KALAELOA AIRPORT MASTER PLAN

Governor Benjamin J Cayetano

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

Aries Consultants Ltd.
November 1998

KALAEALOA AIRPORT MASTER PLAN

FINAL REPORT

Prepared for

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
AIRPORTS DIVISION

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Prepared by:

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November 1998

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Chapter 1

MASTER PLANNING PROCESS

1.1 OVERVIEW

Naval Air Station (NAS) Barbers Point is located on the southwest coast of the Island of Oahu along the Ewa Plain and south of the Waianae Mountains. The location is illustrated on Figure 1-1. It is located 8 nautical miles west of Honolulu International Airport and about 20 miles by road west of the center of the City of Honolulu. The Airport elevation is 33 feet above mean sea level. NAS Barbers Point, as shown on Figure 1-2, contains approximately 3,709 acres. The north side of the property includes the U.S. Navy housing and base support facilities and the south side includes the airport/aviation related facilities.

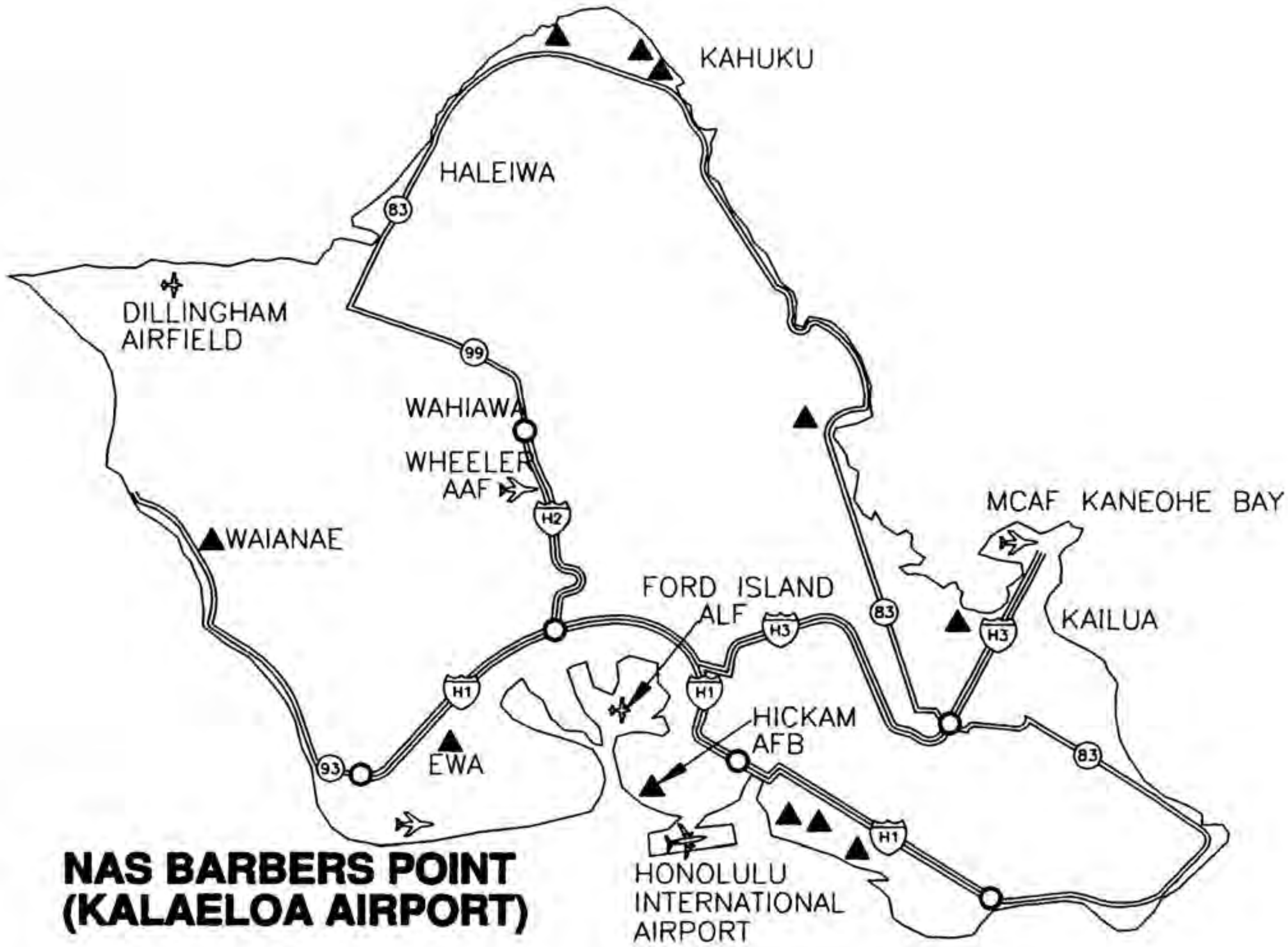
NAS Barbers Point is scheduled to close in 1999. The future use of the Base is currently being determined and implemented by the Barbers Point NAS Redevelopment Commission (formerly the Base Reuse Committee) that has been established jointly by the State of Hawaii and City and County of Honolulu. The State of Hawaii, Department of Transportation (DOT) has studied the potential use of a portion of NAS Barbers Point, which will be called the Kalaeloa Airport, as a general aviation reliever airport as well as for other aviation uses.

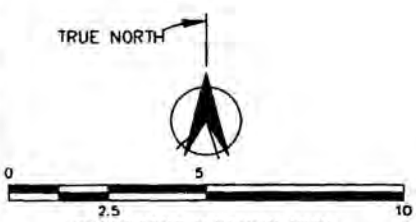
On October 8, 1996, the Redevelopment Commission adopted a final land use plan for the redevelopment of Naval Air Station Barbers Point which is described in the March 1997 *Community Redevelopment Plan* report. The Community Redevelopment Plan recommended use of a portion of the Base for a general aviation reliever airport, aviation training, and an aviation component of the City's Life Safety Academy. The Airport will continue to accommodate the requirements of the commercial airlines and military for an alternate landing site designation as well as the U.S. Coast Guard (USCG) and the Hawaii National Guard (HNG).

The State has requested the Base Redevelopment Commission to recommend transfer of a portion of the Base to the State for use as a reliever airport. The State will file a formal application with the U.S. Navy for a public airport conveyance for use as the Kalaeloa Airport general aviation reliever airport. The Federal Aviation Administration is the sponsor for disposal as a public airport in accordance with 49 U.S.C. 47151.

1.2 BACKGROUND

Honolulu International Airport is already one of the 20 busiest airports in the Country, and it is forecast to become even busier. It also has an undesirable mix of small light aircraft and large heavy aircraft. It will become even more congested overnight when the





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Airports Division

KALAELOA AIRPORT MASTER PLAN

LEGEND	
	AIR CARRIER AIRPORT
	GENERAL AVIATION AIRPORT
	MILITARY AIRPORT
▲	HELIPORT
H1	INTERSTATE HIGHWAY
83	HAWAII STATE HIGHWAY

FIGURE NO 1-1

LOCATION MAP

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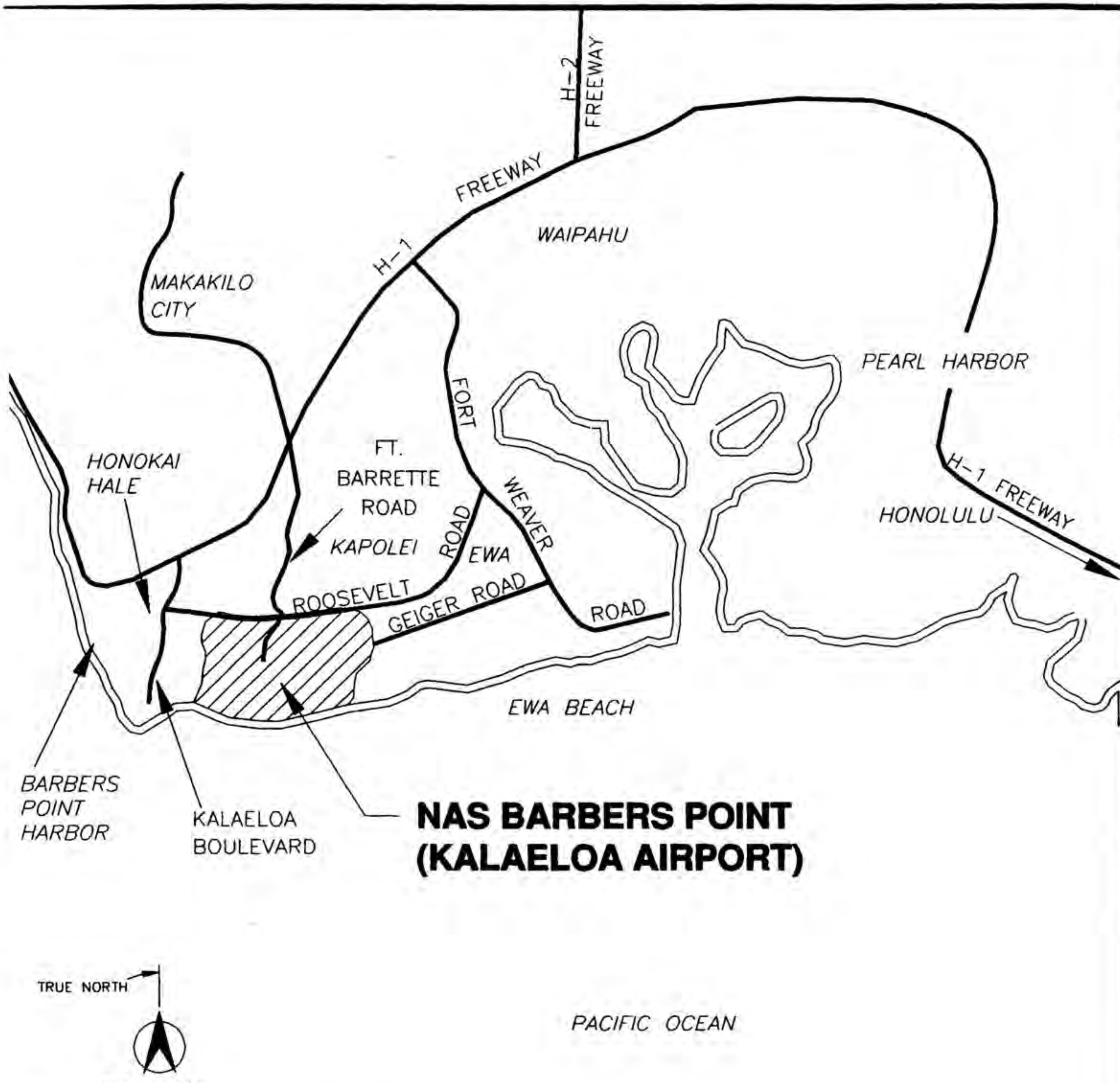
NAME: BPA-11LM	NO. 4240-05
DATE: 02-17-98	PLOT SCALE: 1=5



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KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

FIGURE NO. 1-2

VICINITY MAP

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Navy closes the Ford Island Auxiliary Landing Field runway in 1999, forcing aircraft that are currently using Ford Island to use Honolulu International Airport for their training operations, unless there is a realistic alternative.

A June 1994 General Accounting Office (GAO) report stated that Honolulu International Airport was now the only air carrier airport in the Country that justifies a reliever airport and does not have one. The report, *Airport Improvement Program*, concluded, "FAA's criteria suggest that general aviation traffic could be a major problem at only 1 of the nation's 23 congested airports - Honolulu International."

Without a reliever airport, the closure of Ford Island and anticipated increases in aircraft operations will substantially increase operational delays at Honolulu International Airport. These delays will increase aircraft operating costs for the air carriers. They will also make Honolulu International Airport uneconomical for many general aviation users, the businesses they serve, and the businesses that serve the general aviation community. To avoid this, the State must secure a reliever airport site for general aviation. The closure of NAS Barbers Point represents an unparalleled opportunity to accomplish this at low cost and with a minimum disruption of other uses.

While preservation of a general aviation capability at Barbers Point provides justification for the State to convert existing facilities to general aviation use, it is not the only reason why it should be maintained as an active airport. Retaining the Airport has many public benefits.

1.3 THE PUBLIC BENEFIT

The conveyance of a portion of NAS Barbers Point to the State for use as a civilian public-use general aviation reliever airport (Kalaeloa Airport):

- Ends an over 30-year search for a general aviation reliever airport for Honolulu International Airport. Solves the problem of an unsatisfactory mix of small light general aviation aircraft and large heavy air carrier aircraft that has long been recognized.

- Improves safety and reduces costly delays at Honolulu International Airport. Potentially eliminates the need for additional expensive new runway facilities.

- Accommodates general aviation activity that will be displaced from Ford Island Auxiliary Landing Field when the Navy closes it.

- Provides an opportunity that may never be repeated to obtain a general aviation reliever airport that will also serve the USCG, HNG military and civil defense aviation needs.

- Continues the USCG use of their existing $38 million worth of facilities. Otherwise the USCG will have to abandon its existing facilities and relocate its search and rescue operations (either to Honolulu International Airport or Marine Corps Air Facility Kaneohe Bay) at a cost of $26 million or $35 million, respectively.

- Allows the HNG, which will assume control of 160 acres at Barbers Point, to airlift soldiers and equipment directly from their new facilities there. Otherwise they will have to transport soldiers and equipment to and from Honolulu International Airport, by road, to board aircraft for training missions, incurring additional costs.

- Allows the disaster relief and civil defense agencies to respond with airlift support in times of emergencies and natural disasters.

- Accommodates the air carriers and the military who can continue to designate Barbers Point as an alternate landing site. Otherwise they will burn up more fuel carrying additional fuel loads required to designate more distant airports (e.g., Hilo International, Kona International), thereby increasing their operating costs by at least $2 million a year. Marine Corps Air Facility Kaneohe Bay is inadequate as an alternate for several reasons (e.g., proximity to the mountainous terrain to the southwest, only authorized approach is under visual flight rules, runway length, limited weekday operating hours and closed on weekends, and an access road crossing the runway).

- Presents the State with an opportunity for a cost-free public benefit conveyance for public airport purposes.

- Continues use of an estimated $400 million of existing airport facilities that are in good condition.

- Requires relatively few new airport facilities throughout the 2020 planning period.

- Includes new revenue-producing facilities that will help offset the cost of operating an additional airport in the State system.

- Utilizes financing by airport system users rather than general taxpayers.

Because the airport facilities needed to accommodate aviation uses above and beyond those needed by general aviation are already in place, reserving most or all of the existing airport facilities for airport use is clearly the best choice from the standpoint of aviation use. However, the State DOT recognizes that there are other potential uses of the Base as well. Consequently, it has developed a plan for continued aviation use which protects the most important attributes of the Airport property while leaving the majority of the land that the Navy is declaring surplus open for compatible development.

1.4 STUDY OBJECTIVES

The purpose of this study is to determine and document the type and extent of aviation facilities needed at Kalaeloa Airport through the year 2020 and to prepare a Master Plan which satisfies the projected demand. In addition, the significant environmental impacts associated with an airport are addressed. An Airport Noise Compatibility Program is also being developed for the Airport which addresses existing noise impacts and projects future noise impacts on the airport environs. The Airport Noise Compatibility Program recommends noise abatement and mitigation measures for adoption by the State and City and County of Honolulu in conjunction with their overall planning programs.

The objectives of the Airport Master Plan are to provide the following for agency, user, and public consideration:

- A graphic representation of future Airport development within the context of current and anticipated land uses in the Airport vicinity;
- The technical rationale and documentation of procedures used to formulate the proposed master plan;
- A prioritized capital improvement program and schedule for developments proposed in the master plan; and
- Documentation of the master planning process for the Airport, including input from Airport users; Federal, State, and local agencies; and the community.

The major elements of the Master Plan study include:

- Inventory of existing conditions at the Airport and its environs.
- Forecasts of future aviation activity.
- Determination of airport facility requirements.
- Development of a Master Plan for airport improvements.
- Development of an implementation plan.
- Identifying the financial implications of adding the Airport to the State System of Airports.

1.5 METHODOLOGY

The Kalaeloa Airport Master Plan was prepared after consultation with the State of Hawaii Department of Transportation, Airports Division (DOTA), the Federal Aviation Administration (FAA), Base Redevelopment Commission, Redevelopment Commission Airport Task Force (Technical Advisory Committee) and the general public. The Technical Advisory Committee reviewed and commented on detailed aspects of the Master Plan as related to their areas of interest or concern. Its membership represented various Airport users, governmental agencies, and community representatives. In addition, public informational meetings were held during the course of the Kalaeloa Airport Master Plan study to inform and obtain input from interested parties in the community.

Several airport alternatives were prepared for presentation to the Redevelopment Commission Airport Task Force in 1994 (these are described in Appendix A). The alternatives ranged from providing a single 3,700-foot runway for general aviation use only up to three 7,000-foot runways that would accommodate the USCG and HNG as well as general aviation. The alternative concepts were reviewed with the Redevelopment Commission Airport Task Force and the public on September 1, 1994. On September 1, 1994 the Redevelopment Commission Airport Task Force selected Alternative 6 for the recommended long-range Airport Master Plan which included three 7,000-foot runways. (See Appendix A.)

In 1995 the Airport Task Force was restructured and expanded in order to address additional issues as the Task Force on Transportation, Infrastructure and Urban Design. The following individuals and organizations served on the Transportation, Infrastructure and Urban Design Task Force:

Name/Title	Affiliation
Robin Foster, Chair, Vice President	Plan Pacific
Roy Wickramaratna, Co-Chair	Community
Tim Beltz, Commander	U.S. Coast Guard
Henry Bruckner	General Aviation Council of Hawaii
Arline Eaton	Community
Toru Hamayasu, Planning Chief	Department of Transportation Services
Ben Lee, Deputy Managing Director	Office of the Managing Director
Eugene Lee, Program Coordinator	Department of Public Works
Felix Limtiaco, Director	Department of Waste Water Management
Gordon Lum, Executive Director	Oahu Metropolitan Planning Organization
Martha Makaiwi	Community
Richard Young, Lt. Colonel	Department of Defense

Sidney Miyakawa, Utilities Management Director	U.S. Navy, Public Works Center
Owen Miyamoto, Airports Administrator	Department of Transportation
Dave Mori, Business Agent	ILWU
Ralston Nagata, State Parks Administrator	Department of Land and Natural Resources
Patrick Onishi, Director	Department of Land Utilization
Hugh Ono, Highway Administrator	Department of Transportation
Dave Parker	Community
Jane Ross	Community
Howard Takara, Acting Executive Director	Honolulu Public Transit Authority
John Thatcher, Executive Director	Airlines Committee of Hawaii
Richard Uyehara, President	Hawaii Federal Employees Metal Trades Council
Shereen Wachi	Pacific Division, Naval Facilities Engineering Command
Howard Yoshioka, Manager	Honolulu Airports District Office Federal Aviation Administration
Brooks Yuen	Board of Water Supply
Samuel Mitchell	Liliha/Kapalama Neighborhood Board No. 14
Karen Wenke	Ewa Neighborhood Board No. 23

Additional information on potential use of the Airport, for airline and military alternate airport designations and civil defense/disaster relief needs, as well as additional analyses performed since September 1994, are reflected in this report. In response to DOTA requests in the Summer of 1995 and early in 1996, both an Optimum and a Minimum Airport Master Plan were developed (see Appendix A). The Optimum Airport Master Plan reflects refinements to Alternative 6 as noted earlier. The Minimum Airport Master Plan reflects the "Airport Envelope" that was presented to the Redevelopment Commission in December 1995.

The Optimum and Minimum Airport Master Plans were then incorporated in the Redevelopment Commission's alternative plans for redevelopment of the NAS Barbers Point as a whole. The Alternative A (Optimum) Concept provided the maximum flexibility for airport operators by incorporating all existing runways and related facilities for continued aviation activity on approximately 900 acres. The Alternative B (Minimum) Concept provided minimum space requirements on approximately 645 acres to accommodate aviation industry goals for NAS Barbers Point.

The March 1997 Community Redevelopment Plan recommends approximately 725 acres for use as a general aviation reliever airport. The recommended Airport Master Plan described in this report is based on the Community Redevelopment Plan as modified by more recent and ongoing discussions and negotiations.

In addition to the technical analyses, surveys of Oahu aircraft owners and commercial aviation/fixed base operators were also conducted as part of the study. The results of these surveys are summarized in Appendix B.

1.6 REPORT CONTENT

This report is organized to correspond to the sequence of the planning methodology used to prepare the Airport Master Plan and Airport Noise Compatibility Program. It is divided into nine chapters, as described below:

Chapter 1 *Master Planning Process.* Discusses the Airport's potential relationship to the State of Hawaii Airport System and describes the objectives and methodology used in formulating the Airport Master Plan. Describes the Redevelopment Commission process as it relates to the Airport.

Chapter 2 *Existing Airport Facilities.* Presents the inventory of existing airport facilities at NAS Barbers Point; air traffic control facilities, procedures, and operations at the Airport.

Chapter 3 *Aviation Demand Forecasts.* Presents regional population and economic conditions relevant to potential activity at the Airport. Reviews historical air traffic activity and documents forecasts of potential aviation activities at the Airport.

Chapter 4 *Airport Facility Requirements.* Documents the ability of the existing airfield and other Airport facilities to accommodate forecast activities (demand/capacity analyses), and determines additional Airport facilities required to accommodate the projected demand.

Chapter 5 *Airport Master Plan.* Presents the Airport Master Plan selected by the Redevelopment Commission for the Kalaeloa Airport and supporting rationale. The Airport Layout Plan drawings are included.

Chapter 6 *Implementation Plan.* Presents a phased capital improvement program plan and related cost data for the Airport Master Plan.

Chapter 7 *Financial Implications.* Describes the economic and financial implications of the Airport Master Plan in relationship to the State of Hawaii airport system.

Chapter 8 *Noise Compatibility Program.* Identifies potential noise impacts of the selected airport development concept. Identifies noise mitigation and noise abatement measures to minimize future land use incompatibilities in the vicinity of the Airport.

Chapter 9 *Environmental Analysis.* Presents an evaluation of the significant environmental impacts associated with the Airport and aviation activity.

In addition, there are four appendices to the report:

Appendix A - Presents a comparative evaluation of the alternative airport development concepts that were prepared for review and discussion with the Base Reuse Committee Airport Task Force in 1994. It also includes the Optimum and Minimum airport development concepts reviewed by the Redevelopment Commission between 1995 and 1997.

Appendix B - Presents a summary of the aircraft owner and fixed base operator/ commercial aviation surveys that were conducted as part of the Master Plan Study.

Appendix C - Presents a summary of new airspace/air traffic control terminology.

Appendix D - Presents a comparative evaluation of the noise impacts associated with the various alternative airport development concepts and supporting information used in the noise analysis.

Chapter 2

EXISTING AIRPORT FACILITIES

2.1 OVERVIEW

This chapter describes the existing airport facilities at NAS Barbers Point that could be used as part of a State owned and operated airport. In addition, this section identifies airspace and air traffic control procedures associated with operations at the Airport.

NAS Barbers Point is located 8 nautical miles west of Honolulu International Airport and about 20 miles by road from the center of Honolulu. The Airport elevation is 33 feet above mean sea level. The entire Base contains approximately 3,709 acres and 2,117 acres have been declared surplus by the U.S. Navy in September 1995. The existing airport/aviation facilities are generally bounded by Midway Road on the north and Coral Sea Road on the east, south and west and include about one third of the Base area. The airport facilities are shown on Figure 2-1, Existing Airport Facilities, and Figure 2-2, Existing Terminal Area Facilities, and described below.

2.2 EXISTING AIRPORT FACILITIES

Existing airport facilities include the airfield (runways, taxiways, helipads,) aprons, hangars, navigational aids, terminal/administrative areas, airport support (aircraft rescue and firefighting, air traffic control tower and fuel farm), access and parking as well as supporting infrastructure.

2.2.1 Airfield

The existing airfield configuration at NAS Barbers Point consists of two parallel runways (4R-22L and 4L-22R), a single crosswind runway (11-29) intersecting at midfield and associated taxiways. Helicopters operate from several locations on the Airport.

2.2.1.1 Parallel Runways 4R-22L and 4L-22R

The centerlines of the parallel Runways 4R-22L and 4L-22R are separated by 625 feet and are oriented in an approximate southwest-northeast alignment, with runway azimuth of 234 degrees, 58 minutes 14 seconds, true.

Runway 4R-22L is 8,330 feet long by 200 feet wide with an effective gradient of 0.19 percent from a threshold elevation of 11 feet on Runway 4R up to a threshold elevation of 27 feet on Runway 22L.

Runway 4L-22R is 8,330 feet long by 200 feet wide with an effective gradient of 0.19 percent from a threshold elevation of 13 feet on Runway 4L up to a threshold elevation of 29 feet on Runway 22R.

Emergency aircraft arresting gear is located 2,400 feet from the threshold of Runway 4L and 1,500 feet from the threshold of Runway 22R. The arresting gear extends above the runway surface and, because of the size of the tires, military aircraft are able to roll over the arresting gear without difficulty. However, the same is not true for the much smaller tires on general aviation aircraft. The arresting gear will be removed by the Navy.

Both runways are painted with precision instrument runway markings and equipped with High Intensity Runway Lights (HIRL). There are distance-to-go markers on both runways.

2.2.1.2 Runway 11-29

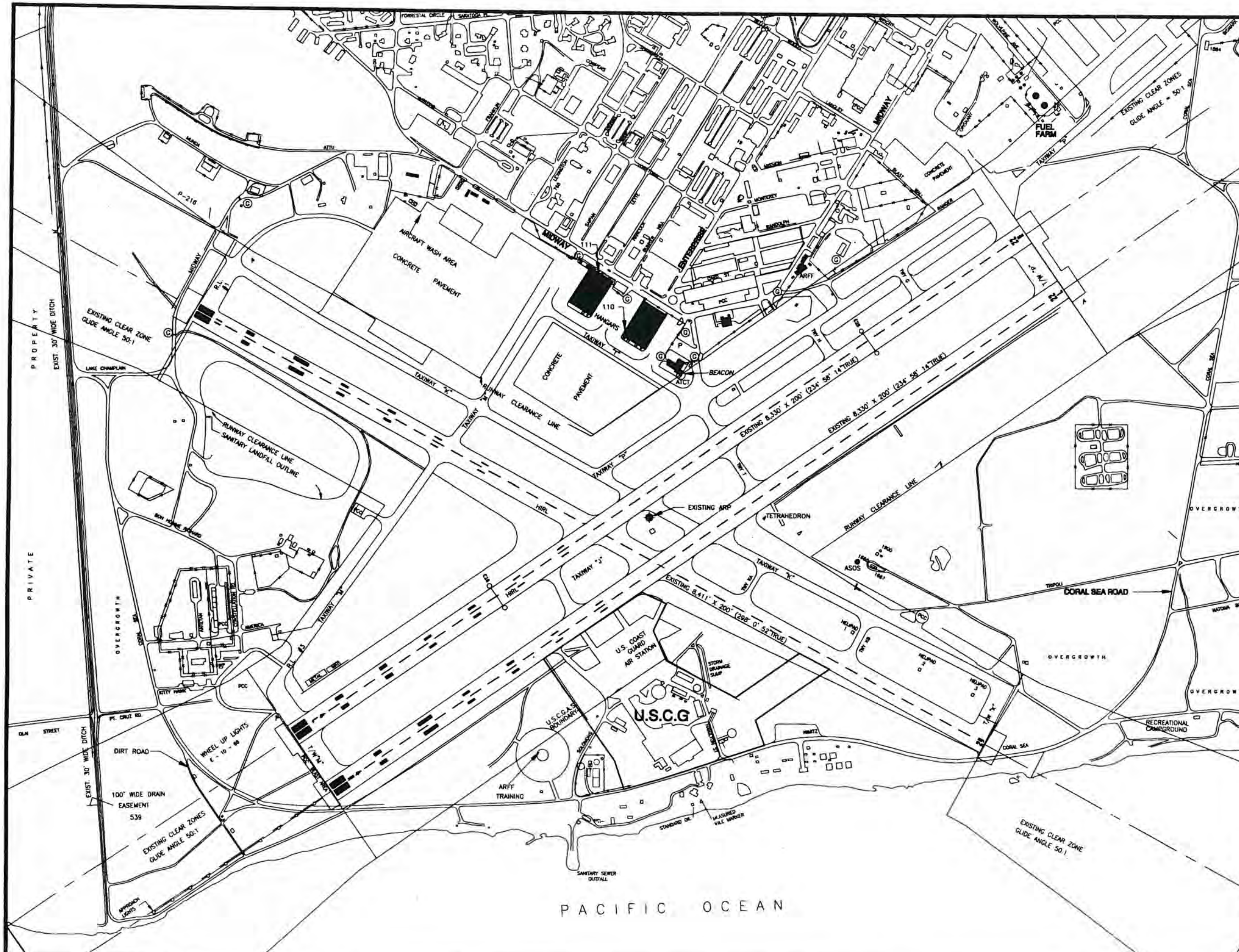
The crosswind Runway 11-29 is in an approximate northwest-southeast alignment with a runway bearing of 298 degrees, 0 minutes 52 seconds, true. The runway is 8,411 feet long by 200 feet wide with an effective gradient of 0.29 percent from a threshold elevation of 9 feet on Runway 29 up to a threshold elevation of 33 feet on Runway 11.

The runway is painted with precision instrument runway markings and equipped with High Intensity Runway Lights (HIRL). There are distance-to-go markers along the runway.

2.2.1.3 Airfield Pavement

The estimated pavement strengths in terms of maximum gross weight (pounds), as defined by aircraft landing gear configuration for all three runways, are as follows:

Single Wheel (S)	74,000 pounds
Dual Wheel (D)	167,000 pounds
Dual Tandem Wheel (DT)	327,000 pounds
Dual Dual Tandem (DDT)	800,000 pounds
Single Tandem Wheel (C130)	189,000 pounds



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

EXISTING AIRPORT FACILITIES

LEGEND	
	STRUCTURE
	AIRFIELD/APRON PAVEMENT
	FENCING
●	AIRPORT REFERENCE POINT
P	PARKING LOTS
	WINDSOCK

TRUE NORTH
MAGNETIC NORTH 10°30'E(1998)

GRAPHIC SCALE IN FEET

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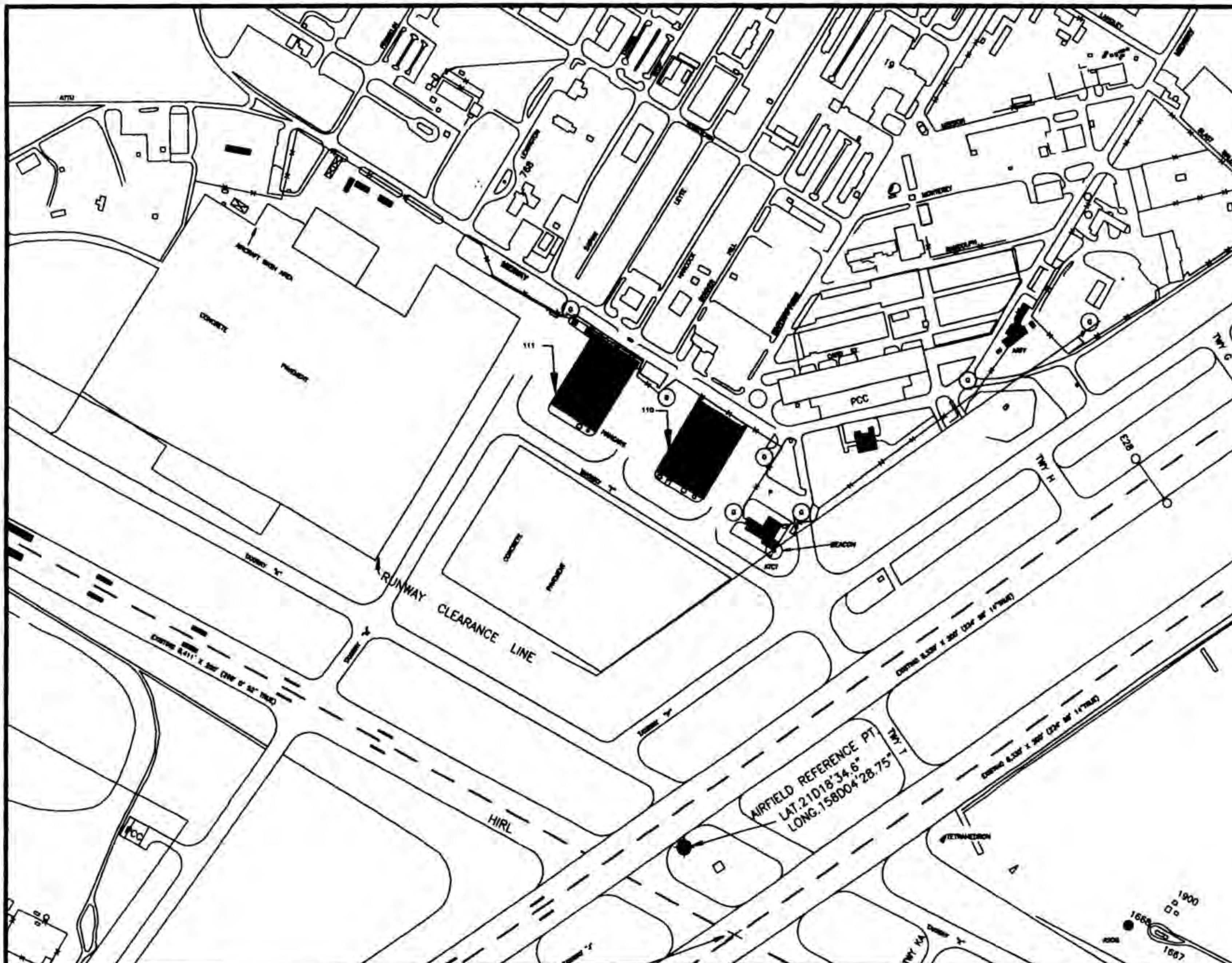
DATE: 11-12-98	FIGURE NO. 2-1
DWG. NO.: BPA-21EA	



State of Hawaii
Airports Division

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

EXISTING TERMINAL AREA FACILITIES

LEGEND	
	STRUCTURE
	AIRFIELD/APRON PAVEMENT
	FENCING
	AIRPORT REFERENCE POINT
	PARKING LOTS
	WINDSOCK

TRUE NORTH

MAGNETIC NORTH 10°30'E(1998)

GRAPHIC SCALE IN FEET

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DATE: 10-07-98

DWG. NO.: EPA-02TA

FIGURE NO. 2-2

2.2.1.4 Helipads

There are two helicopter landing and takeoff pads just south of the Air Traffic Control Tower. There are several Navy carrier practice helipads located near the east end of Runway 11-29. The U.S. Coast Guard (USCG) helicopters take off and land on the taxiway leading to the USCG apron.

2.2.1.5 Taxiways

The taxiways are shown on Figure 2-1. Most of the taxiways are 75 feet wide. There is a full length parallel Taxiway K on the north side of Runway 11-29. There is a partial parallel Taxiway P on the west side of Runway 4L-22R that extends north from Taxiway K to north of the end of Runway 4L-22R. Taxiway M extends south from the large hangars and apron area to the south ends of Runways 4-22. There are no parallel taxiways on the east side of Runway 4R-22L or south side of Runway 11-29.

There are five exit/entry taxiways along both Runways 4-22 and also five along Runway 11-29. Taxiways T and M connect the airfield to the aircraft parking apron and hangar area north of the runways and Taxiway P connects to the hangar and apron area north of the end of Runway 4L-22R.

Most of the taxiways are lighted with medium intensity taxiway lights (MITL). On Taxiway P there are recessed taxiway lights to beyond the ends of Runway 4L-22R and reflectors north of the fuel farm. There are recessed taxiway lights along Taxiways K and P south and east of the aircraft parking aprons, respectively. There are recessed taxiway lights along the south side of Taxiway K from Taxiway M to Runway 4L-22R. There are taxiway reflectors on Taxiway K from the west end of Runway 11-29 east to Taxiway M on the south side and east to the west end of the west apron on the north side. There are reflectors on both sides of Taxiway K from Runway 4R-22L to the end of Runway 29.

2.2.2 Aircraft Parking Aprons

There are two large aircraft parking aprons with tiedown anchors in place north of the intersection of the runways. The east apron by the air traffic control tower contains approximately 900,000 square feet of paved area and the west apron contains approximately 1,600,000 square feet of paved area. The two aprons have a total area of about 60 acres.

2.2.3 Hangars

There are two large hangars (Buildings 110 and 111) north of the intersection of the runways. Hangars 110 (105,284 square feet) and 111 (102,270 square feet) are located north of the aircraft parking aprons and south of Midway Road as shown on Figures 2-1 and 2-2. Each hangar has a clear area of about 75,000 square feet for aircraft parking. The hangar doors are partitioned into eight (8) sections. There are two floors of office space at each end of the hangars with a total of about 24,000 square feet of office space in each hangar. The hangars were built as part of the original base construction in the early 1940s.

2.2.4 Clear Zones, Approach Areas and Obstructions

2.2.4.1 Clear Zones

The term Clear Zone, civil term Runway Protection Zone, is used by the United States Department of Defense for all military airports. The existing clear zones are contained within the NAS Barbers Point boundary or over the ocean except for a small part of the Runway 11 clear zone to the west. A portion of the Runway 11 clear zone is over private property to the west of the Base. The clear zone dimensions are identical for both ends of each of the three runways. The clear zones have an inner width of 1,500 feet, a length of 3,000 feet and an outer width of 2,312 feet as shown on Figure 2-1.

Coral Sea Road violates the clear zone criteria at the approach ends to Runways 4R, 4L and 29. However, these violations are waivered by the Navy. That portion of Coral Sea Road that violates the clear zones for Runways 4R and 4L is currently closed to traffic except for emergency or approved access. That portion of Coral Sea Road that violates the clear zone for Runway 29 is controlled by traffic lights operated by personnel in the Barbers Point Air Traffic Control Tower.

2.2.4.2 Approach Areas and Obstructions

The existing approach area dimensions are identical for both ends of each of the three runways. The inner width is 1,500 feet, the outer width is 16,000 feet and the length is 50,000 feet. The approach surfaces slope upward at a ratio of 50:1 to an altitude of 533 feet above sea level, which is 500 feet above the airport elevation. The rest of the approach surface out to the 50,000 foot length is horizontal.

The latest 1993 Navy drawings entitled "Obstructions to Air Navigation" show some obstructions that violate Navy airfield safety standards, but most of these have been waivered by the Navy (see Figures 2-3 and 2-4). The military criteria are more stringent than the civil criteria contained in FAR Part 77 that will be applicable to the Kalaeloa Airport.

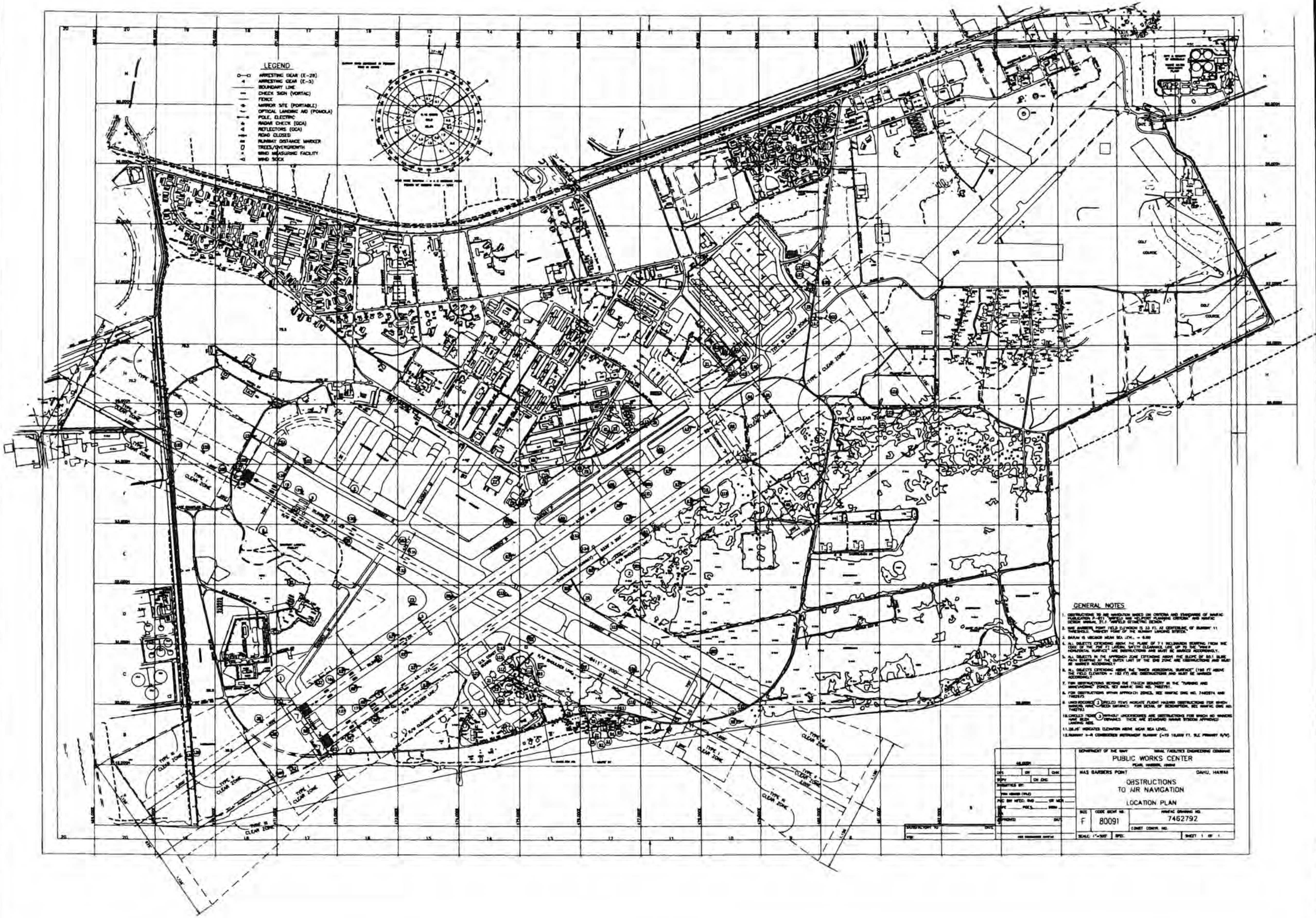
The two groups of trees on the southeast side of Runway 22L, from 400 feet to 3,000 feet from the runway threshold, that would be considered obstructions based on FAA civil criteria have already been cleared. Other than approved navigational aids, there are no obstructions within the clear zones or approach areas except for Coral Sea Road, as described earlier. However, there are some penetrations to other FAR Part 77 imaginary surfaces. Some stacks in the Campbell Industrial Park at 1-1/2 nautical miles (NM) west of the intersection of the runways penetrate the inner horizontal surface. The elevation of the inner horizontal surface is 183 feet mean sea level (MSL), and the stacks rise to an elevation of 310 feet MSL. These stacks dictate the instrument flight rule (IFR) circling minimums to the Airport and the straight-in minimums for the nondirectional beacon (NDB) approach to Runway 4L. Other obstructions to the north of the Airport, including mountainous terrain, prohibit maneuvering north of the runways for circling IFR approaches.

2.2.5 Navigational and Landing Aids

Existing navigational aids include high intensity approach lights with sequenced flashers on Runway 4R. There are wheel-up lights for Runway 4L. There are also military tactical air navigational and distance measuring equipment (TACAN) and precision approach radar (PAR) systems.

The Navy Air Traffic Control Tower operates 24 hours a day. There is an airport rotating light beacon located on top of the Air Traffic Control Tower. There are wind cones near the ends of Runways 4L, 11, 22L and 29 and just west of the intersection of the runways and a tetrahedron just east of the intersection of the runways. There is an Automated Surface Observing System (ASOS) located east of the runway intersection.

The Ewabe nondirectional beacon (NDB), which is associated with the instrument landing system (ILS) to Runway 8L at Honolulu International Airport, is located 4,700 feet northeast of Runways 4-22.



Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

OBSTRUCTIONS TO AIR NAVIGATION

SOURCE: DEPARTMENT OF THE NAVY

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DATE: 12-22-98	FIGURE NO.
DWG. NO.: BPA-01-MP	2-3

NAVAL AIR STATION BARBERS POINT

OBJECTS VIOLATING AIRFIELD SAFETY CRITERIA

PARALLEL RUNWAYS 4–22 (8,330' X 200' EACH)
CROSSWIND RUNWAY 11–29 (8,411' X 200')
END ELEVATION R/W 4–L 13.16, R/W 4–R 11.46, R/W 11 32.74, R/W 22–L 27.12, R/W 22–R 29.28' AND R/W 29 8.87.

VIOLATION OBJECT NO	GRID LOCATION	OBSTRUCTION DESCRIPTION	SUBJECT RUNWAY	DISTANCE ON FROM END OF END ZONE	DISTANCE L OR R FROM RUNWAY CENTERLINE	ELEVATION AT CENTERLINE OF RUNWAY	OBSTRUCTION GROUND ELEVATION	HEIGHT OF OBSTRUCTION	HEIGHT ABOVE R/W CLEARANCE CRITERIA	WAIVER I.D. NO.	ACTION BEING TAKEN TO ELIMINATE OBSTRUCTIONS	REMARKS
1	C-16-C-17	AIRCRAFT PARKING (AEC AREA)	4-L		L-300'-655'	13'	12'	-	-	BE-7	NONE, USED AS AIRCRAFT ARMING AND DE-ARMING PAD	
2	F-15	AIRCRAFT PARKING (VC-1 AREA)	11		L-560'-750'	27'	31'	-	4'	BP-2	NO LONGER USED FOR AIRCRAFT PARKING	
3	D-14	ARRESTING GEAR (E-28)	4-L		L-180' R-180'	17'	18'	4'	5'		STANDARD NAVAIR APPROVED NAVIGATIONAL AIDS	
4	E-11	ARRESTING GEAR (E-28)	22-L		L-140' R-140'	23.4'	22.5'	4'	3'-1"		"	
5	C-15	ARRESTING GEAR (E-28)	4-R		L-180' R-180'	12'	15'	5'	8'		"	
6	F-16	ARRESTING GEAR (E-28)	11		L-147' R-147'	29'	30'	5'	6'		"	
7	E-10-E-11	CORAL PIT (SECURED)	22-L		L-500' - 750'	23'	3'	-20'	-	BP-2	PARTIALLY FILLED, FILLING TO CONTINUE	
8	E-18-C-17	CORAL PIT (SECURED)	11		R-500' - 1,250'	31'	7'	-23'	-	BP-2	PARTIALLY FILLED, USED AS SANITARY LAND FILL	
9	B-16-B-17	CORAL SEA ROAD AT APPROACH END OF	4	*100'-900'					-	BP-2	EMERGENCY USE ONLY (CLOSED & POSTED)	CLOSED TO TRAFFIC
10	B-9-B-10	CORAL SEA ROAD AT APPROACH END OF	29	*50'-1,100'					-	BP-2	NONE - FUTURE ACTION	
11	H-9	FENCE, JET FUEL FARM (JP-5 AREA)	22-R	*655'	R-650'	29.28'	36'	7'	3'-8"	BP-2	MCON P-086 WILL RESITE	
12	G-10-G-11	FENCE, M&U COMPOUND	22-R		R-670'	30'	30'	10'	10'	BP-2	MCON P-073 WILL RESITE	
13	F-12	G.C.A. UNIT	22-R		R-805'	27'	29'	38'	38'	BUAER SPOLTR AER-SE-63/319 OF 17 NOV. 1955	MCON P-051 WILL RELOCATE G.C.A. TO NEW SITE	
14	F-13	HELO PARKING PAD (2 EA.)	22-R		R-560'	24'	25'	-	1'	BUAER LTR AER-SE-43 OF 27 APRIL 1954	USED ONLY ON OCCASIONS FOR TRANSIENT & VIP AIRCRAFT	
15	F-17-G-17	MIDWAY ROAD AT APPROACH END OF	11	*150'					-	BP-2	CLOSED & POSTED	CLOSED TO ALL TRAFFIC
16	C-16	MIRROR SITE (PORTABLE)	4-L		L-108'	12.5'	12'	6'-10"	6'-4"		STANDARD NAVAIR APPROVED NAVIGATIONAL AIDS	
17	B-15	MIRROR SITE (PORTABLE)	4-R		L-108'	12.5'	12'	6'-10"	6'-4"		"	
18	F-16	MIRROR SITE (PORTABLE)	11		L-108'	31'	31'	6'-10"	6'-10"		"	
19	F-8	MIRROR SITE (PORTABLE)	22-L		L-108'	26'	28.8'	6'-10"	5'-8"		"	
20	C-10	MIRROR SITE (PORTABLE)	29		L-177'	11'	10'	6'-10"	15'-10"		"	
21	H-9	POLE, LIGHTS	22-R	*772'	R-630	29.28'	36'	29'	35'-8"	BP-2	MCON P-086 WILL RESITE	
22	G-11	POLE, POWER NO. C-5	22-R		R-923'	30'	32'	40'	42'	BP-2	MCON P-073 WILL RELOCATE P.W. TO NEW SITE	
23	G-11	POLE, POWER W/TRANSFORMER NOS. C-6 & C-7	22-R		R-977'	30'	32'	45'	47'	BP-2	"	
24	C-13	POLE, POWER NO. C-27	4-R		R-856'	18'	15'	40'	37'	BP-2	NONE - FUTURE ACTION	
25	C-13	POLE, POWER NO. C-28	4-R		R-1,115'	17'	13'	40'	36'	BP-2	"	
26	B-12	POLE, POWER NO. C-46	29		L-898'	12'	8'	35'	29'	BP-2	"	
27	B-11	POLE, POWER NO. C-47	29		L-796'	12'	7'	35'	30'	BP-2	"	
28	B-11	POLE, POWER NO. C-48	29		L-880'	12'	8'	35'	31'	BP-2	"	
29	B-11	POLE, POWER W/TRANSFORMER NO. C-49	29		L-984'	12'	10'	35'	33'	BP-2	"	
30	G-11	POLE, SECONDARY NO. C-8	22-R		R-830'	30'	32'	40'	42'	BP-2	MCON P-073 WILL RELOCATE P.W. TO NEW SITE	
31	C-13	POLE, SECONDARY NO. C-18A	4-R		R-860'	17'	15'	30'	28'	BP-2	TO BE DEMOLISHED UPON COMPLETION OF NEW C.G. HANGAR/ADMIN.	
32	B-11	POLE, SECONDARY NO. C-51	29		L-916'	10'	11'	30'	31'	BP-2	NONE - FUTURE ACTION	
33	B-11	POLE, SECONDARY NO. C-52	29		L-843'	11'	11'	30'	30'	BP-2	"	
34	B-11	POLE, SECONDARY NO. C-53	29		L-787'	11'	12'	30'	31'	BP-2	"	
35	H-8	RANGER STREET AT APPROACH END TO (CLOSED)	22	*925'						BP-2	CLOSED & POSTED	CLOSED TO ALL TRAFFIC
36	G-10	RANGER STREET ALONG P.R. COMPOUND (CLOSED)	22-R		R-840'					BP-2	CLOSED & POSTED	CLOSED TO ALL TRAFFIC
37	C-16	REFLECTOR G.C.A.	4-L		L-270'	13'	11'	4'	2'	BUAER SPOLTR AER-SE-63/319 OF 17 NOV. 1955	STANDARD NAVAIR APPROVED NAVIGATIONAL AIDS	
38	B-17	REFLECTOR G.C.A.	4-L	*625'	L-250'	13'	11'	4'	2'	"	"	
39	B-17	REFLECTOR G.C.A.	4-L	*625'	CENTERLINE	13'	12'	4'	3'	"	"	
40	B-15	REFLECTOR G.C.A.	4-R		R-178'	11'	10'	4'	3'	"	"	
41	B-18	REFLECTOR G.C.A.	4-R		R-170'	11'	8.5'	4'	2'-8"	"	"	
42	A-16	REFLECTOR G.C.A.	4-R	*300'	CENTERLINE	11'	10'	4'	3'	"	"	
43	D-10	REFLECTOR G.C.A.	22-R		R-213'	30'	30'	4'	4'	"	"	
44	H-9	REFLECTOR G.C.A.	22-R	*748'	CENTERLINE	29.28'	32'	4'	6'-9"	"	"	DELETE
45	C-15	RUNWAY DISTANCE MARKER	4-L		L-177'	13'	13'	3'	3'	BP-2	"	
46	C-15	RUNWAY DISTANCE MARKER	4-L		R-177'	13'	13'	3'	3'	BP-2	"	
47	D-15	RUNWAY DISTANCE MARKER	4-L		L-176'	15.5'	15.2'	3'	2'-8"	BP-2	"	
48	D-14	RUNWAY DISTANCE MARKER	4-L		R-178	15.5'	15'	3'	2'-8"	BP-2	"	
49	C-15	RUNWAY DISTANCE MARKER	4-R		R-178'	11'	12'	3'	4'	BP-4	"	
50	B-15	RUNWAY DISTANCE MARKER	4-R		R-178'	11'	11'	3'	3'	BP-4	"	
51	C-14	RUNWAY DISTANCE MARKER	4-R		L-178'	13'	15'	3'	5'	BP-4	"	
52	C-14	RUNWAY DISTANCE MARKER	4-R		R-170'	13'	13'	3'	3'	BP-4	"	
53	F-16	RUNWAY DISTANCE MARKER	11		R-178'	30'	29.4'	3'	2'-5"	BP-1	"	
54	E-15	RUNWAY DISTANCE MARKER	11		R-176	29'	28'	3'	3'	BP-1	"	
55	D-14	RUNWAY DISTANCE MARKER	11		R-176	30'	20'	3'	3'	BP-1	"	
56	G-10	RUNWAY DISTANCE MARKER	22-R		R-176	30'	30'	4'	4'	BP-2	"	
57	F-10	RUNWAY DISTANCE MARKER	22-R		L-178'	30'	28.7'	4'	2'-8"	BP-2	"	
58	F-11	RUNWAY DISTANCE MARKER	22-R		R-176'	29'	27.9'	4'	2'-11"	BP-2	"	
59	F-11	RUNWAY DISTANCE MARKER	22-R		L-178'	29'	28.5'	4'	1'-8"	BP-2	"	
60	F-12	RUNWAY DISTANCE MARKER	22-R		R-178'	26'	26.5'	4'	4'-6"	BP-2	"	
61	E-13	RUNWAY DISTANCE MARKER	22-R		R-178'	23'	23.5'	4'	4'-6"	BP-2	"	
62	F-10	RUNWAY DISTANCE MARKER	22-L		R-175'	28'	28'	4'	4'	BP-4	"	
63	F-10	RUNWAY DISTANCE MARKER	22-L		L-175'	28'	24.8'	4'	0'-11"	BP-4	"	
64	F-11	RUNWAY DISTANCE MARKER	22-L		R-175'	28'	25.5'	3'	2'-6"	BP-4	"	
65	E-10	RUNWAY DISTANCE MARKER	22-L		L-176'	26'	22.5'	3'	-	BP-4	"	
66	E-11	RUNWAY DISTANCE MARKER	22-L		L-175'	23'	20'	3'	-	BP-4	"	
67	C-11	RUNWAY DISTANCE MARKER	29		L-176'	11'	10'	3'	2'	BP-1	"	
68	C-11	RUNWAY DISTANCE MARKER	29		L-178'	13'	12'	3'	2'	BP-1	"	
69	D-12	RUNWAY DISTANCE MARKER	29		L-178'	17'	16.5'	3'	2'-8"	BP-1	"	
70	D-11	WIND MEASURING FACILITY	22-L		L-515'	21'	18'	9'	6'	BP-10	"	
71	C-18	WIND SOCK	4-L	*190'	L-315'	13'	12'	17'	16'	BP-2	"	
72	D-14	WIND SOCK	4-L		L-431'	17'	16'	18'	17'	BP-2	"	
73	G-16	WIND SOCK	11		L-890'	34'	37.5'	15'-9"	19'-3"	BP-2	"	
74	G-9	WIND SOCK	22-L	*140'	L-173'	27'	27.8'	16'	19'-10"	BP-2	"	
75	F-13	BLDG. 4 AIRCRAFT CONTROL TOWER	22-R		R-745'	27'	30'	60'	65'	BUAER 2313142 OF 24 JULY 1951	NONE - FUTURE ACTION	
76	J-8	BLDG. 82 TELEPHONE EXCHANGE	22-R	*2,630'	R-830'	29.28'	38'	28'	36'-9"	BUAER 2313142 OF 24 JULY 1951	"	DELETE
77	F-13	BLDG. 110 AIRCRAFT MAINTENANCE HANGAR	22-R		R-1,140'	24'	31'	63'	70'	BP-2	"	
78	F-12	BLDG. 115 WEAPONS DEPT & OFFICE	22-R		R-865'	28'	31'	32'	35'	BUAER 2313142 OF 24 JULY 1951		
79	F-11	BLDG. 132 FUEL TESTING SHED	22-R		R-634'	29'	29'	12'	12'	BP-2	MCON P-086 WILL RELOCATE FUEL FARM TO NEW SITE	
80	G-12	BLDG. 140 AVIATION WAREHOUSE	22-R		R-1,020'	28'	31'	46'	49'	BP-2	NONE - FUTURE ACTION	
81	G-11	BLDG. 145 P.W. MAINTENANCE SHOP	22-R		R-830'	30'	31'	17'	18'	BP-2	MCON P-073 WILL RELOCATE P.W. TO NEW SITE	
82	G-11	BLDG. 147 P.W. MAINTENANCE SHOP	22-R		R-880'	30'	31'	28'	29'	BP-2	MCON P-073 WILL RELOCATE P.W. TO NEW SITE	
83	H-9	BLDG. 167 JET FUEL STORAGE TANK	22-R		R-885'	29.28'	38'	45'	53'-9"	BP-2	NONE - FUTURE ACTION	
84	H-9	BLDG. 168 JET FUEL STORAGE TANK	22-R		R-885	29.28'	38'	45'	53'-9"	BP-2	"	
85	H-9	BLDG. 169 PUMPING STATION ABOVEGROUND	22-R	*308'	R-770'	29.28'	38'	10'	15'-9"	BP-2	"	
86	F-8	BLDG. 174-B VEHICLE MAINTENANCE FAC (SECURED)	22-L		L-1,110'	27'	23'	28'	24'	BP-2	ABANDONED - WILL BE DEMOLISHED	
87	J-9	BLDG. 182 FIRE EQUIPMENT SHED	22-R	*1,050'	R-890'	29.28'	38'	10'	18'-9"	BP-2	MCON P-086 TO BE RELOCATED TO NEW SITE	
88	F-11	BLDG. 708 JET FUEL STORAGE TANK	22-R		R-670'	29'	29'	15'	15'	BP-2	MCON P-086 WILL RELOCATE TO NEW SITE	
89	G-11	BLDG. 803 P.W. SAWDUST HOPPER	22-R		R-1020'	30'	33'	23'	26'	BP-2	MCON P-073 WILL RELOCATE P.W. TO NEW SITE	
90	D-12	BLDG. 1809 NAVIGATION - TRAFFIC AID	22-L		L-214'	21'	20'	15'	14'	BP-2	STANDARD NAVAIR APPROVED NAVIGATIONAL AIDS	
91	E-16	BLDG. 1843 ANTENNA POLE & WIRE	11		R-1,250'	27'	17'	48'	38'	BP-2	POLE CUT TO 48 FEET	DELETE
92	B-11	BLDG. 1701 BEACH COTTAGE E.M.	29		L-805'	11'	11'	12'	12'	BP-2	NONE - FUTURE ACTION	
93	B-11	BLDG. 1702 BEACH COTTAGE E.M.	29		L-750'	11'	11'	12'	12'	BP-2	"	
94	B-11	BLDG. 1704 BEACH COTTAGE E.M.	29		L-810'	11'	11'	12'	12'	BP-2	"	
95	B-11	BLDG. 1705 BEACH COTTAGE E.M.	29		L-750'	11'	11'	12'	12'	BP-2	"	
96	A-16-B-17	END ZONE	4							BP-2	MCON P-077 AND P-087 WILL IMPROVE END ZONE	
97	F-16-G-17	END ZONE	11							BP-2	MCON P-077 WILL IMPROVE END ZONE	
98	G-8-H-9	END ZONE	22							BP-2	MCON P-077 AND P-087 WILL IMPROVE END ZONE	
99	C-9-B-10	END ZONE	29							BP-2	NONE - FUTURE ACTION	
100	J-7	CORAL PIT	22-R	2,400'	CENTERLINE	29.28'	2'	-23.28'	-	BP-2	MCON P-082 WILL CORRECT	
101	F-10	625' CENTERLINE DISTANCE BETWEEN PARALLEL RUNWAY 4 VICE REQ'D 700'								BUAER 2313142 OF 24 JULY 1951	NONE - FUTURE ACTION	
102	F-11	475' CENTERLINE DISTANCE BETWEEN RUNWAY 22-R AND TAXIWAY "F" VICE REQ'D 500'								BP-2	"	
103	E-14	475'-7" CENTERLINE DISTANCE BETWEEN RUNWAY 11 AND TAXIWAY "K" VICE REQ'D 500'								BP-2	"	
104	C-11	ARRESTING GEAR (E-28)	29		L-156' R-156'	11'	11'	5'	5'		STANDARD NAVAIR APPROVED NAVIGATIONAL AIDS	
105	B-16-A-17	APPROACH LIGHTS	4-R	*200'	CENTERLINE	11'	9'	1'	-		"	
106	F-10	ARRESTING GEAR (E-28)	22-R		L-150' R-150'	29'	29'	5'	5'		"	
107	G-18	REFLECTOR G.C.A.	11		L-887.5'	31'	31'	3'	3'	BP-11	"	
108	F-17	REFLECTOR G.C.A.	11	*100'	L-100'	35'	35'	3'	3'	BP-11	"	
109	F-17	REFLECTOR G.C.A.	11	*100'	R-100'	36'	35'	3'	3'	BP-11	"	
110	G-18	REFLECTOR G.C.A.	11	*432.5'	CENTERLINE	35'	29'	7'	1'	BP-12	"	
111	D-11	HANG G.C.A. UNIT	29		L-700'	13'	14'	26'	27'	BP-11	"	
112	D-13	FPN-63	4-L		R-300'	22'	21'	23'	22'	BP-12	"	
113	F-8	TREES	22-L		R-220'-740'	27'	23'	30'	26'		NONE - FUTURE ACTION	
114	E-10-E-11	TREES	22-L		R-335'-750'	26'	4'	50'	28'		"	
115	C-8-D-10	TREES	29		R-970'-1300'	11'	12'	50'	51'		"	
116	B-10-C-11	TREES	29		L-350'-750'	12'	7'	20'	15'		"	
117	C-13	POLE, POWER NO. C-18A	4-R		R-875'	16'	15'-6"	35'	34'-6"		"	
118	C-13	POLE, POWER NO. C-22	29		L-732'	18'	16'	35'	33'		"	
119	C-12	POLE, POWER	29		L-688	18'	14'	37'	33'		"	
120	C-13	POWER UNIT	4-R		R-520	18'	14'	1'	-		"	
121	G-8	POLE, POWER	22-L	*2505	L-1065	27'	26'	35'	34		"	
122	G-8	POLE, POWER	22-L	*2695	L-1010'	27'	26'	35'	34'		"	
123	G-8	POLE, POWER	22-L	*2795	L-980	27'	26'	27'	26'		"	
124	G-8	POLE, POWER	22-L	*2855'	L-880	27'	27'	35'	35'		"	
125	K-8	POLE, POWER (2)	22-R	*2735'	R-940	28'	38'	30'	41'		"	
126	K-7	POLE, POWER	22-R	*2897	R-925'	28'	40'	38'	50'		"	
127	K-8	POLE, POWER	22-R	*2855	R-1070'	28'	43'	28'	43		"	
128	K-8	POLE, POWER	22-R	*2973	R-1141'	28'	43'	28'	43'		"	
129	F-16	RUNWAY DISTANCE MARKER	11		L-174	29'	31'	3'	5'		STANDARD NAVAIR APPROVED NAVIGATIONAL AIDS	
130	F-15	RUNWAY DISTANCE MARKER	11		L-178	27'	27'-6"	3'	3'-6"		"	
131	E-14	RUNWAY DISTANCE MARKER	11		L-176	23'	23'	3'	3'		"	
132	E-14	RUNWAY DISTANCE MARKER	11		R-178	23'	20'	3'	-		"	
133	E-12	RUNWAY DISTANCE MARKER	22-R		L-175	26'	23'	3'	2'		"	
134	E-11	RUNWAY DISTANCE MARKER	22-R		R-178	23'	25'	3'	2'		"	
135	F-17	REFLECTOR	11		R-124	35'	31'	4'	-	BP-12	"	
136	F-18	REFLECTOR	11		L-317	32.5	31'	12'-7"	11'-1"	BP-12	"	
137	B-15	REFLECTOR	4-L		R-311	12.5'	11'	10'	8'-6"	BP-12	"	
138	A-18-B-18	DRAINAGE DITCH	4-L	*2186'	R-500 - L-880	13'	0'-2"	-	-	BP-8	NONE - FUTURE ACTION	
139	A-18-B-18	FENCE	4-L	*2115'	R-500 - L-825	13'	11'	4'	2'		"	
140	F-18-H-18	DRAINAGE DITCH	11	*1495'	R-840 - L-1000'	35'	11'	-	-	BP-10	"	
141	F-18-H-18	FENCE	11	*1390'	R-750 - L-1000'	35'	24'	8	-		"	
142	B-9	TRAFFIC SIGNAL	29		R-475'	11'	7'	20'	16'	BP-22	"	
143	B-11	TRAFFIC SIGNAL	29		L-510'	11'	8'	20'	17'	BP-22	"	
144	B-13	AIRCRAFT PARKING APRON	4-R		R-873'	16'	12'	-		BP-21	"	
145	C-13	AIRCRAFT PARKING APRON	4-R		R-818	16'	16'	-		BP-23(T)	"	
146	H-9	POSTS (8)	22-R	*705-995'	R-351'	28'	36'	4	12'		"	
147	H-8-J-8	FENCE	22-R	*1020-2300	R-407	28'	37'	10	19'		"	
148	J-8	FENCE	22-R	*2422'	R-465	28'	39'	12'	23'		"	
149	C-12	STORM DRAINAGE SUMP	29		L-400	15'	0'	-15	-	BP-2	NONE - FUTURE ACTION	
150	B-10	WIND SOCK	29		L-185	11'	9'-4"	18'-6"	16'-10"		STANDARD NAVAIR APPROVED NAVIGATIONAL AIDS	

* INDICATE DISTANCE FROM END OF THRESHOLD

NOTES:

1. EXISTING WAIVERS:

WAIVER NO.	DESCRIPTION
A. BUAER 2313142 OF 24 JULY 1951	INSUFFICIENT DISTANCE BETWEEN CENTERLINE, 625' VICE REQUIRED 700', OF PARALLEL RUNWAY 4, AND BUILDINGS LOCATED WITHIN LATERAL CLEARANCE ZONE
B. BUAER LTR AER-SE-43 OF 27 APRIL 1954	ALLOW AIRCRAFT PARKING 100' WITHIN THE OUTER EDGE OF THE REQUIRED 750' RUNWAY LATERAL CLEARANCE
C. BUAER SPOLTR AER-SE 63/319 OF 17 NOV. 1955	CONSTRUCTION OF ABOVEGROUND G.C.A. TRANSFORMER PAD AND HARDSTAND BETWEEN RUNWAY 4L AND TAXIWAY "F" AND WITHIN LATERAL CLEARANCE ZONE
D. BP-1 REF: BUWEPS LTR OF 13 DEC. 1961	INSTALL UNLIGHTED RUNWAY DISTANCE MARKERS ON SOUTHSIDE OF RUNWAY 11-29
E. BP-2 REF: BUWEPS LTR SMC-11/77: CWR OF 22 DEC. 1961	BLANKET WAIVER ON ALL AIRFIELD OBSTRUCTIONS SHOWN ON NASBARPT DWG. NOS. 3530-7 AND 3530/1-329
F. BP-3 REF: BUWEPS LTR SMC-11/18: CWR OF 7 FEB. 1962	INSTALL F-8U POWER CHECK FACILITY ON CONCRETE APRON NEAR END OF RUNWAY 11 and within the 750' LATERAL CLEARANCE (NOT REQ'D. CHECK FACILITY RESITED OUTSIDE OF CLEARANCE ZONE ACROSS R/W-11)
G. BP-4 REF: BUWEPS LTR 0320322 APRIL 1962	RELOCATION OF RUNWAY DISTANCE MARKERS ON R/W 4-R. MARKERS WERE RELOCATED 70-75' FROM THE EDGE OF THE 200' WIDE RUNWAY VICE THE STANDARD 25' DISTANCE
H. BP-7 REF: BUWEPS LTR SMC-211/2880: RDH OF 3 JUNE 1965	CONSTRUCTION OF AEC AIRCRAFT PARKING APRON WITHIN THE 750' RUNWAY LATERAL CLEARANCE OF RUNWAY 4-L APPROACH ZONE
I. BP-8 REF: BUWEPS 1ST END SMC-211/3577: RDH ON BUDOCKS LTR 81.210/EPM OF 20 SEP. 1965	ALLOW FUTURE CONSTRUCTION OF COVERED DRAINAGE DITCH 2,000' FROM THRESHOLD OF RUNWAY 4- TO EXPEDITE LAND EXCHANGE BETWEEN NAVY AND CAMPBELL ESTATE
J. BP-10 GRANTED 20 OCT. 1977	PERMIT AUTOMATIC WEATHER STATION, AN/TMQ-29A TO BE LOCATED 500 FEET EAST OF RUNWAY 4R-22L
K. BP-11 REF: BPT LTR ON FILE GRANTED 1 SEP. 1982	PERMIT HANG GCA VAN, 28 FEET HIGH, TO BE LOCATED 887.5 FEET NORTH OF RUNWAY 11-2 HANG GCA GPI REFLECTOR WITH A HEIGHT NOT TO EXCEED 5 FEET TO BE LOCATED 887.5 FEET NORTH OF RUNWAY 11-29 AND TWO HANG GCA BRACKETING REFLECTORS 100 FEET OUTBOARD OF RUNWAY 11 END, 100 FEET NORTH AND SOUTH, RESPECTIVELY, O/T OF RUNWAY 11-29 EDGE
L. BP-12 REF: BPT LTR ON FILE GRANTED 10 JUN. 1985 RVSD. 4 AUG. 1988	PERMIT AN/FPN-63 PAR TO BE LOCATED 312 FEET EAST OF RUNWAY 4L-22R. PERMITS ROY TO BE LOCATED 750 WEST OF RUNWAY 4L-22R AND PENETRATES 7:1 TRANSITIONAL SURFACE. PERMITS RUNWAY REFLECTOR TO BE LOCATED AT THE THRESHOLD END OF RUNWAY 11, TOUCHD REFLECTOR ON RUNWAY 11, CENTERLINE REFLECTOR OF RUNWAY 4R, END OF RUNWAY REFLECT ON RUNWAY 4R, TOUCHDOWN REFLECTOR ON RUNWAY 4R AND CENTERLINE REFLECTOR ON RUNWAY 4L
M. BP-13 REF: BPT LTR ON FILE GRANTED 13 JUN. 1985	PERMIT MICROWAVE TOWER TO PENETRATE THE 7:1 TRANSITIONAL SURFACE OF RUNWAY 4L-22 ORIGINALLY GRANTED AS WAIVER BP-12
N. BP-14 REF: BPT LTR ON FILE GRANTED 8 SEP. 1986	PERMIT BLAST DEFLECTOR FENCE TO BE LOCATED OFF THE NORTHWEST EDGE OF THE AIRCRAFT PARKING APRON ADJACENT OF HANGAR 282
O. BP-18 REF: CARD FILE NAVAIRSYSCOM GRANTED MAY 1990	PERMIT TACTICAL AIR NAVIGATION CHECKPOINT SIGNS ON TAXIWAYS LEADING TO RUNWAY 4L-22R
P. BP-19 REF: BPT LTR ON FILE GRANTED 8 JAN. 1987	PERMIT DRAINAGE DITCH ALONG SOUTHWEST PROPERTY LINE IN TYPE II CLEAR ZONE OF RUN APPLICABLE REQUIREMENTS OF NAVFAC P-80.3 ARE WAIVED
Q. BP-20 REF: LTR 11000 SER AIR-4221G/10330, 4 JUN. 1992	PERMIT FLOOD LIGHT POLE TO BE LESS THAN 100 FEET FROM THE EDGE OF COAST GUARD AIRCRAFT APRON. NAVFAC P-80 REQUIREMENTS ARE WAIVED PROVIDED NO PART OF AIRCRAFT IS WITHIN SIX FEET OF THE POLE WHEN ALL OF THE AIRCRAFT WHEELS ARE ON THE APRON
R. BP-21 REF: LTR 11000 SER AIR-4221G/10330 4 JUN. 1992	PERMIT TAIL OF AIRCRAFT PARKED ON COAST GUARD APRON TO PROTRUDE ABOVE 7:1 TRANSITION SURFACE. APPLICABLE NAVFAC P-80.3 REQUIREMENTS ARE WAIVED
S. BP-22 (T) REF: LTR 11000 SER AIR-4221G/10364, 9 JUN. 1992	PERMIT A TRAFFIC SIGNAL IN THE CLEAR ZONE OF RUNWAY 29 AND ANOTHER TRAFFIC SIGNAL IN THE RUNWAY 29 PRIMARY SURFACE; AND TO PERMIT UNCONTROLLED TRAFFIC ON PORTIONS OF CORAL SEA ROAD THAT ARE IN THE CLEAR ZONE AND PRIMARY SURFACE. NAVFAC P-80.3 REQUIREMENTS ARE WAIVED UNTIL 30 JUNE 1997
T. BP-23(T) REF: LTR 11000 SER AIR-09T1G/10603, 15 OCT. 1992	PERMIT PARKING ONE HC-130H ON THE PRIMARY SURFACE OF RUNWAY 4R-22L NO CLOSER THAN 800 FEET FROM THE RUNWAY CENTERLINE AND APPROXIMATELY 1,000 FEET FROM RUNWAY 11-29 CENTERLINE. NAVFAC P-80.3 REQUIREMENTS ARE WAIVED UNTIL 30 AUGUST 1993

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
PUBLIC WORKS CENTER
PEARL HARBOR, HAWAII

NAS BARBERS POINT — OAHU, HAWAII

TABLE OF OBSTRUCTIONS
TO
AIR NAVIGATION

DES | DR A.T. | CHK B.I.
SUPV | CH ENG
SUBMITTED BY
PWC ON NFEC. ENG ___ BR MGR ___
OPPE ___ FDE ___ MGM ___
DIR
APPROVED — DATE
SATISFACTORY TO — DATE

SIZE F | CODE IDENT NO 80091 | NAVFAC DRAWING NO 7462793
CONST. CONTR. NO.
SCALE: NONE | SPEC | SHEET 2 OF 2

Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPOR
MASTER PLAN

ISLAND OF OAHU

TABLE OF OBSTRUCTIONS TO AIR NAVIGATION

SOURCE: DEPARTMENT OF THE NAVY

NOTE:
THIS DRAWING IS FOR PLANNING PURPOSES ONL' A IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIO PURPOSES

ARIES CONSULTANTS LTD.

DATE: 12-22-98 | FIGURE NO 2-4
DWG. NO.: BPA-01-MP

2.2.6 Military and Government Aviation Facilities

2.2.6.1 U.S. Coast Guard

The USCG, which is currently a tenant of the Navy at Barbers Point, leases a 48-acre area located south of Runways 4R-22L and 11-29 and north of Coral Sea Road as shown on Figure 2-1. The boundary of the USCG area is not fenced. USCG owned facilities include miscellaneous storage structures, residential and recreational facilities, an administrative building and hangars used for aircraft maintenance and operations.

There is a taxiway connection directly from Runway 4R-22L to the USCG aircraft parking apron. The aircraft parking apron accommodates the C130 and HH-65A helicopters based at the USCG facility.

2.2.6.2 Hawaii National Guard

The Hawaii National Guard (HNG) currently has a portable Ground Control Approach (GCA) facility located adjacent to Runway 29.

2.2.7 Airport Access and Parking

2.2.7.1 Airport Access

There are two principal points of road access to NAS Barbers Point as shown on Figure 1-2. The main entrance to the Base is from the north via Fort Barrette Road, which connects it to the H-1 Freeway, the main regional thoroughfare in the area. Fort Barrette Road intersects with Franklin D. Roosevelt Road (which runs along the entire northern boundary of the Naval Air Station) immediately inside the boundary of the Base. Fort Barrette Road becomes Enterprise Road south of Franklin D. Roosevelt Road and continues on to the existing facilities in the center of the Base as shown on Figure 2-1. Enterprise Road ends at the intersection with Midway Road which is along the northern edge of the airport/aviation facilities on the Base. Access to areas south, east and west of the runways is via Coral Sea Road on the east and Midway Road on the west.

Access to the Base from the east is via Geiger Road, which connects to Fort Weaver Road. Geiger Road intersects the Base's perimeter roads, Franklin D. Roosevelt Road to the north and Essex Road to the east and southeast, immediately inside the Base's eastern boundary.

Pacific Planning and Engineering estimated peak traffic volumes (in vehicles per hour) on Fort Barrette Road at the entrance to the Base in November 1992 as follows:

	Inbound	Outbound	Total
Morning Peak Hour	900	200	1,100
Afternoon Peak Hour	210	720	930

Current peak-hour volumes (in vehicles per hour) on Geiger Road at the entrance to the Base were estimated by Pacific Planning and Engineering to be:

	Inbound	Outbound	Total
Morning Peak Hour	820	550	1,370
Afternoon Peak Hour	420	800	1,220

2.2.7.2 Parking

Existing parking areas on the Base are located close to the building which they serve. In general, they consist of asphaltic concrete pavement and are in good condition. The number of stalls is adequate for the existing volumes of use. There are over 300 spaces south of Midway Road in the vicinity of Hangars 110 and 111 and the air operations building/air traffic control tower.

2.2.7.3 Airport Service Roadways

As is true of many of the military airfields that were developed in Hawaii during World War II, most areas between the existing roadways and between the runways and many of the taxiways are paved. Consequently, service vehicles are able to use these paved areas to reach most facilities.

2.2.8 Airport Support

2.2.8.1 Administration/Terminal Building

There is a 17,238 square foot air operations building/air traffic control tower (Building 4) located north of the intersection of the runways and south of, and adjacent to, Midway Road.

2.2.8.2 Aircraft Rescue and Firefighting

There is a 10,300 square foot, 8-bay Aircraft Rescue and Firefighting (ARFF) facility (Building 1755), a 1,000 square foot aircraft rescue and firefighting station (Building 1880) and fuel truck parking area west of Runway 4L-22R and east of Midway Road.

The firefighting training pit is located in the southwestern part of NAS Barbers Point, south of Runway 4R-22L and north of Coral Sea Road, as shown on Figure 2-1. A 100-foot diameter concrete lined firefighting pit was built in 1984. The facility was closed in 1991.

2.2.8.3 Weather Service

The Naval Pacific Meteorology and Oceanography Detachment is located in the Air Operations Building. There is an Automated Surface Observing System (ASOS) located near the center of the airfield.

2.2.8.4 Airport Support and Maintenance Facilities

Maintenance of the airfield is currently contracted out by the Navy.

2.2.8.5 Fuel Storage

The fuel farm is located northwest of Taxiway P and east of Midway Road and consists of the following tanks:

2 - 600,000 gallon above ground JP-5 tanks
1 - 40,000 gallon above ground MoGas tank
1 - 30,000 gallon above ground diesel tank
1 - 10,000 gallon above ground waste fuel tank
1 - 500 gallon underground waste fuel tank

A fueling station is used to transfer JP-5 from the 600,000 gallon tanks into fuel supply trucks that are used to refuel aircraft. A 10,000 gallon waste fuel tank is located west of the JP-5 fueling station. Waste fuel spilled during fueling operations drains to an adjacent catch basin; a sump transfers the contents from the catch basin to the waste fuel tank. A propane tank is also located at the fuel farm.

A 570,000-gallon underground storage tank is located approximately 3,250 feet to the southwest of the fuel farm and 670 feet from the centerline of Runway 4L-22R. This tank is connected to the two above ground 600,000 gallon storage tanks by an underground pipeline. There is a pipeline from Red Hill that runs across the former Ewa Airstrip to the northeast and along the northern edge of Taxiway P to the underground tank.

The USCG currently obtains fuel from the fuel farm and refuels aircraft from tanker trucks.

2.2.8.6 Fencing

The Navy controls access to the entire Base at the entrances on Fort Barrette Road and Geiger Road. Therefore, at the present time there is only a limited amount of fencing around the airport/airfield portion of the Base. There is fencing along the south side of Midway Road that extends from the western edge of the two large aircraft parking aprons, near Franklin Road, east towards Mission Road. There is also some fencing southeast of Taxiway P. The east, south and west sides of the airfield are currently unfenced.

2.2.8.7 Aircraft Wash Facilities

There is an aircraft wash area located at the north end of the western large aircraft parking apron and south of Midway Road. The wash area, which is for small aircraft, consists of hoses and drains that lead to an oil-water separator.

There is an overhead aircraft rinse rack and wash area for large aircraft located on the apron near Hangar 282. This is within the 160-acre parcel the HNG will acquire.

2.2.9 Infrastructure

2.2.9.1 Water Supply

The Barbers Point Well is the primary source of potable water used at NAS Barbers Point. It is located approximately 3 miles north (inland) of the Base. This "Lanai" type well is equipped with two deepwell turbine pumps. The pump capacities are 2,800 and 3,200 gallons per minute (4 and 4.6 million gallons per day), respectively, according to Fukunaga & Associates, Inc., in 1992. The pumps are controlled by a float switch in the higher of the two reservoirs that are fed by the wells.

The two reservoirs (Structures 23 and 24) are underground, reinforced concrete structures located approximately 2 miles inland of the Base's boundary. Each is ten feet deep and has a capacity of 1.0 million gallons. Both were constructed in 1944. Spillway elevations are 217 feet above mean sea level (Structure 23) and 212 feet above mean sea level (Structure 24). Water from the wells is chlorinated and fluoridated in a small structure located near the reservoirs prior to transmission and distribution.

A 24-inch diameter water line connects the well with the two reservoirs and the reservoirs with the Base's water distribution system. The pipe is of cast iron and ductile iron material. A portion of the line was relocated in 1991 as part of the Campbell Estate's development of residential areas on lands inland of the Base. The NAS Barbers Point potable water distribution system consists of approximately 57 miles of underground pipes ranging from 6 inches to 24 inches in diameter. An evaluation of the existing distribution network by Fukunaga & Associates, Inc. in 1992 indicated that the capacity of the distribution system is generally adequate to meet the fire flow demands except for the hangar areas and the magazine area west of the runways.

According to records kept by the Navy Public Works Center (PWC), an average annual water use between 1987 and 1991 varied from 2.33 million gallons per day (mgd) to 2.9 mgd. The lowest daily use during the period was 1.0 million gallons (mg), and the highest was 5.2 mg. Slightly over half of the average water use finds its way into the Base's sanitary sewer system; the remainder is used for golf course and landscape irrigation and for washdown/cleaning of equipment and work areas. The State Water Commission has established a 2.337 mgd allocation for the amount of water that can be withdrawn from the existing wells.

