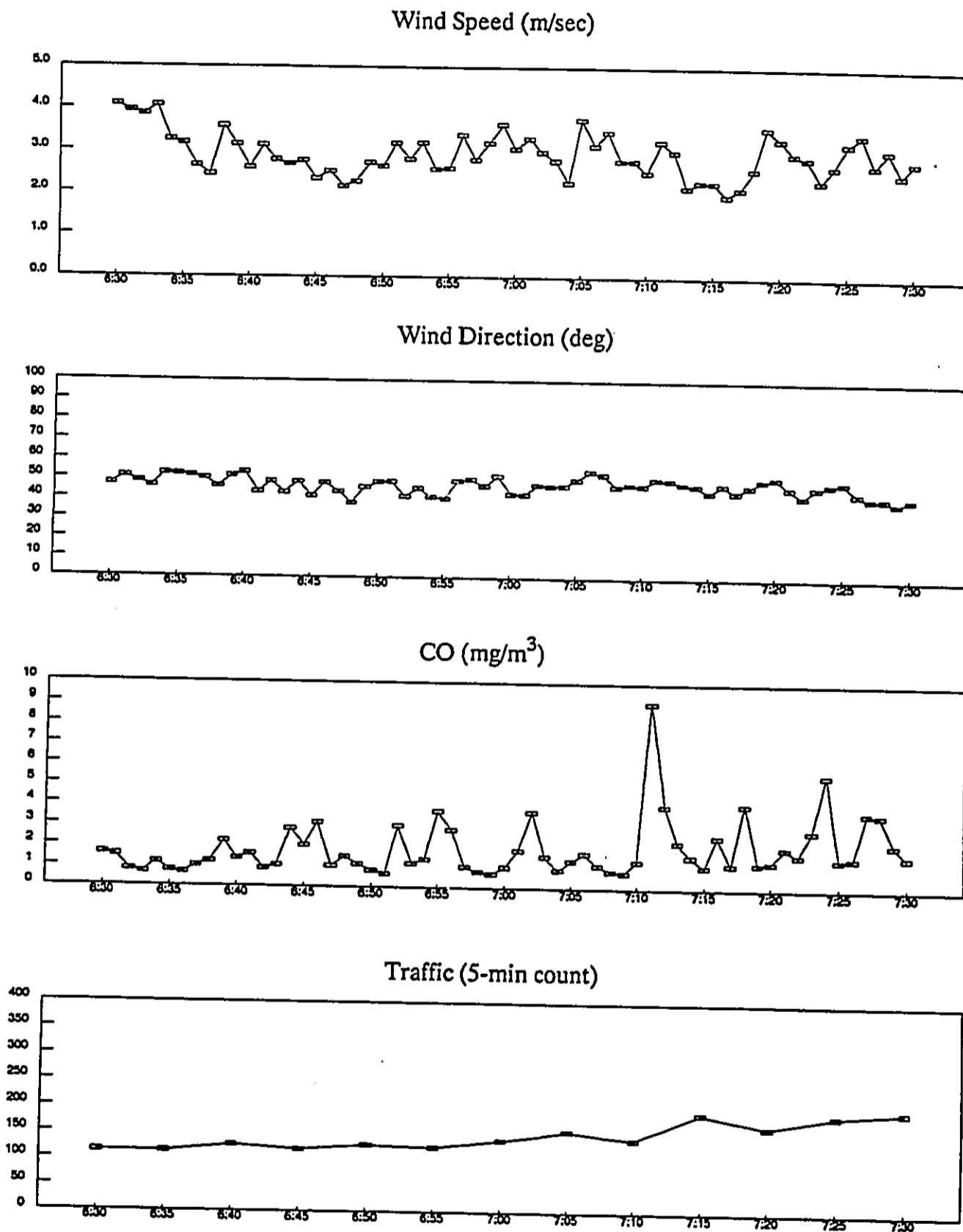
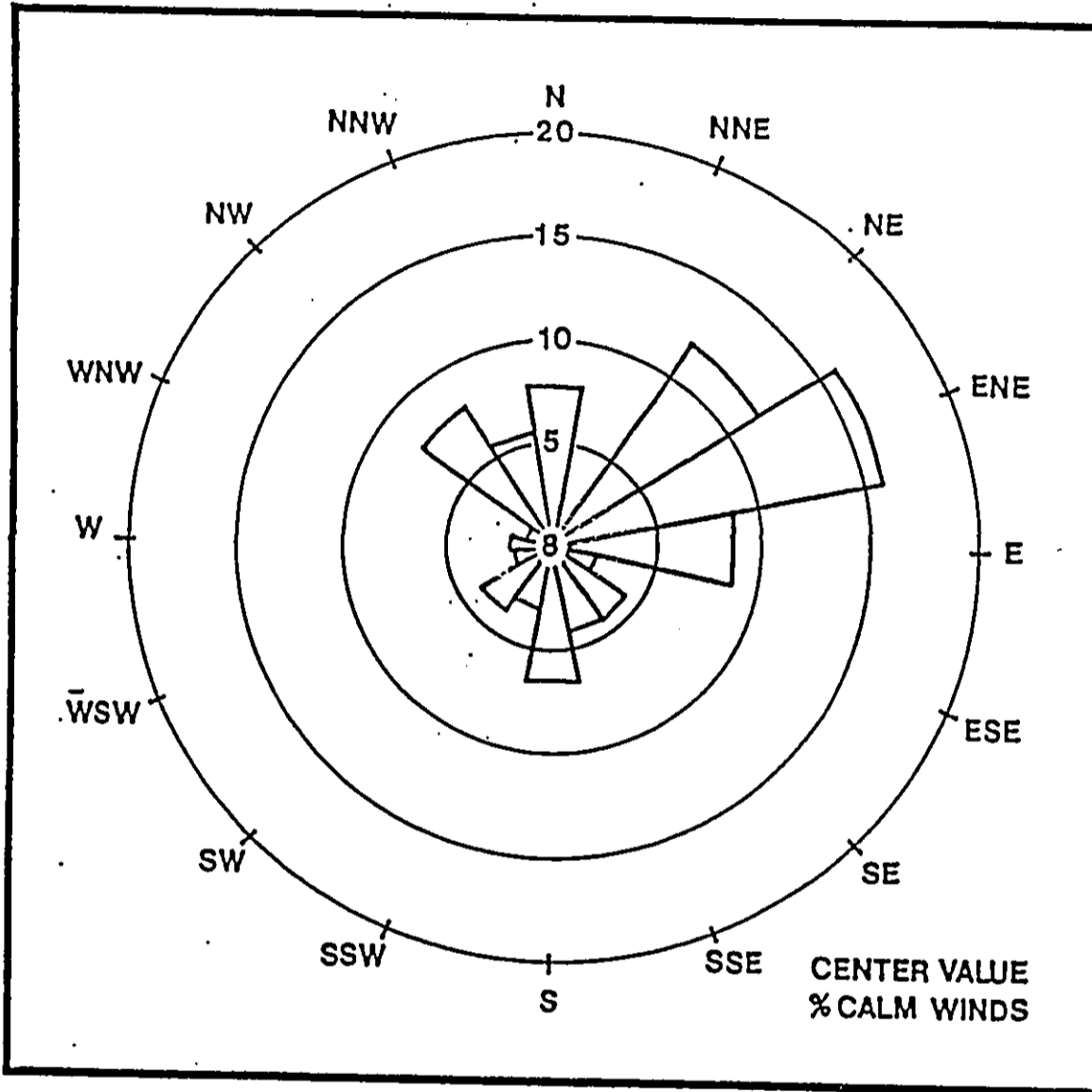
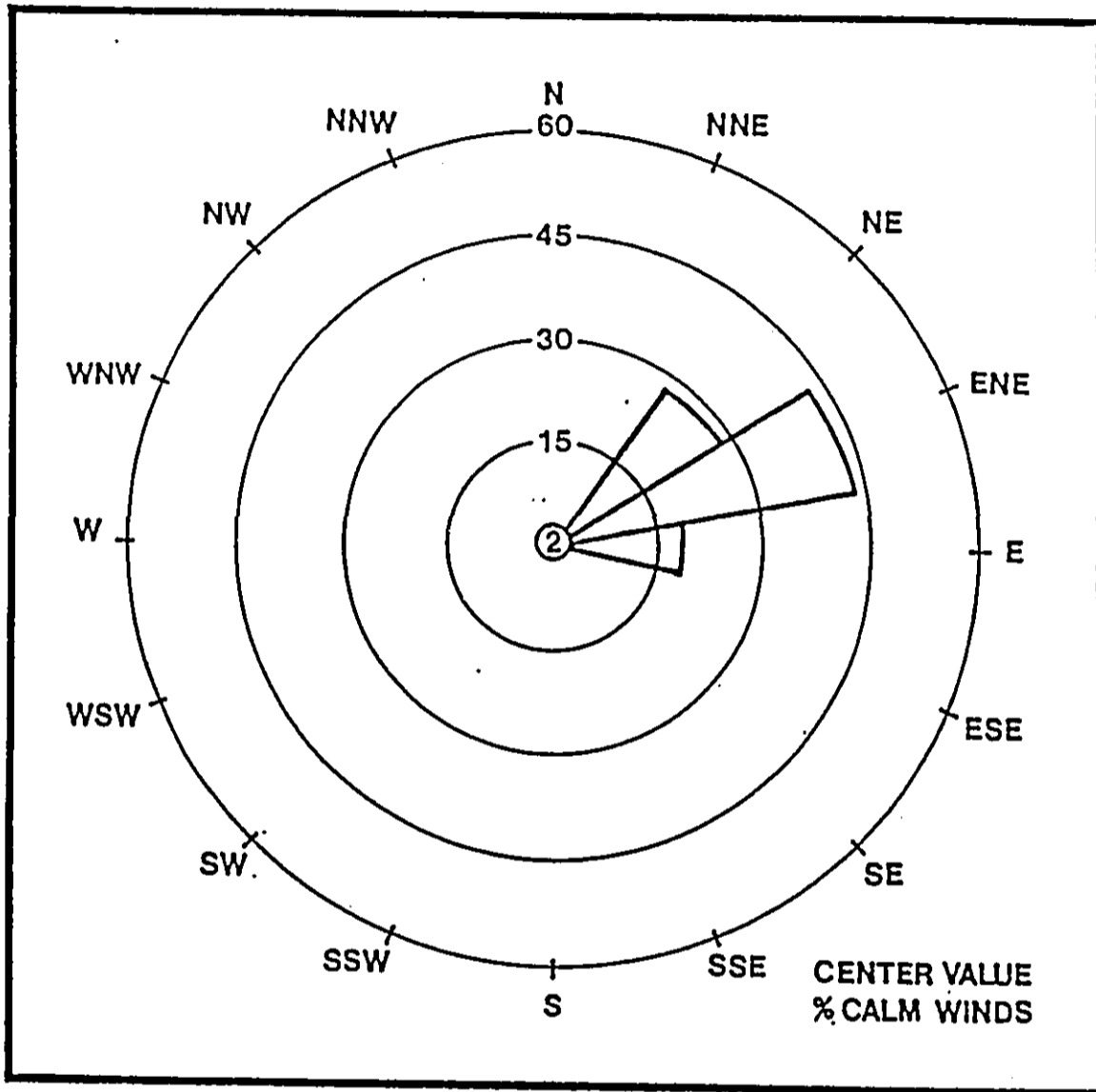


FIGURE 10
JANUARY WINDROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service (1940-67)

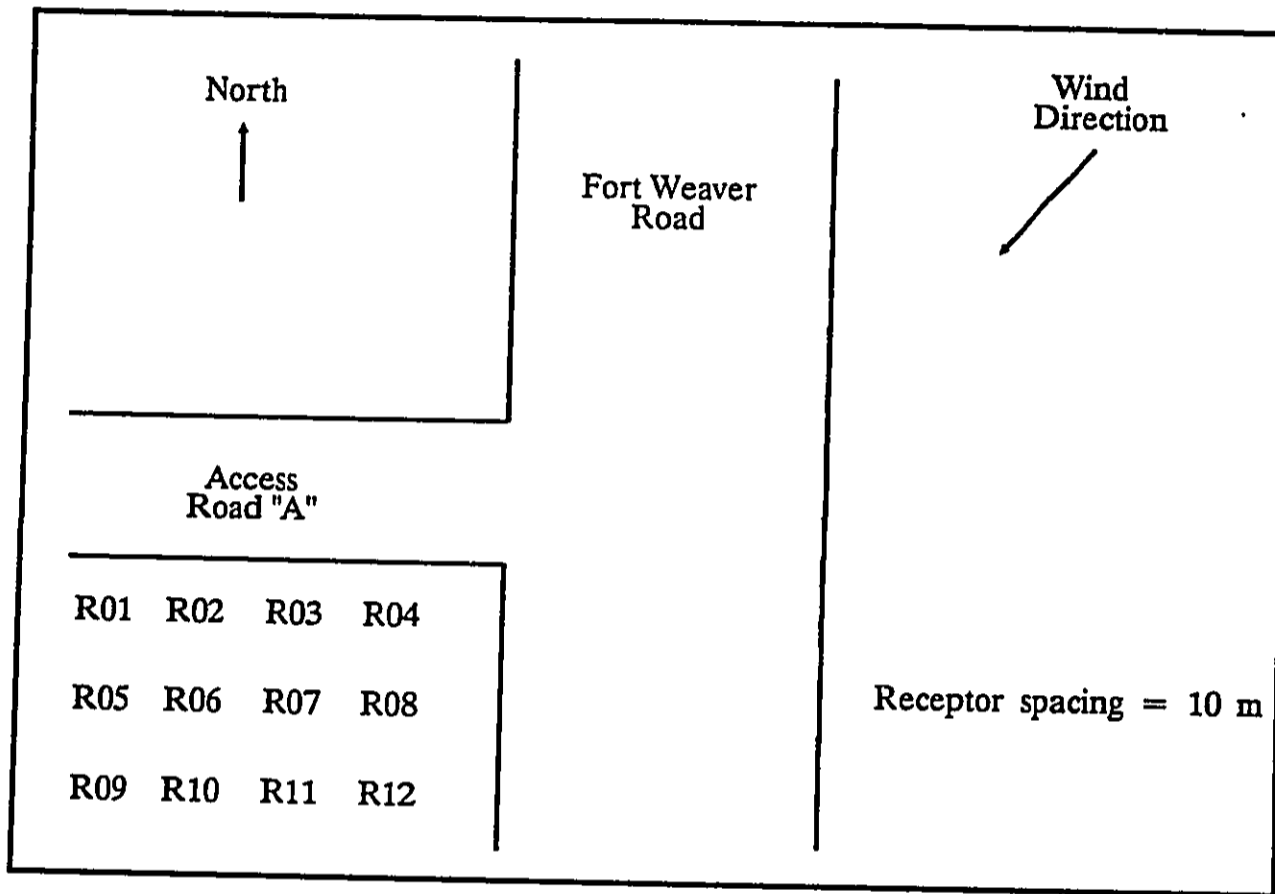
FIGURE 11
AUGUST WINDROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service (1940-67)

