EXECUTIVE CHAMBERS
HONOLULU

JOHN WAIHEE
GOVERNOR

January 30, 1990

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
677 Ala Moana Boulevard, Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the Final Supplemental Environmental Impact Statement for the Kakaako Makai Area Plan, Honolulu, Hawaii, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. This environmental impact statement will be a useful tool in the process of deciding whether the action described therein should be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under applicable laws and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect your agency to weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by reviewers, provide a useful analysis of the proposed action.

With kindest regards,

Sincerely,

John Waihee

JOHN WAIHEE

cc: Office of Environmental Quality Control

1990 - Oahu - FEIS - KaKaaKo MaKai

FILE COPY

Kakaako Makai Area Plan

Final Supplemental Environmental Impact Statement

Honolulu, Hawaii

Prepared By:

Hawaii Community
Development Authority
State of Hawaii

January 1990

FINAL SUPPLEMENTAL

ENVIRONMENTAL IMPACT STATEMENT

FOR THE

KAKAAKO MAKAI AREA PLAN

This document is prepared pursuant to
Chapter 343, Hawaii Revised Statutes

Responsible Official:

Rex D. Johnson, Executive Director

1-2-90
Date

PREPARED BY:

State of Hawaii
Hawaii Community Development Authority
Honolulu, Hawaii

JANUARY 1990

DOCUMENT FOR PUBLICATION IN THE OEQC BULLETIN

DATE: Jan. 4, 1990 90 JAN -5 P4:26 SUBMITTED BY: C. Sakoda on behalf of Hawaii Community Development Authority

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

CHAPTER 205A DOCUMENT	☐	NEGATIVE DECLARATION	☐
CHAPTER 343 DOCUMENT	☒	EIS PREPARATION NOTICE	☐
NEPA DOCUMENT	☐	DRAFT EIS	☐
		FINAL EIS	☒
		ACCEPTANCE NOTICE	☐
		FONSI	☐

IS THE DOCUMENT A SUPPLEMENTAL EIS? YES ☒ NO ☐

TITLE OF PROPOSED ACTION OR PROJECT: Revised Kakaako Makai Area Plan

LOCATION: ISLAND Oahu DISTRICT Kakaako
ATTACH PROJECT LOCATION MAP(S)

TYPE OF ACTION (CHECK ONE): APPLICANT ☐ AGENCY ☒

NAME OF PROPOSING APPLICANT OR AGENCY: Hawaii Community Development Authority
NAME OF CONTACT: Rex Johnson, Executive Director
ADDRESS: 677 Ala Moana Boulevard, Suite 1001
CITY: Honolulu STATE: Hawaii ZIP CODE: 96813
PHONE: (808) 548-7180 or ( ) _____

NAME OF PREPARER OR CONSULTANT: R. M. Towill Corp./Helber Hastert & Kimura
NAME OF CONTACT: Colette Sakoda
ADDRESS: 420 Waiakamilo Road, Suite 411
CITY: Honolulu STATE: Hawaii ZIP CODE: 96817
PHONE: ( ) _____ or ( ) _____

ACCEPTING AUTHORITY: Governor, State of Hawaii

ESTIMATED PROJECT COST:

FEDERAL FUNDS	$
STATE FUNDS	$ 282 M
COUNTY FUNDS	$
PRIVATE FUNDS	$
TOTAL	$

DOCUMENT PREPARATION COST:

NEG DEC/EA	$
DRAFT EIS	$
FINAL EIS	$
SUP DRAFT EIS	$
SUP FINAL EIS	$
TOTAL	$ 50,000.00

EA TRIGGER (CHECK ALL THAT APPLY):

- ☒ USE OF STATE OR COUNTY LANDS OR FUNDS
- ☒ USE OF CONSERVATION DISTRICT LANDS
- ☐ USE OF SHORELINE SETBACK AREA
- ☐ USE OF HISTORIC SITE OR DISTRICT
- ☐ USE OF LANDS IN THE WAIKIKI SPECIAL DISTRICT

☐ 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): _____

SEE ATTACHED

(CONTINUE ON ANOTHER SHEET IF NECESSARY)

TAX MAP KEY(S): 2-1-15:multiple parcels
2-1-60:multiple parcels
2-1-59: multiple parcels
2-1-58: multiple parcels

TOTAL ACREAGE: 227 acres

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:

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

'90 JAN -5 P4:25

Ref. No.: PL EIS 6.16

January 5, 1990

OFC. OF ENV. QUALITY CON

Marvin Miura, Ph.D.
Director
Office of Environmental
Quality Control
State of Hawaii
Room 4
465 South King Street
Honolulu, Hawaii 96813

Dear Dr. Miura:

The Hawaii Community Development Authority is hereby transmitting 25 copies of the Final Supplemental Environmental Impact Statement for the Kakaako Makai Area Plan for publication in your January 8, 1990 OEQC Bulletin.

Please do not hesitate to call us should questions arise as you prepare your recommendation to the Governor regarding acceptance of this document.

Very truly yours,

Rex D. Johnson

RDJ/ST:gst

ATTACHMENT

The Hawaii Community Development Authority (HCDA or Authority) has determined that a Supplemental Environmental Impact Statement (SEIS) is required for its revised makai area plan and rules (October 1989), which is a significant departure from the original makai area plan and rules adopted by the Authority in 1983. HCDA's determination is based on Subchapter 10, Department of Health, Chapter 200 of Title 11, Administrative Rules, regarding EIS Rules of the State Office of Environmental Quality Control (OEQC) which require a Supplemental EIS any time there is a substantial change to any action for which an EIS was accepted. Accordingly, the information provided in the "Final SEIS for the Kaka'ako Community Development District Plan," which was accepted by the Governor in 1985, needs to be updated.

Information presented in the 1985 Final SEIS has been supplemented in several respects. The scope of this Supplemental EIS focuses on changes to the original makai area plan and rules, and changes proposed within the expanded makai area during the next 10 to 20 years. In addition to disclosing the impacts from implementation of the short- and long-range components of the revised makai area plan within an expanded makai area, this SEIS updates and further evaluates traffic, air quality, noise, and economic impacts resulting from development of the makai area in the regional context of the Honolulu waterfront. This Supplemental EIS has been prepared in accordance with Chapter 343, HRS, and the Administrative Rules of the Office of Environmental Quality Control (OEQC).

The revised makai area plan covers 227 acres of land and allocates 7.53 million square feet of floor area among the following major land uses: Commercial (C), Waterfront Commercial (WC), Recreation Commercial (RC), Waterfront Service (W), Park (P), Public (PU), Aloha Tower Special District, Waterways, and Circulation. Major departures from the original Makai Area Plan are: residential uses will not be permitted in the makai area; and industrial uses, except those related to waterfront or marine activities, will not be permitted. Allowed industrial uses will be restricted to WC and W zones.

TABLE OF CONTENTS

APPENDICES

Appendix A - Ocean Engineering (Edward K. Noda & Associates)

Appendix B - Acoustic Study (Darby & Associates)

Appendix C - Market Assessment (John Child & Co.)

Appendix D - Air Quality Impact Report (J. W. Morrow)

LIST OF FIGURES

LIST OF TABLES

Summary

SUMMARY

The Hawaii Community Development Authority (HCDA or Authority) has determined that a Supplemental Environmental Impact Statement (SEIS) is required for its revised makai area plan and rules (October 1989), which is a significant departure from the original makai area plan and rules adopted by the Authority in 1983. HCDA's determination is based on Subchapter 10, Department of Health, Chapter 200 of Title 11, Administrative Rules, regarding EIS Rules of the State Office of Environmental Quality Control (OEQC) which require a Supplemental EIS any time there is a substantial change to any action for which an EIS was accepted. Accordingly, the information provided in the "Final SEIS for the Kaka'ako Community Development District Plan," which was accepted by the Governor in 1985, needs to be updated.

Information presented in the 1985 Final SEIS has been supplemented in several respects. The scope of this Supplemental EIS focuses on changes to the original makai area plan and rules, and changes proposed within the expanded makai area during the next 10 to 20 years. In addition to disclosing the impacts from implementation of the short- and long-range components of the revised makai area plan within an expanded makai area, this SEIS updates and further evaluates traffic, air quality, noise, and economic impacts resulting from development of the makai area in the regional context of the Honolulu waterfront. This Supplemental EIS has been prepared in accordance with Chapter 343, HRS, and the Administrative Rules of the Office of Environmental Quality Control (OEQC).

The revised makai area plan covers 227 acres of land and allocates 7.53 million square feet of floor area among the following major land uses: Commercial (C), Waterfront Commercial (WC), Recreation Commercial (RC), Waterfront Service (W), Park (P), Public (PU), Aloha Tower Special District, Waterways, and Circulation. Major departures from the original Makai Area Plan are: residential uses will not be permitted in the makai area; and industrial uses, except those related to waterfront or marine activities, will not be permitted. Allowed industrial uses will be restricted to WC and W zones.

The original makai area plan encompassed 133 acres of land and had a planned total floor area of 8.3 million square feet, with an average floor area ratio (FAR) of 1.4 for the

developable land area. The revised makai area plan allows for a total potential floor area of 7.53 million square feet, with an overall average floor area ratio of 0.8 for the land area. The slightly reduced floor area ratio is due to the inclusion of the waterfront park and additional park lands proposed in the makai area.

Under the revised Makai Area Plan, property within the Commercial zone may be developed to maximum heights of 150 feet and 200 feet with associated maximum FARs of 2.5 and 3.5, respectively, and to 45 feet and 1.5 FAR in the Waterfront Commercial, Recreational Commercial, and Waterfront Service zones. Building height and bulk in the makai area will be able to exceed a 45-foot height only in the Commercial zone on development units or lots of 10,000 square feet or more, and then only under the provisions of the Planned Development permit process. Within certain maximums HCDA will, during the design review process and according to guidelines in the rules, set building heights and floor area ratios for Planned Development projects based on the size of the development lot, and the inclusion of parking, community facilities, and other public improvements which meet the objectives and requirements of the Plan. Building forms will be transitional from the mauka area's Planned Development projects' platforms with heavily landscaped decks and towers to the "stepped down" makai area landscape and pedestrian activities at a ground level.

Streets and roadways in the makai area will be upgraded to meet or exceed City and County standards. Ward Avenue is proposed to be extended into the makai area as the principal collector street. South and Punchbowl are proposed to be extended into the makai area as a one-way couplet with Punchbowl inbound and South outbound. The plan identifies the development of a one-way looped couplet extension of Cooke and Ohe Streets to provide for a primary park access. Based on a recommendation made by the Honolulu waterfront master plan, a possible leg of the proposed Sand Island Bypass and Tunnel has been designated through the makai area. This concept recognizes the expected regional requirement for increased corridor capacity through the central Honolulu area -- a need which is foreseen with or without any revisions to the makai area plan.

Closure of certain segments of existing streets and the realignment of others to accommodate the proposed land use pattern are also included in the revised makai area

plan. Public transportation would be provided primarily by the City bus system, and proposed rapid transit, people movers and waterborne ferries and taxis.

The revised makai area plan establishes a reserved housing trust fund wherein developers of Planned Development projects are assessed a fee based on the projected leasable commercial floor area of the development parcel. An option partially offsetting the amount of assessment by providing light industrial relocation space within the mauka area is also available. Developers may build reserved housing in lieu of paying the fee on a site mutually agreed to by the developer and HCDA. Units that are to be provided as an alternative to the fee are required to be affordable, as set forth in subchapter 7 (sale and rental of reserved housing units) of the Mauka Area Rules.

The revised plan requires that the future infrastructure be sized to meet the demands of the District developed to its maximum potential. Utility and drainage facilities will be systematically upgraded by HCDA concurrently with roadway improvements. Development will not be permitted if adequate infrastructure is not available.

Redevelopment of the makai area will not result in any significant adverse long-range impacts on the natural environment. The proposed filling to create the new beach park will affect nearshore marine habitats during construction. However, in the long run, new plant and animal species that will repopulate the nearshore waters off the newly created shore are expected to be healthier, more diverse and more numerous. Existing surfing sites are expected to be enhanced as a result of the project.

Drainage from the makai area will not significantly add to the drainage flows from the mauka areas of the District and tributary areas. The proposed inland waterway system will be integrated into the drainage system to improve the circulation while at the same time adding an amenity to the makai area.

Increased urban development within the District will unavoidably result in increased vehicular activity which may adversely affect existing businesses. Federal and State regulations governing noise and air quality, together with HCDA Rules and street improvements, should satisfactorily mitigate these impacts. A positive environmental impact

expected is reduced noise levels as a result of the proposed relocation of the various industrial activities from Fort Armstrong to more appropriate locations.

Some of the existing businesses in the makai area may be temporarily or permanently displaced as a result of redevelopment. The authority will adopt specific relocation policies and procedures as part of its rules to assist affected businesses. Also, the acquisition and development of the Kapalama Military Reservation as a major container terminal and relocation site for major activities displaced by the project, will provide a relocation site for maritime uses presently located within the Fort Armstrong area.

District-Wide Improvement Program Rules adopted by HCDA set forth the methods of assessing costs against real properties that specially benefit from public facility improvements, government agency responsibilities for improvement costs, how the assessment process will be conducted, and the methods of financing infrastructure improvements.

The first project targeted for implementation under the revised Kakaako Makai Area Plan is a 70-acre waterfront park. This project is bounded by the Diamond Head edge of Kewalo Basin on the east, the Keawe Street drainage channel on the west, and Kelikoi and Olomehani Streets on the north.

The entire revised makai area plan is divided into two major phases -- the short-range (Phase I) is expected to begin in the second quarter of 1990, and continue in increments to the year 2000; the long-range (Phase II) is anticipated to begin in the year 2000 and continue to 2010. During the construction period, significant adverse impacts may be expected on air quality, noise, vehicular and pedestrian traffic, business activity, and the visual quality of the area. These impacts, however, for the most part will be temporary. Over the long-term, there will be significant positive impacts, such as reduction of hydrocarbon pollution in storm runoff, improved traffic circulation, increased commercial and recreational floor space, increased employment opportunities, increased cultural activities, increased property tax and excise tax revenues, and an overall improvement in the quality of the environment. These benefits are considered to justify implementation of the proposed improvements, notwithstanding unavoidable adverse impacts.

CHAPTER 1

Introduction

CHAPTER 1
INTRODUCTION

1.1 PURPOSE AND NEED FOR THE SUPPLEMENTAL EIS

The Hawaii Community Development Authority (HCDA or Authority) prepared a Supplemental Environmental Impact Statement (EIS) in 1985 for the 1983 Makai Area Plan and Rules, which was an addendum to the Kakaako Community Development District (KCDD) Plan adopted by the Authority in 1982. The determination at the time was based on the State's Environmental Impact Statement (EIS) Regulations which require a Supplemental EIS any time there is a substantial change to an action for which an EIS was accepted. With the adoption of the Office of State Planning's 1989 Honolulu Waterfront Master Plan, HCDA has undertaken a revision of its original (1983) makai area plan. The revised draft makai area plan and rules (October 1989) reflect many of the changes within the Kakaako makai area that were recommended in the Honolulu waterfront master plan. Because of this, the revised makai area plan and rules represent in many respects, a significant departure from the original 1983 makai area plan and rules. Accordingly, the information provided in the "Final Supplemental Environmental Impact Statement for the Kakaako Community Development District Plan - An Addendum to the Final Environmental Impact Statement 82-5F (FS)", which was accepted by the Governor in 1985, needs to be updated.

Under the EIS Regulations, a "substantial change" would arise whenever the proposed action has been modified to the extent that new or different environmental impacts are anticipated. Further, the conditions which warrant a Supplemental EIS are set forth as follows:

> "...when the scope of an action has been substantially increased, when the intensity of environmental impacts will be increased, when the mitigating measures originally planned are not to be implemented, or where new circumstances or evidence have brought to light different or likely increased environmental impacts, not previously dealt with (State of Hawaii, Office of Environmental Quality Control)."

Since these conditions apply, a supplemental EIS is being done to update the 1985 Final EIS.

The Final SEIS of 1985 has been supplemented in several respects. In addition to disclosing the impacts from implementation of the revised makai area plan, this Supplemental EIS describes and analyzes the impacts resulting from development of a waterfront park, renovation of the Kakaako Peninsula seawall, and projects identified to occur in Phase 2 (long-range plan), and reevaluates traffic, air quality, and noise impacts based on updated studies from the Honolulu waterfront master plan.

The intent of this Supplemental EIS is to provide a disclosure of environmental and economic impacts of the actions contemplated under the revised Kakaako Makai Area Plan which now comprises an additional 77 acres for a total of 210 acres (through Act 355, SLH 1987). This treatment of a group of proposed actions in a single EIS is required by the EIS Regulations. Accordingly, an EIS that is accepted for a group of proposed actions would satisfy the requirements of Chapter 343, HRS, and no other statement for any individual action described therein would be required, provided there is no substantial change which would necessitate a Supplemental EIS.

This Supplemental EIS has been prepared to satisfy the content and procedural requirements of Chapter 343, HRS. Appropriate agencies, organizations, and individuals have been consulted in the preparation of the Draft EIS process so their concerns have been addressed.

1.2 BACKGROUND AND SETTING

1.2.1 The Kakaako Community Development District

Act 153, Session Laws of Hawaii (SLH) 1976 (codified as Chapter 206E, Hawaii Revised Statutes), established HCDA as a public corporation for the purpose of long-range community planning and development. Having the authority to implement its own plan, HCDA assumes a unique position to confront problems of urban blight, underutilization of land resources, lack of coordinated planning, cumbersome government regulations, and unmet community needs.

Kakaako became the first Community Development District designated for improvement by the State Legislature. Private redevelopment of Kakaako has been hindered for years by inadequate infrastructure (i.e., roads, storm drains, and sewers), high interest rates, and government permit requirements. Selection of the area for redevelopment and renewal was due to its strategic location in Central Honolulu, high demand for commercial, industrial and residential space, and the underdeveloped condition of the area's resources as compared to the adjacent Central Business District, State Capitol District, and Waikiki.

The original Kakaako District boundaries (henceforth the "mauka area," or toward the mountains) were designated by King Street, Punchbowl Street, Piikoi Street, and Ala Moana Boulevard. Beginning in 1977 and continuing through 1982, HCDA pursued a methodical approach to planning for the 450-acre district. The Kakaako Plan and corresponding Rules for the mauka area were adopted in February 1982.

In April 1982, the Legislature passed H.B. 3143-82, H.D. 2, S.D. 1, C.D. 1. This bill, which became Act 228, SLH 1982, amended the District boundaries to include approximately 133 acres of land makai (toward the sea) of Ala Moana Boulevard between Kewalo Basin and Pier 4 in Honolulu Harbor (see Figure 1-1). This area, hereafter referred to as the "original makai area," was assigned to HCDA for planning and implementation of improvements to public facilities in accordance with its powers and responsibilities and the development policies established under Chapter 206E, HRS. HCDA issued the first plan for the makai area in October, 1983. A Supplemental EIS was prepared for the original 1983 Makai Area Plan and was accepted by the Governor in 1985.

During its 1987 session, the Legislature expanded the makai area to encompass a sizeable part of the Honolulu waterfront from Ala Moana Park to the Aloha Tower -- an area which includes Kewalo Basin, the entire Kakaako Peninsula, and the waterfront areas between Fort Armstrong and the Aloha Tower (Figure 1-1). Based on the 1987 boundary amendment (Act 355, SLH 1987), the Makai Area now includes nearly 2 miles of waterfront and comprises approximately 210 acres of fast land and an additional 38 acres of submerged land (Kewalo Basin and Piers 4-8 area) makai of Ala Moana Boulevard. Figure 1-2 shows Kakaako Community Development District in its entirely (makai and mauka).

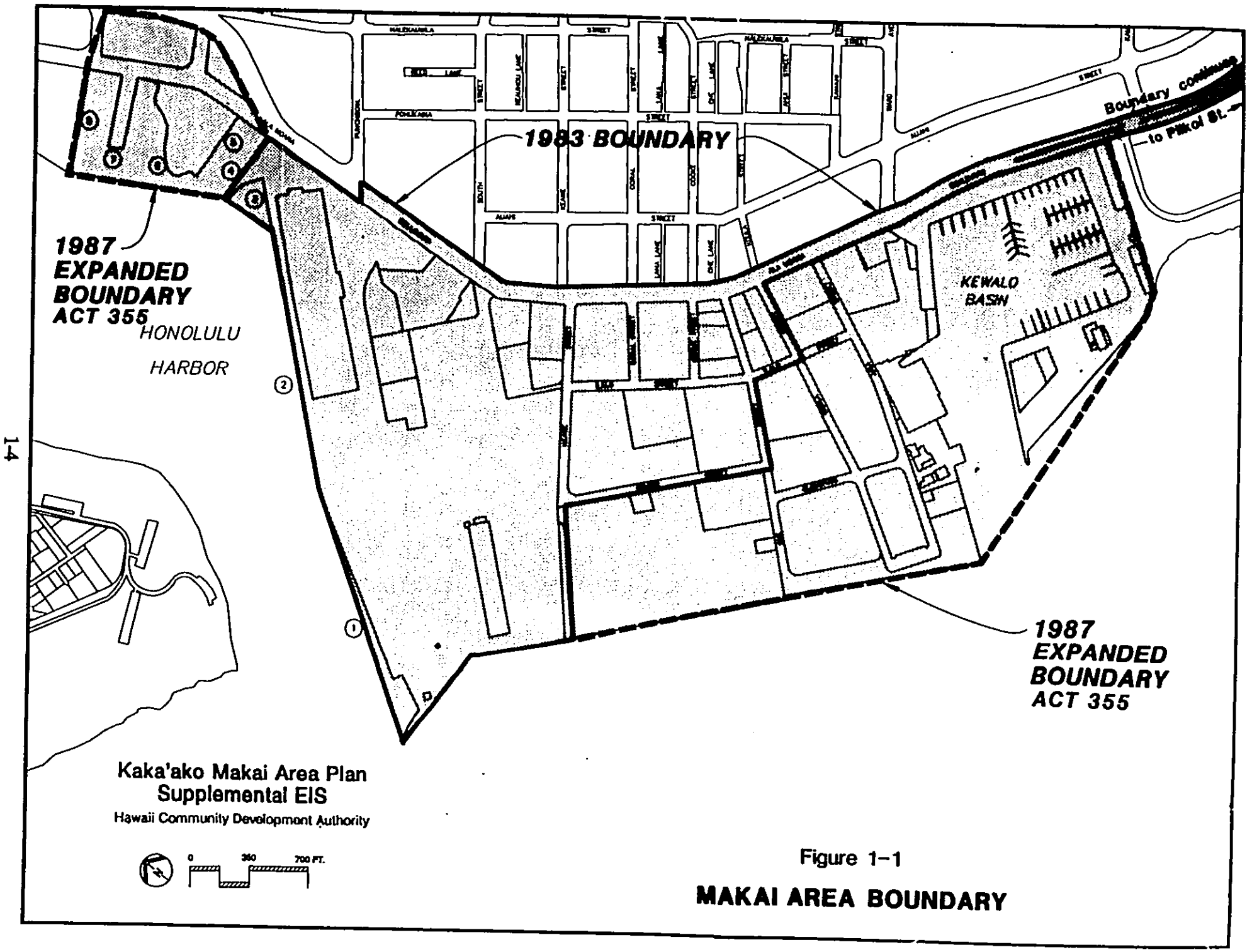


Figure 1-1

MAKAI AREA BOUNDARY

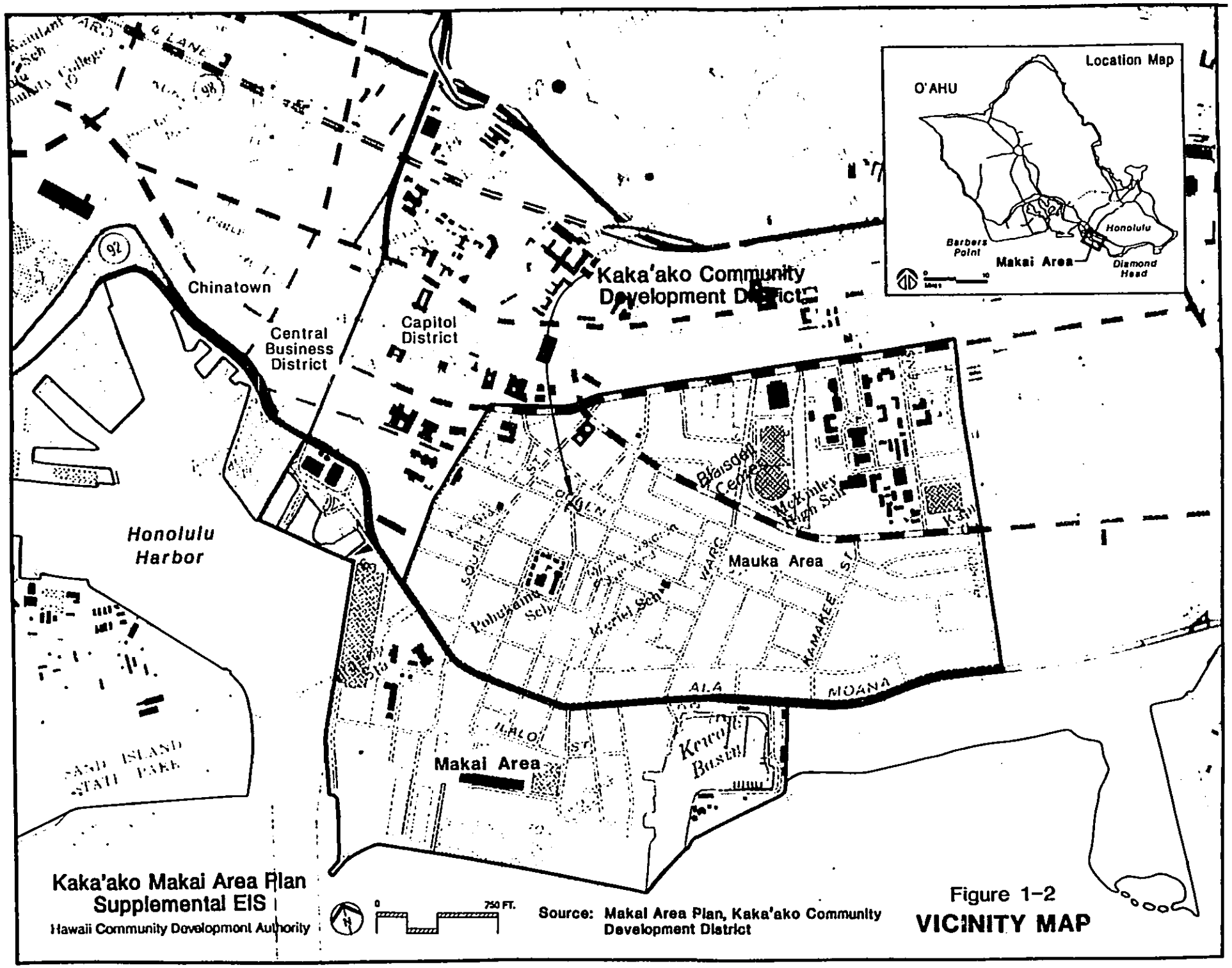


Figure 1-2
VICINITY MAP

In September 1987, Governor John Waihee declared that the time had come to enjoy again the waterfront as a people-oriented gathering place and launched a major "waterfront reawakening" effort. Governor Waihee initiated a concerted planning effort among business and community representatives aimed at generating ideas and obtaining consensus on how best to develop the waterfront.

The 1988 Legislature provided the Office of State Planning (OSP) and HCDA funding to prepare a comprehensive master plan and long-range development program for the Honolulu waterfront. In May of the same year, OSP and the Authority retained the firms of Helber, Hastert & Kimura, Planners and R. M. Towill Corporation as a joint venture charged with conducting the necessary technical planning studies and preparation of the master plan. While the joint venture assembled a technical planning team to prepare the plan, OSP initiated a public participation and awareness program to secure public input into the planning process, and assembled an interagency task force to assure coordination with the numerous public agencies with jurisdiction in the waterfront area.

HCDA participated in the waterfront-wide planning process so as to update the makai area plan based on current market, traffic, engineering, and port planning studies and to assure that plans for the makai area were compatible with and supportive of the comprehensive Honolulu waterfront master plan.

The resulting Honolulu waterfront master plan whose prefinal report was submitted to the Legislature in January, 1989, and final report submitted to the Governor in December 1989, departs significantly from the original Kakaako Makai Area Plan that was issued by the Authority in 1983. The comprehensive planning approach as presented in the Honolulu waterfront master plan has resulted in stronger mauka-makai and Ewa-Diamond Head linkages between and within the various subareas of the Honolulu waterfront (including the makai area) as well as a comprehensive approach to planning and implementing major waterfront-wide public infrastructure improvements.

1.2.2 Project Location of SEIS

The project area of the Supplemental EIS is located on the seaward edge of the southern Honolulu Coastal Plain (Figure 1-2). Kakaako Makai is bordered by the Nimitz

Highway/Ala Moana Boulevard corridor on the mauka side, and extends from the Ewa end of the Ala Moana Beach Park westward to the face of Pier 8 at Aloha Tower. The entire area was at one time submerged lands. Over the last century, offshore landfilling with dredged coral has raised the area to the existing elevation of four to five feet above sea level.

CHAPTER 2

Description of Proposed Action

CHAPTER 2
DESCRIPTION OF THE PROPOSED ACTION

2.1 OVERVIEW

The Kakaako makai area is located within the Kakaako Community Development District on the south side of the Primary Urban Center of Honolulu on the Island of Oahu. The project area is approximately 210 acres of land. Proposed offshore landfilling to create a new beach park near the Honolulu Harbor entrance will increase the existing land area of Kakaako makai by approximately 17 acres. The Kakaako makai land area is currently being used for numerous commercial, industrial and maritime industrial activities and include the City and County of Honolulu's Department of Public Works and Board of Water Supply vehicle maintenance and storage baseyard, the food distribution center, and Fort Armstrong maritime activities.

There are ten components to the Revised Makai Area Plan. They are: Land Use, Transportation, Open Space and Recreation, Urban Design, Infrastructure, Historic Resources, Social and Safety, Relocation, Financing, and Phasing Plan. These components will be discussed individually in the sections following a discussion of the development concept.

2.2 DEVELOPMENT CONCEPT

The development guidance policies provided in Chapter 206E, HRS, as amended, and the recommendations of the Honolulu waterfront master plan were used by HCDA to formulate the revised makai area plan's development concept. These policies called for:

- A mixture of compatible land uses, including commercial, recreational, and maritime uses in appropriate locations.

- The establishment of urban design policies which shall preserve major view planes, view corridors, and other important environmental elements.

- The preservation of historically significant settings, facilities, and sites.

- The promotion of the concept of the makai area as a people-oriented gathering place.

- Primary reliance on public transportation and pedestrian facilities for circulation within the District.

- The development of public facilities and infrastructure to support the redevelopment and revitalization policies for the District.

In addition to the guidance policies listed above, HCDA also considered the unique environmental and physical conditions of the makai area, including the following:

a. The need to temporarily retain existing waterfront terminal and harbor-related uses and activities in the Fort Armstrong area until new terminal facilities are developed at the Kapalama Military Reservation.

b. The aircraft, heavy truck traffic, and industrial noise exposure which inhibits residential use makai of Ala Moana Boulevard.

c. In order to preserve and enhance views, due particularly to the area's waterfront location, building heights and setbacks needed to be controlled.

d. The existence of significant historic sites including the U. S. Immigration Station, the Department of Health Building, and the Old Ala Moana Sewage Pump Station.

Given the development guidance policies and unique environmental conditions described above, the Authority's makai area concept promotes a high quality community that complements the community envisioned in the Kakaako Plan for the mauka portion of the Kakaako District. With the projected new residential population of Kakaako of up to 45,000 over the next 20 to 25 years in the mauka area, an appropriate short- and long-term concept for the use of the makai area as a major recreational, people-oriented activity area

was identified as highly desirable. Kakaako makai is thus planned to offer a variety of urban waterfront recreational and entertainment facilities to residents of the district and of the Honolulu region.

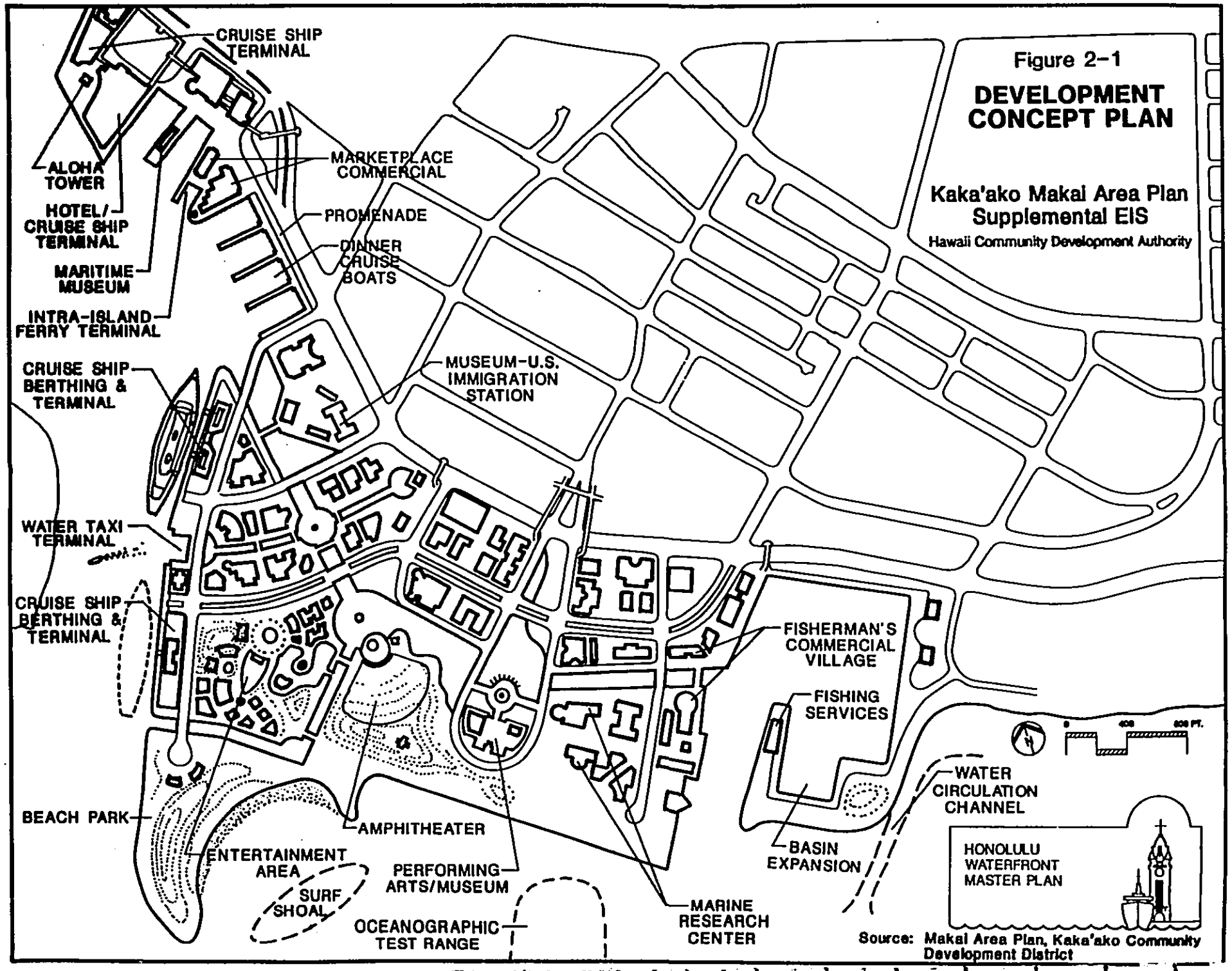
The revised development concept for the makai area was prepared as a key element of the Honolulu waterfront master plan which identified the makai area as the "people-oriented gathering place within a park-like setting." The makai area is envisioned as completing a key link in the system of parks and greenbelts running along the south shore of Oahu ("lei of green"), with the area itself becoming a "great park," opening up public access to the waterfront and providing major regional recreational and cultural amenities.

Significant elements within the concept plan are an expanded and redeveloped Kewalo Basin, an inland waterway system that will connect Kewalo Basin with Honolulu Harbor providing a new urban waterfront for the Kakaako community, a passenger cruise ship terminal at Piers 1 and 2, and expanded water frontage between Piers 4 and 5 to provide additional berthing facilities for large dinner cruise boats. A 70-acre Kakaako Waterfront Park will feature a variety of cultural and ocean recreational facilities, such as an amphitheater, performing arts center and museum complex, and a waterfront promenade and shoreline park (Figure 2-1).

2.3 LAND USE PLAN

The arrangement of land use zones is based on the concept of encouraging a people-oriented gathering place in a park-like setting. Six land use zones are utilized in the Revised makai area plan as shown in Figure 2-2, and these designations carry out the concept as developed in the Honolulu waterfront master plan for the project area. The zones are: Commercial (C), Waterfront Commercial (WC), Recreational Commercial (RC), Waterfront Service (W), Park (P), and Public (PU). Areas adjacent to Aloha Tower have been incorporated into a special district. Industrial uses are not permitted except in WC and W zones, and these allow only industrial uses related to waterfront or marine activities. Residential uses are not permitted in any of these zones.

Table 2-1 summarizes the proposed land uses by the various zones within the makai area.


CRUISE SHIP TERMINAL
ALOHA TOWER
HOTEL/ CRUISE SHIP TERMINAL
MARITIME MUSEUM
INTRA-ISLAND FERRY TERMINAL
CRUISE SHIP BERTHING & TERMINAL
WATER TAXI TERMINAL
CRUISE SHIP BERTHING & TERMINAL
BEACH PARK
MARKETPLACE COMMERCIAL
PROMENADE
DINNER CRUISE BOATS
MUSEUM-U.S. IMMIGRATION STATION
AMPHITHEATER
ENTERTAINMENT AREA
SURF SHOAL
PERFORMING ARTS/MUSEUM
OCEANOGRAPHIC TEST RANGE
MARINE RESEARCH CENTER
FISHERMAN'S COMMERCIAL VILLAGE
FISHING SERVICES
BASIN EXPANSION
WATER CIRCULATION CHANNEL
HONOLULU WATERFRONT MASTER PLAN
Figure 2-1
DEVELOPMENT CONCEPT PLAN
Kaka'ako Makai Area Plan Supplemental EIS
Hawaii Community Development Authority
Source: Makai Area Plan, Kaka'ako Community Development District

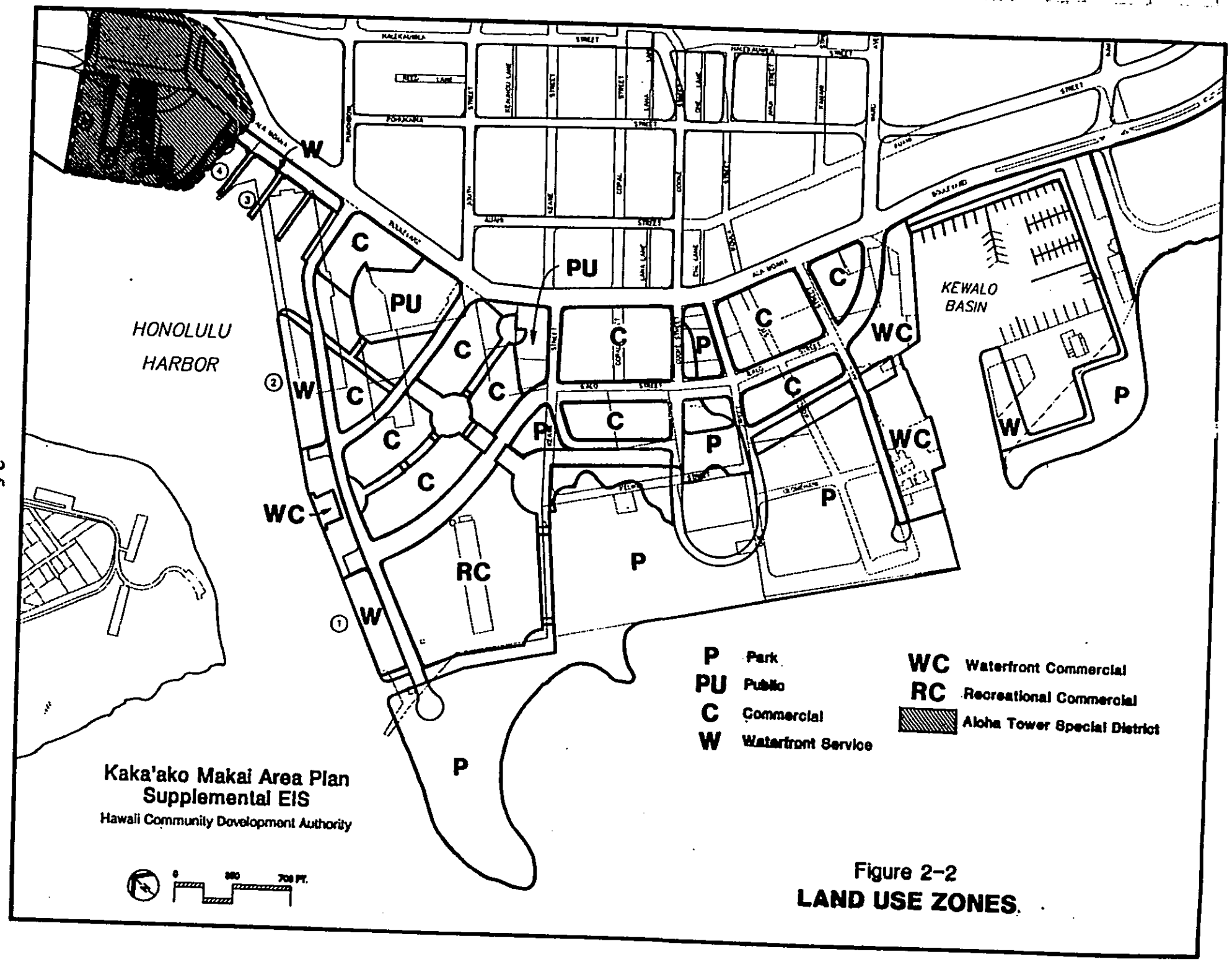


Figure 2-2
LAND USE ZONES

TABLE 2-1

MAKAI AREA LAND USE SUMMARY

Land Use Zone	Land Area (acres)	Building Area (million s.f.)
Commercial (C)	39	5.08
Waterfront Commercial (WC)	12	.80
Recreation Commercial (RC)	16	1.06
Waterfront Service (W)	9	0.59
Aloha Tower Special District	9	NA
Park (P)	70	NA
Public (PU)	7	NA
Waterways	17	NA
Circulation	48	NA
TOTAL	227	7.53

The overall average floor area ratio (FAR) in the makai area would be 0.8.

2.3.1 Base Zone and Planned Development (PD) Provisions

To achieve the desired arrangement and mixture of land uses, two methods of development actions are possible. A standard Base Zone permit is one option. Base Zone developments proposed in the Makai Area will have to comply with appropriate rules regarding standards set forth in subchapters 2 and 3, Land Use Zone Rules and General Development Requirements, respectively, of the Kakaako Community Development District Rules. A Base Zone development would limit a project to 45 feet in height and FAR of 1.5. Any development proposal exceeding the 45 foot height limit or having an FAR greater than 1.5 is required to obtain a Planned Development (PD) Permit. Planned Development projects are allowed only in the Commercial zone. A typical vertical mix within a Planned Development project would be retail and other commercial uses on the lower floors, with commercial/office uses above.

Developers of Planned Development projects are assessed a fee which is targeted for a newly established reserved (affordable) housing trust fund. The fee is based on 2 percent

of revenues from the projected leasable commercial floor area of the development parcel. An option partially offsetting the amount of assessment by providing light industrial relocation space within the mauka area is also available. In lieu of paying this fee, the developer may build reserved housing within the mauka area on a site mutually agreed to by the developer and HCDA. Units which are provided as an alternative to the fee must be affordable according to definitions/guidelines contained in the Mauka Area Rules.

A developer of a project within the makai area is required to dedicate land for public facilities for the joint use by the occupants and employees of the development as well as by the public. The dedication of land for public facilities will be subject to the maximum ceiling in land or money in lieu thereof determined by use of a formula contained in the Kakaako Community Development District rules. A developer may be permitted to pay a fee equal to the value of land which would otherwise have had to be dedicated, or combine the payment of fee with land to be dedicated. Public facilities include streets, utilities and service corridors, parks and playgrounds, parking garages, promenades, pedestrian bridges, storm drain systems, water systems, street lighting systems, and sanitary sewerage systems.

The following are definitions of the various land use zones in the project area:

Commercial Zone (C)

The purpose of this zone is to permit a wide range of commercial land uses, predominantly office-related with ancillary retail commercial uses. "C" zones encompass a total of approximately 39 acres, and are generally located in areas between Ala Moana Boulevard, and the proposed South Street and Ward Avenue extensions. FARs for these zones range from 2.5 to 3.5 with total developable floor area estimated at 5.08 million square feet.

Waterfront Commercial (WC)

The purpose of this zone is to allow for significant commercial redevelopment along the Ewa edge of Kewalo Basin, a smaller area between Piers 1 and 2 and the proposed festival marketplace at Piers 5 and 6, while simultaneously encouraging the

integration of these uses with existing fishing or maritime services located in the area. A total of 12 acres have been designated within the WC zone, providing approximately .80 million square feet of building area.

Recreational Commercial (RC)

The purpose of this zone is to permit the development of a major entertainment and recreational activity center set in an urban park environment. This zone encompasses a 16-acre site located in the Fort Armstrong area with a development potential of about 1.04 million square feet of building area.

Waterfront (W)

The purpose of this zone is to include only those uses which support the marine activities and facilities within Kewalo Basin and Honolulu Harbor. Typical uses include the proposed cruise boat terminals at Piers 1 and 2, and service/support areas at Kewalo Basin. Waterfront zones comprise a total of 9 acres of land with a development potential of approximately 0.59 million square feet of building area.

Park (P)

The purpose of this zone is to permit the development of a multi-faceted public park including passive and active recreation areas as well as major public facilities such as a performing arts center, a museum, and an amphitheater.

A total of 70 acres of park zone are identified which include much of the existing and proposed Kewalo Peninsula, a large contiguous area within the Kakaako Peninsula (including a projection of the park out to and across Ala Moana Boulevard), the proposed beach park extension at Fort Armstrong, and a few smaller parcels located within the Makai Area.

Public (PU)

The purpose of this zone is to identify public lands reserved for such public requirements as open space, preservation of historic resources, and utilities substations. Allowed uses for this zone include public uses and structures as well as accessory activities conducted by private lessees under supervision of a public agency. The specific allowed uses shall be provided by rules.

Three Public areas totalling about 7 acres are designated and include the federal Immigration Building, the operational and Old Ala Moana Pump Station.

Other Land Uses

Waterways: A total of 17 acres has been reserved for the development of inland waterways. The waterways are an important recreational and urban design amenity as well as an important buffer between commercial and recreational activities.

The Aloha Tower Special District includes 9 acres adjacent to the Aloha Tower and includes the Maritime Museum at Pier 7. These parcels will be developed in accordance with the Honolulu waterfront master plan and the development objectives of the Aloha Tower Development Corporation.

A total of 48 acres has also been set aside for circulation, essentially comprised of roadway rights-of-way.

2.4 OPEN SPACE AND RECREATION PLAN

Waterfront open space and recreational areas are envisioned as a coherent, comprehensive system of great parks linked together by a series of linear parkways ("lei of green"). Open space and recreation amenities of the makai area will play a vital role in implementing the lei of green concept.

The 227-acre project area includes the proposed 17-acre beach park off of Fort Armstrong located east of the Honolulu Harbor entrance. The most extensive land use within the makai area is the 70-acre waterfront park, occupying approximately one-third of the area. When combined with the proposed recreational commercial area, the inland waterways and designated "public" zones, recreational and park uses comprise some 111 acres-- nearly one half of the entire makai area.

2.4.1 Open Space

The major proposed open space areas are illustrated in Figure 2-3. Major open spaces recognized by the existing and revised makai area plan include the grounds of the U. S. Immigration Station and the State Department of Health building.

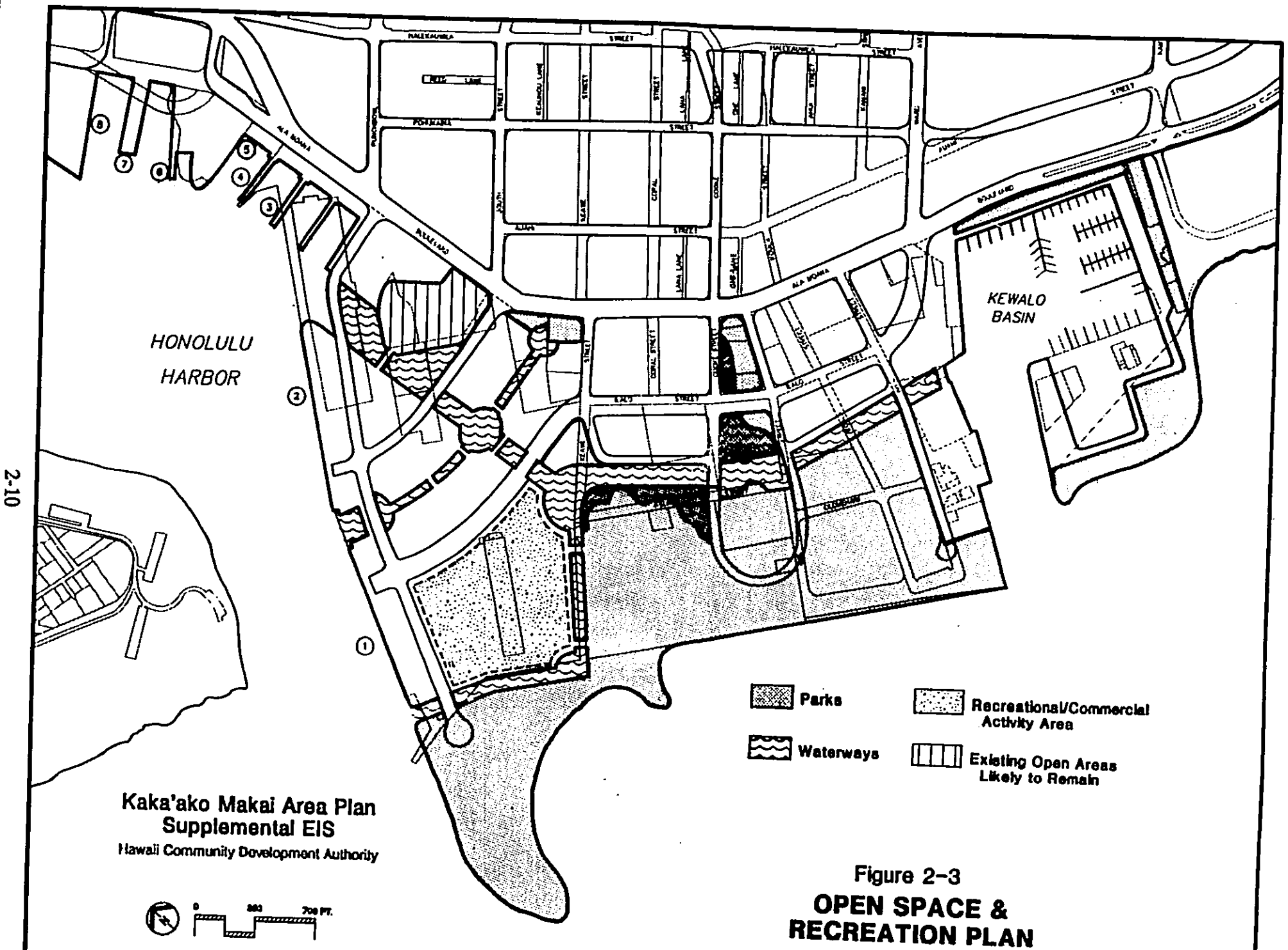


Figure 2-3
OPEN SPACE & RECREATION PLAN

The proposed inland waterway system and circulation network (streets and sidewalks) will provide the physical and visual linkages between major open areas. The required building setback areas along street and waterway frontages will further enhance this linkage and ensure light and air between buildings.

Private, on-site open space provided in concert with individual developments will complete the open space system for the Makai Area. For all areas except the Waterfront Service Zone, a minimum of ten percent of any development lot, in addition to required building setbacks, shall be devoted to open space at grade. Planned Development projects would provide an additional ten percent of the lot as open space at grade. In lieu of providing the additional ten percent of the lot as open space, two square feet of at-grade arcade shall be provided for every square foot of additional open space not provided.

2.4.2 Recreation

Recreation areas will be publicly and privately developed as described below:

2.4.2.1 Public Recreation Facilities

The major public recreation project in the makai area is the 70-acre waterfront park. This large park will be the Central Park of Honolulu, providing a major link in the "lei of green" extending from Waikiki to the airport. Major components of the park include: (1) the waterfront promenade and shoreline park extending from Ala Moana Park to the proposed waterway at Fort Armstrong; (2) an amphitheater and performing arts center/museum complex; (3) a new 17-acre beach park--similar to Magic Island--created on filled land off of Fort Armstrong; and, (4) a major new park entrance between Cooke and Ohe Streets.

The waterfront promenade will provide a continuous link through the Kakaako Peninsula, along the shores of the inland waterway, within the 17-acre beach park at Fort Armstrong, and along Piers 1 through 7. Linkages between the makai and mauka areas will be strengthened by pedestrian overpasses that will bridge the Ala Moana Boulevard/Nimitz Highway corridor.

A significant element of the proposed park will be the new park entrance at Ala Moana Boulevard which will require the acquisition of a private land parcel adjacent to Ala Moana Boulevard. The Honolulu Waterfront Master Plan has recommended exchanging a nearby State-owned parcel of roughly equal size for the private land parcel to complete the exchange. The potential impacts and alternatives will be discussed further in sections 3.2 Socio-Economic Environment, and 5.2 Alternatives to the Proposed Action.

The waterfront park will offer a variety of activities which will include shoreline fishing, picnicking, biking, jogging, scenic viewing, and boating along the inland waterways.

2.4.2.2 Private Recreation Facilities

The makai portion of the Fort Armstrong and Pier 1 area is planned to be developed into a major activity center set in an urban park environment. The 16-acre area is intended to feature commercial, recreational, cultural and educational, and entertainment activities in a park-like, landscaped setting. It is visualized to be a highly active complex for people to spend their leisure time both day and night. Some of the more notable facilities this complex is envisioned to resemble are the Epcot Center, Tivoli Gardens in Copenhagen, Seattle Center, and a permanent Expo site. It offers a major opportunity for private investment into a revenue-generating facility that could benefit both public and private investment objectives while creating an exciting and potentially world-renowned complex.

2.4.2.3 Private Recreation Space

Private recreation space is required for all new developments within Commercial and Waterfront Commercial zones. The recreation space required on a development lot is exclusive of required yards, setback areas, or parking areas. Such recreation space must be designed for the use by employees or visitors to the property and may be located either outdoors or indoors at any elevation. The required amount of on-site recreation space would be 37.5 square feet per each 1,000 square feet of floor area. The required on-site recreation space, if provided outdoors, may be used to satisfy a portion of the required open space.

2.5 URBAN DESIGN PLAN

Urban design in the makai area is an important factor in redeveloping this key waterfront area from its present industrial and maritime uses to future mixed urban and recreational

uses. The Urban Design Plan for the makai area is presented in the makai area master plan in four parts: overall urban design proposals and objectives; controls and guidelines applied to built development, including block sizes, floor area ratios, heights, and massing; plans, classifications, and guidelines for vehicular and pedestrian corridors; and special notes regarding the Piers 5 and 6 area.

2.5.1 Design Objectives

The primary urban design goal for the makai area is its tranformation into a vibrant district of "people-oriented" mixed urban and recreational use. Objectives are:

- Encouragement of pedestrian-scaled, ground (and water) level public activities.

- Development of a variety of streetscape focused building types which maintain viable urban densities.

- Recognition of the need to account for changing market conditions.

The makai area is envisioned as a major urban "gathering place" where people will come from throughout Honolulu to work and play along the water's edge. Some of the proposals include:

1. Development of a major, waterfront-oriented public park which will feature such facilities as an amphitheater, a cultural center, and a "Tivoli Gardens"-type active recreational district.

2. Enhancement of mauka-makai visual and functional linkages through development of linear parks and view corridors, urban transit facilities, and upper-level pedestrianways across Ala Moana Boulevard.

3. Visual and functional linkage of the Downtown Waterfront and Kewalo Basin by creation of a recreational waterway across the Makai Area and a promenade linking the makai area with the Aloha Tower area.

Planned makai area development will provide a transition from the higher and larger scaled buildings of the mauka area down to lower, "ground-level" development adjacent to the Fort Armstrong waterfront, the proposed waterway system and park, and Kewalo Basin. The area along Pier 4 will also include a corridor linking the makai area with the Downtown waterfront and Aloha Tower and will allow the mix of pedestrians and dinner cruise boat activities.

2.5.2 Controls on Built Development

An effective urban design plan must exercise certain controls on the overall physical characteristics of built development. These controls relate to achieving a collective design image of an area without ignoring the community's evolving economic realities.

Tools available at this level of control include limits on density typically expressed as a Floor Area Ratio (FAR), overall building heights, setbacks that regulate the distance from a building frontage to a street or other space, and bulk or massing guidelines usually expressed as three-dimensional envelopes within which buildings must be contained. To encourage or promote certain characteristics, these basic controls may be overlayed with conditional exceptions or incentives, such as a density bonus given when there is promotion of specific street frontage activities within a setback zone.

Building controls within the makai area are designed to encourage a collective urban form with the following general characteristics:

1. Overall, limits on heights will range from 200 feet along parts of Ala Moana Boulevard, to as low as 45 feet along waterways, park edges, and shorelines.

   In this way, building heights will "step down" from tall (400 feet) Kakaako mauka area structures, and gradually descend as one moves in a seaward direction.

2. Street corridors will be defined by building backdrops, or "street walls", of relatively uniform height and setback to help define Makai Area streets as

formal, continuous, urban spaces. To achieve a human scale, the street walls will be assigned a height limit of 45 feet.

3. To encourage vibrant street-level activity, ground floor extensions of buildings will be encouraged within the front yard setback area. Such uses will be "people-oriented" facilities such as sidewalk cafes, bistros, bookstores, galleries, etc., and will be subject to careful design controls.

2.5.3 Building Densities and Heights

The Makai Area will contain a diverse mix of lower and mid-rise structures rising to levels of 150 feet and 200 feet in the Commercial zone, and to 45 feet in the Waterfront Commercial, Recreational Commercial and Waterfront Service areas (Figure 2-4).

Areas with gradually decreasing building heights and associated densities from a higher intensity zone fronting Ala Moana Boulevard to the lower intensity parcels fronting on the waterfront park are divided into two subzones:

- Commercial-zoned parcels fronting Ala Moana Boulevard will have maximum permissible heights of 200 feet with associated maximum FAR of 3.5, and

- Commercial-zoned parcels fronting the waterfront park have maximum permissible building heights of 150 feet with associated maximum FAR of 2.5.

The actual permissible building height and density will be a function of parcel size and whether or not the particular parcel is developed under the Planned Development provisions of the Makai Area Rules.

Maximum floor area ratios (FAR), building heights, and tower footprints for Planned Development projects of the following lot sizes are presented in Table 2-2.

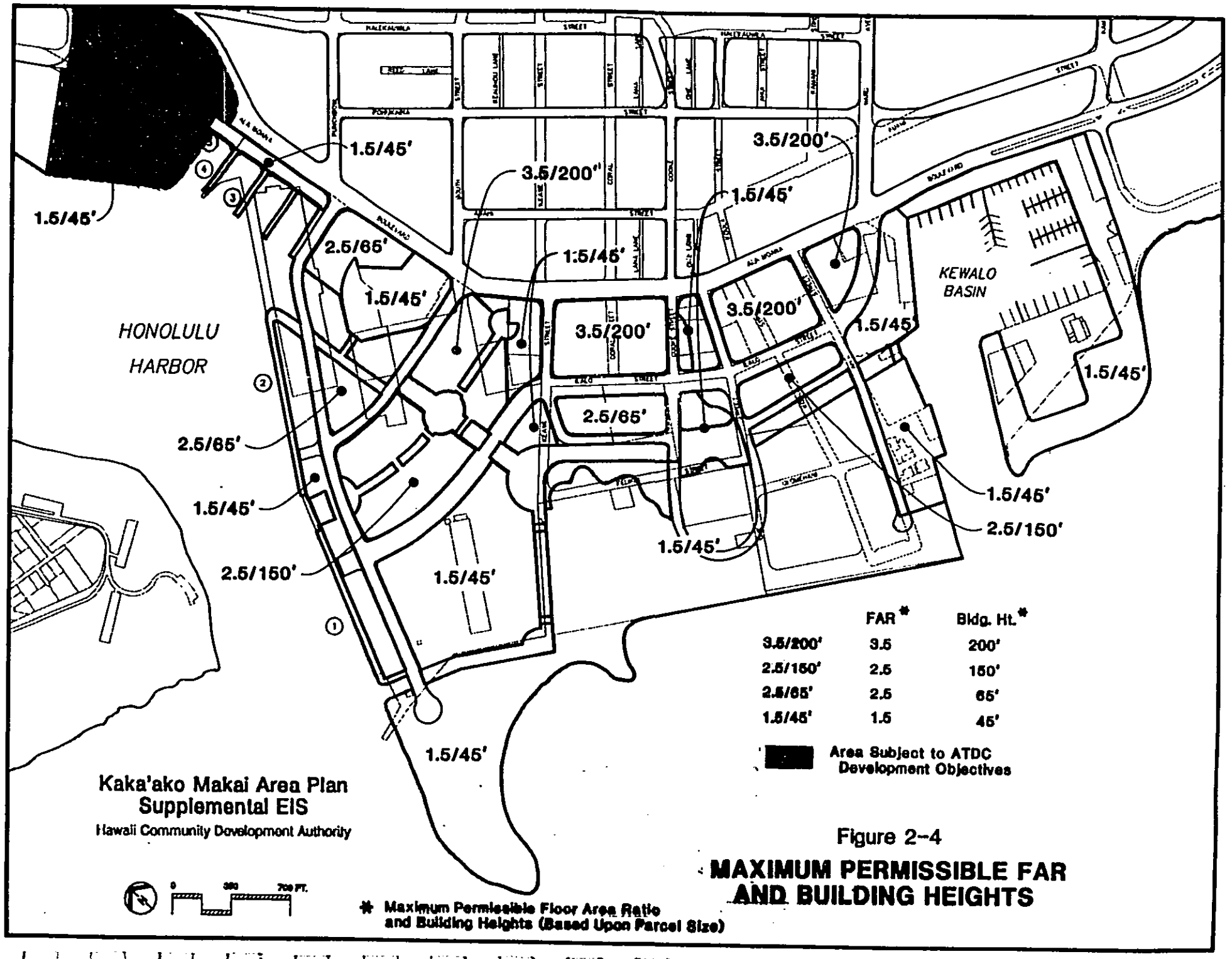


Figure 2-4

MAXIMUM PERMISSIBLE FAR AND BUILDING HEIGHTS

TABLE 2-2

Maximum Permissible Development Height, FAR and Tower Footprint Allowed for Planned Development Projects in Commercial Zone
Maximum FAR and Height Designated Areas

Lot Size (sq. ft.)	2.5 FAR/150-feet Building Height (feet)	2.5 FAR/150-feet FAR	3.5 FAR/200-feet Building Height (feet)	3.5 FAR/200-feet FAR	3.5 FAR/200-feet Tower Footprint (sq. ft.)
10,000	65	1.8	65	1.8	5,000
20,000	75	2.0	100	2.0	8,000
40,000	100	2.2	150	2.5	14,000
60,000	125	2.35	175	3.0	15,000
80,000 and over	150	2.5	200	3.5	16,000

For a development lot of 10,000, 20,000, 40,000, 60,000 or 80,000 square feet, the maximum building height, floor area ratio and tower footprint are noted in Table 2-2. For lot sizes between 10,000 and 80,000 square feet not specifically noted in the table, maximum building height, FAR and tower footprint shall be interpolated from the closest lot sizes enumerated in Table 2-2. Tower footprint means the largest area of a single floor of a building above 105 feet in height as measured from its exterior faces or edges.

Within the maximums indicated in Table 2-2, the Authority will, during the design review process and according to guidelines in the Rules, set building heights and FARs for Planned Development projects based on the size of the development lot, and the inclusion of parking, community facilities, and other public improvements which meet the objectives and requirements of this Plan.

2.5.4 Building Envelope Guidelines

These guidelines establish an appropriate mix of building forms and define the range of building shapes within the contextual fit of the Makai area. Buildings will generally be compatible with adjacent areas including significant existing historical structures such as the Immigration complex and the historic Ala Moana Pumping Station. Building bulk requirements will include the following: at-grade open space, building setbacks, view corridor setbacks, tower coverage, number and height of building towers, tower spacing, building orientation, and parking.

2.5.5 At-Grade Open Space

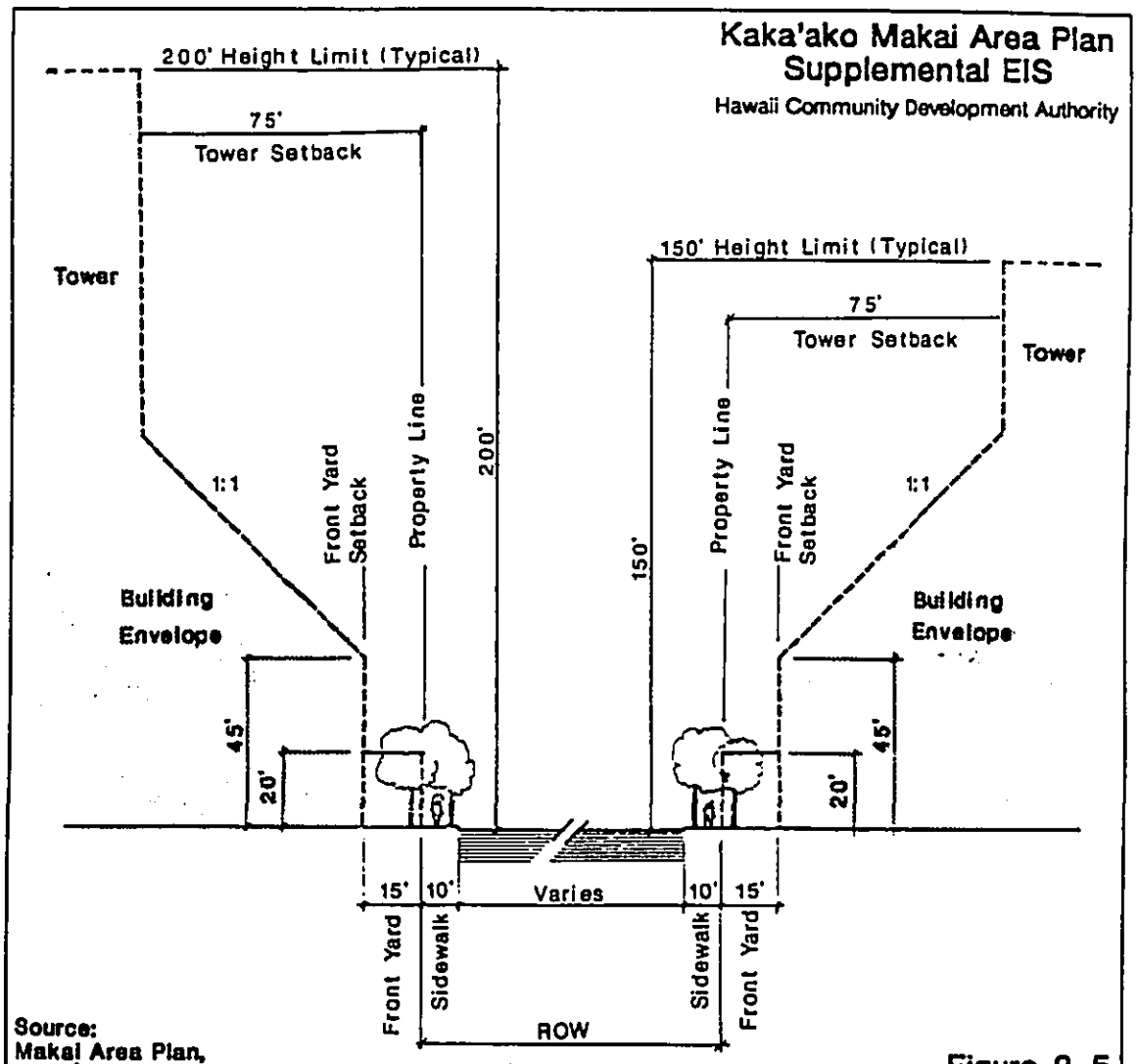
At-grade open space is intended to provide sufficient light and air on the ground and sufficient areas for pedestrian circulation and amenities, landscaping, and recreational use. As noted in the open space component, for all areas except the Waterfront Service zone, a minimum of ten percent of any development lot, in addition to required building setbacks, shall be devoted to open space at grade. Planned Development projects would provide an additional ten percent of the lot as open space at grade. Up to half of this requirement may be substituted with at-grade arcades in the ratio of two square feet of arcade for every one square foot of open space required. All open space and arcade space must be open to the public during normal working hours.

2.5.6 Building Setbacks

The minimum required front-yard setback is fifteen feet along all public roadways in the Makai Area. The minimum side- and rear-yard setback is ten feet for structures containing windows or openings facing side or rear property lines. In recognition of a desired pedestrian-scale and ground level activities along the streets, the Planned Development process permits the establishment of certain pedestrian-oriented activities within the 15-foot front yard setback area including, (1) commercial uses such as cafes, bistros, restaurants, and shops with direct access from sidewalk areas; (2) landscape elements integrated with overall street schemes; and (3) a combination of both commercial and landscaping.

Buildings along all Makai Area streets, including Ala Moana Boulevard, shall be set back at a 1:1 slope from the 45-foot height level and extend to the 75-foot tower setback line (75-feet in from the property line or street setback line). See Figure 2-5.

In addition to street setbacks, a major view corridor is proposed between Cooke and Ohe Streets in order to provide a continuous visual identity from Ala Moana Boulevard into the proposed Waterfront Park.



Source:
Makai Area Plan,
Kaka'ako Community
Development District,
October 1989

Figure 2-5

BUILDING ENVELOPE REQUIREMENTS

2.5.7 Street Right-of-Way Setbacks

These setbacks channel and enhance mauka-makai and Ewa-Diamond Head views along designated streets. They also provide light and air at the street level for pedestrians and motorists alike. The setback would begin at the 15-foot street setback line, rise to the 45-foot height level and continue at a 1:1 slope to the 75-foot street setback line.

2.5.8 Tower Footprint

Tower footprint requirements are intended to minimize the bulk of large-scale, high-rise complexes, to permit views between adjacent high-rise structures, and to provide open space at upper levels. The maximum tower footprint for Planned Development projects in the Commercial zone is shown in Table 2-2.

2.5.9 Number and Height of Towers

Planned developments on lots of 80,000 square feet or less shall be allowed one tower. For parcels exceeding 80,000 square feet, additional towers are allowed, provided the maximum building height and tower footprint are proportional to the parameters enumerated in Table 2-2.

2.5.10 Tower Spacing Guidelines

If possible, long parallel sides of neighboring towers should be no closer than 200 feet. A minimum 150-foot spacing between the short side of towers is also recommended. For better air flow, long rows of parallel buildings should be avoided. All tower placement should respect views of other existing towers as possible.

2.5.11 Building Orientation

The recommended orientation for the long axis of low-rise buildings is between 25 degrees and 55 degrees east of south -- in order to optimize the use of the prevailing northeast tradewinds. For high-rise buildings the recommended orientation for the long axis is between 35 degrees and 65 degrees west of south.

2.5.12 Parking

It is recommended that parking requirements be met with garages located within the

interior of each parcel. Parking garages are not permitted along the 45-foot facade adjacent to frontyard setbacks dedicated to street-level commercial activities.

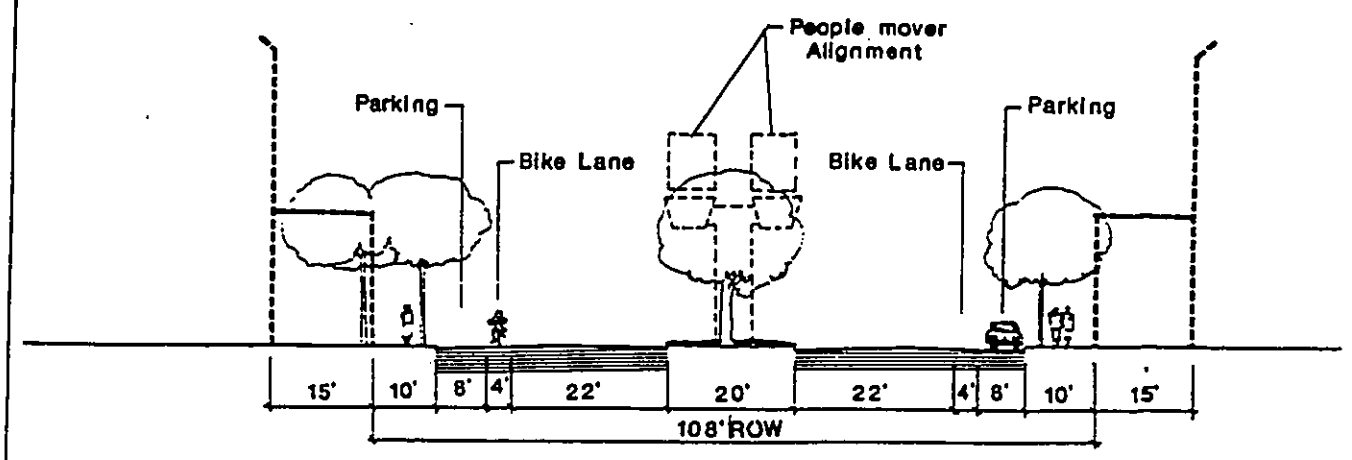
2.5.13 Controls on Streets, Corridors, and Water Edges

The intent of setting standards for the design of the Makai Area's urban spaces and streetscape elements is to achieve the area's desired park-like setting. For example, vehicular and pedestrian corridors are established through a classified hierarchy of open spaces leading from major vehicular streets down to quiet, auto-free water edges.

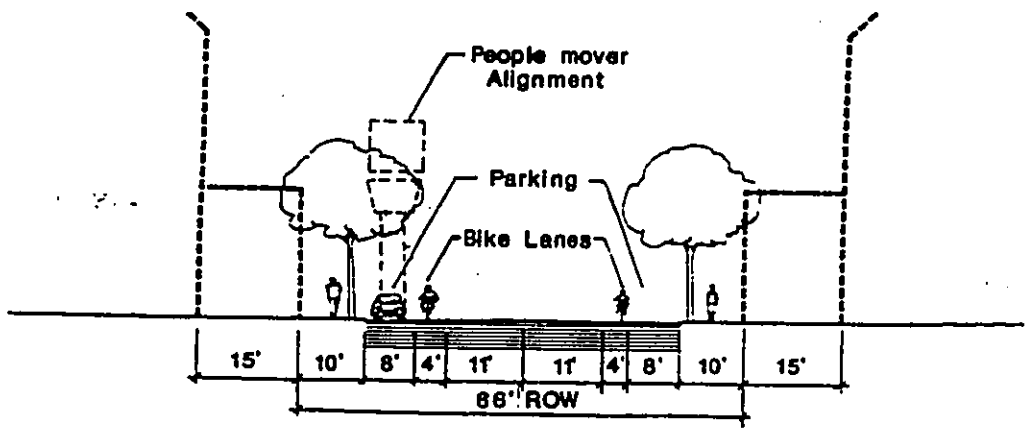
2.5.14 Vehicle and Pedestrian Corridors.

The vehicular and pedestrian corridor plan classifies Makai Area vehicular and pedestrian corridors into one of five corridor types: Thoroughfares (see Figure 2-6a), Park Roads and Esplanades (see Figure 2-6b), and Promenades (see Figure 2-6c). Ala Moana Boulevard is the major east-west vehicular corridor in the vicinity of the Makai Area, linking the area with other regions along the coastline. Pedestrian walkways above the boulevard are proposed at selected sites to link the Makai Area with mauka developments. Thoroughfares include the major vehicle collector streets within the Makai Area. These streets will be dominated by the automobile and will serve as the circulation backbone of the Makai Area. Thoroughfares include the extensions of major Mauka Area streets including Ward Avenue, South and Punchbowl Street (from Ala Moana to Ward) extension). Figure 2-6a illustrates corridor sections for boulevards and thoroughfares, each indicating allowances for pedestrian/bikeway improvements on either side of these corridors.

A cross section of a Park Road is illustrated in Figure 2-6b. Park roads are conceived as "green belt" mauka and makai entry ways into the makai area's waterfront park. The intent is to maximize landscape elements along these roads especially within the setback and sidewalk areas. The Plan recommends that pedestrian-oriented commercial uses within front yard setback areas fronting Park Roads occupy no more than 50 percent of the building frontage with landscaping requirements along the balance. Cooke/Ohe, Ahui and Keawe Streets (and part of Punchbowl Street) are examples of Park Roads.



Ward Avenue Extension



South* and Punchbowl Street Extensions**

* Requires 2 add'l travel lanes and only 1 bike lane (86' ROW)

** From Ala Moana to Ward extension, no parking between Ward and South extensions

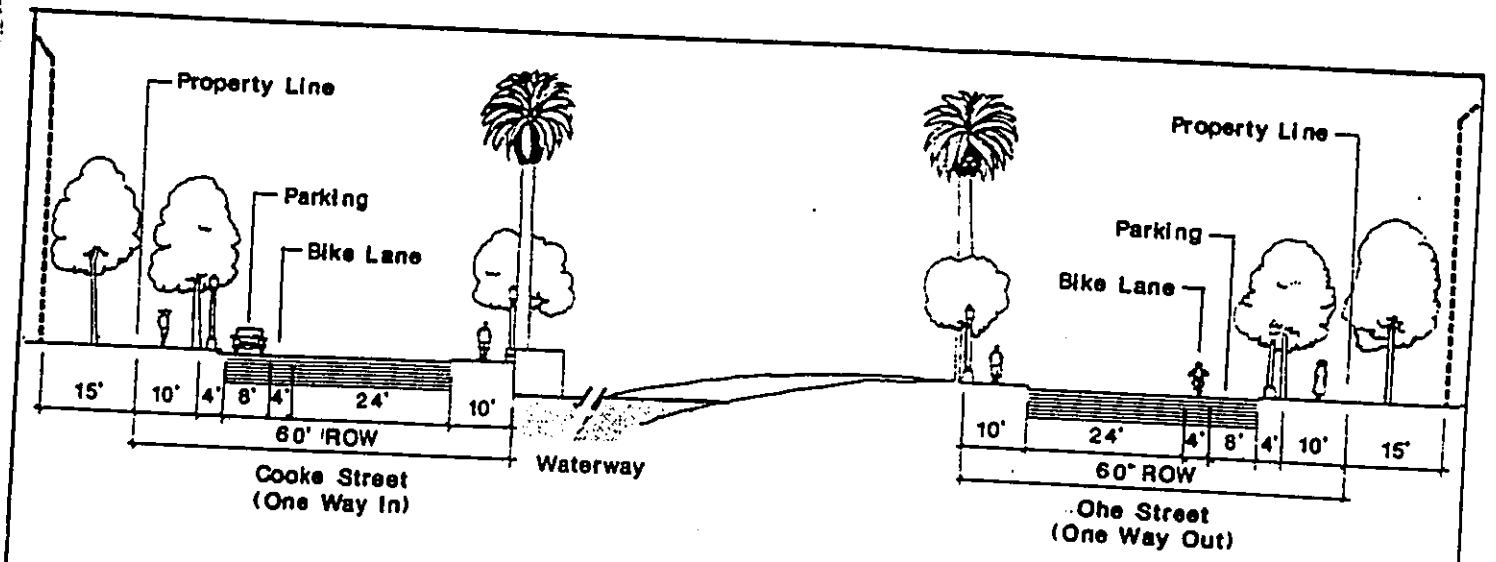
Kaka'ako Makai Area Plan
Supplemental EIS
Hawaii Community Development Authority

Source: Makai Area Plan, Kaka'ako Community Development District.

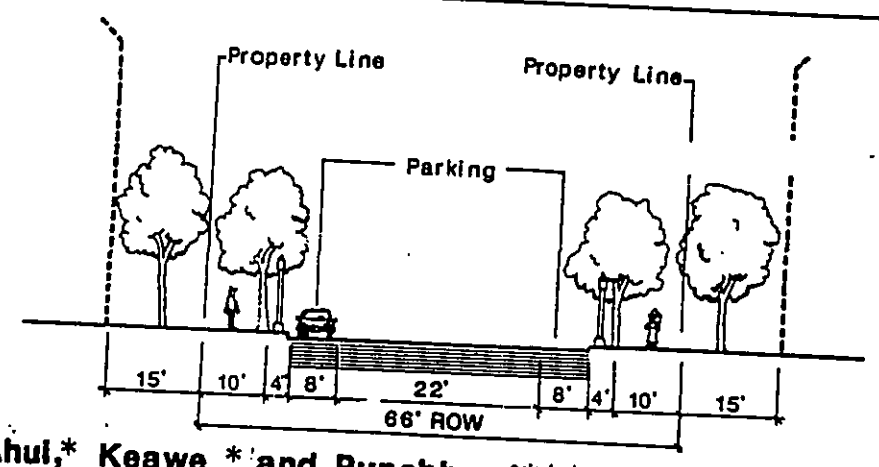
Figure 2–6a

THOROUGHFARES

CORRIDOR SECTION GUIDELINES

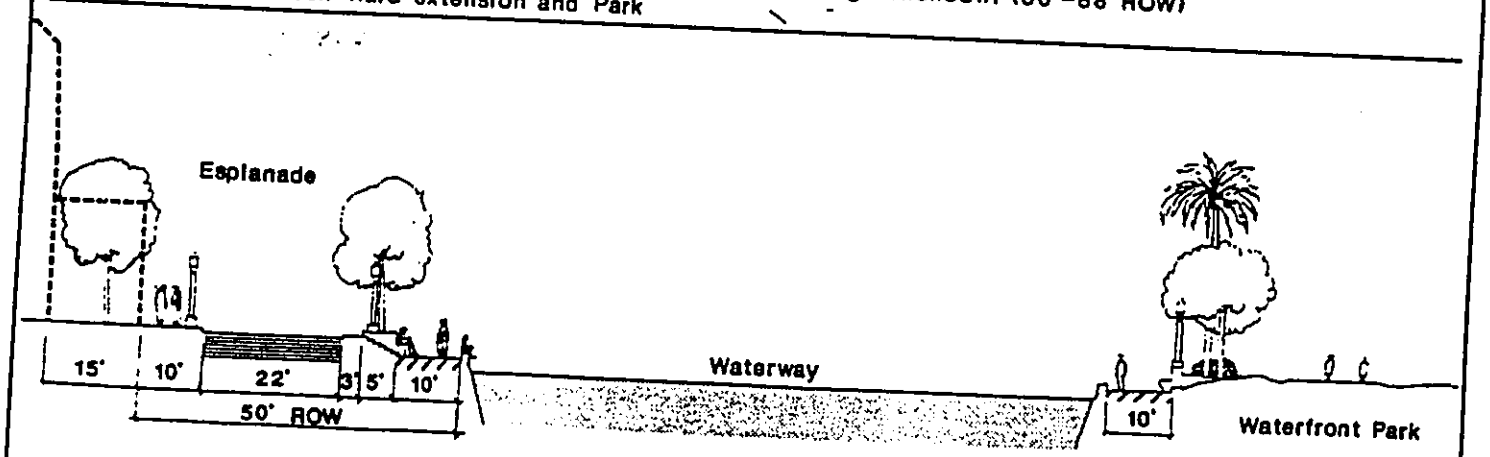


Cooke and Ohe Street Couplet



Ahui,* Keawe * and Punchbowl Street Extensions**

*Requires 2 add'l travel lanes between Ala Moana and Ward extensions, parking on one side only on Keawe; no bike lanes except along Punchbowl (80'–88' ROW)
**Between Ward extension and Park

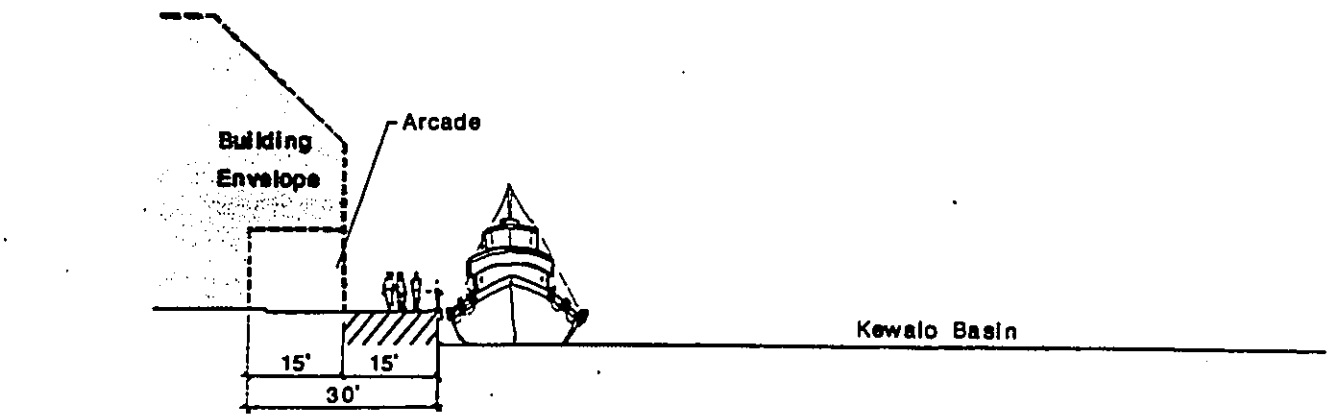


Inland Waterway

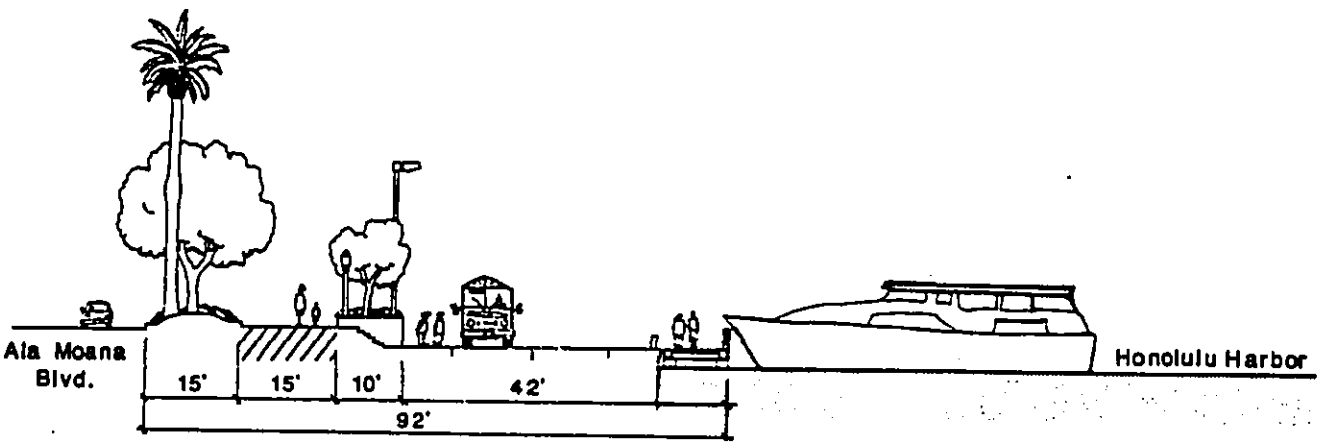
Kaka'ako Makai Area Plan
Supplemental EIS
Hawaii Community Development Authority

Source: Makai Area Plan, Kaka'ako Community Development District.

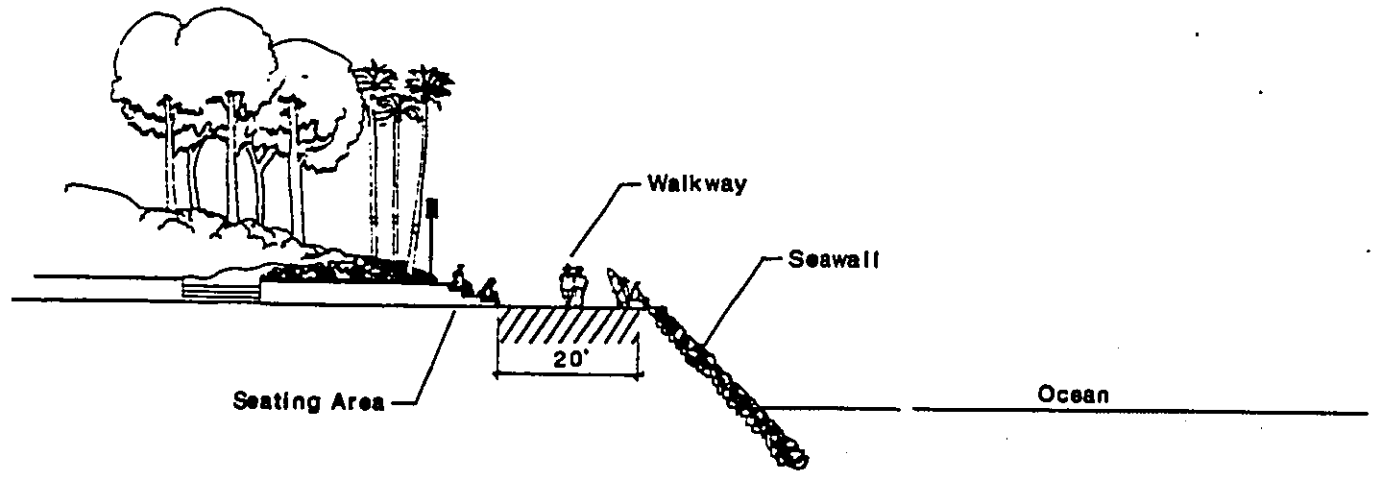
Figure 2-6b
PARK ROADS & ESPLANADES
CORRIDOR SECTION GUIDELINES



Kewalo Basin Promenade



Pier 4 Promenade



Seawall Promenade

Kaka'ako Makai Area Plan
Supplemental EIS
Hawaii Community Development Authority

Source: Makai Area Plan, Kaka'ako Community Development District,

Figure 2-6c
PROMENADES
CORRIDOR SECTION GUIDELINES

Esplanades are identifiable areas where roadway vehicular use is secondary to pedestrian activity. Figure 2-6b illustrates a section through the proposed inland waterway showing the relationship of the esplanade (on the left) to the proposed waterfront park (on the right). Strong commercial emphasis for developments focused on the explanade and adjacent waterways must create a sense of place and destination for shops, cafes, bistros, and restaurants.

Sections of various promenades are illustrated in Figure 2-6c. These corridors are pedestrian walkways with limited vehicular access generally located in areas along the waterfront. Key areas along the promenade include the Ewa edge of Kewalo Basin (Fishing Village area), the proposed Pier 4 area, and the makai area seawall.

Coral and Koula Streets will be closed as public vehicular streets. Their closure will provide additional flexibility in the design of consolidated development parcels. However, in order to avoid massive bulk articulation in building facades and emphasize the pedestrian-oriented focus of the makai area, the closed streets will not be permitted to be built over.

2.5.15 Landscaping

All streets will be landscaped. The continuity along the major roadways will enhance mauka-makai relationships and thereby tend to mitigate the barrier imposed by the Ala Moana Boulevard corridor. Table 2-3 presents the recommended major street system tree list identifying major roadways with their associated street trees, spacing and location. Trees for local streets are subject to approval by the Department of Parks and Recreation.

TABLE 2-3
MAJOR STREET SYSTEM TREE LIST

Street	Tree Species	Guidelines	Location
Ala Moana	Coconut Palm	3 palms min. per 100' street frontage	FY
Cooke	White Shower	35' on center	FY
Ohe	Podocarpus	35' on center	FY
South	Autograph	40' on center	FY
Ward	Rainbow Shower	45' on center	ROW
Punchbowl	Monkeypod	80' on center	FY

FY - Front yard Setback
ROW - Right-of-way

2.5.16 Furniture

The purpose of street furniture is to provide customer and pedestrian amenities along the public rights-of-way. The following are provided as guidelines:

- Benches. To provide resting spaces along the pedestrianways. To be located approximately 400 feet apart.

- Bus Shelters. To provide resting/waiting areas along roadways for commuters. Located approximately in each block.

- Kiosks. To provide for the dissemination of information to pedestrians. To be located approximately within each block.

- Trash Receptables. To provide for convenience of trash disposal along pedestrianways. To be located approximately 400 feet apart.

Whenever possible, the benches, bus shelters, and trash receptables should be located together. The kiosks should be located near the bus shelters so may be used while people are waiting for buses.

2.5.17 Signs

Signs and graphics provide information and are sometimes necessary for regulatory purposes. Informational signs are used for the identification of landmarks, buildings and establishments, and to provide directions.

Regulatory signs are used for the purpose of controlling or directing some type of action such as traffic control signs. Signs will be regulated by the City and County of Honolulu.

2.5.18 Lighting

Lighting should be available to provide for the safe movement of vehicular traffic and pedestrian movement along the roadways and pedestrianways. Lighting will also be required to provide illumination for safe ingress to and egress from all establishments.

Street lights will be provided on all streets as proposed in the utility section. Area lights should also be provide at grade within planted areas as appropriate.

2.5.19 Ingress and Egress Guidelines

Ingress and egress guidelines provide for safe pedestrian and vehicular movement. Parcel location, size, and activity will necessarily govern actual design and, as such, will be an item of review by the authority.

Sidewalks or other features which provide for the entry and exit of pedestrians from an establishment will be regulated to provide unencumbered access. Ingress improvements to an establishment must accommodate the handicapped, according to the City and County Building Code.

Driveways for the entry and exit of vehicles should provide for safe movement of vehicles with limited conflicts with pedestrians. Exit points will be left unobstructed at the property line. Entry and exits shall not be placed less than 75 feet from an intersection whenever possible.

2.6 TRANSPORTATION PLAN

The transportation plan is a multi-modal system intended to move people and goods safely and efficiently. The transportation system includes improvements and new facilities for streets and roadways, parking, public transportation, and pedestrianways.

2.6.1 Streets and Roadways

These improvements include upgrading of roadways to meet or exceed City and County standards. The proposed vehicular circulation and roadway system is presented in Figure 2-7, and roadway dimensions are detailed in Table 2-4.