2.2.9.2 Wastewater Collection and Treatment Facilities

Wastewater from existing facilities and operations at NAS Barbers Point consists primarily of ordinary domestic sewage and some industrial type wastewaters generated by washdown operations, swimming pools, and the medical clinic. The wastewaters are collected by a system of gravity sewers and wastewater pump stations and conveyed to the City and County of Honolulu's nearby Honouliuli Wastewater Treatment Plan (WWTP) for treatment and disposal. The wastewater is handled under a contract between the Navy and the City and County. The Navy has purchased 2.26 mgd of treatment capacity at the WWTP; the current wastewater allocation to the Base is 1.5 mgd, and the present flow ranges from 0.4 to 0.7 mgd. The Base's collection system consists of approximately 15 miles of 6-inch to 30-inch diameter gravity sewers, 12 wastewater pump stations, and about 7 miles of 4-inch through 18-inch diameter force mains.

A 1992 analysis of the gravity mains in the system by Fukunaga & Associates, Inc. concluded that they are in generally good condition. However, it noted that the rungs in many of the manholes are badly corroded and will need to be replaced soon. The report also noted that sewers are only marginally adequate in sewer manholes 34 through 42 (SMH 34 through SMH 42); it noted that the capacity is exceeded infrequently, however, and concluded that no corrective action was necessary. None of these marginally adequate lines serve areas used for airfield-related activities. The evaluation of the wastewater pump stations in the system by Fukunaga & Associates, Inc. concluded that they were generally serviceable and adequate for the present flows.

2.2.9.3 Storm Drainage System

The average annual rainfall on NAS Barbers Point is relatively low. However, infrequent storms produce significant rainfall events (e.g., the 24-hour rainfall that occurs, on the average, once every 10 years is just under 8 inches). Runoff from these storm events is currently handled through an extensive system of swales, underground pipes, and dry wells. With the exception of small amounts of runoff that may enter the Pacific Ocean as overland flow, storm runoff from NAS Barbers Point is disposed of entirely on-site. The 1994 Environmental Baseline Survey conducted as part of the Navy's CLEAN (Comprehensive Long-Term Environmental Action Navy) Program estimated that the existing stormwater disposal system consists of over 200 dry wells. These consist of bored or drilled shafts ranging from 8 inches to 8 feet in diameter and having depths of from 6 to 60 feet.

According to the 1994 study by Ogden Environmental and Energy Services Co., Inc., several of the dry wells have received discharges from industrial facilities. While this process has been largely discontinued, some effluent from oil/water separators and hangars still flows to dry wells. At Hangar 110, Hangar 111, and the former underground fuel farm near Taxiway P, stormwater runoff and washdown water enter catchbasins that are piped underneath the runways and discharged to an earthen stormwater drainage ditch north of the USCG facility on the south side of the runways. Water discharged to the drainage ditch reportedly either enters the dry wells located in the bottom of the trench or infiltrates the ground surface.

2.2.9.4 Electrical System

Electric power for the Base is provided by the Hawaiian Electric Company (HECO). It is distributed through a system of overhead and underground lines. The primary distributions are 11.5 KV, 3-phase circuits. Transformers reduce this to the 120/240 volt, single-phase, three-wire circuits used to supply individual structures. HECO's generating capacity and the transmission and distribution system are adequate at the present time.

2.2.9.5 Telecommunications System

Telephone service to the Base is provided by GTE Hawaiian Telephone. The Base's existing telephone exchange building is located on Franklin D. Roosevelt Avenue. Most main lines are overhead, but distribution to the newer residential areas is via circuits in underground ductlines. CATV service is provided to the newer residential areas.

2.3 AIRSPACE AND AIR TRAFFIC CONTROL

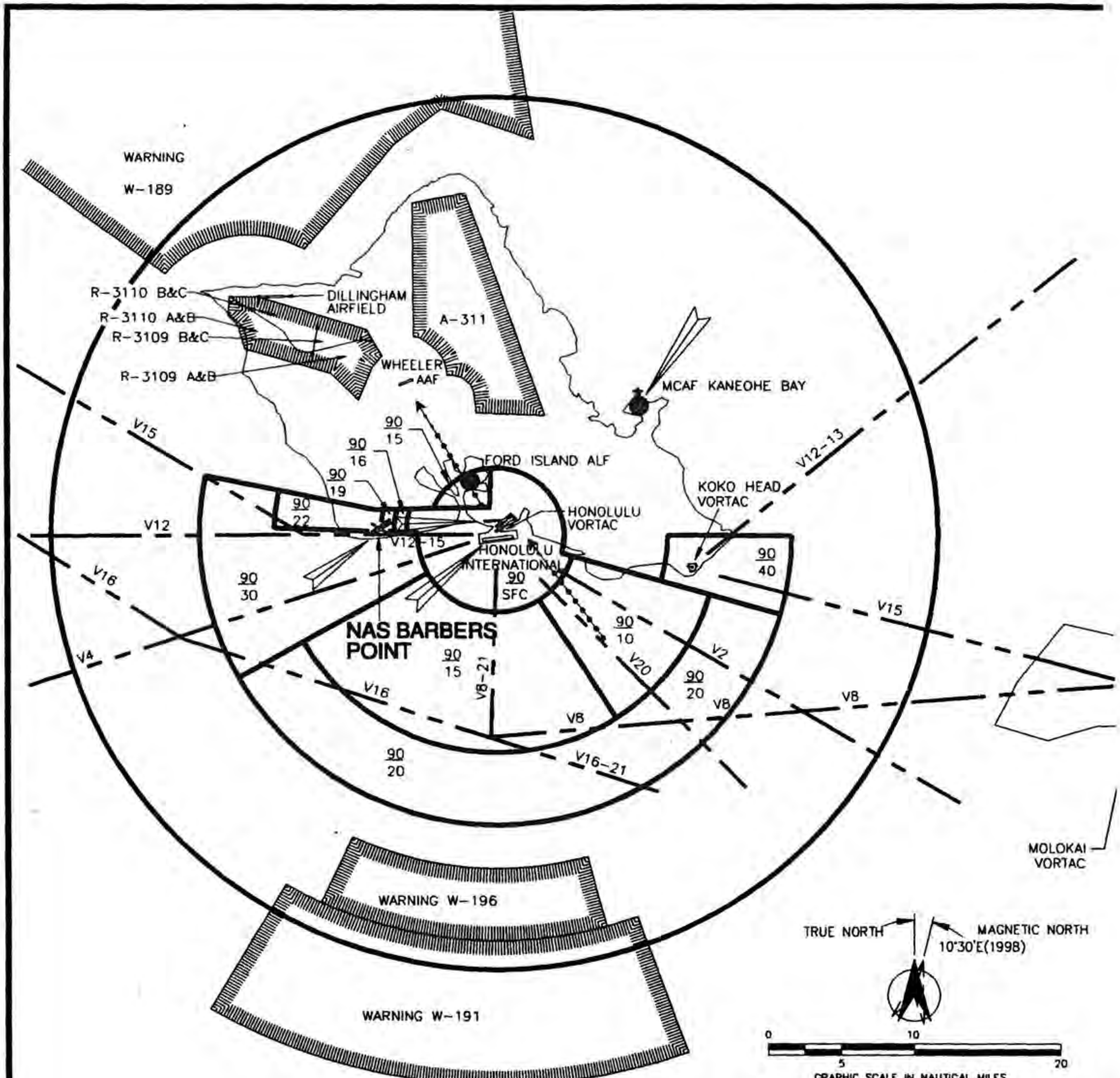
Avigation (air navigation) considerations include airspace and air traffic control, runway protection zones (formerly known as clear zones), approach areas and obstructions, and navigational and landing aids.

2.3.1 Air Traffic Control

Figure 2-5 shows the NAS Barbers Point in relation to the major navigational aids, low altitude airways, special use airspace, IFR approaches and other airports in the area.

There are several navigational aids that provide the basis of the low altitude airway structure in the area. The closest navigational aids (NAVAIDs) to the Kalaeloa Airport are the Honolulu VORTAC and the Koko Head VORTAC. A VORTAC is the colocation of a very high frequency omnidirectional radio range (VOR) and a military tactical air navigational and distance measuring equipment (TACAN). The Honolulu VORTAC is approximately eight (8) nautical miles (NM) to the east and located on the Honolulu International Airport. The Koko Head VORTAC is 13 NM east of the Honolulu VORTAC.

NAVAIDs that presently serve NAS Barbers Point for instrument approaches are the Barbers Point TACAN and the Ewabe Locator Outer Marker (LOM). The Ewabe LOM is the outer marker for the instrument landing system (ILS) to Runway 8L at the Honolulu International Airport, and also serves as the basis for a nondirectional beacon (NDB) approach to Runway 4L at NAS Barbers Point. The LOM will remain but the TACAN will probably be removed by the Navy. The TACAN is of limited use in that civil avionics equipment do not have the military frequencies for the azimuth portion of TACAN. Civil equipment can, however, process the distance measuring equipment (DME) portion of the TACAN signals that are broadcast on a common band of civil/military frequencies.



NOTE:

THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATION PURPOSES.

Airports Division

DEPARTMENT OF TRANSPORTATION STATE OF HAWAII

KALAEOLOA AIRPORT MASTER PLAN

LEGEND

V12	AIRWAYS
	VORTAC
	PRECISION APPROACH
	NONPRECISION APPROACH
90 / 20	CLASS B AIRSPACE EFFECTIVE ALTITUDES IN HUNDREDS OF FEET

AIRSPACE CONFIGURATION

ARIES CONSULTANTS LTD.

NAME: BPA-23AC	NO. 4240-03
DATE: 02-17-98	PLOT SCALE: 1

The Navy has radar facilities on the NAS Barbers Point that provide both precision and nonprecision approaches. However, this equipment will be removed by the Navy. The Hawaii Air National Guard also has precision approach radar (Ground Controlled Approach - GCA) on the Naval Air Station and this may remain. This equipment and personnel are in a training status at this time.

The air traffic control (ATC) facilities that presently serve NAS Barbers Point are the Honolulu Combined Center/Radar Approach Control (CERAP), the Honolulu Terminal Radar Approach Control (TRACON), and the Barbers Point Air Traffic Control Tower (ATCT).

The CERAP provides ATC for en route IFR aircraft. TRACON provides ATC for approach and departure IFR aircraft, and VFR aircraft operating within the Honolulu Class B (formerly TCA) airspace. (The new airspace designations are described in Appendix C.) The ATCT provides ATC for all aircraft within the Class D (formerly airport traffic area) airspace surrounding NAS Barbers Point. The Navy ATCT personnel and some of the equipment will be removed. There may be the option of providing the services of an ATCT. If not, the airspace surrounding the Airport would be downgraded to a lower classification.

The Honolulu TRACON provides approach and departure control services for all the airports within the boundaries of its delegated airspace, including Honolulu International Airport, Wheeler Army Airfield (AAF), and NAS Barbers Point. When NAS Barbers Point becomes Kalaeloa Airport these services will continue to be provided by Honolulu TRACON.

2.3.1.1 Air Route Traffic Control Center Airspace

The airspace over the United States has been divided by the Federal Aviation Administration (FAA) into approximately 25 areas for ATC service to aircraft operating on Instrument Flight Rules (IFR) flight plans. Air traffic control in these areas is provided by the personnel and equipment of FAA ARTCCs, commonly known as Centers (except at Honolulu where it is referred to as CERAP as noted above). NAS Barbers Point/Kalaeloa Airport is within the Honolulu CERAP's jurisdictional area.

2.3.1.2 Terminal Area Airspace

Terminal area airspace is designated for the maneuvering of IFR aircraft approaching and departing airports. Approach and departure control of IFR aircraft may be exercised by the Center, or the Center may delegate terminal area airspace to a local ATC facility for IFR approach and departure control. The airspace overlying most of the island of Oahu including Honolulu International Airport, Wheeler AAF, NAS Barbers Point/Kalaeloa Airport, and over a large area of the ocean south of Oahu, from 16,000 feet above mean sea level and below, has been delegated to the Honolulu TRACON.

2.3.1.3 Air Traffic Control Tower Airspace

Each air traffic control tower (ATCT) has a volume of airspace associated with it, designated as Class B, C or D airspace. Honolulu International has a Class B airspace designation as shown on Figure 2-5. The ceiling and floor levels of the various segments of the Class B airspace are shown on Figure 2-5.

Class B airspace requires an ATC clearance before entering the airspace, certain extra pilot qualifications and certain extra operating aircraft equipment.

NAS Barbers Point has a Class D airspace designation requiring no specific pilot certificate and no ATC clearance. However, two-way radio communications must be established and maintained. The Class D airspace extends from the surface of the ground and the Pacific Ocean up to the floor of the overlying Honolulu Class B airspace within a 5 NM radius of the center of the airfield. The area of the Class D airspace north of the Class B airspace, within 5 NM radius of the center of the airfield, extends from the surface of the ground up to 2,500 feet above the airport elevation, i.e. up to 2,533 feet MSL.

2.3.1.4 Special Use Airspace

Areas near NAS Barbers Point/Kalaeloa Airport that have been designated as special use airspace for the military are shown on Figure 2-5. They are Restricted Areas R-3110A, B and C approximately 12 NM north of the Airport, R-3109A, B and C approximately 9 NM north of the Airport, Alert Area A-311 approximately 10 NM northeast of the Airport, and Warning Area 189 approximately 20 NM north/northwest of the Airport.

Restricted Areas (R) contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Restricted Areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missilery. Penetration of Restricted Areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. R-3109A, B and C and R-3110A, B and C are for use by the U.S. Army and are effective from the ground up to approximately 19,000 feet above mean sea level (MSL).

Alert Areas (A) are depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas. A-311 is for use by the U.S. Army and Air Force and is effective up to 500 feet altitude.

Warning Areas (W) are airspaces which may contain hazards to nonparticipating aircraft in international airspace. Warning Areas are established beyond the 3-mile limit. Although the activities conducted within the Warning Areas may be as hazardous as those in Restricted Areas, Warning Areas cannot be legally designated as Restricted Areas because they are over international waters. Penetration of Warning Areas during periods of activity may be hazardous to the aircraft and its occupants. W-189 is for the use of the Navy, U.S. Marine Corps and other military services and is effective from the surface to an unlimited altitude.

2.3.2 Air Traffic Patterns

The Navy presently has air traffic patterns to the southeast of Runway 4R-22L, northwest of Runway 4L-22R, and southwest of Runway 11-29 for both fixed wing and helicopter operations. There is a right hand traffic pattern on Runway 11. The traffic pattern altitudes are 1,000 feet MSL for fixed wing aircraft and 500 feet MSL for helicopters. The existing air traffic patterns are illustrated on the aircraft noise contour maps from the 1989 NAS Barbers Point Air Installations Compatible Use Zones study in Chapter 8 of this report.

All of the instrument approach procedures are to Runways 4R, 4L or 11. All instrument departures proceed to the southwest on the 210 degree radial from the Barbers Point TACAN, to 10 NM from the TACAN, then proceed on course. Having the instrument procedures from and to the southwest reduces the interactions with operations to and from the Honolulu International Airport (see Figure 2-5).

2.3.3 Airspace Usage

The airspace in the vicinity of NAS Barbers Point/Kalaeloa Airport serves a wide range of civil and military aircraft types and activities both IFR and VFR. The main difference between IFR and VFR is that the pilot maintains spatial orientation of the aircraft by reference to instruments for IFR operations and by visual reference to the ground or surface of water for VFR operations. VFR activity requires good visibility whereas IFR activity can be accomplished in conditions of poor visibility. Meteorological conditions that permit flight under VFR rules are prescribed in the FAR Part 91 *General Operating and Flight Rules*, Paragraph 155, *Basic VFR Weather Minimums*, in terms of visibility and distance from clouds.

2.3.3.1 IFR Operations

As aircraft approach the Honolulu terminal area airspace, Honolulu CERAP directs the aircraft so that they descend from enroute altitudes and are spaced from 5 NM to 10 NM in trail (one behind the other), then transfers control to Honolulu TRACON. TRACON has the responsibility for controlling aircraft from this point to the final approach course to the airport of intended landing maintaining a separation of 3 NM (3 to 6 NM depending on leading and following size of aircraft). As aircraft near the final approach course, they are instructed to descend to a lower altitude. As the aircraft near the final approach fix (FAF) at around 5 to 7 NM from the end of the runway, they are at approximately 1,500 feet above the airport elevation and are cleared for the approach and instructed to contact the ATCT at the airport where they will land.

Departing aircraft receive a clearance prior to takeoff that includes departure procedures and specified climb instructions. At the present time NAS Barbers Point has one published Standard Instrument Departure (SID) procedure that directs IFR departures to the BARRB intersection at 10 DME southwest of the Barbers Point TACAN.

2.3.3.2 VFR Operations

Unlike IFR operations, VFR flights are generally not controlled by the Air Traffic Control System except when operating in certain classes of airspace. On the island of Oahu exceptions are as follows:

- When operating in Class B airspace (formerly TCA) associated with the Honolulu International Airport, an ATC clearance is required and separation services are provided.

- When operating in Class D airspace (formerly Airport Traffic Area) associated with NAS Barbers Point, Marine Corps Air Facility Kaneohe Bay and Wheeler AAF. Two-way radio communications must be established and maintained. Separation services are not provided to VFR aircraft, although advisories may be.

A VFR flyway exists around the north of the Honolulu Class B Airspace. Generally pilots using this flyway to transit the area and remain above the Interstate H-1 corridor. Occasionally some aircraft penetrate the Barbers Point Class D Airspace without radio contact with Barbers Point ATCT. This can be of concern to operations within this Class D Airspace.

2.3.4 Helicopter Operations

There are currently military and USCG helicopters based at NAS Barbers Point. The USCG helicopters are expected to continue to be based at their facility on the south side of the Airport. Additionally, some HNG helicopters will be based at their proposed facility north of the airfield. Civil helicopters may also be based at the Kalaeloa Airport in the future.

Because of the magnitude of helicopter operations over and around the island of Oahu in the mid-1980s, a group was formed, comprised of operators and the FAA, to review and recommend routes and altitudes for helicopters. In October 1987, a map was published by the US Government for use by both civil and military operators. This map shows recommended routes and altitudes for all of Oahu. The routes around NAS Barbers Point/Kalaeloa Airport are approximately 1 NM off the coastline around the south and west of the Airport, above the Interstate Route H-1 corridor to the north of the Airport and over the Pearl Harbor entrance northward over the West Loch to the east of the Airport. Recommended altitudes vary appropriately to be compatible with other aircraft traffic related to NAS Barbers Point, Ford Island Auxiliary Landing Field (ALF) and Honolulu International Airport. Four ingress/egress routes for Barbers Point helicopter operations are provided.

2.3.5 Meteorological Conditions

Trade wind weather with infrequent light showers is the rule at NAS Barbers Point. The winter season brings periods of wet, inclement weather when Kona winds replace the northeast trade winds with southerly winds and rainy weather.

The trade winds are moist when they reach the islands but through orographic lifting the air is relieved of most of its moisture as it passes over the Koolau Range to the northeast. As a result, the leeward areas of the island have sunny skies and few showers during trade wind periods. Eighty-nine percent of the annual rainfall is recorded during the months from October through April. January is normally the wettest month of the year, averaging 4.7 inches of rain. Though June and July are the driest months of the year, with an average of 0.3 inches, the months of May through September are all nearly void of precipitation, each averaging less than an inch of rain annually.

Sky coverage of more than scattered cloud conditions occurs about 40 percent of the time. However, ceiling height and visibilities are almost always high enough to permit visual flight rule (VFR) operations at NAS Barbers Point. Ceilings less than 1,000 feet and/or 3 miles visibility occur only one percent of the time during January, February and December, and less than 1/2 percent of the time the rest of the year.

The humidity at NAS Barbers Point ranges from 60 percent in the summer to 80 percent in the winter. Thunderstorms are rare during the summer months and occur only infrequently during the winter. The mean annual temperature is 76° Fahrenheit, varying from a mean of 72° Fahrenheit in winter to 79° Fahrenheit during summer. Summertime temperatures rarely exceed 96° Fahrenheit. The temperature may dip into the low 50s on a few occasions during the winter each year following a cold frontal passage.

Northeasterly trade winds prevail over Oahu during all months of the year. From November through March the trade winds are occasionally interrupted by moderate to strong southerly winds associated with a Kona frontal passage. Prevailing winds are from the northeast around 8 knots throughout the year, with occasional maximum peak gusts of up to 60 knots in the winter months.

Wind data collected at NAS Barbers Point from 1949 to 1990 indicates that Runways 4-22 provide 97.8 percent wind coverage, Runway 11-29 provides 85.1 percent wind coverage, and combined they provide 99.5 percent wind coverage. This is assuming a maximum allowable crosswind component of 12 miles per hour or 10.5 knots that would apply to small general aviation aircraft.

Chapter 3

AVIATION DEMAND FORECASTS

3.1 OVERVIEW

Studies prepared for the State of Hawaii since the 1960s have identified the need for a general aviation reliever airport on the Island of Oahu to relieve the mix and volume of air traffic activity at Honolulu International Airport. Although a specific location is not defined, a new general aviation reliever airport on Oahu is included as a requirement in the Federal Aviation Administration's (FAA) *National Plan of Integrated Airport Systems* (NPIAS). The NPIAS defines the role and future development of public-use airports throughout the United States.

The FAA defines a reliever airport as a general aviation airport in a metropolitan area intended to reduce congestion at large commercial service airports by providing general aviation pilots with alternative landing areas. According to the NPIAS, the reliever airport must provide substantial capacity or instrument training relief as evidenced by:

- A current activity level for, in the case of a new airport or an airport that is slated for major improvements, a forecast activity level of at least 50 based aircraft or 25,000 annual itinerant operations, or 35,000 annual local operations or,

- The FAA has determined that the airport is a desirable location for instrument training activity, and

The relieved airport:

- Is a commercial service airport that serves a standard metropolitan statistical area (SMSA) with a population of at least 250,000 persons or has at least 250,000 annual enplaned passengers, and

- Operates at 60 percent of its capacity, or would be operated at such a level before being relieved by one or more reliever airports, or is subject to restrictions that limit activity that would otherwise reach 60 percent of capacity.

  Although FAA criteria do not include a specific distance parameter (in terms of travel time or miles) for a reliever airport, the closer the reliever airport is to the primary airport and the metropolitan area being served, the greater the relliever potential that can be provided. Therefore, the closure of NAS Barbers Point provides the opportunity for Kalaeloa Airport to meet the FAA criteria for a reliever airport.

This Chapter presents the forecast aviation activity that could occur as a result of establishing the Kalaeloa Airport as a general aviation reliever airport for the Island of Oahu. Population and economic considerations that are important to the use of and level of activity at the Airport are also described. Historical general aviation activity for the Island's three airports currently providing facilities for general aviation activity--Honolulu International Airport, Dillingham Airfield and Ford Island Auxiliary Landing Field (ALF)--are presented. A review of forecast trends in general aviation activity on the national and State levels was made. This review includes historical data and forecast trends on the national level prepared by the FAA and the initial forecasts of general aviation activity that could be expected to occur at the Kalaeloa Airport prepared as part of the *Update of Hawaii Aviation Demand Forecasts* prepared for the State of Hawaii, Department of Transportation, Airports Division, in 1994.

A survey was made of aircraft owners who base their aircraft on Oahu as part of the airport master planning process. In addition, the commercial aviation/fixed base operators at Honolulu International Airport and Dillingham Airfield were contacted to discuss the viability of relocating general aviation aircraft and associated facilities and services to Kalaeloa Airport and under what conditions these relocations could occur.

Based on the above analyses, aviation demand forecasts for the future use of Kalaeloa Airport as a general aviation reliever airport were prepared. These include information provided by the U.S. Coast Guard (USCG) and Hawaii National Guard (HNG) on their expected future aviation activity at the Airport.

3.2 REGIONAL POPULATION AND ECONOMY

Because the Kalaeloa Airport is expected to serve a primary role as a general aviation reliever airport for Honolulu International Airport, the airport service area will include the entire Island of Oahu. In particular, the airport users in Central and Western Oahu are expected to find the Kalaeloa Airport an attractive alternative to Honolulu International Airport and other airport facilities on Oahu. Historical and forecast population data for the Ewa District are also presented as the State and City and County of Honolulu continue to promote increased residential and economic activity in this District as the "Second City" to complement the already developed areas of Oahu.

3.2.1 Population

The total civilian and military resident population for the State of Hawaii and the City and County of Honolulu are presented in Table 3-1. The resident civilian and military population of the State increased from a population of 769,913 in 1970 to 1,171,600 in 1993, an overall increase of 52 percent. The population of the City and County of Honolulu increased from 630,528 in 1970 to an estimated 863,100 in 1992, an overall increase of 37 percent.

The population for the City and County of Honolulu and the District of Ewa are presented in Table 3-2. The Ewa District population increased from 132,299 in 1970 to 230,189 in 1990, an overall increase of 74 percent. From 1970 to 1990, the population of the City and County of Honolulu increased from 630,528 to 836,231, an overall increase of 33 percent.

The population projections prepared in 1988 by the State of Hawaii, Department of Business, Economic Development and Tourism, in their *Population and Economic Projections for the State of Hawaii to 2010 (Series M-K)* were used. The 1998 Series M-K projected Statewide population to increase by an average annual rate of 1.5 percent through 1995 and at a slightly lower rate of 1.0 percent through 2010. Although population forecasts indicate that higher rates of growth will occur on the Neighbor Islands, the largest concentration of population will remain in the City and County of Honolulu. Population forecasts indicate the City and County of Honolulu will increase from an estimated population of 863,000 in 1992 to an estimated 999,500 by 2010. This represents an average annual growth rate of 0.8 percent. (It should be noted that the State is planning an update of the population and economic projections in the near future.)

3.2.2 Economic Activity

Economic activities on the Island of Oahu are diverse with tourism being the largest industry. The Island economy also depends on military spending, federal and local government spending, agriculture, construction, utilities, marine activities and sports.

The 1988 *Series M-K* projected Statewide employment to increase by an average annual rate of 1.9 percent through 1995 and gradually slowing to 1.5 percent annually through 2000 and 1.0 percent annually beyond 2000 to 2010. Employment forecasts indicate the civilian labor force in the City and County of Honolulu will increase from an estimated 408,200 in 1992 to an estimated 511,200 by 2010. This represents an annual average growth rate of 1.3 percent.

Table 3-1

POPULATION OF THE STATE OF HAWAII
1970-1993

Year	Civilian Resident	Military Residents	Total Resident Population	City and County of Honolulu
1970	714,771	55,142	769,913	630,528
1980	910,600	57,900	964,691	762,565
1990	1,052,896	55,333	1,108,229	836,231
1991	1,080,200	54,700	1,134,900	850,600
1992	1,100,600	55,100	1,155,700	863,100
1993	1,118,900	52,700	1,171,600	-----

Source: State of Hawaii, Department of Business, Economic Development and Tourism

Table 3-2

CITY AND COUNTY OF HONOLULU AND EWA DISTRICT
RESIDENT POPULATION
1970-1990

	Resident Population	
Year	City and County of Honolulu	Ewa
1970	630,528	132,299
1980	762,565	191,051
1990	836,231	230,189
Percent Change		
1970-1980	20.9	44.4
1980-1990	9.7	20.5

Source: State of Hawaii, Department of Business, Economic Development and Tourism

Although the largest concentration of employment is expected to remain in Honolulu, the *Oahu General Plan*, as of 1995, designates the Ewa Plain as Oahu's "second city" and encourages urban expansion onto it. The *Ewa Development Plan*, as of 1995, and zoning designations under the County's Land Use Ordinance, which implement the General Plan, reflect the move to urbanize this historically agricultural area.

3.3 HISTORICAL GENERAL AVIATION ACTIVITY

General aviation is defined as all civil aviation not classified as an air carrier or commuter/air taxi. It includes a multitude of diverse uses of aircraft, ranging from flying for enjoyment and the transportation of personnel or cargo by business firms and individuals in privately-owned aircraft to highly-specialized uses such as aerial surveying, pipeline patrol and aerial advertising. Included in the general aviation category are business and corporate aviation, and the aviation activities of Federal, State and local governments.

The State of Hawaii has four airports classified as general aviation airports in the Statewide Airport System Plan including two, Dillingham Airfield and Ford Island Auxiliary Landing Field (ALF), on the Island of Oahu.

3.3.1 Aircraft Operations

3.3.1.1 Honolulu International Airport

Table 3-3 presents the historical aircraft operations by type at Honolulu International Airport. (The *Update of Hawaii Aviation Demand Forecasts* used 1992 activity for the most recent historical data.) Total aircraft operations increased from 300,629 operations in 1970 to 403,628 operations in 1992, an overall increase of 34 percent. Air carrier operations increased from 122,202 in 1970 to 202,559 in 1992, an overall increase of 65.8 percent. Air taxi operations, which include commuter airline and helicopter sightseeing flights, increased from 27,363 in 1972 to 58,782 in 1992, an overall increase of 115 percent. Air taxi operations were combined with general aviation operations until 1972. General aviation operations increased from 111,225 in 1970 to 113,623 in 1992, an overall increase of 2.2 percent while military operations have decreased from 67,202 in 1970 to 28,664 in 1992, an overall decrease of 57.4 percent.

Total aircraft operations decreased by 11 percent from 403,628 operations in 1992 to 358,505 operations in 1993. Air carrier operations decreased to 185,959 operations. Air taxi operations decreased to 53,742 operations. General aviation operations decreased to 96,504 operations. Military operations decreased to 22,300 operations.

Table 3-3

HISTORICAL AIRCRAFT OPERATIONS BY TYPE
Honolulu International Airport
1970-1993

Year	Air Carrier	Air Taxi[1]	General Aviation	Military	Total
1970	122,202	—	111,225	67,202	300,629
1971	113,087	—	121,915	59,872	294,874
1972	112,403	27,363	100,530	57,565	297,861
1973	114,208	30,852	109,243	54,841	309,144
1974	111,813	37,294	106,442	50,175	305,724
1975	108,446	48,260	111,813	51,257	319,776
1976	108,404	60,614	113,952	37,595	320,565
1977	114,174	68,234	114,484	33,034	329,926
1978	121,056	85,552	137,593	34,905	379,106
1979	133,653	85,177	162,055	31,854	412,739
1980	121,528	76,273	145,215	32,392	375,408
1981	125,321	73,057	110,416	30,565	339,359
1982	128,558	70,574	80,737	28,859	308,728
1983	139,875	75,297	88,657	29,209	333,038
1984	154,121	75,445	82,961	31,291	343,818
1985	167,154	79,329	81,103	29,925	357,511
1986	191,890	69,918	78,985	27,256	368,049
1987	216,044	62,172	83,558	23,501	385,275
1988	185,282	60,628	91,971	40,038	377,919
1989	194,347	64,348	100,287	44,653	403,635
1990	194,357	57,506	122,349	32,836	407,048
1991	196,037	65,390	113,799	28,340	403,566
1992	202,559	58,782	113,623	28,664	403,628
1993	185,959	53,742	96,504	22,300	358,505

1. Air taxi operations were combined with general aviation operations until July 1971.

Source: State of Hawaii, Department of Transportation

Historical activity has fluctuated over the years. Air carrier operations have generally continued to increase. Air taxi aircraft operations have fluctuated over the years in part because of the addition or deletion of commuter/air taxi service by several carriers over the years. General aviation aircraft operations peaked in 1979 at 162,055 operations, declined to 78,985 operations in 1986, increased to 122,349 operations in 1990 and declined to 96,504 operations in 1993. Military aircraft operations have generally declined over the years.

3.3.1.2 Dillingham Airfield

Table 3-4 presents a summary of historical aircraft operations by type for Dillingham Airfield and Ford Island ALF on Oahu. Dillingham Airfield serves as both a general aviation airport as the primary facility in the State that regularly accommodates air taxi glider and skydiving operations as well as military aircraft operations.

Total aircraft operations at Dillingham Airfield decreased from 139,764 in 1975 to 97,728 in 1992, an overall decrease of 30 percent. Powered aircraft operations decreased by 32 percent from 91,453, in 1975 to 61,979 in 1992. Glider operations, while fluctuating in numbers between 1975 and 1992, remained about the same with 30,393 operations in 1992, a 4 percent decrease over the 1975 level of 31,650 operations. Military operations decreased by 71 percent from 16,661 operations in 1975 to 4,906 operations in 1992. The military operations do not include the military activity that occurs at night when the Airfield is closed to civil aviation.

Total aircraft operations decreased by 5 percent from 97,278 operations in 1992 to 92,720 operations in 1993 with glider operations decreasing to 27,928 operations and powered aircraft operations decreasing to 58,721 operations. However, military operations increased to 6,071 operations.

As at Honolulu International Airport, civil (general aviation and air taxi) operations have fluctuated over the years. They reached a high of 123,644 operations in 1979, declined to 73,451 operations in 1982, increased to 111,286 operations in 1989, and declined to 86,649 operations in 1993.

3.3.1.3 Ford Island Auxiliary Landing Field

Ford Island ALF accommodates civil aircraft training operations. Civil aircraft operations at Ford Island ALF decreased from 174,475 in 1975 to 62,744 in 1992, an overall decrease of 64 percent, as presented in Table 3-4. Civil aircraft operations are limited to touch-and-go operations at Ford Island ALF. The civil aircraft touch-and-go operations at Ford Island ALF decreased by 13 percent to 54,277 operations in 1993.

Table 3-4

SUMMARY OF AIRCRAFT OPERATIONS BY TYPE
Dillingham Airfield and Ford Island Auxiliary Landing Field
1975-1993

DILLINGHAM AIRFIELD

Year	Powered	Glider	Military	Total
1975	91,453	31,650	16,661	139,764
1976	83,172	27,324	18,031	128,527
1977	81,366	25,852	24,562	131,780
1978	94,130	29,338	27,162	140,630
1979	91,356	32,288	21,930	145,574
1980	82,604	31,757	16,820	130,989
1981	71,004	33,967	15,946	120,917
1982	56,365	17,086	17,274	90,725
1983	55,078	20,754	9,812	85,644
1984	55,582	24,420	9,228	89,230
1985	60,494	29,590	5,065	95,149
1986	62,976	32,138	4,852	99,966
1987	65,756	32,695	6,202	104,653
1988	70,836	38,494	6,034	115,364
1989	73,382	37,904	5,850	117,136
1990	62,666	31,020	4,294	97,980
1991	66,348	33,980	3,025	103,353
1992	61,979	30,393	4,906	97,278
1993	58,721	27,928	6,071	92,720

FORD ISLAND AUXILIARY LANDING FIELD

Year	Civilian
1975	174,475
1976	172,590
1977	156,811
1978	152,754
1979	177,767
1980	142,438
1981	123,419
1982	108,828
1983	84,857
1984	71,541
1985	85,102
1986	75,429
1987	72,748
1988	77,456
1989	80,193
1990	69,468
1991	62,184
1992	62,744
1993	54,277

Source: State of Hawaii, Department of Transportation

Ford Island ALF civil operations peaked at 177,767 operations in 1979, decreased to 71,541 operations in 1984, increased to 85,102 operations in 1985, decreased to 72,748 operations in 1987, increased to 80,193 operations in 1989, and declined to 54,277 operations in 1993.

3.3.1.4 Naval Air Station Barbers Point

In 1993 there were 68,390 aircraft operations at NAS Barbers Point. Of these, 78 percent were by U.S. Navy or U.S. Marine Corps military aircraft, 21 percent by other military aircraft and 1 percent by air carrier and general aviation aircraft.

3.3.2 Based Aircraft

Based aircraft are those aircraft that are stored in hangars, on tiedowns or otherwise based at Honolulu International Airport or Dillingham Airfield. They include privately owned general aviation and government owned aircraft, as well as commuter and air taxi aircraft.

According to the *Update of Hawaii Aviation Demand Forecasts*, there were 238 aircraft based at Honolulu International Airport and 47 based at Dillingham Airfield in 1992. In 1994, according to State of Hawaii Department of Transportation data, there were 235 aircraft at Honolulu International Airport and 47 at Dillingham Airfield as presented in Table 3-5. There were 188 fixed-wing general aviation aircraft, 61 commuter/air taxi fixed-wing aircraft (including gliders and tow aircraft), and 33 helicopters. Of the total aircraft based at Honolulu International Airport and Dillingham Airfield, an estimated 70 percent are used for general aviation.

An analysis of the geographic distribution of based aircraft owner addresses at Honolulu International Airport and Dillingham Airfield was made based on information provided by the State of Hawaii, Department of Transportation, Airports Division. The results of this analysis are presented in Table 3-5.

3.4 REVIEW OF GENERAL AVIATION TRENDS AND EXISTING FORECASTS

A review of forecast trends in aviation activity on the national, State and local levels was made. This review includes historical data and forecast trends on the national level prepared by the Federal Aviation Administration (FAA) and the most recent forecasts of aviation activity prepared for the 1994 *Update of Hawaii Aviation Demand Forecasts* as part of the State's continuous system planning efforts.

Table 3-5

AIRCRAFT OWNER ADDRESSES
1994

City and County of Honolulu	Honolulu International GA[a]	Honolulu International C/AT[b]	Honolulu International H[c]	Dillingham Airfield GA[a]	Dillingham Airfield G/AT[d]
Honolulu	75	3	10	1	14
Kalihi/Airport	37	20	12	1	
Downtown	9	--	--	--	--
Waikiki	--	--	1	--	--
Waialae-Kohala	1		--		
Kailua	11	--	1	2	1
Kaneohe	10	--	2		
Waialua	1	--	--	5	13
Pearl City	4	--	--	2	--
Aiea	6	--	--	1	--
Makakilo City	1	--	--	--	--
Mililani Town	1	--	--	2	--
Ewa Beach	2	--	--	--	--
Wahiawa	--	--	1	1	--
Haleiwa	--	--	1	2	--
Kahuku	--	--	1	--	--
Waimanalo	2	--	--	--	--
Subtotal	159	23	29	17	28
Maui County	3	--	1	1	1
Kauai County	3	--	--		
Other States	8	9	--	--	--
TOTAL	170	32	33	18	29

a. GA = General aviation
b. C/AT = Commuter/air taxi
c. H = Helicopters
d. G/AT = Air taxi, gliders and tow aircraft

Source: State of Hawaii, Department of Transportation

3.4.1 Federal Aviation Administration

Aviation demand forecasts are prepared by the Federal Aviation Administration (FAA) to meet the budgeting and planning needs of the various offices and services of the FAA.

3.4.1.1 Nationwide

The most recent FAA forecasts were published in March 1994 and are entitled *FAA Aviation Forecasts, Fiscal Years 1994-2005*. According to these forecasts, the general aviation fleet nationwide decreased from 159,700 aircraft in 1988 to 154,100 in 1992, and decreased significantly to 143,600 aircraft in 1993.

Forecasts of the general aviation fleet indicate further decreases in the single-engine and multiengine piston aircraft from 143,600 single-engine aircraft and 18,500 multiengine piston aircraft in 1993 to 131,100 single-engine and 17,600 multiengine piston aircraft by 2005. The continuing decrease in the numbers of single-engine and multiengine piston aircraft is due in part to the retirement of older aircraft from the fleet. Slight increases in multiengine aircraft during the late 1990s and early 2000s are anticipated as new technology aircraft are introduced. (It should be noted that, because of the more recent legislation which placed limitations on aircraft product liability, and the recent announcements of plans by several manufacturers to increase or restart production, the number of single-engine and multiengine aircraft are also expected to increase.)

The FAA also projects the total number of hours flown to increase at an average annual rate of 1.0 percent over the forecast period, primarily in the turbine-powered and rotorcraft aircraft, indicating a greater utilization of the existing fleet. The pilot population is also forecast to increase at an average annual rate of 1.0 percent with growth occurring primarily in the demand for airline transport pilots.

3.4.1.2 Oahu

FAA published the *FAA Aviation Forecasts-Hawaii* in 1993, which included general aviation operations forecasts for the Island of Oahu. The FAA forecast general aviation activity to return to a moderate growth at about the same rate of growth as forecast on the national level. General aviation aircraft operations were forecast for the Island of Oahu for the years 2000 and 2010 as follows:

	FY 1992	FY 2000	FY 2010
Honolulu International	119,896	100,000	90,000
Dillingham Airfield	98,420	132,000	155,000
Ford Island ALF	72,748	----	----
Island of Oahu (new airport)	----	120,000	140,000
TOTAL	291,064	352,000	385,000

The specific location of a new airport on Oahu was not defined but the assumption was made that an estimated 34 percent of forecast general aviation aircraft operations on Oahu would be relocated to a new airport by 2000 and an estimated 36 percent of the forecast general aviation operations by 2010. FAA estimated that actual demand could be higher or lower, depending on the number of aircraft that could be attracted to a new facility and the stimulative effect such a facility may have on general aviation activity on Oahu.

3.4.2 Update of Hawaii Aviation Demand Forecasts

Forecasts of general aviation operations and based aircraft were prepared for the 1994 *Update of Hawaii Aviation Demand Forecasts* for Honolulu International Airport and Dillingham Airfield. In addition, forecasts of general aviation training operations were prepared for Ford Island ALF. The general aviation demand forecasts for each airport are presented in Table 3-6 and discussed in the following paragraphs. Based on these forecasts, assumptions were made as to the attractiveness of relocating some of the based aircraft and aircraft operations to a new general aviation reliever airport at NAS Barbers Point.

General aviation generally decreased after 1979 because of the economy, high product liability costs, high interest costs, high fuel costs, removal of the investment tax credit and the expiration of the Veteran's Bill which provided financial assistance for pilot training. However, for several reasons, general aviation activity is forecast to show some increase in the future. These include the Budget Reconciliation Act repealing the luxury tax on general aviation aircraft; legislative actions placing limitations on aircraft product liability reducing aircraft insurance and cost of new aircraft; reintroduction of the manufacturing of light aircraft; FAA streamlining of the certification process for new entry-level aircraft; strong market for used aircraft: increased use of aircraft for business and corporate flying; and increased use of helicopters by business.

Table 3-6

OAHU GENERAL AVIATION DEMAND FORECASTS[a]
Honolulu International Airport, Dillingham Airfield and Ford Island Auxiliary Landing Field
1992-2020

AIRPORT	Actual[b] 1992	2000	2005	2010	2015	2020
General Aviation						
Aircraft Operations						
Honolulu International Airport	113,623	103,000	107,000	112,000	118,000	130,000
Dillingham Airfield	31,586	35,600	40,400	45,200	50,200	55,800
Ford Island ALF	62,744	-0-	-0-	-0-	-0-	-0-
Based Aircraft						
Honolulu International Airport	238	252	264	277	288	302
Dillingham Airfield	47	52	56	60	64	68

a. Update of Hawaii Aviation Demand Forecasts, October 1994
b. State of Hawaii, Department of Transportation

Source: Aries Consultants Ltd.

3.4.2.1 Honolulu International Airport

Aircraft Operations. Total aircraft operations are forecast to increase from 403,628 in 1992 to 504,500 operations by 2020, an overall increase of 25 percent.

The number of air carrier aircraft operations is forecast to increase from 202,559 operations in 1992 to 263,700 operations by 2020. About five percent of the air carrier operations are assumed to be by air cargo operations.

Commuter/air taxi operations are forecast to increase from 58,782 operations in 1992 to 88,600 operations in 2020. About 30 percent of the commuter/air taxi operations are assumed to be helicopter operations.

General aviation operations have been forecast to show only a modest increase from 113,623 operations in 1992 to 130,000 operations by 2020, assuming continuation of all the current general aviation activity at Honolulu International Airport.

Military aircraft operations are forecast to be between 22,000 and 24,000 operations annually throughout the forecast period.

Based Aircraft. The number of based aircraft is expected to increase from 238 aircraft in 1992 to 302 aircraft in 2020 assuming a continuation of the present types of general aviation activity at the Airport.

3.4.2.2 Dillingham Airfield

The *Dillingham Airfield Master Plan and Part 150 Noise Compatibility Program* prepared for the State of Hawaii, Department of Transportation, Airports Division in 1993 assumed the future role of Dillingham Airfield would remain essentially the same as at present. However, the master plan indicated that the Airfield's role may change if NAS Barbers Point becomes available for civilian use.

Aircraft Operations. Civil aviation aircraft operations, by powered aircraft and gliders, are expected to increase gradually from 97,278 operations in 1992 to 163,000 operations by 2020.

The glider and associated tow aircraft should be counted as air taxi operations according to FAA classifications. On this basis there would be 60,786 air taxi operations and 31,586 general aviation operations in 1992 and 107,200 air taxi operations and 55,800 general aviation operations in 2020.

Military aircraft operations are forecast to remain at approximately 6,000 operations annually throughout the forecast period.

Based Aircraft. The number of based aircraft are forecast to increase from 47 in 1992 to 68 by 2020 assuming a continuation of the present types of general aviation activity. At present air taxi aircraft (gliders, tow and skydiving aircraft) account for about 60 percent of the based aircraft, but are expected to account for an increasing percentage of the total based aircraft in the future. General aviation aircraft could account for a declining percentage of the based aircraft if Kalaeloa Airport becomes a more convenient airport for people to base their aircraft at and also a reliever airport for Honolulu International Airport.

3.4.2.3 Ford Island Auxiliary Landing Field

At this time it is not known how long Ford Island ALF will continue to be available for general aviation training activity. (It is expected to close in 1999.) For the purpose of these forecasts, it is assumed that Ford Island ALF will not be available for general aviation activity by the year 2000. Ford Island ALF operations are assumed to continue at the 1992 level of 62,700 operations and be transferred to Kalaeloa Airport after Ford Island ALF ceases to be available.

3.5 KALAELOA AIRPORT AVIATION DEMAND FORECASTS

The aviation demand forecasts for the Kalaeloa Airport are presented in Table 3-7. The forecasts are based on a review of the historical and forecast general aviation activity on Oahu prepared on the national and local levels. These forecasts were then compared to the results of the aircraft owner survey conducted as part of the airport master planning process. In addition, interviews with the commercial and fixed base operators provided valuable insight into what services and facilities could be provided at the Kalaeloa Airport and under what conditions they would be interested in Kalaeloa Airport. Information on expected aviation activity by the USCG and HNG was also obtained.

3.5.1 Aircraft Owners and Airport Business Surveys

A survey of aircraft owners on the Island of Oahu was conducted as part of the airport master planning process to obtain information and opinions concerning the conversion of NAS Barbers Point to civilian use. Aviation-related businesses located at Honolulu International Airport and Dillingham Airfield were also interviewed to determine the

Table 3-7

AVIATION DEMAND FORECASTS
Kalaeloa Airport
1993-2020

KALAELOA AIRPORT	Actual 1993	2000	2005	2010	2015	2020
Aircraft Operations relocated from						
Honolulu International	----	41,200	48,200	56,000	64,900	78,000
Dillingham Airfield	----	17,800	20,200	22,600	25,100	27,900
Ford Island ALF	----	62,700	62,700	62,700	62,700	62,700
U.S. Coast Guard/Hawaii National Guard	----	13,100	13,100	13,100	13,100	13,100
Total	68,390[a]	134,800	144,200	154,400	165,800	181,700
Based Aircraft relocated from						
Honolulu International	---	101	119	139	158	181
Dillingham Airfield	---	11	12	13	13	14
Total	---	112	131	152	171	195

a. 1993 operations from US Navy

Source: Aries Consultants Ltd.

specific types of facilities and services needed to make the Kalaeloa Airport an attractive alternative, or supplemental location, for their existing facilities and services. The results of these surveys are summarized in Appendix B.

3.5.2 Assumptions

The following assumptions were used in the preparation of the aviation demand forecasts:

- The Department of Transportation, Airports Division (DOTA) will establish Kalaeloa Airport as a general aviation reliever airport for the Island of Oahu.
- General aviation activity will grow at a moderate rate as forecast by the Federal Aviation Administration and the *Update of Hawaii Aviation Demand Forecasts.*
- An increasing percentage of general aviation aircraft owners at Honolulu International Airport will be attracted to the Kalaeloa Airport over time as facilities, services and activities increase.
- The flight schools located at Honolulu International Airport will relocate to the Kalaeloa Airport.
- Ford Island ALF will close to general aviation operations prior to the year 2000, and these training operations will relocate to Kalaeloa Airport.
- DOTA will provide hangar and tiedown facilities for general aviation based aircraft at Kalaeloa Airport at significantly lower rates than are currently being charged for hangar facilities at Honolulu International Airport.
- Fueling will be made available at Kalaeloa Airport for general aviation aircraft users.
- An instrument approach procedure will be provided at the Airport.
- General aviation pilot amenities will be provided such as terminal/lounge, pilot shop, toilets, telephones.
- Fixed base operator facilities providing general aviation services will be available at the Airport.
- Sufficient security will be made available for aircraft owners.

3.5.3 Forecast Airport Operations and Based Aircraft

The forecasts presented in Table 3-7 assume that Kalaeloa Airport would be established as a general aviation reliever airport when NAS Barbers Point is closed. The forecasts assume the Airport would accommodate some of the general aviation operations from Honolulu International Airport, the general aviation training operations at Ford Island ALF and some general aviation activity from Dillingham Airfield. Based on the analysis of the type of aircraft based at Honolulu International Airport and the surveys, it is estimated that the Kalaeloa Airport would serve at least 60 percent of the small single-engine and light twin-engine propeller aircraft estimated to be based at Honolulu International Airport by 2020. (This would exclude both fixed wing and helicopter commuter/air taxi aircraft.) It is estimated that the Airport would accommodate at least 60 percent of the general aviation aircraft operations at Honolulu International Airport by 2020. (This would exclude high performance general aviation aircraft activity.) In addition, based on the current distribution of aircraft owner addresses, the Airport would attract about 50 percent of the general aviation aircraft and operations at Dillingham Airfield. (This would exclude air taxi aircraft, e.g., gliders, tow planes and skydiving aircraft).

Aircraft Operations. General aviation aircraft operations could total about 168,600 operations by 2020. In addition, based on input prepared for the Redevelopment Commission, there would be an estimated 13,100 operations by the USCG and HNG aircraft. Therefore, annual operations could total 181,700 operations by 2020.

Since the Redevelopment Commission process started, the University of Hawaii has expressed an interest in establishing an aviation training center at the Airport. Based on input from the University of Hawaii, this could generate an additional 21,900 annual aircraft operations for a total of 203,600 operations by 2020.

Based Aircraft. The Airport could attract about 195 aircraft by 2020 based on the assumptions noted above. The University of Hawaii aviation training center could add another 11 based aircraft for a total of 206 aircraft by 2020.

3.5.4 Peak Period Forecasts

Peak period aviation forecasts indicate peak levels of aviation-related activities during the average day of the busiest month. The peak number of aircraft operations generated by the forecasts will affect airfield and terminal area requirements at Kalaeloa Airport.

Estimates of peak hour operations by general aviation and government aircraft were prepared using available data obtained from the DOTA and FAA reports. Aircraft operations in the peak month are typically 10 percent of the annual operations based on DOTA and FAA data for other airports in the State. It is assumed that approximately 10 percent of the annual operations will occur in the peak month through the year 2020 planning period at Kalaeloa Airport.

Because it will be primarily a general aviation airport there will be significantly more activity at the Airport on weekends than on weekdays. Daily aircraft operations are typically 50 percent greater on weekends than on weekdays based on DOTA surveys conducted at Dillingham Airfield.

Based on data collected at Dillingham Airfield and for other similar airports, approximately 15 percent of the daily aircraft operations are expected to occur during the peak hour. It is assumed that this relationship will continue through the year 2020 planning period.

Total peak hour aircraft operations are forecast to increase from 98 operations in 2000 to 132 operations by 2020 based on the forecasts. Peak hour general aviation aircraft operations are estimated to increase from 94 to 128 operations between 2000 and 2020. Government aircraft operations are forecast to be at a level of approximately four (4) operations during the peak hour through the 2020 planning period.

Chapter 4

AIRPORT FACILITY REQUIREMENTS

4.1 OVERVIEW

This chapter describes the airport facilities required by the various future users of the Kalaeloa Airport. The major elements of the Airport are analyzed individually and balanced in relation to one another as part of the airport layout and master planning process for the Kalaeloa Airport. These major elements are:

- Airfield
- Avigation
- General Aviation
- Military and Government Aviation
- Airport Access and Parking
- Airport Support and Utilities

The existing facilities are evaluated, and their ability to satisfy forecast aviation demand throughout the planning period are determined. The requirements are based on the Redevelopment Commission's selection of the Airport Master Plan as described in the March 1997 Community Development Plan (and presented later in Chapter 5). The requirements provide the ability to accommodate U.S. Coast Guard (USCG) and Hawaii National Guard (HNG) aviation activity as well as general aviation use. From these evaluations, the requirements for any additional facilities and improvements are established. The limitations of the concept selected by the Redevelopment Commission are also noted as they relate to the future aviation use of the Airport.

A summary of the major requirements for facilities and improvements at the Airport through the year 2020 is presented in Table 4-1.

4.2 AIRFIELD REQUIREMENTS

The following analysis of airfield requirements covers airport classification, runway and taxiway dimensions, airfield pavement, and airfield capacity.

4.2.1 Airport Classification

Based on Federal Aviation Administration (FAA) planning criteria, Kalaeloa Airport will be classified as a Reliever Airport - Transport Airport in the National Plan of Integrated Airport Systems (NPIAS). A Transport Airport is intended to serve not only 100 percent of the single-engine and small twin-engine aircraft used for personal

Table 4-1

EXISTING FACILITIES AND FUTURE REQUIREMENTS
Kalaeloa Airport
1997-2020

	Existing 1997	2000	2005	2010	2020
AIRFIELD					
Runway 4R-22L					
Length (feet)	8,330	8,000	8,000	8,000	8,000
Width (feet)	200	200	200	200	200
Runway 4L-22R					
Length (feet)	8,330	4,500	4,500	4,500	4,500
Width (feet)	200	200	200	200	200
Runway 11-29					
Length (feet)	8,411	6,000	6,000	6,000	6,000
Width (feet)	200	200	200	200	200
Pavement Strength					
All runways (pounds)					
- Single-wheel aircraft	70,000	70,000	70,000	70,000	70,000
- Dual-wheel aircraft	167,000	167,000	167,000	167,000	167,000
- Dual-tandem aircraft	327,000	327,000	327,000	327,000	327,000
- Double dual-tandem aircraft	800,000	800,000	800,000	800,000	800,000
- Single-tandem C-130 aircraft	189,000	189,000	189,000	189,000	189,000
Taxiways					
Width (feet)	75	75	75	75	75
GENERAL AVIATION FACILITIES					
Hangars (spaces)	—	80	90	110	140
Tiedowns (spaces)	—	70	80	90	120
AIRPORT ACCESS AND AUTOMOBILE PARKING					
Access roadway lanes (2-lane)	2	2	2	2	2
Automobile parking spaces	—	130	140	150	200

Source: Aries Consultants Ltd. and Planning Solutions, Inc.

and business purposes but also aircraft with approach speeds of 121 knots or greater. This will accommodate the C-130 aircraft used by the USCG and the HNG.

Based on the forecasts presented in Chapter 3, the Airport has the potential to attract more than 50 based aircraft and accommodate more than 25,000 itinerant or 35,000 local operations. In addition, the "relieved airport" Honolulu International Airport is currently operating at more than 60 percent of its capacity. Although FAA criteria do not include a specific distance parameter (in terms of travel time or miles) for a reliever airport, the closer the reliever airport is to the primary airport and the metropolitan area being served, the greater the reliever potential that can be provided. Therefore Kalaeloa Airport meets the FAA criteria to be a reliever airport.

FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, establishes an airport reference code (ARC) to identify specific design criteria appropriate for the types of aircraft expected to be accommodated at a particular airport. The ARC has two components. The first is a letter referring to the "aircraft approach category" in terms of approach speed. The second is a Roman numeral referring to the "airplane design group" in terms of wingspan. 'A' is the lowest approach speed and 'D' is essentially the highest. The higher the Roman numeral the wider the wingspan.

According to the airport reference code (ARC) definitions contained in FAA AC 150/5300-13, the existing airfield dimensions basically satisfy the criteria for an ARC up to D-V, i.e., for aircraft with an approach speed of less than 166 knots and wing span up to, but not exceeding, 214 feet.

The only large aircraft expected to use the Airport on a regular basis are USCG and Hawaii Air National Guard C-130s and these can be accommodated by ARC C-IV design criteria. Approach Category C includes aircraft with approach speeds between 121 and 140 knots. Airplane design group IV accommodates aircraft with wingspans up to 171 feet. Based on the expected usage by airplane types and the existing airport dimensions, an ARC of C-IV, to accommodate the C -130 aircraft, should be used for the airfield dimensions in the Master Plan.

The vast majority (97 percent) of the fixed-wing aircraft expected to use the Airport are small (12,500 pounds or less) and can be accommodated by ARC B-II design criteria. Approach Category B includes aircraft with approach speeds of less than 121 knots. Airplane design group II accommodates aircraft with wingspans up to 79 feet. In the general aviation terminal area airplane design group II dimensions will be adequate.

4.2.2 Runway Length

The runway length requirements for the general aviation, USCG and HNG aircraft are evaluated. In addition, the runway length requirements for air carrier and military aircraft to continue to designate Barbers Point as an alternate are assessed as well as the HNG for disaster relief and other civil emergencies.

4.2.2.1 Military and Government Aviation

The USCG has a requirement for a runway length of 7,000 feet for their C-130 operations. The HNG has indicated that 5,000 feet would be adequate for their C-130 operations. The HNG has also indicated a need to accommodate larger aircraft (e.g. C-5A, C-141) on an infrequent basis in the event of a natural disaster or other civil emergency. In addition, military users have expressed a desire to continue to designate Barbers Point as an alternate airport for Honolulu International Airport and Marine Corps Air Facility Kaneohe Bay. A runway length of at least 8,000 feet would be required to accommodate all of these uses.

4.2.2.2 General Aviation

FAA AC 150/5325-4A, *Runway Length Requirements for Airport Design*, provides design standards and guidelines for determining recommended runway length. For airplanes of 60,000 pounds or less, runway length curves are provided for families of airplanes. The FAA has derived these curves with data from FAA approved aircraft flight manuals and assumed loading conditions.

According to FAA AC 150/5325-4A, the recommended runway length to accommodate 100 percent of small airplanes (less than 12,500 pounds maximum gross weight) at the Kalaeloa Airport is 3,700 feet. These runway lengths are corrected for elevation (33 feet) and temperature (86° Fahrenheit) at the Airport.

4.2.2.3 Airlines

The airlines have expressed a desire to continue to designate Barbers Point as an alternate airport for flights destined to Honolulu International Airport. The U.S. Navy has had a letter of agreement with the air carriers regarding designation of NAS Barbers Point as an alternate airport for over 20 years. To date, no airline has had to divert and actually land at Barbers Point as an alternate. Being able to designate Barbers Point as an alternate airport to Honolulu International, as opposed to having to designate a more distant airport such as Hilo or Kona International Airports results in significant airline cost savings. An additional cost would be incurred by the airlines for the extra fuel burned en route in order to carry the additional fuel required to reach a more distant alternate airport. According to Federal Aviation Regulations, to designate a more distant alternate would require carrying the additional fuel.

In order for an airline to designate an airport as an alternate, the airline must first determine that it is an adequate airport that meets FAA safety standards and that the runway is able to accommodate the aircraft concerned. The airline must maintain a list of adequate airports within their operations specifications and submit the list to FAA.

The airlines voted to support the retention of the airport subject to retaining the runway and navigation facilities required to use it as an unrestricted adequate alternate airport for flights to Honolulu International Airport. This requires a runway length of at least 8,000 feet to handle all aircraft.

Although Runway 4R presently has the runway approach lights and is generally thought of as the "main" runway, it has more limitations than Runway 4L in providing at least 8,000 feet plus a 500-foot wide runway safety area and an 800-foot wide runway object free area along the entire length of the runway and extending 1,000 feet beyond each runway end. Therefore the 8,000 foot plus capability should be preserved for Runway 4L together with protecting a precision 50:1 approach surface and runway protection zone. (However, the Redevelopment Commission recommended Runway 4R be the 8,000-foot runway as described in Chapter 5.)

4.2.2.4 Summary

Therefore, on the basis of analysis and input from the operators regarding the types of aircraft using and expected to use the Airport, parallel runways, with at least one 8,000-foot runway, and at least a 7,000-foot crosswind runway, are required for large aircraft during the planning period. However, the plan selected by the Redevelopment Commission includes only a 6,000-foot crosswind Runway 11-29 which limits its ability to handle all USCG C-130 aircraft as well as other larger aircraft, e.g., C-5A, C-141 in the event of a natural disaster or other civil emergency.

The existing 200-foot runway width should be retained for the 8,000 and 6,000-foot runways. To reduce the width to 150 feet would require relocation of the runway lights closer to the centerline along each runway.

At least a 3,700-foot runway is required for small general aviation aircraft. However, the Redevelopment Commission selected plan includes the 4,500 feet of Runway 4L-22R that is northeast of Taxiway K. The runway lights would require relocation closer to the runway centerline for a 75-foot wide runway. Alternatively the runway lights could remain for the current 200-foot width which also has advantages for pilot training activity.

4.2.3 Airfield Pavement

The estimated existing airfield pavement strength, presented in Table 4-1, will accommodate all current and forecast aircraft operations through the year 2020.

4.2.4 Airfield Capacity

The FAA technique for estimating airfield capacity (FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*) was used to compute hourly capacity and annual service volumes for the potential airfield alternatives evaluated as part of this study. The resultant figures were then compared to the aviation demand forecasts presented in Chapter 3. The results of this analysis are described below.

According to FAA AC 150/5300-13, the minimum separation between centerlines of parallel runways to allow for simultaneous VFR operations is 700 feet. FAA Manual 7110.65L, *Air Traffic Control*, allows air traffic controllers to authorize simultaneous VFR operations in the same direction with a runway separation of 300 feet, if no large (over 12,500 pounds) or multi-engine aircraft are involved, 500 feet if twin-engine propeller aircraft are involved and 700 feet if any other aircraft are involved.

The existing runway centerline to runway centerline separation for Runways 4L-22R and 4R-22L is 625 feet. This is adequate separation for independent operations most of the time. However, when a C-130 is using one of the parallel runways the other parallel runway cannot be used independently. For this reason, the capacity analysis considers the existing parallel runways as dependent parallel runways and the appropriate aircraft mix is applied accordingly.

4.2.4.1 Definitions

The "hourly capacity" of an airfield is defined as a measure of the maximum number of aircraft operations (landings and takeoffs) that can be accommodated on the airfield in one hour. This definition contains no assumptions regarding "acceptable" levels of delay to aircraft; it simply expresses the maximum physical capability of an airfield or any one of its components under a set of specified conditions.

The hourly capacity of an airfield depends on a number of conditions, including ceiling and visibility, runway use, aircraft mix, percent arrivals, percent touch-and-go, and exit taxiway location. These conditions were determined on the basis of FAA, State, and military statistics, meteorological records, and conversations with Airport personnel.

Annual service volume (ASV) is a reasonable estimate of an airport's annual capacity in terms of aircraft operations that may be used as a reference in airport planning. The ASV is the annual volume of aircraft operations beyond which the average delay to each aircraft increases rapidly with relatively small increases in aircraft operations (and beyond which the levels of service on the airfield deteriorate).

4.2.4.2 Ceiling and Visibility

Based on a review of available data and discussions with persons knowledgeable of weather conditions at NAS Barbers Point, IFR (Instrument Flight Rules) ceiling and visibility conditions below 1,000 feet and/or three miles at NAS Barbers Point occur less than one (1) percent of the time.

4.2.4.3 Runway Use

Review of available data indicates the following runway usage percentages in 1993:

Runway	Percent of Operations
4	67.8
22	5.3
11	14.2
29	12.7

4.2.4.4 Aircraft Mix

For the purpose of determining runway capacity, aircraft are divided into four classes:

Class A: Small single-engine aircraft whose maximum certificated takeoff weight is 12,500 pounds or less.

Class B: Small twin-engine aircraft weighing 12,500 pounds or less.

Class C: Large aircraft weighing more than 12,500 pounds and up to 300,000 pounds (includes C-130 aircraft).

Class D: Heavy aircraft weighing more than 300,000 pounds.

Based on an analysis conducted as part of this study, the following fixed wing aircraft mix is estimated for forecast (2020) conditions:

Aircraft Class	Percent of Total Aircraft Operations
Small Aircraft (Classes A & B)	97
Large Aircraft (Class C)	3
Heavy Aircraft (Class D)	0

4.2.4.5 Arrivals and Touch-and-Go Operations

Hourly runway capacity is influenced by arrivals as a percentage of operations. This analysis assumes equal numbers of arrivals and departures at the Airport.

Touch-and-go operations by general aviation and military aircraft also affect the airfield capacity. The forecast percentage of touch-and-go operations and low approaches at the Airport is assumed to be approximately 60 percent of the total operations by 2020.

4.2.4.6 Exit Taxiway Locations

The number and location of exit taxiways affect the hourly capacity of a runway, since their location affects runway occupancy times. There are presently five exits for all three runways and at least five would be provided in the future.

4.2.4.7 Hourly Capacity

Peak hour aircraft operations are forecast to increase from 98 operations in 2000 to 132 operations in 2020 as presented in Chapter 3. A single runway airfield, with a full-length parallel taxiway has an hourly capacity of about 98 operations during visual flight rule (VFR) conditions and zero operations during instrument flight rule (IFR) conditions without an IFR approach procedure. With a nonprecision instrument approach, based on some future navigational aid, the hourly capacity is estimated to be about 30 to 40 operations an hour during IFR conditions depending on the configuration of a future approach procedure. With a precision instrument approach the IFR hourly capacity could be as high as 60 operations.

An airfield with dependent parallel runways and a full-length parallel taxiway would have an hourly capacity of about 197 operations during VFR conditions. During IFR conditions the hourly capacity would be the same as for a single runway.

4.2.4.8 Annual Service Volume

The annual service volume of a single runway airfield is about 230,000 operations. By comparison, according to the forecasts presented in Chapter 3, air traffic is expected to reach a level of 181,700 operations by the year 2020. This is about 80 percent of the capacity of a single runway.

The ASV for dependent parallel runways is about 300,000 operations. The forecast demand by 2020 would be about 60 percent of the capacity of dependent parallel runways. Depending upon the mix of aircraft, the annual service volume of the parallel runways could be up to 350,000 annual operations.

4.2.4.9 Aircraft Delays

Aircraft delays can also be important for analyses of airfield operations at levels of annual aircraft operations below the Annual Service Volume. As annual aircraft operations approach ASV, the average aircraft delay tends to increase rapidly with relatively small increases in airport operations, thereby causing levels of service on the airfield to deteriorate. Therefore, delays to aircraft must also be considered in planning and evaluating airfield operations at annual operations levels less than Annual Service Volume.

Estimates for average aircraft delays for Kalaeloa Airport were obtained using the long-range planning technique developed by the FAA (Advisory Circular 150/5060-5). For the 181,700 total annual operations forecast at the Airport in 2020, the average delay to each aircraft was estimated to be 0.9 minutes for a single or intersecting runway configuration. Results of the analysis indicate that the average delay will be about 0.4 minutes per aircraft in 2020 with a parallel runway configuration.

Average delays per aircraft increase sharply as annual aviation operations demand reaches and exceeds 80 percent of ASV according to FAA Advisory Circular 150/5060-5. For this reason, the FAA recommends that additional capacity enhancement facilities be planned for at 60 percent of the ASV and be in place by the time demand reaches 80 percent of ASV. Because forecast demand will reach 80 percent of the ASV during the 2020 planning period, the existing parallel runways should be retained to provide adequate airfield capacity.

This analysis assumes that the training operations that currently occur at Ford Island ALF (about 62,700 annual operations) are relocated to Kalaeloa Airport after Ford Island ALF closes as well as 60 percent (78,000 annual operations) of the general aviation activity at Honolulu International Airport by 2020. If Kalaeloa Airport is not available and these operations have to be accommodated at Honolulu International

Airport there would be a very significant impact on the delays at Honolulu International Airport. With these 140,700 annual general aviation operations the estimated average aircraft delay time at Honolulu International Airport would be 26 minutes by 2020. Without these operations the average aircraft delay would decrease to two minutes by 2020. The delay savings at Honolulu International Airport by relocating general aviation to Kalaeloa Airport are estimated to be at least $6 million annually by 2000 and $110 million annually by 2020.

4.2.5 Crosswind Runway

Retaining the crosswind Runway 11-29 provides the opportunity to minimize overflights of local community areas, provides operational flexibility for air traffic control purposes, minimizes interactions and delays with Honolulu International Airport operations and provides a crosswind training capability. Therefore the crosswind runway should be retained at a length of at least 7,000 feet for maximum flexibility. As noted earlier, the Redevelopment Commission selected plan includes only a 6,000-foot crosswind Runway 11-29 which limits its ability to handle all USCG C-130 aircraft as well as other larger aircraft, e.g. C-5A, C-141 in the event of a natural disaster or other civil emergency.

4.2.6 Taxiways

The existing taxiway system is basically adequate to serve the long-term needs of the Airport. However, certain additions/modifications may be required to both the parallel taxiway and the entry/exit taxiway systems to reflect the future runway lengths. A new entry/exit taxiway is required at the relocated end of Runway 11 to connect to Taxiway K. To avoid USCG aircraft having to continue to taxi on the runways, Taxiway J should be extended to the north to connect to an extended Taxiway P. The portions of the runways that are not retained in the Redevelopment Commission Plan should be converted to taxiways to improve airfield circulation and minimize delays.

Any extensions of the parallel taxiway system or additional entry/exit taxiways should be 75 feet wide to accommodate all types of aircraft. However, in the general aviation areas taxiways could be 35 feet wide.

4.2.7 Other Airfield Dimensions

4.2.7.1 Runway Safety Areas and Runway Object Free Areas

Based on FAA design criteria, 500-foot wide runway safety areas (RSA) and 800-foot wide runway object free areas (ROFA), centered on the runway, and extending 1,000 feet beyond the physical ends of the runway, are required for airports with an ARC of C-IV, accommodating aircraft such as the C-130. For small general aviation aircraft 150-foot wide runway safety areas and 500-foot wide runway object free areas, centered on the runway and extending 300 feet beyond the physical ends of the runway, are required for an ARC of B-II.

4.2.7.2 Building Restriction Lines

Building restriction lines (BRL) define the areas around aircraft operating areas in which no permanent structures should be erected. Any new buildings should be built outside the building restriction lines and runway protection zones for all the runways, taxiways, and aircraft parking aprons.

The BRL should be at least 500 feet from the runway centerline to accommodate large airplanes (more than 12,500 pounds), in this case C-130s, on a runway with visual or nonprecision approaches with visibility minimums of more than 3/4 statue mile. To accommodate precision instrument approaches for both small and large airplanes would require a BRL of at least 750 feet from the runway centerline.

The Navy uses 750 feet for the runway lateral clearance line, the equivalent to a BRL, for each of the three runways. No buildings penetrate this line. It would be prudent planning to retain the BRL at 750 feet to preserve the capabilities for precision approaches. There is a requirement for precision approach training for instrument pilot ratings and currency requirements and providing this capability at Kalaeloa Airport would relieve the need for this activity at Honolulu International Airport.

4.2.8 Property Line

The property line should be at least 750 feet from each runway centerline and should include the runway protection zone that extends beyond each runway end, or to the shoreline to the southeast and southwest, as well as land within the building restriction line. If acquisition of all the land within the runway protection zones is infeasible, a permanent avigation easement should be acquired over these areas outside the property line. (An avigation easement allows unobstructed flight through specified airspace.)

4.3 AIRSPACE AND AIR TRAFFIC CONTROL

Avigation (air navigation) considerations include airspace and air traffic control, runway protection zones (formerly known as clear zones), approach areas and obstructions, and navigational and landing aids.

4.3.1 Airspace and Air Traffic Control

Airspace procedures and facilities should provide for safe, orderly, and expeditious flow of air traffic. The aviation demand forecasts indicate activity levels will remain below the requirement for a federal Air Traffic Control Tower (ATCT). FAA has indicated that a level of 235,000 annual operations is required to justify an FAA ATCT. However, the proximity to Honolulu International Airport and its associated air traffic make it important to have an ATCT at the Kalaeloa Airport.

For instance, without an ATCT at the Kalaeloa Airport, IFR departure releases to pilots cannot be precise and delays will occur as the Honolulu TRACON would have to space arrivals to Honolulu International in order to provide a ten minute opening for aircraft departing Kalaeloa Airport. Confirmation of Kalaeloa arrivals could take longer and this would disrupt Honolulu International Airport air traffic. A ten minute interruption in Honolulu International's arrival stream could mean a capacity loss of six (6) arrivals at Honolulu International for every IFR operation at Kalaeloa Airport. If there is an air traffic control facility at the Airport, the TRACON can work in air traffic at Kalaeloa Airport much more quickly. Lacking a federal facility, the State Department of Transportation, Airports Division (DOTA) should consider providing a contract ATCT or other acceptable air traffic facility.

The proximity of Honolulu International Airport is a major consideration in how aircraft operations will be conducted in the vicinity of the Kalaeloa Airport. Figure 2-5 shows several factors that affect Kalaeloa Airport flight operations. Precision approaches to Runways 8L and 4R at Honolulu International and Honolulu International Airport's associated Class B airspace are major factors. There are also air carrier aircraft visual approaches over the entrance channel to Pearl Harbor to Runway 8L. Additionally, the higher terrain just north of the Kalaeloa Airport is a major factor.

The ILS to Runway 8L at Honolulu International passes overhead of the Kalaeloa Airport. The Honolulu Class B airspace overlying the Kalaeloa Airport has a floor of 1,900 feet mean sea level (MSL) and the floor drops to 1,600 feet MSL less than one NM to the east of the Kalaeloa Airport. The ILS to Runway 4R is approximately 5 nautical miles (NM) to the southeast of the Kalaeloa Airport. The floor of the Class B airspace protecting the ILS to Runway 4R is at the surface of the ground or the Pacific Ocean out to 5 NM from the Honolulu VORTAC and at 1,500 feet MSL out to 15 NM from the VORTAC. East of the 1,500 foot floor, and southeast of Honolulu International, the floor drops to 1,000 feet MSL to protect departures from Honolulu International. See Figure 2-3 for the location and effective altitudes of these areas of the Honolulu Class B airspace.

For Kalaeloa Airport flights destined to, or arriving from, the east there are essentially three routes. One would be directly through the Class B airspace and would require a Class B air traffic control (ATC) clearance. Because such a route would interact with Honolulu International IFR arrivals and departures, particularly arrivals on the ILS to Runway 4R, considerable delays would occur for operations at both airports. ATC has to provide separation for all aircraft operating within the Class B airspace. Some departures would be held on the ground. Most departures and arrivals for both airports would, of necessity, receive circuitous radar vectoring. Secondly, to avoid the Class B airspace to the south would place single-engine aircraft too low over the ocean to be able to safely glide back to land in the event of an engine failure. However, twin-engine aircraft could use this route to the south. The third route is to the north of the Class B airspace over the Interstate H-1 which is an established VFR flyway, and is the preferred route for single-engine small aircraft.

For Kalaeloa Airport flights destined to, or arriving from, training areas to the north over Central Oahu, including flights around the north of the Class B airspace, there are essentially two potential routes. One is through a corridor to the north and northeast, staying below 1,900 feet MSL until clear of the Class B airspace, and avoiding overflights of any existing urban development. The other would be to go out over the ocean to the south and around Barbers Point to the west, staying below 2,200 feet MSL until clear of the Class B airspace, then turning inland over the Interstate Route H-1. The latter route would subject existing urban development to overflights.

One way of routing these flights to and from the north and east would be to use one of these routes for departures and the other for arrivals. Designated altitudes would allow for an adequate altitude separation below aircraft arriving on Runway 8L at Honolulu International Airport.

During trade wind conditions, departures on Runway 4L or 4R would use the route to the north and northeast with arrivals using the Interstate H-1 and Kalaeloa Boulevard route until west of the Airport then turning northeast to land on either Runway 4L or 4R. During Kona wind conditions, these routes would reverse with departures on Runway 22R or 22L turning north over Kalaeloa Boulevard and northeast over Interstate H-1. Kona arrivals would approach along the northeast corridor in a southerly direction and turn southwest to land on either Runway 22L or 22R. This way of routing aircraft to and from Kalaeloa Airport would not only provide better altitude separation, of at least 900 feet from Honolulu International traffic, but also would reduce aircraft traffic over any given point along the routes.

Alternatively, to avoid overflights of existing urban development, aircraft departures and arrivals could be routed just using the corridor to the north and northeast with both appropriate horizontal and vertical separation as determined by FAA.

The floor of the Honolulu International Airport Class B airspace over the north and northeast corridor is at 1,900 feet until clear of the Class B airspace. The floor of the Class B airspace over the Kalaeloa Boulevard/Interstate H-1 route is at 2,200 feet. Approaches to Runway 8L at Honolulu International Airport are not to be any lower than the floor of the Class B airspace over either of these routes and if aircraft are flying the ILS to Runway 8L they would be at, or above, 2,800 feet over the Kalaeloa Boulevard/Interstate H-1 route and at 1,900 feet over the north and northeast corridor route.

It should be noted that a VFR pilot, to avoid the Class B airspace, can fly either route and does not require a clearance from FAA. The FAA has preempted the field of airspace regulation but does not, in a strict sense, control VFR aircraft in flight. However, this does not prevent the FAA, with input from the State, from developing recommended procedures and altitudes for these routes and publishing them as a graphic area notice in the *Pacific Chart Supplement*, published by the National Oceanic and Atmospheric Administration, that is available to all pilots.

The various air traffic routes that were analyzed are illustrated on the noise exposure maps for the different alternatives in Appendix D. The air traffic routes associated with the selected Airport Master Plan are illustrated on the noise exposure maps in Chapter 8.

4.3.2 Runway Protection Zones, Approach Areas and Obstructions

4.3.2.1 Runway Protection Zones

The land area within the Airport boundary should be sufficient to include the runway protection zones (RPZ) at each runway end within the Airport boundary or over the ocean. To protect the Airport, based on the Redevelopment Commission's selection of the Plan, land sufficient to provide an RPZ for precision approaches to Runway 4R, nonprecision approaches with visibility not lower than 3/4 mile for large aircraft to Runway 22L and nonprecision approaches with visibility not lower than 1 mile for large aircraft to Runway 29 should be protected. RPZs for visual approaches by large aircraft to Runway 11 and small aircraft to Runways 4L and 22R should also be protected.

The required civil RPZs should be contained entirely within the Airport boundary. Exceptions may exist for small portions of the RPZs associated with Runways 4R and 29 extending out over the Pacific Ocean. To the extent practical, fee title should be acquired to all of the land within the RPZs. Acquisition of fee title to all of the land within the RPZs would provide the State with the greatest control over uses within them, and is the preferred course of action. Where this is not feasible, avigation easements should be acquired over the RPZs.

The FAA required RPZ dimensions are based on the most precise approach to each individual runway end and are given below in feet:

Runway	Length	Inner Width	Outer Width	Type of Approach
4R	2,500	1,000	1,750	Precision
4L	1,000	250	450	Visual
11	1,700	500	1,010	Visual
22R	1,000	250	450	Visual
22L	1,700	1,000	1,510	Nonprecision
29	1,700	500	1,010	Nonprecision

Coral Sea Road currently penetrates the military clear zones for Runways 4R, 4L and 29. If a runway length of 8,000 feet is measured from the northeast end of the existing runways, adequate clearing criteria can be met over Coral Sea Road for precision approaches to Runway 4L but not to Runway 4R. However, to provide a precision approach capability for the existing 8,330-foot Runway 4L requires relocating a portion of Coral Sea Road to the southwest and connecting it to the existing Runway 4R "approach light" road.

To provide a runway length of 8,000 feet, measured from the northeast end of Runway 4R-22L, requires that Coral Sea Road remains closed to public access to meet FAR Part 77, *Objects Affecting Navigable Airspace*, and FAA design criteria. Otherwise, in order to provide a runway length of 8,000 feet and a precision approach, the threshold for Runway 4R would have to be relocated by up to 1,630 feet to the northeast away from Coral Sea Road and the runway would also have to be extended by 1,300 feet to the northeast to meet FAR Part 77 and FAA design criteria.

To provide a runway length of 7,000 feet and a nonprecision approach, the threshold for Runway 29 would have to be relocated 1,411 feet to the northwest away from Coral Sea Road.

The DOTA wants to permit public access to the beach and ocean to the maximum extent possible. Coral Sea Road would be the access road to the beach and ocean. FAR Part 77 requires a 15-foot clearance for a public road below an approach surface and relocating the runway thresholds and Coral Sea Road as described above would be required to meet this clearance, as well as FAA design criteria, for Runways 4L, 4R and 29. Beach and ocean access can also be provided along the West Perimeter Road, near the drainage ditch and outside the Airport property, without adversely impacting FAR Part 77 and FAA design criteria.

4.3.2.2 Approach Areas and Obstructions

Unlike the military approach area dimensions presented in Chapter 2, the FAA required dimensions for civil approach areas are based on the most precise approach to each individual runway end and to the opposite end of each runway. The FAA required approach area dimensions for each of the runways are given below in feet and slope ratio:

Runway	Length	Inner Width	Outer Width	Slope Ratio
4R	50,000	1,000	16,000	50:1 and 40:1*
4L	5,000	250	1,250	20:1
11	5,000	500	1,500	20:1
22R	5,000	250	1,250	20:1
22L	10,000	1,000	3,500	34:1
29	10,000	500	3,500	34:1

* 50:1 for first 10,000 feet of length; 40:1 for the outer 40,000 feet of length

Because these dimensions are less than the military dimensions given in Chapter 2, considerably fewer objects are identified as obstructions, in accordance with FAR Part 77. The two Navy drawings titled "Obstructions to Air Navigation" (identified as Figures 2-3 and 2-4 in Chapter 2), were compared with FAR Part 77, as pertains to civil airports, to identify those objects that would be obstructions to a civil airport. With the recent removal of two groups of trees on the southeast side of Runway 22L, there are no obstructions to FAR Part 77 criteria.

Other than Coral Sea Road, as described above, there are no obstructions within the proposed approach surfaces to all runways, except for Midway Road which is less than 100 feet from the end of Runway 11. There are control gates along Midway Road on either side of the runway which should be maintained or the road should be closed when preparing the RSA and ROFA if the end of Runway 11 remains in its present location. However, the selected Redevelopment Commission plan relocates the Runway 11 threshold by 1,000 feet to the southeast and Midway Road would become the perimeter road around the end of the runway and outside the RSA and ROFA.

4.3.3 Navigational and Landing Aids

The USCG, airlines and military have stated a requirement for at least a nonprecision approach. However, the Navy is expected to remove their radar and TACAN and all but one of the existing approach procedures are based on the radar or TACAN equipment.

One of the Navy nonprecision approaches is based on the nondirectional beacon (NDB) providing the locator outer marker (LOM) for the ILS approach to Honolulu International Airport. This procedure is to Runway 4L and should be retained and approved for civil use as well as by the USCG. Because nondirectional beacon (NDB) equipment provides the least precise approach, a more satisfactory procedure should be established.