FIGURE 14
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS

Fort Weaver Road at Access Road "A"
Peak Traffic Hours
1990 - 2002

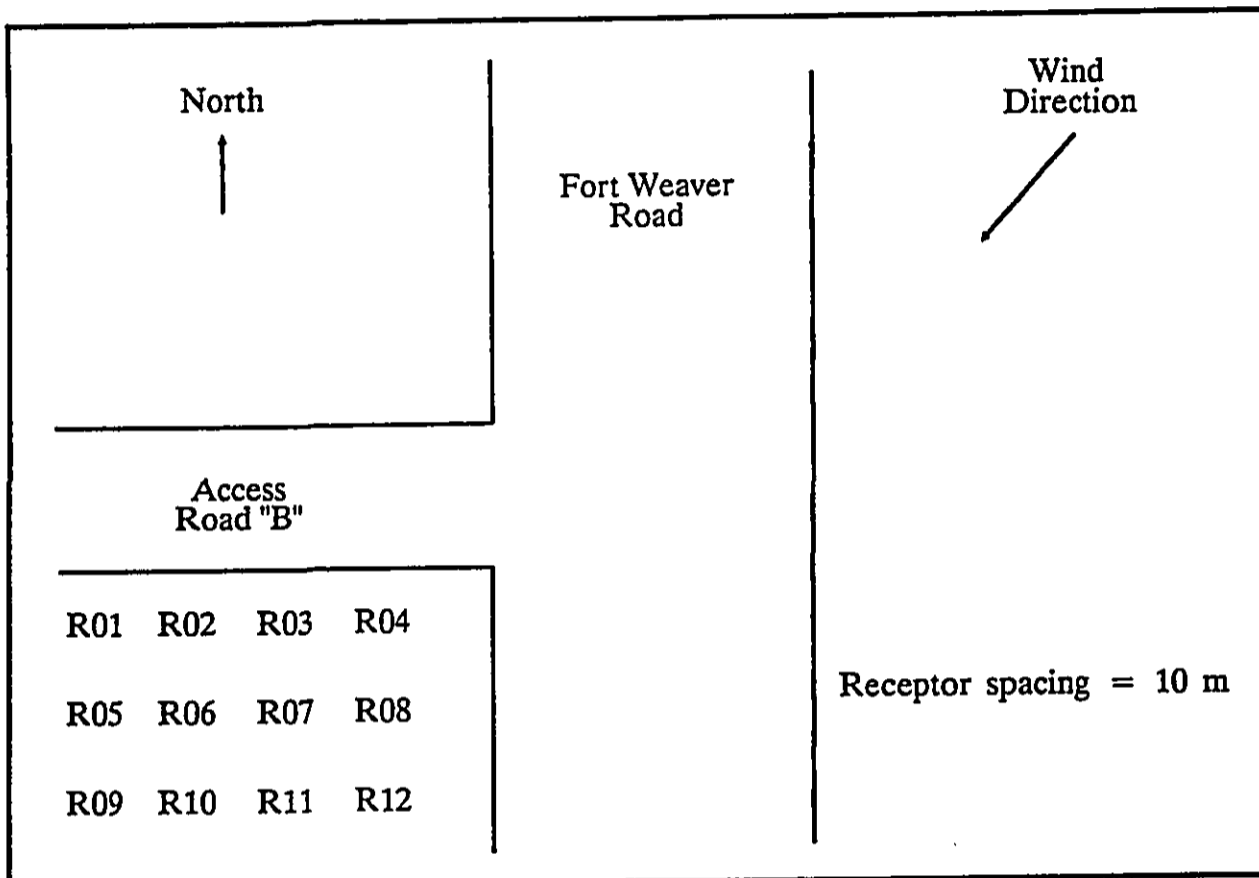


Concentration (mg/m³)

Receptor	1990	A.M.		1990	P.M.	
		2002 w/o	2002 w/proj		2002 w/o	2002 w/proj
R01	2.1	4.1	4.7	1.9	3.2	4.6
R02	2.2	5.4	6.2	2.1	3.9	6.0
R03	2.3	7.0	8.0	2.3	4.9	8.1
R04	2.8	5.7	6.4	2.7	4.4	6.8
R05	2.1	4.1	4.7	1.9	3.1	4.4
R06	2.2	4.4	5.0	2.1	3.3	4.9
R07	2.3	4.0	4.3	2.3	3.2	4.4
R08	2.8	3.2	3.3	2.7	3.1	3.6
R09	2.1	3.5	3.9	1.9	2.7	3.8
R10	2.2	3.3	3.5	2.1	2.7	3.5
R11	2.3	3.0	3.1	2.3	2.6	3.2
R12	2.8	3.1	3.1	2.7	3.0	3.3

FIGURE 15
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS

Fort Weaver Road at Access Road "B"
Peak Traffic Hours
1990 - 2002



Concentration (mg/m³)

Receptor	A.M.			P.M.		
	1990	2002 w/o	2002 w/proj	1990	2002 w/o	2002 w/proj
R01	1.7	4.0	4.1	1.6	3.1	3.4
R02	1.8	5.1	5.5	1.7	3.8	4.2
R03	1.9	6.5	7.1	1.8	4.7	5.4
R04	2.3	5.4	5.8	2.2	4.2	4.3
R05	1.7	4.0	4.2	1.6	3.0	3.2
R06	1.8	4.2	4.6	1.7	3.2	3.3
R07	1.9	3.9	4.1	1.8	3.1	2.8
R08	2.3	3.2	3.4	2.2	2.8	2.1
R09	1.7	3.4	3.5	1.6	2.6	2.5
R10	1.8	3.2	3.4	1.7	2.6	2.3
R11	1.9	2.8	3.1	1.8	2.5	1.9
R12	2.3	3.0	3.2	2.2	2.6	1.7



APPENDIX K

Intensive Archaeological Survey And Test Excavations

Prepared by Paul H. Rosendahl, Ph.D., Inc., January, 1991

**Intensive Archaeological Survey
And Test Excavations
Ewa Marina Community Project - Phase II**

**Land of Honouliuli, Ewa District
Island of Oahu**

PHRI

Paul H. Rosendahl, Ph.D., Inc.

Archaeological • Historical • Cultural Resource Management Studies & Services

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**Intensive Archaeological Survey
And Test Excavations
Ewa Marina Community Project - Phase II**

**Land of Honouliuli, Ewa District
Island of Oahu**

by

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Supervisory Field Archaeologist

and

Alan E. Haun, Ph.D.
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January 1991

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SUMMARY

At the request of Belt Collins & Associates, for their client, HASEKO (Hawaii), Inc., Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an intensive survey and test excavations at the Ewa Marina Community Project - Phase II site (*kiawe* forest portion only), situated in Ewa District, Island of Oahu. The survey and excavations were conducted in February through June 1990, in conjunction with survey and excavations for the Phase I portion of the overall project. The work was conducted under the supervision of Supervisory Field Archaeologist Amy E. Dunn, and under the overall direction of Senior Archaeologist Dr. Alan E. Haun. The overall Phases I and II work was designed to satisfy the federal historic preservation review process required under Section 106 of the National Historic Preservation Act of 1966 (as amended), and to provide the basis for preparation of a Mitigation Plan (MP) that would be included within a Memorandum of Agreement (MOA). This report on the Phase II work is intended to satisfy the requirements of an Environmental Impact Statement (EIS).

During the survey, two sites (3208 and 4293) were identified. Site 4293 is a complex consisting of two mounds and two C-shapes. Site 3208 consists of a platform. Two 1.0 m sq test excavation units were placed at Site 4293, within areas suspected to contain cultural deposits. At Site 3208, one 1.0 m sq unit was placed. No significant cultural remains were encountered in the units placed at Site 4293. A thick cultural deposit was encountered in the unit placed at Site 3208.

Sites 3208 and 4293 are assessed as significant solely for information content. No further work is recommended for Site 4293. For Site 3208, further data collection is recommended. After further data collection is completed it is anticipated that no further work would be necessary.

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INTRODUCTION

BACKGROUND

At the request of Belt Collins & Associates, for their client, HASEKO (Hawaii), Inc., Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted an intensive survey and test excavations at the Ewa Marina Community Project - Phase II site (*kiawe* forest portion only), situated in Ewa District, Island of Oahu. The survey and excavations were conducted in February through June 1990, in conjunction with survey and excavations for the Phase I portion of the overall project (Dunn and Haun 1990). The work was conducted under the supervision of Supervisory Field Archaeologist Amy E. Dunn, and under the overall direction of Senior Archaeologist Dr. Alan E. Haun. The overall Phase I and II work was designed to satisfy the federal historic preservation review process required under Section 106 of the National Historic Preservation Act of 1966 (as amended), and to provide the basis for preparation of a Mitigation Plan (MP) that would be included within a Memorandum of Agreement (MOA). This report on the Phase II work is intended to satisfy the requirements of an *Environmental Impact Statement (EIS)*.

SCOPE OF WORK

The basic objective of the survey and excavations was to collect data sufficient to (a) determine and document as fully as possible the significance of specific archaeological resources, and (b) define as specifically as possible the scope and scale of any subsequent mitigation measures (e.g., data recovery excavations, interpretive development, and/or preservation) that might be necessary or appropriate.

The specific objectives for the overall Phases I and II project area surveys were:

1. **Historical Research** - (a) locate and summarize readily available documents relating to the project area; (b) integrate the findings of this research into a broader historical picture of Honouliuli and the general SW Oahu area; and (c) to assess the potential for further more detailed historical research that might be appropriate in connection with any subsequent mitigation work that might be required;
2. **Intensive Survey and Test Excavations Field Work** - to define for each identified archaeological site, so far as possible on the basis of intensive survey and test excavations (a) overall extent (horizontal and

vertical) and density of cultural deposits; (b) age, duration, and intensity of site occupation; (c) nature and sequence of site occupation; (d) variety and range of cultural activities carried out during site occupation; (e) variety and range of marine and terrestrial resources available to and exploited by site inhabitants; and (f) with regard to sinkholes, both the presence or absence and the general nature of any paleontological remains;

The specific tasks for the field work included:

- a. Accurate locational plotting of all identified sites on an appropriate scale topographic map of the project area;
 - b. Intensive-level survey recording of surface structural sites and features (including detailed plan mapping, surface profiles, written descriptions, and photographs);
 - c. Collection of surface portable remains (artifacts and midden);
 - d. Systematic subsurface testing (by coring) of suspected areas (e.g., sand dunes) to determine the presence or absence of subsurface cultural deposits lacking associated surface structural remains;
 - e. Intensive-level test excavations at selected surface and subsurface sites and features, including recording (detailed plan mapping and stratigraphic cross-sections, written descriptions, and photographs), and collection of portable artifacts and appropriate samples of ecofactual remains and dating materials (charcoal, volcanic glass);
 - f. Test excavations at sinkholes, including a representative sample of sinkholes larger than one meter in diameter, and a representative samples of sinkholes less than one meter found upon examination to have obvious human modifications, side chambers, and/or evidence that they might contain human or fossil bird bone;
3. **Data Analysis and Reports** - Analysis of data recovered during the field work, and preparation of both Interim and Final reports; and

4. Mitigation Plan - Based on the results of the intensive survey and test excavations field work and post-field data analyses, an appropriate mitigation plan would be prepared. This plan would include data recovery, site preservation, burial treatment, and archaeological monitoring elements, as appropriate.

The specific tasks were formulated on the basis of: (a) findings and recommendations of previous work in the general area, (b) review comments on several earlier federal and state EIS-related notices and documents, (c) discussions with PHRI archaeologists with extensive experience in the project area and/or adjacent portions of the Barbers Point and West Beach areas; (d) discussions with Staff Archaeologist Joyce Bath of the State Historic Preservation Office; (e) the general scope of work outlined by the U.S. Army Corps of Engineers (COE letter of 5 September 1989 to BC&A); and (f) the request received from BC&A for the proposal for the project.

The survey was to be carried out in accordance with the standards for inventory-level [intensive] survey recommended by the Department of Land and Natural Resources-Historic Preservation Program/State Historic Preservation Office (DLNR-HPP/SHPO). The significance of all archaeological remains identified within the project area was to be assessed in terms of (a) the National Register criteria contained in the Code of Federal Regulations (36 CFR Part 60), (b) the criteria for evaluation of traditional cultural values prepared by the national Advisory Council on Historic Preservation, and (c) PHRI Cultural Resource Management (CRM) value modes. These evaluation criteria are discussed in detail later in the Conclusion section.

PROJECT AREA DESCRIPTION

The Phase II project area is located adjacent to the Phase I project area, which lies along the east-central segment of the Ewa coral plain (Figure 1). The Ewa plain is a Pleistocene elevated coralline reef that forms the leeward coastal lowlands of southwestern Oahu; it extends 5-8 km south of the Waianae mountains and the adjacent Central Plateau. Pearl Harbor lies at the east end of the plain, while West Beach marks the approximate western end.

The topography of the Ewa coral plain is quite regular, rising to a maximum elevation of about 30 m on an average gradient of less than 1/2 percent from the shore to the uplands. Few features interrupt the monotony of the landscape. Only the low eroded bluffs above West Loch in Pearl Harbor and the two volcanic cones of Puukapolei and Puupalailai

stand out in relief. The ash-cinder cone of Puupalailai is of particular interest to any archaeological study of the Ewa coral plain because this is one of only three known sources of volcanic glass on the Island of Oahu (Manhoff and Uyehara 1976:46). Puupalailai lies to the northwest of the project area, at the base of the Waianae range.

Due to the porous structure of the coral plain, overland runoff is much attenuated at the coast. There are few developed surface drainages in the region, with Honouliuli Stream representing the most significant exception. Intermittent streams include Makaiwa and Waimanalo gulches at the western end of the Plain.

Ewa in general is a semiarid region of intense sunshine, warm dry tradewinds, and little rainfall. At the western end of the plain these conditions are most accentuated. Except for some coastal marshlands, the vegetation is typically xeric and, where undisturbed by modern developments, has become dominated by hardy exotics. There is increasing evidence that prehistorically much of the region was more savannah-like, a grassland studded with thickets and small groves of trees.

The relatively harsh conditions characterizing the region today, as in former times, are primarily determined by geology and the location of the coral plain in the leeward shadow of the Waianae and Koolau mountains. Seasonally shifting wind patterns account for the low annual rainfall, which typically ranges from 300-500 mm. Easterly to northeasterly tradewinds of 10-15 knots prevail c. 75-85 percent of the time during an average year. But due to the rain-shadow effect, the retained moisture less frequently reaches the Ewa Plain in the form of significant quantities of rainfall than is true for many other areas of the island. From October through April, the tradewinds decrease in frequency and intensity and are replaced by more variable kona, or leeward, winds. These kona conditions, especially when they originate from the southeast and southwest, bring in the few winter storms which deposit most of the annual precipitation for this area.

The mean annual temperature in the region is 74-75 degrees F, with a seasonal variation of c. 6-8 degrees F; the winter months are noticeably cooler than the summer months. Diurnal variation is considerably greater than annual temperature variation, ranging from 64 degrees to 84 degrees F in the winter, and from 72 degrees to 93 degrees F in summer.