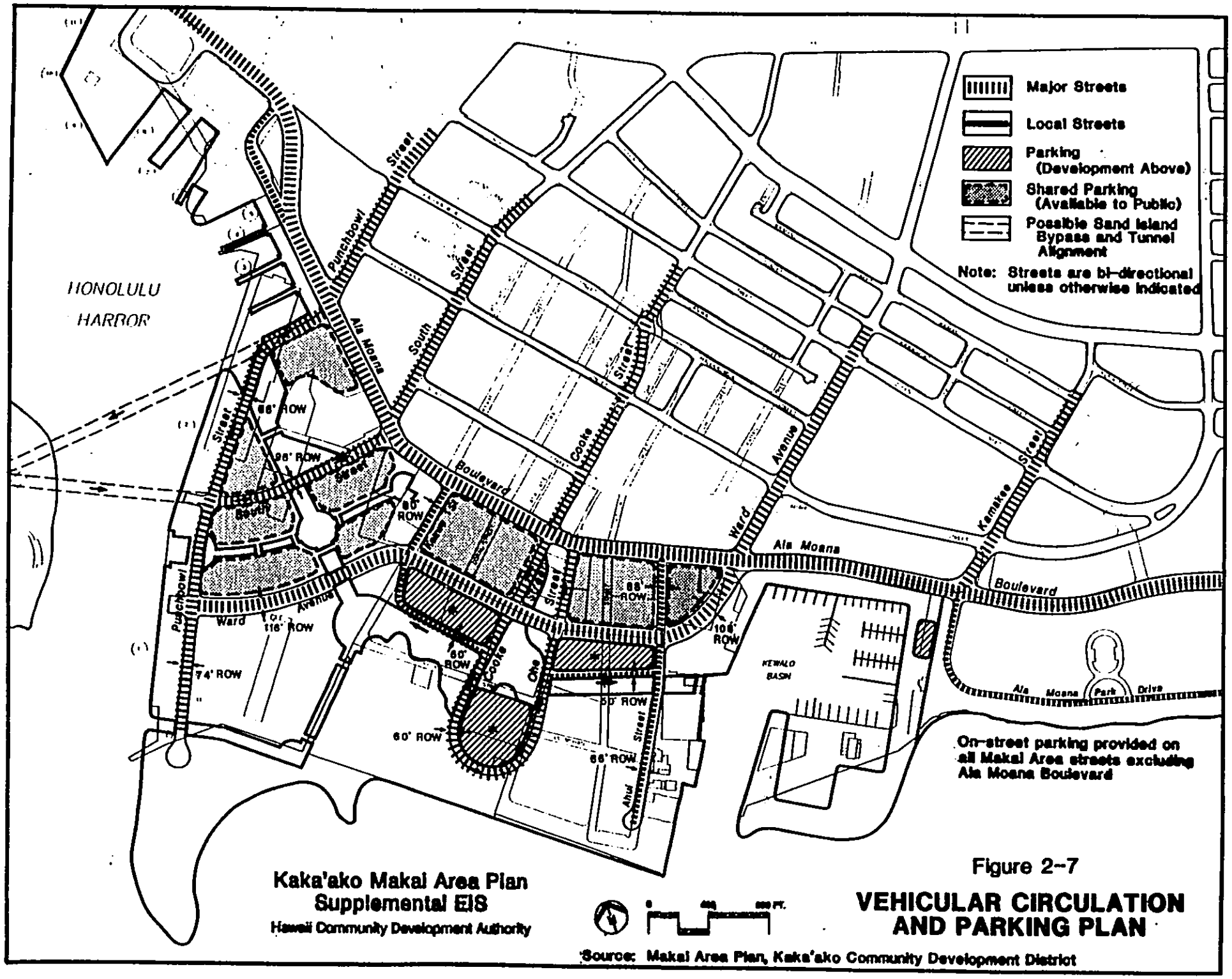


Figure 2-7

VEHICULAR CIRCULATION AND PARKING PLAN

Source: Makai Area Plan, Kaka'ako Community Development District

TABLE 2-4

ROADWAY DIMENSIONS (IN FEET)

Street	Class Exist	Prop	R.O.W. Exist	Prop	Curb to Curb Exist	Prop
Ala Moana	Major	Major	100	100 min.	72	96 min.
Ward	---	Major	---	108	---	88
South	---	Major	---	86	---	66
Punchbowl	---	Major	---	66-74	---	56
Ohe	Minor	Major	50	60	32	36
Cooke	Minor	Major	50	60	32	36
Ilalo	Minor	(Becomes Ward Avenue Extension)				
Koula	Minor	Closed	50	---	30	---
Coral	Minor	Closed	50	---	24	---
Ahui	N/C	Minor	50	66-88	36	38-60
Keawe	Minor	Minor	60	80	24	52
Esplanade	---	Minor	---	50	---	22

N/C = Not Formerly Classified

2.6.2 Ward Avenue Extension

This corridor is planned to be the principal collector street within a 108-foot right-of-way. The extension begins at the present Ward Avenue-Ala Moana Boulevard intersection, runs through the present AAFES parking lot and follows along the present Ilalo Street right-of-way to Keawe Street where it begins an "S" curve terminating at a proposed intersection with the Punchbowl Street extension.

2.6.3 South and Punchbowl Street Extensions

The plan shows the extension of both Punchbowl and South Streets into the makai area. These streets will serve as a one-way couplet with Punchbowl inbound and South outbound. The Punchbowl Street extension will begin at Ala Moana Boulevard running one-way makai within an expanded 74-foot right-of-way until terminating at the proposed beach park. The extension will provide a buffer between maritime-support uses proposed for the deep water berths at Piers 1 and 2 and the park and commercial uses planned immediately to the east. The South Street extension will serve as a major one-way mauka collector

street connecting the proposed Punchbowl Street extension to Ala Moana Boulevard and the present South Street Corridor.

2.6.4 Cooke-Ohe Street Couplet

An attractive park entrance with a visual presence along the Ala Moana Boulevard corridor was a design goal and objective of the makai area concept. To achieve this, a one-way looped couplet was designed which involves the extensions of Cooke and Ohe Streets within 60-foot rights-of-way to provide a primary park access. Cooke Street is presently identified as a major "view corridor."

2.6.5 Sand Island Bypass and Tunnels

As recommended in the Honolulu waterfront master plan, the Roadway Plan identifies possible tunnel and roadway alignments for the proposed Sand Island Bypass and Tunnels. The designation of a possible bypass/tunnel corridor adjacent to the makai area is in recognition of an expected need to address regional requirements for increased roadway capacity through the central Honolulu area -- a need that is foreseen with or without any revisions to the Makai Area Plan. In essence, two one-way tubes could be constructed under Honolulu Harbor linking a proposed Sand Island expressway directly with Ala Moana Boulevard and, possibly, Punchbowl and South Streets mauka of Ala Moana Boulevard.

2.6.6 Ala Moana Boulevard

At present, there are seven lanes of traffic (six through lanes and a central left turn pocket) on Ala Moana Boulevard through Kakaako with concrete sidewalks running up to the curbs. The State Department of Transportation has identified Ala Moana Boulevard as a major component of its proposed "Honolulu Makai Bikeway" which will ultimately involve the development of bike lanes along the roadway. Other proposed improvements for Ala Moana Boulevard include minor realignments and intersection improvements to provide for additional turning lanes. These improvements should occur in conjunction with adjacent redevelopment activities.

2.6.7 Ahui and Keawe Streets

Ahui and Keawe Streets, together with the Cooke/Ohe couplet, will provide direct access to the new waterfront park. These are planned for expansion to 88-foot rights-of-way

except for Ahui makai of Ward which becomes a 66-foot ROW. Keawe Street will be realigned makai of the proposed Ward Avenue extension to intersect with the new Esplanade described above.

2.6.8 New Local Streets and Closures

The Transportation Plan envisions the improvement and development of several local streets, closure of certain segments of existing streets and the realignment of others to accommodate the proposed land use pattern. Street realignments and closures would be permitted only if traffic studies demonstrate that such changes would have no adverse effect on traffic circulation in the area.

- The Ilalo Street right-of-way will be absorbed by the planned Ward Avenue Extension.
- A new local street ("Esplanade") is planned to provide access along the mauka edge of the proposed inland waterways, running parallel to and makai of the proposed Ward Avenue extension.
- Koula Street and Coral Streets will be closed makai of Ala Moana Boulevard.
- Kelikoi and Olomehani Streets would be closed to allow for development of the waterfront park.

2.6.9 Parking

On-street parking will be permitted in most areas with 8-foot parking lanes designated on most makai area roads. Parking for the Waterfront Park will be accommodated onsite and within the blocks makai of and adjacent to the proposed Ward Avenue extension. Initially surface parking will be provided in this area for park goers. Surface parking will be redeveloped into structured parking as the blocks are developed for commercial uses. Parking for major public events (i.e., amphitheater, performing arts center, etc.) will also be accommodated within the proposed commercial developments as shared parking (see Figure 2-7). Automobile parking presently along the Ala Moana Boulevard and Ala Moana Park frontages of Kewalo Basin will be consolidated in an area near Ala Moana Park.

Off-street parking will be required as follows:

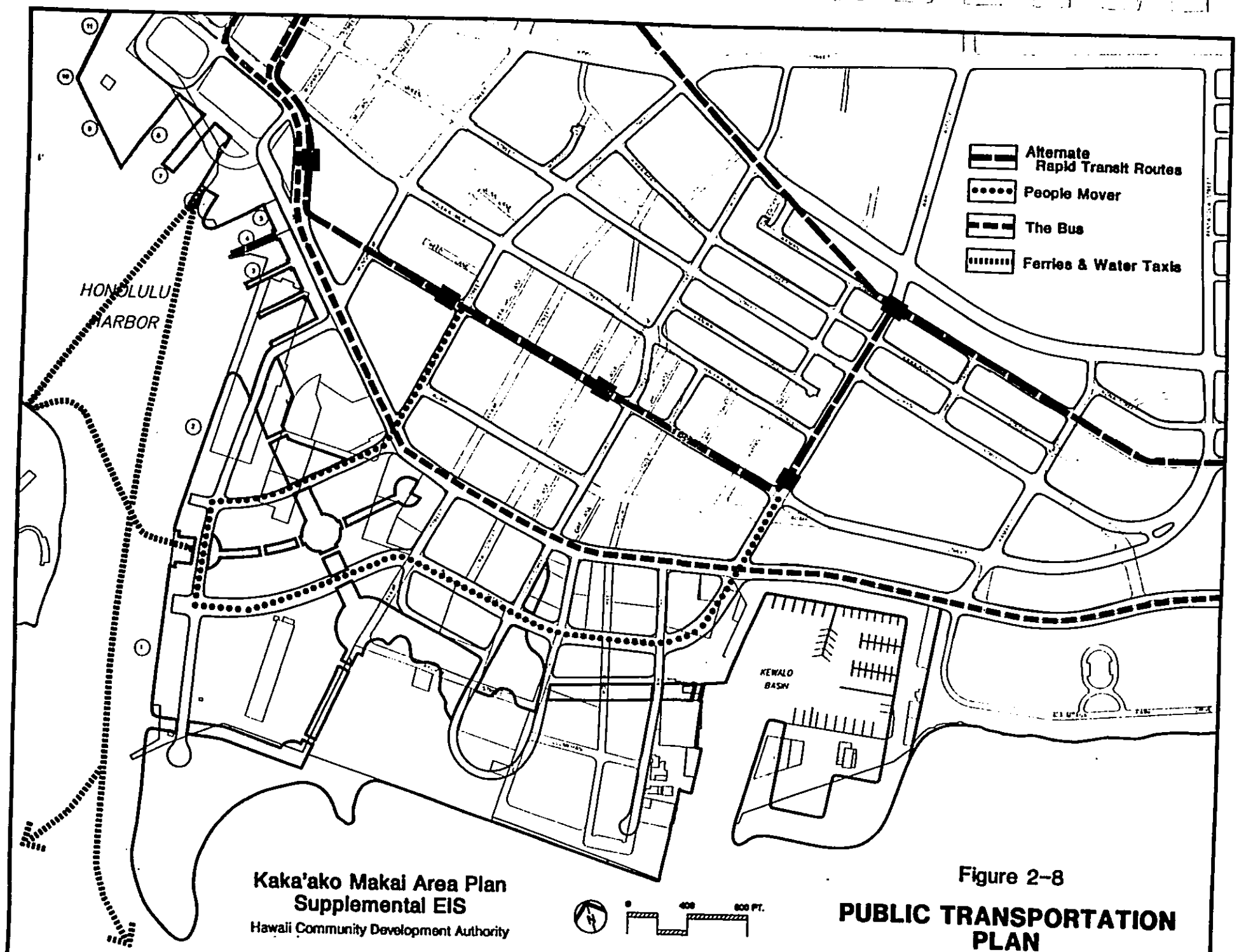
MAKAI AREA
OFF-STREET PARKING REQUIREMENTS

Use	Requirement
Auditoriums	1 per 75 s.f. of assembly area or 1 per 5 fixed seats, whichever is greater.
Churches and theaters	1 per every 5 fixed seats or 75 s.f. of assembly area, whichever is greater.
Day-care facilities	1 per 10 enrollment capacity.
Eating and drinking establishments	1 per 300 s.f. of eating and drinking area, plus 1 per 25 s.f. of dance floor area, plus 1 per 400 s.f. of kitchen or accessory area.
Schools: language vocational, business, technical and trade, colleges or universities	1 for each 10 students of design capacity, plus 1 per 400 s.f. of office floor area.
Waterfront service	1 per 1,000 s.f. of floor area or 1 on-site space per every 2 employees, whichever is greater. On-site parking areas within this zone are not required to be enclosed.
Commercial and all other uses	1 per 400 s.f. of floor area

Base Zone developments may have open or uncovered parking at grade. All on-site parking spaces for Planned Developments shall provide parking within a structure to enhance the visual quality of the area.

2.6.10 Public Transportation

Public transportation will primarily be provided by the City bus system, and proposed rapid transit, people movers, and waterborne ferries and taxis (see Figure 2-8).



Kaka'ako Makai Area Plan
Supplemental EIS
Hawaii Community Development Authority

Figure 2-8

PUBLIC TRANSPORTATION PLAN

Source: Makai Area Plan, Kaka'ako Community Development District

A. The Bus

Additional bus service within the project area or relocation of the Ala Moana route will not be necessary, although modifications can be made to meet increasing demands as developments in the area progress.

B. Rapid Transit

Two principal alternative routes through Kakaako are identified, together with proposed station locations presently being considered by the Honolulu Department of Transportation Services. A "makai alignment" along Pohukaina Street with stations at South Street and Ward Avenue is the closest to the makai area and appears to be the most favorable in terms of service. An alternative route which passes through Downtown in an underground tunnel daylighting near Ward Avenue is also shown.

C. People Mover

A possible loop connecting with the proposed Ward Avenue Rapid Transit station, running through the Makai Area along the Ward Avenue extension and back up to the proposed South Street Rapid Transit Station along the proposed South Street extension is envisioned (see Figure 2-8). This secondary transit system which would use buses, trollies and/or scaled-down people-mover technology is intended to link the Makai Area with the proposed Rapid Transit system.

D. Ferries and Waterways

Small ferries/water taxis are proposed to link the project area with the Sand Island recreation area and Downtown via a central terminal area between Piers 1 and 2. Pier 6 has been identified as the long-term Downtown terminal for the proposed inter- and intra-island ferry system.

E. Pedestrian and Bikeway Plan

A critical objective of this plan is to increase non-vehicular access to the Makai Area from Downtown, Ala Moana Park and Kakaako Mauka areas. These systems are illustrated in Figure 2-9. These accessways are planned to provide movement both laterally and mauka-makai along the entire length of the project area.

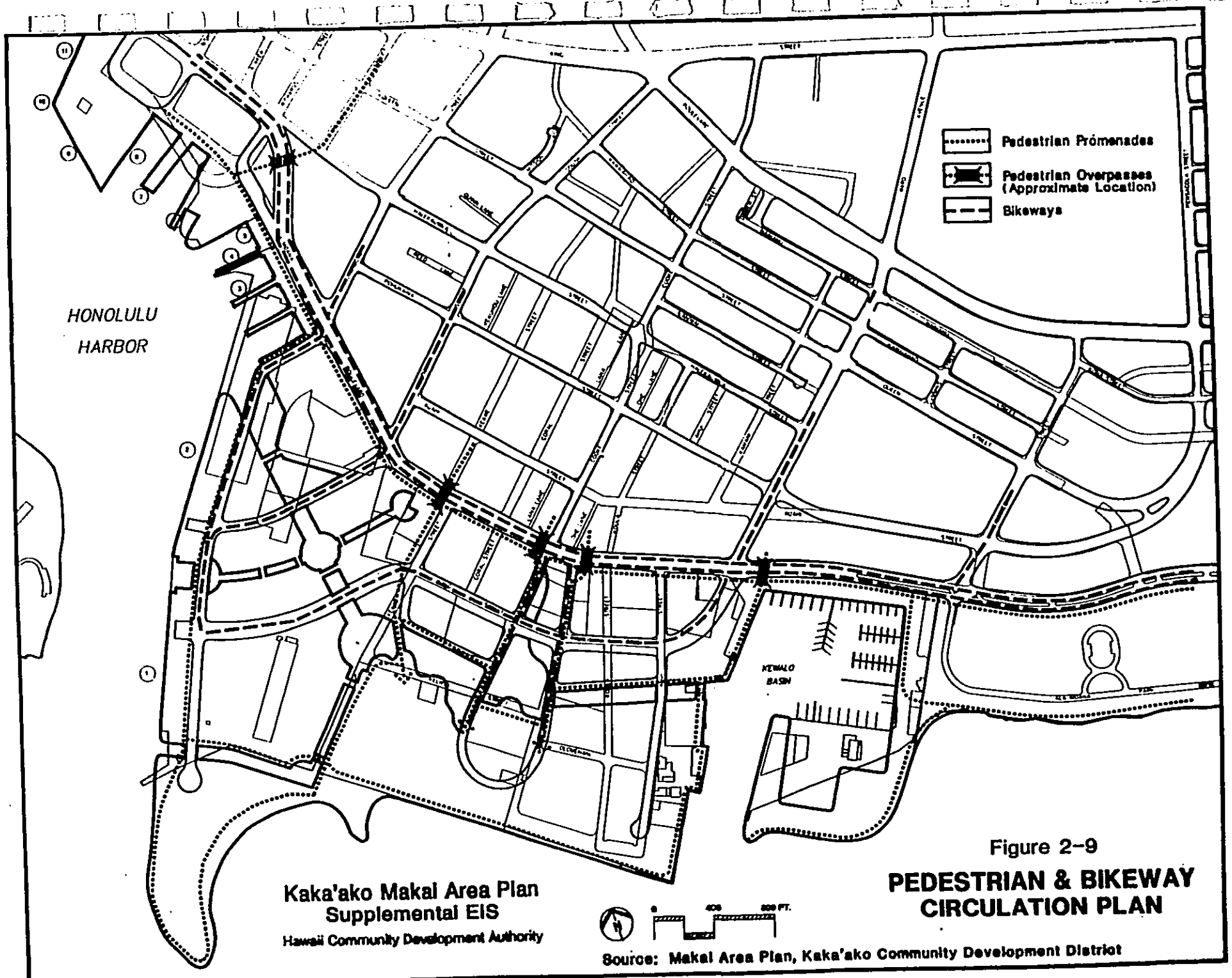


Figure 2-9

PEDESTRIAN & BIKEWAY CIRCULATION PLAN

Source: Makai Area Plan, Kaka'ako Community Development District

The pedestrian promenades may be integrated into the mauka area via at least five pedestrian overpasses presently identified along the Ala Moana Boulevard corridor, near Piers 5 and 6, at Keawe, Cooke and Ohe Streets, and near Ward Avenue.

A bike lane is proposed along Ala Moana Boulevard, and bike lanes along the extensions of Ward, South and Punchbowl (Figure 2-9). Bicyclists would be encouraged to use the street system to get onto these bike lanes as well as the remainder of the Mauka Area bikeway system. Bike lanes may be modified and refined as necessary as detailed engineering analyses and designs are performed and reviews and consultations are carried out with the appropriate parties.

The State Department of Transportation's current bicycle master plan, Bikeplan Hawaii, proposes the development of the "Makai Honolulu Bikeway" to link East and West Honolulu. The proposed facility passes through the Central Honolulu area along the Nimitz Highway/Ala Moana Boulevard corridor and is presently planned to be developed almost entirely as a "bike lane" (a portion of the roadway designated for the preferential or exclusive use of bicycles). DOT is now in the process of updating the bicycle master plan and will be reevaluating the Makai Honolulu Bikeway corridor.

2.6.11 Land Acquisition

Additional private lands will have to be acquired within the Makai area to implement Plan recommendations. The Honolulu Waterfront Master Plan identified a major projection of the Waterfront Park out to Ala Moana Boulevard as shown on Figure 2-10. This includes land bounded by Ala Moana Boulevard, Cooke Street, Ward Avenue extension and Ohe Street. To accomplish this, the Master Plan recommended that the Authority negotiate a land exchange with the landowner which would involve exchanging the State-owned parcel presently housing the Honolulu Board of Water Supply (between Koula and Ahui Streets) for the two parcels discussed above, including the area under the proposed Ohe Street extension. The areas are of approximately equal size, and would allow the private landowner to consolidate land parcels. The Authority will also have to negotiate with the U.S. Coast Guard (owner of the Pier 4 facility) to allow for the planned redevelopment of the Pier 4 area.

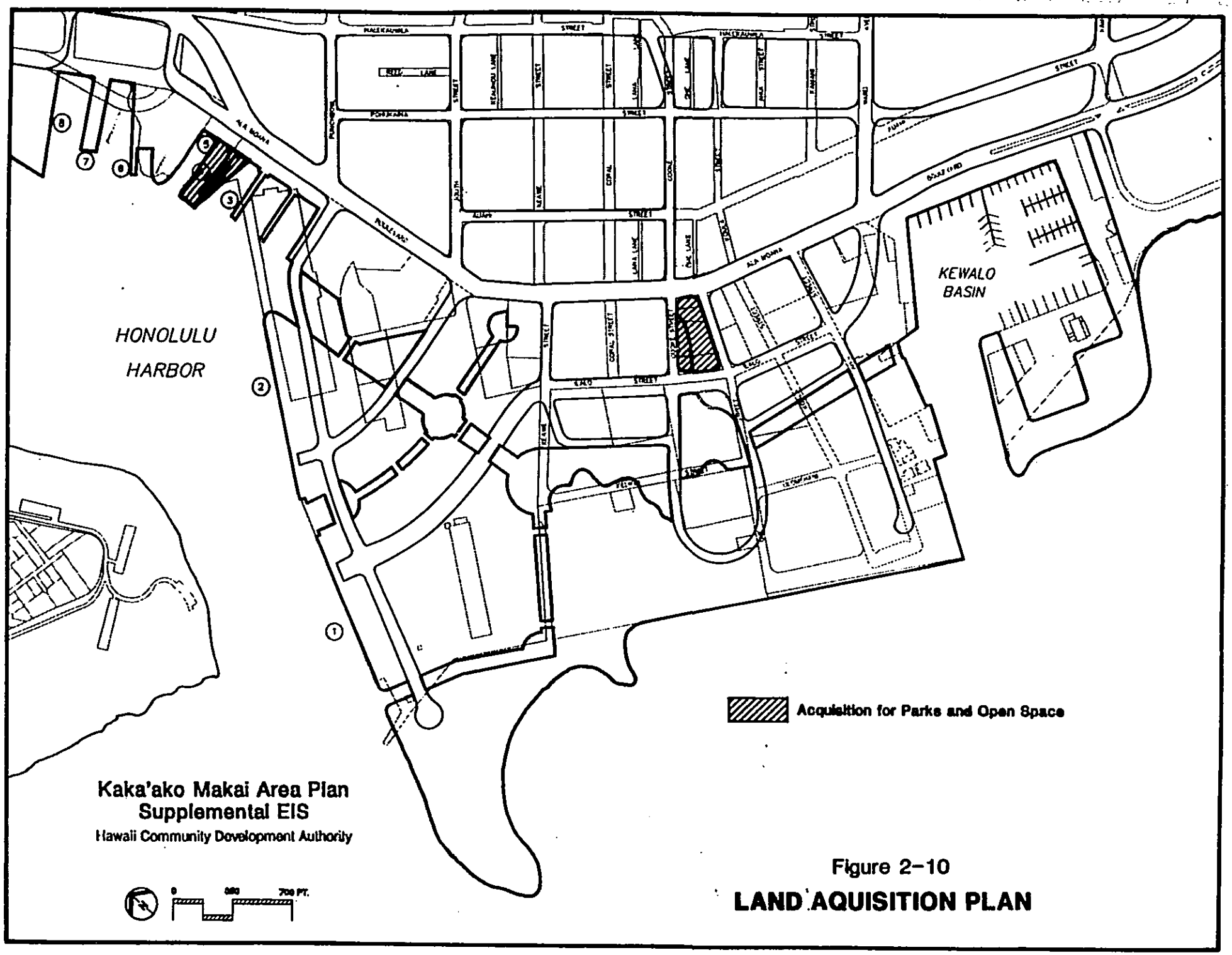


Figure 2-10

LAND AQUISITION PLAN

2.7 INFRASTRUCTURE PLAN

Infrastructure and land use improvements by HCDA would be the major means of strengthening the development efforts of the public and private sectors, and fulfilling Kakaako's potential for commercial and recreational uses in central Honolulu. Public infrastructure systems (including roadways, drainage, wastewater, electrical, and communications systems, lighting and traffic signalization) provide the basic services necessary for the growth and functioning of a community.

For the most part, infrastructure systems in the makai area are inadequate to support any sizable development. Thus, in preparation for new developments, infrastructure systems need to be improved. Roadways, water, wastewater, drainage, street lighting and traffic signalization systems are generally maintained and operated by public agencies while power and communication systems are maintained and operated by privately-run public utility companies.

The infrastructure systems proposed for the makai area have been sized to meet the demands of proposed land use activities and the demands of every parcel developed to its maximum potential. Prior to the initiation of any new development, the utilities expected to serve it will have adequate capacities to meet the demands to be generated. All utilities will be designed in accordance with appropriate City and County and utility company standards and established engineering principles. Infrastructure plans presented in this Section shall be subject to revisions based on subsequent detailed engineering analyses.

Coordinated construction helps to ensure the functioning of infrastructure systems in a shorter amount of time than that resulting from isolated or piecemeal improvements. Therefore, all infrastructure improvements should, to the extent practicable, be coordinated with roadway improvements.

Major infrastructure improvement costs for roads (including bridges), water, wastewater, drainage, electrical and communication systems, street lights, and traffic signalization in the

makai area are estimated to be about $95.1 million in 1989 dollars. Estimated costs include allocations for planning, design, and contingencies.

2.7.1 Roadways

Table 2-5 below identifies the proposed right-of-way widths and estimated costs of the Makai Area right-of-way improvements.

TABLE 2-5
ROADWAY RIGHT-OF-WAY IMPROVEMENTS

Street	Estimated Cost ($ million)
Ward Extension	5.9
South Extension	1.4
Punchbowl Extension	7.1
Ahui Street	1.8
Cooke/Ohe Street	3.3
Keawe Street	0.3
Ala Moana Blvd. Improvements	0.8
Esplanade	1.4
Promenades	4.1
TOTAL	$26.1

The estimated costs include roadway excavation, base course, pavement curbs, sidewalk signs and striping, necessary intersection improvements, bridge construction, and major landscaping elements.

Roadway right-of-way improvements for the project area are estimated at $26.1 million.

2.7.2 Water Supply System

To meet water demands expected from proposed land use activities, the water system will be upgraded in accordance with the standards of the Board of Water Supply. Approximately 14,200 feet of new and larger water lines will be needed to meet expected business and domestic water usage and fire flow requirements. The existing and proposed waterline improvements for the project area are shown in Figure 2-11. Local improvements would include the installation of 8- and 12-inch water lines in major and local streets. Improvements include new fire hydrants, water valves, manholes, and other appurtenances. These improvements may be modified or refined as detailed engineering analyses and designs are performed. The 42-inch water line indicated as proposed for Ala Moana Boulevard in the figure is a transmission line for improved water supply to east Honolulu and thus not identified as an improvement cost borne by the makai area.

The total cost for the project area water system improvements for local water lines is estimated to be $3.0 million.

2.7.3 Wastewater System

The proposed wastewater system improvements are shown in Figure 2-12. The proposed system consists of a series of 8-inch and 12-inch gravity lines and force mains hooking into the existing Ala Moana Pump Station. Existing wastewater lines not needing improvement are also shown. Four new wastewater pump stations have been identified to service the project area. Approximately 13,500 feet of new wastewater lines will be required. Other improvements include replacing existing lines with larger lines to accommodate projected flows and meet City standards. These improvements may be modified or refined as detailed engineering analyses and designs are performed. The proposed inland waterway system will require the lowering of portions of the 60-inch and 78-inch sewage force main and the installation of air release valves and odor control devices. Odor control systems are also proposed for the Ala Moana and Beach Walk wastewater pump stations. The 42-inch relief sewer line proposed on Ala Moana Boulevard will provide relief for the downtown area and is not therefore identified as an improvement cost attributable to the project area.

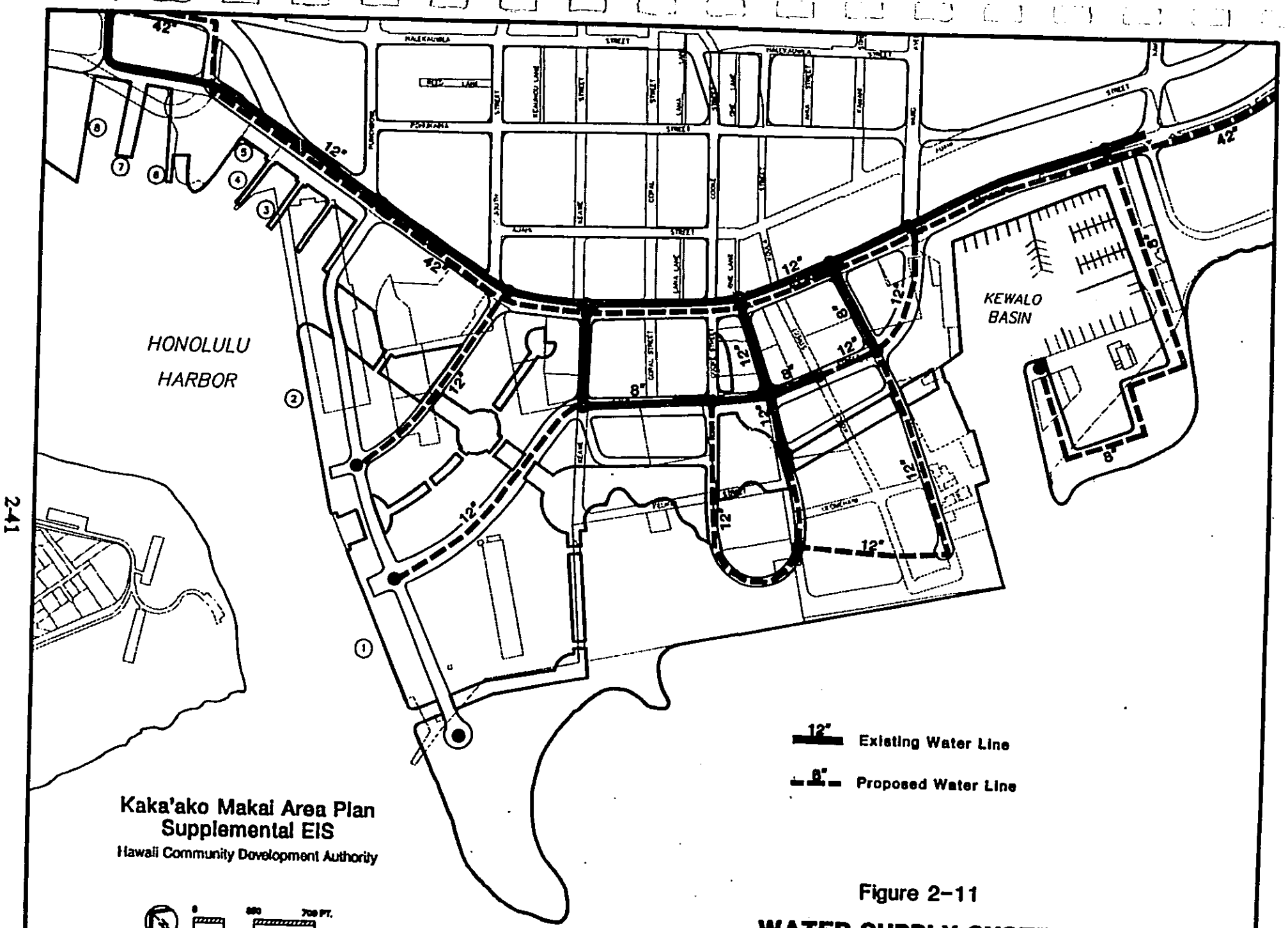


Figure 2-11

WATER SUPPLY SYSTEM

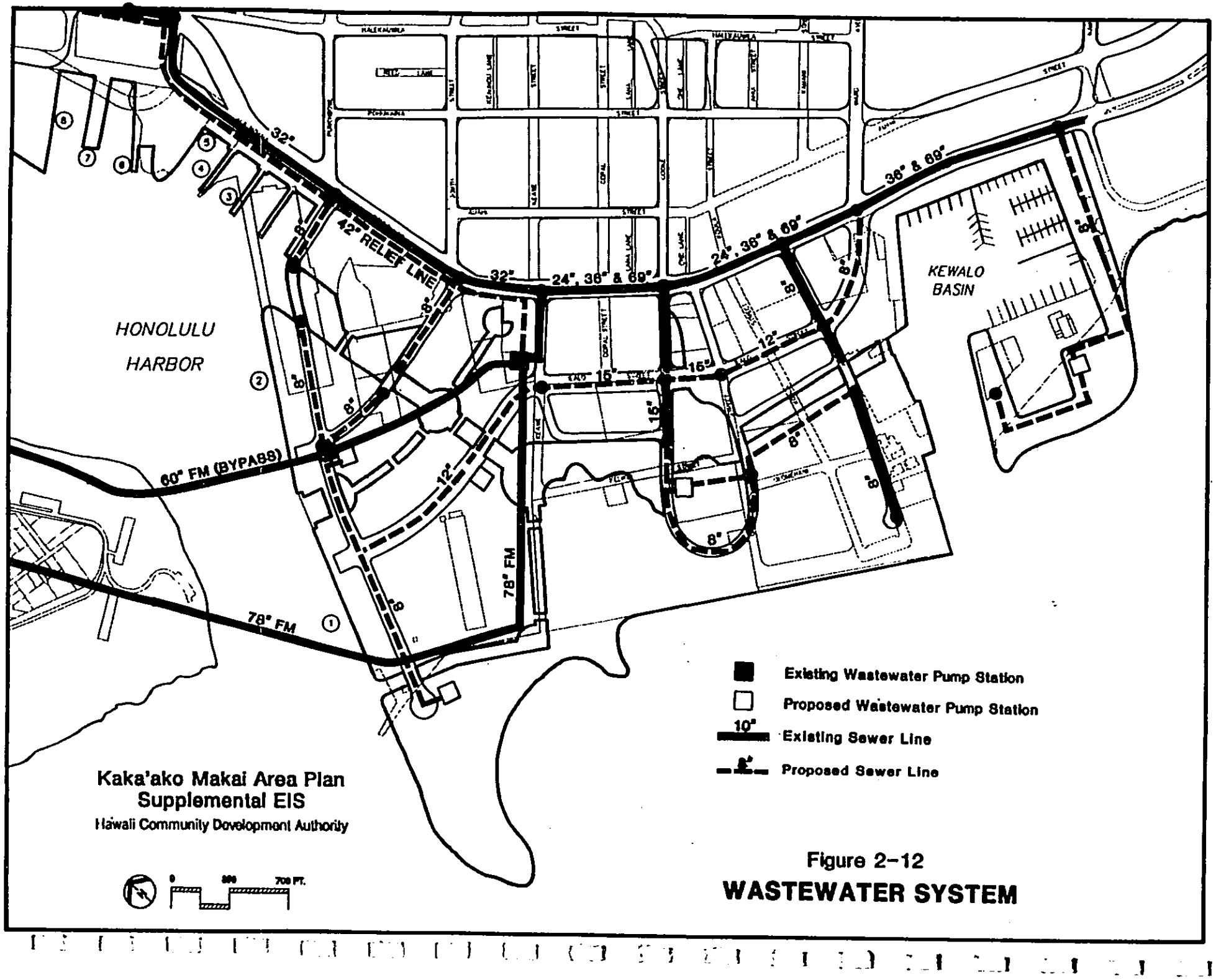


Figure 2-12
WASTEWATER SYSTEM

The total cost for local wastewater system improvements is estimated at $33.8 million.

2.7.4 Drainage System

The proposed drainage system improvements include new reinforced concrete pipe box culverts, manholes, catch basins and/or drainage inlets at appropriate points of the system. Proposed local and major drainage lines are shown in Figure 2-13. As indicated, the proposed inland waterways will provide a major element of the project area drainage system serving as a principal drainage collector. Approximately 11,300 feet of new 24-inch and 36-inch drain lines will be required within the roadways. The existing Keawe Street trunkline will continue to be utilized but will require removal of the box culvert that crosses the proposed inland waterway. These improvements may be modified or refined as detailed engineering analyses and designs are performed.

Total cost for local drainage improvements is approximately $11.4 million.

2.7.5 Power and Communications Systems

A. Gas

Development of a gas line system would depend on the potential load, number of customers, cost of installation, and other factors. Customer rates are covered by Rule No. 13 of the Tariff approved by the State Public Utilities Commission.

Gasco, Inc. is responsible for the funding and replacement of undersized or deteriorated lines as necessary. The present gas distribution system has been determined by Gasco to be able to meet future demands provided some modifications are made. Gasco will decide whether to construct service mains to new customers or provide them with containerized gas.

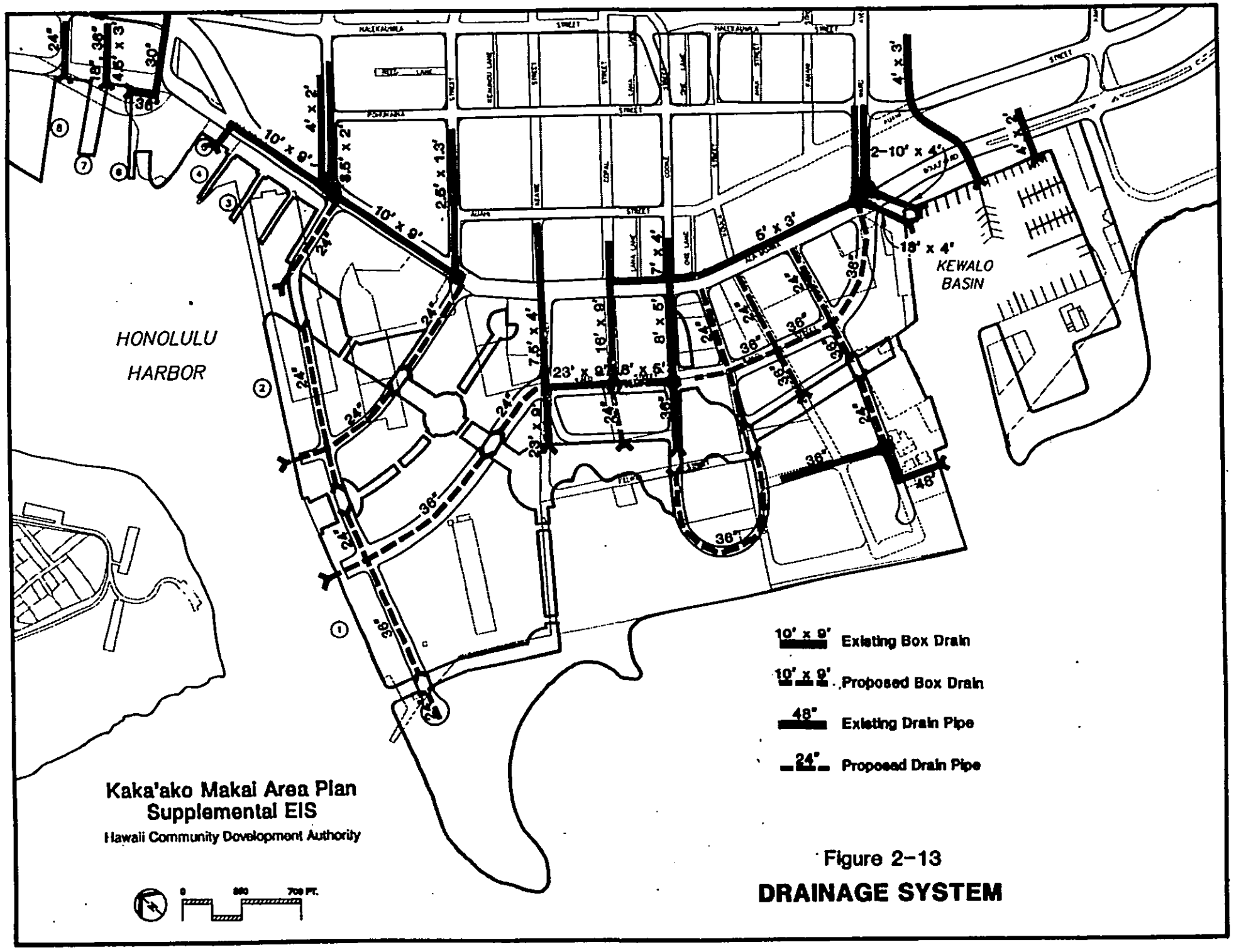


Figure 2-13

DRAINAGE SYSTEM

B. Electrical Power and Communication Systems

The electrical power and communication utilities which serve Kakaako are privately owned by the Hawaiian Electric Company (HECO), Hawaiian Telephone Company (HTCO), and Oceanic Cablevision. The proposed improvements to the electrical and communication utilities are shown in Figure 2-14. Improvements would consist of ductlines, pullboxes and manholes for each system. All overhead lines shall be placed underground in concrete ductlines. The design of the improvements may be modified or refined to conform to the standards of the utility company that owns the system. Construction of proposed underground power and communications lines on Ala Moana Boulevard will be accomplished as the mauka area project and the cost to underground existing overhead utilities will be assessed to adjoining makai area properties in accordance with improvement district rules.

HECO's Distribution Planning Division has indicated that a substation will be required to serve the loads in this area; 46KV ductlines are required to serve the substation.

Costs for modifications to existing substations and costs associated with adding and extending lines from the substation due to increase in loads are paid for in accordance with Rule 13 of HECO's tariff. The existing overhead and underground facilities that are in conflict with the Plan will be removed or relocated to conform to the new layout. New construction cost for conduits and other appurtenances to relocate existing overhead facilities to new underground systems within the public rights-of-way will be shared. The funding will be shared between the government, HECO, and the property owner or developer. The property owner or developer will be responsible for HECO's service charges to individual lots.

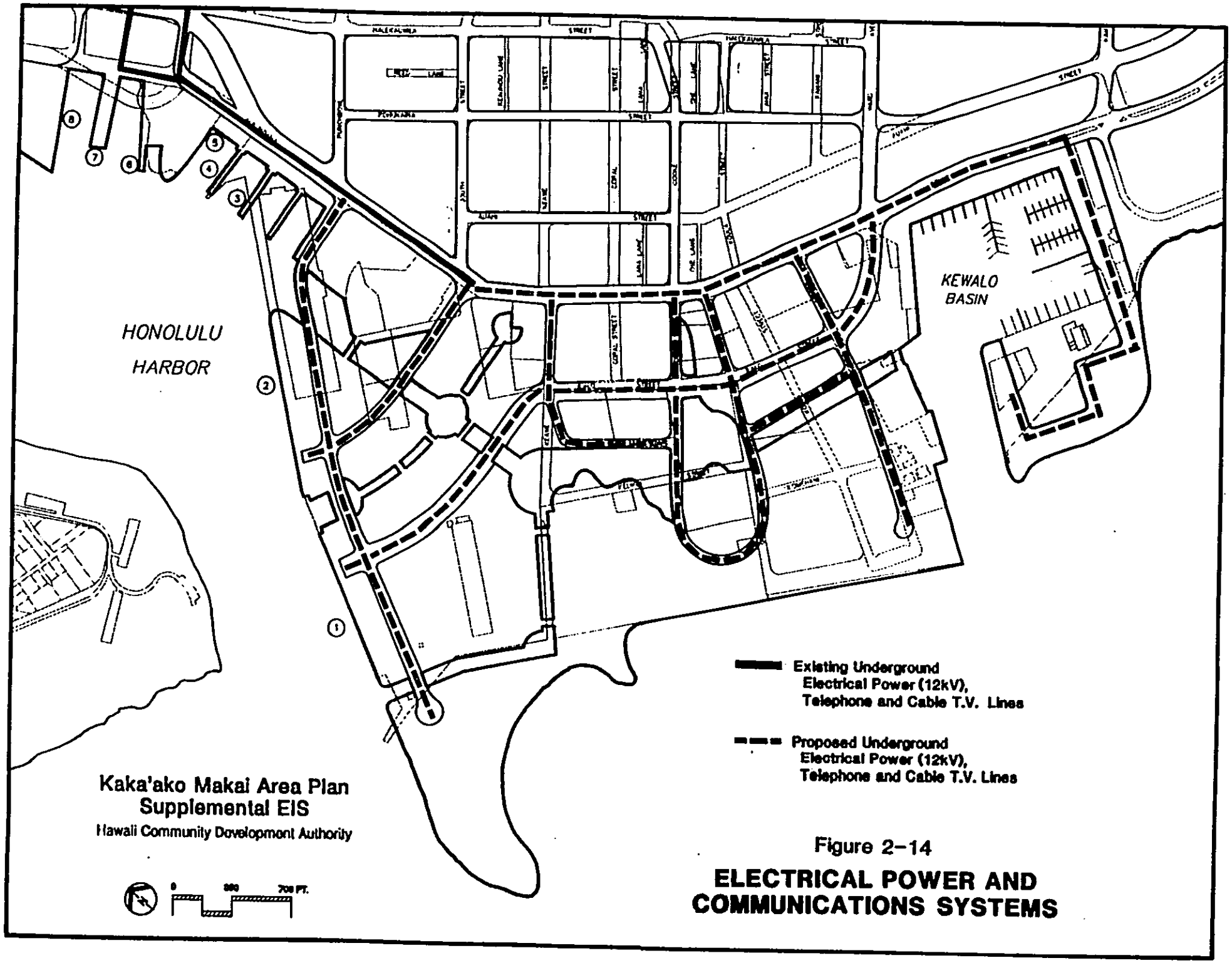


Figure 2-14

ELECTRICAL POWER AND COMMUNICATIONS SYSTEMS

Telephone and cable TV lines will run adjacent to the electric lines within underground ducts buried in the roadways. Approximately 19,200 feet of underground conduits will need to be installed excluding conduits along Ala Moana which have been included in the Kakaako plan for the mauka area. Costs to relocate existing overhead telephone lines and facilities within the area will be shared by HTCO, the government, and the property owner or developer.

Individual HTCO service costs to the customer or developer will be borne by HTCO and the customer.

All costs to relocate existing underground lines and to provide additional electrical and telephone facilities within public right-of-ways shall be borne solely by the applicable utility company.

Total costs of electrical power and communication utilities in the project area are estimated to be about $17.3 million.

2.7.6 Street Lighting and Traffic Signal Systems

Street lights are located throughout Kakaako along public roadways. The street lighting system is owned and maintained by the City and County of Honolulu. Street lights will be installed as part of all new and improved roadways.

Traffic signalizations are presently located at street intersections along Ala Moana. These facilities are owned and maintained by the State of Hawaii. Signal systems will be added or modified as required by improvements and as approved by the appropriate State or County agency.

Total costs of street lighting and traffic signal systems in the project area is estimated to be about $3.5 million.

2.8 HISTORIC RESOURCES PLAN

The preservation of historic sites is integrated into the Kakaako Community Development District's development guidelines. Significant historic resources which merit preservation in the project area include the U. S. Immigration Station, the Department of Health building, and the Ala Moana Pump Station.

Identification of the historic resources recommended for protection or preservation involved the following procedure: First, sites listed on either the State or the National Registers or Historic Places were identified -- the U. S. Immigration Station and the Department of Health building are listed on the National Register; the Ala Moana Pumping Station is found on both the State and National Registers.

The three identified historic resources were then evaluated in terms of the following factors:

1. Placement on the State and National Register does not assure preservation;
2. Buying sites solely for preservation is prohibitively expensive; and,
3. The community's interest is best served by protecting sites that can be placed in productive use.

Given the above criteria, all three sites were considered to be worthy of preservation. Preservation of a site, as defined in the Kakaako Community District Plan, would be to keep a particular property in its present condition. Such property may already be in a restored or rehabilitated condition.

In addition, design guidelines are proposed for transition areas; that is, areas that are compatible with and enhance the integrity of the historic resources and are needed to mitigate some of the adverse effects of adjacent industrial use areas. They include:

- When the historic site is characterized by a low-rise structure surrounded by approximately half the site being landscaped, an open space transition should be provided. This open space transition involves the provision of a 15-foot wide strip of landscaping along the property line adjacent to the historic site

using plant materials similar to those surrounding the historic site.

- Adjacent buildings should not cast shadows on the historic building during midday.

- Where the historic resource is characterized by use of distinctive building materials, landscaping or design motifs, these should be repeated in adjacent developments.

2.9 SOCIAL AND SAFETY PLAN

The provisions of the Kakaako Makai Social and Public Safety Plan provide the means for achieving a safe and secure new people-oriented community. A major objective of makai area development deals with attracting people into the major recreation and open space areas of the waterfront park and adjacent commercial areas after traditional business hours and on holidays and weekends. Thus, unlike typical downtown areas where there are significant periods of time in each 24-hour cycle during which there is very little human activity and interaction, makai area activities will be a place of almost continuing human activity, thus decreasing the inactivity periods and thereby acting as a possible deterrent to crime and vandalism.

The public sector is encouraged to exercise its powers to provide a safe and secure living and working environment. Areas of special concern include, among others, traffic safety and control measures, police and fire protection, acquisition of private security services, and providing information on personal safety within developments.

2.10 RELOCATION PLAN

Displacement is any direct or indirect action, public or private, which forces businesses to move as a result of the acquisition, or imminence of acquisition, of real property. Displacement may be either temporary or permanent.

In temporary displacement, the business may return to the district after revitalization is completed. Businesses permanently displaced, although desiring to return to their original sites, may not do so.

Displacement results from two major causes: (1) public actions such as the construction of streets, parks and parking garages, and other infrastructure systems; and (2) private actions, independently made, or induced by public planning decisions. Privately caused displacements may result from private demolition and new construction, private rehabilitation projects, and evictions due to rising market prices and rents.

Businesses facing displacement may encounter the attendant inconveniences and hardships of moving. Generally, the size and nature of relocation services and payments by public agencies are dictated throughout the State by standards established by Chapter 111, HRS.

The relocation program objectives proposed in the Honolulu waterfront master plan are aimed at providing meaningful assistance for all businesses displaced due to government action. Relevant guiding principles of the program are:

- To phase redevelopment to minimize disruption.

- To ensure that businesses are, to the extent practicable, properly relocated before permitting their displacements by new development, redevelopment, or district-wide rehabilitation.

- To minimize or ameliorate any serious negative impacts on displacees, such as loss of employment, business, or monetary losses.

- To provide counseling, information and referral services to displacees affected by private sector actions, induced or stimulated by governmental planning decisions.

Major relocation actions proposed within the makai area include the relocation of the food distribution center and the Foreign Trade Zone to new facilities to be acquired by the State within the Kapalama Military Reservation. By an agreement with the State, the City and County of Honolulu will relocate its baseyard facilities from within the Makai Area to another site outside of the Kakaako Community Development District, possibly to a site

on Sand Island. The acquisition and development of the Kapalama Military Reservation as a major container terminal will provide a relocation site for maritime uses presently located within the Fort Armstrong area.

HCDA will adopt specific relocation policies and procedures as part of its Rules. The Rules may include the establishment and operation of a central relocation office, relocation payments for actual moving costs, fixed payments for losses suffered, payments for replacement housing or business locations, and other similar relocation matters. Since the State is the major landowner, this may also involve purchase or renegotiation of existing leases.

If Federal actions are involved that require relocation of businesses or residents, then the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) would apply.

2.11 FINANCING PROGRAM

The findings presented in this section are excerpts from original work prepared for the Honolulu waterfront master plan. Project cost information was generated by the Helber Hastert & Kimura, Planners/R.M. Towill Corporation Joint Venture. Public revenue and Cost/Benefit analyses were prepared by John Child & Company. Public financing alternatives were assessed by Dean Witter Capital Markets.

2.11.1 Public Costs

Over the next ten to twenty-year period, the Makai Area Plan envisions a total public investment of approximately $282 million to fund major commercial, recreation and infrastructure improvements, roughly split (60%/40%) between the short (5-10 year) and long-term (10-20 year) phases. Estimated development costs by major phase are presented in Table 2-6 below:

TABLE 2-6
SUMMARY OF ESTIMATED DEVELOPMENT COSTS:
PHASES I & II
(Thousands of 1989 Dollars)

Project	Phase I	Phase II	Total
Pedestrian Overpass (5)	$ 848	$ 565	$ 1,413
Parking	1,188		1,188
Ala Moana Park Extens.	2,002		2,002
Amphitheater	7,150		7,150
Relocation	61,556		61,556
Inland Waterways	8,645	4,166	12,811
Waterfront Park	13,839	742	14,581
Offsite Infrastruc.	9,771		9,771
Onsite Infrastruc.	55,426	39,598	95,024
Piers 1&2 Cruise Boat Term.		7,383	7,383
Kewalo Basin Expansion		9,880	9,880
Pier 4 Improvements		13,945	13,945
People Mover		16,500	16,500
Beach Park		29,053	29,053
Total	$160,864	$121,832	$282,257

Source: Honolulu Waterfront Master Plan, 1989

Funding responsibility for the recommended improvements will be apportioned to the private and public sectors based on the benefits which accrue to their respective areas. Government will be responsible for those improvement which benefit the general public, while the private sector will pay for those improvements that benefit their properties. Improvement districts or other similar programs will be created for areas where infrastructure system improvements provide special benefits to private landowners and/or commercial projects. Property owners or lessees would then be assessed for their portion of the improvement costs.

Major makai area recreation costs include the development of a waterfront park and other public facilities such as the amphitheater, inland waterways, and a new system of public promenades to provide public access to the waterfront. Significant development costs include the construction of major on-site infrastructure which will in turn allow for the subsequent development of identified public parcels. Major circulation/utilities costs include provision for funding the construction of offsite infrastructure necessary to service

the public lands within the makai area. Other costs include funds for major relocations precipitated by the plan, such as the food distribution center and the Foreign Trade Zone.

2.11.2 Public Revenues

A significant development potential for commercial office and retail shopping uses exists within the project area. This development potential can be translated into the form of significant annual ground lease rentals, paid by private developers wishing to develop the public lands. The ground rents generated from public lands leased from private development represent a primary source of public revenue which could be used to finance public improvements within the planning area on a pay-as-you-go basis through reimbursement of a revolving fund and or reimbursement for bond debt service payments. Other indirect revenue sources such as real property and general excise taxes, can also be expected to generate public revenue.

Based on conventional leasing assumptions and in consideration of the projected development phasing and estimated land values, the annual ground rental income stream from the privately-developed, publicly-owned lands within the project area are projected to increase from about $2 million in 1993 to $13.3 million in 2018, at which time it will stabilize until 2052 when original leases will begin to expire and new leases will be negotiated.

2.11.3 Cost/Benefit

Public costs and benefits associated with plan implementation include monetary as well as non-monetary "qualitative" aspects, such as benefits attributable to public parks and open space. The analysis focuses on the monetary costs and benefits associated with the implementation of the makai area plan.

The analysis first identified and projected sources of revenue and expenses to the State and County governments resulting from plan implementation. Revenues were narrowly defined to include income generated from the private development of public land, directly through ground leases and indirectly through general excise and real property taxes. Costs included all urban development, recreation, circulation/utilities, and relocation costs identified in the previous section regarding public costs. Projected State and County operating and maintenance costs were then identified and subtracted from the projected revenue stream.

After operating expenses, the net revenue to the County in the form of real property taxes is projected to increase from a breakeven level for the five years ending 1995 to $26.2 million for the five years ending 2010. Thereafter, the net revenues would average nearly $11.1 million annually over the project's remaining economic life.

Net revenue to the State in the form of ground lease rents and general excise taxes is projected to total nearly $16.6 million for the five years ending 1995, and would be expected to increase to a total of $78.4 million for the five years ending 2010. Thereafter, the net revenue could average about $21.4 million annually.

Capital expenditures are projected at about $282 million as indicated in Table 2-6. The capital improvements would probably be financed through General Obligation Bonds. Thus, the actual cash expenditures would be incurred over a period of years rather than at the time of construction.

2.11.4 Public Financing Alternatives

As earlier discussed, public financing will play a valuable role in plan implementation. By stretching the cost of public improvements over a period of years, public financing will stabilize the cashflow requirements of the makai area and achieve a better matching of revenues and expenditures. It will also achieve a certain "equity" by spreading the costs of an improvement over its useful life.

At present, HCDA has utilized only one financing mechanism to pass Public improvement costs directly to its users -- assessment bonds for the special benefit portion of the urban development costs. The improvements recommended by the plan should result in significant increases in real property tax revenues. However, legal mechanisms do not exist by which the Authority can capture those revenues. As mentioned earlier, sales tax revenues will flow to the State and could represent a bondable source of security. However, even with the legal means to pledge such revenues, the State, like other states, may have little incentive to do so since such revenues would strengthen its General Fund. Finally, although ground lease rentals can be captured, such revenues alone generally provide a relatively weak source of security in a bond issue.

To the extent the Authority cannot capture and pledge a predictable and established revenue flow to a bond issue, or use special assessment bonding, it necessarily must rely on State CIP appropriations, general obligation bonds, pay-as-you-go financing from project area revenue flows, and/or private funds to pay for public improvements. Yet the obstacles to implementing other forms of financing suggest possible ways to reduce the dependency on general obligation bond financing. These include:

- Coordination with the City and County with respect to sharing the "windfall" of increased property tax revenues from the project area.

- Utilizing ground lease rentals for the following purposes: pay-as-you-go financing (thereby reducing future bonding requirements); broadening the revenue base of a public agency with existing bonding capabilities; or for reimbursing a revolving fund, if one is established.

- Adoption of legislation which may increase the flexibility of spreading assessments and levying special taxes on the basis of more general benefit.

While these guidelines will not completely eliminate the need for general obligation bond financing, HCDA may be able to limit the use of General Obligation bonds to those facilities that provide more regional benefit, such as waterfront parks, and other recreation facilities which have no other financing alternatives.

2.12 PHASING PLAN

Implementation of the Makai Area Plan will be in two major phases of approximately equal isze, as discussed earlier. Phase I includes those plans and programs which could be implemented in the next ten years (1990-2000); and Phase II which could be accomplished over the following ten years (2000-2010). Figure 2-15 illustrates the location of the two major phases and Table 2-7 provides a summary of projects.

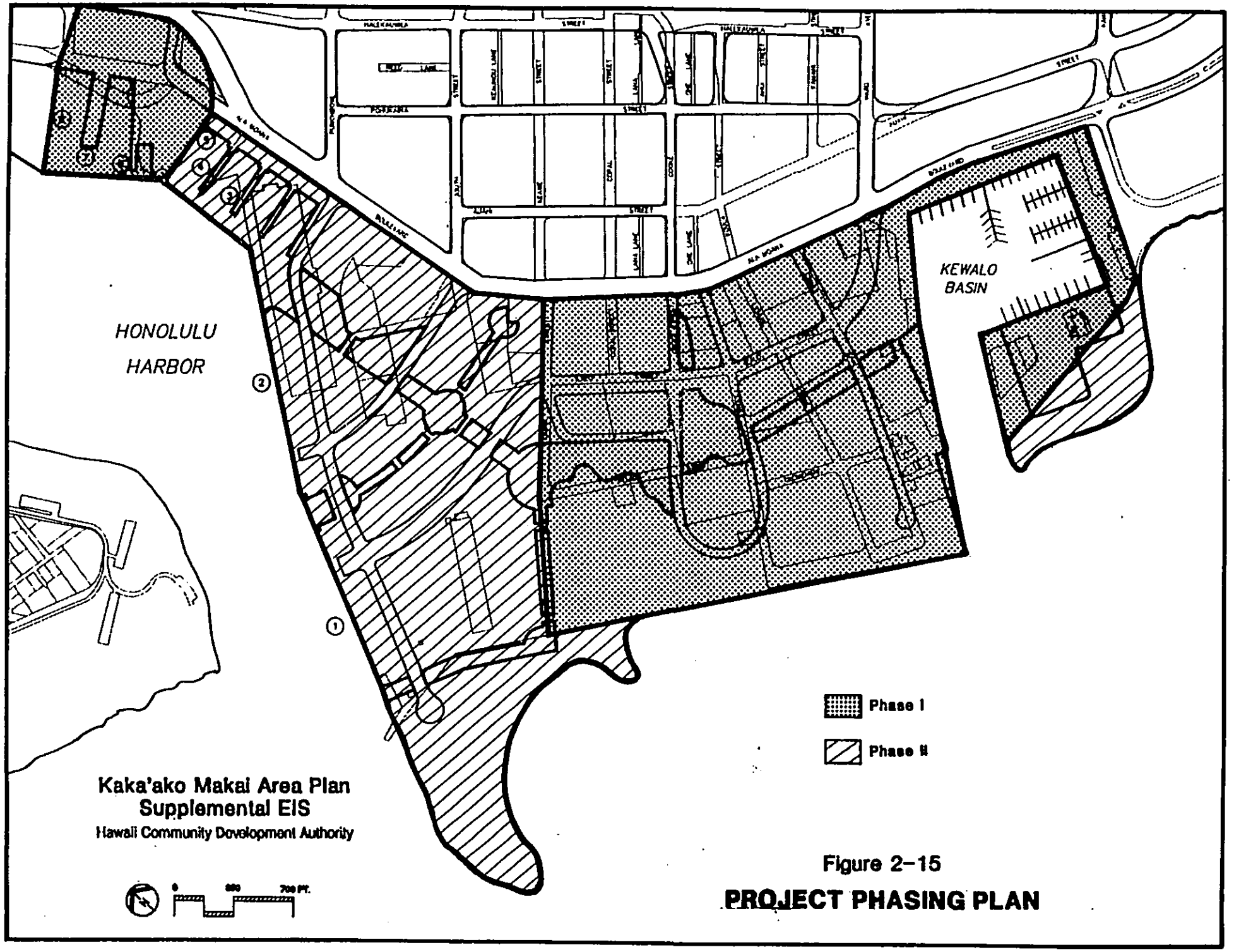


Figure 2-15

PROJECT PHASING PLAN

TABLE 2-7

DEVELOPMENT PROJECT PHASING

Phase	Project
I (1990-2000)	Waterfront Park Seawall Renovation Promenade Inland Waterways Ala Moana Park Expansion into Kewalo Basin Kewalo Basin Ewa-Edge - Commercial Maritime Redevelopment Pier 5 Marketplace
II (2000-2010)	Inland Waterways (Completion) Kewalo Basin Expansion Offshore Landfilling off of Fort Armstrong New Berthing Piers Between Piers 4-5

The discussion of phasing relates to the programming, budgeting and implementation of major infrastructure improvements and not necessarily to the absorption/development of the various land parcels. For example, Phase I improvements are planned to be fully implemented by 2000, however, the specific land parcels and uses serviced by the improvements will be absorbed/developed in accordance with market demands. Based on market forecasts for the year 2010 prepared for the Honolulu Waterfront Master Plan, and extrapolating market demands using historical rates of absorption beyond 2010, the land use inventory within the Makai Area (phases I and II) will be fully absorbed by 2025.

The factor which most influences the phasing of development in the Makai Area is the ultimate acquisition of the federal lands at Kapalama and the conversion of those lands to container operations. Until this is accomplished, along with other necessary maritime improvements at Honolulu and Barbers Point Harbors, the existing maritime operations at Fort Armstrong must remain.

Phase I: Phase I encompasses approximately 125 acres and includes the area around Kewalo Basin, the Kakaako Peninsula east of Keawe Street, and the Piers 5 to 7 area near Downtown. Initial construction in Phase I will include the expansion of Ala Moana Park into Kewalo Basin, initial construction of the first phase of the Waterfront Park which includes seawall and parking improvements, and the grading and irrigation of a portion of the park. Subsequent Phase I development will include the relocation of the City & County Baseyards to Sand Island and food distribution facilities to Kapalama, completion of additional phases of the Kakaako Park and park entrance, construction of major project roads and utilities, development of the amphitheater and performing arts center, the construction of a major portion of the inland waterway system, and the development of commercial parcels on the Ewa edge of Kewalo Basin and between the inland waterway and Ala Moana Boulevard.

Phase II: Phase II encompasses approximately 125 acres and includes the Fort Armstrong area and the proposed landfills off of Fort Armstrong and Kewalo Peninsula. Phase II will commence with the relocation of maritime cargo operations from the Fort Armstrong Piers to Kapalama. Major projects within this phase include the completion of the pedestrian promenades, inland waterways, major roadway and utilities improvements, development of cruise ship terminals at Piers 1 and 2, the development of beachparks off of Kewalo Basin and Fort Armstrong, the dredging and development of the proposed Pier 4 harbor area and the implementation of a people mover for the Makai Area linked to the proposed rapid transit system planned for routing through the Mauka Area of Kakaako.

So that the necessary services provided by public facilities and utilities are adequate to support new development at the time they occur, the programming of infrastructure improvements for the Makai Area will be coordinated with the Phasing Plan for the Mauka area of the Kakaako District. The coordinated phasing plans will establish a framework for ensuring that infrastructure improvements are coordinated in a systematic sequence of development units over time. It provides that improvements to the infrastructure systems will be made as areas are ready to be developed. This maximizes the benefits to be derived from the improvements and is equitable to the landowners who will share in the cost of the improvements. Further, it will result in faster returns to the public sector in the form of the increased tax revenues which will result from construction activities, the value of the new development, and the increase in new business activities.

CHAPTER 3

Description of the Environment, Impacts and Mitigation Measures

CHAPTER 3

DESCRIPTION OF THE ENVIRONMENT, IMPACTS AND MITIGATION MEASURES

3.1 OVERVIEW

This chapter includes assessments of existing conditions and the proposed plan with regard to the physical environment (i.e., geology, oceanography, air quality, traffic, etc.), socio-economic environment and infrastructure systems. Since the acceptance of the Final SEIS for the makai area in 1985, the Legislature, during its 1987 session, expanded the makai area to encompass a sizeable part of the Honolulu waterfront from Ala Moana Park to the Aloha Tower. Based on the 1987 boundary amendment (Act 355, SLH 1987), the makai area now includes nearly 2 miles of waterfront and comprises approximately 210 acres of fast land and an additional 38 acres of submerged land (Kewalo Basin and Piers 4-7 area) makai of Ala Moana Boulevard. The Kakaako district expansion and the changes which constitute the revised makai area plan subsequent to the waterfront master plan recommendations are the subject of this supplemental EIS.

3.1.1 Short- and Long-Range Phases

The revised makai area plan is divided into two major phases -- the short-range (Phase I) is expected to begin in the first quarter of 1990, and continue in increments or sub-phases to the year 2000; the long-range (Phase II) is anticipated to begin in the year 2000 and continue to 2010.

The first project targeted for implementation under the revised makai area plan is a 70-acre waterfront park, whose first sub-phase is bounded by the Diamond Head edge of Kewalo Basin on the east, the Keawe Street drainage channel on the west, and Kelikoi and Olomehani Streets on the north. Other projects targeted to occur during Phase I include the renovation of the Kakaako peninsula seawall; the pedestrian promenade (first increment); expansion of Ala Moana Park into Kewalo Basin; commercial redevelopment along Kewalo Basin's Ewa edge; inland waterways, first increment; amphitheater; Pier 5 marketplace; and offsite infrastructure improvements.

Phase II projects include: completion of pedestrian promenade; completion of the inland waterways; expansion of the Kewalo Basin peninsula area; offshore landfilling to create a

17-acre beach park off Fort Armstrong; and new berthing piers between Piers 4 and 5. Onsite infrastructure improvements will be occurring during Phases I and II to support the development of projects as they are identified in this plan.

3.1.2 Changes to the Original Makai Area Plan

The 1985 SEIS disclosed the impacts from implementation of the original makai area plan as well as described and analyzed the impacts resulting from infrastructure improvements for the increment 1 district-wide improvement program as a whole by focusing on their cumulative impacts. The 1985 SEIS evaluated the impacts of original plan components which were based on guidance policies similar to those on which the 1989 revisions are based with the following exceptions:

* The original plan was based on the need to retain existing waterfront terminal and industrial uses in the Fort Armstrong area, while the revised plan was based on the recreational and commercial uses replacing waterfront industrial uses, as the latter were proposed to be relocated to more appropriate locations outside Kakaako.
* Industrial activities and requirements that existed in the original makai plan were only to be allotted in the Kakaako mauka area, according to the revised plan.
* Residential uses which were included in the original plan, were no longer allowed in the revised makai plan due to potential market constraints which may be exclusionary of lower income families, and environmental impacts from aircraft noise.

Findings and recommendations specific to the makai area from port planning, updated market assessment, acoustic, traffic, ocean engineering, and marine biological studies for the Honolulu waterfront study were used as the bases for revisions to the original makai area plan. Findings from these studies have been incorporated in this SEIS as they apply.

3.2 PHYSICAL ENVIRONMENT

Construction of projects within Phase I are anticipated to begin during the first quarter of 1990, during which time environmental impacts associated with construction activities may

be expected. Construction-related environmental consequences and mitigation measures which were addressed in the 1985 SEIS, are still applicable. Impacts to pedestrian and traffic circulation due to roadway and infrastructure system are anticipated. Construction work along the shoreline of the Kakaako peninsula may disrupt access to the ocean.

These impacts, however, are temporary. Over the long-term, there will be significant positive impacts, such as increased park space, recreational and cultural activities, increased commercial floor space, increased employment opportunities, and property tax revenues, enhanced ocean recreation opportunities, and an overall improvement in the quality of the environment. These benefits are considered to justify implementation of the proposed improvements, notwithstanding unavoidable adverse impacts.

Federal, State and County regulations which enforce health and safety standards during project construction will be adhered to.

3.2.1 Climate

The climate of the project area is similar to that of other coastal areas in Honolulu. On the average, 25 percent of all days each year are clear; 46 percent partly cloudy; and 28 percent cloudy (HCDA, 1982). The average annual rainfall in the Kakaako Makai area is less than 30 inches. The wet season is usually November to March, and the dry season is generally May to September. However, rainfall may vary greatly from year to year. The cooling tradewinds from the northeast prevail most of the year. Occasional "Kona" winds from the south bring warm, humid air.

A. Impacts and Mitigation Measures

Cooler microclimatic conditions will result by replacing large paved areas with the waterfront park, landscaped park areas at Fort Armstrong, landscaping throughout the makai area, and the waterways through the Kakaako peninsula.

3.2.2 Vegetation

Most of the plants in the project area are drought resistant or salt tolerant introduced species commonly found in a shoreline environment. No threatened or endangered species are known to exist at the site. Weedy grasses and plants including koa haole (Prosopis

pallida) and wild tobacco (Nicotiana glauca) are common throughout the site. There are occasional native species found on Kewalo Peninsula: pau-o-Hiiaka (Jacquemontia sandwicensis); ohelo-kai (Lycium sandwicense); and nena (Heliotropium curvassavicum). Noteworthy introduced species include: milo (Thespesia populnea); coconut (Cocos nucifera); mango (Mangifera indica); plumeria (Plumeria sp.); African tulip (Spathodea campanulata); avocado (Persea americana); monkeypod (Samanea saman); and banyan (Ficus spp.) (HCDA, 1986).

A. Impacts and Mitigation Measures

No significant negative impacts to the existing vegetation are anticipated as a result of the project. Moreover, it is expected that long term positive impacts, most notably the extensive landscape improvements planned for the park area, will far outweigh any short term adverse, construction-induced conditions.

3.2.3 Geology and Soils

The study area lies on the Honolulu coastal plain, an emerged fossil reef formed during the Waimanalo High stand of the sea, approximately 120,000 years ago (MacDonald and Abbott, 1970). During that period, sea level was 25 feet higher than it is today. The Kakaako Makai area is generally underlain by a coral layer between 5 and 20 feet below mean sea level (MSL). Soft lagoonal deposits made up of sand, silt, and clay are found above the ancient reef, mainly in a buried stream channel which extends below Ala Moana between Keawe and Ohe Streets to the ocean. Soft alluvial soils within the channel area extend to depths of 50 to 65 feet below sea level. These deposits are covered by 5 to 10 feet of dredged coral fill.

The substrata conditions of the project area, as shown in Figure 3-1, are "Average" in all areas except in the general area of the buried stream channel where the substrata condition is "Poor." Areas described as "Average" would probably support structures of up to 22 feet without special foundations. These would be relatively light structures using continuous lightly loaded individual spread foundations with spans of less than 20 feet. "Poor" areas can only support lightly loaded single-story structures not sensitive to vertical movements. Special foundations can be developed as required to support larger structures (Kakaako Community Development District Plan SEIS, 1985.)

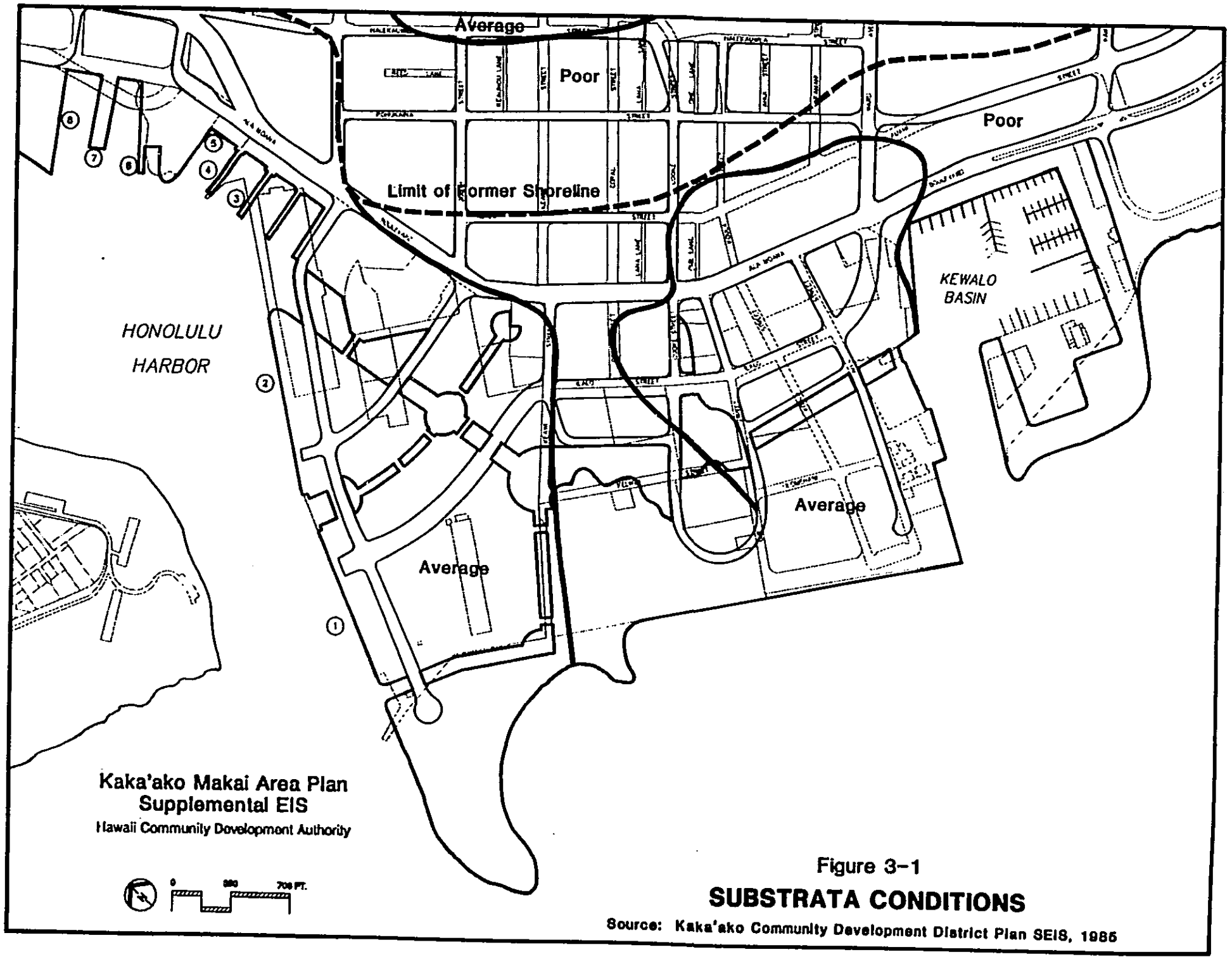


Figure 3-1

SUBSTRATA CONDITIONS

Source: Kaka'ako Community Development District Plan SEIS, 1985

A. Impacts and Mitigation Measures

Proposed development in the project area will be constructed in accordance with structural standards and guidelines regarding building on the area's existing geologic conditions.

Kakaako's soils and geology would affect costs of constructing new building foundations. Foundation support systems built in areas with substrata defined as "poor" will be more extensive and thus, more expensive. A large portion of the area designated "poor" has been zoned for park land construction of which will be in Phase I. Many of the proposed structures in the park will be of lighter weight construction such as pavillions, benches, and picnic tables. Special consideration will be given to larger structures that require sturdier foundations. The highest cost will be incurred within areas of buried stream channels shown in Figure 3-2. (Kakaako Community Development District Plan SEIS, 1985.)

3.2.4 Topography

The terrain of the project area is generally at a low elevation of 5 feet above MSL and flat (less than 5 percent slope), except for a large mound makai of Olomehani and Kelikoi Streets. The debris mound was formed between 1927 and 1977 when the area was an incinerator landfill. The mound contains about 900,000 cubic yards of fill consisting mainly of incinerator residue, municipal solid waste construction debris and dirt. Rising 15 to 55 feet above sea level, the mound is 1,700 feet long and 400 feet wide. The mound site is buffered from the ocean by a rock revetment seawall. From the 23 X 9 foot box culvert at the Ewa end of Kelikoi Street, a 30-foot wide open channel carries storm drainage flows to the ocean.

A. Impacts and Mitigation Measures

The proposed project will resculpture the existing mound and dredge the inland waterway through the peninsula in Phase I. Site grading and dredging will be done in accordance with Federal, State, and County requirements. No adverse impacts are anticipated. Further discussion can be found in subsection "Kewalo Municipal Incinerator Landfill" of Section 3.2.13.

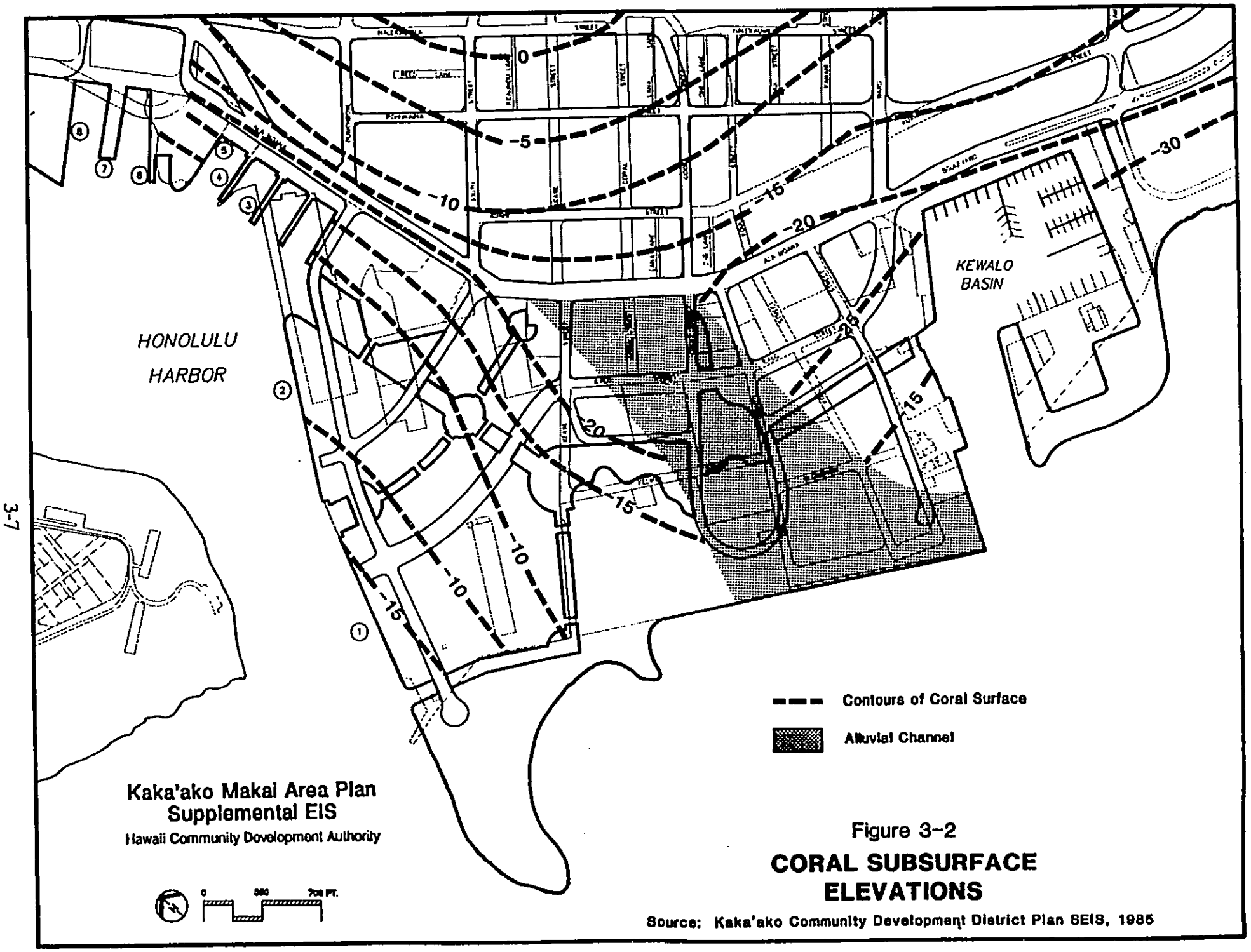


Figure 3-2

CORAL SUBSURFACE ELEVATIONS

Source: Kaka'ako Community Development District Plan SEIS, 1985

3.2.5 Hydrology and Drainage

The sedimentary deposits underlying Kakaako restrict the percolation of rainfall into the underlying Koolau basalt but not into the shallow caprock acquifer. There are no surface water bodies in the makai area.

Urbanization of the Kakaako district and development of storm drains have increased the surface runoff to the nearshore coastal waters. However, much of Kakaako is still subject to shallow flooding because of its flat topography and inadequate drainage facilities. The runoff from the makai area flows into the ocean via the Keawe Street open channel, Kewalo Basin and Honolulu Harbor.

The majority of the drainage systems in the planning area were not designed to the present City and County standards and do not provide drainage protection from the 50-year flood. To correct deficiencies, drainage improvements are being designed and will be implemented to include reinforced concrete pipe and box culverts, manholes, and catch basins. The Kakaako Improvement District 1 improvements increased the capacity of the Punchbowl drainage system which outlets near Pier 4. The Kakaako Improvement District 2, which is presently under construction, will improve the drainage system from South Street to Coral Street. These drainage lines will meet County standards to accommodate the estimated 50-year storm runoff from both the district and the adjacent mauka areas.

A. Impacts and Mitigation Measures

Adverse impacts will be construction related, and thus will be short term in nature. Potential impacts may be expected on the area's air quality, noise, vehicular and pedestrian traffic, disruption of drainage system, business activity, and the overall visual quality of the area. However, these impacts should be no greater than existing industrial activities within the area. Mitigation measures will be practiced in accordance with standards and requirements set forth in construction permits obtained from the State Department of Health and the City and County of Honolulu.

The proposed inland waterway system as conceptually planned is to be integrated into the existing drainage system in Phase I and II. The proposed interior drainage systems for the Kakaako Makai area may flow directly into the proposed waterways, thereby reducing the size and length of the presently required drain lines. The new waterway will provide large cross sectional areas of flow, which will hold large capacities of storm water, and filter sizable amounts of silt and sedimentation before proceeding to the ocean through the channel system. Thus, the velocity and contamination of the storm waters will be reduced prior to reaching the ocean outlets. No loss in flow capacity is expected as long as the proposed waterways are properly maintained. Siltation pits have been installed mauka of the Kakaako peninsula and will deter siltation within existing waterways. Alternative means of siltation control will be evaluated during the engineering design period.

In addition to substantially upgrading the substandard drainage systems, the proposed integrated waterway and drainage systems will have additional positive impacts on the Kakaako makai area in terms of increasing surrounding land values with the introduction of an aesthetically attractive series of functional waterways. Other significant factors will contribute to the overall improved quality of the environment by, increasing commercial and office floor space, and providing recreational opportunities such as boating in the new waterways, and viewing, strolling and fishing along the banks.

3.2.6 Natural Hazards

Coastal flooding hazards and mitigation measures were studied by Edward K. Noda & Associates for the Honolulu waterfront master plan. Makai area-specific excerpts of the study can be found in Appendix B. Coastal flood hazards include tsunamis, hurricane wave-induced coastal inundation, extreme stream or storm drainage flows, and long-term consequences due to the rising sea level.

Tsunami heights within the project area have been reported to be 6 feet or less, and no shoreline reach is within a Zone V (high velocity tsunami wave flood zone) as defined by the Federal Flood Insurance Rate Maps (FIRMs, City and County of Honolulu #115 and

#120, 1987). According to the Civil Defense Tsunami Inundation Map for Oahu, most of the makai area is within the projected inundation zone. All development, however, will be sufficiently elevated above the regulatory 100-year tsunami flood elevation.

As illustrated by Figure 3-3, the greater portion of the project parcels is designated Zone X, "Other Areas" determined to be outside of the 500-year flood plain. This area encompasses most of Kakaako Makai from Aloha Tower to the Ewa edge of Kewalo Basin. In addition, small areas are situated in Zone A, a special flood hazard area inundated by the 100-year flood, with no base flood elevations determined. These areas include the Kakaako Peninsula to Keawe Street, and the general circumference of Kewalo Basin. A small part of the project, the mauka portion of Kewalo Basin, is zoned AE, special flood hazard area inundated by the 100-year flood with a base flood elevation of 4 feet MSL. Primary problems occur at the triangle peninsula due to wave overtopping, which may occur daily during periods of high tide, large waves and/or southerly storm conditions.

Areas designated as Zone A are vulnerable to hurricane-induced coastal inundation. Estimated maximum stillwater level (SWL) due to hurricanes is about 6 feet or less above MSL. Thus, the area from Pier 1 to Keawe Street would be at risk during hurricane season.

During Hurricane Iwa in 1982, the project site and surrounding areas were subjected to high storm surge and wave action. Kewalo Basin and Honolulu Harbor experienced damage to boats and harbor structures, such as piers and catwalks. Wave runup/overtopping caused flooding of the Kewalo peninsula and the Fort Armstrong area of Kakaako during Hurricane Iwa.

3.2.6.1 Long-term Rise in Sea Level

Eustatic processes involve the global changes of oceanic water level due to global warming. The difference between the eustatic change and any local change in land elevation due to uplift or subsidence results in the relative mean sea level change at a particular location. Several studies (gathered by the Committee on Engineering Implications of Changes in Relative Mean Sea Level, National Research Council) have suggested that the eustatic sea level rise may accelerate due to future warming of the atmosphere associated with the "greenhouse effect", melting of glaciers, and expansion of near-surface ocean water due to global ocean warming.

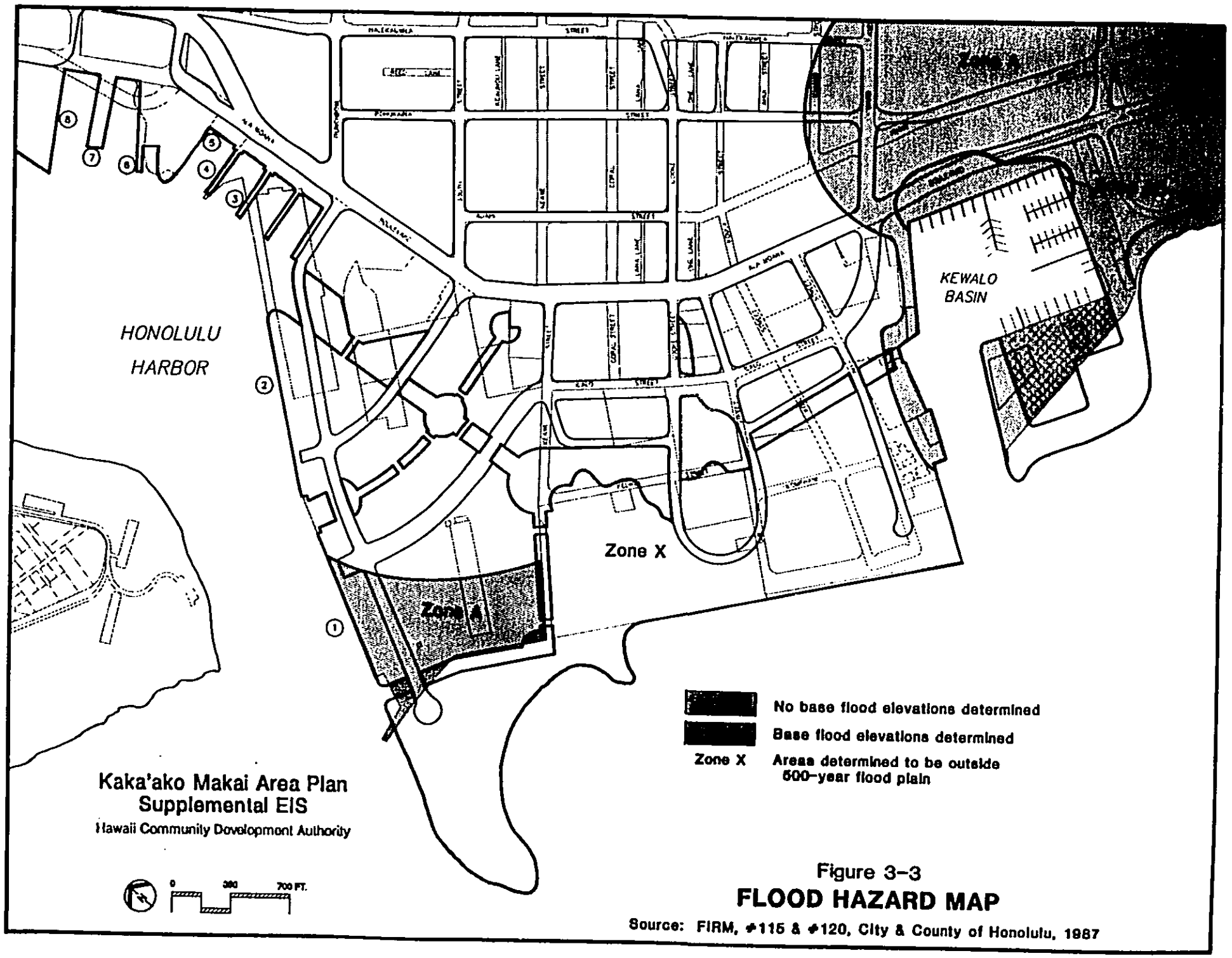


Figure 3-3
FLOOD HAZARD MAP

Source: FIRM, #115 & #120, City & County of Honolulu, 1987

According to the Committee on Engineering Implications of Changes in Relative Mean Sea Level, National Research Council, in the near future, long-term consequences due to the global rise in sea level are relatively insignificant. It is estimated that the change in rising sea level for Honolulu by the year 2010 will be 4 inches or less.

While long-term planning and policy decisions should consider the probability of future increased rates of sea level rise, there is no cause for alarm or action regarding engineering of structures to mitigate the effects. Any action to protect against sea level rise can be carried out in a relatively short time period relative to the rate of potential rise in relative mean sea level.

A. Impacts and Mitigation Measures

Most of the shoreline within the project area is provided with some method of shore protection due to the fact that much of this coastal reach has been altered by dredge and fill operations. Shore protection structures vary, depending on the use of the shoreline area and the ocean bottom characteristics. For instance, rubblemound breakwaters protect the beach at Magic Island, rubble masonry seawalls protect portions of the shore that are not exposed to high wave activity, rubble revetments protect other reaches that are exposed to higher levels of wave activity, and various types of vertical bulkheads are found within the interior harbor basins.

In some instances, the existing structures are too low or have deteriorated over the years due to lack of maintenance, leaving shoreline reaches exposed to erosion. The seawall along the Kakaako Peninsula shorefront is in various stages of disrepair, requiring improvements to prevent additional erosion damage and continuous washing of incinerator landfill material into the ocean environment.

Planned uses and activities along the shoreline areas are being considered from the standpoint of selecting appropriate protection measures that provide an acceptable level of protection to the landside improvements. For example, open space park areas can permit a higher risk of storm wave overtopping and flooding than high intensity commercial development.

If necessitated by high storm conditions, alternative sites in Honolulu Harbor will be used by dinner cruise and harbor cruise boats proposed for new berths at Piers 4 through 7 planned for development in Phase II. The vicinity of Piers 8 to 13 offers more protective landings during conditions of severe surge. Depending on the vessel's structural characteristics, Pier 6 could be utilized as a landing under most surge conditions.

Development will be in accordance with the regulatory shoreline setback requirements and flood hazard requirements. In addition, for shoreline reaches which are anticipated to sustain significant wave overtopping during storm conditions, structures subject to damage may be set back even greater distances to minimize potential wave and water damage.

The park lands that will be created by offshore filling along the westerly reach of the Kakaako peninsula in Phase II will assist in protecting improvements within the peninsula and will require substantial shore protection structures than for the existing shoreline. Larger waves can be expected to impact the shore during extreme storm conditions because of the deeper water depths. The increased height and construction of the revetment along the shoreline are necessary to help prevent wave overtopping and erosion.

The Kewalo Basin peninsula expansion, envisioned to be implemented in Phase II, will require shore protection measures to contain the fill material and prevent storm wave damage. A sloping rock revetment may be preferable to a near-vertical seawall since it would reduce the wave splash and make the shoreline more accessible from the water.

3.2.7 Nearshore and Shoreline Life

A very shallow reef flat fronts the Kewalo Basin Peninsula and a moderately deeper reef flat fronts the Kakaako peninsula shoreline. Coral does not occur in the Kewalo Basin entrance channel. The entire Kewalo peninsula shoreline is protected with a seawall, and the entire Kakaako shoreline (from Kewalo Basin to the Honolulu Harbor entrance

channel) is revetted. Water depth over the shallow fringing reef flat fronting the Kewalo Basin peninsula is about 1.5 to 2.5 feet. The deeper nearshore reef areas fronting the Kakaako shoreline have been disturbed over the debris as well as from sediment loading. The nearshore bottom consists of construction rubble, boulders, and dead coral with occasional pockets of sand. Water depth offshore Kakaako varies from about 5 feet at the shore to about 12 feet within 500 to 1,500 feet from shore. Seaward of the 12-foot contour, the bottom slopes at about 1V:20H to greater than 100-foot depths within 3,000 to 4,000 feet from shore.

The following section details the marine biota and nearshore activities which currently characterize the Kewalo Basin, Kakaako/Fort Armstrong shoreline, and the Honolulu Harbor areas, and the anticipated impacts associated with the project. Excerpts from the Honolulu waterfront master plan "Marine Biology Resources, Opportunities & Constraints" study prepared by William A. Brewer & Associates in February 1989, are included.

3.2.7.1 Marine Biota

Three species of stony coral, Pocillorpora meandrina, Porites lobata, and Porites compressa, are relatively common in nearshore coastal waters of the basin area as well as Kakaako/Fort Armstrong area. Small patches of Montipora patula and M. flabellata cover the drop-off depths at minus 9 to minus 13 meters along Kakaako.

Sea urchins, Diadema paucispinum, Echinothrix sp., Tripneustes gratilla and Echinometra mathaei, nudibranches, sea cucumbers, starfish and lobsters, Panulirus sp., are present throughout Kewalo Basin and the Kakaako/Fort Armstrong area.

In nearshore waters of the Kewalo Basin subarea between the Honolulu Channel and Ala Moana Beach Park, and the Kakaako/Fort Armstrong subarea, at least 106 species of fish have been recorded over a range of depths. Shallow reef areas less than 1 meter are most populated by Mulloides vanicolensis, Naso hexacanthus, and Stethojulis balteata. Depths of minus 2 to minus 3 meters are typified by Acanthurus leucopareius, A. nigrofuscus, Thalassoma duperrey, Chromis vanderbilti, Abudefduf abdominalis, and Ctenochaetus strigosus. Between depths of minus 6 to minus 9 meters, there is an increase in the abundance and diversity of fishes. Common species at these depths are Stegastes

fasciolatus, Thalassoma duperrey, Parupeneus multifasciatus, Zebrasoma flavescens, Decapterus macarrelus, Acanthurus nigrofuscus, Ctenochaetus strigosus, Naso literatus, and Parupeneus pleurostigma.