Additionally, there is a requirement for instrument approach training on Oahu for both precision and nonprecision approaches. A precision approach capability should be provided to Runway 4R to adequately relieve this required training activity from Honolulu International Airport.

Because of the advancement and potential of Differential Global Positioning System (GPS) technology, the FAA may or may not consider procurement of ILS facilities for Runway 4R and localizer facilities for Runway 29 as prudent planning. Nonprecision GPS approaches are becoming a reality at this time, and FAA is designing and approving new stand alone GPS approach procedures. The FAA is continuing to evaluate GPS capability to provide precision approaches. New GPS approaches, including precision GPS, appear promising.

GPS nonprecision instrument approaches with straight-in minimums should be established for Runways 4R and 29. An upgrade for Runway 4R to precision GPS should be accomplished as soon as the technology allows.

The runway lights and threshold lights will require adjustment to the new runway lengths. It will be necessary to relocate the runway lights on a 75-foot wide Runway 4L-22R closer to the centerline of the runway unless it is retained at a 200-foot width. It will also be necessary to relocate the approach light system on Runway 4R for the new runway threshold. Precision approach path indicators (PAPIs) for VFR operations should be provided for all runways. The rotating beacon will have to be replaced or modified to a single beam, signifying a civil airport. Some wind socks will have to be relocated closer to the new runway ends.

The Hawaii Air National Guard has precision approach radar on the field at this time. This equipment and personnel are in a training status, and the availability for general aviation use in the future is unknown.

4.4 GENERAL AVIATION

4.4.1 Hangars

On the basis of the general aviation activity forecasts presented in Chapter 3, it is estimated that space will be required for about 200 based aircraft by the year 2020. Up to two-thirds (140) of the powered based aircraft should be planned to be accommodated in T-hangars or conventional hangars in the long-range plan. Ideally, the aircraft storage hangars should be consolidated in the same general area.

4.4.2 Aircraft Parking Apron

Provision for one-third (60) of the based aircraft in tiedown spaces should be planned for together with a tiedown area for up to 60 itinerant aircraft. It would be desirable to park any large aircraft (over 12,500 pounds) using the Airport on a separate tiedown area away from the small aircraft.

4.4.3 Commercial Aviation/Fixed Base Operator Lease Lots

A "fixed base operator" (FBO) is a private company which provides on-airport facilities and services for various aviation-related activities. These typically include facilities and services needed for such things as aircraft maintenance and repair, aircraft charters, flight training, aircraft refueling, etc.

Although the DOTA property development standards establish a 2-acre minimum plot size, commercial aviation operators at several airports in the State (including Honolulu International Airport) currently lease smaller plots. Because of the extent and nature of commercial aviation activity expected at the Kalaeloa Airport, smaller lease lots (e.g., one-quarter to one acre) should be considered for commercial aviation operators.

Space should be provided in the general aviation area for an aircraft wash rack and automobile parking for aircraft owners and pilots. A pilot's lounge, or ready room, could be provided within a commercial aviation/fixed base operator's hangar and office building.

Alternatively, a pilot's lounge could be provided in a general aviation terminal, in close proximity to the general aviation area, such as the existing air operations building or

Base aero club building. Restrooms could be provided at the end of a row of hangars or in a general aviation terminal. Space for rental cars should also be provided.

Utility connections - including power, water, sewer and communications - should be provided for all commercial aviation/fixed base operator hangars and office buildings. Some utilities should also connect to the storage hangars. Taxiways will be required, or need to be modified, to connect any new aircraft apron and hangar areas to the existing airfield and taxiway system. Apron lighting should be provided as well.

4.5 MILITARY AND GOVERNMENT AVIATION

4.5.1 U.S. Coast Guard

The USCG will retain their 48 acres in the area directly south of the intersection of Runways 4R and 29, adjacent to the Airport. The USCG will continue to operate helicopters and C-130 aircraft from the Airport. The USCG will continue to access the airfield via Taxiway J. An extension of Taxiway J to an extended Taxiway P would minimize taxiing on the runways by USCG aircraft.

4.5.2 Hawaii National Guard

The HNG application for 160 acres in the area northeast and adjacent to the Airport boundary to relocate their operations and facilities to has been approved by the Barbers Point Naval Air Station Redevelopment Commission and the Office of the Secretary of the Navy. The HNG requirements for facilities and the associated land include hangar and apron areas and other facilities that would be used for CH-47 operations and support HNG missions with civil authorities during emergencies. The HNG will fly C-130 and C-26 aircraft into and out of the Airport in support of the HNG. These aircraft will require airfield access to and from the HNG base facilities via Taxiway P.

4.6 AIRPORT ACCESS AND PARKING

4.6.1 Airport Access Roads

The existing access roads serving the Airport area (Fort Barrette Road and Geiger Road) have sufficient excess capacity to accommodate the traffic that would be generated by the Airport even if the current level of traffic from the Base were to be maintained. Consequently, no additional laneage would be required to accommodate the reliever airport activity.

4.6.2 Parking

The number of parking stalls should be based on detailed design analyses for each of the proposed facilities. In general, however, sufficient space should be provided within 500 feet of destinations to accommodate one vehicle (400 square feet) for each two based aircraft and one vehicle (400 square feet) for each tiedown for itinerant aircraft tiedown or parking area. Parking should take advantage of existing paved areas, e.g. along Midway Road, to the greatest extent possible.

Automobile parking spaces should be provided near the future aircraft parking areas and in the administrative/terminal facilities area for public and employee parking. Up to 40 automobile parking spaces should be provided for public and employee use on the Airport.

4.6.3 Airport Service Roadways

A perimeter/service roadway system inside the Airport property should be provided so that vehicles using it do not obstruct the runway primary surfaces or penetrate the approach surfaces in the runway protection zones.

4.7 AIRPORT SUPPORT

Airport support facilities, depending on the level of activity, include airport administration/terminal facilities, fuel storage, DOTA maintenance facilities, utility systems and aircraft rescue and firefighting (ARFF) facilities.

4.7.1 Administration/Terminal Building Area

Space will be required for DOTA administrative staff and facilities. This could be provided in the current air operations building and associated parking area.

4.7.2 Aircraft Rescue and Firefighting Facilities

While there is no requirement for an ARFF facility on the Airport for general aviation activity, consideration for, and coordination with, the ARFF requirements of the USCG and HNG should be made. The personnel that operate the existing ARFF equipment and facilities are civil employees with the Department of Defense (DOD). Whether this contract could be modified to provide for the requirements of the HNG (a reserve component of the DOD) with provisions for requirements of the USCG (an element of the Department of Transportation that reports to the Navy during national emergencies) is not known. A State operated ARFF is another potential with contributions from other airport users. The HNG has provisions within their manning and equipment allowance documents to provide for their requirements.

4.7.3 Weather Service

A weather reporting capability at Kalaeloa Airport is required after the Navy weather service leaves, or else Honolulu International weather would have to be relied on. Otherwise, this would eliminate the potential to designate Kalaeloa Airport as an IFR alternate for Honolulu International Airport, for any airline, military or general aviation use. Further, any IFR flights destined to Kalaeloa Airport, whether military or general aviation, would have to file a more distant alternate airport (e.g., Lihue or Molokai) whenever Honolulu International Airport has a ceiling of 2,000 feet or lower.

There can be a difference in weather conditions between these two airports. Clouds spill over the Koolau Range and drift over Honolulu but usually dissipate before reaching Barbers Point. It would be difficult or impossible for transient pilots to continue to benefit from this phenomenon if using Honolulu weather reports. For over 20 years, airline pilots have been able to file NAS Barbers Point as an alternate airport when Honolulu International Airport weather is marginal.

Air traffic controllers are often certified as weather observers. They provide hourly observations that go into the overall weather service system that is available to all pilots. However, if an Air Traffic Control Tower (ATCT) is not established at the Kalaeloa Airport, these observations would not be available.

The Navy should be requested to leave the Automated Surface Observing System (ASOS). Information from an ASOS could also go into the overall weather service system. Air traffic controller observations could augment ASOS reports and enter the system as human assisted automated observations. Because of the utility of the system and the capability of human assisted reports, it is recommended that the ASOS be retained, however it will probably have to be relocated.

4.7.4 Airport Support and Maintenance Facilities

Space will be required for the storage and maintenance of any State-owned airport maintenance equipment to be based at the Kalaeloa Airport. The Weapons Department (Building 115) is a 5,680-square foot drive-through building, with offices on both sides and on the second floor, with an adjacent parking lot located just to the northeast of the air operations building.

4.7.5 Fuel Storage

The existing fuel storage facilities would be made available to the DOTA and the DOTA will determine whether to request conveyance of all or just some of the fuel tanks. The smaller 10,000-gallon, 40,000-gallon and 30,000-gallon tanks (Buildings 1863, 1864 and 1865, respectively) could be used for general aviation fuel storage facilities. Conveyance of any tanks would be based on the ability of the tanks to be retrofitted (cleaned) and the ability of the tanks to meet current Environmental Protection Agency (EPA) standards.

Fueling could be by tanker truck initially and/or a fuel island card lock system later on. A card lock system would provide a 24-hour refueling capability.

The EPA promulgated federal laws in the 1980s governing requirements for existing underground fuel tanks and the installation of new underground and above-ground fuel tanks. Prior to the State's requesting conveyance of any of the existing fuel tanks, tank tightness testing must be performed. If a tank leaks, it must be repaired and re-tested within one year. If it leaks a second time, the tank must be replaced. If the tank does not leak, it can remain in service but must meet EPA standards within 10 years including corrosion, protection and a leak detection system.

Based on discussions with the USCG and HNG representatives, both agencies want to refuel aircraft by truck and to truck fuel from the fuel farm to their own facilities. The USCG uses about 300,000 gallons of fuel a month and the HNG uses about 50,000 gallons of fuel per month.

4.7.6 Fencing

Fencing and additional gates will be required around the Airport boundary to control access to the airfield. The layout of the fencing should be coordinated with the USCG and HNG to ensure enclosure of the entire perimeter of the airfield.

4.8 UTILITIES

Additional utility systems (electrical power, gas supply, water, sewer and telephone) extensions will be required to serve any new areas that may be developed on the Airport based on the selected airport development concept. The existing systems should be utilized wherever possible to minimize the additional capital investment required.

Chapter 5

AIRPORT MASTER PLAN

5.1 OVERVIEW

Several airport development concepts were formulated and evaluated by the State of Hawaii Department of Transportation, working with the Redevelopment Commission, for review prior to preparation of the recommended long-range Airport Master Plan. These alternative development concepts, which are described in Appendix A, were presented and discussed with the Airport Task Force on September 1, 1994. The Airport Task Force voted for Alternative 6 with three 7,000-foot runways. An Optimum Airport Master Plan based on Alternative 6, as modified in early 1996, is presented in Appendix A.

On October 4, 1994 the Redevelopment Commission approved the recommendation that a minimum of one 7,000-foot runway be continued at Barbers Point, with the final configuration of the Airport to be presented to the Redevelopment Commission as part of the master planning process for the Base. At the same meeting they approved a motion recommending retention of the U.S. Coast Guard (USCG) at Barbers Point with all current facilities. Consequently the U.S. Navy was requested not to declare the USCG area as surplus land.

In the summer and fall of 1995 the State of Hawaii Department of Transportation requested that a Minimum Airport Master Plan reflecting a smaller airport envelope also be prepared, and this is described in Appendix A. The Minimum Airport Master Plan is based on the "Airport Envelope" that was presented to the Redevelopment Commission in December 1995.

The Optimum and Minimum Airport Master Plans were then incorporated into the Redevelopment Commission's alternative plans for redevelopment of the NAS Barbers Point as a whole. The Alternative A (Optimum) Concept provided the maximum flexibility for airport operations by incorporating all existing runways and related facilities for continued aviation activity on approximately 900 acres. Alternative B (Minimum) Concept Plan provided minimum space requirements on approximately 656 acres to accommodate aviation industry goals for NAS Barbers Point.

The March 1997 Community Redevelopment Plan recommended approximately 725 acres for use as a general aviation reliever airport. The proposed airport is intended to include one 8,000-foot runway in order to accommodate the requirement of the commercial airlines and military for an alternate landing site designation, one 4,500-foot runway for general aviation operations, and one 6,000-foot crosswind runway for takeoffs over the ocean on Runway 11 and landings over the ocean on Runway 29. The airport area includes Hangars 110 and 111 and other structures currently used for airfield operations. However, Hangar 111 and approximately 2 acres of paved parking are to be transferred to the University of Hawaii for aviation training. The USCG will remain in its existing facilities, adjacent to Runways 4R-22L and 11-29. The USCG's facility is approximately 48 acres.

The recommended Airport Master Plan described in this report is based on the Community Development Plan as modified by more recent and ongoing discussions and negotiations. This includes the April 21, 1997 DOT request to FAA for modifications to FAA design standards and the September 19, 1997 response from FAA which declined most of the requests for modifications related to runway safety area, runway object free area, primary surface, transitional surface, and approach surface standards. (Copies of these letters are included at the end of the Bibliography section.)

5.2 AIRPORT MASTER PLAN

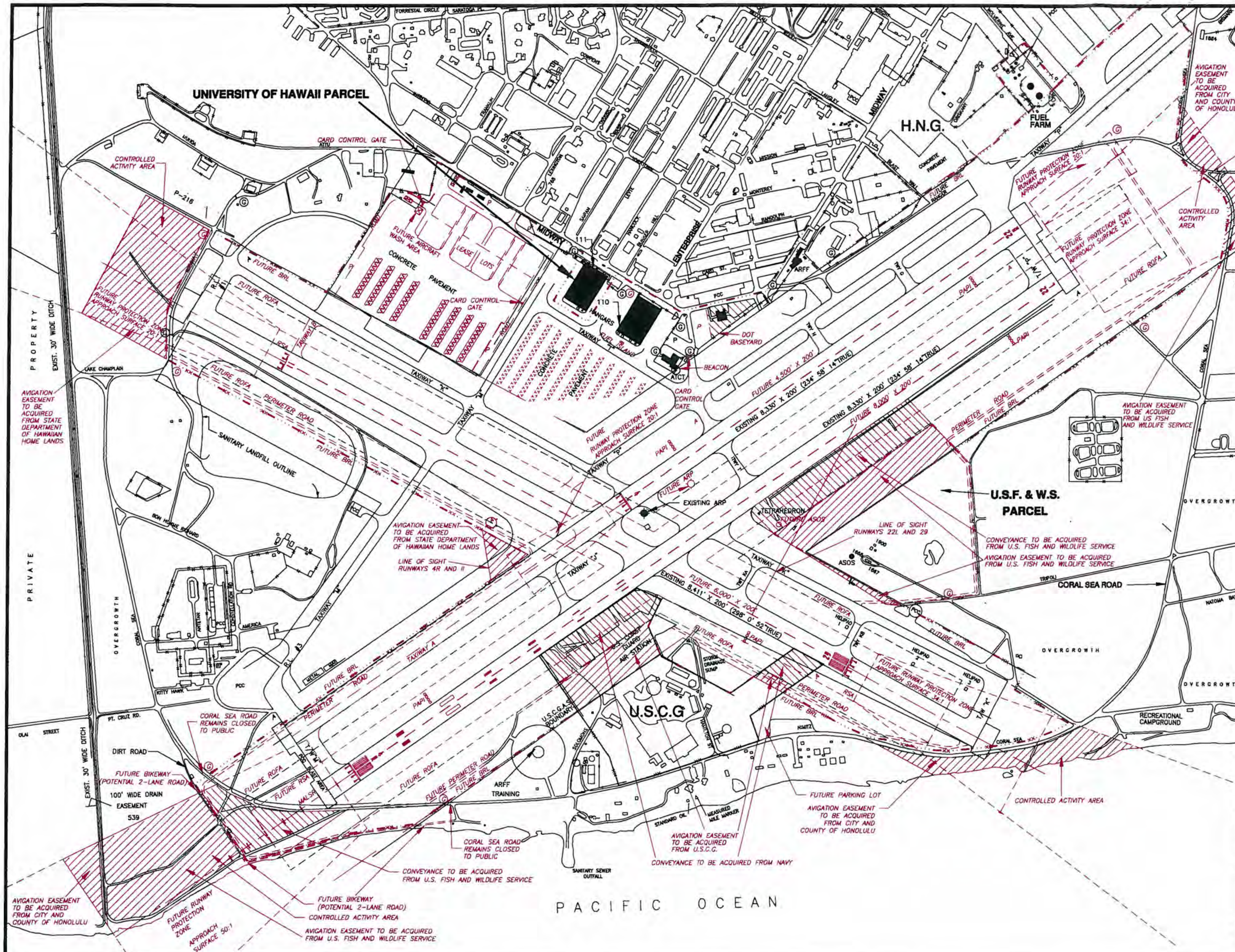
The Airport Master Plan (Plan) for the Kalaeloa Airport is illustrated on Figure 5-1. The Terminal Area and Access Plan is shown on Figure 5-2. The Plan integrates long-term airfield and terminal area requirements with forecast aviation demand and airport access and parking needs. It represents a guide for airport development through the year 2020 planning period.

The primary functional areas of the Airport Master Plan, as illustrated on Figure 5-1, are:

- Airport Property
- Airfield
- Avigation
- General Aviation
- Military and Government Aviation
- Airport Access and Parking
- Airport Support

General adherence to the land use recommendations and circulation patterns shown on Figure 5-1 will ensure that continuing development of the Airport may take place in an orderly manner within the framework of long-range potential development.

From a physical planning standpoint, an important consideration is to reserve sufficient land area now (before the surrounding land is committed to other uses) for the preservation of existing, and development of new, airport facilities capable of



Airports Division
DEPARTMENT OF TRANSPORTATION STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

AIRPORT MASTER PLAN

LEGEND

- STRUCTURE
- AIRFIELD/APRON PAVEMENT
- STRUCTURE TO BE REMOVED
- AIRPORT BOUNDARY
- BUILDING RESTRICTION LINE
- FENCING
- AIRPORT REFERENCE POINT
- THRESHOLD LIGHTS
- WIND SOCK
- RUNWAY SAFETY AREA
- RUNWAY OBJECT FREE AREA
- T-HANGAR
- TIEDOWN
- PARKING LOT
- GATE
- PAPI
- LAND CONVEYANCE
- AVIGATION EASEMENT
- FUEL ISLAND
- PERIMETER ROAD
- SEGMENTED CIRCLE

NOTE:
THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.

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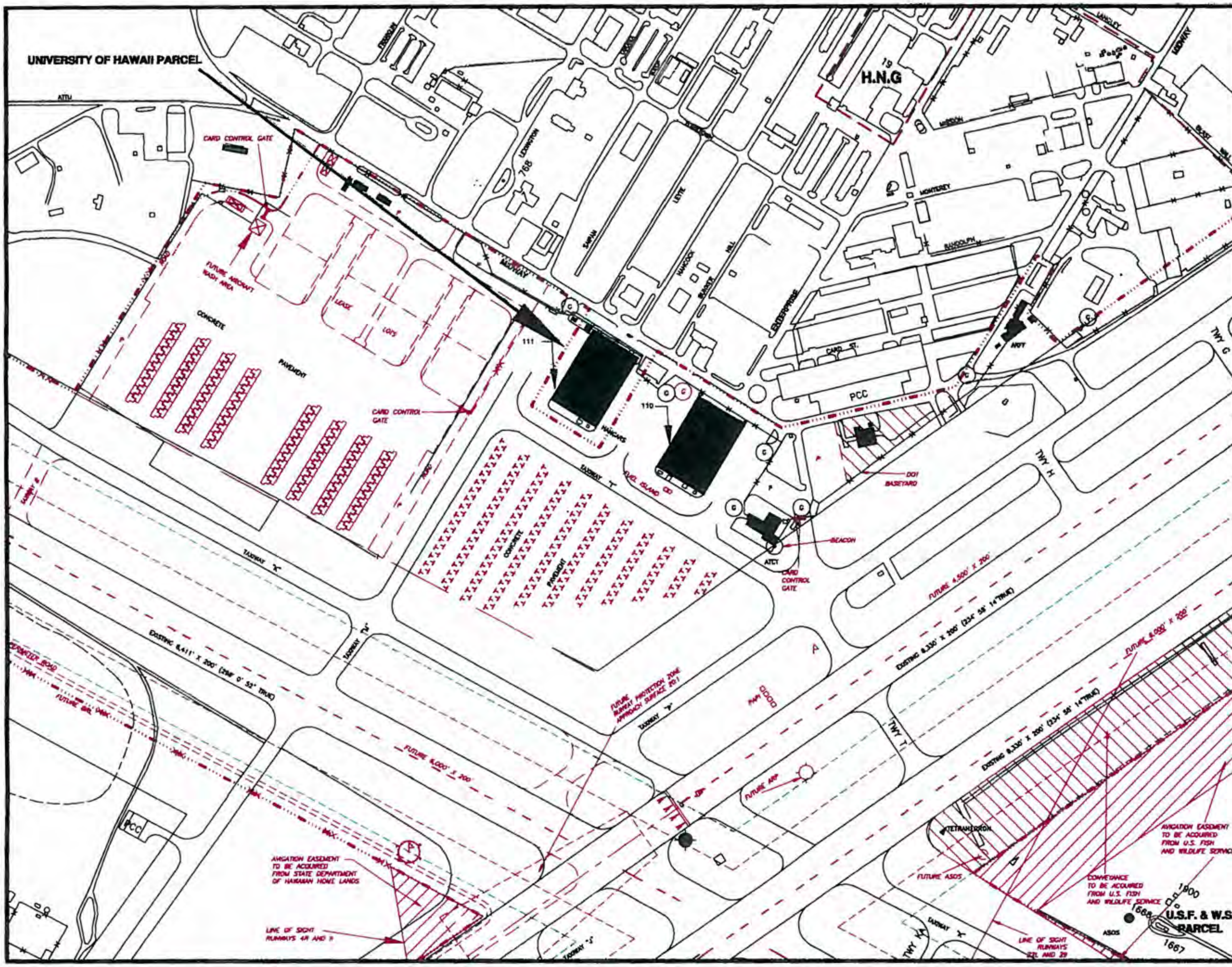

Airports Division

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

TERMINAL AREA AND ACCESS PLAN

LEGEND

EXISTING	FUTURE	
		STRUCTURE
		AIRFIELD/APRON PAVEMENT
		STRUCTURE TO BE REMOVED
		AIRPORT BOUNDARY
		BUILDING RESTRICTION LINE
		FENCING
		AIRPORT REFERENCE POINT
		THRESHOLD LIGHTS
		WIND SOCK
		RUNWAY SAFETY AREA
		RUNWAY OBJECT FREE AREA
		T-HANGAR
		TIEDOWN
P	P	PARKING LOT
		GATE
		PAPI
		LAND CONVEYANCE
		AVIGATION EASEMENT
		FUEL ISLAND
		PERIMETER ROAD
		SEGMENTED CIRCLE

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FIGURE NO. 5-2

accommodating future air traffic demand. Future adjacent development can then be guided by the long-range traffic potential so that the Airport will be protected from encroachment by incompatible land uses, and the surrounding area will be protected from airport operations. Actual physical facilities should be constructed only as the demand arises.

The basic elements of the Airport Master Plan are described below.

5.2.1 Airport Property

Based on the analyses conducted since the Redevelopment Commission action on the Airport in October 1996, the following modifications are recommended in the Airport Master Plan.

- Ideally, the airport property should include the land needed to the southwest for a precision approach runway protection zone for an 8,000-foot Runway 4R if the capability for all airlines and the military to continue to designate the Airport as an alternate for all aircraft is to be preserved. If the land cannot be acquired in fee title an avigation easement, which limits the height of permanent or mobile structures or equipment but permits recreational activity, should be obtained for the land to the southwest between the existing Coral Sea Road, the existing Base boundary and the shoreline that is within the runway protection zone for Runway 4R, as shown on Figure 5-1. The airport property should include the parcel of land that has been awarded to the U.S. Fish & Wildlife Service (USF&WS) but which is east of the dirt road around the end of Runway 4R and avoids the endangered plants area, as shown on Figure 5-1.

- An avigation easement should be obtained from the City and County of Honolulu for the land within the runway protection zone southwest of the drainage ditch.

- The airport property should incorporate the parcel of land east of Runway 4R-22L that is within the runway object free area that has been awarded to the USF&WS. An avigation easement should be obtained for the adjacent area between the runway object free area (ROFA) and 750-foot building restriction line (BRL).

- The airport property should incorporate the parcels of land on the north and east sides of the USCG facility that are within the Runway 4R-22L and Runway 11-29 runway object free areas. An avigation easement should be obtained for the adjacent areas between the ROFA and BRL.

- An avigation easement, which limits the height of permanent or mobile structures or equipment but permits recreational activity, should be obtained for the land between Coral Sea Road and the shoreline that is within the runway protection zone and building restriction lines for Runway 29.
- Avigation easements should be obtained from the USF&WS and City and County of Honolulu for the land northeast of Coral Sea Road that is within the runway protection zone for Runway 22L.
- An avigation easement should be obtained from the Department of Hawaiian Homelands for the land northwest of the perimeter fence that is within the runway protection zone for Runway 11.
- An avigation easement should be obtained from the Department of Hawaiian Homelands for line-of-sight between Runways 4R and 11.

Therefore the State should acquire approximately 757 acres of land as shown on Figure 5-1. This acreage includes adequate land for an airfield of three runways and a taxiway system meeting all required protection and object clearing criteria, and adequate land for aircraft basing, terminal and administration facilities. This acreage does not include the 48-acre USCG facility, the 160-acre Hawaii National Guard (HNG) facilities, 4-acre University of Hawaii parcel, and areas shown for avigation easements. It does include 25 acres along Taxiway P to connect the HNG facilities to the airfield.

5.2.2 Airfield

The airfield configuration, illustrated on Figure 5-1, includes one 8,000-foot, one 6,000-foot and one 4,500-foot runway to meet the long-range airport needs of all users through the 2020 planning period and beyond. Based on the aviation forecasts and FAA airfield capacity criteria, there is a need to plan for parallel Runways 4R-22L and 4L-22R before 2020. Use of parallel runways also results in less aircraft delay costs at Kalaeloa Airport. A second 6,000-foot runway is also recommended to provide a limited backup capability when the other runway is closed for maintenance or other reasons.

In addition, a 6,000-foot crosswind Runway 11-29 provides some operational benefits for C-130 aircraft and land use compatibility benefits to the local community in maximizing flights over water, and accommodates crosswind and crosswind training activity. During tradewinds, takeoffs would be on Runway 11 with landings on Runway 4R. During Kona conditions, takeoffs would be from Runway 22L with landings on Runway 29. This configuration also preserves airfield capacity to meet forecast demand beyond the year 2020 planning period. The Plan is intended to accommodate aircraft primarily in Airport Reference Code B-II (general aviation aircraft) with occasional use by larger C-130 aircraft which are in Airport Reference Code C-IV.

5.2.2.1 Runway 4R-22L

The airlines and the military have expressed a desire to continue to designate the Airport as an alternate to Honolulu International Airport. To preserve the potential for all airline and military aircraft to be able to continue to designate Kalaeloa Airport as an alternate airport, Runway 4R-22L is planned to be retained at a length of 8,000 feet at the existing width of 200 feet. To provide for a precision instrument approach no object should penetrate a 50:1 approach surface related to the 8,000-foot runway length. This requires Coral Sea Road remaining closed as a public access road to the southwest as shown on Figure 5-1.

The Airport Master Plan provides for Coral Sea Road remaining closed as a public access road outside the Airport boundary in the vicinity of the approach ends of Runway 4R. The capability for beach access is provided via Coral Sea Road to the southeast and the existing drainage service road to the area southwest of Runway 4R-22L. A bikeway may be provided close to the shoreline around the end of the Runway 4R runway safety area.

5.2.2.2 Runway 4L-22R

Runway 4L-22R is planned to be shortened to a length of 4,500 feet and retained at a width of 200 feet. (If narrowed to 75 feet then the runway lights would have to be repositioned.) The 4,500 feet are measured from the northeast end of the runway. The remaining 3,830 feet of pavement could be used for a taxiway.

5.2.2.3 Runway 11-29

Runway 11-29 is planned to be shortened to a length of 6,000 feet at the existing width of 200 feet. The 6,000 feet are measured by closing 1,000 feet from the existing northwesterly end of the runway and by relocating the Runway 29 threshold 1,441 feet from the existing southeasterly end. This configuration allows the 34:1 nonprecision runway approach surface for Runway 29 to clear Coral Sea Road in accordance with FAR Part 77. (However, a 6,000-foot crosswind runway limits its ability to handle fully loaded USCG C-130 aircraft as well as other larger aircraft in the event of a natural disaster or other civil emergency.) A 6,000-foot runway length also provides for a runway safety area and runway object free area as described in the next section. The capability for beach access is provided southeast of Runway 11-29.

5.2.2.4 Runway Safety Areas and Runway Object Free Areas

The Plan provides for runway safety areas (RSA) and runway object free areas (ROFA) to extend the full length of each runway and beyond each end of the runways. For Runways 4R-22L and 11-29 each RSA is 500 feet wide and each ROFA is 800 feet wide, and both are centered on the runway centerline, and extend 1,000 feet beyond each runway end. For Runway 4L-22R the RSA is 150 feet wide and the ROFA is 500 feet wide and both extend 300 feet beyond each runway end.

5.2.2.5 Taxiways

The Plan provides for the retention of existing taxiways, in their present configuration, with a width of 75 feet, and taxiway object free area width of at least 259 feet centered along the taxiway. Within the general aviation area, apron taxiways should be at least 35 feet wide with an object free area width of at least 131 feet centered along the taxiway.

Taxiway P is recommended to be extended to the southwest to Runway 11-29. A new entry/exit taxiway is planned to connect Taxiway K to the relocated threshold for Runway 11.

Taxilanes between rows of hangars and tiedowns are planned with an object free area width of at least 79 feet centered along the taxilane. Taxilanes serving the commercial aviation/fixed base operator lease areas are planned with a taxilane object free area of 115 feet centered along the taxilane.

The unused portions of the runways should be painted in accordance with FAA Advisory Circular 150/5340-1G, *Standards for Airport Markings*. The portions at the southwest end of Runway 4L-22R and southeast and northwest ends of Runway 11-29 could be used as taxiways in the future.

5.2.2.6 Airfield Pavement

The existing airfield pavement is adequate for future forecast aircraft operations. Any future airfield/taxiway pavement that will be used by C-130 aircraft should be designed to accommodate single tandem-wheel aircraft with 155,000 pounds maximum gross weight. Any new airfield pavement in the general aviation basing area should be designed to accommodate single-wheel aircraft with 12,500 pounds maximum gross weight.

5.2.3 Airspace and Air Traffic Control

Avigation (air navigation) considerations in the Plan include airspace and air traffic control, approach areas and obstructions, runway protection zones, navigational and landing aids.

5.2.3.1 Airspace and Air Traffic Control

An air traffic control facility is recommended within the existing air traffic control tower (ATCT) facility.

5.2.3.2 Runway Protection Zones, Approach Areas and Obstructions

The Plan provides for a precision runway approach surface and a runway protection protection zone (RPZ) for Runway 4R, nonprecision approach surfaces and RPZs for Runways 22L and 29, and visual approach surfaces and RPZs for Runways 4R, 11 and 22R. The approach slope surface ratios, provided for in the Plan, are as shown below:

Runway	Approach Slope Surface Ratio
4R	50:1 inner 10,000 feet 40:1 outer 40,000 feet
4L	20:1
11	20:1
22R	20:1
22L	34:1
29	34:1

Except for required aviation facilities whose locations are fixed by function, there are no obstruction penetrations of the above approach slope surfaces other than Coral Sea Road. At the critical point Coral Sea Road would penetrate the primary surface, transitional surface, 50:1 approach surface related to the 8,000-foot length of Runway 4R-22L by as much as 75 feet with the alignment shown on Figure 5-1 as well as the runway safety area and runway object free area.

5.2.3.3 Navigational and Landing Aids

Based on available data, forecasts of general aviation activity, and the requests of the USCG, airlines and military, the capability for at least a nonprecision instrument approach procedure should be provided to serve the Kalaeloa Airport. This can be accomplished most expeditiously by the FAA testing and approving the existing nondirectional beacon (NDB) approach to Runway 4L for civil use to Runway 4R.

In addition, the State should request the FAA to evaluate a precision Differential Global Positioning System (DGPS) approach capability for Runway 4R and nonprecision approach capability for Runway 29 to facilitate the requirement for instrument approach training as well as use by itinerant aircraft operations. Based on recent evaluations, new GPS approaches, including precision GPS, appear to have potential for use at Kalaeloa Airport.

A medium intensity approach lighting system with runway alignment indicator lights (MALSR) should be provided with a precision approach for Runway 4R. Some or all of the existing approach lighting system (equipment and lights) on Runway 4R may be reused.

The existing high intensity runway lights (HIRL) are retained on Runways 4R-22L and 11-29. However, the runway lights for Runway 4L-22R could be retained for a 200-foot width but would have to be relocated closer to the runway centerline for a 75-foot width. The existing medium intensity taxiway lighting (MITL) is retained on all the existing taxiways. MITL should be installed on new taxiways and to replace existing taxiway reflectors along the west end of Taxiway K.

Precision approach path indicators (PAPI) are proposed on all runways except Runway 11. Runway 4R-22L should be painted with precision runway markings. Runway 11-29 should be painted with nonprecision instrument markings and Runway 4L-22R should be painted with visual runway markings.

The existing airport beacon should be converted from a dual beam to a new single beam to identify the Airport as civilian rather than military. A segmented circle, with traffic pattern indicators and lighted wind cone, should be installed near the center of the airfield. Wind socks are recommended adjacent to each runway end. The existing wind sock will have to be relocated for Runway 29.

There are several facilities associated with the aircraft operations at NAS Barbers Point that are within the boundaries of the land requested by the USF&WS. Based on recent correspondence, these facilities, and the underlying land, could be conveyed to the State as part of the Kalaeloa Airport. Otherwise the existing Automated Surface Observing System (ASOS) and other facilities in this area would have to be relocated within the proposed airport property.

The NAS Barbers Point Redevelopment Commission decided that, pending development of an overall reuse plan for the Base, the FAA outer marker facility for Honolulu International Airport will remain in its present location, with the option to move it at a later date. The largest displacement would be 800 feet east or west only.

If required to be moved, the cost of relocation would be included in the project requiring the move. A 500-foot radius clear area should be maintained around this facility according to FAA.

5.2.4 General Aviation

General aviation facilities are proposed north of the intersection of the runways as indicated on Figures 5-1 and 5-2. Approximately 115 acres have been retained in the Plan for general aviation uses, such as hangars, tiedowns, fixed base operators (FBOs) and limited commercial service operators in the area on the north side of the Airport.

Initially, the large hangar (Building 110) would be used for aircraft storage with space for a total of about 23 aircraft as illustrated on Figure 5-3. When no longer required for aircraft storage the large hangar could be leased out for commercial aviation uses or the hangar, which is a historical building, could be used for other aviation related activities such as an air museum. It is recommended that up to 140 new hangars be developed by 2020 on the western apron. Space is available for additional hangars to be developed as needed.

Hangar 111 will be transferred to, and used by, the University of Hawaii for their aviation training center.

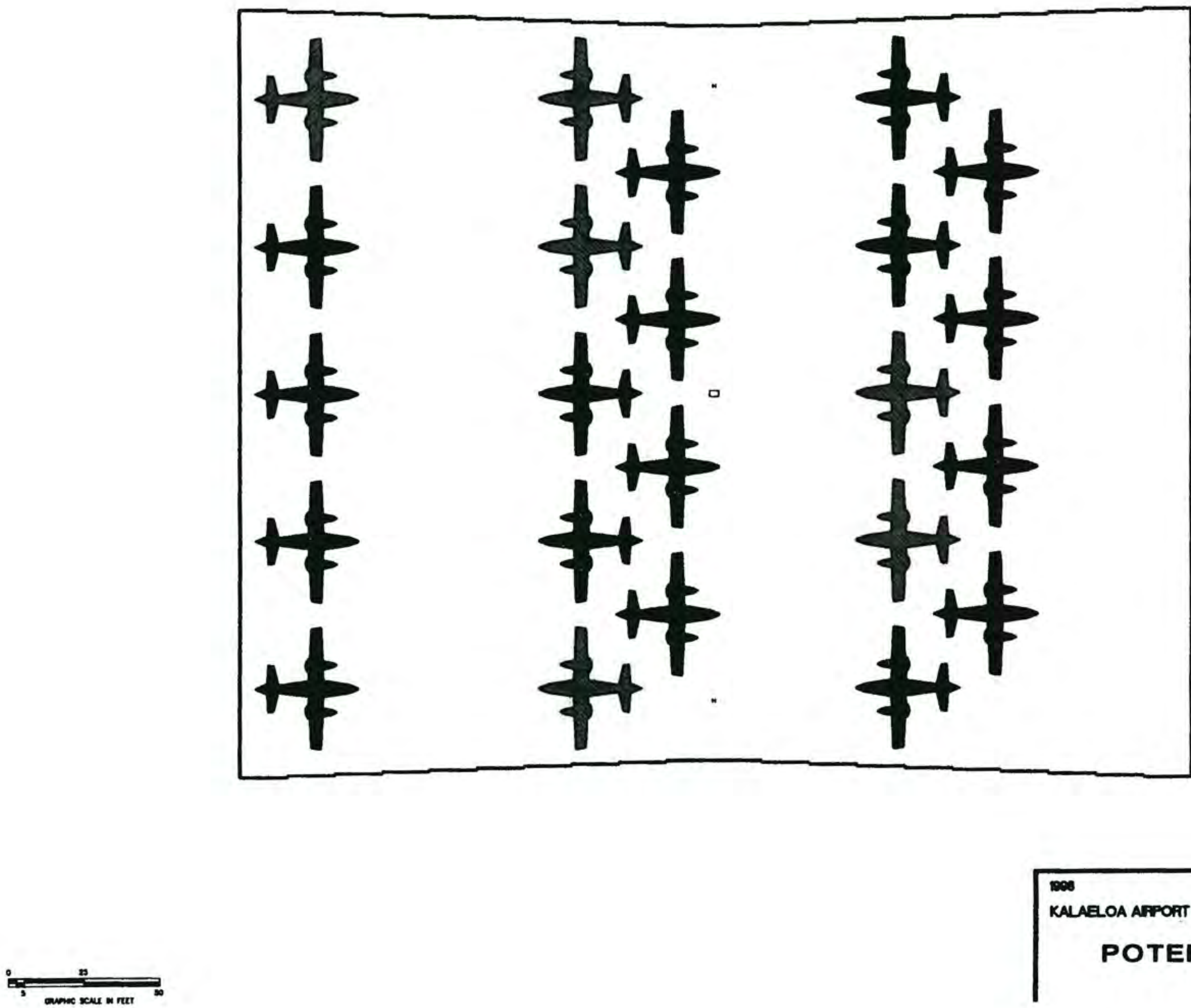
Aircraft parking apron areas for based and itinerant aircraft tiedowns are provided for over 120 aircraft by 2020 on the existing easterly apron south of the two large hangars. Space is available for additional tiedowns as needed. The Plan keeps the line-of-sight between Runways 11 and 22R clear of tiedowns.

Commercial aviation lease lots are provided to the west of the two large hangars with both airfield and roadway access and adjacent vehicular parking. Space should be provided in the existing air operations building for a general aviation pilots' lounge. The small existing aircraft wash rack is retained to the west of the lease lots for general aviation use.

5.2.5 Military and Government Aviation

5.2.5.1 U.S. Coast Guard

The Plan provides for the USCG to retain occupancy of its 48-acre station in the area directly south of the intersection of Runways 4R and 29, adjacent to the Airport. Access to the airfield is provided via Taxiway J directly to Runway 4R and along Runway 4L to Taxiway K to Runway 11-29. It is proposed that the airport perimeter



1998
FIGURE NO. 5-3

KALAELOA AIRPORT MASTER PLAN
ISLAND OF OAHU

POTENTIAL HANGAR LAYOUT

fencing extend along the boundary of the USCG area on the north side of Coral Sea Road. Access to the USCG could then be controlled by a single gate.

5.2.5.2 Hawaii National Guard

The Plan provides for the HNG to occupy 160 acres in the area northeast and adjacent to the Airport. Access to the airfield is provided via Taxiway P. Airport perimeter fencing would tie into HNG perimeter fencing on the south side of Taxiway P.

5.2.6 Airport Access and Parking

5.2.6.1 Airport Access

Fort Barrette Road will continue to be the main access road from Interstate H-1 to the existing main gate of NAS Barbers Point and then continue as Enterprise Road to Midway Road which will be the northern boundary of the Airport. Several access points to various facilities on the north side of the Airport will be available from Midway Road. Access to the HNG facilities will be from Enterprise Road via Saratoga Road, and access to the USCG facilities will be from Franklin D. Roosevelt Road and Coral Sea Road, as it is today. This existing system of access roads will be adequate to serve the Airport through the planning period.

5.2.6.2 Parking

The existing vehicular parking spaces are retained in the administrative/terminal facilities area for public, employee parking and potential rental car parking. This parking area can be expanded to the northeast. Vehicular parking areas are provided on the west and east sides of the proposed hangar area. Parking for visitors and employees of commercial aviation lease holders should be provided within individual lease plot boundaries. Additional space for parking is provided south of Midway Road near the commercial aviation lease area and the two large hangars. All parking facilities open to the public should be fenced from the airfield with a limited number of controlled access gates to provide security and safety.

5.2.7 Airport Support

5.2.7.1 Administration/Terminal Building Area

The existing air operations building and associated parking area, north of the runway intersection, is planned to become the Terminal/Administration Building Area as illustrated on Figures 5-1 and 5-2. Space for a pilot's lounge, passenger lounge and rental car facilities is also proposed for this building.

5.2.7.2 Aircraft Rescue and Firefighting Facilities

There is no current requirement for an Aircraft Rescue and Firefighting (ARFF) facility for civil use of the Airport. The HNG will have a requirement for ARFF but can only provide for their own activities. The USCG requirements may or may not be provided by the USCG.

The existing facility is manned and operated under contract to the Department of Defense. The future of the equipment and manning is unknown at this time. Procurement of the existing equipment and facilities by the State Department of Transportation, Airports Division (DOTA) and a DOTA contract to operate the ARFF activity may be the best option. Further discussions and coordination are required between the various agencies as it would appear that some mutually beneficial joint arrangement could be worked out. In any event the Plan provides for acquisition and retention of the ARFF facilities in their present location.

The closed ARFF training facility located south of Runway 4R-22L near the USCG facility is not recommended for retention.

5.2.7.3 Weather Service

The Plan relocates the Automated Surface Observing System (ASOS) towards the center of the airfield. This system can be augmented by a trained and certified weather observer. This observer is usually an air traffic controller and this is recommended.

5.2.7.4 Airport Support and Maintenance Facilities

Space is reserved for a DOTA maintenance baseyard, located adjacent to, and northeast of, the terminal/administration building to serve the Airport during the planning period. This includes the Weapons Department (Building 115) facility. The site has good airfield access and is located along Midway Road.

5.2.7.5 Fuel Storage

The DOTA will decide which fuel storage facilities and refueling trucks should be requested to be conveyed. In the initial phases of operation of the Kalaeloa Airport, trucking of fuel from the existing fuel tanks to refuel general aviation aircraft is proposed.

Later on, a fuel island and a 24-hour card lock system could be installed near the general aviation aircraft apron and Hangar 110. A card lock system allows fuel to be dispensed using one of several credit cards on a 24-hour basis. This feature would be useful for aircraft needing fuel after normal business hours.

The usage of the available storage capacity and refueling trucks needs to be coordinated with the USCG and HNG and the future use of any surplus fuel storage capacity determined by the State.

5.2.7.6 Fencing

It is recommended that the entire airport operating area be fenced as illustrated on Figure 5-1. New fencing is proposed extending from along the south side of Taxiway P, on the northeast side of the Airport, around the runway protection zones for Runways 22R and 22L on the west side of Coral Sea Road then along the building restriction lines east of Runway 4R-22L and then east of the USF&WS parcel and north of Runway 11-29. It is proposed that the fencing run along the north side of Coral Sea Road around the southeast end of Runway 11-29 and west along the BRL to the end of the USCG facility, then around the USCG facility and then along the BRL to the shoreline near the end of Runway 4R. Then it is proposed the fencing extend along the shoreline and on the east side of the dirt road across the runway protection zone for Runway 4R. It would then extend east along the proposed property line and then northwest towards and around the end of Runway 11, west of Midway Road, then east along the proposed property line to tie into the existing fencing along Midway Road. Controlled access gates are recommended at several points along the airport boundary.

5.2.8 Utilities

For the most part, the facilities that would be needed to convert the existing military airfield into a general aviation reliever airport have less demanding utility service requirements than the activities that they would replace. Consequently, they would not increase the regional demand for utility service. However, since some of the improvements that would be needed cannot be served directly by the existing transmission and collection network, some new construction will be needed. These improvements are described below.

5.2.8.1 Water Supply

Water use by the commercial aviation/fixed base operators (FBOs), who would occupy the lease lots, occupants of the T-hangars and other general aviation users would be low. Daily potable water use by 2020 would typically be on the order of 3,000 gallons per day based on the following assumptions:

- an average of 50 percent of the T-hangars and the tiedowns being used on a busy day;
- two persons per T-hangar and tiedown, plus 50 employees and visitors at the FBOs; and
- 10 gallons per day per user.

Additional water needs would include the aircraft wash rack and landscaping. The expected usage is less than the amount of water that has historically been used by the Navy for activities in this portion of the Base that are being replaced. Consequently, the overall system can accommodate the proposed new uses.

New service lines must be installed to deliver water from existing water mains to the proposed new uses. In the case of the proposed T-hangars, this would involve installing a 4- to 6-inch water main tapping off the existing 12-inch water line located in the quarter-circular service road to the west of the proposed hangars. The new main would be situated within the new roadway/parking area that would be constructed on the existing apron between the T-hangars and the proposed lease lots. The 6-inch size would provide the capacity needed to meet the fire flow standards; if auxiliary fire pumps are provided at the hangars, a smaller line-size might be adequate.

Water service to the proposed lease lots would be provided by extending a 6-inch line off the existing 12-inch water main that runs along Midway Road north of the proposed lease lots. The service would be installed to the boundary of each lot, with individual users responsible for the final connection to the buildings that would be constructed there.

No new facilities would be needed to supply water to the administration/terminal building, ARFF or to Hangars 110 and 111. The existing water supply to the aircraft wash rack is also adequate.

5.2.8.2 Wastewater Collection and Treatment

More than sufficient regional wastewater treatment and transmission capacity is already available. The existing service to the administration/terminal building and to Hangars 110 and 111 is also adequate. However, it will be necessary to extend existing collector sewers to service the toilets that would be located at the ends of the T-hangar buildings and in any buildings that are constructed on the lease lots.

The nearest existing sewer is an 8-inch line that serves the general warehouse (Buildings 1791 and 1792) immediately south of Midway Road near the proposed lease lots. If detailed engineering analyses confirm its feasibility, sanitary wastewater from the proposed T-hangars and from buildings built on the lease lots will be collected from these structures via a gravity main and pumped via a buried pressure main to SMH 28. If capacity problems prevent this, the wastewater would be taken to SMH 26 at the intersection of Midway Road and Lexington Avenue.

5.2.8.3 Storm Drainage

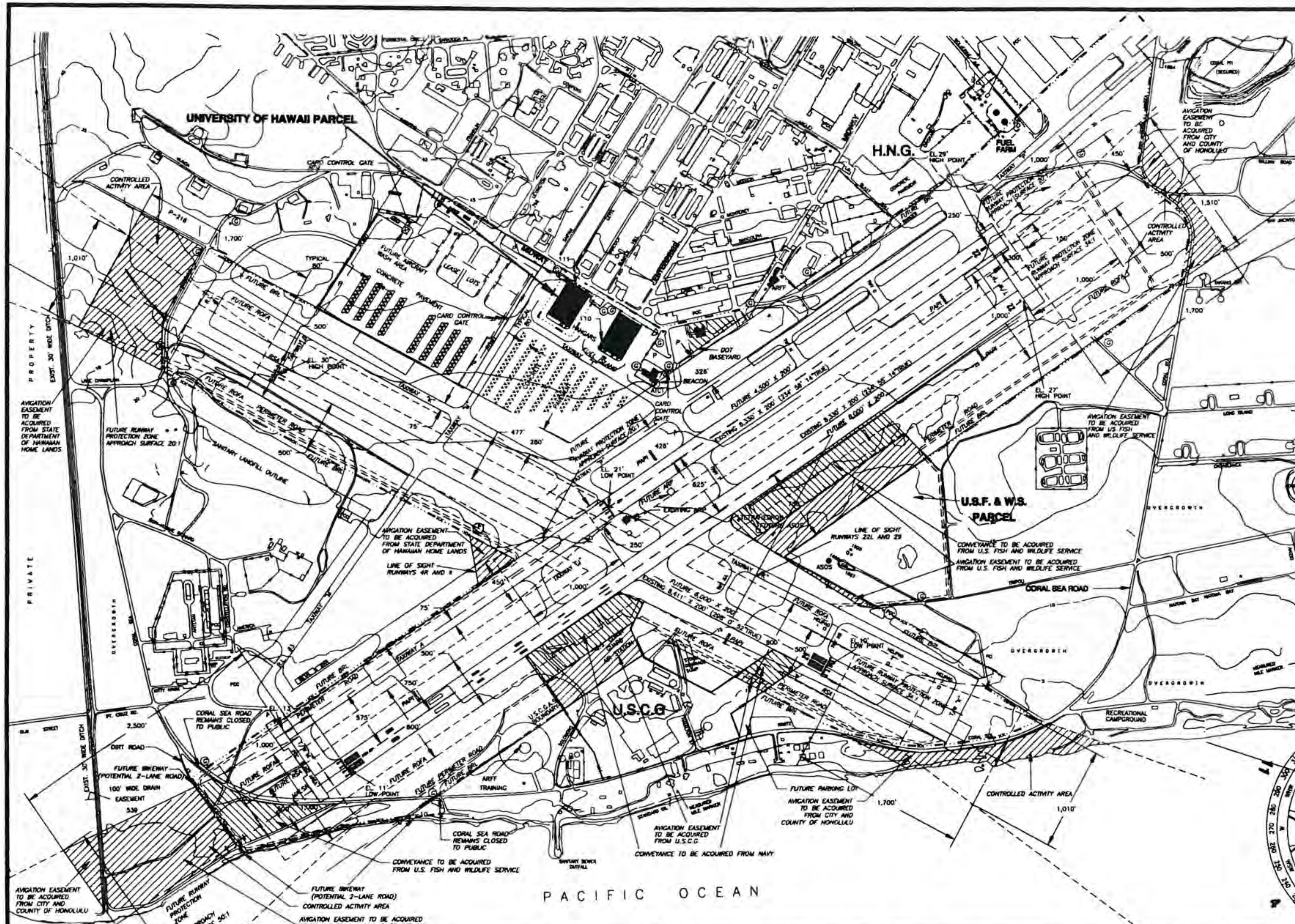
The proposed general aviation facilities and services will be developed within existing structures (e.g., the administration/terminal building and Hangars 110 and 111) and in new buildings constructed on existing aircraft apron areas. Thus, there will be no change in the volume, routing or quality of stormwater runoff. Consequently, no new stormwater drainage facilities will be needed.

5.2.8.4 Electrical and Telecommunications Facilities

The proposed uses consume small amounts of electrical energy. They can be served adequately by existing regional electrical generating and transmission facilities and by the Base's telecommunications exchange. New electrical and telecommunications service lines will be needed, however. These will be provided via underground service lines connecting the new buildings to the existing lines along Midway Road.

5.3 AIRPORT LAYOUT PLAN

The Airport Master Plan serves as the basis for the Airport Layout Plan. The Airport Layout Drawing, Airspace Plan and Inner Approach Surface Drawing for Kalaeloa Airport, derived from all the foregoing plans and analyses, are presented on Figures 5-4, 5-5 and 5-6, respectively.



TRUE NORTH

MAGNETIC NORTH 10°30'E(1998)

0 500 1000

GRAPHIC SCALE IN FEET

NOTE:

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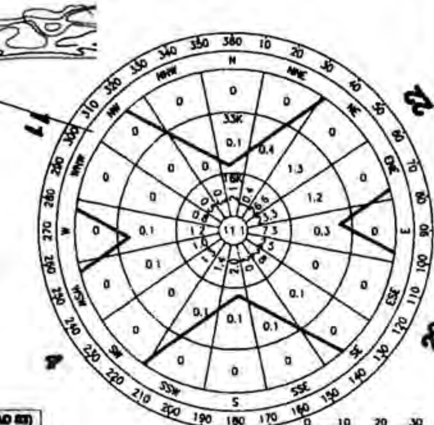


GRAPHIC SCALE IN KNOTS

WIND COVERAGE	10.5 KNOTS	16.5 KNOTS
RUNWAY 4-22	97.80%	99.55%
RUNWAY 11-29	85.10%	98.35%
BOTH RUNWAYS	99.50%	99.80%
CALM AND LESS THAN 3 KNOTS = 11.1%		

ALL-WEATHER WIND ROSE

WEATHER DATA FROM BARBERS POINT WEATHER STATION. 1949-1990

LEGEND

EXISTING	ULTIMATE		EXISTING	ULTIMATE	
		STRUCTURE			STRUCTURE TO BE REMOVED
		AIRFIELD/APRON PAVEMENT			GROUND CONTOURS
		AIRPORT BOUNDARY			RUNWAY PROTECTION ZONE
	FUTURE BRL	BUILDING RESTRICTION LINE			
		FENCING			LAND CONVEYANCE
		AIRPORT REFERENCE POINT			AVIGATION EASEMENT
		THRESHOLD LIGHTS		RSA	RUNWAY SAFETY AREA
		WIND SOCK		ROFA	RUNWAY OBJECT FREE AREA
	G	GATE			T-HANGAR
		FUEL ISLAND		T	TIEDOWN
	P	PARKING LOT			PAPI
					SEGMENTED CIRCLE

AIRPORT DATA

		EXISTING	ULTIMATE
AIRPORT ELEVATION (MSL) FEET		33'	30'
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	LATITUDE	21°18'24"N	21°18'25"N
	LONGITUDE	158°04'18"W	158°04'15"W
NORMAL MAX. TEMP. HOTTEST MONTH		88°F	SAME
AIRPORT AND TERMINAL NAVAIDS		TACAN-78 PAR-4 NDB	GPS, NDB
AIRPORT CATEGORY AND ROLE		MILITARY	RL/TR
ROTATING BEACON		YES	SAME
TAXIWAY LIGHTING		YES	SAME
TAXIWAY SIGN SYSTEM		YES	SAME
AIR TRAFFIC CONTROL TOWER		YES	SAME
RADAR APPROACH/DEPARTURE CONTROL		HONOLULU	SAME
LIGHTED TETRAHEDRON		YES	SAME
LIGHTED WIND CONE		YES	SAME
AIRPORT REFERENCE CODE		D-V	C-IV
AIRPORT PROPERTY (ACRES)		-	757

RUNWAY DATA

		RUNWAY 4R-22L		RUNWAY 4L-22R		RUNWAY 11-29	
		EXISTING	ULTIMATE	EXISTING	ULTIMATE	EXISTING	ULTIMATE
EFFECTIVE GRADIENT (%)		0.19	0.20	0.19	0.18	0.29	0.33
WIND COVERAGE(16.5 KNOTS) ALL WEATHER(%)		99.55	SAME	99.55	SAME	98.35	SAME
INSTRUMENT RUNWAY		YES	SAME	YES	NO	YES	SAME
APPROACH SURFACES (FAR PART 77)		4R 50:1 22L 501	SAME 22L 34:1	4L 50:1 22R 50:1	4L 20:1 22R 20:1	11 50:1 19 50:1	11 20:1 29 34:1
NAVIGATIONAL AND VISUAL AIDS		4R ALS 22L NONE	4R MALSR PAPI 22L PAPI	4L NONE 22R NONE	4L PAPI 22R PAPI	11 NONE 29 NONE	SAME 29 PAPI
RUNWAY LIGHTING		HIRL	SAME	HIRL	MIRL	HIRL	SAME
RUNWAY MARKING		4R PIR 22L PIR	4R PRECISION 22L NONPRECISION	4L PIR 22R PIR	4L VISUAL 22R VISUAL	11 PIR 29 PIR	11 VISUAL 29 NONPRECISION
PAVEMENT STRENGTH (LBS)	SINGLE	74,000	SAME	74,000	SAME	74,000	SAME
	DUAL	167,000	SAME	167,000	SAME	167,000	SAME
	DUAL TANDEM	327,000	SAME	327,000	SAME	327,000	SAME
AIRCRAFT DESIGN GROUP		D-V	C-IV	D-V	B-II	D-V	C-IV
RUNWAY DIMENSIONS (FEET)		8,330'X200'	8,000'X200'	8,330'X200'	4,500'X200'	8,441'X200'	6,000'X200'
PAVEMENT SURFACE		PAVED	SAME	PAVED	SAME	PAVED	SAME

RUNWAY END COORDINATES (NAD 83)

RUNWAY		EXISTING	ULTIMATE
4R	LATITUDE	21°17'59"N	21°18'01"N
	LONGITUDE	158°04'49"W	158°04'46"W
22L	LATITUDE	21°18'46"N	SAME
	LONGITUDE	158°03'38"W	
4L	LATITUDE	21°18'04"N	21°18'24"N
	LONGITUDE	158°04'52"W	158°04'18"W
22R	LATITUDE	21°18'50"N	SAME
	LONGITUDE	158°03'38"W	
11	LATITUDE	21°18'43"N	21°18'38"N
	LONGITUDE	158°05'02"W	158°04'53"W
29	LATITUDE	21°18'04"N	21°18'11"N
	LONGITUDE	158°03'44"W	158°03'57"W

NOTE:
OBSTACLE FREE ZONE 400 FEET FOR LARGE AIRCRAFT

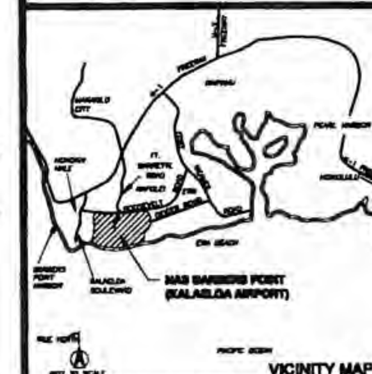
Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

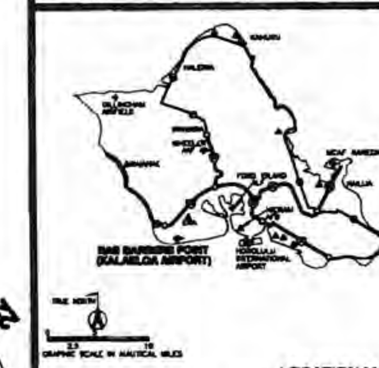
KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

AIRPORT LAYOUT DRAWING



VICINITY MAP



LOCATION MAP

NO.	REVISIONS	DATE

FAA APPROVED:
REFER TO FAA LETTER DATED

DIRECTOR, DEPARTMENT OF TRANSPORTATION STATE OF HAWAII — DATE

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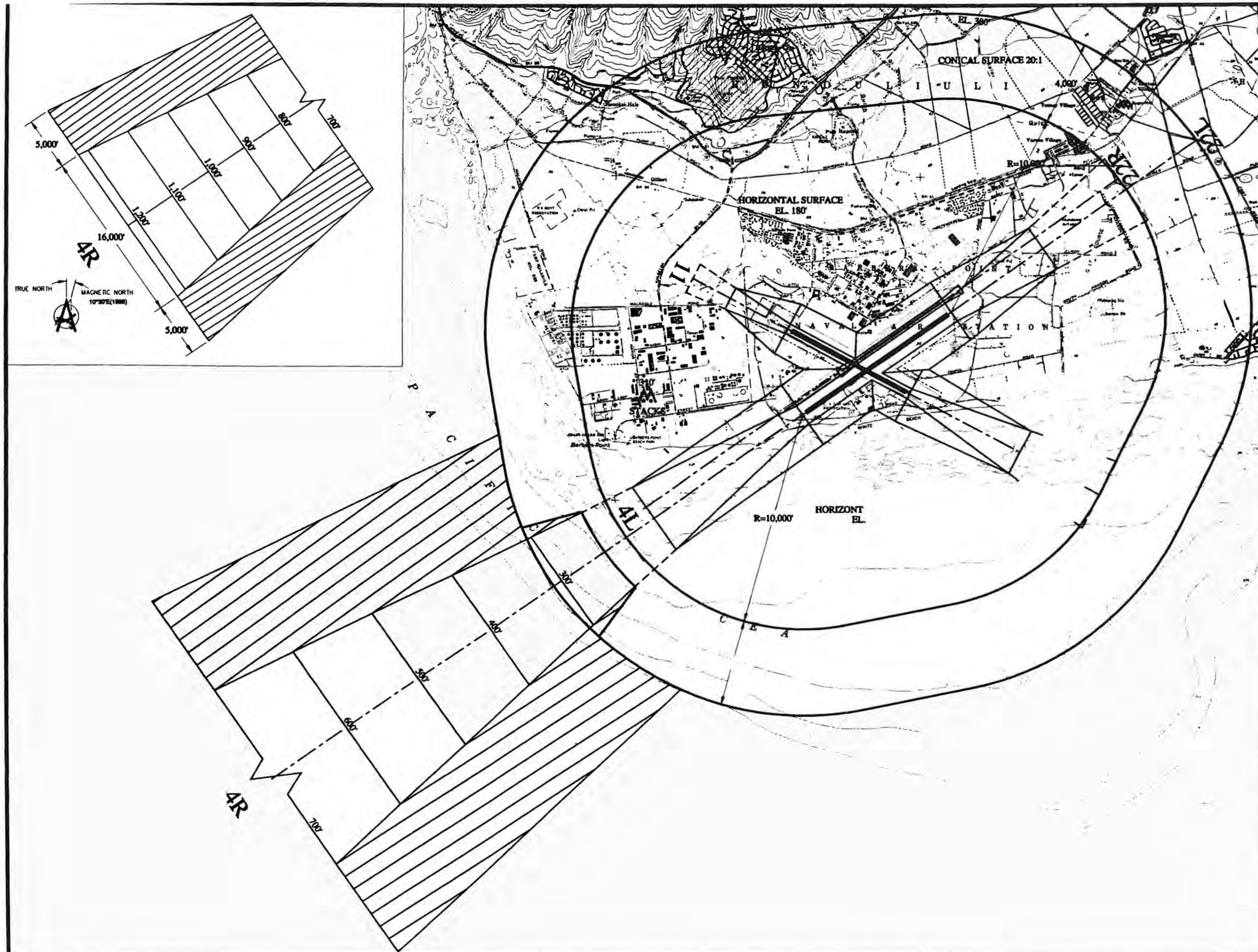
SHEET 1 OF 3

DATE: 11-12-98

FIGURE NO. 5-4

DWG. NO.: BPA-06-ALP



STATE OF HAWAII

Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT
MASTER PLAN

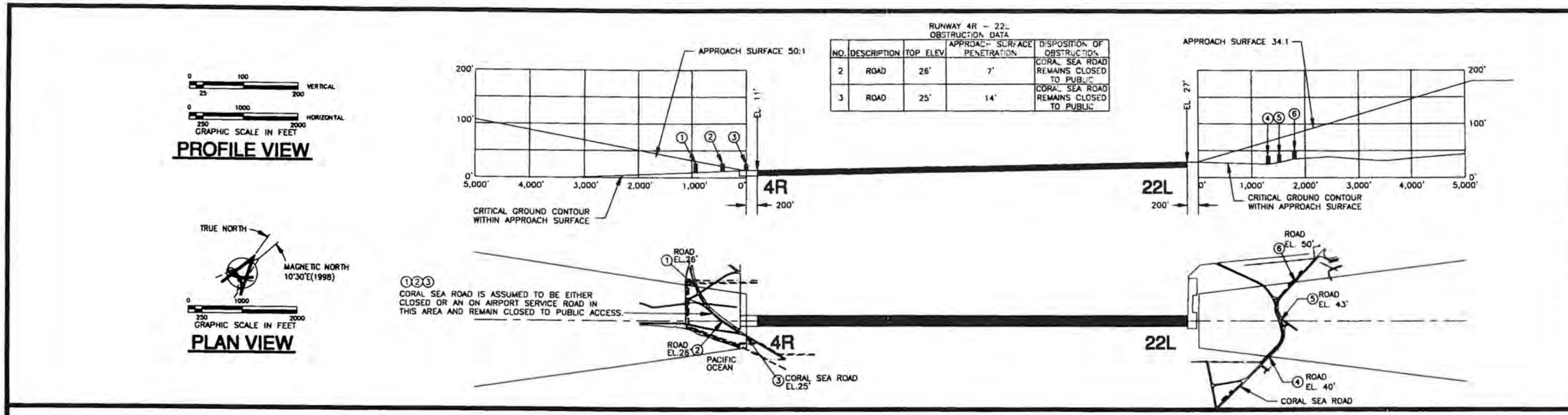
ISLAND OF OAHU

AIRSPACE PLAN

NO.	REVISIONS

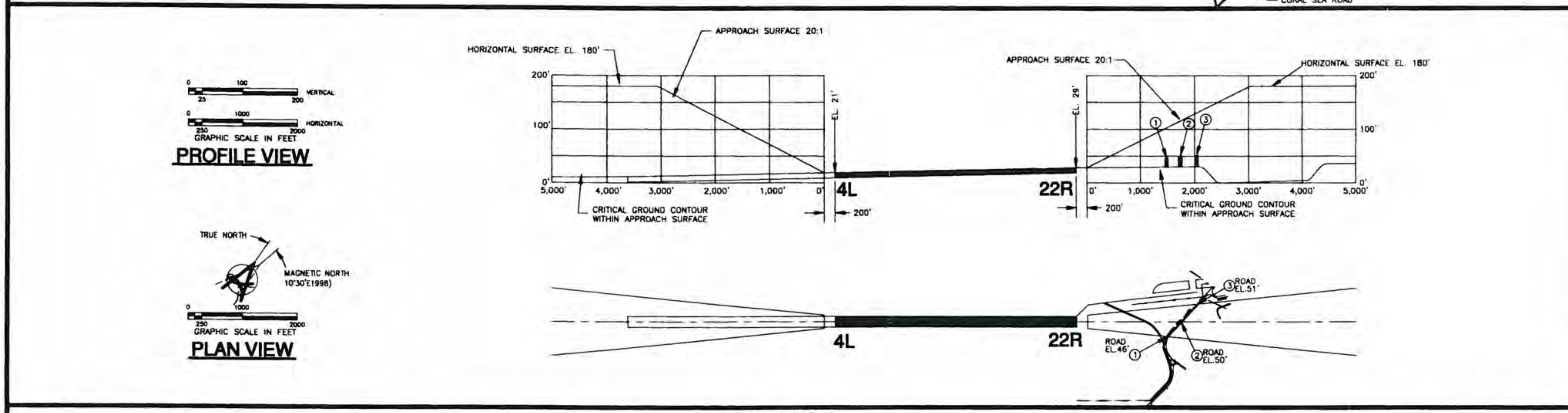
DATE: 08-07-97

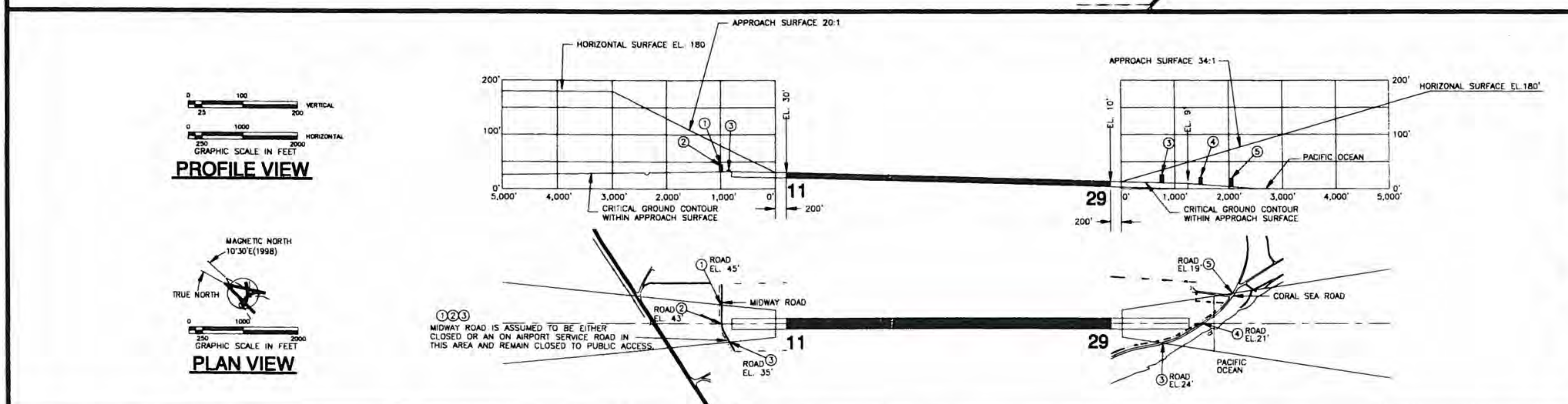
DWG. NO.: BPA-56OAS



RUNWAY 4R – 22L
OBSTRUCTION DATA

NO.	DESCRIPTION	TOP ELEV	APPROACH SURFACE PENETRATION	DISPOSITION OF OBSTRUCTION
2	ROAD	26'	7'	CORAL SEA ROAD REMAINS CLOSED TO PUBLIC
3	ROAD	25'	14'	CORAL SEA ROAD REMAINS CLOSED TO PUBLIC





Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

INNER APPROACH SURFACE DRAWING

NOTE:

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SHEET 3 OF 3

DATE: 11-13-98

FIGURE NO. 5–6

DWG. NO.: [illegible]

Chapter 6

IMPLEMENTATION PLAN

6.1 OVERVIEW

The phased development plan and capital improvement program for Kalaeloa Airport and the estimated costs of the airport improvements recommended as part of the Airport Master Plan discussed in Chapter 5 are presented in this chapter.

A three-phase Implementation Plan has been developed, as a guide for future development, to meet estimated short-range (Phase I, 1998 through 2000), intermediate-range (Phase II, 2001 through 2010) and long-range (Phase III, 2011 through 2020) airport requirements. Phasing of the plan reflects an assessment of the relative priorities of various proposed projects and the approximate timing of the anticipated development.

Phase I projects are considered to be the highest priority items and should be implemented as soon as practicable following conveyance of the Airport to the State. Because of the extensive existing airport facilities and infrastructure that is already in place the requirements for capital improvements in the initial phase of operation will be minimal. This is reflected in the capital improvement program. Fencing of the Airport property is considered the highest priority. There are several improvements requiring implementation by the State that are considered part of the State's regular maintenance and operation program. Although these improvements are not considered part of the capital improvement program, they are referred to in the text.

Phase II and Phase III should be undertaken as the actual needs are demonstrated by the demand for airport facilities and services and financing arrangements are made.

6.2 CAPITAL IMPROVEMENT PROGRAM

The phasing of the recommended capital improvements is presented on Figure 6-1, Airport Phasing Plan. An approximate planning cost estimate for each improvement for the recommended three-phase capital improvement program is presented in Tables 6-1, 6-2 and 6-3. A summary of the total capital improvement program through 2020 is presented in Table 6-4.

Total costs for all projects included in the program are estimated in 1998 dollars. These costs would be incurred as follows:

Phase I	$1,192,000
Phase II	3,873,000
Phase III	3,330,000
TOTAL	$8,395,000

6.2.1 Phase I (1998-2000)

Phase I projects are considered to be the highest priority items and should be implemented as soon as practicable following conveyance of the Airport to the State.

6.2.1.1 Airfield

Minimal improvements will be required to the airfield during the initial phase of operation. Runways 4R-22L, 4L-22R and 11-29 will require restriping of the markings to reflect the new runway lengths. The threshold lights and markings on Runways 4R, 4L, 11 and 29 will require relocation.

The U.S. Navy will be responsible for the removal of the arresting gear on Runways 4L and 22R.

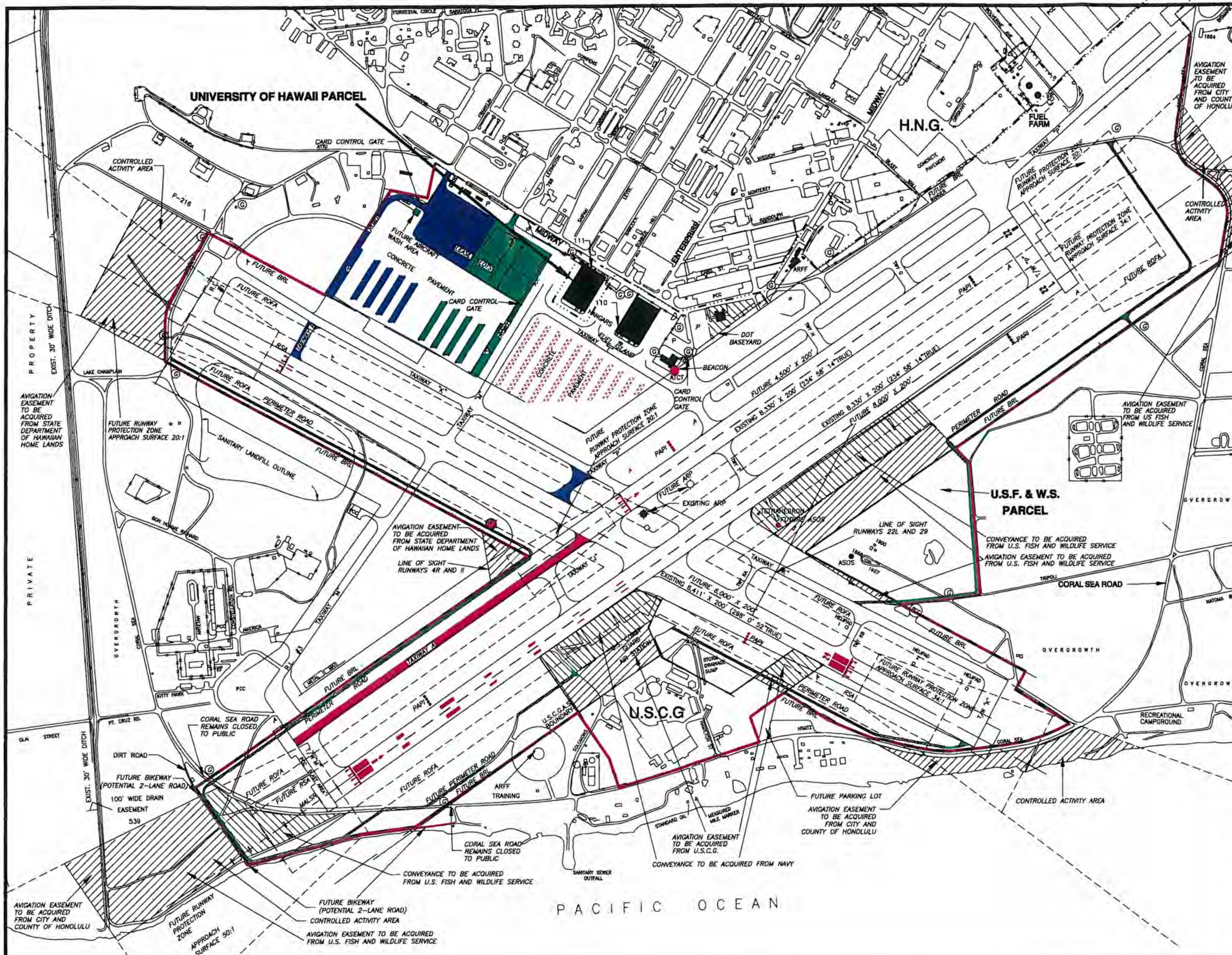
6.2.1.2 Navigational Aids

A Precision Differential Global Positioning System (GPS) approach for a Category I airport to Runway 4R is planned for. The existing Approach Lighting System (ALS) will be repositioned on Runway 4R and converted to a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). The Department of Transportation, Airports Division (DOTA) should request funding for these navigational systems through the FAA's Facilities and Equipment Program as soon as practicable following the conveyance.

Precision Approach Path Indicators (PAPIs) are planned for Runways 4L and 29. A segmented circle with lighted wind cone is recommended for installation during the first phase. The windsocks adjacent to the ends of Runways 4L and 11 will require relocation.

It is recommended that DOTA install a new civil airport beacon. Older beacons are difficult to maintain, and replacements parts are not readily available.

DOTA should request that the Navy leave the existing Runway 4R Approach Lighting System (ALS) and electrical infrastructure in place. The DOTA should also request



STATE OF HAWAII

Airports Division

DEPARTMENT OF TRANSPORTATION STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

AIRPORT PHASING PLAN

LEGEND		
EXISTING	FUTURE	
		STRUCTURE
		AIRFIELD/APRON PAVEMENT
		STRUCTURE TO BE REMOVED
		AIRPORT BOUNDARY
	FUTURE BRL	BUILDING RESTRICTION LINE
		FENCING
		AIRPORT REFERENCE POINT
		THRESHOLD LIGHTS
		WIND SOCK
	RSA	RUNWAY SAFETY AREA
	ROFA	RUNWAY OBJECT FREE AREA
		T-HANGAR
		TIEDOWN
P	P	PARKING LOT
	G	GATE
		PAPI
		LAND CONVEYANCE
		AVIGATION EASEMENT
		FUEL ISLAND
		PERIMETER ROAD
		SEGMENTED CIRCLE
		PHASE I 1998–2000
		PHASE II 2001–2010
		PHASE III 2011–2020

NOTE:

THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.

ARIES CONSULTANTS LTD.

DATE: 11-13-98

FIGURE NO. 6-1

DWG. NO.: BPA-10-Phase

Table 6-1

CAPITAL IMPROVEMENT PROGRAM
Kalaeloa Airport
Phase I (1998-2000)

	Estimated Costs
Airfield	
• Restripe markings on Runways 4R-22L, 4L-22R and 11-29	$30,000
• Relocate threshold lights on Runways 4R, 4L, 11 and 29	40,000
Navigational Aids	
• Install Precision Differential Global Positioning System (GPS) and convert the existing Approach Lighting System to a Medium Intensity Approach Lighting System wih Runway Alignment Indicator Lights (MALSR)	a.
• Install Precision Approach Path Indicators (PAPIs) on Runways 4L and 29	100,000
• Install new airport beacon	30,000
• Install segmented circle with lighted wind cone	3,000
• Relocate wind sock adjacent to ends of Runways 4L and 11	2,000
• Relocate Automated Surface Observing System (ASOS)	1,000
Terminal Area and Access	
• Develop aircraft tiedown area	26,000
Airport Support and Utilities	
• Construct perimeter fencing (31,000 l.f.) around airfield including card-control gate	960,000
TOTAL PHASE I IMPROVEMENTS	$1,192,000

a. This would be included in the FAA Facilities and Equipment Budget.

Source: Aries Consultants Ltd. and Planning Solutions, Inc.

Table 6-2

CAPITAL IMPROVEMENT PROGRAM
Kalaeloa Airport
Phase II (2001-2010)

	Estimated Costs
Navigational Aids	
• Install Precision Approach Path Indicators (PAPIs) on Runways 4R, 22R and 22L	150,000
Terminal Area and Access	
• Construct 80 T-hangars	2,400,000
• Develop lease lots including utilities and service roads	176,000
Airport Support and Utilities	
• Develop service road and parking lot on east side of west apron	157,000
• Install new card-control gate	30,000
• Extend utilities (water, sewer, electrical, telecommunications) to new T-hangars	360,000
• Develop perimeter road (20,000 l.f.)	600,000
TOTAL PHASE II IMPROVEMENTS	$3,873,000

Source: Aries Consultants Ltd. and Planning Solutions, Inc.

Table 6-3

CAPITAL IMPROVEMENT PROGRAM
Kalaeloa Airport
Phase III (2011-2020)

	Estimated Costs
Airfield	
• Construct new taxiways 75 feet wide--extend Taxiway P to the southwest and entry/exit taxiway for Runway 11	$ 675,000
Navigational Aids	
• Replace taxiway reflectors along Taxiway K with Medium Intensity Taxiway Lights (MITL)	60,000
• Install MITL on new taxiways	36,000
Terminal Area and Access	
• Construct 60 T-hangars	1,800,000
• Develop lease lots including utilities and service roads	264,000
Airport Support and Utilities	
• Develop service road and parking lot on west side of west apron	230,000
• Install new card-control gate	30,000
• Extend utilities (water, sewer, electrical, telecommunications) to new T-hangars	235,000
TOTAL PHASE III IMPROVEMENTS	$3,330,000

Source: Aries Consultants Ltd. and Planning Solutions, Inc.

Table 6-4

SUMMARY OF CAPITAL IMPROVEMENT PROGRAM
Kalaeloa Airport
1998-2020

	Estimated Costs
PHASE I (1998-2000)	
Airfield	$ 70,000
Navigational Aids	136,000
Terminal Area and Access	26,000
Airport Support and Utilities	960,000
Phase I Subtotal	$1,192,000
PHASE II (2001-2010)	
Navigational Aids	$ 150,000
Terminal Area and Access	2,576,000
Airport Support and Utilities	1,147,000
Phase II Subtotal	$3,873,000
PHASE III (2011-2020)	
Airfield	$ 675,000
Navigational Aids	96,000
Terminal Area and Access	2,064,000
Airport Support and Utilities	495,000
Phase III Subtotal	$3,330,000
TOTAL CAPITAL IMPROVEMENT PROGRAM	$8,395,000

Source: Aries Consultants Ltd. and Planning Solutions, Inc.

the Navy to leave the Automated Surface Observing System (ASOS) and then relocate it to the west.

6.2.1.3 Terminal Area and Access

The development of the aircraft tiedowns on the east apron area will be initiated in the first phase. This will include aircraft parking apron markings and tiedowns.

Some modifications and maintenance will be required for Hangar 110 which are included in the State's maintenance and operations budget. This will include modifications required to park aircraft in the hangar as well as to lease office space at the ends of the hangar.

6.2.1.4 Airport Support and Utilities

The most significant capital expenditure associated with the initial development of the Airport will be the perimeter fencing around the Airport and a card-control gate for airfield access. Coral Sea Road will remain closed to the public around the end of Runway 4R.

Other expenditures required during the initial phase of operation of the Airport will be for any modifications to the administration/terminal building and establishing a DOTA maintenance baseyard. These expenditures are also considered as part of the maintenance and operations budget.

6.2.2 Phase II (2001-2010)

Beyond Phase I, it is assumed that development of the Airport will proceed according to the priorities proposed in the recommended phased development plan.

6.2.2.1 Navigational Aids

Precision Approach Path Indicators (PAPIs) are planned for Runways 4R, 22R and 22L.

6.2.2.2 Terminal Area and Access

The DOTA should begin developing new T-hangars on the east side of the west concrete apron. After the individual T-hangars are constructed, the DOTA will have the opportunity of leasing space in Hangar 110 (or the entire hangar). Tenant improvement work within the large hangar is assumed to be the responsibility of the lessee(s).