Despite the relatively low precipitation and the normally restricted surface runoff, coastal Ewa is not without accessible

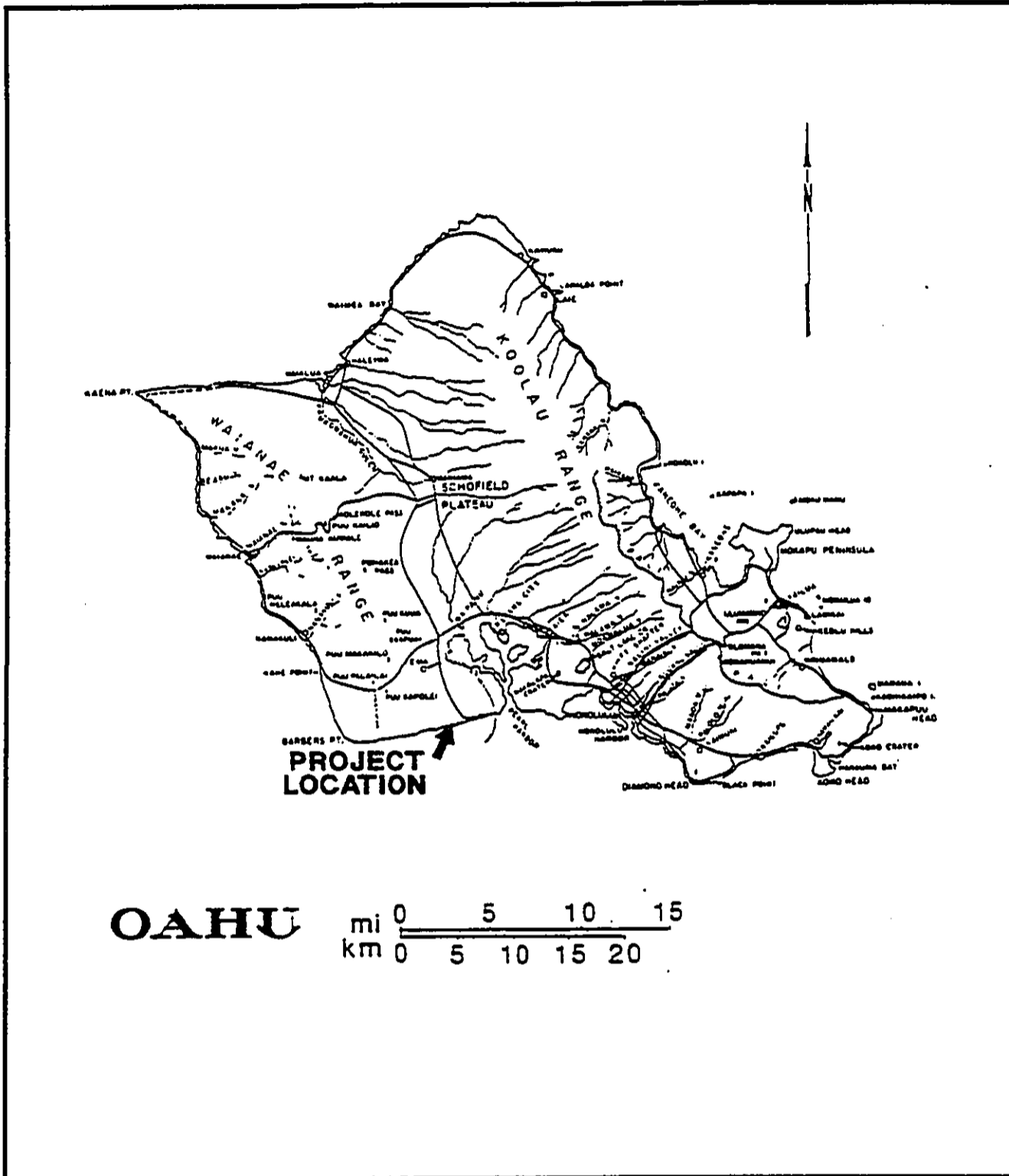


Figure 1. PROJECT LOCATION MAP

**INTENSIVE ARCHAEOLOGICAL SURVEY AND TEST EXCAVATIONS
EWA MARINA COMMUNITY PROJECT - PHASE II**

Land of Honouliuli, Ewa District Island of Oahu

PHRI Project 90-1006 January 1991

fresh water. Prolonged rains during the winter storm season can exceed the capacity of the coral sub-strate to accommodate the increased volume, thus producing extensive sheet-wash flooding at the coast. This was especially evident during the winter of 1981-1982. Groundwater is another important factor in flooding at lower elevations. The water table usually stands 0.3-0.6 m AMSL (above mean sea level). This is only 1.0-3.0 m below ground level through most of the coastal zone; in some areas it appears at the surface as coastal marshlands. Depending upon the combined effect of runoff from the inland zone and the long-term stability of the water table, some of these marshlands may appear only seasonally while others persist year round.

Groundwater in southwestern Oahu is present in two different reservoirs, or aquifers. Basal fresh water is contained in the Waianae Volcanic Series. This is partly overlain by the adjacent coral rock cap containing largely brackish water. Ordinarily, the basal water would flow into the adjacent coral aquifer due to the pressure created by the higher elevation and greater capacity of the catchment that recharges the basal reservoir. But the two are separated by an aquaclude, a dense descending stratum of low permeability formed by terrigenous and marine sediments which act as a barrier to retard the normal flow of fresh water from the basal aquifer. This restricted movement of groundwater between the two reservoirs means that the recharge of the lowland water table must rely primarily on the direct infiltration of the scant rains over the plain, plus the intermittent stream flow and runoff from the adjacent uplands.

Certain aspects of seasonal variation in the region have been discussed in some previous studies. The recent archaeological research in the deep-draft harbor area (Davis and Griffin 1978) suggests that the following elements are important to an understanding of seasonal use of the general region:

- a. **Seasonal Fishery:** The productivity of the Waianae fishery is legendary. It is also generally acknowledged that winter and spring (January to May) are the most productive seasons. The higher productivity of this fishery during this time of the year is apparently correlated with a number of seasonal variations, both oceanographic and biologic. Contributing factors include (a) the prevailing southeasterly surface and near-surface currents and their associated gyres; (b) the synchrony of peak reproductive activity among Hawaiian reef fish with the occurrence of the southeasterly current; (c) the North Pacific Swell and its effect of upwelling cooler nutrient-rich

waters from deeper levels into the upper water column; and, (d) the greater aggregation of fish attracted to the increased food levels over the submarine outcrops and escarpments where this upwelling occurs;

- b. **Seasonal Effects on Terrestrial Resources:** There is apparently little in the way of conspicuous seasonal variation in the vegetation, other than perhaps flowering and seed-bearing among several species like the *wiliwili* tree (*Erythrina sandwicensis* Degener), and new leaves resulting from precipitation in November through April. For avifauna, there are the following seasonal cycles. Note that the potential overlap of stages from one period to another is not indicated. Note also that this is only a partial listing since no data are available for many of the species identified to date:

- (1) For the Hawaiian Goose, breeding adults arrive at nesting sites in lower elevations from October to November and egg laying begins shortly thereafter. Hatching is underway by December and January. The chicks remain in the nest until February or March, by which time the young have fledged and are beginning to fly. Adult birds are also going through their postnuptial molt and are flightless at this time. Finally, from April through September most, if not all, of the geese return to their upland feeding in the interior. A few birds possibly remain at lower elevations;

- (2) For upland forest birds, May to October finds them resident in the uplands, with only occasional excursions to lower areas. These birds frequent lower elevations from November to April; and

- (3) For the Petrel (excepting two species), Shearwaters, and Tropic Birds breeding adults begin arriving at nesting sites in April and egg laying continues until August. Hatching begins about June and there may be chicks in the nest through mid-October. Finally, from November to March all the pelagic birds are away at sea. The nesting sites are generally abandoned at this time, with the exception of the White-tailed Tropic Bird which appears to remain in the general vicinity. For Markham's Storm Petrel and the Bonin Island Petrel, eggs are laid in January and February, and chicks begin hatching in March. The young remain in the nest until June. These are also pelagic species and are at sea from July to December.

ARCHAEOLOGICAL CONTEXT

The earliest archaeological evidence for settlement of Oahu and the Hawaiian Islands dates to about AD 300-500 (Kirch and Kelly 1975; Pearson, Kirch, and Pietruszewsky 1971; Schilt 1980). The settlers who came at that time originated from an unspecified island in Eastern Polynesia. Initial settlement is believed to have occurred along the wetter and more fertile windward coasts where "conditions were optimal for marine and terrestrial exploitation along lines followed previously in Eastern Polynesia" (Green 1980:1). This exploitation involved a variety of techniques for obtaining fish and shellfish from the sea, gardening, animal husbandry, and utilization of the natural terrestrial flora and fauna (Kirch and Kelly 1975; Pearson, Kirch, and Pietruszewsky 1971).

The settlement pattern consisted of a series of widely spaced, permanent home settlements that are thought to have gradually given way to a nearly continuous series of settlements along the windward coasts as the population grew. Leeward settlement is believed to have begun only after windward areas were settled. It is currently unclear whether the earliest leeward coastal settlements were permanent or seasonal/temporary. Inland leeward settlement, at least on a permanent basis, is thought to have occurred only after the development of inland dryland agricultural techniques. Evidence currently available indicates that inland leeward settlement did not occur until 600 to 900 years after initial settlement, or between about AD 1100 and 1400 (Green 1980; Hommon 1976).

Hypothetical reconstructions based on data from archaeology, linguistics, and ethnology suggest that early Hawaiians were organized in a typical Polynesian conical clan pattern in which individual status was based on genealogical ranking (Green 1980:72). Kinship formed a basis for regional and island-wide societal integration; however, the most important social subsistence unit was the localized territorial community-based corporate kin group. Leadership within this group fell to the "highest ranking individual of the locally dominant, socially ranked lineage" (Green 1980:73). This individual acted as the local chief, overseeing the social, political, and economic functioning of the community.

The subsequent development of a uniquely Hawaiian innovation, the *ahupua'a*, resulted in a more complex level of social and political integration (Hommon 1976; Green 1980). The *ahupua'a* is a traditional Hawaiian land division ideally extending from the coast to the mountains, often corresponding with a valley drainage. The chief or manager

(*konohiki*) of an *ahupua'a* extracted rents or tribute from the people (commoners or *maka'ainana*) who worked the land. The chief was a member of a non-localized ruling elite (*ali'i*). Thus, the earlier kinship-based relationship between a chief and his local community no longer existed.

Green's (1980) summary of the prehistory of Makaha Valley and the probable pattern of adaptation by Polynesians to the Hawaiian high-island ecosystem is of direct relevance for understanding the prehistory of the Ewa coral plain area in general and the Marina project area in particular. Makaha prehistory begins with a hypothesized coastal settlement in the late first millennium AD. Although the nature of coastal settlement is unknown because of land modifications and the lack of archaeological investigations on the coast, it is believed to have consisted of habitation structures associated with nearby garden areas (Green 1980:74). Marine exploitation is thought to have played a prominent role in the subsistence economy, and the presence of a small *heiau* has been interpreted as reflecting a lineage-based system of local chiefly leadership.

Some between the 12th and 14th centuries, if not before, cultivation of inland areas began. Dryland field systems marked by stone walls appear to be associated with small field shelters (C-shapes and other enclosure types) that were used on a temporary basis by people tending the fields, but who lived permanently in the coastal settlement (Green 1980). Irrigated terrace systems were in use by the 15th century in the uppermost part of Makaha Valley. Permanent inland settlement is thought to have begun by this time period (Green 1980:76). There is abundant evidence for permanent inland habitation during the 17th century, including rectangular dwellings, religious structures (stepped-stone platforms, shrines, and other specialized architecture). Large-scale construction of irrigation works and the rebuilding and expansion of an inland *heiau* at Makaha indicate that, by the mid-1600s, this area had become an *ahupua'a* unit in the "larger scale, complex rank social systems typical of Hawai'i at the time of contact" (Green 1980:76).

While the conditions on the western Ewa coral plain are considerably drier than those existing at Makaha, many of the archaeological remains reported from the lower valley have also been found in the coastal zone of the Ewa region, and may represent associations generally similar to those suggested above for coastal Makaha. At the west end of the Ewa coral plain, Honouliuli gulch and stream provided a much closer physiographic approximation to Makaha, and it is likely that the Makaha pattern was generally duplicated within this area. Recent research provides some evidence in support of this contention (PHRI Project No. 88-440), although

the extensive agricultural-related and other disturbances to the area have undoubtedly destroyed numerous features dating to the 14-17th centuries, while others have likely been deeply buried by extensive sediments washed down from the Waianae Range to the north.

PREVIOUS ARCHAEOLOGICAL WORK

A significant number of archaeological projects have been conducted on the Ewa coral plain, extending from West Loch through Ewa Beach, around Barber's Point, and to the West Beach area near Kahe Point. The most substantial recent projects include those by Lewis (1970), Davis (1980a, 1980b, 1981, 1982), Davis and Griffin (1978), Hammatt and Folk (1981), Barrera (1975), and Sinoto (1976, 1978, 1979).

The earliest reference to archaeological remains in the area (Thrum 1907:46) mentions a *heiau* situated on Kapolei Hill in Ewa. The site was apparently destroyed for its stones, either for use in constructing fences, or crushed for building material (McAllister 1933), and nothing is known concerning its original size or type.

McAllister (1933) listed many sites in Honouliuli; however, most are located at Pearl Harbor or high on the ridges of the Waianae Range. The Barbers Point area and much of the Ewa coral plain are subsumed under his site number 146. Concerning this site area he stated:

Ewa coral plains, throughout which are the remains of many sites. The great extent of old stone walls, particularly near the Puuloa Salt Works, belongs to the ranching period of about 75 years ago. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation and even today one comes upon bananas and Hawaiian sugarcane still growing in them (McAllister 1933:109).

McAllister also identified a rock shelter located on the same hill (Kapolei) as the *heiau* noted by Thrum, where the pig-god Kamapua'a is said to have resided with his grandmother (McAllister 1933:108). A well-preserved house site and possible *heiau* located on the western part of the Ewa Plain, adjacent to Kalaeloa Boulevard, were examined by Emory (Bishop Museum Site Files [1933]). Both structures had been constructed of stacked limestone slabs and uprights, but had been destroyed during the course of sugarcane cultivation.

In 1959, William Kikuchi removed 12 to 16 incomplete human burials from a limestone sink (Site 50-0a-B6-10) prior to the construction of the Standard Oil refinery (Oahu Sites Folder 01.1 and Site Card in Dept. Anthropology, Bishop Museum).

In 1962, Lloyd Soehren recorded a burial at the Naval Air Station (Bishop Museum Files). The burial, a secondary interment, was found in a sinkhole located near house sites and modified pits.

In 1966, Soehren recorded and excavated a possible fishing shrine that was to be destroyed in the course of constructing a barge harbor (Site 50-0aB6-13; Oahu Sites Folder 01.1 and Site Card in Dept. Anthropology, Bishop Museum). Excavation revealed a pre-construction layer containing large amounts of fish scales. Dog, fish, and shellfish remains, and a one-piece rotating fishhook, were recovered from the architectural fill.

A beach midden site (50-0a-B6-14), located south of the barge harbor in Camp Malakole, was recorded by Roger Green for the Bishop Museum in 1969. Discovered during construction of a pipeline that cut through the site, Green collected surface artifacts including a bone awl, a coral file, a one-piece fishhook point fragment, and a piece of cut bone. The site was subsequently tested by Davis (Davis and Griffin 1978), revealing two components both characterized by charcoal-stained sand, charcoal, fire-cracked rocks, burned coral, and artifacts. The upper layer exhibited pits containing ash and charcoal.