In the Kewalo Basin area, 62 species of fish have been recorded as inhabiting the steep drop-off at depths of minus 9 to minus 12 meters. Of these, 11 occur most frequently as follows: Chromis ovalis, C. hanui, Chaetodon miliaris, Thalassoma duperreyi, Stegastes fasciolatus, Acanthurus triostegus, A. xantherythrus, Mulloides vanicolensis, Pseudocheilinus octotaenia, Gomphosus varius and Myripristis sp. At least 40 species exist at depths of minus 24 to minus 30 meters, most commonly, Chromis verator, C. ovalis, C. vanderbilti, Naso hexacanthus, Selar crumenophthalmus, Mulloides flavlineatus, and Parupeneus multifasciatus (Division of Fish and Game, 1972).

The entrance channel to Honolulu Harbor (which forms the Piers 4 through 8 nearshore community), is characterized primarily by corals, invertebrates and fishes. In addition, three genera of algae, Ulva, Halimeda, and Amansia inhabit this area.

A total of ten species of coral were identified within close proximity to the power plant intake/outfall basins. The four most common species, comprising 95 to 99 percent of total living coral coverage, are as follows: Porites lobata, Pocillopora meandrina, Montipora verrucosa, and Montipora patula. The Honolulu Harbor entrance channel and adjacent reef areas are primarily characterized by dead corals, though the Ewa side of the entrance channel has pockets of live corals that have established relatively small communities along the toe of the Sand Island seawall.

Within the harbor basin, the soft-bottom benthic community of crabs, polyps, shrimp, and sponges is inadequately developed and highly affected by sedimentation. The faunal community along the rocky fringes of the harbor is fairly well developed. Tunicates, sponges, fanworms, and various fouling species occupy the bulkheads and pilings.

Harbor waters provide limited habitat for a variety of common reef fishes. These fishes are widely scattered throughout the harbor but appear most frequently in the vicinity of the thermal outfall of the Hawaiian Electric Company Honolulu Power Plant. The harbor also

serves as a nursery for several species of reef and open ocean fishes, including the hammerhead shark Sphyrna lewini, and several species of carangids (jacks), mugilids (mullets), sphyraenids (barracudas), and mullids (goatfishes).

3.2.7.2 Nearshore Activities

The waters offshore of Kewalo Basin and Kakaako support a number of water-dependent recreational activities. Commercially operated sport diving, surfing, fishing, shelling and limu collecting are popular throughout the area (Department of Transportation, 1984). Pole fishing is popular from the seawall fronting Kakaako. Interisland tugboats with barges in tow utilize the waters off Kakaako for alignment and mobilization for proceeding into or out of the Honolulu Harbor entrance channel.

Honolulu Harbor is one of four principle baiting areas for the Hawaiian skipjack tuna industry. According to 1977 data, the Hawaiian anchovy or nehu (Stolephorus purpureus) comprises about 93 percent of the bait used by the skipjack industry. Captured both day and night, the nehu is the preferred species of bait fish. Honolulu Harbor is primarily valued for productive night baiting.

The proposed renovation of the Kakaako Peninsula seawall will provide wave exposed environments for nearshore and shoreline life. Seaweed such as limu kala (Sargassum sp.) and the sea lettuce, limu palahalaha (Ulva fasciata), are common along the seawalls. Small invertebrates and crabs are also present (AECOS, 1980).

A surfing break outside the Kewalo Basin entrance channel is used by both board and body surfers. Called "Point Panic" (Figure 3-6), this break is reportedly one of the finest for bodysurfing in Hawaii, with the best waves occurring during large south swell conditions during the summer months (often in association with near or distant tropical storms or hurricanes). Increasing use of the site by board surfers deploying board leashes has caused considerable conflict and many collisions with boards. Waves roll almost directly into the seawall, which is hazardous to surfers and surfboards. Entry over the seawall fronting the Kewalo Basin Laboratory is often hazardous (Hawaii Surfing Association, 1968). A second surfing area is located on the immediate southeast side of the channel entrance. Like "Point Panic", this site is heavily used during summer south swell conditions.

A. Impacts and Mitigation Measures

The proposed development of a Marine Science and Research Center near Kewalo Basin would require seawater intake and outfall pipelines. Construction of ocean water intake and outfall lines could result in the destruction of benthic habitat along a defined and narrow pipeline corridor. Suspended solids and nutrient loads associated with outfall may be expected to cause localized short-term lowering of water quality, but would provide long-term enrichment of the nearshore marine ecosystem, resulting in increased fish biomass and improved fishing.

The proposed Phase I renovation of the Kakaako Peninsula seawall and Phase II offshore landfilling will result in some localized displacement of benthic marine organisms and a temporary loss of marine habitat for a variety of benthic algae, invertebrates, and nearshore fishes now associated with the existing seawall and nearshore benthic environment. The impact of the seaward filling of Kewalo peninsula in Phase II, intended to straighten or "square off" the outer or makai edge with approximately 5.5 acres of dredged material from inside Kewalo Basin, will be minimal. The nearshore reef (area closest to the peninsula) that is expected to be affected is already suffocating from sediment loading. New intertidal habitat will be created by the shoreline revetments, and the new offshore shoal intended to protect the Kakaako beach park will create a higher quality replacement habitat because of the vertical relief provided over an existing featureless ocean bottom.

To help prevent adverse impacts of the proposed dredging and filling activities on the nearshore marine environment, HCDA will take necessary measures to minimize erosion and siltation, and prevent fuel, oil and other toxic substances associated with the use of machinery from falling into the nearshore waters.

Landfilling would generate short-term silt, sediment and nutrient loading in the water column which would reduce water quality within the immediate

work area. Waters located further away from the project work site may also be affected as a function of local wind and tidal driven water current patterns. These adverse consequences will be temporary and will not extend significantly beyond the construction phase of the project. Fishermen, divers, and surfers who presently utilize the water areas would not be displaced during the construction phase of the project.

The nature of the existing landfill, and the lack of structural integrity of the existing revetment produces chronic siltation and sedimentation in nearshore waters during heavy surf conditions. Continued erosion will result in losses to marine communities and habitats which presently exist therein. This situation would be alleviated by the proposed near-term seawall improvements, resulting in improved water quality and biological diversity within the intertidal and nearshore waters.

The provision of man-made nearshore surf-generating shoals and man-made offshore reef habitats will increase the biological diversity and population densities of reef organisms within the area. This could make the area more productive for pole, net and spearfishing. Minor losses of existing sand, coral and coral rubble habitat would be offset by the proposed improvements. It would also increase the habitat diversity in the project area and result in an increase in biological diversity.

A recent legislative resolution (H.R. No. 266, H.D.1) mandated DLNR to designate a site as an Artificial Reef Zone and Marine Life Conservation District, for the purpose of artificial reef research and recreational uses (non-consumptive activities). The original draft of the resolution recommended a site offshore Kakaako, since the ocean bottom characteristics (40 to 70-foot depth range) were well suited for artificial reef construction, being relatively flat and largely devoid of marine life, and located close to the U.H. facilities at Kewalo Basin and Snug Harbor so that deployment and monitoring can be carried out in a cost effective way, and also conveniently located for public access. The final resolution, as amended, deleted reference to the

recommended site and indicated a non-specific area off Oahu. An artificial reef sanctuary and research area offshore Kakaako would complement and enhance the proposed Kakaako Park and offshore improvements recommended by the Honolulu Waterfront Master Plan. The park facilities would enable convenient access to the artificial reef sanctuary for dive groups (could provide a Hanauma Bay experience), and the artificial reef sanctuary would enhance the shoreline fishing opportunities adjacent to the site.

While a recreational beach could be considered as part of the Kakaako fill extension in Phase II, it will require stabilization with breakwaters or with the submerged surf shoal. A submerged shoal structure is preferable, since it would not block the seaward views, and can be designed to enhance the surfing conditions in the present site known as "Flies" (Figure 3-6).

The surfing shoal would provide safer access from the Kakaako Park than the Kewalo Basin entrance channel, which is presently used by surfers. This would improve the use and safety factors of the surf sites in the area by enabling, for the first time, a beach entrance at the Ewa end of the Peninsula. Currently, surfers enter through the Basin entrance channel because of deteriorating conditions along the Kakaako shoreline. Often, this conflicts with vessel passage in and out of the Basin.

During Phase II, the construction of various dock and shoreside facilities in Honolulu Harbor would disturb the existing benthic environment as harbor sediments containing certain heavy metals and organic chemicals may be stirred up within the water column. However, these effects would be short-term and would not result in any long-term unfavorable ecological consequences to the Honolulu Harbor or adjacent offshore waters. Honolulu Harbor has a history of periodic maintenance dredging, yet, significant long-term adverse environmental impacts have not been associated with any of these past dredging events.

3.2.8 Oceanography

An assessment of ocean engineering considerations was done by Edward K. Noda and Associates for the Honolulu waterfront master plan. Excerpts specific to the Kakaako makai area can be found in Appendix A.

3.2.8.1 Bathymetry

Bathymetric characteristics influence the breaking wave heights at the shoreline, thus affecting its shape and character. Kewalo Basin was created by dredging the shoreline and filling a small portion of the reef area to create the triangular peninsula which serves to protect the harbor basin as well as providing usable harbor shoreside area. The dredged channel through the shallow fringing reef augments the surfing conditions by providing a launch and recovery area through the surf zone.

The Kakaako peninsula from Kewalo Basin entrance channel to the Honolulu Harbor entrance channel was created by filling over the shallow reef. The shoreline stretch is therefore revetted, with water depth that varies from 5 feet at the shore to about 12 feet within 500 to 1,500 feet from shore. Seaward of the 12-foot contour, the bottom slopes at about 1:20 (vertical:horizontal) to more than 100-foot depths within 3,000 to 4,000 feet from shore.

The long-period swells are significantly influenced by the nearshore bottom contours, undergoing refraction and shoaling effects as these waves approach shore. Long-period swell breaking heights can be twice the deepwater heights depending on the wave period and bottom slope characteristics. For relatively shallow water depths at the shore, the wave height will be determined by depth.

The coastal reach of the project area has also been significantly modified by human activity. Dredging and filling of shoreline and reef areas have physically altered the coastal characteristics, and the marine environment has been stressed by inland development, channelization of streams, and urbanization of the watershed.

3.2.8.2 Littoral Processes

The littoral (shoreline) processes, like the natural shoreline features along the study reach, have been altered by natural and man-made changes. However, because the changes have occurred gradually over many years, it is not apparent whether the cumulative changes have been positive or negative. In addition, only in the past 20 years or so has the public consciousness been raised with respect to the potential for impacts to the littoral environment due to shoreline development.

There is a paucity of littoral transport of sediments along the project reach, evidenced by the lack of significant sand accumulation within the navigation channels. Because of the existing numerous navigation channels and dredged inland areas cut through the reef, there is no continuous longshore movement of sediment along the shoreline.

3.2.8.3 Wave Climate

The south shore is sheltered from the predominant northeast tradewind-generated waves as well as the winter North Pacific swell. Thus, wave activity at the shore is relatively mild except during the summer months when southern swell can produce moderately high surf conditions. The south shore is also exposed to infrequent Kona storms and hurricane waves approaching from the southeast through southwest directions.

Intermittent wave data to characterize the high south swell conditions for this south shore area is available from the University of Hawaii Look Laboratory records of wave data accumulated in its underwater test range offshore from the Kakaako Peninsula. Wave data statistics are also available from the U. S. Army Corps of Engineers' wave measuring buoys located offshore of Makapuu Point (Oahu), Barbers Point Deep Draft Harbor (Oahu), and Barking Sands (Kauai). However, the data do not provide directional wave characteristics and are not representative of the wave climate on the protected south shore of Oahu.

The submerged shoal is intended to serve as a surfing shoal as well as to provide shore protection. If constructed as merely shore protection, the reef breakwater crest would not have to be as wide and the fill volume could be significantly reduced. However, the surfing

shoal concept is recommended since it would enhance the existing surf site known as Flies. It would provide a surf site away from the hazardous Kewalo Basin entrance channel frequented by boats, with convenient access from the Kakaako waterfront park, and would enhance recreational snorkeling and diving opportunities during calm wave conditions. The constructed shoal would not interfere with the existing Point Panic body surf site or the University of Hawaii Look Lab offshore test range.

As mentioned earlier, during the summer, there are several popular surfing breaks in the project area -- "Kewalo's," "Point Panic," and "Flies" (Figure 3-6). Several hundred surfers may utilize the offshore area during summer south swell conditions as the entrance channel to Kewalo Basin is subject to significant wave swell action.

3.2.8.4 Nearshore Currents

Coastal currents are predominantly tidal with velocities typically about 1/2 knot along the coastal area. Flood tide (incoming) currents in the study area typically set westward while ebb tide (outgoing) currents generally flow eastward along the bottom contours. Net drift is southwestward, probably due to the influence of the tradewind-driven flow.

In waters close to shore, the land effects can cause highly variable currents and eddies. In some areas of Mamala Bay, the current patterns are especially irregular due to eddies and relative weakness of the tidal currents compared to wind-induced and wave mass transport.

A. Impacts and Mitigation Measures

The long-range filling and shoreline extension proposed for the Kewalo peninsula in conjunction with dredging of a circulation channel to improve water quality in the Ala Moana Beach area will impact existing fishing and surfing activities in the short-term by displacing fishermen and surfers during the construction period. Surfers would have to travel additional distances to surf sites. However, construction will be coordinated to limit the duration of displacement and provide access for surfers. Kewalo peninsula is proposed to be reconfigured as part of the Kewalo Basin expansion by squaring off the southeastern portion of the triangular peninsula with dredged material from inside the basin, without affecting the surf sites in the long run.

Offshore landfilling of the Kakaako Peninsula shoreline will produce an additional 17 acres to be used as beach area. As mentioned earlier, the existing ocean recreation activities in the area are limited and are expected to be enhanced and increased in the long-term.

The recreational beach considered as part of the Kakaako fill extension will require stabilization with breakwaters or with a submerged shoal. A submerged shoal structure is preferable since it would not block the seaward views, and can be designed to enhance the surfing conditions. The submerged offshore shoal will provide wave protection to the Diamond Head shoreline facade, while the seaward and Ewa shoreline facade will require revetment protection. It is assumed that the shoal will be comprised of a designed artificial reef of rocks.

By locating a new beach area off Fort Armstrong, body surfers and surf boarders would have improved access to the water at the Ewa end of the Kakaako Peninsula. This would enhance the use and safety factors of the surf sites in this area by enabling, for the first time, a beach entrance to these sites. Currently, due to the adverse conditions of the deteriorating Kakaako shoreline, surfers enter the water through the Kewalo Basin entrance channel (where waters are calmer) which often conflicts with vessel passage in and out of the Basin.

Also, the proposed artificial reef sanctuary located offshore from the artificial shoal would be located sufficiently close to the shore such that divers and others using this feature should be a safe distance from the transit routes of the harbor cruise and recreational vessels. These types of ships currently are traveling from the Ewa end of Mamala Bay to points Diamond Head of the Kakaako peninsula -- the waters offshore Kakaako are used for transisting of these vessels rather than a planned part of a tour. The nearshore artificial reef sanctuary area could be marked on navigational maps to inform maritime users.

The proposed Pier 6 intra-island ferry landing site will be subject to occasional surge conditions from southern storms due to its exposure to the entrance of the Honolulu Harbor channel. This would require the availability of an alternate, more protected landing in the vicinity of Piers 8 to 13 during conditions of severe surge. Depending on their structure, those ships with appropriate response characteristics would be able to utilize Pier 6 as a landing under most surge conditions.

The proposed in-water construction activities will have no significant long-term adverse impacts on the physical oceanographic parameters of the area, including waves, currents, and littoral processes. The proposed landfill for beach park extension of the Kakaako peninsula will likely improve the navigation aspects of Honolulu Harbor entrance channel by reducing cross currents in the channel. The proposed surf shoal will improve the surfing opportunities in the area as well as provide shore protection to the beach.

3.2.9 Air Quality

A 1989 air quality impact report was prepared by J. W. Morrow as an update to the 1985 SEIS analysis for the original makai area plan. The scope of the update covered assessments of impacts from implementation of the broader scaled waterfront master plan as well as from implementation of the revised Kakaako makai plan. Excerpts from the 1989 report are included below. The 1989 report is included as Appendix D.

3.2.9.1 Existing Conditions

* Climate and Meteorology

  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 int 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."

Meteorological records from the Honolulu International Airport indicate that northeast tradewinds predominate during much of the year. However, 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. Honolulu generally experiences elevated pollutant levels during these periods.

* Emission Sources

The waterfront area has a variety of air pollution sources, both stationary and mobile. The primary stationary sources in the area include: HECO's Honolulu Power Plant. The downtown power plant represents about 9.1 percent of HECO's installed electrical generating capacity on Oahu; that is, about 116 MW out of a total of 1,277 MW.

These sources are presently in compliance with State and Federal air pollution control regulations and are not causing violations of ambient air quality standards. HECO's Honolulu Power Plant, with its two, low sulfur fuel oil-fired boilers, is scheduled for shutdown in the 1994-95 timeframe, and there are no plans to replace it.

Mobile sources in the waterfront include motor vehicle traffic along the Ala Moana Boulevard - Nimitz Highway corridor, ship and boat traffic, and aircraft activity due to the adjacent international airport. A recent study of the airport's impact on air quality revealed that motor vehicle traffic, not aircraft, were the primary contributors to groundlevel pollutant concentrations in the airport area. While ship emissions are occasionally visible due to the low grade fuel oil burned, these emissions are not as frequent or as widespread as those from motor vehicles.

- Air Quality Standards

  A summary of State of Hawaii and national ambient air quality standards is presented in Table 3-1. 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 prevent of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values.

  Some of Hawaii's standards are more stringent than the Federal standards. However, like their Federal counterparts, these standards 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), leaving the State once again with standards different from the Federal level.

  In the case of the automotive pollutants [carbon monoxide (CO), oxides of nitrogen (NOx), 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.

  The U.S. Environmental Protection Agency (EPA) is mandated by Congress to periodically review and reevaluate the Federal standards in light of new research findings. The last review resulted in the relaxation of the oxidant standard from 160 to 240 micrograms/cubic meter (ug/m3). The carbon monoxide (CO), particulate matter, sulfur dioxide (SO2), and nitrogen dioxide (NO2) standards are currently under review, but final action has not been taken yet.

TABLE 3-1

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)	Annual Geometric Mean	--	--	60
(micrograms per cubic meter)	Maximum Average in Any 24 Hours	--	--	150
2. PM-10	Annual	50	50	--
(micrograms per cubic meter)	Maximum Average in Any 24 Hours	150	150	--
3. Sulfur Dioxide (SO2)	Annual Arithmetic Mean	80	--	80
(micrograms per cubic meter)	Maximum Average in Any 24 Hours	365	--	365
	Maximum Average in Any 3 Hours	--	1,300	1,300
4. Nitrogen Dioxide (NO2)	Annual Arithmetic Mean	100		70
(micrograms per cubic meter)				
5. Carbon Monoxide (CO)	Maximum Average in Any 8 Hours	10		5
(milligrams per cubic meter)	Maximum Average in Any 1 Hour	40		10
6. Photochemical Oxidants (as O3)	Maximum Average in Any 1 Hour	240		100
(micrograms per cubic meter)				
7. Lead (Pb)	Maximum Average in Any Calendar Quarter	1.5		1.5
(micrograms per cubic meter)				

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities. There simply can be no visible emissions from fugitive dust sources.

* Historical Air Monitoring Data

The State Department of health maintains a network of air monitoring stations around the State to gather data on the following regulated pollutants:

  * total suspended particulates (TSP)
  * particulate matter - 10 microns (PM-10)
  * sulfur dioxide (SO2)
  * carbon monoxide (CO)
  * ozone (O3)
  * lead (Pb)

In the case of TSP and SO2, measurements are made on a 24-hour basis to correspond with the averaging period specified in State and Federal 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 (reported as quarterly averages) are determined from the TSP samples which are sent to an EPA laboratory for analysis.

The most extensive air monitoring has been conducted by the Department of Health at its own building in downtown Honolulu about one-half mile northeast of the waterfront area. A summary of these data is presented in Tables 3-2 and 3-3.

TABLE 3-2

SUMMARY OF AEROMETRIC DATA COLLECTED
AT THE DEPARTMENT OF HEALTH BUILDING
1971-1987

Nitrogen Dioxide (24-hr values)	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980-87
Period of Sampling (mos.)	10	12	12	12	12	3	ND	ND	ND	ND
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				
No. of Times State AQS Exceeded	1	2	0	0	0	0				

Carbon Monoxide (daily 1-hr maxima)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Period of Sampling (mos.)	12	8	ND	ND	ND	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			0-8.6	0.6-10.9	0.0-10.4	0.2-13.5	0.3-11.1
Arithmetic Mean of Daily Maximum Values	3.1	3.0	Kaimuki			2.4	2.4	1.5	2.2	1.7
No. of Days State AQS Exceeded	19	10				0	1	1	3	1

TABLE 3-3

SUMMARY OF AEROMETRIC DATA COLLECTED
AT THE DEPARTMENT OF HEALTH BUILDING
AND SAND ISLAND
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-<5	<5-<5	<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.):	12	12	12	8	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

The monitoring results indicate general compliance with State and Federal ambient air quality standards. Only carbon monoxide and photochemical oxidants (ozone) occasionally exceed their respective State standards. The State also has been having particulate samples analyzed for lead content, and as indicated in Table 3-4, 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 an a result of scouring winds or mechanical disturbance due to vehicular motion.

* Computer Simulation Modeling

Afternoon peak-hour traffic data for the following intersections were obtained from the traffic consultant in order to estimate carbon monoxide levels:

* Ward Avenue at Ala Moana Boulevard
* South Street at Ala Moana Boulevard
* Punchbowl at Ala Moana Boulevard
* Alakea Street at Nimitz Highway
* Bishop troth at Nimitz Highway

Since the traffic data were for 1985, automotive emission factors for carbon monoxide (CO) were generated for that calendar year using the Mobile Source Emissions Model (MOBILE-3). To localize emission factors, the August, 1988 age distribution for the City and County of Honolulu was input in lieu of the national statistics normally used.

Analyses such as this involve estimation of concentrations of non-reactive pollutants. This is due to the complexity of modeling 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), and it comprises the largest fraction of automotive emissions.

TABLE 3-4

LEAD MONITORING DATA, 1970-87
HONOLULU, OAHU, HAWAII

Year	Average Concentration (micrograms/cubic meter) 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	NA	NA	NA	NA
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

SOURCE: State of Hawaii, Department of Health.

In this instance, a microscale screening analysis was performed for the intersections. The updated version of an EPA guideline model CALINE-4 was employed with an array of receptors spaced at 5-meter intervals around the intersections. The intersection option of the model was used as well as an approach speeds ranging 5 to 18 mph.

Worst case meteorological conditions of 1 meter per second wind speed, an acute wind/road angle, and "D" stability, were all selected to maximize concentration estimates in the vicinity of the various intersections.

Estimates of maximum one-hour carbon monoxide (CO) concentrations were then computed. They indicate excedances of the State's 1-hour and 8-hour standards at all intersections, but not of the Federal standards.

3.2.9.2 Air Sampling

A limited air sampling program was also conducted as part of this study. A.M. and P.M. peak hour CO levels were sampled at the following intersections:

- Ward Avenue at Ala Moana Boulevard

- Richards Street at Nimitz Highway

- Bishop Street at Nimitz Highway

The results of this sampling area as follows: one-hour CO concentrations ranged 3.9 to 8.8 milligrams per cubic meter (mg/m3) and thus were below both State and Federal standards. Wind conditions during all sampling hours tended to be extremely variable thus contributing to relatively low pollutant levels.

A. Impacts and Mitigation Measures

With or without the makai area project, traffic-related emissions will contribute to elevated carbon monoxide levels all along the Ala Moana - Nimitz corridor. In close proximity to the intersections (5 - 15 meters), levels will exceed State and Federal standards during peak hours and worst case meteorology. This is most likely to occur during the winter months when the prevailing tradewinds break down into more frequent light and variable wind conditions. Also, as found during the field sampling, onsite winds tend to be of lower velocity than those reported at the airport due to local frictional effects, i.e., manmade structures which block air flow. Thus, analysis of airport data may underestimate the frequency of low wind speed conditions.

In general, the makai area development is likely have a beneficial effect on air quality with regard to existing stationary sources which are likely to relocate and new sources which will not locate in a people-oriented area.

The downtown plant represents 9.1 percent of HECO's installed electrical generating capacity on Oahu; i.e., 116 MW out of a total of 1,277 MW. It is not used to full capacity as indicated by 1986 HECO generating data which show that the plant generated only 3.7 percent of the total 5.8 million megawatt hours of power on Oahu. Plant closure will result in an estimated reduction in the following pollutants (based on the 1986 generation data):

sulfur oxides	600 T/yr
nitrogen oxides	792
particulate matter	60
carbon monoxide	38
hydrocarbons	8

The apparent reduction in ambient impact despite projected increases in traffic exemplifies the effect of the Federal motor vehicle control program. In this instance, the projected rate of reduction in emissions per vehicle over

the 1988 - 2010 period was greater than the projected rate of increase in traffic for the Ala Moana - Nimitz corridor over the same period; thus, a net decrease in cumulative emissions and ambient impact results.

Another way of examining this situation is by plotting projected annual vehicle miles travelled (VMT) along the Ala Moana - Nimitz corridor and comparing it with projected emissions of automotive pollutants during the same time period. Annual VMT shows a continuous increase over the 25-year period. The pollutants, however, indicate markedly different patterns because of their different Federal emission standards and timetables for compliance with those standards. By 1999, CO emissions drop to 61 percent of their 1985 value, but the rise back up to 75 percent of the 1985 value by 2010. This is consistent with the modeling results which showed 2010 CO values slightly less than the 1985 levels. Non-methane hydrocarbons (NMHC) show a similar pattern dropping to 49 percent of the 1985 level by 1999 and rising back to 55 percent of that level by 2010. Nitrogen oxides (NOx) show a relatively smaller decrease by 1999, and climb back up to 94 percent of their 1985 level by 2010. In a sentence, it might be said that Federal emission controls offset growth in traffic up to about 1999, after which emissions start climbing along with traffic volume.

Intensified use of the waterfront will also result in increases in electrical demand and solid waste generation both of which will result in offsite impacts at the locations where power is generated (Kahe/Waiau) and where municipal solid waste is combusted (Waipahu/HPOWER).

B. Mitigating Measures

Controlling mobile sources is one of the most difficult tasks in the air pollution control business. The multitude of privately-owned, moving sources in varying degrees of repair (or disrepair) spread emissions throughout an urban area. The Federal approach, upon which the State of Hawaii has relied for control, is to mandate maximum allowable emissions on newly manufactured vehicles. As has been demonstrated above, this approach works

up to a point after which new, more stringent emission standards must be imposed if effective control is to be maintained. At the present time, no new standards are being proposed, and the Federal Clean Air Act has been held up in Congress for several years without formal reauthorization.

At the State and local level, mitigative measures range from the carpooling and bikeways to more stringent measures such as placing a moratorium on any further growth or development which encourages private automobile use.

Honolulu's heavily used bus system already reduces regional emissions by providing an alternative to cars. If all the current bus passengers were traveling in cars, Honolulu's emissions would be significantly greater. Buses alone, however, are not the long-term solution because in large numbers they too become significant contributors to local pollutant levels. In a growing and densely populated area, development of an efficient mass transit system is necessary to further reduce the dependency on private automobile use. The City and County of Honolulu is working on development of such a system. The effectiveness would be greatly enhanced if continued support and encouraged if automobile-oriented facilities were sharply reduced or eliminated.

Institution of an inspection/maintenance program for all in-use vehicles can contribute to reduced emissions by insuring that those vehicles are properly tuned and have not had their emission control devices removed or tampered with.

Construction-related air quality impacts include the excavation activities, the transportation of excavated material, the emission of hydrocarbons or exhaust fumes from construction equipment and employee vehicles. Under normal tradewind conditions, dust and fumes will be dispersed away from the project site toward the ocean. However, it is during "Kona" winds that the ambient air movement will decrease, thus lowering the air quality.

All of the construction equipment must meet the requirements of State emission control laws in order to mitigate the effects of construction of air quality. The Department of Health (DOH) will monitor equipment for compliance.

3.2.10 Water Quality

Nearshore coastal waters from Ala Moana Beach park to the easterly entrance channel of Honolulu Harbor are designated "Class A" by the DOH. Honolulu Harbor and Kewalo Basin are designated as "Class A" embayments. Waters classified "A" are to be protected for recreational uses, aesthetic enjoyment and propagation of marine life. The DOH monitors bacterial concentrations at three stations along Ala Moana Park, located east of the project area.

Historically, Kewalo Basin received pollutants from the tuna canneries which border the Western side of the harbor. Discharges into the nearshore waters once included 8.3 million gallons per day (mgd) of thermal and wash water effluents from the Dole and Del Monte canneries and 0.05 mgd of wash water from Bumble Bee Seafoods. Subsequently, the canneries have ceased operations. Present discharges include approximately 1.87 mgd from the National Marine Fisheries Service research laboratory, an undefined amount of water from the Kewalo Basin Marine Mammal Facility, and intermittent discharges from at least three drainage trunk lines serving the Kakaako area. The planned diversion of approximately 166.7 cfs peak discharge from Kewalo Basin to the Keawe Street drainage channel, currently being constructed as part of the Kakaako Community Development District Plan, is expected to improve water quality within Kewalo Basin.

The Water Quality Program for Oahu report included a single offshore monitoring station off Kewalo Basin. Although DOH standards for turbidity were frequently exceeded, the station ranked second best of the 57 sampled around the island (City and County of Honolulu, 1971). In general, underwater visibility is good (60 to 65 feet) over deep bottom areas west of Kewalo Basin, becoming more turbid toward Kewalo Channel (Dollar, 1979). Water quality within Kewalo Basin is variable as a function of runoff conditions.

Like the Kewalo Basin area, the Mamala Bay coastline is designated Class "A", while the immediate Honolulu Harbor area is classified as "B". Class "B" waters are to be protected for small boat harbors, commercial and industrial shipping, bait fishing, compatible recreation, the support and propagation of aquatic life, and aesthetic enjoyment. This designation applies only to the limited area next to boat docking facilities in bays and harbors.

Honolulu Harbor is a receiving basin for a number of pollution sources, which accounts for its generally poor quality in comparison to standards set for Class "A" and "B" waters. Nuuanu and Kapalama Streams contribute industrial wastes and urban runoff. Other pollution sources are numerous storm drains, oil refinery activities, thermal pollution, effluents from a fishery research center, and ship activity within the harbor. Oil and fuel slicks are not uncommon, and trash and debris associated with stormwater runoff from Nuuanu and Kapalama Streams are often prevalent.

Sedimentation is one of the primary pollution sources within the harbor. The tributary streams are the primary sources of the sediment which accumulates in the harbor basin, principally near the stream mouths. Shoaling rates within the harbor require the removal of approximately 200,000 cubic yards of bottom sediments every five years during periodic maintenance dredging operations. Analysis of bottom sediment samples indicate that the bottom sediments are composed largely of land-derived silty-clays. Heavy metal analyses of bottom sediments from Honolulu Harbor have indicated a number of metals generally associated with urban runoff. The high levels of heavy metals in harbor sediments do not necessarily lead to water quality impairment. Studies conducted at Pearl Harbor indicated that only one in six samples contained levels of cadmium, lead, mercury and zinc above the water quality standards (Department of the Army, 1976).

A. Impacts and Mitigation Measures

Construction activities during Phase I and II are not expected to cause any adverse impacts to existing groundwater resources in the project area or to the caprock located at the coast. However, nearshore waters and Honolulu Harbor may experience potential adversities due to drainage runoff during and after construction.

The pollutant which may negatively affect the quality of coastal waters are sediments from construction activities. This pollutant may enter the drainage system as runoff during rainy periods or sprinkling activities. Dewatering activities can also pose a threat to nearshore waters. Siltation associated with this activity enter the ocean through storm drains.

Trenches for the new utility lines and drainage boxes will fall below the groundwater table to about minus 10 feet in some locations within the project area. So that construction can be proceed in a dry trench, the excavated trench will be dewatered. The water that is taken from the trench will contain a high concentration of sediment which must be treated before disposing it into any drainage system.

Mitigation methods such as siltation pits and screens, cofferdams, and debris-sediment traps could be employed to minimize the potential adverse impacts of silt and sediment loading and disturbances along the ocean floor. These devices need to be assembled at the source or outlets of the drainage system during construction. This will prevent the ocean water from entering the excavation during construction, while simultaneously trapping all or most of the sediment, debris from washing into the ocean.

Construction of docks and shoreside improvements in Honolulu Harbor would produce only minor, short-term adverse impacts to water quality within the harbor. Suspension of benthic sediments, particularly near the mouths of existing drainage channels, would cause various heavy metals and organic pollutants to be suspended in the water column, resulting in short-term excedance of State Water Quality Standards. However, because of the low diversity of marine organisms within the harbor, impacts to marine biota are not expected to be significant or result in any long-term ecological consequences.

Chronic siltation and sedimentation in nearshore waters occurs during heavy surf conditions as a result of the existing landfill, the slippage of fill materials

into the ocean, and the lack of structural integrity of the existing revetment. Proposed near-term seawall improvements will alleviate this condition by improving water quality and biological diversity within the intertidal and nearshore waters.

The provision of the aforementioned submerged surf shoals and man-made offshore reef habitats would offset the minor adverse consequences of ocean intake and outfall structures at Kewalo and the long-term stabilization of the Kakaako shoreline. The provision of marine habitats in the offshore waters would increase the recreational fishing, snorkeling and diving potential throughout the area. The surf shoal would improve the present surf location for board and body surfers by improving the surf, providing safer access to the site, and providing protection to the beach expanse.

3.2.11 Noise

An acoustic impact study, commissioned for the Honolulu waterfront master plan, updates the findings of the noise study conducted for the 1985 SEIS. Appropriate excerpts from the 1989 study done by Darby & Associates, are found in Appendix B.

Average noise indices are commonly used to deal with fluctuating noise from traffic and aircraft. Decibels, or dB, are a unit for measuring the relative loudness of sound. For example, noise levels over a one-hour sample of traffic noise provides an equivalent number expressed in dB. The Day-Night Sound Level, or Ldn, is a commonly accepted standard noise descriptor for the determination of land use compatibility. The Ldn is used to define the 24-hour average sound level for noise. The nighttime noise levels occurring between 10:00 PM and 7:00 AM are increased (or penalized) by 10 dB before calculation of the 24-hour average.

On Oahu, State and County noise regulations exist, and may be enforced whenever noise emissions exceed specified levels and cause complaints from neighboring properties. State DOH and City and County of Honolulu Land Use Ordinance (LUO) noise regulations are expressed in maximum allowable noise limits rather than Ldn. For industrial or non-dwelling areas, DOH noise limits equate to 76 Ldn and LUO limits equate to 69 Ldn. No

explicit federal standards exist for these land uses, although existing state and local regulations are generally consistent with other criteria established for land use planning purposes. Compliance with LUO noise regulations (expressed as octave band noise limits) help since objectionable pure tones or concentrated bands of noise are not generated.

There are three main sources of noise in the makai area: industrial equipment, traffic, and aircraft. Significant noise levels exist in certain portions of the site, including noise from mechanical systems (air conditioning and refrigeration) and truck noise from the food distribution operations.

A. Impacts and Mitigation Measures

Traffic - The actual increase in noise level will probably be less if congestion along the road causes the effective average operating speed of the vehicles to be reduced. The increase in the hourly noise level would range from 0.7 to 1.5 dB depending on the location of a building along the arterial.

The actual increase in noise level will probably be less if congestion along the road causes the effective average operating speed of the vehicles to be reduced. Moreover, unlike aircraft noise, buildings will effectively block traffic noise to workers at lower elevations. Thus, the makai region behind structures on Ala Moana Boulevard should be substantially shielded from traffic noises.

Walkways and commercial complexes along the proposed waterways as well as the parks and special uses in the Fort Armstrong area should be reasonably quiet except for noises from slower moving local traffic. It is shown that the elimination of fully-developed containerized cargo handling facilities in the Fort Armstrong area will reduce the contribution of noise from heavy diesel trucks and buses on Ala Moana Boulevard from about 71 percent to 57 percent of the total traffic noise.

Aircraft - There should be a reduction in aircraft noise impact within the project area when older, noisier Stage 2 aircraft are phased out and replaced

by Stage 3 aircraft which contain quieter engines. The majority of the Kakaako makai area and Ala Moana Beach Park will experience a small reduction in noise levels, generally less than 5 Ldn. The proposed Kakaako Waterfront Park should also experience a slight noise reduction. Although aircraft exposure is expected to gradually decrease, air traffic is expected to increase. Thus, the Makai Area will continue to be exposed to similar levels of aircraft noise.

Figure 3-4 illustrates the expected 1992 and 2007 aircraft noise Ldn contours for the project area. The contours do not show any significant change in the area despite the assumption that quieter Stage 3 aircraft were used. This is due to the increase in operations.

Industrial - The relocation of fully developed container handling facilities from the Fort Armstrong area and relocation of the food distribution operations will reduce the contribution of noise from heavy diesel trucks and buses on Ala Moana Boulevard from about 71 percent to 57 percent of the total traffic noise.

Construction Noise. Development of the project area will involve grubbing, grading, and the construction of infrastructure and buildings as well as dredging and filling of waterways and lagoons. The various construction phases of a development project may generate significant amounts of noise; the actual amounts are dependent upon the methods employed during each stage of the process. Typical construction equipment noise ranges in dB(A) are shown in Figure 3-5. Pile drivers and rock drills as well as earthmoving equipment such as bulldozers and diesel powered trucks will probably be the loudest equipment used during construction. Since it is anticipated that noise generated during construction will exceed allowable limits, a permit will be obtained from the Department of Health. DOH may grant permits to operate vehicles, construction equipment, power tools, etc., which emit noise levels in excess of the allowable limits. Required permit conditions for construction activities are:

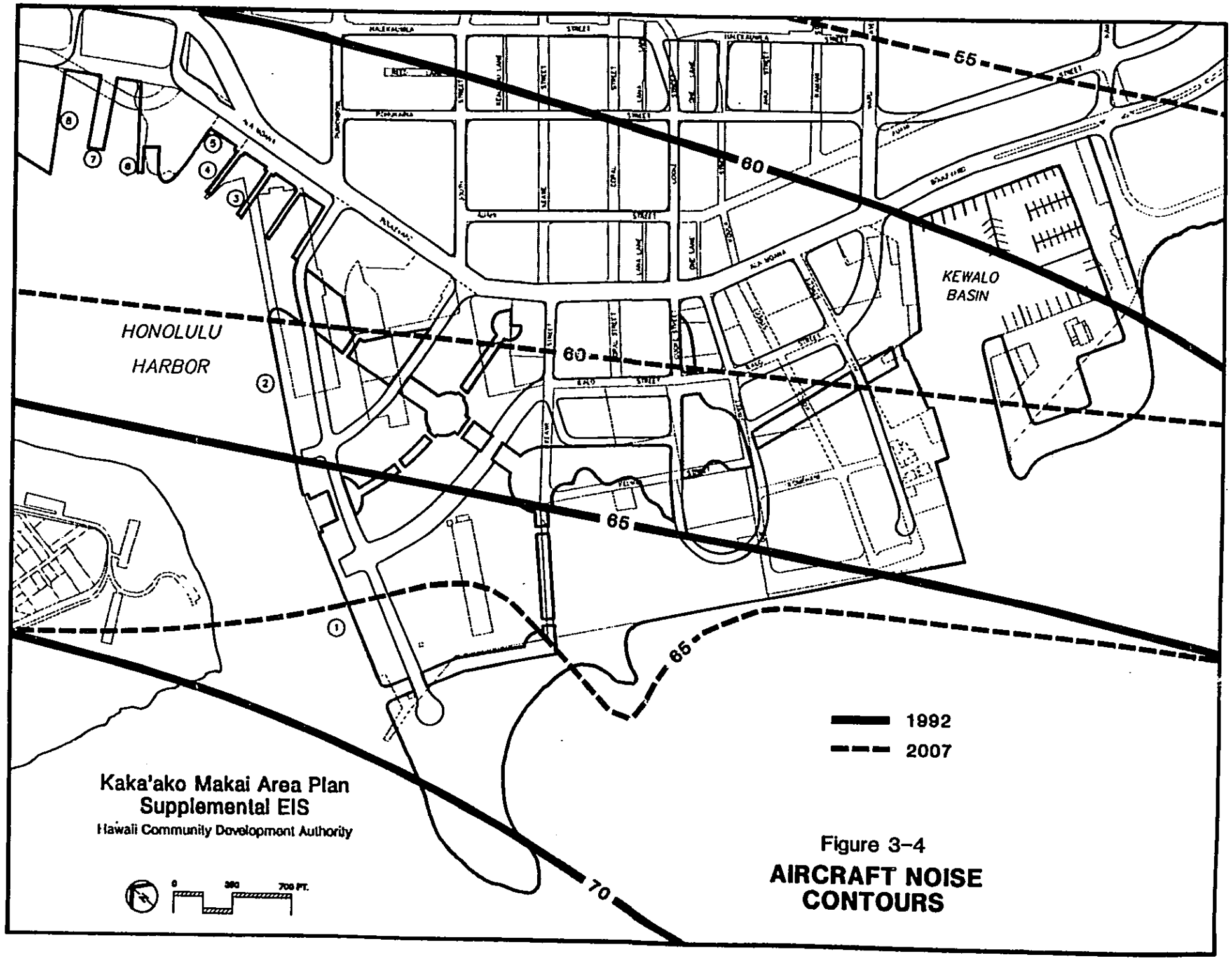
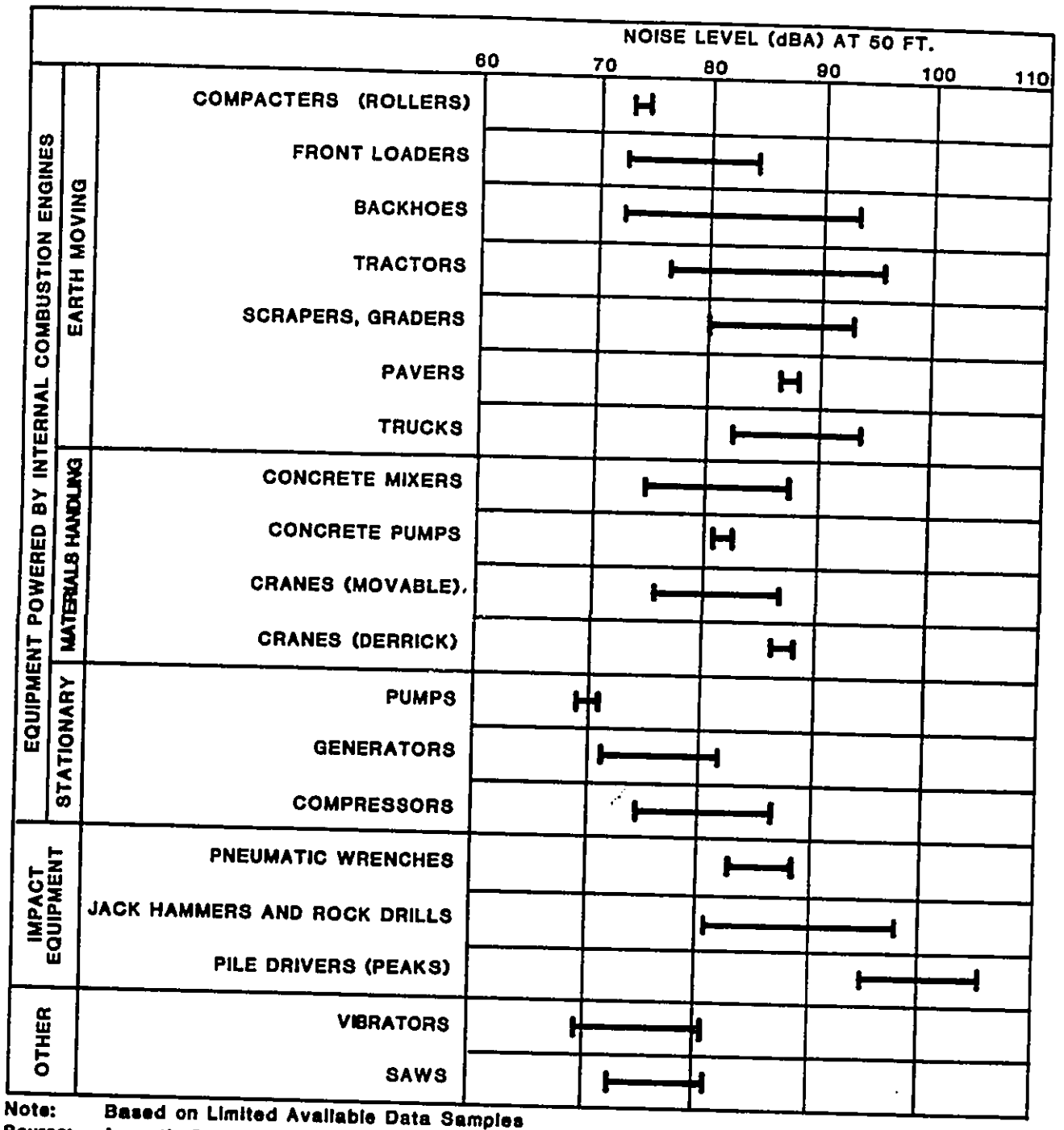


Figure 3–4
AIRCRAFT NOISE CONTOURS



Note: Based on Limited Available Data Samples
Source: Acoustic Study, Honolulu Waterfront Master Plan, Darby & Associates, February 1989

Kaka'ako Makai Area Plan
Supplemental EIS
Hawaii Community Development Authority

Figure 3-5

CONSTRUCTION EQUIPMENT NOISE RANGES

> "No permit shall allow construction activities creating excessive noise ... before 7:00 a.m. and after 6:00 p.m. of the same day."
>
> "No permit shall allow construction activities which emit noise in excess of ninety-five dB (A) ... except between 9:00 a.m. and 5:30 p.m. of the same day."
>
> "No permit shall allow construction activities which exceed the allowable noise levels on Sundays and on ... [certain] holidays. Activities exceeding ninety-five dB(A) shall [also] be prohibited on Saturdays."

In addition, construction equipment and on-site vehicles or devices requiring an exhaust of gas or air must be equipped with mufflers. Also, construction vehicles using trafficways will satisfy the noise level requirements defined by the Department of Health.

The following are mitigation measures to impacts from construction noise:

Mitigation of noise from construction activities on Oahu is accomplished by enforcement of the Department of Health noise regulations. The mitigation of construction noise on Oahu has been accomplished by citing equipment with defective mufflers, and by limiting the hours of operation of excessively noisy operations.

Under DOH permit procedures, construction activities which exceed 95 dB at adjoining properties are restricted to the hours between 9:00 a.m. and 5:30 p.m., from Monday through Friday, and excluding certain holidays. As a general rule, pile driving activities will fall within this excessively noisy

category, and the existing permit procedures will be adhered to.

A major portion of the work will generate noise impacts on daytime business/commercial operations. Waivers to continue construction activity past 6:00 p.m., from Monday through Saturday, have been granted when the best interest of the public are served by reducing the period of construction or by reducing traffic congestion. This may occur along Ala Moana Boulevard. Use of waivers to allow for nighttime construction activities when residences will not be affected, will minimize construction noise impacts on daytime business activities.

Impacts generated during the construction phases of infrastructure improvements as well as the facilities identified in Phases I and II, are inherent to construction activities and are considered unavoidable. However, mitigation measures will be taken to minimize these impacts. These include:

* Contractors will follow current DOH noise regulations which cite defective mufflers on construction equipment and limit the hours of operating excessively noisy equipment and/or operations (i.e., pile driving).
* Use of vibratory hammers which produce less noise and generate less vibrations.
* Use of electric pumps for the dewatering system. These pumps operate at a quieter level than the usual diesel or gasoline driven pumps. Pumps also control the water level in excavated trenches, thus reducing the potential for transmission of sound through the water.

Noise Sensitive Land Uses - Two acoustical issues associated with the proposed amphitheater are: (1) noise from aircraft overflights interfering with performances; and (2) sounds from the amphitheater possibly causing annoyance to residents in the mauka area.

From the on-going flight patterns and noise levels, it can be seen that loud music passages generally would not be masked by commercial jet activity, but more subdued passages could be disturbed. Military aircraft operations would often be detectable even during loud passages.

In the future when quieter Stage 3 aircraft are deployed into the interisland fleet, maximum noise levels should be reduced substantially during tradewind departures, perhaps typically by 7 to 10 dBA. However, there probably will be more departures during a given period of time. During Kona wind flight patterns, there probably will be approximately the same maximum noise levels since approach noise levels are not substantially decreased in Stage 3 aircraft. Also, somewhat more aircraft landings are predictable in the future during concert times.

It is difficult to predict annoyance to potential Kakaako mauka residents due to sounds from performances in the proposed amphitheater. However, hypothetically, the closest residential structure will be approximately 1,500 feet mauka of the proposed amphitheater. The propagation of sound to these structures depends on the entertainment source level, the loud speaker system design, the construction and orientation of the amphitheater structure, the density and heights of non-noise sensitive buildings between the amphitheater and the listeners, and upon the weather conditions.

A worst case situation occurs during light Kona winds and a scenario where there are no significant sound-blocking structures allowing a direct line-of-sight to the amphitheater from the residential highrises. It can be shown that if the amphitheater is properly oriented and the structure provides minimumly 10 to 20 dB acoustic shielding from the loudspeakers which have commonly available directivity patterns; sound levels of 100 to 107 dBA can be utilized at a distance of 100 feet from the speakers. This source level equates to the range of 88 to 95 dBA for the audience located at 400 feet from the speakers. The sound level in the highrises at 1,500 feet would be approximately 50 dBA and should meet local DOH and LUO nighttime

noise criteria. Additional loudness could be provided by more sophisticated distributed sound systems. During tradewinds, which occur about 90 percent of the time, it is estimated that entertainment sound levels could be increased by 10 to 15 dBA. Thus, it is believed that many popular types of entertainment performances are compatible with the proposed amphitheater if state-of-the-art design concepts are implemented into the structure and the sound system.

Further, the location and design of the amphitheater would minimize potential noise impacts in surrounding properties by directing sound towards the ocean as much as possible.

3.2.12 Seawall

A 2,300-foot long unreinforced rock seawall retains the land area from Point Panic to Fort Armstrong. The seawall, constructed in 1951, is in disrepair and allows excessive wave overtopping at some places. Reconstruction of the seawall will be designed and constructed to protect the shoreline from erosion damage and to minimize wave overtopping. Height of the wall will be approximately 15 feet. The following is an estimate of the amount of material required for the seawall repair and reconstruction work which will begin during the first quarter of 1990:

Bedding material (spalls to 10" stone)	9,283 cy
Underlayer (600-900 lb. stone)	12,177 cy
Armor layer (3-4.5 ton stone)	19,463 cy
TOTAL	40,923 cy

Reconstruction of the seawall would be accomplished without removal of the new seawall, or with minimal disruption to the existing seawall, thereby minimizing turbidity impacts.

Currently, there is no access to the seawall for repair vehicles, and the resulting neglect has contributed to the damaged condition of the wall. The proposed promenade strip of land adjacent to the wall should be wide enough (15 to 20 feet) to accommodate vehicular access for repair work.

A. Impacts and Mitigation Measures

The proposed seawall work is to occur in Phase I of the Kakaako Makai development project. The construction of the seawall will have some short-term impacts. Shoreline and nearshore activities will be temporarily displaced during the period of construction, including shoreline fishing and nearshore diving and body-surfing. Increased turbidity during construction can be expected in nearshore waters, reducing water quality in the immediate and surrounding areas. However, the proposed construction method will mitigate turbidity impacts. Rather than trying to reconstruct the existing seawall, which would temporarily expose the landfill materials to wave attack and erosion, a new seawall would be constructed makai of the existing seawall. The construction materials would consist of gravel bedding material and rock, which are relatively clean of silts.

The reconstructed seawall would cover the existing nearshore marine habitat, but the new face would provide replacement habitat. Long-term impacts will be positive, since the new seawall will prevent the erosion of landfill materials which pose a water quality problem as well as a public safety hazard. The reconstructed seawall would not permanently affect the surfing sites such as Point Panic and Flies, and would improve shoreline fishing and surfing by providing improved access to the water.

3.2.13 Kewalo Municipal Incinerator Landfill

The Kewalo Municipal Incinerator Landfill is a 15-acre site bounded by the Pacific Ocean on the south, a concrete drainage channel on the west, Olomehana Street and various State parcels occupied by light industrial activities on the north, and Point Panic on the east. The land to the east, north and west is flat and is approximately five feet above mean sea level. The landfill is approximately 1,700 feet long and 400 feet wide. It is a mound with an uneven top surface that ranges in elevation from approximately 15 feet to 55 feet above mean sea level. There is a riprap seawall on the side bordered by the ocean. The area occupied by the landfill was formerly a shallow offshore reef. Prior to filling, the landfill site was approximately 5 to 15 feet below mean sea level. The volume of fill at the landfill

is estimated to be about 900,000 cubic yards. The fill consists mostly of incinerator ash, stockpiled soil from construction sites, small quantities of debris from demolished structures and small quantities of trash and refuse. The incinerator ash, trash and refuse are mostly covered with stockpiled soil; however, the soil is thin in certain areas and trash is exposed at the surface in other localized areas. The riprap seawall has been eroded in at least one place and incinerator ash is exposed to the ocean in a limited area.

The proposed waterfront park is to incorporate the existing Kewalo Municipal Incinerator Landfill site. The proposed development will require grading of the landfill mound for future amphitheater usage and reconstruction of the existing seawall along the southern boundary.

During the period from July through September 1989, the firm of Harding Lawson Associates, conducted a remedial investigation of the Kewalo Municipal Incinerator Landfill. The investigation consisted of exploration of the site, collection and chemical analysis of soil, groundwater and landfill gas samples, data evaluation, and assessment of public health risks. The study report, "Remedial Investigation, Kewalo Municipal Incinerator Landfill dated October 20, 1989," was prepared for the Office of State Planning, Office of the Governor and Hawaii Community Development Authority.

Based on the chemistry data, the solid materials at the landfill (cover soil and incinerator ash) contain elevated concentrations of several contaminants including certain metals, organochlorine pesticides, PCBs, and polynuclear aromatic hydrocarbons. In comparison with criteria in the Resource Conservation and Recovery Act (RCRA), however, the solid materials at the landfill are not considered hazardous wastes. Therefore, the materials may be graded, transported, and disposed as non-hazardous wastes. However, precautions should be taken to prevent inhalation, ingestion, and dermal contact with the materials. Current plans are to use all of the solid materials from the landfill within the park.

The groundwater at the landfill also contains elevated concentrations of certain contaminants. These include arsenic, barium, cyanide, and selenium. These contaminants could have impacts on aquatic life in the nearshore marine environment as groundwater migrates to the shore and discharges into the ocean. However, the shore at the landfill is

exposed to the open ocean, and wave and tidal actions tend to rapidly mix, disperse, and dilute discharging groundwater near the shore. Therefore, the concentrations of contaminants leaching from the landfill into the marine environment are unlikely to be significant.

Methane was detected in the subsurface at the landfill. Methane is natural gas and is a common product of decomposition within landfills. Methane is combustible but not toxic.

A. Impacts and Mitigation Measures

The proposed Waterfront Park is to be constructed during Phase I of the Kakaako Makai Development Project. The development of the park will have some short-term impacts on the environment. The development of the park will require grading of the existing landfill and reconstruction of the existing seawall. Ambient air quality is expected to temporarily decrease during construction. Fugitive dust emissions should be monitored and controlled with appropriate measures, such as water applications and dust screens. To prevent the public's exposure to the airborne dust, access to the construction site should be restricted by a security fence. Environmental monitoring should be done to check the effectiveness of mitigative measures.

A subsurface piping system should be installed at the landfill to control landfill gas migration and emission. Fugitive dust emissions should be permanently controlled by covering the existing landfill materials with a layer of engineered fill from uncontaminated sources. The solid materials of the landfill and the landfill gases are expected to have no adverse impacts on park users and others if the above mitigative measures are applied.

A proposed inland waterway, to be located approximately 300 feet from the northern boundary of the existing landfill site, will be constructed within a 5 to 10-year period. Groundwater containing elevated concentrations of contaminants could migrate from the landfill and seep into the waterway. If prevention of seepage is necessary, seepage barriers could be designed and installed between the landfill and the waterway.

The current condition of the landfill is unacceptable from the environmental point of view. Fugitive dust emissions and methane gas generation impose small but potentially significant environmental risks to the health and safety of people at the site. Furthermore, incinerator ash is subject to erosion by wave action where the existing seawall is in a state of disrepair. Regardless of development plans, the landfill should be remediated for the protection of public health and the environment. Remedial construction and park development would both protect public health and the environment, but park development also will create a useful and valuable asset for the community.

3.3 SOCIO-ECONOMIC ENVIRONMENT

At present, the general mix of land uses in Kakaako Makai consists of maritime industrial cargo and warehousing operations at Fort Armstrong, light industrial, public facility, and commercial office activities in the central portion of the peninsula, recreational uses limited to Point Panic Park, and a 10-acre former sanitary landfill extending along the shoreline and currently being used as a temporary storage area for construction material (Figure 3-6).

3.3.1 Land Uses and Encumbrances

The total land area of the project area is approximately 210 acres (excluding submerged lands), as shown in Table 3-5.

TABLE 3-5
LAND AREA SUMMARY

Subarea	Acres
Kewalo Basin	25
Kakaako (incl. Coast Guard Pier 4)	175
Piers 5-7	10
TOTAL PROJECT AREA	210

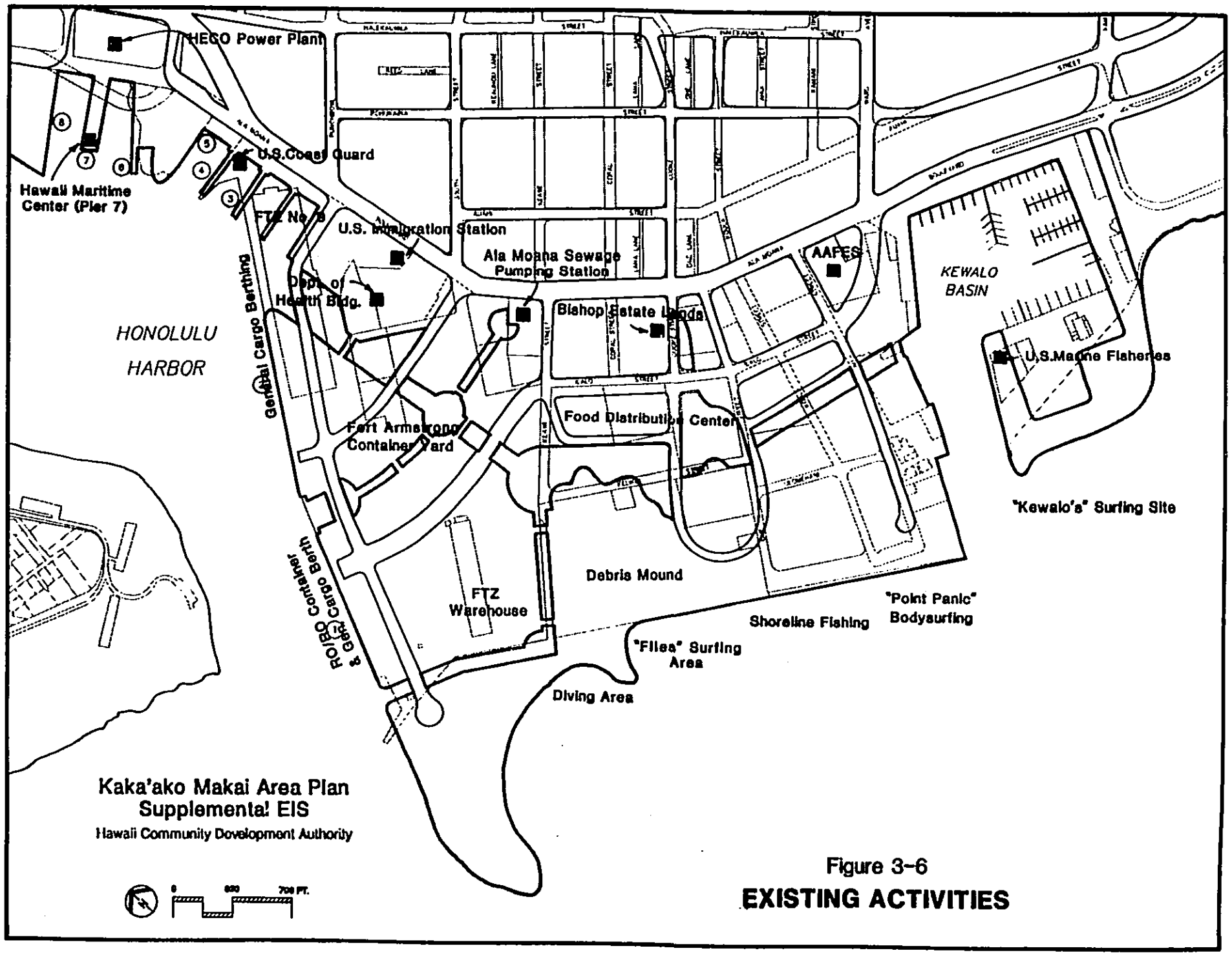


Figure 3-6
EXISTING ACTIVITIES

Within the project area, approximately 189 acres (90%) of the land area are owned by the State of Hawaii; 7 acres (3%) are owned by the City and County Honolulu; 4 acres (2%) are owned by the Federal Government; and the remaining 10 acres (5%) are privately owned. Figure 3-7 illustrates the land ownership pattern of these various entities.

As the major landowner in the Makai Area, the State of Hawaii allows various uses through the exercise of one of three methods: (1) executive order, (2) general lease, or (3) revocable permit. Executive orders are issued by the Governor and allow government agencies to utilize State-owned land for a specified public purpose. General leases are issued by the Department of Land and Natural Resources (DLNR) and allow tenants to occupy State-owned land for a specific purpose and a specific number of years, not to exceed 65 years. Revocable permits, also issued by DLNR, allow tenants to occupy State-owned land for a specific purpose on a month-to-month basis. The status of leases by subarea are discussed in further detail later in this section.

Table 3-6 below summarizes the predominant general land uses in the project area which are illustrated in Figure 3-8.

TABLE 3-6
EXISTING USES

Area	Acres
Harbor	107.0
Commercial/Industrial	39.0
Public (includes roadways)	50.0
Vacant	14.0
TOTAL	210.0

The following is a description of the land uses and encumbrances of the project by subareas which were listed in Table 3-4.

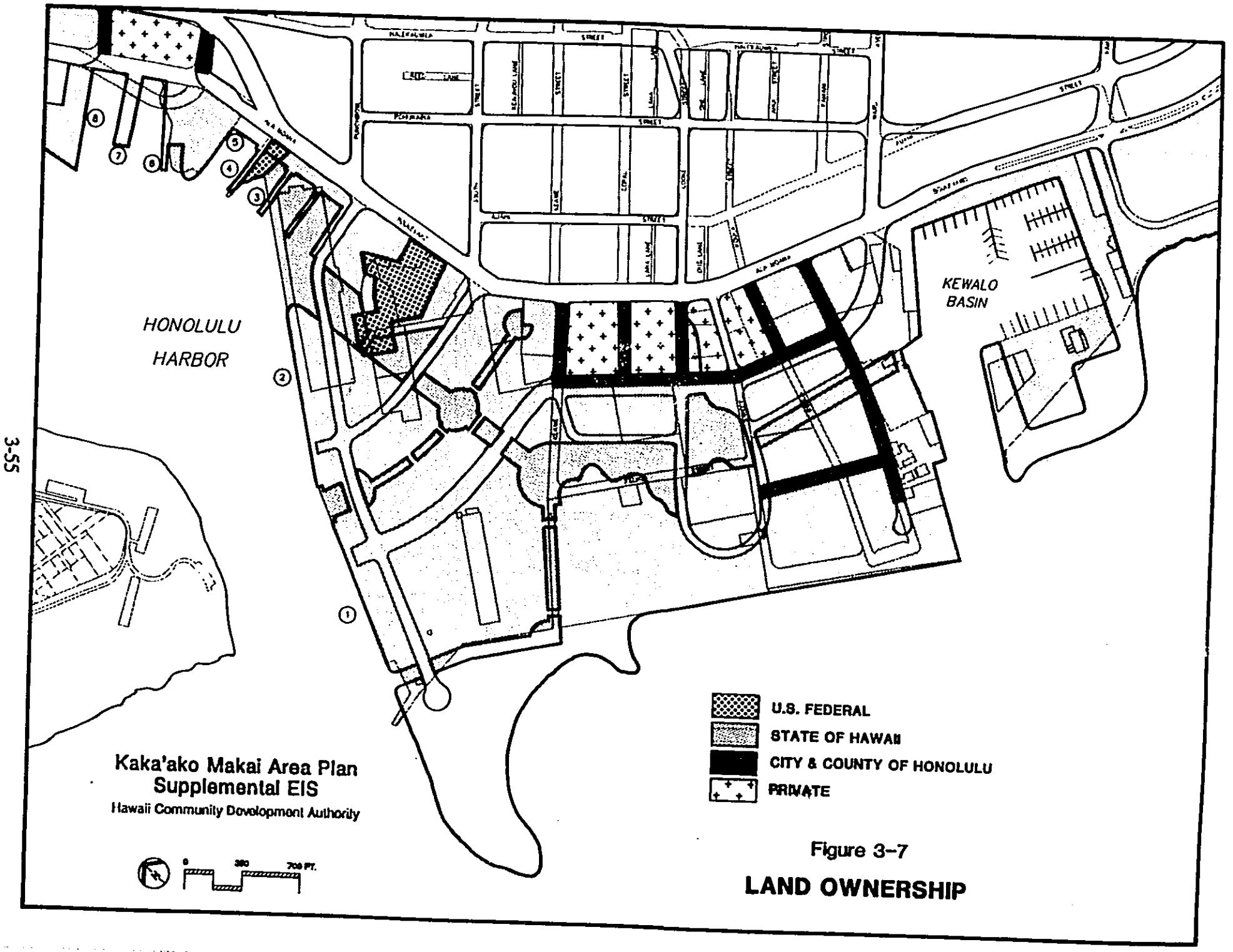


Figure 3-7

LAND OWNERSHIP

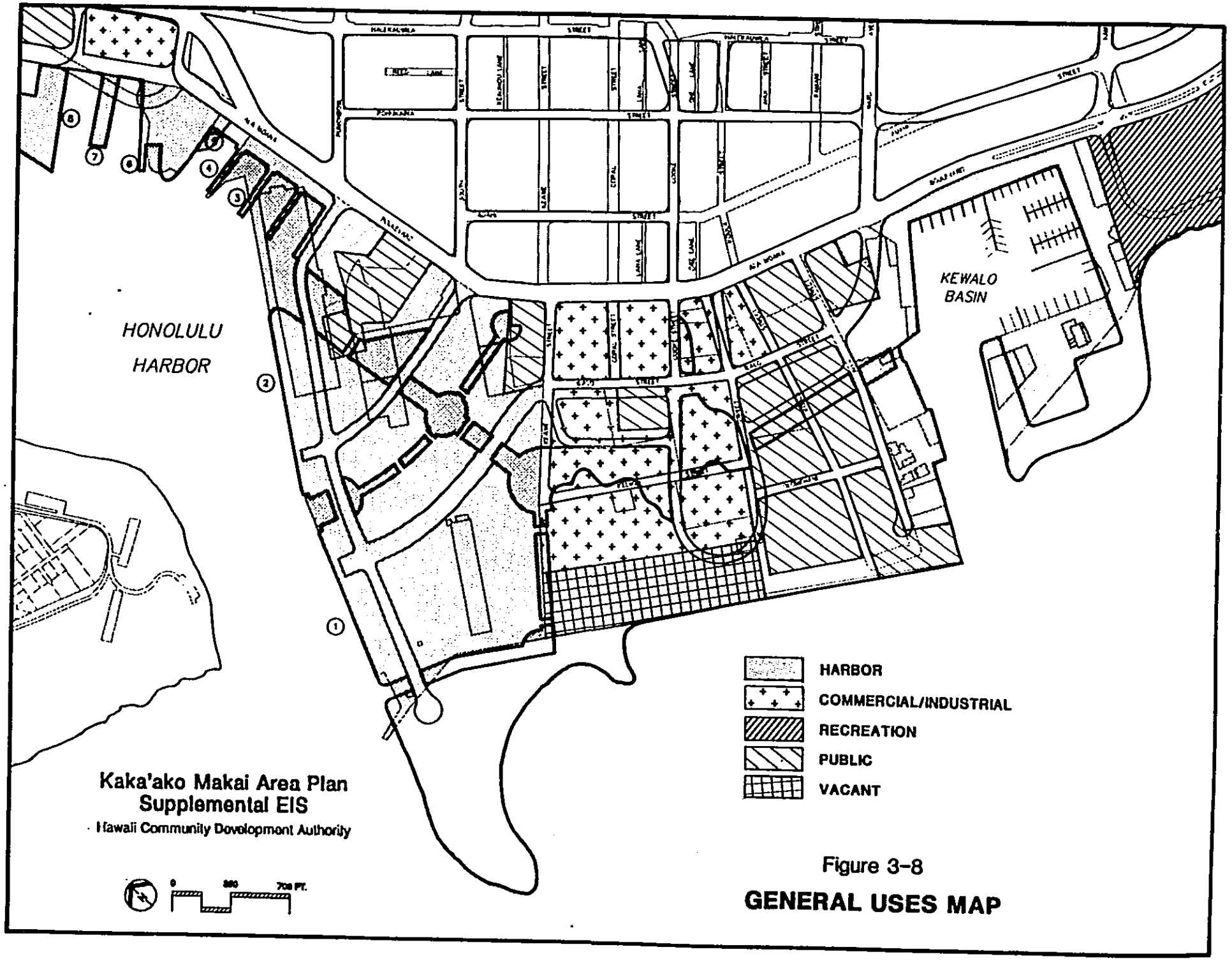


Figure 3-8

GENERAL USES MAP

3.3.1.1 Kewalo Basin

Kewalo Basin is bounded on the Diamond Head side by Ala Moana Park. Ahui Street, located on the Kakaako Peninsula, marks the Ewa boundary of the subarea. An important physical feature of the basin is the landfilled Kewalo peninsula which shelters the harbor from open ocean disturbances and marks the makai boundary of the area. The subarea fronts on Ala Moana Boulevard, makai of Victoria Ward Ltd.'s Ward Warehouse.

* Land Uses and Water Uses - This subarea contains 25 acres of land and 30 acres of water area and provides the primary berthing space for Oahu's commercial fishing fleet, cruise/excursion boats and charter fishing fleet. Water access into the harbor is through a 350-foot wide entrance channel between the Kewalo and Kakaako Peninsulas. The harbor area is surrounded by landside activities which support the maritime operations, marine research and commercial restaurant operations.

* Landownership and Leases - The entire subarea is owned by the State of Hawaii. Long-term leases exist for most of the property along the Ewa edge of the Kewalo subarea. Existing uses and lease expiration dates are: the University of Hawaii Biomedical Research Center (2030), the John Dominis Restaurant (2042), the fish auction operation (2000), the drydock and shipyard facility (2021), the Hawaiian Tuna Packers cannery and ice plant (2027), and the Fisherman's Wharf Restaurant (1990).

  The only long-term encumbrances of State land existing along the Diamond Head edge of the basin involves the marine service station (dba Kewalo Marine) located on the Ewa side of the Basin, near the entrance of the peninsula. The lease on this 7,500 square foot site expires in 2003. The lease for the Kewalo Ship's Galley Restaurant ends in 1992. The remainder of the businesses (including McWayne Marine operation) are either on month-to-month revocable permits or on leases due to expire in 1994.

3.3.1.2 Kakaako Peninsula

The Kakaako subarea lies between the Kewalo and Downtown subareas on a largely

manmade peninsula. Ahui Street marks the Diamond Head boundary, while the pier frontage at Fort Armstrong (Piers 1 and 2), up to and including the Coast Guard's Pier 4 area, marks the Ewa boundary. This subarea is strategically located in central Honolulu near Downtown and the Capitol District.

* Land Uses and Water Uses - The Kakaako Peninsula consists of approximately 175 acres. Specific land uses in this area include maritime industrial, commercial, light industrial, marine research and public facilities. Each of these is described below:

  Maritime industrial uses occupy approximately 75 acres within the Fort Armstrong area at Piers 1 and 2. This area, once the primary container cargo facility on Oahu, is currently dedicated to maritime break-bulk and limited container cargo operations, ship maintenance operations, AT&T Cable Depot, and the Foreign Trade Zone warehouse and offices.

  Commercial uses occupy much of the central portion of the subarea. Four blocks which run along the makai side of Ala Moana Boulevard between Koula Street to the east, Keawe to the west, and Ilalo to the south, are owned by the Bernice Pauahi Bishop Estate, and are presently dominated by new and used car sales facilities, and the Gold Bond Building. Makai of this area, between Ilalo and Kelikoi Streets, are 14 acres of State land presently used as a major food distribution center.

  Recreational uses are limited to the 2.5-acre Point Panic Park managed by DLNR. Located at the Diamond Head makai corner of the peninsula, Point Panic is a popular site for body surfers and viewing vessel traffic in and out of Kewalo Basin.

  Over 25 acres of the Kakaako Peninsula are utilized for public facility activities. Most of this land is occupied by the City and County of Honolulu's Board of Water Supply and the Department of Public Works for equipment storage and maintenance, and the Ala Moana Wastewater Pump Station. The Department of Agriculture's Plant Quarantine Station, and Weights and

Measures Branch are located on about 3 acres adjacent to the Food Distribution Center. Finally, the historic U.S. Immigration Station and the historic former Ala Moana Wastewater Pump Station, along with the U.S. Coast Guard facility at Pier 4, are located along Ala Moana Boulevard in the Fort Armstrong area.

Marine research activities located near Point Panic include the University of Hawaii Hyperbaric Treatment Center and Look Laboratory. Marine research at Look Lab includes the use of an area offshore for underwater studies on topics such as ocean mining.

Lands makai of the Food Distribution Center, occupying approximately 9 acres, contain a tour bus storage and maintenance yard, an auto rust-proofing operation, and miscellaneous other light industrial land uses.

A former sanitary landfill area of approximately 10 acres is located along the shoreline in the central portion of the peninsula. The landfill is currently used as a temporary storage area for construction material.

* Landownership and Leases - The State of Hawaii owns 159 acres of land in the Kakaako Peninsula. Privately owned lands total 10.7 acres. The Federal government owns 5.3 acres of land in the Fort Armstrong area, which includes the Immigration Station and the Coast Guard Pier 4 site.

  A major portion of State land is encumbered by leases. The marine research activities are operating on a 65-year lease which expires in 2030. Food distribution center operations have leases which expire in years 2029 and 2021. The existing bulk cargo operation at Fort Armstrong holds a lease on covered office and storage space until 1996. Remaining activities and operations are either on a one-year or month-to-month revocable permit.

3.3.1.3 Piers 5 to 7 (including water area of Pier 8)

This area is located at the foot of the central business district fronting Honolulu Harbor

and extends from Pier 5 to the face of Pier 8. Pier 5, located makai of the Federal Building on Ala Moana Boulevard, is currently the berthing area for the Alii Kai dinner cruise vessel. The Rella Mae, another cruise vessel, is presently berthed alongside the Hawaii Maritime Museum at Pier 7. The unused Oceania Floating Restaurant is berthed at Pier 6. Pier 8 is a part of the Aloha Tower complex, and is used as an additional berthing area for cruise vessels.

* Land and Water Uses - Maritime commercial activities dominate this particular area. Public facility uses exist at Piers 5 and 6, and for public parking. Pier 7 is occupied by the Hawaii Maritime Museum, which offers the public a variety of exhibits highlighting the maritime history of the Hawaiian Islands. It is also the permanent site for the Falls of Clyde and the Hokulea historic ships.

* Landownership and Leases - All land within this area is owned by the State of Hawaii. State land within this area is currently encumbered by various operations with one-year revocable permits. The only exception is a lease to the operator of the Alii Kai dinner cruise ship. This lease extends to the year 2005.

3.3.1.4 Impacts and Mitigation Measures

A. Impacts on Existing Land Uses and Tenants

The land use changes proposed to occur in Phase I (1990 to 2000) of the Makai Area Plan will result in displacement of current major maritime and non-maritime industrial activities in the areas between Kewalo Basin and Keawe Street, and between Pier 5 and the Aloha Tower. Implementation of Phase II (2000 to 2010) projects will displace activities from the area between Keawe Street and Pier 5.

B. Mitigation

These displaced activities will be relocated to appropriate, more compatible areas adjacent to similar industrial and semi-industrial facilities. Because displacement will be necessary for redevelopment in the Makai Area, the timing and phasing of the changeover of activities will be critical in terms of mitigation.

Present container cargo operations at Piers 1 and 2 are proposed to be replaced by urban uses including an urban activity park and other commercial office mixed uses. The deep water berths at Piers 1 and 2 would be retained for cruise ships and transient vessels.

Subsequent to the Honolulu Waterfront Master Plan recommendation that the Kapalama Military Reservation land behind Piers 39 and 40 be acquired as soon as possible, the State has initiated the process to negotiate with the Federal government for the acquisition of this area to meet the need for expanded maritime containerized cargo operations by the year 2000. The proposed shift of container operations from Fort Armstrong to Kapalama would help shift cargo handling operations away from an area undergoing urban redevelopment (Kakaako Peninsula). Without relocation, problems could emerge because of incompatibility between industrial harbor operations and nearby residential, commercial and recreational activities in Kakaako.

The long-term impacts on the existing land uses and activities in Kakaako Makai will be positive, however, as the net result of implementation of the entire project will be increased waterfront recreational and economic development opportunities for the expanding Downtown Honolulu district and the State of Hawaii.

C. Impacts on the Original 1983 Makai Area Plan

The 1983 Makai Area Plan envisioned mixed-use commercial (MUZ-C), mixed-use residential (MUZ-R), and waterfront industrial (WI) zones on the Kakaako Peninsula. These land use designations were replaced by zones identified by the revised Makai Area Plan as commercial (C), waterfront commercial (WC), retail commercial (RC), and waterfront (W). The change in overall land use emphasis from industrial and mixed use residential to commercial may involve a limited amount of temporary displacement for existing businesses and activities. However, for the most part, those affected will be relocated to more appropriate locations adjacent to compatible land

uses and activities.

The new land use zones are a departure from the original makai area plan development concept resulting from the Honolulu waterfront master plan recommendations, as they reflect the changes which include:

* Elimination of on-site relocation policies for light-industrial uses in light of availability of Kapalama Military Reservation lands as a major relocation site.

* Elimination of requirements for the integration of residential and industrial uses within redevelopment parcels.

* Establishment of an affordable housing trust fund wherein developers of Planned Development projects in C zones are assessed a fee established by a formula based on present affordable housing policies in the mauka area.

Developers may build affordable housing in lieu of paying the fee on a site mutually agreed to by the developer and the Authority; units that are to be provided as an alternative to the fee must be affordable units as defined by the State Housing Finance and Development Corporation.

The changes described above resulted from a comprehensive Honolulu Waterfront master planning process which included a detailed review of the original Makai Area Plan and a detailed analysis of the area's environmental (physical, economic, social) resources. The revised land use zones provide a broader-based perspective of the long-range role of Kakaako Makai in the growing urban Honolulu waterfront.

3.3.2 Historic Sites

Significant historic resources in the makai area include the U.S. Immigration Station, the Department of Health building, and the former Ala Moana Wastewater Pump Station (see Figure 3-6 for site locations). Each of these structures was built prior to 1941, and has

been associated with a historic period or architectural style. Both the U.S. Immigration Station and the Pump Station are on the National Register of Historic Places. All of these buildings are considered to have "high" preservation potential, historic significance, and can be feasibly maintained and sustained in their present condition.

Preservation is the act of maintaining and sustaining a building or site in its present condition. It implies that the building or site is already in a restored or renovated condition, and that it can be feasibly maintained. Since the U.S. Immigration Station and the Department of Health building are government owned and are currently functioning for public use, continued preservation of these sites can reasonably be expected. The function of the historic Ala Moana Wastewater Pump Station has now been replaced by the City and County's new Ala Moana Wastewater Pump Station located adjacent to the historic structure. Future uses of the historic building should, however, ensure protection of the building structure.

A. Impacts and Mitigation Measures

The historic resources in the Kakaako Makai area are proposed to be preserved and enhanced. Future uses will be compatible and consistent with their cultural significance relative to the role that each played in the historic development of the Honolulu Waterfront. Renovation and restoration of these sites will be focused on such uses as museums and cultural/performing arts centers. The Ala Makai walking tour will also bring special attention to these historic features of the waterfront.

Transition areas which are compatible with and enhance the integrity of the historic resources are necessary in the Makai Area to mitigate some of the adverse effects of adjacent industrial use areas. Proposed design guidelines to ensure preservation are:

* When the historic site is characterized by a low-rise structure surrounded by approximately half the site being landscaped, an open space transition should be provided. This open space transition involves the provision of a 15-foot wide strip of landscaping along the

property line adjacent to the historic site using plant materials similar to those surrounding the historic site.

* Buildings on adjacent sites should be situated so that no shadows are cast on the historic building during midday. This has the effect of forcing taller buildings to locate farther away from the southeast and southwest sides of the historic site.

* When the historic resource is characterized by use of distinctive building materials, landscaping or design motifs, these should be repeated in adjacent developments.

A consulting archaeologist will be retained by HCDA during project (infrastructure and other developments) construction to assure preservation of significant historic sites or other finds.

3.3.3 Open Space and Visual Resources

The makai area consists largely of low-rise structures. The ten-story Gold Bond Building is the only high rise. The major open space is in the Fort Armstrong area. There are pockets of open space throughout the makai area that are used primarily for circulation to historic features of the waterfront.

A. East-West View Planes

The oceanfront location of the project area is one of its prime attributes. The site is one of the few places in Honolulu where a 360-degree panoramic view of the ocean, the Koolau and Waianae Ranges, Barbers Point, Downtown Honolulu, and Waikiki can be enjoyed. Splendid views of Kewalo Basin and Honolulu Harbor activities are also available to visitors. A variety of cruise ships, catamarans, fishing vessels, and barges can be seen entering and leaving the two harbors flanking the site. This maritime procession continues throughout the day and into the evening lending an active waterfront atmosphere to the area.

B. Mauka-Makai View Corridors

View points in the makai area include the makai views down Cooke and Ohe Streets which delineate the Park entrance. New makai views and waterfront park vistas from Ala Moana Boulevard will be created with the proposed relocation of the industrial uses and development of the 70-acre park.

Views toward Diamond Head, Ewa, as well as views mauka from the proposed amphitheater and Waterfront Park will be newly created, thereby increasing and enhancing the waterfront experience to residents and visitors alike. Mauka view channels will be created by the development of the Kakaako Park. Particular views will be from the Park looking mauka along the Cooke-Ohe couplet, makai of the proposed waterway, and from the new beach park looking mauka along Keawe Street. Views of the mountains will be available from the inland waterway.

The revised makai area plan contains development guidance policies and building height limits which are intended to preserve major view planes, view corridors, and enhance the urban Honolulu shoreline and ocean views. Enhancement of mauka-makai views is facilitated by building height guidelines:

> "Overall, the heights of buildings will gradually "descend" from tall structures in the areas mauka of Ala Moana Boulevard to lower, but still high density, structures along the makai area water frontages. Limits on heights will range from 200 feet along parts of Ala Moana Boulevard, to as low as 45 feet along waterways, park edges, and shorelines."

C. Impacts and Mitigation Measures

View planes and view corridors will be given full consideration in the development of the recreational areas as well as future commercial and office spaces in later development increments. Standards and urban design criteria have been developed and utilized as guidelines to ensure preservation and

enhancement of these precious natural resources in the Kakaako makai area.

The urban form in the makai area will be diverse, with a mix of lower and mid-rise structures rising to levels of 150 feet and 200 feet in the commercial zone, and to 45 feet in the waterfront commercial, recreation commercial, and waterfront service areas. Building forms will be transitional from the mauka area's planned development projects' platforms with heavily landscaped decks and towers to the "stepped down" makai area landscape and pedestrian activities at a ground level.

Views toward as well as from the inland waterways will also open up new view corridors throughout the Kakaako Peninsula and offer park goers a variety of view opportunities in urban Honolulu.

3.3.4 Displacement and Relocation

Displacement is the movement caused by any direct or indirect action, public or private, which forces businesses to move as a result of the acquisition, or imminence of acquisition, of real property. It may be temporary or permanent.

Implementation of the Makai Area Plan will require the displacement/relocation of a number of existing Makai Area tenants with various lease commitments ranging from month to month revocable permits to fifty-year remaining terms.

A. Impacts and Mitigation Measures

1. Project Impacts

The major relocation actions proposed within the makai area include the relocation of the Food Distribution Center, Y. Hata & Company, Fort Armstrong marine cargo operations, and the Foreign Trade Zone to new facilities to be acquired by the State within the Kapalama Military Reservation. By an agreement with the State, the City and County of Honolulu will relocate its baseyard facilities from within the makai area to another site outside of the Kakaako Community Development District, possibly to a site on Sand Island. The

acquisition and development of the Kapalama Military Reservation, primarily as a major container terminal, will also provide relocation sites for other uses presently located within the Fort Armstrong area.

The following discussion of displacement/relocation actions is presented in terms of the major project phases.

Implementation of the Makai Area Plan will be in two major phases of approximately equal size: Phase I includes those plans and programs which will be implemented in the next ten years (1990-2000); and Phase II, planned for implementation over the following ten years (2000-2010).

The factor which most influences the phasing of development in the Makai Area is the State's ultimate acquisition of the federal lands at the Kapalama Military Reservation and the conversion of those lands to container and other operations. Until this is accomplished, along with other necessary maritime improvements at Honolulu and Barbers Point Harbors, the existing maritime operations at Fort Armstrong must remain.

Phase I: Phase I encompasses approximately 125-acres and includes the area around Kewalo Basin, the Kakaako Peninsula east of Keawe Street, and the Piers 5-7 area near Downtown.

Phase II: Phase II encompasses approximately 125-acres and includes the Fort Armstrong area and the proposed landfills off of Fort Armstrong and Kewalo Peninsula. Phase II will commence with the relocation of maritime cargo operations from the Fort Armstrong Piers to Kapalama. Major project within this phase include the completion of the pedestrian promenades, inland waterways, major roadway and utilities improvements, development of cruise ship terminals at Piers 1 and 2, the development of beach parks off of Kewalo Basin and Fort

Armstrong, the dredging and development of the proposed Pier 4 harbor area and the implementation of a people mover for the makai area linked to the proposed rapid transit system planned for routing through the mauka area of Kakaako.

2. Mitigation Measures

Table 3-7 summarizes the major relocation/displacement impacts and provides a summary of existing and proposed uses in addition to the relocation site (if appropriate).

The specific redevelopment phases and subphases have been scheduled for implementation in such a way that displacement and relocation will have minimal impact on ongoing business activities.

Businesses facing displacement may encounter the attendant inconveniences and hardships of moving. Generally, the size and nature of relocation services and payments by public agencies are dictated throughout the State by standards established in 1970 by Chapter 111, HRS. These payments are limited to direct government actions. The following presents an overview of the types of compensation that are allowed by Chapter 111, HRS provisions:

* State will compensate a landowner who also owns the existing structures and operates the business, the fair market value of the land and any improvements. Furthermore, the State may be required to pay a moving expense not to exceed $5,000, or a fixed relocation payment based on the average annual net earnings over the past two years up to a maximum of $5,000.

* State will compensate the owner for the fair market value of the land.

* State will compensate the owner for the fair market value of the improvements on the land.

TABLE 3-7

SUMMARY OF MAJOR RELOCATION/DISPLACEMENT IMPACTS

As of: 29 Nov 89

Par. Num.	Existing Use	(Ac.)	Proposed Use	New Site Phase
1	Roberts Ilima Tours	2.6	Waterfront Park	Relo. Assistance I-A
2	Kewalo Net Shed	0.1	Ala Moana Pk. Exp.	Kewalo Peninsula I-A
3	Kewalo Restaurant	0.2	Ala Moana Pk. Exp.	Kewalo Peninsula I-A
4	McWayne Marine/Servco	0.7	Ala Moana Pk. Exp.	Relo. Assistance I-B
5	Kewalo Marine	0.2	Ala Moana Pk. Exp.	Relo. Assistance I-B
6	UH Marine Mammal Lab	0.3	Ala Moana Pk. Exp.	Kakaako or Sea Life Park I-B
7	C&C Baseyards	15.9	Waterfront Park	Sand Island I-B
8	Food Distribution Center	9.2	Waterfront Park	Kapalama I-C
9	Y. Hata & Co.	4.1	Waterfront Park	Kapalama I-C
10	Dept. of Agriculture	2.1	Waterfront Park	Halawa Valley/Kapalama I-C
11	Honolulu Ford	2.1	Waterfront Park Ent.	Land Exchange I-C
12	Dept. of Health	1.4	Waterfront Park Ent.	Kapalama I-C
13	Board of Water Supply	1.7	Waterfront Park Ent.	Sand Island I-C
14	Foreign Trade Zone	17.0	Cruise Ship Terminal	Kapalama II
15	Fort Armstrong Terminal Opns.	33.0	Cruise Ship Terminal	Kapalama II
16	US Coast Guard Pier 4	1.3	Pier 4 Redevelopment	Pier 4 II

SOURCE: R. M. Towill Corporation/Helber, Hastert & Kimura, Planners.

* State may provide either a moving expense payment or a fixed relocation payment of no more than $5,000, to lessees who operate a business but have no ownership of land or structures.

* Renters of dwelling units on the site are entitled to a moving expense allowance not to exceed $200 and a dislocation allowance not to exceed $100. In addition renters may also be eligible for rental assistance if they have lived in their homes for at least 90 days prior to the formal notification of intent to acquire the property. They may be entitled to the difference between their present rent and the rent of their new home, for a period of two years and up to a maximum of $1,500.

Relocation program objectives are intended to provide meaningful assistance for all businesses displaced due to government action. The basic objectives include:

* To phase redevelopment to minimize disruption.
* To ensure that businesses are, to the extent practicable, properly relocated before permitting their displacements by new developments, redevelopment, or district-wide rehabilitation.
* To minimize or ameliorate any serious negative impacts on displacees, such as loss of employment, business, or monetary losses.
* To provide counseling, information and referral services to displacees affected by private sector actions, induced or stimulated by governmental planning decisions.

Specific actions may include the establishment and operation of a central relocation office, relocation payments for actual moving costs, fixed payments for losses suffered, payments for replacement housing or business locations, purchase and/or renegotiation of lease where eventual use is consistent with the makai area plan and other similar relocation matters.

If Federal actions are involved that require relocation of businesses or residents, then the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) would be applicable.

3.3.5 Economic and Population Characteristics

Long-term economic projections prepared by the State's Department of Business and Economic Development (DBED) indicate continued economic growth for the State through the year 2010, although at a slower rate when compared with the rapid increases of the 1960's and 1970's.

The Gross State Product (GSP) for Hawaii, which is the total value of all goods and services produced within the State, is projected to increase from $13.7 billion in 1980 to $30.4 billion in 2010 (in 1982 dollars). This represents an average growth in GSP of 2.7% per year, compared with an average growth of 5.3% per year for the period 1960 to 1980. By comparison, the U.S. Department of Commerce expects U.S. GNP to grow at an average of 2.4% per year between 1980 and 2010.

DBED has projected job formations by industry sector for Oahu and the State through the year 2010. These projections are considered reasonable and have been adopted by the State and County for long-range planning. The demand analysis focuses on those employment sectors that generate the majority of jobs requiring office space, including: Banking, finance, real estate and insurance; services (excluding hotels); and government. Total employment in these selected employment sectors is projected to increase from about 189,400 in 1985 to about 261,000 by 2010. Assuming each new job in the selected employment sectors resulted in a demand for about 65 square feet of office space, the demand for new office space could be expected to be a total of approximately 4 million square feet by 2010.

Tourism will continue to dominate future economic activity, despite a slower growth rate in the number of visitor arrivals. The projection of visitor arrivals to the State are based on forecasts also provided by DBED. The Department estimates that visitor arrivals to the State will be 6.6 million in 1990, increasing to 11.6 million by 2010.

As a result of increased competition from neighbor island resort destinations, Oahu's share of westbound visitors to the State is projected to decline from about 72.5% in 1990 to about 65% by 2010. Based on DBED's projections and Oahu's anticipated market share, total visitor arrivals to Oahu are projected to increase from about 5.2 million in 1990 to about 8.5 million by 2010. Total business travel is projected to increase from about 108,000 arrivals in 1990 to about 175,000 arrivals by 2010.

The State's resident population, which includes all residents and military personnel stationed in Hawaii, is projected to increase from 1,137,200 in 1990 to 1,436,000 in 2010. This will be an overall increase of 26.3%, or an average growth rate of 1.3% per year.

Hawaii's de facto population, which includes visitors present but excludes residents temporarily out-of-state, is projected to increase from 1,269,100 in 1990 to 1,674,200 in 2010, or an overall increase of 31.9%, or an average of 1.6% per year. The faster growth rate of the de facto population, as compared to the resident population, is due to the growth rate of visitors over the next 20 years.

The resident population of Oahu, as projected by DBED, is expected to increase from about 861,600 in 1990 to 999,500 by 2010. The de facto population is anticipated to increase from 1,000,000 in 1990 to 1,094,700 in 2010. The projected population of the Kakaako district is expected to grow to 45,000 over the next 20 to 25 years.

The average household sizes on Oahu and in Honolulu have been declining since 1970, and were reported to be 3.13 and 2.87 persons per household, respectively, in 1985. This trend is anticipated to continue through the projection period with the average household size in Honolulu declining from about 2.65 persons in 1990 to about 2.57 by 2010.

As a result of the expansion in the resident population and declining household sizes, the number of households in Honolulu over the next 22 years is projected to increase from nearly 150,000 in 1988 to nearly 162,000 by 2010.

The average annual household income in Honolulu has increased from about $10,346 in 1970 to an estimated $40,270 in 1988. Assuming income and expenditures expand at a rate

consistent with inflation, the total household income in Honolulu is projected to increase from about $6.0 billion in 1988 to about $6.5 billion by 2010, in constant 1988 dollars.

Based on a study prepared by the U.S. Bureau of Labor Statistics, retail expenditures in Honolulu are estimated to represent about 38% of total household income. Assuming this relationship continues, retail expenditures could increase by about $190 million, from about $2.29 billion in 1988 to about $2.48 billion by 2010.

3.3.6 Economic and Fiscal Impacts

This section examines economic impacts of the revised Makai Area Plan by estimating employment effects attributable to the project, as well as effects the project would have on tourism and downtown development.

The estimates provided here indicate the order of magnitude of the impacts in question, rather than precise amounts which accrue to the City and the State.

3.3.7 Employment Impacts

The project will generate both short-term employment, during construction, and long-term employment during the operational phase. Employment impacts include:

- Direct Employment - jobs created both on-site and elsewhere as new income attributable to the project is spent;

- Indirect Employment - jobs created as establishments receiving direct income purchase goods and services; and

- Induced Employment - jobs created as employees spend their wages in the local economy or support government jobs through taxes.

3.3.8 Construction Phase

During construction, the project will create direct construction jobs, both on-site and off-

site. Construction further contributes to the State economy, generating indirect and induced employment.

Construction jobs are estimated in Table 3-8. Construction of Phase I projects will generate an estimated 1,080 person-years of direct employment. Construction of Phase II projects will generate an estimated 818 persons-years of direct employment. Based on industry practice, the on-site direct employment is estimated as 864 person-years in Phase I and another 654 in Phase II.

Some phases of construction are more labor-intensive than others, so the demand for construction workers on the project will not be constant during the construction phase.

Since no project construction schedule exists, and basic construction and design decisions have not been made, no more specific estimation of direct on-site construction employment in any month or year is appropriate.

Indirect and induced employment attributable to Phase I's projects construction will amount to approximately 432 person-years, and 327 person-years during Phase II's construction period. The total employment impact of Phase I's construction phase is estimated as 1,512 person-years, and 818 during Phase II's construction phase.