Commercial aviation lease lots will be developed on the east side of the west apron with direct access to the airfield for use by aviation-related commercial activities.

Service roads and utility extensions to the lease lots should be provided by the State with structures and improvements provided by the lessees.

6.2.2.3 Airport Support and Utilities

A new service road and parking lot on the east side of the west apron will be developed for the new T-hangar area. A new card-controlled airfield access gate is also planned for.

The extension of utilities (water, sewer, electrical, telecommunications) to the new T-hangars is provided for.

A perimeter road will be developed around the Airport property.

6.2.3 Phase III (2011-2020)

It is assumed that Phase III projects will be implemented as the actual needs are demonstrated.

6.2.3.1 Airfield

New 75-foot wide taxiways are planned. Taxiway P is extended to the southwest to Runway 11-29 and a new entry/exit taxiway between Runway 11 and Taxiway K is built.

6.2.3.2 Navigational Aids

Medium Intensity Taxiway Lights (MITL) will be installed along Taxiway K to Taxiway M to replace the existing taxiway reflectors as well as along the new taxiways.

6.2.3.3 Terminal Area and Access

An additional 60 T-hangars are planned for construction. Additional commercial aviation lease lots will be developed on the west side of the west apron including service roads and utilities.

6.2.3.4 Airport Support and Utilities

A new service road and parking lot on the west side of the west apron will be developed for the new T-hangar area. A third card-controlled airfield access gate is also provided.

Chapter 7

ECONOMIC AND FINANCIAL IMPLICATIONS

7.1 OVERVIEW

This chapter describes the financial considerations and economic benefits associated with the proposed conveyance of NAS Barbers Point to the Department of Transportation, Airports Division (DOTA) for use as a civilian public-use airport. The estimated operations and maintenance costs associated with the initial acquisition of the Airport are presented, and sources of funds are identified. The funding of the capital improvement program, discussed in Chapter 6, is presented including the major documents that provide the framework for financing the Statewide Airport System and the eligibility of the Airport to receive development grants from the Federal Aviation Administration through the Airport Improvement Program.

The economic benefits that are associated with the conveyance of the Airport are also presented.

7.2 FINANCIAL PLAN

This section describes the financial considerations of funding the future maintenance and operation expenses of the Kalaeloa Airport. Sources of funding for the capital improvement program are also identified.

7.2.1 Operations and Maintenance

A preliminary operations and maintenance budget was obtained from DOTA and refined based on further discussions with DOTA staff. Operations and maintenance costs that would be associated with the first year of operation by the State are estimated as follows:

Personnel	$ 200,000
Utilities	160,000
Machinery and equipment	250,000
Maintenance of buildings and grounds	50,000
Materials and supplies (including small tools)	70,000
Environmental	50,000
Subtotal Operations and Maintenance	$ 780,000
Contract Air Traffic Control Tower	$ 250,000
Security Contract	170,000
Total	$1,200,000

In addition to the operations and maintenance costs, a contract air traffic control tower is assumed to be in operation with an annual cost of $250,000. The DOTA will also secure the services of a security contract for State-owned and operated facilities estimated at $170,000 annually bringing the total estimated costs to $1.2 million during the initial year of operation.

The costs of operating and maintaining the Kalaeloa Airport during the initial year of operation are estimated to be higher than in the following years. The acquisition of machinery and equipment (sweepers, grass cutters, utility vehicles, etc.) and the environmental analyses will not be required in subsequent years thereby reducing the estimated annual operations and maintenance costs from $780,000 to $500,000 following the initial year of operation. Therefore, together with the contract air traffic control tower and the security contract, the total estimated operations and maintenance costs are $920,000 in the following years.

It is anticipated that, subject to future negotiations, the U.S. Coast Guard (USCG) and Hawaii National Guard (HNG) will share in the costs of operations and maintenance of the Airport in proportion to the incremental costs of providing airfield and airport facilities and the services to accommodate their activities. In addition, any specific requirements of DOTA, the USCG and the HNG should be assumed by the user.

In addition to the USCG and HNG sharing in the operations and maintenance costs, it is estimated that revenues from airport users (hangars, tiedowns, leases) will contribute to the DOTA share of the operations and maintenance costs. The amount of these revenues will depend on the inducements the State offers to aircraft owners and commercial aviation/fixed base operators to make the Kalaeloa Airport an attractive alternative to Honolulu International Airport and Dillingham Airfield.

Because of the uncertainties involved in forecasting financial data and precise acquisition details, it is recommended the DOTA negotiate agreements with the USCG and the HNG based on an annual compensatory agreement for the operations and maintenance of the facility. This would be advisable during the initial three to five years of operation.

7.2.2 Capital Improvement Program

The capital improvement program and associated costs for the Airport Master Plan presented in Chapter 6 indicates there will be a requirement for $1,192,000 for capital improvements associated with the first phase of operation of the Airport. First-phase development projects are all eligible for 90 percent FAA AIP funding totaling $1,072,800. The remaining 10 percent totaling $119,200 will be the local share responsibility of the State.

The following identifies the sources of funds available for implementing the capital improvement program.

7.2.2.1 State Department of Transportation-Airports

The Kalaeloa Airport will become the 16th airport in the Statewide Airports System administered by the Airports Division of the State Department of Transportation. The Airports System is operated as a self-sustaining enterprise of the State with the primary source of revenue being from airport user-related fees.

The DOTA has financed Airports System capital improvements with available surplus revenue, federal grants-in-aid, general obligation bonds and Airports System revenue bonds.

As of June 30, 1997, the DOTA has issued 25 series of Airports system revenue bonds totaling $1,417,005,000 under the 1969 Certificate of the Director of Transportation (providing for the issuance of State of Hawaii Airports System Revenue Bonds). These revenue bonds are payable solely from and secured solely by the revenues generated by the Airports system. As of June 30, 1997, $1,129,236,528 of these bonds remained outstanding.

DOTA reimburses the State for the portion of debt service on several general obligation bonds issued by the State, the proceeds of which were used to finance various airport projects. As of June 30, 1997, the outstanding amount of these bonds totaled $1,846,365.

The internally-generated cash flow has been generated by Airports System operations, largely as a result of the historic duty free concession agreement and the minimum Airport Use Charge provision of the Airport-Airline Agreement. The current duty free concession agreement, effective June 1, 1997, is for a four-year period at approximately $105 million annually.

The Airport-Airline Lease Agreements, provided for an Airport Use Charge for the nonexclusive right to use the Airports System facilities, equipment, improvements and services, in addition to occupying certain premises and facilities, expired on July 31, 1992. The terms of the Airport-Airline Lease Agreements were extended through June 30, 1997 and have been extended automatically every quarter unless written notice of termination is given. The sources of funds for the capital improvement program have been identified as a) cash on hand, b) cash flow generated from operations, c) Federal grants-in-aid, and d) investment income.

The cost of some of the improvements (e.g., fencing, airport beacon, and airfield marking and lighting) associated with implementing the selected Airport Master Plan for the Kalaeloa Airport are already included in the DOTA capital improvement program. In addition, the State can amend the capital improvement program to include other proposed development costs for the Kalaeloa Airport. DOTA will make arrangements to include the estimated operations and maintenance requirements for the Kalaeloa Airport in the State's budget at the appropriate time.

Historically, the airlines have contributed to the State Airports System through an Airport Use Charge based on a computed rate per 1,000-pound unit of approved maximum landing weight for each aircraft used in revenue landings. Under the terms of the Lease Extension Agreement, the air carriers pay an Airports System Support Charge based on 1,000 pounds of approved maximum landed weight to recover residual costs of the Airports System. Effective September 1, 1997, the Governor implemented a 2-year moratorium on landing fees and Airports System Support Charges paid by the air carriers. However, the Governor reserved the right to reinstate the landing fees and Airports System Support Charges before the 2-year period ends.

7.2.2.2 Federal Aviation Administration Grants-in-Aid

The current grant program, known as the Airport Improvement Program (AIP), was established by the Airport and Airway Improvement Act of 1982. It provides funding for airport planning and development under a single program, unlike the prior 1970 Airport and Airway Development Act. The Airport and Airway Trust Fund, which was established by the Airport and Airway Development Act of 1970, provides the revenues used to fund AIP projects. Taxes or user fees are collected from the various segments of the aviation community such as airline fares and air freight and placed in the Trust Fund. The 1982 Act, as amended in 1987, 1990, 1992 and 1994, authorizes the use of monies from the Airport and Airway Trust Fund to make grants under the Airport Improvement Program.

The State Airports System receives funds from the AIP on an annual basis. The apportionment of these funds is based on:

- Entitlements for the airports (based on the FAA's enplaned passenger formula);
- Cargo entitlements for several airports in the Airport System; and
- "Statewide allocations" intended primarily for general aviation airport projects.

The capital improvements would be eligible for 90 percent AIP funding except for the recommended Runway 4R MALSR and GPS approach which would be 100 percent funded by the FAA's Facilities and Equipment budget. Private-use facilities such as the proposed new hangars will not be eligible for AIP funds. It is important to note that the AIP is funded by users of the airport system and not from general taxpayer sources.

The DOTA is also eligible to receive discretionary AIP funds. Until recently, all monies which the DOTA collected from airport users had to be spent on eligible airport-related projects. In June 1991, Federal legislation authorized the transfer of $250 million from off-Airports System duty free revenues from the Airport Revenue Fund into the State highway special fund. The State forfeited its eligibility to receive discretionary AIP funds during that year. No further transfers are permitted under existing federal law.

7.2.2.3 Project Eligibility at Kalaeloa Airport

The National Plan of Integrated Airport Systems (NPIAS) is published by the U.S. Department of Transportation, Federal Aviation Administration, to estimate the costs of airport development associated with establishing a system of public-use airports to meet the needs of civil aviation and support the Department of Defense and U.S. Postal Service. The NPIAS is structured to provide each community with access to a safe and adequate airport.

Classification and listing of an airport in the NPIAS makes it eligible to receive financial assistance for airport planning and development. Based on FAA criteria, the Kalaeloa Airport will be classified as a Reliever Airport in the NPIAS with a designated airport role of Transport Airport. Five percent of the current AIP funds totaling $62.2 million are set aside for Reliever Airports. The Kalaeloa Airport will be eligible to compete with other Reliever Airports for development funding set aside under this category.

The Military Airport Program (MAP) was established in 1990 to assist airports converting from military to civilian use. The current FAA AIP sets aside 2.5 percent totaling $31 million for the MAP. The Kalaeloa Airport will be eligible to compete for funding under the MAP. Currently, there are 15 airports competing for MAP funds which are more flexible in the eligibility criteria for funding development such as fueling facilities, terminal renovations and utility renovation requirements.

The DOTA should consider applying for federal grants under the Military Airport Program in the initial phase for those projects that will be associated with converting the Airport to civilian public use that may not be considered eligible under other Airport Improvement Program grants in the future.

7.2.3 Financing Recommendations

Based on the financial analysis, the Kalaeloa Airport will not operate on a sufficient surplus revenue basis over the initial five-year period to finance the operations and maintenance of the Airport and contribute to the recommended capital improvement program. The feasibility of the operation and future development of the Airport will be based on direct financial assistance from the Airport Revenue Fund as supported by concession fees, building space and land rentals, investment income, airport use charges, landing fees and other sources. This financial support will be offset by the savings in costs and benefits a general aviation reliever airport will provide at Honolulu International Airport.

The DOTA could consider applying for Federal Aviation Administration grants-in-aid for all of the development projects being considered in the capital improvement program as soon as conveyance of the Airport to the DOTA has occurred. As noted earlier, the Airport will be the first designated general aviation reliever airport for the State and will be eligible for funding under the reliever airport category set aside funding. In addition, under the less-restrictive eligibility criteria of the Military Airports Program set aside funds, nearly all of the projects recommended in the capital improvement program, with the exception of private-use facilities such as hangars, will be eligible for federal grants. It should be recognized that the Kalaeloa Airport will be competing with other military airports that are being converted to civilian public-use airports, and all projects will be considered based on priorities with runways, taxiways, approaches, signage, road systems, terminal modifications and lighting systems being given higher priority for funding.

7.3 ECONOMIC IMPLICATIONS

The economic considerations of a proposed action are usually considered in terms of costs and benefits. The proposed facilities and financial costs associated with the conveyance of NAS Barbers Point to the State as a civilian public-use airport are presented earlier. A number of the benefits that will be gained from the conveyance are subjective and cannot be readily quantified in terms of dollars. The following economic implications are associated with the proposed conveyance and would:

- Allow Honolulu International Airport to better serve its primary role as the principal air carrier gateway to the State by increasing the airfield capacity available for air carrier operations by reducing the level of general aviation operations.

- Avoid the need to build an additional $100 million runway at Honolulu International Airport.

- Reduce aircraft delay costs at Honolulu International Airport by at least an estimated $6 million annually by 2000 and $100 million annually by 2020 by accommodating many of the general aviation operations that will otherwise occur at Honolulu International Airport.

- Save an additional estimated $59 million annually in aircraft delay costs by 2000 and $487 million annually by 2020 at Honolulu International Airport by accommodating Ford Island ALF operations at Kalaeloa Airport, and not at Honolulu International Airport, when Ford Island ALF closes.

- Allow Honolulu International Airport South Ramp facilities to be converted to other uses such as air cargo, air taxi and aircraft maintenance facilities.

- Retain a vital disaster relief and civil defense facility for use in times of emergencies and natural disasters.

- Continue to allow Barbers Point to continue to be designated as an alternate for international, overseas and interisland flights and save at least an estimated $2 million annually in airline operating costs, with reduced fuel loads. Otherwise they will burn up more fuel in carrying additional fuel loads required to reach more distant airports. (In all the years the airlines have been operating in Hawaii, they have never had to actually land at NAS Barbers Point.)

- Continue to be designated as an alternate for military operations when Honolulu International Airport or Marine Corps Air Facility Kaneohe Bay is their destination from the Mainland or Western Pacific.

- Provide jobs initially, including transfers from Honolulu International Airport to the Ewa area, and additional jobs in the future as aviation activity increases.

- Include new revenue-producing facilities, e.g. fixed base operator lease lots, hangars and tiedowns to help offset the cost of operating the airport.

- Cost an estimated $1.2 million in capital improvements (primarily for fencing) to convert to a general aviation airport. Up to 90 percent will be funded by FAA grants which are financed by airport system users rather than by general taxpayers.

- Cost an estimated $1.1 million annually initially to operate and maintain and then $900,000 annually afterwards. (This represents less than one percent of the DOTA total operating costs for the State Airport System.)

- Save the State $400,000 annually in not having to operate the Ford Island airfield.

- Provide access to air transportation as an incentive to businesses to locate or relocate to the Kapolei area.

- Accommodate air ambulance aircraft and helicopters for medevac rescues and provide critical medical transportation.

- Serve as an important source for business, training and recreational activities. Business activities include business flights to and from the Neighbor Islands, aerial surveying, pipeline and utility line patrols, transportation of records of commercial transactions and some on-demand air taxi and charter services. Training activities include basic as well as proficiency flight training. Recreational uses include local and Neighbor Island personal, sightseeing and recreational transportation.

- Allow the USCG to conduct its responsibilities in the most efficient manner possible as a direct benefit to the State of Hawaii. The USCG performs an essential service for people of the State through its marine search and rescue and other operations. The USCG saves an average of 50 lives each year.

- Retain 180 USCG active personnel with a $6 million annual payroll in the Ewa area. The USCG owns an estimated $38 million worth of facilities at NAS Barbers Point. Otherwise the USCG will have to abandon its existing facilities and relocate its search and rescue operations (either to Honolulu International Airport or Marine Corps Air Facility Kaneohe Bay) at a cost of about $26 million or $35 million, respectively.

- Provide facilities for the University of Hawaii for an aviation training center.

- Retain a large amount of land for a regional park, recreational activities and other uses. It provides for public access to the beach and shoreline. Coordinated planning will ensure that these land uses are compatible with an airport and aircraft operations.

Chapter 8

NOISE COMPATIBILITY AND IMPACT ANALYSES

8.1 OVERVIEW

This chapter describes the noise compatibility and impact analyses conducted as part of the Airport Master Plan study. It describes the noise descriptors used and their relationship to land use compatibility and the noise impact analysis methodology. During the initial stages of the study, noise contours were prepared to cover the potential noise impacts for the range of airport development concept alternatives presented in Appendix A. These noise contours were plotted on a map of forecast year 2020 airport environs land uses, and any areas of potential incompatible land uses were identified for each alternative. As the alternatives became more refined, two sets of noise contours were developed for each layout. One addressed only Kalaeloa Airport aircraft operations; the other depicted noise from Kalaeloa Airport plus noise from aircraft on their landing approach to Honolulu International Airport. The noise contour maps developed for these airport development concept alternatives are described in Appendix D.

Two Final Noise Exposure Maps have been prepared for the airport development concept (Alternative 17) selected by the Redevelopment Commission and described in Chapter 5. The first noise exposure map for the recommended alternative shows only the noise from Kalaeloa Airport aircraft operations. The second map shows noise from Kalaeloa Airport plus Honolulu International Airport aircraft operations. Both are described in this chapter.

Noise measurements were made at selected locations around the Airport, as well as elsewhere on Oahu, to identify and verify aircraft noise from NAS Barbers Point (NASBP) and Honolulu International Airport enroute aircraft operations, and to determine background ambient noise levels. The aircraft noise measurements are summarized in this Chapter.

Aircraft noise has been taken into consideration throughout the airport planning process. Efforts to mitigate potential adverse noise impacts have influenced the selection of runway lengths, landing and departure thresholds, and proposed operational procedures in evaluating alternatives. The final Noise Exposure Maps presented in this chapter are for the selected runway configuration, proposed aircraft flight tracks, and forecast Year 2020 aircraft operational usage.

8.2 LAND USE

8.2.1 Introduction

The compatibility of the proposed aviation uses with existing and forecast land uses on the Ewa Plain was taken into consideration during the airport master planning process. This was done to insure that airfield configurations and aircraft operations suitable from an aviation viewpoint would not unduly conflict with existing or approved land uses in the area. The evaluation was done using forecasts of aircraft operations prepared for the Airport Master Plan, the Federal Aviation Administration (FAA) Integrated Noise Model, land use compatibility criteria and guidelines developed by the State and Federal governments for the FAR Part 150 Airport Noise Compatibility Program, and estimates of existing and future land use developed as part of this study.

This section describes the methodology used to forecast land use in the area most affected by aircraft operations at the Kalaeloa Airport and the land use forecast itself.

8.2.2 Methodology and Assumptions Used to Forecast Land Use

Future land use in the vicinity of the airport was forecast in two parts. The first part focused on land outside the existing boundaries of the Base; the second was limited to the area within those boundaries. The results of these two processes were then combined to arrive at the complete year 2020 land use forecast needed for the land use compatibility analysis. The methodology is summarized below.

<u>Principal Data Sources Used to Forecast Future Land Use Outside NASBP.</u> Information needed to forecast future land use for the study area *outside* the existing boundaries of NAS Barbers Point (including maps showing its location) was obtained from two principal types of sources. The first was interviews with the region's major landowners and developers. The second was documents prepared by the City & County of Honolulu (e.g., Existing Land Use Maps, Zoning Maps, Development Plan Maps, etc.). Residential unit data in the *Development Plan Annual Report, Fiscal Year 1993* and population, housing unit, and persons-per residential unit forecasts for Oahu's "Traffic Analysis Zones" from the City & County of Honolulu's computerized Land Use Model was also collected for possible future use, but was not employed in preparing the land use forecasts. Table 8-1 contains a detailed listing of these sources.

<u>Principal Sources of Land Use Data for Areas Inside NASBP.</u> Data on existing and future land use (including unit-per-acre and population-per-unit) for the area *within* the portion of NASBP that is to be retained by the Department of Defense (DOD) were obtained from the government sources listed in Table 8-1 (see rows labeled "NASBP").

Table 8-1

INTERVIEWS CONDUCTED FOR LAND USE ANALYSIS

Area or Activity	Contact	Agency or Firm	Subject of Discussion
Ewa Marina	Vicky Gaynor	HASEKO (Hawaii) Inc.	Future land uses and densities for Ewa Marina
Villages of Kapolei	Stephen Thomas	State of Hawaii Housing Finance and Development Corporation	Existing and future land uses in Villages of Kapolei
Ewa Villages	Avis Kanimura Jean Hamilton	City and County of Honolulu Department of Land Utilization	Existing and future land uses in Ewa Villages (focus on Verona Village)
	Steven Kellogg	R.M. Towill Corporation	
Kapolei Long Range Master Plan	Henry Eng Charles Ehrhorn David Rae	Estate of James Campbell	Existing and future land uses in Kapolei
Makakilo	Wendall Pang Robert Miyasato	Finance Realty, Inc.	Existing and planned land uses in Makakilo
NASBP	Roger Au	NAS Barbers Point	Existing & Future on-base land use
	James Bossick	PACDIV	Plans for future base housing; referrals
	Hazel Esposito	PACDIV	Plans for future base housing
	Gail Hamada	NASBP Housing Office	Current base housing and densities
	Fred Minato	PACDIV	Status of proposed housing project
	Mark Shimabokuro	PACDIV	Master planning efforts
	Ed Yamada	U.S. Army Corps of Engineers	Recent housing descriptions and maps
	Burns Yamashita	PACDIV	Current NASBP land uses and referrals
Forecasting	Lynn Zane	State of Hawaii Department of Business, Economic Development and Tourism	Status of Series M-K projections for year 2020
Forecasting	Dr. Gregory Pai	State of Hawaii Office of State Planning	Verification of availability of disaggregated 2020 forecast data
Forecasting	Robin Foster Steve Young	City and County of Honolulu Planning Department	Availability of Land Use Model data Obtain Land Use Model forecasts of units and household size

Source: Belt Collins Hawaii

The ultimate land use plan for the remainder of the Base, i.e., the area not designated for retention by DOD, was under review during the initial stages of airport planning. Consequently, only the uses reported on the September 26, 1995, "Determination of Surplus" (GSA Form 1422) for NAS Barbers Point (illustrated later in the report on Figure 9-1) could be addressed while Alternatives 1 through 16 were being evaluated. Alternative 17, the recommended airport plan, was developed after the Redevelopment Commission submitted its recommendations to the U.S. Navy. It was evaluated using those recommended land uses.

Choice of Forecast Year. Land use in the vicinity of Barbers Point was forecast for the year 2020. Three principal considerations led to the choice of a 2020 time horizon. First, it is the planning horizon for the *Kalaeloa Airport Master Plan*. Second, it is also the time frame for the *Kapolei Area Long Range Plan* map that is widely referenced in planning for the Ewa region (Helber, Hastert, & Fee Planners, 1993 for Alternatives 1-16, October 1997 for the recommended airport plan). Finally, it is the most distant year for which the necessary population and economic forecasts are available.

Areal Limit of Data Collection and Forecasts. It was necessary to forecast future land use simultaneously with development of the noise contours for the various airport alternatives. Consequently, using the contours to define the area within which land use information was needed was not possible. Noise from aircraft operating at the proposed Kalaeloa Airport is expected to be less than noise from the aircraft currently using NAS Barbers Point. Consequently, it was concluded that forecasting future land use for the entire area inside the 60 DNL noise contour shown in the 1987 *Naval Air Station Barbers Point Air Installation Compatible Use Zones* (AICUZ) would provide more than enough land use information for subsequent analysis.[1]

Besides all the land within the existing boundaries of NAS Barbers Point, the land use forecast covers all, or portions of, the following major development projects in the Ewa region of Oahu: Campbell Business Park, the Barbers Point Deep Draft Harbor, the City of Kapolei, Ewa Marina, Villages of Kapolei, Makakilo and Ko Olina. Several other major projects in Ewa, including Makaiwa Hills to the north, and West Loch and Ewa Gentry to the east, are beyond the 60 DNL contour and are not included.

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[1]Once the noise contours for the various alternatives had been prepared, information on future land use was collected outside the AICUZ 60 L_{dn} (DNL) contour for a narrow corridor beneath the general aviation flight tracks departing the Airport to the northeast. This was done when it was found that aircraft overflights would result in the area being within the 55 DNL contour that would require disclosure of potential aircraft noise to potential buyers of property.

Selection of Land Use Categories. The forecast used the following land use categories:

- **Residential**, including subcategories of single-family, low- and medium-density apartment, and resort and residential mixed-use;

- **Public facility**, including privately owned facilities benefiting the community. Noise-sensitive subcategories include educational facilities (such as schools, child care centers and libraries) and indoor auditoriums, and churches.

- **Commercial**, including retail/office and light industrial uses;

- **Heavy industrial**, reflecting the existing land use in already-developed portions of the James Campbell Industrial Park;

- **Recreational use**, with subcategories of parks and golf courses; and

- **Unplanned**, reflecting the uncertain future land uses of certain areas within the portion of NASBP that will be released by the Navy and which had not been tentatively assigned to a Federal agency as of September 26, 1995.

The categories used in the mapping of forecast land use were selected on the basis of two factors: (1) consistency with the land use categories used in the Federal Aviation Administration's FAR Part 150 Airport Noise Compatibility Planning Criteria, and (2) the presence of a particular type of land use within the study area. Table 8-2 relates the land use categories used for the years 2000 and 2020 land use forecasts to the official FAR Part 150 land use categories.

Base Map. The base map for the study area was created using the most current U.S. Geological Survey 7.5-minute quadrangle map. The forecast land use information was entered as a computer-overlay to this.

Forecast Land Uses: Year 2000. Large-scale development of the Ewa Plain is ongoing. As a result, it is being transformed from the essentially agricultural region that it was in 1980 to Oahu's "second city." The current State Land Use Map for the area is shown on Figure 8-1. The land use pattern expected in the vicinity of the Airport by the year 2000 (when it would first be fully operational as a general aviation reliever airport) is described below and illustrated on Figure 8-2. Most of these uses are either existing or have received the major land use approvals they will require, including designation as "Urban" by the State Land Use Commission. Because many of the areas are being developed under provisions of State and/or City and County laws exempting them from the land use controls that would otherwise be applicable), they are often still designated for agricultural use on the City and County of Honolulu Development Plan and Zoning maps for Ewa.

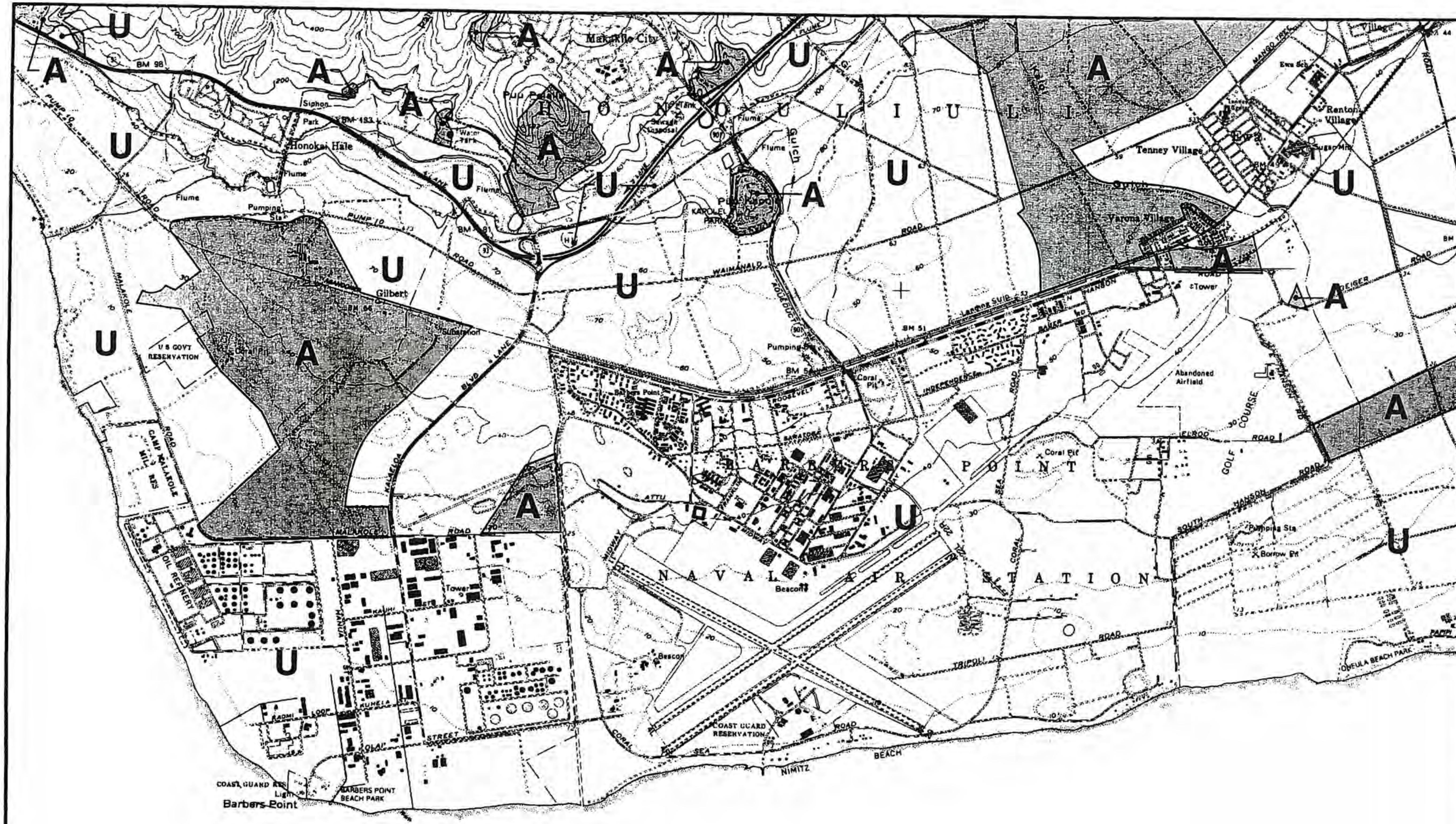
Table 8-2

FAR PART 150 CATEGORY EQUIVALENCY

Existing Part 150 Land Use Category	Land Use Analysis Equivalent Category	Map Symbol	Remarks
Residential	**Residential**		
Low density residential	Residential (single family detached)	MDA	
Low density apartment	Low density apartment (less than 15 units per acre)	LDA	
	Residential mixed use	MU(resid)	
High density apartment	Medium density apartment (15 or more units per acre)	MDA	No high density in study area.
Transient lodging	Resort mixed use	MU(resort)	All planned resort residential will be residential mixed use. This category includes NASBP beach cottages.
Public Use	**Public Facility**		
Schools, day care centers, libraries, clinics	Schools, day care centers, libraries, clinics	PF(educ)	
Hospitals, nursing homes	None present in study area.		Medical Mall in City of Kapolei is considered commercial office space (physicians' offices).
Indoor auditoriums and concert halls	Churches	PF(church)	
Government services and office buildings serving the general public	Public facility	PF	
Transportation and parking facilities	Public facility	PF	Includes Barbers Point Deep Draft Harbor.
Commercial and Government Use	**Commercial**		
Offices, business, government, business and professional	Commercial	COM	Government offices are considered public uses in land use analysis.
Wholesale and retail	Light industrial	LI	Includes Kapolei Business Park.
Airport businesses	Commercial	COM	
Retail trade	Commercial	COM	
Studios with outdoor sets	None present in study area.		
Manufacturing, Production and Storage	**Manufacturing**		
Manufacturing, general	Heavy industrial	HI	Includes James Campbell Industrial Park.
Photographic and optical	None present in study area.		
Agriculture and forestry	Agriculture	AG	
Livestock farming and breeding	None present in study area.		
Mining and fishing	None present in study area.		
Recreational Use	**Recreational Use**		
Outdoor sports arenas	None present in study area.		
Outdoor music shells, amphitheatres	None present in study area.		
Nature exhibits and zoos	None present in study area.		
Amusements, parks, resorts, camps	Parks	PK	
Public golf courses, stables, gardens	Golf courses	GC	
Professional/resort sports facilities	Park	PK	Includes Hawaii Raceway Park.
Extensive wildlife and recreation areas	None present in study area.		

Sources: Compiled by Belt Collins Hawaii Ltd. from the following:

(1) "Existing Part 150 Land Use Categories" are from FAR Part 150, Appendix A, Table 2, "Land Us Compatibility With Yearly Day-Night Average Sound Levels".
(2) *Kapolei Area Long Range Master Plan* (July 1993), prepared by Helber Hastert & Fee, Planners.
(3) Developers and landowners.
(4) Aerial photography.



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN
ISLAND OF OAHU

STATE LAND USE DISTRICT MAP

LEGEND

- A — Agricultural District
- U — Urban District
- Existing Runways

TRUE NORTH MAGNETIC NORTH 11°30' (1995)

0 625 1250 2500
GRAPHIC SCALE IN FEET

NOTE:
THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.

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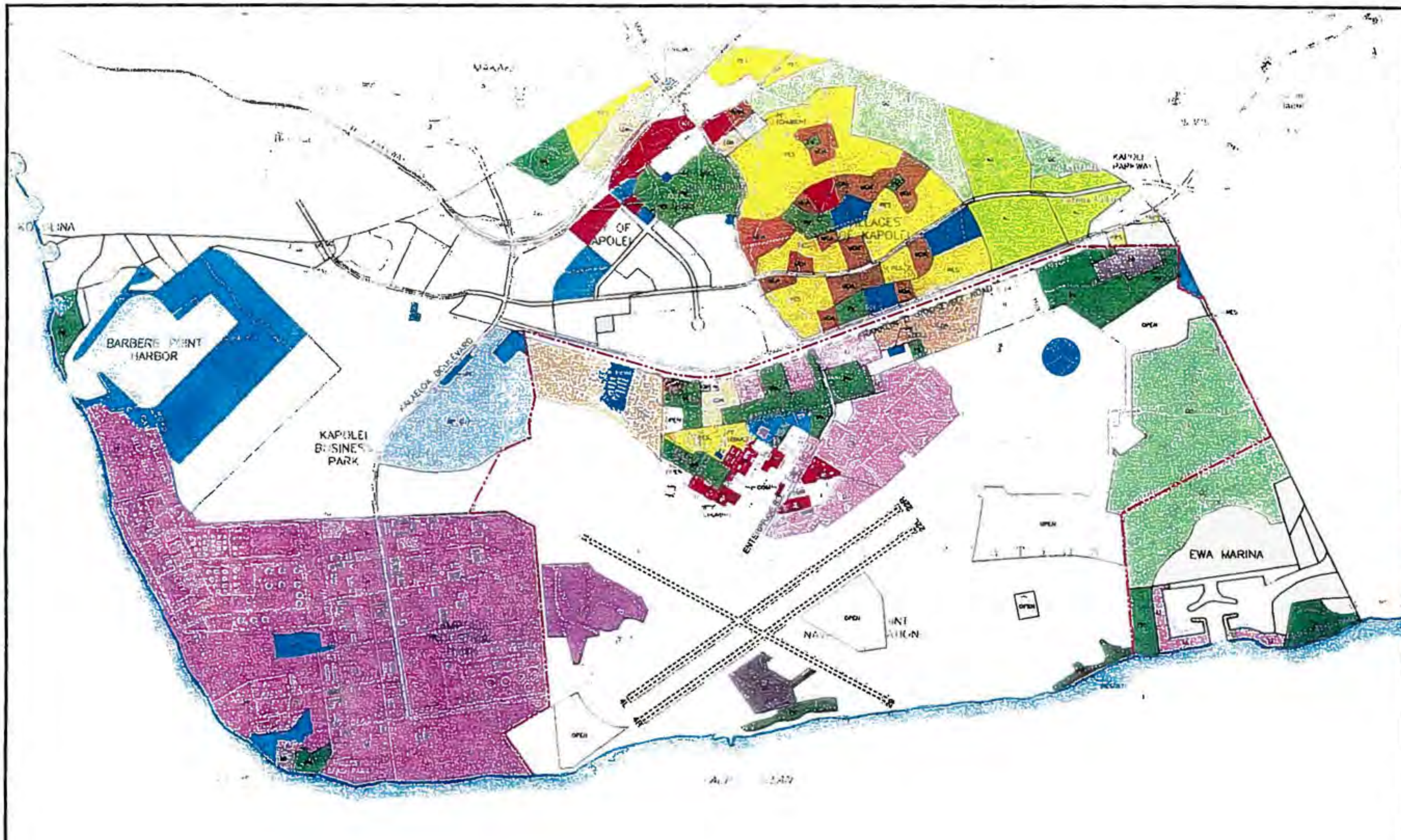
DATE: 11-27-95
DWG. NO. 441-0500/002
FIGURE NO. 8-1



Airports Division

DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

FORECAST YEAR 2000 LAND USE MAP

LEGEND

- RES — Residential
- LDA — Low-Density Apartment
- MDA — Medium-Density Apartment
- Commercial/Office
- BP — Business Park
- Light Industrial
- HI — Heavy Industrial
- Mixed Use (Residential)
- Park
- Mixed Use (Resort)
- GC — Golf Course
- Public Facility
- Public Facility (Education)
- Public Facility (Church)
- Military
- OPEN — Open
- Barbers Point NAS Boundary

TRUE NORTH MAGNETIC NORTH 11°30' (1995)

0 625 1250 2500

GRAPHIC SCALE IN FEET

NOTE:
THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.

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Y. EBISU AND ASSOCIATES

DATE: 4-11-98	FIGURE NO.
DWG. NO. 441-0500/005	8-2

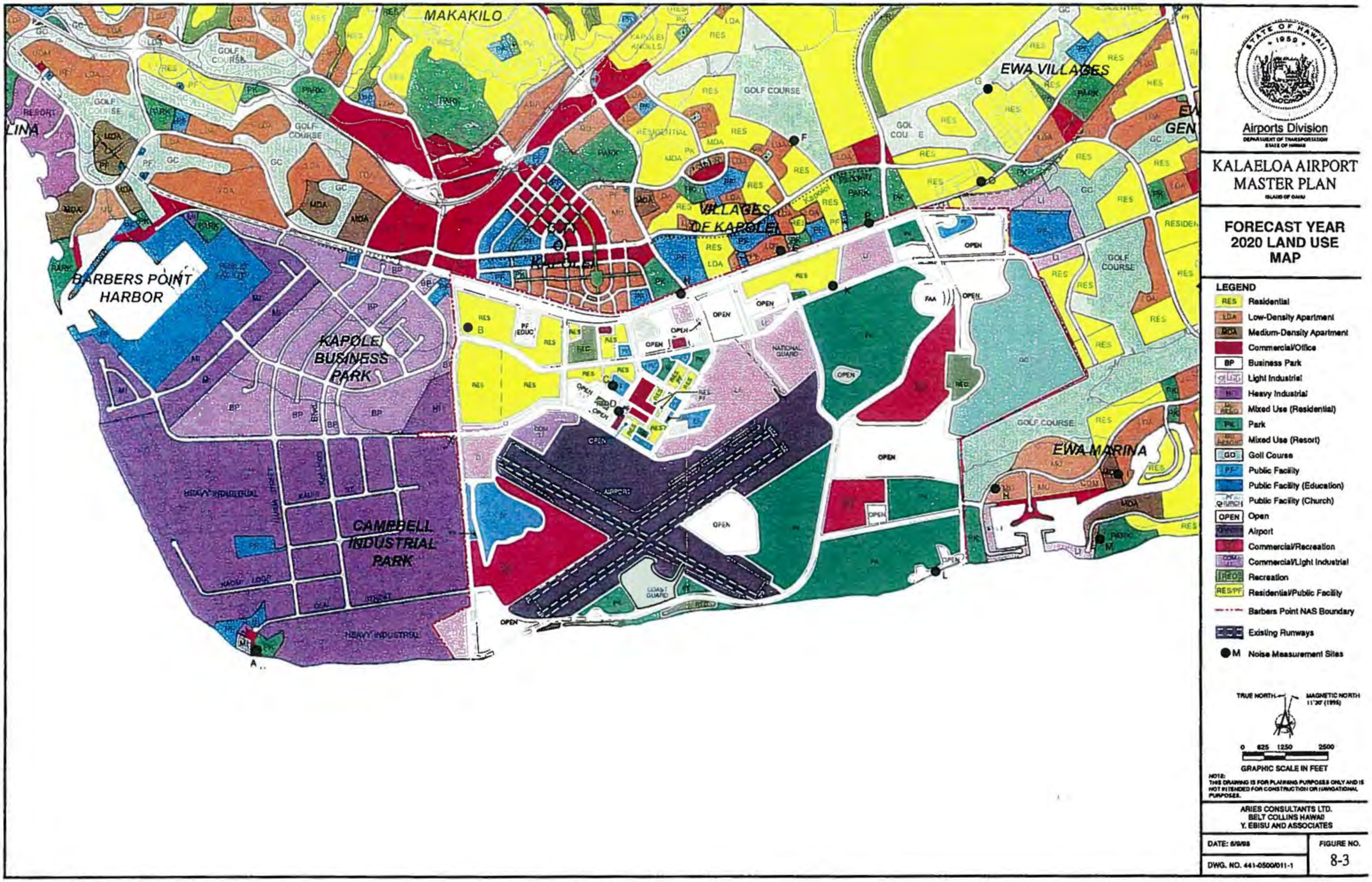
Residential. The first part of the Villages of Kapolei will be completed by 2000. Located just north of the Base, it will contain a mix of single-family detached homes and medium-density, multi-family housing. Other civilian residences within the study area in 2000 include existing homes in the lower part of Makakilo, in the area next to existing Varona Village, and in the first phase of an affordable housing project developed by the James Campbell Estate. In addition to these civilian residential areas, existing multi-family housing and barracks are expected to remain on portions of NAS Barbers Point retained by the Federal government. The Redevelopment Commission has recommended that a few of the existing structures within the "Downtown" portion of the Base be given to agencies that would use them for residential purposes, as shown on Figure 8-3, e.g., as shelters for the homeless.

Resort. The first phase of development on the Ewa Marina site to the east of the base will be underway by 2000, but the hotel and other resort uses that are planned for development on the portion of the property closest to the Airport will not have been started by that time. Short-term vacation use ("resort") is also expected to continue in the beach cottages along the shoreline at the eastern end of NAS Barbers Point.

Public Facility. Some types of public facilities are noise-sensitive. These include schools, libraries, child care centers, churches, and chapels. By the year 2000 the study area will include three elementary schools, one intermediate school, four child care centers, and a regional library. (Two of the elementary schools already exist.) Two major church sites and the chapel are located on NAS Barbers Point. Public facilities in the form of government offices within the City of Kapolei "Civic Center" and a new corporation baseyard for the City and County of Honolulu within the Campbell Industrial Park are also due for completion by the year 2000. A major regional police facility is expected to be constructed within the study area, and the existing electrical and telephone substations, power plants, wastewater treatment plant, and desalinization plant are expected to continue in operation.

Commercial and Light Industrial. The major commercial area in the year 2000 will be the developing City of Kapolei. The Villages of Kapolei and the DOD-retained area of NAS Barbers Point will contain smaller commercial centers. Light industrial land uses will be located in the first increment of Kapolei Business Park and in NAS Barbers Point.

Heavy Industrial Land Use. Heavy industry will continue to be centered in Campbell Industrial Park.



MAKAKILO
EWA VILLAGES
VILLAGES OF KAPOLEI
CITY OF KAPOLEI
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
CAMPBELL INDUSTRIAL PARK
EWA MARINA
GOLF COURSE
NATIONAL GUARD
COAST GUARD
AIRPORT
HEAVY INDUSTRIAL
Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII
KALAELOA AIRPORT
MASTER PLAN
ISLAND OF OAHU
FORECAST YEAR 2020 LAND USE MAP
LEGEND
RES Residential
LDA Low-Density Apartment
MDA Medium-Density Apartment
Commercial/Office
BP Business Park
Light Industrial
HI Heavy Industrial
Mixed Use (Residential)
PK Park
Mixed Use (Resort)
GC Golf Course
PF Public Facility
Public Facility (Education)
Public Facility (Church)
OPEN Open
Airport
Commercial/Recreation
Commercial/Light Industrial
REC Recreation
RES/PF Residential/Public Facility
Barbers Point NAS Boundary
Existing Runways
M Noise Measurement Sites
TRUE NORTH
MAGNETIC NORTH 11°30' (1995)
0 625 1250 2500
GRAPHIC SCALE IN FEET
NOTE: THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.
ARIES CONSULTANTS LTD.
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DATE: 6/9/98
FIGURE NO. 8-3
DWG. NO. 441-0500/011-1

Recreational Land Use. The primary recreational land uses in the study area will be golf courses and community parks.

Forecast Land Uses: Year 2020. Figure 8-3 shows the land uses forecast for the Year 2020. It reflects the extensive residential and commercial development expected to occur in the study area during the first two decades of the next century as Ewa continues to be developed as Oahu's "second city." It shows no major new land uses within the portion of NAS Barbers Point that would be retained by the Department of Defense. No forecast has been made for the portion of the base that would be released by the Department of Defense except for those areas that the Pacific Division of the Naval Facilities Engineering Command (September 26, 1995) has determined are surplus to the needs of the Federal Government. The overall land use pattern is expected to be as follows:

Residential. By the year 2020 the major public and private sector residential projects that are being developed within the study area are expected to be largely completed. Major developments within the study area include the City of Kapolei and the Villages of Kapolei, as well as portions of the Ewa Marina and Ko Olina projects having residential and mixed-use development. Nearly all of this land is already in the State Urban District and is designated for various types of urban uses on the Ewa Development Plan Land Use Map. The exception, a narrow corridor between the Villages of Kapolei and Varona Village, is still in the State Agricultural District (see Figure 8-1). This important area is discussed further in Section 8.6.2.

Resort. By 2020, resort uses in the portions of the Ewa Marina and Ko Olina projects that are within the study area are expected to be fully developed.

Public Facility. By the year 2020, the City of Kapolei is expected to include a regional government complex. Other minor public facilities would also be constructed in support of the ongoing urbanization of the Ewa Plain.

Commercial/Light Industrial. Major commercial development in the City of Kapolei is expected to be largely completed by 2020, with a combination of retail and office commercial uses and residential mixed use. The commercial area of Ewa Marina is also expected to be complete. In addition, the Estate of James Campbell anticipates full development of Kapolei Business Park's light industrial area.

Heavy Industrial. No major changes in heavy industrial land use are expected between 2000 and 2020. They will remain concentrated around the Barbers Point Harbor.

Recreation. There will be little change in recreational land uses outside the existing boundaries of NAS Barbers Point between 2000 and 2020. The major exception is the development of a regional park in Makakilo, only part of which is in the study area. Community groups and public agencies have proposed the development of extensive new recreational facilities on land within the existing boundaries of NASBP that the Navy has declared surplus.

8.2.3 Other Land Use Considerations

Because the Kapolei area was, and is, being developed as a Master Planned Second City, with disclosure of the aircraft noise contours presented in the 1989 NAS Barbers Point AICUZ and 1989 Honolulu International Airport FAR Part 150 Noise Compatibility Planning Study being required during the planning process, it is believed that the more recently completed existing land uses in Kapolei are compatible with existing aircraft noise levels. Also, by State of Hawaii, *Mandatory Seller Disclosures in Real Estate Transactions* (HRS 508-D-15) and the legislation which preceded it, adequate disclosures of aircraft noise have probably been made to new property owners in the project area.

The Navy has purchased restrictive noise easements over some of the property surrounding NAS Barbers Point that is impacted by noise from current military aircraft operations there. A portion of the area covered by the easements would also be affected by aircraft operations and aircraft noise at the Kalaeloa Airport. This includes currently undeveloped areas under the proposed flight tracks to the northeast for the Kalaeloa Airport. While a comprehensive study of the easements was not conducted as part of this study, the language in the 1989 AICUZ was reviewed. Paragraph 9b on Restrictive Easements states, *"If the Navy in its sole discretion determines that the methods of avigation or the use of NASBP has so changed as to eliminate the Navy's need for said easements and issues a declaration to that effect, or if NASBP permanently ceases to be used as a military air station, the restrictive easements herein shall terminate."* A Navy representative has indicated that the easement would terminate upon "operational closure" of the airfield, which is currently scheduled for 1999. He anticipated that termination of the easement might be accomplished by the Navy's filing a document with the land court to cancel the easement.

8.3 NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

A consensus has developed for using the Day-Night Sound Level (DNL) in describing environmental noise in general, and in particular for relating the acceptability of the noise environment for various land uses. The Day-Night Sound Level represents the 24-hour average sound level for a typical day, with nighttime noise levels (10:00 p.m. to 7:00

a.m.) increased by 10 decibels prior to computation of the 24-hour average. Annual aircraft operations are divided by 365 days to obtain the 24-hour average used in DNL computations.

The DNL descriptor employs a process of averaging instantaneous A-weighted sound levels as read on a standard sound level meter, which are normally referred to as meter readings in dBA. A brief description of the acoustic terminology and symbols used are provided in Appendix D. The maximum A-weighted sound level occurring during an aircraft flyby event (or single event) is referred to as the Lmax value. The mathematical product (or integral) of the instantaneous sound level, times the duration of the event, is known as the Sound Exposure Level, or Lse, and is analogous to the energy of the time-varying sound levels associated with an aircraft flyby event.

Current noise standards and criteria which associate land use compatibility or adverse health and welfare effects with various levels of environmental noise are normally described in terms of DNL rather than the single event (Lmax or Lse) noise descriptors. The reasons for this are based on the relatively good correlation between the cumulative DNL descriptor and annoyance reactions of the exposed population. However, at very low levels of environmental noise (55 DNL or less), other attitudinal variables and biases (besides noise) of the exposed population tend to influence annoyance reactions, and the correlation between annoyance reactions and DNL levels deteriorates.

Table 8-3, derived from *Guidelines for Considering Noise in Land Use Planning and Control*, presents current federal noise standards and acceptability criteria for residential land uses. Land use compatibility guidelines for various levels of environmental noise as measured by the DNL descriptor system are shown on Figure 8-4. As a general rule, noise levels of 55 DNL or less occur in rural areas, or in areas which are removed from high volume roadways. In urbanized areas which are shielded from high volume streets, DNL levels generally range from 55 to 65 DNL, and are usually controlled by motor vehicle traffic noise. Residences which front major roadways are generally exposed to levels of 65 DNL; the noise level can be as high as 75 DNL when the roadway is a high-speed freeway. Due to noise shielding effects from intervening structures, interior lots are usually exposed to 3 to 10 DNL lower noise levels than the front lots which are not shielded from the traffic noise.

8.3.1 FAA Land Use Compatibility Criteria

Table 8-4 presents current FAA standards and acceptability criteria for various land uses exposed to differing levels of environmental noise as measured by the DNL descriptor. For the purposes of determining noise acceptability for funding assistance from federal agencies (FAA, FHA/HUD, and VA), an exterior noise level of 65 DNL or lower is

Table 8-3

EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)

NOISE EXPOSURE CLASS	DAY-NIGHT SOUND LEVEL	EQUIVALENT SOUND LEVEL	FEDERAL (1) STANDARD
Minimal Exposure	Not Exceeding 55 DNL	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 DNL But Not Above 65 DNL	Above 55 Leq But Not Above 65 Leq	Acceptable (2)
Significant Exposure	Above 65 DNL But Not Above 75 DNL	Above 65 Leq But Not Above 75 Leq	Normally Unacceptable
Severe Exposure	Above 75 DNL	Above 75 Leq	Unacceptable

Notes:

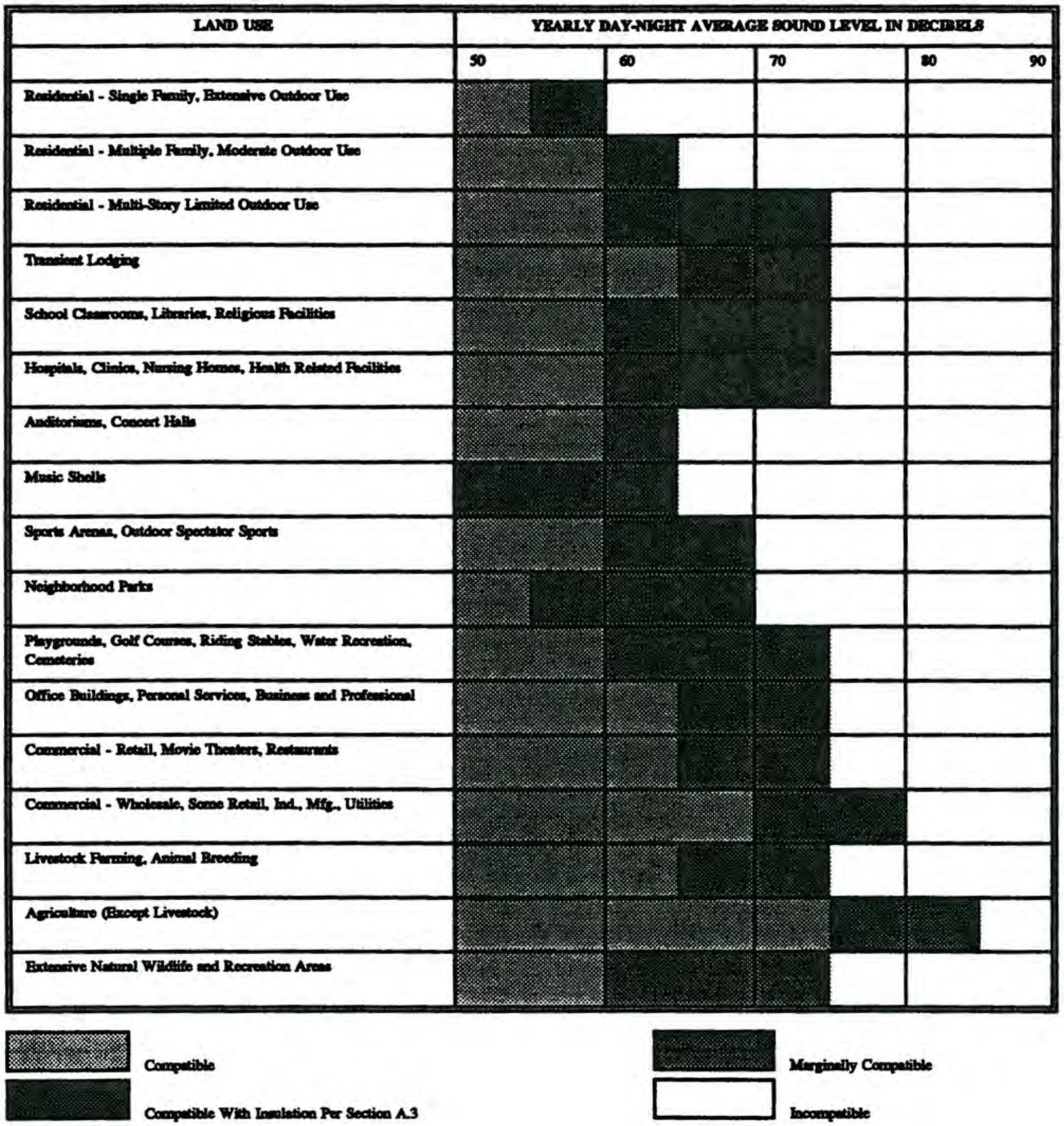
1. Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation

2. FHWA uses the Leq instead of the DNL descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 Leq.

Source: "Guidelines for Considering Noise in Land Use Planning and Control"

Figure 8-4

American National Standards Institute Guidelines for Land Use Compatibility with Yearly Day-Night Average Sound Level at Sites for Buildings as Commonly Constructed



Source: ANSI S12.40-1990.

Table 8-4

FAR Part 150 Recommendations for Land Use Compatibility in Yearly Day-Night Average Sound Levels (DNL)

TYPE OF LAND USE	Yearly Day-Night Average Sound Level ≤65	65-70	70-75	75-80	80-85	Over 85
RESIDENTIAL:						
Residential (except mobile homes & transient lodgings)	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE:						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE:						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale & Retail: (bldg. mater., hardware, & farm equip.)	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade - general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION:						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL USE:						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Note: Numbers in parentheses refer to the following notes.

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
(3) Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
(4) Measures to achieve NLR 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.
(5) Land use compatible provided special sound reinforcement systems are installed.
(6) Residential buildings require a NLR of 25.
(7) Residential buildings require a NLR of 30.
(8) Residential buildings not permitted.

Abbreviations:
Y(Yes) = Land Use and related structures compatible w/o restrictions.
N(No) = Land Use and related structures are not compatible and should be prohibited.
NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35 = Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.

Regulatory Note. The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Source: FAR Part 150, Appendix A, Table 1. "Land Use Compatibility With Yearly Day-Night Average Sound Levels."

considered acceptable. This standard is applied nationally (*Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B*), including Hawaii.

Because of Hawaii's open living conditions, the predominant use of naturally ventilated dwellings, and the relatively low exterior-to-interior sound attenuation afforded by these naturally ventilated structures, in Hawaii an exterior noise level of 65 DNL does not eliminate all risks of adverse noise impacts. Because of these factors, and as recommended in *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, a lower level of 55 DNL is considered as the "Unconditionally Acceptable" (or "Near-Zero Risk") level of exterior noise. For typical, naturally ventilated structures in Hawaii, an exterior noise level of 55 DNL results in an interior level of approximately 45 DNL, which is considered to be the "Unconditionally Acceptable" (or "Near-Zero Risk") level of interior noise in respect to potential adverse health and welfare effects. However, after considering the cost and feasibility of applying the lower level of 55 DNL, government agencies such as FHA/HUD and VA have selected 65 DNL as a more appropriate regulatory standard.

8.3.2 State of Hawaii Department of Transportation, Airports Division, Land Use Compatibility Criteria

For aircraft noise, the State of Hawaii Department of Transportation, Airports Division, (DOTA) has recommended that 60 DNL be used as the common level for determining land use compatibility for noise-sensitive uses near its airports. Table 8-5 presents the current land use compatibility guidelines which have been recommended for use around the airports in Hawaii. It should be noted that for residential and certain public uses (schools, day-care centers, libraries, churches, clinics and public meeting rooms), aircraft noise levels less than 60 DNL are considered to be compatible in Table 8-5. In order to further reduce risks of adverse noise impacts from airport noise in the State of Hawaii, *Mandatory Seller Disclosures in Real Estate Transactions* (HRS 508-D-15) requires that disclosure of the airport noise levels be provided prior to real property transactions concerning properties located within Air Installation Compatibility Use Zones (AICUZ) or located within airport noise maps developed under Federal Aviation Regulations (FAR) Part 150 - Airport Noise Compatibility Planning (14 CFR Part 150). The most recent AICUZ and FAR Part 150 Noise Exposure Maps currently used for disclosure purposes in the project environs were prepared for 1987 for NAS Barbers Point and 1992 for Honolulu International Airport.

For commercial, industrial and other non-noise sensitive land uses, exterior noise levels as high as 75 DNL are generally considered acceptable. Exceptions to this occur when naturally ventilated office and other commercial establishments are exposed to exterior levels which exceed 65 DNL.

Table 8-5
State Department of Transportation, Airports Division, Recommendations for Local Land Use Compatibility Expressed in Yearly Day-Night Average Sound Levels (DNL)

TYPE OF LAND USE	Yearly Day-Night Average Sound Level					
	≤ 60	60-65	65-70	70-75	75-80	80-85
RESIDENTIAL:						
Low density residential, resorts, & hotels (w/ outdoor facil).	Y(a)	N(b)	N	N	N	N
Low density apartment w/ moderate outdoor use	Y	N(b)	N	N	N	N
High density apartment with limited outdoor use	Y	N(b)	N(b)	N	N	N
Transient lodgings (w/ limited outdoor use)	Y	N(b)	N(b)	N	N	N
PUBLIC USE:						
Schools, day care centers, libraries, and churches	Y	N(c)	N(c)	N(c)	N	N
Hospitals, nursing homes, clinics, and health facilities	Y	Y(d)	Y(d)	Y(d)	N	N
Indoor auditoriums and concert halls	Y(c)	Y(c)	N	N	N	N
Government services and office bldgs.serving the public	Y	Y	Y(d)	Y(d)	N	N
Transportation and parking	Y	Y	Y(d)	Y(d)	Y(d)	Y(d)
COMMERCIAL AND GOVERNMENT USE:						
Offices—government, business, and professional	Y	Y	Y(d)	Y(d)	N	N
Wholesale & Retail: bldg.mater.,hardware, & heavy equip..	Y	Y	Y(d)	Y(d)	Y(d)	Y(d)
Airport businesses—car rental, ticketing, lei stands, etc..	Y	Y	Y(d)	Y(d)	N	N
Retail trade,restaurants,shp.centers,financial institutn.etc.	Y	Y	Y(d)	Y(d)	N	N
Power plants, sewage treatment plants, & base yards.	Y	Y	Y(d)	Y(d)	Y(d)	N
Studios w/o outdoor sets, broadcasting & Production facil.	Y(c)	Y(c)	N	N	N	N
MANUFACTURING, PRODUCTION AND STORAGE:						
Manufacturing, general	Y	Y	Y(d)	Y(d)	Y(d)	N
Photographic and optical	Y	Y	Y(d)	Y(d)	N	N
Agriculture (except livestock) and forestry	Y	Y(e)	Y(e)	Y(e)	Y(e)	Y(e)
Livestock farming and breeding	Y	Y(e)	Y(e)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL USE:						
Outdoor sports arenas and spectator sports	Y	Y(f)	Y(f)	N	N	N
Outdoor music shells, amphitheaters	Y(f)	N	N	N	N	N
Nature exhibits and zoos, neighborhood parks	Y	Y	Y	N	N	N
Amusements, beach parks, active playgrounds, etc.	Y	Y	Y	Y	N	N
Public golf courses, riding stables, cemeteries, gardens, etc.	Y	Y	N	N	N	N
Professional/resort sports facil., media event facil., etc.	Y(f)	N	N	N	N	N
Extensive natural wildlife and recreation areas	Y(f)	N	N	N	N	N

Note: Letters in parentheses refer to following notes.

(a) A noise level of 60 DNL does not eliminate all risks of adverse noise impacts from aircraft noise. However, the 60 DNL planning level has been selected by the State Airports Division as an appropriate compromise between the minimal risk level of 55 DNL and the significant risk level of 65 DNL.

(b) Where the community determines that these uses should be allowed, Noise Level Reduction (NLR) measures to achieve interior levels of 45 DNL or less should be incorporated into building codes and be considered in individual approvals. Normal local construction employing natural ventilation can be expected to provide an average NLR of approximately 9 dB. Total closure plus air conditioning may be required to provide additional outdoor to indoor NLR, but will not eliminate outdoor noise problems.

(c) Because the DNL noise descriptor system represents a 24-hour average of individual aircraft noise events, each of which can be unique in respect to amplitude, duration, and tonal content, the NLR requirements should be evaluated for the specific land use, interior acoustical requirements, and properties of the aircraft noise events. NLR requirements should not be based solely upon the exterior DNL exposure level.

(d) Measures to achieve required NLR must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

(e) Residential buildings require NLR. Residential buildings should not be located where exterior noise is greater than 65 DNL.

(f) Impact of amplitude, duration, frequency, and tonal content of aircraft noise events should be evaluated.

Abbreviations:
Y(Yes) = Land Use and related structures compatible without restrictions.
N(No) = Land Use and related structures are not compatible and should be prohibited.

Source: Airports Division, Department of Transportation, State of Hawaii

It is of interest to note from Figure 8-4 that noise levels below 60 DNL are considered "Compatible" for lands with "Extensive Natural Wildlife and Recreation Areas". For park areas such as those which exist or are proposed within the environs of the Kalaeloa Airport, noise levels less than 55 to 60 DNL are considered to be "Compatible" on Figure 8-4. Also from Figure 8-4, neighborhood parks and golf courses are considered to be "Marginally Compatible" at levels as high as 70 and 75 DNL, respectively.

8.3.3 Other Land Use Compatibility Guidelines

The State of Hawaii Department of Health has also established noise regulations; these are contained in Title 11, Chapters 42, *Vehicular Noise Control for Oahu* and 46, *Community Noise Control,* Administrative Rules of the State Department of Health. Chapter 42 governs noise emissions from vehicles (cars, trucks, buses, etc.), while Chapter 46 is aimed at noise from on-site activities. Neither Chapter 42 nor 46 is applicable to noise from aircraft. State Department of Health noise regulations for on-site activities are expressed in maximum allowable property line noise limits rather than DNL. Chapter 46 limits noise from mechanical equipment on Oahu to approximately 55 DNL where they are adjacent to residentially zoned property; to approximately 60 DNL where they are next to parcels zoned for apartment or hotel use; and to approximately 76 DNL where they are adjacent to agricultural and industrial land uses.

The City & County of Honolulu Land Use Ordinance contains a noise standard, which is applicable to all zoning districts where dwellings are permitted. This standard stipulates maximum allowable noise levels by octave band; the limit is roughly equivalent to 57 DNL. This limit is not applicable to aircraft in flight.

8.4 GENERAL STUDY METHODOLOGY

8.4.1 Airport Noise Modeling

Airport noise contours were developed to cover the range of Kalaeloa Airport Master Plan alternatives described in Appendix A (Alternatives 1 through 16) and for the Airport Master Plan concept selected by the Redevelopment Commission. All airport noise contours for the proposed Kalaeloa Airport operations were developed using the Federal Aviation Administration's (FAA) Integrated Noise Model (INM), Version 4.11. Using the average daily frequency of aircraft operations, their proposed runway use and flight tracks, their proposed ingress and egress routes, and their proposed hours of flight operations, the model calculates both the daily DNL (Day-Night Sound Level) noise exposure level as well as the Lse (Sound Exposure Level) of single aircraft flyby events.

Although FAA INM, Versions 5.0, 5.1 and 5.1a were released prior to the completion of the *Kalaeloa Airport Master Plan*, they were not available in 1994 when the first noise contours were developed for initial evaluations of the alternatives. For this reason, use of Version 4.11 was maintained to the completion of this study.

Kalaeloa Airport noise contours were developed for 2020 for the Airport Master Plan alternatives described in Appendix A. Noise contours were also developed for the Airport Master Plan concept selected by the Redevelopment Commission.

The selected Airport Master Plan (Alternative 17) is illustrated on Figure 5-1. It utilizes the northeast 8,000 feet of Runway 4R-22L, the northeast 4,500 feet of existing Runway 4L-22R, and a 6,000-foot long section of crosswind Runway 11-29. These allow it to accommodate single- and twin-engined general aviation fixed-wing aircraft, helicopters, and C-130 aircraft. The 8,000-foot-long runway can act as an emergency alternate landing site for air carrier and military aircraft as well.

The 2020 aircraft operations forecasts for Kalaeloa Airport (see Chapter 3) were used to develop the future aircraft noise contours, and to model future aircraft noise levels at Kalaeloa Airport for the selected Airport Master Plan alternatives. These operations forecasts are presented in Appendix D, and include the mix of future aircraft types, the daytime and nighttime splits of the future operations, the new traffic patterns associated with the various airport runway configurations, and the new runway use frequencies associated with the various runway configurations. In addition, forecasts for aircraft transiting the Kalaeloa Airport area on their approach to landing on Runway 8L at Honolulu International Airport were also used to describe non-project aircraft noise levels in the Kalaeloa Airport environs. The FAA INM, Version 4.11, was also used to develop combined 2020 aircraft noise contours resulting from Honolulu International Airport and Kalaeloa Airport operations.

8.4.2 Noise Measurements

Existing aircraft noise levels were measured in the project environs to provide a basis for describing the existing background ambient and aircraft noise levels. Measurements of aircraft noise made at various locations on the island of Oahu were used to validate the general aviation aircraft noise levels modeled using the FAA INM. The locations of the measurement sites in the project environs are shown on Figure 8-3. Additional noise measurements of general aviation aircraft were obtained at Keehi Lagoon Park (RMS #7), Kakaako Waterfront Park (Site KA), and Wheeler Army Airfield (Sites A and B) in 1994. These additional aircraft noise measurements were made to confirm that single-event noise levels associated with proposed aircraft operations at Kalaeloa Airport were consistent with the single event noise predictions produced by the FAA INM.

The results of the single-event (Lmax and Lse) noise measurements and their comparisons with the predictions of the FAA INM, Version 4.11, are shown in Tables 8-6 through 8-9. The average noise levels are based on the noise levels recorded during the noise

Table 8-6

SUMMARY OF AIRCRAFT NOISE MEASUREMENTS AT KEEHI LAGOON PARK (RMS #7)

AIRCRAFT TYPE[1]	MAXIMUM SOUND LEVELS Lmax (in dB)	SOUND EXPOSURE LEVELS Lse (in dB)
DASH 6 [DHC6]	70.8; 69.4; 67.4; 68.3; 67.6; 67.6; 69.2; 66.0; 72.7; 66.9 (AVG.=68.6)	78.2; 75.7; 77.5; 78.6; 75.2; 77.3; 77.9; 75.3; 79.3; 75.1 (PRED.=78.9) (AVG.=77.3)
GA-1 (RWY 04R) [GASEPF]	72.8; 80.2; 75.7; 74.2; 75.6; 72.8; 77.0 (AVG.= 75.5)	82.5; 84.0; 82.3; 84.3; 81.7; 81.9 (PRED.=81.3) (AVG.=82.9)
GA-1 (RWY 04L) [GASEPF]	75.1; 70.1; 74.5; 75.9; 67.5; 77.9; 72.8; 70.6; 68.3; 70.1; 69.4; 68.7 (AVG.= 71.7)	81.4; 81.2; 81.2; 83.3; 78.9; 85.0; 81.2; 80.3; 79.1; 79.2; 78.0; 79.5 (PRED.=78.8) (AVG.=81.2)
GA-2 (RWY 04R) [BEC58P]	67.0; 68.8; 75.1; 63.8; 88.2; 65.4; 74.2; 79.8; 66.9; 72.9; (AVG.= 71.7)	73.3; 76.9; 80.5; 74.1; 94.2; 76.6; 78.6; 85.2; 76.9; 78.0; (PRED.=88.9) (AVG.=84.9)
GA-2 (RWY 04L) [BEC58P]	83.1; 70.8; 69.1; 77.4; 84.1 (AVG.= 76.9)	88.5; 81.1; 74.6; 85.4; 88.7 (PRED.=88.4) (AVG.=85.9)
C-130 [C130]	78.2	84.1 (PRED.=86.7)

1. Alpha-numeric in brackets shows INM equivalent code.
AVG = Average and PRED = Predicted

Source: Y. Ebisu & Associates

Table 8-7

SUMMARY OF AIRCRAFT NOISE MEASUREMENTS AT KAKAAKO WATERFRONT PARK (SITE KA)

AIRCRAFT TYPE[1]	MAXIMUM SOUND LEVELS Lmax (in dB)	SOUND EXPOSURE LEVELS Lse (in dB)
DASH 6 [DHC6]	67.4; 73.2; 73.3; 69.8; 69.1; 70.5; 69.3; 70.1; 71.0; 69.3; 69.6; 73.3; 69.3; 66.2; 69.3; 72.0; 69.9; 62.6; 68.9 (AVG.=69.7)	74.9; 77.5; 77.9; 76.1; 73.5; 76.9; 74.6; 75.2; 75.7; 77.1; 76.6; 74.5; 75.3; 70.7; 75.9; 76.1; 74.9; 80.1; 76.8 (PRED.=76.2) (AVG.=76.2)
GA-1 [GASEPV]	71.4; 74.5; 68.7; 68.4; 69.0; 68.9; 66.6 (AVG.=69.6)	76.9; 80.0; 73.8; 74.3; 76.5; 73.2; 76.5 (PRED.=76.6) (AVG.=76.5)
GA-2 [BEC58P]	69.9; 79.1; 66.4; 67.4; 67.4; 73.0; 77.6; 66.5; 72.1; 67.7; 66.9; 74.4; 64.0; 69.2; 68.9; 67.8; 79.1; 69.1; 70.6; 68.8; 70.0; 71.2; 69.4; 68.2; 69.2; 76.3; 78.1; 70.1; 69.1; 69.9; 68.4 (AVG.=70.5)	75.8; 83.1; 74.4; 75.3; 75.4; 79.4; 83.8; 70.1; 79.4; 73.9; 75.7; 82.8; 73.2; 76.4; 73.9; 75.9; 82.4; 72.9; 78.8; 76.5; 73.2; 77.9; 75.7; 74.0; 72.0; 81.9; 81.2; 74.8; 70.8; 74.5; 71.1 (PRED.=76.8) (AVG.=78.1)

1. Alpha-numeric in brackets shows INM equivalent code.
   AVG = Average and PRED = Predicted

Source: Y. Ebisu & Associates

Table 8-8

SUMMARY OF AIRCRAFT NOISE MEASUREMENTS AT WHEELER ARMY AIRFIELD (SITE A)

AIRCRAFT TYPE[1]	MAXIMUM SOUND LEVELS Lmax (in dB)	SOUND EXPOSURE LEVELS Lse (in dB)
C152 [GASEPF]	72.2; 74.6; 74.1; 72.8; 73.1; 75.6; 71.6; 75.1 (AVG.=73.5)	79.5; 81.6; 81.3; 80.0; 79.1; 80.0; 79.8; 81.8 (PRED.=84.5) (AVG.=80.5)
C172 [GASEPF]	80.6; 79.7 (AVG.=80.2)	84.4; 84.7 (PRED.=84.5) (AVG.=84.6)
PA28R [GASEPV]	78.2; 80.8; 84.7; 86.2; 82.9 (AVG.=82.6)	82.5; 85.8; 88.1; 89.9; 87.7 (PRED.=89.5) (AVG.=87.4)
PA28RT [GASEPV]	84.1; 88.5; 73.9; 88.0; 91.5; 89.0 (AVG.=85.8)	89.4; 91.8; 84.1; 91.7; 92.8; 91.2 (PRED.=89.5) (AVG.=90.9)

1. Alpha-numeric in brackets shows INM equivalent code.
   AVG = Average and PRED = Predicted

Source: Y. Ebisu & Associates

Table 8-9

SUMMARY OF AIRCRAFT NOISE MEASUREMENTS AT WHEELER ARMY AIRFIELD (SITE B)

AIRCRAFT TYPE[1]	MAXIMUM SOUND LEVELS Lmax (in dB)	SOUND EXPOSURE LEVELS Lse (in dB)
C152 [GASEPF]	64.0; 60.3; 60.9; 69.2; 74.1; 63.1 (AVG.=65.3)	70.5; 66.6; 67.4; 74.5; 77.5; 70.1 (PRED.=81.2) (AVG.=72.9)
C172 [GASEPF]	60.9; 68.1 (AVG.=64.5)	66.8; 73.9 (PRED.=81.2) (AVG.=71.7)
PA28R [GASEPV]	66.3; 71.6; 69.7; 70.3; 72.7 (AVG.=70.1)	75.8; 78.9; 76.3; 78.9; 78.6 (PRED.=84.5) (AVG.=77.9)
PA28RT [GASEPV]	69.7; 69.8; 66.9; 69.9; 70.0; 68.1 (AVG.=69.1)	75.5; 75.3; 73.3; 75.1; 74.7; 74.0 (PRED.=84.5) (AVG.=74.7)

1. Alpha-numeric in brackets shows INM equivalent code.
AVG = Average and PRED = Predicted

Source: Y. Ebisu & Associates

measurements. In general, the FAA INM predictions are relatively consistent with the measured aircraft noise levels. They are considered sufficiently accurate for this study.

Aircraft and background ambient noise measurements were obtained at Sites "M" and "P" (see Figure 8-3) in 1995 in the project environs. Station "M" is situated in Oneula Beach Park in Ewa Marina, and Station "P" is located along the northern boundary of NAS Barbers Point, north of Franklin E. Roosevelt Road. The results of the noise measurements are summarized in Tables 8-10 and 8-11. These results were used to characterize the existing and future Honolulu International Airport aircraft, as well as non-aircraft, noise levels which are expected to remain in the Barbers Point environs by 2020.

8.4.3 Aircraft Noise Impact Analysis

Aircraft noise contours were developed for the various Airport Master Plan alternatives described in Appendix D (i.e., Alternatives 1 through 16) using 2020 as the year of analysis. Risks of adverse noise impacts and complaint risks associated with the various airport operational alternatives were evaluated by examining the relationship of the aircraft noise contours to the noise sensitive land uses expected in the airport environs in 2020. In addition, the relationship of the forecast 2020 airport noise levels to historical (1987 and 1992) aircraft noise levels from NAS Barbers Point and Honolulu International Airport operations were described. The increases in forecast 2020 Honolulu International Airport aircraft noise levels in the project environs were also evaluated.

The FAA criteria of 1.5 DNL increase in aircraft noise level at noise-sensitive properties was also used in evaluating noise impacts resulting from increases in aircraft noise exposure. Although this criteria was originally intended for use within the 65 DNL noise contour, (see FAA Order 1050.1D - *Policies and Procedures for Considering Environmental Impact Statements*) the 1.5 DNL criteria was applied at all noise-sensitive uses within the 60 DNL noise contour for this study. This was consistent with the DOTA recommendation to use the 60 DNL contour to identify noise levels which were considered to be incompatible with noise-sensitive land uses (dwellings, schools, day care centers, other public use facilities, hotels, etc.).

Because aircraft noise complaints occur from residents who are located outside the 60 DNL contour, other differences among the various Master Plan alternatives were also evaluated. These included the changes in single-event noise levels during aircraft flyby events and the changes in aircraft overflight patterns or frequencies at noise sensitivelocations. Although FAA Order 1050.1D does not require the development of noise contours below the 65 DNL level, lower level noise contours were analyzed to assess the areas of potential noise complaints resulting from aircraft operations at the Kalaeloa Airport.

Table 8-10

SUMMARY OF AIRCRAFT NOISE MEASUREMENTS AT SITE "M", ONEULA BEACH PARK (NOVEMBER 13, 1995 FROM 1115 TO 1515)

AIRCRAFT TYPE[1]	MAXIMUM SOUND LEVELS Lmax (in dB)	SOUND EXPOSURE LEVELS Lse (in dB)
C-130	75.1; 79.5; 78.7; 61.9 (AVG.=73.8)	80.7; 80.9; 82.6; 70.2 (AVG.=80.3)
B-737(200)	60.1; 60.2; 57.5; 59.5; 63.7 (AVG.=60.2)	65.1; 65.5; 66.5; 68.8; 69.6 (AVG.=67.5)
B-737(300)	66.3 (AVG.=66.3)	68.5 (AVG.=68.5)
B-747	62.6; 62.2; 60.3 (AVG.=61.7)	71.3; 69.8; 71.1 (AVG.=70.8)
DC-9	60.3; 56.1; 74.0; 60.3; 59.5 (AVG.=62.0)	68.5; 63.6; 82.3; 67.0; 66.9 (AVG.=75.8)
DC-10	61.7; 57.1; 59.1; 62.2; 59.6; 57.6; 64.3; 60.4; 59.2; 58.6; 62.1; 61.0 (AVG.=60.2)	70.0; 65.9; 69.9; 71.6; 67.4; 66.9; 70.5; 69.3; 69.8; 66.9; 70.5; 70.1 (AVG.=69.4)
L1011	59.9; 61.0; 75.8 (AVG.=65.6)	68.4; 70.5; 83.9 (AVG.=79.4)
C-135	65.4 (AVG.=65.4)	70.9 (AVG.=70.9)
ATR-42	50.2 (AVG.=50.2)	59.6 (AVG.=59.6)
	AVERAGE NOISE LEVEL:	53.4 Leq
	MAXIMUM NOISE LEVEL:	80.3 dBA
	MINIMUM NOISE LEVEL:	36.9 dBA

1. Alpha-numeric in brackets shows INM equivalent code.
   AVG = Average and PRED = Predicted

Source: Y. Ebisu & Associates

Table 8-11

SUMMARY OF AIRCRAFT NOISE MEASUREMENTS AT SITE "P", NORTHERN BOUNDARY OF NAS BARBERS POINT (NOVEMBER 14, 1995 FROM 0705 TO 1500)

AIRCRAFT TYPE[1]	MAXIMUM SOUND LEVELS Lmax (in dB)	SOUND EXPOSURE LEVELS Lse (in dB)
P-3	81.4; 76.9; 84.6; 81.2; 80.7; 78.1; 74.0; 75.1; 69.4; 75.9; 77.1; 77.4; 79.7; 72.1; 78.2; 80.9; 78.0; 77.3; 81.1; 79.2; 79.5; 80.1; 79.7; 71.8; 79.6; 77.4; 83.5; 78.4; 80.2; 79.7; 80.7; 60.9; 79.7; 80.6 (AVG.=77.9)	86.8; 84.5; 88.8; 87.4; 85.9; 83.0; 81.2; 81.8; 77.8; 81.8; 83.9; 84.8; 86.3; 80.5; 85.7; 87.7; 85.2; 84.9; 86.7; 85.4; 85.8; 86.3; 83.1; 79.3; 83.8; 84.5; 88.2; 86.6; 86.9; 86.8; 86.3; 87.3; 85.4; 88.1 (AVG.=85.6)
C-130	89.4; 85.8; 79.4; 72.6; 73.8; 80.9; 81.5; 80.5; 71.9; 70.6; 73.4 (AVG.=78.2)	93.8; 91.9; 87.1; 81.3; 81.5; 87.8; 87.3; 87.5; 77.3; 79.2; 80.9 (AVG.=87.8)
B-737(200)	63.8; 66.1; 67.0; 67.3; 66.7; 70.2; 69.8 (AVG.=67.3)	72.5; 75.1; 74.6; 75.7; 74.2; 79.3; 76.4 (AVG.=75.9)
B-737(300)	67.7 (AVG.=67.7)	74.9 (AVG.=74.9)
B-747	79.1; 73.1; 75.1; 78.1; 74.5; 75.0; 78.2; 76.1; 78.1; 71.8 (AVG.=75.9)	87.0; 82.5; 83.8; 86.3; 84.6; 85.1; 87.6; 85.0; 85.2; 81.8 (AVG.=85.2)
DC-9	72.4; 71.1; 65.2; 69.9; 70.3; 65.7; 65.2 (AVG.=68.5)	79.5; 78.7; 75.3; 76.5; 76.7; 74.2; 72.1 (AVG.=76.7)
DC-10	74.9; 74.5; 69.5; 72.1; 72.6; 71.0; 71.8; 69.0; 71.3; 71.8; 62.1; 68.5; 72.1; 73.6; 70.2 (AVG.=71.0)	83.8; 83.5; 79.8; 82.0; 81.8; 79.0; 80.4; 78.8; 81.0; 79.3; 72.0; 78.3; 80.4; 82.1; 79.7 (AVG.=80.8)
L1011	71.8; 75.3; 70.6 (AVG.=72.6)	80.4; 83.7; 78.6 (AVG.=81.4)
ATR-42	62.8; 66.9; 67.3 (AVG.=65.7)	71.3; 74.1; 75.3 (AVG.=73.9)
	AVERAGE NOISE LEVEL:	59.7 Leq
	MAXIMUM NOISE LEVEL:	89.2 dBA
	MINIMUM NOISE LEVEL:	37.0 dBA

1. Alpha-numeric in brackets shows INM equivalent code.
   AVG = Average and PRED = Predicted

Source: Y. Ebisu & Associates

The 2020 noise contours were also compared to future conditions when aircraft noise in the project environs is expected to be dominated by aircraft landing on Runway 8L at Honolulu International Airport. With the anticipated closure of NAS Barbers Point in 1999, and in the absence of noise from aircraft operations at the proposed Kalaeloa Airport, noise levels would diminish from the 1987 noise levels depicted in the NAS Barbers Point AICUZ to reflect noise levels associated solely with Honolulu International Airport aircraft operations. Therefore, comparisons of Kalaeloa Airport noise contours with those forecast for Honolulu International Airport in 2020 should provide a reasonable basis for determining the potential noise impacts and complaint risks resulting from the Kalaeloa Airport operations.