Lewis (1970) has summarized the available historical data for the Ewa coral plain. The data indicates a sparse population at European contact, which was further reduced shortly thereafter. Early travelers made few comments about the region, and many native Hawaiians avoided the area, apparently preferring to use trails further inland. In 1969 and 1970, Lewis also conducted the first extensive archaeological survey and excavations in an area inland of Malakole Road. Lewis summarized his archaeological research, as follows:

For our area we find many kinds of sites - houses and house compounds; cairns mounds, ahus of myriad size and shape; pits that may have had cultural uses; walls of several types. It is obvious that the people at some time adapted themselves to life on this near-barren coral expanse. Though much of the land has been put under cane or concrete, there is yet a large area in which we may expect to find many additional sites to the few we have. Thus

there is hope that we can define something of the past life of the Hawaiians who lived in such a seemingly un-Hawaiian place (Lewis 1970:42).

Lewis considered the area to be so marginal that it would only have been settled after more desirable locations had been occupied, and that one should not ascribe patterns of adaptation, known from other parts of the islands, to west Ewa. The primary food source was thought to be the sea and reef. The possibility of raising fish (mullet) in brackish-water ponds, and limited agriculture associated with pits and mounds is also noted, as is trade as a potential means for obtaining non-marine foods and other resources.

The Department of Anthropology of the Bishop Museum conducted a reconnaissance of c. 900 acres at Barbers Point in 1975 (Barrera 1975). Inland areas were examined to relocate sites recorded by Lewis in 1969 and 1970, and to locate additional sites. Seaward areas were examined to determine the extent and density of surface remains. A total of 24 sites was located, and historic sources were researched. Nine of Lewis's sites were relocated within the survey area, and one could not be found. At least five of Lewis's sites had been destroyed. Twelve new sites were recorded. Site types included limestone sinks, house sites, walls, cairns, enclosures, shelters, a terrace, a midden deposit, a paved area, a burial cave, and many mounds; the latter are typically constructed of coralline limestone boulders and cobbles. A triangular basalt adze was found on the surface within an enclosure.

Barrera (1975) concluded that prehistoric occupation of the Barbers Point area was demonstrated by the presence of midden and artifacts. Fishing was considered to be the primary prehistoric use of the area, and was evidenced by fish bones and scales, fishhooks, and sinkers. No indications of agricultural activities were present, but Barrera suggested that some of the mounds may have been used for cultivation of ti (*Cordyline terminalis* [L.] Kunth) and sweet potato (*Ipomoea batatas* [L.] Lam.), and recommended further survey and excavations to document this possibility. The settlement pattern was described as "dispersed clusters of residences, surrounded by a relatively open and little-inhabited area" (Barrera 1975:18). The Barbers Point locality was considered a potentially important locale for archaeological research because it represents "the prehistoric Hawaiian adaptation to a unique set of ecological circumstances (raised reef, low rainfall, and immediate proximity to deep ocean)" (Barrera 1975:18).

Sinoto (1976) provided a list of sites and features recorded for Barbers Point in four survey areas designated A through D. A total of 97 sites was identified, including 17 previously recorded by Lewis (1970) and 36 reported by Barrera (1975).

All sites were assigned Bishop Museum site numbers (50-0a-B6-22 through 137; B6-58 through 137 added by A. Sinoto). The most common features recorded were unmodified limestone sinks (80 total), walled sinks (17), rectangular enclosures (18), C-shape enclosures (12), wall segments (14), and *ahu* (15+). Other infrequent sites/features included cairns, complexes of walls and enclosures, an L-shape wall, a ramp associated with a sink, a filled sink, railroad tracks, a cyst, a trail, platforms (2), and culturally modified caves (3). Sinoto (1976) undertook excavation at a total of 27 sites. An important result of the excavations was the discovery, within limestone sinks, of six fossil bird bones; the bones were deemed potentially important for paleontological research.

In 1977 an archaeological and paleontological salvage project was conducted by the Department of Anthropology, Bishop Museum, to mitigate the impacts of constructing the deep-draft harbor at Barbers Point (Sinoto 1978). Five archaeological and 13 paleontological sites were excavated. The excavations at the five archaeological sites produced portable artifacts (25), and midden, soil, and land snail samples (Sinoto 1978). In general, the excavations evidence a high degree of disturbance at project area sites. Sinoto noted only a single component, or cultural stratum, among all of the excavated sites. Basaltic glass from one site (Site B6-70) was hydration-rind dated to the 17th century (AD 1612-1650). Artifacts consisted of single specimens of the following artifact categories: adze, adze chip, basalt flake, basalt hammerstone, coral abrader, coral file, fishhook fragment (Type S-IA/B-HT 4; after Emory, Bonk, and Sinoto 1959), modified bird bone, and polished hematite. A total of ten pieces of basaltic glass and three unmodified basalt flakes were also recovered from the excavations. Midden materials consisted primarily of mollusca, echinodermata, and Crustacea, species which commonly inhabit nearby shallow waters, the reef, and the surge zone. Tuna (*Scombridae* sp.) was the only fish remains identified, and bird bones were scarce. Mammal bones were primarily rodent, with minor amounts of human bone.

Several trends in prehistoric utilization of the area, as evidenced by the archaeological remains, were discussed by Sinoto (1978). Construction of surface architectural features incorporated natural features such as outcrops surrounding low lying areas. Habitation-related structures were oriented in a manner that offered protection from the prevailing winds (i.e., highest walls along the northeast side of habitation areas). Sinkholes, when sufficiently large, evidenced habitation, and were often modified and incorporated into clusters of surface structures. The prehistoric utilization of the area was interpreted as short term, temporary, or seasonal and/or specialized. This interpretation was based on consistently thin cultural stratigraphic units, the absence of

internal features such as fireplaces, and low artifact and midden densities. The stratigraphic consistency and range of dates from Sites B6-58 and B6-70 suggested that regional sites represent a "coeval occupation." The artifacts, midden, and the presence of *ahu* were interpreted as evidence for fishing-oriented activities.

In 1978, Davis and Griffin (1978) discussed previous research in the Barbers Point area. They recognized the tentative nature of some of the earlier hypotheses advanced by Lewis (1970) and Sinoto (1976), particularly the hypotheses suggesting permanent occupation of the area and the comments re. plant cultivation. Davis and Griffin, on the contrary, suggested another plausible interpretation of the existing data. Their suggestion was that these sites simply represented use and revisitation over an extended period of time. Furthermore, contrary to Lewis' earlier assertion, Davis and Griffin suggested that techniques for cultivating atoll environments could have been readily applied to the more or less equivalent environmental context at Barbers Point. Intensive labor practices, involving mulching and tapping the subterranean brackish water lens, for example, would have permitted small-scale food production within this area.

Sinoto (1979) conducted survey and test excavations in an 80-acre parcel adjacent to the area which he had previously surveyed in 1976. No new architectural types were present, but Sinoto (1979:32) did note variation in the "intensity in the exploitation of the two areas." Sinoto's research focused on continued evaluation of paleontological significance. In addition to locating over 500 testable limestone sinks using a systematic quadrant sampling design, 24 sinks were actually evaluated. Sixteen percent of the excavated sinks were found to contain extinct avifaunal remains, and Sinoto (1979:34) outlined four categories of significance or potential significance for the avifaunal remains which he had inventoried:

1. Species of birds that are totally extinct in the Hawaiian Islands, with no historic record of extinction;
2. Species of birds that still exist today in the Hawaiian Islands but that occupy a totally different type of habitat from that of Barbers Point;
3. Species of birds that are extinct on Oahu Island; and
4. Species of birds that are totally extinct in the Hawaiian Islands today, with a historic record of extinction.

In the mid-1980s, resort, commercial, residential community, and public recreation developments were proposed for a 640-acre parcel situated at the far west end of the Ewa coral plain. Known as West Beach, the area was subjected to intensive inventory survey and test excavation work, which resulted in identifying 181 component features at 48 separate sites (Davis and Haun 1986). Sites included habitation complexes with and without architectural features, gardening areas, and both primary and secondary human burials. Typical features included trash dumps, large cairns and isolated examples, and numerous modified sinkholes, some containing cultural refuse.

Dating results confirmed that most of the occupation likely dated to the latter centuries of the prehistoric sequence. However, samples from some rockshelters and cultural deposits identified near an old buried marshland suggested initial use/occupation as early as the period of initial Polynesian settlement of Oahu, and possibly during the period of initial Polynesian settlement of the Hawaiian Islands overall. The West Beach project thus yielded the first clear evidence of early occupation within the leeward zone of Oahu.

Recommendations for additional data collection work and data recovery excavations for the West Beach project area were formalized in the fall of 1986 in a Data Recovery Plan (Davis, Haun, and Rosendahl 1986). The field work portion of this work was completed before the end of 1987, and laboratory and other analyses were undertaken during the subsequent three years. Overall, the findings of the data recovery excavations at West Beach provide a picture of the overall spatial patterning of settlement on the west end of the Ewa coastal plain. It appears that the western Ewa plain had a long initial settlement period and that initial settlement was based on a high degree of marine-oriented task specialization. Marine task specialization continued into later settlements, but it seems that in later settlements terrestrially oriented activities increased. This shift in activities suggests a concomitant shift from a very dispersed temporary occupation to a loosely nucleated one involving extended periods of residence. This nucleation apparently depended upon a functionally (task) integrated household where membership was both kin- and task-based.

Concurrently with implementation of the West Beach Project, PHRI undertook additional inventory survey work above Pearl Harbor's West Loch (Dicks, Haun, and Rosendahl 1987). The City and County of Honolulu proposed residential community and golf course developments on c. 216 acres located within the lower and upper valley segments of Honouliuli Gulch. Although agriculture and other

disturbances to the project area were extensive, a total of seven sites were identified. These sites included both historic and prehistoric habitation and burial sites situated on Hoaeae Point and on the slopes and uplands surrounding the Honouliuli Stream floodplain. Included among the recorded features were the remnants of a once extensive agricultural system which combined aquiculture in fishponds situated on the shores of West Loch, irrigated pondfield cropping of the floodplain, and dryland cultivation of the surrounding slopes and uplands.

Additional data collection was recommended for six of the seven West Loch Estates and Golf Course project area sites. This work was undertaken in 1988 and 1989, but has not yet been fully reported on. Generally, the findings support initial testing results, wherein (a) permanent occupation was indicated for most of the habitation features, (b) upper valley occupation may have occurred as early as the mid-6th to mid-9th centuries, and (c) subsequent occupations appear to have been most intensive between the 1300s and 1600s, and between the late 1700 to early 1800s.

FIELD METHODS AND PROCEDURES

The surface survey was conducted by way of a series of pedestrian sweeps. Distance between sweeping crew members

was maintained at 10-20 m, depending on ground visibility. All sites encountered were described on standard PHRI site survey record forms and were photographed using 35mm black-and-white film. Detailed site recording included written descriptions, measurements, and scaled plan maps. Each site, or the primary feature within each site complex, was marked with an aluminum tag bearing the site number, date, the letters "PHRI", and the PHRI project number. Flagging tape on which were written the site number and feature letter was wrapped around a rock and placed on all the features as an aid to future site reidentification. All newly identified sites were assigned temporary field numbers prefixed with "T-", beginning with "T-1". The sites were later assigned permanent State Inventory of Historic Places site numbers.

Three excavation units were placed in the project area. The locations of the units were plotted on site maps. The units were dug using arbitrary levels within layers, and all fill was processed through 1/8-in mesh screens to facilitate recovery of portable artifacts and midden. If necessary, portions of structural features were dismantled as part of the test excavation units, and selected cross sections were recorded. All detailed soil sample descriptions were done using standard procedures and terminology as set forth in the Soil Survey Manual (Soil Survey Staff 1962).

FINDINGS

During the Phase II area survey, two sites (3208 and 4293) were identified (Figure 2). Site 4293 is a complex consisting of two mounds and two C-shapes. Site 4293 consists of a platform. Two 1.0 m sq test excavation units were placed at Site 4293, within areas suspected to contain cultural deposits. One unit was placed within Feature A (mound) and another was placed within Feature C (C-shape). No cultural deposits were encountered in the excavations. At

Site 3208, one 1.0 m sq unit was placed. The unit displayed 35 cm of cobbles stacked above a 10 cm thick cultural deposit of historic midden. Site 3208 is interpreted as a prehistoric temporary habitation site, and Site 4293 is interpreted as a historic/prehistoric habitation and agricultural site. Both sites are described in detail below; also described below are the test units excavated at the sites.

SITE AND TEST UNIT DESCRIPTIONS

SITE NO.: State: 3208 Other: 3208B PHRI: T-84

SITE TYPE: Platform

TOPOGRAPHY: Generally flat

VEGETATION: Thick ground vegetation, dense *koa-haole*, large fallen *kiawe*, sword grass, and purple flowering vines.

CONDITION: Poor

INTEGRITY: Altered (tree disturbance)

PROBABLE AGE: Prehistoric

FUNCTIONAL INTERPRETATION: Temporary habitation

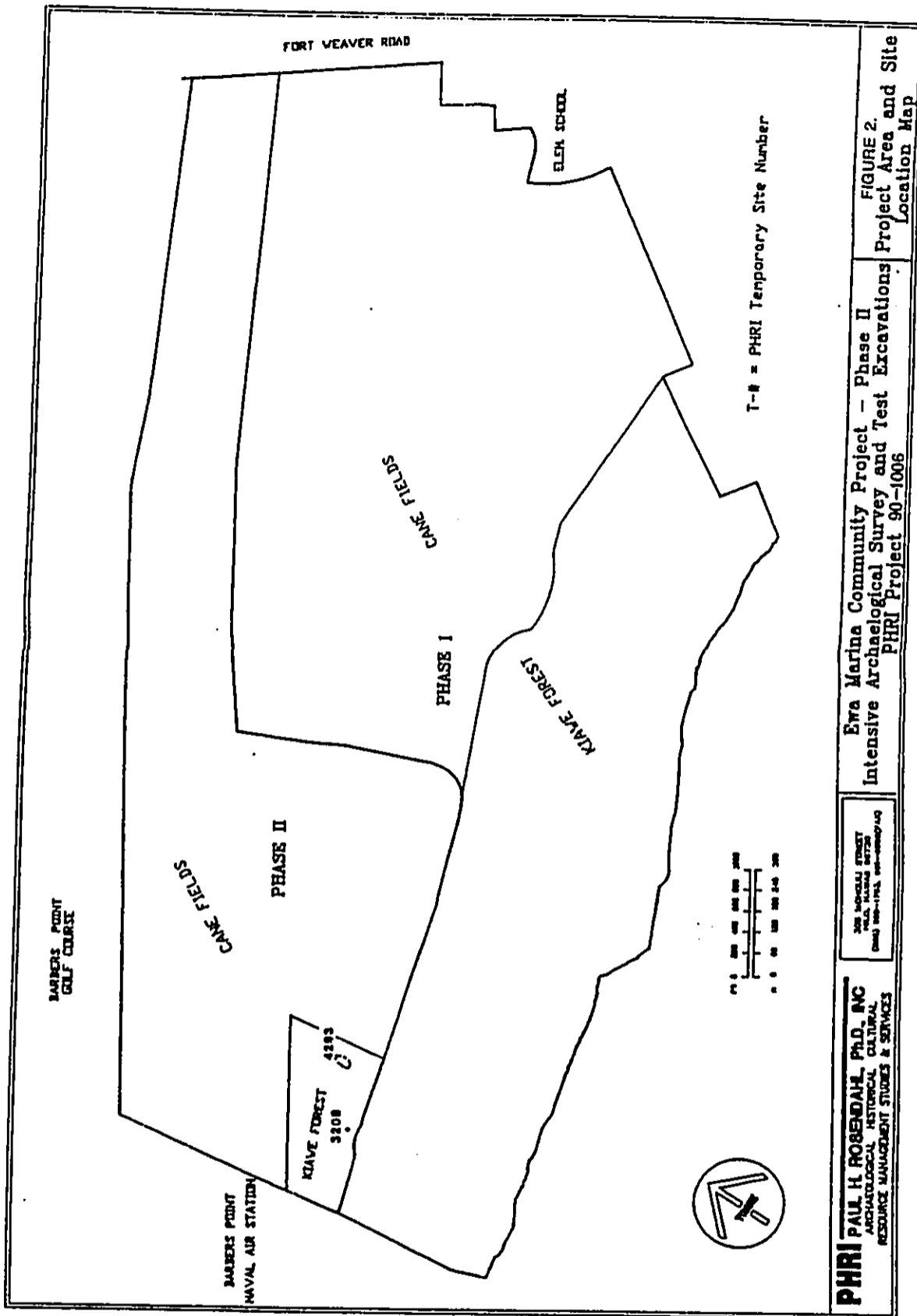
DIMENSIONS: 2.80 m by 2.70 m by 0.32 m (approx.)