3.3.9 Operational Phase

The long-term impacts of the Kakaako Makai Area project build out can be estimated in the following order of magnitude range:

The assessment conducted for the Honolulu Waterfront Master Plan indicated the Kakaako Makai will have a share of 2 million sq. ft. of office development between 1990 and the year 2000, and 180,000 sq. ft. of retail space during the same period. Between the years 2000 and 2010, another 300,000 to 350,000 sq. ft. of retail space will be built to help meet the demand. Assuming that an employee density is one worker per 200 sq. ft. (1988 BOMA Experience Exchange Report) allotted to the new office and retail space in Kakaako Makai, an additional 12,650 employees can be estimated for this area (based on 2,530,000 sq. ft.).

TABLE 3-8

CONSTRUCTION PHASE EMPLOYMENT AND INCOMES

	Phase 1		Phase 2
CONSTRUCTION COSTS:	$103,000,000	(1)	$78,000,000
Average Cost per Worker	$95,410	(2)	$95,410
Direct Construction Jobs (Construction Costs divided by average construction spending per job)	1,080 jobs		818 jobs
On-Site Direct Construction Jobs	864 jobs	(3)	654 jobs
Industry Employment Multiplier	1.4	(4)	1.4
Direct, Indirect and Induced Jobs	1,512		1,145
Direct Construction Jobs	1,080		818
Average Construction Wage, 1987	$30,645		$30,645
Direct Income	$33,096,600		$25,067,610
Industry Income Multiplier	0.8	(5)	0.8
TOTAL INCOME	$26,477,280		$20,054,088

NOTES:

(1) Based on original estimates by R. M. Towill Corporation for the Honolulu Waterfront Master Plan and Draft Makai Area Plan, 1989. Assumption is labor costs are about 64 percent of development costs; remaining 36 percent consists of cost of materials, etc. (per John Child & Company, December 1989).

(2) Hawaii Department of Business and Economic Development, 1987, pp 351-52, 562 (DATABOOK).

(3) Based on estimate that 80 percent of construction jobs will be on site.

(4) Communication with Department of Business and Economic Development, (J. Child & Co.) December 1989.

(5) Communication with Department of Business and Economic Development, (J. Child & Co.) December 1989.

However, if the "C" (Commercial-Office), "WC" (Waterfront Commercial), and "RC" (Recreational Commercial) zones were fully developed, the number of employees could be as high as 37,550 (based on 7,510,000 sq. ft.) in Kakaako Makai at build out. (See Table 3-9, Employment and Income Effects of Operational Phase.)

3.3.10 Impacts on Tourism Industry

Proposed recreational activities, such as the Waterfront Park, festival marketplace (at Piers 5 and 6), urban entertainment center in the park, museum/cultural complex, and commercial/retail redevelopment at Kewalo Basin will likely result in increased visitor expenditures, as such attractions would draw residents and visitors alike. Thus, the effect the project is expected to have on Hawaii's visitor industry would be positive in terms of increased visitor expenditures.

3.3.11 Impact on Downtown Development

The market assessment conducted by John Child and Company for the Honolulu Waterfront Master Plan concluded that demand for office and retail/commercial space in downtown Honolulu to the year 2010 will be sufficient to allow Kakaako Makai its share of 2 million square feet of office space between 1990 to 2000, and 530,000 sq. ft. of retail space between 1990 and 2010. In other words, demand for new office and retail space will be strong enough in downtown Honolulu to the year 2010, such that development of leasable space in Kakaako Makai will help meet the demand rather than compete with other downtown Honolulu development the Makai Area's office development could capture 50 percent of the market for new office space between 1991 and 1995, increasing to about 70 percent between 2001 and 2010, totalling about 2 million square feet over this period.

3.3.12 Operating Expenses of Public Facilities

As Kakaako Makai is redeveloped, certain improvements will require maintenance. The facilities requiring the most maintenance will include the parks, promenades, amphitheater, and public rights-of-way. Responsibility for maintenance of these facilities has not yet been determined. For the purposes of this analysis, the City and County is assumed to maintain the improvements.

TABLE 3-9

EMPLOYMENT AND INCOME EFFECTS OF OPERATIONAL PHASE, KAKAAKO MAKAI

	Minimum		Maximum
New Office Commercial/ Retail Space	2.53 msf		7.5 msf
Direct Employment	12,650 jobs		37,550 jobs
Multiplier (DBED'S Input/Output Model, Databook, 1988, Table 222)	0.8	(1)	0.8
Total Employment (Direct, Indirect, and Induced Jobs)	10,120		30,040
Direct Jobs	12,650		37,550
Median Income Honolulu, 1989	$27,400	(2)	$27,400
Direct Income	$346,610,000		$10,288,700,000

(1) Hawaii State Department of Planning and Economic Development, 1977 (No. 20).

(2) Source: State Housing Finance and Development Corporation (1989).

Operating expenses associated with these facilities are a function of their area or size. Most of the facilities which require maintenance will be completed by 1995, as shown in Table 3-10, Kakaako Makai Area Plan.

Annual operating expenses for the facilities will range from $50 per seat for the amphitheater to $4,500 per acre for the parks, as shown below:

Estimated Annual Operating Expenses
(in 1989 dollars)

Use	Unit	Expense per Unit
Parks	Acre	$4,500.00
Amphitheater	Seat	50.00
Promenades	Foot	1.00
Parking Areas	Stall	2.40
Public Right-of-Ways	Foot	7.20

Source: Interviews with State and County representatives, R. M. Towill Corporation, Helber Hastert & Kimura Planners and John Child & Company, Inc.

Expenses associated with police and fire protection, and State and County administration will also increase over the projection period. However, these expenses will result from population growth that is anticipated to occur regardless of the redevelopment in the Kakaako Makai area.

The total annual operating expense will increase from $930,000 to $1.55 million over the projection period, based on the per unit operating expense estimates and proposed development schedule.

3.3.13 Impacts and Mitigation Measures

After operating expenses, the net revenue to the County in the form of real property taxes will increase from a breakeven level for the five years ending in 1995 to $26.2 million for the five years ending in 2010. Thereafter, the net revenues will average nearly $11.1 million per year over the project's remaining economic life.

TABLE 3-10

KAKAAKO MAKAI AREA PLAN
Projected Completion of Selected
Facilities Which Require Maintenance

	1991-1995	1996-2000	2001-2005	2006-2010
Recreation:				
Kaka'ako Passive Park	X			
Kaka'ako Beach Park			X	
Amphitheater	X			X
Promenades	X			
Kaka'ako Parking	X			
Urban Development:				
Public Rights-of-Way(1)	X		X	X

(1) Include all roadways, bridges, tunnels, bypasses and inland waterways.

Source: Helber Hastert & Kimura Planners.

Net revenue to the State in the form of ground lease rents and general excise taxes is projected to total nearly $16.6 million for the five years ending in 1995, and would be expected to increase to a total of $78.4 million for the five years ending in 2010. Thereafter, the net revenue is estimated to average $21.4 million per year. Thus, the analysis indicates that the projected revenue to the State and County will exceed the associated operating expenses and result in a plan that will be self-sustaining over its economic life. (NOTE: Public costs and benefits associated with plan implementation include monetary as well as non-monetary "qualitative" aspects, such as benefits attributable to public parks and open space. The analysis focuses on the monetary costs and benefits associated with the implementation of the makai area plan. The analysis first identified and projected sources of revenue and expenses to the State and County governments resulting from plan implementation. Revenues were narrowly defined to include income generated from the private development of public land, directly through ground leases and indirectly through general excise and real property taxes. Costs included all urban development, recreation, circulation/utilities and relocation costs identified earlier. Projected State and County operating and maintenance costs were then identified and subtracted from the projected revenue stream.

A. Impacts and Mitigation Measures

The development phasing for the Makai Area's commercial office, and retail sites is based on projected market support and absorption foreseen for the various land uses, and availability of the necessary infrastructure to service the sites. A market assessment conducted for the Honolulu Waterfront Master Plan (by John Child & Co., excerpts of which can be found in Appendix C) concluded that there will be sufficient market demand for a 400-500 room business hotel in the Pier 4 to Aloha Tower area by the year 2000, approximately 2 million square feet of office development between 1990 and 2000; about 180,000 square feet of "ancillary" retail uses to support the commercial office uses; and between 300,000 and 350,000 square feet of retail shopping leasable floor area by the year 2010. In the short-term, the economic impact would be the significant amount of public capital outlay

required to provide the infrastructure systems to support the Makai Area development.

Over the next ten to twenty year period, the Makai Area Plan envisions a total public expenditure of approximately $283 million to fund major commercial, recreational, and infrastructure improvements, roughly split (60%/40%) between the short-(five to ten year) and long-term (ten to twenty year) phases. In other words, about $161 million of public dollars will be spent in Phase I, while approximately $122 million of the same will be expended in Phase II.

The public sector will pay for those improvements which benefit the general public, while the private sector will pay for those improvements that benefit their properties. Improvement Districts, or other similar programs will be created for the areas where infrastructure system improvements provide special benefits to private landowners and/or commercial projects. Within these areas, property owners/lessees will be assessed for their portion of the improvement costs.

Major Makai Area recreational facilities costs include the development of the Waterfront Park and other public facilities such as the amphitheater and a system of public promenades to provide public access to the waterfront. Major circulation/utilities costs include provision for funding the construction of off-site infrastructure necessary to service the public lands within the Makai Area.

However, the public revenues as well as the resulting higher quality of urban Honolulu life anticipated in the long run are expected to substantially mitigate the initial public capital outlay required to initiate the project. For example, the annual ground rental income stream from the privately-developed, publicly-owned lands within the Makai Area is projected to increase from about $2 million in 1993 to $13.3 million in 2018, at which time it will stabilize until 2052 when original leases will begin to expire and new

leases will be negotiated.

Another public benefit projected is the net revenue (after operating expenses) to the County in the form of real property taxes, which are expected to increase from a breakeven level for the five years ending 1995 to $26.2 million for the five years ending 2010. Thereafter, the net revenues would average nearly $11.1 million per year over the project's remaining economic life.

Further, net revenue to the State in the form of ground lease rents and general excise taxes is projected to total nearly $16.6 million for the five years ending 1995, and would be expected to increase to a total of $78.4 million for the five years ending 2010. Thereafter, the net revenue could average about $21.4 million per year.

3.4 INFRASTRUCTURE SYSTEMS AND SERVICES

Construction of proposed improvements to infrastructure systems described in the following sections will have short-term adverse environmental impacts, particularly on noise levels and air quality in the project area. These impacts will be temporary, however. Mitigation measures will minimize these adverse effects and, in some cases, reduce the construction period in order to reach project completion more efficiently. The long-term impacts of the proposed infrastructure improvements will be positive and support the many new and exciting developments envisioned to occur during the next ten to 20 years in Kakaako makai.

The construction-induced environmental impacts and appropriate mitigation measures are described below:

A. Short-Term Construction-Related Impacts and Mitigation Measures

Improvements to existing roadways will temporarily restrict vehicular and pedestrian traffic, disrupt business activity, and cause a decrease in the overall quality of the environment. In general, construction will be a major cause of inconvenience to the people living, working, having business, doing

business in, or commuting through the area.

B. Noise

Mitigation of noise from construction activities on Oahu is generally accomplished by enforcement of the State Department of Health (DOH) noise regulations. The mitigation of construction noise on Oahu has been achieved by citing equipment with defective mufflers, and by limiting the hours of operation of excessively noisy operations, such as pile driving.

Noise impacts resulting from the necessary construction are unavoidable due to the short distances between existing commercial structures, and the necessity to break existing pavement and to trench. Buildings which are in close proximity to heavy equipment may be impacted by construction generated vibrations. Mitigative measures to ameliorate the effects of vibration include the use of vibratory hammers and eliminating changes in water levels in excavated trenches. Water is a good conductor of sound waves and high water levels can be conducive to vibration effects.

Because a major portion of the infrastructure work will generate noise impacts on daytime business/commercial operations rather than residences, consideration will be given to nighttime and early morning waivers of existing property line noise limits within the area whenever construction noise levels at residences do not exceed 50 dB. Waivers to continue construction activity past 6:00 p.m., from Monday through Saturday, have been granted when the best interests of the public are served by reducing the period of construction or by reducing traffic congestion. This may occur along Ala Moana Boulevard. Use of waivers to allow for nighttime construction activities when residences will not be affected, will minimize construction noise impacts on daytime businesses.

C. Air Quality

Construction activity will generate temporary adverse impacts on the ambient air quality of the project area. The principal pollutants anticipated are

fugitive dust from construction activities and hydrocarbon emissions or exhaust fumes from construction equipment and vehicles. Emission sources of this pollutant include excavation activities, the hauling of construction materials and debris, the use of construction vehicles and equipment, the addition of vehicles belonging to construction workers, traffic congestion and general construction activities.

Although the generation of fugitive dust is a matter of concern, it is not anticipated to be a major impact. The majority of construction activities will be performed within existing roadways. Therefore, it is not anticipated that there will be any major earth moving operations that are normally associated with new roadways. Thus, the emission rate of fugitive dust should be lower than levels associated with major new roadway construction.

Excavation activities during construction will include cutting through existing pavement, trenching, backfilling, and repairing. These activities will also affect the air quality of the project area.

The generation of hydrocarbon emissions or exhaust fumes will also adversely impact the ambient air quality of the project area. Sources of exhaust fumes include diesel-powered vehicles, equipment, and generators. The construction equipment will be in constant use during the period of construction and therefore will be continually emitting exhaust fumes.

Hydrocarbon emissions will also be generated by the additional presence of vehicles belonging to construction workers and as a result of traffic congestion generated during construction. It is not expected that the vehicles belonging to the construction personnel will adversely affect the air quality. However, the disruption of normal traffic patterns and anticipated traffic congestion will cause an increase in hydrocarbon levels.

Under normal tradewind conditions, dust and fumes will be dispersed away

from the project site toward the ocean. However, during periods of "Kona" winds when the wind changes direction, the ambient air movement in the project area will decrease thereby lowering the ambient air quality.

To mitigate the effects of construction on air quality, all of the equipment must meet the requirements of State emission control laws. The State Department of Health will monitor equipment for compliance.

3.4.1 Transportation Systems

A traffic assessment report for the Makai Area Plan was prepared by Pacific Planning of Engineering, Inc. The primary roadways utilized for east-west traffic flow are Nimitz Highway and Ala Moana Boulevard. Nimitz Highway/Ala Moana Boulevard is a major divided highway, providing an important link between the airport area, downtown, and Waikiki. Between Iwilei and Kakaako, Nimitz provides three lanes for vehicular traffic in each direction and a center left turn lane. From Kakaako to Waikiki, Nimitz continues on as Ala Moana Boulevard with three lanes in each direction. Exclusive left turn lanes are provided in the medians at major intersections. Separate phases are given to left turn movements at signalized intersections. The posted speed limit on Nimitz/Ala Moana is 35 miles per hour. The highway right-of-way width varies from 100 feet to 120 feet.

North to south traffic flow is provided for in the Downtown area by Punchbowl and South Streets. North to south traffic flow in the Kakaako area is provided by Punchbowl and South Streets, Keawe and Coral Streets, Cooke Street and Ward Avenue. The streets makai of Ala Moana Boulevard in Kakaako are not constructed to City standards and will require construction of curbs, gutters, sidewalks, and street lighting. (New underground utilities will be required in the makai area.)

A significant unresolved issue which has the potential for affecting existing and recommended land uses within the Honolulu waterfront planning area deals with the potential need for additional transportation corridor capacity within the Central Honolulu area by 2010. Traffic studies conducted for the Honolulu Waterfront Master Plan indicate that forecasted growth in regional (east-west) traffic, with or without any contribution from Honolulu Waterfront Master Plan recommendations, will exceed planned capacity by 2010

(i.e., additional laneage will be required beyond that which is presently planned to exist in 2010). The issue of the need for additional capacity is unresolved because the indicated need is thus far based on a preliminary level of study which has not yet been evaluated by State's official long-range transportation planning process coordinated by the Oahu Metropolitan Planning Organization (OMPO). (OMPO coordinates the integrated transportation planning for Oahu, combining the planning resources of the City and County of Honolulu, Departments of General Planning, and Transportation Services, and State Departments of Office of State Planning and Transportation. These agencies are responsible for facility needs and programming of local State and Federal monies for Oahu's transportation needs.)

OMPO is presently completing long-range forecasts and plans based on the official 2005 horizon year. Preliminary findings (which were not available at the time the traffic studies for the Waterfront Plan were completed) indicate that levels of service (LOS) for traffic conditions across the downtown screenline covering the H-1 Freeway, Beretania, King and Nimitz/Ala Moana will be LOS "D" (i.e., bordering on unstable flow-just above capacity). Thus, at least for the 2005 time period, there appears to be sufficient planned corridor capacity to accommodate forecasted traffic volumes. It should be noted that because this LOS represents an average condition across the four identified corridors (one of which, Nimitz/Ala Moana, passes through the waterfront planning area), it is impossible to determine service conditions on any particular corridor (i.e., it is possible that all corridors operate at LOS "D" or, that some operate at LOS above "D" with others below "D"). The actual LOS along any particular corridor must be evaluated in the regional or systemwide context due to the "substitutability" of corridors (i.e., highway users are assumed to seek out corridors offering higher levels of service and, correspondingly, avoid those with lower levels, thus tending to balance-out levels of service across comparable corridors). The preliminary OMPO findings for 2005--that planned corridor capacity is sufficient to meet projected traffic volumes in 2005--do not necessarily contradict the Waterfront Plan's findings regarding the need for additional corridor capacity by 2010 for the simple reason that the growth in regional traffic (between 2005 and 2010) could exceed planned improvements to corridor capacity by 2010. The OMPO process has not yet looked at 2010 projections and will not be able to fully resolve the issue (i.e., confirm or dismiss the Waterfront Plan findings) until major new systemwide studies are completed.

Thus, a dilemma faced by the project was that preliminary traffic studies indicate the need for additional corridor capacity to accommodate growth in regional traffic somewhere within the Central Honolulu area by 2010. At the same time, there is an inability to confirm this need until the official State transportation planning process is able to analyze it in detail.

The traffic study commissioned by the Honolulu waterfront master plan project provided, among other information, an analysis of the existing intersection capacities relative to the Kakaako district. Recorded and estimated traffic volumes for the year 1988 and intersection capacity analysis were used to evaluate the operation of Nimitz Highway and Ala Moana Boulevard. Key intersections along this corridor were analyzed using the "Planning Analysis" procedure to estimate intersection capacity from the State's Highway Capacity Manual Special Report 209 published in 1985. Planning analysis estimates the capacity of an intersection by adding conflicting movement volumes. If the sum of the conflicting movement volumes is below 1,200, the intersection is below capacity; from 1,201 to 1,400 the intersection is near capacity; and above 1,400 the intersection is over capacity.

Table 3-11 illustrates the results of the analysis of the Kakaako Makai Area's major intersection capacities during morning and afternoon peak hour traffic.

TABLE 3-11

EXISTING CAPACITY ALONG NIMITZ/ALA MOANA CORRIDOR

Intersection	Morning Peak Hour	Afternoon Peak Hour
Alakea Street	Under	Near
Punchbowl Street	Under	Near
South Street	Under	Under
Ward Avenue	Under	Near

Portions of the Ala Moana Boulevard are presently near or at their capacity to accommodate traffic during peak periods. The principal source of delay occurs at the

Ward Avenue intersection due to the heavy left turn movements at the Diamond Head bound side of Ala Moana Boulevard.

Project Impacts - Vehicle trips generated by the proposed project were estimated using average trip rates from the Trip Generation Report, 1987 (Fourth Edition), Institute of Transportation Engineers (ITE). Land use data by John Child and Company dated December 21, 1988 was used to generate future traffic for the project area. Table 3-12 shows the trip generation rates and vehicular trips generated by the various land uses.

TABLE 3-12

TRIP GENERATION RATES AND GENERATED TRIPS

		AFTERNOON PEAK HOUR			
		TRIP RATE		NO. OF TRIPS	
Land Use	Units	Enter	Exit	Enter	Exit
Primary Office Space	2,763,400 s.f.	.27/1000	1.44/1000	746	3979
Primary Retail Space	301,500 s.f.	4.26/1000	4.44/1000	1284	1339
Ancillary Retail Space	265,100 s.f.	5.97/1000	6.22/1000	1583	1649
Entertainment & Beach Park Area	33 acres	1.67	1.70	55	56
Marine Research Center	8 acres	1.00	16.25	8	130
Amphitheater & Arts Complex	13,300 seats	1.00/100	1.00/100	133	133
Cruise Ship Berthing	2 ships	61.50	62.00	123	124
TOTALS				3932	7410

Ambient traffic along Ala Moana Boulevard was based on traffic forecast for the year 2010 without the Waterfront Project as reported in the Honolulu Waterfront Master Plan Traffic Impact Report by Pacific Planning & Engineering, Inc.

The project's vehicle trips were then assigned to the proposed road network based on location and shortest direct route into and out of the project area. Approximately 10 percent of the trips generated by the project was estimated to originate and terminate within the project site. Figure 3-9 shows the various turning movements at the major intersections.

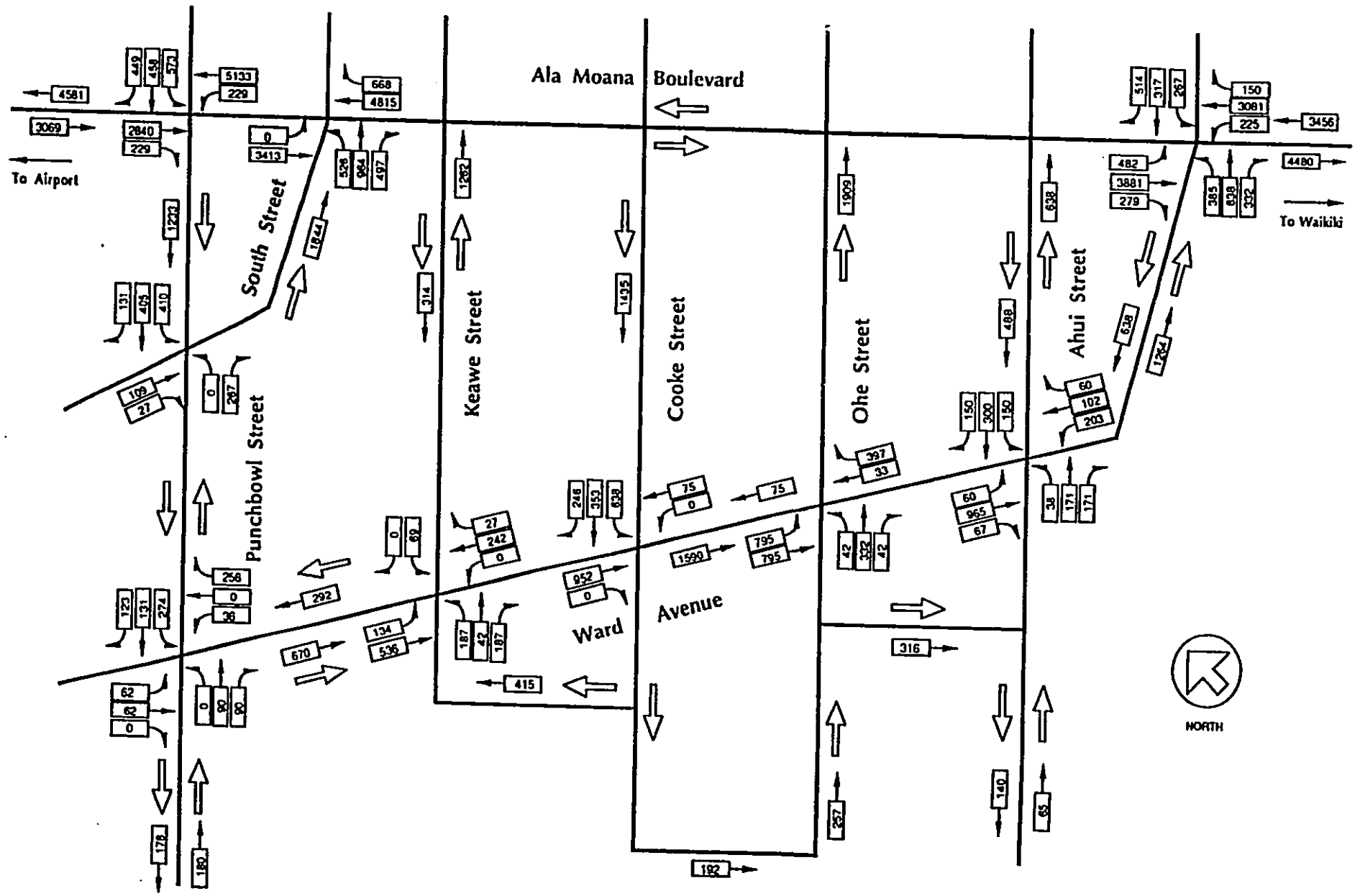


Figure 3-9
Intersection Turning Movements
2010 Forecast w/Waterfront
PM Peak Hour

Source: Pacific Planning and Engineering Inc., 1989

Based on the forecasted traffic, intersection planning analysis was conducted at eight signalized intersections in accordance with the Highway Capacity Manual Special Report 209. Table 3-13 shows the results of the planning analysis during the afternoon peak hour when the impact of the project generated traffic is expected to be the greatest. The results show critical volumes and capacity level.

TABLE 3-13
CRITICAL VOLUMES AND CAPACITY LEVEL (YEAR 2010)
PLANNING ANALYSIS--SIGNALIZED INTERSECTION

Intersection	Afternoon Peak Hour	
	Critical Vol.	Capacity Level
Ala Moana Blvd. & Ward Ave.	1357	Near*
Ala Moana Blvd. & South St.	1349	Near*
Ala Moana Blvd. & Punchbowl St.	1313	Near*
South St. & Punchbowl St.	781	Under
Ward Ave. & Punchbowl St.	462	Under
Ward Ave. & Keawe St.	455	Under
Ward Ave. & Cooke St.	1114	Under
Ward Ave. & Ohe St.	1160	Under
Ward Ave. & Ahui St.	1007	Under

*Assumes some improvements to Ala Moana Boulevard.

A. Long-Term Impacts and Mitigation Measures

Ala Moana Boulevard between Punchbowl Street and Ward Avenue will continue to be near capacity during the afternoon peak hours.

A bike lane and a landscaped separation between traffic and the pedestrian promenade are proposed for Ala Moana Boulevard. This landscaped buffer strip will provide for a physical and psychological relief for pedestrians as well as improve the appearance of this gateway corridor for the Makai Area.

However, until such time, as the need for road widening can be substantiated by a comprehensive review of the regional growth issue conducted by the official State transportation planning process, it would be premature to identify a specific widening on Ala Moana Boulevard.

Identified as an alternative is a possible tunnel and roadway alignment for the proposed Sand Island Bypass and Tunnel as recommended by the Honolulu waterfront master plan. The designation of a possible bypass/tunnel corridor through the makai area recognizes an expected regional requirement for increased corridor capacity through the central Honolulu area -- a need foreseen with or without any revisions to the makai area plan. Mitigation measures to minimize the impacts of the increased traffic will include overhead pedestrian bridges linking the Makai Area with downtown and Kakaako mauka areas.

If a Sand Island Bypass and Tunnel are not implemented, then other measures will be needed to address regional traffic concerns. Other corridors to handle increases in regional traffic may need to be considered. For example, these alternatives may include additional lanes on the H-1 Freeway or King and Beretania Streets. In addition, the City's proposed Automated Light Rail Transit System is also a possible alternative. Additional intersection improvements and left turn lanes may also have to be considered for Ala Moana Boulevard. Nonstructural demand reducing alternatives may have to be seriously considered to restrict access to regional corridors through the imposition of road tolls, mandatory carpooling, user taxes and other measures which have heretofore been considered unacceptable to the general public.

Other measures include the proposed closure of Koula and Coral Streets makai of Ala Moana Boulevard; and Kelikoi and Olomehani Streets will also be closed to allow for development of the waterfront park. The closure of streets is intended to allow such streets to be used as private streets and pedestrianways within consolidated blocks. These closures should be offset by the addition of new streets to include extensions of Ward Avenue, Punchbowl Street and South Street, and additional laneage provisions proposed for Ahui and Keawe Streets.

Parking for the Waterfront Park will be accommodated onsite and within the blocks makai of and adjacent to the proposed Ward Avenue extension. Initially surface parking will be provided in this area for park users. Surface parking will subsequently be redeveloped into structured parking as the blocks are developed for commercial uses.

Public transportation will be provided primarily by the City bus system, and proposed rapid transit, people movers and waterborne ferries and taxis. Additional bus service within the Makai Area or relocation of the Ala Moana route will not be needed, although modifications can be made to meet increasing demands as developments in the area progress. Shelters and benches would be required at all bus stops.

Events at the proposed amphitheater for musical concerts, etc., should be scheduled so traffic generated by the events will not occur during peak hours.

An important objective of the pedestrian and bikeway plan (which provides movement both laterally and mauka-makai along the entire length of the Makai Area) is to increase non-vehicular access to the Makai Area from the Downtown, Ala Moana Park, and Kakaako Mauka areas.

3.4.2 Water Supply System

At present, main distribution water lines in the makai area are 12-inch lines and are located along Ala Moana Boulevard and Ohe Street, and within the Fort Armstrong area. All other lines of 8 inches or less are located along Keawe, Koula, and Ilalo Streets, and also within the Fort Armstrong and Food Distribution Center areas.

The water supply system in the area includes water mains that are over 60 years old. Over 40 mgd passes through the Downtown area to meet the water demands of Kakaako, McCully, Moiliili, Waikiki and the rest of East Honolulu.

A critical component of the system is water storage. The area is served by the Bella Vista and Punchbowl Reservoirs. These reservoirs provide water storage to meet peak hourly

demands and for emergencies. The two reservoirs are not adequate to meet the peak hourly demands and the additional peak hour requirements are met by source pumps. The major pump stations are the Kalihi and Beretania Stations.

A. Impacts and Mitigation Measures

To meet water demands generated by proposed Makai Area land use activities, the water system will be upgraded in accordance with the standards of the Board of Water Supply. Approximately 14,200 feet of new and larger water lines will be required to meet expected business and domestic water usage and fire flow requirements. Local improvements will include the installation of 8- and 12-inch water lines in major and local streets. Total cost for the Makai Area water system improvements for local water lines is estimated to be $3 million.

B. Short-Term Construction-Related Impacts and Mitigation Measures

Installation of new water lines and related improvements will require construction work in and around the Kakaako makai area.

C. Long-Term Impacts and Mitigation Measures

Additional water storage and/or source pumping systems will be required to accommodate the future growth of the Honolulu Water District.

The Board of Water Supply, in conjunction with the Department of Land and Natural Resources, is making every effort to develop new groundwater sources on Oahu. They are also investigating the potential of alternative means of potable water development such as wastewater reclamation and desalinization.

3.4.3 Wastewater System

The project area is serviced by major sewer lines on Ala Moana Boulevard. Another major sewage line runs down Ward Avenue to Auahi Street and enters the Ala Moana Wastewater Pump Station off of Keawe Street. The sewer line from the Ala Moana Park Wastewater Pump Station along Ala Moana Boulevard to the Ala Moana Wastewater Pump Station is adequate and no plans exist for any major upgrades.

All of the primary sewer lines in the City and County are presently being analyzed for adequacy in the Islandwide Sewer Adequacy Study for the Department of Public Works of the City and County.

A. Impacts and Mitigation Measures

The proposed project will probably not greatly impact the existing and planned wastewater systems of Honolulu. Four new wastewater pump stations have been identified to service the Makai Area. Approximately 13,500 feet of new wastewater lines will be required. Other improvements include replacing existing lines with larger lines to accommodate projected flows and meet City standards. The proposed inland waterways will require the lowering of portions of the 60-inch and 78-inch sewage force main and the installation of air release valves and odor control devices. Total cost for local wastewater system improvements in the Makai Area is estimated to be $34.9 million.

B. Short-Term Construction-Related Impacts and Mitigation Measures

Construction of the necessary wastewater system improvements will have short-term adverse environmental impacts. They are noise and air quality impacts which have been described earlier in this Section, and the recommended mitigation measures are applicable.

3.4.4 Drainage System

The drainage system contains drains constructed as long ago as 1921. Since then, design standards for drainage systems have undergone many changes, as more information and experience has been gathered by the design community. The majority of the drainage systems in the project area were not designed to the present City and County standards and do not provide drainage protection from the 50-year flood. The Kakaako Improvement District 1 improvements increased the capacity of the Punchbowl drainage system which outlets near Pier 4. The Kakaako Improvement District 2 which is presently under construction will improve the drainage system in the Kakaako area from South Street to Cooke Street.

A. Impacts and Mitigation Measures

Proposed drainage system improvements for the Makai Area include new reinforced concrete pipe and box culverts, manholes, catch basins and/or drainage inlets at appropriate points of the system.

The proposed inland waterways will provide a major element of the Makai Area drainage system serving as a principal drainage collector. Approximately 11,300 feet of new 24-inch and 36-inch drain lines will be needed within the roadways. The existing Keawe Street trunkline will continue to be utilized but will require removal of the box culvert that crosses the proposed inland waterway. Total cost for local drainage improvements is estimated to be $11.4 million.

B. Short-Term Construction-Related Impacts and Mitigation Measures

Noise and Air Quality: The short-term adverse noise impacts as well as effects on air quality due to construction of drainage improvements and the inland waterway system will be similar to those impacts and appropriate mitigation measures which were described in earlier discussions in this Section.

Water Quality: Sediments and other materials generated during construction can enter the existing drainage system during rainy periods, sprinkling activities, and when runoff enters the drainage system. The second source of sediment which may potentially impact the nearshore waters is a result of dewatering activities.

As a mitigation measure to the potentially adverse water quality impacts, a temporary cofferdam and a debris-sediment trap or alternate method are proposed to be constructed at the outlets of the drainage system during construction. This will keep sea water from entering the excavation during construction and will trap a majority of the sediment and debris which may otherwise wash into the sea should a storm occur while construction is in

progress. The Contractor will be responsible to maintain the debris-sediment trap and to keep it in good working order so that the quality of water at the shoreline is not affected by the sediment, debris, or other contaminants from construction.

Should excavation go below water level, sediment will mix with the water in the trench. A dewatering system taking water directly from the trench will contain a high concentration of sediment. Therefore, where necessary, the Contractor will be required to treat this water before disposing it into any existing drainage system or into the sea. A suggested dewatering method is to install well casings, screened at the bottom and set at least five feet below the bottom of the excavation. Electric dewatering pumps can be used to pump the water from the well casings and discharge it into the existing drainage system. The granular material at the bottom of the excavation will serve as a filter and only sediment-free water will be pumped from the trench. Where necessary, the contractor will be required to install sediment and oil traps during construction to prevent the contamination of the shore waters. In all cases, the water will be tested for contaminants and the discharge must meet all applicable Federal, State, and County rules concerning water pollution prior to release to the drainage system. Discharge permits will be obtained from applicable City and County, State, and Federal agencies.

Erosion: Erosion control measures will be required during construction of the Waterfront Park. Further, permanent erosion controls will be implemented when the park is constructed.

C. Long-Range Impacts and Mitigation Measures

The planned network of waterways in the inland area of Kakaako Peninsula will be integrated into the existing drainage system. A waterway depth of 6 feet below mean sea level is proposed by ocean engineers for the Honolulu Waterfront Master Plan.

The proposed interior drainage systems for the project area can flow directly into the proposed waterways, thereby reducing the size of the required drain lines. The mauka-makai waterway branch will replace the new 30-foot wide concrete channel to be constructed by the Kakaako Improvement District 2 project. The new waterway will provide over twice the cross sectional area of flow, reducing the velocity of the storm waters, so no loss in flow capacity is expected as long as the proposed waterways are properly maintained.

3.4.5 Solid Waste Collection and Disposal

Private refuse collectors serve some commercial and industrial users in the area. City collected solid wastes from the Honolulu District are hauled to a transfer station at Keehi, loaded to larger trucks, and hauled to the Waipahu incinerator and/or the Campbell Industrial Park H-Power Plant for disposal.

A. Impacts and Mitigation Measures

Solid waste collection and disposal systems and services would increase as demands for services increase in Kakaako Makai. There will probably be an increase in demand for private refuse collection services as commercial office and commercial retail development occur.

3.4.6 Electric Power and Communications Systems

Electric power, telephone and cable television (CATV) demands in Kakaako Makai are presently served via overhead pole lines and underground duct systems. The overhead and underground facilities are within road right-of-ways or easements granted to the utility companies. Hawaiian Electric Company's islandwide generation capacity is approximately 1,300 MW, with a present peak demand of approximately 1,000 MW. Existing on-site facilities include the Honolulu Power Plant which is located in the Aloha Tower area. The power plant is capable of generating approximately 120 MW of electricity and is currently used during peak loading periods.

Existing telephone facilities in the project area are served from the Hawaiian Telephone Company central office located on Bishop Street. Hawaiian Telephone also maintains a baseyard in the Kakaako Peninsula, adjacent to the HONFED Bank Ala Moana Building.

CATV service in the project area is currently provided by Oceanic Cable. Existing CATV facilities are served from Oceanic Cable's headquarters studio located on Waimanu Street.

A. Impacts and Mitigation Measures

Based on the loads forecasted for the project a new electrical power substation will be required to serve the project demands. 12-KV distribution feeders from the substation will be connected to service transformers located adjacent to project facilities via switching vaults provided along the 12-KV distribution feeder routes.

Hawaiian Telephone plans to upgrade their facilities to accommodate the Kakaako project. Major improvements are expected to be capable of serving the development planned in the Kewalo Basin area. Existing overhead facilities will be relocated underground.

HECO, Hawaiian Telephone, and Oceanic Cable are responsible for maintenance of the lines and facilities for their best and efficient use, therefore, it is expected that these facilities would have minimal negative impact on the surrounding areas.

All offsite work will be constructed and maintained following the utility company's standard practices.

3.4.7 Fire and Police

The Kakaako Fire Station, Pawaa Fire Station, and Central Fire Station at Fort and Beretania service the Kakaako makai, downtown Honolulu and Piers 5-7 areas. The Kakaako Station, located between Punchbowl and South Streets, services the area from Punchbowl to Kamakee Street.

The project area is located within the Police Department's Honolulu Metropolitan District 1 which extends from Hawaii Kai to Pearl City. District 1 headquarters is in the process

of relocating to a site on Hotel Street between Beretania and Alapai Streets. Currently there are 2.5 police employees per 1,000 population on Oahu.

A. Impacts and Mitigation Measures

Fire protection services provided by the three stations are considered adequate for the short- and long-term plans for Kakaako makai (Battalion Chief, Administrative Services, October 1989). Special or unique requirements will be programmed for with proper planning.

The relocation of the Police Station to Hotel Street between Beretania and Alapai Streets will locate the service closer to the project area. Additional police service for the project will depend on demand (calls for service), and the rate of development in the area.

CHAPTER 4

Relationship to Land Use Plans and Policies

CHAPTER 4
RELATIONSHIP TO LAND USE PLANS AND POLICIES

4.1 OVERVIEW

This section will describe the proposed action in relation to the applicable policies and controls of the Federal, State and City agencies.

4.2 FEDERAL POLICIES AND CONTROLS

Any project that proposes work or discharges into U. S. navigable waters may need to demonstrate compliance with a number of Federal laws and Executive Orders, which include:

- Section 10 of the Rivers and Harbors Act (P.L. 90-483), Sections 401 and 404 of the Federal Clean Water Act Amendments (P.L. 95-217), and applicable implementing regulations.
- Section 307 of the CZM Act (P.L. 92-583), as amended and applicable implementing regulations;
- Noise Pollution and Abatement Act (P.L. 91-604) and applicable implementing regulations;
- Clean Air Act (P.L. 90-148), as amended, and applicable implementing regulations;
- Section 208 of the Federal Water Pollution Control Act Amendments (P.L. 92-500), Safe Drinking Water Act (P.L. 93-523), and applicable implementing regulations;
- National Historic Preservation Act (P.L. 89-665), and applicable implementing regulations;

Of particular concern to the Federal Government is Section 10 of the Rivers and Harbors Act of 1899 and Section 401 and 404 of the Clean Water Act. These laws stipulate that a permit is required for work performed in or affecting navigable waters which will have an impact on navigable capacity and certain discharges of dredged or fill material into waters of the United States.

Work to be performed in navigable waters will occur in phases. The initial phase of the Kakaako Makai Area Plan will be the repair or rehabilitation of the existing seawall which

was constructed in 1951. The rehabilitation of the seawall will be subject to a Nationwide permit from the U. S. Army Corps of Engineers. The Nationwide permit is designed to allow certain activities to occur with little delay or paperwork. These activities include work on facilities which previously received authorization to perform work in navigable waters. This will probably be the case for repair on the existing seawall. Latter phases of work in navigable waters, which include filling with dredged material to create the beach park off Fort Armstrong and dredging of Kewalo Basin for expansion, will require additional studies and will be subject to the Rivers and Harbors Act and the Clean Water Act.

4.3 STATE PLANS, POLICIES, AND CONTROLS

A number of State plans, policies and controls provide guidelines for development within the State of Hawaii. These guidelines include the Hawaii State Plan, State Functional Plans State Land Use Plan, Kakaako Community Development District Plan and Conservation District Law. The following describes the relationship of the proposed project to these plans.

4.3.1 Hawaii State Plan

The Hawaii State Plan was developed to serve as a guide for future development of the State of Hawaii in the areas of population growth, economic benefits, enhancement and preservation of the physical environment, facility systems maintenance and development, and socio-cultural advancement. The Plan identifies, in general, the goals, objectives, policies and priorities for the development and growth of the State. Guidelines have been provided in the Plan to give direction to the overall development of the State.

The Kakaako Makai Area plan is generally consistent with the objectives and policies of the Hawaii State Plan. The following pages describe the relationship and compatibility of the proposed project with the overall plans for the State of Hawaii as set forth in the Hawaii State Plan, Chapter 226 of the Hawaii Revised Statutes, as amended.

4.3.1.1 Population (H.R.S., Section 226-5)

The proposed project will achieve the population objectives by increasing and encouraging the physical, social and economic opportunities and aspirations for the people of the State of Hawaii. The overall goal of the project, to create a "people-oriented gathering place," directly relates to the population objectives.

Increased physical, social and economic opportunities will be accomplished by the development of commercial, social and recreational facilities. Numerous job opportunities will be created by the various uses, thereby increasing economic activity. The unique mix of passive and active social and recreational facilities will enhance the mental and physical well-being of the people in the community. People will be attracted to this area because of its amenities, proximity to the ocean, social and recreational activities, and employment opportunities.

4.3.1.2 Economy (H.R.S., Section 226-6, -8, and -10)

The proposed project will create numerous short-term and long-term employment opportunities. Short-term employment will be available during the course of construction. Diversified employment opportunities will be created by the commercial and office uses, museums, performing arts center, intra-island ferry system, water taxi, and expanded harbor facilities. The people will have choices in the variety of indoor and outdoor jobs which will be created.

In support of the objective of the visitor industry as a major component of a steadily growing Hawaii economy, the project includes hotel accommodations and improved and expanded cruise ship and dinner cruise boat facilities. The unique location of the hotel, which is planned as part of the Aloha Tower Development in the heart of downtown Honolulu and the cruise ship facilities, will provide the visitors to Hawaii an opportunity to intermix with the true social and economic lifestyles of the people of Hawaii, rather than the somewhat artificial "Hawaiian Style" atmosphere typical of resort destinations.

The diversity of the uses planned will facilitate growth activities in marine related research development and educational programs. These facilities include the marine research center, the expanded harbor and fishing facilities, performing arts center and the museums. These uses will contribute to the mental and physical well-being of Hawaii's present and future generations.

4.3.1.3 Physical Environment (H.R.S., Section 226-11, -12, and -13)

Much care was taken in the planning of this coastal area to achieve an aesthetically pleasing environment and a compatible relationship between land and water activities. The inland

waterways provide a physical and visual link with the ocean resources. This concept uses the natural and environmental resources, and the physical attributes to enhance the environment in a manner which will be beneficial to the public. This development will promote increased accessibility of inland and shoreline areas for public recreational, educational and scientific purposes.

The inland waterways will also serve to improve the inadequate drainage facilities which currently exist in the area. The drainage system will be integrated with the waterways, accommodating the flow capacity and reducing the velocity of storm waters.

The proposed project will visually and physically enhance the existing Kakaako Makai area. The sculpturing of the 55-foot high landfill mound will open both mauka and makai view corridors and expand view plane opportunities in eastward and westward directions. Building bulk requirements will include at-grade open space, building setbacks, and view corridor setbacks. Planned Developments are still required to have a minimum of 10 percent at-grade open space. At-grade open space is intended to provide sufficient light and air on the ground and sufficient areas for pedestrian circulation and amenities, landscaping, and recreational use.

Building setbacks along the front, side and rear property lines affect the three-dimensional building form in a number of ways. Building setbacks provide safety measures for the general public's welfare. They also provide ground-level open space for sidewalk cafes, pedestrian-oriented shops, landscaping, pedestrian circulation and amenities, and provide view corridors between buildings and along streets. In addition, the landscaping and open lawns in the park area will promote the amount of open spaces and sense of openness.

Two historical sites are proposed to be preserved. These sites include the existing Immigration Station and the old Ala Moana Pumping Station. Preservation is the act of maintaining and sustaining a building or site in its present condition. It implies that the building or site is already in a restored or renovated condition, and that it can be feasibly maintained. Future uses of a historic building should ensure protection of the building structure. The proposed method of preservation is to follow the provisions of the makai area rules, as well as design guidelines proposed for transition areas.

Although the project will remove land for construction of the inland waterways, additional land will be created at Fort Armstrong for a beach park similar to Magic Island. The project also proposes to use currently underutilized land by transforming it into a passive and active, cultural, social and recreational gathering place which will be enjoyed by the community.

The landscaping of the existing dirt covered, landfill mound will help to improve the air quality in the area by eliminating fugitive dust. This site is currently being used as a stockpile for gravel and dirt, and large trucks generate dust pollution while continually picking up or dropping off material via dirt roads. Soil erosion will also be abated by the addition of landscaping, thus improving the water quality in the vicinity.

4.3.1.4 Facility Systems (H.R.S., Section 226-14 through 18)

There will be significant improvements or additions of public facility systems resulting from the proposed action. This project will require the development of new water source and storage facilities to meet the potable water demands. The new water source will be developed in accordance with Chapter 20, Title 11, Administrative Rules.

Possible mitigative measures to improve the transportation system within the development and the area in general is to implement staggered work hours, traffic control plans for special events, carpool/vanpool programs and shuttle bus service for the Downtown and Kakaako areas. Some of these mitigative measures will also serve to conserve energy consumed by motor vehicles. The inclusion of landscaping along the roadways will help to encourage the use of the pedestrian walkway and bikeway system within the area.

Internal to the peninsula, the roads are not constructed to City standards. The development will improve the internal roadway system by constructing roadways to include curbs, gutters, sidewalks and street lighting. These improvements will greatly improve traffic circulation, pedestrian circulation and the overall appearance of the area.

4.3.1.5 Socio-Cultural Advancement (H.R.S., Section 226-20, 21, 23, 24, 25, 26 and 27)

The proposed indoor and outdoor recreational facilities, museums and research center will provide healthy mental and physical enrichment to the general public. These facilities help

meet the growing demand for a wide variety of social, cultural, educational and recreational activities which will be enjoyed by the community.

The socio-cultural advancement with regard to culture will be achieved by the development of the performing arts center and the preservation of two historic sites. In addition, the unique mix of visitors, and maritime, office commercial and recreational uses will help to promote a harmonious interaction and encourage the essence of the "Aloha" spirit in the daily activities of the people.

The Kakaako Makai Area Plan proposes to attain the goal of providing safe public access to the ocean and along the water's edge. The improved traffic and circulation pattern within and around the site will also assure public safety.

The project will encourage private sector redevelopment wherever possible by providing sufficient infrastructure development to reduce the private sector risks and insure long-term project viability. Public/private sector development partnerships will also be encouraged. Revenue generating development which would attract private sector development could include the performing arts center and museum complex or the urban park entertainment area.

4.3.2 State Functional Plans

The twelve State Functional Plans were adopted by the State legislature in April 1984. These plans were formulated to specify in greater detail the policies, guidelines and priorities set forth in the Hawaii State Plan. The twelve functional plans include: Energy, Transportation, Water Resources, Historic Preservation, Recreation, Health, Education, Housing, Conservation Lands, Higher Education, Agriculture and Tourism. Except for the Housing Functional Plan, which is a part of the Kakaako Mauka Area Plan, and the Agricultural Functional Plan, all of the plans directly relate to the proposed Makai Area Plan.

4.3.2.1 State Energy Functional Plan

To conserve energy consumed by motor vehicles, landscaped sidewalks are planned to encourage its use. In addition, the plan to implement car/van pool, easy access to public

transportation systems and staggered work hours will reduce the amount of energy used by motor vehicles.

The extensive amount of landscaping proposed throughout the makai area will reduce heat reflectants. Energy conservation devices or methods can be used to conserve energy. The use of solar water heaters and designing buildings to maximize indoor light without increasing heat will help to lessen electrical power demands. These design alternatives could include tinting of glass windows or landscaping around buildings to provide shade. Other newly developed energy efficient retrofits will also be considered during design.

4.3.2.2 State Transportation Functional Plan

To provide a safe, efficient and convenient movement of people and goods, roadway and harbor improvements will be provided. Significant upgrades to the internal roadway system are also planned as discussed earlier. The implementation of the water taxi and intra-island ferry terminal will also help to lessen motor vehicle congestion along public roadways as well as provide an alternate means of transportation.

Harbor improvements include the expansion of Kewalo Basin to support an additional 7 acres to accommodate commercial fishing and dinner cruise boats. Outside of Kewalo Basin expansion of the Cruise Ship berths and additional dinner cruise boat docking/berthing areas are planned. These plans will be consistent with the State's policy to foster and support commerce, industry and agriculture.

4.3.2.3 State Historic Preservation Functional Plan

The Immigration Station and the Ala Moana Pumping Station, which are listed on the National Register of Historic Places, will be preserved. Although the use of these sites will be changed, the architectural integrity of the structures will be maintained. Preservation of these sites will facilitate the need to understand the ethnic and cultural heritage of Hawaii.

4.3.2.4 State Recreational Functional Plan

The major focus of the project is to provide recreational opportunities which will be available to the public. There are a number of indoor, outdoor and water related

recreational facilities that will be provided for the enjoyment of the community. These public facilities encompass approximately 40 percent of the Kakaako Makai area. In addition, offshore water related recreational uses are available such as the man-made surfing shoal. The entire 2-mile long waterfront area, from Ala Moana Park to the Aloha Tower, will be made accessible to the public. This public waterfront will share one of Hawaii's major coastal resource with the people of the community.

The proposed inland waterways will offer recreational activities such as row-boating, fishing, scenic viewing, and casual waterside strolling.

Indoor recreational facilities include the performing arts center and museums. Passive outdoor recreational facilities include the amphitheater, entertainment area, walking, jogging and bikeway system, and picnic areas. Water related recreational opportunities include swimming, fishing and surfing areas, and sport fishing and dinner cruise boat facilities. These facilities will provide ample recreational opportunities for the community as a whole. The variety of recreational uses planned will help meet social, cultural, and recreational needs.

4.3.2.5 State Health Functional Plan

The project will reduce fugitive dust in the area by grassing and landscaping the existing landfill mound. Increased carbon monoxide emissions will result from the increase in traffic, however tighter emission control standards in new vehicles will reduce the amount of lead emissions from new vehicles. Improvements to the roadway system will help to reduce the amount of carbon monoxide emissions generated from the increased traffic, because idling time at intersection and slow moving traffic causing more pollutant emissions will be decreased. Fugitive dust generated during construction will be controlled in accordance with the Department of Health regulations.

An erosion control plan will be developed to reduce soil erosion caused during construction. Siltation basins used during construction will reduce the amount of water and silt that will enter the coastal waters. Landscaping of the landfill mound and the development of the inland waterway system will also minimize impacts to coastal waters.

Short term unavoidable noise impacts will be caused during construction. The temporary nature of noise impacts during construction is not expected to jeopardize public health and safety. Muffled construction equipment and incorporation of State Department of Health construction noise limits and curfew times will be recommended during construction. Long term noise impacts from traffic and harbor facilities are expected to be below Federal and State standards. However, to minimize noise impacts from increased traffic, landscaping will be incorporated along the roadways to help attenuate the noise.

The most significant advantage of the proposed project is the availability of healthful mental and physical stimulation from the varied recreational activities.

4.3.2.6 State Education Functional Plan

The Kakaako Makai Area Plan will provide educational opportunities through the planned marine research center. This complex will include the University of Hawaii Marine Mammal Laboratory, Look Laboratory, Kewalo Oceanographic Research Center and Hyperbaric Treatment Facility. This research center is well located, near the coastline, for the purposes of marine related research activities.

The Plan will increase the opportunities for appreciation and participation in the performing arts and musical arts by the development of the performing arts center, the amphitheater and entertainment center. These facilities will provide the means for development of creative expression in the artistic disciplines.

The project provides adequate and accessible recreational facilities to promote the physical and mental well-being of the people. These facilities include active and passive, indoor and outdoor recreational opportunities on land and in the sea, which will be enjoyed by the public.

The cruise ship berthing areas and terminals will allow for upward mobility within the visitor industry and foster a recognition of the contribution of the visitor industry to Hawaii's economy. Support of the visitor industry will educate Hawaii's people by providing the opportunity to learn to accept and appreciate ethnic differences. This intermingling plays a key role in developing attitudes that will benefit the people of Hawaii. The

preservation of historical sites will contribute the understanding and knowledge of Hawaii's ethnic and cultural heritages for the benefit of Hawaii's people as well as the visitors to the State.

4.3.2.7 State Housing Functional Plan

A major new proposal of the revised makai area plan promotes the State's affordable housing goals of increasing the number of available units and expanding cooperative efforts between the public and private sectors to develop housing. A reserved housing trust fund is proposed wherein developers of Planned Development projects area assessed a fee based on the projected leasable commercial floor area of the development parcel. Developers may build reserved housing in lieu of paying the fee elsewhere in the district on a site mutually agreed to by the developer and the authority. Units that are to be provided as an alternative to the fee must be affordable units as set forth in subchapter 7 (sale and reserved housing units) of the Kakaako Community Development District rules.

4.3.2.8 State Tourism Functional Plan

The tourism industry is one of Hawaii's major source of jobs and income, and currently the largest industry. The steady growth in the tourist industry necessitates the addition of visitor accommodations and related support facilities. The project will support the growing needs of the tourist industry by providing adequate berthing areas and terminal for cruise ships and sport fishing and dinner cruise boat facilities.

4.3.2.9 State Conservation Lands Functional Plan

The nature of the proposed project to provide coastal recreational uses accessible to the public, shares the objective of the Conservation Lands Functional Plan to take care of Hawaii's unique natural resources. Development of this project will greatly enhance the 2-mile, underutilized and unattractive shoreline area and transform it into a gathering place for social, cultural, educational and recreational activities.

The policy of the State to manage marine fishing areas and encourage the expansion of Hawaii's fishing industry, directly relates to the improvements planned. The entire shoreline area will be easily accessible for public shoreline fishing. The expansion of

Kewalo Basin to accommodate additional fishing vessels and fishing related facilities will help to support the commercial fishing industry.

In addition, the water quality in the area will be improved by providing inland waterways which will deposit much of the silt and sediments before entering the ocean. This inland waterway will eliminate point source discharge, which is presently being done.

4.3.3 State Land Use

The State Land Use Commission designates the land in the project area "Urban." The proposed project will be developed in accordance with rules and regulations for urban development.

4.3.4 Waterfront Master Plan

As a result of the 1988 Legislative Session, the Office of State Planning was tasked to prepare a comprehensive master plan for development and improvement of 1,550 acres, a six mile coastal stretch of the Honolulu waterfront, from Ala Wai Yacht Club to the Honolulu International Airport. In May 1988, the firms of Helber, Hastert and Kimura, Planners and R. M. Towill Corporation as a Joint Venture were retained to prepare this comprehensive master plan.

The waterfront master plan had a number of physical, social and economic goals that would improve the existing functional and operational aspects of maritime activities, economic/urban development, recreation/leisure and circulation, and transform the waterfront into a "people-oriented gathering place." These goals were achieved by numerous studies and working sessions with key State officials, public participation, consultants, community leaders, businesses and lease holders to develop a land use plan to accommodate waterfront activities to the year 2010. The land use plan reorganized the uses along the six mile waterfront stretch by relocating, expanding and creating facilities to accommodate maritime, urban, and recreational activities and improve the circulation pattern. This reorganization of uses, provides for a more efficient and effective use of the waterfront. Details of the overall development pattern and concepts for the Honolulu Waterfront are presented in the Honolulu waterfront master plan final report, December

1989, prepared by Helber, Hastert & Kimura, Planners and R. M. Towill Corporation, a Joint Venture, for the Office of State Planning, Office of the Governor, State of Hawaii.

The overall land use pattern proposed by the Honolulu waterfront master plan promotes the makai area as a vibrant, centrally located people-gathering place. The original 1983 makai area plan has, as a result, been revised to reflect the changes recommended by the waterfront master plan, wich includes a 70-acre waterfront park and inland waterways.

4.3.5 Kakaako Community Development District Plan

In 1976 the State Legislature created the Hawaii Community Development Authority (HCDA) to initiate and guide the timely revitalization of underdeveloped urban communities in the State. Kakaako was selected as the HCDA's first community development district. The State Legislature established development guidance policies for the HCDA to implement. These policies provide the planning basis for the Kakaako District and makai area. Urban use of the makai area is appropriate given that the area is classified within the Urban District by the State Land Use Commission. In compliance with the State Plan (Chapter 225, HRS), urban development is being encouraged within an already urbanized area and the physical and locational attributes of the area have been accounted for during the planning and designing of activities and facilities.

The boundary of the initial phase for the Kakaako District was Piikoi Street, King Street, Punchbowl Street and Ala Moana Boulevard. A Kakaako Community Development District Plan was completed and took effect in February 1982. However, in the 1982 State Legislative session, the boundary of this development district included an additional 133 acres on the makai side of Kakaako, a portion of the Kakaako peninsula. The first plan for this makai area was issued in October 1983. Again, in the 1987 session, the State Legislature expanded the makai area boundary to extend from Ala Moana Park to the Aloha Tower. Thus, the makai area grew from a 133-acre site to a 210-acre site.

With the launching of the waterfront master plannning process, HCDA involved itself in the effort to update the makai area plan based not only on an expanded area, but also on current market, traffic, engineering and port planning studies. HCDA's participation was also critical to ensure that plans for the makai area were compatible with and supportive of the comprehensive waterfront master plan.

Subsequent to the finalization of the waterfront planning effort, the makai area plan and rules were revised to reflect the recommended changes. The changes to the original plan and rules are the subject of this supplemental EIS.

The original makai area plan (133 acres) consisted of "Mixed Use Zone Commercial", "Mixed Use Zone Residential", "Waterfront Industrial", "Public Use Areas and Parks". The proposed plan consists of "Commercial", "Waterfront Commercial", "Recreational Commercial", "Waterfront Service", "Park" and "Public Facilities". The major difference in the two plans is the elimination of residential and industrial uses in the new plan. The Honolulu waterfront master plan study identified more suitable areas for Waterfront Industrial uses in Honolulu Harbor, and determined that Kakaako district's residential uses should be restricted to the mauka area, because of certain environmental and market concerns, such as aircraft noise and the potential exclusion of lower income families from the makai area since higher land values would necessitate higher priced housing, respectively.

4.3.6 Kakaako Makai Area Rules

The purpose of the rules is to enable HCDA to implement the policies and programs relating to the Kakaako district. Revisions to the January 1988 Kakaako district rules, which covered both mauka and makai areas, encompass the following: general language relative to the entire district was retained, with references to the waterfront master plan and the Aloha Tower Development Corporation added, and language specifically related to the mauka area removed. Language relating to the makai area was amended to conform with the recommendations of the October 1989 draft makai area plan.

The current makai area rules have been developed as a separate document which supports the recommendations of the Honolulu waterfront master plan and revised makai area plan.

The original makai area plan's land use zone rules featured the MUZ-C, MUZ-R and WI zones. The revised rules replace these with C, WC, RC, and W zones. Further, the 0.3 FAR industrial requirement formerly applied to the mixed-use zones was amended.

Specific changes to development requirements are:

- Certain pedestrian-oriented uses are now permitted within the front yard areas of parcels fronting certain streets.
- Minimum off-street parking requirements have been raised 10 percent above mauka area standards.
- At-grade oriented activities are recognized as important wherein new building envelope guidelines have been established allowing for lower rise structures while still permitting more traditional platform/tower forms.
- The interim waterfront rules have been incorporated into the Aloha Tower special district section.

Changes to the Planned Developments subchapter are:

- The reserved housing requirement which formerly applied to the mixed-use zones now apply only to C zones.
- Planned developments are required to have a minimum of 20 percent at-grade open space.

4.3.7 Conservation District Use Law

The Conservation District Use Law consists of five subzones which include: 1) "Protective" (P), 2) "Limited" (L), 3) "Resource" (R), 4) "General" (G), and 5) "Special" (SS). The conservation area of the Kakaako waterfront is seaward of the shoreline and is categorized as "Resource" subzone. The proposed project will fall partially within this subzone of the Conservation District. The objective of this subzone is "to develop, with proper management, areas to ensure sustained use of the natural resources of those areas." Permitted uses in this subzone include all permitted uses stated in the Protective and Limited subzones; aquaculture; artificial reefs; and commercial fishing operations.

The portion of the project which falls within the Conservation District entails rehabilitation of the existing seawall, dredging and filling at Kewalo Basin, and dredging of inland waterways, and offshore filling of a portion of the reef off Fort Armstrong to create a new beach park similar to Magic Island. Development of these facilities is not expected to have any long term negative effects on the environment. These improvements will greatly benefit the public through the elimination of flooding within the Kakaako District, in providing

necessary infrastructure support for planned future development, and increasing needed maritime, recreational, and urban uses, which will be enjoyed by the community.

4.4 COUNTY PLANS, POLICIES, AND CONTROLS

The Legislature gave the HCDA the power to supercede County ordinances pursuant to Act 153, SLH 1976. With the adoption of the Kakaako District and existing Makai Area Plans and Rules, HCDA has in effect overridden certain local controls such as the Development Plan and Zoning. The Kakaako Plans, however, will do much to further the goals of both the State Plan and the County General Plan.

Other County or State approvals that may be required for individual projects include:

- Building Permit - County Building Department
- Special Management Area Permit - City Council
- Grading/Grubbing Permit - County Dept. of Public Works
- Approval of Drainage Outfall - State Dept. of Health
- Conservation District Use Permit - State Board of Land and Natural Resources
- Use of State Land - BLNR and State Dept. of Transportation
- Shorewaters Construction Permit - State Dept. of Transportation
- Permit for Industrial Wastewater Discharge - County Dept. of Public Works
- Shoreline Variance Permit - Dept. of Land Utilization

4.4.1 City and County Development Plan

The Development Plan designations shown in Figure 4-1 within the project boundary include "Public Facilities" (PF), "Park" (P) and "Commercial" (C). The new Kakaako Makai Area Plan does not drastically change the overall land use pattern of the Development Plan. Some of the public facility uses encroaches into the commercial designation and vice verse. The greatest difference is the size of the park. The new park areas are approximately five times larger than that provided for in the Development Plan. The "Park" designation will replace "Commercial" and "Public Facility" designations. This change will have a more positive rather than negative impact.

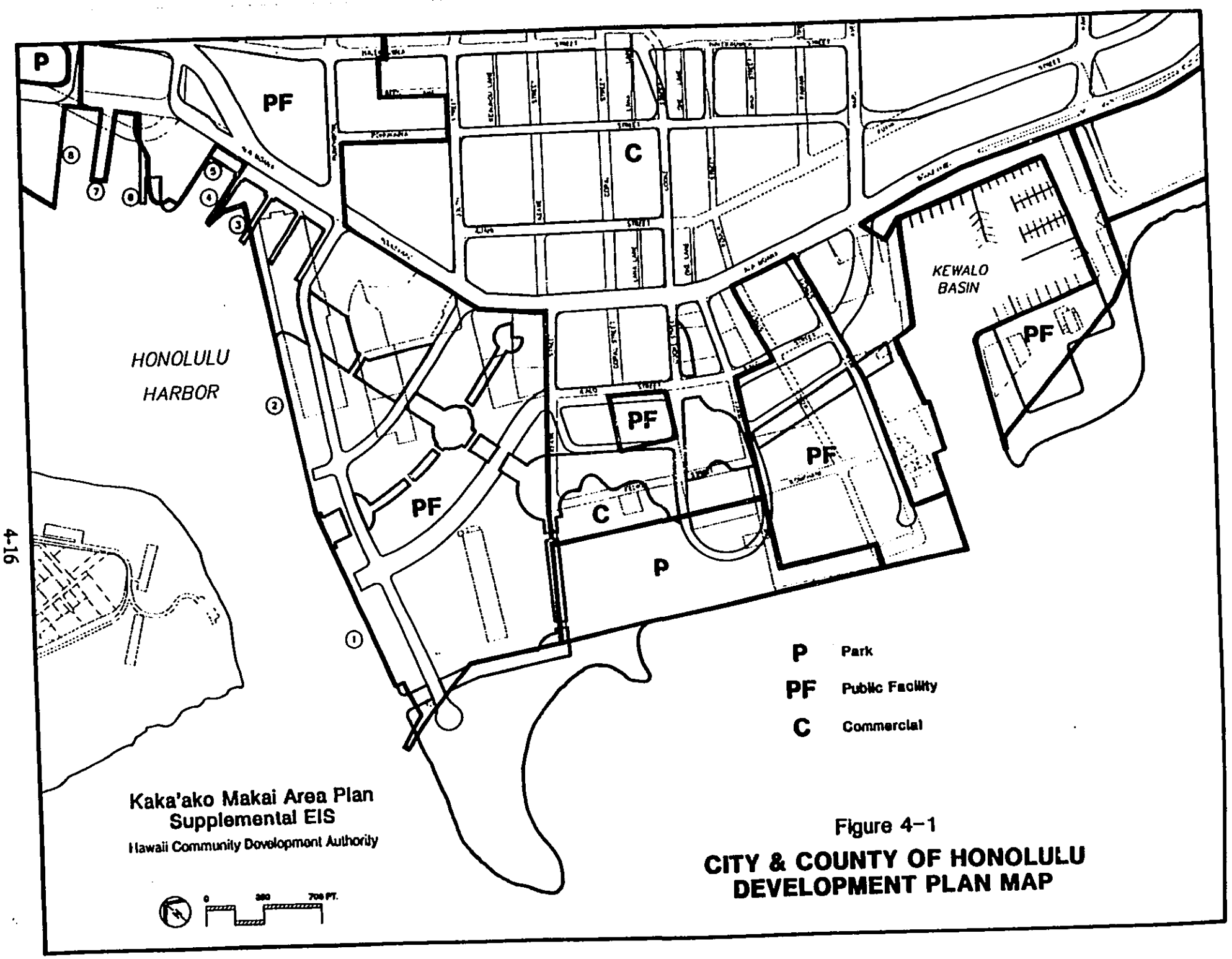


Figure 4-1

CITY & COUNTY OF HONOLULU DEVELOPMENT PLAN MAP

4.4.2 Zoning

Since the inclusion of additional makai area lands into the HCDA jurisdiction, via Act 355, SLH 1987, the lands have not been zoned by HCDA. Existing City zoning designations for these lands are P-2 (Preservation General), which is the site of the existing Ala Moana Park, Kakaako Special Design District (Kewalo Basin and a portion of the Kakaako peninsula) and B-2 (Community Business) from Pier 4 to Aloha Tower. Kakaako Special Design District land use zones P (park at grade) for Kewalo Basin and a portion of Kakaako peninsula, MUZ-Residential and MUZ-Commercial for the rest of Kakaako peninsula, and WI (waterfront industrial) for Fort Armstrong to Pier 4.

The revised makai area plan rules specify that existing MUZ-C, MUZ-R and WI zones were replaced by the new C, WC, RC, and W zones.

4.4.3 Coastal Zone Management (CZM)

In accordance with the State CZM Program (Chapter 205A, HRS), development which is not coastal dependent is being encouraged to locate in an inland area. Facilities, specific to this project include, the food distribution center, vehicle storage, tour bus yards, Kewalo Incinerator site, the City's Corporation Yard, and other small businesses. Refer to Figure 4-2 for CZM information.

The recreation objective of the Coastal Zone Management Program is to "provide coastal recreational opportunities accessible to the public." This objective is satisfied by creating diverse recreational opportunities, which currently do not exist, and which will be made available for public use. Other implementing methods which achieve this objective are, the non-point source discharge into coastal waters, creation of artificial reefs for surfing and fishing and the creation of a new sandy beach.

The historic resource objective will be satisfied by the preservation of two historic sites within the project area. These sites include the U. S. Immigration Station and the Ala Moana Pumping Station. These sites will either be preserved in their natural state or be refurbished. As stated previously, the architectural integrity of these buildings will be maintained.

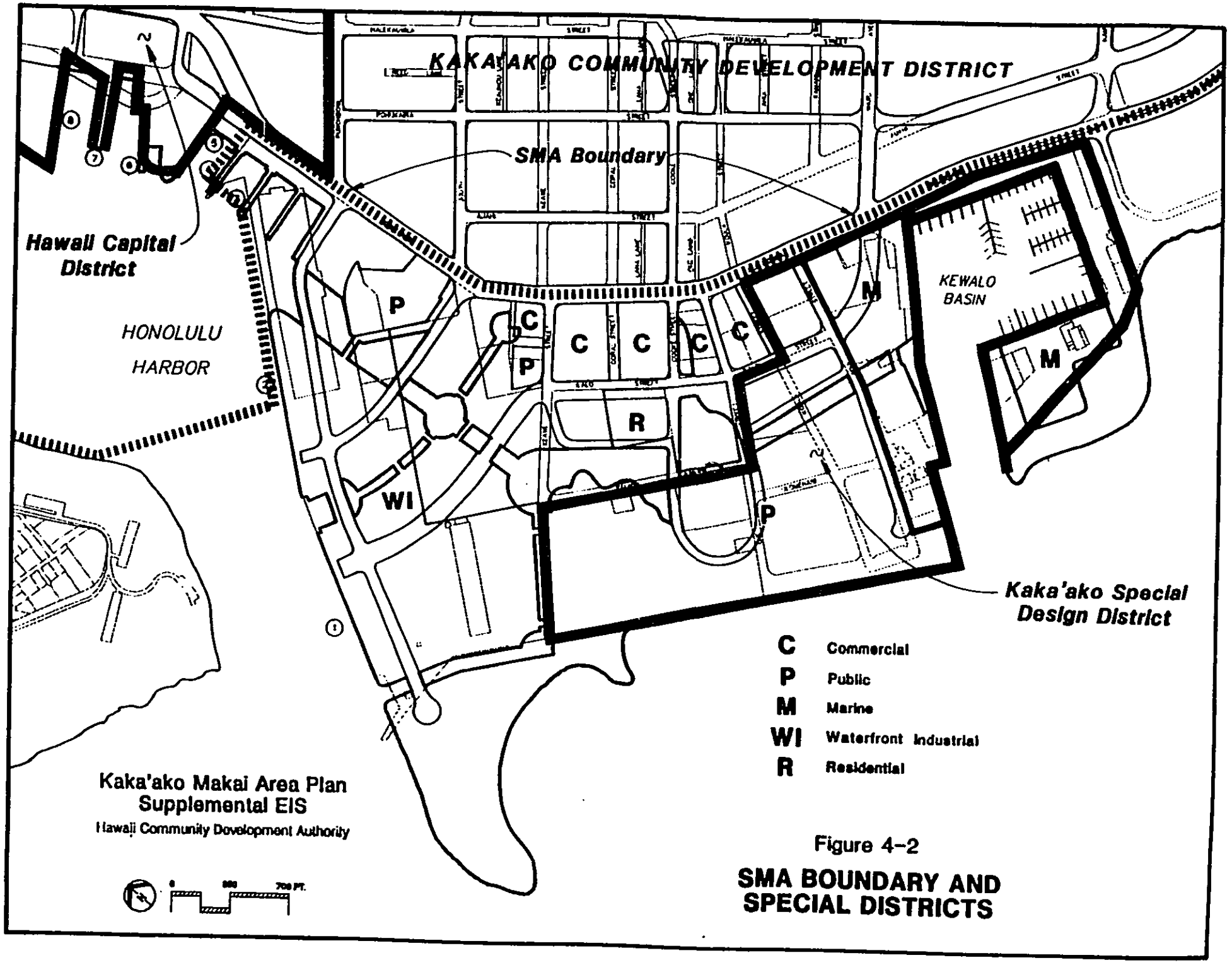


Figure 4-2

SMA BOUNDARY AND SPECIAL DISTRICTS

The project will greatly improve the scenic and open space resources objective to protect, preserve, restore or improve these resources. The present unsightly condition of the coastal area will be enhanced by opening up view valuable view corridors, providing ample open space and landscaping to improve the appearance of the area.

The coastal ecosystems objective will be fulfilled by improving the water quality in the area, by landscaping, to prevent soil erosion into receiving waters, and eliminating point source discharge by the construction of inland waterways.

The projected growth of cruise ship, commercial fishing, and dinner cruise activities, as researched and determined in the Honolulu Waterfront Master Plan, will support the economic uses objective. The expansion of these facilities will help meet the needs of the visitor and commercial fishing industries.

The improved drainage system will meet the coastal hazards objective by preventing flooding in the area. The inadequate drainage system, which currently exist, causes much flooding during storms in the area.

The public, private, government, and consultant participation in the development of the Honolulu Waterfront Master Plan, of which Kakaako Makai Area is a part, and this disclosure statement (SEIS), satisfies the objective of managing development. Short and long term impacts resulting from this project are made available to the public, the development process will utilize and implement existing laws, and application for permits will be done in a timely fashion.

4.4.4 Special Management Area (SMA)

A portion of the site is within the SMA as illustrated in Figure 4-2. Much of the area has already been developed into urban uses. However, the uses planned are proposing to improve the overall development pattern of the area. This planned development will attract the public because of its diversified uses.

The objectives of the CZM program apply to the SMA. Thus, as stated above, the project will more than satisfy these objectives with minimal adverse impacts and ample positive impacts.

All phases of the project will be in accordance with the rules and regulations of the SMA. An SMA Permit will be obtained from the City and County, Department of Land Utilization.

4.5 COASTAL VIEW STUDY

The Coastal View Study was prepared to identify significant views from within the SMA boundary islandwide. The focus of this report is the scenic and open space objective of the CZM and SMA, and elaborates on implementation of the objectives and policies.

The study divided the island into seven viewsheds which include: 1) North Shore, 2) Koolauloa, 3) Koolaupoko, 4) East Honolulu, 5) Primary Urban Center, 6) Ewa, and 7) Waianae. Of particular concern for this project was the Primary Urban Center. This area was sectioned into four subsections, Pearl Harbor, Keehi Lagoon, Downtown and Ala Moana.

After evaluation of views within the seven viewsheds, five types of views were categorized as follows:

- Type 1 - Areas which demonstrate high levels of visual intactness
- Type 2 - Rural settings near residential, agricultural and preservation land uses along the coastal highway
- Type 3 - Waianae and Nanakuli viewsheds
- Type 4 - Suburban residential communities
- Type 5 - Highly urbanized areas

The views within the project area are categorized as Type 5 viewshed. These significant views within the Downtown and Ala Moana areas, in which the project lies, include:

- Continuous and intermittent view of the Honolulu Harbor from Nimitz Highway
- Stationary views from Sand Island Park looking east, west and mauka
- Continuous makai views across Kewalo Basin and Ala Moana Park

In addition to the views identified in the Coastal View Study, view corridors which currently exist in the project area are the east/west view along Ala Moana Boulevard and the mauka/makai view along Cooke Street. The development will enhance and improve the vistas along these streets. The makai view on Cooke Street will be opened and extended to the new waterfront park, which is a great improvement over the view of the existing landfill mound. Similarly, views from Sand Island Park will be enhanced by the sculpturing and landscaping of the unattractive debris and dirt covered mound and the waterfront which will extend from Kewalo Basin to Fort Armstrong.

Views along Nimitz Highway will be improved by providing more continuous makai views. The removal of the ramp to the upper levels of Aloha Tower, the inclusion of additional dinner cruise boat slips right up to the edge of Nimitz Highway and the introduction of the inland waterway system will create additional view opportunities.

Views along Ala Moana Boulevard looking makai into Ala Moana Park will not be changed.

Other guidelines presented in the view study include building height restrictions, building setback, location of overhead utilities to the mauka side or undergrounding, street scapes and landscaping. Implementation of these guidelines are already part of the revised makai area plan.

4.6 EIS REQUIREMENTS

A Supplemental Environmental Impact Statement was prepared for the existing Makai Area Plan in May 1985. Since then, however, the revisions and modifications made to the Plan have been determined significant such that the original conclusions made in the Final EIS and the Final SEIS would not apply. The HCDA has determined that a Supplemental EIS is necessary at this time to evaluate and discuss the proposed project's short-and long-term impacts and mitigation measures.

4.7 NECESSARY PERMITS AND APPROVALS

The following are permits and approvals required prior to project construction:

- Federal

U. S. Corps of Engineers

- Department of the Army Permit (Section 10 or Section 404) for construction of structures or work in navigable waters

- State of Hawaii

Department of Land and Natural Resources

- Conservation District Use (CDUA) Permit
- Concurrence of this Department regarding historic sites
- Notice of Intent to Drill
- Right of Entry approval for planning and construction work on State-owned lands

Department of Transportation

- Written permit for any project involving permanent or temporary construction (Highways - Ala Moana Blvd.)
- Approval for utilities and traffic rerouting

Office of State Planning

- Compliance with the Coastal Zone Management program guidelines

Department of Health

- National Pollutant Discharge Elimination System (NPDES) Permit
- Noise Variance Permit
- Variance for 24-Hour construction
- Permit for Air Emissions
- Notification of work on sewer lines
- Section 401 Water Quality Certification

- City and County of Honolulu

Department of Land Utilization

- Permit for the construction of any structure within the Shoreline Management Area (SMA)
- Shoreline setback variance for construction in the shoreline area

Department of Public Works

- Stockpiling Permit

- Grubbing Permit
- Grading Permit
- Demolition Permit
- Dewatering Permit
- Excavation Permit

Building Department

- Building Permit

- Others

Hawaiian Telephone Company

- Permit or concurrence regarding work on utility lines

Hawaiian Electric Company

- Permit or concurrence regarding work on utility lines

Gas Company

- Permit or concurrence regarding work on utility lines

Cable TV

- Permit or concurrence regarding work on utility lines

Board of Water Supply

- Notification of drilling project area

CHAPTER 5

Alternatives to the Proposed Action

CHAPTER 5
ALTERNATIVES TO THE PROPOSED ACTION

5.1 NO ACTION ALTERNATIVE: ORIGINAL 1983 MAKAI AREA PLAN

The features of the original makai area plan are: to retain the existing maritime cargo operations at Piers 1 and 2; introduction of residential uses along with commercial/office development, and a requirement of a minimum amount of industrial or relocation commercial use in the area bounded by Ala Moana, Koula, Ilalo, Ohe, Kelikoi, and Keawe.

5.1.1 Commercial vs. Industrial

The land use pattern envisioned for the original makai area plan utilized approximately 4.4 million square feet or 102 acres, and 4.4 acres of public-designated land. The original planning area encompassing 133 acres, was included in the Kakaako district (Act 228, SLH 1982) as assigned to HCDA for planning and implementation of improvements. The area was makai of Ala Moana Boulevard between Ala Moana Park and Pier 4. Kewalo Basin, the proposed 60-acre waterfront park, and Pier 4 to the Aloha Tower were adjacent to the makai planning area, and County zoning designations for these areas still applied. Zoning for these areas were Kakaako Special Design District, P or park at grade, and B-2 community business, respectively.

The original makai area plan designated MUZ-C (mixed use commercial), MUZ-R (mixed use residential), and WI (single use waterfront industrial) zones. Two public (P) designated areas were included in the Fort Armstrong area. This plan offered a total floor area of 8.3 million square feet (msf) with an average floor area ratio of 1.4. The revised makai area plan, on the other hand, proposed to replace these zones with the new C (commercial), WC (waterfront commercial), RC (recreation commercial), and W (waterfront service) land use designations. The total potential floor area for this plan is 7.51 msf, with an overall average FAR of 0.8. The slightly reduced potential FAR is due to the inclusion of the waterfront park and additional park lands proposed in the makai area.

The original makai plan contained a 0.3 FAR industrial requirement in the MUZ-C and MUZ-R zones. Industrial uses were allocated about 3.2 msf (30 percent) of the developable land area. The revised makai plan was amended to delete this requirement.

The revised plan no longer allows industrial uses in the makai area. Existing industrial uses are planned for relocation to the Kapalama Military Reservation, assuming the State is successful in purchasing this property.

The makai area commercial zone contains a potential gross commercial floor area of 5.07 msf (net of the Piers 5 and 6/HECO parcels adjacent to the Aloha Tower) within a 39-acre area resulting in an average maximum FAR of 3.0. A mixture of commercial and office uses are envisioned for approximately 40 acres of the makai area. This includes about 12 acres of privately-owned lands along Ala Moana Boulevard, parcels along the mauka side of the proposed inland waterway and lands within the mauka portion of the Fort Armstrong area. Along Ala Moana Boulevard, the maximum permissible FAR is 3.5, with a maximum height of 200 feet. On other parcels, the FAR is 2.5 with a maximum height of 150 feet.

Advantages. Waterfront industrial uses in Kakaako makai would be retained until alternative relocation sites become available. This aids the long-term stability of the maritime industry. The allowance for relocation sites also aids the continued operations for business that may be displaced by urban redevelopment in Kakaako.

Disadvantages. Long-term retention of waterfront industrial uses at Fort Armstrong and on the Peninsula would conflict with encroaching urban waterfront commercial and recreational activities in the long run. The scenario foreseen would be that of adverse environmental impacts from these ongoing industrial activities on the newly redeveloped Kakaako Mauka area that will contain numerous residential developments.

Summary. A broader perspective of the urban waterfront helped in the reshaping of the Kakaako makai area's long-term redevelopment potential-- the Makai area's role was determined to be that of a regional Central Park of Honolulu equipped with active recreational, educational and cultural uses for residents. Relocation of maritime industrial and other light industrial uses to areas compatible with these types of uses is possible within the broader context of the Honolulu waterfront master plan.

The need for commercial office and retail shopping facilities within the makai area was studied as part of the Honolulu waterfront planning process. The analysis was based on a detailed analysis of those factors which influence supply and demand and consideration for the competitive advantages of each land use. Based on the locations and development timetables of planned and proposed office developments, makai area office development on both State and privately-owned property could amount to an estimated 2 msf between 1990 and 2010, with absorption estimated at about 100,000 square feet per year. The market assessment concluded that there will be an increasing demand for commercial office and retail shopping facilities in Kakaako makai as the area redevelops over the next 10 to 20 years.

The Honolulu waterfront master plan process involved the consideration of a variety of alternative land use, physical design elements, and public financing options during the year-long planning process. While the outlook for housing demand in Honolulu remains strong, potentially adverse market considerations, and environmental impacts from aircraft, traffic, and amphitheater noise necessitated re-evaluation of inclusion of residential development in the Makai Area.

5.2 COMMERCIAL VS. RESIDENTIAL LAND USES

The need for commercial office and retail shopping facilities within the Makai Area through 2010 was studied by John Child and Company, Inc. as part of the Honolulu Waterfront planning process. The assessment was based on a detailed analysis of those factors which influence supply and demand and consideration for the competitive advantages and disadvantages of each land use. Honolulu's projected population growth and job formation forecast, which form the assumptions for market demand, were based on DBED's 1988 M-K projections to the year 2010.

Based on the locations and development timetables of planned and proposed office developments, makai area office development on both State and privately-owned property could amount to approximately 2 million square feet between 1990 and 2010, with absorption at about 100,000 square feet per year. A mix of commercial and office uses are planned for approximately 40 acres of the makai area. This area includes approximately 12 acres of privately-owned lands along Ala Moana Boulevard, parcels along the mauka

side of the proposed inland waterway and lands within the mauka portion of the Fort Armstrong area. Height limits will vary, stepping down towards the shoreline. This area is planned to include a significant portion of the parking required for users of the waterfront park and other uses within the area.

At the present time, the makai area plan does not provide for the inclusion of residential uses. The revised Makai Area Plan reflects land use zone changes as follows: existing MUZ-C, MUZ-R, and WI zones were replaced by the new C, WC, RC, and W zones. Specifically, the original Makai Area Plan included an allowance for residential development within the MUZ-R and MUZ-C zones. The revised Plan reflects the results of a complex Honolulu Waterfront planning process which now places an emphasis on commercial office and commercial retail, and recreational land uses for Kakaako Makai due to its central Honolulu waterfront location.

As stated in the goals for the Honolulu Waterfront Master Plan, housing should only be provided if it is not competing with or impacted by other uses which benefit or need a waterfront location. There are, however, advantages to including residential uses in the Kakaako Peninsula.

Advantages. First, marketing analyses show that residential uses create higher land values the closer they are to the waterfront. A model of specific development parcels in the Fort Armstrong area indicates a premium of up to 25 percent for residential property located adjacent to the waterways. Secondly, housing in the Kakaako Peninsula would open the area to an additional market which would likely increase the pace of development in the area. Thirdly, housing would provide a 24-hour population that would promote the concept of the area as a gathering place. Finally, housing provides an opportunity for people to live and work in the same vicinity, thus reducing traffic generation in the area.

Disadvantages. Arguments against housing in Kakaako makai is that the housing would be targeted for higher income families since it will be adjacent to massive public amenities to public parks. However, the addition of affordable housing would decrease the potential economic benefits used to subsidize other public improvements in the area. Another disadvantage of residential uses is the anticipated demand for parking. As noted in the

Makai Area Plan and Rules, the Commercial zone parcels will provide parking for the general area and, in off-peak hours, park visitors. Parking for residential uses would limit this sharing potential. In fact, residential uses would be competing with the general public for both on- and off-street parking, possibly requiring the development of additional public parking facilities. Further, the projected 19,000 units projected for the mauka area effectively reduced the need for any residential development in the Makai Area. Further, planned development project in the Makai area are required to contribute to the Reserve Housing Trust Fund or develop housing in the Mauka area.

Other arguments against housing in Kakaako Makai include the potential of noise impacts from aircraft, roadway traffic and the proposed amphitheater. The Fort Armstrong area is and will continue to be subjected to aircraft noise generated from flight operations associated with Honolulu International Airport. Major arrival and departure flight tracks for the Honolulu International Airport are located in the vicinity of the Makai Area. The principal impact associated with this proximity is a relatively high level of aircraft noise with much of the Makai Area exposed to aircraft noise levels in excess of 60 Ldn (average day-night sound level). Although noise exposure is expected to gradually decrease over the next 20 years as the introduction of quieter engines into the aircraft fleet offset the projected increase in air traffic, the Makai Area will continue to be exposed to similar levels of aircraft noise.

Further, State policy has been the discouragement of urban residential development within areas impacted by aircraft noise levels in excess of 60 Ldn (Ldn levels represent the aircraft noise for the 24-hour period of the average day of the year with a ten percent penalty for nighttime aircraft operations. The calculations take into account tradewind and Kona wind aircraft flight patterns.)

Properties fronting Ala Moana Boulevard are also impacted by traffic noise generated by vehicular movements along Ala Moana Boulevard. Although the proposed amphitheater is to be situated facing the ocean, the proximity of housing to this facility nonetheless presents the potential for noise impacts. (Such a situation has recently limited the use of the Waikiki Shell.)

Summary. Commercial office uses will not provide the same 24-hour presence associated with residential uses. However, when combined with specialty retail facilities, such as the proposed Kewalo fishing village, and significant public facilities, such as the proposed performing arts center, museum, amphitheater, and inland waterway system (as well as the recreational commercial "Tivoli Gardens" facility proposed for the long-term), commercial uses will nonetheless provide a different and more vibrant center of activity, supplying a critical mass needed to sustain a high degree of recreation and leisure activity within the Makai Area. Finally, the development of commercial uses rather than residential uses would ensure that a greater number and cross section of people would enjoy the public activities and facilities planned for the area.

5.3 INLAND WATERWAYS VS. NO INLAND WATERWAYS

The network of inland waterways is planned through the Kakaako peninsula. This network will extend from Kewalo Basin to the proposed newly developed Pier 4 area and encompass 15-18 acres. Much of the waterways would be approximately 100 feet wide, with some areas forming lagoons of up to 250 feet across. The waterways could serve a variety of recreational activities: paddling, canoeing, rowing, model boat sailing and fishing, as well as passive enjoyment.

The planned network of waterways will be integrated into the existing drainage system. A depth of -6 feet mean sea level for the waterways will be typical.

Advantages. The inland waterways will provide significant economic and aesthetic benefits to the adjacent land areas. The rationale for the proposed alignment is based on the concept of bringing more waterfrontage into the Kakaako area, creating a new urban waterfront for the Kakaako community in addition to the passive waterfront of the shoreline park.

Preliminary analysis of the costs and benefits of this system find that the feature should be able to pay for itself with the prospective costs of canal and bridge construction expected to roughly equal the projected premiums paid by developers of adjacent commercial lands. Preliminary calculations were done based on projected ground rental income stream which

compared land values with and without the waterway.

Assumptions included total office, commercial development on the Kakaako peninsula:

With Waterway Total Income Stream = $220 million
Without Waterway Total Inc. Stream = $175 million

Potential benefit in terms of rental income stream would mean properties fronting the proposed waterway could yield revenues approximately 1.25 times higher than if they did not feature the waterway. It should be noted that the analysis did not attempt to quantify indirect benefits of the inland waterway, such as the added value perceived by visitors to the park and other public land uses in the makai area.

The proposed interior drainage systems for the Kakaako peninsula can flow directly into the waterways, thereby reducing the size and length of the required drain lines. The waterways will be at least 100 feet in width and have a depth of 6 feet below mean sea level. The mauka-makai waterway branch will replace the new 30-foot wide concrete channel to be constructed by the Kakaako improvement district 2 project. The proposed waterway will provide over twice the cross sectional area of flow, reducing the velocity of the storm waters so that no loss in flow capacity is expected as long as the proposed waterways are properly maintained.

There are three sources of energy which may help the flushing action to maintain water quality in the waterway system: (See Appendix A).

* Tidal action: given a depth of 6 feet flushing would occur with a complete turnover of water within the 4 tidal cycles of a 2-day period.
* Wind-induced currents: prevailing tradewinds can aid in flushing these waterways.
* Freshwater inflow: groundwater inflow can also aid in flushing.

Disadvantages. The amount of developable fast land acreage (15-18 acres) would be sacrificed for the use as additional waterways. Public funds would be expended to plan and

construct this inland waterway system. Thus, the short-term public costs of $12.8 million would be high.

Summary. Despite initially high public costs, the inland waterways will provide significant economic, practical (in terms of enhancing the drainage system), and aesthetic benefits to the redeveloping adjacent land areas.

5.4 ORIGINAL VS. NEW WATERFRONT PARK

The original waterfront park was to be developed by the Department of Land and Natural Resources as a 60-acre regional facility featuring physical waterfront activities, such as walking, viewing, jogging, picnicking, fishing, and easy access to ocean recreation such as body and board surfing. This park was envisioned as an extension of Ala Moana Beach Park. Focus of the recreational opportunities was on physical recreation.

The new, revised waterfront park is proposed to cover approximately 70 acres, and offer a wider range of recreational activities, such as cultural entertainment facilities, from museums to an amphitheater, as well as large areas for picnicking, viewing, jogging, shoreline fishing, and access to the ocean. A 17-acre beach park similar to Magic Island is also envisioned by offshore landfilling at the end of Fort Armstrong. The newly proposed waterfront park features a broader waterfront experience to Honolulu residents and visitors through enrichment of the body and mind.

Both the original and the new waterfront parks focused on achieving the urban design goal of exposing the general public to the new regional park. An appealing park entrance with significant exposure along the Ala Moana Boulevard corridor was viewed as an important design solution to encourage park use. The original (existing 1983) Makai Area Plan designated the State-owned block makai of Ala Moana Boulevard and surrounded by Ahui and Koula Streets as the waterfront park entrance. While this entrance was envisioned to be a major landmark for the new park, the Honolulu Waterfront planning process identified an even more significant element which would enhance an existing major view corridor (Cooke Street) -- one privately-owned parcel fronting Ala Moana Boulevard and bounded by Cooke Street, Ohe Street. This parcel is proposed to become a major entrance of the waterfront park out onto Ala Moana Boulevard.

Advantages. An urban waterfront park which offers an exciting range of entertainment, cultural and physical activity areas would create a setting along the waterfront that encourages the "people-oriented gathering place." These elements include major links of the Great Park concept of the waterfront master plan, and are intended to add variety and diversity to the typical beach park experience. A waterfront park entrance which projects into the mauka area of Kakaako will achieve the urban design goal of the Makai Area Plan to visually expose the general public to the proposed "Central Park" of Honolulu. Such an appealing entrance will draw a greater number of park visitors and simultaneously provide an important link between the Mauka Area and the waterfront park. Cooke Street is presently identified as a major "view corridor" street and the development of this park entrance will provide an important Mauka-Makai linkage.

Disadvantage. Additional lands will have to be acquired by the State within the Makai Area to implement this proposal. The parcel fronting Ala Moana Boulevard and bounded by Cooke Street, Ohe Street is owned by Bishop Estate. A land exchange with the landowner could be negotiated whereby the State-owned parcel presently housing the Honolulu Board of Water Supply Corporation yard (between Koula and Ahui Streets) would be traded for the parcel discussed above. The areas are of approximately equal size, and would allow the private landowner to consolidate land parcels. This procedure would be more involved as opposed to the use of State land for the original Waterfront Park entrance. Such a land exchange may be complicated by a potential condemnation process which may delay the start of construction of the park entrance ultimately.

Summary. Despite a potentially complex land exchange or acquisition process for the new park entrance, the long-range public benefits of a more accessible and attractively designed Waterfront Park will outweigh the initial public costs. The new park is envisioned as a major public amenity. It is planned to be the "Central Park" of Honolulu, providing a vital link in the "lei of green" extending from Waikiki to the airport. A major park entrance between Cooke Street and Ohe Street will provide a landmark that will enhance the highly urbanized central Honolulu district.

5.5 PUBLIC FINANCING ALTERNATIVES

By stretching the high cost of public improvements ($280 million) over a period of time, public financing will stabilize the cashflow requirements of the Makai Area and achieve a better matching of revenues and expenditures.

At present, the Authority has used only one financing mechanism to pass identified plan improvement costs directly to its users--assessment bonds for the special benefit portion of the urban development costs. Recommended plan improvements should result in real property tax revenues; however, legal mechanisms do not exist by which the Authority can capture those revenues. Sales tax revenues will flow to the State and could represent a bondable source of security; however, even with the legal means to pledge such revenues, the State, like other states, may have little inclination to do so since such revenues would strengthen its General Fund. Finally, although ground lease rentals can be captured, such revenues, alone generally provide a somewhat weak source of security in a bond issue.

To the extent HCDA cannot capture and pledge a predictable and established revenue flow to a bond issue, or use special assessment bonding, it necessarily must rely on State CIP appropriations, general obligation bonds, pay-as-you-go financing from project area revenue flows, and/or private funds to pay for public improvements. To implement other forms of financing which would reduce the dependency on general obligation bond financing, the following strategies will be considered:

- Coordinate with the City and County with respect to sharing the "windfall" of increased property tax revenues from the planning area.

- Utilize ground lease rentals for the following purposes: pay-as-you-go financing (thereby reducing future bonding requirements); broaden the revenue base of a public agency with existing bonding capabilities; or for reimbursing a revolving fund, if one is established.

- Adopt legislation which may increase the flexibility of spreading special assessments and levy special taxes on the basis of more general benefit.