Using the DNL and single-event aircraft noise predictions for 2020, evaluations were made of potential noise impacts in the health and welfare category, and of potential annoyance responses from future area residences. Based on the above evaluations, preliminary recommendations for mitigation measures which would minimize risks of health and welfare impacts and risks of annoyance responses from area residences were developed. Preliminary recommendations associated with the conduct and regulation of aircraft operations at the Kalaeloa Airport were also developed to minimize impacts and complaint risks at outlying areas. These are presented in Section 8.8.

8.5 EXISTING NOISE ENVIRONMENT

8.5.1 Naval Air Station Barbers Point Aircraft Noise

The most recent AICUZ report for NAS Barbers Point is the 1989 *Naval Air Station Barbers Point Air Installations Compatible Use Zones (AICUZ) Noise Contours and Supporting Data*. This report contains aircraft noise contours for NAS Barbers Point operations which were anticipated to continue at levels experienced in 1987 and which are illustrated on Figure 8-5. In addition, the AICUZ report also includes combined aircraft noise contours resulting from both Honolulu International Airport and NAS Barbers Point operations in 1987. These contours are reproduced on Figure 8-6. ("TACAMO", as referenced on Figure 8-6, stands for "take charge and move out" and refers to a specially equipped heavy B-707 aircraft.)

Rapid development of the area around the Base, with residential and other noise sensitive uses, has occurred since 1987, particularly to the north and east, with the future land uses forecast for 2000 and 2020 shown on Figures 8-2 and 8-3, respectively. The ongoing development planning around NAS Barbers Point, shown on Figure 8-2, was based on the expectation that the Navy use of the existing airport facilities would continue. Consequently, areas close to the existing flight tracks are generally planned for non-noise sensitive compatible activities (e.g., agriculture, golf course, industrial, and commercial uses). The planned land uses in the project environs shown on Figure 8-2 attempt to take into account the potential impacts associated with aircraft noise from both NAS Barbers

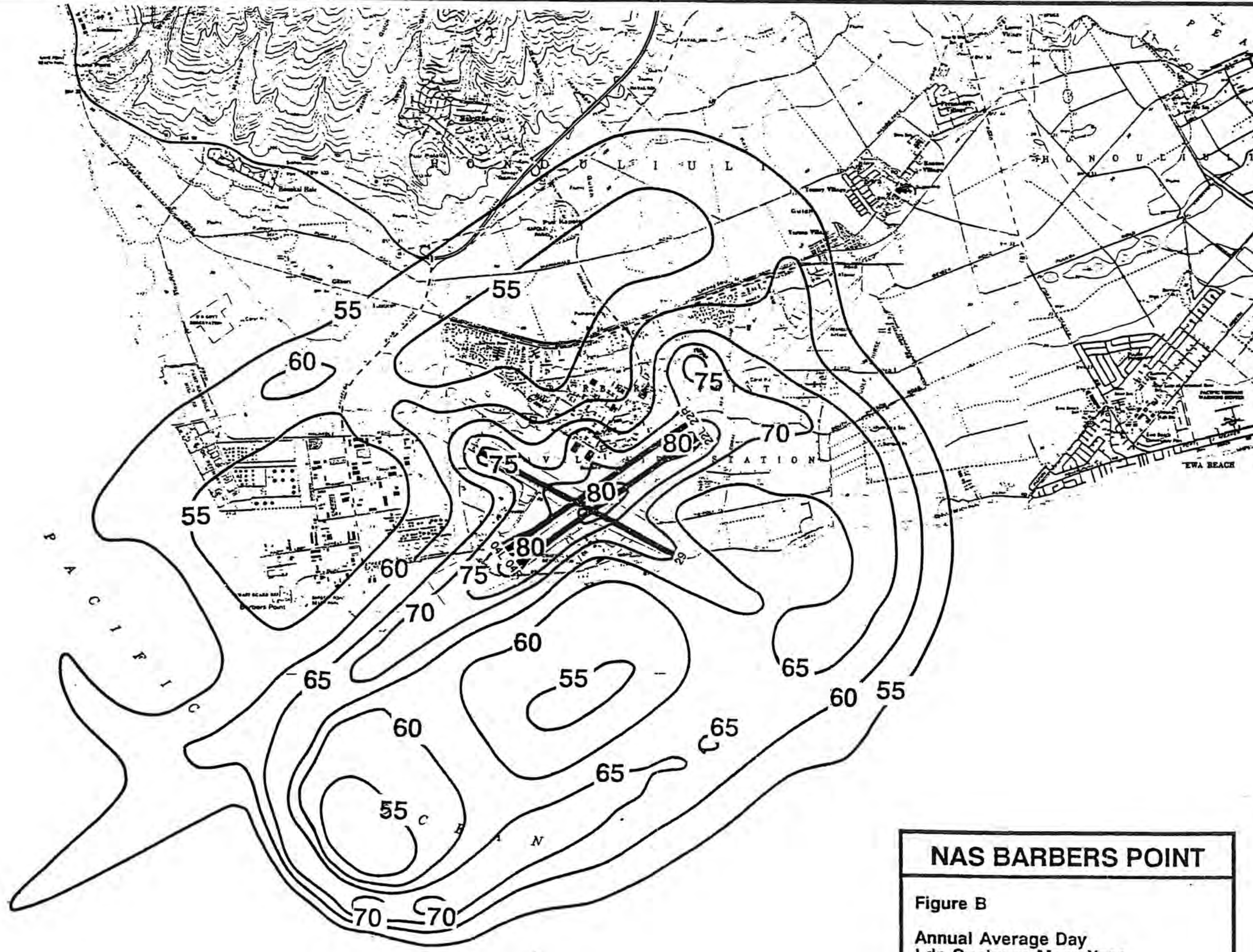
Point and Honolulu International Airport operations in 1987 as depicted on Figure 8-6. The NAS Barbers Point contributions to the aircraft noise contours shown on Figure 8-6 are expected to be zero after the anticipated closure of NAS Barbers Point in 1999. Then the dominant aircraft noise sources would be from aircraft landing at Honolulu International Airport.

Noise measurements obtained at Sites "M" and "P" (see Figure 8-3), show that single-event noise levels associated with current NAS Barbers Point operations range between 65 and 89 dB (Lmax). For the purposes of comparison, typical maximum noise levels of heavy trucks are on the order of 80 to 85 dB at a 50-foot distance. Overflights of Site "P" by P-3 and C-130 aircraft flying within the local traffic pattern corridor north of NAS Barbers Point routinely occur during both tradewind and Kona wind conditions. The average measured noise level at Site "P" during the 7.5 hour period monitored on November 14, 1995 was 60 Leq and this was primarily attributable to aircraft noise. During periods of local training flights, NAS Barbers Point aircraft are the dominant noise sources at locations which are directly under the local traffic pattern corridors. For this reason, the lands under the NAS Barbers Point traffic pattern corridors have been primarily developed or planned with land uses which are compatible with aircraft noise levels greater than the recommended DOTA planning level of 60 DNL.

8.5.2 Honolulu International Airport Aircraft Noise

Historical (1987) and forecast (1992 and 2007) aircraft noise contours for the project environs were developed during the most recent FAR Part 150 Study for Honolulu International Airport, which was published in 1989. The Honolulu International Airport noise contours which were originally forecast for 1992, and which are assumed to be the most representative of current conditions, are reproduced on Figure 8-7. The accuracy of these 1992 noise contours was not validated during this *Kalaeloa Airport Master Plan Study*.

Measurements of single-event noise levels of aircraft landing at Honolulu International Airport were obtained at Sites "M" and "P", and are summarized in Tables 8-10 and 8-11. The noise from aircraft landing at Honolulu International Airport is the dominant noise source in the project environs between the hours of 7:00 a.m. and 7:00 p.m., when Runway 8L is normally used for landings at Honolulu International Airport and when NAS Barbers Point flight operations are very low. During the evening and nighttime hours, as well as during Kona wind conditions, aircraft noise from Honolulu International Airport operations is typically lower and is primarily associated with more distant enroute aircraft.



Airports Division

DEPARTMENT OF TRANSPORTATION STATE OF HAWAII

KALAEOLA AIRPOR
MASTER PLAN

ISLAND OF OAHU

NASBP ANNUAL AVERAGE DAY LDN CONTOURS MEAN YEAR WITHOUT TACAMO

NAS BARBERS POINT

Figure B

Annual Average Day
Ldn Contours Mean Year
Without TACAMO

SCALE IN FEET

0 2000 4000 8000 NORTH

HARRIS MILLER MILLER & HANSON INC.

NOTE
THIS DRAWING IS FOR PLANNING PURPOSES ONLY. IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATION PURPOSES

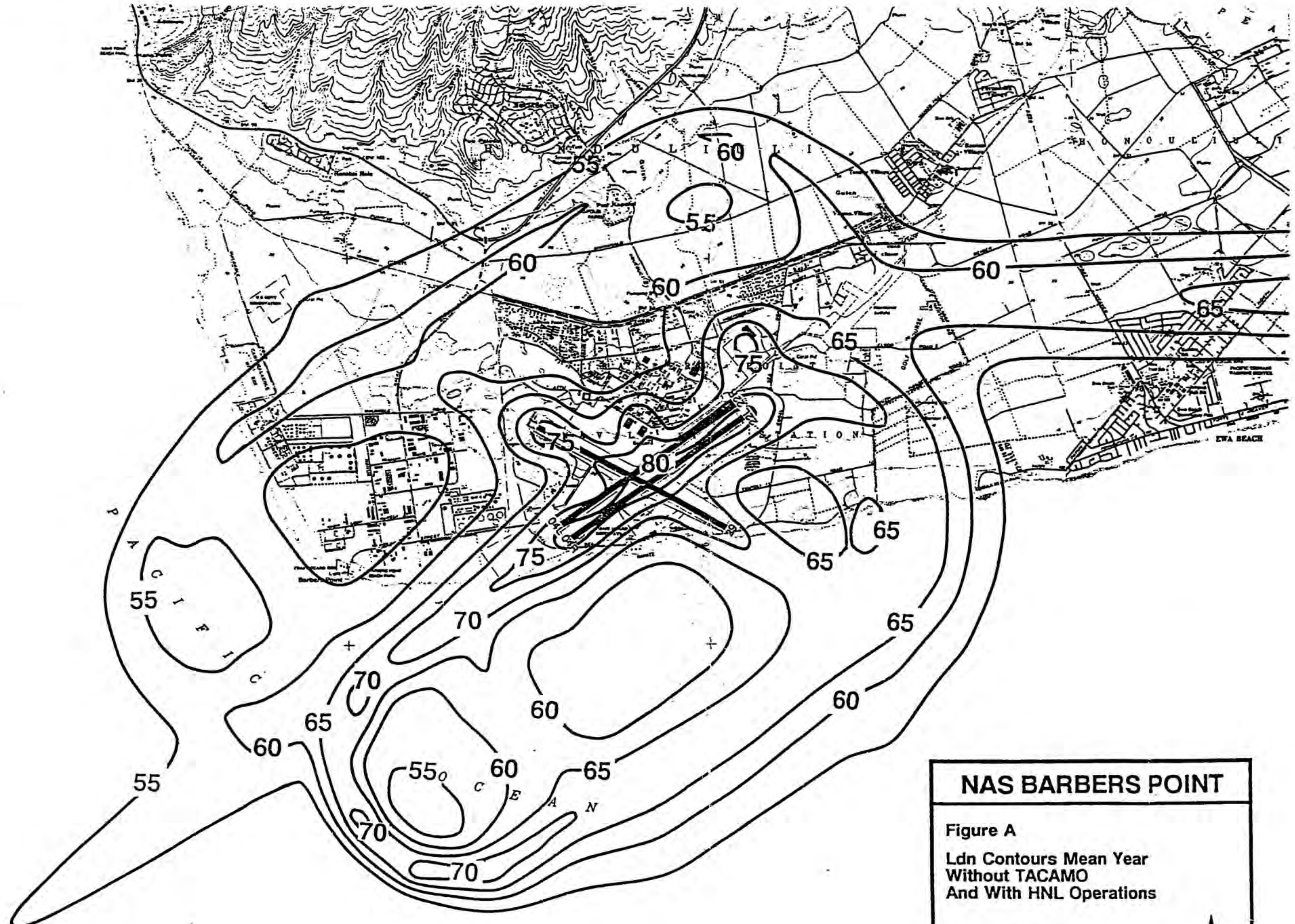
ARIES CONSULTANTS LTD.
BELT COLLINS HAWAII
Y. EBISU AND ASSOCIATES

DATE: 05-09-96

FIGURE N

8-5

DWG. NO.: BPA-84LN



NAS BARBERS POINT

Figure A

Ldn Contours Mean Year Without TACAMO And With HNL Operations

SCALE IN FEET

0 2000 4000 8000

NORTH

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DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN
ISLAND OF OAHU

NASBP ANNUAL AVERAGE DAY LDN CONTOURS MEAN YEAR WITHOUT TACAMO AND WITH HNL OPERATIONS

NOTE:
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DATE: 05-09-96	FIGURE NO.
DWG. NO.: BPA-84LN	8-6

KALAELOA AIRPORT MASTER PLAN

ISLAND OF OAHU

1992 LDN CONTOURS; HONOLULU INTERNATIONAL AIRPORT

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AIRPORTS DIVISION
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

HONOLULU INTERNATIONAL AIRPORT MASTER PLAN UPDATE AND NOISE COMPATIBILTY PROGRAM

KFC AIRPORT, INC.
MANAGEMENT CONSULTANTS

1992 LDN CONTOURS

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FIGURE NO. 8-7

8.5.3 Background Ambient Noise Levels

Between aircraft flyby events, background ambient noise levels are typically less than 55 dBA. They may decrease to levels less than 40 dBA during calm wind periods at locations which are removed from motor vehicle traffic, surf noise, or developed areas.

Tables 8-10 and 8-11 depict the average (or Leq) measured noise levels attributable to aircraft and non-aircraft sources at measurement Sites "M" (Oneula Beach Park) and "P" (along the northern boundary of NAS Barbers Point). The locations of these measurement sites are shown on Figure 8-3. Aircraft noise events are typically audible in the project environs because they are louder than the background ambient noise levels during an aircraft flyby event. Average background ambient (non-aircraft) noise levels measured at Sites "M" and "P" were 52 and 50 Leq, respectively. The measured values are typical of vacant or undeveloped land areas which are removed from major roadways or highways. These background ambient levels are relatively low and compatible for noise sensitive land uses.

8.6 FUTURE NOISE ENVIRONMENT

The noise contours produced by the Integrated Noise Model (INM) for Kalaeloa Airport aircraft operations combined with the aircraft approaching Runway 8L at Honolulu International Airport were overlain on the forecast 2020 land use map shown on Figure 8-3. The noise contours for only the Honolulu International Airport aircraft arrivals were also overlain on the 2020 land use map. This was done for each of the alternatives evaluated. The extent to which the noise associated with Alternatives 1 through 16 would be compatible with the forecast land use pattern is summarized in Appendix D. The extent to which the anticipated 2020 land use would be compatible with noise levels resulting from the recommended Kalaeloa Airport Plan (Alternative 17) are discussed below in Section 8.6.2.

Departures and arrivals would be separated horizontally and vertically in accordance with FAA approved procedures. For the purposes of the comparative analyses, the flight tracks and number and type of aircraft assumed to use each flight track were varied among the alternatives to assess the different potential noise impacts. The evaluation of Alternatives 1 through 16 assumed some HNG helicopter operations would be along flight tracks to and from the northeast and northwest. Recent information from the HNG indicates that this will not be the case. Consequently, no HNG helicopter operations are assumed to the northeast or northwest in the selected Airport Master Plan.

The usage of the various flight tracks has been further refined for the selected Airport Master Plan based on continuing input from potential airport users, FAA and DOTA. The changes in the operating profiles are intended to reduce the noise impacts from Kalaeloa

Airport. These efforts will continue, and they should further mitigate noise impacts for the selected airport master plan.

8.6.1 Aircraft Noise - Without the Project

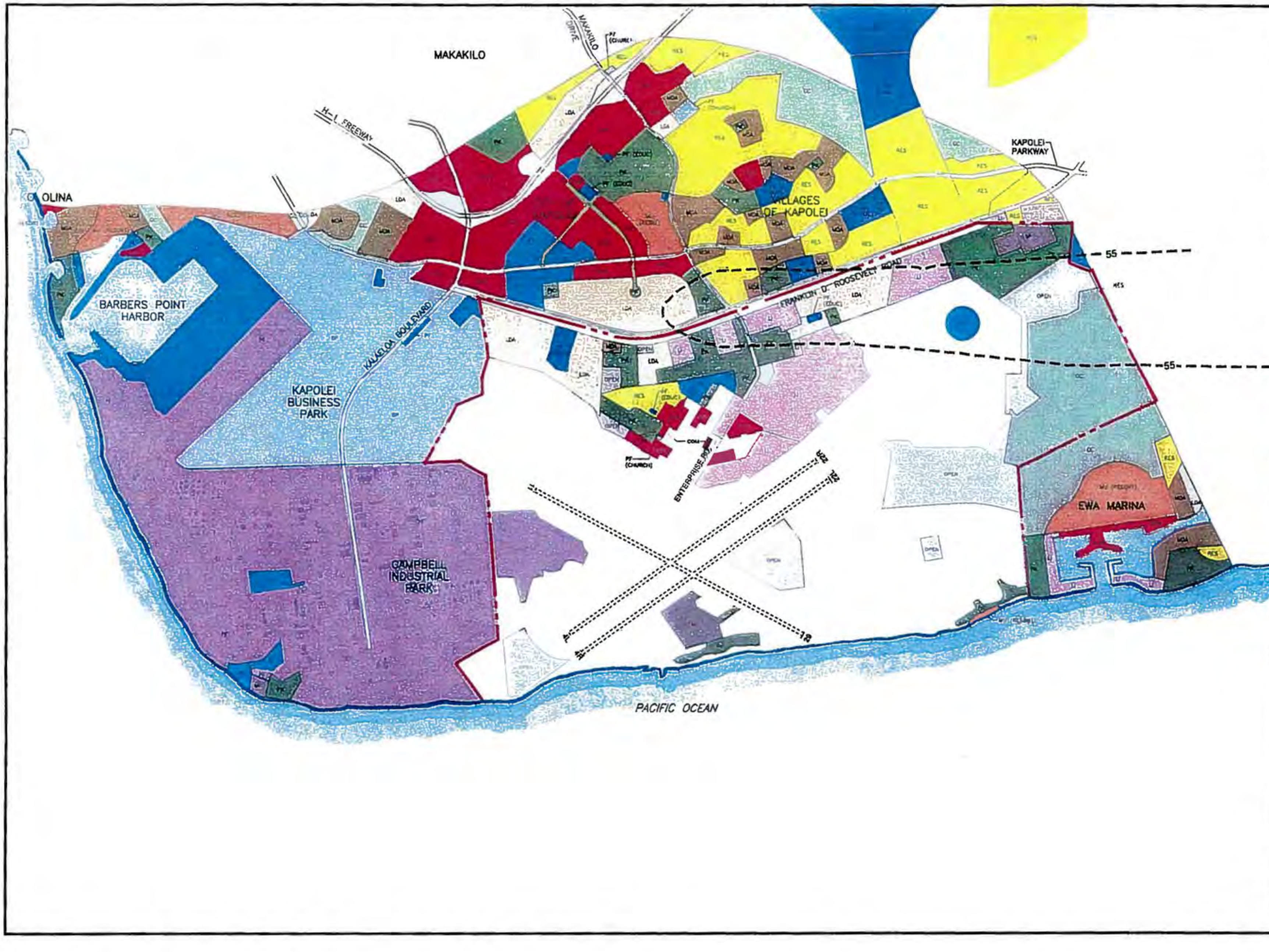
Without a Kalaeloa Airport, and following the anticipated closure of NAS Barbers Point in 1999, the Honolulu International Airport noise contours shown on Figure 8-7 should approximate the aircraft noise in the project environs. By 2020, predicted Honolulu International Airport noise contours in the project environs are anticipated to be similar to those shown on Figure 8-8, which were developed during this current study effort. The forecast Honolulu International Airport aircraft landing operations are presented in Appendix D. Figure 8-8 depicts the forecast aircraft noise in the project environs for the 2020 planning period. It should be noted that, if current military aircraft operations at NAS Barbers Point did not cease, the aircraft noise levels "without the project" might be similar to the original combined AICUZ noise levels shown on Figure 8-6.

8.6.2 Aircraft Noise - Selected Kalaeloa Airport Master Plan

The runway configuration for the selected Airport Master Plan (Alternative 17) is similar to the runway configuration assumed for Alternatives 6, 15, and 16 (see Appendix A) in that it includes use of the three existing runways. However, based on the March 1997 recommendations of the Redevelopment Commission, the runway lengths and threshold locations of the selected Plan differ from all of the other alternatives considered. Under the selected Plan, only the northeast 8,000-foot section of Runway 4R-22L and 4,500-foot northeast section of Runway 4L-22R are retained. In addition, only a 6,000-foot long section of crosswind Runway 11-29 is retained to accommodate itinerant USCG, HNG, and twin-engined general aviation operations.

The aircraft flight tracks and ingress/egress routes for the recommended alternative are shown on Figure 8-9; they are similar (but not identical) to those used for Alternatives 15 and 16. The availability of the crosswind Runway 11-29 allows for the avoidance of overflights of Ewa Marina by the larger C-130 aircraft when departing and landing at Kalaeloa Airport.

Under the selected Plan, only small, single-engine, general aviation aircraft would use the northeast flight track corridor over the proposed north-south road towards H-1. This generalized route would be used for both departures to, and arrivals from, the H-1/Central Oahu area. The departing and arriving aircraft would be separated both horizontally and vertically in accordance with FAA approved procedures. The twin-engine, small, general aviation aircraft would be routed to the south and below the Honolulu International Airport Class B airspace for flights to and from the east. No general aviation departures and arrivals are assumed over the H-1/Kapolei Boulevard corridor to and from the northwest. Runway 11-29 would be used for only two purposes. The first is for takeoffs



Airports Division
DEPARTMENT OF TRANSPORTATION
STATE OF HAWAII

KALAELOA AIRPORT MASTER PLAN
ISLAND OF OAHU

2020 NOISE CONTOURS, HIA RUNWAY 8L ARRIVALS ONLY

LEGEND

- RES Residential
- LDA Low-Density Apartment
- MDA Medium-Density Apartment
- Commercial/Office
- BP Business Park
- LI Light Industrial
- HI Heavy Industrial
- Mixed Use (Residential)
- PK Park
- Mixed Use (Resort)
- GC Golf Course
- Public Facility
- Public Facility (Education)
- Public Facility (Church)
- M Military
- OPEN Open
- Barbers Point NAS Boundary
- 55 DNL Contour
- Existing Runways

TRUE NORTH — MAGNETIC NORTH

0 625 1250 2500
GRAPHIC SCALE IN FEET

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DATE: 4-11-96
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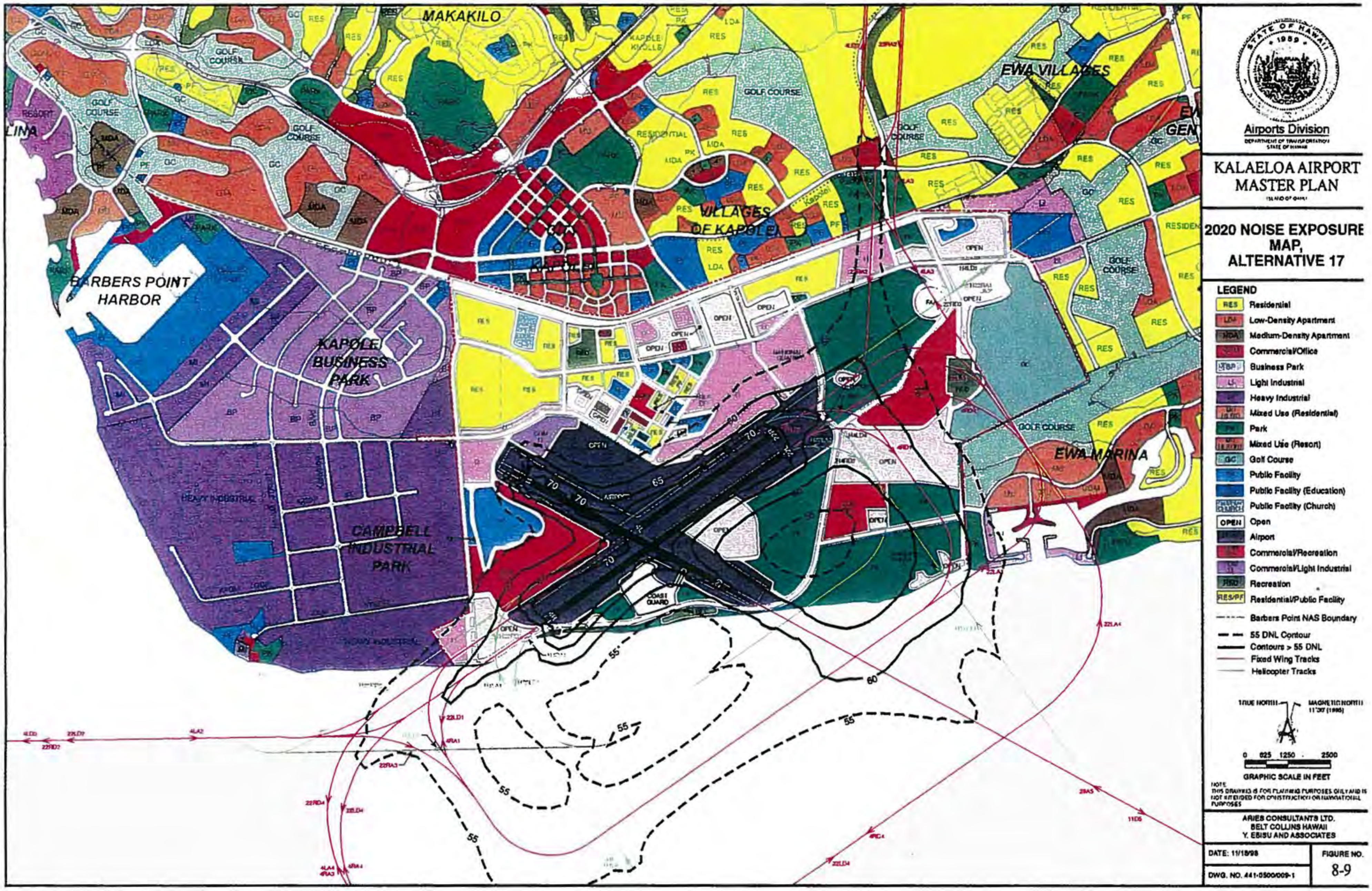
FIGURE NO. 8-8


MAKAKILO
EWA VILLAGES
VILLAGES OF KAPOLEI
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
CAMPBELL INDUSTRIAL PARK
EWA MARINA
GOLF COURSE
COAST GUARD
Airports Division
DEPARTMENT OF TRANSPORTATION STATE OF HAWAII
KALAELOA AIRPORT MASTER PLAN
ISLAND OF OAHU
2020 NOISE EXPOSURE MAP, ALTERNATIVE 17
LEGEND
RES Residential
LDA Low-Density Apartment
MDA Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
Public Facility (Church)
OPEN Open
Airport
Commercial/Recreation
Commercial/Light Industrial
REC Recreation
RES/PF Residential/Public Facility
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
Fixed Wing Tracks
Helicopter Tracks
TRUE NORTH
MAGNETIC NORTH
0 625 1250 2500
GRAPHIC SCALE IN FEET
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DWG. NO. 441-0500/009-1
FIGURE NO.
8-9

on Runway 11 by itinerant USCG, HNG, and twin-engine general aviation aircraft in Tradewind conditions. The second is for landings on Runway 29 by these aircraft in Kona wind conditions.

The general aviation, USCG, and HNG training patterns would be on Runway 4R-22L to the south and over the ocean. The shorter Runway 4L-22R would be used primarily for itinerant operations by the smaller single- and twin-engine general aviation aircraft.

The USCG and HNG helicopters would depart to, and arrive from, flight tracks offshore and south of the Airport. These aircraft would not use flight tracks to the northeast or northwest towards H-1. Most of the civil helicopter operations would also be routed to the south, but infrequent civil operations would depart to, and arrive from, the northeast towards West Loch and the "Harbor" Intersection over H-1.

Figure 8-9 depicts the resulting noise contours associated with Kalaeloa Airport operations in 2020 under the selected Plan. These noise contours are very similar to those for Alternative 16, since both alternatives utilize the same number and type of annual aircraft operations, utilize similar flight tracks, and utilize all three of the existing runways. Except for the existing beach cottages within NAS Barbers Point, future noise sensitive land uses should remain outside the 60 DNL contour. As was the case under Alternative 16, potential risks of adverse health and welfare noise impacts from the Airport will remain under this alternative if noise sensitive uses are developed directly under the northeast flight corridor.

The off-base year 2020 forecast land use shown on Figure 8-9 differs from that shown with the other alternatives described in Appendix D. This is because it is based on data that were compiled more recently by the Campbell Estate and published in October 1997. This updated map reflects substantial changes in the anticipated pattern of development. These changes include: (i) the relocation of the proposed University of Hawaii West Oahu campus; (ii) changes in the location of residential development resulting from a land exchange negotiated as part of the University of Hawaii arrangement; and (iii) the creation of additional park space on the eastern side of the Villages of Kapolei. The latter change is significant to the Kalaeloa Airport because it eliminates residential development previously planned beneath the flight track between the Kalaeloa Airport and the H-1/Central Oahu area.

For this reason, there should be less risk of adverse noise impacts associated with the itinerant aircraft operations along the northeast ingress/egress corridor.

With the exception of a few acres of "preservation" land on the southwest corner of the adjacent Ewa Marina site, the 60 DNL contour is entirely within the existing base boundaries.

With one exception, the 65 DNL contour is entirely within the Kalaeloa Airport boundaries approved by the NAS Barbers Point Redevelopment Commission. The exception occurs along the southwest side of Runway 4R-22L, where the 65 DNL contour extends about 200 feet into the commercial recreation raceway complex planned by the Department of Hawaiian Home Lands for that location.

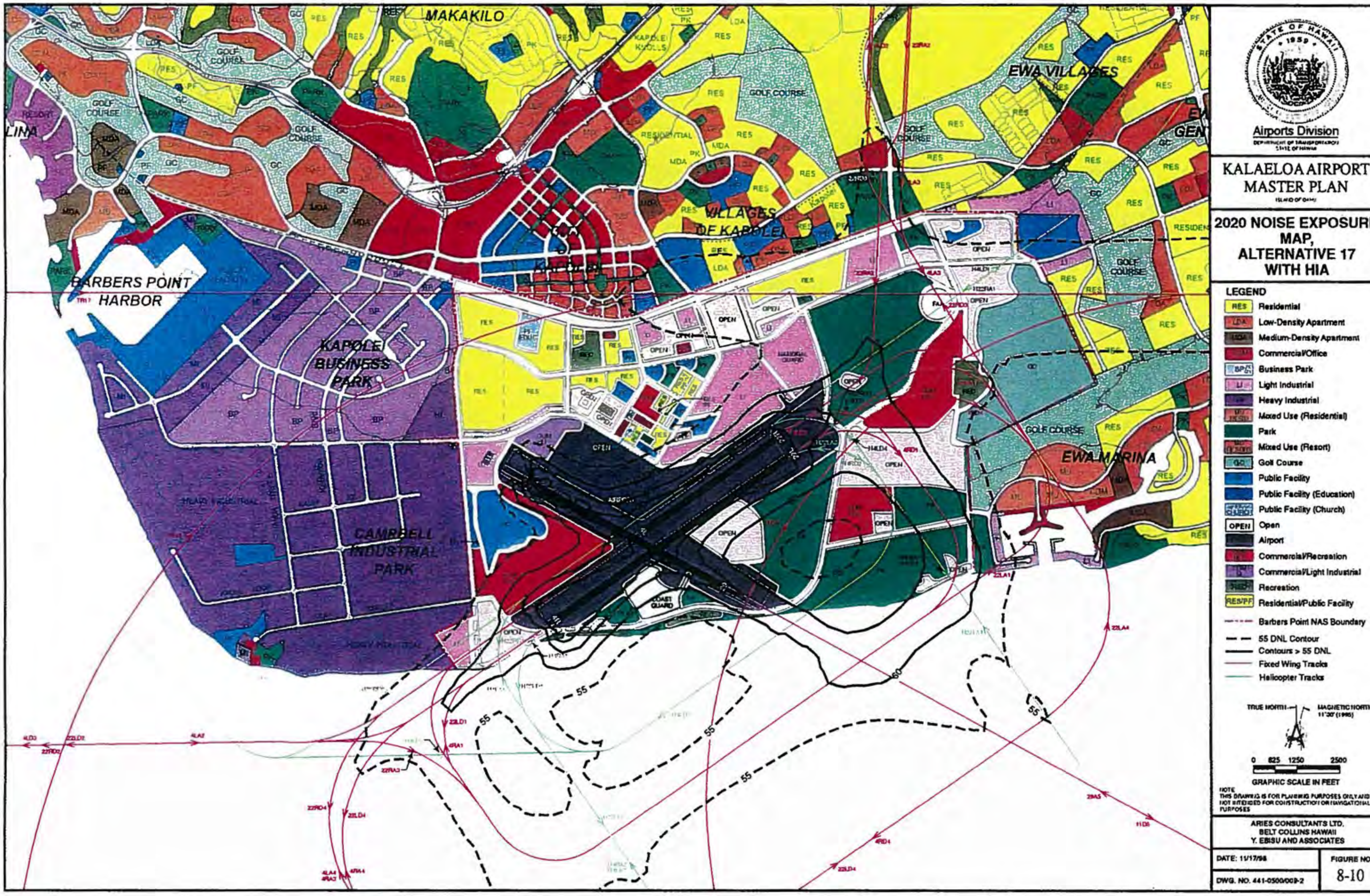
Except for the existing beach cottages within NAS Barbers Point, there are no planned noise-sensitive land uses between the 60 DNL and 65 DNL noise contours. The forecast aircraft noise levels in the cottages and other beach recreational areas with the proposed Kalaeloa Airport are well below the levels experienced while NAS Barbers Point was in operation.

The 55 DNL contour does not extend into any noise-sensitive areas off-base. This conclusion differs from those reported previously for the other alternatives described in Appendix D. This is not due to a major change in anticipated aircraft noise level. On the contrary, noise levels from the selected Plan are similar to those forecast for Alternatives 15 and 16, the two others most recently analyzed. Instead, the improvement is due to the fact that the land use plans for the area have recently been modified to keep noise-sensitive uses away from the corridor that would be used by aircraft operating between the Kalaeloa Airport and the H-1/Central Oahu area.

The new land uses shown in the Downtown Area of the Redevelopment Commission's Community Redevelopment Plan in the airport sideline area, north of Runway 4L-22R on Figure 8-9, include noise sensitive parcels within 1,200 feet of the runway. Because of the location of the south ends (and departure threshold) of Runway 4L near these noise sensitive parcels, the 55 DNL contour crosses into these parcels as shown on Figure 8-9. For this reason, there is a higher risk of adverse noise impacts in the airport sideline area under the selected Plan than under Alternative 16.

8.6.3 Aircraft Noise - Selected Kalaeloa Airport Master Plan with Honolulu International Airport

Figure 8-10 depicts the combined noise contours resulting from forecast operations at Kalaeloa Airport under the selected Plan (Alternative 17) plus those operations associated with landings on Runway 8L at Honolulu International Airport. This figure can be interpreted as the forecast aircraft noise levels in the project environs "with the project" under the selected Plan. Figure 8-8 can be interpreted as the forecast aircraft noise levels "without the project". Therefore, as can be seen by comparing Figures 8-8 and 8-10, Kalaeloa Airport operations should not affect the 60 DNL contour for Honolulu International Airport, and noise sensitive land uses north of Kalaeloa Airport should remain outside the 60 DNL contour. However, Kalaeloa Airport operations will increase cumulative aircraft noise levels along the flight corridor northeast of the Airport, causing a slight increase in the Honolulu International Airport's 55 DNL contour directly under



Airports Division
KALAELOA AIRPORT
MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 17 WITH HIA
LEGEND
RES Residential
LDA Low-Density Apartment
MDA Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
Public Facility (Church)
OPEN Open
Airport
Commercial/Recreation
Commercial/Light Industrial
Recreation
RES/PF Residential/Public Facility
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
Fixed Wing Tracks
Helicopter Tracks
0 625 1250 2500
GRAPHIC SCALE IN FEET
NOTE
THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES
ARIES CONSULTANTS LTD.
BELT COLLINS HAWAII
Y. EBISU AND ASSOCIATES
DATE: 11/17/98
FIGURE NO.
8-10
DWG. NO. 441-0500/009-2
MAKAKILO
EWA VILLAGES
VILLAGES OF KAPOLEI
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
CAMPBELL INDUSTRIAL PARK
EWA MARINA
GOLF COURSE
COAST GUARD
55
60

this flight corridor. The combined noise contours shown on Figure 8-10 for the selected Plan are similar to those for Alternative 16. However, for reasons stated earlier in Section 8.6.2 above, the 55 DNL contour is slightly larger in the "Downtown Area" of the Community Redevelopment Plan of the airport sideline area north of Runway 4L-22R.

The great majority of the area that the Redevelopment Commission's plan designates for Park use lies outside the 60 DNL contour. This includes most of the shoreline. In the Ewa Marina and NAS Barbers Point beach cottages areas, increases in aircraft noise levels under the selected Plan will be similar to those under Alternative 16. Except for the existing beach cottages within NAS Barbers Point, future noise sensitive land uses in the project environs should remain outside the 60 DNL contour. The risks of potential adverse noise impacts at the Ewa Marina area have been eliminated under the selected Plan. For this reason, as well as the changes in planned land uses along the northeast flight corridor, potential adverse noise impacts and complaint risks under the selected Plan should be low.

8.7 PROJECT RELATED NOISE IMPACTS AND POSSIBLE NOISE MITIGATION MEASURES

8.7.1 Land Use Compatibility Criteria

The State Department of Transportation, Airports Division (DOTA) recommends against the siting of future noise-sensitive developments within the 60 DNL airport noise contour. The siting of industrial and commercial uses within the 60 DNL and higher noise contours is acceptable, since enclosure and air-conditioning of industrial and commercial office spaces are the rule rather than an exception. The siting of these types of uses within the high noise areas around an airport is usually permitted, since it tends to preclude future development of noise sensitive uses on the same lands. An example of this has occurred under the downwind leg of the existing NAS Barbers Point local flight pattern in the City of Kapolei, which has been, or is planned to be, developed primarily with commercial uses.

In addition, disclosure of airport noise is also recommended within the 55 DNL contour in accordance with *Mandatory Seller Disclosures in Real Estate Transactions* (HRS 508-D-15). In addition to the DNL criteria, siting of future noise sensitive developments under aircraft flight corridors should also be avoided to reduce the risk of complaints risk. Residences, schools, churches, health centers, day care centers and hotels are included within the noise sensitive land use category.

8.7.2 Forecast Land Use Compatibility

Forecast aircraft noise levels associated with the Kalaeloa Airport are substantially below the levels that surrounding areas experienced in the past as a result of operations from the

NAS Barbers Point. The only noise-sensitive use (existing, planned or proposed) which would be located within the Kalaeloa Airport's 60 DNL contour is the existing beach cottages on NAS Barbers Point property. There are approximately eight cottages, some of which are provided with window air conditioning units. These cottages have been exposed to even higher levels of aircraft noise in the past, and they are used primarily for transient lodging. Moreover, only a few nighttime general aviation operations are expected at Kalaeloa Airport. Consequently, this potential incompatible land use is not considered to be serious. Mitigation measures in the form of window air conditioning may be applied to these cottages as required.

Except for the previously mentioned beach cottages within NAS Barbers Point, no existing, planned or proposed noise sensitive land use, which is located within the 60 DNL aircraft noise contours for 2020, should be subject to significant increases in aircraft noise levels as a result of Kalaeloa Airport operations. This conclusion was reached using the FAA 1.5 DNL increase criteria (see FAA Order No. 1050.1D, *Policies and Procedures for Considering Environmental Impact Statements*).

While noise levels between 55 and 60 DNL are consistent with established land use compatibility criteria for noise-sensitive land uses, they can cause some adverse effects. There are only two areas where the combination of forecast noise levels in this range and planned land uses are of concern. They are: (1) single-family residential units planned on the south-central side of the Villages of Kapolei and (2) single-family homes below the proposed flight corridor to the northeast. In both of these locations, the affected areas total less than ten acres.

The small area on the southern side of the Villages of Kapolei that would be exposed to aircraft noise levels between 55 and 60 DNL is related solely to overflights by aircraft inbound to Honolulu International Airport. Forecast Kalaeloa Airport operations do not have a significant effect on the location of this contour.

As indicated in the discussion of alternatives contained in the appendices to this report, when preliminary airport development and operating scenarios were being evaluated, landowners' plans for surrounding areas called for considerable residential development within the corridor to the northeast. Consequently, the 55 DNL contour was anticipated to encompass a substantial amount of noise-sensitive residential uses in that area. Since that time, landowners' plans have changed. As a result of this, it now appears that the combination of Honolulu International Airport arrivals and Kalaeloa Airport operations would produce noise levels in excess of 55 DNL in fewer than ten acres of planned residential uses below the northeast arrival-departure corridor.

To minimize overflights of future noise sensitive properties under the proposed northeast flight route for Kalaeloa Airport, and not to expose them to levels above 55 DNL, an alternate flight route to the south and west and then over Campbell Industrial Park, Kalaeloa Boulevard, and H-1, and the downwind leg of the existing NAS Barbers Point local traffic pattern, could be considered for some of the flights. This route could be over an area that has a higher background ambient noise level than the area under the proposed flight route to the northeast. It could also cause noise impacts on other residential areas in the vicinity of NAS Barbers Point. Use of this alternate flight route would minimize potential adverse health and welfare impacts associated with the 55 DNL contour to the northeast over the planned residential areas in the Villages of Kapolei and the proposed residential areas adjacent to Tenney/Varona Villages.

DOT should work with the FAA to establish flight track patterns. These should be planned to minimize airspace interactions and noise impacts.

8.7.3 Aircraft Flyby Events

The past history of community complaints and annoyance responses regarding helicopter and general aviation aircraft noise suggest that the "no reaction" response threshold for these types of aircraft flyby events can be less than the 55 DNL threshold for protection of the public health and welfare. The average "no reaction" response threshold to aircraft noise is approximately 5 DNL units less than the DNL associated with other background ambient noise, as long as the exposed population does not have attitudinal biases regarding the source of the noise. Variations in this "no reaction" response threshold are possible due to attitudinal biases (favorable and unfavorable) of the exposed population.

The existing background ambient noise level in the vicinity of the Kalaeloa Airport is estimated to be approximately 50 DNL. Thus, the "no reaction" response threshold for persons who are not biased against aircraft noise is estimated to be approximately 45 DNL (see 1989 *Hawaii State Helicopter System Plan*). Because noise levels in excess of 45 DNL are anticipated in some of the existing and proposed residential areas to the north of the Airport, noise from aircraft operations may cause complaints from some residents even though it is below the 55 DNL level that has the potential to cause adverse health and welfare effects. These observations are particularly applicable in the vicinity of the planned and proposed noise-sensitive land uses near the flight tracks over the Villages of Kapolei and Varona/Tenney Villages, at the existing beach cottages on NAS Barbers Point property, and in the Ewa Marina area. Based on the "ambient, less 5 DNL" complaint criteria, risks of noise complaints from other residences or noise-sensitive properties are considered to be relatively low.

The noise mitigation measures recommended for implementation during operation of the Kalaeloa Airport are those operational procedures which minimize complaint risks from surrounding noise-sensitive properties and which are possible within the operating constraints at the Airport. One of the primary mitigation measures for reducing risks of complaints from noise sensitive properties is to avoid overflights of these properties, particularly at low altitudes. If the existing agricultural lands northeast of the Airport were to remain in non-noise sensitive uses, the inland flight routes adjacent to Tenney/Varona Villages would remain clear of noise-sensitive properties. If this now undeveloped land under the flight corridor, which is currently under the NAS Barbers Point local traffic pattern, cannot be maintained in vacant or non-sensitive land uses, the primary flight route to/from inland points may need to be revised, or supplemented with another flight route, to minimize risks of adverse noise impacts and/or complaints. For these reasons, land use controls and disclosures of the presence and necessity of the flight routes will be required in order to maintain the future compatibility of the land uses below these routes.

8.8 OTHER NOISE IMPACT CONSIDERATIONS

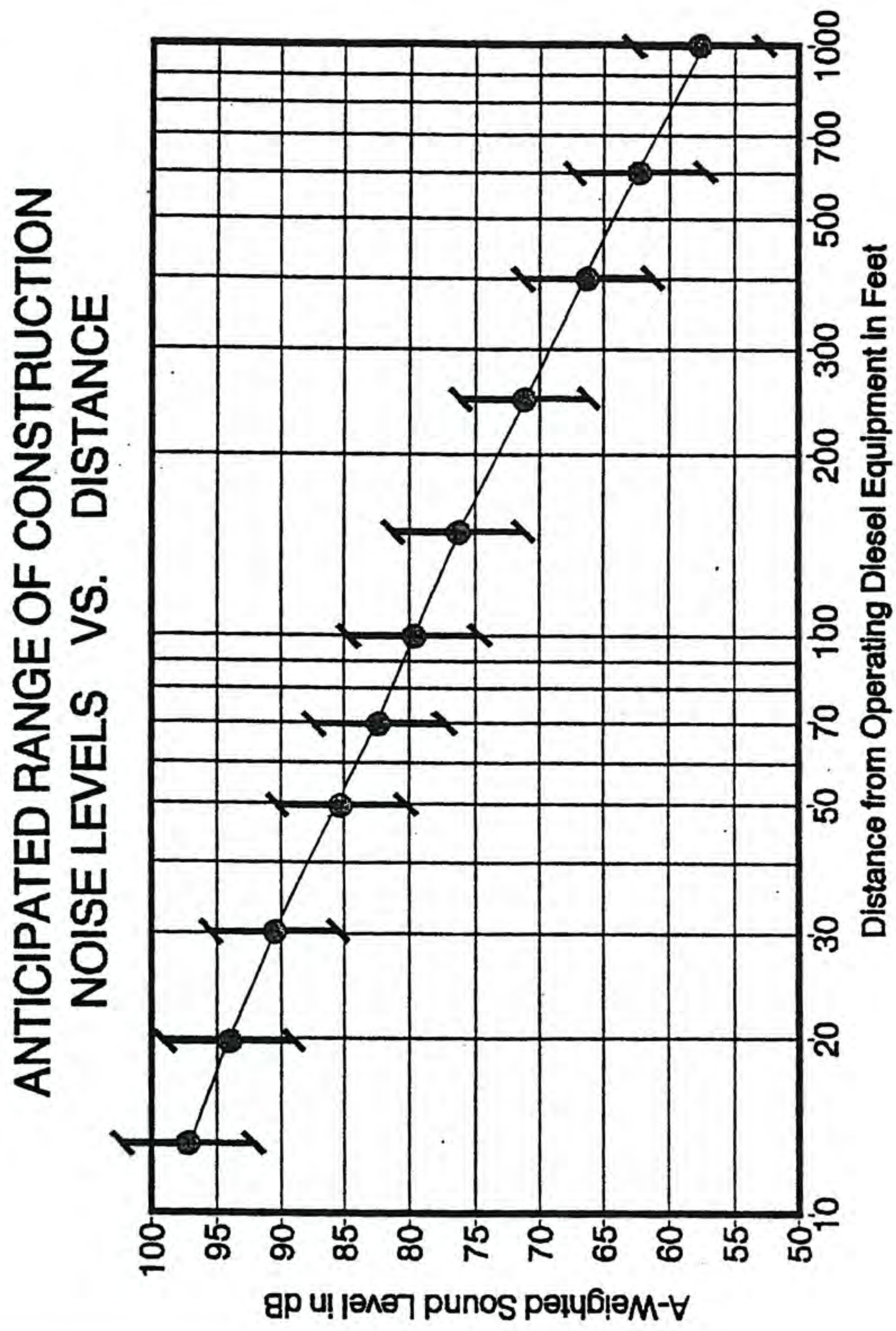
8.8.1 Noise From Other On-Site Airport Facilities

Noise from other on-site facilities at Kalaeloa Airport is primarily associated with mechanical equipment such as air conditioning and refrigeration condensers and chillers, blowers, emergency generator equipment and ground transportation vehicles. Because the existing and planned airport facilities are located at relatively large (over 500 feet) distances from any noise-sensitive areas, adverse noise impacts from these on-site facilities are not anticipated. Additionally, if airport equipment or facilities need to be located near noise-sensitive properties, sound attenuation treatment may be applied to the airport equipment or facilities to minimize the possible adverse noise impacts from these units.

8.8.2 Construction Noise

Should any heavy construction work be required to implement the improvements proposed in the Airport Master Plan, audible construction noise may be unavoidable during the construction period. The total time period for construction is unknown, but it is anticipated that the actual work may move from one location on the Airport to another during that period. The actual length of exposure to construction noise at any receptor location will therefore be probably less than the total construction period required. Typical levels of noise from construction activity (excluding pile driving activity) are shown on Figure 8-11. Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work, the large distances from noise sensitive properties, the limited extent of additional facilities required, and due to the administrative controls available for its regulation. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the various construction sites.

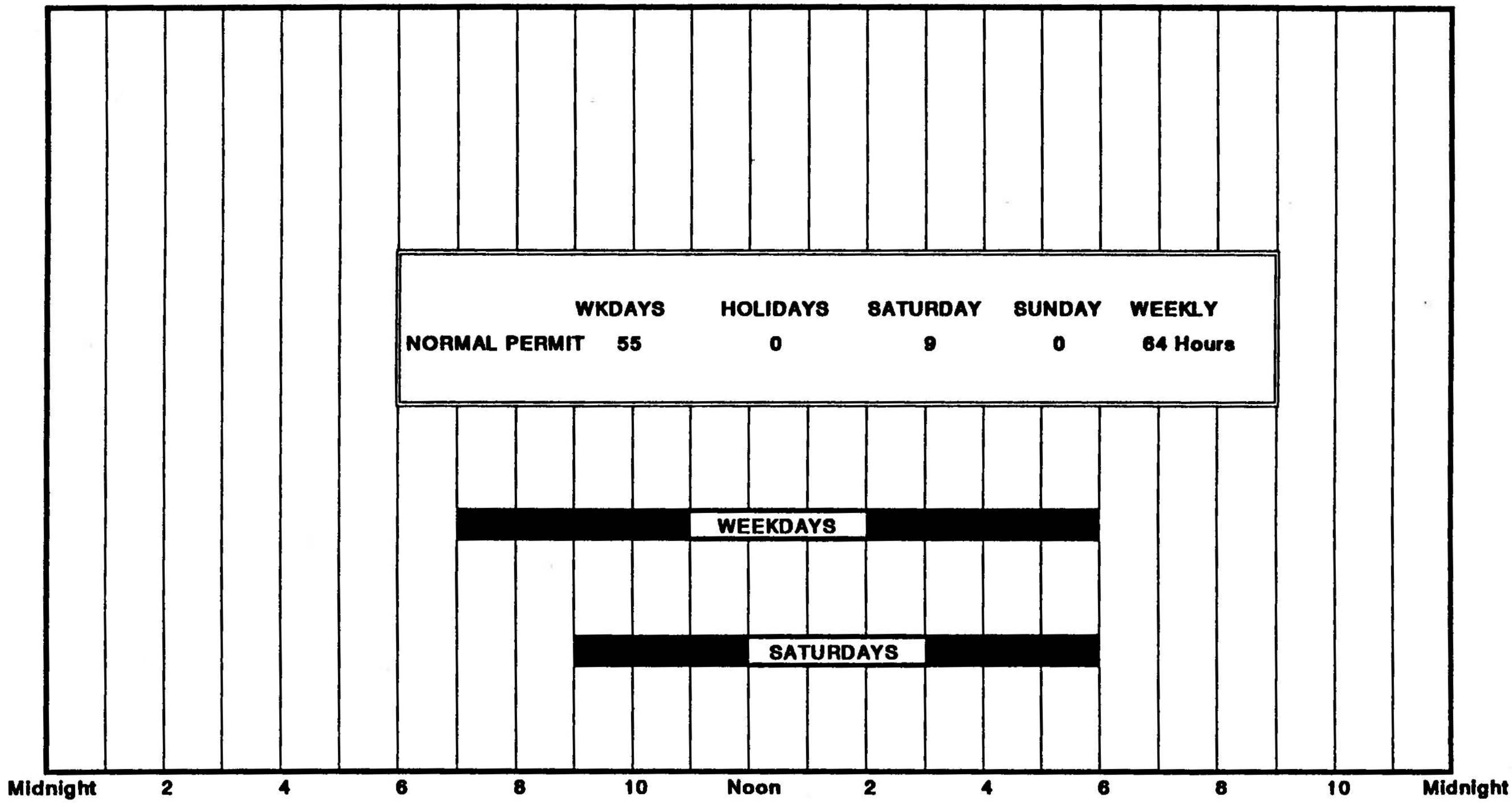
Mitigation of construction noise to inaudible levels will not be practical in all cases. This is due to the intensity of construction noise sources (80 to 90+ dB at 50-foot distance) and to the exterior nature of the work (grading and earth moving, trenching, concrete pouring,



CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE
8-11

hammering, etc.). The use of properly muffled construction equipment should be required on the job sites. The incorporation of State Department of Health construction noise limits and curfew times, which are applicable on the island of Oahu (*Title 11, Administrative Rules, Chapter 46, Community Noise Control*), is another noise mitigation measure which can be applied in implementing the Kalaeloa Airport Master Plan. Table 8-12 depicts the allowed hours of construction for normal construction noise. Noisy construction activities are not allowed on Sundays and holidays under the State Department of Health permit procedures.



AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

TABLE 8–12

Chapter 9

ENVIRONMENTAL ANALYSIS

9.1 OVERVIEW

The proposed airport uses involve existing facilities or areas that have already been disturbed and do not involve development of natural areas. The specific environmental impact categories addressed in this chapter include: noise, compatible land use, safety/risk of upset, air quality and traffic and circulation. Air quality is discussed in Section 9.2, safety and risk of upset in Section 9.3 and traffic and circulation in Section 9.4. The analyses relating to noise and compatible land use are presented earlier in Chapter 8.

The information contained in this environmental analysis was originally intended to be used in the *Disposal and Reuse of NAS Barbers Point Environmental Impact Statement (EIS)* being prepared by the U.S. Navy. Towards that end, aircraft noise and other relevant information generated during the planning process has been provided to the Navy for that purpose.

9.2 AIR QUALITY

The air quality emissions from aircraft and vehicles associated with airport operations are discussed in this section. This information has been provided to the Navy for use in the cumulative air quality impact analyses for the *Disposal and Reuse of NAS Barbers Point Environmental Impact Statement (EIS)*. Changes in pollutant emissions associated with other land uses proposed within the Base are expected to be evaluated in the *Disposal and Reuse of NAS Barbers Point Environmental Impact Statement (EIS)*. Similarly, construction related emissions, which are short-term by nature, are expected to be addressed in the *Disposal and Reuse of NAS Barbers Point Environmental Impact Statement (EIS)*.

9.2.1 Ambient Air Quality

9.2.1.1 Applicable Ambient Air Quality Standards

The Environmental Protection Agency publishes and currently maintains the National Ambient Air Quality Standards; these are summarized in Table 9-1. The State of Hawaii has also promulgated ambient air quality standards which are also shown in Table 9-1. In the case of carbon monoxide, nitrogen dioxide and ozone, the State standards are more stringent than the federal standards.

Table 9-1

AMBIENT AIR QUALITY STANDARDS[a]

Pollutant	National Standards[b] Primary[c]	National Standards[b] Secondary[d]	Hawaii Standards
Ozone			
Maximum 1-hour concentration	235 µg/m3		100 µg/m3
Carbon Monoxide			
Maximum 8-hour concentration	10 mg/m3		5 mg/m3
Maximum 1-hour concentration	40 mg/m3		10 mg/m3
Nitrogen Dioxide			
Annual arithmetic mean	100 µg/m3		70 µg/m3
Sulfur Dioxide			
Annual arithmetic mean	80 µg/m3		80 µg/m3
Maximum 24-hour concentration	365 µg/m3		365 µg/m3
Maximum 3-hour concentration		1,300 µg/m3	1,300 µg/m3
Suspended Particulates			
Maximum 24-hour concentration	150 µg/m3	150 µg/m3	150 µg/m3
Annual arithmetic mean	50 µg/m3	50 µg/m3	50 µg/m3
Hydrogen Sulfide (H_2S)			
Maximum 1-hour concentration			35 µg/m3
Lead (Pb)			
Calendar quarter concentration	1.5 µg/m3		1.5 µg/m3

mg/m3 = Milligrams per cubic meter (1 milligram = 1/1,000 gram)
µg/m3 = Micrograms per cubic meter (1 microgram = 1/1,000,000 gram)

a. Concentrations are expressed first in the units in which the standard was promulgated. Equivalent units are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury.

b. National Ambient Air Quality Standards - Other than ozone and those based on annual averages or annual arithmetic means, standards are not to be exceeded more than once a year. The ozone standard is attained when the number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

c. National Primary Standards - level of air quality necessary to protect the public health with an adequate margin of safety.

d. National Secondary Standards - level of air quality necessary to protect public welfare.

Source: State of Hawaii Hawaii Department of Health

9.2.1.2 Existing Ambient Air Quality

The State Department of Health maintains a network of air monitoring stations around the State. The pollutants monitored at each station differ, but collectively they gather data on total suspended particulates (TSP); that portion of suspended particulate matter less than 10 microns, typically about 50 percent of TSP (often referred to as PM-10); sulfur dioxide (SO_2); carbon monoxide (CO); ozone (O_3) and lead (Pb). One of the State Department of Health monitoring stations is located at Barbers Point. It samples PM-10 particulates and sulfur dioxide. Table 9-2 provides a summary of monitoring at this station over the period 1985 to 1990. The data in Table 9-2 indicate that standards for PM-10 and SO_2 are being met. Additional monitoring station data for PM-10, SO_2, CO, O_3 and lead from the State Department of Health building in Honolulu are presented in Table 9-3 for the period 1988 to 1990. These data also indicate that existing ambient air quality complies with both State and Federal standards.

9.2.2 Aircraft and Vehicular Emissions

Other than the U.S. Coast Guard (USCG) aircraft that are currently based at NAS Barbers Point, most of the aircraft that are expected to use Kalaeloa Airport are currently based at Honolulu International Airport. These aircraft are forecast to encounter much less delay if they operate at Kalaeloa Airport than if they were to continue to operate at Honolulu International Airport. Consequently, shifting general aviation activities to Kalaeloa Airport will lower overall emissions by these aircraft. As a corollary, the general aviation and commercial aircraft that would continue to operate at Honolulu International Airport would have lower average emissions per operation as well.

It is worth noting that emissions from aircraft using the Kalaeloa Airport and from vehicle-trips related to airport activities will also be lower than historical emissions from aircraft and vehicle operations at NAS Barbers Point. This conclusion is generally applicable to each of the alternative development concepts evaluated, although there are differences among the alternatives. The ambient air quality conditions at Kalaeloa Airport are not currently an issue and reduced emissions from aviation activities should contribute to continued good air quality.

Based on the wind conditions at the Kalaeloa Airport, the fact that much of the existing aircraft related pollutant emissions already contribute to air quality conditions on Oahu, and that those conditions are within accepted State and federal standards, none of the airport alternatives can be considered to have significant air quality impacts.

Table 9-2

AMBIENT AIR QUALITY DATA
BARBERS POINT, OAHU
1985-1990

	Ambient Concentrations in Micrograms Per Cubic Meter of Air					
	PM-10[1]			SO_2[2]		
Year	**Range**	**Mean**	**>AQS[3]**	**Range**	**Mean**	**>AQS[3]**
1985	24 - 138	57	3	<5 - 25	<5	0
1986	7 - 66	26	0	<5 - 10	<5	0
1987	10 - 40	22	0	<5 - 13	<5	0
1988	10 - 48	24	0	<5 - 19	<5	0
1989	10 - 44	25	0	<5 - 20	<5	0
1990	12 - 60	28	0	<5 -<5	<5	0

Notes:

1. PM-10 = particulate matter less than or equal to 10 microns
2. SO_2 = sulfur dioxide
3. >AQS = number of violations of Hawaii air quality standard

Source: State of Hawaii Department of Health

Table 9-3

AMBIENT AIR QUALITY DATA
DEPARTMENT OF HEALTH BUILDING
1988-1990

	Ambient Concentrations in Micrograms Per Cubic Meter of Air	
Year	**Range**	**Mean**
Particulate Matter (PM-10)		
1988	9 - 25	17
1989	10 - 33	16
1990	8 - 36	15
Sulfur Dioxide (SO_2)		
1988	<5 - <5	<5
1989	<5 - 8	<5
1990	<5 - <5	<5
Carbon Monoxide (CO)		
1988	0.2 - 10.3	1.7
1989	0.3 - 9.7	1.9
1990	0.1 - 7.1	1.5
Ozone (O_3)		
1988	0 - 92	14
1989	0 - 94	15
1990	4 - 116	36
Lead (Pb)		
1988	0.0 - 0.1	0
1989	0.0 - 0.1	0
1990	0.0 - 0.0	0

Source: State of Hawaii Department of Health and East Kapolei Project Draft EIS

Each of the alternative airport development concepts produces considerably less pollutants than from existing NAS Barbers Point vehicular traffic, or from identified future land uses. In order to fully analyze pollutant concentrations, the total emissions from all land uses and vehicular traffic included in the Redevelopment Commission Community Redevelopment Plan should be analyzed.

9.3 SAFETY AND RISK OF UPSET

Public safety concerns at the Kalaeloa Airport include aircraft overflights of existing and any proposed new development along the approach and departure paths for each runway, which may pose a risk to persons on the ground, and development, which may pose a risk to aircraft overflights. This section presents a discussion of aviation safety issues as they relate to the Kalaeloa Airport as a general aviation airport.

Two considerations related to public safety were used to evaluate the airport alternatives. One consideration used various research reports and statistical data to evaluate the safety of persons on the ground. As discussed, there are few established guidelines regarding this aspect of safety because aircraft accidents are a random event. The second consideration used established height restriction criteria developed by the FAA, which protects the operating ability of aircraft and thus, the airport.

9.3.1. Safety to Persons on the Ground

9.3.1.1 Historic Accident Data

The National Transportation Safety Board (NTSB) is the primary repository of aircraft accident data in the U.S. Additional information is available from the FAA. However, data regarding the location of aircraft accidents is scarce. Aircraft accident data are maintained and published by the National Transportation Safety Board (NTSB), which has the responsibility for investigating aviation accidents.

Since 1946, the rate of aircraft accidents per 100,000 hours flown has shown a steady and fairly rapid decline. Accident rates have declined from the range of 80 to 90 per 100,000 hours to a range of 8 to 9 per 100,000 hours. Aviation authorities have cited several reasons for such a decline. These include improved pilot training, pilot education programs by such groups as the Aircraft Owner and Pilot Association (AOPA), increased regulation of airspace by the Federal Aviation Administration (FAA), improved structural and performance characteristics of general aviation aircraft, and strengthened zoning and land use regulations that have reduced incompatible land uses in the vicinity of airports.

Table 9-4 summarizes historic civil aviation accident data over the period 1983-1993 for all airports in the State of Hawaii, for all airports on Oahu, and specifically for Naval Air Station Barbers Point. There were a total of only three civilian aircraft accidents at NAS Barbers Point with no fatalities during this period. However, it should be noted that after 1986, the local flying club ceased activities and civilian aircraft operations have declined since then at NAS Barbers Point. Military aircraft accidents are not reported.

9.3.1.2 Aircraft Accident Locations

In preparing the *Airport Land Use Planning Handbook* for the Caltrans Division of Aeronautics in 1993, analysts made a considerable effort to define the nature of the safety issues surrounding an airport. The Institute of Transportation Studies (ITS) at the University of California, Berkeley conducted a special study of general aviation aircraft accidents in an attempt to replicate the work done for the Department of Defense when the Air Installation Compatible Use Zone (AICUZ) safety zones were established for military bases.

The ITS analysis of 1974 through 1981 NTSB data revealed that nearly half (47 percent) of all aircraft accidents take place on an airport and would not, therefore, constitute a hazard to adjacent, off-airport uses. The FAA's airport design standards provide a reasonable protection for on-airport land uses, so that these accidents are unlikely to injure anyone other than the individual(s) in the aircraft that are involved in the accident.

Another 30 percent are *en route* accidents. These are defined as accidents occurring more than 5 miles from an airport. These are widely scattered and their location has little to do with the location of a specific airport.

About 23 percent of all accidents can be classified as airport-vicinity accidents, potentially including some en route accidents which happened to take place within 5 miles of an airport. It is these types of accidents that may constitute a potential concern to surrounding land uses. Most aircraft accidents near an airport occur relatively close to the runway ends and the departure/arrival tracks.

Some of the more significant conclusions developed in the University of California study regarding accident location by type of aircraft were:

Single-engine propeller aircraft accidents tend to be clustered close to the runway ends and relatively near the extended centerline of the runway. For approach/landing accidents, the median distance is 1,260 feet from the landing threshold. For

Table 9-4

ACCIDENT SUMMARY - 1983-1993
STATE OF HAWAII, OAHU AND NAS BARBERS POINT

Year	All Hawaii Airports Total Accidents	Total Fatal Accidents	All Oahu Airports Total Accidents	Accidents (Fatalities)	Naval Air Station Barbers Point Total Accidents	Accidents (Fatalities)
1983	7	2	3	1 (1)	0	0
1984	9	4	4	0	2	0
1985	16	2	3	0	0	0
1986	14	2	4	0	1	0
1987	19	3	6	2 (2)	0	0
1988	7	1	1	0	0	0
1989	11	3	6	1 (1)	0	0
1990	10	0	2	0	0	0
1991	11	2	3	0	0	0
1992	10	3	4	2 (7)	0	0
1993	9	3	3	2 (3)	0	0

Note: Military aircraft accidents are not included.

Source: National Transportation Safety Board takeoffs/departures, the median distance is 770 feet from the departure end of the runway, and 4,090 feet from the start of takeoff roll. Also almost 90 percent of all the departure accident points lie within 9,000 feet of the start of takeoff roll.

Accident points for multiengine aircraft, including jets, are comparatively more dispersed further out than are those for single-engine aircraft. The majority of the approach/landing accidents are within 500 feet (lateral distance) of the extended runway centerline, but the median distance is more than 3,300 feet from the landing threshold. The takeoff/departure accidents are also more widely scattered. Although the median accident site distance is 1,600 feet from the departure end of the runway, the sites are spread about evenly in the 5,000 to 10,000-foot range as measured from the start of takeoff roll.

Based on the geographic location of the flight tracks and the accident probabilities based on the NTSB data, there is little danger that aircraft operating from the Kalaeloa Airport runways would injure people or damage buildings. The probability of injury or death from vehicular traffic and other types of accidents near Barbers Point is much greater.

One finding of the analysis of the 1971 through 1981 NTSB data was the rarity of accidents involving residences or other buildings. Another finding was that general aviation accidents injure people on the ground (i.e., people who are not occupants of the aircraft) even less frequently than collisions with buildings. Moreover, most such incidents that do injure people take place on airports. National data, over a 19-year period, indicate only 3.1 accidents per year nationwide resulted in fatal or serious injuries to people in a building.

These accident statistics make it clear that the prime risk of general aviation is to those who participate in it, not to those on the ground. There is little likelihood that aircraft operating from the proposed airport will cause deaths or serious injuries to those who live, work, or play in the surrounding areas.

9.3.2 FAA Standards

The Federal Aviation Administration (FAA) has established minimum dimensional standards to provide for the protection of persons and property on the ground and to protect navigable airspace. These standards are contained in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, and Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*. The FAA regards its criteria as "minimum standards". State and local agencies can set their own land use compatibility policies as they see fit, provided they are not less than those established by the FAA.

9.3.2.1 Airport Design

FAA AC 150/5300-13 establishes criteria for the runway protection zones whose primary purpose is to protect persons and property on the ground. It also establishes criteria for runway safety and object free areas, and provides guidelines for establishing building restriction lines in relation to runways. The dimensional standards that would apply to the Kalaeloa Airport are described in Chapters 4 and 5 of this report. These areas are recommended for inclusion within the airport boundary.

Runway protection zones (RPZ) are trapezoidal areas just beyond each runway end that ideally would be free of all objects. The RPZ is divided into two areas, a runway object free area (ROFA) and a controlled activity area. The ROFA is to remain free of all objects other than those required for air navigation or aircraft ground maneuvering purposes and whose location is fixed by its function. Some limited uses are permitted within the controlled activity area provided they do not attract wildlife, are outside of the ROFA, and do not interfere with navigational aids. Golf courses (but not clubhouses) and agricultural operations (other than forestry or livestock farms) are expressly permitted, and automobile-parking facilities, although discouraged, may be permitted. Prohibited land uses include, but are not limited to, residences and places of public assembly. Ideally, each runway protection zone should be entirely clear of all objects. The FAA strongly recommends that airports own this property outright or, when this is impractical, to obtain avigation easements sufficient to control the land use. A combination of property ownership and avigation easements is recommended for the runway protection zones at Kalaeloa Airport.

9.3.2.2 Airspace Protection

Airport vicinity height limitations are required for two reasons. The first is to protect the public safety, health, and welfare by ensuring that aircraft can safely fly in the airspace around an airport. This protects both the interest of those in the aircraft and those on the ground who could be injured in the event of an accident. Secondly, height limitations are required to protect the operating capability of airports, thus preserving an important part of the national transportation system.

The Federal Aviation Regulation Part 77, *Objects Affecting Navigable Airspace*, establishes obstruction standards and airport imaginary surfaces by which to identify objects that are obstructions to air navigation as discussed in Chapters 4 and 5. Additionally, FAR Part 77 establishes more stringent imaginary surfaces by which to identify projects that must submit an FAA Form 7460-1, *Notice of Proposed Construction or Alteration* to the FAA. FAR Part 77 has been adopted as a means of monitoring and protecting the airspace required for safe operation of aircraft at an airport. These regulations require that the FAA be notified of certain proposed construction or alteration of objects, whether permanent or temporary, within a specified vicinity of an airport. Standards for determining what constitutes an obstruction to air navigation also are established.

These standards are defined in terms of imaginary surfaces in the airspace extending about one to two miles from the runway ends at Kalaeloa Airport, except they extend nearly eight miles to the southwest in the case of a precision instrument approach to Runway 4R. The dimensions of the civil airport imaginary surfaces vary depending on the type of approach to the runways. Nonprecision runways have larger surfaces and flatter approach slopes than visual runways. Precision instrument runways have still larger surfaces and flatter approaches than nonprecision runways.

The FAA uses these FAR Part 77 obstruction standards not as absolute height limits, but as elevations above which structures may constitute a safety problem. Any penetrations of the FAR Part 77 surfaces are subject to review on a case-by-case basis. If a safety problem is found to exist, FAA will issue a determination of a hazard to air navigation. The airport imaginary surfaces that apply to the airport are the primary, approach and transitional surfaces.

The primary surface is centered on the runway and extends two hundred (200) feet beyond the runway ends. The elevation is the same as the nearest point of the runway centerline. The width varies by type of approach and use of the runway. The widths applicable to the Kalaeloa Airport are 250 feet wide for a 4,500-foot long Runway 4L-22R, 500 feet wide for a 6,000-foot long crosswind Runway 11-29, and 1,000 feet wide for the northeast/southwest 8,000-foot long Runway 4R-22L.

The approach surfaces are longitudinally centered on the extended runway centerline and extend outward and upward from each end of the primary surface. The dimensions vary based on the type of approach and use of the runway. The dimensions applicable to the Kalaeloa Airport are described in Chapters 4 and 5 of this report.

The transitional surfaces start at the edges of the primary and approach surfaces, extending outward and upward, at a slope of 7:1, to the horizontal surface at an elevation of 150 feet above the highest elevation of the runway surface on the Airport.

The primary, approach and transitional surfaces are depicted on the Airport Layout Plan set of drawings, described in Chapter 5, for the selected Airport Master Plan concept. Any penetration of any of the FAR Part 77 surfaces will be identified as an obstruction to navigable airspace.

FAA does not have the authority to prevent the encroachment of an object into navigable airspace. It is up to the local zoning authorities to enforce the FAA recommendation. The FAA has encouraged local enactment of height restrictions by producing a model zoning ordinance to limit the height of objects around airports (see FAA Advisory Circular 150/5190-4A, *A Model Zoning Ordinance to Limit Height of Objects Around Airports*). The model zoning ordinance proposes the use of the FAR Part 77 surfaces as regulatory height limits.

Most zoning ordinances have inherent height restrictions. An airport height zoning restriction acts like an overlay zone affecting only those areas of the airport vicinity defined within the ordinance itself. Typically this includes the horizontal surface, the approach and departure corridors, and portions of the aircraft traffic patterns, to the extent that the traffic patterns extend beyond the horizontal surface.

Additional guidelines regarding protection of airport airspace are set forth in other FAA documents. In general these criteria specify that no land use within the boundaries encompassed by the FAR Part 77 surfaces should endanger or interfere with the landing, takeoff, or maneuvering of an aircraft at an airport. In addition to height restrictions, specific characteristics to be avoided include:

- Creation of electrical interference with navigational signals or radio communication between the airport and aircraft;
- Lighting which is difficult to distinguish from airport lighting;
- Glare in the eyes of pilots using the airport;
- Smoke or other impairments to visibility in the airport vicinity; and
- Uses which attract birds or create bird strike hazards.

With regard to bird strike hazards, the FAA specifically considers waste disposal sites (sanitary landfills) to be incompatible land uses if located within 10,000 feet of a runway used by turbine-powered aircraft or 5,000 feet of other runways. Any waste disposal site located within 5 miles of an airport is also deemed incompatible if it results in a hazardous movement of birds across a runway or aircraft approach and departure paths.

9.3.3 Consistency with Redevelopment Commission Community Development Plan

The selected Airport Master Plan has been evaluated on the basis of the proposed Federal uses identified in the September 25, 1995 US Navy *Determination of Surplus* and illustrated on Figure 9-1. They have also been evaluated in relation to reuses recommended in the March 1997 Redevelopment Commission Community Redevelopment Plan and illustrated on Figure 9-2. Proposed land uses in the Airport environs, as presented on Figures 8-2 and 8-3, and existing land uses on and adjacent to the Base, as discussed in Chapter 8, have also been considered.

The selected Airport is generally compatible with the other land uses that the Redevelopment Commission recommended in the March 1997 *Community Redevelopment Plan*. However, some of the land uses included in the Redevelopment Commission *Community Redevelopment Plan* could affect the Airport and as a result the Airport has been adjusted to reflect the Redevelopment Commission's overall land use decisions. Specific areas of impact, or potential impact, and proposed mitigation measures are as follows:

9.3.3.1 Department of Hawaiian Home Lands Motor Raceway Complex

Impact

A Motor Raceway Complex is proposed by the Department of Hawaiian Home Lands (DHHL) on the southwest portion of existing Runway 4L-22R and on Taxiway M (see 126-acre Commercial/Recreation area on Figure 9-2). Use of this area for the Motor Raceway Complex precludes the use of the full length of Runway 4L-22R as the primary runway at the Kalaeloa Airport.

Mitigation

If the Motor Raceway Complex is developed in the proposed location, care must be taken in the design of the facilities to preserve an unobstructed line-of-sight between Runways 11 and 4R across the raceway complex. An avigation easement should be created that restricts the use of land in this area before it is transferred to DHHL.

9.3.3.2 Department of Hawaiian Home Lands Residential Areas

Impact

Some of the proposed DHHL residential areas to the northwest of Runway 11-29, as illustrated on Figure 9-2, would not be compatible with retaining the full use of the crosswind Runway 11-29, including landings on Runway 11 and takeoffs on Runway 29.

Mitigation

To avoid this incompatibility the State Department of Transportation, Airports Division (DOTA) has agreed to no landings on Runway 11 and no takeoffs on Runway 29. In addition, the DHHL has indicated that it does not intend to pursue development of areas for housing that would affect aircraft operations on Runway 11-29.

Impact

Some of the proposed DHHL housing in the Downtown Area of the Base, as shown on Figure 9-3, is within the 55 DNL noise contour.

Mitigation

Disclosure of the anticipated noise levels is recommended in accordance with *Mandatory Seller Disclosures in Real Estate Transactions* (HRS 508-D-15) if the DHHL intends to transfer title to this property to another agency. In addition, sound treatment of the structures should be considered if they provide less than 10 dB attenuation.

9.3.3.3 U. S. Fish & Wildlife Service Wildlife Preserves

The Redevelopment Commission has designated areas to the southeast and southwest of Runway 4R-22L for use as wildlife preserves by the U.S. Department of the Interior Fish & Wildlife Service (USF&WS). The wildlife value of these areas is already affected by existing Navy aircraft operations.

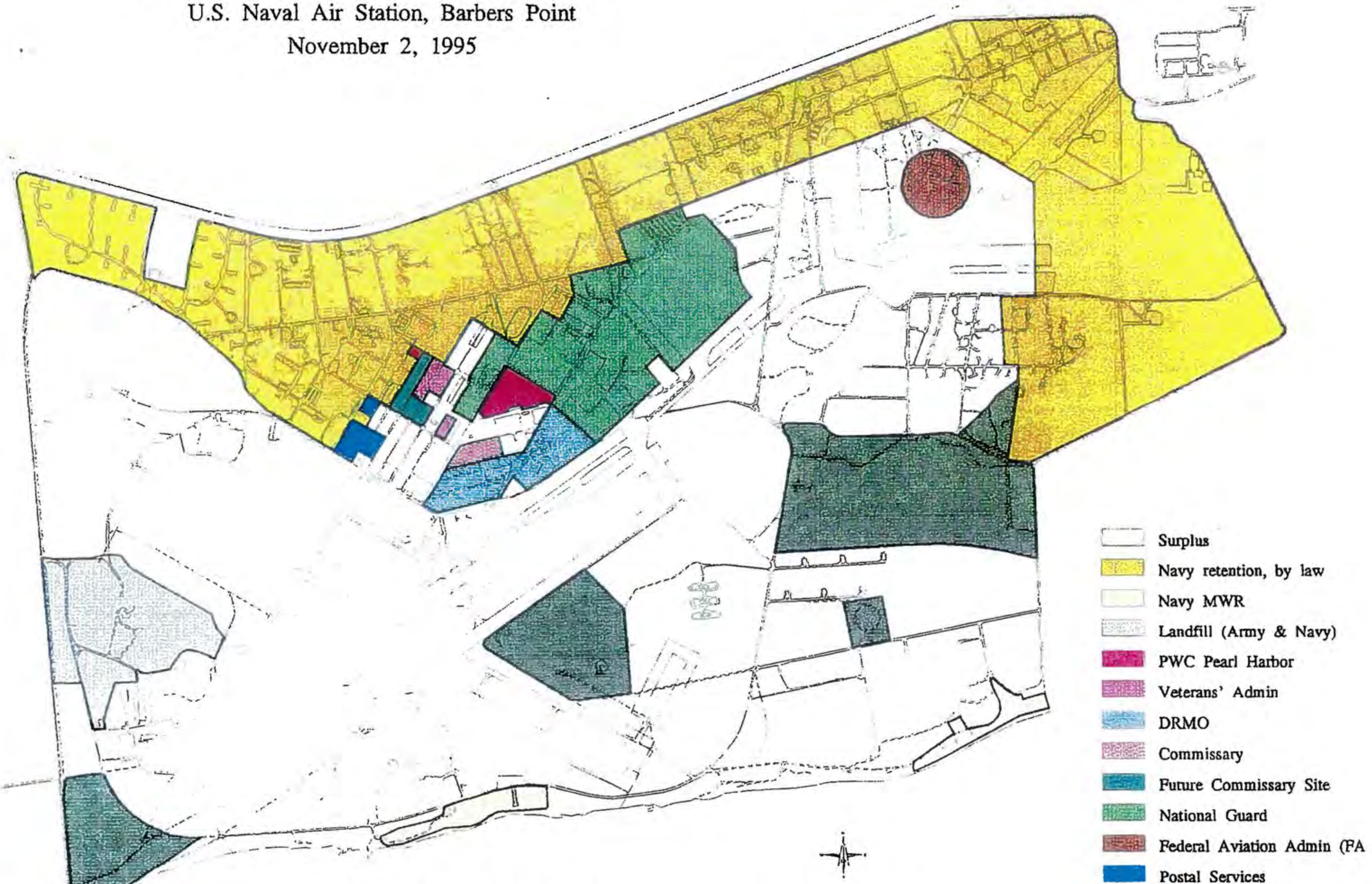
Impact

Part of the land to be turned over to the USF&WS is within the runway safety area, runway object free area and building restriction line southeast of Runway 4R-22L. The proposed USF&WS Open Space parcel appears to abut the existing runway pavement, as shown on Figures 9-1 and 9-2. This area does not have any special habitat value as the Navy currently mows it on a regular basis because it is within the Navy runway clearance line (building restriction line). However, this is compatible with airport uses so long as it continues to be maintained in accordance with current practices.