DESCRIPTION: This platform is badly disturbed; a large *kiawe* tree has fallen on its east side. The platform is oriented c. east-southeast to west-northwest; the platform walls consist of small and large subangular limestone cobbles and a few boulders stacked one to two courses high. The interior of the platform is flat and contains depressions. The perimeter of this feature is clear. Cobbles from the wall are scattered on the ground.

This site was previously identified by Davis (1979) (as Feature B of Site 3208).

A 1.0 m by 1.0 m test unit (TU-1) was excavated in the center of the platform. A datum was set c. 0.3 m south of the northwest corner of the unit, on the platform surface. The unit displayed the following stratigraphy:

Layer	Description
I	0-35 cmbd; mound of limestone cobbles and boulders; lower boundary is abrupt and irregular in profile;
II	35-45 cmbd; dark brown (10YR 3/3 dry); gravelly silt loam and loose organic material intermixed; consistency is loose and noncoherent when dry, nonsticky when wet, and nonplastic; lower boundary is abrupt and wavy in profile;
III	45-55 cmbd; brown (10YR 4/3 dry); stony silt loam and loose organic material intermixed; consistency is slightly hard when dry, nonsticky when wet, and slightly plastic; lower boundary is abrupt and smooth in profile;
IV	55-65 cmbd; light yellow brown (10YR 6/4 dry); silty clay loam with rare loose organic material intermixed; consistency is soft and weakly coherent when dry, nonsticky when wet, and slightly plastic; lower boundary is abrupt and smooth in profile;



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Ewa Marina Community Project - Phase II
Intensive Archaeological Survey and Test Excavations
PHRI Project 90-1006

FIGURE 2.
Project Area and Site
Location Map

SITE NO.: State: 4293 Other: 3208 A PHRI: T-80

SITE TYPE: Complex (4 Features)

TOPOGRAPHY: Generally flat

VEGETATION: *Kiawe*, dense *koa-haole*, thick ground vegetation, fallen *kiawe* trees, vine with purple flowers, sword grass.

CONDITION: Poor-fair

INTEGRITY: Bulldozing in the area may have altered site

PROBABLE AGE: Prehistoric/historic

FUNCTIONAL INTERPRETATION: Habitation-agriculture

DESCRIPTION: The complex area measures c. 24.0 m at 180° Az. by 10.0-12.0 m wide. The complex consists of two mounds (Features A and B) and two C-shapes (Features C and D). The features are constructed of limestone slabs and boulders and are built atop a natural limestone bedrock outcropping. Remnants of barbed wire and bottle glass were present on the site. A metal site tag (3208-A) was found on Feature C, C-shape.

FEATURE A: Mound

FUNCTION: Agriculture

DIMENSIONS: 3.50 m by 2.30 m by 0.22-0.47 m (approx.)

DESCRIPTION: Feature A is roughly rectangular in plan. It consists of limestone boulders crudely stacked on natural limestone bedrock. The feature is disturbed to the southwest. Feature A was initially identified by Davis (1980b) who designated it as Site 3208.

A 1.0 m by 1.0 m test unit (TU-1) was excavated in the center of the feature. A datum was set c. 25 cm from the north corner along the northeast boundary of the unit at the soil surface underlying stacked limestone cobbles. The following stratigraphy was displayed:

Layer	Description
I	0-10 cmbd (datum set at 45 cm below surface of mound to mark start of soil layers); very dark brown (10YR 2/2 dry); stony silt loam and loose organic material intermixed; consistency is loose and noncoherent when dry, nonsticky when wet, and nonplastic; lower boundary is abrupt and smooth in profile;
II	10-14 cmbd; very dark grayish-brown (10YR 3/2 dry); stony silt loam intermixed with loose organic material and shell; consistency is slightly hard when dry, nonsticky when wet, and nonplastic; lower boundary is abrupt and smooth in profile;
III	14-20 cmbd; dark yellowish-brown (10YR 4/4 dry); stony silt loam and loose organic material intermixed; consistency is soft and weakly coherent when dry, slightly sticky when wet, slightly plastic; lower boundary is abrupt and smooth in profile;
IV	20-26 cmbd; brownish-yellow (10YR 6/6 dry); silty clay loam and loose organic material intermixed; consistency is soft and weakly coherent when dry, slightly sticky when wet, and slightly plastic; lower boundary is abrupt and smooth in profile;
V	26+ cmbd; bedrock.

Approximately 0.45 m of stacked limestone cobbles was removed before reaching a soil deposit. Layers I through IV were excavated by soil stratum. None of the layers contained cultural deposits. Excavation was terminated on bedrock at 0.26 mbd.

FEATURE B: Mound**FUNCTION:** Agriculture**DIMENSIONS:** 1.80 m by 1.30 m by 0.58 m (approx.)**DESCRIPTION:** Feature B is a crude mound located c. 6.0 m southwest of Feature A. It is smaller than Feature A and somewhat disturbed to the northeast. Feature B is constructed of limestone slabs and boulders, crudely stacked three courses high.**FEATURE C: C-shape State: 3208 A****FUNCTION:** Possibly temporary habitation**DIMENSIONS:** 3.40 m by 3.30 m by 0.65 m (approx.)**DESCRIPTION:** Oriented north-northeast to south-southwest, with the opening facing to the east-southeast. It is a well defined C-shape; the walls consist of small to large limestone cobbles and boulders stacked two to three courses high atop bedrock outcropping. Possible remnant of facing along the northwest interior and exterior sides. The north-northeast and south-southwest walls are collapsed, the north-northeast wall due to a large fallen *kiawe* branch. The northwest wall is intact. The floor of the C-shape has scattered cobbles and clinkers; the interior measures c. 1.8 m by 1.24 m. The wall heights range from c. 0.13 m to 0.65 m.

A broken bottle neck and another bottle fragment were found on the feature. An engraved metal washer (engraved with 3208) and a site tag with (3208-A) was also found at the feature.

A 1.0 m by 1.0 m test unit (TU-2) was excavated inside and near the opening of the feature. Two soil layers were found in the unit. Layer I (0.0-0.05 mbd) consisted of dark brown silty loam containing glass fragments. Layer II (0.05-0.15 mbd) was light brown silty loam and contained no cultural material. Excavation was terminated on bedrock at 0.15 mbd.

FEATURE D: C-shape**FUNCTION:** Possible temporary habitation**DIMENSIONS:** 2.80 m by 2.05 m by 0.60 m (approx.)**DESCRIPTION:** Oriented north-northeast to south-southwest with the opening to the east-southeast. The C-shape is small, but intact. The C-shape is constructed using small and large subangular limestone cobbles and a few boulders and slabs. The stones are stacked two to three courses high. The perimeter of the C-shape is stacked.

The southwest portion is more collapsed than the rest of the feature. There are possible remnants of facing along the interior and exterior walls of the feature. At the south-southeast end of the C-shape, it appears that the wall may have extended c. 1.0 m more; however four small trees growing in the area make this difficult to determine.

The floor of the C-shape has soil (brown sandy loam) and a few cobbles that have fallen out of place. The floor measures c. 1.42 m by 1.28 m. The heights of the walls range from 0.20 m to 0.60 m. No cultural deposit was visible at the feature.

CONCLUSION

Based on the findings of the present survey, Sites 3208 and 4293 were assessed for significance in terms of the National Register criteria for evaluation, as outlined in the Code of Federal Regulations (36 CFR Part 60). The DLNR-HPP/SHPO uses these criteria for evaluating cultural resources. 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."

The sites were assessed for potential cultural significance using guidelines prepared by the Advisory Council on Historic Preservation (ACHP) entitled "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (Draft Report, August 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." 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."

Based on the above criteria, both Sites 3208 and 4293 are assessed as significant solely for information content. No further work is recommended for Site 4293, a small complex of two temporary habitation features and two agricultural features. This site has been measured, described, photographed, plotted, and tested, and this data is considered sufficient recovery of significant information. For Site

3208, a temporary habitation feature, further data collection is recommended. After further data collection, it is anticipated that no further work would be necessary.

To further facilitate client management decisions regarding the subsequent treatment of resources, the general significance of Sites 3208 and 4293 was also evaluated in terms of potential scientific research, interpretive, and/or cultural values (PHRI CRM [Cultural Resource Management] value modes). These value modes are derived from the previously mentioned state and federal evaluation criteria. The sites were 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. Based on the value modes, Site 4293 is assessed as having low research, interpretive, and cultural values, and Site 3208 is assessed as having moderate research value, and low interpretive and cultural values.

It should be noted that the assessments and recommendations presented here have been based on an intensive surface survey and limited test excavations. There is always the possibility, however remote, that potentially significant, unidentified subsurface cultural remains could be encountered in the course of further archaeological investigations or subsequent development activities. In such situations, archaeological consultation should be sought immediately.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

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FEATURE D: C-shape**FUNCTION:** Possible temporary habitation**DIMENSIONS:** 2.80 m by 2.05 m by 0.60 m (approx.)**DESCRIPTION:** Oriented north-northeast to south-southwest with the opening to the east-southeast. The C-shape is small, but intact. The C-shape is constructed using small and large subangular limestone cobbles and a few boulders and slabs. The stones are stacked two to three courses high. The perimeter of the C-shape is stacked.

The southwest portion is more collapsed than the rest of the feature. There are possible remnants of facing along the interior and exterior walls of the feature. At the south-southeast end of the C-shape, it appears that the wall may have extended c. 1.0 m more; however four small trees growing in the area make this difficult to determine.

The floor of the C-shape has soil (brown sandy loam) and a few cobbles that have fallen out of place. The floor measures c. 1.42 m by 1.28 m. The heights of the walls range from 0.20 m to 0.60 m. No cultural deposit was visible at the feature.

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APPENDIX A

HISTORICAL DOCUMENTARY RESEARCH by Helen Wong Smith, B.A.

INTRODUCTION

Honouliuli is the largest and most western *ahupua'a* in the Ewa District of Oahu (Hammatt and Folk 1981:29). From the ridgeline of Palikea in the Waianae Range, its western border extends to the sea at Piliokahe, and on the east it reaches to Puu Loa, west of Pearl Harbor's West Loch. It is from the waters of West Loch that Honouliuli takes its name, which means "dark harbor" or "dark bay" (Jarret IN Frierson 1972, and Pukui et al. 1974:51).

Honouliuli contained all of the resource-zones necessary for full economic subsistence in ancient Hawaii: *uka* (mountain), *waena* (middle), and *kahakai* (seashore). The shoreline of Honouliuli at the project area was once an area of fishponds, shellfish resources, and salt-drying (Frierson 1972:6). Nearby Puuloa, to the east, was once an important agricultural area, and it boasted a productive fishery as well, with fishponds and fish traps. The coastal waters from Keahi Point to Kualakai were, and still are, a source of *lipoa*, an edible seaweed (Sterling and Summers 1978:44). In modern times poultry and pig farms were located in the *kiawe* forest area *mauka* of the project area. The coastal portion of the district is now the site of Oneula (red sand) County Beach Park, Del Monte Beach Park, and Alii Park (Flanders 1986).

The project area is one of the last undeveloped parcels on the Ewa Plain. Although it lies in the *ahupua'a* of Honouliuli, it is very close to the neighboring *ahupua'a* of Puuloa, and may fall partly inside it (Figure A-1). For this reason, this report includes references to Puuloa. The Barber's Point Naval Air Station abuts the project area on its north and west boundaries, but the history of this area receives only brief mention here. Because of the immense size of Honouliuli, this report is limited to the history of the southeast portion of it, which fronts the West Loch portion of Pearl Harbor.

LEGENDS AND PRE-CONTACT HISTORY

Honouliuli contains the well-known beach where the hairless human beings (*'olohe*) first landed on Oahu (Beckwith 1970:343). In Hawaiian legend the *'olohe* were said to live in caves or pits on the arid Ewa Plain. They lived in caves in the uplifted coral reef composing the plain. Such caves were once found throughout the area now occupied by the Naval Air Station.

The area behind Oneula, known today as the Coral Plains, is probably the legendary "Plain of Kaupe'a," said to be the realm of the *ao kuewa* or *ao auwana*, the homeless wandering souls. Located next to Puuloa by Sterling and Summers (1978:36), this was the wandering place of those who died having no rightful place to go. These souls wandered "in the wiliwili grove of Kaupe'a on Oahu," according to Kamakau (1964:47). He writes that "these wanderers on the plain of Kaupe'a beside Pu'uloa...could go to catch moths (*pulelehua*) and spiders (*nanana*)" in the hope of finding helpful *'aumakua*, souls who could save them (ibid:49). Kelly agrees with Kamakau that Kaupea was known as the place on Oahu where these friendless souls wandered (1978:1).

Mary Kawena Pukui describes an encounter with these wandering ghosts:

A wide plain lies back of Keahi and Pu'uloa where the homeless, friendless ghosts were said to wander about. These were the ghosts of people who were not found by their family *'aumakua* or gods and taken home with them, or had not found the leaping places where they could leap into the nether world. Here they wandered, living on the moths and spiders they caught. They were often very hungry for it was not easy to find moths or to catch them when found.

Perhaps I would never have been told of the plain of homeless ghosts if my cousin's dog had not fainted there one day. We (my cousin, aunt & I) were walking to Kalae-loa from Pu'uloa accompanied by Teto, the dog. The dog was a native dog (not the so-called poi dog of today) with upright ears and body and size of a fox terrier. For no accountable reason, Teto fell into a faint and lay still. My aunt exclaimed and sent me to fetch sea water at once which she sprinkled over the dog saying, "Mai hana ino wale 'oukou i ka holoholona a ke kaikamahine. Uoki ko 'oukou makemake ilio." (Do not harm the girl's dog. Stop your desire to have it.) Then with a prayer to her *'aumakua* for help she rubbed the dog. It revived quickly and after being carried a short way, was frisky and lively as ever.

Then it was that my aunt told me of the homeless ghosts and declared that some of them must have

wanted Teto that day because she was a real native dog, the kind that were roasted and eaten long before foreigners ever came to our shores (Pukui 1943).

Another legend holds that on the south shore of Honouliuli, at Waipuuli, is the cave where the young boy, Namakaokapaoo, hid his mother after killing his stepfather and throwing his head five miles. Though only two and one-half feet tall, Namakaokapaoo is said to have conquered Oahu by defeating the king and 18 canoe-loads of warriors (Fornander 1913, V. 2:274-8 IN Lewis 1970:5).