The above alternative strategies will not completely eliminate the need for general obligation bond financing. However, HCDA may be able to limit the use of general obligation bonds to those facilities which provide more regional benefit, such as the Waterfront Parks and other recreation facilities, or which have no other financing alternatives.

CHAPTER 6

Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

CHAPTER 6

RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The major tradeoff of redevelopment in the Kakaako Makai area involves the relocation of existing light industrial businesses and activities in return for higher density commercial and office spaces, regional urban waterfront recreational uses, and growth areas for maritime commercial activities. The proposed action is expected to enhance the long-term vitality of this presently underutilized urban area by upgrading the infrastructure necessary for redevelopment and by providing additional public services and amenities. The proposed action does not pose significant long term risks to the health or safety of residents or workers in the makai area.

CHAPTER 7

Irreversible/Irretrievable Commitment of Resources by the Proposed Action

CHAPTER 7

IRREVERSIBLE/IRRETRIEVABLE COMMITMENT OF RESOURCES BY THE PROPOSED ACTION

The proposed improvements will require an irretrievable and irreversible commitment of a number or resources for its completion. These resources will include capital, materials, manpower, and energy. Financial, material, and manpower resources will be irretrievably committed to the planning, design and construction of the improvements. Energy is another valuable resource which will be required for the completion of Phase I and future phases.

The project will also commit water resources after the construction phase is complete to service the new development.

The oceanfront property is a valuable resource to the State of Hawaii. The proposed action would set aside this land for the public for many generations to come. As there would be minimal on-site structures and landscaping, alternative development would be possible if continued recreational use was not desired.

CHAPTER 8

Unresolved Issues

CHAPTER 8
UNRESOLVED ISSUES

One of the principal benefits of the Kakaako makai area plan will be a significantly improved vehicular circulation system. Key streets will be improved and upgraded to provide increased roadway capacity and allow traffic to flow more smoothly within Kakaako. As in the mauka area, guidelines in the makai area on urban design will encourage less dependence on the automobile. Nonetheless, traffic volumes in and around the district is expected to increase from 1990 to 2010.

An unresolved issue which has the potential for affecting existing and recommended land uses within the Honolulu waterfront planning area (and more specifically, the Kakaako makai area) is the potential regional need for additional transportation corridor capacity within the central Honolulu area. Traffic studies conducted for the Honolulu waterfront master plan indicate that forecasted growth in regional (east-west) traffic with or without any contribution from the master plan recommendations will exceed planned capacity by the year 2010. This implies that additional laneage will be required beyond that which is presently planned to exist in 2010. The issue of the need for additional capacity is unresolved because the indicated need is thus far based on a preliminary level of study which has not yet been evaluated by the State's official transportation planning process coordinated by the Oahu Metropolitan Planning Organization (OMPO).

OMPO coordinates the integrated transportation planning for Oahu, combining the planning resources of the City and County of Honolulu, Departments of General Planning, and Transportation Services, and the State Departments of Business and Economic Development, and Transportation. These agencies are responsible for facility needs and programming of local, state, and federal funds for Oahu's transportation needs.

OMPO is presently completing long-range forecasts and plans based on the official 2005 horizon year. Preliminary findings were not available at the time the traffic studies for the waterfront plan were completed. The OMPO process has not yet looked at 2010 projections, and will not be able to fully resolve the issue (i.e., confirm or dismiss the waterfront plan findings) until major new system-wide studies are completed.

CHAPTER 9

Consulted Agencies and Participants in the Preparation of the Environmental Impact Statement

CHAPTER 9

CONSULTED AGENCIES AND PARTICIPANTS IN THE PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT

U. S. GOVERNMENT

- Department of Agriculture, Soil Conservation Service
- Department of the Army, U.S. Army Corps of Engineer District, Honolulu
- Department of the Interior, Fish and Wildlife Service
- Department of the Interior, Geological Survey Water Resources Division
- Department of the Navy, Naval Base Pearl Harbor
- Fourteenth Coast Guard

STATE OF HAWAII

- Office of State Planning
- Department of Transportation
- Hawaii Community Development Authority
- Office of Environmental Quality Control
- Department of Land and Natural Resources
- Department of Health
- Department of Business and Economic Development
- Department of Agriculture
- Department of Education

CITY AND COUNTY OF HONOLULU

- Department of Land Utilization
- Department of Public Works
- Department of Parks and Recreation
- Department of General Planning
- Department of Housing and Community Development
- Police Department
- Fire Department
- Board of Water Supply
- Office of the Mayor

OTHER

- Downtown Neighborhood Board No. 13
- Waikiki Aquarium
- University of Hawaii Zoology Department
- University of Hawaii Environmental Center
- Hawaiian Electric Company, Inc.

CHAPTER 10

List of Preparers

CHAPTER 10
LIST OF PREPARERS

LIST OF PREPARERS

R. M. Towill Corporation	Bruce Tsuchida, Principal in Charge
	Colette Sakoda, Senior Planner
	Joanne Hiramatsu, Staff Planner
	Laura Fujioka, Planning Aide
	F. L. Vuillemot, Project Engineer
Helber, Hastert & Kimura Planners	Tom Fee, Project Planner
Edward K. Noda and Associates, Inc.	Elaine Tamaye
William A. Brewer & Associates	William A. Brewer
Darby & Associates	Ron Darby
Pacific Planning & Engineering, Inc.	Jonathan Shimada, Ph.D.
J. W. Morrow	James Morrow
John Child & Company, Inc.	Paul D. Cool
Dean Witter Capital Markets	
Harding Lawson Associates	
Miyabara Associates	

CHAPTER 11

Preparation Notice Comments Received

JOHN WAIHEE
GOVERNOR

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

Mailing Address:
P. O Box 22159
Honolulu, Hawaii 96822-0159

July 18, 1989

'89 JUL 21 AM 10 09
RECEIVED

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
677 Ala Moana Boulevard
Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Subject: Environmental Impact Statement Preparation Notice (EISPN) for
Revised Kakaako Makai Area Plan
TMK: 2-1-15: multiple parcels
2-1-60: multiple parcels
2-1-59: multiple parcels
2-1-58: multiple parcels

The Department of Agriculture would like to be a consulted party to the subject EISPN. Please send all pertinent materials to:

Mr. Yukio Kitagawa
Chairperson, Board of Agriculture
P. O. Box 22159
Honolulu, Hawaii 96822

Sincerely,

PAUL J. SCHWIND
Planning Program Administrator

cc: Chairperson, Board of Agriculture

John Waihee
Governor

Kenneth K. Takemaka
Chairman

Rex D Johnson
Executive Director

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

August 31, 1989

Mr. Paul J. Schwind
Planning Program Administrator
Department of Agriculture
State of Hawaii
P. O. Box 22159
Honolulu, Hawaii 96822-0159

Dear Mr. Schwind:

Re: Kakaako Makai Area Plan Supplemental Environmental Impact Statement (SEIS) Preparation Notice

We are in receipt of your letter dated July 18, 1989 in response to the SEIS Preparation Notice for the Kakaako Makai Area Plan.

Per your request, the State Department of Agriculture shall be a consulted party in the SEIS process.

Very truly yours,

Rex D. Johnson

RDJ/ST:ak
cc: Mr. Eric Hasutomi
(Office of State Planning)
The Honorable Marvin Miura
(Office of the Environmental Quality Control)

DOWNTOWN NEIGHBORHOOD BOARD NO. 13
c/o NEIGHBORHOOD COMMISSION OFFICE
CITY HALL
HONOLULU, HAWAII 96813

July 20, 1989

RECEIVED
'89 JUL 24 AM 10 02
HAWAII COMMUNITY DEVELOPMENT AUTHORITY

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
677 Ala Moana Blvd., Suite 1001
Honolulu, HI 96813

Dear Mr. Johnson:

Downtown Neighborhood Board No. 13 wishes to be a consulted party in the Supplemental EIS for HCDA's Kaka'ako Makai Area Plan.

Sincerely,

Andrew Rothstein
Chairman

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613

August 30, 1989

Mr. Andrew Rothstein, Chair
Downtown Neighborhood Board No. 13
c/o Neighborhood Commission Office
Honolulu Hale
Honolulu, Hawaii 96813

Dear Mr. Rothstein:

Re: Kakaako Makai Area Plan Supplemental Environmental Impact Statement (SEIS) Preparation Notice

We are in receipt of your letter dated July 20, 1989 in response to the SEIS Preparation Notice for the Kakaako Makai Area Plan.

Per your request, the Downtown Neighborhood Board No. 13 shall be a consulted party in the SEIS process.

Very truly yours,

Rex D. Johnson

RDJ/ST:ak
cc: Mr. Eric Masutomi
(Office of State Planning)
The Honorable Marvin Miura
(Office of the Environmental
Quality Control)

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF:

August 3, 1989

Planning Branch

Mr. Rex D. Johnson, Executive Director
Hawaii Community Development Authority
Suite 1001
677 Ala Moana Boulevard
Honolulu, Hawaii 96813

'89 AUG 8 AM 10 11
RECEIVED
HAWAII COMMUNITY DEVELOPMENT AUTHORITY

Dear Mr. Johnson:

Thank you for the opportunity to review the Supplemental Environmental Impact Statement (EIS) Preparation Notice for the amended Makai Area Plan, Kakaako Waterfront Area, Honolulu. The following comments are offered:

a. The Department of the Army (DA) regulates the placement of fill and structures in waters of the United States. Operations Branch (telephone 438-9258) will respond to questions regarding the DA permit program. Mr. Clayton Goo of your organization has discussed this project with Operations Branch and is aware of permit requirements.

b. Much of the flood hazard information presented on page 3-4 of the Environmental Assessment is obsolete and should be replaced with statements (such as those provided in paragraph c, below) which are based on the latest (September 4, 1987) Flood Insurance Rate Map (FIRM).

c. According to the Flood Insurance Study for the City and County of Honolulu, most of the project parcels are located in Zone X, "Other Areas" determined to be outside of the 500-year flood plain as designated by the Federal Emergency Management Agency (FEMA) in September 1987. A small portion of

the project is located in Zone AE (special flood hazard area inundated by the 100-year flood) with a base flood elevation of 4 feet MSL. Additional small portions are located in Zone A (special flood hazard areas inundated by the 100-year flood, with no base flood elevations determined).

Sincerely,

C Tsuyuguchi

Kisuk Cheung
Chief, Engineering Division

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

August 31, 1989

Mr. Kisuk Cheung, Chief
Engineering Division
Department of the Army
U. S. Army Engineer District,
Honolulu
Building 230
Fort Shafter, Hawaii 96858-5440

Dear Mr. Cheung:

Re: Kakaako Makai Area Plan Supplemental Environmental Impact Statement (SEIS) Preparation Notice

We are in receipt of your letter dated August 3, 1989 in response to the SEIS for the Kakaako Makai Area Plan.

The Draft SEIS will contain the updated information relative to flood hazard designations for the Kakaako makai project area based on the latest (September 4, 1987) Flood Insurance Rate Map.

Mr. Cleighton Goo of the HCDA office will continue to coordinate with your Operations Branch in order to provide sufficient information on the proposed seawall renovation work in the waters off Kakaako in fulfilling the Department of the Army's permit requirements. The Draft SEIS will contain such information for your review and comment.

Thank you for your participation in the planning process of this vital project. We look forward to your continued input and cooperation as the Makai Area Plan progresses toward implementation.

Very truly yours,

Rex D. Johnson

RDJ/ST:ak
cc: Mr. Eric Hasutomi
(Office of State Planning)
The Honorable Harvin Miura
[illegible]
Quail [illegible]

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

DONALD A. CLEGG
CHIEF PLANNING OFFICER

GENE CONNELL
DEPUTY CHIEF PLANNING OFFICER

KK/DGP 7/89-2712

August 14, 1989

Honorable Rex D. Johnson, Executive Director
Hawaii Community Development Authority
677 Ala Moana Boulevard, Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Preparation Notice for a Supplemental
Environmental Impact Statement (SEIS)
for the Amended Makai Area Plan for the
Kakaako Waterfront Area
Your letter dated July 17, 1989

We have reviewed the subject Preparation Notice and have the following concerns which should be addressed in the Draft SEIS:

1. Although the proposed waterway (canal and lagoons) will provide more water frontage, the actual recreational use may be limited (the Ala Wai Canal services canoe clubs and limited fishing activity). Additional canoe club facilities are currently planned for Keehi Lagoon.

   The costs for building and maintaining these water features may outweigh the benefit. These costs, including construction costs for dredging, lining the channel, and bridges, as well as maintenance costs for the upkeep of the channel and bridges, should be projected.

   Another cost is the loss of 15 to 18 acres that could meet other recreational needs that would service a greater number of people. One possible use of a portion of this land would be for landscaped (lighted?) parking areas which could also function as a buffer area between urban and park uses. We are concerned with the plan for shared parking since often times commercial office developments have enclosed multi-level parking facilities which could create security problems in the evenings and weekends.

2. We support the idea of extending the park entrance to the mauka portion of Kakaako with a triangle park but are concerned about the creation of a 5-leg intersection. Are there plans to have these legs function as one way streets looping around the Performing Arts/Museum Complex? If not, perhaps some other design can be considered to eliminate the 5-leg intersection or mitigate the conflicting traffic movements it would create.

3. The impacts (particularly on the ocean environment) of the planned dredge and fill activities, including the water circulation channel and surf shoal, should be addressed.

4. The impacts of the Urban Park Entertainment Area should be considered. The preparation notice indicated that the project may be similar to the Epcot Center in Orlando which has extensive parking requirements and has had a major impact on traffic.

5. Alternate plans for redevelopment of the City corporation yard at its present location should be included in the event that the facility cannot be relocated to Sand Island.

6. The Department of Land Utilization is moving to protect mauka views from Magic Island through graduated height limits in the Sheridan area. The Hawaii Community Development Authority (HCDA) should consider similar controls to protect this site's important mauka views. As mentioned in the preparation notice, "The site is one of the few places in Honolulu where a 360-degree panoramic view of the ocean, the Koolau and Waianae Ranges, Barbers Point, Downtown Honolulu, and Waikiki can be viewed."

7. The use of non-potable water for landscaping should be considered.

8. A discussion of the inconsistencies between the Kakaako Makai Area Plans and the County's Development Plan Land Use and Public Facilities Maps would be helpful to reviewers.

We appreciate the opportunity to comment on this Preparation Notice. If you have any questions, contact Keith Kurahashi at 527-6051.

Sincerely,

DONALD A. CLEGG
Chief Planning Officer

DAC:ft

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

August 31, 1989

The Honorable Donald A. Clegg
Chief Planning Officer
Department of General Planning
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Re: Kakaako Makai Area Plan Supplemental Environmental Impact Statement (SEIS) Preparation Notice

We are in receipt of your letter dated August 14, 1989 in response to the SEIS for the Kakaako Makai Area Plan.

The following has been prepared in response to your comments:

1. Preliminary analyses conducted as part of the Honolulu Waterfront Master Planning process indicated that the overall costs of construction and maintenance would be outweighed by the aesthetic value and practical benefits of the proposed inland waterway system. A preliminary cost benefit analysis, done for the Honolulu Waterfront Master Plan, yielded a conclusion that costs of the canal and bridge construction were expected to roughly equal the projected premiums paid by developers of adjacent commercial lands in the makai area. It should be noted that the analysis did not attempt at the time to quantify additional indirect benefits of the inland waterway, such as the added value perceived by visitors to the Waterfront Park and other

public land uses in the area. Further, the proposed interior drainage systems for the Kakaako Peninsula can flow directly into the waterways, thereby reducing the size of the required drain lines.

The concern for safety in enclosed parking facilities is ongoing. However, the Makai Area Plan envisions a public safety program which would include acquisition and installation of private security systems or services, ensuring safe and pleasant access to services, places of employment and recreation areas, and providing information on personal safety within developments.

2. Your comments relative to traffic and circulation impacts and parking provisions, as well as impacts of the planned dredge and fill activities, will be addressed in the Draft SEIS. Alternate plans for the City Corporation Yard are not feasible at the present location.

3. The Makai Area Plan proposes to preserve and enhance mauka views as well as other view corridors and view plane opportunities critical to this prime waterfront location. The Draft SEIS will discuss how the Plan promotes and increases all existing and potential view opportunities in accordance with the City and County's Coastal View Study. Further, the document will include discussion on how the Makai Area Plan complies with or differs with other plans and policies including the Coastal Zone Management law and the Shoreline Management Area ordinance and guidelines relative to views. The document will also include a comparison between provisions of the Makai Area Plan and the County's Development Plan Maps. The use of nonpotable water for landscaping will be evaluated.

Thank you for your comments, recommendations, and continued interest in the Kakaako makai area planning process. We look forward to your input and cooperation as we proceed into project implementation.

Very truly yours,

Rex D. Johnson

RDJ/ST:ak
cc: Mr. Eric Hasutomi
(Office of State Planning)
The Honorable Marvin Miura
(Office of the Environmental
Quality Control)

RECEIVED AS FOLLOWS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS OFFICE
P O BOX 50167
HONOLULU, HAWAII 96850

RECEIVED
89 AUG 16 AM 10 07
HAWAII COMMUNITY DEVELOPMENT AUTHORITY

ES
Room 6307

AUG 15 1989

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development
Authority
Suite 1001
677 Ala Moana Boulevard
Honolulu, Hawaii 96813

Re: Preparation Notice for a Supplemental Environmental Impact Statement (EIS) for the Amended Makai Area Plan in the Kakaako Waterfront Area

Dear Mr. Johnson:

We have reviewed the referenced material dated July 17, 1989 and find that due to its nature, the proposed project will have no significant deleterious impact on fish and wildlife resources within our jurisdiction. Please do not hesitate to call on us if we may be of further assistance.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka
Field Office Supervisor
Environmental Services

cc: NMFS WPPO
DLNR
EPA, San Francisco

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takemoto
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613

August 31, 1989

Mr. Ernest Kosaka
Field Office Supervisor
Environmental Services
U. S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Office
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Kosaka:

Re: Kakaako Makai Area Plan Supplemental Environmental Impact Statement (SEIS) Preparation Notice

We are in receipt of your letter dated August 15, 1989 in response to the SEIS for the Kakaako Makai Area Plan.

Thank you for your interest and participation in the planning process of this vital project.

Very truly yours,

Rex D. Johnson

RDJ/ST:ak
cc: National Marine Fisheries
Service - Western Pacific
Program Office
Department of Land
and Natural Resources
Mr. Eric Masutomi
(Office of State Planning)
The Honorable Marvin Miura
(Office of the Environmental
Quality Control)

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

EDWARD Y. HIRATA
DIRECTOR

DEPUTY DIRECTORS
JOHN R. HORIUCHI
RONALD N. HIRANO
DAN T. KOCIR
JEANNE K. SCHULTZ

IN REPLY REFER TO

August 16, 1989

HAR-EP 1549

RECEIVED
89 AUG 24 AM 10 06
HAWAII COMMUNITY DEVELOPMENT AUTHORITY

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
677 Ala Moana Boulevard, Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Preparation Notice for a Supplemental
Environmental Impact Statement (SEIS)
for the Amended Makai Area Plan in the
Kakaako Waterfront Area

Thank you for your letter of July 19, 1989, which enclosed a copy of your environmental assessment for the SEIS.

Since the waterfront area consists of facilities under our jurisdiction and the facilities are operational and essential in meeting our program objectives, we must be consulted and the implementation plan must meet our operational and financial requirements.

Thank you for this opportunity to comment and we look forward to working with you in the future phases of this development.

Very truly yours,

Edward Y. Hirata
Director of Transportation

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takemoto
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613

August 31, 1989

The Honorable Edward Y. Hirata
Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hirata:

Re: Preparation Notice for a Supplemental
Environmental Impact Statement (SEIS)
for the Amended Makai Area Plan in the
Kakaako Waterfront Area

We are in receipt of your letter of August 16, 1989 in response to the Preparation Notice for the Kakaako Makai Area SEIS.

You can be assured that your continued participation and input into the planning and implementation process of this vital project is critical and necessary. We look forward to working with you in the coming phases of this development.

Very truly yours,

Rex D. Johnson

RDJ/ST:ak
cc: The Honorable Marvin Miura
(Office of the Environmental
Quality Control)

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

REF:OCEA:SOR

AUG 24 1989

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
LINDAY H. LANDGRAF
MANABU TAGOMORI
RUSSELL M. FUKUMOTO

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

FILE: 90-45
DOC.: 6356E

'89 AUG 25 AM 11 24

RECEIVED

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
Suite 1001
677 Ala Moana Boulevard
Honolulu, Hawaii 96813

Dear Mr. Johnson:

SUBJECT: Preparation Notice for a Supplemental Environmental Impact Statement (EIS) for the Amended Makai Area Plan in the Kakaako Waterfront Area

Thank you for the opportunity to review this matter.

We note that a number of proposed projects may involve lands (fast and/or submerged) that currently are situated in the State Land Use Conservation District (i.e. Kakaako Peninsula Beach Park, drainage outlets, etc.). Please be advised that Conservation District Use Applications (CDUA's) are required for all development projects situated in the Conservation District.

From the standpoint of aquatic resources, we have three primary areas of concern:

1. the potential adverse impact of the proposed dredging and filling activities on the nearshore marine environment;

2. the proposed inland waterway; and

3. the expansion of Kewalo Basin.

To address the first concern, you are advised to take appropriate measures to minimize erosion and siltation, and prevent fuel, oil and other toxic substances associated with the use of heavy machinery from falling into the water.

Our concerns about the proposed inland waterway involves water quality. Since the waterway will be an integral part of the drainage system of the highly industrialized Kaka'ako district, storm runoff could contain hazardous substances. The large lagoons and complex short canals also represent a substantial amount of "dead water." We suggest a straight water course like the Ala Wai Canal so that flushing can be made adequate to maintain water quality.

While the proposed expansion of Kewalo Basin will provide additional facilities for Hawaii's commercial fishing fleet, the proposed action will eliminate the reef area off Kewalo Basin Peninsula. The area offers safety, ease of access and a diversity of marine life unmatched by any site in the city. To properly assess the importance of this site from an educational resources standpoint, we suggest that comments be solicited from the Waikiki Aquarium, the State Department of Education, the City and County of Honolulu Department of Parks and Recreation, the University of Hawaii (Zoology Department), and other interested parties.

Additionally, we recommend that the HCDA closely coordinate the development of the proposed waterfront park with the State Parks Division. This includes the transfer or dedication of any improvements to the State Parks Division for future maintenance and operation.

With regard to historic sites review, we understand that HCDA has an archaeologist on contract for the duration of the project.

We have no other comments to offer at this time.

Should you have any questions, please feel free to contact Ed Henry at the Office of Conservation and Environmental Affairs (548-7837).

Very truly yours,

WILLIAM W. PATY

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

September 8, 1989

The Honorable William Paty
Chairperson
Department of Land and Natural
Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Re: Kakaako Makai Supplemental Environmental
Impact Statement (SEIS) Preparation Notice

We are in receipt of your letter of August 24, 1989 in response to the SEIS Preparation Notice for the Hawaii Community Development Authority's (HCDA) amended Kakaako Makai Area Plan.

The following responses have been prepared to address your comments and recommendations:

1. To help prevent adverse impacts of the proposed dredging and filling activities on the near shore marine environment, the HCDA will take appropriate measures to minimize erosion and siltation, and prevent fuel, oil and other toxic substances associated with the use of machinery from falling into the near shore waters. The Draft SEIS will discuss these issues.

2. Your recommendations regarding the water quality in the proposed inland waterway will be taken into consideration. The final design of the waterway system will be determined following detailed modeling and engineering analyses.

3. According to the ocean engineering consultant involved in the Honolulu

Waterfront Master Plan whose preliminary study determined that the seaward expansion of Kewalo Basin would be possible, the impact on the reef area off Kewalo Basin will be minimal. The filling of the seaward edge of the peninsula is intended to straighten or "square off" the outer edge with approximately 5.5 acres of landfill. Further, the new intertidal habitat that will be replacing the affected portion of the reef will be of higher quality, for such replacement habitats create vertical relief to the ocean bottom, according to our technical experts. The reef area that is expected to be affected (area closest to the peninsula) is already suffocating from sediment loading.

We will seek comments from the Waikiki Aquarium, the State Department of Education, the University of Hawaii (Zoology Department), and other parties regarding the proposed expansion of Kewalo Basin by sending copies of the Draft SEIS to them.

The HCDA will be applying for the appropriate Conservation District Use Applications for projects within the Conservation District.

There will be close coordination with the State Parks Division regarding the proposed waterfront park improvements for future maintenance and operation. Finally, the HCDA will be retaining an archaeologist during the construction period of the project.

Very truly yours,

Robert K. Miura
for Rex D. Johnson

RDJ/ST:gst
cc: Marvin Miura, Ph.D.
(Office of Environmental
Quality Control)

JOHN WAIHEE
GOVERNOR OF HAWAII

RECEIVED
'89 SEP 6 AM 10 20

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EPHSO

August 25, 1989

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
Suite 1001
677 Ala Moana Blvd.
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Subject: Request for Comments on the Environmental Assessment (EA) for a Revised Kakaako Makai Area Plan

Thank you for allowing us to review and comment on the subject environmental assessment.

A water quality certification, required by Section 401 of the Clean Water Act Amendments of 1977, will be necessary to accommodate the Corps of Engineers Section 404 permitting process when placing fill in State waters.

On page 3-23 of the EA it was stated that the Palailai Landfill is available for the disposal of solid waste. A correction is needed here as this landfill was closed in May 1988.

The Department's Hazard Evaluation and Emergency Response (HEER) Program is working very closely with Eric Matsutomi of the Office of State Planning (OSP) and Clayton Goo of the Hawaii Community Development Authority (HCDA) regarding the Kewalo Incinerator/Landfill investigation. HEER has met with OSP, HCDA and their environmental consultant regarding the investigation. We have determined that the work plan adequately addresses health and environmental concerns due to the re-development of the landfill and surrounding area. There is no apparent immediate threat to public health or the environment due to the landfill's present condition; however, the re-development of the area may release potentially hazardous materials and thereby pose a threat to public health and the environment.

We understand that the investigation underway has three goals:

1. Characterization of the contents in the landfill;

2. Determination of the health and environmental risks posed by the release of hazardous materials found in the landfill in its present condition or due to the re-development of that area; and

3. If a health or environmental risk is identified or projected, what types of mitigation measures would be appropriate to offset the risk due to re-development of the landfill.

The results of the investigation and the appropriate mitigation measures should be fully presented in the Draft Supplemental EIS in order to disclose the potential impacts of the proposed action. Given the comprehensive work to date on this project, we anticipate that the contractors should have adequate data to meet this recommendation.

Sincerely,

Bruce S. Anderson

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2013

Ref. No.: PL EIS 6.16

September 15, 1989

MEMORANDUM

TO: The Honorable John C. Lewin, Director
Department of Health

FROM: Rex D. Johnson, Executive Director
Hawaii Community Development Authority

SUBJECT: Kakaako Makai Area Supplemental Environmental Impact Statement

We are in receipt of your letter of August 25, 1989 in response to the Preparation Notice for the Kakaako Makai Area Supplemental Environmental Impact Statement (SEIS).

We acknowledge that Section 401, Water Quality Certification, is necessary to accommodate the Corps of Engineers Section 404, Permit Application Process, relative to the placement of fill in State waters, and this will be reflected in the Draft SEIS.

Discussion pertaining to the disposal of solid waste will be revised to reflect your information regarding the closure of the Palailai Landfill.

Cleighton Goo of the HCDA staff will continue to work closely with your staff regarding the incinerator landfill study in order to assure the achievement of the goals and objectives of the investigation, the results of which will be published in the SEIS.

cc: Marvin Miura, Ph.D.
(Office of Environmental
Quality Control)

CHAPTER 12

Draft SEIS Comments Received

1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

TIM CHOW
PLANNING CONSULTANT

(808) 523-9570

December 4, 1989

Honorable Rex D. Johnson
Executive Director
Hawaii Community Development Authority
677 Ala Moana Blvd., Suite 1001
Honolulu, HI 96813

Dear Mr. Rex Johnson:

Subject: Comments on the Draft Supplemental Environmental Impact Statement for the Revised Makai Area Plan of the H.C.D.A., dated Oct. 20, 1989

Attached are comments on the Draft Supplemental Environmental Impact Statement for Plan and Rule Amendments to the Makai Area Plan of the H.C.D.A., dated October 20, 1989, submitted on behalf of Victoria Ward, Limited. As you can see, they follow the written public hearing testimony we submitted to the Authority on November 15, 1989 in opposition to the proposed widening of Ala Moana Blvd.

Please understand that we do not oppose the overall objectives of the proposed Makai Area Plan revisions, even though we have major reservations about its scope and feasibility. Much of the plan appears to be imaginative and would benefit the rest of Kaka'ako, for which you and your staff should be commended. The proposed widening of Ala Moana Blvd., in contrast, is an old idea that has never been acceptable to the community because of its disruptive effects, heavy costs and negligible benefits.

Thank you for providing us an opportunity to comment on the Draft Supplemental E.I.S. Please feel free to call me if you have any questions.

Sincerely,

Willard T. Chow

attachment

cc: Edward C. Mustace
John P. Perkin

89 DEC 4 PM 12 34

COMMENTS ON THE DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE KAKA'AKO MAKAI AREA PLAN, DATED OCTOBER 20, 1989

BASED UPON WRITTEN TESTIMONY OFFERED BY VICTORIA WARD, LIMITED
IN OPPOSITION TO THE PROPOSED WIDENING OF ALA MOANA BLVD.
AT THE H.C.D.A. PUBLIC HEARING HELD AT THE STATE CAPITAL ON NOVEMBER 15, 1989

CONFLICTS THAT NEED TO BE RESOLVED AND IMPACTS THAT NEED TO BE ADDRESSED

1. THE PROPOSED WIDENING IS OUTSIDE THE JURISDICTION OF THE MAKAI AREA PLAN.

   Private lands along the mauka edge of Ala Moana Blvd. that would be taken for the proposed widening are not located within the boundaries of the HCDA'S Makai Area. It is inappropriate, therefore, for the HCDA to amend the Mauka Area Plan in the name of amending the Makai Area Plan. Chapter 4 of the SEIS should be expanded to resolve this conflict.

2. THE PROPOSED WIDENING WAS NOT DISCLOSED AS A PLANNING ALTERNATIVE.

   If the waterfront planning process is to be comprehensive and fair, then all the alternatives being considered for possible adoption and future implementation need to be clearly identified and disclosed. Had the people reviewing the Honolulu Waterfront Plan in 1988 and 1989 known that the HCDA was going widen Ala Moana Blvd., many would certainly have opposed its recommendations.

   Failure to disclose what alternatives were being considered and who would be affected by such changes appears to undermine both the spirit and intent of the "interactive planning process" being promoted by the Office of State Planning, as described on p. 1-9 of the 1989 report. Chapter 4 of the SEIS should be expanded to resolve this conflict.

3. MAJOR ENVIRONMENTAL AND ECONOMIC IMPACTS OF THE PROPOSED WIDENING HAVE NOT BEEN DISCLOSED.

   Neither the 1988 Preliminary Report nor the 1989 Pre-Final Report called for the taking of private properties along the mauka side of Ala Moana Blvd. In order to widen the existing public right-of-way. It is not surprising, then, that the public costs of land acquisition, building damages, severance damages and relocation assistance resulting from the recently proposed widening were never included in the financial program of the Pre-Final Report.

   None of these costs were taken into account in the analysis of public benefits and costs anticipated from implemention of the waterfront master plan. None of these costs were disclosed to the State Legislature. Nor were studies completed to determine the full impact of the widening on people working and doing business along the mauka side of Ala Moana Blvd. No studies were completed to determine the long-term effects of such a widening on the redevelopment of adjoining parcels.

The Draft (dated October 20, 1989) Supplemental EIS (p. 1-2) was supposed to "to provide a disclosure of environmental and economic impacts of the actions contemplated." It appears, however, that the proposal's disruptive effects, costs, alternatives and possible mitigation measures were not even considered.

The Draft Supplemental claims on p. 1-2 that "appropriate agencies, organizations and individuals have been consulted in the preparation of the Draft EIS so their concerns will be addressed." However, private landowners and businesses affected by the widening were not consulted, as indicated on p. 9-1 of the DSEIS. Chapter 3 of the Supplemental EIS should be expanded to specifically address the socio-economic impacts of widening Ala Moana Blvd.

4. **THE PROPOSED WIDENING IS NOT JUSTIFIED BY PLANNING STUDIES.**

Amending an adopted plan must be done in a comprehensive manner, as set forth 20 ago in the case of Dalton vs. City and County of Honolulu 51 Hawaii 400, 462 P.2d 199 (1969). Studies must be conducted in order to justify amendments to an adopted community plan. An amendment that cannot be supported by such studies should not be adopted.

Existing traffic studies provide no justification for the proposed widening. According to the HCDA's own Draft Supplemental Environmental Impact Statement (dated October 20, 1989, p. 3-68), "at least, for the 2005 time period, there appears to be sufficient planned corridor capacity to accommodate forecasted traffic volumes."

The HCDA concedes, therefore, that there is no technical basis for requiring additional vehicular circulation capacity along Ala Moana Blvd. The Draft Supplemental Environmental Impact Statement concludes on p. 3-71 that "until such time as the need for road widening can be substantiated by a comprehensive review of the regional growth issue conducted by the official State transportation planning process, it would be premature to identify a specific widening on Ala Moana Boulevard." Chapter 3 of the SEIS should be corrected, therefore, to conclude that the proposed widening amendment should not be adopted at this time, since no such studies exist.

5. **DESIGNATING PROPERTIES FOR POSSIBLE WIDENING IN THE FUTURE WOULD MAKE IT MUCH MORE DIFFICULT TO MAKE IMPROVEMENTS AND RENOVATIONS DURING THE INTERIM PERIOD.**

Adopting the proposed amendment to widen Ala Moana Blvd. would have a devastating impact on the ability of tenants to finance and refinance their improvements and to acquire permits to repair, renovate, expand or reconstruct (in the event of a fire) existing structures designated within or adjacent to the planned widening during the interim period before the roadway is widened.

Section 15-23-74 of the HCDA Rules prohibits buildings and structures from being erected within a "mapped street" or its required setback area. If Ala Moana Blvd. is designated for widening, much of the Ward Warehouse and Ward Plaza would be encumbered by such restrictions. The ill-effects of such encumberances would thus be felt long before properties are actually taken for roadway improvements and by nearby as well as directly affected tenants.

Chapter 3 of the SEIS should be expanded to address the impact of the proposed widening upon the repair, renovation and expansion of existing buildings.

6. **THE PROPOSED WIDENING CONFLICTS WITH IMPORTANT PLANNING OBJECTIVES.**

If "the pedestrian promenade and walkways connecting the waterfront with the mauka side of Nimitz Highway" are such "key elements" to redeveloping the Aloha Tower, Downtown and Chinatown areas of Honolulu's waterfront (see p. 3-57 of the 1989 Pre-Final Report), then they should also be important to redeveloping the Kaka'ako portion of Honolulu's waterfront. Unfortunately, proposed amendments to the Makai Area Plan will have the opposite effect. Increasing the width of Ala Moana Blvd will make it more, not less, difficult for pedestrians (especially the elderly, the handicapped and young children) to cross the highway.

One of the three purposes of the Honolulu Waterfront Plan (p. 1-2) is "to assure a logical, orderly and achievable phasing of improvements in a manner that minimizes social, environmental and economic disruption (emphasis added)." Why, then, is the HCDA proposing to widen Ala Moana Blvd. and thereby disrupt scores of businesses along its mauka frontage? Chapter 4 of the SEIS should be expanded to resolve those two conflicts.

7. **THE PROPOSED WIDENING IS INCONSISTENT WITH THE HONOLULU WATERFRONT MASTER PLAN.**

Many roadway widenings, closures, extensions and realignments have been proposed within the Makai Area. However, neither the Honolulu Waterfront Master Plan Preliminary Report (dated November 1988) nor the Honolulu Waterfront Master Plan Pre-final Report (dated January 1989), which were distributed for public review by the Office of State Planning, called for widening along the mauka side of Ala Moana Blvd.

Only at major mauka-makai intersections of Ala Moana Blvd. was widening even considered in the 1988 report (see pp. 3-48 to 3-51). The 1988 report, as shown by Circulation Plan (figure 12), did not call for any pedestrian or bikeway paths within the Ala Moana Blvd. right-of-way.

Although the 1989 report suggested on p. 6-18 that two more lanes would be needed in Kakaako to accommodate northbound circulation, the report did not recommend that Ala Moana Blvd. be widened to accommodate east-west circulation. Nor did the 1989 Circulation Plan (figure 16) call for any pedestrian or bikeway paths within the Ala Moana Blvd. right-of-way.

To widen Ala Moana Blvd., as proposed by the revised Makai Area Plan, would thus be inconsistent with the findings and recommendations of the Honolulu Waterfront Master Plan, which the Makai Area Plan is supposed to follow. Chapters 3 and 4 of the SEIS should be expanded to resolve these conflicts.

8. **ALTERNATIVES WITH LOWER CIRCULATION REQUIREMENTS NEED TO BE CONSIDERED.**

Commercial land uses and higher densities being proposed for the Makai Area are expected to generate additional traffic, require greater takings, and increase building damages and disruptions to existing businesses. The

alternative of less intensive development, however, was not reviewed. Less intensive uses of the Makai Area would generate less traffic and result in less land acquisition, less damage to existing buildings and less disruption to existing businesses. Expanding the amount of land to be used for parks and reducing the amount of floor area devoted to retail activities and commercial offices, for example, would reduce the need for waterway amenities, roadway widenings and highway beautification. The public costs of implementing this alternative would thus be much lower.

The Honolulu Waterfront Plan, in effect, has examined only one redevelopment alternative without disclosing its disruptive and costly consequences. The public should be given a choice among redevelopment alternatives and a basis for comparing their advantages and disadvantages. Chapter 5 of the SEIS should be expanded to review the merits, including traffic generation impacts, of an alternative that emphasizes park uses instead of commercial uses.

9. **FORCING THE MAUKA AREA TO BEAR NEARLY ALL OF THE COSTS OF THE PROPOSED WIDENING WOULD BE INEQUITABLE.**

In the interest of fairness, the adverse impacts of redevelopment (in terms of land acquisition, building damages and business disruption) should be borne as much as possible by the lands which would benefit most from the proposed plan amendments. Proposed amendments to the Makai Area Plan, unfortunately, have the opposite effect.

Only a small amount of the land being proposed by the HCDA for taking is located along the makai side of Ala Moana Blvd., where much of the land is owned by the State of Hawaii. Almost all of the land designated for taking is located along the mauka side of Ala Moana Blvd., none of which is owned by the State of Hawaii.

If "the authority's objective is to create a truly high quality community that complements the community envisioned in the Kaka'ako Plan for the Mauka Area of the Kaka'ako District," as stated on p. 14 of the Makai Area Plan (October 1989), then it should not be proposing to take land, destroy buildings and disrupt businesses along mauka side of Ala Moana Blvd. Chapter 5 of the SEIS should be expanded to review the merits of widening within the makai area instead of widening along the mauka side of Ala Moana Blvd.

10. **THE COSTS OF ADDITIONAL TRAVEL LANES WOULD EXCEED THE BENEFITS.**

If the proposed widening of Ala Moana Blvd. were really needed, then it should have been identified in the Supplemental Environmental Impact Statement prepared by the HCDA in May of 1985. Instead, the EIS found on p. B-31 that "the projected increase in Kakaako traffic is comparatively small to total corridor travel and would have little effect on travel corridor conditions with the exception of the traffic inbound from the Leeward/Central Oahu areas through the Downtown on either H-1 Freeway or the major streets."

It is not clear that a significant amount of travel time would be saved by providing additional travel lanes within this section of Ala Moana Blvd. The effect of such savings would probably be negligible in view of (a) existing congestion Ewa of the Federal Building and Waikiki of Kewalo Basin and (b) anticipated conflicts between vehicular circulation and bicycle/pedestrian movements being encouraged in the area.

Widening Ala Moana Blvd. would be extremely expensive! The cost of acquiring designated properties would not be limited to the value of the land taken for additional public right-of-way. Compensation will also need to be paid for the blighting effects of building and severance damages borne by adjoining properties. All of the tenants at The Ward Warehouse shopping center and Ward Plaza office building would be damaged, and not just the tenants whose premises would be destroyed. Tax revenues from businesses disrupted by the widening and its encumberances would fall, making it more difficult to fund needed public programs, such as affordable housing. Chapter 3 of the SEIS should be expanded to specifically address these impacts.

11. **THE COSTS OF ADDITIONAL BIKEWAYS AND WIDER SIDEWALKS WOULD EXCEED THE BENEFITS.**

Current HCDA plans do not require any widening along Ala Moana Blvd. to accommodate planned bikeways paths. Proposed amendments to the Makai Area Plan would require that land fronting the mauka side of the highway be taken for this purpose even though two additional bikeway paths are being proposed one block makai of Ala Moana Blvd. along Ilalo St.

The need for bikeway paths along Ala Moana Blvd. in view of proposed bikeways along Ilalo St. has not been demonstrated, particularly since the shoreline route would be far more pleasant for bikers. The benefits to bicyclists may also be reduced since bicycles using Ala Moana Blvd. would have to compete with buses, trucks, cars and pedestrians along the boulevard.

Amendments to the Makai Area Plan call for 10 ft. wide sidewalks along Ala Moana Blvd. In comparison to 8 ft. wide sidewalks in the Mauka Area of Kaka'ako. It is not clear why the 25 percent increase is needed, based on lower planned densities and nonresidential uses. Widening the right-of-way for wider sidewalks and additional bike paths would also increase the cost of building and maintaining five pedestrian bridges over the boulevard.

Wider sidewalks and additional bikeway lanes along Ala Moana Blvd., like additional travel lanes, would disrupt businesses, hurt workers, and raise the public costs of land acquisition, building and severance damages, relocation assistance, construction and maintenance. Chapter 3 of the SEIS should be expanded to specifically address these impacts.

12. **THE COSTS OF ADDITIONAL LANDSCAPING WOULD EXCEED THE BENEFITS.**

Proposed amendments would require at least 8 ft. of landscaping along each side of Ala Moana Blvd. In addition to the landscaping already required within the 15 ft. front yard of each parcel fronting the boulevard. The need for increased landscaping within the public right-of-way, however, has not been demonstrated. Nor is it clear that the benefits of creating landscaped areas within the public right-of-way will be assured.

The State Dept. of Transportation has not had adequate resources in the past to fully maintain landscaping within the public right-of-way. Maintenance is difficult during dry times of the year, during water conservation periods and when the departmental budget is tight. Poorly maintained landscaping would be an eyesore and offers no benefits to the community. Chapter 3 of the SEIS should be expanded to specifically address these impacts.

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

Tim Chow Planning Consultant
Suite 212
1210 Auahi Street
Honolulu, Hawaii 96814

Dear Mr. Chow:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We are in receipt of your testimony provided at the November 15, 1989 public hearing on the Makai Area Plan and Rules. Since the public hearing and extensive review by the Hawaii Community Development Authority's staff, the draft Makai Area Plan has been revised to reflect no lane widening of Ala Moana Boulevard. Until such time as the need for road widening can be substantiated by a comprehensive review of the regional growth issue conducted by the State transportation planning process, it would be premature to identify a specific widening on Ala Moana Boulevard to address regional concerns.

Subsequently, Chapter 3 of the SEIS has been revised to conclude that the proposed widening amendment should not be adopted at this time.

Thank you for your participation in the Makai Area planning process. We look forward to your continued interest and participation as we proceed with implementation of this Makai Area Plan.

Very truly yours,

for Robert K. Hirata
Rex D. Johnson

RDJ/ST:gst

COMMANDER, FOURTEENTH COAST GUARD DISTRICT
HONOLULU, HAWAII 96850-4982

27 October 1989

RECEIVED
'89 NOV 1 AM 9 57

Mr. Rex Johnson
Hawaii Community Development Authority
Suite 1001
677 Ala Moana Boulevard
Honolulu, HI 96813

Dear Mr. Johnson:

I recently received your Makai Area Plan, Makai Area Rules, and Kaka'ako Makai Area Plan Draft Environmental Impact Statement and I appreciate the opportunity to comment on them.

These documents show your continued plans to include Pier 4 as part of the waterfront/Kaka'ako development. However, as the Draft EIS correctly notes, "The federal government owns...the Coast Guard Pier 4 space." As I pointed out to Mr. Harold Masumoto, Director of State Planning in my letter of 14 February, I do not foresee any practical probability that we would consent to vacating or relocating from Pier 4.

This does not mean that our need to stay at Pier 4 will necessarily conflict with your planned development. It does mean that our requirements at Pier 4 (that the Captain of the Port and Officer in Charge of Marine Inspection be located where he can best carry out his duties and that Pier 4 remain easily accessible to members of the marine industry and environmental community) must be considered in your planning.

As I noted before, we will be happy to work with you to insure that our needs and your development are compatible. Please feel free to contact my planning officer, Commander Mike Adams, at 541-2126, if further questions arise.

Sincerely,

W. P. KOZLOVSKY
Rear Admiral, U. S. Coast Guard

Encl: Copy of My letter dtd 14 February 1989 to Mr. H. S. Masumoto

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613

December 29, 1989

Rear Admiral W. P. Kozlovsky
Commander
Fourteenth Coast Guard District
Honolulu, Hawaii 96850-4982

Dear Rear Admiral Kozlovsky:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We have received your letter of October 27, 1989 regarding the DSEIS for the Kakaako Makai Area Plan. Please be assured that there will be close coordination between the Coast Guard and the State agencies with regard to the future use of Pier 4.

We appreciate your interest and participation in the Kakaako Makai Area planning process.

Very truly yours,

Rex D. Johnson

RDJ/ST:gst

ROBIN C

F-5915

OFFICE OF THE MAYOR

CITY AND COUNTY OF HONOLULU

HONOLULU, HAWAII 96813 • AREA CODE 808 • 523-4141

FRANK F. FASI
MAYOR

November 13, 1989

Mr. Kenneth T. Takenaka, Chair
Hawaii Community Development Authority
710 Kapiolani Blvd., Suite 1010
Honolulu, Hawaii 96813

Dear Chair Takenaka:

We are pleased with the Makai Area Plan and Makai Area Rules and Regulations. There are many proposed provisions which can make it a "people-oriented gathering place within a park-like setting."

We agree that the waterfront is an important public resource, which can be, and should be developed for public benefit based on proper planning and coordination. We strongly support the concept of a "lei of green" around the shores of Oahu, as demonstrated by the proposed "great park."

However, many issues need to be more fully discussed before we can support the proposed Plan. We find that the Plan, Rules and the Environmental Impact Statement (EIS) do not sufficiently address concerns directly related to city operations and responsibilities. I will only highlight some of the concerns here. Others will be expressed more fully by individual city departments under the EIS review process.

Public Beach and Open Space

We do have reservations about the creation of a new beach on the diamond head side of Fort Armstrong. Any artificial beach will tend to be unstable due to seasonal wave action and the absence of a natural sand replenishment system. Any sand material placed there may be scoured primarily during the summer months.

Inland Waterways

While inland waterways are an attractive concept, the costs for building and maintaining them may outweigh their anticipated benefits. If Ala Moana Park can be used as a comparable project, inland waterways connected to the Kakaako storm drain system can become polluted, malodorous and a health hazard. Rather than a recreational amenity, they become a lost

opportunity for better utilized open areas. At minimum, if this concept is implemented, it should provide for adequate flushing and circulation of waters to mitigate environmental pollution problems.

Public Views

Just as the envisioned "great park" is a shoreline expansion of Ala Moana Park, views in the Makai Area should also be an expansion of our present proposal to retain mauka views from Ala Moana Park. It would be a major urban design accomplishment for Honolulu if this design philosophy extended through the Kakaako area. Doing so would reflect a strong commitment to a "mountain to the sea" orientation.

It is acknowledged that these are ambitious public view corridor proposals, that not only require lower height limits for the Makai Area, but also for other portions of Kakaako as well. Nevertheless, now is the appropriate time to make this commitment, thereby saving public views which, once lost, can never be regained.

Additional Infrastructure Studies

In general, we feel that the assessments for water, roadways, and wastewater are incomplete. Specifically:

Water. As noted in the draft EIS, "A critical component of the system is water shortage." The draft Plan mentions the 42-inch water line for Ala Moana which is necessary "for improved water supply to East Honolulu and is therefore not identified as an improvement cost borne by the makai area." Since this line will benefit the Kakaako area, the issue of who will bear the cost of this improvement should be addressed. A pro rata share of this cost should be incorporated into this Plan.

In addition, calculations on peak hour business and domestic water usage and fire flow requirements should be provided. Development of specific new source facilities in coordination with the Board of Water Supply should be discussed, relative to these calculated figures.

Wastewater. Who will construct proposed modifications to the Ala Moana Force Mains, Ala Moana Wastewater Pump Sation, and Beachwalk Wastewater Pump Stations? Who will maintain the four proposed new pump stations?

Roadways. A traffic study specifically for the Makai Area Plan should be done.

Areas of maintenance responsibility for the following should be identified: roadway median grass strips, and sidewalk irrigation systems.

Park Zone

We are uncomfortable with a Park Zone that has a 45-foot height limit and no lot coverage standard (beyond base percentages applicable to all zones; i.e. 10% open space). Forty-five foot high buildings close to the shoreline seem high, given that the purpose of the zone is for open space and recreational uses. It is also odd that the major structures proposed for the park, the amphitheater and performing arts center, are to be exempt from height limits, according to the proposed Rules.

Consideration should be given to standards similar to our P-2 General Preservation District, which include a 25-foot height limit and a 5% maximum lot coverage. There should also be some guideline on how far from the shoreline major buildings will be.

Amphitheater and Performing Arts Center

More discussion needs to occur on how the proposed amphitheater and performing arts center will affect the Waikiki Shell and Neal Blaisdell Center. The City has budgeted construction of a new theater for the Center, which could be in direct competition with the proposed Kakaako Performing Arts Center. Have market studies been completed to show that all of these facilities can be economically maintained?

Once again, the draft Makai Area Plan has many exciting concepts which we applaud. We hope that the final adopted Plan will address many of our concerns, and that the City will be be allowed to participate fully in the deliberations over this important component to our Island's development.

Warm personal regards.

Sincerely,

/s/

FFF:ap (Kay,14)
bcc: Department of General Planning
Department of Housing & Community Development
Department of Parks & Recreation
Department of Public Works
Department of Transportation Services
Board of Water Supply

Pebn. #8

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613

December 29, 1989

The Honorable Frank F. Fasi
Mayor
Office of the Mayor
City and County of Honolulu
530 South King Street
Honolulu, Hawaii 96813

Dear Mayor Fasi:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We are in receipt of your letter of November 13, 1989 regarding the DSEIS for the Kakaako Makai Area Plan. The following has been prepared in response to your comments.

Public Beach and Open Space

A preliminary investigation and analysis was conducted by our ocean engineering consultant, Edward K. Noda and Associates, to identify opportunities and constraints for the Makai Area in conjunction with the Honolulu Waterfront Master Plan. The consultant's recommendation to construct a new 17-acre beach area off of Fort Armstrong is based on a goal to provide needed additional safe ocean recreational activities along the southern shore of Oahu.

The consultant's preliminary analysis indicated that this landfill extension will require stabilization with breakwaters or with a submerged shoal. A submerged shoal was recommended since it would not block the seaward views and can be designed to enhance the surfing conditions. The submerged offshore shoal will provide wave protection to the Diamond Head shoreline facade, while the seaward and Ewa shoreline facade will require revetment protection. It is assumed that the shoal will be comprised of a designed artificial reef of rocks.

Modeling studies to help determine feasibility and design alternatives will be conducted for this major facility. Latter phases of work in navigable waters, which include the landfill extension, will require additional studies and will be subject to the Rivers and Harbors Act, and the Clean Water Act.

Inland Waterways

Preliminary ocean and civil engineering analyses conducted during the Honolulu Waterfront Master planning process determined that the proposed inland waterway can be designed and integrated with the drainage system to improve the overall drainage in the Makai Area. These preliminary studies also concluded that with proper design and regular maintenance, the drainage systems can flow directly into the interior waterway, thereby reducing the size of the required drain lines. The mauka-makai waterway branch will replace the new 30-foot wide concrete channel to be constructed by the Kakaako Improvement District 2 Project. The new waterway can be expected to provide over twice the cross-sectional area of flow, reducing the velocity of the storm waters so no loss in flow capacity is expected as long as the proposed waterway is properly maintained.

A cost-benefit analysis for the waterway was conducted by John Child & Co., Inc. to determine the total income effect the inland waterway would have on surrounding commercially zoned land values. While this analysis was preliminary and conducted for order of magnitude estimates, an adequate study does exist to substantiate this concept. The hypothetical scenario used by the consultant was the project ground rental income stream for commercial/mixed-use parcels, either with the waterway or without the waterway. Our consultants concluded that an approximately 30 percent premium would accrue to parcels adjacent to the waterway.

Public Views

We agree preservation of existing views is important to the Kakaako District. Our Makai Area Plan contains

development guidance policies and building height limits which are intended to preserve major view planes, view corridors, and enhance the urban Honolulu shoreline views. The preservation of views in the Makai Area is a concern expressed in public policy, and is particularly important because of the area's proximity to the shoreline and its location relative to major scenic vantage points in surrounding areas (i.e., Kakaako, Downtown, Aloha Tower, Sand Island Park, etc.).

Building controls within the Makai Area are designed to encourage a collective urban form. General characteristics with regard to building heights would consist of buildings that gradually "descend" from tall structures in the areas mauka of Ala Moana Boulevard to lower structures along the Makai Area water frontages. Limits on heights will range from 200 feet along parts of Ala Moana Boulevard, to as low as 45 feet along waterways, park edges, and shorelines.

Additional Infrastructure Studies

Preliminary infrastructure system assessments were conducted for the Makai Area in conjunction with the Honolulu Waterfront Master Plan. Order of magnitude requirements and costs were determined by our consultants as part of these studies.

Water. As in other proposed major development projects, specific Board of Water Supply requirements will be met during development of the Water Master Plan by the Hawaii Community Development Authority upon completion and acceptance of the Makai Area Plan.

Wastewater. Required public infrastructure improvements will be funded by the Hawaii Community Development Authority through assessments against real properties that specifically benefit from public facility improvements. Improvements will then be dedicated to the City and County of Honolulu for maintenance.

Roadways. A traffic impact assessment specifically for the Makai Area Plan was conducted by Pacific

Planning & Engineering, Inc. to help planners determine land requirements for Makai Area intersections and internal roadways.

Public roadway maintenance and roadway median grass strip maintenance will be a responsibility of the City and County of Honolulu. To facilitate maintenance of the median grass strips, sidewalk irrigation systems will be incorporated. These improvements will then be the responsibility of the party maintaining the roadways.

Park Zone

The 45-foot height limit provides the option for support structures for park facilities. Design of these structures may require that heights exceed the 45-foot height limit, due generally to the nature of the facility's design.

Amphitheater and Performing Arts Center

Although the Makai Area Plan envisions an amphitheater/performing arts center at this conceptual level, additional studies will be conducted during implementation stages of the Plan to determine actual feasibility of such a facility for the Waterfront Park. In other words, while the Makai Area Plan allows for this land use, this does not necessarily mean that such a facility will actually be constructed.

We appreciate your participation and interest in the Makai Area planning process and look forward to working with the City and County of Honolulu on the implementation of this very important project.

Very truly yours,

Rex D. Johnson

RDJ/ST:gst

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER

In reply refer to:
ENV 89-216(449)

November 16, 1989

RMT		WES	
DK		BTT	
RYK		RDE	
REC'D NOV 20 1989			RMTC
GSY			
DKM			

Dr. Marvin T. Miura, Director
Office of Environmental Quality Control
State of Hawaii
465 South King Street, # 405
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Draft Environmental Impact Statement (DEIS)
Kakaako Makai Area Plan

We have reviewed the subject DEIS and have the following comments:

1. The Environmental Impact Statement should address the following questions:

   a. Who will operate and maintain the four (4) new pump stations?

   b. Who will be responsible for the proposed modifications to the Ala Moana Force Mains, Ala Moana Wastewater Pump Station, and Beachwalk Wastewater Pump Station?

2. The layout of streets makai of the Ala Moana Boulevard should be in line with mauka streets.

3. Who will maintain the median strip of the Ward Avenue Extension?

Very truly yours,

Sam Callejo

SAM CALLEJO
Director and Chief Engineer

cc: Hawaii Community Development Authority
R. M. Towill Corporation

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER

In reply refer to:
ENV 89-225(449)

RMT		WES	
DK		BTT	BTT
RYK		RDE	
REC'D NOV 30 1989			RMTC
GSY			
DKM			

November 28, 1989

Dr. Marvin T. Miura, Director
Office of Environmental Quality Control
State of Hawaii
465 South King Street, #405
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Draft Supplemental Environmental Impact Statement (DSEIS) - Kakaako Makai Area Plan

This is a supplement to our previous comments dated November 16, 1989 regarding the subject DSEIS.

1. Until the relocation of the City Corporation Yards from the Kewalo Basin to the proposed Sand Island site of which the progress at present is stymied is realized, the implementation of the Kakaako Makai Plan, Phase I, within 1990-2000 may not be feasible.

Very truly yours,

Sam Callejo

SAM CALLEJO
Director and Chief Engineer

cc: Hawaii Community Development Authority
R.M. Towill Corporation

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

The Honorable Sam Callejo
Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Callejo:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We have received your letters of November 16, and November 28, 1989. The following has been prepared in response to your comments regarding the DSEIS for the Kakaako Makai Area Plan.

Responsibility of Public Facilities Maintenance

Design and development of public infrastructure improvements will be the Hawaii Community Development Authority's responsibility. Upon completion, improvements will then be dedicated to the City and County of Honolulu for maintenance.

Street Layout

Your recommendation regarding the road layout will be taken under advisement.

City Corporation Yard

Relocation of the corporation yard during Phase I of the 1990-2000 time frame remains the targeted deadline for this project.

We appreciate your interest and participation in the Kakaako Makai Area planning process. Thank you for your comments and recommendations.

Very truly yours,

Robert K. Mine

Rex D. Johnson

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-000

William A. Bonnet
Manager
Environmental Department

ENV 2-1
JA/G

November 17, 1989

Marvin T. Miura, Ph.D., Director
Office of Environmental Quality Control
465 South King Street, #104
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Draft Environmental Impact Statement (DEIS) for the Kakaako Makai Area Plan

We have reviewed the above subject and have the following comments:

1. HECO's Distribution Planning Division has indicated that a substation will be required to serve the loads in this area. The provisions for a substation site should be mentioned in the paragraph on "Electrical Power and Communication Systems" given in page 2-44. This paragraph should also mention that 46kv ductlines are required to serve the substation.

2. In the paragraph referenced in the first comment, it should be noted that line extensions from substations or other power sources to accommodate increases in loads are paid for in accordance with Rule 13 of HECO's tariff. It is not to be assumed a HECO cost.

3. We have not yet made our load forecasts for the project but based on known load increases in the surrounding area, we agree with your statement on page 3-78 that a new electrical power substation within the area will probably be required to serve the project demands.

4. Figure 4-2 indicates the boundaries for the Special Management Area (SMA). Based on this figure, any substation site located on the makai side of Ala Moana Boulevard will be in the SMA.

5. Since your plan is to underground HECO's existing facilities in the project area in accordance with prevailing improvement district cost-sharing rules, we will reserve comments on line conflicts and relocation requirements when more definite plans are available.

Sincerely,

cc: Hawaii Community Development Authority
Attn: Rex D. Johnson, Executive Director
Milton Arakawa, Chief Planner

R. M. Towill, Corp.
Attn: Colette Sakoda

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

Mr. William A. Bonnet
Manager
Environmental Department
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840-5020

Dear Mr. Bonnet:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We are in receipt of your letter of November 17, 1989 regarding the DSEIS for the Kakaako Makai Area Plan.

Your comments and recommendations regarding project impacts and probable requirements to accommodate the Kakaako Makai Area Plan have been taken under advisement, and revisions to the SEIS text, where appropriate, will be made.

Thank you for your interest in the Kakaako Makai Area planning process.

Very truly yours,

Rex D. Johnson

RDJ/ST:gst

United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

November 27, 1989

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
677 Ala Moana Boulevard, Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Subject: Kakanko Makai Area Plan Draft Supplemental Environmental Impact Statement (DSEIS)

We have reviewed the subject DSEIS and have the following comments:

3.2.3:

Geology and Soils- Please provide a reference for the descriptive material relating to the substrata conditions of the project area. Also, references for figures 3-1 and 3-2 should be provided.

3.2.5:

Hydrology and Drainage- The first paragraph is misleading. The sedimentary deposits underlying Kakaako restrict the percolation of rainfall into the underlying Koolau basalt but not into the shallow cap rock aquifer.

We appreciate the opportunity to comment on this DSEIS.

Sincerely,

William Meyer
District Chief

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613

December 29, 1989

Mr. William Meyer
District Chief
Geological Survey
Water Resources Division
U. S. Department of the Interior
Suite 415
677 Ala Moana Boulevard
Honolulu, Hawaii 96813

Dear Mr. Meyer:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We have received your letter of November 27, 1989. The following has been prepared in response to your comments regarding the DSEIS for the Kakaako Makai Area Plan.

Geology and Soils

The references relating to the substrata conditions of the project area will be provided in the Final SEIS.

Hydrology and Drainage

The discussion referenced in the DSEIS will be clarified in the Final SEIS.

We appreciate your interest and participation in the Kakaako Makai Area planning process. Thank you for your comments and recommendations.

Very truly yours,

for Rex D. Johnson

RDJ/ST:gst

JOHN WAIHEE
GOVERNOR

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

November 28, 1989

'89 DEC 4 AM 10 54

RECEIVED

MEMORANDUM

To: Dr. Marvin T. Miura, Director
Office of Environmental Quality Control

Subject: Draft Environmental Impact Statement (DEIS) for
Revised Kakaako Makai Area Plan
Hawaii Community Development Authority
TMK: 2-1-15: multiple parcels
2-1-60: multiple parcels
2-1-59: multiple parcels
2-1-58: multiple parcels
Area: approximately 210 acres

The Department of Agriculture has reviewed the subject document and offers the following comments.

Our primary concern is that the Plant Quarantine and Measurement Standards facilities (presently TMK: 2-1-60: 10, 2.079 acres) be relocated to a suitable site which will meet the needs of each program, and that the relocation process will not adversely affect their provision of services to the public.

This effort is being coordinated with the Hawaii Community Development Authority and the Department of Accounting and General Services. Discussions have taken place intra- and inter-departmentally and will continue as relocation assistance, site alternatives, and program requirements and concerns are being addressed.

Thank you for the opportunity to comment.

Yukio Kitagawa

YUKIO KITAGAWA
Chairperson, Board of Agriculture

cc: Mr. Rex D. Johnson, Executive Director, HCDA ✓
Ms. Colette Sakoda, R. M. Towill, Corp.

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613 December 29, 1989

The Honorable Yukio Kitagawa
Chairperson
Board of Agriculture
State of Hawaii
P. O. Box 22159
Honolulu, Hawaii 96822-0159

Dear Mr. Kitagawa:

Re: Draft Supplemental Environmental
Impact Statement (DSEIS) for the
Kakaako Makai Area Plan

We are in receipt of your letter of November 28, 1989 regarding your concerns that the necessary relocation of the Plant Quarantine and Measurement Standards facilities from Kakaako be coordinated so that provision of services to the public is not jeopardized. We will continue to work closely with you and the appropriate parties to assure as non-disruptive a relocation process for these programs as possible.

We appreciate your comments and participation in the Kakaako Makai Area planning process.

Very truly yours,

Robert K. Miura
Rex D. Johnson

RDJ/ST:gst

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 8TH FLOOR
HONOLULU, HAWAII 96813
PHONE: 523-4427 • FAX 527-5488

FRANK F. FASI
MAYOR

MICHAEL N. SCARFONE
DIRECTOR

RONALD S. MUN
DEPUTY DIRECTOR

December 5, 1989

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

'89 DEC 6 PM 1 40

Dear Dr. Miura:

Subject: Draft Environmental Impact Statement
Revised Kaka'ako Makai Area Plan

Thank you for the opportunity to review and comment on the Draft EIS for the Revised Kaka'ako Makai Area Plan. Our comments are as follows:

1. In light of the HCDA's plans to develop the Kaka'ako Mauka area with a projected 19,000 residential units, we fully support the concept of the 70-acre Waterfront Park in the Makai area which will create much needed open space and recreational facilities for those nearby residents and all residents of metropolitan Honolulu.

2. While Table 2-4 in the Draft EIS lists numerous road widenings and extensions, Section 2.6.11 and Figure 2-10 on land acquisition are silent on the additional rights-of-way required and the number of landowners affected. The Final EIS should also elaborate on the extent of taking and effect on Ala Moana Boulevard businesses.

We have no other comments at this time. We will retain a copy of the Draft EIS for our files.

Sincerely,

MICHAEL N. SCARFONE
Director

cc: Hawaii Community Development
Authority
R. M. Towill Corporation

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613 December 29, 1989

The Honorable Michael N. Scarfone
Director
Department of Housing and
Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Scarfone:

Re: Draft Supplemental Environmental
Impact Statement (DSEIS) for the
Kakaako Makai Area Plan

We have received your letter of December 5, 1989 regarding the DSEIS for the Kakaako Makai Area Plan.

Thank you for your support with regard to the proposed 70-acre Waterfront Park which will create much needed open space and recreational facilities in the Makai Area.

In response to your comments regarding the proposed widening of Ala Moana Boulevard, the proposal has been withdrawn at this time.

Although this regional traffic measure was the alternative preliminarily proposed by our traffic consultant, Pacific Planning & Engineering, Inc., the consultant also stated that actual determination of any long-range transportation improvement such as this is vested with the Oahu Metropolitan Planning Organization (OMPO).

OMPO is presently completing long-range forecasts and plans based on the official 2005 horizon year. Preliminary findings indicate that levels of service (LOS)

for traffic conditions across the downtown screen line covering the H-1 Freeway, Beretania Street, King Street, and Nimitz Highway/Ala Moana Boulevard will be LOS "D" (i.e., bordering on unstable flow just above capacity). Thus, at least for the 2005 time period, there appears to be sufficient planned corridor capacity to accommodate forecasted traffic volumes.

Because this LOS represents an average condition across the four identified corridors (one of which, Nimitz Highway/Ala Moana Boulevard, passes through the Waterfront planning area), it is impossible to determine service conditions on any particular corridor (i.e., it is possible that all corridors operate at LOS "D", or that some operate at LOS above "D", with others below "D"). The actual LOS along any particular corridor must be evaluated in the regional or system-wide context due to the "substitutability" of corridors (i.e., highway users are assumed to seek out corridors offering higher levels of service, and correspondingly avoid those with lower levels, thus tending to balance out levels of service across comparable corridors).

The preliminary OMPO findings for 2005, that planned corridor capacity is sufficient to meet projected traffic volumes in 2005, do not necessarily contradict the Waterfront Plan's findings regarding the need for additional corridor capacity by 2010, for the simple reason that the growth in regional traffic (between 2005 and 2010) could exceed planned improvements to corridor capacity by 2010. The OMPO process has not yet looked at 2010 projections and will not be able to fully resolve the issue (i.e., confirm or dismiss the Waterfront Plan findings) until major new system-wide studies are completed.

Until such time that these issues are addressed by the responsible agencies, further alterations to these facilities to address regional transportation concerns would be premature.

We appreciate your participation and interest in the Makai Area planning process and look forward to working with you as we proceed with implementation of this project.

Very truly yours,

Robert K. Mizuno for
Rex D. Johnson

RDJ/ST:gst

JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MAZZURARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

ENERGY DIVISION, 335 MERCHANT ST., RM 110, HONOLULU, HAWAII 96813 FAX: (808) 586-2536

89:772e

December 5, 1989

'89 DEC 7 AM 10 40

Mr. Marvin T. Miura, Director
Office of Environmental Quality Control
465 S. King Street, #405
Honolulu, Hawaii 96813

Dear Mr. Miura:

Subject: Draft Supplemental Environmental Impact Statement
for the Kaka'ako Makai Area Plan

The Energy Division has received the above-referenced Draft Supplemental Environmental Impact Statement (DSEIS) and has the following comments:

We note that the DSEIS contains a brief discussion (pp. 4-6, 4-7) of landscaping, building design, and energy conserving technology that the Hawaii Community Development Authority intends to consider throughout the Makai Area. We also note, however, that the DSEIS does not contain an estimate of total electricity consumption within the subject area, nor a discussion of how applications of energy conservation or renewable energy sources might help meet the area's electricity requirements. The requirement for such an evaluation is spelled out in the enclosed excerpt from the OEQC Bulletin.

We would like to recommend that the Hawaii Community Development Authority consider the adoption of "energy efficiency design guidelines" for Kaka'ako. Enclosed for HCDA's consideration are the Energy Efficiency Design Guidelines that were prepared for the Housing Finance and Development Corporation (HFDC) and subsequently were included as an Addendum in its most recent Request for Proposals for increments two and three of the Villages of Kapolei.

Thank you for this opportunity to comment; I hope these comments will be useful to you.

Sincerely,

Tom O'Brien
for Maurice H. Kaya

MHK/PE:be

Enclosures

cc: ✓HCDA
R. M. Towill

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

John Waihee
Governor
Kenneth K. Takenaka
Chairman
Rex D. Johnson
Executive Director

Ref. No.: PL EIS 6.16

December 29, 1989

Mr. Maurice Kaya
Energy Division
Department of Business and
Economic Development
State of Hawaii
Room 110
335 Merchant Street
Honolulu, Hawaii 96813

Dear Mr. Kaya:

Re: Draft Supplemental Environmental
Impact Statement (DSEIS) for the
Kakaako Makai Area Plan

We are in receipt of your letter of December 5, 1989. The following has been prepared in response to your comments regarding the DSEIS for the Kakaako Makai Area Plan.

The total projected electricity consumption for the Makai Area Plan has not been estimated at this conceptual master plan level. Due to the preliminary nature of the master plan, it is not possible to estinate with any accuracy the amount of electricity that might be consumed. However, as separate and specific projects are developed in the Makai Area, electricity consumption levels will then be estimated. As specific projects are defined and developed, necessary design details and specifications will be available to help determine electricity consumption requirements.

Thank you for your recommended use of "energy efficiency design guidelines" that were prepared for the Housing Finance and Development Corporation. We will take your recommendation under advisement.

Very truly yours,

Robert K. Mina
for Rex D. Johnson

RDJ/ST:gst

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

RECEIVED
'89 DEC 7 AM 10 40

December 6, 1989
RE:0543

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

Dear Dr. Miura:

Draft Supplemental Environmental Impact Statement
Revised Kaka'ako Makai Area Plan
Honolulu, Oahu

The Hawaii Community Development Authority (HCDA) proposes a major revision to its Kaka'ako Makai Area Plan as accepted by the governor in the Final Supplemental EIS for the Kaka'ako Community Development District Plan in 1985. The revised plan consists of two, ten-year development phases beginning in 1990 and concerns an area of 227 acres on the southern Honolulu coast between Pier 8 at the Aloha Tower and Ala Moana Beach Park extending south from Ala Moana Boulevard. The plan allocates 227 acres (as opposed to 133 in the original plan) to six zones - Park (70), Public (8), Commercial (39), Waterfront Service (9), Waterfront Commercial (12), and Recreational Commercial (16) - and other uses including inland waterways (17), the Aloha Tower Special District (8), and roadway rights-of way (48). Revisions to the original plan include development of a waterfront park, elimination of residential use, and restriction of industrial use to only those related to waterfront or marina activities and located within the Waterfront Service and Waterfront Commercial zones.

We have reviewed the Draft Supplemental EIS for this project with the assistance of Karl Kim and Peter Flachsbart, Urban and Regional Planning; Peter Rappa, Sea Grant; Hans-Jurgen Krock, Ocean Engineering; and Harriett Kessinger of the Environmental Center.

All of our reviewers noted an overall vagueness and lack of precision in the DSEIS which disallowed opportunity for effective review of the proposed actions and resulting impacts. We also found that many of the claims regarding benefits were unsubstantiated and inflated.

Transportation

It is very unclear from this document what level of traffic will be generated from the proposed projects. If the intention of the Kaka'ako Makai Area Plan is for this area to be a major regional activity generator, what are the projected levels of vehicular traffic? An "Epcot Center", an amphitheater, increased commercial uses (cafes, bistros, restaurants, bookstores, and shops), and new recreational facilities will undoubtedly generate more cars and people. Order of magnitude estimates of the level of increased traffic to the area should be included in the EIS. Without these estimates, it is difficult to evaluate the adequacy of proposed street and circulation improvements and parking requirements, as well as resultant changes in congestion, traffic safety, and air pollution.

The transportation impacts component (p. 3-66 to 3-72) is also deficient. While there is need to coordinate with the OMPO process, it is not unreasonable to expect more detailed study of the site-specific traffic impacts likely to result from development. It is unclear from Table 3-6 (p. 3-70) how much of the forecasted volumes results from the development and how much is from growth in regional travel demand. Based upon the market assessment described in the DSEIS, it should be possible to estimate travel demand associated with new development. Also, the impacts of the Sand Island Bypass and Tunnel are not adequately described.

Another related area of concern involves the lack of provision for public parking, particularly for the park users. While the document emphasizes private, covered parking facilities, indicating there may be parking available for those utilizing the commercial establishments, there does not appear to be sufficient detail to evaluate the adequacy of parking for users of the park and other public amenities.

The need for the construction of five pedestrian bridges over Ala Moana Boulevard is unsubstantiated and explained only in vague terms.

Costs/Financing

Estimated costs presented in the DSEIS are difficult to evaluate because they have been presented at such an aggregated level. While some of the capital costs are discussed, operating and maintenance costs are not. Since there is a large amount of open and public space, the public costs associated with upkeep are likely to be significant.

The DSEIS does not contain a detailed discussion of impacts on public services such as police, fire, and public transportation. There are certain to be new costs generated by this development, and the assumption of a "property tax windfall" needs to be qualified against the new costs which the City and County will have to bear.

Other fiscal impacts not directly addressed include the impacts of additional debt-financing on the state and local sector. More detailed analysis of the various financing schemes - G.O. financing, other types of debt obligations (such as special assessment bonds, revenue bonds, etc.) - and private sector "contributions" is needed. It is unclear who will bear the various costs of the proposed development.

Socio-Economic Impacts

Many socio-economic impacts, such as impacts of development on employment, the tourism industry, and downtown development, are not discussed in the DSEIS. These impacts are important, not only in terms of justifying the large public costs, but because they have much to do with improving the quality of life in Honolulu.

A detailed discussion of the trade-offs associated with relocating the existing light industries and replacing them with "higher density commercial and office spaces, regional waterfront recreational areas, and maritime commercial activities" is needed. Again, the point is not that the actions are not justifiable, but rather that there is a lack of discussion. As the first community development district in the state, issues such as governance, public participation, intergovernmental relations, and long-term management of the area should be more openly discussed.

The DSEIS should include a list of businesses which will be relocated, citing the number of businesses, nature of the businesses, proposed site of relocation, and specific impacts. A list of existing buildings and plans regarding their fates should also be included (p. 3-58).

Air Quality

The treatment of the topic of air quality is too brief and seriously deficient in two major areas: 1) those of current air quality status; and 2) projected future concentrations.

1) James Morrow's 1989 report on current conditions should have been included. Without an opportunity to view his report, it is unknown what methodology was used and in what way the results support the conclusions presented in the DSEIS. Also, "limited sampling" during periods of "extremely variable" wind conditions "thus contributing to relatively low pollutant levels" does not present an accurate picture of the true situation (p. 3-27).

2) Projections of future concentrations should have been made. Commonly accepted methodologies of emissions (Mobile4) and dispersion (Caline4) models are recommended for this purpose. Without these projections, it is impossible to credibly assess the potential impacts on air quality.

Our reviewers also noted several other points:

How much of a "beneficial effect on air quality" is the "likely" closure of HECo's power plant in 1990 "likely to have" (p. 3-27)?

In regards to mitigation measures, "high parking charges can also reduce the volume at an over-utilized parking garage and thereby reduce nearby CO levels" (p. 3-28), it would seem that elimination of the parking garage to begin with would be a more effective, practical means of mitigation in that direction. In general, how effective and realistic are the mitigative measures suggested in this section? What support can be demonstrated to the effectiveness to air quality improvement of such measures as "encouragement and greater use of public transit", and "provisions for bike lanes and esplanades, and pedestrian promenades"? To what extent is "substitution of public transportation facilities" for "facilities which serve privately owned vehicles" planned in this project?

Other Concerns

The seawall reconstruction section (p. 3-40) should specify the height of the completed wall. The DSEIS should acknowlege that the reconstruction effort will follow the guidelines recommended in the 1986 Sea Grant study (reference 2 in the list of references in the DSEIS), if that is indeed the case.

The statement, "construction-related environmental consequences and mitigation measures which were addressed in the 1985 FSEIS, are still applicable" (p. 3-3), means little without a summary of what those construction-related impacts and measures were.

Under Impacts and Mitigation Measures for nearshore activities (p. 3-16 to 3-17), the construction of ocean water intake and outfall lines is discussed but without reference to the existing pipes or their status. Are the preparers aware of their existence, and, if so, what is the disposition of the existing pipes?

"Mitigation methods such as siltation pits and screens, cofferdams, and debris-sediment traps could be employed to minimize the potential adverse impacts of silt and sediment loading..." (p. 3-31) indicates what could be done but discloses no clue as to whether or not these methods will be employed. Again, the lack of specification impedes serious review.

Are there any plans to preserve, or at least assess the historical significance of the two incinerators, constructed around 1927 and 1950, which are located in the project area?

Conclusions

We find this DSEIS to contain serious deficiencies according to the EIS Rules (Sections 11-200-16 and 17) regarding content requirements. The Rules state, "the contents shall fully declare the environmental implications of the proposed action and shall discuss all relevant and feasible consequences of the action" (Sec. 11-200-16), and "the draft EIS shall contain a project description which shall include...summary technical data; diagrams; and other information necessary to permit an evaluation of potential environmental impact by commenting agencies and the public". Clearly the Kaka'ako Makai DSEIS does not fulfill these requirements as exemplified in the preceding comments.

Consequently, we strongly recommend an additional supplemental EIS for this project at such time that the above-cited requirements can be met, or at least the full correction of the deficiencies in the upcoming Final Supplemental EIS.

Thank you for the opportunity to comment on this document.

Yours truly,

John T. Harrison
Environmental Coordinator

cc: R. M. Towill, Corp.
Hawaii Community Development Authority ✓
L. Stephen Lau
Karl Kim
Peter Rappa
Peter Fachsbart
Hans-Jurgen Krock
Jacquelin N. Miller
Harriett Kessinger

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

Mr. John Harrison
Environmental Coordinator
University of Hawaii at Manoa
Environmental Center
State of Hawaii
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Mr. Harrison:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We have received your letter of December 6, 1989. The following has been prepared in response to your comments and concerns regarding the DSEIS for the Kakaako Makai Area Plan.

Transportation

1. The traffic that will be generated by the proposed project is summarized below by major land use categories. Levels were estimated using average trip rates from the Trip Generation Report, 1987 (Fourth Edition), Institute of Transportation Engineers (ITE). Estimates are shown as number of trips during the afternoon peak hour:

   a. Commercial uses: 3,623 trips entering the area and 6,967 trips exiting the area.

   b. New recreational facilities: 319 trips entering and 443 exiting the area.

2. A traffic impact assessment to determine lane requirements was prepared specifically for the Makai

Area by Pacific Planning & Engineering, Inc. Site-specific traffic impacts were evaluated to help the planners determine lane requirements for the Makai Area. Critical volumes and capacity levels of major intersections are discussed by the traffic consultant based on his assumptions that: (1) the analysis was to be based on volumes projected to the year 2010; and (2) Ala Moana Boulevard would be the corridor to carry increasing regional traffic because mauka corridors such as Beretania Street or the H-1 Freeway would not be capable of handling significantly more regional traffic (because it would not be feasible, for example).

While the Sand Island Bypass and Tunnel are shown on the Honolulu Waterfront Master Plan schematic, this facility is not part of the Makai Area Plan. Therefore, analysis of this facility was not necessary for this SEIS. However, if the appropriate agency decides to pursue implementation of this alternative facility, more detailed analyses of its impacts, feasibility, and design will be conducted.

3. Provisions for public parking for the new Waterfront Park and other public amenities are initially in the form of surface parking in areas adjacent to and makai of the proposed Ward Avenue extension. Surface parking will subsequently be redeveloped into structured parking as the blocks are developed for commercial uses. Parking for major public events (i. e., amphitheater, performing arts center, etc.) will be accommodated within the proposed commercial developments indicated as "shared parking" in the Vehicular Circulation and Parking Plan.

4. One of the goals of the Honolulu Waterfront Master Plan and subsequently of the Makai Area Plan, was to break down the barrier created by the Ala Moana Boulevard/Nimitz Highway corridor which, over the years, has separated the mauka and makai communities

of the Kakaako to downtown Honolulu areas. The intent of planning pedestrian bridges across this corridor is to help open up the shoreline to the mauka communities once again. Strategic placement of these pedestrian bridges along the Ala Moana Boulevard corridor will theoretically encourage people to leave their vehicles outside the Makai Area and traverse Ala Moana Boulevard via these pedestrian bridges on foot.

Costs/Financing

1. As the Makai Area is redeveloped, certain improvements would require maintenance. The facilities requiring the most maintenance would include the parks, promenades, amphitheater and public rights-of-way. Responsibility for maintenance, while not yet determined, is assumed for this analysis to be the City and County's.

   The annual operating expenses for the facilities have been estimated to range from $50 per seat for the amphitheater to $4,500 per acre for the parks, as will be further discussed in the final SEIS.

2. Expenses associated with police and fire protection and State and County administration will also increase over the projection period. However, these expenses will result from population growth which is anticipated to occur regardless of the redevelopment in the study area. Therefore, these expenses although important to be aware of, have been excluded from the operating and maintenance costs. It should be noted that these are necessary public services which are programmed for in response to Planned Developments.

3. Capital improvements will be financed through General Obligation Bonds. Thus, the actual cash expenditures would be incurred over a period of years rather than at the time of construction. To illustrate the relative cash flow of the annual debt service, for the

purposes of the long-range Makai Area Plan, it has been assumed the non-maritime capital expenditures would be financed through 20-year State General Obligation Bonds at a rate of 7 percent.

Private sector "contributions" will occur in the form of provisions including: 1) assessments on the real properties that specially benefit from public facility improvements, which help pay for infrastructure improvements; 2) paying a fee in accordance with the rules for the reserved housing trust fund wherein developers of Planned Developments are assessed based on the projected leasable commercial floor area of the development parcel; and 3) property taxes.

Costs of the proposed development will be borne by those who will benefit from it, this means that public benefits will be realized only after public expenditures are made to develop facilities including the Waterfront Park, new roadways and pedestrian promenades, and other park amenities such as the inland waterways.

Socio-Economic Impacts

1. The impacts of development on employment, the visitor industry, and on downtown development will be discussed in the FSEIS from the standpoint of potential jobs to be created, and potential income implications.

2. The intent of relocating existing light industries to Iwilei and other appropriate locations is to consolidate such land uses and activities in the Honolulu Waterfront area in order to make more efficient and effective uses of precious waterfront space. The trade-offs are that State expenditure on the purchase of Kapalama Military Reservation land, and subsequent relocations of light industries, will in the long-term benefit residents by providing

necessary open space, parkland, and recreational facilities in a central Honolulu location, adjacent to a growing urban center.

Relocating light industrial uses and their attendant environmentally insensitive uses such as heavy diesel trucks, will minimize potentially adverse environmental impacts (such as noise and conflicting mixes of truck and pedestrian traffic) on adjacent urban land uses in the redeveloping Kakaako district.

3. Governance, public participation, intergovernmental relations, and long-term management of the first community development district in the State continue to be addressed and openly discussed in the numerous public workshops and meetings the Hawaii Community Development Authority (Authority) holds with neighborhood boards, special interest groups, private industry and public agencies. The public planning process in which the Authority involves itself to facilitate its plans for the Kakaako district is a dynamic and open process which it intends to continue with its revised Makai Area Plan and other plans it may be involved within the future.

4. A listing of businesses which will be relocated, proposed use of the existing site, and proposed site of relocation will be provided in the FSEIS.

Air Quality

A comprehensive discussion of the project area's existing conditions, project-induced impacts and mitigation measures with regard to air quality will be included in the FSEIS document.

The source of HECO's Honolulu Power Plant's contribution to air pollution are its two, low sulfur fuel oil-fired boilers. Sulfur dioxide is a pollutant which is known to cause respiratory problems and other health

problems. The expected closure of the plant will at least reduce the amount of sulfur dioxide emissions in this area.

Additional Comments to Air Quality Response

1. Limited sampling was conducted as a supplement to the long-term monitoring done at the Department of Health (DOH) building. It was conducted to provide a few examples of actual street level CO concentrations which could then be compared to (1) DOH data which are collected on the upper level of the DOH building; and (2) computer modeled street level concentrations.

2. Projections were made as part of the Air Quality Impact report (1989) for the Waterfront Master Plan. Emission factors were generated with MOBILE-3 and ambient concentration estimates were computed with CALINE-4.

3. Impact of closure of HECO's downtown plant: This plant represents only about 9.1 percent of HECO's installed electrical generating capacity on Oahu (i.e., 116 MW out of a total of 1,277 MW). It is not used to full capacity as indicted by HECO's 1986 generation data which show that the plant generated only 3.7 percent of the total 5.8 million megawatt hours of power on Oahu. Estimated emissions reduction as a result of plant closure and based on the 1986 generation data are as follows:

   sulfur oxides - 600 T/yr
   nitrogen oxides - 792
   particulate matter - 60
   carbon monoxide - 38
   hydrocarbons - 8

4. The "no garage" alternative would clearly have less air quality impact than a "high parking charges garages" alternative. The latter would reduce impact whereas the former would eliminate it. The

effectiveness of such a measure is clear. The practicality may be argued by some. A governmental policy that no new parking facilities will be built in the area would improve its desirability as a truly "people-oriented" pedestrian area.

5. The effectiveness of "encouragement and greater use of public transit" is clearly variable. The City is currently evaluating the subject as it plans for a mass transit system. The effectiveness would be greatly enhanced if continued support and encouragement of automobile-oriented facilities were sharply reduced or eliminated. Likewise, bike lanes and pedestrian promenades would be more desirable and effective if they did not have to compete with automobiles which impact them in terms of noise, air pollution, and safety.

Other Concerns

1. The height of the completed seawall will be approximately 15 feet.

2. Please refer to Chapter IV-C for "Consequences of Actions Proposed to Construct the Infrastructure Improvements for Incremental I and Future Increments," and Chaper IV-E.2, "Summary of Mitigating Measure for Construction of Infrastructure".

3. At present, there are no plans to change the existing ocean water intake and outfall lines.

4. The Authority will be working with the DOH and City departments to be consistent with these agencies' standards in providing proper mitigation measures on equipment during construction. It is, at present, premature to foreclose any set of options the Authority may have by way of safe and sound construction methods which will meet environmentally compatible/sensitive health and safety standards.

5. Following our research on the potential historical significance of the two incinerators on the Kakaako Peninsula, we have determined that there should not be any plans to preserve these facilities. If energy resource recovery methods such as steam were practiced at these incinerator sites, there may have been some historical significance. However, our research concluded that no energy resource recovery was practiced at either site.

   Further, a survey was commissioned by the Authority, to identify all sites worthy of preservation based on historic preservation guidelines in Kakaako. Of all sites identified in this study, the two incinerators were not included on the final list.

6. With regard to your comment on an additional supplemental EIS for this project prior to implementation of the major facilities (i.e., the proposed inland waterway and landfill extension), additional modeling and feasibility studies will be conducted.

We appreciate your interest and participation in the Makai Area planning process. Thank you for your comments and recommendations.

Very truly yours,

Robert K. Hiura
for Rex D. Johnson

RDJ/ST:gst

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

BENJAMIN B. LEE
DEPUTY DIRECTOR

LU10/89-6862(RF)

December 6, 1989

Marvin T. Miura, Ph.D, Director
Office of Environmental Quality Control
State of Hawaii
465 South King Street, #405
Honolulu, Hawaii 96813

RECEIVED
'89 DEC 12 PM 2 4h

Dear Dr. Miura:

Draft Supplemental Environmental Impact Statement (EIS)
Kakaako Makai Area Plan

We have reviewed the Draft EIS and have the following comments and questions:

1. Purpose of the EIS: As we understand it, the main purpose of the EIS is to assess the impacts of proposed changes to the Makai Area Plan and Rules. The content and level of analysis of the Draft EIS clearly satisfy this purpose.

   Further assessment is needed, however, concerning the impacts of major public improvement projects, such as the development of the Kakaako Park (new seawall and treatment of hazardous wastes), the offshore landfills planned for both peninsulas, and the creation of interior waterways. Further modelling and feasibility studies are needed to detail the costs and benefits, design considerations, and mitigation measures of the offshore fill and inland waterway projects.

2. Kakaako Peninsula Seawall: How will the new seawall affect the Point Panic surf site? As the Draft EIS notes, access to the surf site from the existing seawall is hazardous. Given that the proposed beach park offshore at Ft. Armstrong may or may not be implemented sometime in the future, what mitigation measures could be taken in the seawall project to make entering the water less hazardous? Mitigation could include steps or a flat apron built into the revetment or dredging a shallow channel near the wall.

3. Public Views (p. 3-57): The Draft EIS contains little analysis of views from the planned Kakaako Park towards the mountains. Given development potential under the existing Hauka Area Rules and the proposed Makai Area Rules, will there be any mountain views from the new park on Kakaako Peninsula? Will there be any mountain views from the new beach park, if it is developed?

4. Building Design Requirements: The Draft EIS states that buildings will generally be compatible with adjacent areas, including significant historical structures (p. 2-48). Are the design guidelines stated in the Draft EIS also included in the proposed Rules? How will the guidelines be implemented?

5. Transportation: We concur that transportation is a major unresolved issue, particularly with regard to east-west corridor capacity. Development of major projects such as the proposed "Tivoli Gardens" recreational commercial area should be linked to development of long-range transportation improvements.

We also direct your attention to the issues raised in Mayor Fasi's comments on the Makai Area Plan and Makai Area Rules, contained in his November 13 letter to the HCDA. Thank you for the opportunity to comment.

Very truly yours,

John P. Whalen

JOHN P. WHALEN
Director of Land Utilization

JPW:sl
0293M/46-47

John Waihee
Governor
Kenneth K. Takenaka
Chairman
Rex D. Johnson
Executive Director

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

The Honorable John P. Whalen
Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We are in receipt of your letter of December 6, 1989. The following has been prepared in response to your comments and questions regarding the DSEIS for the Kakaako Makai Area Plan.

Purpose of the SEIS

While we agree that additional modeling and feasibility studies will be needed for the offshore landfills and interior waterways, we need to point out that design studies for the Kakaako seawall renovation by Edward K. Noda and Associates and remedial assessment for the use of the former Kewalo landfill site by Harding Lawson Associates were commissioned for the Makai Area Plan. The studies' conclusions, recommendations, and mitigation measures will be discussed in the Final SEIS.

Kakaako Peninsula Seawall

Our ocean engineering consultant, Edward K. Noda and Associates, has conducted an evaluation of the proposed seawall renovation during the Honolulu Waterfront Master planning process. The same consultant further refined the study for design purposes during the Makai Area Plan revision period. It was concluded that the only adverse

impact on the Point Panic surf site will be on the landside, and the existing parking lot for the facility will be temporarily closed during renovation work on the seawall. Access for trucks and construction equipment will be necessary. However, upon conclusion of the renovation work, the parking lot will be reopened. Your recommended mitigation measures for improving access from the shoreline into the water off the Kakaako shore has been evaluated by our consultant.

Public Views

The Final SEIS will include discussion of views from the planned Kakaako Park towards the mountains. Mauka view corridors will be created by the development of the Kakaako Park. A view corridor that will be created will be the new beach park at the Ewa end of the Kakaako Peninsula looking mauka along Keawe Street. Excellent mauka views from the inland waterway will also be enjoyed by park goers.

Building Design Requirements

The design guidelines relative to recognizing historic resources in adjacent buildings' materials, landscaping, or design motifs, are discussed in the SEIS, but are not contained in the Kakaako Community Development District Rules. Application of these design guidelines will occur in the design review process for Planned Developments.

Transportation

We appreciate your recommendation that major projects such as the "Tivoli Gardens" recreational commercial area be linked to development of long-range transportation improvements. The Makai Area Plan will accommodate and encourage the use of public transportation modes such as buses, a people mover system, waterborne ferries and taxis, and other forms of mass transit.

We truly appreciate your continued interest and thoughtful considerations and recommendations throughout the planning process for the Makai Area Plan.

Very truly yours,

Robert K. Mina for
Rex D. Johnson

RDJ/ST:gst

RECEIVED
'89 DEC 12 AM 10 47

University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 • 2540 Dole Street
Honolulu, Hawaii 96822

7 December 1989

State of Hawaii
Hawaii Community Development Authority
677 Ala Moana Blvd., Suite 1001
Honolulu, Hawaii 96813

Gentlemen:

SUBJECT: Draft Report, Makai Area Plan, Kaka'ako Community Development District, October 1989

We have reviewed the subject Draft Report and offer the following comments:

1. There will be a lot of floating flotsam and jetsam coming down the storm drains. Therefore, the outlets from these drains should be designed and located to facilitate trapping the debris and to keep the unsightly rubbish out of sight as much as possible. There is also a need to provide access for men and equipment to periodically clean up the mess because this will be a continuing maintenance effort.

2. Similarly sediments will settle in the channels, necessitating periodic dredging. Therefore, sediment removal techniques, such as dredging, will need to be designed into bridge haights and canal widths to facilitate these activities.

3. In line with marine highway concepts, for the south shore of Oahu, the canals should be made wide and deep enough to allow appropriate ferry ships to pass through from probable stops in Kewalo Basin and Honolulu Harbor without going back out to the open sea. Correspondingly, bridges should be built high enough to allow ship passage.

4. The proposed amphitheater should be conceived as possibly replacing the present Waikiki Shell which has been besieged by noise complaints. Locating such a facility in this Kaka'ako Makai Area Plan would make eminent sense because there are no residences or hotels in proximity to the site. To mitigate any noise disturbance to its neighbors, as well as any cruise ships which might be docked at the nearby proposed berthing and terminal area, it is suggested that the amphitheater be sited at the eastern edge along the Ewa side of the Kewalo Basin channel. The shell should also be directionally oriented so that the noise will go directly out to sea. In line with this, adequate parking will need to be provided.

Thank you for the opportunity to comment.

Sincerely,

Edwin T. Murabayashi
EiS Coordinator

ETM:jm

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

Mr. Edwin T. Murabayashi
EIS Coordinator
Water Resources Research Center
University of Hawaii at Manoa
State of Hawaii
Holmes Hall
2540 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Murabayashi:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We are in receipt of your letter of December 7, 1989. The following has been prepared in response to your comments regarding the DSEIS for the Kakaako Makai Area Plan.

Inland Waterway

Your recommendations regarding design and maintenance of this facility will be given full consideration during the next level of modeling and design studies. However, with regard to your recommended depth, the rationale for the 5-foot water depth of these canals is that the waterway will need to be shallow enough for sunlight to penetrate through to the bottom to address the maintenance concerns. The detailed modeling studies will take your comments into consideration.

Amphitheater

While the Makai Area Plan identifies the amphitheater as a proposed land use, actual feasibility and siting of the facility are yet to be determined. As we proceed with Plan implementation and detailed feasibility studies, your

suggestions with regard to siting will be given consideration. Should such a facility be constructed in the Makai Area, you can be assured that it will be oriented so that the sound will be directed in a seaward direction.

Thank you for your participation in the planning stages of the Makai Area Plan. We look forward to working with you as we proceed with implementation.