SURPLUS & FEDERAL LAND USE

U.S. Naval Air Station, Barbers Point

November 2, 1995



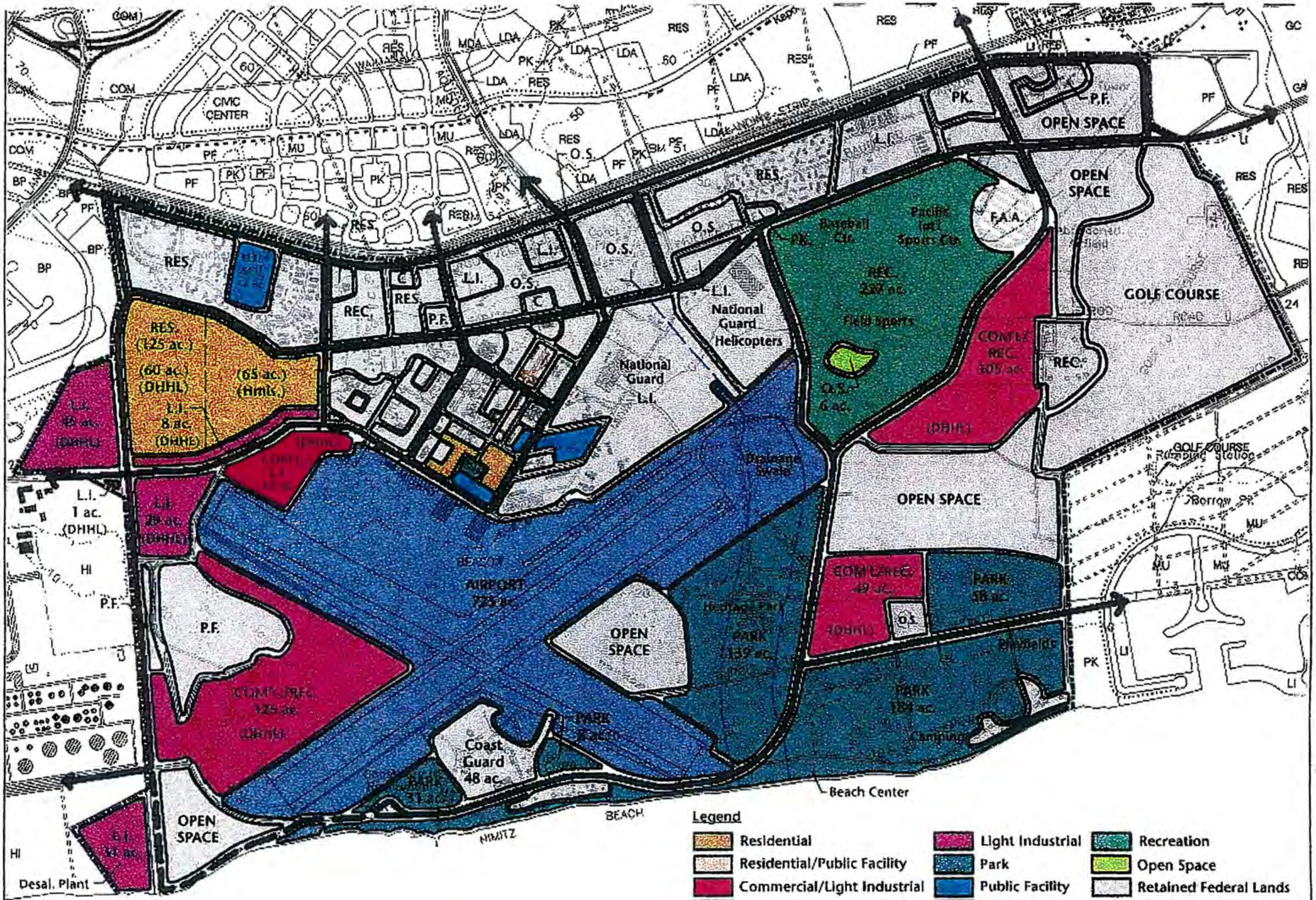
This map was produced by the Office of State Planning (OSP) for planning purposes. It should not be used for boundary interpretations or other spatial analysis beyond the limitations of the data. Information regarding compilation dates and accuracy of the data presented can be obtained from

Scale 1:24400

0 1000 2000 feet

Source: U.S. Navy

FIGURE 9-



March 1997

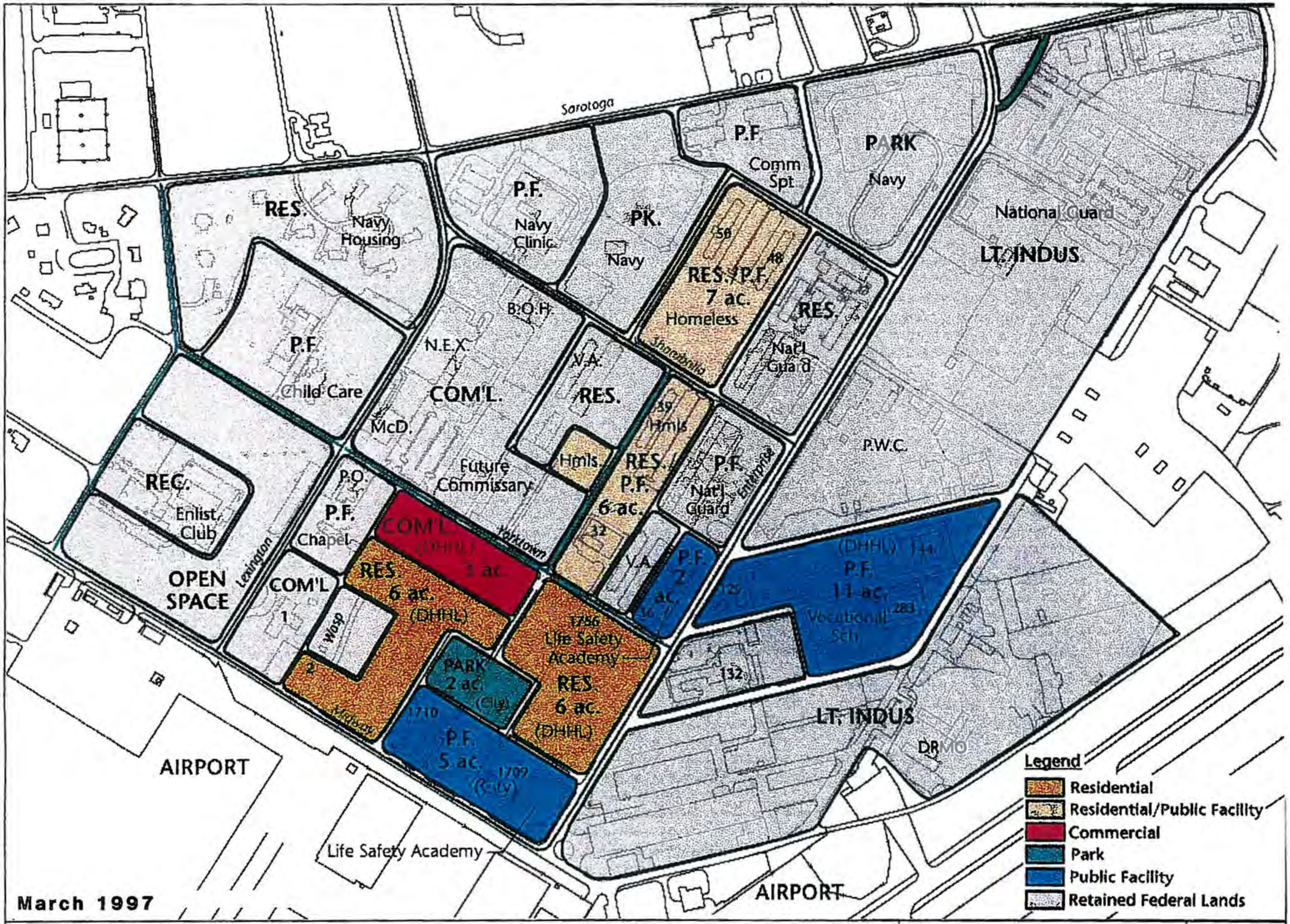
Basewide Redevelopment Plan

NAS Barbers Point Community Redevelopment Plan

Feet

0 1000 2000 3000

Figure 9–2



Downtown Area Redevelopment Plan

NAS Barbers Point Community Redevelopment Plan

Figure 9-3

Mitigation

In order to comply with FAA design criteria, the portion of this area that is within the runway object free area, at a minimum, should be conveyed to DOTA to be part of the airport property according to FAA. The effect that the USF&WS' use of the parcel to the southeast of Runway 4R-22L would have on the Airport can be mitigated by a combination of a conveyance of the land closest to the airfield and creation of an avigation easement over the remaining land out to 750 feet from the runway centerline. In addition, it is important that ongoing airport maintenance in this area can continue in accordance with current practices.

Impact

Another parcel proposed for transfer to the USF&WS, shown as Open Space on Figures 9-1 and 9-2, is within the runway safety area, runway object free area and runway protection zone to the southwest of Runway 4R for an 8,000-foot runway. This existing land use can continue as it is already within the current Navy clear zone.

Mitigation

In order to comply with FAA design criteria, the portion within the runway object free area should be conveyed to DOTA to be part of the airport property. The effect that the USF&WS' use of the parcel to the southwest of Runway 4R would have on airport operations can be mitigated by creation of an avigation easement over the outer portion of the USF&WS property, that is within the runway protection zone, in favor of the DOTA.

Impact

The USF&WS has requested use of two other areas to the east of the airfield for waterbird habitat enhancement.

Mitigation

This use is compatible with airport activities so long as the USF&WS and DOTA coordinate to ensure that any habitat enhancement does not create a hazard for aircraft operations.

9.3.3.4 Department of Hawaiian Home Lands Light Industrial Uses

Impact

The DHHL is proposing Light Industrial use in a 29-acre area under the approach to Runway 11, as shown on Figure 9-2. A portion of this acreage is within the runway protection zone for Runway 11.

Mitigation

In order to keep the runway protection zone free of all objects, avigation easements should be created that restrict the use of land within the runway protection zone before it is transferred to DHHL.

9.3.3.5 City and County of Honolulu Light Industrial Uses

Impact

Light Industrial use is also proposed in the Runway 4R runway protection zone west of the drainage channel, as shown on Figure 9-2. Ideally, the runway protection zone should be clear of all objects. Some limited uses are permitted provided they do not interfere with navigational aids and do not include places of public assembly.

Mitigation

In order to keep the runway protection zone free of all objects, avigation easements should be created that restrict the use of land within the runway protection zone before it is transferred to the City and County of Honolulu.

9.3.3.6 Parks and Recreation Uses

Major uses being considered for part of the Base, and adjacent to the Airport, are Parks and Recreation Uses. In general, park and recreation activities are compatible land uses in an airport environs.

Impact

It will be important to insure that the detailed plans for the proposed Park and Recreational areas northeast of Runways 4-22 be coordinated to ensure that uses that could create a risk to either aircraft and airport operations or to users of the proposed sports facilities be located so as to result in a compatible relationship between an airport and parks and recreational uses.

Mitigation

In operational terms, this means avoiding concentrations of people and/or sources of light and glare or penetrations of the FAR Part 77 imaginary surfaces, along the aircraft flight tracks. It also requires the DOTA obtaining avigation easements over any portion of the runway protection zones not included within the airport property that are used for a park, recreation or any other land use.

9.3.3.7 Coral Sea Road

Impact

With one major exception, both existing land uses and those proposed in the Redevelopment Commission *Community Redevelopment Plan* are compatible with the FAA airport design and FAR Part 77 criteria. The major exception is the proposed public access Coral Sea Road around the southwest end of Runway 4R (as discussed in Chapters 4 and 5). The proposed upgrading of Coral Sea Road around the southwest end of Runway 4R is not compatible with the Redevelopment Commission's intended use of the airfield facilities, nor with FAR Part 77 and FAA design criteria, as noted earlier in this report.

Mitigation

The DOTA desires to permit public access to the beach and ocean to the maximum extent possible south of the Airport. Coral Sea Road provides access for shoreline recreational activities from the east to just west of the USCG facility. In addition, space is provided for public access to the shoreline along the West Perimeter Road east of the Drainage Ditch and outside of the Airport property. To comply with FAR Part 77 and FAA design criteria, Coral Sea Road should remain closed to public access.

9.3.4 Hazardous Materials

The operation of the Kalaeloa Airport would include the use and storage of fuel, lubricants and solvent substances. The potential would exist for spillage resulting from an accident or mishandling of these materials. However, DOTA has established comprehensive hazardous/toxic materials management policies for safe handling and use of these materials in effect at other State operated airports and they would apply these policies to the Kalaeloa Airport. The DOTA will decide which of the fuel storage facilities, that are located adjacent to Taxiway P on the airfield and away from other proposed redevelopment uses, will be requested to be conveyed.

9.4 TRAFFIC IMPACTS

9.4.1 Access Routes

The aviation facilities are in essentially the same location in all alternatives described in Appendix A, differing only in their size and internal configuration. All would be accessed by the same routes on the existing roadway system. These routes are described in Chapter 2.

9.4.2 Trip Generation

Wilbur Smith Associates' (WSA) *Traffic Impact Study: Barbers Point Naval Air Station Redevelopment Master Plan* (October 1997) contains estimates of the traffic that would be generated by the future uses at NAS Barbers Point. These estimates, as presented in Table 9-5, indicate that the proposed aviation facilities, including the USCG facilities on the south side of the airfield, would generate approximately 3,260 vehicle trips per day. WSA derived this estimate using standard trip-generation factors.

9.4.3 Impact of Airport-Related Traffic

Airport-related traffic would amount to approximately 3,260 vehicle-trips per day. This is approximately 6.5 percent of the total number of daily vehicle-trips estimated to be generated by the proposed uses on the redeveloped property. It is only 16 percent of the 19,900 daily vehicle-trips estimated from the West Reuse Area in which the aviation facilities would be located.

Estimates contained in the WSA report indicate that traffic from the proposed aviation activities would be an even smaller percentage of the peak hour traffic. In and of itself, then, the proposed airport facilities would not contribute significantly to overall traffic in the area. In fact, aviation-related traffic would be significantly lower than it has been for at least the past several decades.

While airport-related traffic will decline as a result of the Base's change from military to civilian use, full buildout of the other facilities included in the Redevelopment Commission's approved plan will markedly increase the number of vehicle-trips associated with other uses of the base property. The WSA *Traffic Impact Study* for the Redevelopment Commission's Community Redevelopment Plan identified several improvements needed to facilitate traffic flow with full buildout of the proposed facilities. It concluded that development of these new roadway facilities would provide an adequate level of service.

Table 9-5

VEHICLE TRIPS PER DAY FROM PROPOSED USES

		AM Peak-Hour Trips			*PM Peak-Hour Trips*		
AREA/LAND USE	*Daily*	*In*	*Out*	*Total*	*In*	*Out*	*Total*
RETAINED AREAS TOTAL	**12,075**	**583**	**588**	**1,173**	**592**	**717**	**1,309**
DOWNTOWN REUSE AREAS TOTAL	**4,093**	**119**	**212**	**331**	**233**	**165**	**408**
EAST REUSE AREAS TOTAL	**14,298**	**708**	**119**	**828**	**485**	**458**	**955**
Parks, Beaches, Playgrounds	5,381	115	48	163	163	174	337
Parks, Open Space	695	19	8	28	29	29	58
Marine Park	3,820	125	31	157	94	141	235
International Sports Center	2,445	407	13	420	152	49	201
Baseball Center	1,438	31	13	44	44	47	91
Festival Center	420	12	5	17	16	18	34
WEST REUSE AREAS TOTAL	**19,901**	**1,492**	**856**	**2,347**	**884**	**1,567**	**2,451**
Aviation	3,260	201	157	357	255	257	532
Light Industrial	8,039	967	199	1,186	135	992	1,127
Auto Raceway	1,120	66	5	71	40	6	106
Single-Family Housing	3,992	79	230	300	86	106	422
Homeless Housing	2,627	37	171	207	175	81	256
Elementary School	142	95	237	3	5	8	
GRAND TOTAL	50,367	2,905	1,774	4,679	2,214	2,900	5,120

Source: Wilbur Smith Associates, *Traffic Impact Study: Barbers Point Naval Air Station Redevelopment Master Plan*, October 1997.

The proposed improvements include such things as additional turning lanes, re-striping, and the establishment of seven additional roadway linkages to off-base areas. The proposed new roadway linkages include:

- Extension of Tripoli Road to connect to the future Ewa Marina (recently renamed "Ocean Pointe") project to the east.
- Extension of the planned "North-South Road", connecting with Coral Sea Road.
- Extension of Lexington Avenue to connect to the City of Kapolei street network.
- Extension of Hornet Avenue to connect to the City of Kapolei street network.
- Extension of Franklin D. Roosevelt to connect to Kalaeloa Boulevard in the James Campbell Industrial Park.
- Construction of a new road connecting Midway Avenue with Malakole Road in the James Campbell Industrial Park.
- Construction of a new road connecting the West Perimeter Road to Olai Street in the James Campbell Industrial Park.

In addition to these new off-base roadways, the plan calls for several on-base roadway improvements to improve the circulation pattern. These include:

- Extensions of Saratoga Street to connect to Geiger Road to the east and to the West Perimeter Road to the west.
- Extension and upgrade of Midway Road to connect to Malakole Road.
- Development of a West Perimeter Road connecting Franklin D. Roosevelt Avenue to Coral Sea Road.

The analysis in the WSA study assumed that a new public roadway along Coral Sea Road would be provided around the southwestern end of Runway 4R-22L as shown on the Redevelopment Commission approved plan. Subsequent information from the FAA would prohibit this roadway from being open to general public use because it penetrates the FAR Part 77 imaginary surfaces and is within critical FAA design criteria considerations, e.g., runway safety area and runway object free area. The elimination of this link would require vehicles to travel around the north side of the airfield instead.

The elimination of the West Perimeter Road - Coral Sea Road connection would require this traffic to either travel through the Base via the roadways north of the Airport (Geiger Road extension, Saratoga Avenue, Midway Avenue) or use the Kapolei Parkway to travel to the north around the Base. These routes north of the Airport would have sufficient capacity to accommodate the addition of the 215 to 275 vehicles assigned in each peak hour to the shoreline Coral Sea Road route. Any diversion of these vehicles to the Kapolei Parkway route would result in a small incremental worsening of the conditions along that route.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:

AIR-EP
97.858

April 21, 1997

AIRPORTS DIV.
AIR ____
AIR-A ____
AIR-E ____
AIR-L ____

Mr. Howard S. Yoshioka
Manager, Airports District Office
Federal Aviation Administration
Western-Pacific Region
P. O. Box 50244
Honolulu, Hawaii 96850-0001

Dear Mr. Yoshioka:

Subject: Kalaeloa Airport Layout Plan - Request for Waivers or Modifications of FAA Airport Design Standards to Meet Local Conditions

The Naval Air Station Barbers Point Redevelopment Commission has just completed the preparation of the March 1997 Community Redevelopment Plan for Governor Cayetano to forward to the Navy. The Plan includes the Kalaeloa Airport as a public benefit conveyance as a public airport to the State of Hawaii, Department of Transportation (DOT).

The Redevelopment Commission recommended approximately 721 acres for use as a general aviation reliever airport for Honolulu International Airport. The Redevelopment Commission intended the proposed airport to include one 8,000-foot Runway 4R-22L in order to accommodate the requirements of the commercial airlines and military for an alternate landing site designation, one 4,500-foot Runway 4L-22R for general aviation operations, and one 6,000-foot crosswind Runway 11-29 for takeoffs over the ocean on Runway 11 and landings over the ocean on Runway 29.

The Airport will also serve the aviation needs of the Hawaii National Guard, from their 150-acre parcel abutting the Airport, and the U.S. Coast Guard, from their 48-acre parcel abutting the Airport. The Airport will also be used for the aviation operations of the City and County of Honolulu Fire and Police Departments and the University of Hawaii's proposed aviation training school from their 4-acre parcel abutting the Airport.

The airport plan, as included in the Community Redevelopment Plan, will require FAA approval of waivers or modifications to design standards in order to accommodate the Redevelopment Commission's intended aviation uses of the facility.

The enclosed Airport Layout Plan does not include one element of the Community Redevelopment Plan that would adversely affect the Redevelopment Commission's intended uses of the Airport. This is the upgrading of Coral Sea Road, from a 2-lane limited use road to a 4-lane public road within an 80-foot right-of-way, around the southwest end of Runway 4R. This would result in reducing the length of Runway 4R-22L to less than 7,000 feet and not being able to accommodate the Redevelopment Commission's intended aviation uses as a commercial airline and military alternate airport and for U.S. Coast Guard operations and Hawaii National Guard civil defense and disaster relief requirements. Consequently, we are also requesting your review and written comments on the implications of providing a 4-lane public access Coral Sea Road around the southwest end of Runway 4R on the proposed airport layout in addition to your comments on the waivers and modifications.

We are enclosing eight (8) copies of the Airport Layout Plan for the Kalaeloa Airport for your review. We would appreciate your notifying us in writing whether or not FAA will approve the following requested modifications of FAA airport design standards. The modifications are being requested to maximize the usefulness of the Airport, within the limited space that the Redevelopment Commission has allocated, and to serve all of the Redevelopment Commission's intended uses of the Airport as described above.

1. MODIFICATIONS RELATED TO RUNWAY 4L-22L

   a. Request FAA documentation of the required Airport property line east of the centerline of Runway 4R-22L.

      A parcel that will be transferred to the U.S. Fish & Wildlife Service (USF&WS) abuts the edge of the Runway 4R-22L pavement as shown on the Community Redevelopment Plan and the Airport Layout Plan. Recent discussions between DOT and USF&WS indicate that the USF&WS may be willing to convey the portion within 750 feet of the runway centerline to DOT, as long as they are granted a form of management agreement into this area within the 750-foot line. This will be based on FAA documenting the need for DOT to own this land in fee title instead of an avigation agreement as described in our April 3, 1997 letter to you. Please advise as soon as possible on the land FAA requires the DOT to own in fee title so that we can finalize an agreement with USF&WS.

b. Request FAA documentation of the required Airport property line southwest of the end of Runway 4R-22L for land within the runway safety area, runway object free area, and runway protection zone. Request FAA approve an avigation easement over the rest of the runway protection zone within land awarded to USF&WS.

A parcel that will be transferred to the USF&WS includes a significant portion of the Runway 4R runway protection zone as shown on the Airport Layout Plan. This U.S. Fish & Wildlife Service parcel extends to within 300 feet of the physical end of an 8,000-foot Runway 4R and includes parts of the runway safety area and runway object free area.

Based on recent discussions between DOT and the USF&WS, the USF&WS may be willing to convey that portion of the runway protection zone within the 1,000-foot by 500-foot runway safety area and 1,000-foot by 800-foot runway object free area beyond the end of Runway 4R, as shown on the Airport Layout Plan, as long as they are granted a form of management agreement into this area. This will be based on FAA documenting the need for DOT to own this land in fee title instead of an avigation easement. Please advise us as soon as possible on the land FAA requires the DOT to own in fee title so we can finalize an agreement with USF&WS.

c. Requesting FAA approve a waiver of the standard 500-foot wide runway safety area extending 1,000 feet southwest of Runway 4R.

The Airlines Committee of Hawaii and the military have indicated that they require at least 8,000 feet for an alternate airport designation as the Redevelopment Commission intended in their Community Redevelopment Plan. The enclosed Airport Layout Plan assumes Coral Sea Road is closed as a public access road around the southwest end of the Airport at a point outside the Airport property and east of the end of Runway 4R, to provide an 8,000-foot runway.

A small outer portion of the recommended 1,000-foot runway safety area extending beyond an 8,000-foot Runway 4R extends to the shoreline of the Pacific Ocean. This, up to 200-foot long portion of the runway safety area, varies in width from 0 to 50 feet to stay clear of the beach and shoreline. We request FAA approve this modification from the standard runway safety area dimensions.

d. Request FAA approve a waiver of the standard 800-foot wide runway object free area extending 1,000 feet southwest of Runway 4R.

The outer portion of the recommended 1,000-foot runway object free area extending beyond an 8,000-foot Runway 4R extends across the shoreline and over the Pacific Ocean. This, up to 600-foot portion of the runway object free area, varies in width from 0 to 200 feet to stay clear of the beach and shoreline. The perimeter road and Airport property fencing penetrate the runway object free area to avoid the beach and the shoreline. The enclosed Airport Layout Plan assumes Coral Sea Road is closed as a public access road around the southwest end of the Airport, at a point outside the Airport property and east of the end of Runway 4R, to provide an 8,000-foot runway. We request FAA approve this modification from the standard runway object free area dimensions.

e. Request FAA response on the implications of a public access Coral Sea Road southwest of Runway 4R.

The Redevelopment Commission Community Redevelopment Plan includes the widening to an 80-foot right-of-way and upgrading to a 4-lane public road of Coral Sea Road around the southwest end of Runway 4R. This includes the section of road west of the U.S. Coast Guard facility, around the end of Runway 4R, to Pt. Cruz Road along the existing road alignment as shown on the Airport Layout Plan. This road extends through the primary surface, runway safety area, runway object free area, transition surface and approach surface of the 8,000-foot Runway 4R-22L shown on the Airport Layout Plan.

In addition to your December 13, 1996 letter noting criteria that cannot be waived, we would appreciate your response to the following so that the significance of including a 4-lane public access Coral Sea Road in this area can be resolved with other agencies.

1. Can Coral Sea Road penetrate the FAR Part 77 primary surface.
2. Can Coral Sea Road penetrate the runway safety area.
3. Can Coral Sea Road penetrate the runway object free area.

4. Can Coral Sea Road penetrate the FAR Part 77 approach surface.
5. Can Coral Sea Road penetrate the FAR Part 77 transition surface.

f. Request FAA approve an avigation easement over that portion of the Runway 4R runway protection zone west of the drainage ditch.

The Redevelopment Commission awarded the land west of the existing 30-foot wide north-south drainage ditch that crosses the runway protection zone to the City and County of Honolulu Board of Water Supply for the possible construction of a desalination plant. This includes a small outer portion of just over 2 acres within the Runway 4R runway protection zone as shown on the Airport Layout Plan. The avigation easement would include the right to overfly, right of access, compliance with FAR Part 77 criteria and FAA runway protection zone land use criteria. We request FAA approve an avigation easement rather than ownership in fee title over this portion of the runway protection zone.

g. Request FAA approve an avigation easement over that portion of the Runway 22L runway protection zone northeast of Coral Sea Road.

A small outer portion of the runway protection zone of about 6 acres, extending up to 400 feet northeast of Coral Sea Road, is over land proposed for active sports and recreational uses by the City and County of Honolulu, Department of Parks and Recreation. The avigation easement would include the right to overfly, right of access, compliance with FAR Part 77 criteria and FAA runway protection zone land use criteria. We request FAA approve an avigation easement rather than ownership in fee title over this portion of the runway protection zone.

h. Request FAA approve line-of-sight easements or lease agreements across non-Airport property.

Based on the Community Redevelopment Plan, DOT will not own the property required to meet FAA line-of-sight criteria between Runways 4R and 11 (across State Department of Hawaiian Home Lands parcel); Runways 22L and 29 (across U.S. Fish & Wildlife Service parcel) and Runways 4R and 29 (across the U.S. Coast Guard parcel). The avigation easement or lease agreement would protect a clear line-of-sight for aircraft on each runway in accordance with FAA AC 150/5300-13, Airport Design, criteria. We request FAA approve an avigation easement rather than ownership in fee title.

2. MODIFICATIONS RELATED TO RUNWAY 11-29

a. Request FAA approve a modification of the standard 800-foot wide runway object free area extending 1,000 feet southeast of Runway 29.

Up to 200 feet of the outer southeast corner of the 1,000-foot long by 800-foot wide runway object free area, varying in width from 0 to 100 feet, extends outside the Airport property and across Coral Sea Road southeast of Runway 29. The perimeter road and Airport property fencing penetrate the runway object free area to avoid Coral Sea Road. We request FAA approve this modification from the standard runway object free area dimensions.

b. Request FAA approve an avigation easement for a portion of the Runway 11 runway protection zone.

The DOT will obtain the inner portion of the Runway 11 runway protection zone as shown on the Airport Layout Plan. However, the outer 700 to 900 feet of the 1,700-foot long runway protection zone, northwest of Midway Road, will be transferred to the State Department of Hawaiian Home Lands and used for light industrial uses. The avigation easement would include the right to overfly, right of access, compliance with FAR part 77 criteria and FAA runway protection zone land use criteria. We request FAA approve an avigation easement rather than ownership in fee title over this portion of the runway protection zone.

c. Request FAA approve an avigation easement for a portion of the Runway 29 runway protection zone.

The DOT will obtain the inner portion of the 1,700-foot runway protection zone northwest of Coral Sea Road as shown on the Airport Layout Plan. The City and County of Honolulu, Department of Parks and Recreation will obtain the outer portion of the runway protection zone of about 3 acres along the shoreline, southeast of Coral Sea Road, for ocean-related shoreline park and other passive recreational activities. The avigation easement would include the right to overfly, right of access, compliance with FAR Part 77 criteria and FAA runway protection zone land use criteria. We request FAA approve an avigation easement rather than ownership in fee title over this portion of the runway protection zone.

3. MODIFICATIONS RELATED TO RUNWAY 4L-22R

a. Request FAA approve an avigation easement for portion of the Runway 4L runway protection zone.

A small portion of about 2 acres at the southwest corner of the runway protection zone is over land awarded to the State Department of Hawaiian Home Lands for a motorsports racewaycomplex. The avigation easement would include the right to overfly, right of access, compliance with FAR Part 77 criteria and FAA runway protection zone land use criteria. We request FAA approve an avigation easement rather than ownership in fee title over this portion of the runway protection zone.

AIR-EP
97.858

SUMMARY

We believe it would be helpful to meet after you have completed a preliminary review to discuss your preliminary findings. If you are unable to approve any of these modifications, please indicate what you would approve for each item listed above. Please contact Mr. Stephen Takashima of my Planning staff at (808) 838-8810 if you have any questions or require additional information.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Director of Transportation

Enclosures: Eight (8) copies of Airport Layout Plan

c: DBEDT
SDOD
Senator's Inouye's office
Airlines Committee of Hawaii (J. Thatcher)
U.S. Coast Guard
DHHL (K. Watson)
U.S. Navy (R. Au)

U.S. Department of Transportation
Federal Aviation Administration

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September 19, 1997

Mr. Jerry M. Matsuda
Airports Administrator
DOT, State of Hawaii
400 Rodgers Blvd., Suite 700
Honolulu, HI 96819-1880

Dear Mr. Matsuda:

Kalaeloa Airport
Proposed Waivers and Approvals of the Draft Airport Layout Plan (ALP)

We have evaluated your letter of April 21, 1997 (AIR-EP 97.858), addressing the proposed ALP waivers and easements for Kalaeloa Airport. The ALP should be consistent with and reflect the Federal Aviation Administration (FAA) dimensional standards required for a General Aviation Reliever Airport, capable of servicing commercial and military aircraft. The following comments and recommendations on the above mentioned subject are submitted for your consideration:

1.a. Request FAA documentation of the required airport property line east of the centerline of Runway 4R/22L.

COMMENT: The State of Hawaii, Department of Transportation (HDOT) must obtain, in fee simple, the land within the Runway Safety Area (RSA), and Runway Object Free Area (ROFA) to satisfy safety standards for the precision instrument Runway 4R/22L. Any proposed management agreements between the HDOT and U.S. Fish and Wildlife Service (USFWS) for the land between the ROFA and 750' Building Restriction Line (BRL), must be evaluated by the FAA for consistency with FAR Part 77 primary and transition surface standards, as well as conform to criteria contained in Advisory Circular 150/5200-32 "Airport Wildlife Hazard Management". The final management agreement can be incorporated in the instrument conveying title from the Navy to the USFWS.

1.b. Request FAA documentation of the required airport property line southwest of the end of Runway 4R/22L for land within the runway safety area, runway object free area, and runway protection zone. Request FAA approve an avigation easement over the rest of the runway protection zone within land awarded to USFWS.

COMMENT: The HDOT must acquire the RSA portion of the Runway Protection Zone (RPZ) in fee simple to obtain safety standards for the precision instrument Runway 4R/22L. Any proposed management agreements should include an avigation easement addressing the remainder of the RPZ. They must be evaluated by the FAA for consistency with FAA RPZ criteria, FAR Part 77 standards, avigation easement provisions, Wildlife Management (referenced above) and Approach Lighting System requirements. The final management agreement can be incorporated in the instrument conveying title from the Navy to the USFWS.

1.c. Requesting FAA approve a waiver of the standard 500-foot wide runway safety area extending 1,000 feet southwest of Runway 4R.

COMMENT: The FAA does not concur with waiving the 1,000' x 500' RSA standards. The waiver request is based on the terrain deficiencies, which should be corrected by fill and grading construction in this area.

1.d. Request FAA approve a waiver of the standard 800-foot wide runway object free area extending 1,000 feet southwest of Runway 4R.

COMMENT: The FAA does not object to this waiver that involves the last 800' of ROFA. The area is located at the shoreline that varies in width from 0 to 200' on the southwest boundary of the RPZ. The waiver is subject to HDOT preventing the erection of structures within the subject area that violate the ROFA criteria. The waiver of this standard should be noted on the ALP.

1.e. Request FAA response on the implication of a public access Coral Sea Road southwest of Runway 4R.

COMMENT: FAA objects to the use of Coral Sea Road as a public access route through the southwest RPZ, RSA, and ROFA near the threshold of Runway 4R. The road would also violate criteria associated with the RSA, ROFA, and FAR Part 77 approach surface requirements. A roadway through this area is also a major security concern.

1.e.1. Can Coral Sea Road penetrate the FAR Part 77 primary surface?

COMMENT: No.

1.e.2. Can Coral Sea Road penetrate the runway safety area?

COMMENT: No.

1.e.3. Can Coral Sea Road penetrate the runway object free area?

COMMENT: No. The ROFA must be controlled to provide clearance for taxiing aircraft.

1.e.4. Can Coral Sea Road penetrate the FAR Part 77 approach surface?

COMMENT: No. The road violates the 50:1 approach surface required for the RPZ of the precision instrument Runway 4R. It also derogates the approach lighting system area.

1.e.5. Can Coral Sea Road penetrate the FAR Part 77 transition surface?

COMMENT: An airspace review would be required to determine the impact on navigable airspace and the instrument approach criteria within the transition surface area.

1.f. **Request FAA approve an avigation easement over that portion of the Runway 4R runway protection zone west of the drainage ditch.**

COMMENT: Obtaining an avigation easement over the 2-acre portion of the RPZ is acceptable to the FAA, subject to the inclusion of land use provisions that preclude development of facilities that attract wildlife. The proposed easement must be evaluated by the FAA for consistency with approach surface and land use criteria. The final easement for this RPZ should be noted on the ALP.

1.g. **Request FAA approve an avigation easement over that portion of the Runway 22L runway protection zone northeast of Coral Sea Road.**

COMMENT: The FAA concurs with the proposed avigation easement over the outer limits of the northeast RPZ, near the Runway 22L threshold. The easement must grant the HDOT adequate control that restricts the RPZ land use to activities and purpose compatible with normal airport operations, including the landing and takeoff of aircraft. The proposed easement must be evaluated by the FAA for consistency with RPZ standards and noted on the ALP.

1.h. **Request FAA approve line-of-sight easements or lease agreements across non-airport property.**

COMMENT: The FAA would accept a line-of-sight easement to ensure the visual criteria protecting the crossing runways. The easement must convey adequate control that restricts the land use adjacent to or in the immediate vicinity of the runways to activities and purpose compatible with RSA, ROFA, and FAR Part 77 primary surface requirements. The proposed easement must be evaluated by the FAA for consistency with applicable standards and noted on the ALP.

2.a. **Request FAA approve a modification of the standard 800-foot wide runway object free area extending 1,000 feet southeast of Runway 29.**

COMMENT: The FAA does not object to the proposed modification subject to the HDOT prohibiting the erection of structures or objects that violate ROFA standards. The standards modification must be noted on the ALP.

2.b. Request FAA approve an avigation easement for a portion of the Runway 11 runway protection zone.

COMMENT: The FAA concurs with the proposed avigation easement over the northwesterly portion of the RPZ, northwest of Midway Road. The easement must provide the HDOT adequate land use control within this area to activities and purpose compatible with normal airport operations, including the landing and takeoff of aircraft. The proposed easement must be evaluated by the FAA for consistency with RPZ standards and noted on the ALP.

2.c. Request FAA approve an avigation easement for a portion of the Runway 29 runway protection zone.

COMMENT: The FAA concurs with the proposed avigation easement over the strip of recreational land use adjacent to Coral Sea Road. The easement must grant the HDOT adequate control that restricts land use within the RPZ to activities and purpose compatible with normal airport operations, including the landing and takeoff of aircraft. The proposed easement must be evaluated by the FAA for consistency with RPZ standards and noted on the ALP.

3.a. Request FAA approve an avigation easement for portion of the Runway 4L runway protection zone.

COMMENT: The FAA concurs that this proposed easement be incorporated into the line-or-sight easement discussed in item 1.h. The easement must grant the HDOT adequate RPZ land use control that limits activities and purposes to those compatible with normal airport operations, including the landing and takeoff of aircraft. The proposed easement must be evaluated by the FAA for consistency with RPZ standards and noted on the ALP.

Please call if you have any questions.

Sincerely,

Howard S. Yoshioka

Howard S. Yoshioka
Manager, Airports District Office

cc:
Rear Admiral William G. Sutton, USN
Fred Minato, PACDIV, NAVFAC ENGCOM
Roger Au, USN

APPENDIX A

AIRPORT DEVELOPMENT ALTERNATIVES

Appendix A

AIRPORT DEVELOPMENT ALTERNATIVES

This appendix describes the airport development alternatives that were prepared for the future aviation uses of NAS Barbers Point. Initially, several alternatives were prepared with airfield configurations ranging from a single 3,700 foot runway alternative up to three 7,000 foot runways.

The alternative concepts were reviewed with the Redevelopment Commission Airport Task Force and the public on September 1, 1994. On September 1, 1994 the Aviation Task Force selected Alternative 6 for the recommended long-range Airport Master Plan.

A summary of the principal features of each alternative is presented on the following pages. The airport development concepts are illustrated on Figures A-1 through A-10. A comparison of the airport activities that would be accommodated by each alternative is presented in Table A-1. A comparison of the capital and operations and maintenance costs and costs savings and benefits of each alternative is presented in Table A-2.

The Optimum Airport Master Plan (Alternative 15), as described in this appendix, is based on Alternative 6 as modified in early 1996. In the summer and fall of 1995 the State of Hawaii Department of Transportation requested that a Minimum Airport Master Plan (Alternative 14) reflecting a smaller airport envelope be prepared and this is also described in this appendix. The Minimum Airport Master Plan is based on the "Airport Envelope" that was presented to the Redevelopment Commission in December 1995.

The Optimum and Minimum Airport Master Plans were then incorporated into the Redevelopment Commission's alternative plans for redevelopment of the NAS Barbers Point as a whole. These are described in the Redevelopment Commission's March 1997 Community Redevelopment Plan. The Redevelopment Commission's Alternative A (Optimum) Concept Plan provided the maximum flexibility for airport operations by incorporating all existing runways and related facilities for continued aviation activity on approximately 900 acres. The Redevelopment Commission's Alternative B (Minimum) Concept Plan provided minimum space requirements for airport operations on approximately 645 acres to accommodate aviation activity goals for NAS Barbers Point.

A.1 ALTERNATIVE 1

AIRPORT FACILITIES

Airport acreage:

• State DOT (includes airfield) -	280 acres
• HNG -	160
• USCG -	0

Runway 4L-22R = 3,700 feet

- Accommodates single and light twin-engine aircraft but not USCG and HNG C-130s.

Airport capacity: 220,000 annual operations

All weather capability: No

Crosswind capability: No

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 66,000
FAA	597,000
Total	$663,000

Estimated initial annual maintenance and operating costs:

- Sources of funds

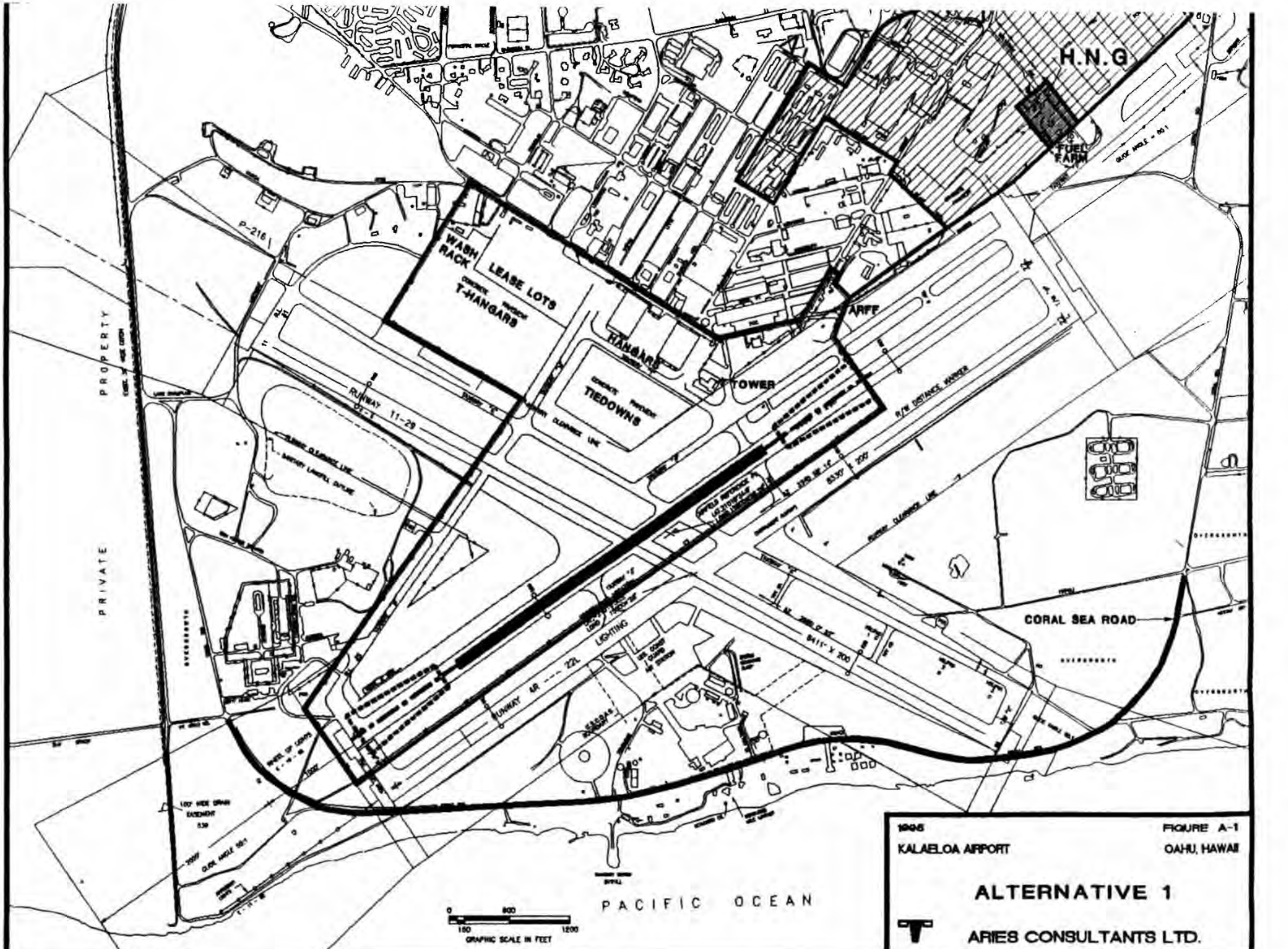
Airport User Costs	$292,000
Airport User Fees	153,000
Total	$445,000

• USCG Relocation	13,500,000

Savings and benefits because of an airport at Barbers Point:

Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	-0-
Ford Island Closure	400,000

• Total Savings (Costs)	$(8,208,000)



1995
KALAELOA AIRPORT

FIGURE A-1
OAHU, HAWAII

ALTERNATIVE 1

ARIES CONSULTANTS LTD.

A.2 ALTERNATIVE 2

AIRPORT FACILITIES

Airport acreage:

• State DOT (includes airfield) -	670 acres
• HNG -	160
• USCG -	48

Runway 4R-22L = 7,000 feet

- Accommodates single and light twin-engine aircraft and USCG and HNG C-130s.

Airport capacity: 230,000 annual operations

All weather capability: Yes

Crosswind capability: No

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 58,000
FAA	524,000
Total	$582,000

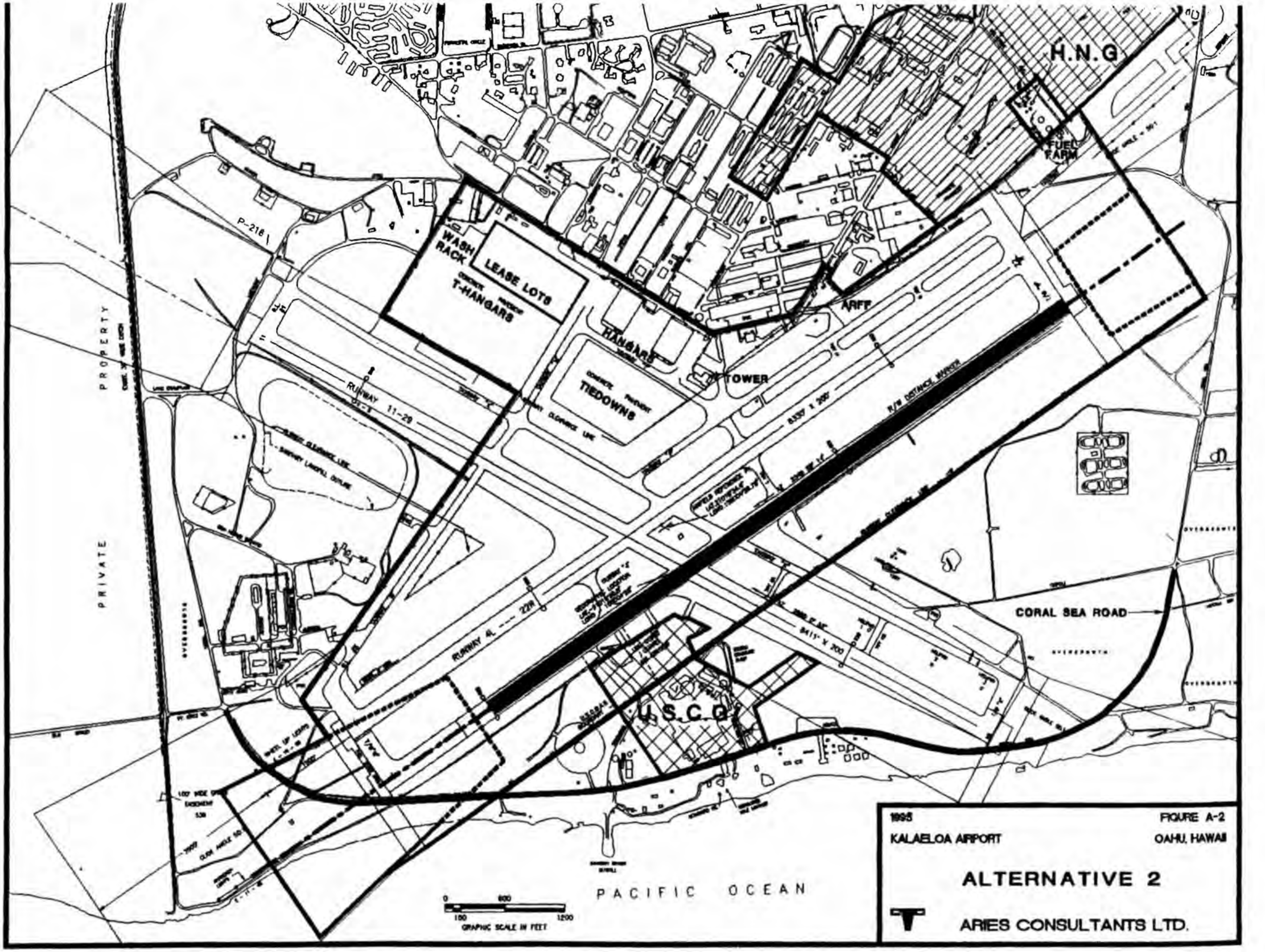
Estimated initial annual maintenance and operating costs:

- Sources of funds

Airport User Costs	$714,000
Airport User Fees	153,000
Total	$867,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000
• Total Savings (Costs)	$20,451,000



1995
KALAELOA AIRPORT
FIGURE A-2
OAHU, HAWAII

ALTERNATIVE 2

ARIES CONSULTANTS LTD.

A.3 ALTERNATIVE 3

AIRPORT FACILITIES

Airport acreage:

- State DOT (includes airfield) - 670 acres
- HNG - 160
- USCG - 48

Runway 4R-22L = 7,000 feet
Runway 4L-22R = 3,700 feet

- Accommodates single and light twin-engine aircraft and USCG and HANG C-130s.

Airport capacity: 355,000 annual operations

All weather capability: Yes

Crosswind capability: No

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 73,000
FAA	659,000
Total	$732,000

Estimated initial annual maintenance and operating costs:

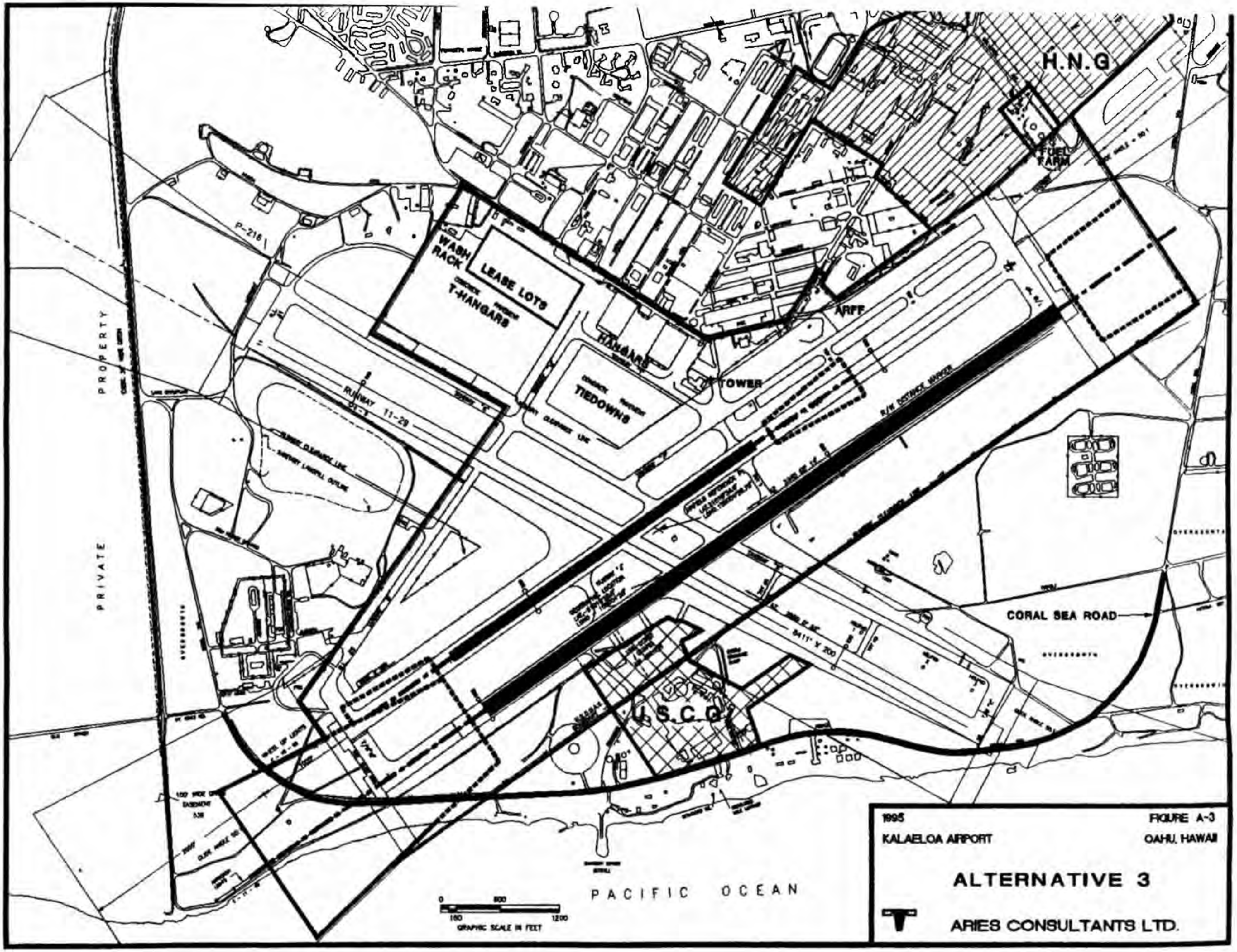
- Sources of funds

Airport User Costs	$809,000
Airport User Fees	153,000
Total	$962,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000

- Total Savings (Costs) $20,206,000



1995 FIGURE A-3

KALAELOA AIRPORT OAHU, HAWAII

ALTERNATIVE 3

ARIES CONSULTANTS LTD.

A.4 ALTERNATIVE 4

AIRPORT FACILITIES

Airport acreage:

• State DOT (includes airfield) -	670 acres
• HNG -	160
• USCG -	48

Runway 4R-22L = 7,000 feet
Runway 4L-22R = 7,000 feet

- Accommodates single and light twin-engine aircraft and USCG and HNG C-130s.

Airport capacity: 355,000 annual operations

All weather capability: Yes

Crosswind capability: No

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 58,000
FAA	524,000
Total	$582,000

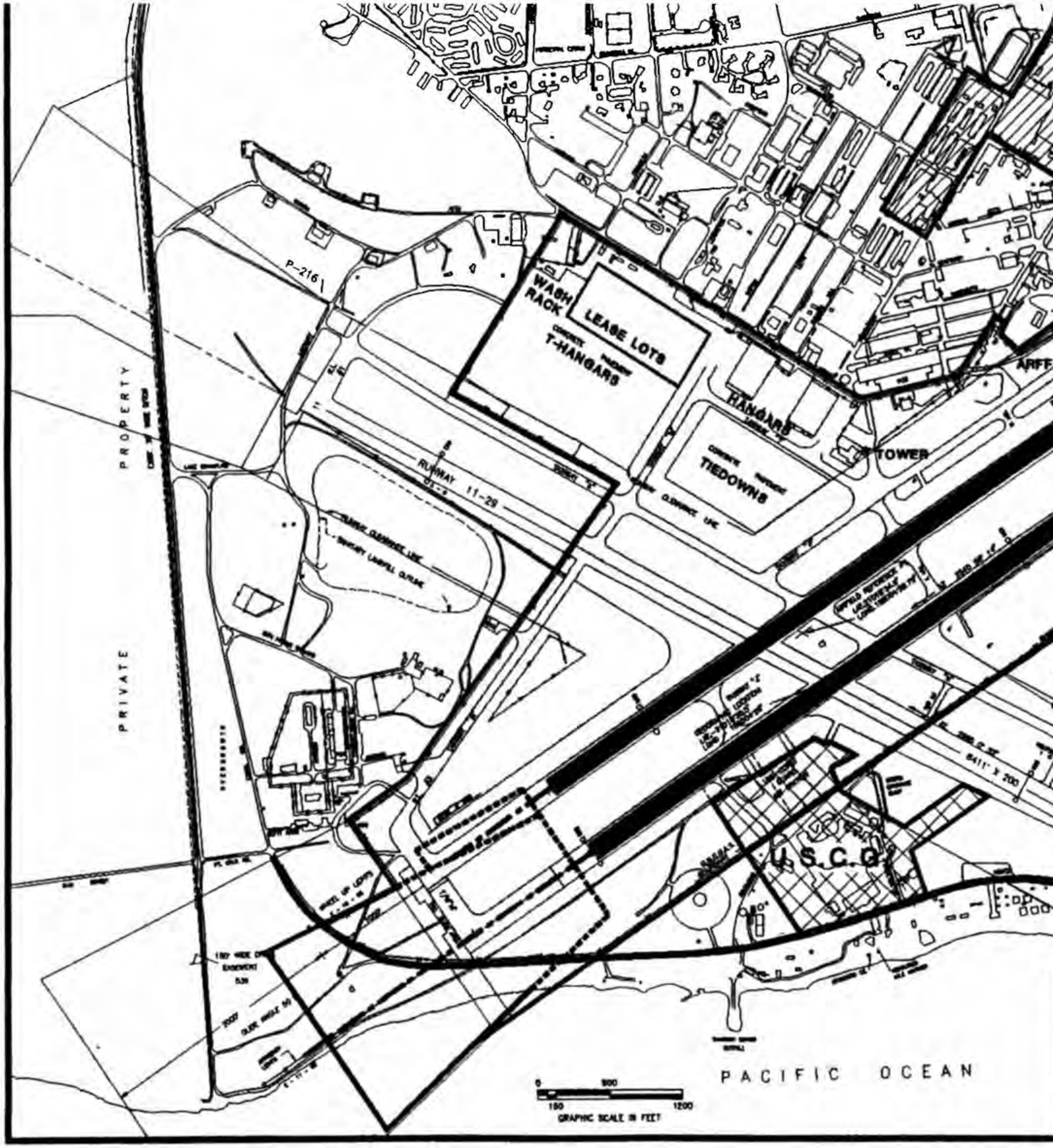
Estimated initial annual maintenance and operating costs:

- Sources of funds

Airport User Costs	$1,125,000
Airport User Fees	153,000
Total	$1,278,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000
• Total Savings (Costs)	$20,040,000



1995	FIGURE A-4
KALAELOA AIRPORT	OAHU, HAWAII

ALTERNATIVE 4

ARIES CONSULTANTS LTD.

A.5 ALTERNATIVE 5

AIRPORT FACILITIES

Airport acreage:

- State DOT (includes airfield) - 740 acres
- HNG - 160
- USCG - 48

Runway 4R-22L =	7,000 feet
Runway 4L-22R =	7,000 feet
Runway 11-29 =	3,700 feet

- Accommodates single and light twin-engine aircraft and USCG and HNG C-130s.

Airport capacity: 355,000 annual operations

All weather capability: Yes

Crosswind capability: Single and light twin-engine aircraft only, not USCG and HNG C-130

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 86,000
FAA	778,000
Total	$864,000

Estimated initial annual maintenance and operating costs:

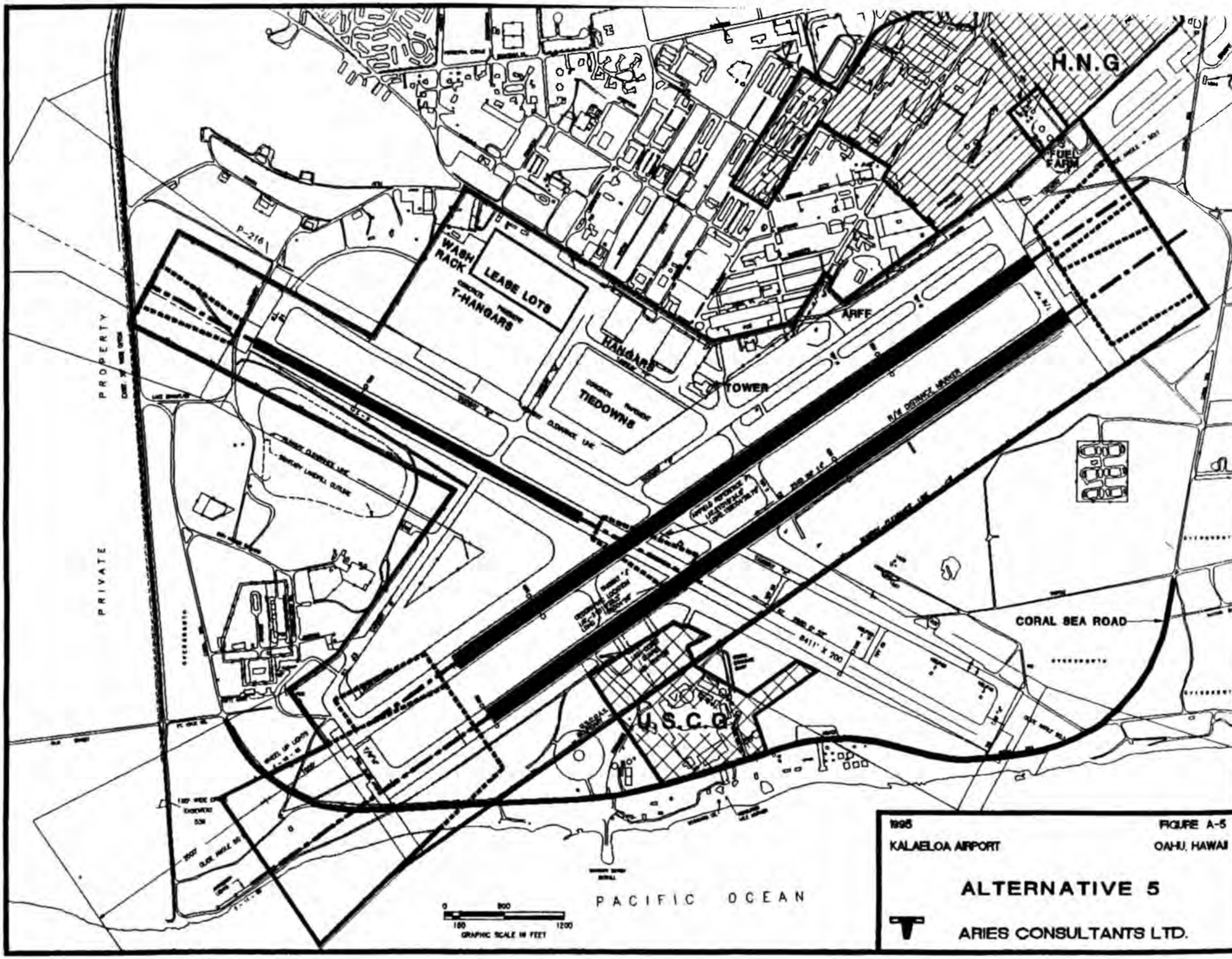
- Sources of funds

Airport User Costs	$ 938,000
Airport User Fees	153,000
Total	$1,091,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000

- Total Savings (Costs) $19,945,000



1995

KALAELOA AIRPORT

FIGURE A-5

OAHU, HAWAII

ALTERNATIVE 5

ARIES CONSULTANTS LTD.

A.6 ALTERNATIVE 6

AIRPORT FACILITIES

Airport acreage:

- State DOT (includes airfield) - 890 acres
- HNG - 160
- USCG - 48

Runway 4R-22L = 7,000 feet
Runway 4L-22R = 7,000 feet
Runway 11-29 = 7,000 feet

- Accommodates single and light twin-engine aircraft and USCG and HNG C-130s.

Airport capacity: 355,000 annual operations

All weather capability: Yes

Crosswind capability: Single and light twin-engine aircraft and USCG and HNG C-130

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 83,000
FAA	745,000
Total	$828,000

Estimated initial annual maintenance and operating costs:

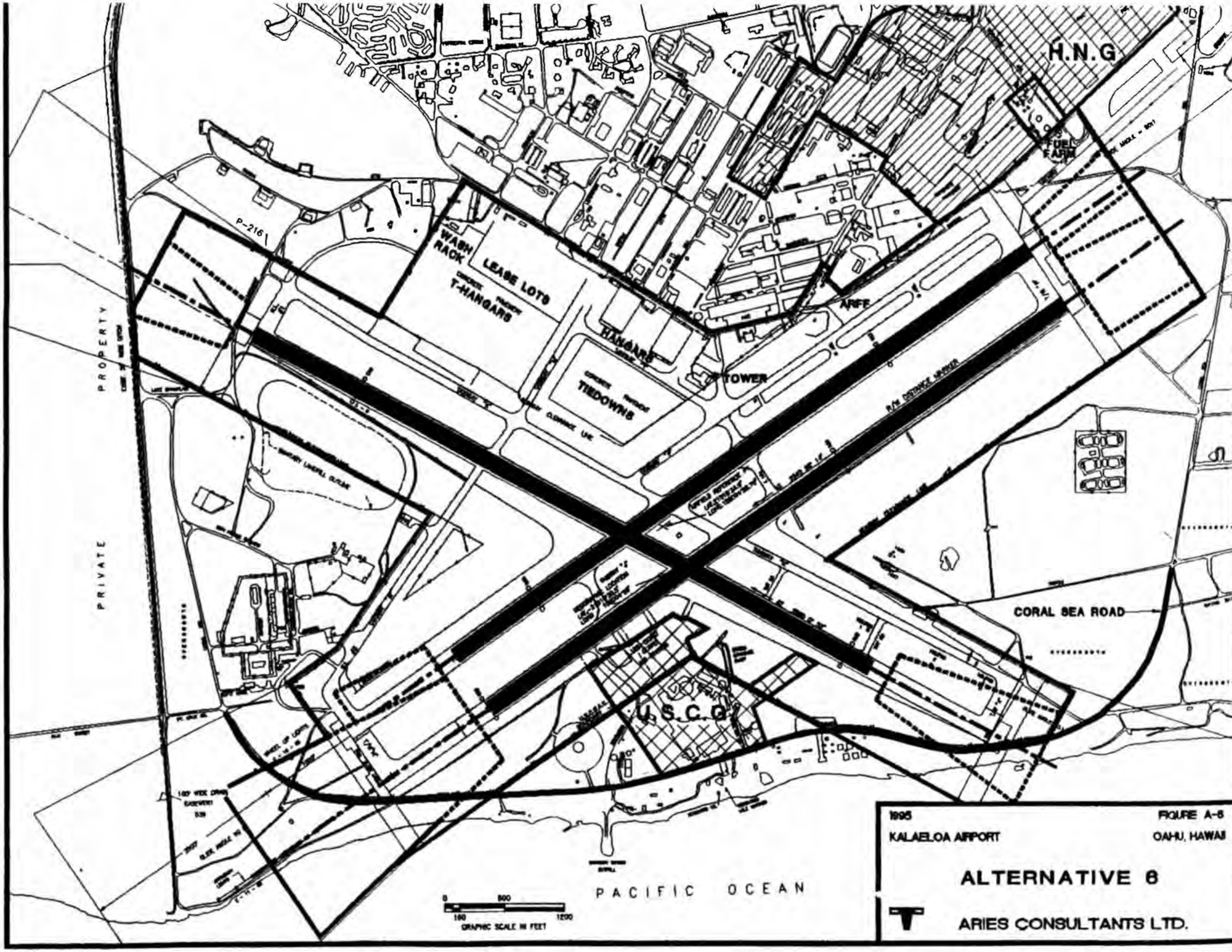
- Sources of funds

Airport User Costs	$1,507,000
Airport User Fees	153,000
Total	$1,660,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000

- Total Savings (Costs) $19,412,000



1995 FIGURE A-6
KALAELOA AIRPORT OAHU, HAWAII

ALTERNATIVE 6

ARIES CONSULTANTS LTD.

A.7 ALTERNATIVE 7

AIRPORT FACILITIES

Airport acreage:

- State DOT (includes airfield) - 740 acres
- HNG - 160
- USCG - 48

Runway 4R-22L = 7,000 feet
Runway 11-29 = 3,700 feet

- Accommodates single and light twin-engine aircraft and USCG and HNG C-130s.

Airport capacity: 230,000 annual operations

All weather capability: Yes

Crosswind capability: Single and light twin-engine aircraft only, not USCG and HNG C-130

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 86,000
FAA	778,000
Total	$864,000

Estimated initial annual maintenance and operating costs:

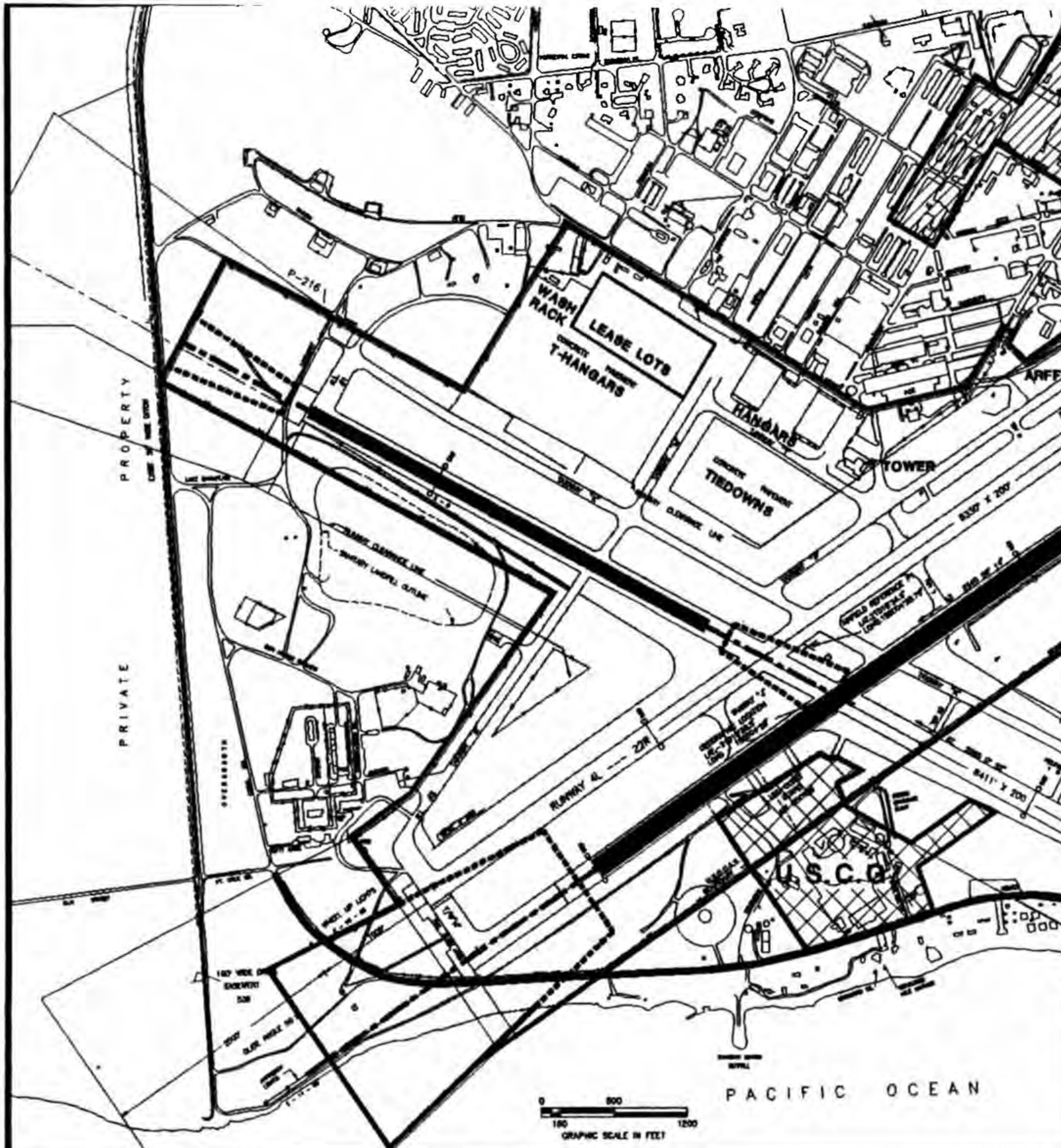
- Sources of funds

Airport User Costs	$ 850,000
Airport User Fees	153,000
Total	$1,003,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000

- Total Savings (Costs) $20,003,000



1995 KALAELOA AIRPORT

FIGURE A-7 OAHU, HAWAII

ALTERNATIVE 7

ARIES CONSULTANTS LTD.

A.8 ALTERNATIVE 8

AIRPORT FACILITIES

Airport acreage:

• State DOT (includes airfield) -	890 acres
• HNG -	160
• USCG -	48

Runway 4R-22L = 7,000 feet
Runway 11-29 = 7,000 feet

- Accommodates single and light twin-engine aircraft and USCG and HNG C-130s.

Airport capacity: 230,000 annual operations

All weather capability: Yes

Crosswind capability: Single and light twin-engine aircraft and USCG and HNG C-130

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 83,000
FAA	745,000
Total	$828,000

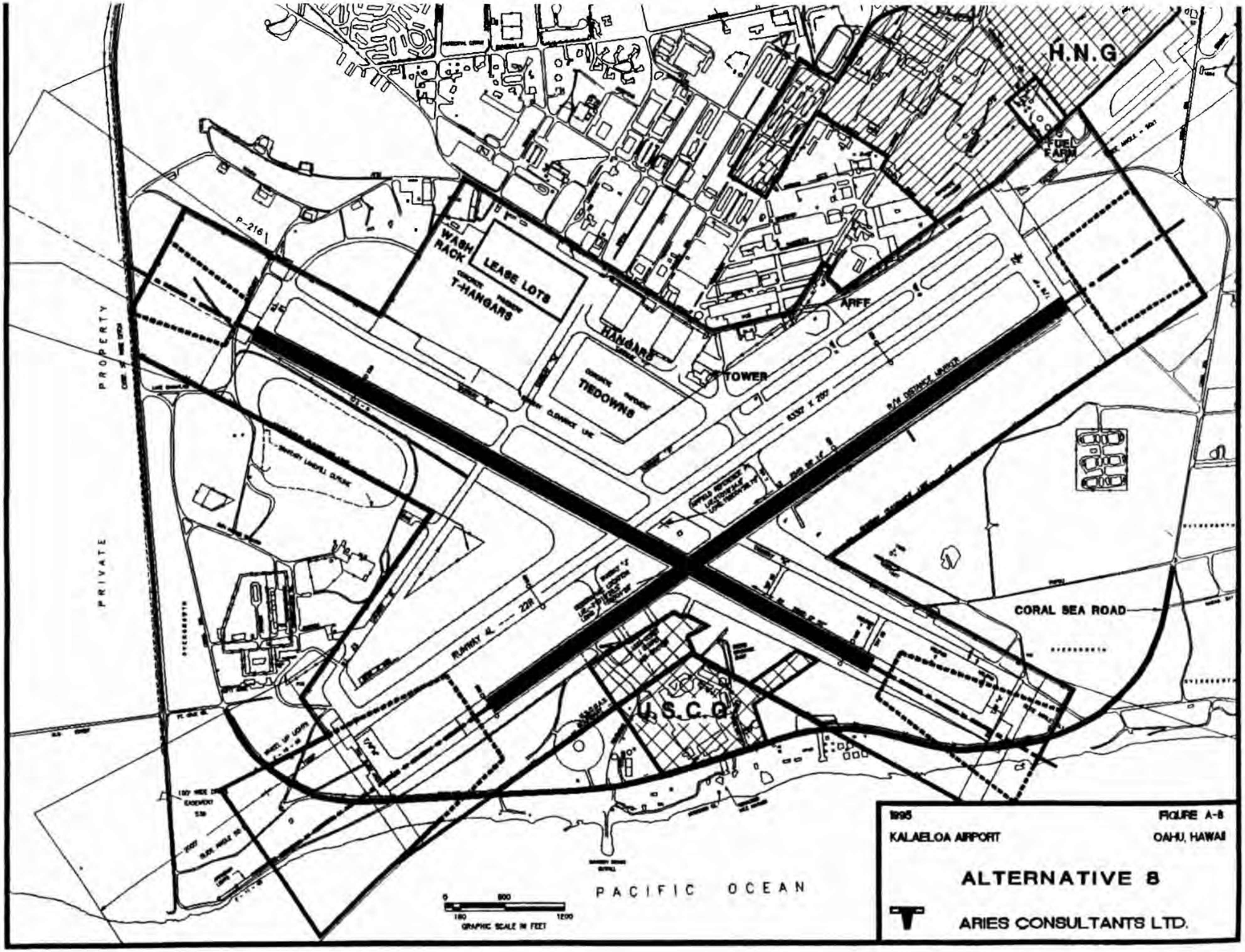
Estimated initial annual maintenance and operating costs:

- Sources of funds

Airport User Costs	$1,172,000
Airport User Fees	153,000
Total	$1,325,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000
• Total Savings (Costs)	$19,747,000


H.N.G
FUEL FARM
WASH RACK
LEASE LOTS
CONCRETE PARKING
T-HANGARS
HANGARS
TOWER
ARFF
CONCRETE PARKING
TIEDOWNS
CLEARANCE LINE
6332' X 200'
RUNWAY 4L --- 22R
U.S.C.G
CORAL SEA ROAD
P-216
PROPERTY
PRIVATE
PACIFIC OCEAN
GRAPHIC SCALE IN FEET
0
600
150
1200
1995
KALAELOA AIRPORT
FIGURE A-8
OAHU, HAWAII
ALTERNATIVE 8
ARIES CONSULTANTS LTD.

A.9 ALTERNATIVE 9

AIRPORT FACILITIES

Airport acreage:

• State DOT (includes airfield) -	370 acres
• HNG -	160
• USCG -	0

Runway 4R-22L = 3,700 feet
Runway 4L-22R = 3,700 feet

- Accommodates single and light twin-engine aircraft but not USCG and HNG C-130s.

Airport capacity: 340,000 annual operations

All weather capability: Yes

Crosswind capability: No

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 78,000
FAA	702,000
Total	$780,000

Estimated initial annual maintenance and operating costs:

- Sources of funds

Airport User Costs	$ 427,000
Airport User Fees	153,000
Total	$ 580,000
• USCG Relocation	13,500,000

Savings and benefits because of an airport at Barbers Point:

Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	-0-
Ford Island Closure	400,000
• Total Savings (Costs)	$(8,460,000)

1995 KALAELOA AIRPORT FIGURE A-9 OAHU, HAWAII

ALTERNATIVE 9

ARIES CONSULTANTS LTD.

A.10 ALTERNATIVE 10

AIRPORT FACILITIES

Airport acreage:

- State DOT (includes airfield) - 890 acres
- HNG - 160
- USCG - 48

Runway 4R-22L = 7,000 feet
Runway 4L-22R = 3,700 feet
Runway 11-29 = 7,000 feet

- Accommodates single and light twin-engine aircraft and USCG and HNG C-130s.

Airport capacity: 340,000 annual operations

All weather capability: Yes

Crosswind capability: Yes

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 98,000
FAA	880,000
Total	$978,000

Estimated initial annual maintenance and operating costs:

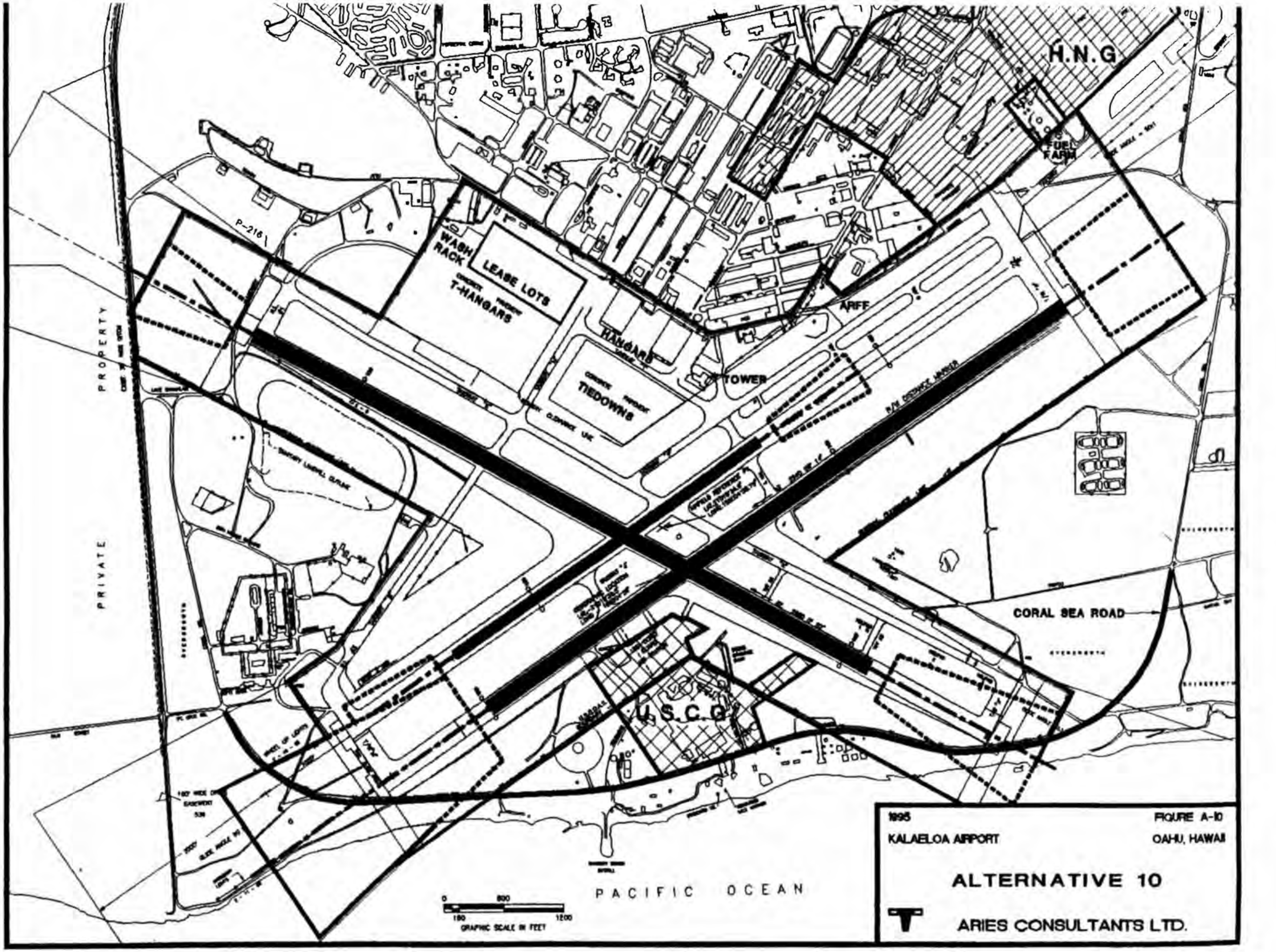
- Sources of funds

Airport User Costs	$1,258,000
Airport User Fees	153,000
Total	$1,411,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000

- Total Savings (Costs) $19,511,000



1995

KALAELOA AIRPORT

FIGURE A-10

OAHU, HAWAII

ALTERNATIVE 10

ARIES CONSULTANTS LTD.

Table A-1

KALAELOA AIRPORT

COMPARISON OF ALTERNATIVES - AIRPORT FACTORS

				ALTERNATIVES									
To Accommodate	Runway Length	Number of Runways	Orientation	1	2	3	4	5	6	7	8	9	10
General aviation	3,700	1	4-22	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
HNG	5,000	1	4-22		Y	Y	Y	Y	Y	Y	Y		Y
USCG	7,000	1	4-22		Y	Y	Y	Y	Y	Y	Y		Y
General aviation aircraft in crosswinds	3,700	2	4-22 11-29					Y	Y	Y	Y		Y
Instrument capability	7,000	1	4-22		Y	Y	Y	Y	Y	Y	Y		Y
Maximize C-130 flights over water	7,000	2	4-22 11-29						Y		Y		Y
Long range planning for all activity	7,000	2/3	4-22 11-29			Y	Y	Y	Y				Y
Airport acreage State DOT HNG USCG				 280 160 0	 670 160 48	 670 160 48	 670 160 48	 740 160 48	 890 160 48	 740 160 48	 890 160 48	 370 160 0	 890 160 48

Table A-2

KALAELOA AIRPORT

COMPARISON OF ALTERNATIVES - COSTS

	ALTERNATIVES									
	1	2	3	4	5	6	7	8	9	10
CAPITAL COSTS AND OPERATIONS AND MAINTENANCE COSTS (thousands)										
TOTAL CAPITAL COSTS (1997)										
Airport	663	582	732	582	864	828	864	828	780	978
- DOT - Airports	66	58	73	58	86	83	86	83	78	98
- FAA AIP	597	524	659	524	778	745	778	745	702	880
USCG Relocation	13,500	-0-	-0-	-0-	-0-	-0-	-0-	-0-	13,500	-0-
TOTAL OPERATIONS AND MAINTENANCE (1997)	445	867	962	1,278	1,091	1,660	1,003	1,325	580	1,411
Airport User Costs	292	714	809	1,125	938	1,507	850	1,172	427	1,258
Airport User Fees	153	153	153	153	153	153	153	153	153	153
COST SAVINGS AND BENEFITS (thousands)										
TOTAL SAVINGS (1997)	6,400	21,900	21,900	21,900	21,900	21,900	21,900	21,900	6,400	21,900
Honolulu International Airport Delays[1]	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Designated Air Carrier Alternate	-0-	2,000	2,000	2,000	2,000	2,000	2,000	2,000	-0-	2,000
Ford Island Closure	400	400	400	400	400	400	400	400	400	400
USCG Relocation	-0-	13,500	13,500	13,500	13,500	13,500	13,500	13,500	-0-	13,500
TOTAL COSTS AND SAVINGS (thousands)										
TOTAL COSTS	14,608	1,449	1,694	1,860	1,955	2,488	1,867	2,153	14,860	2,389
TOTAL SAVINGS	6,400	21,900	21,900	21,900	21,900	21,900	21,900	21,900	6,400	21,900
TOTAL SAVINGS (COSTS)	(8,208)	20,451	20,206	20,040	19,945	19,412	20,033	19,747	(8,460)	19,511

1. Honolulu International Airport delay costs are estimated for the year 2000. All other costs are estimated for 1997.

A.14 ALTERNATIVE 14 (REDEVELOPMENT COMMISSION ALTERNATIVE B - MINIMUM AIRPORT MASTER PLAN)

AIRPORT FACILITIES

Airport acreage:

• State DOT (includes airfield) -	600 acres
• HNG -	160
• USCG -	48

Runway RL-22L = 3,700 feet
Runway 4L-22R = 8,000 feet

- Accommodates single and light twin-engine aircraft and USCG and HANG C-130s.