Northwest of the project area is the inland hill known as Puuokapolei. This prominent topographical feature is prominent in legend as well. It was here that the demigod Kamapuaa is said to have established the court of his grandmother, Kamaunuanoho, an *ali'i* who came by canoe from Kahiki to Oahu. The people of Oahu, Kauai, and Hawaii are said to descend from Kamaunuanoho, which is why the Ewa district was called the "celebrated land of the ancestors" (Kamakau 1964:68, 84).

Kamapuaa had a practical reason for installing Kamaunuanoho at Puuokapolei: "This was to compel the people who were to pay tribute to bring all the necessities of life from a distance, to show [Kamapuaa's] absolute power over all" (Nakuina IN Lewis 1970). Nakuina claimed that the house foundations and the surrounding wall could still be seen in the late 1800s. A different version depicts Kamaunuanoho living at Puuokapolei with Kekeleai, the older brother of Kamapuaa, after they were driven out of Kaliuwaa in Kaluanui, Koolauloa (Sterling and Summers 1978:33).

Another legend of Honouliuli describes the strange fate of two women who lived on the plain called Pukaua, beyond Puuokapolei, toward Waianae. After going down to Kualakai, on the coast, to gather aama crabs, pipipi, and limu, they failed to return home before morning light, and were turned into a pillar of stone (Sterling and Summers 1962:39). Also well-known in legend is the place on the coast, west of the project area, called Kualakai. The spring located there, called Hoakalei, is associated with Hiiaka, the favorite sister of the fire goddess, Pele (Sterling and Summers 1962, I, 2:179).

Mary Pukui also tells a story about the waters of Puuloa, to the East. It was told to her by her uncle, Akoni Kawaa, a native of Aiea.

At the entrance (of Pu'uloa) was a pond built out into the water in the shape of a tennis racket. This pond, called Kapakule, was said to have been the

labor of the Menehune, a people who were something like the "little people" of old Ireland. On the left side of the pond stood the stone called Hina, which represented a goddess of the sea by that name. Each time the sea ebbed, the rock became gradually visible, vanishing again under water at high tide. Ku, another stone on the right, was never seen above sea level. This stone represented Ku'ula, Red Ku, god of fish and fishermen. From one side of the pond a long wall, composed of driven stakes of hard wood, ran toward the island in the lochs. When the fish swam up the channel and then inside of this wall, they invariably found themselves in the pond. A short distance from the spot where the pond touched the shore was a small *ko'a* or altar composed of coral rock. It was here that the first fish caught in the pond was laid as an offering to the gods. At the time I last saw it in 1907, this altar was fenced in by Edwin P. Mikalemi, the caretaker of the place and brother-in-law of Akoni Kawa'a. There were times when the sharks were caught in the pond at low tide, but no Hawaiian there ever dreamed of molesting them. Never shall I forget the day when a haole guest of Mikalemi went to harpoon one of the sharks in the pond. My uncle shouted for him to get away from there and swore as I had never heard him swear before. Those sharks were as dear to him as a relative, and he did not want to see them speared any more than he wanted us to be hurt in the same way. At the age of twelve, I was taken to the cave of Ka'ahupahau, Cloak-well-cared-for. Most of the cave was deep under water. A small plant laden with red berries hung over the entrance, and when I reached to pluck one, my uncle pulled my hand back quickly and chided me. Those belonged to Ka'ahupahau. Ka'ahupahau had a brother Kahi'uka, The Smitingtail, whose stone form was a good distance away from the cave, lying deep in the water. Yet it was plainly seen from the surface. Ka'ahupahau's son, Ku-pipi, had his home where the dry dock was built and sank about thirty years ago. These were not the only sharks at Pu'uloa, for like all members of royalty there were others to stay about and serve them. Ka'ahupahau was the chiefess of sharks in the length and breadth of the Pearl Lochs, hence the old saying, "Alahula Pu'uloa he alahela na Ka'ahupahau," "Everywhere in Pu'uloa is the trail of Ka'ahupahau."

Her brother and she were born, not sharks, but human beings. One day a shark god saw them and converted them into sharks like himself. Every day they swam up a stream at Waipahu and there they were fed on 'awa by relatives. 'Awa was always the

food of the gods. When they became too large to swim upstream, the offerings of food were carried to the lochs for them.

Because the sharks, though numerous, were not harmful within Pearl Lochs, the natives used to have fun mounting on their backs and riding them as cowboys ride horses. To turn them around, a little pressure was used just back of the eyes. Is this a tall fish story of men riding sharks? No, it is not. My uncle said that it was true and so did the historian Kamakau (Pukui 1943).

The waters West of Puuloa, near Kalaeloa (Barber's Point), are said to be the home of a famous giant *kupua* (magical) fish, named Uhumakaikai. This fish is said to have taught the art of fighting to Kawelo, a mid-16th century chief (Sterling & Summers 1978:41).

The importance of fishing to Honouliuli in pre-contact times is suggested by the presence of a fishing shrine (*ko'a*), called Kalanamaihihi, near the west end of West Loch (Kaihuopalaai), and by the presence, not too far from there, of the fishpond, Lauaunui (Figure A-1). Two place names in Honouliuli *ahupua'a* also suggest associations with fishing: Keoneoio, "sandy (place with) bone fish," and Puu Lailai, "young *lai* fish hill" (Pukui et al. 1974). The latter suggests an association with offshore fishing; the hill might have been used as a range or bearing marker for fishing grounds. The literal translation of Puu Makakilo, in the central part of the *ahupua'a*, is "observing eyes," which may also relate to fishing, because *kilo* is the Hawaiian word for a fishing observation tower or place (Hammatt and Folk 1981:33).

Puuloa is said to be the place where breadfruit was introduced to Hawaii. It is said to have been brought from Upolu, Samoa in the 12th century by Kahai, who was returning home from Tahiti (Fornander 1919-1920:313 IN Lewis 1970:5; Kelly 1985:165).

According to Sterling and Summers, Puuloa was also known as a place to collect bird feathers:

Among the places where the o'o, 'i'iwi and other indigenous birds were caught was at Puuloa on Oahu. There the o'o, 'i'iwi and other birds gathered when the noni fruit ripened. They came down to feed and when the season was over the birds returned to the mountains. - Lahilahi Webb, Coll. on Kahilis Ms. (1978:45).

The early Hawaiians used their ingenuity to make the dry inland areas of Honouliuli productive. McAllister tells how they used the naturally-occurring pits on coral plains for agriculture:

Site 146. Ewa coral plains, throughout which are remains of many sites. The great extent of old stone walls, particularly near Puuloa Salt Works, belongs to the ranching period of about 75 years ago. It is probable that the holes and pits in the coral were formerly used by the Hawaiians. Frequently the soil on the floor of the larger pits was used for cultivation, and even today one comes upon bananas and Hawaiian sugar cane still growing in them. They afford shelter and protection, but I doubt if previous to the time of Cook there was ever a large population here (McAllister 1933:109).

Puuokapolei was used in pre-contact times to mark the changing seasons. Here is how Kamakau says it was done:

In the same way the people of Oahu reckoned from the time when the sun set over Pu'uokapolei until it set in the hollow of Mahinaona and called this period Kau, and when it moved south again from Pu'uokapolei and it grew cold and the time came when young sprouts started, the season was called from their germination (oilo) the season of Ho'olilo. There were therefore two seasons, the season of Makali'i and the season of Ho'olilo (Kamakau Mo'olelo Hawaii Vol.I, Chap 2, p 23 IN Sterling and Summers 1978:34).

Puuokapolei also figured in at least one chant used in pre-contact times. On January 13th, 1900, the newspaper *Ka Loea Kalaiaina* contained an article which recalled the chant. Headlined "Na Wahi Pana o Ewa," the article reminded readers that Puuokapolei:

"...was one of the most famous hills in the olden days. The chant composed for games in the olden days began with the name of this hill and went on (with the place names) all around the island. This chant was used for those who swung with ropes, played on wooden ukeke instruments, or those who juggled with stones, noni fruit or kukui nuts" (Sterling and Summers 1978:33-34).

Several sources mention a *heiau* located on or near Puuokapolei. Thrum's mention is brief: "[a] heiau on

Kapolei hill, Ewa - Size and class unknown. Its walls thrown down for fencing" (1907:46). McAllister, an archaeologist, was able to supply more information:

Pu'u Kapolei Heiau (Destroyed) Site 138, on Pu'u Kapolei hill. The stones from the heiau supplied the rock crusher which was located on the side of this elevation, which is about 100 feet away on the sea side. There was formerly a large rock shelter on the sea side where Kamapuaa is said to have lived with his grandmother (McAllister 1933:108).

One of the last pre-contact references to the area describes how the famous Oahu *kahuna*, Kaopulupulu, was killed by Kahahana's warriors at Puuloa sometime around the year 1782 (Kamakau 1961:133-134), and how two of Kamehameha's chiefs, Kekuamanoha and Kauhiwawaeono, lived at Puuloa (ibid:182). Kauhiwawaeono was the infamous murderer chief who used the bodies of his victims for shark bait (ibid:232). He was later discovered by Kamehameha I to have plotted against him (ibid:182).

POST-CONTACT HISTORY

Despite the plentiful marine resources of Honouliuli and Puuloa, early Westerners failed to appreciate the importance of these areas in the Hawaiian economic system. According to Kelly, "the coastal area near Ewa has historically provided significant marine resources, with neighboring areas, particularly Puuloa containing large fishponds and traps" (1978:1). Early Westerners ignored this abundance in their accounts and focused on the coral plain, which seemed marginal and desolate to them. The failure to understand the Hawaiian economic system frequently led to misconceptions concerning the importance of certain lands to the Hawaiians, and to misconceptions about Hawaiian land use patterns in general (Hammatt & Folk 1981:33).

In March of 1792, Captain George Vancouver sailed past the southwest point of Oahu, recording the first Western observation:

This point is low flat land, with a reef round it, extending about a quarter of a mile from shore. The reef and low land continue some distance to the eastward towards Whyteete Bay....Not far from the S.W. point is a small grove of shabby cocoa-nut trees, and along these shores are a few struggling fishermen's huts" (Vancouver 1798, I:167).

From these shores we were visited by some of the natives, in the most wretched canoes I had yet seen amongst the South-Sea islanders; they corresponded however with the appearance of the country, which from the commencement of the high land to the westward of Opooroah [Puuloa], was composed of one very barren rocky waste, nearly destitute of verdure, cultivation or inhabitants, with little variation all the way to the west point of the island (ibid. II:217).

A year later, while anchored in Pearl Harbor off Puuloa, Vancouver again recorded his observations:

The part of the island opposite to us was low or rather only moderately elevated, forming a level country between the mountains that compose the east [Koolau] and west [Waianae] ends of the island. This tract of land was of some extent but did not seem to be populous, nor to possess any great degree of fertility; although we were told that at a little distance from the sea, the soil is rich, and all necessaries of life are abundantly produced (ibid. III:361-363).

Vancouver sent a boat into Pearl Harbor to take soundings, and the officer in charge reported:

The soil in the neighborhood of the harbor appeared of a loose sandy nature; the country low for some distance, and, from the number of houses within the harbor, it would seem to be very populous, but the very few inhabitants who made their appearance were an indication to the contrary (ibid. II:215-216).

Vancouver's cartographer, Lt. C.R. Malden, indicated on his map the presence of a few stone walls, a few trees, and enclosures in the Kualakai area on the south shore of Honouliuli (Kelly 1985:160).

Barber's Point, west of the project area, was known to the Hawaiians as Kalaeloa ("the long point"). In 1786, Captain Nathaniel Portlock gave it the name, Point Banks, in honor of Sir Joseph Banks, who was then president of the Royal Society in London, and who had been naturalist on Cook's first voyage to the Pacific (Kelly 1985:165).

Point Banks was later renamed in honor of the unfortunate English Captain, Henry Barber, who lost his ship on the reef

off the Kualakai coast, near the point. There are several versions of the story of Captain Barber. Those below are cited in *Sites of Oahu*:

In October 1795 Captain Henry Barber made one of several trips to Oahu. At this time Kamehameha I was on Oahu and he and Capt Barber became very friendly. When Barber departed he gave Kamehameha gifts. He intended giving him a keg of brandy but after thinking it over decided that to give the heathen king a whole keg of good brandy which he wouldn't appreciate was a great waste. He therefore had the keg half drained and filled up with water and sent this watered brandy to the king. On leaving Oahu he ran aground at Kalaeloa (Oct. 31, 1796) and when the natives saw the ship's plight they swarmed out to it taking everything they could lay their hands on. In the meantime Kamehameha had left for Kona and Barber seeking his help to recover the stolen goods went to Kona to see him. There he was treated cordially and a large feast was prepared. When the awa was passed around Barber was surprised and chagrined to find that his awa cup held nothing but watered awa, thus did Kamehameha remind Barber that he was not a fool. In spite of Barber's treatment of Kamehameha the king sent him back with kapu sticks and orders that the Hawaiians must return all which had been stolen. When the Hawaiians saw that Barber came with authority they immediately returned all that had been taken. - Joseph Emerson, as told to Mrs. Beatrice Greenwell (IN Sterling and Summers 1978).

History recalls that on one of his visits to Hawaii Capt. Barber and his good ship *Arthur* became shipwrecked on a reef near Pearl Harbor. His crew of 22 men were saved, six were drowned. Hawaiian hospitality overwhelmed them and some time was spent here. Later, King Kamehameha salvaged a dozen brass cannon from the wreck of the *Arthur* and mounted them. Capt. Barber arriving unexpectedly two years later, had two kegs of gunpowder for the cannon. A sharp bargain was driven by the Hawaiian king and the swap was made. Barber admitted he was worsted in the transaction. - *Honolulu Advertiser*, Feb. 18, 1939 (ibid.).

At the end of 1802 he sailed for China and again called at Honolulu. He took the opportunity to visit Kamehameha at Lahaina on Maui, and saw that the king had a battery of ten guns placed for the defense

of his palace with its brick walls and glazed windows. Barber learned that these had been recovered from the wreck of the brig *Arthur* near Barber's Point, and he asked the King to return them, but Kamehameha refused. The king's divers had brought the guns up from the bottom with great difficulty and the king had had them for six years. He wouldn't be convinced that the original owner who had left them derelict, had any right to them. Possession was nine parts of the law.

Nor would he listen to Barber's suggestion that his possession of the guns entitled the captain to "the most-favored individual" treatment. He wanted gunpowder that Barber had on the *Unicorn*, however, for his planned expedition against Kauai and Niuhau, and refused to exchange provisions for anything but powder. Barber had to accept; Kamehameha got the powder and kept the cannon, and Barber got only the supplies. - Laselle Gilman, *Honolulu Advertiser*, July 2, 1939, Bishop Museum Scrapbook p. 102 (ibid.).

According to another source, Kamehameha's *ha'ole* advisor, John Young, succeeded in convincing the king to return Barber's goods:

Numerous native canoes went back and forth, salvaging the cargo and ship's equipment. John Young interceded with Kamehameha I on behalf of Barber, so that the salvaged materials were returned to him rather than kept by the natives (*The Friend* 1862:43). Since then "the long point", *Ka lae loa*, has been known as Barber's Point (Lewis 1970:7).

Shortly after Western contact, the destruction of Hawaii's sandalwood forests began, as traders attempted to supply an insatiable Chinese market for the fragrant wood. In Honouliuli, sandalwood thrived in the higher elevations in the mixed evergreen forest, and dense stands of sandalwood probably extended down into the plain, to the 300-foot elevation, where it grew in the open grassland with scattered 'ohe (bamboo) and wiliwili trees (Frierson 1972:4-6).