Very truly yours,

Rex D. Johnson

RDJ/ST:gst

DOWNTOWN NEIGHBORHOOD BOARD NO. 13
c/o NEIGHBORHOOD COMMISSION OFFICE
CITY HALL
HONOLULU, HAWAII 96813

December 8, 1989

Mr. Rex Johnson
Hawaii Community Development Authority
677 Ala Moana Blvd., Suite 1001
Honolulu, HI 96813

Dear Mr. Johnson:

The Downtown Neighborhood Board, at its December 7, 1989 meeting, took the following position concerning the Draft Supplemental Environmental Impact Statement for the Kaka'ako Makai Area Plan.

I. Recreational Needs

This is probably one of the most significant areas of deficiency in the report. In particular, while the report acknowledges that the Makai Area will be the major recreational resource for Kaka'ako, no effort is made to assess the specific needs of the Kaka'ako district *mauka* of Ala Moana Boulevard. The entire issue of active versus passive recreational uses is glossed over. No definition of "active recreation" is presented, nor are the various types of active recreation (personal, such as jogging, on the one hand, compared with social, such as baseball or soccer, on the other) defined or evaluated in terms of demand.

We feel that it is critical that standards be established as to how much "public active social recreation space" is required for the planned population of Kaka'ako. Without such a standard, it is impossible to determine whether or not a vital need is being met, or whether a particular use is necessary or simply window dressing. In this regard, we feel that the performing arts center fits in the latter category: a facility which we would like to have somewhere in town but which does not belong here where it will prevent the utilization of the park for active social recreation.

The issue of public access to the public facilities needs to be addressed. Ala Moana Park is as successful as it is due to the large amounts of free parking available. What will be the situation in Kaka'ako? How will public parking be differentiated from private parking when placed in close proximity? How will we be sure that park users will not be prevented from accessing the park because commercial clients take free stalls?

II. Inland Waterways

The creation of the inland waterways deserves a full-scale presentation in the DEIS instead of the brief summary comments which claim to justify it. We have serious doubts that any adequate study exists to show that the existence of a canal by itself adjacent to a commercial property in Hawaii will create any increment in value beyond the increment already provided by large open spaces on the far side of the canal. Furthermore, the simple sum of the future rents is not a proper measure of the possible value of such a canal. The rents have to be discounted to a present value and such a process would tend to reduce the difference between the values of the canal and no-canal alternatives.

More thought also needs to be given to the actual mechanics of the canal. The suggestion that the canal could be flushed by drain water from Kaka'ako brings to mind the filthy state of the Ala Wai Canal. Is that what is desired for this area? How can it be prevented?

III. Ala Moana Boulevard

The traffic problem along this major road will be a major issue. The DEIS states that there is insufficient data at present to properly analyze the future traffic, but that reports are pending from other agencies, such as OMPO. Is it appropriate to approve a plan while a major aspect is unresolved?

We have two concerns. The DEIS proposes widening a portion of the road right of way. Apparently, a part of this will be for a bikeway. The viability of a bikeway from the Federal Building to Kewalo Basin is not addressed. Similarly, there also is reference to adding an additional lane of traffic. Will said extra lane be in addition to the bikeway? Why will the additional extra lane end just past Ward Avenue? What happens to all the traffic that heads for Ala Moana Shopping Center and Waikiki?

The Sand Island Bypass Tunnel appears to be a bit of expensive puffery. How will this help the traffic situation in the subject area? To the extent that it enables traffic to bypass any snarls in the CBD, won't it encourage people to drive along Ala Moana Blvd.? Won't this actually add to the traffic problem in the study area?

IV. The Environment

There is a general discussion of the impact on sea life but there is no estimate of what quantity or percentage of that life will be disrupted or destroyed. Nor is there any estimate of the length of time such impacts will be felt. None of the three technical studies in the Appendix deal with marine life. Was a professional technical study done?

Recent articles in the newspaper about the contamination of the Kewalo landfill leave questions on the ability of the State to render this area publicly usable and the cost to achieve such a goal. Shouldn't there be a detailed discussion on this aspect of the plan given the proposed public uses of the contaminated area?

V. Relocation

Recent announcements of the airport expansion tell us that numerous industrial neighbors will be displaced. How will this impact the displacement of current tenants from Kaka'ako? Has anyone tried to determine how much space will be needed and where it likely will be found? Would it be worthwhile to speed up the landfill which will become additional industrial space in Keehi in order to handle some of the displacement?

VI. City Real Property Taxes

The last paragraph of Appendix C suggests that the City pay for some of the improvements out of the "windfall" real property taxes which the development of this area will generate. Such a suggestions assumes that the development will only create income for the City, not expenses. In reality, the City will have to pay for additional police, fire and road maintenance services. To the extent that the park is like Ala Moana Park, the City will have to clean and operate it. The public transit which services this area is City-subsidized. We are sure that there are many other reasons why the City's only major source of revenue, real property taxes, should not be raided by the State to fund State projects.

Very truly yours,

Andrew Rothstein, Chairman

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

Mr. Andrew Rothstein
Chairman
Downtown Neighborhood Board
No. 13
c/o Neighborhood Board Commission
530 South King Street
Honolulu, Hawaii 96813

Dear Mr. Rothstein:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We are in receipt of your letter of December 8, 1989. The following has been prepared in response to your comments and questions relative to the DSEIS for the Kakaako Makai Area Plan.

Recreational Needs

The Waterfront Park proposed in the Makai Plan is not intended to meet the recreational needs of the Mauka Area, nor are the Makai recreational facilities intended to be the only recreational resource available to Kakaako residents. Therefore, inasmuch as Kakaako residents will be able to use the recreational facilities in the Makai Area, the Waterfront Park is being developed as a regional park and not to meet the exclusive needs of the Kakaako residents.

We are very familiar with the community's concerns regarding the quantity and quality of active recreational opportunities available in and around Kakaako. We share these concerns, and are currently exploring the available alternatives. As part of our on-going re-examination of the Mauka Plan and Rules, we will complete a comprehensive assessment of the recreational standards and demand for Kakaako.

Public access to public facilities will be provided through a variety of means:

1. Initially, public parking will be in the form of surface parking in areas adjacent to and makai of the proposed Ward Avenue extension.

2. Surface parking will subsequently be redeveloped into structure parking as the blocks are developed for commercial uses. These lots will be utilized on a "shared basis" (i.e., during the weekdays, workers will be the predominant users, park goers will be weekend users, and amphitheater attendees will be nighttime users).

3. The people mover system will be in the form of localized mass transit which will service the Makai Area.

4. Pedestrian bridges linking mauka areas across Ala Moana Boulevard with the Makai Area will make it easier to park in garages in the mauka area and walk over Ala Moana Boulevard via these overhead pedestrian bridges.

Last but not least, waterborne ferries and taxis will offer additional means of access to those coming from western areas (such as Ewa) and eastern areas (such as Waikiki) of Honolulu.

Inland Waterways

Market Assessment/Cost-Benefit Analysis. A cost-benefit analysis was conducted by John Child & Co., Inc. to determine the total income effect the inland waterway would have on surrounding land uses. While this analysis was preliminary and conducted for order of magnitude estimates, adequate study does exist to substantiate this proposed use. The hypothetical scenario used by John Child & Co., Inc. was the projected ground

rental income stream for parcels either with the waterway or without the waterway. Our market analysts concluded that an approximately 30 percent premium would accrue to parcels adjacent to the waterway.

Further, preliminary ocean and civil engineering analysis of the mechanics of the inland waterway and its integration into the drainage system are discussed in the final SEIS. Our ocean and civil engineers preliminarily concluded that the waterway would be an enhancement to the drainage system. Given proper design and maintenance considerations, the inland waterway can operate in such a manner that it will not only be an amenity to the Makai Area, but a practical upgrade to the drainage system. Prior to implementation of the proposed inland waterway additional modeling and feasibility studies will be conducted.

Ala Moana Boulevard

The DSEIS emphasized the differentiation between project-specific traffic impacts and mitigation measures, and regional traffic projections and impacts. The Oahu Metropolitan Planning Organization (OMPO) is in the process of completing long-range forecasts and plans based on the official 2005 horizon year. The preliminary OMPO findings for 2005, that planned corridor capacity is sufficient to meet projected traffic volumes in 2005, do not necessarily contradict the Waterfront Plan's findings regarding the need for additional corridor capacity by 2010, for the simple reason that the growth in regional traffic (between 2005 and 2010) could exceed planned improvements to corridor capacity by 2010. The OMPO process has not yet looked at 2010 projections and will not be able to fully resolve the issue until major new system-wide studies are completed.

Until such time that these issues are addressed by the responsible agencies, further alterations to these

facilities to address regional transportation concerns would be premature.

Due to concerns raised by existing businesses, the 32-foot road widening along Ala Moana Boulevard has been deleted. Since there are no specific plans for Ala Moana Boulevard widening set forth by regional transportation authorities and the study area is only a small part of the regional transportation network, we have not included Ala Moana Boulevard widening in the final Makai Area Plan.

While it may be possible that the Sand Island Bypass and Tunnel would add to the Makai Area's traffic volumes on the Diamond Head end, please be mindful that this facility is not a proposed facility of the Makai Area Plan. Although it is reflected on the schematic plan, the tunnel was an alternative considered in the Waterfront Master Plan in an attempt to address the projected regional traffic growth on Oahu.

Since the bypass and tunnel are not proposed facilities for the Makai Area, analysis of this facilitiy was not necessary for this SEIS.

The Environment

A marine biological assessment was conducted by William A. Brewer & Associates for the Honolulu Waterfront Master Plan. The study's findings and recommendations for the Makai Area were summarized in the DSEIS. Adverse impacts on existing marine communities will be short term as it will be during in-water construction, of facilities such as the seawall renovation and offshore landfilling.

Harding Lawson Associates' investigation of the Kewalo landfill concluded that current plans to use all of the solid material from the landfill within the park will be acceptable with the following mitigation measures:

1. A sub-surface piping system will be installed at

the landfill to control landfill gas migration and emission. Fugitive dust emissions will be permanently controlled by covering the existing landfill materials with a layer of engineered fill from uncontaminated sources.

2. To prevent the public's exposure to the airborne dust, access to the construction site should be restricted by a security fence. Environmental monitoring should be done to check the effectiveness of mitigation measures.

Relocation

Relocation is an ongoing responsibility of the Hawaii Community Development Authority. While there will always be competition for relocation space among businesses/activities faced with displacement, redevelopment in phases (as discussed in the SEIS) will help minimize the inconveniences associated with displacement.

City Real Property Taxes

There has been no decision made regarding who (State, County, or private contractor) will be responsible for operating and maintaining the proposed public facilities in the Makai Area. We agree that the City will have to pay for additional police, fire and road maintenance services. Copies of the DSEIS have been submitted to the Police Department, Fire Department and Department of Public Works for review and comments. The Police Department and Fire Department had no comments or objections to offer while the Department of Public Works commented on responsibility of the four new pump stations, Ala Moana Force Mains, and the median strip of the Ward Avenue extension. The Department of Public Works also suggested that streets makai of Ala Moana Boulevard should be in line with mauka streets. These concerns will be addressed in the final SEIS.

Thank you for your participation in the planning stages of the Makai Area Plan. We look forward to working with you as we proceed with implementation.

Very truly yours,

Robert K. Maina

for Rex D. Johnson

RDJ/ST:gat

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

December 13, 1989

AMT		WEB	
DK		BTT	
AYI		HOF	
REC'D	DEC 1 8 1989	RMTC	
GSY			
DKM			

Marvin T. Miura, Ph.D.
Director
Office of Environmental
Quality Control
465 South King Street,
Room 405
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan for the State of Hawaii's Hawaii Community Development Authority, Kakaako, Oahu

Thank you for the opportunity to review and comment on the DSEIS for the proposed redevelopment project.

We have the following comments to offer:

1. A revised water master plan for the Kakaako Makai Area should be submitted for our review and approval. It should include calculations that show that the proposed facilities will be adequate to provide the minimum required fire flows and pressures during peak demand periods.

2. A full discussion should be included on the water requirements for the development of the area. Primary concerns that must be addressed are the total estimated water demand and the associated problem of providing a source(s) that can meet the demand.

   In addressing the source requirements, two alternatives that should be considered are either obtaining an allocation from wells developed by the Department of Land and Natural Resources (DLNR) or participating with the Board of Water Supply (BWS) in the development of a new source(s).

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

3. The Kakaako Makai Area will place additional demands on our existing transmission mains that currently serve Waikiki and East Honolulu. As a consequence, we have to increase our transmission capability and capacity to ensure adequate service to those areas.

   Since the proposed 42-inch transmission main along Ala Moana Boulevard will directly address this concern, the Makai Area Plan should incorporate it as part of the infrastructure improvements and include a pro-rata share of the design and construction costs in the budget.

4. Approximately 1,200 linear feet of 12-inch main along Ala Moana Boulevard, between Keawe Street and Ward Avenue, is planned for replacement during the 1990-1991 fiscal year. The developer should coordinate any infrastructure plans he may have for this area with our Planning and Engineering Division so as to alleviate future design and construction phasing problems.

5. The construction plans for roadways and utility improvements should be submitted for our review and approval.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: Hawaii Community Development Authority
Rex Johnson, Executive Director
Milton Arakawa, Chief Planner

R. M. Towill Corporation
Colette Sakoda

Hawaii Community Development Authority

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

The Honorable Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We have received your letter of December 13, 1989 which contains comments on the DSEIS for the Kakaako Makai Area Plan.

Please be assured that the Board of Water Supply requirement will be met during the development of a Water Master Plan by the Hawaii Community Development Authority upon completion and acceptance of the overall Makai Area Plan.

We appreciate your participation throughout the Makai Area planning process. We look forward to working with you and your staff as we progress into implementation of the Makai Area Plan.

Very truly yours,

for Robert K. Miura
Rex D. Johnson

RDJ/ST:gst

JOHN [illegible]
[illegible]

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

ROBERT K. SANDOSAM
MANABU TAGOMORI
RUSSELL N. FUKUMOTO

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

REF:OCEA:SOR

FILE: 90-250
DOC.: 6976E

'90 DEC 21 AM 10 40

Mr. Rex D. Johnson
Executive Director
Hawaii Community Development Authority
677 Ala Moana Blvd., Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Johnson:

SUBJECT: Revised Kakaako Makai Area Plan Draft Environmental Impact Statement

We have reviewed the subject document and have the following comments.

Our Division of Aquatic Resources has three primary areas of concern:

1. the potential adverse impact of the proposed dredging and filling activities on the nearshore marine environment;

2. the proposed inland waterway; and

3. the expansion of Kewalo Basin.

To address the first concern, the applicant should be required to take appropriate measures to minimize erosion and siltation, and prevent fuel, oil and other toxic substances associated with the use of heavy machinery from falling into the water.

Our concerns about the proposed inland waterway involves water quality. Since the water way will be an integral part of the drainage system of the highly industrialized Kakaako district, storm runoff could contain hazardous substances. The large lagoons and complex short canals also represent a substantial amount of "dead water." We suggest a straight water course like the Ala Wai Canal so that flushing can be made adequate to maintain water quality.

While the proposed expansion of Kewalo Basin will provide additional facilities for Hawaii's commercial fishing fleet, the proposed action will eliminate the reef area off Kewalo Basin Peninsula. The area offers safety, ease of access and a diversity of marine life unmatched by any site in the city. To properly assess the importance of this site from an educational resource standpoint, we suggest that comments be solicited from the Waikiki Aquarium, the State Department of Education, the City and County of Honolulu, Department of Parks and Recreation, the University of Hawaii (Zoology Department), and other interested parties.

Finally, as noted on pp. 4-22, Conservation District Use Applications (CDUA's) may be required for certain proposed projects and land uses situated in the State Land Use Conservation District.

Thank you for the opportunity to comment. Should you have any questions, please feel free to contact Ed Henry at the Office of Conservation and Environmental Affairs (548-7837).

Very truly yours,

WILLIAM W. PATY

cc: OEQC
R. M. Towill

Hawaii Community Development Authority

John Waihee
Governor

Kenneth K. Takenaka
Chairman

Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813 Ref. No.: PL EIS 6.16
(808) 548-7180 FAX: (808) 599-2613

December 29, 1989

The Honorable William W. Paty
Chairperson
Department of Land and
Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Paty:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We received your letter of December 20, 1989 regarding the DSEIS for the Kakaako Makai Area Plan. The following has been prepared in response to your comments.

Impact of Dredging and Filling Activities

Please be assured that appropriate measures will be taken to minimize erosions and siltation, and prevent fuel, oil, and other toxic substances associated with the use of heavy machinery from falling in the water. Such activities will be carried out and monitored in accordance with standards and guidelines as prescribed by the State Department of Health and U. S. Army Corps of Engineers.

Proposed Inland Waterway

Your recommendations regarding the alignment of the proposed inland waterway will be taken under advisement as more detailed technical modeling and design studies are conducted for the next level of implementation for the facility. Preliminary ocean and civil engineering analyses conducted during the Honolulu Waterfront Master planning process determined preliminarily that the inland

waterway can be designed and integrated with the drainage system to improve the overall drainage in the Makai Area. These preliminary studies also concluded that with proper design and regular maintenance, the drainage systems can flow directly into the interior waterway, thereby reducing the size of the required drain lines. The mauka-makai waterway branch will replace the new 30-foot wide concrete channel to be constructed by the Kakaako Improvement District 2 Project. The new waterway can be expected to provide over twice the cross-sectional area of flow reducing the velocity of the storm waters so no loss in flow capacity is expected as long as the proposed waterway is properly maintained.

Expansion of Kewalo Basin

As a follow-up to your previous recommendations, we have sought comments from the Waikiki Aquarium, the State Department of Education, the City and County of Honolulu's Department of Parks and Recreation, and the University of Hawaii's Zoology Department regarding the proposed seaward expansion of the Kewalo Basin Peninsula. While we have not received any comments to date, we will continue to seek comments from these parties as we proceed with modeling and engineering design studies, as well as during the Conservation District Use Permit (CDUP) application period.

Further, the Hawaii Community Development Authority will be applying for the appropriate CDUP applications for projects within the State's Conservation District.

Thank you again for your participation in the Kakaako Makai Area planning process, and we look forward to working with you as we proceed with implementation of this important project.

Very truly yours,

Robert K. Minn
for Rex D. Johnson

RDJ/ST:gst

OMPO

Oahu
Metropolitan
Planning
Organization

Suite 1509
1164 Bishop Street
Honolulu, Hawaii 96813
(808) 523-4178
(808) 848-2638

December 13, 1989

Mr. Rex D. Johnson
Hawaii Community Development
Authority
Suite 1001
677 Ala Moana Boulevard
Honolulu, Hawaii 96813

Dear Mr. Johnson:

Kaka'ako Makai Area Plan (DSEIS)

We have reviewed the Draft Supplemental Environmental Impact Statement for the Kaka'ako Makai Area Plan and offer the following comments:

1. Street modifications and building orientation should incorporate features conducive to transit usage. Streets serving existing or potential bus routes should have turning radii that can be negotiated by a bus. Construction of bus pads, shelters and bays should be considered during this modification phase.

2. Incentives for ridesharing should be proposed during the design of off-street parking facilities for long-term parkers. An example of this would be to designate desirable parking locations to carpoolers.

3. The discussion on 3.4.1 Transportation Systems (pages 3-67 to 3-68) regarding the screenline analysis of OMPO's transportation plan for 2005 is fairly accurate. However, some of the other statements made in this paragraph should be clarified.

   Page 3-67, last paragraph, third sentence reads:

   "The issue of the need for additional capacity is unresolved because the indicated need is thus far based on a preliminary level of study which has not yet been evaluated by State's official long-range transportation planning process coordinated by the Oahu Metropolitan Planning Organization (OMPO)."

   The OMPO study is a regional planning document and will focus only on regional travel patterns/demands/needs. Although a few projects identified in the Honolulu Waterfront Master Plan and Kaka'ako Makai Area Plan fall within this category, most of these roadways serve local needs and are of an internal circulation concern. The OMPO study will not address these concerns.

   Page 3-68, first paragraph, second to the last sentence reads:

   "The preliminary OMPO findings for 2005--that corridor capacity is sufficient to meet projected traffic volumes in 2005--do not necessarily contradict the Waterfront Plan's findings regarding the need for additional corridor capacity by 2010 for the simple reason that the growth in regional traffic (between 2005 and 2010) could exceed planned improvements to corridor capacity by 2010."

   The word "planned" should be inserted before "corridor capacity" in the first line. It is important to note that the forecasted level of service for any screenline in the OMPO study is based on a set of recommended transportation projects. If a major project(s) is not built by 2005, the forecasted level of service could worsen.

4. A more detailed traffic study should be conducted as part of the Kaka'ako Makai Area Plan (this comment is not directed to the DSEIS process). The planning level intersection capacity analysis identified potential problems at three intersections. Operational solutions to these problem intersections should be identified. An assessment of the level of service for streets and roadways handling internal circulation movements should be made.

Thank you for the opportunity to comment on the DSEIS.

Sincerely,

Gordon G.W. Lum
Executive Director

g:admin/kakaako.ele

Hawaii Community Development Authority

John Waihee
Governor
Kenneth K. Takenaka
Chairman
Rex D. Johnson
Executive Director

677 Ala Moana Boulevard, Suite 1001 Honolulu, Hawaii 96813
(808) 548-7180 FAX: (808) 599-2613

Ref. No.: PL EIS 6.16

December 29, 1989

Mr. Gordon G. W. Lum
Director
Oahu Metropolitan Planning
Organization
State of Hawaii
Suite 1509
1164 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Lum:

Re: Draft Supplemental Environmental Impact Statement (DSEIS) for the Kakaako Makai Area Plan

We are in receipt of your letter of December 13, 1989. The following has been prepared in response to your comments regarding the traffic and transportation sections of the DSEIS for the Kakaako Makai Area Plan.

Your recommendations regarding design of facilities, streets, and off-street parking facilities to assure incorporation of long-range alternative transportation options are excellent ones. We would like to incorporate such design considerations in coordination with your organization. Other actions will be to consider offering incentives for ride sharing.

The SEIS will be modified to include your suggested revision regarding "planned" corridor capacity to the year 2005.

We appreciate your participation in the Makai Area planning process, and look forward to working with you and your staff as we proceed with implementation.

Very truly yours,

Rex D. Johnson

RDJ/ST:gst

LETTERS THAT DID NOT REQUIRE RESPONSES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS OFFICE
P.O. BOX 50167
HONOLULU, HAWAII 96850

RMT		WES	
DK		BTT	
RVK		RDE	
REC'D OCT 25 1989 RMTC			
GSV			
DKM			

ES
Room 630
October 24, 1989

Mr. Marvin T. Miura, Director
Office of Environmental Quality Control
465 S. King Street, #405
Honolulu, Hawaii 96813

Re: Revised Kakaako Makai Area Plan Draft Environmental Impact Statement

Dear Mr. Miura:

We have reviewed the referenced material dated October 20, 1989 and find that due to its nature, the proposed project will have no significant deleterious impact on fish and wildlife resources within our jurisdiction. Please do not hesitate to call on us if we may be of further assistance.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka

Ernest Kosaka
Field Office Supervisor
Environmental Services

cc: Mr. Rex D. Johnson, Exec. Dir.
Hawaii Community Development Authority
Ms. Colette Sakoda
R. M. Towill, Corp.

OCT 2 . 1989

RMT DK RYK BT RDE
REC'D OCT 31 1989 RMTC
GSY DKM BTT

(F)2073.9

Dr. Marvin T. Miura
Director
Office of Environmental
Quality Control
State of Hawaii
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Revised Kakaako Makai Area Plan
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. Cedric Takamoto of the Planning Branch at 548-7192.

Very truly yours,

D. Dominaga

TEUANE TOMINAGA
State Public Works Engineer

CT:em
cc: Hawaii Community Development Authority
R.M. Towill Corporation

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816-4495

ALBERT T. LUM
MAJOR GENERAL
ADJUTANT GENERAL

MYLES M. NAKATSUJI
STATE
DEPUTY ADJUTANT GENERAL

'89 OCT 31 AM 9 32

October 27, 1989

Engineering Office

Dr. Marvin T. Miura, Director
Office of Environmental
Quality Control
465 South King Street, #405
Honolulu, Hawaii 96813

Dear Dr. Miura:

Revised Kakaako Makai Area Plan
Draft Environmental Impact Statement
Kakaako, Oahu

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 M. Matsuda

Jerry M. Matsuda
Lieutenant Colonel
Hawaii Air National Guard
Contracting & Engineering Officer

cc: Mr. Rex D. Johnson, Exec. Dir.,
Hawaii Community Development Authority
Ms. Colette Sakoda, R.M. Towill, Corp.

NATIONAL GUARD
Americans At Their Best

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 S BERETANIA STREET, ROOM 306
HONOLULU HAWAII 96814

FRANK F. FASI
MAYOR

FRANK K. KAHOOHANOHANO
FIRE CHIEF

LIONEL E. CAMARA
DEPUTY FIRE CHIEF

November 2, 1989

Marvin T. Miura, Director
Offie of Environmental Quality Control
465 S. King Street, #405
Honolulu, Hawaii 96813

Dear Mr. Miura:

SUBJCT: Revised Kakaako Makai Area Plan
Draft Enrivonmental Impact Statement

We have reviewed the subject material provided and have no comments or objections.

Very truly yours,

FRANK K. KAHOOHANOHANO
Fire Chief

MZ:ny

cc: Hawaii Community Development Authority
Rex D. Johnson, Exec. Director
Milton Arakawa, Chief Planner
677 Ala Moana Blvd., #1001
Honolulu 96813

✓R. M. Towill, Corp
Colette Sakoda
420 Waiakamilo Rd., #411
Honolulu 96817

DEPARTMENT OF THE NAVY
COMMANDER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860-5020

IN REPLY REFER TO

11010
Ser 03(202)/2785
06 NOV 1989

Mr. Harvin T. Miura
Director
Office of Environmental Quality Control
465 South King St., #405
Honolulu, HI 96813

REVISED KAKAAKO MAKAI AREA PLAN DRAFT
ENVIRONMENTAL IMPACT STATEMENT (DEIS)

Dear Mr. Miura:

Thank you for the opportunity to review the Revised Kakaako Makai Area Plan (DEIS) transmitted by your form letter which was received on October 24, 1989.

The Navy has no comments to offer at this time.

Sincerely,

[illegible]
Director, Navy Environmental Coordinator

Copy to:
✓Hawaii Community Development Authority (R. D. Johnson, Executive Director)

R.M. Towill Corp. (C. Sakoda)

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-5440

REPLY TO ATTENTION OF:
Planning Branch

November 17, 1989

Dr. Marvin T. Miura, Director
Office of Environmental Quality Control
465 South King Street, #485
Honolulu, Hawaii 96813

Dear Dr. Miura:

Thank you for the opportunity to review the Draft Supplemental Environmental Impact Statement (DSEIS) for the Kaka'ako Makai Area Plan, Honolulu, Hawaii. Our comments in response to the Preparation Notice (letter dated August 3, 1989) have been incorporated into the DSEIS. We have no additional comments.

Sincerely,

C Tyuen

Kisuk Cheung
Chief, Engineering Division

Copies furnished:

✓Mr. Rex D. Johnson, Executive Director, and
Mr. Milton Arakawa, Chief Planner
Hawaii Community Development Authority
677 Ala Moana Blvd., #1001
Honolulu, Hawaii 96813

Ms. Colette Sakoda
420 Waiakamilo Road, #411
Honolulu, Hawaii 96817

UNIVERSITY OF HAWAII • HONOLULU, HAWAII 96822

PRESIDENT

November 27, 1989

Mr. Rex D. Johnson
Hawaii Community Development Authority
677 Ala Moana Boulevard, Suite 1001
Honolulu, Hawaii 96813

Dear Mr. Johnson:

SUBJECT: Kakaako Makai Area Plan
Draft Supplemental Environmental Impact Statement (DSEIS)

We have reviewed the subject document and have no comments. Thank you for the opportunity to review the documents.

Sincerely yours,

Albert J. Simone
President

cc Chancellor Joyce Tsunoda

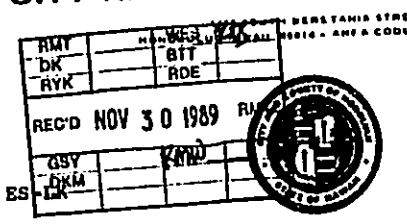
POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

FRANK F. FASI
MAYOR

DOUGLAS G. GIBB
CHIEF

WARREN FERREIRA
DEPUTY CHIEF

OUR REFERENCE ES-LK



November 28, 1989

Mr. Marvin T. Miura, Director
Office of Environmental Quality Control
465 South King Street, #405
Honolulu, Hawaii 96813

Dear Mr. Miura:

We have reviewed the Kakaako Makai Area plan draft supplemental environmental impact statement, which we received on October 25, 1989.

Since this draft represents an extension of the previous plans for the Kakaako area, our general comments on those plans still apply. We have no specific comments on this draft, which appears to address all the general concerns that we would normally have. Individual projects within the plan area may merit comments later.

Sincerely,

DOUGLAS G. GIBB
Chief of Police

By
JOSEPH AVEIRO
Assistant Chief of Police
Support Services Bureau

cc: Hawaii Community Development Authority
R. M. Towill Corporation

PRI Gasco, Inc.

515 Kamakee Street
PO Box 3379 Honolulu, Hawaii 96842
Telephone 808 547 3333 Telex (ITT) 7410292

December 1, 1989

Mr. Rex D. Johnson
Hawaii Community Development Authority
677 Ala Moana Boulevard, Suite 1001
Honolulu, Hawaii 96813

Gentlemen:

Re: Kakaako Makai Area Plan
Draft Supplemental Environmental
Impact Statement (DSEIS)

In response to your letter of October 27, 1989, we have reviewed the DSEIS.

According to the proposed land use zones, commercial areas are being planned and we anticipate a potential demand for gas service from these establishments. Additionally, The Gas Company currently maintains an underground distribution system within the project boundary. Consequently, we request the consideration of your planners and designers during the development process to provide for the needs of the area.

Your attention to our request will be very much appreciated.

Very truly yours,

Edwin N. Sawa

Edwin N. Sawa
Manager, Engineering

ENS:nsd

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HAWAII
96850

December 18, 1989

Dr. Marvin T. Miura, Director
Office of Environmental Quality Control
465 S. King Street, #104
Honolulu, HI 96813

Dear Dr. Miura:

Subject: Draft Environmental Impact Statement (DEIS) -
Revised Kaksako Makai Area Plan - Kaksako, Oahu

We appreciated the opportunity to review the revised Kaksako Makai area plan. We have no comments to offer at this time; however, we would appreciate the opportunity to review the final EIS.

Sincerely,

WARREN M. LEE
State Conservationist

cc:
Mr. Rex D. Johnson, Executive Director, Mr. Milton Arakawa, Chief Planner,
Hawaii Community Development Authority, 677 Ala Moana Blvd., #1001,
Honolulu, HI 96813
Ms. Colette Sakoda, R.M. Towill, Corp., 420 Waiakamilo Rd., #411,
Honolulu, HI 96817

References

REFERENCES

1. "Final Supplemental Environmental Impact Statement for the Kakaako Community Development District Plan An Addendum to the Final Environmental Impact Statement 82-5F(FS), May 1985, HCDA.

2. "Kakaako Waterfront Park Development Plan and Environmental Assessment," September 1986, University of Hawaii Sea Grant Extension Service, Honolulu, Hawaii.

3. "Honolulu Waterfront Master Plan Pre-Final Report," January 1989, and "Honolulu Waterfront Master Plan Final Report," October 1989, Office of State Planning, Office of the Governor.

4. "Marine Biological Resources Report," February 1989, William Brewer & Associates, for the Honolulu Waterfront Master Plan Project.

5. "Ocean Engineering Report," February 1989, Edward K. Noda and Associates, Inc., for the Honolulu Waterfront Master Plan Project.

6. "Acoustical Report," February 1989, Darby and Associates, for the Honolulu Waterfront Master Plan Project.

7. "Traffic Impact Report," February 1989, Pacific Planning and Engineering, for the Honolulu Waterfront Master Plan Project.

8. "Traffic Impact Assessment Report for Portion of Honolulu Waterfront Project (Kakaako Makai Area Plan)," Pacific Planning & Engineering, August 1989.

9. Real Estate Data Base for the Honolulu Waterfront Master Plan Project, R.M. Towill Corporation, June 1989.

10. "The Honolulu Waterfront, Background and Parameters," October 1987, HCDA.

11. "Harbors Planning," May 1989, Moffatt & Nichol, Engineers, for the Honolulu Waterfront Master Plan Project.

12. "Market Assessment and Analyses of Public Revenues, Costs and Benefits," May 1989, John Child & Company, Inc.

13. "Kakaako Makai Area Plan," Draft, October 1989, Helber, Hastert & Kimura, Planners and R. M. Towill Corporation, a Joint Venture.

APPENDIX A

Ocean Engineering

HONOLULU WATERFRONT MASTER PLAN
TECHNICAL REPORT SERIES

OCEAN ENGINEERING CONSIDERATIONS

(EXCERPTS)

Prepared By:
Edward K. Noda and Associates, Inc.
615 Piikoi Street, Suite 1000
Honolulu, Hawaii

Prepared For:
Helber, Hastert & Kimura, Planners and
R. M. Towill Corporation, A Joint Venture

February 1989

Office of State Planning
Office of the Governor

Edward K. Noda
and
Associates, Inc.

HONOLULU WATERFRONT MASTER PLAN

OCEAN ENGINEERING CONSIDERATIONS

(EXCERPTS SPECIFIC TO THE KAKA'AKO MAKAI AREA)

[The enclosed report has been edited to include data and associated analyses specific to the makai area of the Kaka'ako Community Development District with the consent of Ed Noda & Assoc.]

Prepared for:

R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817

Project No. 1-15317-0-C

Prepared by:

Edward K. Noda and Associates, Inc.
615 Piikoi Street, Suite 1000
Honolulu, Hawaii 96814

Report No. EKN-1162-R-1-2

February 1989

HONOLULU WATERFRONT MASTER PLAN
OCEAN ENGINEERING CONSIDERATIONS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 EXECUTIVE SUMMARY

The coastal reach encompassed by the Honolulu Waterfront Master Plan (HWMP) from Magic Island/Ala Moana Park westward to the Reef Runway has been significantly modified by human activity during this century. Dredging and filling of shoreline and reef areas have physically altered the coastal characteristics, and the marine environment has been stressed by inland development, channelization of streams, and urbanization of the watershed. While the nearshore coastal environment can hardly be considered "virgin", it is still relatively unspoiled and offers numerous shoreline and water recreation opportunities for metropolitan Honolulu, including shoreline parks, beaches, swimming areas, fishing, diving, recreational boating, surfing, and numerous other water recreation activities. The ocean engineering considerations pertinent to the HWMP include the need to:

- enhance the quality of usage of the coastal area;
- maintain and enhance the coastal environment and ocean recreation opportunities;
- assure that planned development does not cause increased risks to life and property during the design planning period.

An understanding of the existing coastal environment and coastal processes is vital to the design and planning for any development in the coastal region. The following generally summarizes the coastal engineering baseline parameters and the design and planning considerations which represent opportunities and constraints for development.

Wave Climate: The south shore of Oahu is sheltered from the predominant northeast tradewind-generated waves as well as the winter North Pacific swell. Thus, wave activity at the shore is

relatively mild except during the summer months when southern swell can produce moderately high surf conditions. The south shore is also exposed to infrequent Kona storms and hurricane waves approaching from the southeast through southwest directions.

Nearshore Bathymetry: The nearshore bathymetry is highly variable along the Honolulu waterfront due to the extensive modifications by dredging and filling of the coastal area. Wide shallow fringing reefs front portions of this shoreline, while other shoreline areas have been created by filling out over the shallow reefs. Numerous harbor basins and navigation channels have been dredged through the nearshore zone. Remaining shallow fringing reef areas should be preserved to the maximum extent possible. However opportunities exist for seaward extension of existing shoreline fill areas where the nearshore ocean bottom is relatively flat and does not provide marine habitat of high or unique value. Those areas include the Kaka'ako Peninsula.

Littoral Processes: There is little sand transport along the south shore within the study reach since much of the shoreline has been filled over the fringing reefs and the numerous navigation channels through the nearshore areas effectively cut off any continuous longshore transport at the shoreline. Shore protection structures are necessary to stabilize the existing shoreline reaches which have been created by filling, and shore protection measures will be necessary for any additional fill extension of existing shorelines. The Ala Moana Park shoreline is the only extensive recreational beach within the study reach. This beach was augmented by artificial beach fill and is not presently nourished naturally because of the deep dredged channel fronting the entire park shoreline. Because of the paucity of littoral drift along the Honolulu waterfront coastal reach, any plan for the creation of new recreational beach areas will require artificial beach fill and structural measures for beach stabilization.

Nearshore Currents: Coastal currents are predominantly tidal with velocities typically about 1/2 knot along the Honolulu waterfront coastal reach and somewhat higher offshore the Barbers Point area. In waters close to shore, tidal currents are weaker and land effects can cause highly variable currents and eddies. In shallow reef areas and sheltered embayments, current patterns can be greatly influenced by wind drift and wave mass transport. The Ala Moana Park dredged area is an example where the local shoreline alterations have influenced the circulation patterns. In its present configuration, this dredged area is poorly flushed. The dredging of channel(s) through the reef would improve the circulation and flushing within this existing dredged area. Any development offshore Ala Moana Park which would restrict the exchange of water over the reef should not be contemplated. This also applies to the reef areas fronting Keehi Lagoon.

Coastal Flood Hazard: Coastal flood hazards include tsunamis, hurricane wave-induced coastal inundation, extreme stream flows or storm drainage flows, and long-term consequences due to rising sea level. Tsunami heights within the project area have been reported to be 6 feet or less, and no shoreline reach is within a Zone V (high velocity tsunami wave flood zone) as delineated by the Flood Insurance Rate Maps (FIRMs). Shoreline areas within FIRM flood zones are designated Zone AE (base flood elevations determined) or Zone A (undetermined base flood elevations). Zone AE base flood elevations are typically +5' MSL or less along the Honolulu waterfront. The areas designated Zone A are susceptible to hurricane-induced coastal inundation. Estimated maximum stillwater level due to hurricanes is about +6' MSL or less along the Kewalo-Kakaako shoreline reach. Major streams for which the 100-year flood characteristics have been determined by FEMA include Kalihi Stream and Moanalua Stream which discharge into Keehi Lagoon. Long-term consequences due to the global rise in sea level is relatively insignificant in the near future. It is estimated that the relative sea level rise for Honolulu by the

year 2010 will be 0.3 feet or less. However, it is expected that the sea level will rise at an accelerated rate in the distant future due to general global warming, with possible relative rise of about 1.8' by the year 2050 and 5' by the year 2100. While long-term planning and policy decisions should consider the probability of future increased rates of sea level rise, there is no cause for alarm or action regarding engineering of structures to mitigate the effects. Any action to protect against sea level rise can be carried out in a relatively short time period in relation to the rate of potential rise in relative mean sea level.

Shore Protection Structures: Most of the shoreline within the Honolulu waterfront study area is provided with some method of shore protection due to the fact that much of this coastal reach has been altered by dredge and fill activities. The types of shore protection structures vary, depending on the use of the shoreline area and the ocean bottom characteristics. Rubblemound breakwaters protect an artificial beach at Magic Island, rubble masonry seawalls protect portions of the shore that are not exposed to high wave activity, rubble revetments protect other reaches that are exposed to higher levels of wave activity, and various types of vertical bulkheads are found within the interior harbor basins. In some cases, the existing structures which were built to retain the fill material have deteriorated over the years due to lack of maintenance, leaving shoreline reaches vulnerable to erosion damage. The seawall along the Kaka'ako Peninsula shorefront is also in various stages of disrepair, requiring improvements to prevent future erosion damage. Planned uses and activities in the shoreline area need to be considered from the standpoint of selecting appropriate shore protection measures that are compatible with the planned uses and that provide an acceptable level of protection to the landside improvements.

2.0 WAVE CLIMATE

2.1 South Shore:

The study reach from Magic Island to the Reef Runway is located on the south-facing shore of Oahu and sheltered by the island mass from the predominant northeast tradewind-generated waves as well as the winter North Pacific swell. Thus, wave activity at the shore is relatively mild except during the summer months when southern swell can produce moderately high surf conditions. This coastal area is also exposed to infrequent Kona storms and hurricanes approaching from the southeast or southwest quadrants.

There is no long-term record of measured wave data to characterize the typical wave climate for this shoreline area. In spite of the intense development along the south shore of Oahu, the lack of measured wave data points to the relatively benign wave climate and perceived lack of need to quantify the wave energy levels affecting the coastal areas. Wave data statistics are available from the U.S. Army Corps of Engineers' wave measuring buoys located offshore Makapuu Point (Oahu), Barbers Point Deep Draft Harbor (Oahu), and Barking Sands (Kauai). However, the data do not provide directional wave characteristics and are not indicative of the wave climate on the sheltered south shore of Oahu.

Wave hindcast statistics were developed by Marine Advisers[1] to characterize the typical wave types affecting Oahu. Their data includes southern swell characterized by direction (SSE, S, SSW), significant wave height and period classes, for the months of April through November. Table 1 summarizes the deepwater

[1]Marine Advisers (1963, revised March 1964), "Characteristics of Deep-Water Waves in the Oahu Area for a Typical Year", prepared for the Board of Harbor Commissioners, State of Hawaii.

Table 1. Marine Advisers (1964). Southern Swell Data

		% Frequency of Occurrence of Deepwater Waves			
Month	Hs(ft)	Ts(sec)/ 11-12.9	13-14.9	15-16.9	Total %
Apr	1-1.9	51.6	--	--	51.6
	2-3.9	28.9	19.3	--	48.2
					99.8
May	1-1.9	--	--	--	--
	2-3.9	34.7	13.4	--	48.1
					48.1
Jun	1-1.9	69.5	--	--	69.5
	2-3.9	21.2	31.9	--	53.1
	4-5.9	6.4	--	--	6.4
					129.0
Jul	1-1.9	--	--	--	--
	2-3.9	31.9	23.3	--	55.2
	4-5.9	30.5	14.7	--	45.2
					100.4
Aug	1-1.9	--	--	--	--
	2-3.9	25.0	69.5	--	94.5
					94.5
Sep	1-1.9	--	41.5	--	41.5
	2-3.9	4.6	4.1	30.0	38.7
					80.2
Oct	1-1.9	--	--	--	--
	2-3.9	21.5	25.7	--	47.2
					47.2
Nov	1-1.9	--	14.4	--	14.4
	2-3.9	--	26.4	--	26.4
					40.8

significant wave height versus period for each month. Because the method of compiling the statistics resulted in the detection of simultaneous wave trains of differing characteristics, the percent frequency of occurrence total for each month can exceed 100%.

3.0 NEARSHORE BATHYMETRY

The bathymetric characteristics will influence the breaking wave heights at the shoreline. The long-period swell waves are significantly influenced by the nearshore bottom contours, undergoing refraction and shoaling effects as these waves approach shore. Long-period swell breaking heights can be twice the deepwater heights depending on the wave period and bottom slope characteristics. For relatively shallow water depths at the shore, the design wave height will be depth-limited.

3.1 South Shore:

The bathymetry at the shoreline is highly variable within the study area due to the extensive modifications by filling and dredging of the coastal area. Figure 1[2] depicts the bathymetry and shoreline characteristics. The depths are given in fathoms below MLLW (1 fathom = 6 feet).

Ala Moana Park is fronted by a wide shallow fringing reef. The inner reef adjacent to the shoreline was originally dredged as a boat channel and is now used as a swimming area. Sand was trucked from offsite and artificially placed on the shoreline to augment the recreational beach. Magic Island was created by filling over the shallow reef area.

Kewalo Basin was created by dredging the shoreline and filling a small portion of the reef area to create the triangular peninsula which serves to protect the harbor basin as well as providing usable harbor shoreside area. The dredged channel through the shallow fringing reef augments the surfing conditions by providing a launch and recovery area through the surf zone.

[2]From NOAA Chart #19364, South Coast of Oahu, scale 1:20,000.

The Kakaako peninsula from Kewalo Basin entrance channel to the Honolulu Harbor entrance channel was created by filling over the shallow reef. Thus, this entire shoreline stretch is revetted and water depth varies from about 5 feet at the shore to about 12 feet within 500 to 1500 feet from shore. Seaward of the 12-foot contour, the bottom slopes at about 1V:20H to greater than 100-foot depths within 3000 to 4000 feet from shore.

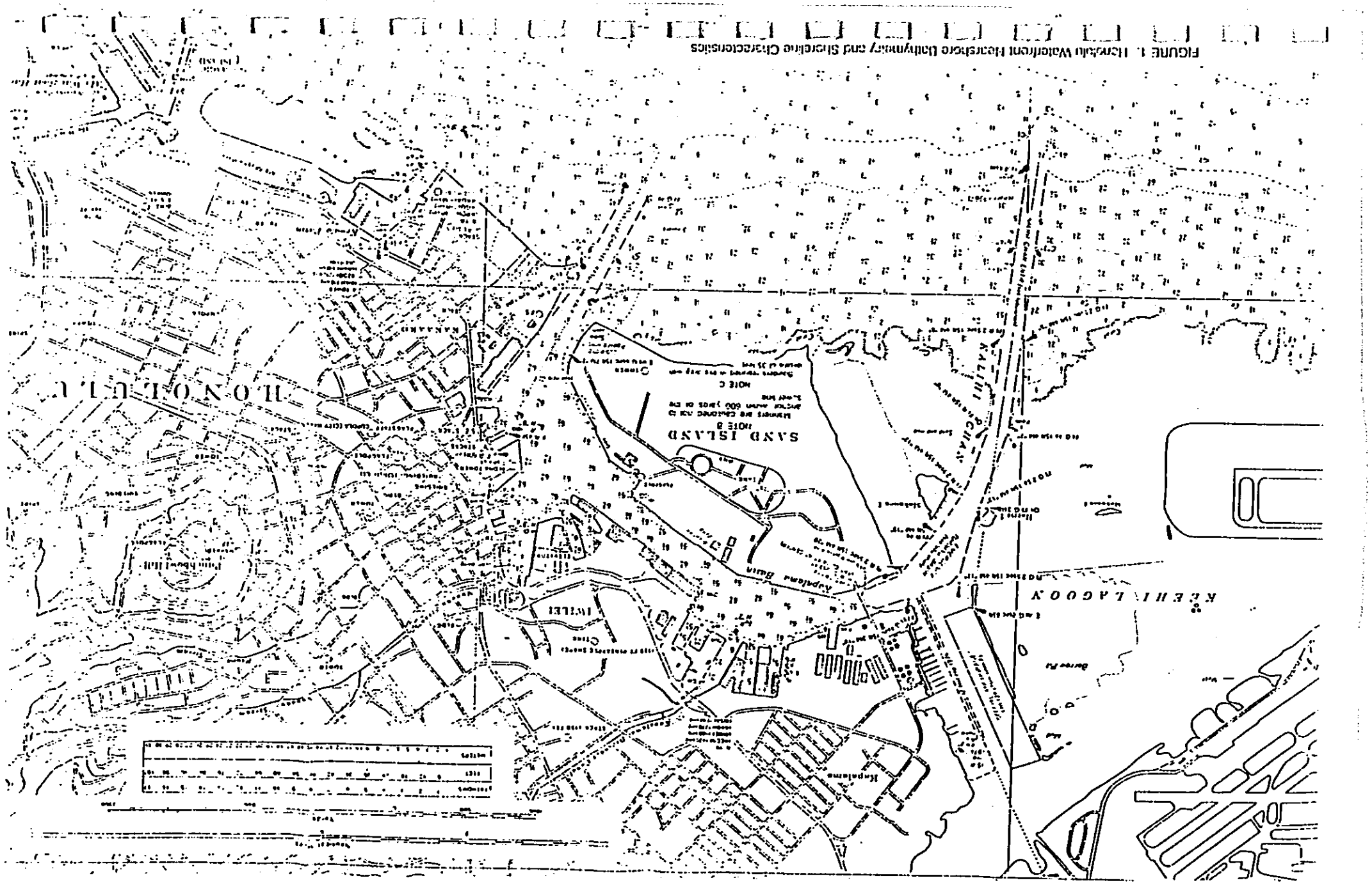


FIGURE 1. Honolulu Waterfront Heritage Dailynotes and Shoreline Characteristics

RECEIVED AS FOLLOWS

4.0 LITTORAL PROCESSES

4.1 South Shore:

The shoreline along the entire study reach has been altered by development, and similarly, the littoral processes are affected by these man-made changes to the natural shoreline features. However, whether the cumulative changes have been positive or negative is not obvious since the changes have occurred gradually over many years and it has only been in the past 20 years or so that the public consciousness has been raised with respect to the potential for impacts to the littoral environment due to shoreline development.

There is little sand transport within the study reach since much of the shoreline has been filled over the fringing reef and the numerous navigation channels through the reef areas effectively cut off any continuous longshore transport at the shoreline. In fact, the lack of any significant sand accumulation within these channels points to the paucity of littoral transport along this reach.

The Ala Moana Park shoreline is the only extensive recreational beach within the study reach. The wide fringing reef provides protection to the shore and the Kewalo Basin peninsula as well as Magic Island serve as containment "barriers" to isolate this littoral cell. Because of the shallow reef, very little wave energy reaches the beach due to wave breaking and dissipative processes over the reef, and the deep dredged area effectively acts as a barrier to natural beach nourishment. However, what little wave energy that does reach the shore results in "shaping" the beach, as can be seen in aerial photos. Beach fronted by the deeper portions of the reef are narrower in width than beach fronted by very shallow portions of the reef. The calm, protected, and "contained" nature of this beach area does have a

negative drawback in that the dredged area is poorly flushed. With only a 2-foot tidal exchange (over depths exceeding 6 feet), poor mixing characteristics within the sheltered waters, and virtually no well-defined circulation, the water quality is less than ideal.

5.0 NEARSHORE CURRENTS

5.1 South Shore:

Figure 4[3] depicts the current patterns in the vicinity of the study area. Flood tide currents generally set westward while ebb tide currents generally flow eastward along the bottom contours. Maximum measured current speed at a location about 1.5 miles offshore Sand Island is less than 1 knot. Typical current speed is about 1/2 knot. Current speeds close to shore are expected to be less. The net drift is southwestward, probably due to the influence of the tradewind-driven flow augmenting the flood tide currents.

In waters close to shore, the land effects can cause highly variable currents and eddies. In some areas of Mamala Bay, the current patterns are especially irregular due to eddies and the relative weakness of the tidal currents compared to wind-induced and wave mass transport.[4] The influence of shoreline alterations on the nearshore circulation patterns is exemplified at the Ala Moana Beach Park. Following is an excerpt from Laevastu et al (1964):

> "Prior to the construction of the Ala Wai Yacht Harbor channel and the isolation of Kewalo Basin from the channel along the front of Ala Moana Park, there was a strong, unidirectional current flowing from the Ala Wai canal through the Yacht Harbor, augmented in the Ala Moana Park channel by water carried by mass transport over the reef, continuing through Kewalo Basin and out to sea through the Kewalo channel.

---

[3]"Circulation Atlas for Oahu, Hawaii", prepared by Karl H. Bathen, UNIHI-SEAGRANT-MR-78-05, April 1978.

[4]T. Laevastu, D.E. Avery, and D.C. Cox, "Coastal Currents and Sewage Disposal in the Hawaiian Islands", HIG-64-1, June 1964.

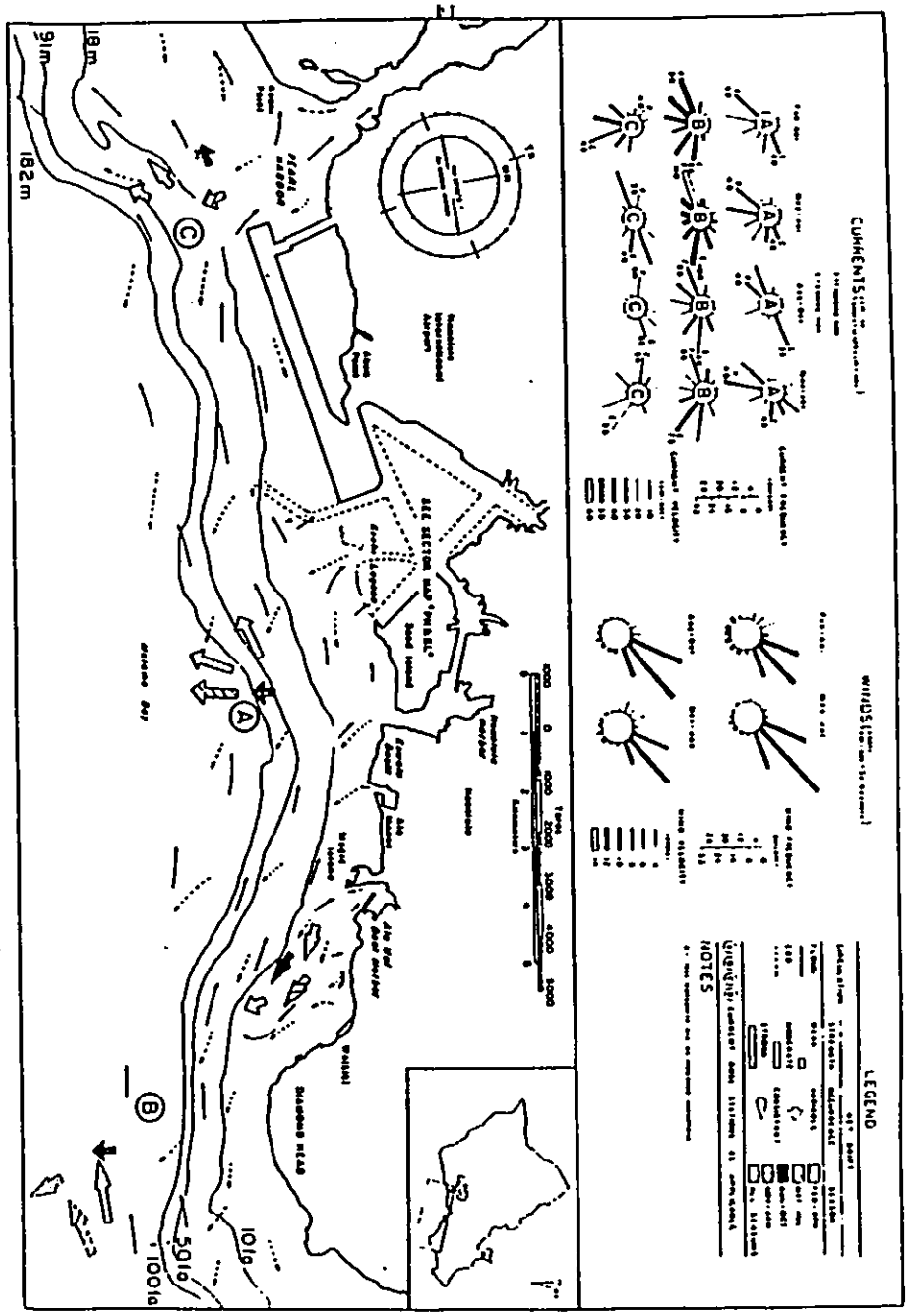


FIGURE 4. Circulation Patterns and Current Speeds in the Vicinity of the Honolulu Waterfront

Since the Ala Wai Yacht channel was dredged, and the channel along the front of Ala Moana Park was blocked off from both the Yacht Harbor and Kewalo Basin, the Ala Wai canal water has drained seaward through the yacht channel. Groundwater and storm-sewer discharge continues to flow seaward through the Kewalo channel, however. Float studies by H.A.R. Austin and Associates and Law and Wilson (1960)[7] show that the seaward currents in both the Ala Wai and the Kewalo channels have velocities on the order of 0.1 to 0.2 knot. There continues to be a slight westward flow in the Ala Moana Park channel, probably resulting from a combination of mass transport over the reef and wind drag in the channel.

In the "Magic Island" channel configuration planned for construction on the Ala Moana reef (H.A.R. Austin and Associates and Law and Wilson, 1960), mass transport over a weir at the east entrance to the channel will be counted on to flush the channel westward."

It is now apparent that the "channel weir" adjacent to the Magic Island side of Ala Moana Park is not adequate to provide good flushing characteristics within the Ala Moana Park dredged area in its present configuration.

[7]H.A.R. Austin and Associates and Law and Wilson (1960), "Engineering Feasibility Studies: Part I of the Comprehensive Plan, Ala Moana Reef", Report to Hawaii Department of Land and Natural Resources.

6.0 COASTAL FLOOD HAZARDS

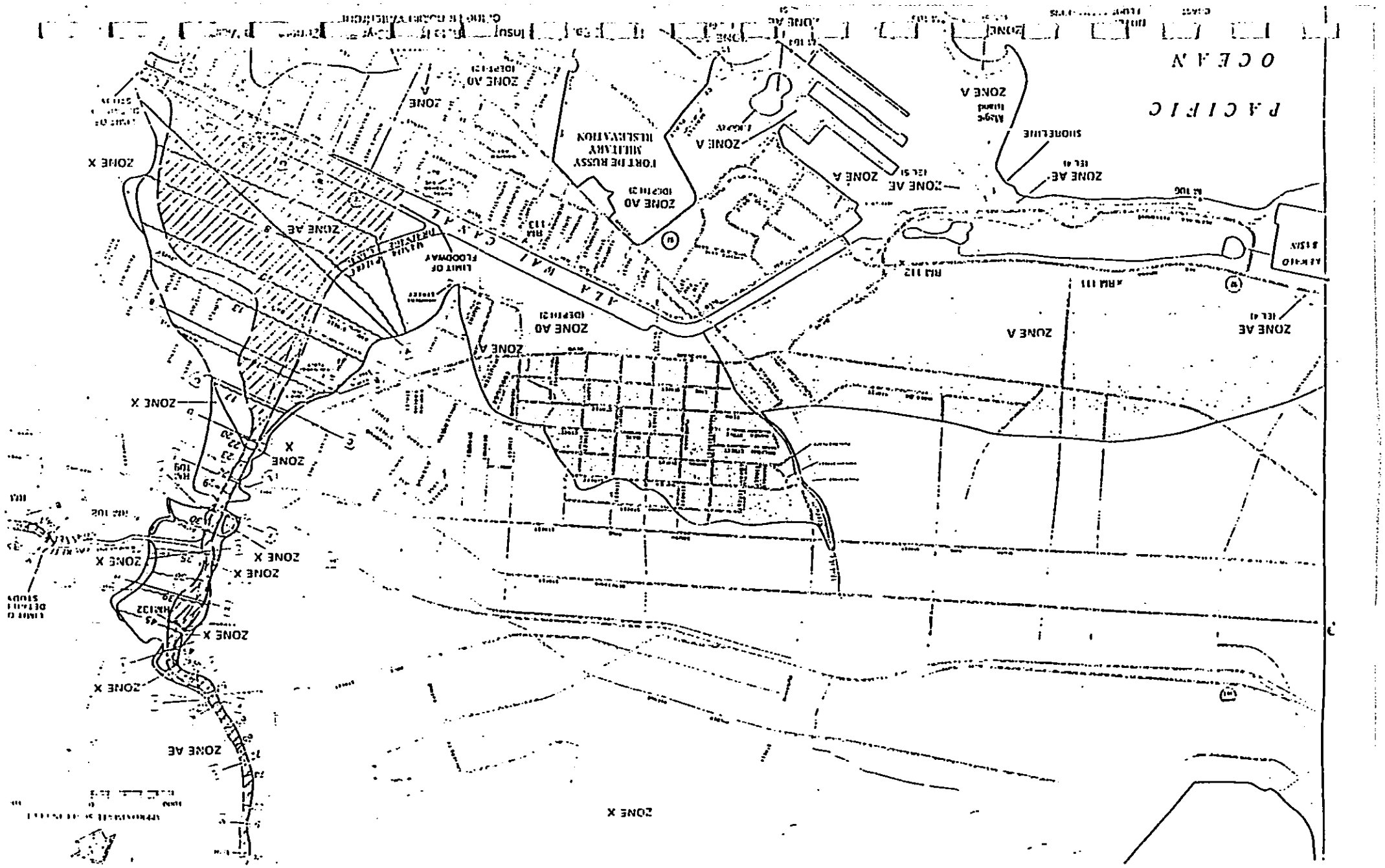
Coastal flood hazards include tsunamis, hurricane wave-induced coastal inundation, extreme stream flows and storm drainage flows, and long-term consequences due to rising sea level.

6.1 Regulatory Flood Zones:

Figures 8a through 8d show the 100-year regulatory flood zones from the Flood Insurance Rate Maps (FIRMs)[10] encompassing the Honolulu waterfront study reach. There are no shoreline areas within the study reaches that are in Zone V (high velocity tsunami wave flood zones).

Flood zones within the Honolulu waterfront study reach that are designated Zone AE (base flood elevations determined) are typically elevation +5' MSL or less. Hatched areas in Zone AE are floodways. Zone A areas have undetermined base flood elevations, and are susceptible to hurricane-induced coastal inundation. Zone AO areas have flood depths of 1 to 3 feet (usually areas of sheet flow on sloping terrain), with the average depth of flooding as indicated on the map. Zone X shaded areas are areas of the 500-year flood and areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile. Zone X unshaded areas are determined to be outside the 500-year flood plain. Zone D are areas in which

[10]FIRM Panels No. 150001 0115B and 150001 0120C, dated September 4, 1987, published by Federal Emergency Management Agency (FEMA).



RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

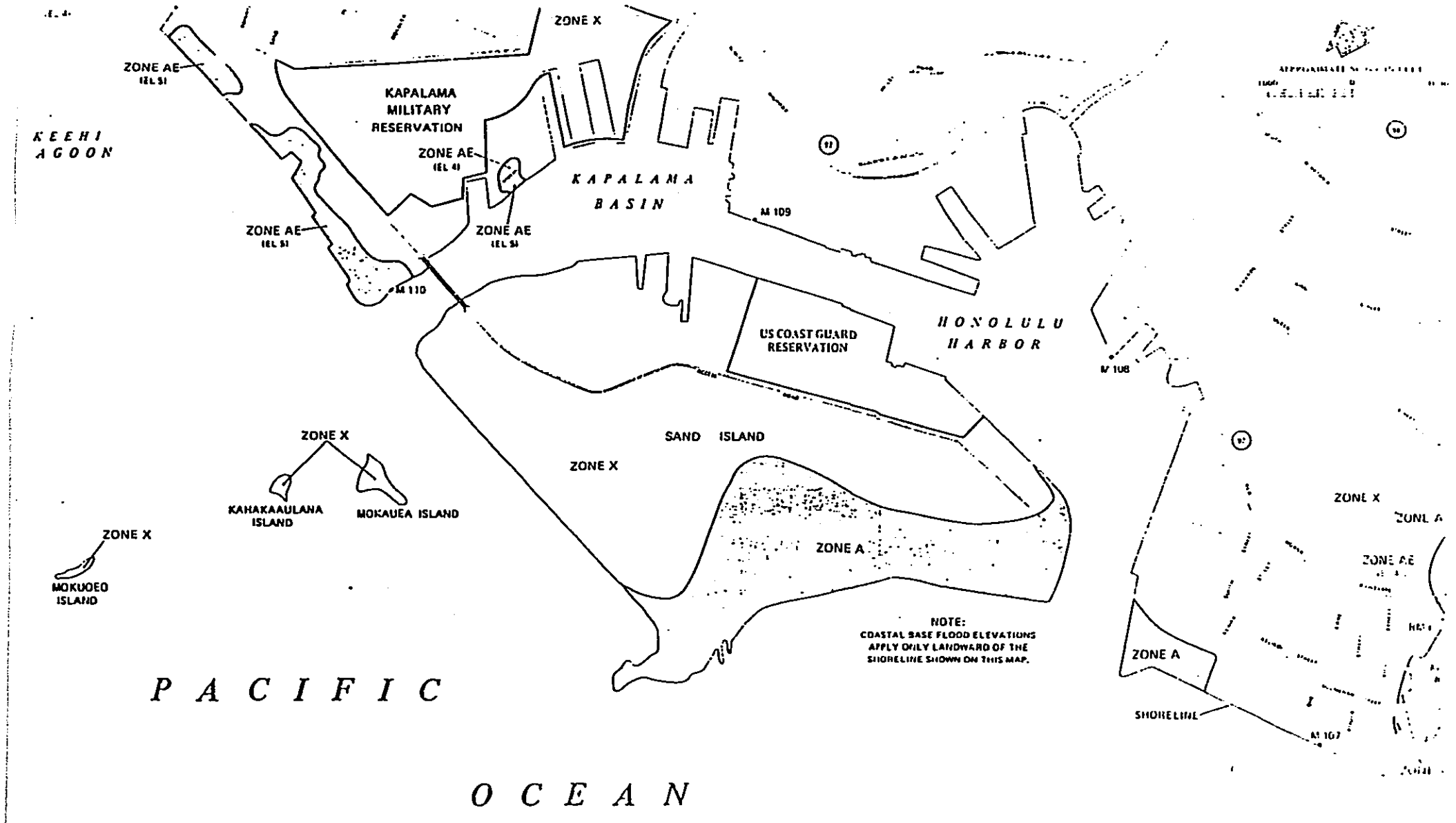


FIGURE 8b. Flood Insurance Rate Map 100-yr Flood Zones in the Vicinity of the Honolulu Waterfront

flood hazards are undetermined.

6.2 Tsunamis:

Tsunamis are not a serious concern for the shoreline reaches within the study area. Tsunami heights have been reported to be 6 feet or less along the Honolulu waterfront reach (Figure 10)[12]. Maximum runup heights of 12 feet and 9 feet have been reported.

6.3 Hurricane-Induced SWL Rise:

The typical variation in stillwater level (SWL) due to the tidal range is 1.9 feet as given below:

Mean Higher High Water (MHHW)	1.9'
Mean Sea Level (MSL)	0.9'
Mean Lower Low Water (MLLW)	0.0'

For land (topographic) elevations, the reference datum is usually MSL. For ocean bottom (bathymetric) elevations, the reference datum is usually MLLW.

Superelevation in the SWL will occur during high surf or storm conditions due to wave setup, wind setup, and inverted barometer effect caused by the decrease in atmospheric pressure within a hurricane. For island coastal areas with relatively narrow reefs and steep offshore slopes which drop off quickly to deep water depths, the wind setup effects are small in relation to wave

[12]H.G. Loomis (1976), "Tsunami Wave Runup Heights in Hawaii", Hawaii Institute of Geophysics, University of Hawaii, HIG-76-5.

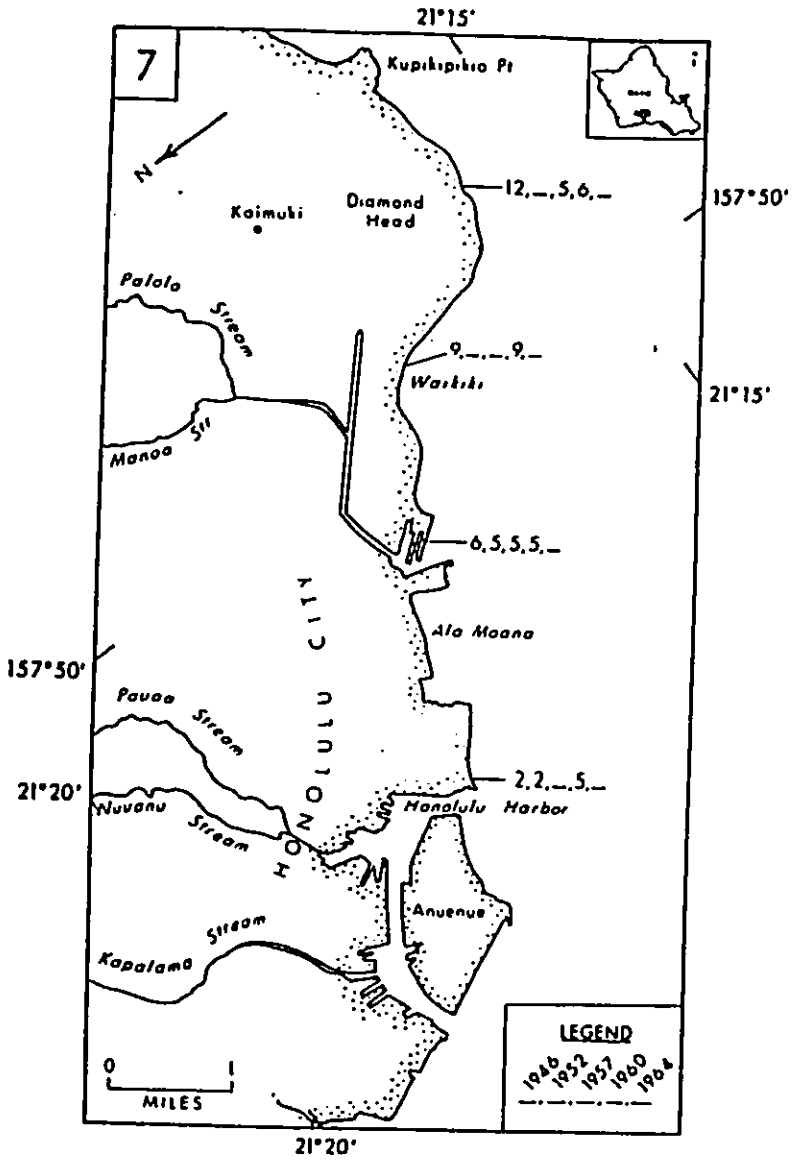


FIGURE 10. Tsunami Heights Reported in the Honolulu Waterfront Vicinity

Table 3. Hurricane-Induced SWL Elevations

	Honolulu Harbor	Fort Armstrong Shoreline	Kakaako SHoreline	Kewalo Basin	Kewalo Peninsula
Hurricane Iwa					
Estimated Total Setup <1>	4.6'	4.4'	4.6-5.2'	4.9'	5.1-5.4'
Measured Interior Setup <2>	2.1'	-	-	3.4'	-
Runup/Flooding <3>	-	Flood	+11.6'(R)	-	Flood
Scenario SE Model					
Total Setup <1>	4.0'	4.1'	4.5'	4.4'	4.5'
Exterior SWL Elev <4>	+5.0'	+5.1'	+5.5'	+5.4'	+5.5'
Interior SWL Elev <5>	+3.0'	-	-	+4.4'	-
Scenario SE Worst					
Total Setup <1>	5.4'	5.5'	5.6'	6.0'	6.2'
Exterior SWL Elev <4>	+6.4'	+6.5'	+6.6'	+7.0'	+7.2'
Interior SWL Elev <5>	+3.8'	-	-	+5.6'	-
Scenario SW Model					
Total Setup <1>	4.2'	4.1'	4.7'	4.8'	5.2'
Exterior SWL Elev <4>	+5.2'	+5.1'	+5.7'	+5.8'	+6.2'
Interior SWL Elev <5>	+3.1'	-	-	+4.7'	-
Scenario SW Worst					
Total Setup <1>	6.3'	6.2'	7.0'	7.0'	7.4'
Exterior SWL Elev <4>	+7.3'	+7.2'	+8.0'	+8.0'	+8.4'
Interior SWL Elev. <5>	+4.2'	-	-	+6.4'	-

<1> Total setup includes wind setup, wave setup, and inverted barometer effect; based on application of hurricane hindcast and wave propagation models (open coast values).
<2> Measured SWL elevations corrected for tide effects to obtain the setup values within harbor interior.
<3> Calculated runup (R) elevation above MSL or flooding condition.
<4> Exterior SWL elevation = Total setup + 1.0' (MHHW) = feet above MSL
<5> Interior SWL elevation = (Total setup x Y) + 1.0' (MHHW) = feet above MSL
Y = 51% Honolulu Harbor, 77% Kewalo Basin

setup. A detailed study[11] evaluated the possible inundation limits due to hurricane-induced water level rise and wave effects for the entire south shore of Oahu from Barbers Point to Koko Head. The study evaluated the effects due to four scenario hurricanes: "model" and "worst" case hurricanes from the southeast and southwest. The scenario hurricane parameters were established based on historical data of hurricanes affecting the Hawaiian Islands. However, for the determination of the coastal flooding effects, each scenario hurricane was assumed to pass directly over Oahu. The objective of the study was to determine the maximum inundation limits due to potential hurricane events. Thus, the approach taken assumed that the scenario hurricane parameters resulting in the maximum potential flooding may theoretically occur anywhere within the study reach. Also, no probabilities of occurrence were determined for any of the scenario hurricanes, as the chance of a hurricane passing over Oahu is very slight (no hurricane has passed directly over Oahu in recorded history). Table 3 summarizes some of the results from the study for the Honolulu Harbor to Kewalo Basin shoreline reach. Hurricane Iwa, which passed over Kauai, resulted in similar SWL and flooding effects as determined for the scenario SW Model Hurricane. Thus, the design SWL due to oceanographic considerations can be reasonably approximated by the results for the scenario SW Model.

Any plan for interior waterways connecting Kewalo Basin and Honolulu Harbor should also include consideration of the stormwater drainage flows which would be discharged through these waterways.

[11]Charles L.Bretschneider and Edward K. Noda and Associates (1985), "Hurricane Vulnerability Study for Honolulu, Hawaii, and Vicinity, Vol. 2, Determination of Coastal Inundation Limits for Southern Oahu from Barbers Point to Koko Head", prepared for U.S. Army Engineer Division, Pacific Ocean.

6.4 Long-term Rise in Sea Level:

Several studies have suggested that the rate of eustatic[14] sea level rise may accelerate due to future warming of the atmosphere associated with the "greenhouse effect", melting of glaciers, and expansion of near-surface ocean water due to global ocean warming. The Marine Board of the National Research Council convened a committee on "Engineering Implication of Changes in Relative Mean Sea Level" to examine the knowledge concerning mean sea level changes, establish the rate of relative sea level change based on past data, develop projections of future sea level rise, examine the responses of sandy shorelines and wetlands to sea level rise, examine the consequences on engineering works and built facilities, and to develop recommendations. The results of the 2-year study effort are summarized in the publication Responding to Changes in Sea Level, Engineering Implications[15]. The following are some of the conclusions and recommendations contained in the published report:

- Relative mean sea level, on statistical average, is rising at the majority of tide gauge stations situated on continental coasts around the world. Relative mean sea level is generally falling near geological plate boundaries and in formerly glaciated areas such as Alaska, Canada, Scandinavia, and Scotland. Relative mean sea level is not rising in limited areas of the continental U.S., including portions of the Pacific Coast. The differences are due to differing rates of vertical motion of land surfaces due to subsidence or uplift.

- Large, short-term (2-7 year) fluctuations worldwide are related to meteorological phenomena, notably shifts in the mean jet-stream path and the El Nino-Southern Oscillation (ENSO) mechanisms, which lead to atmospheric pressure anomalies and temperature changes that may cause rise or fall of mean sea level by 15-30 centimeters over a few years.

- The risk of accelerated mean sea level rise is sufficiently established to warrant consideration in the planning and design of coastal facilities. Accelerated sea level rise would contribute toward a tendency for exacerbated beach erosion. The prognosis for sea level rise should not be cause for alarm or complacency. Three plausible variations in eustatic sea level rise was adopted by the committee. The three scenarios provide a useful range of possible future sea level changes for design calculations. Present decisions should not be based on a particular sea level rise scenario. Rather, those charged with planning or design responsibilities should be aware of and sensitized to the probabilities of and quantitative uncertainties related to future sea level rise.

- The two response options to sea level rise are stabilization and retreat. Retreat is most appropriate in areas with a low degree of development. There does not now appear to be reason for emergency action

[14]Eustatic means a global change of oceanic water level. The difference between the eustatic change and any local change in land elevation results in the relative mean sea level change at a particular location.

[15]Report by the Committee on Engineering Implications of Changes in Relative Mean Sea Level, Marine Board, Commission on Engineering and Technical Systems, National Research Council, published by the National Academy Press, Wash. D.C., 1987.

regarding engineering structures to mitigate the effects of anticipated increases in future eustatic sea level rise. Sea level change during the design service life should be considered along with other factors, but it does not present such essentially new problems as to require new techniques of analysis. The effects of sea level rise can be accommodated during maintenance periods or upon redesign and replacement of most existing structures and facilities. Construction of almost any conceivable protection against sea level rise can be carried out in a very short time relative to the rate of sea level rise.

Because the rate of future sea level rise is uncertain, the committee examined three possible scenarios of eustatic sea level rise to the year 2100: rises of 0.5m, 1.0m, and 1.5m (1.6', 3.3', and 4.9', respectively). The general shape of the curves is concave upward with greater rates of rise in the distant future than those in the next decade or so. The equation adopted for the eustatic rise in sea level is:

$$E(t) = 0.0012t + bt^2$$

where: E(t) = eustatic component in sea level rise above present level (meters)

t = time from present (years)

b = coefficient (m/yr^2)
= 0.000028 for E(114) = 0.5m
= 0.000066 for E(114) = 1.0m
= 0.000105 for E(114) = 1.5m

The total relative sea level change above present levels at time t from present is:

$$T(t) = L(t) + E(t)$$

where: T(t) = total relative sea level change

L(t) = local change due to subsidence or uplift

E(t) = eustatic change

Given the equation for eustatic change, the total relative sea level change can be written as:

$$T(t) = (0.0012 + M/1000)t + bt^2 \quad \text{(meters)}$$

where: M = 0.4 mm/yr (subsidence) determined for Honolulu from tide gage measurements assuming a eustatic rate of 1.2 mm/yr.

Figure 11 shows the eustatic sea level rise scenarios adopted by the commission, and Figure 12 depicts the estimated total relative sea level rise for Honolulu. By the year 2010, the total relative rise in sea level above present levels is estimated to be 0.3 feet for the worst case scenario. By the year 2050, the total relative rise is estimated to be between 0.71 to 1.75 feet, for the best and worst case scenarios. Thus, for the next 50 years or so, the relative rise in sea level will not have major implications for most coastal areas in Hawaii. However, by the year 2100, the total relative rise is estimated to be between 1.8 to 5.1 feet. Depending on the coastline characteristics, sea level rise on the order of a couple feet or more could have major implications with respect to higher wave activity and erosion damage as well as flooding or inundation tendencies. For the south shore of Oahu within the Honolulu waterfront study reach, shoreline stabilization could probably be justifiable versus retreat of development mauka from the shore, depending on the cost of the existing infrastructure.

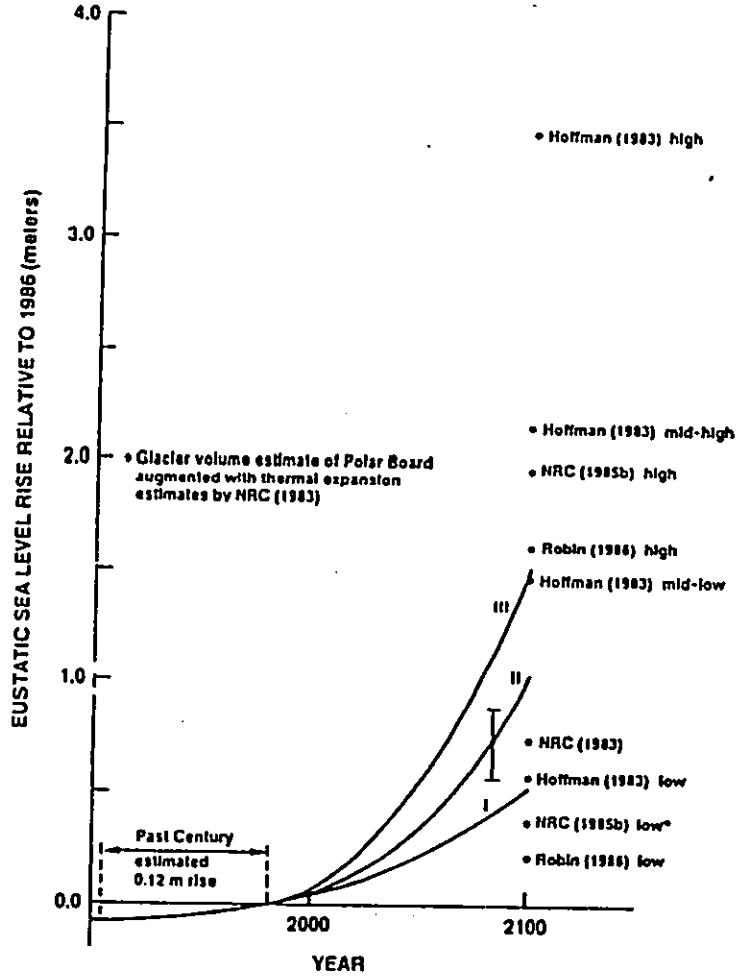


FIGURE 11. Eustatic Sea Level Rise Scenarios (as adopted by the Committee on Engineering Implications of Changes in Relative Mean Sea Level, National Research Council)

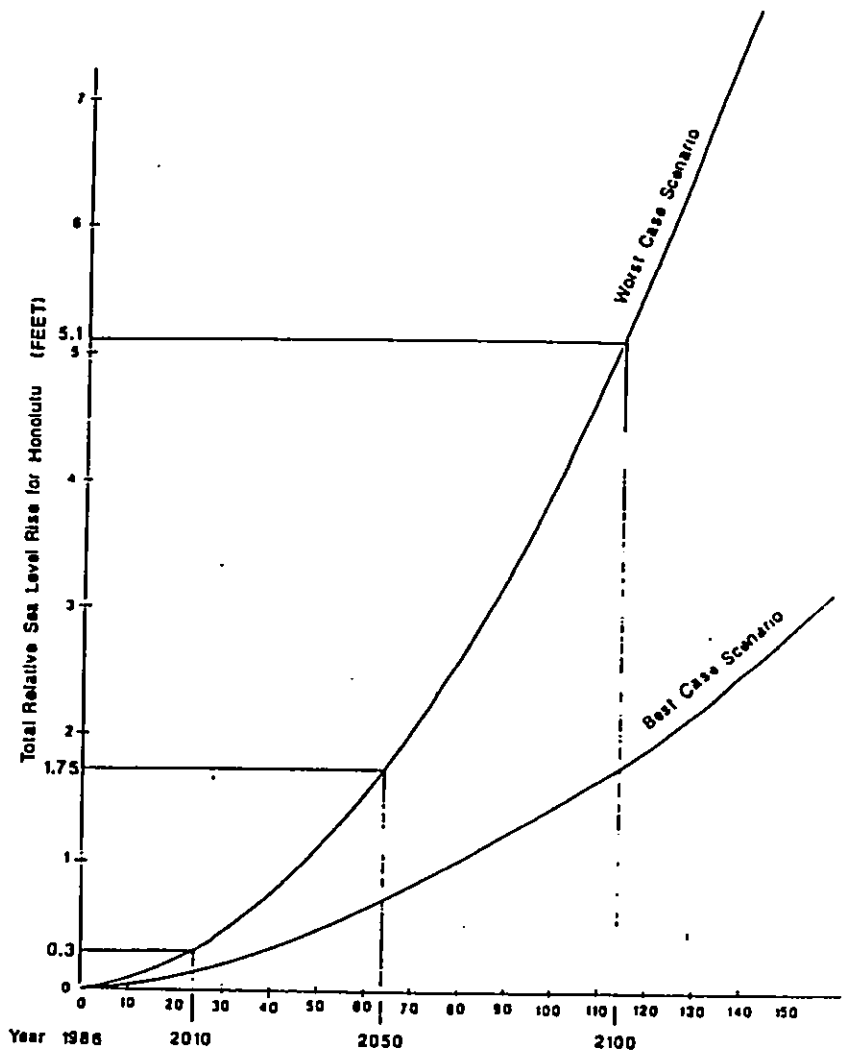


FIGURE 12. Estimated Total Relative Sea Level Rise for Honolulu

7.0 SHORE PROTECTION STRUCTURES

The condition of existing shore protection structures and planned future structures need to be considered in the planning of shoreside development. Physical factors include the requirement to repair or improve existing structures to prevent future erosion damage or the need to provide new shore protection measures to protect planned shoreline fill areas extending makai of the present shoreline. Planned uses and activities in the shoreline area need to be considered from the standpoint of selecting appropriate shore protection alternatives that are compatible with the planned uses and activities and that provide an acceptable level of protection to the landside improvements planned for specific development activities. For example, open space park areas can permit a higher risk of storm wave overtopping and flooding than high intensity commercial development areas. Following is a description of the existing shore protection structures along the open coastal reaches within the master plan boundaries, and the shore protection considerations for conceptual development plans.

7.1 Existing Structures:

Ala Moana Park-Magic Island: Magic Island was created by filling over the shallow reef flat. The beach is protected by a segmented breakwater situated at the seaward edge of the reef flat. Water depth along the seaward toe of the breakwater is about 3-5 feet below MLLW, with a nearshore bottom slope of about 1V:20H to 1V:30H. The breakwater crest height is about 8.5-10 feet above MSL and completely blocks the seaward vista from the beach. The armor stone sizes are estimated to be about 3-5 tons (3-4 foot diameter), and are adequate to withstand maximum breaking wave heights of about 9 feet. The breakwater is not high enough to prevent overtopping during large wave conditions, and in fact, frequent overtopping occurs during moderately high 3-4 feet south swell conditions. The breakwater is generally in good condition, although some stones are displaced from the structure probably due to the substantial wave overtopping. Various types of rubble and masonry seawalls protect the rest of the Magic Island shoreline. The shallow reef flat fronting Ala Moana Park provides natural shore protection to the Ala Moana beach. Deepwater wave energy is substantially dissipated over the 600-1000 feet wide reef flat, and what little wave energy reaches the shore is absorbed by the wide sloping beach face.

Kewalo Basin: The peninsula fronting Kewalo Basin is comprised of fill material with 1200 feet of ocean frontage protected by a rock masonry seawall. The seawall is situated directly on the shallow limestone reef flat, with water depth at the toe of about 1 feet or less below MLLW. The seawall crest and shoreline fill elevation is about 5 feet above MSL. The shallow reef flat dissipates considerable wave energy, and the maximum wave height at the wall is limited by the water depth over the reef. Typical maximum wave height is about 2.5 feet. The rock masonry seawall is presently in good condition, but is susceptible to frequent wave overtopping and scouring of backshore areas within 30-40 feet of the seawall. Any shoreline development being considered for this reach should provide for improvements to the seawall to reduce the overtopping characteristics. This will prevent future erosion and wave damage and allow for enhanced usage of the shoreline perimeter areas. Possible shoreline fill extension should be protected by a properly designed seawall or revetment. A sloping rock revetment may be preferable to a near-vertical seawall since it would reduce the wave splash and make the shoreline more accessible from the water. For a sloping rock revetment along this reach, the non-overtopping crest elevation is about +8 feet MSL for typical maximum wave conditions. Wave overtopping could

be expected during extreme Kona storm or hurricane wave conditions, and damageable structures should be set back about 50 feet or so from the ocean front with provision for adequate drainage of overtopping water to minimize flooding damage. A landscaped shoreline promenade would be a compatible land use within this setback zone.

Kakaako Shoreline: The Kakaako shoreline from the Kewalo Basin entrance channel to the Honolulu Harbor entrance channel is comprised of fill material with the 3300+ feet of ocean frontage protected by rock seawalls in various stages of disrepair. Water depth fronting the shore is about 3-5 feet below MLLW, similar to the water depths fronting the Magic Island breakwater. The bottom slope towards the east end of this shorefront is about 1V:30H, while the bottom slope towards the west end is much flatter out to the -12 feet MLLW depth contour. Seaward of the 12-foot depth contour, the bottom slope increases to about 1V:20H. Approximately 500 feet of seawall at the east end fronting PBRC and Look Lab is in relatively good condition, with crest elevation varying from about 9 feet to 11 feet above MSL. The stone size is estimated to be about 5 tons, placed on a 1V:2H slope. The seawall westward of this reach fronting the landfill refuse mounds is in poor condition, with crest elevation varying from near 0 feet (where failure has occurred) to about 10 feet above MSL. Figure 13 shows the varying crest elevation of the seawall along the Kakaako shorefront from Point Panic to Fort Armstrong.[16] Frequent wave overtopping of the seawall occurs along this entire reach. For typical high south swell conditions (H = 4 feet, T = 12 sec), the expected runup height is about 11-13 feet above MSL. For extreme storm wave conditions, the

[16]From a study conducted by the UH Department of Ocean Engineering under Sea Grant funding. The purpose of the study was to examine the present condition of the seawall from Point Panic to Fort Armstrong, and to propose seawall improvements related to the proposed Kakaako Development Park.

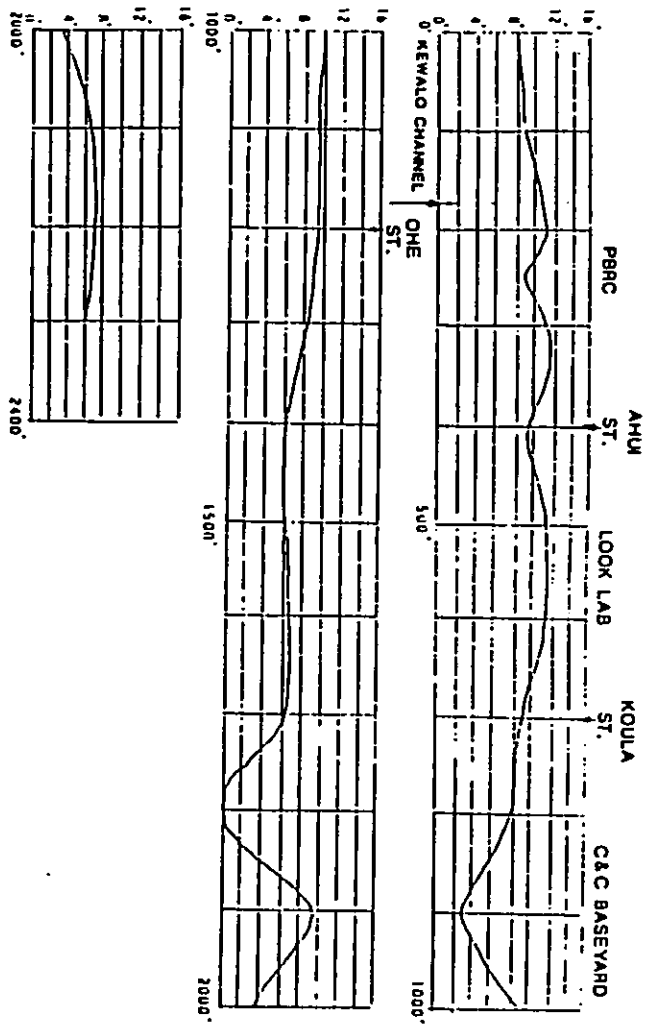


FIGURE 13. Top Elevation of Seawall from Point Panic to Fort Armstrong

maximum depth-limited wave height is about 8 feet and the runup height is about 19 feet above MSL. Any shoreline development being considered for this reach should provide for improvements to the seawall to reduce the overtopping characteristics. This will minimize future erosion and wave damage and will allow for enhanced usage of the shoreline perimeter areas. The seawall fronting the existing landfill refuse mounds requires rebuilding using appropriately sized armor stone and proper design considerations for stability. A minimum revetment crest elevation of about +13 feet MSL will ensure minimal to no overtopping during typical high south swell conditions. Significant wave overtopping would be expected during extreme storm conditions, and damageable structures should be set back 50 feet or so from the ocean front with provision for adequate drainage of overtopping water.

7.2 Future Structures and Development Concepts:

Ala Moana Park: The present circulation and flushing of the dredged area fronting Ala Moana Park is inadequate to maintain good water clarity. Therefore, any shoreline or offshore development should not further restrict the exchange of water over the reef. Any offshore development at the reef edge is also likely to obscure the ocean views from the beach and park areas. Opportunities exist for improving the circulation and flushing aspects within the Ala Moana Park dredged area by dredging of circulation channel(s) through the reef to provide direct opening(s) to the sea for positive circulation. Consideration must be given to balancing the degree of channelization with the increased wave energy levels at the shoreline and the potential for increased currents due to return flows through the channel. Also, consideration of existing surf sites may restrict the siting and alignment of any circulation channel through the reef.

A curved channel alignment will minimize the possibility of increased wave energy levels entering through the circulation channel. Also, a relatively narrow and deep channel is preferable to a wide and shallow channel with respect to minimizing wave energy as well as to enhance flushing. A gross estimate of the current velocity through the channel can be determined by considering the tidal prism within the Ala Moana Park dredged area and the cross-sectional area of the circulation channel. For a 2-foot tide, the added volume in the Ala Moana Park dredged area is approximately:

$$3400' \times 300' \times 2' = 2{,}040{,}000\ ft^3$$

Assuming that this entire volume drains through the circulation channel, then:

$$Q = 2{,}040{,}000\ ft^3/6\ hr = 94\ cfs$$

Assuming a 50' wide by 6' deep circulation channel, the velocity of return flow through the channel is:

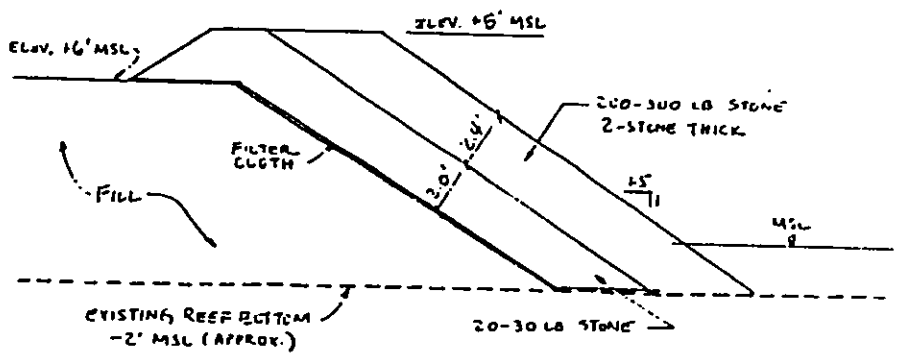
$$94\ cfs/300\ ft^2 = 0.31\ ft/sec\ (approx.\ 0.17\ knot)$$

Thus, gross estimates indicate that the circulation channel can be designed to enhance circulation and flushing of the Ala Moana Park dredged area without significant adverse effects due to increased wave energy or high velocity flows.

Kewalo Basin Peninsula: Opportunity exists for minor filling and shoreline extension of the Kewalo Basin peninsula in conjunction with dredging of the circulation channel(s) to improve water quality aspects within Ala Moana Park. Any additional filling of the peninsula should not extend substantially seaward of the present channel "jetty" due to potential impacts to the surfing sites at the edge of the fringing reef. The peninsula could be "squared off" by filling

the southeastern part of the triangular peninsula without affecting the surf sites. The dredged material from the circulation channel could be used to supplement the fill requirements for the Kewalo Basin peninsula fill extension. The Kewalo Basin peninsula expansion will require shore protection measures to contain the fill material and prevent storm wave damage. A sloping rock revetment may be preferable to a near-vertical seawall since it would reduce the wave splash and make the shoreline more accessible from the water. The revetment should have a minimum crest elevation of +8' MSL to prevent wave overtopping during typical maximum wave conditions which can be expected to occur on a yearly basis. The minimum stone size for stability is about 200-300 lbs. (1.2' diameter). A conceptual design sketch of a typical section for the revetment is shown in Figure 16.

Kakaako Shoreline: The approximate 2,400' of Kakaako ocean frontage from Kewalo Basin to the drainage canal is protected by rock seawalls in various stages of disrepair. Any development for use of this area will require the construction of adequate shore protection to prevent continued erosion damage to this existing fill area. A conceptual design sketch of a typical section for revetment protection is provided in Figure 17. The minimum crest elevation should be +13' MSL to prevent significant wave overtopping during typical maximum wave conditions which can be expected to occur on an annual basis. Significant overtopping



TYPICAL SECTION
(APPROX SCALE: 1" = 5')

FIGURE 16. Conceptual Revetment Typical Section for Kewalo Basin Peninsula Extension

would be expected during extreme storm conditions, and a 20'-wide apron is provided at the crest to prevent scouring damage due to the overtopping water. The minimum armor stone size required for stability under extreme storm conditions is 6000-9000 lbs, as determined below:

$$W = \frac{w_r H^3}{K_D (S_r - 1)^3 \cot\theta} = 7{,}500 \text{ lbs} \pm 25\%$$

where: W = armor stone weight (lbs)

w_r = unit weight of stone (assume 160 lb/ft^3)

H = wave height = 7.8' (breaking)

K_D = stability coefficient = 2 (angular quarrystone, 2-stone thick placement, breaking waves)

$S_r = w_r / w_w = 2.5$

w_w = unit weight of seawater = 64 lb/ft^3

cotθ = cotangent of structure slope = 1.5 (min)

The layer thickness is:

$$n\, k(W/w_r)^{1/3} = 7.2'$$

where: n = # of units comprising the thickness of the layer = 2

k = layer coefficient = 1

W = armor stone weight

w_r = unit weight of stone

The underlayer and bedding layer are designed to prevent leaching and loss of fine material through the revetment structure.