Airport capacity: 355,000 annual operations

All weather capability: Yes

Crosswind capability: No

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 100,000
FAA	903,000
Total	$1,003,000

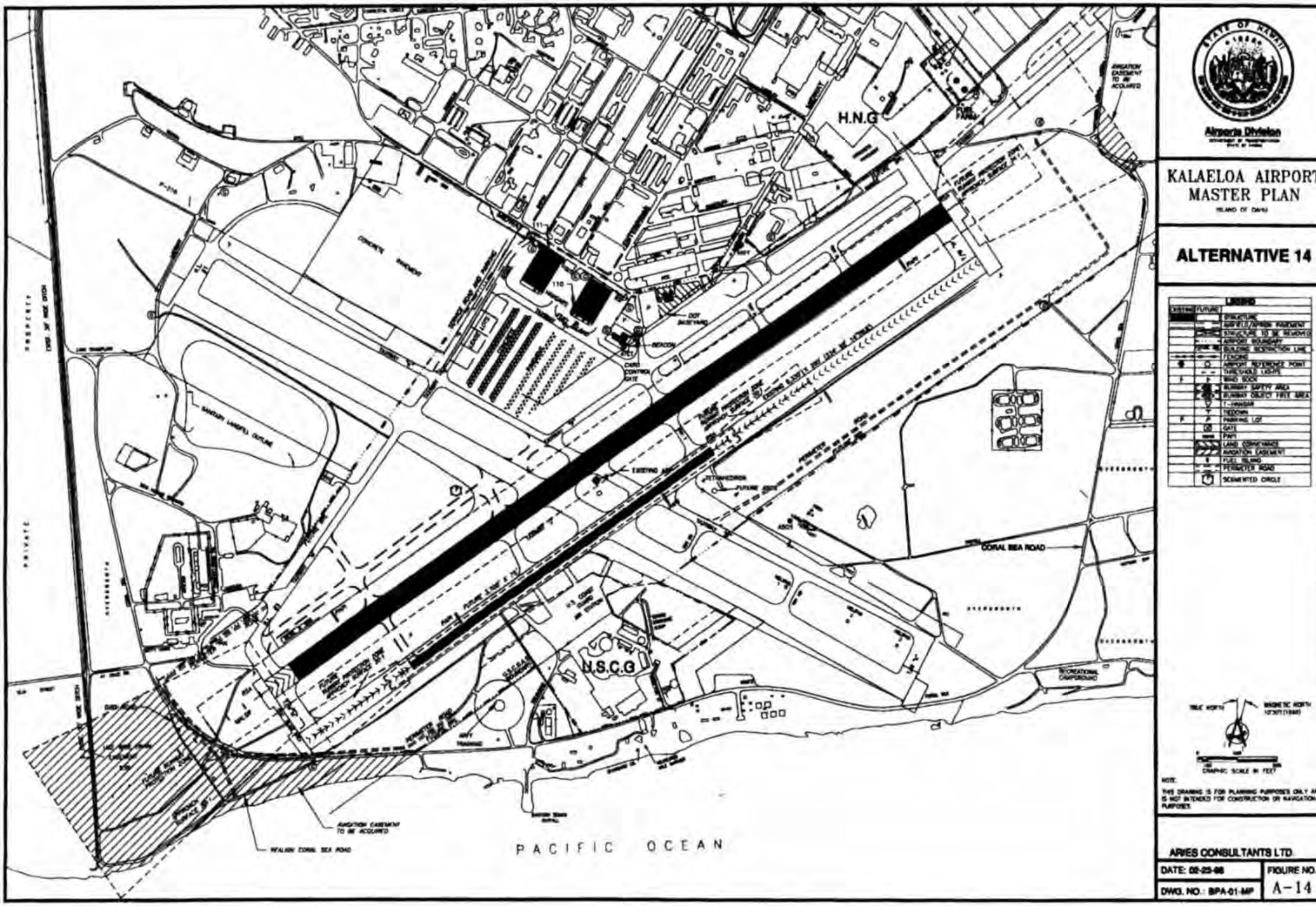
Estimated initial annual maintenance and operating costs:

- Sources of funds

Airport User Costs	$1,047,000
Airport User Fees	153,000
Total	$1,200,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000
• Total Savings (Costs)	$19,697,000


KALAELOA AIRPORT
MASTER PLAN
ISLAND OF OAHU
ALTERNATIVE 14
Airports Division
LEGEND
EXISTING
FUTURE
STRUCTURE
AIRFIELD/APRON PAVEMENT
STRUCTURE TO BE REMOVED
AIRPORT BOUNDARY
BUILDING RESTRICTION LINE
FENCING
AIRPORT REFERENCE POINT
THRESHOLD LIGHTS
WIND SOCK
RUNWAY SAFETY AREA
RUNWAY OBJECT FREE AREA
T-HANGAR
TIEDOWN
PARKING LOT
GATE
PAPI
LAND CONVEYANCE
AVIGATION EASEMENT
FUEL ISLAND
PERIMETER ROAD
SEGMENTED CIRCLE
TRUE NORTH
MAGNETIC NORTH
GRAPHIC SCALE IN FEET
NOTE:
THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.
ARIES CONSULTANTS LTD.
DATE: 02-23-98
DWG. NO.: BPA-01-MP
FIGURE NO.
A-14
H.N.G
N.S.C.G
CONCRETE PARKING
CORAL SEA ROAD
PACIFIC OCEAN
AVIGATION EASEMENT TO BE ACQUIRED
REALIGN CORAL SEA ROAD
RECREATIONAL CAMPGROUND
BEACON
PRIVATE
PROPERTY

A.15 ALTERNATIVE 15 (REDEVELOPMENT COMMISSION ALTERNATIVE A - OPTIMUM AIRPORT MASTER PLAN)

AIRPORT FACILITIES

Airport acreage:

• State DOT (includes airfield) -	900 acres
• HNG -	160
• USCG -	48

Runway RL-22L = 3,700 feet
Runway 4L-22R = 8,330 feet
Runway 11-29 = 7,000 feet

- Accommodates single and light twin-engine aircraft and USCG and HANG C-130s.

Airport capacity: 340,000 annual operations

All weather capability: Yes

Crosswind capability: Yes

COST/BENEFIT CONSIDERATIONS

Estimated capital costs for initial civil use:

- Sources of funds

DOT-Airports	$ 137,000
FAA	1,237,000
Total	$1,374,000

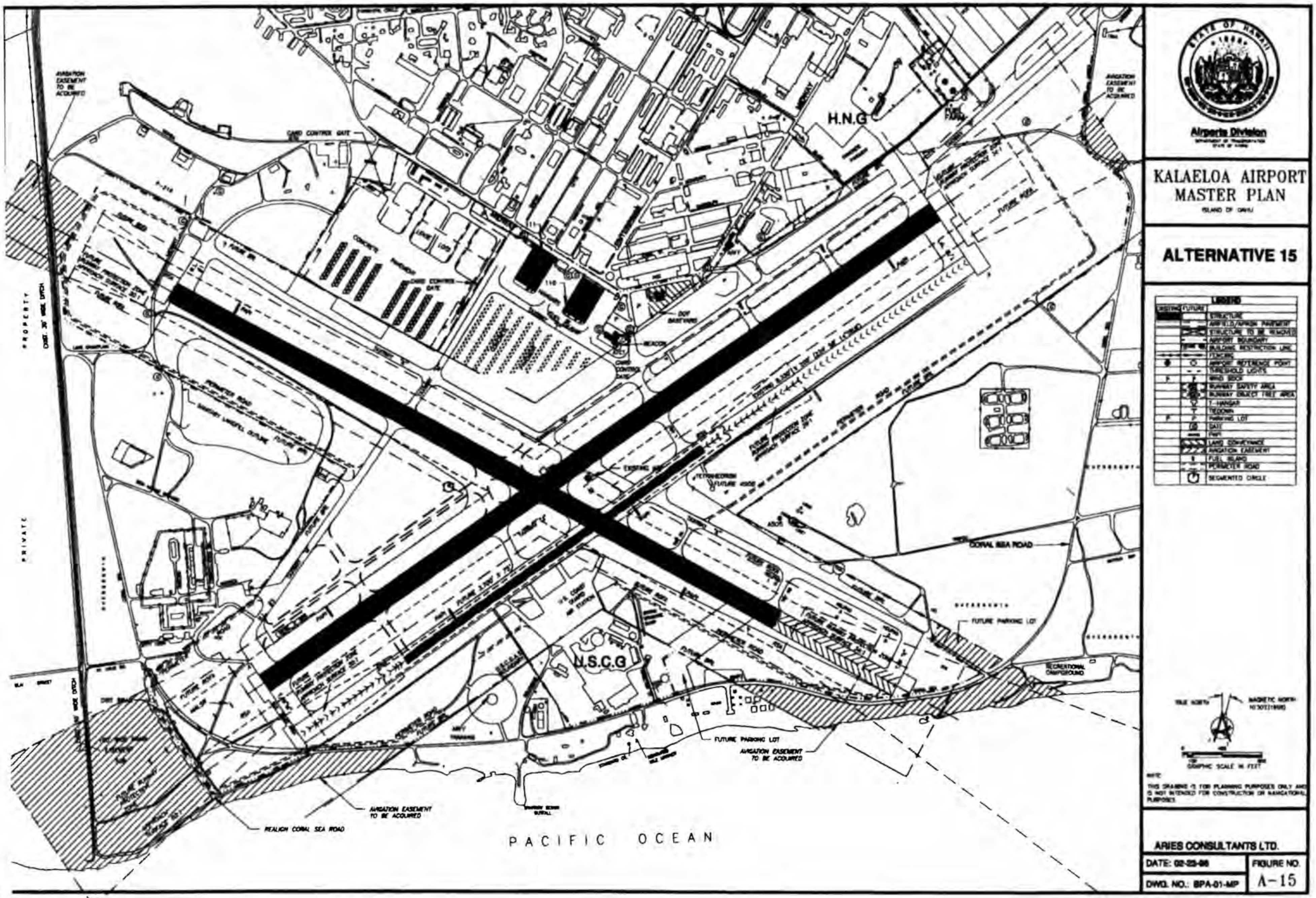
Estimated initial annual maintenance and operating costs:

- Sources of funds

Airport User Costs	$1,047,000
Airport User Fees	153,000
Total	$1,200,000

Savings and benefits because of an airport at Barbers Point:

USCG Relocation	13,500,000
Honolulu International Airport Delays	6,000,000
Designated Air Carrier Alternate	2,000,000
Ford Island Closure	400,000
• Total Savings (Costs)	$19,326,000



Airports Division
KALAELOA AIRPORT MASTER PLAN
ISLAND OF OAHU
ALTERNATIVE 15
LEGEND
H.N.G
U.S.C.G
CORAL SEA ROAD
FUTURE PARKING LOT
AVIATION EASEMENT TO BE ACQUIRED
REALIGN CORAL SEA ROAD
RECREATIONAL CAMPGROUND
PACIFIC OCEAN
PROPERTY
PRIVATE
EXIST. 30' WIDE DITCH
ARIES CONSULTANTS LTD.
DATE: 02-23-06
DWG. NO.: BPA-01-MP
FIGURE NO.
A-15

APPENDIX B

AIRCRAFT OWNER AND AIRPORT BUSINESS SURVEYS

SURVEYS

In July 1994, an Aircraft Owners Survey was conducted for all aircraft owners on the Island of Oahu. An Airport Business Survey was conducted of the aviation-related businesses located at Honolulu International Airport and Dillingham Airfield. The Aircraft Owners Survey was transmitted by a letter from the Airports Administrator of the State of Hawaii, Department of Transportation, Airports Division (State DOT-Airports). The Airport Business Survey was conducted by personal interviews and telephone conversations, also via a letter of introduction from the Airports Administrator. The names and addresses of aircraft owners on the Island of Oahu were provided by State DOT-Airports. In addition, a listing of the fixed base operators was also provided.

AIRPORT BUSINESS SURVEY

The purpose of the Airport Business Survey was to obtain information and opinions concerning the conversion of the airfield and associated facilities at Naval Air Station Barbers Point to civilian use. Businesses who currently provide aviation facilities and services at Honolulu International Airport and Dillingham Airfield were contacted to help determine the specific types of facilities and services needed to make an airport at Barbers Point an attractive alternative, or supplemental location, for their existing facilities.

The businesses surveyed provided a wide variety of aviation services including training, charter flights, fueling, aircraft and helicopter maintenance, contract small package services, air tours, aircraft storage, freight handling, aircraft rentals, air ambulance, etc. Those services that would remain at Honolulu International Airport because of location and, in some instances, the necessity to remain in close proximity to the major airlines and other facilities at Honolulu International Airport (e.g. air ambulance, small package services, and sightseeing fixed-wing and helicopter air taxis) were eliminated from further consideration.

The following summary focuses on the possible attraction of those aviation businesses that could support the activities of private pilots and training facilities that could be accommodated at Kalaeloa Airport.

- All persons interviewed indicated it would be a mistake not to retain NAS Barbers Point as an alternative for general aviation activities.

- All of the businesses who currently provide fueling services at Honolulu International Airport expressed an interest in providing fueling services at Kalaeloa Airport.

- An overall opinion was that a Kalaeloa Airport would be an ideal place for pilot training. Concern was expressed, however, over whether all operators who provide training would relocate to a Kalaeloa Airport. If all training operations relocated to a Kalaeloa Airport, it would be a desirable move. However, if one or more of the commercial aviation operators providing flight training remained at Honolulu International Airport, those operators would have an advantage in terms of location and proximity to the largest student training market, i.e., Honolulu.

- Providing training at a Kalaeloa Airport would be ideal in terms of reducing delays to pilots. An air traffic control tower and an instrument approach system would be required at Kalaeloa Airport for training. Otherwise, training operations will still have to go to other airports where these facilities are available, and the incentive for all training to be relocated to Kalaeloa Airport is diminished.

- The hangaring of aircraft at Honolulu International Airport is very expensive (an estimated $6,000 annually per aircraft). Many pilots choose to pay for hangars to avoid the $6,000 to $8,000 cost of repainting their aircraft if it was parked out on open tiedowns. If the State provided hangar facilities at Kalaeloa Airport at a reasonable cost, it would be a good incentive for some aircraft owners to move. The number of aircraft owners attracted to base their aircraft at Kalaeloa Airport would have a significant influence on the general aviation services that could be relocated and/or duplicated at Kalaeloa Airport. If enough based aircraft owners moved to Kalaeloa Airport, the ancillary facilities would follow.

- Concern was expressed over the cost of relocating to Kalaeloa Airport. While lower lease rates and attractive space would be significant incentives to relocate, the cost of relocating or duplicating commercial aviation facilities would be a consideration.

- Several tenants have long-term leases with State DOT-Airports at Honolulu International Airport. Will State DOT-Airports terminate these leases without cost to the tenant? Several tenants have made significant investments in their leaseholds based on long-term leases. Will there be provisions to replace and/or duplicate these investments at Kalaeloa Airport.

- Several major leaseholders with the State have several sublessees that support the master lease. If a major leaseholder relocated to Kalaeloa Airport, problems could be encountered if it were mandatory that one or more of the sublessees remain at Honolulu International Airport. Would adequate facilities (or the same facilities) be made available to the sublessees at a reasonable cost. Some sublessees may not qualify for a long-term lease with State DOT-Airports.

- Several operators expressed a concern over the availability of next-day air small package service. If their facilities were to relocate to Kalaeloa Airport, would next-day air become two-day? This could be a problem for some operators getting parts and other materials overnight from the Mainland.

- A number of aircraft could use automotive fuel, but restrictions at Honolulu International Airport prevent aircraft owners from using this fuel. Providing for this capability at Kalaeloa Airport could be an incentive to some aircraft owners to relocate.

- The State can impose general aviation landing fees and/or raise the fees and charges at Honolulu International Airport to be prohibitive to providers of general aviation facilities and services, in effect forcing relocation from Honolulu International Airport. Rental rates will have to be raised consistently among all categories of tenants at Honolulu International Airport to avoid discriminatory charges. The increased charges for those tenants who have to remain at Honolulu International Airport could become a hardship. In addition, the implementation of general aviation landing fees for local users would cause an incremental increase in administrative costs to State DOT-Airports.

- A concern was raised over the cost of maintenance and operation of a Kalaeloa Airport and will those who base their aircraft at Kalaeloa Airport and provide facilities and services be expected to be pay for these costs.

AIRCRAFT OWNER SURVEY

The following is a summary of the responses to the Aircraft Owner Survey responses.

	Surveys Answered Question	Total	Percent of Total
A1) Aircraft Profile	(87)		
Type of Aircraft			
a. Single Engine		57	65.0
b. Multi-engine		18	20.5
c. Turboprop		0	0
d. Turbojet		1	1.2
e. Helicopter		10	12.1
f. Glider		1	1.2
		87	100.0%

	Surveys Answered Question	Total	Percent of Total
A2) Type of Aircraft Used	(83)		
Aircraft is Currently:			
a. Active		78	94
b. Inactive		5	6
		83	100.0%
How many hours flying in the last 12 months)	(75)	Total 12,353 hours = 165 hours average	
Percent of time aircraft is used for:	(85)		
1. Business			43.3
2. Personal			56.5
3. Other			0.2
			100.0%
B1) Aircraft Owner Profile	(83)		
Aircraft is:			
a. Privately owned: individual		43	51.8
Privately owned: partnership		11	13.2
b. Corporate owned		29	35.0
c. Flying Club		0	0.0
d. Government		0	0.0
		83	100.0%
C1) Aircraft Facilities Currently Used	(85)		
Aircraft Based At:			
a. Honolulu International		74	87.0
b. Dillingham Airfield		8	9.4
c. Other -		3	3.6
		85	100.0%
C2) Is Aircraft Kept at State or Privately Owned Facility	(84)		
State			
a. Tiedown		35	41.7
b. T-hangar		34	40.5
FBO Facility			
c. Tiedown		3	3.5
d. Conventional/large hangar		12	14.3
		84	100.0%

	Surveys Answered Question	Total	Percent of Total
C3) What Services Do You Currently Use?	(based on 85 surveys		
a. Fuel		75	88.2
b. Minor repairs		66	77.7
c. Major repairs		55	64.7
d. Engine overhaul		25	29.4
e. Avionics		68	80.0
f. None		5	5.9
g. Other		9	10.6

D1) **Factors Affecting Your Choice of Barbers Point Airport** (Please rank in order of importance) (1 = highest)

	1	2	3	4	5	6
a. Lower cost to base aircraft	41	12	6	3	2	0
b. Closer airport location	13	7	7	7	11	1
c. Available facilities/services	5	24	18	5	4	1
d. Airspace/air traffic control considerations	9	8	12	16	3	1
e. Airfield considerations	2	3	8	8	23	3
f. Other	22 various answers					

D3) **What specific airport facilities and services would make Barbers Point Airport an attractive airport at which to base your aircraft?**

(62 surveys answered)

1) Low cost hangars	25
2) Fuel service	9
3) Pilot lounge/food service	9
4) Maintenance facilities	7
5) Car parking at hangar	5
6) Electrical power, phones	5
7) Instrument approach	4
8) Security	4
9) Aircraft wash area	3
10) Air Traffic Control	3
11) Flight school	2

D2) **Please rank in order of importance the facilities and services you would want to be provided at a Barbers Point Airport (1=highest)**

	1	2	3	4	5	6	7	8	9	10	11	12	Total
a) Tiedowns	4	11	4	4	6	1	4	5	1	2	1	0	43
b) T-hangars	36	8	8	0	4	1	5	1	2	0	0	0	65
c) Conventional/corporate hangars	8	1	5	2	0	1	2	0	2	5	4	1	37
d) Fuel	25	20	8	6	4	0	0	1	0	0	0	0	64
e) Air traffic control tower	1	12	12	10	6	1	1	1	2	5	0	0	57
f) Instrument approach capability	6	4	9	7	4	5	0	3	1	4	7	0	50
g) Minor repairs	8	4	10	12	12	9	4	3	1	0	0	0	63
h) Major repairs	7	2	2	11	9	8	5	6	4	3	0	0	57
i) Engine overhaul	6	1	0	2	4	2	5	3	10	2	6	0	41
j) Avionics	4	2	5	2	13	13	8	3	5	1	1	0	57
k) Pilot lounge facilities	0	3	1	5	5	7	6	4	3	10	4	0	48
l) Other	5	1	0	1	0	0	0	0	1	0	0	2	10
TOTAL	116	75	64	62	67	48	40	30	32	32	23	3	592

D4) What factors are most likely to keep you from relocating to an airport at Barbers Point?

(68 surveys answered)	
Too far	43
High costs	16
Poor security	6
Too much State interference	5
No provisions for helicopters	2

D5) The existing facilities at Barbers Point include large hangars. Initially, the most economical way to provide hangars for general aviation is to subdivide these internally. Would you consider storing your aircraft in such an environment and, if so, what special provisions (e.g., security, type of separation, etc.) would make this most acceptable to you?

(57 surveys answered)

1) Safe separation/security	24
2) Without separation/but security	21
3) No	13
4) Security, telephone, electricity, bathrooms, utilities, and cost	Most of them

	Surveys Answered Question	Total	Percent of Total
D6) Based on available information, would you consider relocating to Barbers Point?	(82)		
a. Yes		25	30.5
b. No		38	46.3
c. Uncertain		19	23.2
		82	100.0%

Comparison between responses to C1 and D6:

	Based At	Yes	No	Uncertain	Total
Honolulu International	74	23	34	17	74
Dillingham	8	2	4	2	8

APPENDIX C

NEW AIRSPACE CLASS DESIGNATIONS

APPENDIX C

NEW AIRSPACE CLASS DESIGNATIONS

New Airspace Class Designations became effective on September 16, 1993. The new designations basically conform with the International Civil Aviation Organization (ICAO) designations which will become the world standard. The new designations are A, B, C, D, E and G airspace. The ICAO Class F airspace is not being used because the United States has no airspace equivalent.

The following table shows the new designations and the old ones they replace:

Airspace Class Designations

New	Old
A	Positive Control Area (PCA)
B	Terminal Control Area (TCA)
C	Airport Radar Service Area (ARSA)
D	Airport Traffic Area (ATA)/Control Zone (CA)
E	Control Area (CA)/Control Zone (CA [at airports with no control tower])
G	Uncontrolled

These airspace class designations basically identify the set of rules the airspace user, the pilot, must adhere to within each class. These rules, or regulations, are given in terms of the following requirements:

- IFR vs. VFR rules
- Requirement for ATC clearance
- Pilot qualifications
- Aircraft equipment
- Weather minimums
- Clearance from clouds

These airspace class designation changes are primarily name changes in nature, with some combining under a single class designation. Detailed description of airspace class definitions are published in the *Airman's Information Manual* for the FAA by the U.S. Government Printing Office. A graphic illustration of the airspace reclassification is presented at the end of this appendix. This illustration is included in the *Hawaii*

Airports and Flying Safety Manual, published by the State of Hawaii Department of Transportation, Airports Division. Basic descriptions of the new airspace classifications follow:

Class A (Positive Control Area) - Positive controlled airspace from 18,000 feet up to and including Flight Level 600 (approximately 60,000 feet MSL). Flight within this class of airspace requires an IFR clearance. It also requires certain aircraft equipment and pilot instrument rating. This class of airspace overlies all of the United States with the exception of Hawaii.

Class B (Terminal Control Area) - Controlled airspace of defined dimensions and effective altitudes, within which all aircraft must have an ATC clearance and are subject to pilot and aircraft equipment requirements. This class of airspace has been established in Hawaii as the Honolulu Class B overspace. It overlies essentially the entire southern coastline area of the island of Oahu, including NAS Barbers Point/Kalaeloa Airport. It is centered over the Honolulu International Airport and extends 20 NM to the east, south and west in a semicircle centered on the Honolulu VORTAC. Within 5 NM to the south and 4 NM to the north of the VORTAC effective altitudes are from the surface of the earth up to 9,000 feet mean sea level (MSL). Over NAS Barbers Point/Kalaeloa Airport, the bases of the effective altitudes are 1,600, 1,900, 2,200 and 3,000 feet MSL up to 9,000 feet MSL. The configuration of this Class B airspace is shown on Figure 2-3.

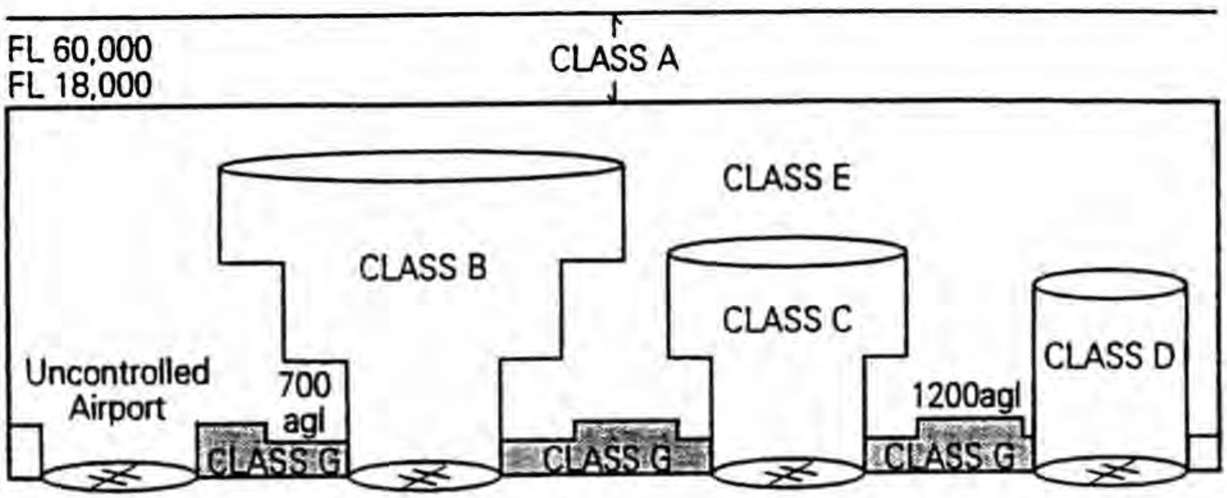
Class C (Airport Radar Service Area) - Controlled airspace that requires establishment of two-way radio communications before entering and during operations within. Certain aircraft equipment is required. This class of airspace does not exist near NAS Barbers Point/Kalaeloa Airport. The nearest Class C airspace is at the Kahului Airport.

Class D (Airport Traffic Area/Control Zone) - Controlled airspace normally within 5 NM of an airport with an operating control tower, extending from the surface upward to 2,500 feet AGL. Flight within this class of airspace requires an ATC clearance. This class of airspace has been established at MCAF Kaneohe Bay, Wheeler AAF, and NAS Barbers Point. Each of these Class D airspace dimensions is different than normal. At MCAF Kaneohe Bay and NAS Barbers Point the radius is 4-1/2 NM rather than 5 NM. At Wheeler AAF the radius is 2-1/2 NM. Additionally, at NAS Barbers Point the ceiling of Class D airspace lies below the floor of the overlying Honolulu Class B airspace.

Class E (Control Area) - Controlled airspace associated with low altitude airways, additional control areas, and control area extensions. This class includes all controlled airspace not listed above. At non-control tower airports with instrument procedures that need protection, Class E airspace will extend downward to the surface within 5 NM of the airport, with extensions as necessary extensions of Class E airspace to the Class D airspace at NAS Barbers Point for the protection of instrument approaches. One of these extensions is to the west/southwest and the other is to the west/northwest of NAS Barbers Point. These extensions will be reviewed by FAA and revised as necessary to protect any IFR approaches to Kalaeloa Airport. Class E airspace extends over essentially all of the State of Hawaii as control areas or additional control area except where higher class airspace has been designated.

Class G (Uncontrolled) - All other airspace not classified as Class A, B, C, D or E is uncontrolled airspace. All of the airspace underlying the Class E airspace is uncontrolled Class G airspace from the surface up to the floor of controlled airspace above. This includes airspace at some of the uncontrolled airports within the State such as Dillingham, Hana, Upolu, etc.

NEW AIRSPACE CLASSIFICATIONS



Airspace Features	CLASS A	CLASS B	CLASS C	CLASS D	CLASS E	CLASS G
Equivalent designation prior to September 16, 1993	Positive Control Area (PCA)	Terminal Control Area (TCA)	Airport Radar Service Area (ARSA)	Airport Traffic Area (ATA) and Control Zone (CZ)	General Controlled Airspace	Uncontrolled Airspace
Operations Remitted	IFR	IFR and VFR	IFR and VFR	IFR and VFR	IFR and VFR	IFR and VFR
Entry Prerequisites	ATC Clearance	ATC Clearance	ATC Clearance for IFR, radio contact for all VFR	ATC Clearance for IFR, radio contact for all VFR	ATC Clearance for IFR	None
Minimum Plot Qualifications	Instrument Rating	Private or Student Certificate	Student Certificate	Student Certificate	Student Certificate	Student Certificate
Two-way Radio Communications	Yes	Yes	Yes	Yes	Yes for IFR	No
Aircraft Separations	All	All	IFR, SVFR, and runway operations	IFR, SVFR and runway operations	IFR and SVFR	None
Conflict Resolution	N/A	N/A	Between IFR and VFR operations	No	No	No
Traffic Advisories	N/A	N/A	Yes	Workload permitting	Workload permitting	Workload permitting
Safety Advisories	Yes	Yes	Yes	Yes	Yes	Yes

BASIC VFR WEATHER MINIMUMS

Airspace	Flight Visibility	Distance from Clouds
CLASS A	Not applicable	Not applicable
CLASS B	3 statute miles	Clear of clouds
CLASS C*	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
CLASS D*	3 statute miles	500 feet below 1,000 feet above 2,00 feet horizontal
CLASS E*		
Less than 10,000 feet MSL	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
At or above 10,000 feet MSL	5 statute miles	1,000 feet below 1,000 feet above 1 statute mile horizontal
CLASS G		
1,200 feet or less above the surface (regardless of MSL altitude)		
Day, except as provided in FAR Part 91.155(b)	1 statute mile	Clear of clouds
Night, except as provided in FAR Part 91.155(b)	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface but less than 10,000 feet MSL		
Day	1 statute mile	500 feet below 1,000 feet above 2,000 feet horizontal
Night	3 statute miles	500 feet below 1,000 feet above 2,000 feet horizontal
More than 1,200 feet above the surface and at or above 10,000 feet MSL	5 statute miles	1,000 feet below 1,000 feet above 1 statute mile horizontal

* Except as provided in FAR Part 91.157

APPENDIX D

NOISE ANALYSES

NOISE ANALYSES FOR AIRPORT MASTER PLAN ALTERNATIVES

1. ALTERNATIVES

This appendix presents the noise contour maps for the following Airport Master Plan Alternatives. These alternatives were developed during the course of planning for the Kalaeloa Airport:

ALTERNATIVE 1: Utilize a 3,700-foot-long section of existing Runway 4L-22R to accommodate single- and twin-engined general aviation fixed-wing aircraft. The C-130 aircraft flown by the Coast Guard and the National Guard would not be accommodated under this alternative.

ALTERNATIVE 2: Utilize a 7,000-foot-long section of existing Runway 4R-22L to accommodate single- and twin-engined general aviation fixed-wing aircraft and C-130 aircraft.

ALTERNATIVE 6: Utilize 7,000-foot-long sections of existing Runways 4R-22L and 4L-22R, as well as a 7,000-foot-long section of crosswind Runway 11-29 to accommodate single- and twin-engined general aviation fixed-wing aircraft and C-130 aircraft.

ALTERNATIVE 11: Utilize a 7,000-foot-long section of existing Runway 4L-22R as well as a 3,700-foot-long section of existing Runway 4R-22L to accommodate single- and twin-engined general aviation fixed-wing aircraft and C-130 aircraft.

ALTERNATIVE 14: (Minimum Airport Master Plan). Utilize a 8,000-foot-long section of the existing Runway 4L-22R as well as a 3,700-foot-long section of existing Runway 4R-22L to accommodate single- and twin-engined general aviation fixed-wing aircraft and C-130 aircraft.

ALTERNATIVES 15 AND 16: (Optimum Airport Master Plan). Utilize the existing 8,330 feet of Runway 4L-22R, as well as a 3,700-foot-long section of existing Runway 4R-22L, and a 7,000-foot-long section of crosswind Runway 11-29 to accommodate twin-engined general aviation fixed-wing aircraft and C-130 aircraft.

Note: A 7,000-foot Runway 4-22 was used for developing, and comparing, the noise contours for Alternatives 2, 6 and 11. With an 8,000-foot Runway 4-22, as included in Alternative 14 (Minimum Airport Master Plan) and described in Appendix A, the extent of the noise contours to the northeast would be reduced somewhat because aircraft would take off from 1,000 feet further to the southwest. An 8,330-foot Runway 4L-22R was used to develop the noise contours for Alternatives 15 and 16 (Optimum Airport Master

Plan) in Appendix A. The analyses assume that rotary-wing aircraft would take off and land on ramps to the side of Runway 4L-22R or at the intersection of Runways 4R-22L and 11-29.

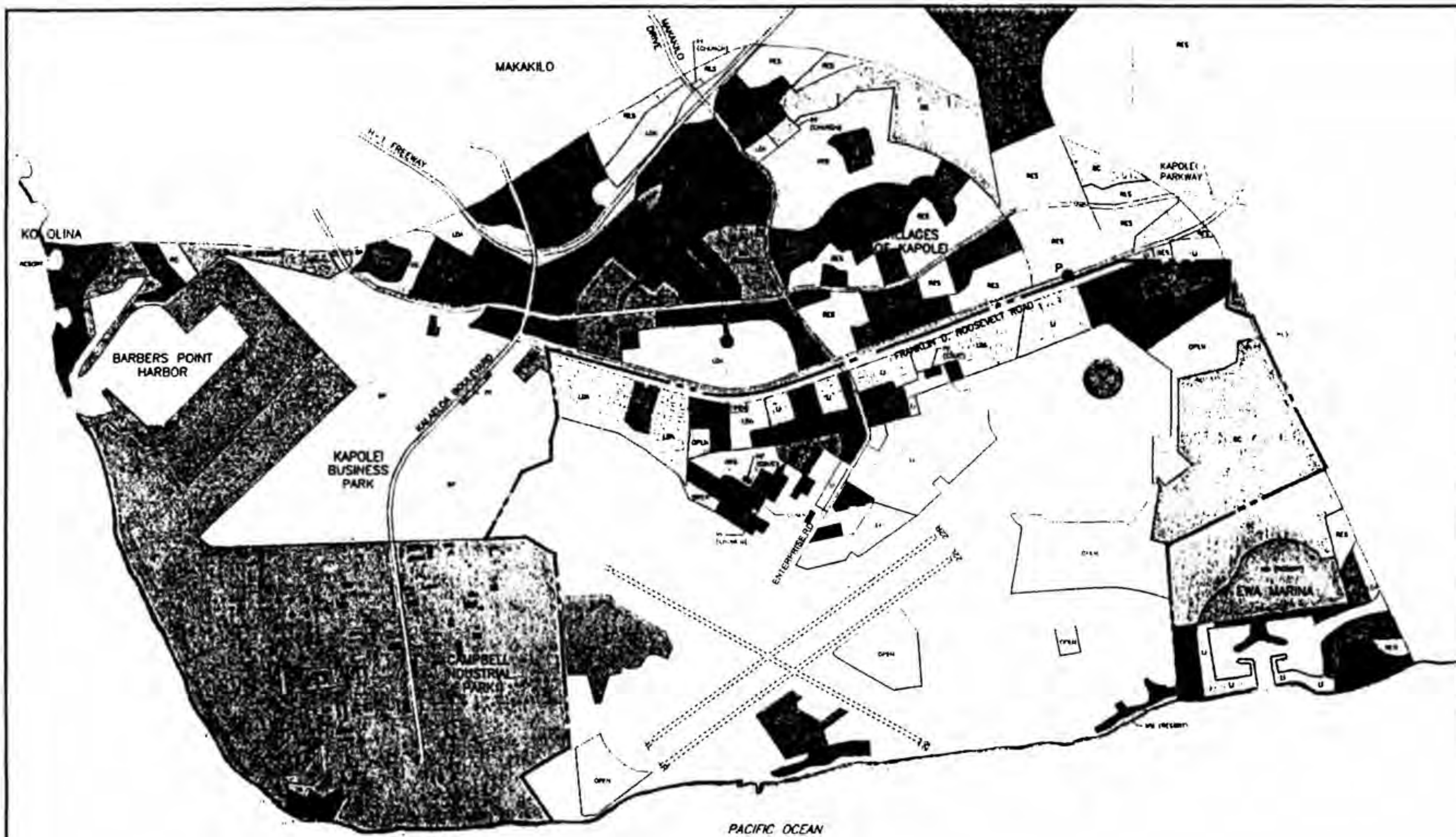
2. FUTURE NOISE ENVIRONMENT

The noise contours produced by the FAA's Integrated Noise Model (INM) for Kalaeloa Airport aircraft operations alone and for the combination of Kalaeloa Airport operations and aircraft approaching Runway 8L at Honolulu International Airport were overlain on the forecast 2020 land use map shown on Figure 1. The noise contours for only the Honolulu International Airport aircraft arrivals were also overlain on the 2020 land use map on Figure 8-8. The extent to which the noise associated with each Kalaeloa Airport alternative would be compatible with the forecast land use pattern is summarized below.

The operating scenarios used in the analyses assume that departures and arrivals would be separated horizontally and vertically in accordance with FAA approved procedures. For the purposes of the comparative analyses, the flight tracks and number and type of aircraft assumed to use each flight track were varied among the alternatives to assess the different potential noise impacts. For example, Alternatives 1, 2, 6, and 11 assume some Hawaii National Guard (HNG) helicopter operations would be along flight tracks to and from the northeast and northwest. The HNG subsequently indicated that this will not be the case. Consequently, Alternatives 14, 15, 16 and 17 assume there will be no HNG helicopter operations to the northeast or northwest.

The usage of the various flight tracks was refined for Alternatives 14, 15, 16 and 17 based on continuing input from potential airport users, FAA and DOTA to reduce the noise impacts from Kalaeloa Airport. These efforts should continue to further mitigate noise impacts for the selected airport master plan (Alternative 17).

The State requested that noise contour maps be prepared that related to both the Minimum Airport Master Plan (Alternative 14) and Optimum Airport Master Plan (Alternatives 15 and 16) described in Appendix A. These two alternatives included refinements of the aircraft ingress and egress routes, pattern altitudes and flight tracks, and the minimum and optimum runway configurations and usage not included in earlier alternatives. The 2020 noise contours of both alternatives were also examined in combination with Honolulu International Airport's forecast noise contours as had been previously done with Alternatives 6 and 11. Because of the flight track and aircraft operational assumptions used for Alternatives 14, 15 and 16, they would result in less risk of potential noise impacts northeast of the Airport than for the other alternatives previously examined (Alternatives 1, 2, 6 and 11). This is primarily due to the reduction in the noise contours under the general aviation flight corridor northeast of the Airport.



Airports Division

KALAELOA AIRPORT
MASTER PLAN

FORECAST YEAR
2020 LAND USE
MAP

LEGEND

RES	Residential
LDA	Low Density Apartment
	Medium Density Apartment
	Commercial/Office
BP	Business Park
LI	Light Industrial
HI	Heavy Industrial
MU RESID	Mixed Use (Residential)
	Park
MU RESORT	Mixed Use (Resort)
GC	Golf Course
	Public Facility
	Public Facility (Education)
PF CHURCH	Public Facility (Church)
	Military
OPEN	Open
	Barbers Point NAS Boundary
	Existing Runways
● P	Noise Measurement Site

0 625 1250 2500
GRAPHIC SCALE IN FEET

ARIES CONSULTANTS LTD
BELT COLLINS HAWAII
Y EBISU AND ASSOCIATES

DATE 9.5.96

FIGURE NO.
1

2.1 Aircraft Noise - Alternative 1

This alternative is limited to one 3,700-foot-long runway (a portion of Runway 4L-22R) and smaller general aviation aircraft. It cannot accommodate operations by most business jets, by US Coast Guard or Hawaii National Guard C-130s, or by other large aircraft. Consequently, it has the lowest forecast number of operations and the smallest noise footprint of all the alternatives considered.

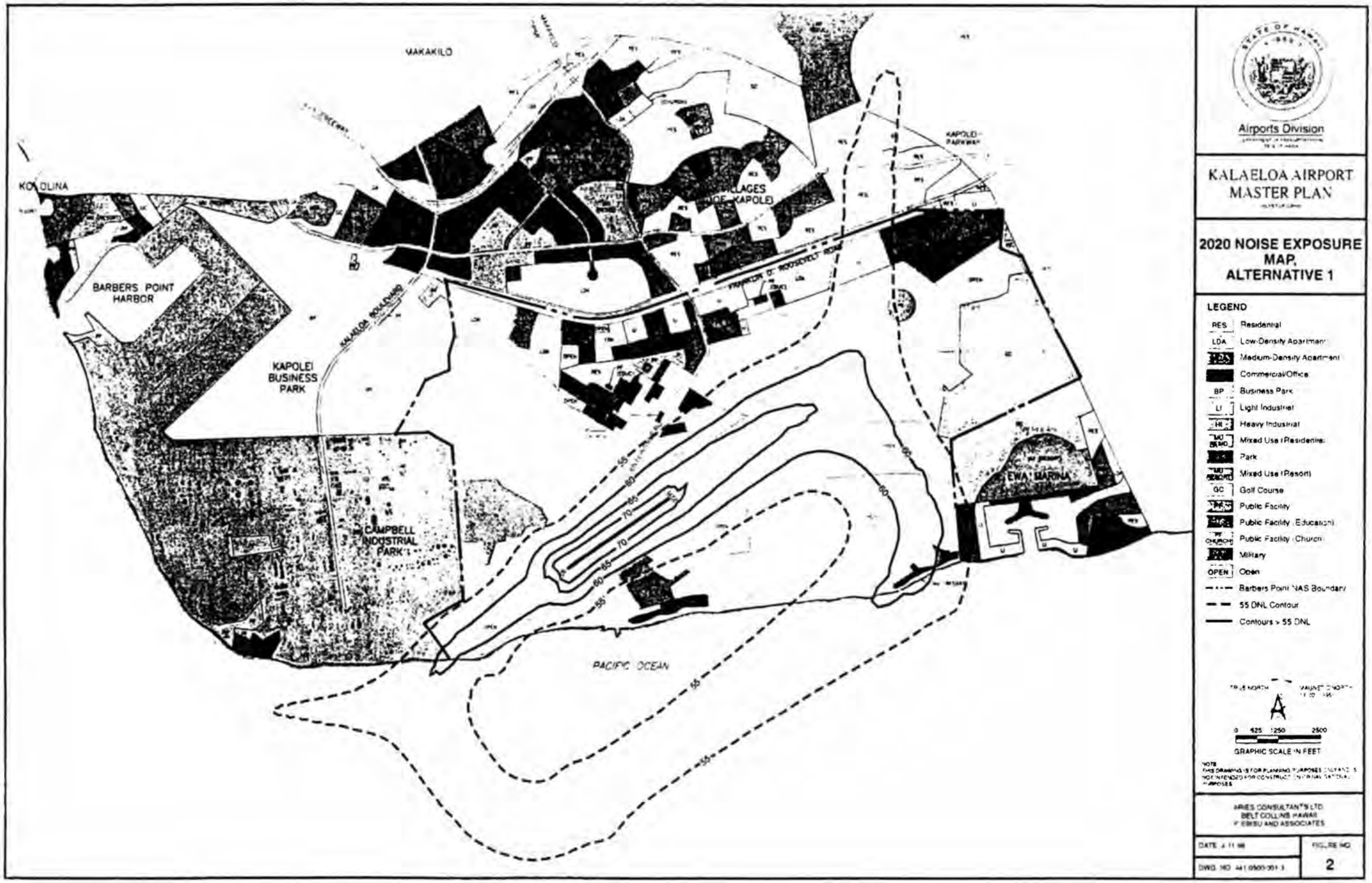
The general aviation operations to the northeast are assumed to be evenly split along two flight tracks — one to the northeast towards H-1 near Kunia Road and one to the north towards H-1 over the proposed north-south road between Kapolei Parkway and H-1. The operating scenario used for this alternative assumes that some civil helicopters flying to and from the north and east will use the flight track to the northeast towards West Loch.

There are no U.S. Coast Guard (USCG) and HNG C-130 aircraft and USCG helicopter operations assumed in Alternative 1. HNG helicopter operations are included and some are assumed to use the northeast route towards the West Loch intersection and some to the northwest towards H-1.

Figure 2 depicts the noise contours associated with Kalaeloa Airport operations in 2020 for Alternative 1.[1] Except for the existing beach cottages within the Base boundary, other existing and planned noise-sensitive land uses should remain outside the 60 DNL contour. Alternative 1 ranks near the best (with Alternative 6) in minimizing potential adverse noise impacts and noise complaint risks. As shown on Figure 2, the highest aircraft noise is just over 70 DNL. At no point would the 65 DNL contour be more than 600 feet from the runway centerline, and the 60 DNL contour would be entirely within the existing boundaries of the base.

All of the forecast year 2020 off-base land uses are compatible with the aircraft noise that would be generated by this alternative when judged by either the Federal or State noise compatibility criteria presented in Tables 8-4 and 8-5. However, light aircraft flying between the Kalaeloa Airport and training areas over Central Oahu or Neighbor Island airports to the east would overfly the expanding development in the Ewa and Central

[1] Note that this analysis was conducted with the most up-to-date land use forecast available at the time the study was conducted. The discussion in this appendix is based on that forecast. The James Campbell Estate published an updated land use forecast in late 1997. This revised forecast reflected changes in development plans that leave most of the area under the arrival-departure corridor to the northeast planned for uses that are not noise-sensitive. The updated forecast was used for the analysis of Alternative 17 (the Recommended Plan).


MAKAKILO
KO OLINA
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
KALAELOA BOULEVARD
VILLAGES OF KAPOLEI
FRANKLIN D. ROOSEVELT ROAD
KAPOLEI PARKWAY
CAMPBELL INDUSTRIAL PARK
EWA MARINA
PACIFIC OCEAN
55
60
65
70
Airports Division
KALAELOA AIRPORT MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 1
LEGEND
RES Residential
LDA Low-Density Apartment
Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
HI Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
Public Facility (Church)
Military
OPEN Open
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
0 625 1250 2500
GRAPHIC SCALE IN FEET
ARIES CONSULTANTS LTD.
BELT COLLINS HAWAII
Y. EBISU AND ASSOCIATES
FIGURE NO.
2

Oahu areas. Potential adverse health and welfare noise impacts (as discussed in Section 8.3) were judged possible at then-proposed residential areas near the Varona Village area, Villages of Kapolei, and directly under the flight corridor for aircraft operations northeast of the Airport. This area is evidenced by the extension of the 55 DNL contour to the northeast that is shown on Figure 2. The overflights and noise would probably lead to some complaints if noise-sensitive uses are developed in this area as indicated on the forecast 2020 land use map on Figure 1.

The uses proposed for the on-base area that would be retained by the Navy, including the beach cottage areas along the *makai* boundary of the existing base, are compatible with the forecast noise levels. Uses proposed by other federal agencies, and which had been tentatively accepted by the Navy and Redevelopment Commission as of September 26, 1995, are also compatible with the forecast aircraft noise from this alternative when judged by both the State and Federal noise compatibility criteria presented previously.

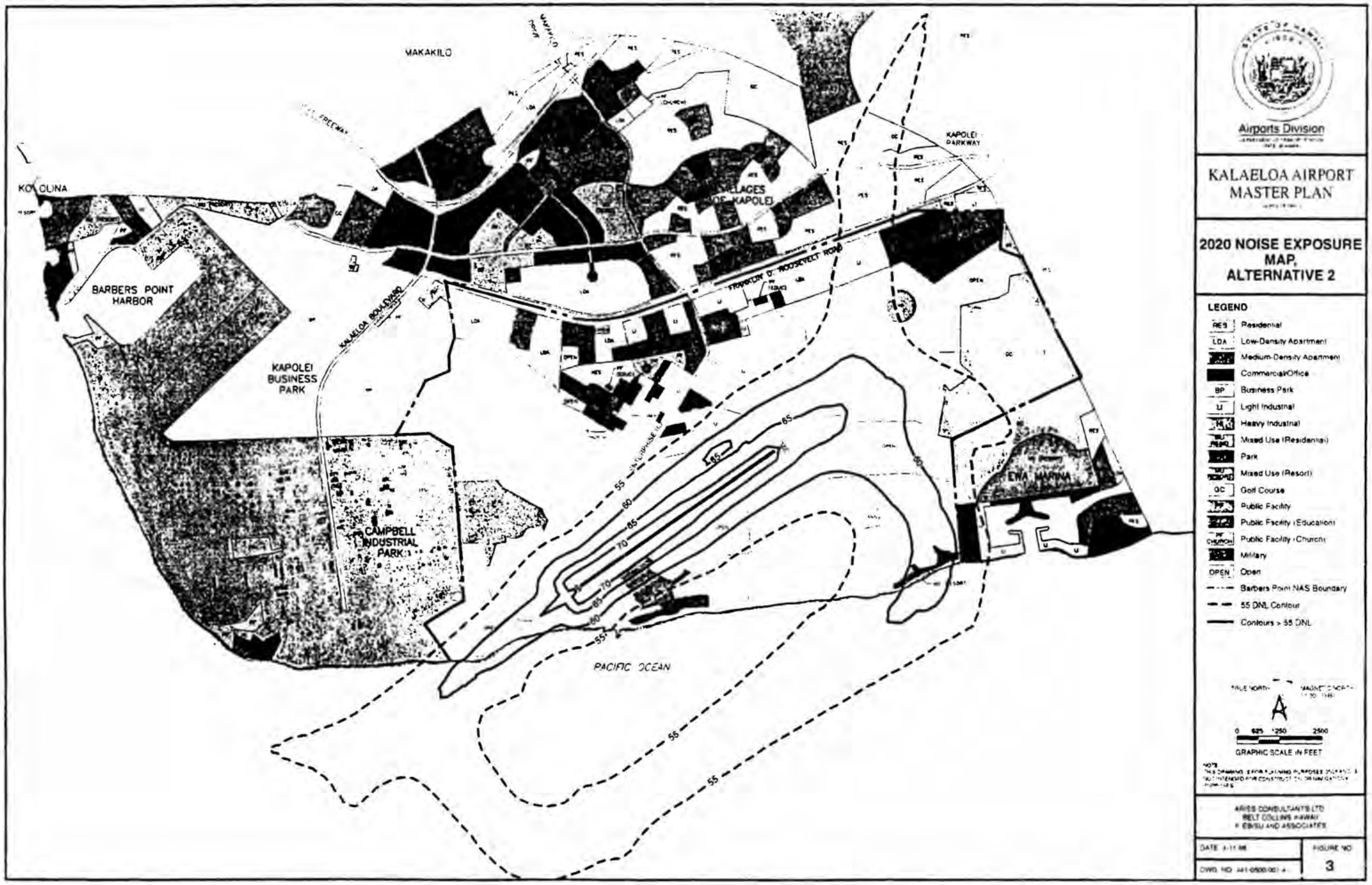
2.2 Aircraft Noise - Alternative 2

This alternative retains the inland-most 7,000 feet of Runway 4R-22L. This is sufficient to accommodate US Coast Guard and Hawaii National Guard C-130 aircraft and general aviation aircraft. A 3,300-foot displaced landing threshold on Runway 22L is assumed for general aviation aircraft arrivals.

The general aviation operations to the north/northeast are all assumed to use the northeast route towards H-1 and Kunia Road, and none use the north route towards H-1 over the proposed north-south road. Some civil helicopters flying to the north and east use the flight track to the northeast towards West Loch.

For HNG helicopter operations to the north/northeast it is assumed 50 percent use the northeast route towards West Loch and 50 percent use the north route towards H-1 and Kunia Road to compare noise impacts.

The DNL contours associated with this alternative (see Figure 3) are somewhat larger than those for Alternative 1. The principal differences between the two result from the addition of the larger aircraft and the use of a portion of Runway 4R-22L instead of a portion of Runway 4L-22R. The future noise levels are slightly higher in the Ewa Marina area due to the C-130 operations assumed in this alternative and the closer proximity of the northeast end of the runway to Ewa Marina. Alternative 2 ranks lower (with Alternative 11) in minimizing potential adverse noise impacts and noise complaint risks due to the anticipated higher noise levels in the Ewa Marina area.


MAKAKILO
KO OLINA
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
KALAELOA BOULEVARD
CAMPBELL INDUSTRIAL PARK
VILLAGES OF KAPOLEI
FRANKLIN D. ROOSEVELT ROAD
KAPOLEI PARKWAY
EWA MARINA
PACIFIC OCEAN
55
60
65
70
Airports Division
KALAELOA AIRPORT MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 2
LEGEND
RES Residential
LDA Low-Density Apartment
Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
Public Facility (Church)
Military
OPEN Open
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
TRUE NORTH
0 625 1250 2500
GRAPHIC SCALE IN FEET
ARIES CONSULTANTS LTD
BELT COLLINS HAWAII
F EBISU AND ASSOCIATES
FIGURE NO
3

Aircraft noise from Alternative 2 is compatible with all forecast 2020 off-base land uses when judged by both State and Federal noise compatibility standards and guidelines as with Alternative 1. Because the number of northeast-bound general aviation aircraft operations is the same for this alternative as for Alternative 1, it would produce a similar number of overflights of residential and other uses if new development occurs as presently proposed in the flight corridor to the northeast of the Airport. Consequently, some complaints about aircraft noise can be expected if noise-sensitive uses are developed under the flight corridor. Potential adverse health and welfare noise impacts are possible at proposed residential areas near the Varona Village area, Villages of Kapolei, and directly under the flight corridor for aircraft operations northeast of the Airport.

Due to its use of the *makai* runway (4R-22L) rather than the *mauka* runway (4L-22R), Alternative 2 shifts the noise contours to the southeast relative to Alternative 1. This increases noise levels in the area immediately adjacent to the seaward side of Runway 4R-22L by up to five DNL points. The increase grows smaller quickly as one moves away from the runway towards the ocean. Consequently, the principal change along the shoreline areas that have the greatest potential for other uses is to shift the 55 DNL contour about 1,000 feet to the east. As a result, slightly more usable shoreline area west of the existing beach cottages and Navy recreation center is actually outside the 55 DNL contour in Alternative 2 than is true for Alternative 1. This alternative produces slightly higher aircraft noise levels within the Ewa Marina project than does Alternative 1, but it maintains land use compatibility there. Finally, the use of the *makai* runway reduces noise levels on the inland portions of the base by about five DNL points.

All of the uses proposed for the on-base area that would be retained by the Navy, including the noise-sensitive residential areas along the *mauka* boundary of the existing base, are compatible with the forecast noise levels for this alternative. Uses proposed by other federal agencies which had been tentatively accepted by the Navy and Reuse Commission as of September 26, 1995, are also compatible with the forecast aircraft noise from this alternative. In Alternative 1, most of the shoreline area that would not be needed for airport facilities and that the Navy has not requested is outside the 55 DNL contour. Only the area close to the existing recreational facilities and beach cottages at the eastern end of the base is within the 55 or 60 DNL contour. Alternative 2 shifts the noise contours slightly seaward, marginally increasing noise exposure in potential shoreline recreational areas.

2.3 Aircraft Noise - Alternative 6

This alternative retains the inland-most 7,000 feet of all three existing runways (Runways 4L-22R, 4R-22L, and 11-29). A 3,300-foot displaced landing threshold on Runways 22L and 22R is assumed for general aviation arrivals. The general aviation operations to the north/northeast are all assumed to use the northeast flight track towards H-1 and Kunia

Road, and none use the north route over the proposed north-south road. Some civil helicopters flying to the north and east use the flight track to the northeast towards West Loch.

The general aviation training pattern is on Runway 4R-22L and to the south over the ocean in most Tradewind and Kona conditions. However, general aviation training operations are on Runway 11-29 and to the south over the ocean when there are strong crosswinds and also itinerant operations are on Runway 11-29 in strong crosswinds.

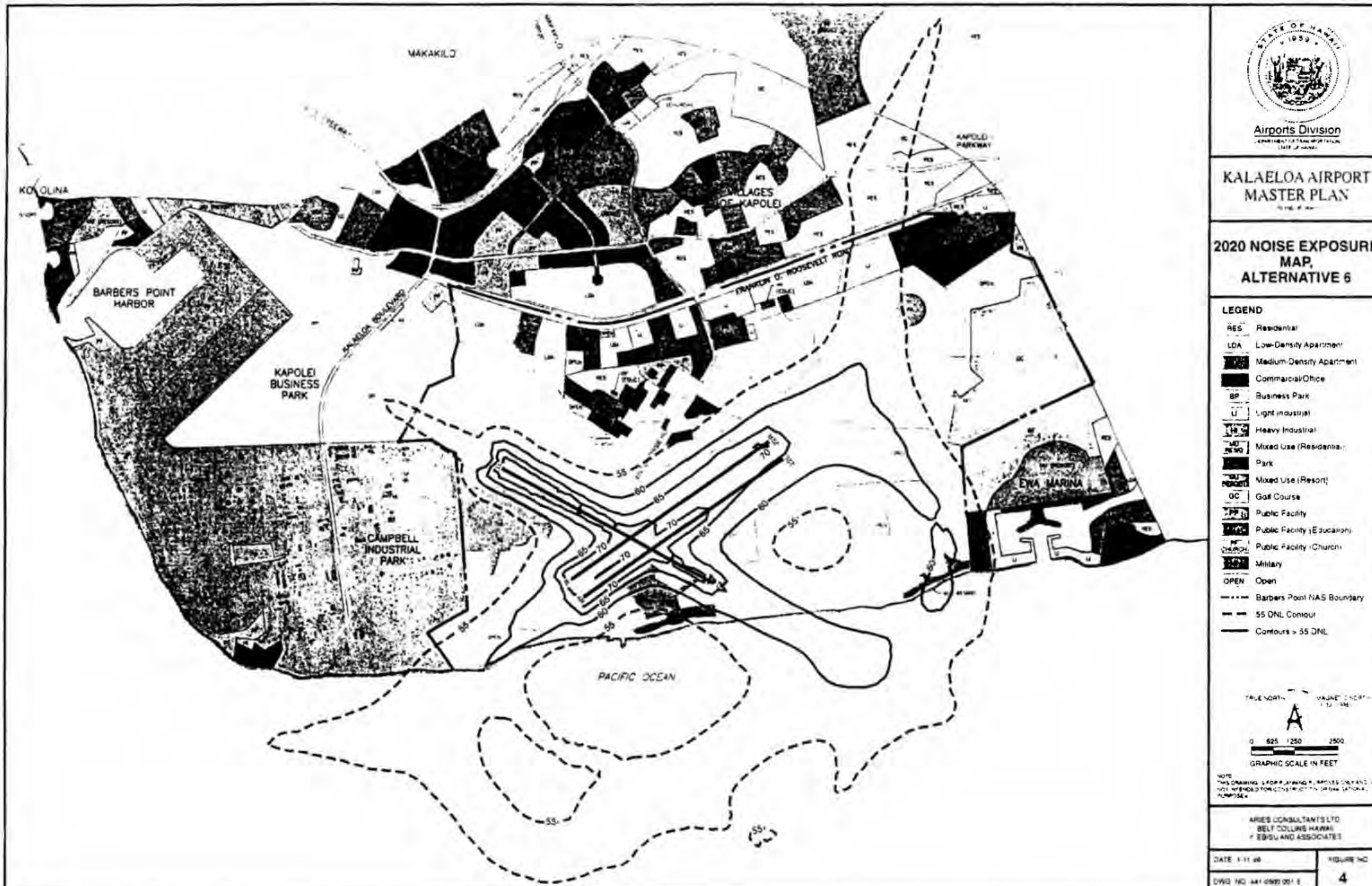
The USCG and HNG C-130 training patterns are assumed to be on Runway 11-29 and to the south of the runway. In Tradewind, conditions the C-130s are assumed to take off on Runway 11 and land on Runway 4R; in Kona conditions they are assumed to take off on Runway 22R and land on Runway 29.

For HNG helicopter operations to the north/northeast, some were assumed to use the northeast route towards West Loch and some to use a flight track to the northwest towards H-1.

The retention of Runway 11-29, and its use for the great majority of C-130 departures, has two principal effects on the DNL contours shown on Figure 4. Those contours to the east of the Airport are about the same as those for Alternative 1 and slightly smaller than those for Alternative 2. This is because most departures by noisier aircraft (principally C-130s) are assumed to be made from Runway 11. While the use of Runway 11 slightly reduces noise and overflights immediately east of the Base, it increases noise at either end of Runway 11-29 and brings more on-base property within the plotted noise contours than is the case for Alternatives 1 and 2.

The use of Runway 11-29 should not cause additional incompatible land uses or adverse noise impacts outside the Base. Except for the existing beach cottages within NASBP, other existing and planned noise sensitive land uses should remain outside the 60 DNL contour. Alternative 6 ranks higher (with Alternative 1) in minimizing potential adverse noise impacts and complaint risks from Kalaeloa Airport operations.

As with Alternatives 1 and 2, noise from this alternative is compatible with all forecast 2020 off-base land uses when judged by both State and Federal noise compatibility standards and guidelines. Because the number of northeast-bound general aviation aircraft operations is the same for Alternative 6 as for Alternatives 1 and 2, it would produce a similar number of overflights of residential and other uses in new development planned for Ewa and Central Oahu. Consequently, some complaints and impacts can be expected if the area beneath the flight corridor to the northeast is developed as proposed. Potential adverse health and welfare noise impacts are possible at planned and proposed residential areas near the Varona Village area, Villages of Kapolei, and directly under the flight corridor for aircraft operations northeast of the Airport.



Airports Division

KALAELOA AIRPORT MASTER PLAN

2020 NOISE EXPOSURE MAP, ALTERNATIVE 6

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FIGURE NO. 4

2.4 Aircraft Noise - Alternative 11

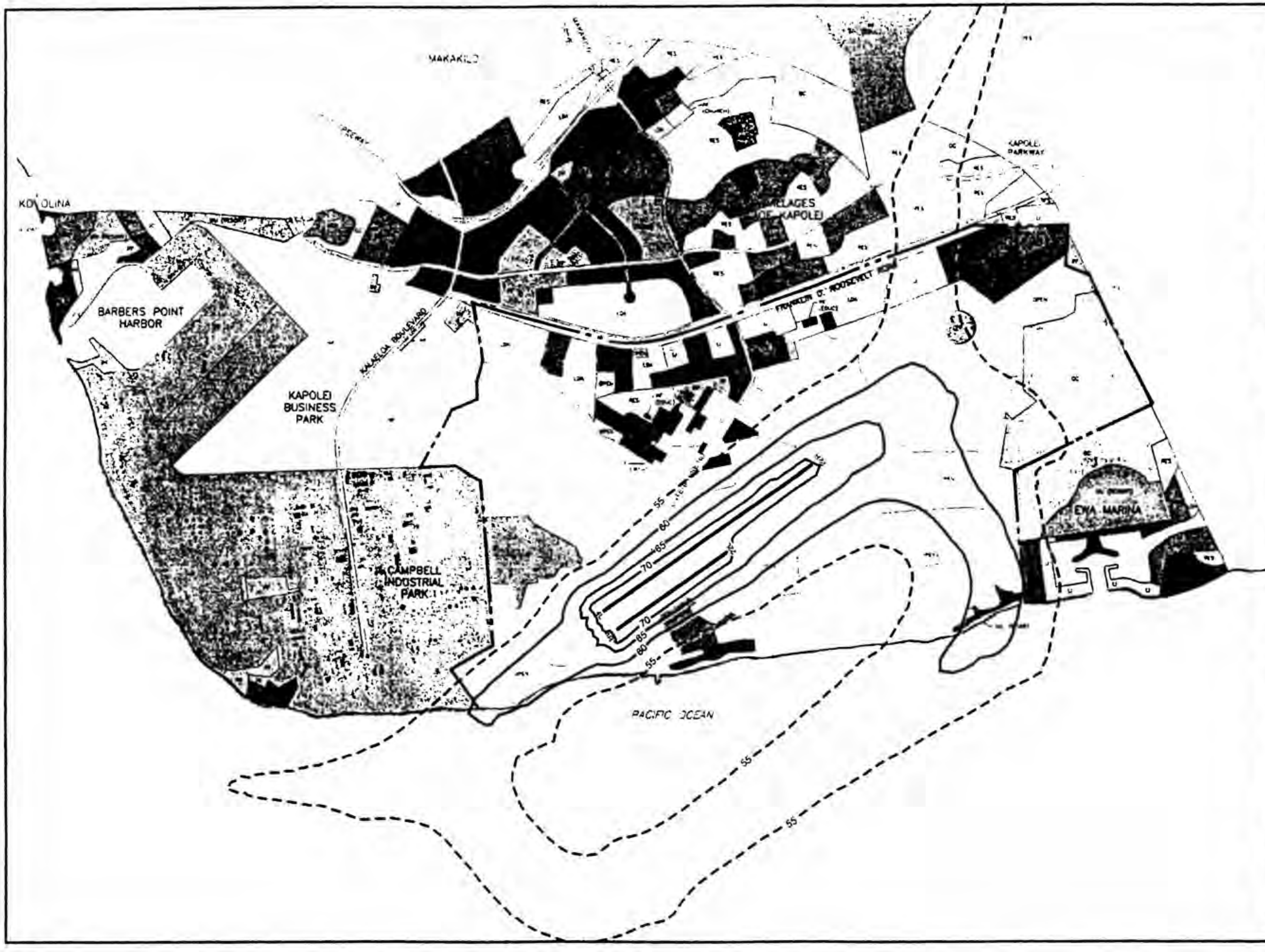
The runway configuration for this alternative includes the inland-most 7,000 feet of Runway 4L-22R and 3,700 feet of the *makai* end of Runway 4R-22L. A 3,300-foot displaced landing threshold on Runway 22R is assumed for general aviation aircraft arrivals. The general aviation operations to the north/northeast are all assumed to use the northeast flight track towards H-1 and Kunia Road; this scenario assumes that none use the north route over the proposed north/south road. Some civil helicopters flying to the north and east are assumed to use the flight track to the northeast towards West Loch.

For HNG helicopter operations to the north/northeast, some are assumed to use the northeast route towards West Loch. The remainder are assumed to use a flight track to the northwest towards H-1.

The noise footprint shown on Figure 5 is quite similar to that for Alternative 2, which accommodates the same number of operations as that alternative but places them on a 7,000-foot segment of Runway 4R-22L. Figure 5 depicts the resulting noise contours associated with Kalaeloa Airport operations in 2020 under Alternative 11. Except for the existing beach cottages within NASBP, future noise sensitive land uses should remain outside the 60 DNL contour. Alternative 11 ranks lower (with Alternative 2) in minimizing potential adverse noise impacts and noise complaint risks due to anticipated higher noise levels in the Ewa Marina area. In fact, there is no significant difference between the two alternatives with respect to aircraft noise and land use compatibility in this area. While Alternative 11 is compatible with all off-site land uses when judged by both State and Federal noise compatibility standards and guidelines, the potential exists for complaints about aircraft noise and overflights under the flight corridor to the northeast. Potential adverse health and welfare noise impacts are possible if residential areas are developed near the Varona Village area, Villages of Kapolei, and directly under the flight corridor for aircraft operations northeast of the Airport.

2.5 Aircraft Noise - Alternative 6 With Honolulu International Airport

Figure 6 shows the cumulative noise contours when Kalaeloa Airport operations with the runway configuration shown in Alternative 6 (i.e., the inland-most 7,000 feet of Runways 4L-22R, 4R-22L, and 11-29) are combined with noise from aircraft overflying the Airport on their approach to Runway 8L at Honolulu International Airport. Figure 6 can be interpreted as the forecast aircraft noise levels in the project environs "with the project" under Alternative 6. Figure 8-8 can be interpreted as the forecast aircraft noise levels "without the project". Therefore, as can be seen from a comparison of Figures 8-8 and 6, the addition of noise from aircraft on the approach to Honolulu International Airport to the noise generated solely by aircraft operating out of the Kalaeloa Airport has virtually no effect on DNL contours of 60 and above. Future noise sensitive land uses in the project environs should remain outside the 60 DNL contour.



Airports Division

KALAELOA AIRPORT MASTER PLAN

2020 NOISE EXPOSURE MAP, ALTERNATIVE 11

LEGEND

- RES — Residential
- LDA — Low-Density Apartment
- MDA — Medium-Density Apartment
- Commercial/Office
- BP — Business Park
- LI — Light Industrial
- HI — Heavy Industrial
- MU RESID — Mixed Use (Residential)
- Park
- MU RESORT — Mixed Use (Resort)
- GC — Golf Course
- PF — Public Facility
- Public Facility (Education)
- PF CHURCH — Public Facility (Church)
- Military
- OPEN — Open
- Barbers Point NAS Boundary
- 55 DNL Contour
- Contours > 55 DNL

TRUE NORTH — MAGNETIC NORTH

0 625 1250 2500

GRAPHIC SCALE IN FEET

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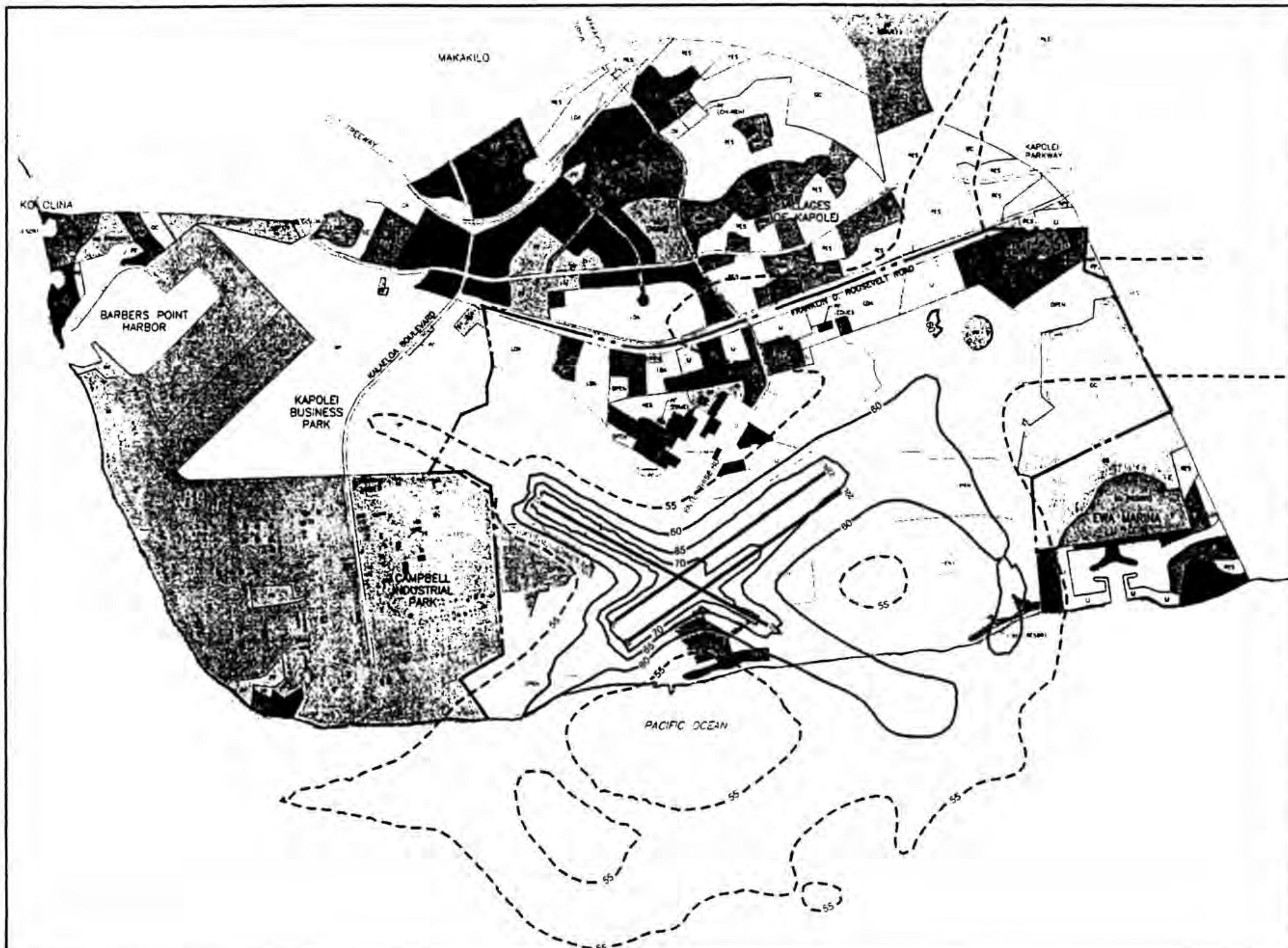
DATE 4-11-96	FIGURE NO
DWG NO 441-0500/004	5



Airports Division

KALAELOA AIRPORT MASTER PLAN

2020 NOISE EXPOSURE MAP, ALTERNATIVE 6 WITH HIA

LEGEND

- RES Residential
- LDA Low-Density Apartment
- Medium-Density Apartment
- Commercial/Office
- BP Business Park
- LI Light Industrial
- Heavy Industrial
- Mixed Use (Residential)
- Park
- Mixed Use (Resort)
- GC Golf Course
- PF Public Facility
- Public Facility (Education)
- Public Facility (Church)
- Military
- OPEN Open
- Barbers Point NAS Boundary
- 55 DNL Contour
- Contours > 55 DNL

GRAPHIC SCALE IN FEET

ARIES CONSULTANTS LTD
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DATE 4-17-98 | FIGURE NO. 6

DWG NO 241-0500-013

The addition of Honolulu International Airport operations does, however, enlarge the 55 DNL contour along the north side of the Base and in the following noise-sensitive locations: Varona Village and Villages of Kapolei. It only affects the width of the 55 DNL noise contour from the Kalaeloa Airport toward the northeast along the Base boundary. Thus, the conclusions reached on the basis of the noise contours generated only by aircraft operations from the proposed Kalaeloa Airport are also relevant to the combined Kalaeloa Airport and Honolulu International Airport noise impacts. It should be noted that the 55 DNL noise contour for Honolulu International Airport aircraft operations only includes residential areas in the Villages of Kapolei and two schools that would not be impacted by Kalaeloa Airport operations.

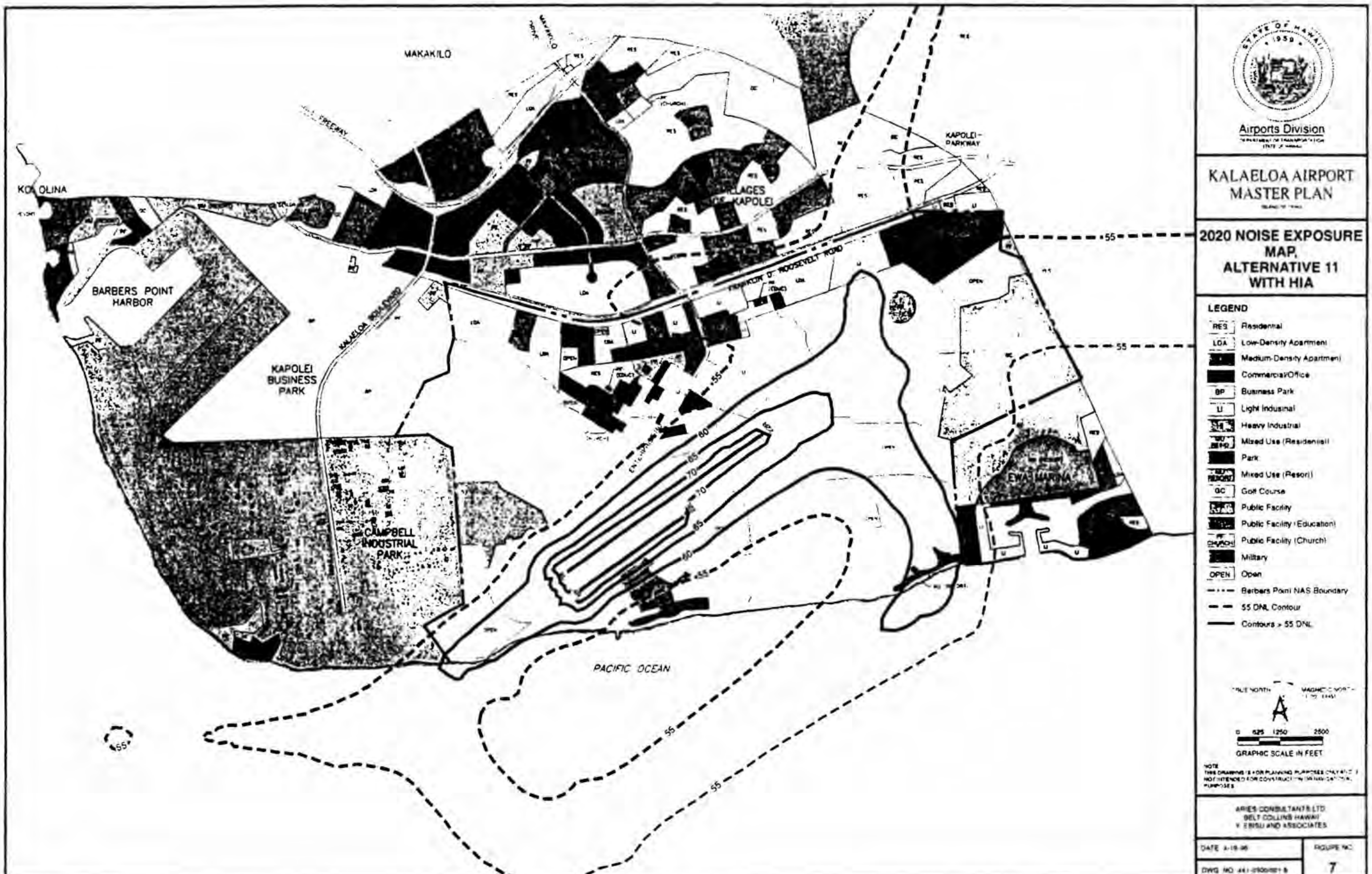
2.6 Aircraft Noise - Alternative 11 With Honolulu International Airport

Figure 7 depicts the combined noise contours resulting from forecast operations at Kalaeloa Airport under Alternative 11 and those operations associated with landings on Runway 8L at Honolulu International Airport in 2020. Figure 7 can be interpreted as the forecast aircraft noise levels in the project environs "with the project" if Alternative 11 is selected. Figure 8-6 can be interpreted as the forecast aircraft noise levels "without the project". Comparing Figures 8-8 and 7, it can be concluded that Kalaeloa Airport operations would increase cumulative aircraft noise levels in the following noise-sensitive locations: Varona Village and Villages of Kapolei. Except for the existing beach cottages within NASBP, future noise-sensitive land uses in the project environs should remain outside the 60 DNL contour. The combined Honolulu International Airport plus Kalaeloa Airport aircraft noise levels under Alternative 11 are similar to those under Alternative 6 in the Villages of Kapolei and Varona Village area. In the Ewa Marina and NASBP beach cottages areas, Alternative 11 would cause greater increases in aircraft noise levels than Alternative 6. Aircraft noise levels in the commercial and industrial areas northwest of Runway 11 would be lower under Alternative 11 than Alternative 6.

2.7 Aircraft Noise - Alternative 14

The runway configuration for this alternative includes the inland-most 8,000 feet of Runway 4L-22R and 3,700 feet near the makai end of Runway 4R-22L. The runway configuration is similar to Alternative 11. The principal difference is that this alternative retains an additional 1,000 feet of Runway 4L-22R. This additional length would allow all air carrier and military aircraft bound for Honolulu International Airport to continue to designate Barbers Point as an alternate landing site.

For this alternative, the departures and arrivals on Runway 4L use 8,000 feet of the runway rather than the 7,000 feet available in Alternative 11. The operating procedures for this alternative differ slightly from those used for other alternatives in their having been adjusted, after consultation with the FAA, to reduce the number of general aviation aircraft operations using the flight corridor to the northeast as described below.


Airports Division
KALAELOA AIRPORT
MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 11 WITH HIA
LEGEND
RES Residential
LOA Low-Density Apartment
Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
Public Facility (Church)
Military
OPEN Open
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
GRAPHIC SCALE IN FEET
0 625 1250 2500
ARIES CONSULTANTS LTD
BELT COLLINS HAWAII
V. EBISU AND ASSOCIATES
FIGURE NO.
7
MAKAKILO
KAPOLEI PARKWAY
KO OLINA
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
KALAELOA BOULEVARD
FRANKLIN D. ROOSEVELT ROAD
CAMPBELL INDUSTRIAL PARK
EWA MARINA
PACIFIC OCEAN
55
60
65
70

The aircraft flight tracks for this alternative are shown on Figure 8. In tradewind conditions single- and twin-engine general aviation aircraft departing Runway 4L to the northeast use the northeast flight track towards H-1 and Central Oahu over the proposed north-south road. Arriving aircraft use a flight track over H-1 and Kalaeloa Boulevard to the north and west of the Kalaeloa Airport and then land on Runway 4L in tradewind conditions. In Kona winds the routing is reversed; departures use Runway 22R and turn to the north over Kalaeloa Boulevard and then east over the H-1 corridor. Kona arrivals use the northeast corridor from H-1 over the proposed north-south road to land on Runway 22L.