The *ali'i* and *konohiki* had cultivated a taste for exotic wares. They sent their retainers to the forests to harvest sandalwood to trade for the foreign goods they craved. As a result Hawaiians abandoned their taro patches and other means of subsistence. The sandalwood trade reached its peak between 1815-1830. Since the immensely valuable trees were distributed throughout the lower dry ridges of the Waianaes and leeward Koolaus, much of Honouliuli was

heavily harvested. Not only were thousands of trees cut down, but harvesters burned much of the Ewa Plain in order to detect by the odor of the smoke any sandalwood logs they had overlooked (St. John IN Frierson 1972:7).

Nearly one quarter of the entire Ewa District population lived in Honouliuli *ahupua'a* in the 1830s (Schmitt IN Kelly 1978:2). By the count of the 1831-32 missionary census, Honouliuli had a population of 1,026. But the area soon went into decline, probably due to disease brought in by Westerners (ibid.), and the 1835 census counted only 870 residents. Lowell Smith, an early missionary, estimated that in 1835 eight to 10 deaths occurred for every birth in the Ewa District (Ewa Station Report for 1835:8). Kamakau relates that at one time "Honouliuli had over ten school houses with their teachers...Oahu was then thickly populated." After that time "whole villages had vanished leaving not a man" (Kamakau 1961:424-5).

In 1839, E.O. Hall, a member of the mission, recorded his crossing of Honouliuli:

Passing all the villages (after leaving Pearl River) at one or two of which we stopped, we crossed the barren desolate plain, at the termination of which is Barber's Point (Hall IN Kelly 1985:160).

Kamehameha III requested a survey in 1840, and it was recorded that, "There are no chiefs or any persons of distinction residing in the districts; the people are laborers or Kanakas, and the landholders reside near the King at Lahaina, or at Honolulu" (Wilkes IN Lewis 1970).

LAND TENURE

When Kamehameha I conquered Oahu in 1795, he placed his own supporting chiefs as managers over the various districts (*moku-o-loko*), *ahupua'a*, and the sub-district land divisions called *'ili'aina*. From these lands they fed themselves, their families, and their supporters (Kelly 1985:165). It was at this time that Kamehameha installed Kekuamanoha and Kauhiwawaeono at Puuloa (see p.8) (Kamakau 1961:182).

In 1848, during the reign of Kamehameha III, the traditional Hawaiian land ownership system was replaced with a more Western-style system. This radical restructuring was called The Great Mahele (division). The Great Mahele separated and defined the undivided land interests of the King and the high-ranking chiefs, and the *konohiki*, who were originally those in charge of tracts of land on behalf of

the king or a chief (Chinen 1958:vii and Chinen 1961:13). More than 240 of the highest-ranking chiefs and *konohiki* in the kingdom joined Kamehameha III in this division. The first mahele was signed on Jan. 27, 1848 by Kamehameha III and Princess Victoria Kamamalu, and by her guardians Mataio Kekuanaoa and Ione Ii. The last mahele was signed by the King and E. Enoka on March 7, 1848 (Chinen 1958:16).

The mahele did not convey title to any land. The chiefs and *konohiki* were required to present their claims to The Land Commission to receive awards for lands quitclaimed to them by Kamehameha III. They were also required to pay commutations to the government in order to receive royal patents on their awards. Until an award was issued, title remained with the government. The lands awarded to the chiefs and *konohiki* became known as Konohiki Lands. Because there were few surveyors in Hawaii at the time of the Mahele, the lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This expedited the work of the Land Commission and speeded the transfers (Chinen 1961:13).

During this process all land was placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, and Konohiki Lands. These were all "subject to the rights of native tenants," (Laws of Hawaii, 1848:22). Native tenants were the common Hawaiian people who lived on the land and worked it for their subsistence. Questions concerning the nature of these rights began to arise as the King, the government, and *konohiki* began selling parcels of land. On December 21, 1849 the Privy Council attempted to clarify the situation by adopting four resolutions intended to protect the rights of native tenants referred to in the 1848 law (Chinen 1958:29).

These resolutions authorized the Land Commission to award fee simple title to all native tenants who occupied and improved any portion of Crown, Government, or Konohiki lands. These awards were to be free of commutation except for house lots located in the districts of Honolulu, Lahaina, and Hilo (ibid.).

Before receiving their awards from the Land Commission, the native tenants were required to prove that they cultivated the land for a living. They were not permitted to acquire wastelands or lands which they cultivated "with the seeming intention of enlarging their lots." Once a claim was confirmed, a survey was required before the Land Commission was authorized to issue any award. These lands became known as "Kuleana Lands" (ibid:30). Until its

dissolution on March 31, 1855, the Land Commission issued thousands of awards to the native tenants for their *kuleana*; even so, less than 30,000 acres of land were awarded to the native tenants as Kuleana Lands.

In 1826, Kawaa was the *konoiki* for Honouliuli (Bingham IN Frierson 1972:9). The Mahele reserved no land there to the Crown or the government, though many other Ewa lands were reserved, including the entire *ahupua'a* of Aiea. Honouliuli's 43,250 acres were confirmed to M. W. Kekauonohi, a high chiefess, great-granddaughter of Kekaulike (King of Maui), and granddaughter of Kamehameha I. It is uncertain whether this award was through her father, Kinau, or her mother, Wahinepio, who was governess of Maui (Frierson 1972:9). Kekauonohi was one of Liholiho's five wives. She later ran off with a Kaahumanu stepson, after which she married Hoapili. He left her a widow, and she married again, this time to Levi Haalelea. Kekauonohi died in 1851 (Board of Commissioners 1929:27-28, 40-44, 50-52, 67-70, 301). Two years before her death, she had sold the 2,300 acre *ahupua'a* of Puuloa to Isaac Montgomery, for \$11,000 (Bureau of Conveyances Book 4:41; Lewis 1970:12). When she died, her widower, Levi Haalelea, inherited the remainder of her lands.

According to Kelley, of the Honouliuli lands, 97 awards totalling 106,524 acres were set aside for people who claimed *kuleana* (Frierson gives a figure of 150 acres [1972:12]). Using Kelly's figure, the average grant size was 1.098 acres, with most of the awards granted in the wet-land taro gardens of Honouliuli, not in the dry plain. In 1863 all of these grants were deeded to Haalelea by their owners in payment of debts to him (Kelley 1985:168).

The only mention of the vegetation there at that time speaks of taro lands in the foothills, and of an "old kukui tree," which was one of the boundary markers between Honouliuli and Hoaeae. This tree was a lone reminder of the former forest, and Kunia Road now runs along the boundary it represented (Frierson 1972:11-12). No Land Commission Awards are listed for the immediate vicinity of the project area (Board of Commissioners 1929), nor are any settlements shown on W.D. Alexander's survey map of 1873. However, Division of Land Management records show that a 3/4-acre parcel at Oneula, being *Apana* 8 of Royal Patent (School) Grant No. 30, was set aside for the Board of Education in 1852. This lot and two others at Kualakai and Waimanalo had been abandoned by the turn of the century. A Territorial Land Court boundary map for Honouliuli, dated 1933-34, locates this parcel in the present Oneula Beach Park (Davis 1979:19).

Kelly (1985:168-9) reports that in 1858, Haalelea sued Montgomery's brother, Daniel, to get back the fishing rights associated with the land of Puuloa (Civil Court Case No. 348). Montgomery based his defense, in part, on the claim that after selling Puuloa, Kekauonohi withdrew her *konoiki* from the area and ceased to maintain any control over that fishery (Law Equity, Admiralty and Probate, 1857-1865:1-29; Reports of a Portion of the Decisions Rendered by the Supreme courts of the Hawaiian Islands.). But the judge ruled that Montgomery had only tenant's rights in the fishing grounds, along with all other tenants of Honouliuli (Civil Court Case No. 248:22-23).

Isaac Montgomery and Kamehameha III entered into a lucrative partnership for the salt works at Puuloa. At first the salt was traded to the other islands (Kamakau 1961:409), but by 1897 they counted local meat packers among their customers, and the Russian settlements in the North Pacific, which used the salt for packing salmon (*Hawaiian Gazette* 29 Jan. 1897). A saltworks was also established at Kualakai in Honouliuli, to the west. The remnants of the structures there were still visible in 1935 (Kelly 1985:169).

When Levi Haalelea died, the property went to his wife, Anadelia Amoe, who in 1871 rented it to James Dowsett and John Meek for grazing stock (Frierson 1972:13). These men introduced grazing in areas too high or dry for agriculture. The seed pods from the *kiawe* trees growing there provided food for the cattle, and *kiawe* wood made excellent charcoal (Henke 1929 IN Frierson 1972).

Amoe deeded Honouliuli to her sister's husband, John H. Coney, who sold it to James Campbell in September 1877, for \$95,000. The deed put the size of Honouliuli at 43,640 acres, "or thereabouts" (Bureau of Conveyances Book 52:210), approximately 400 acres more than Kekauonohi's original award (Kelly 1985:169).

By 1881, Honouliuli was the site of a prosperous ranch that "had 10,000 acres devoted to agriculture, with abundant pasturage of various kinds." Campbell put up fences and chased out the 32,000 head of cattle, owned by other people, that roamed the area (Briggs IN Lewis 1970:13, Dillingham 1885). This was twice the number of cattle estimated for all of Oahu in 1879 (Henke IN Frierson 1972:13). Campbell also granted leases for rice lands, fishing rights at Pearl Harbor, and a lime quarry. In addition, he made a business of fattening and slaughtering cattle from other ranches to supply the Honolulu market (*ibid.*).

Campbell had contracted with John Ashley to drill a well behind his ranch house in Honouliuli in July of 1879, and the result was the first artesian well in the Hawaiian Islands. It flowed until 1939, when it was sealed by the City and County of Honolulu, and all that remains of it is a commemorative plaque on Fort Weaver Road (Pagliaro 1987:2). The success of this well inspired those who understood the link between water and prosperity, and from 1890 into the 1920's, 71 additional wells were drilled, with a capacity of over one hundred million gallons per day (Lewis 1970:14).

THE PLANTATION AND THE RAILROAD

With readily available water, commercial agricultural came to the plains. In 1889, Honouliuli was leased to Dillingham for 50 years, and on January 29, 1890, the Ewa Sugar Plantation Company was chartered. Ewa Plantation soon began operations in the lower portion of the *ahupua'a* (Kelley 1978:3). The first fields were plowed for sugar in 1890 (Lewis 1970:16), and Chinese tenants grew rice in taro fields abandoned by the vanished Hawaiians (Briggs IN Lewis 1970).

It was said that "what had been veritable desert now began to blossom into a full-fledged sugar venture" (Conde and Best 1973:278). Ewa Plantation was at one time said to be the "richest sugar plantation in the world" (*Paradise of the Pacific* Dec. 1902:19-22). Later, Oahu Sugar Company began operations in the upper portion of Honouliuli (Kelly 1978:3).

The plantation operators recognized the agricultural potential of the coral plain. For a few years during the early part of this century, Ewa Plantation undertook a land reclamation project in order to put some of this wasteland into cultivation. They devised a complex system of drainage ditches running from the lower slopes of the Waianae Range to the coral plain. Before the rainy season, the slopes were plowed so as to induce erosion, and when the heavy rains began, great quantities of soil were carried down into the drainage ditches and onto the plain. As much as this practice seems to contradict modern notions of soil conservation, it was considered successful by the men who used it, and in the few years it was tried, about 373 acres of coral wasteland were reclaimed (Immisch 1964:70).

Seeking a greater return on his investment, Campbell collaborated with Dillingham in 1885-1886 on a "great land colonization scheme" for Honouliuli (Thrum 1886:73-80). They proposed to form a development company that would offer small tracts of land for agriculture and homesteads.

They touted 7000 acres of "rich, smooth bottom land lying at the southeastern end of the Waianae mountains," with an "inexhaustible supply of water" (Dillingham 1885). They described the climate as perfectly suited to sugar, rice, grapes and other fruits, but they had almost no takers.

Construction of a railroad by Oahu Railway and Land Company (OR&L) began in 1889, and by 1895 the tracks extended through Honouliuli to Waianae (Figure A-2). On June 19, 1890, *The Pacific Commercial Advertiser* noted, "The first carload of freight to Ewa Plantation went over the OR&L Co.'s line yesterday," and on August 1st, the *Honolulu Advertiser* reported:

On Wednesday last the track of the Ewa Plantation railway was completed to the harbor front, so the first train reached the wharf and several carloads of bananas were placed in scows and put on board the Australia.

To create business for the railroad, Dillingham sublet all the land below 200 ft to William Castle, who sublet again to the Ewa Plantation Company, which planted sugar cane (Frierson 1972:15). Dillingham also established a string of ranches along the proposed line (ibid:16).

There are indications of a spirited legal battle between the plantation and the Oahu Railway & Land Co. over use of the OR&L Co. tracks in the plantation. The 1893 Annual Plantation Report describes the settlement:

The settlement of the dispute with the Oahu Railway & Land Co., as regards the intention of the lease gives the plantation fee use of the Oahu Railway & Land Co.'s track within the boundary of the plantation for plantation purposes for the full term of the lease (Conde & Best 1973:279).