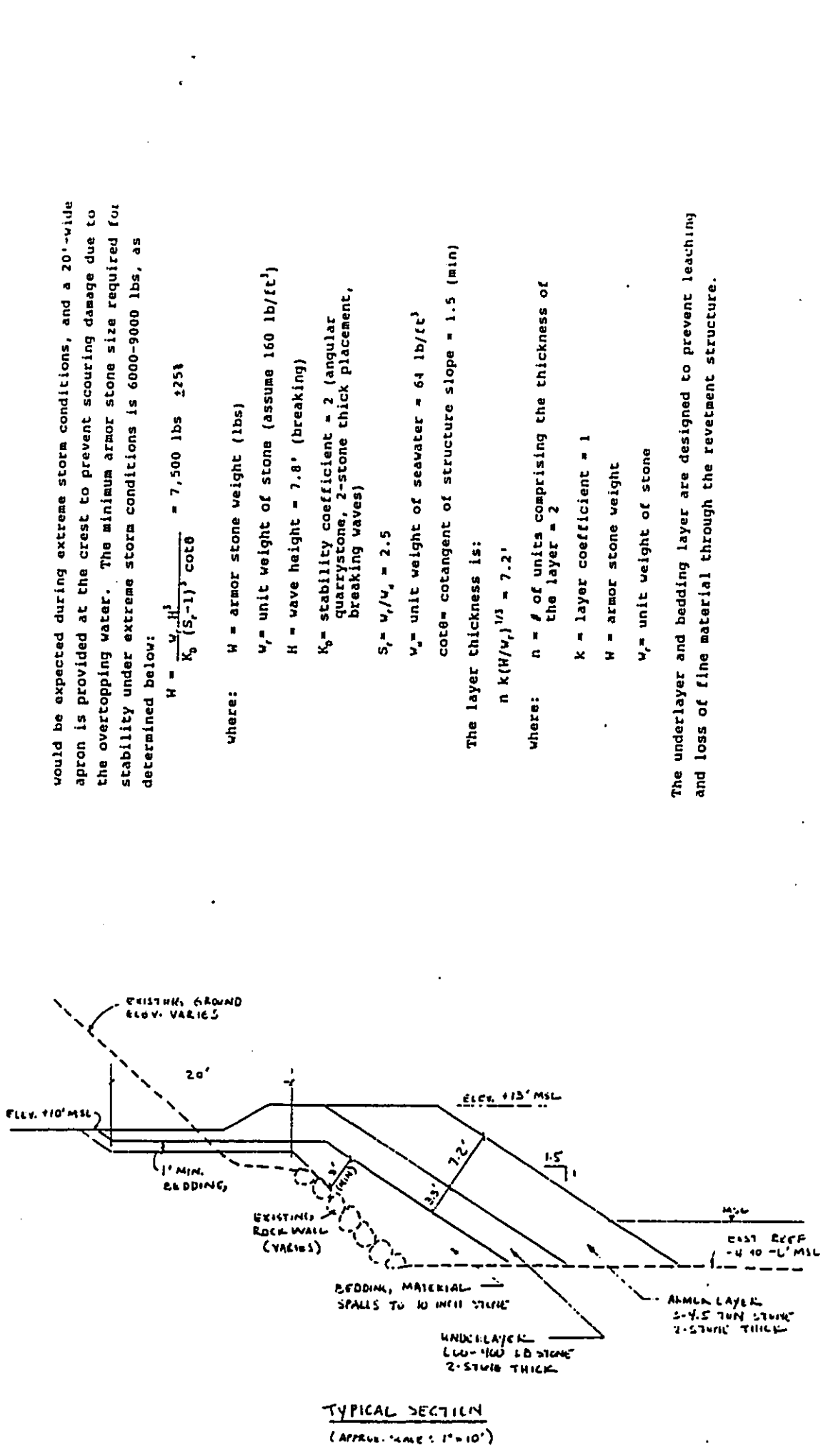


FIGURE 17. Conceptual Revetment Typical Section for Kakaako Shoreline

Synthetic filter cloth can be used in lieu of the bedding layer if placed on a prepared foundation slope. However, because the existing seawall is in various stages of deterioration, it would probably be more cost-efficient to place the bedding material directly over the existing seawall and portions of the exposed shoreline to prepare the revetment slope for the underlayer and armor layer, rather than to remove the existing rocks to prepare the slope for the filter fabric. Also, because of the uncertain nature of the landfill materials, minimum disturbance to the land/sea interface is desirable to mitigate water quality impacts which may occur due to exposure of the landfill material to wave activity. It is anticipated that the revetment toe can be placed directly on the hard limestone reef bottom.

Possible Kakaako Fill Extension: The Kakaako peninsula shoreline and offshore areas provide an opportunity to develop the 60 acre Kakaako Park that is a required objective of the planning effort. Park fast lands can be created by shoreline filling, primarily along the westerly reach of the peninsula shoreline where 5 to 12 foot water depths extend over 1000 feet offshore. Shoreline fill extension to the -12' MLLW contour will require substantially more massive shore protection structures than that necessary for the existing shoreline. Because of the deeper water depth, larger waves can be expected to impact the shore during extreme storm conditions. For a maximum breaking wave height of about 17 feet, the non-overtopping crest elevation would be on the order of about 25-30 feet, and the required armor stone size is about 40 tons. For this magnitude of wave exposure, the use of concrete armor units such as dolos is generally more cost-effective. Because of the higher degree of interlocking between the dolos armor units, 5-6 ton dolos will suffice in lieu of 40-ton rock. The wave protective structure fronting the west end of the Reef Runway is a good example of the necessary shore protection requirements for possible shoreline

fill extension to the 12-foot depth contour. The Reef Runway shore protection is comprised of 4-6 ton dolos concrete armor units placed on a 1V:1.5H slope to a crest elevation of +20 feet MSL. This protective structure is designed to be overtopped during extreme storm conditions. For typical high south swell conditions (H = 4 feet, T = 12 sec), the expected runup height is about 8-10 feet above MSL. Thus, a structure crest height of about +15 feet MSL would sustain no wave overtopping due to typical high south swell conditions, but substantial wave overtopping would be expected during storm wave conditions. Damageable structures should be set back about 100 feet or so from the ocean front with provision for adequate drainage of overtopping water to minimize flooding damage. Figure 18 depicts a conceptual design sketch of a typical section for the revetment. A 40'-wide apron is provided at the crest to prevent scouring damage due to extreme storm wave overtopping. Concrete dolos units could be used for the armor layer, as depicted in the typical section. The 6-ton dolos units are the same size as used for the Reef Runway wave protective structure. For water depth of -12' MLLW, the maximum breaking wave height is 17.5', and the required dolos weight is determined as follows:

$$W = \frac{w_r H^3}{K_D (S_r - 1)^3 \cot\theta} = 11{,}800 \text{ lb} = 5.9 \text{ ton}$$

where: $w_r = 156$ lb/ft^3

$H = 17.5'$

$K_D = 15.8$ (dolos, 2-unit thick placement)

$S_r = 2.44$

$\cot\theta = 1.5$ (min)

Based on the required dolos dimensions, the average thickness of the 2-unit thick layer is about 8' and the number of units per 1,000 sf is 48.1.

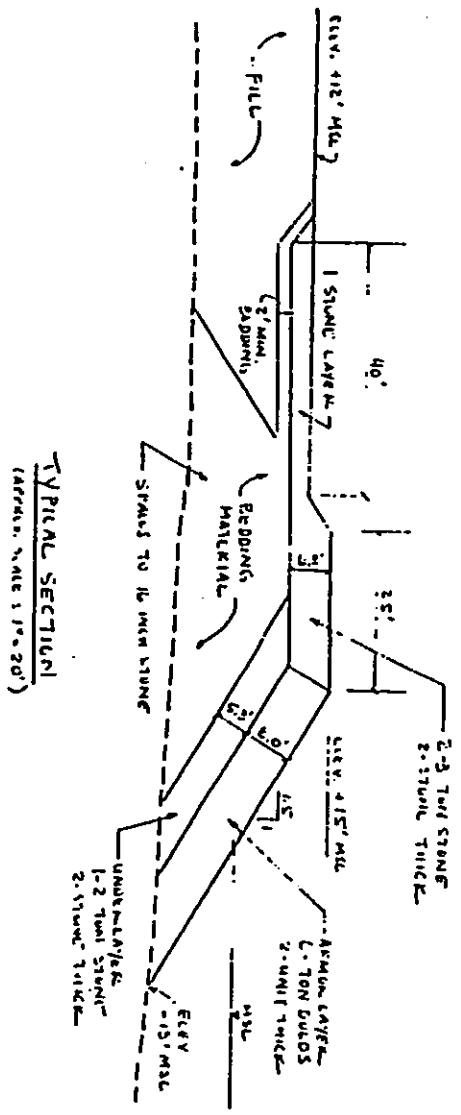


FIGURE 18. Conceptual Revetment Typical Section for Kakaako Fill Extension

A recreational beach could be considered as part of the Kakaako fill extension but will require stabilization with breakwaters or with a submerged shoal. A submerged shoal structure is preferable since it would not block the seaward views, and can be designed to enhance the surfing conditions. Figure 19 shows a conceptual plan sketch of the fill extension and submerged offshore reef required to stabilize the recreational beach. The approximate shoreline fill area is 1,100,000 sf, and the required volume of fill material is approximately 815,000 cy, assuming an average fill thickness of about 20'. The submerged offshore reef will provide wave protection to the Diamond Head-facing shoreline, while the seaward and Ewa-facing shore will require revetment protection.

Figure 20 shows a conceptual design sketch of a typical section for the recreational beach. The beach width is 100' at a crest elevation of +8' MSL, with a seaward beach slope of 1V:8H. The total dry beach width (above high tide elevation) is about 150', providing approximately 240,000 sf of recreational beach area.

Figure 21 shows a conceptual design sketch of a typical section for the submerged offshore reef. To minimize the required stone size for the underwater shoal and to mimic the natural bottom characteristics of the existing reef areas, the seaward slope is 1V:20H. From model tests of "reef breakwaters"[18], where the breakwaters tested were a homogeneous pile of stone with low profile, the data indicate that the required stone size for stability is approximately 1.3 ton as determined below:

$$W_{50} = \frac{w_r H_s^3}{N_s^3 (S_r - 1)^3} = 2{,}600 \text{ lb}$$

[18]Ahrens, J.P., G. Viggosson, & K.P. Zirkle, "Interim Report, Stability and Wave Transmission Characteristics of Reef Breakwaters", October 1982.

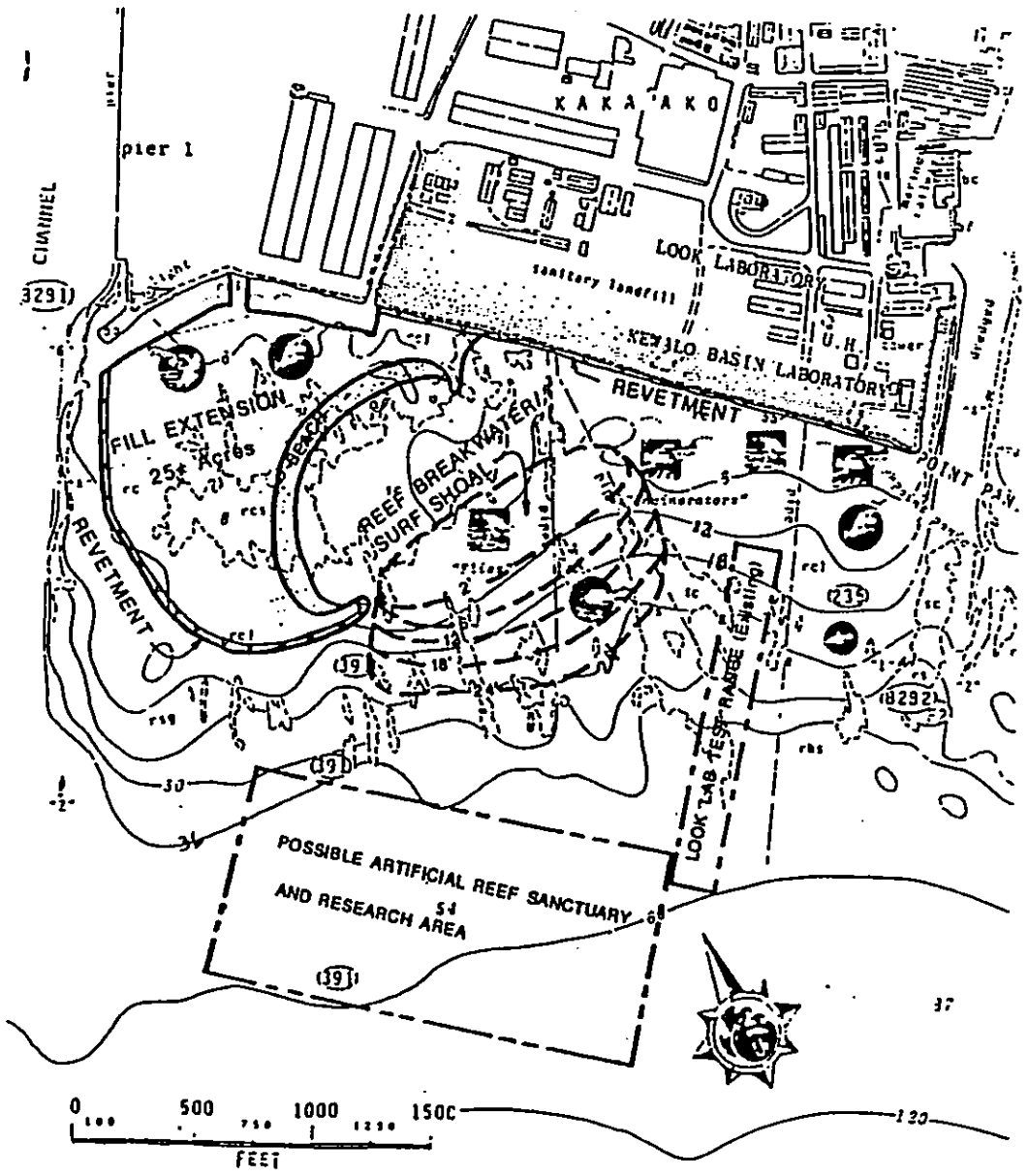


FIGURE 19. Conceptual Plan for Kakaako Offshore Improvements

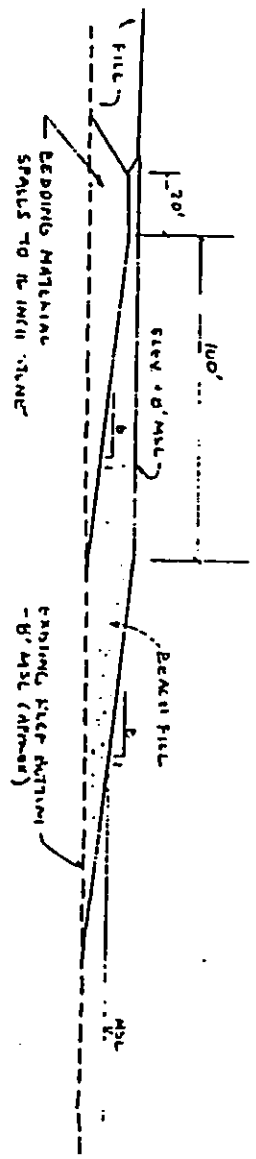


FIGURE 20. Conceptual Beach Typical Section for Kakaako Fill Extension

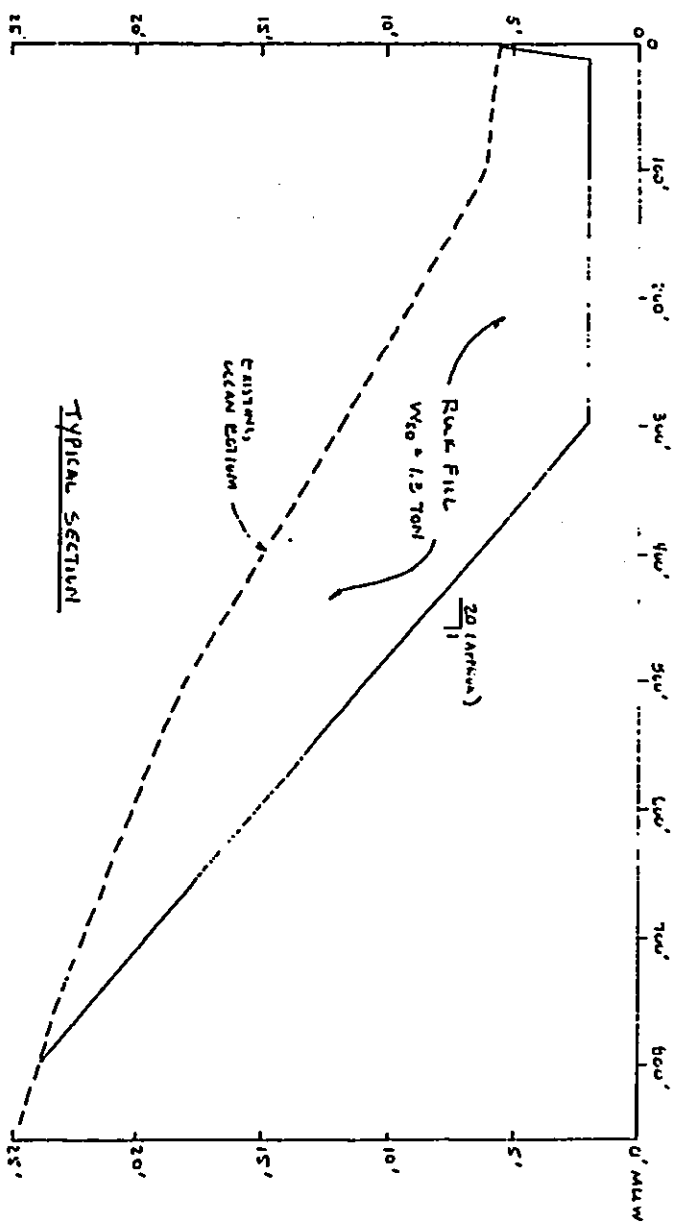


FIGURE 21. Conceptual Typical Section for Reef Breakwater/Surf Shoal

where: H_{50} = median stone weight (lb)

w_r = 160 lb/ft^3

H_s = 17.5'

N_s = stability number = 4.6

S_r = 2.5

The total volume of rock required for the submerged reef is about 200,000 cy. The reef breakwater would serve to stabilize the sandy beach as well as to provide an enhanced surf site. Further refinement of the design for the offshore reef can probably result in lower overall cost, such as providing dual slopes and multiple layers where the inner core of the reef can be built up using smaller rock. For this conceptual planning effort, however, it is assumed that the shoal is comprised of a homogeneous pile of stones.

The submerged reef is intended to serve as a surf shoal as well as to provide shore protection. If intended merely as shore protection, the reef breakwater crest would not have to be as wide and the fill volume could be much reduced. However, the surf shoal concept is recommended since it would enhance the existing surf site known as "Flies", it would provide a surf site away from the Kewalo Basin entrance channel with convenient access from the Kakaako Park, and would enhance recreational snorkeling and diving opportunities during calm wave conditions. This reef breakwater/surf shoal would not interfere with the existing Point Panic body surf site, nor the U.H. Look Lab offshore test range area (as described by CDUA File No. OA-11/20/86-1941).

A recent legislative resolution (H.R. No. 266, H.D.1) mandated DLNR to designate a site as an Artificial Reef Zone and Marine Life Conservation District, for the purpose of artificial reef

research and recreational uses (non-consumptive activities). The original draft of the resolution recommended a site offshore Kakaako, since the ocean bottom characteristics (40-70 foot depth range) were well suited for artificial reef construction, being relatively flat and largely devoid of marine life, and located close to the U.H. facilities at Kewalo Basin and Snug Harbor so that deployment and monitoring can be carried out in a cost effective way, and also conveniently located for public access. The area shown on the Figure 19 plan sketch, designated "Possible Artificial Reef Sanctuary and Research Area", was the site originally proposed in the draft resolution. The final resolution, as amended, deleted reference to the recommended site and indicated a non-specific area off Oahu. An artificial reef sanctuary and research area offshore Kakaako would certainly complement and enhance the proposed Kakaako Park and offshore improvements recommended by the Honolulu Waterfront Master Plan. The park facilities would enable convenient access to the artificial reef sanctuary for dive groups (could provide a Hanauma Bay experience), and the artificial reef sanctuary would enhance the shoreline fishing opportunities adjacent to the site.

The combination of the HWMP development activities together with the proposed artificial reef sanctuary and research area, as well as the existing U.H. research facilities and offshore test range, would create a world class ocean theme park within metropolitan Honolulu. A visitor's center could be provided as part of the U.H. research complex or within the Kakaako Park development to enhance the concept and use of this ocean theme park.

APPENDIX B

Acoustic Study

HONOLULU WATERFRONT MASTER PLAN
TECHNICAL REPORT SERIES

ACOUSTIC STUDY

(EXCERPTS)

The enclosed report has been edited to include data and associated analyses specific to the makai area of the Kaka'ako Community Development District with the consent of Darby & Associates.

Prepared By:
Darby & Associates
Pali Palms Plaza
970 North Kalaheo Avenue, Suite A311
Kailua, Hawaii

Prepared For:
Helber, Hastert & Kimura, Planners and
R. M. Towill Corporation, A Joint Venture

February 1989

Office of State Planning
Office of the Governor

Acoustic Study
Honolulu Waterfront Master Plan

Table of Contents

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF TABLES

ACOUSTIC STUDY

HONOLULU WATERFRONT MASTER PLAN

(EXCERPTS SPECIFIC TO THE KAKA'AKO MAKAI AREA)

Prepared by

Darby & Associates
Pali Palms Plaza
970 North Kalaheo Avenue
Suite A311
Kailua, Hawaii 96734

February 28, 1989

I. EXISTING CONDITIONS

An evaluation of noise in the Waterfront area has been made involving noise from traffic, aircraft, and industrial/commercial complexes for existing conditions and the far future plans.

Special average noise indices are commonly used to deal with fluctuating noise from traffic and aircraft. For example, equivalent noise level over a one-hour sample of traffic noise provides a single number in decibels (dB) to express the complicated time-varying situation. Also day-night noise level (Ldn) is used to define a single number for traffic and aircraft noise averaged over 24 hours, including a 10 dB penalty for the noise sensitive period between 10:00 PM and 7:00 AM. See Appendix A for a more detailed discussion of noise indices.

A. Traffic Noise

Motor vehicular traffic noise is a function of: (a) the volume of traffic (e.g. vehicles per hour); (b) the operating speed; (c) the vehicle mix (usually characterized as automobiles including pickup trucks, vans, etc., medium trucks, and heavy trucks including buses); and (d) the sound propagation conditions, e.g. a direct noise path to a high-rise lanai vs. a path where sound grazes over ground covered with grass and foliage. Traffic noise levels are often expressed as an equivalent sound level over a one-hour period, e.g. L_{eq} (60 minutes). See Appendix A. It is stated in Reference 1 that when the L_{eq} is determined for the noisiest hour of a 24 hour period, and if certain conditions are met, then the noisiest L_{eq} (60 minutes) is approximately equal to the Day-Night Sound Level (L_{dn}). The Federal Highway Administration (FHWA) has developed a traffic noise level prediction model that has proved to be very reliable. (Reference 2) Using this model, it can be seen that if the traffic volume is doubled (e.g. from 2,000 to 4,000 vehicles/hour) and all other factors (e.g. speed, mix, etc.) are held constant, then the L_{eq} and L_{dn} will increase by 3 dB. However, if the speed is doubled (e.g. from 20 mph to 40 mph) for the same volume and mix, then the L_{eq} and L_{dn} will increase typically by about 10 dB.

The percent of heavy trucks in the traffic mix is a dominant factor in determining the total traffic noise level. For example, if there is a traffic volume of 2,500 vehicles per hour involving 2,387 autos, 50 medium trucks, and 63 heavy trucks (95.5%, 2%, and 2.5% respectively), it can be shown that the traffic noise level contribution by the autos

is 33%, by the medium trucks is 10%, and by the heavy trucks is 57%. Thus, only 2.5% heavy trucks in the traffic flow typically would contribute 57% to the total traffic noise. If 53 additional trucks were introduced during the hour, then the percent of heavy trucks in the mix would rise to 5%, but the contribution to the total traffic noise would increase to 71%.

Another factor concerning the effect of heavy trucks on total traffic noise is that the engine exhaust outlet is usually elevated, typically to 8 or 9 feet. Automobiles and smaller trucks have an effective noise source located very near the ground. With heavy trucks, the dominant noise source is significantly elevated, and the effectiveness of natural or man-made noise barriers is reduced tremendously. Thus, trucks and bus noise often invades spaces not heavily impacted by noise from other vehicles. Also, the noises from heavy trucks contain much more low frequency sounds that propagate with much less attenuation as do the mid- and high-frequency sounds from autos and small trucks.

Since many high rises are involved in the Waterfront study area may involve high-rises, the following excerpt from Reference 3 is provided:

"Traffic noise levels generally increase with elevation of the high-rise unit due to increased field-of-view to streets and reflected building surface with elevation. Traffic noise sources probably tend to radiate more noise upward than horizontally, due to hard pavement surfaces below the vehicles and due to the use of vertical exhaust systems by some heavy vehicles (trucks and buses)."

"Figure 1 presents a two-dimensional prediction of traffic noise contributions from an adjacent view corridor street and from a distant view corridor street. Traffic noise predictions along one face of the high-rise unit are provided for the two streets which run parallel to the building face...."

"From Figure 1, it can be said that the lower floors (at 45 through 60 FT elevation) would be the quietest, since shielding of both local and distant traffic noise will occur for these units. Above the 60 FT elevation, shielding of local traffic noise would not occur, but shielding effects on distant traffic diminish entirely at 330 FT elevation. Total traffic noise level from the two streets shown would vary from 54 L_{dn} at the lowest elevation to 65 L_{dn} at the highest elevation."

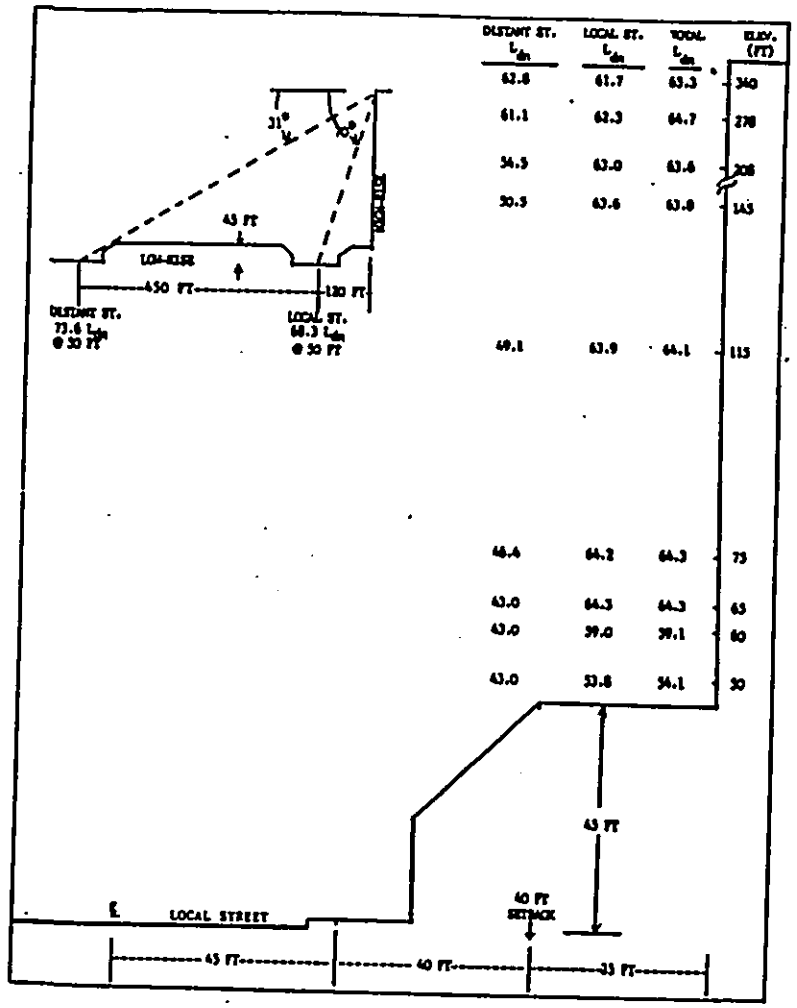


FIGURE 1

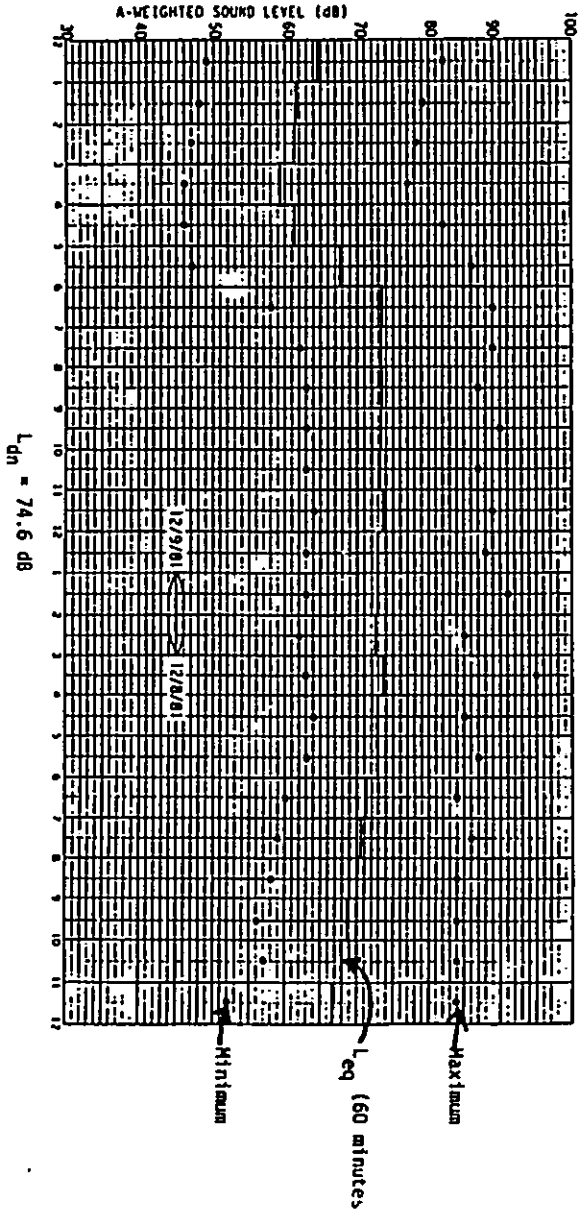
VARIATION OF TRAFFIC NOISE WITH HIGH-RISE ELEVATION

An increase of 10 dB for a given noise is subjectively considered twice as noisy. Thus, it is seen that occupants on the lanais of units 10 floors and above in the hypothetical high-rise in Figure 1 can expect traffic to be more than twice as noisy as on the lanais of units at the 5th to 6th floors. Precise predictions of traffic noise levels in specific high-rises can be very complicated and depends on the specific geometry of the streets and other building within the field-of-view as well as upon the traffic parameters associated with each street.

Figure 3 shows maximum, minimum, and hourly traffic noise levels, L_{eq} (60 minutes), plotted over 24 hours for Ala Moana Boulevard (from Reference 3). It is seen that the hourly noise level is relatively constant between 6 AM and 6 PM because the hourly traffic volume fluctuations are not large enough to effect average traffic noise significantly. Also, when the hourly volumes are highest, e.g. at peak hours, the average operating speed probably decreases sufficiently to reduce traffic noise. In fact, the noisiest hour usually occurs before or after peak hours when vehicles can operate at, or near, posted speed.

Table I presents recent traffic noise level measurements and traffic data obtained for three locations along Ala Moana Boulevard. Also shown are traffic noise level predictions using the FHWA noise model and it can be seen that the agreement is within one decibel. All three sites involve sound propagation across grassy surfaces which tended to reduce the traffic noise level compared to paved surfaces or to raised elevations, e.g. on high-rise lanais. Extremely large set-backs, e.g. greater than 250 feet, from Ala Moana Boulevard would be required to assure that 65 L_{dn}, the HUD acceptability threshold for residences, is not exceeded at the exterior of high-rise units. However, if the units are air conditioned allowing windows and doors to be closed, then HUD requirements can be met.

Traffic noise levels are reduced substantially in locations distant and shielded from the main thoroughfares. For example, Reference 3 provides 1984 noise measurements obtained at the three locations makai of Ala Moana Boulevard



L_{dn} = 74.6 dB

Figure 3 - Maximum, Minimum, and Hourly Noise Levels Measured on Ala Moana Boulevard over 24 hours.

shown in Figure 4. The results of the noise measurements are shown in Figures 5 thru 7. The L_{eq} values shown with each figure represent the total contributions from aircraft, traffic, and fixed machinery.

At Location "A" (parking lot of existing park), traffic noise was minimal and was approximately 55 L_{dn}. At Location "B" (50 FT from the centerline of Olomehani Street), traffic noise was approximately 59 L_{dn} due to the passage of tour buses and heavy trucks. At Location "C" (30 FT from the centerline of Ilalo Street), traffic noise was approximately 62 L_{dn}, due to heavy truck and automobile traffic. The results indicate that existing traffic noise within the Makai Area is approximately 60 L_{dn} at 50 FT distance from the centerline of streets makai of Ala Moana Boulevard.

B. Aircraft Noise

Figures 8 and 9 show the aircraft departure tracks during trade winds, and aircraft arrival tracks during Kona flying patterns at Honolulu International Airport (HIA) impacting the study area (Reference 4). Figure 10 provides the most recent preliminary L_{dn} noise contours for 1987 (Reference 5). The noise contours were generated using the FAA's Integrated Noise Model (INM) computer program which takes into account the flight tracks, the frequency and time of operations, as well as the noise and flight profiles of each type of aircraft. The predicted noise levels take into account measured single event noise levels obtained over the years from fixed Remote Monitoring Stations (RMS's) in the HIA Noise Monitoring System (NMS). RMS's in the project area are located at the Aloha Tower and at Kewalo Basin.

Aircraft noise measurements were also obtained in Reference 3 at locations "A", "B", and "C" shown in Figure 4. The measurements occurred during trade winds conditions. At the "A" site, the aircraft noise contribution was approximately 60 L_{dn} and aircraft noise was the dominant noise source at that site. Military jet aircraft (F-4 and KC-135) were the loudest events recorded at 82 to 84 dB (L_{MAX}). At the "B" site, aircraft noise was approximately 60 L_{dn} with military jet aircraft recorded at 81 to 92 dB (L_{MAX}). Aircraft noise contributes approximately 41% to the total noise environment at location "B". At the location "C" site, aircraft noise was approximately 60 L_{dn}, with military jet aircraft recorded at 81 to 85 dB (L_{MAX}). Aircraft noise contributed only 22 percent to the total noise environment due to the higher relative contributions from traffic and machinery (reefer vans) noise sources.

TABLE 1 - Measured and Predicted Traffic Noise Levels Along Ala Moana Boulevard on August 30, 1988 between 12:30 - 2:30 PM

LOCATION	DISTANCE TO ROAD CENTERLINE	ESTIMATED VEHICLES/HR*	ESTIMATED % HEAVY TRUCKS*	MEASURED L_{eq} (10 Min.)	PREDICTED L_{eq} (60 Min.)**
Ala Moana Park (near Piikoi Street)	85'	3,574	2.7	66.6	67.3
Ala Moana Park (near Kewalo Basin)	125'	3,864	2.9	64.5	65.1
Near South Street	93'	4,434	3.2	67.4	67.8

*Hourly Traffic Volumes and % Heavy Trucks are based on a 10 minute count.

**Predicted noise levels assumed an average operating speed of 30 mph and took into account sound propagation across grass using the FHWA traffic prediction model.

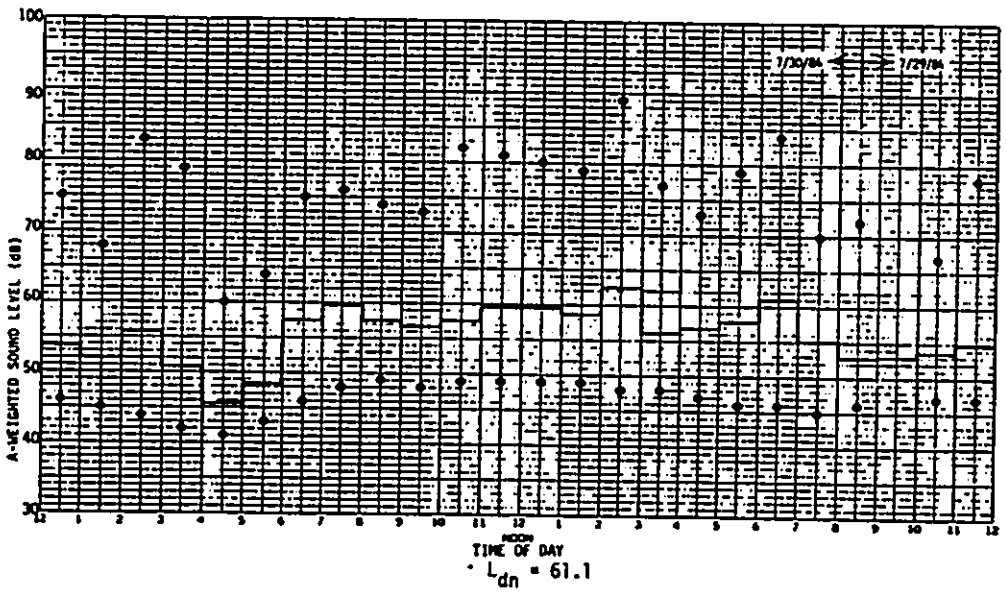


Figure 5 - Maximum, Minimum, and Hourly Noise Levels Measured at Site "A"
(see Figure 9 for Measurement Location)

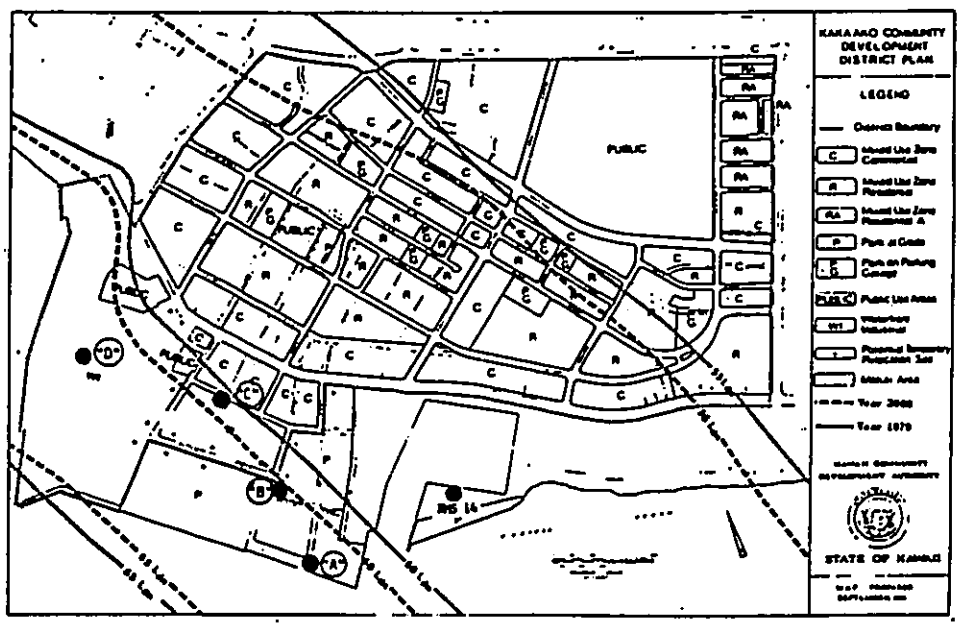
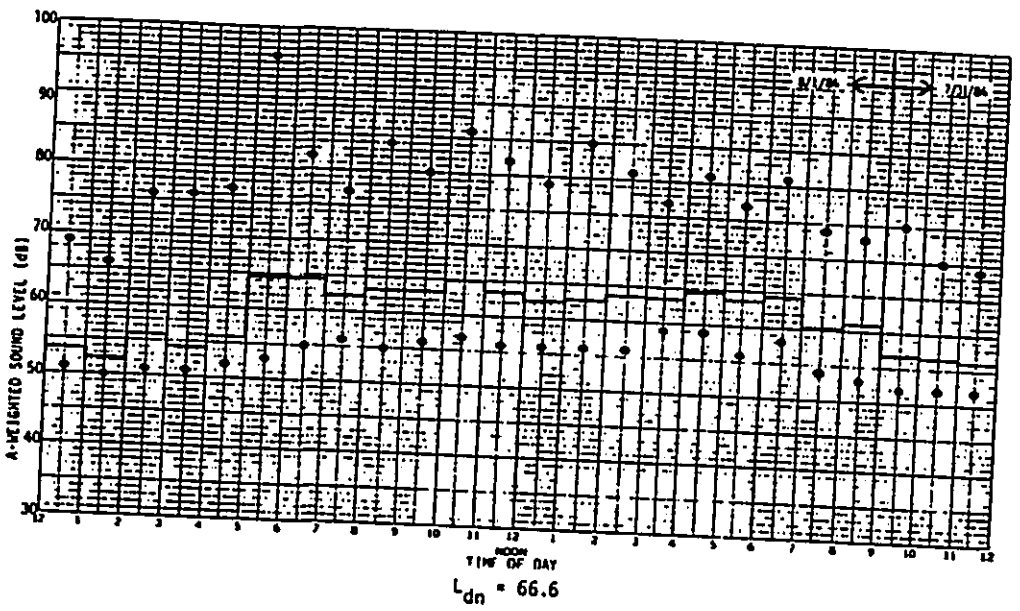


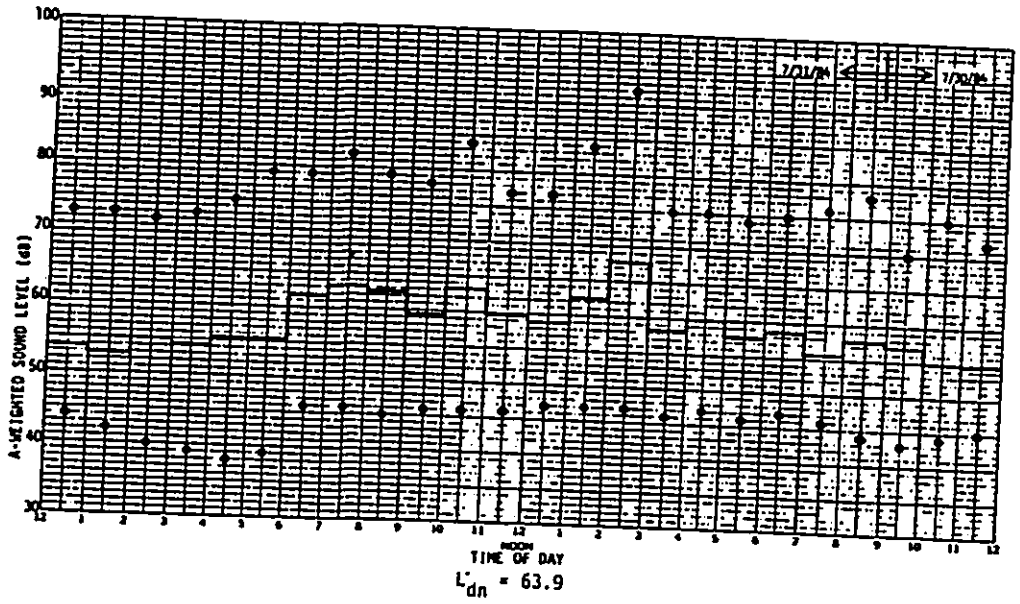
Figure 4 - HIA Aircraft Noise Contours Within Kaka'ako as Determined in Reference 3
and Noise Measurement Locations

RECEIVED AS FOLLOWS



L_{dn} = 66.6

Figure 7 - Maximum, Minimum, and Hourly Noise Levels Measured at Site "C"
(see Figure 9 for Measurement Location)



L_{dn} = 63.9

Figure 6 - Maximum, Minimum, and Hourly Noise Levels Measured at Site "B"
(see Figure 9 for Measurement Location)

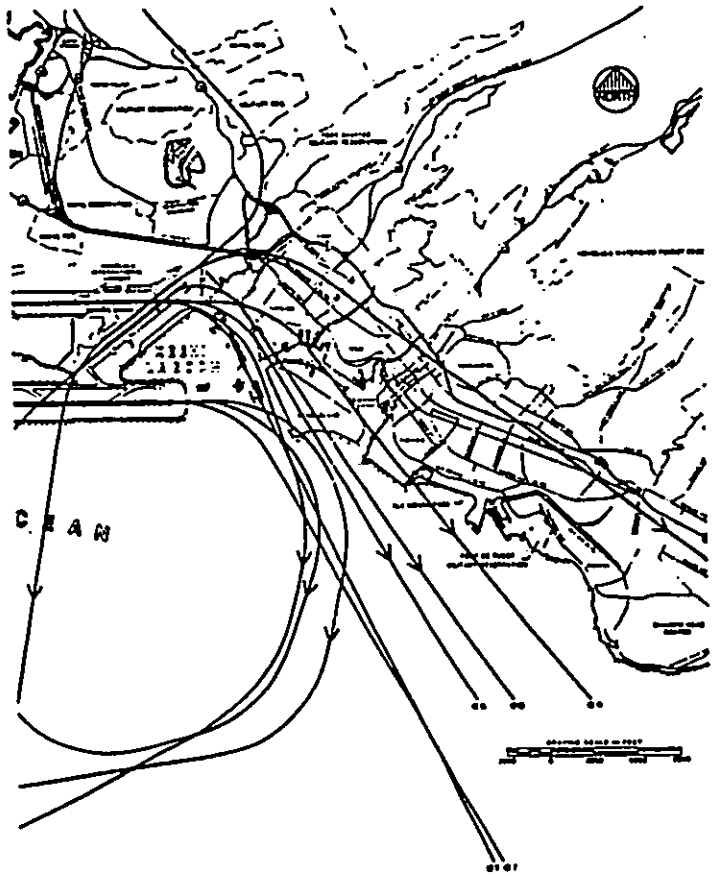


Figure 8 - Departure Flight Tracks During Trades from HIA

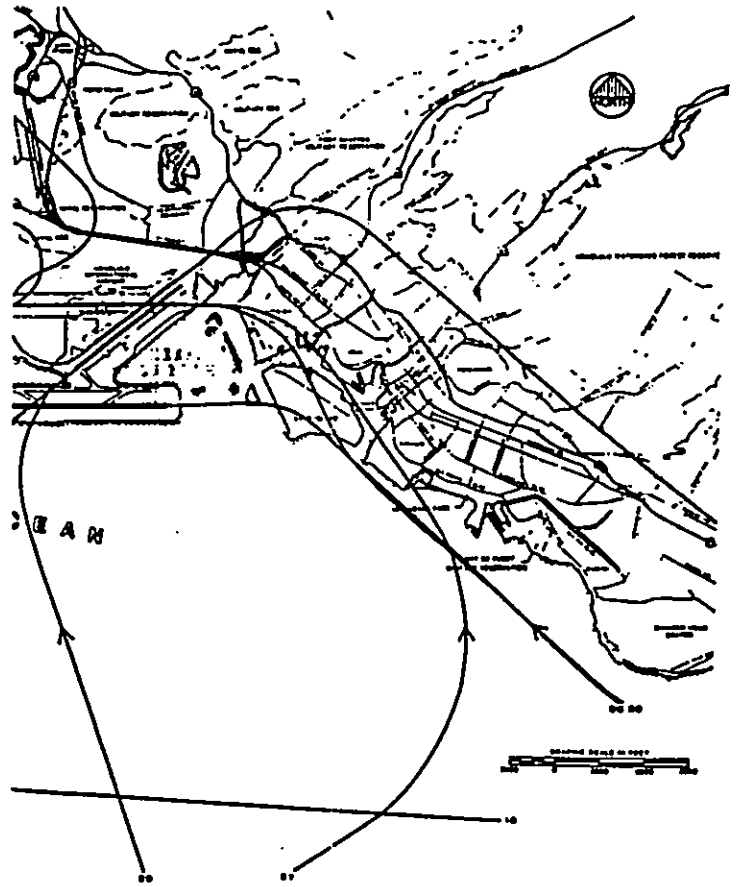


Figure 9 - Arrival Flight Tracks During Kona Flight Patterns to HIA

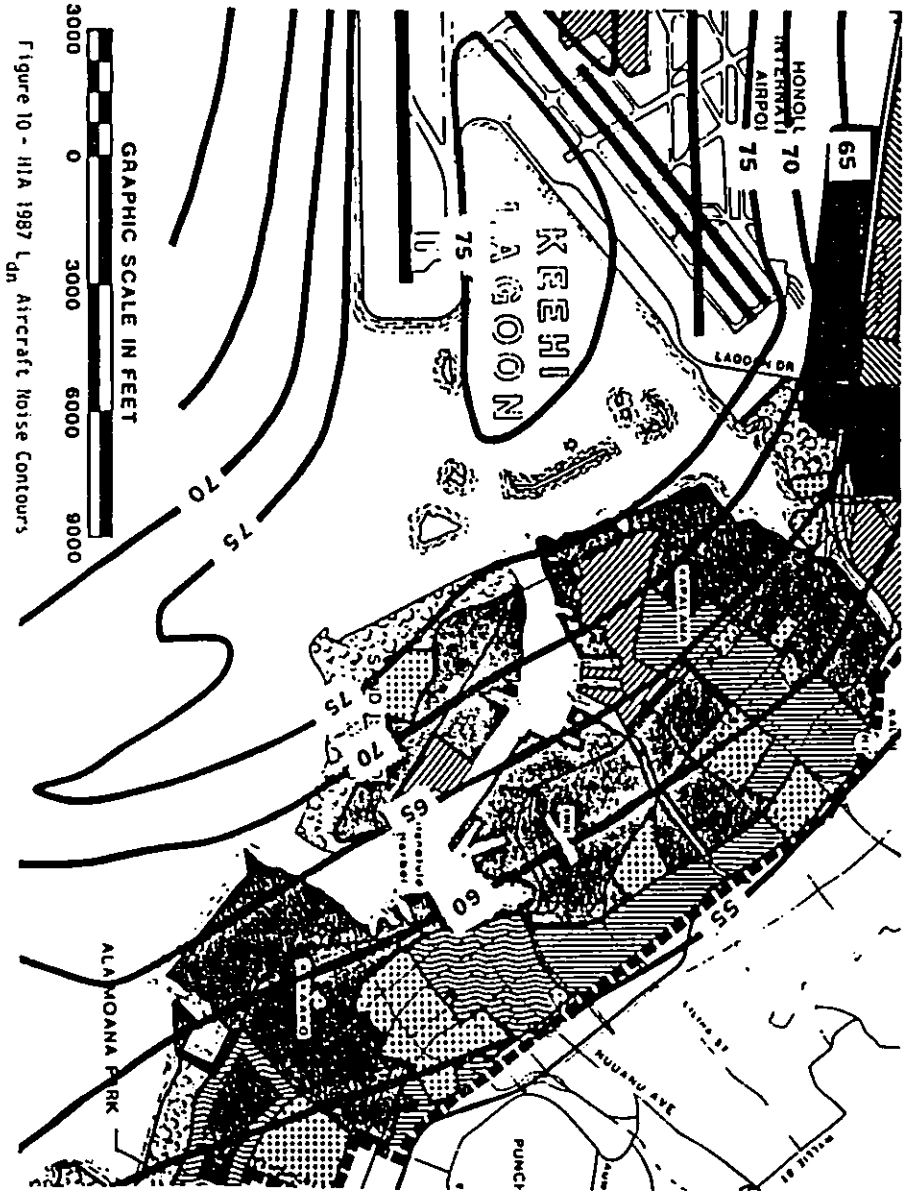


Figure 10 - HIA 1987 L_{dn} Aircraft Noise Contours

The L_{dn} noise contours in the study area caused by HIA can change when aircraft types and operations are modified. For example, the L_{dn} contours shown in Figure 4 obtained from the 1984 study (Reference 3) show less noise impact in the Kaka'ako Makai area than the more recently predicted L_{dn} contours for 1987 shown in Figure 10. The increase in L_{dn} values is believed to be attributed to overall greater activity and to the demise of Mid Pacific Airlines and the fact that jet aircraft are now handling more noise-sensitive night cargo operations including those previously carried on turboprop aircraft by Mid Pac.

c. Noise From Maritime, Industrial and Commercial Operations

The noise experienced from maritime, industrial, and commercial operations depends not only on the intensity of the source, but also on the sound propagation conditions determined largely by the elevation of the noise source, the presence of buildings, etc. causing shielding (or reflective sound buildup), the terrain, i.e. hard or soft, etc.

Table II from Reference 3 contains a summary of workplace noise levels measured in Kaka'ako, and are applicable to many conditions found in the project area. The following excerpt is also from Reference 3:

"Practically all workplace activities, which involve the use of powered tools or machinery, will generate noise levels in excess of 65 dB at the operator position...Tables III and IV present typical ranges of noise levels for various equipment which may be used in an individual workplace environment. The ultimate effect of noisy equipment on the spatial and temporal noise level distributions within a particular workplace depends upon a number of factors such as: the loudness, physical location, and frequency of operation of the noisy equipment; the interior architectural finishes and furnishings used in the workplace; and the extent to which partitions or enclosures are used to contain high level noise sources. The use of electronic paging system will generally result in intermittent sound levels which are higher (by design) than the workplace noise levels.

"Hearing damage criteria for the workplace is approximately 85 dB, and it is possible that noise levels in the workplace environment may ultimately be at or below the 85 dB level. However, it is not likely that equipment of the industrial types shown in Table IV will be quieted to levels below 85 dB due to economic considerations. Therefore, it is

TABLE III

RANGE OF INDUSTRIAL MACHINERY/EQUIPMENT SOUND LEVELS*

	Sound Levels - dB
	80 85 90 95 100 105 110 115
1. Pneumatic Power Tools (grinders, chippers, etc.)	
2. Air Blown-Down Devices (painting, cleaning, etc.)	
3. Air Compressors (reciprocating, centrifugal)	
4. Metal Forming (punch, shearing, etc.)	
5. Pumps (water, hydraulic, etc.)	
6. Industrial Trucks (LP gas)	
7. Saws	
8. Laundry Equipment	
9. Electric Motors	
10. Blowers (forced, induced, fan, etc.)	

*Measured at operator positions.

TABLE II

SUMMARY OF MEASURED WORKPLACE SOUND LEVELS

Business Establishment (Measurement Location)	Background Ambient Noise Level	Transient Noise Sources	
Auto Body Repair & Paint Shop (At Doorway)	71	Air Compressor:	78 dB
		Grinding:	85 dB
		Hammering:	75 dB
Tire Repair (Outside Entrance)	57	PA System:	80 dB
		Pneumatic Wrench:	75 dB
		Pneumatic Jack:	72 dB
		Hammering:	70 dB
Golf Club Manufacturing (At Doorway)	61	Grinding:	70 dB
		Spray Painting:	68 dB
		Hammering:	74 dB
Spray Paint Shop (At Doorway)	61	Air Gun:	74 dB
Upholstery Shop (At Doorway)	55	Stapler:	67 dB
		Sewing Machine:	63 dB
Auto Repair Shop Below Parking Deck (30 FT from Entrance)	62	Pneumatic Wrench:	74 dB
		Hammering:	72 dB
Auto Body Repair Shop (Outside and 8' from Entrance)	58	Hammering:	74 dB
		PA System:	75 dB
		Grinding:	65 dB
Warehouse (Outside on Sidewalk)	60	Container Loading:	76 dB

TABLE IV

MEASURED SOUND LEVELS OF INDUSTRIAL EQUIPMENT

Operation	Sound Level (dB)
Steam cleaning	109-114
Buffing and polishing	103-104
Use of bed planer	95-97
Use of compressed air for blowdown	102
Use of abrasive cut-off saw	104-108
Operation of paint spray booth	92
Use of large bandsaw	96-97
Operation of Motor Generator sets, Battery Shop	95-102
Use of portable pneumatic sander	96-98
Operation of abrasive cut-off wheels	92-96
Use of pneumatic wire brushes	94-98
Use of 4" belt sander	96-97
Use of saw	100-106
Use of pneumatic hoists	98
Use of surface planer	100
Use of table saws	96-98

reasonable to assume that workplace noise levels do and will continue to occur within a band of values, of approximately 65 to 85 dB with possible levels exceeding 85 dB for industrial operations.

Noise level measurements were made in August 30, 1988 at location "D" shown in Figure 4 at the Fort Armstrong container handling facility. Table V presents the measured data. During a 25 minute period, noise from trucks and forklifts with typical maximum dBA noise levels of 72 to 80 dBA were measured. The noise level exceeded 50% of the time (L_{50}) was 68 dBA, while the level exceeded 10% of the time (L_{10}) was 75 dBA.

II. FUTURE CONDITIONS WITHOUT PROJECT

Population in urban Honolulu is expected to increase by approximately 25% and employment by about 30% by the year 2010 even without the Waterfront Project. With this projected growth, estimated vehicle trips in the waterfront area would probably increase by 25%. Such increases imply greater levels of noise poilution which would be inevitable in areas of the urban core where major employment centers and services are located. Aircraft noise exposures in the area without the project will be identical to those estimated for the case with the project as discussed below.

III. FUTURE CONDITIONS WITH PROJECT

A. Traffic

If in the future, the projected increased traffic volumes can move at today's speeds, then it can be shown that hourly traffic noise levels should increase from 0.7 to 1.5 dB depending on the location along the traffic routes.

The actual increase in noise level will probably be less if congestion along the road causes the effective average operating speed of the vehicles to be reduced. Moreover, unlike aircraft noise, buildings will effectively block traffic noise to listeners at lower elevations. Thus, the makai regions behind structures on Ala Moana Boulevard should be muted from traffic noises.

The walkways and commercial complexes along the

TABLE V - Summary of Activities and Measured Noise Levels on August 30, 1988 at the Fort Armstrong Container Handling Facility

Activity	(approx. feet) Distance to Source	dBA Maximum Noise Level
Incoming & Outgoing Trucks	100'	70-78
Loading & Unloading by Forklift	150'	72-78
Reverse Beep Alarm from Forklift	150'	72-76
Heavy Forklift	100'	73-80
Aircraft Flyover	-	70-74

Note: o The noise level exceeded 10% of the time (L_{10}) for the period from 2:17 PM to 2:42 PM was 75 ± 3 dBA.

o See measurement location "D" on Figure 4.

proposed canal as well as the parks and special uses in the Fort Armstrong area should be reasonably quiet except for noises from slower moving local traffic. It is shown that the elimination of fully-developed container handling facilities in the Fort Armstrong area will reduce the contribution of noise from heavy diesel trucks and buses on Ala Moana Boulevard from about 71% to 57% of the total traffic noise.

B. Aircraft

Figures 11 & 12 show aircraft noise Ldn contours labeled 1992 and 2007. These contours reflect future cases where 1992 contour show no significant changes in Kaka'ako Makai area despite an increase in operations. This is primarily because some quieter Stage 3 aircraft were assumed. The 2007 contours in Figure 12 reflect a case where the majority of the aircraft are Stage 3 and significant noise reductions are seen in most of the project area despite even greater operations than in 1992.

From Figure 12 one can estimate the degree of noise reduction that will occur when the quieter Stage 3 aircraft are essentially in full use. The figure shows circled letters denoting major features proposed for the ultimate Honolulu Waterfront Project. The amount of the predicted noise reduction varies from zero to more than 10 dB at the various locations within the planning area.

C. Industrial/Commercial Activities

Examples of industrial activities that cannot reasonably have acoustic enclosures are container handling facilities; ship and boat maintenance and repair operations; truck terminals; salvage, scrap and junk storage; concrete batch plants; and large saw mills. These as well as other activities will continue and in some cases, increase in the future.

Noise compatibility criteria provided by many Federal agencies generally assume that buildings are closed for heating or air conditioning. This condition makes these facilities both susceptible to noises from surrounding areas as well as not being quiet or compatible neighbors themselves.

Noise levels from industrial/commercial activities such as these will more than likely continue to increase as demand for such services and products increase with economic growth

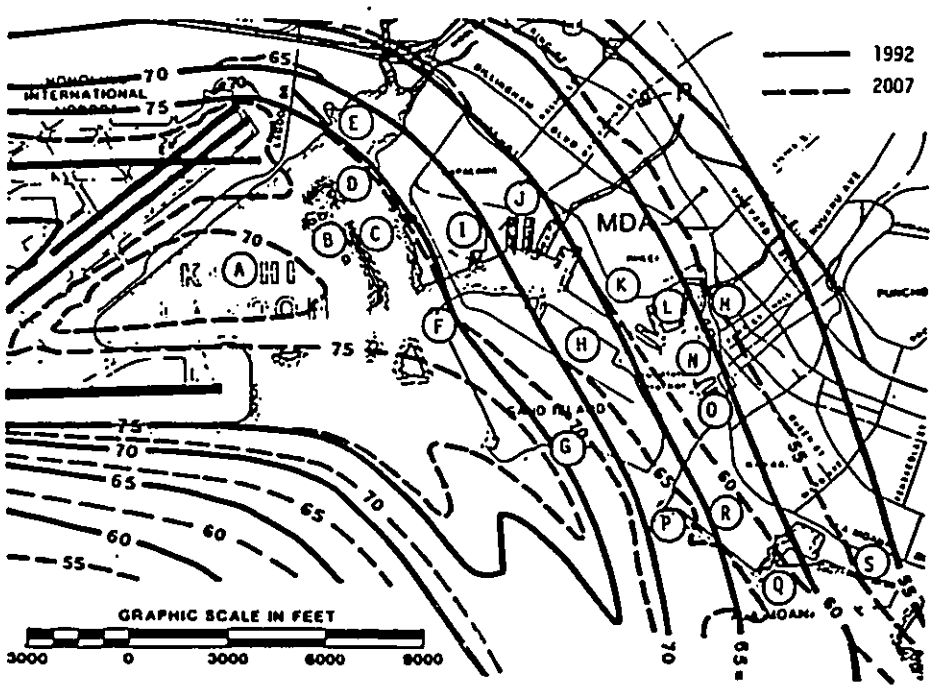


Figure 12 - Preliminary HIA "1992" and "2007" L_{dn} Aircraft Noise Contours

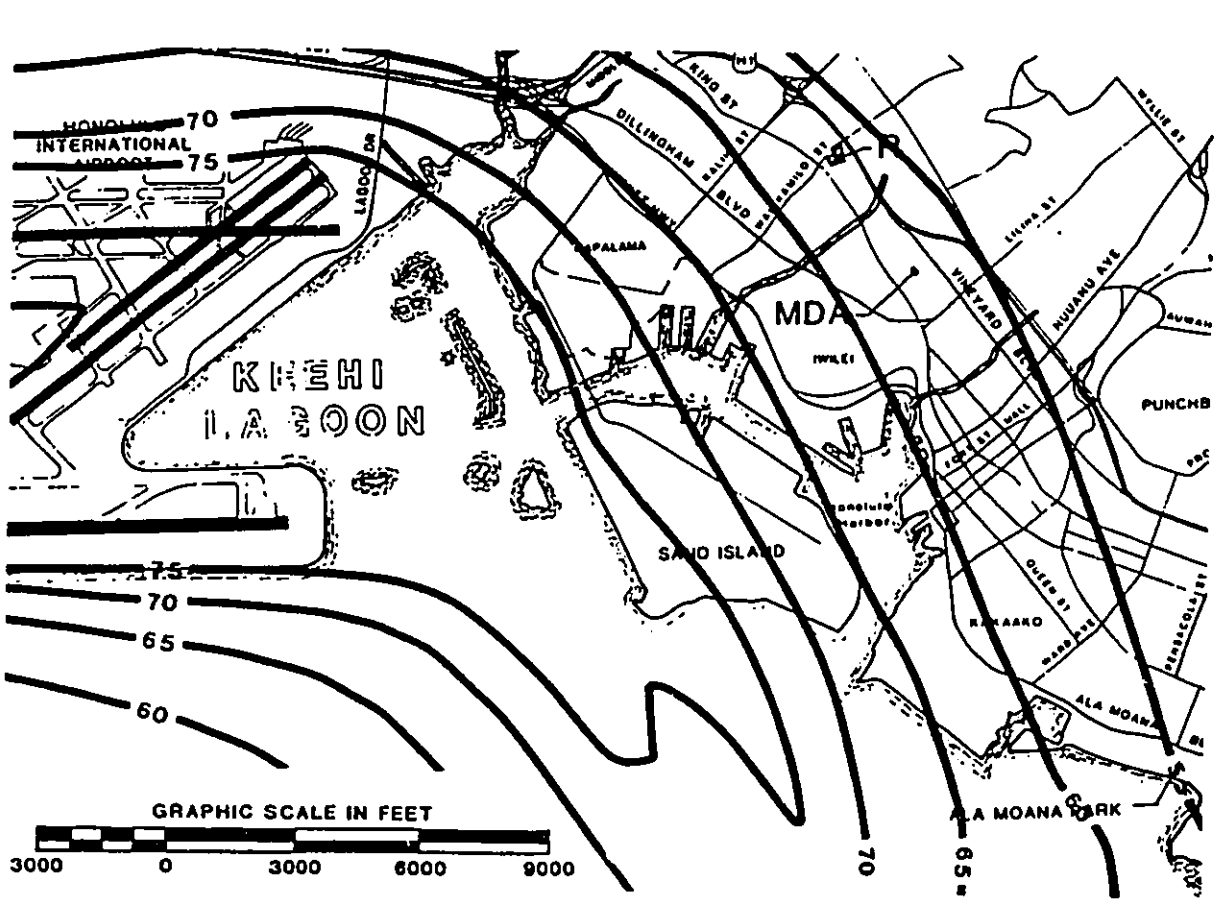


Figure 11 - Preliminary HIA "1992" L_{dn} Aircraft Noise Contours

and diversification on the Honolulu Waterfront.

IV. PROBABLE IMPACTS AND MITIGATING MEASURES

A. Traffic

Noise from traffic on Ala Moana Boulevard and Nimitz Highway is not expected to increase significantly as can be seen in Table VI. The increase in the hourly noise level (L_{eq} [60 minutes]) or the day-night noise level (L_{dn}) ranges from 0.7 to 1.5 dB depending on the location along the trafficway. The actual increase in noise level will probably be less than shown in the table if congestion along the road causes the effective average operating speed of the vehicles to be reduced.

Assuming that there will be an ADT of 75,000 with 2.5% heavy trucks and buses, the worst case hourly noise levels [L_{eq} (60 minutes)] for 65 dB would involve a noise corridor about 700 feet wide centered about the roadway and should represent the noise exposure that persons on lanais of high rises would experience if there is direct line-of-sight to the traffic. During evenings, when traffic volumes are assumed to decrease by about one-third, the L_{eq}'s would be about 5 dB less.

Fortunately, unlike aircraft noise, buildings will effectively block traffic noise to listeners at lower elevations. Thus, the makai regions behind structures on Ala Moana Boulevard should be muted from traffic noises. The walkways and commercial complexes along the proposed canal as well as the parks and special uses in the Fort Armstrong area should be reasonably quiet except for noises from slower moving local traffic.

B. Aircraft

There should be significant reduction in aircraft noise impact within many portions of the study area when the older, noisy Stage 2 aircraft are phased out. Presently, task forces comprised of government and airline officials are working at the development of an economically feasible plan to determine the rate of phase-out for the older aircraft which comprised about 80% of the U.S. commercial fleet. Noise from military aircraft also contribute to the impact in portions of the project area. Changes in the type of military aircraft and operations also can affect the L_{dn} contours. Thus, predictions of HIA noise impact into the future can show a large variability.

Figures 11 and 12 show aircraft noise Ldn contours labeled 1992 and 2007 from Reference 5. These contours reflect future cases where the 1992 contours show no significant changes in Kaka'ako Makai area despite an increase in operations. This is primarily because some quieter Stage 3 aircraft were assumed. The 2007 contours in Figure 12 reflect a case where the majority of the

TABLE VI- Average PM Peak-Hour, Two Directional Traffic on Nimitz Highway and Ala Moana Boulevard in 1985 and 2010 and the Expected Increase in Traffic Noise Level.

STREET	AVERAGE DAILY TRAFFIC 1985 Vehicles/Hr.	2010 Vehicles/Hr.	Percent Increase	L_{eq} and L_{dn} Increase (dB)
Nimitz Highway				
Iwilei	5,400	6,300	17%	0.7
Bishop Street	5,400	6,600	22%	0.9
Alakea Street	5,400	6,700	24%	0.9
Punchbowl Street	5,400	6,700	30%	1.1
South Street	5,400	7,000	29%	1.1
Ward Avenue				

Note: The traffic noise level increase assumes no change in vehicle speed or mix or vehicle types.

aircraft are Stage 3 and significant noise reductions are seen in most of the project area despite even greater operations than in 1992.

From Figure 12 one can estimate the degree of noise reduction that will occur when the quieter Stage 3 aircraft are essentially in full use. The figure shows circled letters denoting major features proposed for the ultimate Honolulu Waterfront Project. Following are comments pertaining to the specific features:

N. and O. The Aloha Tower Complex, and the Dinner Cruise Area should have less than 5 Ldn reduction.

P. and Q. The proposed land fill peninsula parks should have essentially no change.

R. and S. The majority of the Kaka'ako Makai peninsula and Ala Moana Beach Park will experience a reduction of less than 5 Ldn.

C. Maritime, Industrial and Commercial Operations

Because of our favorable climate, many industrial activities here are open or are naturally ventilated, whereas the same businesses on the mainland would have to be closed for heating or cooling purposes. Examples of activities which may be enclosed and either air conditioned or mechanically ventilated for noise containment are: fabricating establishments, dance or music schools, light manufacturing, processing, and packaging establishments, publishing plants, repair establishments, laundries, etc. Closure may be required in order to comply with the local noise regulations cited in reference 7.

Simple walls of metal decking or single plywood panels often would provide adequate noise containment. The major cost is the installation and operation of the air conditioning or mechanical ventilation systems, not heavy sound retardant building elements, e.g. walls, windows, doors, etc.

Examples of industrial activities that cannot reasonably have acoustic enclosures are container handling facililties, ship and boat maintenance and repair operations, truck terminals, salvage, scrap and junk storage, concrete

batch plants, large saw mills, etc.

D. Noise Sensitive Land Uses

In order to be consistent with the noise compatibility criteria shown in Figure 14 which generally assumes that buildings are closed for heating or air conditioning, naturally ventilated residential units and other naturally ventilated noise-sensitive uses should not be planned where the day-night levels (L_{dn}) are greater than L_{dn} 60. Thus, taking aircraft noise into account, it can be seen from Figure 12 that essentially all such uses in the planning area should involve full closure of the structure with air conditioning or mechanical ventilation. Those interiors of structures in the L_{dn} 60 to 65 region would have adequate shielding from normal construction while those in the L_{dn} 65 to 70 region should have special considerations, e.g. use smaller windows and/or sound retardant glass; heavier roof systems, etc.

In industrial and commercial complexes a large variety of businesses are present involving a wide spectrum of activities. Decisions can be made on the need for soundproofing based on the sensitivity to noise that the activities have. For example, Table VII from Reference 7 provides an activity sensitivity analysis for different human activities and can be used as a guide to evaluate the compatibility of a proposed land use to the noise environment. The "maximum allowable steady-state noise level (dBA)" in the table refers to interior noise levels. Note that these values in Table VII are conservative and 5 dB could be added in many cases and would still be considered acceptable by many people.

If the activity is a naturally ventilated operation, then the maximum allowable exterior noise level would be typically 7 to 10 dBA greater than the perceptible interior noise level. If simple, single wood wall or metal decking walls are used with air conditioning or mechanical ventilation, then the exterior noise level could be typically 15 to 25 dBA greater than the acceptable interior level. As mentioned above, the land use compatibility criteria shown in Figure 14 was developed based on typical mainland conditions and assumes minimally that such enclosures exist in those uses involving buildings. Table VIII, also from reference 8, can be used to relate land use to the human activities in Table VII. Using the rationale in these tables, land use compatibility guidelines for special design districts in the Waterfront Area could be developed. For example, certain uses could be allowed if buildings are enclosed in predictably noisy areas (due to either transportation noises or neighboring industrial noises), e.g., offices, vocational

Figure 14

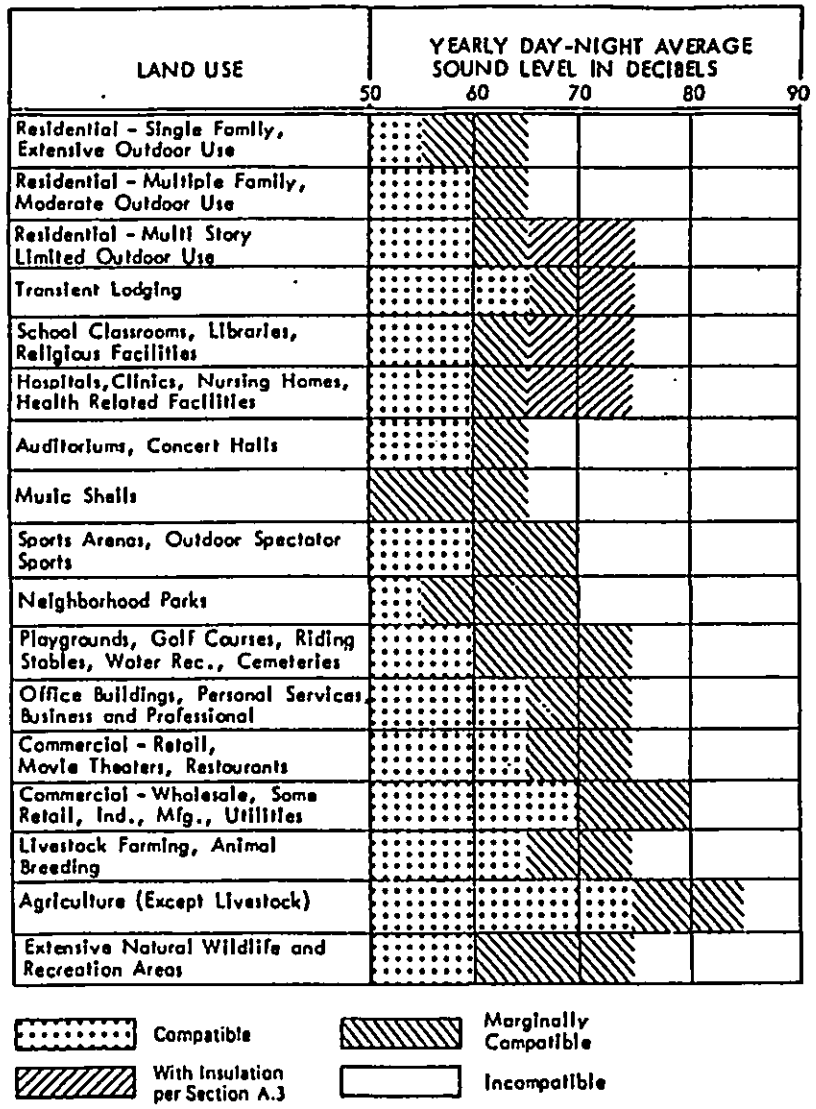


FIG. S-2 Land use compatibility with yearly day-night average sound level at a site for buildings as commonly constructed. [For information only; not a part of American National Standard for Sound Level Descriptors for Determination of Compatible Land Use S3.23-1980.]

TABLE VII

ACTIVITY SENSITIVITY ANALYSIS

HUMAN ACTIVITIES (see Table 2-5 for description)	BASIC SENSITIVITY FACTORS: Noises allowable steady-state noise level (dBA)	Self-noise important to noise sensitivity	Associated aural information-carrying sound level (dBA)	Importance of speech or other information-carrying sound	Frequency of speech communication or other sound information	LAND-USE DEPENDENT SENSITIVITY FACTORS: Schedule of activity (day, night)	Duration of activity	Frequency of activity	Suitability of amplification	Possibility of rescheduling	Possibility of relocating activity	Suitability of structural insulation	Importance of values
ACTIVITY SENSITIVITY FACTORS: H = High, M = Medium, L = Low, V = Varies													
Intensive Conversation	40	No	60	H	H	D,N	H	H	H	H	H	H	H
Casual Conversation	50	No	60	H	H	D,N	L	H	L	H	H	H	H
Telephone Use	45	No	60	H	H	D,N	L	H	H	H	H	H	H
Sleeping	35	No	V	L	L	N	H	H	L	L	H	H	H
Eating	45	No	60	H	H	D,N	H	H	L	L	H	H	H
Reading	40	No	V	L	L	D,N	H	H	L	H	H	H	H
Meditation	40	No	V	L	L	D,N	H	H	L	H	H	H	H
Writing	40	No	V	L	L	D,N	H-H	H	L	H	H	H	H
Studying	40	No	V	L	L	D,N	H-H	H	L	H	H	H	H
Seminar, Group Discussion	40	No	60	H	H	D	H	H	H	L	H	H	H
Classroom, Lecture	40	No	60	H	H	D	H	H	H	L	H	H	H
Individual Creative Activity	40	No	V	L	L	D,N	H-H	H	L	H	H	H	H
Live Theater	35	No	60	H	H	D,N	H	L	L	L	L	H	H
Watching Films	40	No	60	H	H	D,N	H	L	H	L	L	H	H
Watching Television	40	No	60	H	H	D,N	H	H	H	H	H	H	H
Listening to Music	35	No	V	H	H	D,N	H	H	H	H	H	H	H

TABLE VII(continued)

ACTIVITY SENSITIVITY ANALYSIS

HUMAN ACTIVITIES / ACTIVITY SENSITIVITY FACTORS (N = High, M = Medium, L = Low, V = Varies)	BASIC SENSITIVITY FACTORS: Maximum allowable steady-state noise level (dBA)	Self-noise important to noise sensitivity	Associated normal information-carrying sound level (dBA)	Importance of speech or other information-carrying sound	Frequency of speech communication or other sound information	Schedule of activity (day, night	LAND-USE DEPENDENT SENSITIVITY FACTORS: Duration of activity	Frequency of activity	Suitability of amplification	Possibility of rescheduling	Possibility of relocating activity	Suitability of structural insulation	Importance of values
Ceremony, Tradition	40	NO	V	H	H	D,N	H	L	L	L	L	H	H
Public Events, Assemblies	45	NO	60	H	H	D,N	H	L	H	L	L	H	L
Spectator Sports	50	NO	V	L	H	D,N	H	L	H	L	L	L	L
Public Mass Recreation	55	NO	V	H	H	D,N	H-M	L	L	L	L	L	L
Physical Recreation	45	NO	V	H	H	D,N	H	H	L	H	H	L	L
Outdoor Activities	35	NO	V	H	L	D,N	H-M	L	L	L	H	L	H
Urban Outdoor Activities	45	NO	V	H	H	D,N	H	H	L	H	H	L	H
Extended Child Care	40	NO	60	H	H	D,N	H-M	H	L	L	H	H	H
Driving	65	Yes	V	L	L	D,N	H	H	L	L	L	L	L
Shopping	45	NO	60	H	H	D	H	H	L	H	H	H	L
Technical Manual Work	35	NO	V	H	H	D	H-M	H	L	L	H	H	L
Skilled Manual Work	40	Yes	V	H	H	D	H-M	H	L	L	H	H	L
Manual Work	50	Yes	V	H	H	D	H-M	H	L	L	H	H	L
Equipment Operation	V	Yes	V	L	L	D	H-M	H	L	L	L	H	L
Repetitive Work	50	Yes	60	H	H	D	H-M	H	L	L	H	H	L
Noise-Sensitive Equipment	V	Yes	V	V	V	D,N	H-M	L	V	V	V	H	L

TABLE VIII

ACTIVITIES ASSOCIATED WITH COMMON LAND USE CATEGORIES

LAND USE CATEGORY / ACTIVITIES	Residential - Single Family, Duplex	Residential - Multiple Family, Dormitories, etc.	Transient Lodging	School classrooms, Libraries, Churches, Nursing Homes	Auditoriums, Concert Halls, Music Shells	Sports Arenas, Outdoor Spectator Sports	Playgrounds, Neighborhood Parks	Golf Courses, Riding Stables, Water Recreation, Cemeteries	Office Buildings, Business and Professional Commercial, Retail Trade	Theaters, Restaurants	Commercial - Wholesale, Some Retail, Ind., Mfg., Util.	Manufacturing, Communications (Noise Sensitive)	Livestock Farming, Animal Breeding	Agriculture (Noise Insensitive) Crops, Timbering	Mining and Fishing, Resource Production, Extraction	Outdoor Amphitheaters
Interior Conversation																
Casual Conversation																
Telephone Use																
Reading																
Writing																
Studying																
Lecture, Group Discussion																
Classroom Lecture																
Individual Creative Activity																
Live Theater																
Telephone Rings																
Listening Television																
Listening to Music																
Ceremony, Tradition																
Public Events, Assemblies																
Spectator Sports																
Public Mass Recreation																
Physical Recreation																
Outdoor Activities																
Urban Outdoor Activities																
Extended Child Care																
Driving																
Shopping																
Technical Manual Work																
Skilled Manual Work																
Manual Work																
Equipment Operation																
Noise-Sensitive Equipment																

H: Activity critical to normal function of land use.

M: Activity important to normal function of land use.

L: Activity of secondary importance - land use generally able to function satisfactorily if activity cannot be performed.

[illegible] Standard Land Use Coding Manual.

[illegible] represents a SLUCM category narrower than, but generally included in, the category described.

[illegible] Hospitals.

[illegible] is intended as a guide to assist local planning [illegible] establishing their particular lists for [illegible] land use classification system.

schools, retail and eating establishments, light fabricating and processing operations, etc.

Noise sensitive land uses where no enclosures can practically exist are parks, marinas, golf courses, amphitheaters, etc. These uses should not be encouraged unless there is a great public need and alternative, quieter space is not available. Such is the case for marinas and recreational uses in Ke'ehi Lagoon, and possibly an amphitheater in the Kaka'ako Makai area after quieter Stage 3 aircraft are implemented.

The amphitheater proposed for the Kaka'ako Waterfront Park is to be located on 6 to 8 acres and would accommodate between 10,000 to 12,000 people. There would be approximately 5,000 fixed seats, with grass seating built into the slopes of the existing landfill. The location and design of the amphitheater would minimize potential noise impacts on surrounding properties by directing sound towards the ocean as much as possible. Modern design and construction techniques would equip a facility suitable for a variety of performances. Two acoustical issues associated with this complex are (a) noise from aircraft overflight interference with performances, and (b) sounds from the amphitheater possibly causing annoyance and activity interference to residents in the area.

Typical flight tracks for trade wind departures from Honolulu International Airport (HIA) are shown in figure 8. Trade wind departures represent about 95% of the annual departure from HIA. Currently there are about 21 scheduled departures during the evening between 7:00 PM and 11:00 PM when concerts may occur. Six of the departures are interisland jet aircraft from runway 08L and typically would cause a maximum noise level of about 79 dBA in the area. Fifteen departures would be transoceanic air carriers from the reef runway causing about 70 dBA maximum levels. Military light tactical jet aircraft takeoffs with afterburners could cause maximum levels in excess of 90 dBA.

Figure 9 shows typical flight tracks into HIA during Kona flight patterns which represent about 5% of the annual arrivals for HIA. Currently there are about 30 scheduled arrivals of commercial jet aircraft between 7:00 PM and 11:00 PM which could impact concerts during Kona weather. Typical maximum noise levels of 74 to 78 dBA would occur for 747 aircraft on the nearest flight track. Military aircraft landing on the same flight track can cause 90 dBA maximum levels.

From the above, it can be seen that loud music passages generally would not be masked by commercial jet activity, but more subdued passages could be disturbed. Military aircraft operations would often be detectable even during loud passages.

In the future when more quiet Stage 3 aircraft are implemented into the interisland fleet, maximum noise levels should be reduced substantially during trade wind departures, perhaps typically by 7 to 10 dBA. However, there probably will be more departures during a given period of time. During Kona flight patterns, there probably will be approximately the same maximum noise levels since approach noise levels are not substantially decreased in Stage 3 aircraft. Also, somewhat more aircraft landings are predictable in the future during concert times.

It is difficult to predict annoyance to potential nearby residents due to sounds from performances in the proposed amphitheater. This is primarily because the actual sound sources are loud speaker systems which belong to the entertainment groups and are considered a part of their artistic expression. If sponsors of events at the proposed shell were required to use the house sound system and a resident sound engineer, the control of intrusive noise to neighbors could be accomplished. However, recently there was U.S. Supreme Court action concerning New York City's effort to control sound levels at a bandshell in Central Park and not violate the performers' freedom of expression (Ward vs. Rock Against Racism, USSupCt No. 88-226). Another complication is the trend to use large sub-bass amplifiers and speakers which produce essentially omni-directional sound that cannot be effectively directed away from residential areas.

Another important factor is the ambient or background noise level that normally exists at residences in the amphitheater environs. If a quiet ambient noise condition usually exists, then people get accustomed to enjoying outdoor areas and lanais in the evening (such is the case predicted for residential units in the Kaka'ako Waterfront area shielded from traffic noise on Ala Moana Boulevard by buildings). If buildings have lanais overlooking the boulevard, many people would tend not to utilize them because of uncomfortably high motor vehicular traffic noise.

In consideration of the above factors, it does not seem prudent to plan for residential units in the Kaka'ako Makai area if an amphitheater is to be located there. One exception to this statement is that, conceivably, a row of

continuous high-rise office buildings surrounding three sides of the amphitheater could act as an effective noise barrier to lower rise residential units located on the mauka, east and west sides of the "barrier".

E. Construction Noise

Development of the project area will involve grubbing, grading, and the construction of infrastructure and buildings as well as dredging and filling of waterways and lagoons. The various construction phases of a development project may generate significant amounts of noise; the acutual amounts are dependent upon the methods employed during each stage of the process. Typical construction equipment noise ranges in dB(A) are shown in Figure 15. Pile drivers and rock drills as well as earthmoving equipment such as bulldozers and diesel powered trucks will probably be the loudest equipment used during construction. Since it is anticipated that noise generated during construction will exceed allowable limits in reference 7, a permit will be obtained from the Department of Health. DOH may grant permits to operate vehicles, construction equipment, power tools, etc. which emit noise levels in excess of the allowable limits. Required permit conditions for construction activities are:

> "No permit shall allow construction activities creating excessive noise...before 7:00 a.m. and after 6:00 p.m. of the same day."
>
> "No permit shall allow construction activities which emit noise in excess of ninety-five db(A)...except between 9:00 a.m. and 5:30 p.m. of the same day."
>
> "No permit shall allow construction activities which exceed the allowable noise levels on Sundays and on... [certain] holidays. Activities exceeding ninety-five dB(A) shall [also] be prohibited on Saturdays."

In addition, construction equipment and on-site vehicles or devices requiring an exhaust of gas or air must be equipped with mufflers. Also, construction vehicles using trafficways will satisfy the noise level requirements defined in reference 9.

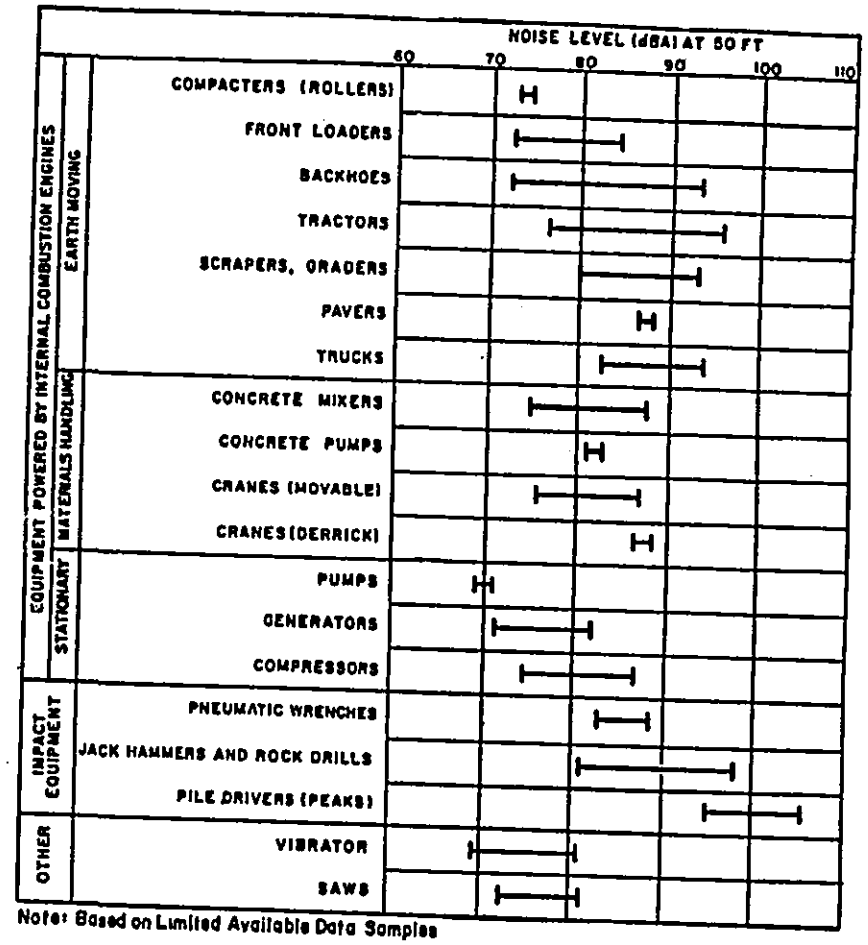


FIG. 15 CONSTRUCTION EQUIPMENT NOISE RANGES.

V. SUMMARY

An evaluation of noise in the Waterfront area has been made involving noise from traffic, aircraft, and industrial/commercial complexes for existing conditions and the far future plans.

Noise from traffic on the main artery through the area, Ala Moana Boulevard/Nimitz Highway, is shown to cause maximum hourly noise levels of 65 dB to persons on lanais in high-rises at distances of 250 to 350 feet from the roadway. During evenings, when traffic volumes decrease by about one-third, the average hourly noise levels would be about 5 dB less. If in the future, the projected increased traffic volumes can move at today's speeds, then it can be shown that hourly traffic noise levels should increase from 0.7 to 1.5 dB depending on the location along the trafficways. The actual increase in noise level will probably be less if congestion along the road causes the effective average operating speed of the vehicles to be reduced. Fortunately, unlike aircraft noise, buildings will effectively block traffic noise to listeners at lower elevations. Thus, the makai regions behind structures on Ala Moana Boulevard should be muted from traffic noises. The walkways and commercial complexes along the proposed canal as well as the parks and special uses in the Fort Armstrong area should be reasonably quiet except for noises from slower moving local traffic.

It is shown that the elimination of fully-developed container handling facilities in the Fort Armstrong area will reduce the contribution of noise from heavy diesel trucks and buses on Ala Moana Boulevard from about 71% to 57% of the total traffic noise.

The L_{dn} aircraft noise contours in the study area caused by HIA can change when aircraft types and operations are modified. There should be significant reduction in aircraft noise impact within many portions of the study area when the older, noisy Stage 2 aircraft are phased out. Presently, task forces comprised of government and airline officials are working at the development of an economically feasible plan to determine the rate of phase-out for the older aircraft which comprised about 80% of the U.S. commercial fleet. Noise from military aircraft also contribute to the impact in portions of the project area. Changes in the type of military aircraft and operations also can affect the L_{dn} contours. Thus, predictions of HIA noise impact into the future

can show a large variability.

Figure S-1 shows aircraft noise Ldn contours labeled 1992 and 2007. These contours reflect future cases where the 1992 contours show no significant changes in Kaka'ako Makai area despite an increase in operations. This is primarily because some quieter Stage 3 aircraft were assumed. The 2007 contours in Figure S-1 reflect a case where the majority of the aircraft are Stage 3 and significant noise reductions are seen in most of the project area despite even greater operations than in 1992.

From Figure S-1 one can estimate the degree of noise reduction that will occur when the quieter Stage 3 aircraft are essentially in full use. The figure shows circled letters denoting major features proposed for the ultimate Honolulu Waterfront Project. The amount of the predicted noise reduction varies from zero to more than 10 dB at the various locations within the planning area, and are discussed in more detail in the report.

The noise experienced from maritime, industrial, and commercial operations depends not only on the intensity of the source, but also on the sound propagation conditions determined largely by the elevation of the noise source, the presence of buildings, etc. causing shielding (or reflective sound buildup), the terrain, i.e. hard or soft, etc. The report provides noise level measurements obtained in typical work places and of various industrial equipment.

Because of our favorable climate, many industrial activities here are open or are naturally ventilated, whereas the same businesses on the mainland would have to be closed for heating or cooling purposes. Examples of activities which may be enclosed and either air conditioned or mechanically ventilated for noise containment are: fabricating establishments, dance or music schools, light manufacturing, processing, and packaging establishments, publishing plants, repair establishments, laundries, etc. Simple walls of metal decking or single plywood panels often would provide adequate noise containment. The major cost is the installation and operation of the air conditioning or mechanical ventilation systems, not heavy sound retardant building elements, e.g. walls, windows, doors, etc.

Example of industrial activities that can not reasonably have acoustic enclosures are container handling facilities; ship and boat maintenance and repair operations; truck term-

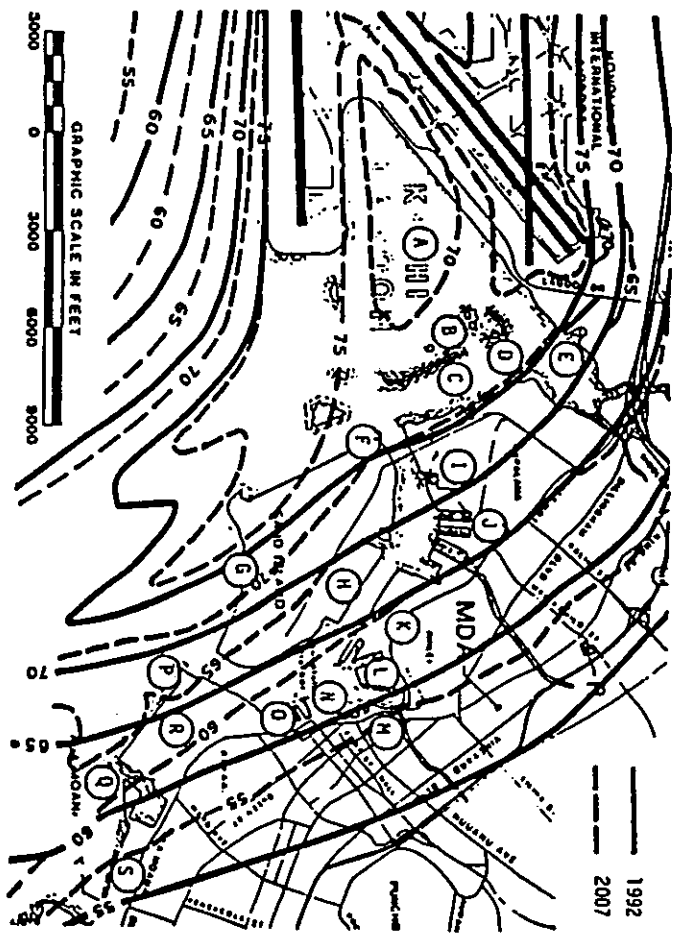


Figure S-1- Preliminary HIA "1992" and "2007" L_{dn} Aircraft Noise Contours

inals; salvage, scrap and junk storage; concrete batch plants; large saw mills; etc.