This appeared to benefit both the plantation and the railway. A reporter for the *Louisiana Planter* wrote in 1910:

One of the biggest things about this plantation is its railway system. There are two or three motor cars on the plantation used on the railway tracks; in fact these are indispensable, as it is impossible to get from point to point, between which there is often a distance of several miles, quick enough without them. The general manager's car is two-seated and holds four persons, and in this we made our inspection of the many miles of track and the numerous fields being harvested. This plantation has thirty miles of permanent track rockballasted, and twelve or fifteen miles of portable trackage for

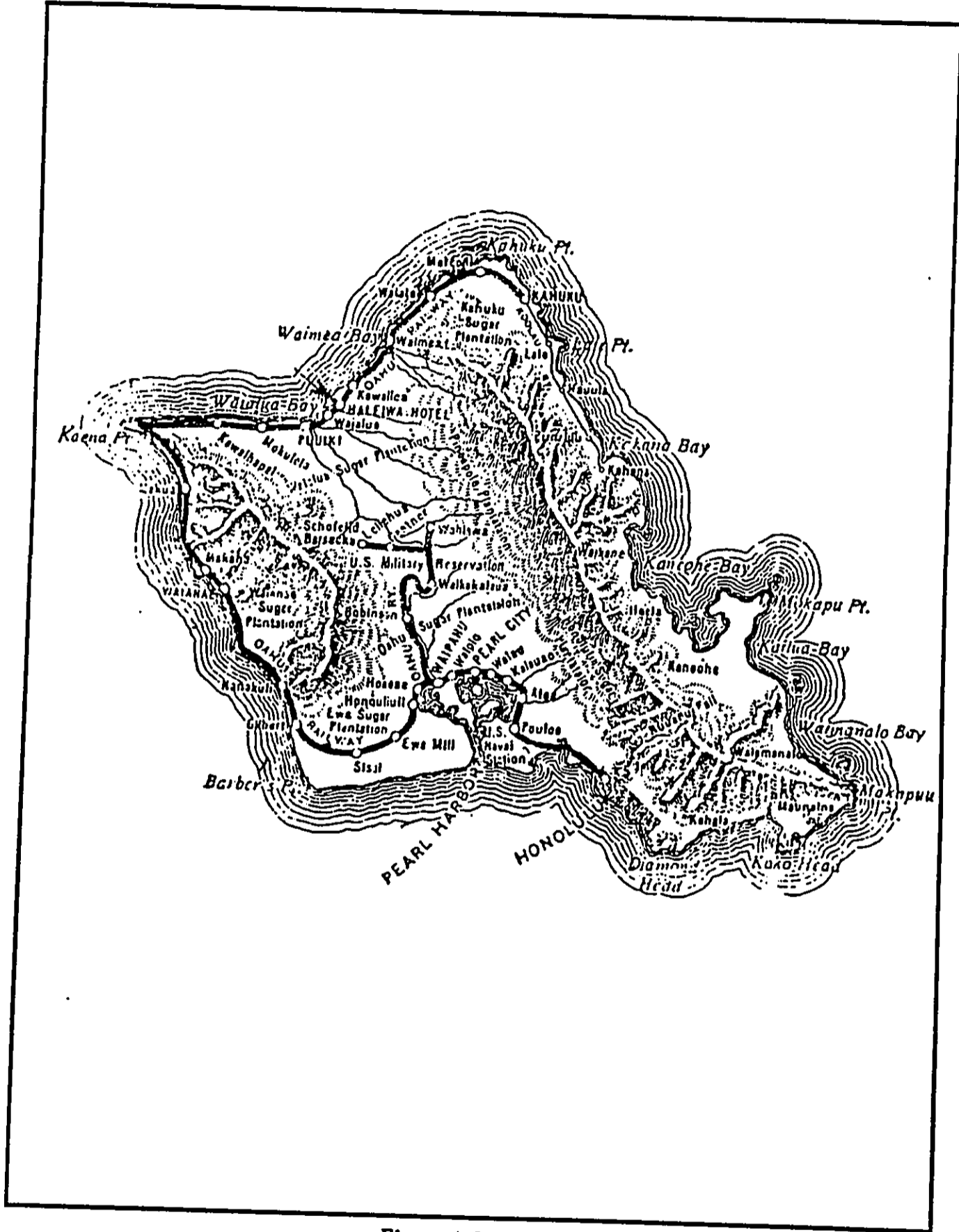


Figure A-2.
OR&L ROUTE

transient field work. On the former, we at times sped along at 35 miles per hour, and almost as easily as in a Pullman. In spite of being able to attain great speed on straight stretches of track, it took us hours to see the whole plantation (ibid:280).

The beginning of the end for the railroad was the dissolution of ties with Oahu Railway and Land Company. The plantation manager's report for 1947 contains this comment: "For over fifty years we have depended upon the reliable and efficient service of the Oahu Railway & Land Co. to transport our sugar, molasses and supplies. We regret it has been necessary for them to terminate this service at the end of 1947" (ibid:315). The last load of sugar cane came in by rail from the fields on November 14, 1950. In an entry under "Harvesting," the Oahu Sugar Company manager noted that by the end of 1951, "transportation of the entire crop from field to factory was done for the first time, the railroad being eliminated" (ibid:316).

SOCIAL CHANGE AT EWA PLANTATION

Management of the immigrant labor force at Ewa Plantation was a complex and challenging job. This is evident in a report made by the first manager for Ewa Plantation Company, W.J. Lowrie:

"There is one thing that probably some of you are not aware of, and that is, that the more scarce labor is, the more independent they are, and the less work they do. I am sure 3 Chinamen at the present rate of wages, \$24.00 per month, are not any more than equal to what 2 Chinamen were two years ago at \$18.00 per month; and if I am correct you can see that Chinese labor for the past season has cost exactly 100% more than two years ago (Ewa Plantation Co. Annual Report 1890:6).

We expect to plant 1000 acres for the next crop, and will require by next July at least 500 more laborers. Our Japanese are doing very well. There were no deaths in 1890, but so far in 1891 we have lost two, quite a number of them are on the sick list, and it is not to be wondered at when we consider how they live. They seem to prefer sending a large portion of their earnings to Japan, rather than buying proper food and keeping in good health. But we are slowly overcoming this difficulty by encouraging them to eat meat, potatoes, etc. All other classes of people on the place appear to keep in good health (ibid.)

In her 1987 historical study of Ewa Plantation, Penny Pagliaro discusses such problems as labor-management relations and health care. She argues that Lowrie's cultural insensitivity was typical of the period (1987:6). She adds that his collected letters do not show him to have been either negative or positive toward specific immigrant groups, except in relation to their willingness to abide by their contract with the company (ibid.).

Lowrie's answer to labor shortages was to try to develop a stable work force by establishing a profit-sharing program for his employees. By 1894, he was able to report the formation of "five new [profit-sharing] companies, with about one hundred acres each. They are giving good satisfaction" (Ewa Plantation Co. Annual Report 1894:12). Ewa Plantation was spared much of the turmoil experienced elsewhere when the contract labor system was abolished in 1900, possibly due to the profit-sharing system. The succeeding manager, George F. Renton Sr., reported:

While laborers came and went in the period of unrest following the termination of the contract system on June 14th last, there was practically no change in the personnel of the Profit Sharing 'Companies'; and...this branch of [the plantation] was not set back in the slightest degree (Ewa Plantation Co. Annual Report 1900:4).

Renton tried to insure that employees thought of Ewa Plantation as their permanent home. In 1918, he explained this to the stockholders:

That in the evolution of things a better housing of our workmen and their families is necessary, and that any reasonable expenditure for their comfort and happiness in any direction will be profitable, is beyond doubt. The main idea being to have the employees look upon the plantations as their homes and not as temporary camps to be left as soon as enough money has been saved to enable them to do so (Ewa Plantation Co. Annual Report 1918:7).

This, Renton believed, was the foundation of a stable and reliable work force (Pagliaro 1987:10). This policy was continued by Renton Jr., who succeeded his father. He recorded that 4,967 persons lived in the various villages on Ewa Plantation lands as of December 31, 1928. Pagliaro notes that Renton's job included many duties normally the responsibility of a city mayor.

Possibly more important to the well-being of plantation residents was Renton Jr.'s crusade for improved health care, especially for infants and children. The infant mortality rate in 1929 reached a shocking 160.7 deaths per thousand. That year, in conjunction with Queen's Hospital, Ewa Plantation opened a small, experimental health center for the purpose of reducing the infant mortality rate. The results were spectacular, and within two years Hawaii Sugar Planters Association had agreed to underwrite a portion of the cost in return for the general dissemination of the results to all plantations (Pagliaro 1987:16).

By 1934, the full impact of the program was apparent:

The Health Center is continuing its commendable work. Daily about 280 babies (approximately 90% of the total) are brought to the Health Center for their food. About 80 children, or a little over one-half of those attending our free Kindergarten, ages 3 to 6 years, are enrolled in our Health Center and thus obtain proper lunches. In the Ewa Public School there are about 1,030 children — ages 6 to 17 years. Of these, 620 are served with lunches at the school, the menus having been approved by the Director of the Health Center, and the other children bring their lunches from home.

The general health of the children is good. With 100 live births this past year, there were but five deaths—three infants died of meningitis, one of beri-beri, and one was prematurely born. This represents an infant mortality rate of 50, which is considered good (Ewa Plantation Co. Annual Report 1934:9).

According to Pagliaro, the Ewa Plantation Health Center project revolutionized the concept of child health care on Island plantations (1987:17).

The next manager, J.D. Bond, recognized individual employees in the annual report for the first time, paying tribute to the contributions of his workers:

You will find a list of names of 592 of you in this booklet. Those of you who are recorded have an unbroken service record at Ewa of at least 10 years. You have invested a part of your lives in this Company and in some slight recognition of this, we include this list in the annual report. At the top of the list, Mr. Joe Fernandez stands alone. Joe will have completed 48 years of continuous service at Ewa in 1939, and I hope will complete many more (Ewa Plantation Co. Annual Report 1938:18).

The Ewa Plantation Company operated until 1947 (Hammatt & Shideler 1989:7). It was sold on April 18, 1970 to Oahu Sugar Co. (American Factors) by Castle and Cooke, Inc. (*Honolulu Star-Bulletin* 1970:A-4).

FIBER CROPS AND COASTAL MARINE RESOURCES

Sugar was not the only crop the planters tried. Fiber plants, henequen and sisal, had been introduced about 1840 for rope production (Franck 1937 IN Frierson 1972). Sisal was planted in the area southeast of Puuokapolei, and on the land now occupied by Barber's Point Naval Air Station. According to the *Pacific Commercial Advertiser* (1894:7) sisal was planted first in 1894 for cordage, resulting in the name "Sisal" for the area southeast of Puuokapolei (Kelly 1978:3; Frierson 1972:11). Successful experiments with sisal in Hawaii led to the organization of the Hawaiian Fibre Company in 1898:

This corporation secured about 300 acres on the coral limestone coastal plain which skirts leeward Oahu, and began planting on a commercial basis. The original investment represented about \$37,000. The land controlled by this company now comprises about 3,000 acres, with a capitalization of \$150,000, and an annual yield of about 500 tons. The company employs about 60 laborers, men and women; at present all are Japanese. The minimum [pay is] \$1.25 per day (U.S. gold); in addition to this, living quarters, land for gardens, water, insurance, fuel, and medical attendance are furnished by the company. This gratuity represents an expenditure of over \$.25 per day per laborer. These wages correspond with those of the sugar and pineapple plantation for the same classes of labor, and strikingly indicate that Hawaii, contrary to popular opinion upon the mainland, does not possess "cheap labor" (MacCaughy and Weinrich 1918:43).

William Castle Jr. describes the sisal fields and their surroundings in Honouliuli in 1913:

From Pearl Harbor the train cuts across the broad cane fields of Ewa Plantation....Beyond, on the barren plains that slope upward to the Waianae Mountains, there are fields of sisal, each plant looking like a rosette of spears protruding from the ground. Through scrub algaroba [Kiawe] forests, where honey bees are raised, the railroad passes (Frierson 1972:17).

In the early 20th Century, fishermen occasionally built shanties by the shore, where they lived as squatters, trading fish for taro at Ewa. Their drinking water, taken from nearby ponds, was so brackish that other people could not drink it. Near Barber's Point there was a pond with freshwater shrimp, which were assumed to have been brought down from inland streams and put there to propagate (Herman Von Holt, interview April 6, 1970 IN Lewis 1970:16).

The following account by Eleanor Williamson of Bishop Museum, whose family lived at Kualakai (see Fig. 1), recalls the abundance of seafood in the area and includes a reference to the sisal which was so common:

In the Honouliuli area the train stopped among the kiawe (algaroba) trees and malina (sisal) thickets. We disembarked with the assorted food bundles and water containers. Some of the Kualaka'i 'ohana met us to help carry the 'ukana (bundles) along a sandstone pathway through the kiawe and malina. The distance to the frame house near the shore seemed long.

When we departed our 'ukana contained fresh lobsters, limu (algae), fish and i'a malo'o (dried fish)...Tutu ma (grandfolks and others) shared and ate the seafoods with great relish (Williamson IN Kelly 1985:160).

By 1920, land use in Honouliuli looked something like this:

Ewa Plantation - 12,000 acres, including sugar cane, a large mill, residential areas for several thousand people, a sisal plantation, large wood-lot at Waimanalo, and a limestone quarry.

Oahu Sugar Co. - 3000 acres, partially in sugar, which was primarily at the lower elevations.

Honouliuli Ranch - 20,000 acres, much of it classified as "waste" because of rocks and gullies; 2000-4000 cattle, plus hogs, horses and mules.

Pineapple, forest, and wasteland occupied the remaining 6000 acres.

HONOULIULI FOREST RESERVE

Much of the pasture land later went into pineapple production, but some higher elevation pasture was included in the Honouliuli Forest Reserve, which was established on

Feb. 2, 1925 (ibid:18). The October-December 1924 issue of the *Hawaiian Forester and Agriculturist* contained a detailed report on the Honouliuli Forest Reserve, which included the following description:

[Honouliuli Forest Reserve consists] of 4,936 acres in the ahupua'a of Honouliuli...[it] is entirely owned by the James Campbell Estate. The land at present is under lease to the Oahu Railway and Land Co. with an unexpired term of about 15 years, and is used in part as a cattle range.

Of the total area of 4,936 acres included in this reserve, 75% is covered with forest, and the heaviest forest is found in the Popouwela section at the north end, where higher elevations and a greater mountain mass induce more moisture. The wet or lehua type of forest naturally occurs near the crest of the range, and occupies 14% of the reserve area. The kukui type is found next below, in which clumps of koa on slopes, and other species already mentioned are frequent. It is of a very open nature, due largely to cattle and other depredations, and occupies 57% of the reserve area. At the south end, partly inside the kukui type, approximately 200 acres, or 4% of the reserve area, are occupied by a planted forest of cypress, eucalyptus, koa, plum, silk oak, sugi, and other species. Areas covered only with brush such as lantana and oi weed, with grass, or entirely bare of vegetation, amount to 25% of the total reserve area.

The ridges at the south end of this section are bare as the result of erosion, and are exposed to drying winds. The native forest of koa on the ridges and kukui in the valleys has been badly depleted in the past by overgrazing, so that practically only half of the area is covered by original forest.

The forest situation in this section has been vastly improved, however, by the artificial planting, done under the direction of Mr. H.M. von Holt during the past 20 years. This has resulted in an excellent forest in places of koa, several different species of eucalyptus, cypress, plum, Japanese cedar, and other sturdy trees.

Although cattle have been kept out of this section for many years past, horses in limited numbers have been allowed on the area without much apparent damage.

Although there are no permanently running streams on the area at present, I feel, as did my predecessor, that it would be best in the long run to begin now the protection and extension of the native forest by the exclusion of cattle and other grazing stock (Judd 1924).

GOVERNMENT OCCUPATION

In 1888, the Hawaiian Government established the Barber's Point Lighthouse, one of the first government structures in the area (Thrum 1889:89). In 1937, United States Government emergency funds were used to construct about 18 miles of road in the Barber's Point area. A map of Ewa Plantation dated July 27, 1939 clearly depicts the United States Army Road running west from the Puuloa Area, paralleling the coast to its termination near Barber's Point Lighthouse (Albert 1980:290).

In late 1939 and early 1940, the United States Navy acquired over 3,500 acres of land from the Campbell Estate, and built the first military installation in Honouliuli, the Ewa Marine Corps Air Station, Barber's Point. The facility remained operational until the current Naval Air Station was commissioned in 1942 (Kelly 1978:3).

World War II accelerated the pace of construction at the Naval Air Station, and it was already being heavily used before its completion on April 15, 1942 (Kelly 1985:175). It was reported that by October 1947 the Station had the largest landing mat in the Pacific, and that takeoffs averaged 1,500 planes daily during World War II (ibid.).

During World War II, the military also used the OR&L rail system. In 1944, the plantation manager reported: "We have continued to haul large quantities of ammunition over our railroad tracks and are continuing to supply the Armed Forces with buildings and electricity" (Conde & Best 1973:282). Hammatt notes that the coastline "has clearly been dramatically altered, mostly for coastal defense during the early 1940's. Concrete structures, including antiaircraft emplacements, tank traps, etc. are still visible. Their construction would have involved bulldozing and grading in surrounding areas" (1984:2).

Oneula Beach Park is within the boundaries of the project area. The Oneula Archaeological District contains the last remaining archaeological sites in the vicinity (Flanders 1986). As of September 30, 1986, Site 50-OA-2873 within the Oneula Archaeological District was considered eligible for inclusion on the National Register of Historical Places.

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