In order to be consistent with the noise compatibility criteria shown in Figure S-2, which generally assumes that buildings are closed for heating or air conditioning, naturally ventilated residential units and other naturally ventilated noise-sensitive uses should not be planned where the day-night noise levels (L_{dn}) are greater than L_{dn} 60. Thus, taking aircraft noise into account, it can be seen from Figure S-1 that essentially all such uses in the planning area should involve full closure of the structure with air conditioning or mechanical ventilation. Those interiors of structures in the L_{dn} 60 and greater region would have adequate shielding from normal construction while those in the L_{dn} 65 and greater region should have special considerations, e.g. use smaller windows and/or sound retardant glass; heavier roof systems, etc.

In industrial and commercial complexes, a large variety of businesses are present involving a wide spectrum of activities. Decisions can be made on the need for soundproofing based on the sensitivity to noise that the activities have. The report provides information on activity sensitivity and other considerations that can be used as a guide to evaluate the land use compatibility. Using this rationale, land use compatibility guidelines for special design districts in the Waterfront Area could be developed. For example, certain uses could be allowed if buildings are enclosed in a predictably noisy area (due to either transportation noises or neighboring industrial noises), e.g., offices, vocational schools, retail and eating establishments, light fabricating and processing operations, etc.

Noise sensitive land uses where no enclosures can practically exist are parks, marinas, golf courses, amphitheaters, etc. These uses should not be encouraged in areas with greater noise exposure than shown in Figure S-2 unless there is a great public need, and alternative, quieter space is not available. Such is the case for an amphitheater in the Kaka'ako Makai area after quieter Stage 3 aircraft are implemented.

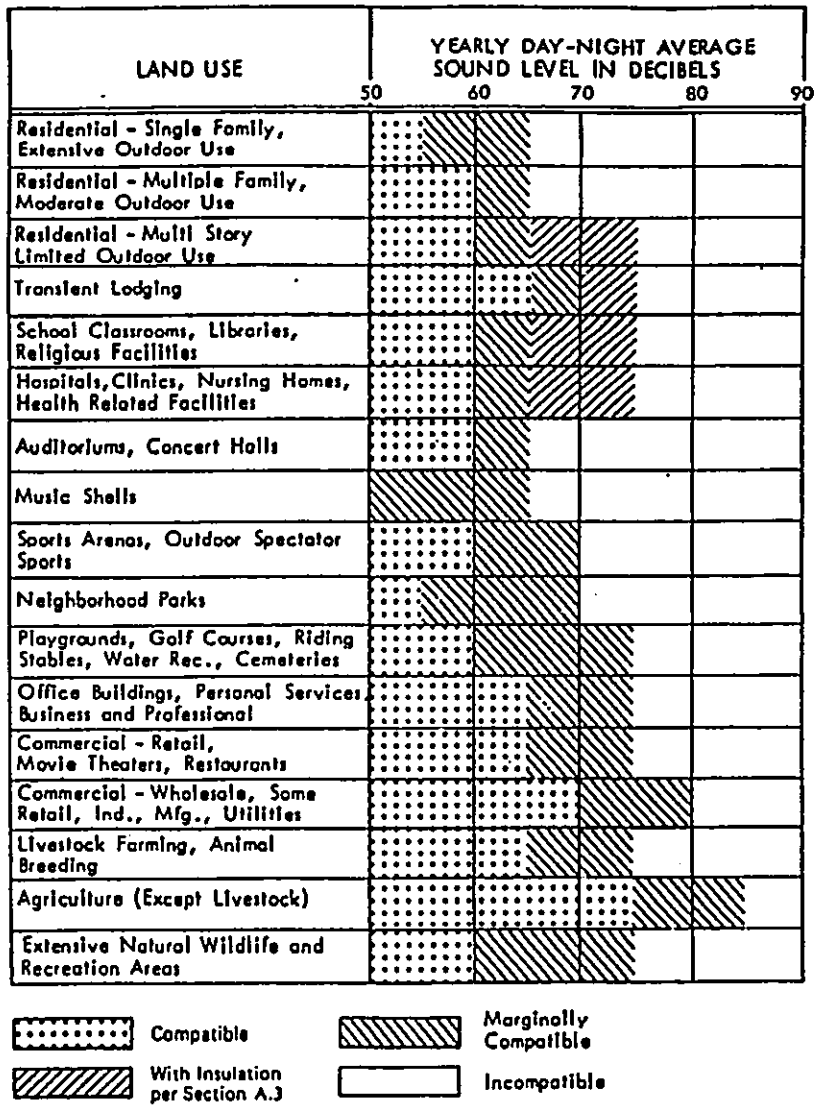


FIG. S-2. Land use compatibility with yearly day-night average sound level at a site for buildings as commonly constructed. [For information only; not a part of American National Standard for Sound Level Descriptors for Determination of Compatible Land Use S3.23-1980.]

REFERENCES:

1. "HUD Environmental Criteria and Standards, 24 CRF Part 51", Federal Register, Volume 44, No. 135, July 12, 1979; amended 49 FR 880, January 6, 1984.

2. "FHWA Highway Traffic Noise Prediction Model", HWA-RD-77-108; U.S. Department of Transportation, December 1978.

3. "Kaka'ako Supplemental Environmental Impact Statement - Acoustic Study", Ebisu, Darby-Ebisu & Associates, Inc., August 20, 1984.

4. "Honolulu International Airport Master Plan Update and Noise Compatibility Program", Inventory of Existing Noise Mitigation Programs and Noise Map Information, State of Hawaii, Department of Transportation, Airports Division, prepared by KFC Airport, Inc., March 1987.

5. "Preliminary L_{dn} Noise Contours for Current HIA Master Plan and Noise Compatibility Program", FAA, Part 150, Study by E.K. Noda & Associates, 1988.

6. "Naval Air Station Barbers Point Air Installation Compatibility Use Zones (AICUZ) Study", Department of the Navy, July 19, 1988.

7. Chapter 43 of Title 11, Administrative Rules, Community Noise Control for Oahu, State of Hawaii, Department of Health, November 6, 1981.

8. "Aircraft Noise Impact Planning Guidelines for Local Agencies", Department of Housing and Urban Development, prepared by Wilsey and Ham, November 1972.

9. Chapter 42 of Title 11, Administrative Rules, Vehicular Noise Control for Oahu, State of Hawaii, Department of Health, November 6, 1981.

APPENDIX A

NOISE DESCRIPTORS AND THE RELATIONSHIP OF NOISE LEVELS TO LAND USE COMPATIBILITY

The Day-Night Sound level, or L_{dn}, is a commonly accepted noise descriptor for the determination of land use compatibility. The Day-Night Sound Level is a 24-hour average sound level in which nighttime noise levels occuring between 10:00 PM and 7:00 AM are increased (or penalized) by 10 dB* before calculation of the 24-hour average. Figure A-1, extracted from Reference A-1, provides land use compatibility determination for various levels of exterior noise as measured by the L_{dn} descriptor. It should be noted from Figure A-1 that L_{dn} values of 60, 65, and 70 are considered Unconditionally Compatible for apartment, commercial, and industrial land uses, respectively. A general consensus among federal agencies has developed whereby residential housing is considered acceptable where exterior noise does not exceed 65 L_{dn} (see References A-2 through A-5). EPA's original recommendation of 55 L_{dn} or less for residential housing is now recognized as a desirable long-term goal as cited in Reference A-6.

Table A-I (extracted from Reference A-7) describes the typical variation of L_{dn} for various kinds of neighborhoods. Levels of 60 L_{dn} or greater are typical along city streets with daily traffic volumes exceeding 2,500 vehicles. 65 to 70 L_{dn} are typical values for city business districts where traffic is a dominant noise source. Figure A-2 presents typical L_{dn} values obtained on Oahu (Reference A-8).

TABLE A-I

Typical Values of Yearly Day-Night Average Sound Level for Various Residential Neighborhood Where There is No Well Defined Sources of Noise Other Than Usual Transportation Noise

Description	L_{dn} - dB
Rural (Undeveloped)	35
Rural (Partially developed)	40

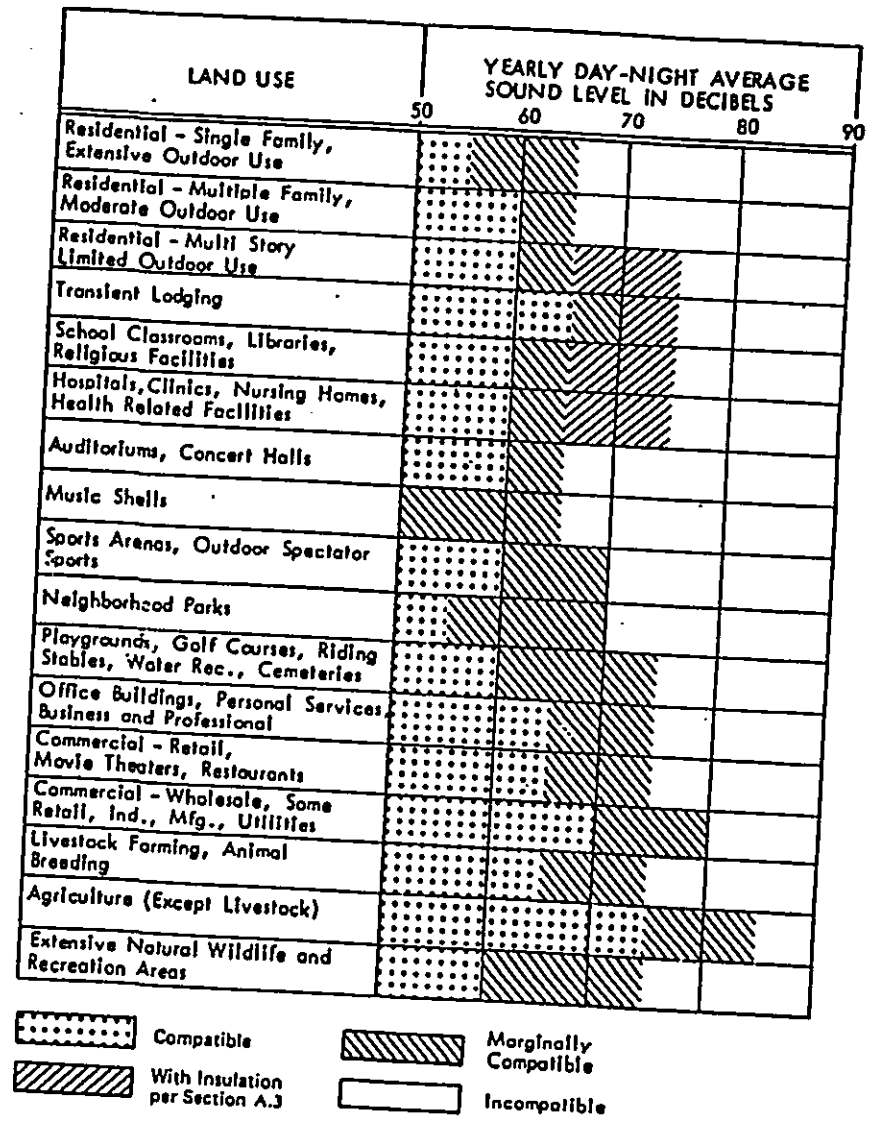
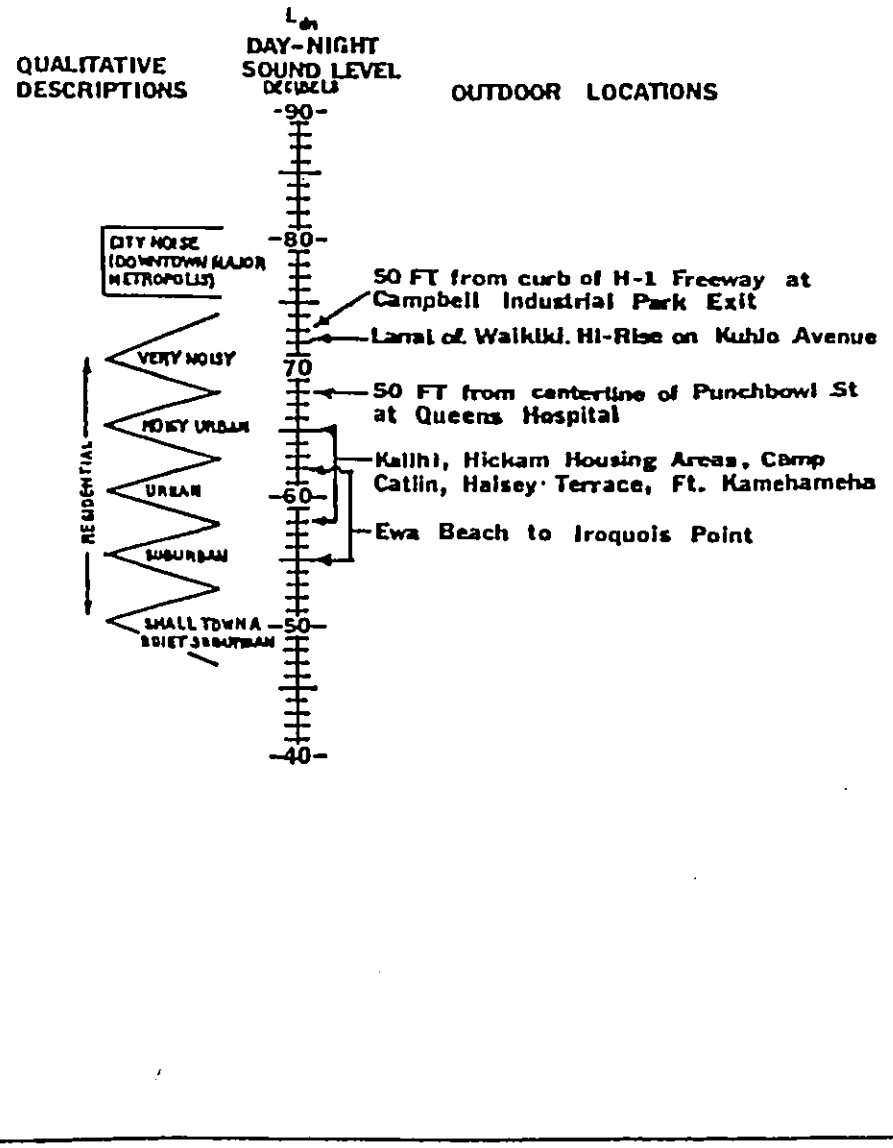


FIG. A-1 Land use compatibility with yearly day-night average sound level at a site for buildings as commonly constructed. [For information only; not a part of American National Standard for Sound Level Descriptors for Determination of Compatible Land Use S3.23-1980.]

FIGURE A-2

RANGE OF EXTERIOR BACKGROUND AMBIENT NOISE LEVELS



Description (continued)	L_{dn} - dB
Quiet Suburban	45
Normal Suburban	50
Urban	55
Noisy Urban	60
Very Noisy Urban	65

On Oahu, State and County noise regulations exist, and may be enforced whenever noise emissions exceed specified levels and cause complaints from neighboring properties. State Department of Health (DOH) and City and County of Honolulu Land Use Ordinance (LUO) noise regulations are expressed in maximum allowable noise limits rather than L_{dn} (Reference A-9 and A-10 respectively). The Kaka'ako Community Development Plan (KCDDP) also contains noise regulations similar to the DOH regulations (Reference A-11). They are all summarized in Table A-II for many cases of interest. Values shown in Table A-II represent short-term noise levels rather than 24-hour averages. Although they are not directly comparable to noise criteria expressed in L_{dn}, Table A-III has been constructed in order to make the following general comparisons of the various noise regulations:

a. State DOH noise limits for residential district are approximately equal to 55 L_{dn}, or 10 L_{dn} units below existing federal standards (65 L_{dn}), and equal to EPA's long-term goal for residences.

b. State DOH and KCDDP noise limits for apartment districts are approximately equal to 60 L_{dn}, or 5 L_{dn} units below existing federal standards.

c. LUO noise limits for residential/apartment uses are approximately equal to 59 L_{dn}, or 6 L_{dn} units below existing federal standards. It is to be noted that the LUO regulations consider "nighttime" as between 6 PM to 8 AM, and therefore may may be more restrictive.

d. For industrial or non-dwelling areas, DOH noise limits equate to 76 L_{dn} and LUO limits equate to 69 L_{dn}. No explicit federal standards exist for these land uses, although existing state and local regulations are generally consistent with

TABLE A-II

COMPARISON OF EXISTING NOISE REGULATIONS

Noise Regulation*	Daytime/Nighttime Allowable Noise Level	Zoning District	Measurement Location
State Dept. of Health	60/50 dB (A-weighted)[1]	Apartment/Commercial	Lot or common property boundary.
State Dept. of Health	55/45 dB (A-weighted)[1]	Residential	Lot or common property boundary
State Dept.of Health	70/70 dB (A-weighted)[1]	Industrial/Agricultural	Lot or common property boundary
Honolulu LUO	See below for octave band limits[2]	Apartment or Residential	At or beyond lot boundary.
Honolulu LUO	See below for octave band limits[3]	Any district where apartment or residences are not permitted.	At or beyond district boundary line for I-2 and I-3 lot zoning or at or beyond lot boundary for I-1 lot zoning.
KCDDP	60/50 dB (A-weighted)[1]	MUZ-RA, MUZ-R, & MUZ-C	Lot or common property boundary.
KCDDP	70/60 dB (A-weighted)[1]	MUZ-WI	Lot or common property boundary

Notes: 1. Levels not to be exceeded for more than 10% of the time within any 20-minute period.

	OCTAVE BAND CENTER FREQUENCY (Hz)							
	63 or Below	125	250	500	1000	2000	4000	8000 or above
2.	72/69 dB	67/64 dB	59/56 dB	52/49 dB	46/43 dB	40/37 dB	34/31 dB	32/29 dB
3.	79/79 dB	74/74 dB	66/66 dB	59/59 dB	53/53 dB	47/47 dB	41/41 dB	39/39 dB

TABLE A-III

APPROXIMATE RELATIONSHIP OF NOISE REGULATIONS TO L_{dn}

Noise Regulations	Zoning District	Approximate L_{dn} at Lot or Property Boundary
State Dept. of Health	Residential	55 L_{dn}
State Dept. of Health	Apartment/Business	60 L_{dn}
State Dept. of Health	Industrial	76 L_{dn}
Honolulu LUO	Any district where residences or apartments permitted.	59 L_{dn}
Honolulu LUO	Any district where residences or apartments are not permitted.	69 L_{dn}
KCDDP	MUZ-RA, MUZ-R, MUZ-C	60 L_{dn}
KCDDP	MUZ-WI	70 L_{dn}

other criteria established for land use planning purposes. Compliance with LUO noise regulations (expressed as octave band noise limits) help insure that objectionable pure tones or concentrated bands of noise are not generated.

e. KCDDP noise limits for waterfront industrial districts are approximately 70 L_{dn}, or 6 L_{dn} units below DOH, and 1 L_{dn} unit above LUO regulations for industrial districts.

State and local noise regulations have been enforced, and have been used to effect court injunctions and remedial measures. The KCDDP noise limits are also enforceable whenever complaints regarding excessive noise are generated.

It should be noted that noise resulting from motor vehicles are regulated separately by existing DOH regulations (Reference A-12) whenever public roadways are used.

Following is a brief description of the acoustic terminology and symbols. All sound levels used in this report are A-weighted sound levels unless otherwise noted.

BNA

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the L_{Cpk} with the L_{Apk}.

Although not included in the tables, it is also recommended that "L_{PN}" and "L_{EPN}" be used as symbols for perceived noise levels and effective perceived noise level, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured L-A values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, L_{eq} is designated the "equivalent sound level". For L_d, L_n, and L_{dn}, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristic of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, dBA, PNdB, and EPNdB are not to be used. Examples of this preferred usage are: the Perceived Noise Level (LPN was found to be 75 dB. L_{PN} = 75 dB.) This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighted Loss of Hearing" (PHL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

TABLE I: A-Weighted Recommended Descriptor List

Term	Symbol
1. A-Weighted Sound Level	L_A
2. A-Weighted Sound Power Level	L_{WA}
3. Maximum A-Weighted Sound Level	L_{max}
4. Peak A-Weighted Sound Level	L_{Apk}
5. Level Exceeded x% of the time	L_x
6. Equivalent Sound Level	L_{eq}
7. Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8. Day Sound Level	L_d
9. Night Sound Level	L_n
10. Day-Night Sound Level	L_{dn}
11. Yearly Day-Night Sound Level	$L_{dn(y)}$
12. Sound Exposure Level	L_{SE}

(1) Unless otherwise specified, time is in hours (e.g. the hourly equivalent level is L_{eq} (1)). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine.)

Published by THE BUREAU OF NATIONAL AFFAIRS, INC WASHINGTON, D.C. 20037

TABLE II: Recommended Descriptor List

TERM	A-WEIGHTING	ALTERNATIVE(1) A-WEIGHTING	OTHER WEIGHTING	(2) UNWEIGHTED
1. Sound (Pressure) (3) Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2. Sound Power Level	L_{WA}		L_{WB}	L_W
3. Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4. Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5. Level Exceeded x% of the time	L_x	L_{Ax}	L_{Bx}	L_{px}
6. Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7. Equivalent Sound Level Over Time(T) (4)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8. Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9. Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10. Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11. Yearly Day-Night Sound Level	$L_{dn(y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12. Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13. Energy Average value over (non-time domain) set of observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14. Level exceeded x% of the total set of (non-time domain) observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15. Average L_x value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.

(2) Only B-weighting shown.. Applies also to C,D,E..... weighting.

(3) The term "pressure" is used only for the unweighted level.

(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is $L_{eq[1]}$). Time may be specified in non-quantitative terms (e.g., could be specified as $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine)).

- D -

Published by THE BUREAU OF NATIONAL AFFAIRS, INC., WASHINGTON, D.C. 20037

REFERENCES

A-1. Sound Levels Descriptors for Determination of Compatible Land Use, American National Standards, ANSI S3.23-1980, May 30, 1980.

A-2. "HUD Environmental Criteria and Standards, 24 CFR Part 51, "Federal Register, Volume 44, No. 135, July 12, 1979; amended 49 FR 880, January 6, 1984.

A-3. Guidelines for Considering Noise in Land Use Planning and Control, Federal Interagency Committee on Urban Noise, June 1980.

A-4. "Noise Control and Compatibility Planning for Airports", Federal Aviation Administration, August 5, 1983.

A-5. "Environmental Protection-Planning in the Noise Environment", Departments of the Air Force, the Army, and the Navy, June 15, 1978.

A-6. "Towards a National Strategy for Noise Control", U.S. Environmental Protection Agency, April 1977.

A-7. "Guidelines for Preparing Environmental Impact Statements on Noise", Report of Working Group 79, (CHABA), National Research Council, National Academy of Science, 1977.

A-8. "Kaka'ako Supplemental Environmental Impact Statement - Acoustic Study", Ebisu, Darby-Ebisu & Associates, Inc., August 20, 1984.

A-9. Chapter 43 of Title 11, Administrative Rules, Community Noise Control for Oahu, State of Hawaii, Department of Health, November 6, 1981.

A-10. "Section 3.100, Noise Regulations", Land Use Ordinance, City and County of Honolulu, October 22, 1986.

A-11. "Kaka'ako Community Development District Plan", Hawaii Community Development Authority, November 2, 1981, with revisions.

A-12. Chapter 42 of Title 11, Administrative Rules, Vehicular Noise Control for Oahu, State of Hawaii, Department of Health, November 6, 1981.

APPENDIX C

Market Assessment

KAKA'AKO MAKAI AREA PLAN

(OCTOBER 1989)

EXCERPTS FROM AN ORIGINAL REPORT

FOR THE HONOLULU WATERFRONT MASTER PLAN

ENTITLED

MARKET ASSESSMENT

BY

JOHN CHILD & COMPANY

10.0 MAKAI AREA FINANCIAL PROGRAM

In implementing the Plan for the makai area, public and private capital and human resources will be committed and expended. These expenditures will be reflected in new development and result in increased economic activity, property values, and tax revenues. Information presented in this Section has been extracted from original work prepared for the Honolulu waterfront master plan. Project cost information was generated by the Helber Hastert & Kimura, Planners/R.M. Towill Corporation Joint Venture. Public Revenue and Cost/Benefit analyses were prepared by John Child & Company. Public financing alternatives were assessed by Dean Witter Capital Markets.

10.1 Public Costs

Over the next twenty to forty year period, the makai area plan envisions a total public investment of approximately $282 million to fund major commercial, recreation and infrastructure improvements, roughly split (60%/40%) between the short (5-10 year) and long-term (10-20 year) phases. A summary of estimated development costs by major phase is provided in Table 6 below.

Table 6: SUMMARY OF ESTIMATED DEVELOPMENT COSTS:
PHASES I & II
(Thousands of 1989 Dollars)

Project	Phase I	Phase II	Total
Pedestrian Overpasses (5)	848	565	1,413
Parking	1,188		1,188
Ala Moana Park Expansion	2,002		2,002
Amphitheater	7,150		7,150
Relocation	61,556		61,556
Inland Waterways	8,645	4,166	12,811
Waterfront Park	13,839	742	14,581
Offsite Infrastructure	9,771		9,771
Onsite Infrastructure	55,426	39,598	95,024
Piers 1&2 Cruise Boat Terminal		7,383	7,383
Kewalo Basin Expansion		9,880	9,880
Pier 4 Improvements		13,945	13,945
People Mover		16,500	16,500
Beach Park		29,053	29,053
Total	160,425	121,832	282,257

Source: Honolulu waterfront master plan

Responsibility for funding the recommended improvements will be apportioned to the private and public sectors on the basis of benefits which accrue to their respective areas. The public sector will pay for those improvements which benefit the general public, while the private sector will pay for those improvements that benefit their properties. Improvement Districts, or other similar programs, will be created for the areas where infrastructure system improvements provide special benefits to private landowners and/or commercial projects. Within these areas, property owners/lessees will be assessed for their portion of the improvements costs .

Major makai area recreation costs include the development of a waterfront park and other public facilities such as the amphitheater, inland waterways, and a new system of public promenades to provide public access to the waterfront. Significant urban development costs include the construction of major on-site infrastructure which will in turn allow for the subsequent development of identified public parcels within the waterfront. Major circulation/utilities costs include provision for funding the construction of off-site infrastructure necessary to service the public lands within the makai area. Other costs include funds for major relocations precipitated by the plan, such as the Food Distribution Center and the Foreign Trade Zone.

10.2 Public Revenues

A significant development potential for commercial office and retail shopping uses exists within the makai area. This development potential can be translated into the form of significant annual ground lease rentals, paid by private developers wishing to develop the public lands. The ground rents generated from public lands leased for private development represent a primary source of public revenue which could be used to finance public improvements within the planning area on a pay-as-you-go basis through reimbursement of a revolving fund and or reimbursement for bond debt service payments. Other indirect revenue sources, discussed further below, such as real property and general excise taxes, can also be expected to generate public revenue.

Based on conventional leasing assumptions and in consideration of the projected development phasing and estimated land values, the annual ground rental income stream from the privately-developed, publicly-owned lands within the makai area are projected to increase from about $2 million in 1993 to $13.3 million in 2018, at which time it will stabilize until 2052 when original leases will begin to expire and new leases will be negotiated.

10.3 Cost/Benefit

Public costs and benefits associated with plan implementation include monetary as well as non-monetary "qualitative" aspects, such as benefits attributable to public parks and open space. The analysis focuses on the monetary costs and benefits associated with the implementation of the makai area plan.

The analysis first identified and projected sources of revenue and expenses to the State and County governments resulting from plan implementation. Revenues were narrowly defined to include income generated from the private development of public land, directly through ground leases and indirectly through general excise and real property taxes. Costs included all urban development, recreation, circulation/utilities and relocation costs identified in Section 11.2. Projected State and County operating and maintenance costs were then identified and subtracted from the projected revenue stream.

After operating expenses, the net revenue to the County in the form of real property taxes is projected to increase from a breakeven level for the five years ending 1995 to $26.2 million for the five years ending 2010. Thereafter, the net revenues would average nearly $11.1 million per year over the project's remaining economic life.

Net revenue to the State in the form of ground lease rents and general excise taxes is projected to total nearly $16.6 million for the five years ending 1995, and would be expected to increase to a total of $78.4 million for the five years ending 2010. Thereafter, the net revenue could average about $21.4 million per year.

Capital expenditures are projected at about $282 million as indicated in Table 6. The capital improvements would probably be financed through General Obligation Bonds. Therefore, the actual cash expenditures would be incurred over a period of years rather than at the time of construction.

10.4 Public Financing Alternatives

As discussed above, public financing will play a valuable role in plan implementation. By stretching the cost of public improvements over a period of years, public financing will stabilize the cashflow requirements of the makai area and achieve a better matching of revenues and expenditures. It will also achieve a certain "equity" by spreading the costs of an improvement over its useful life.

At present, the authority has used only one financing mechanism to pass identified Plan improvement costs directly to its users--assessment bonds for the special benefit portion of the urban development costs. Recommended plan improvements should result in soaring real property tax revenues; however legal mechanisms do not exist by which the authority can capture those revenues. As noted in Section 11.4 above, sales tax revenues will flow to the State and could represent a bondable source of security; however, even with the legal means to pledge such revenues, the State, like other states, may have little inclination to do so since such revenues would strengthen its General Fund. Finally, although ground lease rentals can be captured, such revenues, alone generally provide a somewhat weak source of security in a bond issue.

To the extent the authority cannot capture and pledge a predictable and established revenue flow to a bond issue, or use special assessment bonding, it necessarily must rely on State CIP appropriations, general obligation bonds, pay-as-you-go financing from project area revenue flows, and/or private funds to pay for public improvements. However, the obstacles to implementing other forms of financing suggest possible elements of a basic strategy to reducing the dependency on general obligation bond financing. These include:

- o Coordinating with the City and County with respect to sharing the "windfall" of increased property tax revenues from the planning area.

- o Utilizing ground lease rentals for the following purposes: pay-as-you-go financing (thereby reducing future bonding requirements); broadening the revenue base of a public agency with existing bonding capabilities; or for reimbursing a revolving fund, if one is established.

- o Adoption of legislation which may increase the flexibility of spreading special assessments and levying special taxes on the basis of more general benefit.

The above guidelines will not completely eliminate the need for general obligation bond financing. However, the authority may be able to limit the use of general obligation bonds to those facilities which provide more regional benefit, such as waterfront parks and other recreation facilities, or which have no other financing alternatives.

APPENDIX D

Air Quality Impact Report

HONOLULU WATERFRONT MASTER PLAN
TECHNICAL REPORT SERIES

AIR QUALITY IMPACT REPORT

Prepared By:
J. W. Morrow
563 Paulele Street
Kailua, Hawaii

Prepared For:
Helber, Hastert & Kimura, Planners and
R. M. Towill Corporation, A Joint Venture

February 1989

Office of State Planning
Office of the Governor

TECHNICAL REPORT SERIES

This is one of a series of technical reports which have been prepared to provide basic supporting documentation for the Honolulu Waterfront Master Plan. The technical reports and corresponding authors are listed below.

TECHNICAL REPORT	AUTHOR
HARBORS PLANNING	Moffatt & Nichol, Engineers
MARKET ASSESSMENT AND ANALYSES OF PUBLIC REVENUES, COSTS AND BENEFITS	John Child & Company, Inc.
PUBLIC FINANCE	Dean Witter Capital Markets
TRAFFIC IMPACT REPORT	Pacific Planning & Engineering, Inc.
SOCIAL IMPACTS	Earthplan
OCEAN ENGINEERING CONSIDERATIONS	Edward K. Noda and Associates, Inc.
MARINE BIOLOGICAL RESOURCES, OPPORTUNITIES AND CONSTRAINTS	William A. Brewer & Associates
ALA MAKAI: THE SEASHORE TRAIL OF HONOLULU HARBOR AN INTERPRETIVE PLAN	Dr. Glenn Grant, Ms. Jane Silvermann, Dr. Rube Kawena Johnson, and Mr. Tom Coffman
AIR QUALITY IMPACT REPORT	J. W. Morrow
ACOUSTIC STUDY	Darby & Associates
ELECTRICAL ENGINEERING REPORT	Ronald N.S. Ho & Associates, Inc.
PRELIMINARY GEOLOGICAL AND GEOTECHNICAL ENGINEERING RECONNAISSANCE REPORT	Geolabs - Hawaii
PRELIMINARY INVESTIGATION OF KEWALO INCINERATOR LANDFILL	Woodward-Clyde Consultants
PETROLEUM FACILITIES	Jason Lembeck & Associates
EVOLUTION OF THE HONOLULU WATERFRONT: A HISTORICAL PERSPECTIVE	Helber Hastert & Kimura, Planners
INFRASTRUCTURE STUDY	R.M. Towill Corporation
PARTICIPATION AND AWARENESS PROGRAM	Office of State Planning

AIR QUALITY IMPACT REPORT
HONOLULU WATERFRONT MASTER PLAN

Prepared for

R. M. Towill Corporation

J. W. MORROW
ENVIRONMENTAL MANAGEMENT CONSULTANT
KAILUA, HAWAII

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The Honolulu Waterfront Development Area as defined for the purposes of this master planning effort extends approximately from the Ala Wai Boat Harbor in the east to the Honolulu International Airport in the west (see Figure 1). Within that area are a limited number of major stationary air pollution sources and many mobile sources, i.e., motor vehicles. It is the purpose of this report to examine existing air quality and the effect of future growth and development on that air quality.

2. EXISTING CONDITIONS

2.1 Climate and Meteorology. 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° [1].

Historical rainfall data from the Honolulu International Airport indicate an annual average rainfall of 23 inches. Based on this annual average rainfall and in accordance with Thornwaite's scheme for climatic classification, the area is considered subhumid grassland [2].

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 1). 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 2 and 3.

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 [3]. These data indicated that stable conditions, i.e., Pasquill-Gifford stability categories E and F [4], occur about 28% of the time. It is under such conditions that the greatest potential for air pollutant buildup from groundlevel sources exists.

2.2 Emission Sources. As previously noted, the waterfront area has a variety of air pollution sources, both stationary and mobile. The primary stationary sources in the area include:

- HECO's Honolulu Power Plant (Figure 4)
- Hawaiian Bitumuls Asphalt Plant (Figure 4)
- HC&D's Batch Plant (Figure 5)
- Sand Island Sewage Treatment Plant (Figure 5)
- Fuel Storage Tanks (Figures 6 and 7)

These sources are all presently in compliance with state and federal air pollution control regulations and are not causing violations of ambient air quality standards. HECO's Honolulu Power Plant, with its two, low sulfur fuel oil-fired boilers, is scheduled for shutdown in the 1994-95 timeframe, and there are no plans to replace it. The Sand Island STP has several combustion sources including a sludge incinerator, two steam boilers, a waste heat boiler, and three diesel engines for pump units.

Ninety percent of the petroleum fuels coming into the state pass through the waterfront fuel storage tanks. They hold gasoline, diesel, commercial jet fuel, residual oil and asphalt. All tanks holding volatile fuels, e.g., gasoline, are equipped with vapor control devices, primarily floating roofs. Fugitive volatile organic compound (VOC) emissions are thereby controlled.

Mobile sources in the waterfront include motor vehicle traffic along the Ala Moana Boulevard - Nimitz Highway corridor, ship and boat traffic, and aircraft activity due to the adjacent international airport. A recent study of the airport's impact on air quality revealed that motor vehicle traffic, not aircraft, were the primary contributors to groundlevel pollutant concentrations in the airport area [5]. While ship emissions are occasionally visible due to the low grade fuel oil burned, these emissions are not as frequent or as widespread as those from motor vehicles.

2.3 Air Quality Standards. A summary of State of Hawaii and national ambient air quality standards is presented in Table 2 [6, 7]. 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 [8].

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) [9], 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 (NOx), 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 [10].

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 [11]. The last review resulted in the relaxation of the oxidant standard from 160 to 240 micrograms/cubic meter (ug/m3) [12]. The carbon monoxide (CO), particulate matter, sulfur dioxide (SO2), and nitrogen dioxide (NO2) standards are currently under review, but final action has not been taken yet [13].

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [14]. There simply can be no visible emissions from fugitive dust sources.

2.4 HISTORICAL AIR MONITORING DATA. 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 and SO2, measurements are made on a 24-hour basis to correspond with the averaging period specified in state and federal 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.

The most extensive air monitoring has been conducted by the Department of Health at its own building in downtown Honolulu about one-half mile northeast of the waterfront area. Ozone has also been monitored for a number of years at a Sand Island location. A summary of these data is presented in Tables 3 and 4.

The monitoring results indicate general compliance with state and federal ambient air quality standards. Only carbon monoxide and photochemical oxidants (ozone) occasionally exceed their respective state standards. The State also has been having particulate samples analyzed for lead content, and as indicated in Table 5, 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.

2.5 Computer Simulation Modeling. Afternoon peak-hour traffic data for the following intersections were obtained from the traffic consultant [15] in order to estimate carbon monoxide levels:

- Ward Avenue at Ala Moana Boulevard
- South Street at Ala Moana Boulevard
- Punchbowl at Ala Moana Boulevard
- Alakea Street at Nimitz Highway
- Bishop Street at Nimitz Highway
- Waiakamilo Road at Nimitz Highway
- Kalihi Street at Nimitz Highway
- Sand Island Access Road at Nimitz Highway
- Lagoon Drive at Kamehameha/Nimitz Highways

Since the traffic data were for 1985, automotive emission factors for carbon monoxide (CO) were generated for that calendar year using the Mobile Source Emissions Model (MOBILE-3) [16]. To localize emission factors as much as possible, the August, 1988 age distribution for the City & County of Honolulu [17] was input in lieu of the national statistics normally used.

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 air pollution source, carbon monoxide is normally selected for modeling because it has a relatively long half-life in the atmosphere (about 1 month) [18], and it comprises the largest fraction of automotive emissions.

In this instance, a microscale screening analysis was performed for the nine previously mentioned intersections. The updated version of an EPA guideline [19] model CALINE-4 [20] was employed with an array of receptors spaced at 5-meter intervals around the intersections. The intersection option of the model was used as well as an approach speeds ranging 5 - 18 mph.

Worst case meteorological conditions of 1 meter per second wind speed, an acute wind/road angle, and "D" stability [4], were all selected to maximize concentration estimates in the vicinity of the various intersections.

Estimates of maximum one-hour carbon monoxide (CO) concentrations were then computed. The results are summarized in Figures 8 - 16. They indicate exceedances of the State's 1-hour and 8-hour standards at all intersections and exceedances of the federal standards at five of the nine intersections.

Estimates of maximum 8-hour CO levels were also derived by use of a meteorological "persistence" factor of 0.6. This persistence factor originates from a number of EPA studies in which it was found that based on the persistence of adverse meteorological conditions a ratio of 8-hour maximum to 1-hour maximum CO levels could be derived [21]. The factor normally fell in the range of 0.6 to 0.7. Analysis of local CO monitoring data has also confirmed the validity of the 0.6 value [22].

2.6 Air Sampling. A limited air sampling program was also conducted as part of this study. A.M. and P.M. peak hour CO levels were sampled at the following five intersections:

- Ward Avenue at Ala Moana Boulevard (Figure 17)
- Richards Street at Nimitz Highway (Figure 17)
- Bishop Street at Nimitz Highway (Figure 18)
- Sand Island Access Road at Nimitz Highway (Figure 19)
- Lagoon Drive at Nimitz/Kamehameha Highways (Figure 19)

The results of this sampling are presented in Table 6. One-hour CO concentrations ranged 3.9 to 8.8 milligrams per cubic meter (mg/m3) and thus were below both state and federal standards. Wind conditions during all sampling hours tended to be extremely variable thus contributing to relatively low pollutant levels. Onsite winds were of noticeably lower velocity than those recorded at the airport during the same hours. The fact that the sampled concentrations were lower than the modeled values is not at all surprising due to the steady-state assumptions of the model. In the model, wind speed and direction are assumed constant for the full 1-hour period.

2.7 Barbers Point Harbor. The Barbers Point Harbor, located some 15 miles west of the Honolulu Harbor, is adjacent to Oahu's major industrial area, Campbell Industrial Park. Its meteorology is similar to that at the airport with predominant northeasterly tradewinds during the summer months and more variable conditions during the winter season. It differs from the Honolulu waterfront in that it is sparsely populated, has significantly less traffic, and has a greater concentration of heavy industry.

The State Department of Health has monitored air quality at Barbers Point for many years. A summary of those monitoring data are presented in Table 7. The data suggest that despite the proximity of major sources, air quality continues to meet both federal and state ambient standards.

3. FUTURE CONDITIONS

3.1 Without Waterfront Development. Even without any special development plan, the activity of air pollution sources in the waterfront area is expected to grow. As reported in the traffic and harbor planning studies [23, 24], the numbers and level of activity of transportation-related air pollution sources, e.g., motor vehicles and ships, are expected to increase significantly. Stationary sources, on the other hand, are not anticipated to increase and, in fact, may decrease in the harbor area. As noted previously, at least one major source, the Honolulu Power Plant, is going to be shut down during the mid-1990's.

In an effort to evaluate the impact of growing traffic volumes, projections provided by the traffic consultant and the same methodology previously described were used to estimate worst case 1-hour carbon monoxide levels for the year 2010. The results have been combined with the "current conditions" results in Figures 8 - 11 for comparative purposes.

While exceedances of state and federal standards still appeared in close proximity to most intersections, predicted CO levels at the majority of receptor locations declined.

In the Barbers Point Harbor area, completion of landside facilities will result in increased cargo handling activities in the area; thus, there will be a concomitant increase in truck-generated emissions (83 trucks per day). While perhaps locally significant, they will be relatively minor on a regional

scale compared to the emissions from traffic generated by future Ewa residents. Currently unoccupied lands to the northwest, north, and northeast will soon house thousands of new people as the City implements its urbanization plan for Ewa.

The proximity of the industrial sources at Campbell Industrial Park and its continuing growth will continue to have a significant impact on air quality. Besides the existing sources, a large gas turbine, a coal-fired power plant, and refinery expansions are being planned. Offloading of coal at the harbor may also be a source of particulate emissions. Although, existing records indicate that air quality standards are currently being met, this is an area that will have to be watched closely due to the extensive growth in both stationary and mobile sources of air pollution being planned.

3.2 With Waterfront Development. If waterfront development proceeds with the intent of making the area more people-oriented, there will likely be a general reduction in the number of stationary air pollution sources and an increase in mobile sources. An increase in people-oriented facilities may, for example, encourage eventual relocation of the HC&D and Hawaiian Bitumuls batch plants currently located on the Ewa end of Sand Island near Keehi Lagoon. One possible exception to this scenario would be creation of the proposed industrial park in central Sand Island which might attract new sources.

As reported by the traffic consultant [23], the existing road network will be overcapacity in 2010 even without waterfront development; thus, any additional traffic will necessitate new transportation facilities. A Sand Island Parkway has been proposed as one possible means of alleviating the congestion on the Ala Moana - Nimitz corridor. The localized air quality impact of that alternative was estimated for three key intersections identified by the traffic consultant. The results of that analysis are incorporated in Figures 8, 12, and 15. They indicate a general reduction in CO levels around those intersections, although at a few receptors the level increased slightly. Where concentrations were over state standards they tended to stay over the standards even with the additional highway.

At this time there does not appear to be any additional major development plans for Barbers Point Harbor beyond that already funded and under construction; thus, the previous discussion under the "without waterfront development" scenario is equally applicable to the "with waterfront development" scenario.

4. PROBABLE IMPACTS

It is quite evident from the preceding analyses that with or without waterfront development, traffic-related emissions will contribute to elevated carbon monoxide levels all along the Ala Moana - Nimitz corridor. In close proximity to the intersections (5 - 15 meters), levels will exceed state and federal standards during peak hours and worst case meteorology. This is most likely to occur during the winter months when the prevailing trade winds break down into more frequent light and variable wind conditions. Also, as found during the field sampling, onsite winds tend to be of lower velocity then those reported at the airport due to local frictional effects, i.e., manmade structures which block air flow. Thus, analysis of airport data may underestimate the frequency of low wind speed conditions.

In general, waterfront development is likely have a beneficial effect on air quality with regard to existing stationary sources which are likely to relocate and new sources which will not locate in a people-oriented area. As noted previously, the one possible exception is the proposed industrial park on Sand Island where new sources may choose to locate.

The apparent reduction in ambient impact despite projected increases in traffic exemplifies the effect of the federal motor vehicle control program. In this instance, the projected rate of reduction in emissions per vehicle over the 1988 - 2010 period was greater than the projected rate of increase in traffic for the Ala Moana - Nimitz corridor over the same period; thus, a net decrease in cumulative emissions and ambient impact results.

Another way of examining this situation is by plotting projected annual vehicle miles travelled (VMT) along the Ala Moana - Nimitz corridor and comparing it with projected emissions of automotive pollutants during the same time period. This has been done in Figures 20 - 23. Not surprisingly, annual VMT shows a continuous increase over the 25-year period. The pollutants, however, show markedly different patterns because of their different federal emission standards and timetables for compliance with those standards. By 1999, CO emissions drop to 61% of their 1985 value, but then rise back up to 75% of the 1985 value by 2010. This is consistent with the modeling results which showed 2010 CO values slightly less than the 1985 levels. Non-methane hydrocarbons (NMHC) show a similar pattern dropping to 49% of the

1985 level by 1999 and rising back to 55% of that level by 2010. Nitrogen oxides (NOx) show a relatively smaller decrease by 1999, and climb back up to 94% of their 1985 level by 2010. In a sentence, it might be said that federal emission controls offset growth in traffic up to about 1999, after which emissions start climbing along with traffic volume.

Intensified use of the waterfront will also result in increases in electrical demand and solid waste generation both of which will result in offsite impacts at the locations where power is generated (Kahe/Waiau) and where municipal solid waste is combusted (Waipahu/HPOWER).

5. MITIGATING MEASURES

Controlling mobile sources is one of the most difficult tasks in the air pollution control business. The multitude of privately-owned, moving sources in varying degrees of repair (or disrepair) spread emissions throughout an urban area. The federal approach, upon which the State of Hawaii has relied for control [25], is to mandate maximum allowable emissions on newly manufactured vehicles. As has been demonstrated above, this approach works up to a point after which new, more stringent emission standards must be imposed if effective control is to be maintained. At the present time, no new standards are being proposed, and the federal Clean Air Act has been held up in Congress for several years without formal reauthorization.

At the State and local level, mitigative measures range from the relatively easy (and not too effective) carpooling and bikeways to more severe measures such as placing a moratorium on any further growth or development which encourages private automobile use.

Honolulu's heavily used bus system already reduces regional emissions by providing an alternative to cars. If all the current bus passengers were traveling in cars, Honolulu's emissions would be significantly greater. Buses alone, however, are not the long-term solution because in large numbers they too become significant contributors to local pollutant levels. In a growing and densely populated area, development of an efficient mass transit system is necessary to further reduce the dependency on private automobile use. The City & County of Honolulu is in fact working on development of such a system.

Institution of an inspection/maintenance program for all in-use vehicles can contribute to reduced emissions by insuring that those vehicles are properly tuned and have not had their emission control devices removed or tampered with.

Any or all of the above measures will retard to some extent the rate of deterioraton of air quality in the waterfront area. In the long term, however, as long as Honolulu's people depend primarily on their cars for transportation, the quality of the air will deteriorate along the lines shown in Figures 20 - 23. This, of course, is not a unique waterfront, city, or even state problem. It is a national one that probably won't be solved until a new, non-polluting powerplant is developed for automobiles.

REFERENCES

1. U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Environmental Satellite, Data and Information Service, National Climatic Center. Local Climatological Data: Annual Summary with Comparative Data: 1982 Honolulu, Hawaii.

2. Thornwaite, C. W. Climates of North America According to a New Classification, Geog. Rev. 21: 633-655, 1931.

3. U.S. Air Force, Environmental Technical Applications Center. Report No. 7461: Stability Wind Roses, Hickam AFB, HI, 0000-2400 LST by Boundary Layer Section, 4 Sep 74.

4. U. S. Environmental Protection Agency. Workbook of Atmospheric Dispersion Estimates, AP-26 (Sixth Edition), 1973.

5. Morrow, J. W. Air Quality Impact Report, Honolulu International Airport, prepared for KFC Airports, Inc. and the State of Hawaii Department of Transportation, Airports Division, November, 1987.

6. U. S. Government. Code of Federal Regulations, Title 40, Protection of Environment, Part 50, National Primary and Secondary Ambient Air Quality Standards.

7. State of Hawaii. Title 11, Administrative Rules, Chapter 59 Ambient Air Quality Standards, as amended, April, 1986.

8. Library of Congress, Congressional Research Service. A Legislative History of the Clean Air Amendments of 1970, Volume 1, p. 411, January, 1974.

9. U.S. Environmental Protection Agency. Revisions to National Ambient Air Quality Standards for Particulate Matter, Federal Register, Vol. 52, p. 2463, July 1, 1987.

10. U. S. Environmental Protection Agency. National Ambient Air Quality Standards for Hydrocarbons: Final Rulemaking, Federal Register, Volume 48, No. 3, p. 628, January, 1983.

11. U. S. Congress. Clean Air Act Amendments of 1977 (P.L. 95-95) Section 109, National Ambient Air Quality Standards, August, 1977

12. U. S. Environmental Protection Agency. National Ambient Air Quality Standards for Photochemical Oxidants: Final Rulemaking, Federal Register, Volume 44, No. 28, p. 8202, February 8, 1979

13. U. S. Environmental Protection Agency. Regulatory Agenda, Federal Register, Volume 50, No. 82, p. 17784, April 29, 1985.

14. State of Hawaii. Title 11, Administrative Rules, Chapter 60, Air Pollution Control.

15. Pacific Planning & Engineering, Inc. Personal communications, Conrad Higashionna, September-October, 1988.

16. U. S. Environmental Protection Agency. User's Guide to MOBILE-3 (Mobile Source Emissions Model), EPA-460/3-84-002, June, 1984.

17. City & County of Honolulu, Department of Data Systems. Age Distribution of Registered Vehicles in the City & County of Honolulu (unpublished report), August, 1988.

18. Seinfeld, John H. Air Pollution: Physical and Chemical Fundamentals, p. 69, McGraw-Hill Book Company, 1975

19. U.S. Environmental Protection Agency. Guideline on Air Quality Models (Revised), EPA-450/2-78-027R, July, 1986.

20. California Department of Transportation. CALINE4 - A Dispersion Model for Predicting Air Pollutant Concentrations Near Roadways (Final Report), November, 1984.

21. U.S. Environmental Protection Agency. Guidelines for Air Quality Maintenance Planning and Analysis: Indirect Sources Volume 9 (Revised), EPA-450/4-78-001, September, 1978.

22. Morrow, J. W. Air Quality Impact Analysis: Kaka'ako Redevelopment District Plan, July, 1984.

23. Pacific Planning & Engineering, Inc. Draft Report: Honolulu Waterfront Master Plan, Traffic Study, November, 1988.

24. Moffat & Nichol, Engineers. Draft Report: Honolulu Waterfront Project, Special Study: Harbors Planning, November, 1988.

25. State of Hawaii, Department of Health. Air Pollution Control Implementation Plan, January 21, 1972.

TABLES

TABLE 1

HONOLULU INTERNATIONAL AIRPORT
ANNUAL WIND ROSE

Direction	Wind Speed (Kts) 0 - 3	4 - 7	8 - 12	13 - 18	19 - 24	>24	TOTAL
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

SOURCE: Reference 3

TABLE 3

SUMMARY OF AEROMETRIC DATA COLLECTED
AT THE DEPARTMENT OF HEALTH BUILDING
AND SAND ISLAND
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-<5	<5-<5	<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 2

SUMMARY OF STATE OF HAWAII AND FEDERAL
AMBIENT AIR QUALITY STANDARDS

	POLLUTANT	SAMPLING PERIOD	FEDERAL STANDARDS PRIMARY	FEDERAL STANDARDS SECONDARY	STATE STANDARDS
1.	Total Suspended Particulate Matter (TSP)	Annual Geometric Mean	--	--	60
	(micrograms per cubic meter)	Maximum Average in Any 24 Hours	--	--	150
2.	PM-10	Annual	50	50	--
	(micrograms per cubic meter	Maximum Average in Any 24 Hours	150	150	--
3.	Sulfur Dioxide (SO2)	Annual Arithmetic Mean	80	--	80
	(micrograms per cubic meter)	Maximum Average in Any 24 Hours	365	--	365
		Maximum Average in Any 3 Hours		1,300	1,300
4.	Nitrogen Dioxide (NO2)	Annual Arithmetic Mean		100	70
	(micrograms per cubic meter)				
5.	Carbon Monoxide (CO)	Maximum Average in Any 8 Hours		10	5
	(milligrams per cubic meter)	Maximum Average in Any 1 Hour		40	10
6.	Photochemical Oxidants (as O3)	Maximum Average in Any 1 Hour		240	100
	(micrograms per cubic meter)				
7.	Lead (Pb)	Maximum Average in Any Calendar Quarter		1.5	1.5
	(micrograms per cubic meter)				

TABLE 5

LEAD MONITORING DATA
HONOLULU, OAHU
1970-87

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

Source: State of Hawaii
Department of Health

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			0-8.6	0.6-10.9	0.0-10.4	0.2-13.5	0.3-11.1
Arithmetic mean of daily maximum values:	3.1	3.0		Kaimuki		2.4	2.4	1.5	2.2	1.7
Number of days State AQS exceeded:	19	10				0	1	1	3	1

TABLE 6

AM/PM PEAK HOURS CARBON MONOXIDE SAMPLING RESULTS
OCTOBER, 1988

Date	Time	Location	CO Concentration (mg/m3)	Onsite Winds Wind Direction (deg)	Onsite Winds Wind Speed (m/sec)
26 Oct 88	0700-0800	Ward Avenue at	6.0	102	< 1.0
13 Oct 88	1600-1700	Ala Moana Boulevard	7.0	81	1.5
25 Oct 88	0700-0800	Richards Street at	4.8	106	< 1.0
17 Oct 88	1600-1700	Nimitz Highway	5.6	116	< 1.0
20 Oct 88	0700-0800	Sand Island Access	8.8	165	< 1.0
18 Oct 88	1600-1700	Road at Nimitz Hwy	3.9	125	< 1.0
24 Oct 88	0700-0800	Bishop Street at	5.6	320	< 1.0
19 Oct 88	1600-1700	Nimitz Highway	5.4	280	< 1.0
21 Oct 88	0700-0800	Lagoon Drive at	7.2	160	calm
20 Oct 88	1600-1700	Kam/Nimitz Highways	7.0	53	< 1.0

TABLE 7

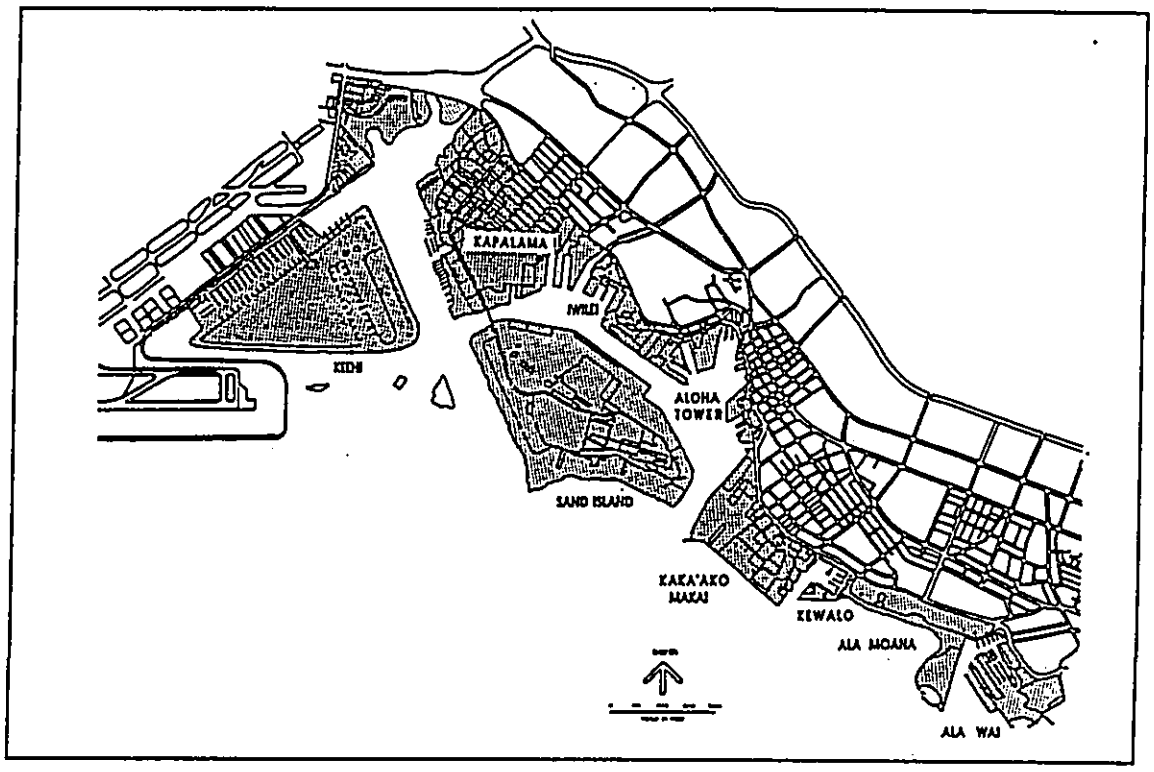
AIR MONITORING DATA
CAMPBELL INDUSTRIAL PARK
1971-85

	TSP			SO_2			NO_2		
YEAR	RANGE	MEAN	>AQS	RANGE	MEAN	>AQS	RANGE	MEAN	>AQS
1971	18-471	125	54	<5-16	<5	0	<20-49	29	0
1972	24-155	55	4	<5- 7	<5	0	<20-49	21	0
1973	14-129	50	1	<5-5	<5	0	<20-33	<20	0
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	25-138	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	------	--	-

NOTES:
1. TSP = total suspended particulates
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

FIGURE 1

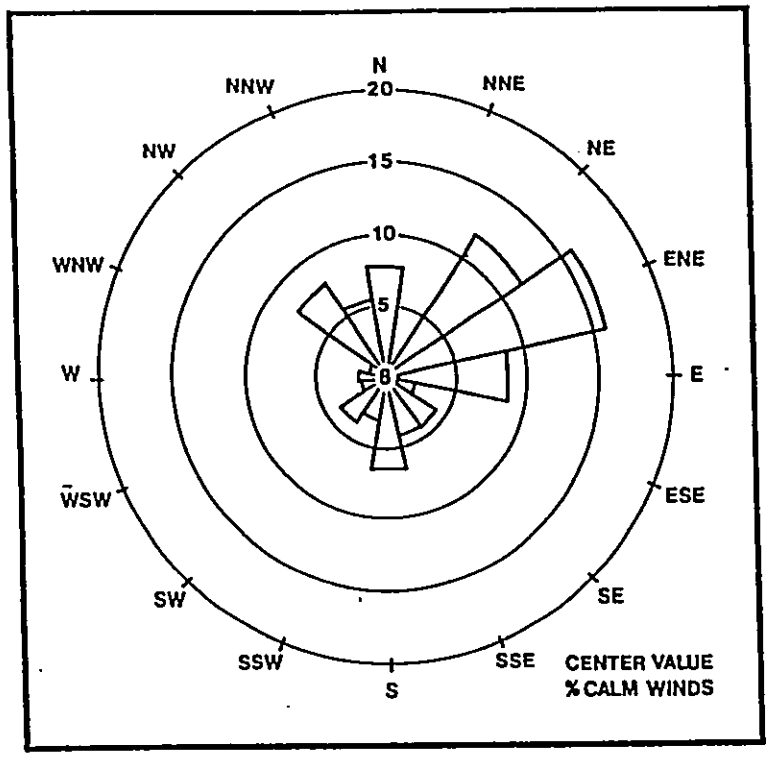
STUDY AREA



FIGURES

FIGURE 2

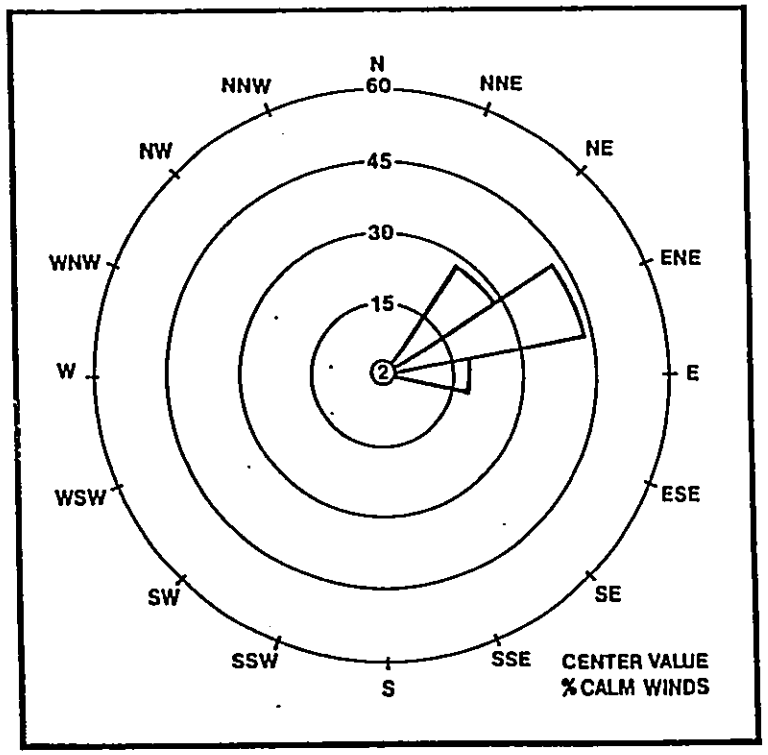
JANUARY WINDROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service (1940-67)

FIGURE 3

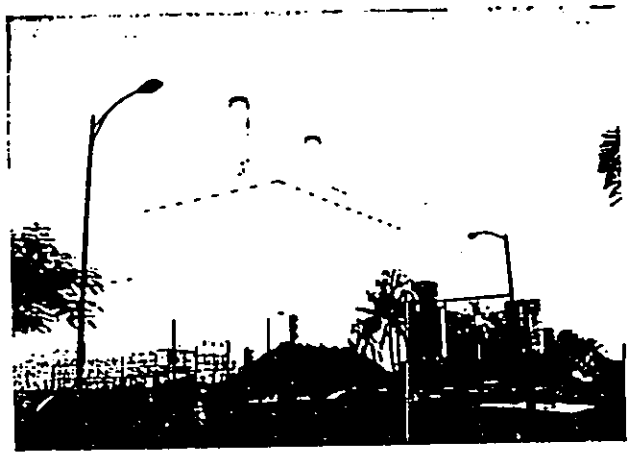
AUGUST WINDROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service (1940-67)

FIGURE 4

MAJOR STATIONARY SOURCES
IN THE WATERFRONT AREA



HECO Honolulu
Power Plant

Hawaiian Bitumuls
Asphalt Plant
Sand Island Road

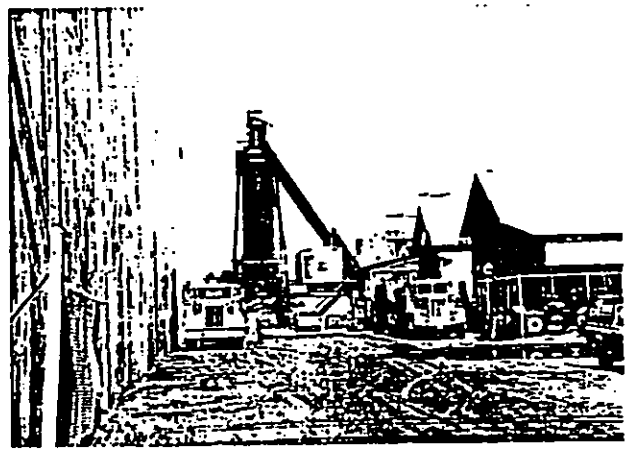
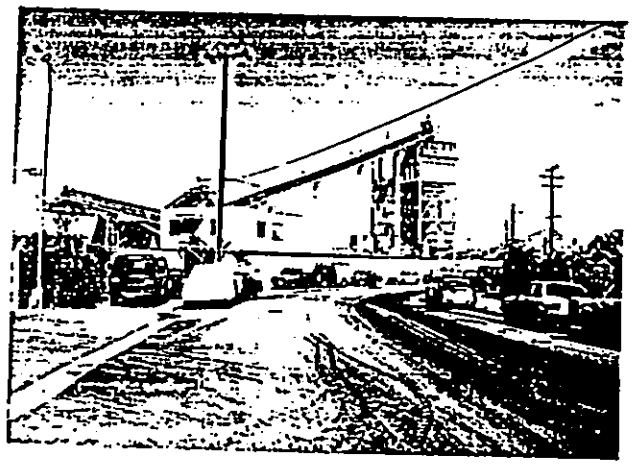


FIGURE 5

MAJOR STATIONARY SOURCES
IN THE WATERFRONT AREA



HC&D Batch Plant
Sand Island Road

Sand Island Sewage
Treatment Plant

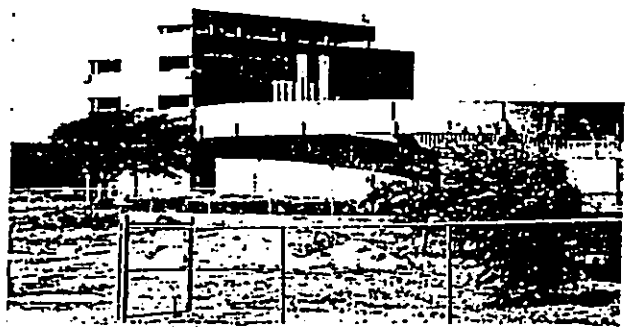
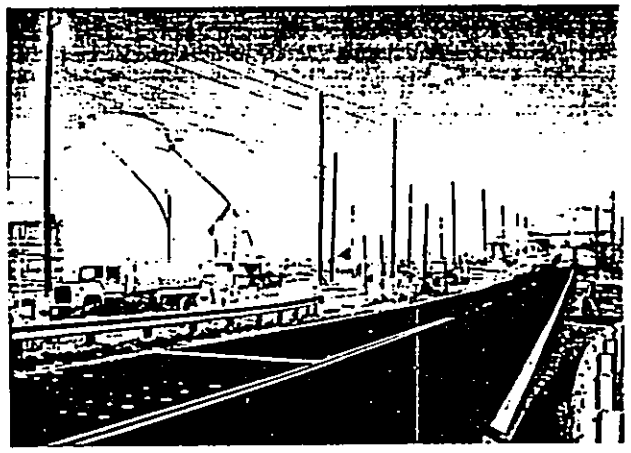
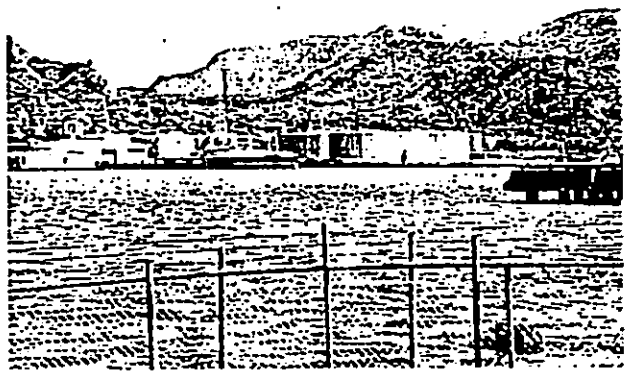


FIGURE 6

MAJOR STATIONARY SOURCES
IN THE WATERFRONT AREA



Jet Fuel Storage
Sand Island Road



Fuel Storage on
the Water's Edge
View from Sand
Island

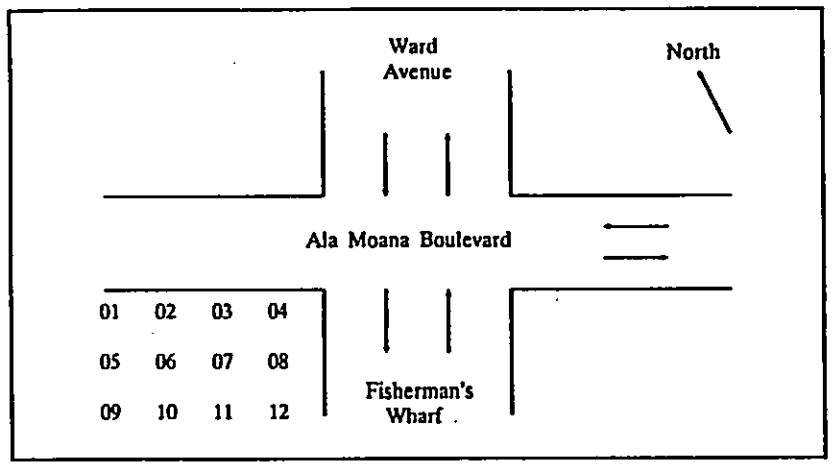
FIGURE 7

MAJOR STATIONARY SOURCES
IN THE WATERFRONT AREA

Fuel Storage
Along Nimitz
Highway
Piers 29 - 31

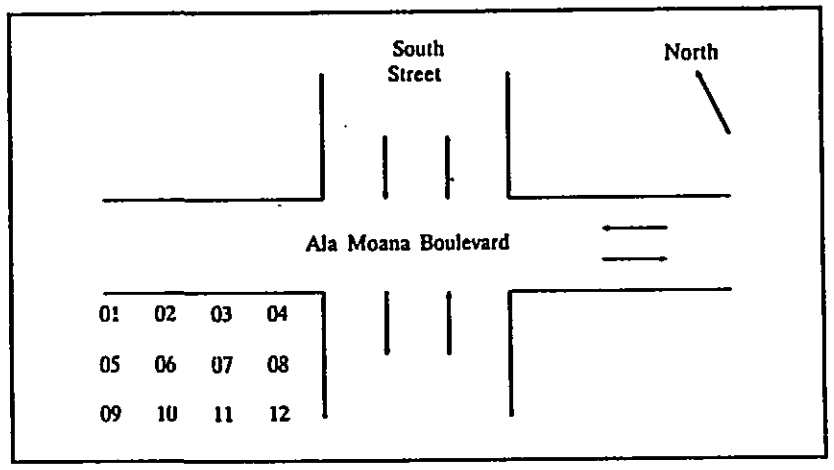
Fuel Storage Along
Nimitz Highway
Piers 36 - 37

FIGURE 8
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
WARD AVENUE AT ALA MOANA BOULEVARD
PM PEAK-HOUR (1985 - 2010)



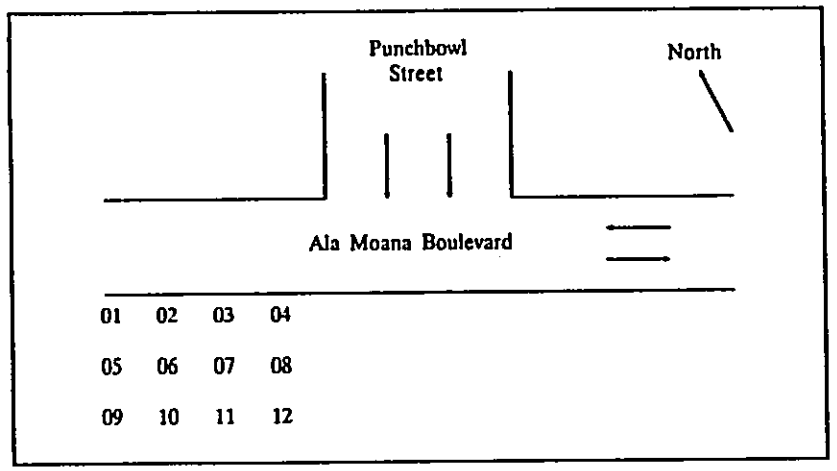
Receptor	Concentration (mg/m^3) Existing (1985) 1-hr	8-hr	2010 Without Project 1-hr	8-hr	2010 With Project 1-hr	8-hr
01	15.7	9.4	11.9	7.1	10.4	6.2
02	14.1	8.5	10.1	6.1	9.3	5.6
03	12.2	7.3	8.2	4.9	8.3	5.0
04	12.0	7.2	7.8	4.7	8.8	5.3
05	12.1	7.3	8.7	5.2	8.3	5.0
06	10.8	6.5	7.4	4.4	7.9	4.7
07	10.3	6.2	6.7	4.0	8.1	4.9
08	9.3	6.4	7.0	4.2	9.5	5.7
09	9.8	5.9	6.8	4.1	7.3	4.4
10	9.1	5.5	6.0	3.6	7.2	4.3
11	9.0	5.4	5.9	3.6	7.6	4.6
12	9.2	5.5	6.0	3.6	8.7	5.2

FIGURE 9
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
SOUTH STREET AT ALA MOANA BOULEVARD
PM PEAK-HOUR (1985 - 2010)



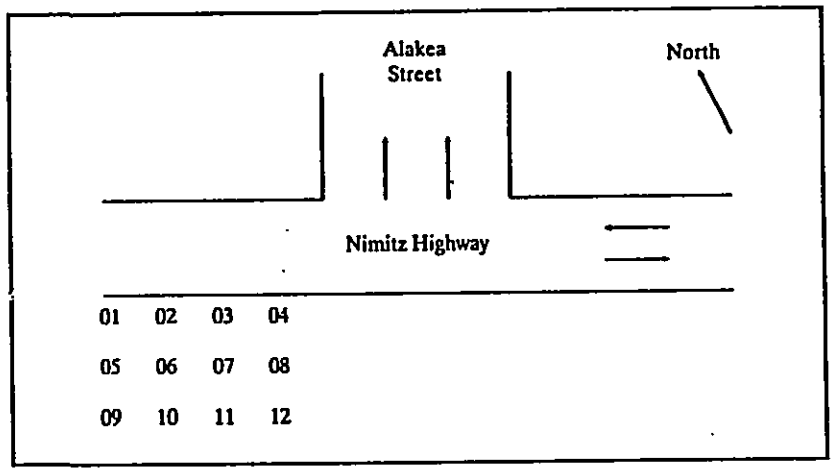
Receptor	Concentration (mg/m^3) Existing (1985) 1-hr	8-hr	2010 Without Project 1-hr	8-hr
01	12.8	7.7	8.3	5.0
02	12.8	7.7	8.3	5.0
03	12.7	7.6	8.1	4.9
04	12.0	7.2	7.6	4.6
05	10.1	6.1	6.6	4.0
06	10.4	6.2	6.7	4.0
07	10.1	6.1	6.5	3.9
08	9.9	6.0	6.3	3.8
09	8.7	5.2	5.7	3.4
10	8.7	5.2	5.6	3.4
11	8.5	5.1	5.5	3.3
12	8.5	5.1	5.4	3.2

FIGURE 10
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
PUNCHBOWL STREET AT ALA MOANA BOULEVARD
PM PEAK-HOUR (1985 - 2010)



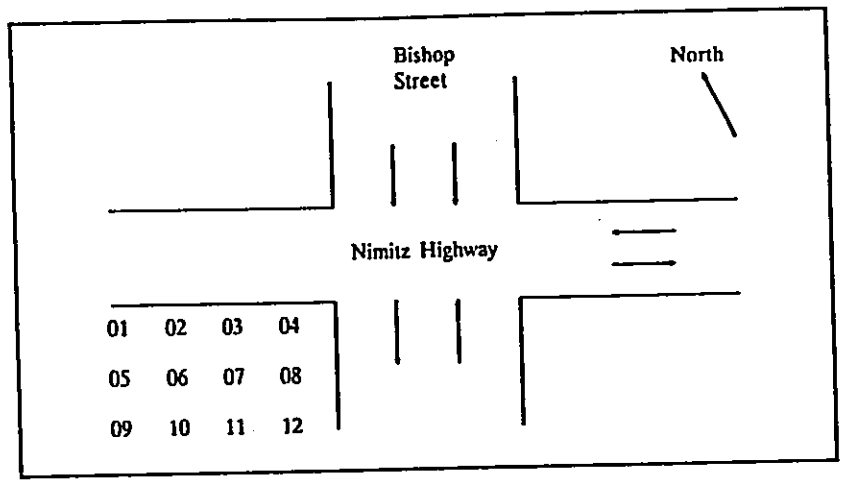
Receptor	Concentration (mg/m^3) Existing (1985) 1-hr	8-hr	2010 Without Project 1-hr	8-hr
01	19.4	11.6	20.7	12.4
02	19.6	11.8	21.0	12.6
03	17.9	10.7	17.9	10.7
04	15.8	9.5	15.6	9.4
05	15.3	9.4	16.1	9.6
06	14.8	8.9	14.9	9.0
07	13.5	8.1	13.2	7.9
08	12.3	7.4	12.0	7.2
09	12.4	7.5	12.7	7.6
10	11.9	7.1	11.9	7.1
11	10.7	6.4	10.5	6.3
12	9.9	6.0	9.6	5.7

FIGURE 11
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
ALAKEA STREET AT NIMITZ HIGHWAY
PM PEAK-HOUR (1985 - 2010)



Receptor	Concentration (mg/m^3) Existing (1985) 1-hr	8-hr	2010 Without Project 1-hr	8-hr
01	16.0	9.6	17.1	10.3
02	14.4	8.6	14.9	9.0
03	12.8	7.7	13.2	7.9
04	12.9	7.7	13.1	7.9
05	12.3	7.4	12.7	7.6
06	11.3	6.8	11.4	6.8
07	10.8	6.5	10.7	6.4
08	11.1	6.6	10.4	6.2
09	10.4	6.2	10.3	6.2
10	9.6	5.7	9.3	5.6
11	9.6	5.7	9.0	5.4
12	9.5	5.7	8.8	5.3

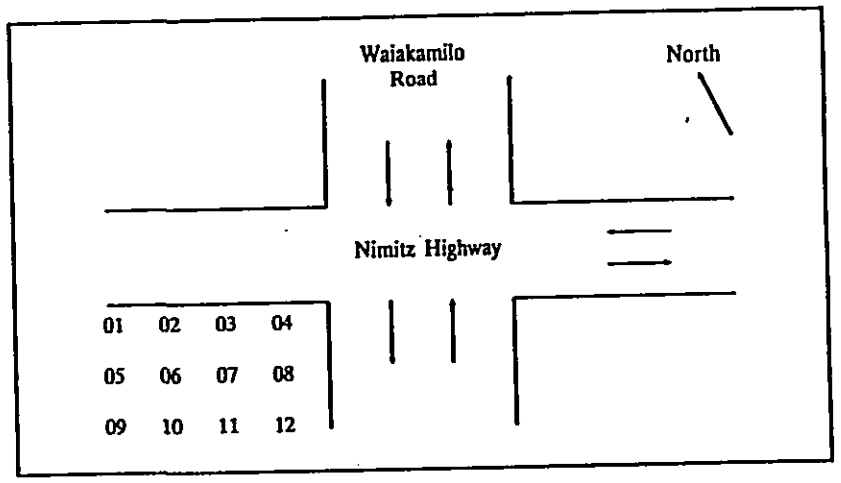
FIGURE 12
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
BISHOP STREET AT NIMITZ HIGHWAY
PM PEAK-HOUR (1985 - 2010)



Concentration (mg/m^3)

Receptor	Existing (1985) 1-hr	Existing (1985) 8-hr	2010 Without Project 1-hr	2010 Without Project 8-hr	2010 With Project 1-hr	2010 With Project 8-hr
01	15.5	9.3	14.1	8.5	12.8	7.7
02	15.0	9.0	14.0	8.4	13.2	7.9
03	14.0	8.4	13.6	8.1	13.8	8.3
04	14.9	9.0	14.2	8.5	16.2	9.7
05	12.7	7.6	11.7	7.0	12.0	7.2
06	12.4	7.5	11.6	7.0	13.0	7.8
07	12.7	7.6	11.7	7.0	14.8	8.9
08	14.2	8.5	12.7	7.6	18.4	11.0
09	10.9	6.6	10.1	6.1	11.5	6.9
10	10.9	6.6	10.0	6.0	12.4	7.5
11	11.5	6.9	10.4	6.2	14.1	8.5
12	12.4	7.5	10.9	6.6	16.5	9.9

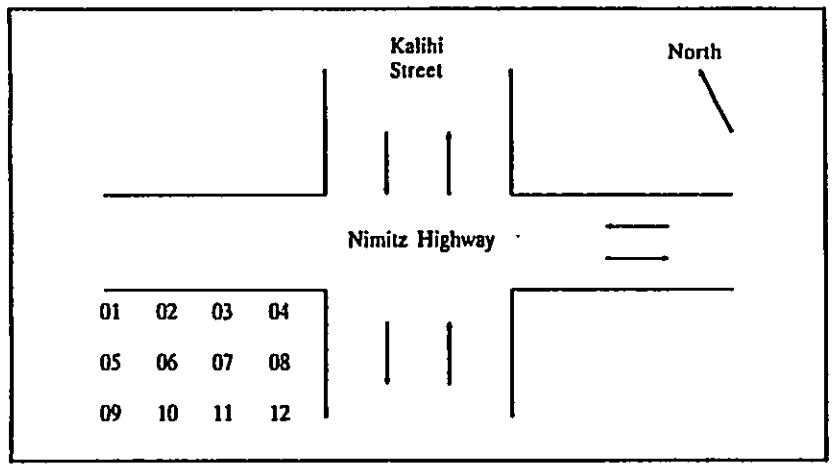
FIGURE 13
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
WAIAKAMILO ROAD AT NIMITZ HIGHWAY
PM PEAK-HOUR (1985 - 2010)



Concentration (mg/m^3)

Receptor	Existing (1985) 1-hr	Existing (1985) 8-hr	2010 Without Project 1-hr	2010 Without Project 8-hr
01	18.8	11.3	16.0	9.6
02	18.5	11.1	16.5	9.9
03	19.2	11.5	17.0	10.2
04	17.8	10.7	14.4	8.6
05	14.8	8.9	12.8	7.7
06	15.0	9.0	12.9	7.7
07	14.9	9.0	12.2	7.3
08	14.6	8.8	11.1	6.6
09	12.4	7.5	10.4	6.2
10	12.5	7.5	10.3	6.2
11	12.5	7.5	9.8	5.9
12	12.4	7.4	9.3	5.6

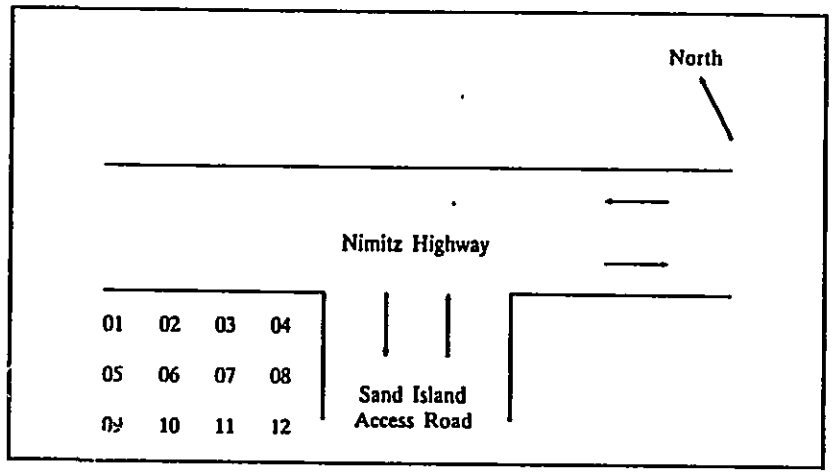
FIGURE 14
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
KALIHI STREET AT NIMITZ HIGHWAY
PM PEAK-HOUR (1985 - 2010)



Concentration (mg/m^3)

Receptor	Existing (1985) 1-hr	Existing (1985) 8-hr	2010 Without Project 1-hr	2010 Without Project 8-hr
01	17.8	10.7	15.4	9.2
02	18.4	11.0	16.2	9.7
03	18.4	11.0	15.5	9.3
04	18.2	10.9	14.0	8.4
05	14.9	9.0	12.5	7.5
06	15.5	9.3	12.7	7.6
07	15.7	9.4	12.1	7.3
08	16.6	10.0	11.9	7.1
09	13.1	7.9	10.5	6.3
10	13.6	8.1	10.4	6.2
11	13.9	8.3	10.0	6.0
12	14.9	9.0	10.3	6.2

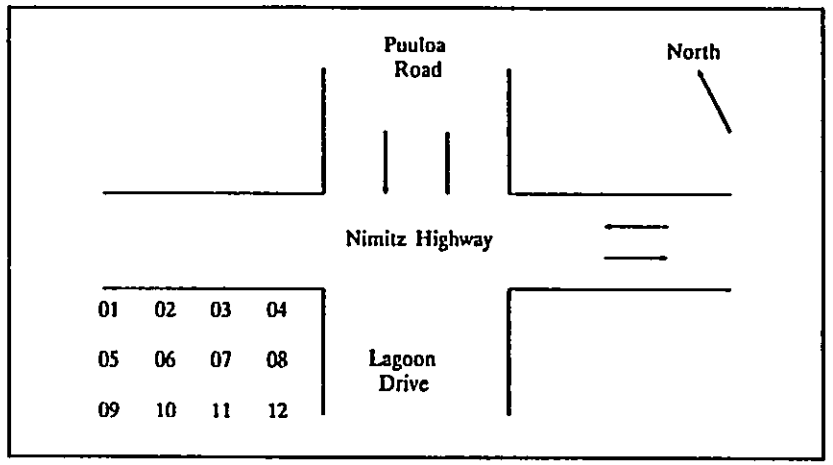
FIGURE 15
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
SAND ISLAND ACCESS ROAD AT NIMITZ HIGHWAY
PM PEAK-HOUR (1985 - 2010)



Concentration (mg/m^3)

Receptor	Existing (1985) 1-hr	Existing (1985) 8-hr	2010 Without Project 1-hr	2010 Without Project 8-hr	2010 With Project 1-hr	2010 With Project 8-hr
01	25.0	15.0	17.9	10.7	14.5	8.7
02	26.9	16.1	19.5	11.7	15.8	9.5
03	30.3	18.2	21.7	13.0	17.8	10.7
04	38.5	23.1	26.2	15.7	21.5	12.9
05	24.9	14.9	17.2	10.3	14.2	8.5
06	28.4	17.0	19.3	11.6	16.0	9.6
07	34.1	20.5	22.2	13.3	18.6	11.1
08	43.2	25.9	26.7	16.0	22.5	13.5
09	24.5	14.7	16.4	9.8	13.7	8.2
10	27.4	16.4	17.0	10.7	14.9	9.0
11	32.3	19.4	20.2	12.2	17.0	10.2
12	38.6	23.2	23.3	14.0	19.7	11.8

FIGURE 16
ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
LAGOON DRIVE AT NIMITZ HIGHWAY
PM PEAK-HOUR (1985 - 2010)



Receptor	Concentration (mg/m^3) Existing (1985) 1-hr	8-hr	2010 Without Project 1-hr	8-hr
01	21.4	12.9	17.0	10.2
02	22.7	13.6	18.2	10.9
03	22.3	13.4	17.8	10.7
04	23.3	14.0	18.6	11.1
05	18.7	11.2	14.9	9.0
06	19.6	11.7	15.5	9.3
07	20.2	12.1	16.0	9.6
08	22.2	13.3	17.8	10.7
09	17.0	10.2	13.6	8.1
10	17.8	10.7	14.2	8.5
11	18.8	11.3	14.9	9.0
12	21.0	12.6	16.8	10.1

FIGURE 17

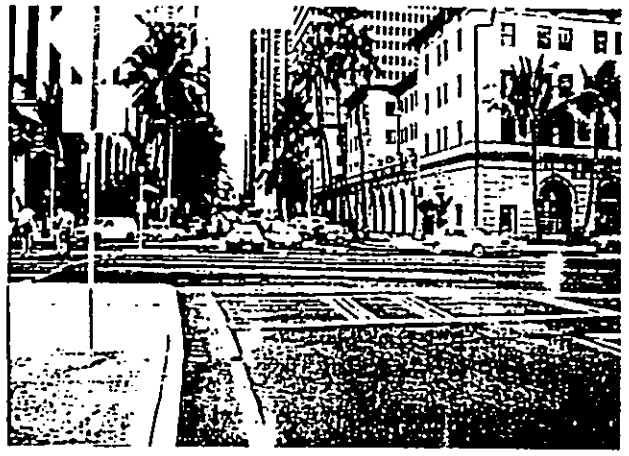
CARBON MONOXIDE SAMPLING SITES
IN THE WATERFRONT AREA

Ward Avenue
at Ala Moana
Boulevard

Richards Street at
Nimitz Highway

FIGURE 18

CARBON MONOXIDE SAMPLING SITES
IN THE WATERFRONT AREA



Bishop Street
at Nimitz
Highway

Nimitz Highway at
Bishop Street

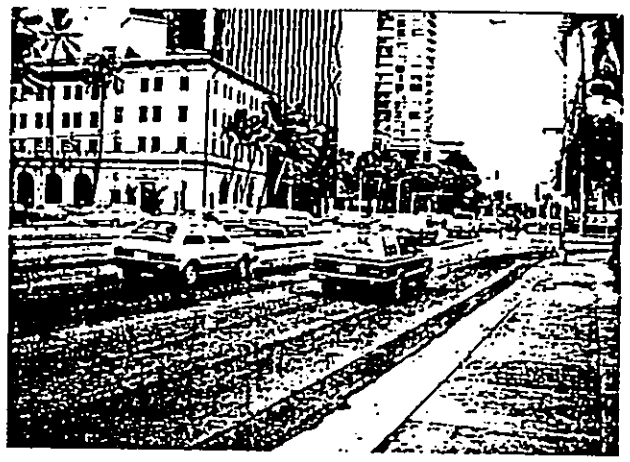


FIGURE 19

CARBON MONOXIDE SAMPLING SITES
IN THE WATERFRONT AREA

Sand Island Road
at Nimitz Highway

Lagoon Drive at
Nimitz Highway

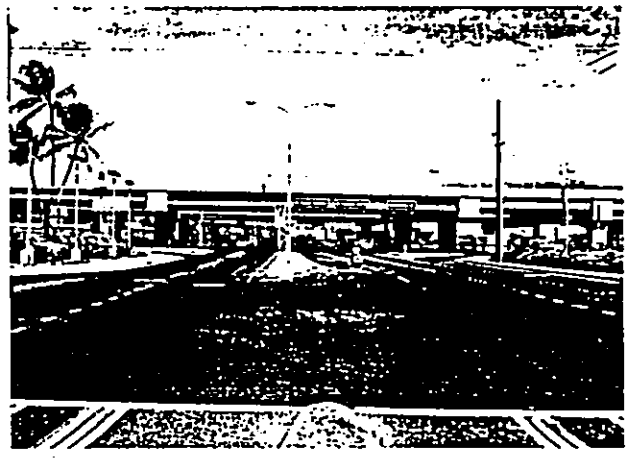


FIGURE 20

ESTIMATED VEHICLE MILES TRAVELED (VMT)
ALONG THE ALA MOANA - NIMITZ CORRIDOR
1985 - 2010

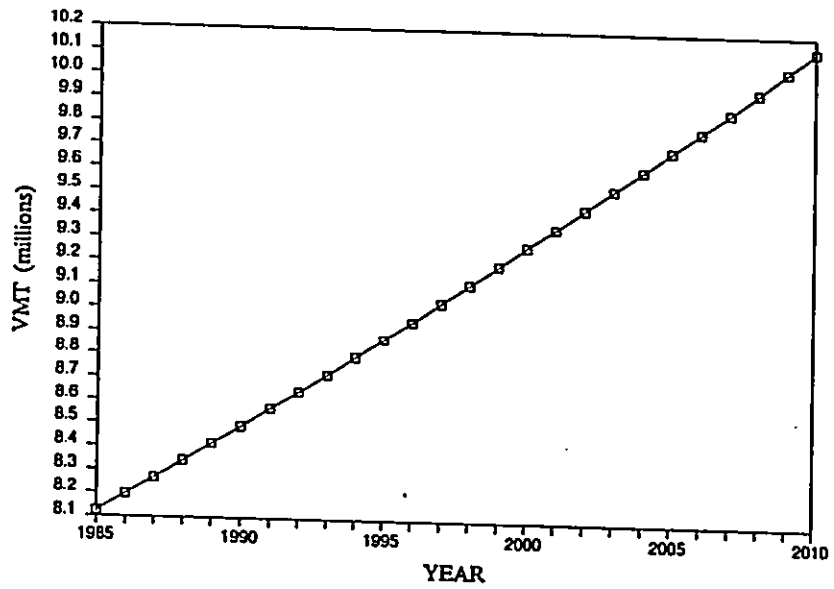


FIGURE 21

ESTIMATED CARBON MONOXIDE EMISSIONS
ALONG THE ALA MOANA - NIMITZ CORRIDOR
1985 - 2010

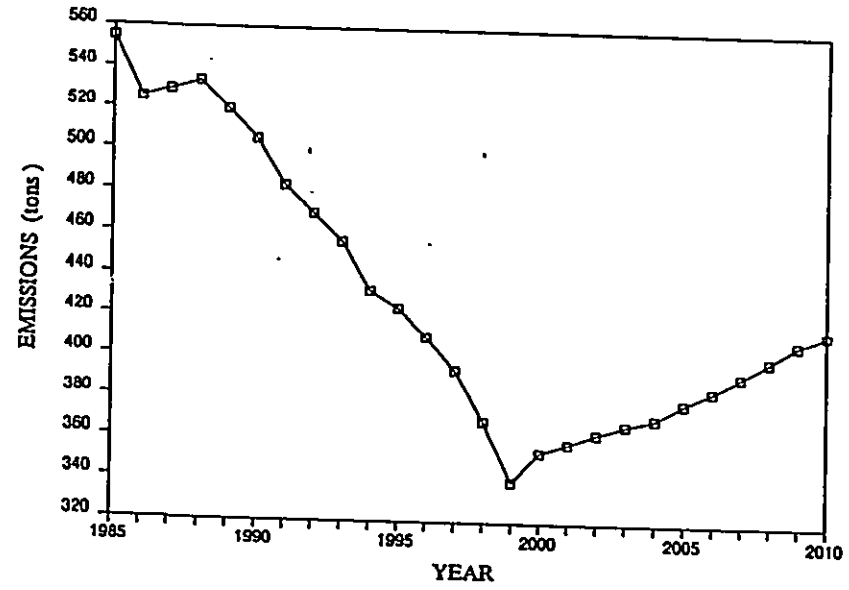


FIGURE 22

ESTIMATED NON-METHANE HYDROCARBON EMISSIONS
ALONG THE ALA MOANA - NIMITZ CORRIDOR
1985 - 2010

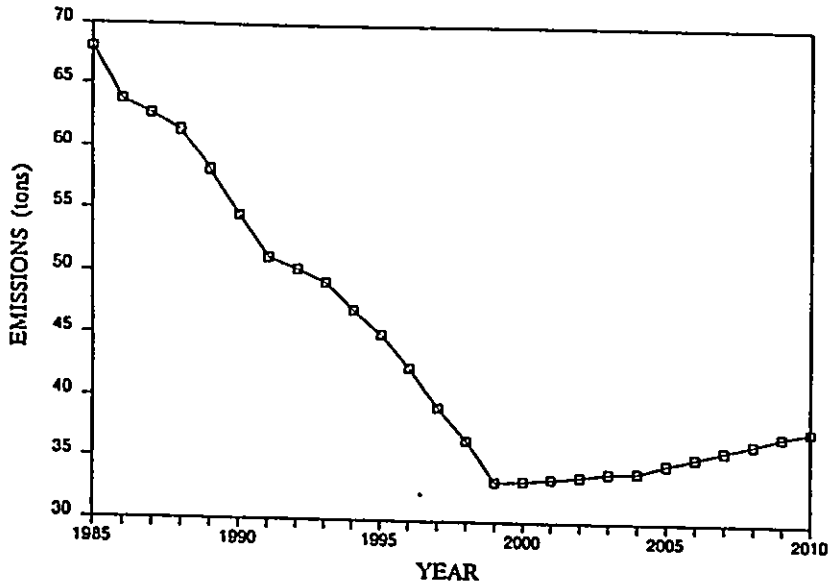


FIGURE 23
ESTIMATED NITROGEN OXIDES EMISSIONS
ALONG THE ALA MOANA - NIMITZ CORRIDOR
1985 - 2010