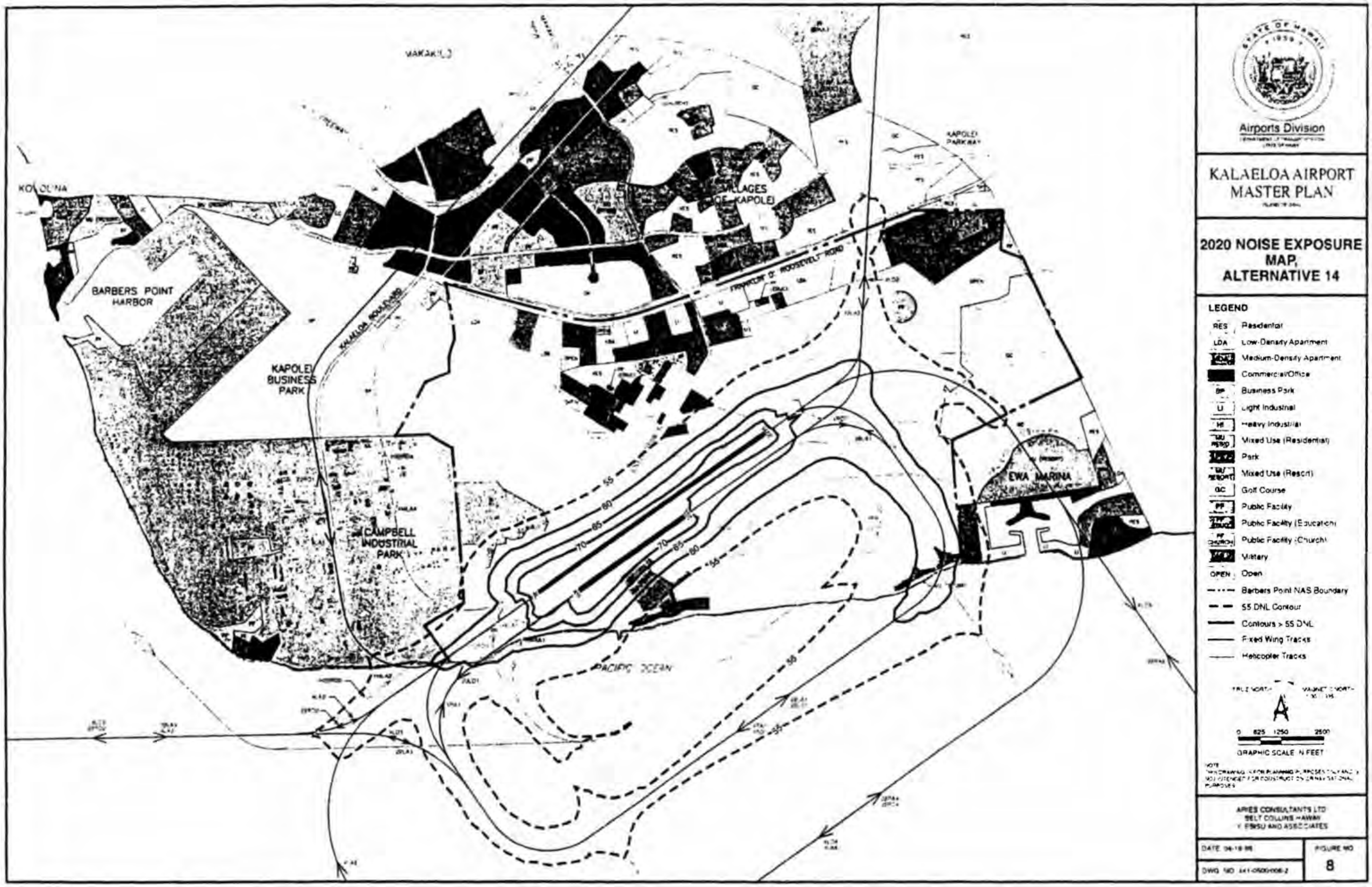
Most of the civil helicopters are routed offshore in this alternative. The infrequent civil helicopter operations to the northeast are assumed to depart to the southwest on Runway 22R and overfly Campbell Industrial Park, east of Kapolei Boulevard, and then circle back over the H-1 corridor. Arrivals to Runway 22R would be from the West Loch intersection to the northeast. The fixed-wing and helicopter operations are separated vertically and horizontally in accordance with approved FAA procedures.

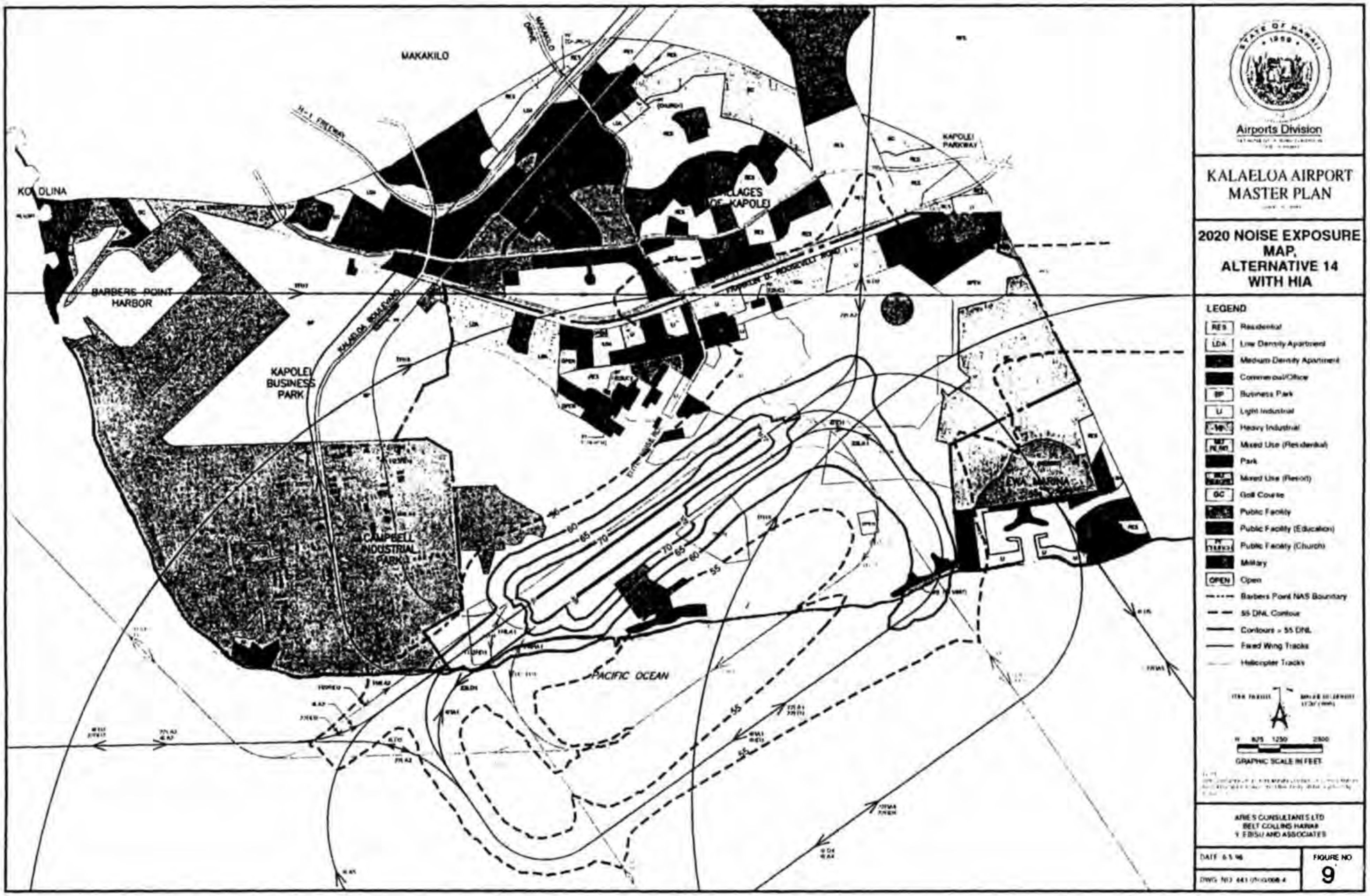
The USCG and HNG fixed wing aircraft and helicopter departure and arrival flight tracks are offshore and south of the Airport. None are to or from the northeast or northwest towards H-1.

Figure 8 depicts the resulting noise contours associated with Kalaeloa Airport operations in 2020 under Alternative 14. Except for the existing beach cottages within NASBP, future noise sensitive land uses should remain outside the 60 DNL contour. The noise contours for Alternative 14 are similar to Alternative 11, except for the significant reduction in the size of the 55 DNL contour in the Varona Village and Villages of Kapolei areas. This reduction is due to the aircraft operational and flight track procedures incorporated in this alternative. Alternative 14 ranks as one of the better alternatives (with Alternative 15) in minimizing potential adverse noise impacts and noise complaint risks near the Varona Village and Villages of Kapolei flight corridor. Potential adverse health and welfare noise impacts are possible at planned and proposed residences near the Varona Village area, Villages of Kapolei, and directly under the northeast flight corridor.

2.8 Aircraft Noise - Alternative 14 With Honolulu International Airport

Figure 9 depicts the combined noise contours resulting from forecast operations at Kalaeloa Airport under Alternative 14 plus those operations associated with landings on Runway 8L at Honolulu International Airport. This figure can be interpreted as the forecast aircraft noise levels in the project environs "with the project" under Alternative 14. Figure 8-8 can be interpreted as the forecast aircraft noise levels "without the project". Therefore, as can be seen by comparing Figures 8-8 and 9, Kalaeloa Airport


MAKAKILO
KO OLINA
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
CAMPBELL INDUSTRIAL PARK
VILLAGES OF KAPOLEI
KALAELOA BOULEVARD
FRANKLIN D. ROOSEVELT ROAD
KAPOLEI PARKWAY
EWA MARINA
PACIFIC OCEAN
55
60
65
70
Airports Division
KALAELOA AIRPORT
MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 14
LEGEND
RES Residential
LDA Low-Density Apartment
Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
HI Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
PF Public Facility
Public Facility (Education)
Public Facility (Church)
Military
OPEN Open
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
Fixed Wing Tracks
Helicopter Tracks
0 625 1250 2500
GRAPHIC SCALE IN FEET
ARIES CONSULTANTS LTD
BELT COLLINS HAWAII
Y. EBISU AND ASSOCIATES
FIGURE NO
8



Airports Division
KALAELOA AIRPORT MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 14 WITH HIA
LEGEND
RES Residential
LDA Low Density Apartment
Medium Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
Public Facility (Church)
Military
OPEN Open
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
Fixed Wing Tracks
Helicopter Tracks
0 625 1250 2500
GRAPHIC SCALE IN FEET
ARIES CONSULTANTS LTD
BELT COLLINS HAWAII
Y. EBISU AND ASSOCIATES
FIGURE NO
9
MAKAKILO
H-1 FREEWAY
KO OLINA
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
KALAELOA BOULEVARD
VILLAGES OF KAPOLEI
KAPOLEI PARKWAY
FRANKLIN D. ROOSEVELT ROAD
CAMPBELL INDUSTRIAL PARK
EWA MARINA
PACIFIC OCEAN
55
60
65
70

operations should not affect the 60 DNL contour for Honolulu International Airport, and noise sensitive land uses north of Kalaeloa Airport should remain outside the 60 DNL contour. The 60 DNL contours for the two airports do not overlap.

It can be concluded that Kalaeloa Airport operations would increase cumulative aircraft noise levels along the flight corridor northeast of the Airport, causing a slight increase in the 55 DNL contour over the proposed residential area west of Varona Village. Substantially less land area under the northeast corridor would be enclosed by the 55 DNL contour under Alternative 14 than under Alternatives 1, 2, 6 and 11. For this reason, potential adverse noise impacts in this area under Alternative 14 should be significantly less than for the other alternatives previously examined. The improvement is due to the aircraft operational and flight track patterns assumed for this alternative.

In the Ewa Marina and NASBP beach cottages areas, Alternative 14 would cause increases in aircraft noise levels similar to those under Alternative 11. Except for the existing beach cottages within NASBP, future noise sensitive land uses in the project environs should remain outside the 60 DNL contour.

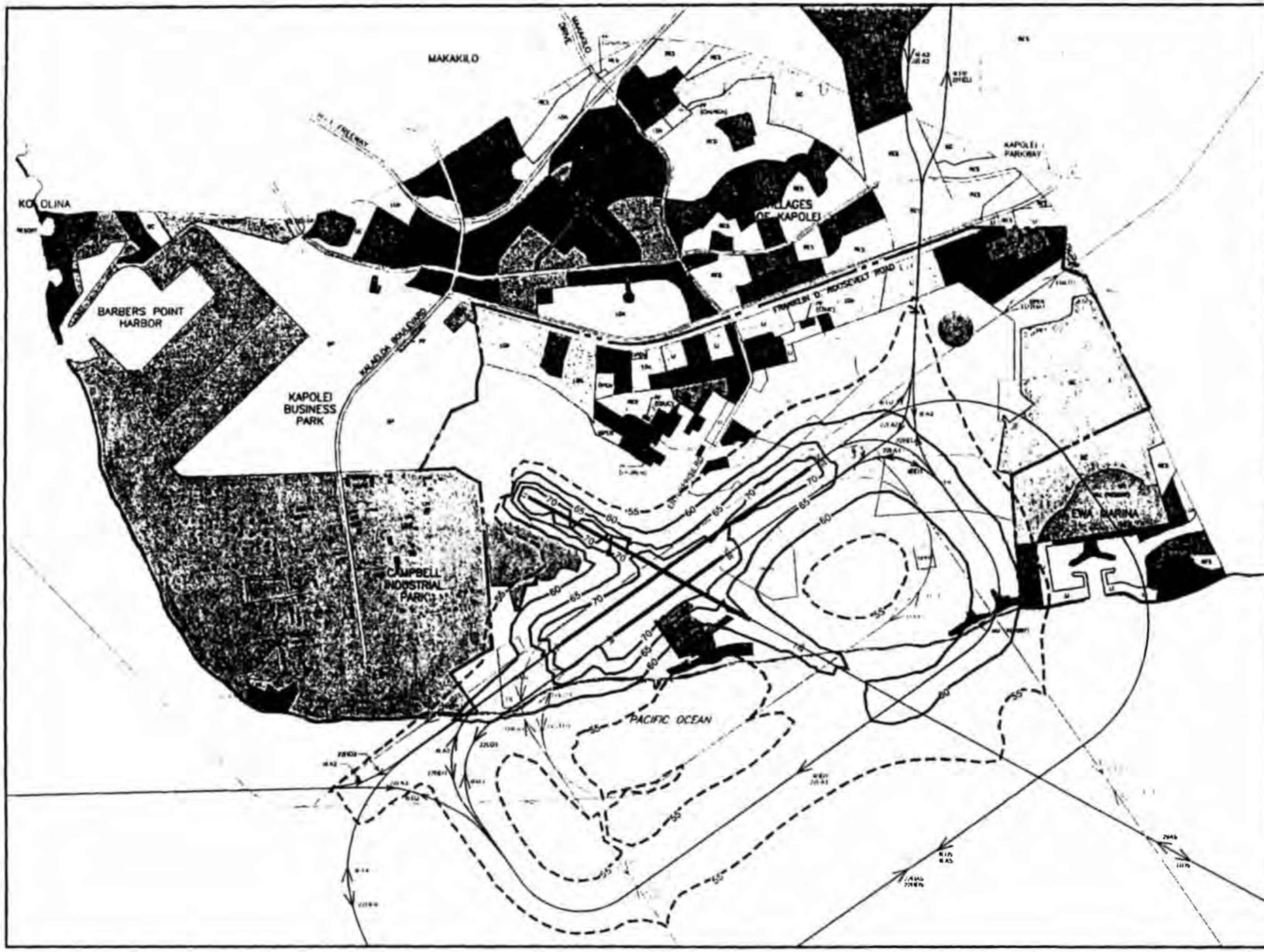
2.9 Aircraft Noise - Alternative 15

The runway configuration for this alternative includes the entire 8,330 feet of Runway 4L-22R and 3,700 feet near the makai end of Runway 4R-22L. In addition, a 7,000-foot-long section of crosswind Runway 11-29 is retained to accommodate itinerant USCG, HNG and twin-engined general aviation operations. The parallel runway configuration is similar to Alternative 14. The only difference is that Alternative 15 retains the full existing 8,330-foot length of Runway 4L-22R.

In this alternative, departures and arrivals on Runway 4L use the entire 8,330-foot length of the runway compared to the 7,000 feet available in Alternative 6. Another difference from Alternative 6 is that USCG and HNG aircraft would arrive on Runway 4L rather than Runway 4R because Runway 4R-22L is shortened to 3,700 feet in Alternative 15. The operating procedures for this alternative, as described below, differ slightly from those used for other alternatives in their having been adjusted, after consultation with the FAA, to reduce aircraft operations over existing noise-sensitive areas.

The aircraft flight tracks for this alternative are shown on Figure 10. The availability of the crosswind Runway 11-29 (similar to Alternative 6) allows the larger C-130 aircraft to avoid overflights of Ewa Marina when taking off and landing at Kalaeloa Airport.

For Alternative 15, only small single-engine general aviation aircraft would use the northeast flight track corridor over the proposed north-south road towards H-1. This generalized route would be used for both departures to, and arrivals from, the H-1/Central Oahu area. The departing and arriving aircraft would be separated both horizontally and



Airports Division

KALAELOA AIRPORT MASTER PLAN

2020 NOISE EXPOSURE MAP, ALTERNATIVE 15

LEGEND

- RES Residential
- LDA Low Density Apartment
- Medium Density Apartment
- Commercial/Office
- BP Business Park
- LI Light Industrial
- HI Heavy Industrial
- MU Mixed Use (Residential)
- Park
- MU Mixed Use (Resort)
- GC Golf Course
- Public Facility
- Public Facility (Education)
- Public Facility (Church)
- Military
- OPEN Open
- Barbers Point NAS Boundary
- 55 DNL Contour
- Contours > 55 DNL
- Fixed Wing Tracks
- Helicopter Tracks

0 625 1250 2500

GRAPHIC SCALE IN FEET

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FIGURE NO. 10

vertically in accordance with FAA approved procedures. The twin-engine small general aviation aircraft would be routed to the south and below the Honolulu International Airport Class B airspace for flights to and from the east. No general aviation departures and arrivals are assumed over the H-1/Kapolei Boulevard corridor to and from the northwest in this alternative. Runway 11-29 would be used only for takeoffs on Runway 11 by itinerant USCG, HNG and twin-engine general aviation aircraft in Tradewind conditions and for landings on Runway 29 by these aircraft in Kona wind conditions.

The general aviation training pattern is on Runway 4R-22L to the south and over the Ocean and the USCG and HNG training pattern is on Runway 4L-22R to the south and over the Ocean.

The USCG and HNG helicopter departure and arrival flight tracks are offshore and south of the Airport. None are to or from the northeast or northwest towards H-1. Most of the civil helicopter operations would also be routed to the south, but infrequent civil helicopter operations would depart to, and arrive from, the northeast over West Loch and the Harbor Intersection over H-1.

Figure 10 depicts the resulting noise contours associated with Kalaeloa Airport operations in 2020 under Alternative 15. Except for the existing beach cottages within NASBP, future noise sensitive land uses should remain outside both the 55 and 60 DNL contours. Potential risks of adverse health and welfare noise impacts from the Airport have been eliminated under this alternative at planned and proposed residences near the Varona Village area, Villages of Kapolei, and directly under the northeast flight corridor. Because of the aircraft operational and flight track assumptions made for Alternative 15, this ranks as the best alternative in minimizing potential adverse noise impacts near the northeast flight corridor in the Varona Village and Villages of Kapolei area.

The retention of Runway 11-29 in Alternative 15 and its use for the majority of C-130 departures has two principal effects on the DNL contours, just as it did in Alternative 6. First, it slightly reduces noise and overflights immediately east of the base. Second, it increases noise at either end of Runway 11-29 and brings more on-base property within the equivalent noise contours than is the case for alternatives that do not include this runway. However, without departures to, and arrivals from, the northwest and with no training activity, the equivalent noise contours for Alternative 15 are smaller than for Alternative 6 to both the northwest and southeast.

2.10 Aircraft Noise - Alternative 15 With Honolulu International Airport

Figure 11 depicts the combined noise contours resulting from forecast operations at Kalaeloa Airport under Alternative 15 plus those operations associated with landings on Runway 8L at Honolulu International Airport. This figure can be interpreted as the

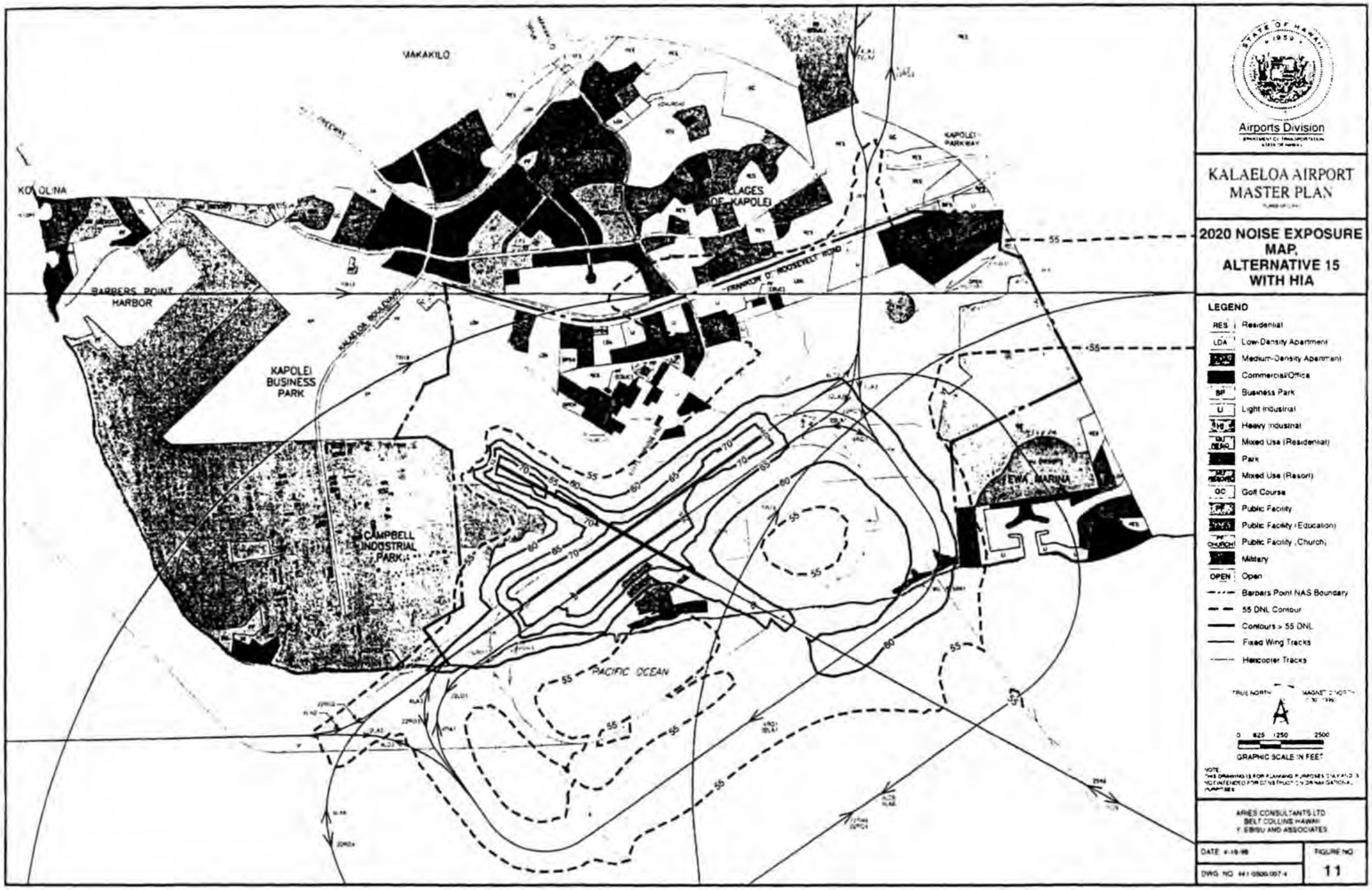
MAKAKILO
KO OLINA
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
CAMPBELL INDUSTRIAL PARK
VILLAGES OF KAPOLEI
KAPOLEI PARKWAY
FRANKLIN D. ROOSEVELT ROAD
KALAELOA BOULEVARD
EWA MARINA
PACIFIC OCEAN
55
60
65
70
Airports Division
KALAELOA AIRPORT MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 15 WITH HIA
LEGEND
RES Residential
LDA Low-Density Apartment
Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
Public Facility (Church)
Military
OPEN Open
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
Fixed Wing Tracks
Helicopter Tracks
TRUE NORTH
0 625 1250 2500
GRAPHIC SCALE IN FEET
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FIGURE NO
11

forecast aircraft noise levels in the project environs "with the project" under Alternative 15. Figure 8-8 can be interpreted as the forecast aircraft noise levels "without the project". Therefore, as can be seen by comparing Figures 8-8 and 11, Kalaeloa Airport operations should not affect the 60 DNL contour for Honolulu International Airport, and noise sensitive land uses north of Kalaeloa Airport should remain outside the 60 DNL contour.

Kalaeloa Airport operations for this alternative would slightly increase cumulative aircraft noise levels along the flight corridor northeast of the Airport, causing a slight increase in the 55 DNL contour directly under this flight corridor. Substantially less land area below the northeast corridor would be enclosed by the 55 DNL contour under Alternative 15 than under Alternatives 1, 2, 6 or 11. In addition, due to this alternative's elimination of twin-engine general aviation departures and arrivals along the northeast corridor, aircraft noise levels along both sides of the corridor (Villages of Kapolei and Varona Village) are lower than for all other alternatives.

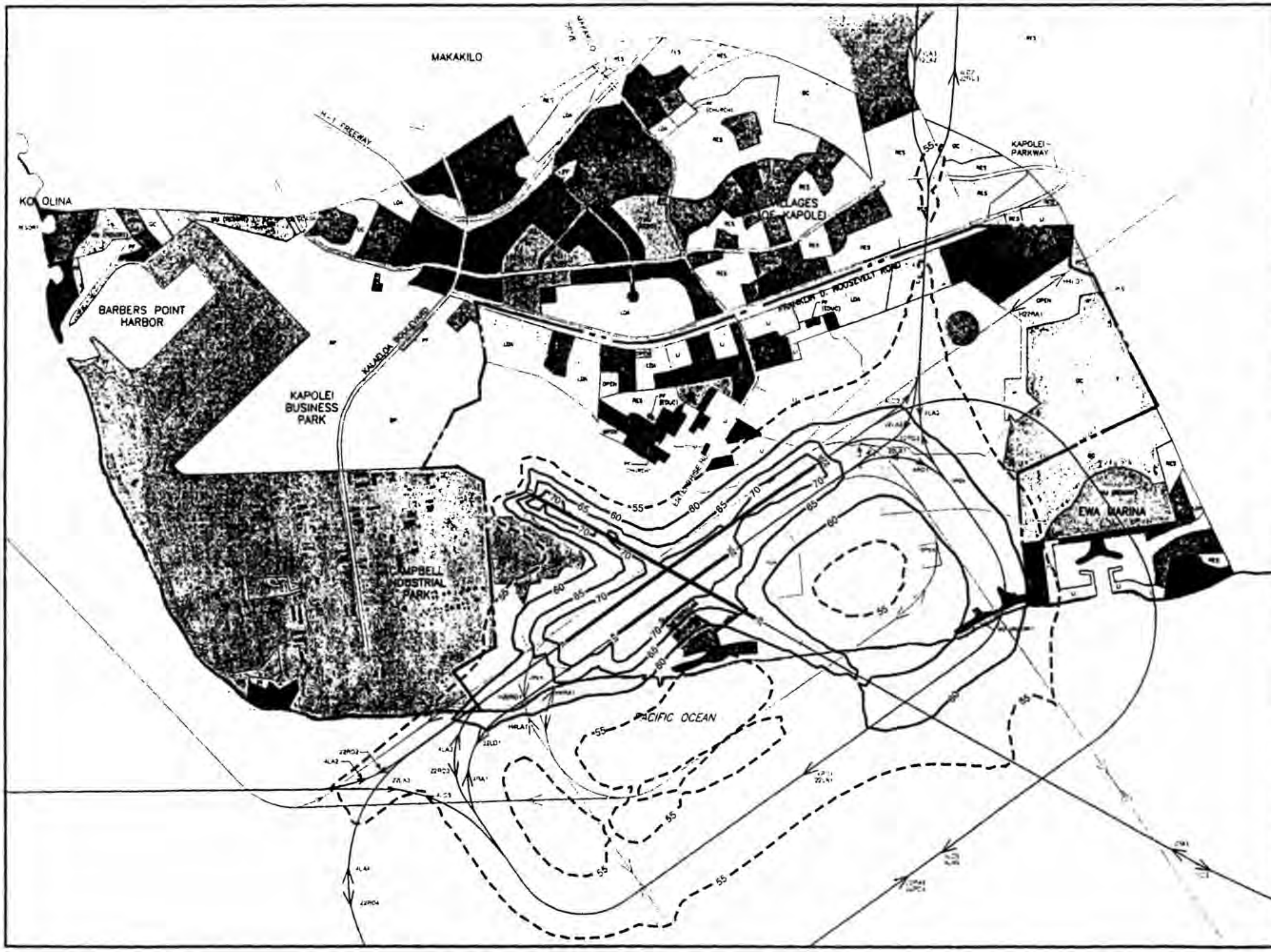
In the Ewa Marina and NASBP beach cottages areas, increases in aircraft noise levels under Alternative 15 would be similar to those under Alternative 6. Except for the existing beach cottages within NASBP, future noise sensitive land uses in the project environs should remain outside the 60 DNL contour. Additionally, risks of potential adverse noise impacts at the Ewa Marina area have been eliminated under Alternative 15. For this reason, as well as the reduction in aircraft noise levels along the northeast flight corridor, potential adverse noise impacts and complaint risks under Alternative 15 should be lower than for any of the alternatives previously examined because of the assumed aircraft operational and flight track patterns.

2.11 Aircraft Noise - Alternative 16

The runway configuration for this alternative is identical to Alternative 15, and includes the entire 8,330 feet of Runway 4L-22R and 3,700 feet of the makai end of Runway 4R-22L. In addition, a 7,000-foot-long section of crosswind Runway 11-29 is retained to better accommodate itinerant USCG, HNG, and twin-engined general aviation operations.

The aircraft flight tracks for this alternative are shown on Figure 12, and are identical to those shown for Alternative 15 on Figure 10. The availability of the crosswind Runway 11-29 allows for the avoidance of overflights of Ewa Marina by the larger C-130 aircraft when departing and landing at Kalaeloa Airport.

Under Alternative 16, only small, single-engine, general aviation aircraft would use the northeast flight track corridor over the proposed north-south road towards H-1. This generalized route would be used for both departures to, and arrivals from, the H-1/Central Oahu area. The departing and arriving aircraft would be separated both horizontally and vertically in accordance with FAA approved procedures. The twin-engine, small, general



Airports Division

KALAELOA AIRPORT MASTER PLAN

2020 NOISE EXPOSURE MAP, ALTERNATIVE 16

LEGEND

- RES — Residential
- LDA — Low-Density Apartment
- Medium-Density Apartment
- Commercial/Office
- BP — Business Park
- LI — Light Industrial
- Heavy Industrial
- Mixed Use (Residential)
- Park
- Mixed Use (Resort)
- GC — Golf Course
- Public Facility
- Public Facility (Education)
- Public Facility (Church)
- Military
- OPEN — Open
- Barbers Point NAS Boundary
- 55 DNL Contour
- Contours > 55 DNL
- Fixed Wing Tracks
- Helicopter Tracks

0 625 1250 2500

GRAPHIC SCALE IN FEET

ARIES CONSULTANTS LTD
BELT COLLINS HAWAII
Y. EBISU AND ASSOCIATES

DATE 7-25-96

FIGURE NO. 12

aviation aircraft would be routed to the south and below the Honolulu International Airport Class B airspace for flights to and from the east. No general aviation departures and arrivals are assumed to and from the northwest under this alternative. Runway 11-29 would be used only for takeoffs on Runway 11 by itinerant USCG, HNG, and twin-engine general aviation aircraft in Tradewind conditions, and for landings on Runway 29 by these aircraft in Kona wind conditions.

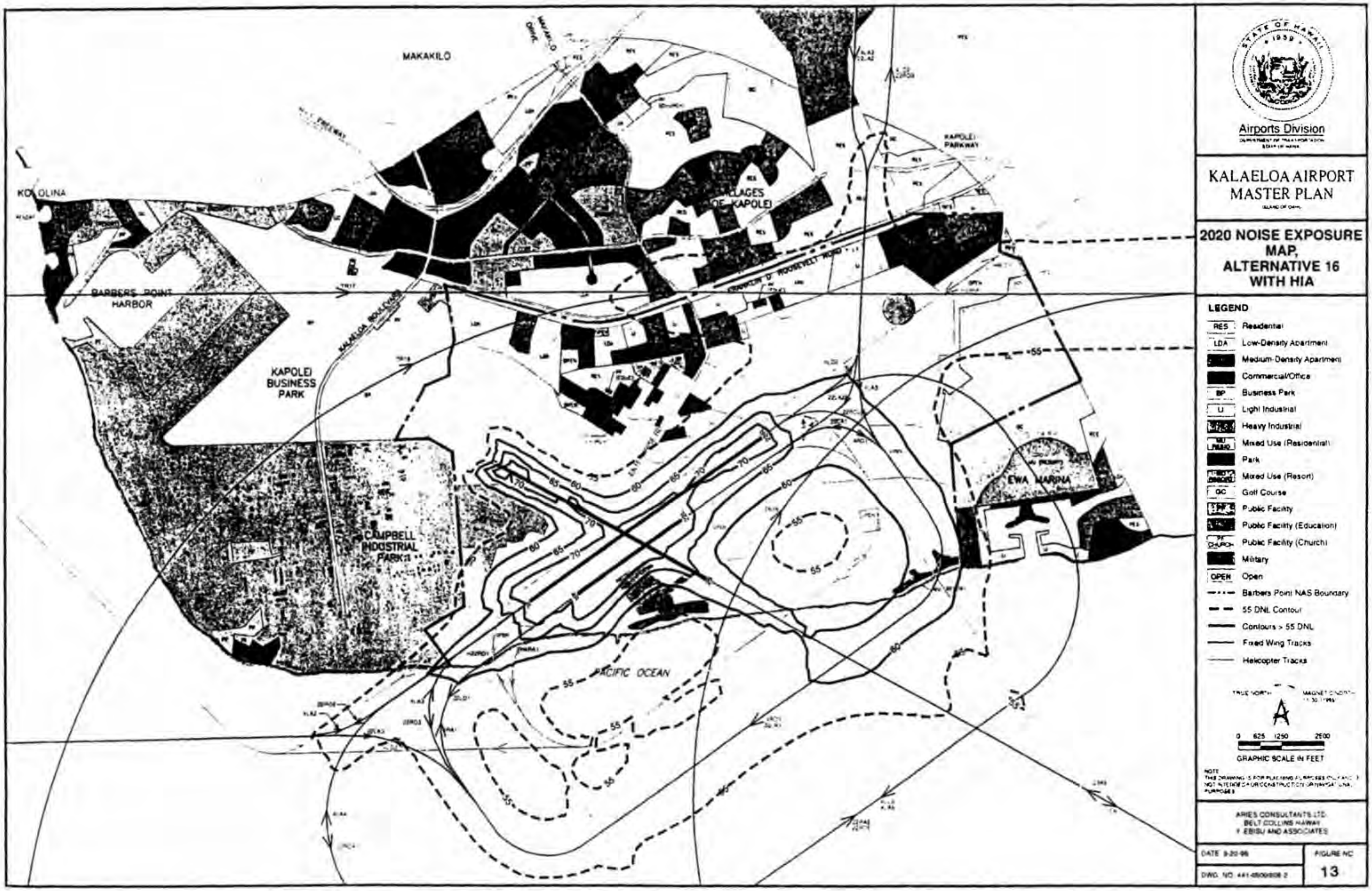
The general aviation training pattern is on Runway 4R-22L to the south and the USCG and HNG training pattern is on Runway 4L-22R to the south and over the ocean.

The USCG and HNG helicopters would depart to, and arrive from, flight tracks offshore and south of the Airport, with none to the northeast or northwest towards H-1. Most of the civil helicopter operations would also be routed to the south but infrequent civil helicopter operations would depart to, and arrive from, the northeast towards West Loch and the Harbor Intersection over H-1.

Figure 12 depicts the resulting noise contours associated with Kalaeloa Airport operations in CY 2020 under Alternative 16. These noise contours are approximately 0.2 to 0.5 DNL larger than those for Alternative 15, and differ from the noise contours of Alternative 15 under the northeast flight corridor near Varona Village. Except for the existing beach cottages within NASBP, future noise sensitive land uses should remain outside the 60 DNL contour. With the additional general aviation aircraft operations associated with the proposed Hawaii Aviation Training Center flight school, potential risks of adverse health and welfare noise impacts from the Airport have not been eliminated under this alternative at planned and proposed residences near the Varona Village area, Villages of Kapolei, and directly under the northeast flight corridor. However, because of the reduced twin-engine aircraft noise levels under the northeast flight corridor, Alternative 16 ranks as the second best (slightly below Alternative 15) in minimizing potential adverse noise impacts near the northeast flight corridor in the Varona Village and Villages of Kapolei areas.

2.12 Aircraft Noise - Alternative 16 with Honolulu International Airport

Figure 13 depicts the combined noise contours resulting from forecast operations at Kalaeloa Airport under Alternative 16 plus those operations associated with landings on Runway 8L at Honolulu International Airport. This figure can be interpreted as the forecast aircraft noise levels in the project environs "with the project" under Alternative 16. Figure 8-8 can be interpreted as the forecast aircraft noise levels "without the project". Therefore, as can be seen by comparing Figures 8-8 and 8-20, Kalaeloa Airport operations should not affect the 60 DNL contour for Honolulu International Airport, and noise sensitive land uses north of Kalaeloa Airport should remain outside the 60 DNL contour.


Airports Division
KALAELOA AIRPORT
MASTER PLAN
2020 NOISE EXPOSURE MAP, ALTERNATIVE 16 WITH HIA
LEGEND
RES Residential
LDA Low-Density Apartment
Medium-Density Apartment
Commercial/Office
BP Business Park
LI Light Industrial
Heavy Industrial
Mixed Use (Residential)
Park
Mixed Use (Resort)
GC Golf Course
Public Facility
Public Facility (Education)
PF CHURCH Public Facility (Church)
Military
OPEN Open
Barbers Point NAS Boundary
55 DNL Contour
Contours > 55 DNL
Fixed Wing Tracks
Helicopter Tracks
TRUE NORTH
0 625 1250 2500
GRAPHIC SCALE IN FEET
ARIES CONSULTANTS LTD.
BELT COLLINS HAWAII
EBISU AND ASSOCIATES
FIGURE NO.
13
MAKAKILO
KO OLINA
BARBERS POINT HARBOR
KAPOLEI BUSINESS PARK
KALAELOA BOULEVARD
VILLAGES OF KAPOLEI
FRANKLIN D. ROOSEVELT ROAD
KAPOLEI PARKWAY
CAMPBELL INDUSTRIAL PARK
EWA MARINA
PACIFIC OCEAN
55
60
65
70
75

It can be concluded that Kalaeloa Airport operations would increase cumulative aircraft noise levels along the flight corridor northeast of the Airport, causing a slight increase in Honolulu International Airport's 55 DNL contour directly under this flight corridor. Substantially less land area under the northeast corridor would be enclosed by the 55 DNL contour under Alternative 16 than under Alternatives 1, 2, 6 and 11. Like Alternative 15, the elimination of twin-engine general aviation departures and arrivals along the northeast corridor under Alternative 16 would result in lower aircraft noise levels along both sides of the corridor (Villages of Kapolei and Varona Village). Comparing Alternative 16 with Alternative 15, the resulting combined Kalaeloa Airport and Honolulu International Airport noise contours along this northeast corridor would be only 0.2 DNL higher under Alternative 15.

In the Ewa Marina and NASBP beach cottages areas, increases in aircraft noise levels under Alternative 16 would be similar to those under Alternative 6, and approximately 0.5 DNL higher than those under Alternative 15. Except for the existing beach cottages within NASBP, future noise sensitive land uses in the project environs should remain outside the 60 DNL contour. As was true of Alternative 15, risks of potential adverse noise impacts at the Ewa Marina area have been eliminated under Alternative 16. For this reason, as well as the reduction in aircraft noise levels along the northeast flight corridor, potential adverse noise impacts and complaint risks under Alternative 16 should be one of the lowest, and second only to Alternative 15.

Appendix A

REFERENCES

1. "Guidelines for Considering Noise in Land Use Planning and Control", Federal Interagency Committee on Urban Noise, June 1980.

2. "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B", U.S. Department of Housing and Urban Development, July 12, 1979.

3. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety", Environmental Protection Agency (EPA 550/9-74-004), March 1974.

4. Chapter 508D, "Mandatory Seller Disclosures in Real Estate Transactions", Hawaii Revised Statutes, July 1, 1995.

5. "Title 11, Administrative Rules, Chapter 42, Vehicular Noise Control for Oahu", Hawaii State Department of Health, October 27, 1981.

6. "Title 11, Administrative Rules, Chapter 43, Community Noise Control for Oahu", Hawaii State Department of Health, November 6, 1981.

7. "Kahului Airport - FAR Part 150 Noise Compatibility Program, Volume II: Noise Compatibility Program Report", Hawaii State Department of Transportation, Airports Division, September 1995, Draft.

8. CY 2020 aircraft operations forecasts for Kalaeloa Airport via transmittals from Aries Consultants Ltd. from August 1994 through January 1998.

9. "FAA Order No. 1050.1D - Policies and Procedures for Considering Environmental Impact Statements", Federal Aviation Administration, December 5, 1986.

10. "Naval Air Station Barbers Point Air Installations Compatible Use Zones (AICUZ) Noise Contours and Supporting Data", Contract No. N62477-86-D-0261, Harris Miller Miller & Hanson, Inc., July 1989.

11. "Honolulu International Airport Master Plan Update and Noise Compatibility Program, Volume 2, Part I; FAR Part 150 - Noise Exposure Maps and Noise Compatibility Program", Hawaii State Department of Transportation, Airports Division, December 1989.

APPENDIX B

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 LCdn with the LAdn.

Although not included in the tables, it is also recommended that "Lpn" and "LepN" be used as symbols for perceived noise levels and effective perceived noise levels, 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 LA 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, Leq, is designated the "equivalent sound level". For Ld, Ln, and Ldn, "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 characteristics 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. Lpn = 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 Weighed Loss of Hearing" (PHL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

APPENDIX B (CONTINUED)

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).

SOURCE: EPA ACOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78, NOISE REGULATION REPORTER.

TABLE II

RECOMMENDED DESCRIPTOR LIST

TERM	A-WEIGHTING	ALTERNATIVE[1] A-WEIGHTING	OTHER[2] WEIGHTING	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 [4] Over Time(T)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
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 Leq(1). Time may be specified in non-quantitative terms (e.g., could be specified as Leq(WASH) to mean the washing cycle noise for a washing machine.

APPENDIX C-1. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 1 (2020)

A/C	TOTAL DAILY LAND'S.	RWY 04L ITIN. 4LA2	RWY 04L ITIN. 4LA3	RWY 04L LOCAL 4LA1	RWY H4L ITIN. 4LA2	RWY H4L ITIN. 4LA3	RWY H4L LOCAL 4LA1	RWY H22R ITIN. 22RA1	RWY H22R ITIN. 29A1	RWY H22R ITIN. 11A1	RWY H22R ITIN. 11A2	RWY H22R LOCAL 22RA3	RWY 22R ITIN. 22RA2	RWY 22R ITIN. 22RA3	RWY 22R LOCAL 22RA1
C-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.16	0.25	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.03	0.08
CH-47	6.79	0.00	0.00	0.00	0.14	0.00	3.75	1.63	0.34	0.07	0.20	0.66	0.00	0.00	0.00
HH-65A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	7.59	11.38	18.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.01	1.34	3.35
C172/PA28	167.81	28.53	42.80	71.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.55	5.03	12.59
BELL	11.64	0.00	0.00	0.00	0.58	7.57	1.98	1.16	0.00	0.00	0.00	0.35	0.00	0.00	0.00
TOTAL DAY:	231.83	36.28	54.43	90.69	0.72	7.57	5.73	2.79	0.34	0.07	0.20	1.01	9.59	6.40	16.01
C-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.12	0.05	0.01	0.00	0.01	0.02	0.00	0.00	0.00
HH-65A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.23	0.35	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.10
C172/PA28	5.19	0.88	1.32	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.16	0.39
BELL	0.36	0.00	0.00	0.00	0.02	0.23	0.06	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00
TOTAL NITE:	7.17	1.12	1.68	2.80	0.02	0.23	0.18	0.09	0.01	0.00	0.01	0.03	0.30	0.20	0.50

APPENDIX C-1. (CONTINUED) **AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 1 (2020)**

	TOTAL	RWY 04L			RWY H4L			RWY H22R					RWY 22R		
	DAILY	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL
A/C	DEPART'S	4LD2	4LD3	4LD1	4LD1	4LD4	4LD3	22RD2	29D1	29D2	11D1	22RD1	22RD2	22RD3	22RD1
C-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.25	0.16	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.08
CH-47	6.79	0.00	0.00	0.00	1.63	0.00	3.75	0.14	0.07	0.20	0.34	0.66	0.00	0.00	0.00
HH-65A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	11.38	7.59	18.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	2.01	3.35
C172/PA28	167.81	42.80	28.53	71.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.03	7.55	12.59
BELL	11.64	0.00	0.00	0.00	1.16	7.57	1.98	0.58	0.00	0.00	0.00	0.35	0.00	0.00	0.00
TOTAL DAY:	231.83	54.43	36.28	90.69	2.79	7.57	5.73	0.72	0.07	0.20	0.34	1.01	6.40	9.59	16.01
C-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.05	0.00	0.12	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.00
HH-65A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.35	0.23	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.10
C172/PA28	5.19	1.32	0.88	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.23	0.39
BELL	0.36	0.00	0.00	0.00	0.04	0.23	0.06	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
TOTAL NITE:	7.17	1.68	1.12	2.80	0.09	0.23	0.18	0.02	0.00	0.01	0.01	0.03	0.20	0.30	0.50

APPENDIX C-2. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 2 (2020)

	TOTAL	RWY 04R					RWY H4L				RWY H22R					
	DAILY	ITIN.	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	ITIN.	ITIN.	LOCAL
A/C	LAND'S.	4RA2	4RA3	4RA4	4RA5	4RA1	4LA2	4LA3	4LA4	4LA1	22RA1	22RA2	29A1	11A1	11A2	22RA3
C-130	4.85	0.00	0.00	3.09	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.62	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	3.75	0.81	0.81	0.34	0.07	0.20	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	7.59	11.38	0.00	0.00	18.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	28.53	42.80	0.00	0.00	71.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.58	7.57	0.00	1.98	1.16	0.00	0.00	0.00	0.00	0.35
TOTAL DAY:	241.53	36.11	54.17	3.72	1.03	90.48	0.72	7.57	0.00	5.73	1.98	0.81	0.34	0.07	0.20	1.01
C-130	0.15	0.00	0.00	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.03	0.03	0.01	0.00	0.01	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.23	0.35	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.88	1.32	0.00	0.00	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.02	0.23	0.00	0.06	0.04	0.00	0.00	0.00	0.00	0.01
TOTAL NITE:	7.47	1.12	1.68	0.11	0.03	2.80	0.02	0.23	0.00	0.18	0.06	0.03	0.01	0.00	0.01	0.03

APPENDIX C-2. (CONTINUED)

AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 2 (2020)

	TOTAL	------------- RWY 22L				--------------	-- RWY H4R --		-- RWY H22L --	
	DAILY	ITIN.	ITIN.	ITIN	LOCAL	LOCAL	ITIN.	LOCAL	ITIN.	LOCAL
A/C	LAND'S.	22LA2	22LA3	22LA4	22LA5	22LA1	4RA2	4RA1	22LA1	22LA2
C-130	4.85	0.00	0.00	0.54	0.18	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.11	0.00	0.04	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	2.01	1.34	0.00	0.00	3.35	0.00	0.00	0.00	0.00
C172/PA28	167.81	7.55	5.03	0.00	0.00	12.59	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	9.55	6.37	0.65	0.18	15.98	3.15	1.21	0.24	0.24
C-130	0.15	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.06	0.04	0.00	0.00	0.10	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.23	0.16	0.00	0.00	0.39	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.30	0.20	0.02	0.01	0.49	0.10	0.04	0.01	0.01

APPENDIX C-2. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 2 (2020)

	TOTAL	RWY 04R					RWY H4L				RWY H22R				
	DAILY	ITIN.	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	ITIN.	LOCAL
A/C	DEPART'S	4RD2	4RD3	4RD4	4R05	4RD1	4LD1	4LD2	4LD4	4LD3	22RD2	29D1	29D2	11D1	22RD1
C-130	4.85	0.00	0.00	3.09	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.62	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.81	0.81	0.00	3.75	0.14	0.07	0.20	0.34	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	11.38	7.59	0.00	0.00	18.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	42.80	28.53	0.00	0.00	71.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	1.16	0.00	7.57	1.98	0.58	0.00	0.00	0.00	0.35
TOTAL DAY:	241.53	54.17	36.11	3.72	1.03	90.48	1.98	0.81	7.57	5.73	0.72	0.07	0.20	0.34	1.01
C-130	0.15	0.00	0.00	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.12	0.00	0.00	0.01	0.01	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.35	0.23	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	1.32	0.88	0.00	0.00	2.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.23	0.06	0.02	0.00	0.00	0.00	0.01
TOTAL NITE:	7.47	1.68	1.12	0.11	0.03	2.80	0.06	0.03	0.23	0.18	0.02	0.00	0.01	0.01	0.03

APPENDIX C-2. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 2 (2020)

A/C	TOTAL DAILY DEPART'S	RWY 22L ITIN. 22LD2	RWY 22L ITIN. 22LD3	RWY 22L ITIN. 22LD4	RWY 22L LOCAL 22LD5	RWY 22L LOCAL 22LD1	RWY H4R LOCAL 4RD2	RWY H4R ITIN. 4RD1	RWY H22L ITIN. 22LD2	RWY H22L LOCAL 22LD1
C-130	4.85	0.00	0.00	0.54	0.18	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.11	0.00	0.04	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	1.21	3.15	0.24	0.24
PA31/C402	44.62	1.34	2.01	0.00	0.00	3.35	0.00	0.00	0.00	0.00
C172/PA28	167.81	5.03	7.55	0.00	0.00	12.59	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	6.37	9.55	0.65	0.18	15.98	1.21	3.15	0.24	0.24
C-130	0.15	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.01	0.01
PA31/C402	1.38	0.04	0.06	0.00	0.00	0.10	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.16	0.23	0.00	0.00	0.39	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.20	0.30	0.02	0.01	0.49	0.04	0.10	0.01	0.01

APPENDIX C-3. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 6 (2020)

A/C	TOTAL DAILY LAND'S.	--- RWY 04R --- ITIN. 4RA4	LOCAL 4RA1	--- RWY 04L --- ITIN. 4LA2	ITIN. 4LA3	-------- RWY H4L ------ ITIN. 4LA2	ITIN. 4LA3	LOCAL 4LA1	-------------- RWY H22R ------------ ITIN. 22RA1	ITIN. 29A1	ITIN. 11A1	ITIN. 11A2	LOCAL 22RA3	-- RWY 22R -- ITIN. 22RA2	ITIN. 22RA3
C-130	4.85	2.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.14	0.00	3.75	1.63	0.34	0.07	0.20	0.66	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	0.00	15.39	6.16	9.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.72
C172/PA28	167.81	0.00	57.90	23.16	34.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.02	2.70
BELL	11.64	0.00	0.00	0.00	0.00	0.58	7.57	1.98	1.16	0.00	0.00	0.00	0.35	0.00	0.00
TOTAL DAY:	241.53	3.49	73.29	29.32	43.96	0.72	7.57	5.73	2.79	0.34	0.07	0.20	1.01	5.08	3.41
C-130	0.15	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.05	0.01	0.00	0.01	0.02	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.00	0.48	0.19	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02
C172/PA28	5.19	0.00	1.79	0.72	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.08
BELL	0.36	0.00	0.00	0.00	0.00	0.02	0.23	0.06	0.04	0.00	0.00	0.00	0.01	0.00	0.00
TOTAL NITE:	7.47	0.11	2.27	0.91	1.36	0.02	0.23	0.18	0.09	0.01	0.00	0.01	0.03	0.16	0.11

APPENDIX C-3. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 6 (2020)

	TOTAL	-RWY 22L-	RWY 11				RWY 29					RWY H4R		RWY H22L	
	DAILY	LOCAL	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	LOCAL	ITIN.	LOCAL
A/C	LAND'S.	22LA1	11A3	11A4	11A2	11A1	29A3	29A4	29A5	29A2	29A1	4RA2	4RA1	22LA1	22LA2
C-130	4.85	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.73	0.18	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.15	0.04	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	1.78	2.28	1.51	0.00	3.79	0.81	0.53	0.00	0.00	1.34	0.00	0.00	0.00	0.00
C172/PA28	167.81	6.71	8.57	5.69	0.00	14.26	3.03	2.01	0.00	0.00	5.03	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	8.50	10.85	7.21	1.23	18.05	3.83	2.54	0.87	0.22	6.37	3.15	1.21	0.24	0.24
C-130	0.15	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.06	0.07	0.05	0.00	0.12	0.02	0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.21	0.27	0.18	0.00	0.44	0.09	0.06	0.00	0.00	0.16	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.26	0.34	0.22	0.04	0.56	0.12	0.08	0.03	0.01	0.20	0.10	0.04	0.01	0.01

APPENDIX C-3. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT
(CONTINUED) UNDER ALTERNATIVE 6 (2020)

A/C	TOTAL DAILY DEPART'S.	-- RWY 04L -- ITIN. 4LD2	ITIN. 4LD3	RWY 04R LOCAL 4RD1	-------- RWY H4L ------ ITIN. 4LD1	ITIN. 4LD4	LOCAL 4LD3	-------------- RWY H22R ----------- ITIN. 22RD2	ITIN. 29D1	ITIN. 29D2	ITIN. 11D1	LOCAL 22RD1	-- RWY 22R -- ITIN. 22RD2	ITIN. 22RD3
C-130	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.00
C-26	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
CH-47	6.79	0.00	0.00	0.00	1.63	0.00	3.75	0.14	0.07	0.20	0.34	0.66	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	9.23	6.16	15.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	1.07
C172/PA28	167.81	34.73	23.16	57.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.70	4.02
BELL	11.64	0.00	0.00	0.00	1.16	7.57	1.98	0.58	0.00	0.00	0.00	0.35	0.00	0.00
TOTAL DAY:	241.53	43.96	29.32	73.29	2.79	7.57	5.73	0.72	0.07	0.20	0.34	1.01	4.29	5.08
C-130	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.05	0.00	0.12	0.00	0.00	0.01	0.01	0.02	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.29	0.19	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03
C172/PA28	5.19	1.07	0.72	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.12
BELL	0.36	0.00	0.00	0.00	0.04	0.23	0.06	0.02	0.00	0.00	0.00	0.01	0.00	0.00
TOTAL NITE:	7.47	1.36	0.91	2.27	0.09	0.23	0.18	0.02	0.00	0.01	0.01	0.03	0.13	0.16

APPENDIX C-3. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT
(CONTINUED) UNDER ALTERNATIVE 6 (2020)

	TOTAL	RWY 22L	------------- RWY 11				-------------	--------- RWY 29			-----------	-- RWY H4R --		-- RWY H22L --	
	DAILY	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	LOCAL	ITIN.	LOCAL
A/C	DEPART'S.	22LD1	11D3	11D4	11D5	11D2	11D1	29D3	29D4	29D2	29D1	4RD1	4R02	22LD2	22LD1
C-130	4.85	0.00	0.00	0.00	2.91	1.03	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.00	0.58	0.20	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	1.78	2.28	1.51	0.00	0.00	3.79	0.81	0.53	0.00	1.34	0.00	0.00	0.00	0.00
C172/PA28	167.81	6.71	8.57	5.69	0.00	0.00	14.26	3.03	2.01	0.00	5.03	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	8.50	10.85	7.21	3.49	1.23	18.05	3.83	2.54	0.22	6.37	3.15	1.21	0.24	0.24
C-130	0.15	0.00	0.00	0.00	0.09	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.06	0.07	0.05	0.00	0.00	0.12	0.02	0.02	0.00	0.04	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.21	0.27	0.18	0.00	0.00	0.44	0.09	0.06	0.00	0.16	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.26	0.34	0.22	0.11	0.04	0.56	0.12	0.08	0.01	0.20	0.10	0.04	0.01	0.01

APPENDIX C-4. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 11 (2020)

	TOTAL	-RWY 04R-	---------- RWY 04L ---------				-------- RWY H4L ------			---------------- RWY H22R --------------				
	DAILY	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	ITIN.	LOCAL
A/C	LAND'S.	4RA1	4LA2	4LA3	4LA5	4LA4	H4LA2	H4LA3	H4LA1	H22RA1	H29A1	H11A1	H11A2	H22RA3
C-130	4.85	0.00	0.00	0.00	2.91	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.00	0.58	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.14	0.00	3.75	1.63	0.34	0.07	0.20	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	19.19	7.67	11.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	72.16	28.86	43.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.58	7.57	1.98	1.16	0.00	0.00	0.00	0.35
TOTAL DAY:	241.53	91.34	36.53	54.81	3.49	1.23	0.72	7.57	5.73	2.79	0.34	0.07	0.20	1.01
C-130	0.15	0.00	0.00	0.00	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.05	0.01	0.00	0.01	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.59	0.24	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	2.23	0.89	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.02	0.23	0.06	0.04	0.00	0.00	0.00	0.01
TOTAL NITE:	7.47	2.83	1.13	1.70	0.11	0.04	0.02	0.23	0.18	0.09	0.01	0.00	0.01	0.03

APPENDIX C-4. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT
(CONTINUED) UNDER ALTERNATIVE 11 (2020)

A/C	TOTAL DAILY LAND'S.	RWY 22R ITIN. 22RA2	RWY 22R ITIN. 22RA3	RWY 22R ITIN. 22RA5	RWY 22R LOCAL 22RA4	RWY 22L LOCAL 22LA1	RWY H4R ITIN. H4RA2	RWY H4R LOCAL H4RA1	RWY H22L ITIN. H22LA1	RWY H22L LOCAL H22LA2
C-130	4.85	0.00	0.00	0.73	0.18	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.15	0.04	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	1.87	1.25	0.00	0.00	3.12	0.00	0.00	0.00	0.00
C172/PA28	167.81	7.04	4.70	0.00	0.00	11.75	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	8.91	5.96	0.87	0.22	14.87	3.15	1.21	0.24	0.24
C-130	0.15	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.06	0.04	0.00	0.00	0.10	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.22	0.15	0.00	0.00	0.36	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.28	0.18	0.03	0.01	0.46	0.10	0.04	0.01	0.01

APPENDIX C-4. (CONTINUED) **AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 11 (2020)**

	TOTAL	RWY 04L				RWY 04R	RWY H4L			RWY H22R				
	DAILY	ITIN.	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	ITIN.	LOCAL
A/C	DEPART'S.	4LD2	4LD3	4LD5	4LD4	4RD1	H4LD1	H4LD4	H4LD3	H22RD2	H29D1	H29D2	H11D1	H22RD1
C-130	4.85	0.00	0.00	2.91	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.58	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	1.63	0.00	3.75	0.14	0.07	0.20	0.34	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	11.51	7.67	0.00	0.00	19.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	43.30	28.86	0.00	0.00	72.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	1.16	7.57	1.98	0.58	0.00	0.00	0.00	0.35
TOTAL DAY:	241.53	54.81	36.53	3.49	1.23	91.34	2.79	7.57	5.73	0.72	0.07	0.20	0.34	1.01
C-130	0.15	0.00	0.00	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.12	0.00	0.00	0.01	0.01	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.36	0.24	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	1.34	0.89	0.00	0.00	2.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.04	0.23	0.06	0.02	0.00	0.00	0.00	0.01
TOTAL NITE:	7.47	1.70	1.13	0.11	0.04	2.83	0.09	0.23	0.18	0.02	0.00	0.01	0.01	0.03

APPENDIX C-4. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 11 (2020)

A/C	TOTAL DAILY DEPART'S.	RWY 22R ITIN. 22RD2	RWY 22R ITIN. 22RD3	RWY 22R LOCAL 22RD4	RWY 22L LOCAL 22LD1	RWY H4R ITIN. H4RD1	RWY H4R LOCAL H4RD2	RWY H22L ITIN. H22LD2	RWY H22L LOCAL H22LD1
C-130	4.85	0.73	0.00	0.18	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.15	0.00	0.04	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	1.25	1.87	0.00	3.12	0.00	0.00	0.00	0.00
C172/PA28	167.81	4.70	7.04	0.00	11.75	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	6.83	8.91	0.22	14.87	3.15	1.21	0.24	0.24
C-130	0.15	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.04	0.06	0.00	0.10	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.15	0.22	0.00	0.36	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.21	0.28	0.01	0.46	0.10	0.04	0.01	0.01

APPENDIX C-4A. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 14 (2020)

	TOTAL	-RWY 04R-	---------- RWY 04L			---------	----------- RWY H4L			----------	-RWY H22R-
	DAILY	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	LOCAL
A/C	LAND'S.	4RA1	4LA2	4LA1	4LA5	4LA4	H4LA2	H4LA3	H4LA4	H4LA1	H22RA3
C-130	4.85	0.00	0.00	0.00	3.09	1.03	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.00	0.62	0.20	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	2.04	0.34	0.00	3.75	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	18.96	7.59	11.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	71.31	28.53	42.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	1.16	7.33	0.81	1.98	0.35
TOTAL DAY:	241.53	90.28	36.11	54.17	3.72	1.23	3.20	7.67	0.81	5.73	1.01
C-130	0.15	0.00	0.00	0.00	0.10	0.03	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.12	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.59	0.23	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	2.21	0.88	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.04	0.23	0.03	0.06	0.01
TOTAL NITE:	7.47	2.79	1.12	1.68	0.11	0.04	0.10	0.24	0.03	0.18	0.03

APPENDIX C-4A. (CONTINUED)

AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 14 (2020)

A/C	TOTAL DAILY LAND'S.	-- RWY 22R -- ITIN. 22RA5	LOCAL 22RA4	------- RWY 22L ------ ITIN. 22LA2	ITIN. 22LA3	LOCAL 22LA1	--- RWY H4R -- ITIN. H4RA2	LOCAL H4RA1	--- RWY H22L --- ITIN. H22LA1	LOCAL H22LA2
C-130	4.85	0.54	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	0.00	0.00	2.01	1.34	3.35	0.00	0.00	0.00	0.00
C172/PA28	167.81	0.00	0.00	7.55	5.03	12.59	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	0.65	0.22	9.55	6.37	15.94	3.15	1.21	0.24	0.24
C-130	0.15	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.00	0.00	0.06	0.04	0.10	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.00	0.00	0.23	0.16	0.39	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.02	0.01	0.30	0.20	0.49	0.10	0.04	0.01	0.01

APPENDIX C-4A. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 14 (2020)

A/C	TOTAL DAILY DEPART'S.	RWY 04L ITIN. 4LD2	RWY 04L ITIN. 4LD3	RWY 04L ITIN. 4LD5	RWY 04L LOCAL 4LD4	RWY 04R LOCAL 4RD1	RWY H4L ITIN. H4LD4	RWY H4L ITIN. H4LD5	RWY H4L LOCAL H4LD3	RWY H22R ITIN. H22RD2	RWY H22R ITIN. H22RD4	RWY H22R LOCAL H22RD1
C-130	4.85	0.00	0.00	3.09	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.62	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.34	1.63	3.75	0.41	0.00	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	11.38	7.59	0.00	0.00	18.96	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	42.80	28.53	0.00	0.00	71.31	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	7.33	0.00	1.98	1.16	0.81	0.35
TOTAL DAY:	241.53	54.17	36.11	3.72	1.23	90.28	7.67	1.63	5.73	1.57	0.81	1.01
C-130	0.15	0.00	0.00	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.12	0.01	0.00	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.35	0.23	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	1.32	0.88	0.00	0.00	2.21	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.06	0.04	0.03	0.01
TOTAL NITE:	7.47	1.68	1.12	0.11	0.04	2.79	0.24	0.05	0.18	0.05	0.03	0.03

APPENDIX C-4A. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT
(CONTINUED) UNDER ALTERNATIVE 14 (2020)

A/C	TOTAL DAILY DEPART'S.	------- RWY 22R ------- ITIN. 22RD2	ITIN. 22RD1	LOCAL 22RD4	-RWY 22L- LOCAL 22LD1	--- RWY H4R --- ITIN. H4RD1	LOCAL H4RD2	---- H22L ---- ITIN. H22LD2	LOCAL H22LD1
C-130	4.85	0.54	0.00	0.18	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.11	0.00	0.04	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	1.34	2.01	0.00	3.35	0.00	0.00	0.00	0.00
C172/PA28	167.81	5.03	7.55	0.00	12.59	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	7.02	9.55	0.22	15.94	3.15	1.21	0.24	0.24
C-130	0.15	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.04	0.06	0.00	0.10	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.16	0.23	0.00	0.39	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.22	0.30	0.01	0.49	0.10	0.04	0.01	0.01

APPENDIX C-4B. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 15 (2020)

	TOTAL	-RWY 04R-	---------- RWY 04L ---------				-------- RWY H4L --------			--- RWY H22R ---	
	DAILY	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	LOCAL
A/C	LAND'S.	4RA1	4LA2	4LA3	4LA5	4LA4	H4LA2	H4LA3	H4LA1	H22RA1	H22RA3
C-130	4.85	0.00	0.00	0.00	1.03	3.09	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.00	0.20	0.62	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	2.04	0.34	3.75	0.00	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	18.96	7.59	0.00	0.00	11.38	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	71.31	28.53	42.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	1.16	7.33	1.98	0.81	0.35
TOTAL DAY:	241.53	90.28	36.11	42.80	1.23	15.09	3.20	7.67	5.73	0.81	1.01
C-130	0.15	0.00	0.00	0.00	0.03	0.10	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.12	0.00	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.59	0.23	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	2.21	0.88	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.04	0.23	0.06	0.03	0.01
TOTAL NITE:	7.47	2.79	1.12	1.32	0.04	0.47	0.10	0.24	0.18	0.03	0.03

APPENDIX C-4B. (CONTINUED) **AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 15 (2020)**

A/C	TOTAL DAILY LAND'S.	-RWY 22R- LOCAL 22RA5	------- RWY 22L ------ ITIN. 22LA2	ITIN. 22LA3	LOCAL 22LA1	-RWY 29- ITIN. 29A5	--- RWY H4R --- ITIN. H4RA2	LOCAL H4RA1	--- RWY H22L --- ITIN. H22LA1	LOCAL H22LA2
C-130	4.85	0.18	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
C-26	0.97	0.04	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	0.00	0.00	1.34	3.35	2.01	0.00	0.00	0.00	0.00
C172/PA28	167.81	0.00	7.55	5.03	12.59	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	0.22	7.55	6.37	15.94	2.66	3.15	1.21	0.24	0.24
C-130	0.15	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.00	0.00	0.04	0.10	0.06	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.00	0.23	0.16	0.39	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.01	0.23	0.20	0.49	0.08	0.10	0.04	0.01	0.01

APPENDIX C-4B. (CONTINUED) **AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 15 (2020)**

A/C	TOTAL DAILY DEPART'S.	RWY 04L ITIN. 4LD2	RWY 04L ITIN. 4LD3	RWY 04L LOCAL 4LD5	RWY 04R LOCAL 4RD1	RWY H4L ITIN. H4LD1	RWY H4L ITIN. H4LD4	RWY H4L LOCAL H4LD3	RWY H4L ITIN. H4LD5	RWY H22R ITIN. H22RD2	RWY H22R LOCAL H22RD1
C-130	4.85	0.00	0.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.34	3.75	1.63	0.41	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	44.62	0.00	7.59	0.00	18.96	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	167.81	42.80	28.53	0.00	71.31	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.81	7.33	1.98	0.00	1.16	0.35
TOTAL DAY:	241.53	42.80	36.11	1.23	90.28	0.81	7.67	5.73	1.63	1.57	1.01
C-130	0.15	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.01	0.12	0.05	0.01	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.38	0.00	0.23	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.19	1.32	0.88	0.00	2.21	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.03	0.23	0.06	0.00	0.04	0.01
TOTAL NITE:	7.47	1.32	1.12	0.04	2.79	0.03	0.24	0.18	0.05	0.05	0.03

APPENDIX C-4B. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 15 (2020)

	TOTAL	········· RWY 22R ·········				·RWY 22L·	·RWY 11-	··· RWY H4R ···		··· RWY H22L ···	
	DAILY	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	LOCAL
A/C	DEPART'S.	22RD2	22RD5	22RD3	22RD4	22LD1	11D5	H4RD1	H4RD2	H22LD2	H22LD1
C-130	4.85	0.54	0.18	0.00	0.00	0.00	3.09	0.00	0.00	0.00	0.00
C-26	0.97	0.11	0.04	0.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	44.62	1.34	0.00	0.00	2.01	3.35	11.38	0.00	0.00	0.00	0.00
C172/PA28	167.81	5.03	0.00	7.55	0.00	12.59	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL DAY:	241.53	7.02	0.22	7.55	2.01	15.94	15.09	3.15	1.21	0.24	0.24
C-130	0.15	0.02	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.38	0.04	0.00	0.00	0.06	0.10	0.35	0.00	0.00	0.00	0.00
C172/PA28	5.19	0.16	0.00	0.23	0.00	0.39	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL NITE:	7.47	0.22	0.01	0.23	0.06	0.49	0.47	0.10	0.04	0.01	0.01

APPENDIX C-4C. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 16 (2020)

	TOTAL	-RWY 04R-	---------- RWY 04L ---------				-------- RWY H4L --------			--- RWY H22R ---	
	DAILY	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	LOCAL
A/C	LAND'S.	4RA1	4LA2	4LA3	4LA5	4LA4	H4LA2	H4LA3	H4LA1	H22RA1	H22RA3
C-130	4.85	0.00	0.00	0.00	1.03	3.09	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.00	0.20	0.62	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	2.04	0.34	3.75	0.00	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	51.41	23.58	8.05	0.00	0.00	12.07	0.00	0.00	0.00	0.00	0.00
C172/PA28	190.12	86.49	28.53	46.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	1.16	7.33	1.98	0.81	0.35
TOT DAY:	270.63	110.07	36.58	46.59	1.23	15.78	3.20	7.67	5.73	0.81	1.01
C-130	0.15	0.00	0.00	0.00	0.03	0.10	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.12	0.00	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.59	0.73	0.25	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.88	2.67	0.88	1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.04	0.23	0.06	0.03	0.01
TOT NITE:	8.37	3.40	1.13	1.44	0.04	0.49	0.10	0.24	0.18	0.03	0.03

APPENDIX C-4C. (CONTINUED)

AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 16 (2020)

A/C	TOTAL DAILY LAND'S.	-RWY 22R- LOCAL 22RA5	------- RWY 22L ------ ITIN. 22LA2	ITIN. 22LA3	LOCAL 22LA1	-RWY 29- ITIN. 29A5	--- RWY H4R --- ITIN H4RA	LOCAL H4RA1	--- RWY H22L --- ITIN. H22LA1	LOCAL H22LA2
C-130	4.85	0.18	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
C-26	0.97	0.04	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	51.41	0.00	0.00	1.42	4.16	2.13	0.00	0.00	0.00	0.00
C172/PA28	190.12	0.00	8.22	5.03	15.27	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOT DAY:	270.63	0.22	8.22	6.45	19.43	2.78	3.15	1.21	0.24	0.24
C-130	0.15	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.59	0.00	0.00	0.04	0.13	0.07	0.00	0.00	0.00	0.00
C172/PA28	5.88	0.00	0.25	0.16	0.47	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOT NITE:	8.37	0.01	0.25	0.20	0.60	0.09	0.10	0.04	0.01	0.01

APPENDIX C-4C. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 16 (2020)

A/C	TOTAL DAILY LAND'S.	-RWY 04R- LOCAL 4RA1	---------- RWY 04L --------- ITIN. 4LA2	ITIN. 4LA3	LOCAL 4LA5	ITIN. 4LA4	-------- RWY H4L -------- ITIN. H4LA2	ITIN. H4LA3	LOCAL H4LA1	--- RWY H22R --- ITIN. H22RA1	LOCAL H22RA3
C-130	4.85	0.00	0.00	0.00	1.03	3.09	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.00	0.20	0.62	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	2.04	0.34	3.75	0.00	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	51.41	23.58	8.05	0.00	0.00	12.07	0.00	0.00	0.00	0.00	0.00
C172/PA28	190.12	86.49	28.53	46.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	1.16	7.33	1.98	0.81	0.35
TOT DAY:	270.63	110.07	36.58	46.59	1.23	15.78	3.20	7.67	5.73	0.81	1.01
C-130	0.15	0.00	0.00	0.00	0.03	0.10	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.12	0.00	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.59	0.73	0.25	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.88	2.67	0.88	1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.04	0.23	0.06	0.03	0.01
TOT NITE:	8.37	3.40	1.13	1.44	0.04	0.49	0.10	0.24	0.18	0.03	0.03

APPENDIX C-4C. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 16 (2020)

A/C	TOTAL DAILY LAND'S.	-RWY 22R- LOCAL 22RA5	------- RWY 22L ------ ITIN. 22LA2	ITIN. 22LA3	LOCAL 22LA1	-RWY 29- ITIN. 29A5	--- RWY H4R --- ITIN H4RA	LOCAL H4RA1	--- RWY H22L --- ITIN. H22LA1	LOCAL H22LA2
C-130	4.85	0.18	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
C-26	0.97	0.04	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	51.41	0.00	0.00	1.42	4.16	2.13	0.00	0.00	0.00	0.00
C172/PA28	190.12	0.00	8.22	5.03	15.27	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOT DAY:	270.63	0.22	8.22	6.45	19.43	2.78	3.15	1.21	0.24	0.24
C-130	0.15	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.59	0.00	0.00	0.04	0.13	0.07	0.00	0.00	0.00	0.00
C172/PA28	5.88	0.00	0.25	0.16	0.47	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOT NITE:	8.37	0.01	0.25	0.20	0.60	0.09	0.10	0.04	0.01	0.01

APPENDIX C-4C. (CONTINUED) **AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 16 (2020)**

A/C	TOTAL DAILY DEPART'S.	------ RWY 04L ------ ITIN. 4LD2	ITIN. 4LD3	LOCAL 4LD5	-RWY 04R- LOCAL 4RD1	----------- RWY H4L ----------- ITIN. H4LD1	ITIN. H4LD4	LOCAL H4LD3	ITIN. H4LD5	---RWY H22R--- ITIN. H22RD2	LOCAL H22RD1
C-130	4.85	0.00	0.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.97	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.34	3.75	1.63	0.41	0.66
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	51.41	0.00	8.05	0.00	23.58	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	190.12	46.59	28.53	0.00	86.49	0.00	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.81	7.33	1.98	0.00	1.16	0.35
TOT DAY:	270.63	46.59	36.58	1.23	110.07	0.81	7.67	5.73	1.63	1.57	1.01
C-130	0.15	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.01	0.12	0.05	0.01	0.02
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA31/C402	1.59	0.00	0.25	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00
C172/PA28	5.88	1.44	0.88	0.00	2.67	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.03	0.23	0.06	0.00	0.04	0.01
TOT NITE:	8.37	1.44	1.13	0.04	3.40	0.03	0.24	0.18	0.05	0.05	0.03

APPENDIX C-4C. (CONTINUED)

AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 16 (2020)

	TOTAL	---------- RWY 22R -------------				-RWY 22L-	-RWY 11-	--- RWY H4R ---		--- H22L ---	
	DAILY	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	LOCAL
A/C	DEPART'S.	22RD2	22RD5	22RD3	22RD4	22LD1	11D5	H4RD1	H4RD2	H22LD2	H22LD1
C-130	4.85	0.54	0.18	0.00	0.00	0.00	3.09	0.00	0.00	0.00	0.00
C-26	0.97	0.11	0.04	0.00	0.00	0.00	0.62	0.00	0.00	0.00	0.00
CH-47	6.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	4.85	0.00	0.00	0.00	0.00	0.00	0.00	3.15	1.21	0.24	0.24
PA31/C402	51.41	1.42	0.00	0.00	2.13	4.16	12.07	0.00	0.00	0.00	0.00
C172/PA28	190.12	5.03	0.00	8.22	0.00	15.27	0.00	0.00	0.00	0.00	0.00
BELL	11.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOT DAY:	270.63	7.10	0.22	8.22	2.13	19.43	15.78	3.15	1.21	0.24	0.24
C-130	0.15	0.02	0.01	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
C-26	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
CH-47	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HH-65A	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.04	0.01	0.01
PA31/C402	1.59	0.04	0.00	0.00	0.07	0.13	0.37	0.00	0.00	0.00	0.00
C172/PA28	5.88	0.16	0.00	0.25	0.00	0.47	0.00	0.00	0.00	0.00	0.00
BELL	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOT NITE:	8.37	0.22	0.01	0.25	0.07	0.60	0.49	0.10	0.04	0.01	0.01

APPENDIX C-4D. AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 17 (2020)

	TOTAL	------ RWY 04R ------			------ RWY 04L ------			----- RWY H4L --------			--- RWY H22R ----	
	DAILY	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	ITIN.	ITIN.	ITIN.	LOCAL	ITIN.	LOCAL
A/C	LAND'S.	4RA3	4RA4	4RA1	4LA2	4LA3	4LA4	H4LA2	H4LA3	H4LA1	H22RA1	H22RA3
DAYTIME:												
C-130	4.85	3.09	1.03									
C-26	0.97	0.62	0.20									
CH-47	6.79							2.04	0.34	3.75		0.66
HH-65A	4.85							0.00		0.00		
PA31/C402	51.41			23.58	8.05		12.07					
C172/PA28	190.12			86.49	28.53	46.59						
BELL	11.64							1.16	7.33	1.98	0.81	0.35
TOT DAY:	270.63	3.72	1.23	110.07	36.58	46.59	12.07	3.20	7.67	5.73	0.81	1.01
NIGHT:												
C-130	0.15	0.10	0.03									
C-26	0.03	0.02	0.01									
CH-47	0.21							0.06	0.01	0.12		0.02
HH-65A	0.15							0.00		0.00		
PA31/C402	1.59			0.73	0.25		0.37					
C172/PA28	5.88			2.67	0.88	1.44						
BELL	0.36							0.04	0.23	0.06	0.03	0.01
TOT NITE:	8.37	0.11	0.04	3.40	1.13	1.44	0.37	0.10	0.24	0.18	0.03	0.03

APPENDIX C-4D. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 17 (2020)

GA-BPT (ALT 17) CY 2020 DEPARTURES/DAY:

	TOTAL	------- RWY 22L	--------		- RWY 11 -	--- RWY H4R ---		--- RWY H22L ---	
	DAILY	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	LOCAL
A/C	DEPART'S.	22LD2	22LD4	22LD1	11D5	H4RD1	H4RD2	H22LD2	H22LD1
DAYTIME:									
C-130	4.85	0.54	0.18		3.09				
C-26	0.97	0.11	0.04		0.62				
CH-47	6.79								
HH-65A	4.85					3.15	1.21	0.24	0.24
PA31/C402	51.41			4.16	12.07				
C172/PA28	190.12			15.27					
BELL	11.64								
TOT DAY:	270.63	0.65	0.22	19.43	15.78	3.15	1.21	0.24	0.24
NIGHT:									
C-130	0.15	0.02	0.01		0.10				
C-26	0.03	0.00	0.00		0.02				
CH-47	0.21								
HH-65A	0.15					0.10	0.04	0.01	0.01
PA31/C402	1.59			0.13	0.37				
C172/PA28	5.88			0.47					
BELL	0.36								
TOT NITE:	8.37	0.02	0.01	0.60	0.49	0.10	0.04	0.01	0.01

APPENDIX C-4D. (CONTINUED) AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 17 (2020)

GA-BPT (ALT 17) CY 2020 DEPARTURES/DAY:

	TOTAL	--- RWY 04L ---		--- RWY 04R ---		----------- RWY H4L -------------				---- RWY H22R ----		-------- RWY 22R --------		
	DAILY	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	ITIN.	ITIN.
A/C	DEPART'S.	4LD2	4LD3	4RD4	4RD1	H4LD1	H4LD4	H4LD3	H4LD5	H22RD2	H22RD1	22RD2	22RD3	22RD4
DAYTIME:														
C-130	4.85			1.03										
C-26	0.97			0.20										
CH-47	6.79						0.34	3.75	1.63	0.41	0.66			
HH-65A	4.85													
PA31/C402	51.41		8.05		23.58							1.42		2.13
C172/PA28	190.12	46.59	28.53		86.49							5.03	8.22	
BELL	11.64					0.81	7.33	1.98		1.16	0.35			
TOT DAY:	270.63	46.59	36.58	1.23	110.07	0.81	7.67	5.73	1.63	1.57	1.01	6.45	8.22	2.13
NIGHT:														
C-130	0.15			0.03										
C-26	0.03			0.01										
CH-47	0.21						0.01	0.12	0.05	0.01	0.02			
HH-65A	0.15													
PA31/C402	1.59		0.25		0.73							0.04		0.07
C172/PA28	5.88	1.44	0.88		2.67							0.16	0.25	
BELL	0.36					0.03	0.23	0.06		0.04	0.01			
TOT NITE:	8.37	1.44	1.13	0.04	3.40	0.03	0.24	0.18	0.05	0.05	0.03	0.20	0.25	0.07

APPENDIX C-4D. (CONTINUED) **AVERAGE DAILY OPERATIONS AT KALAELOA AIRPORT UNDER ALTERNATIVE 17 (2020)**

GA-BPT (ALT 17) CY 2020 LANDINGS/DAY:

	TOTAL	--- RWY 22R ---		--- RWY 22L ---		· RWY 29 ·	--- RWY H4R ---		--- RWY H22L ---	
	DAILY	ITIN.	ITIN.	LOCAL	LOCAL	ITIN.	ITIN.	LOCAL	ITIN.	LOCAL
A/C	LAND'S.	22RA2	22RA3	22LA4	22LA1	29A5	H4RA2	H4RA1	H22LA1	H22LA2
DAYTIME:										
C-130	4.85			0.18		0.54				
C-26	0.97			0.04		0.11				
CH-47	6.79									
HH-65A	4.85						3.15	1.21	0.24	0.24
PA31/C402	51.41		1.42		4.16	2.13				
C172/PA28	190.12	8.22	5.03		15.27					
BELL	11.64									
TOT DAY:	270.63	8.22	6.45	0.22	19.43	2.78	3.15	1.21	0.24	0.24
NIGHT:										
C-130	0.15			0.01		0.02				
C-26	0.03			0.00		0.00				
CH-47	0.21									
HH-65A	0.15						0.10	0.04	0.01	0.01
PA31/C402	1.59		0.04	0.00	0.13	0.07				
C172/PA28	5.88	0.25	0.16	0.00	0.47					
BELL	0.36									
TOT NITE:	8.37	0.25	0.20	0.01	0.60	0.09	0.10	0.04	0.01	0.01

APPENDIX C-5. AVERAGE DAILY LANDINGS ON RUNWAY 08L AT HONOLULU INTERNATIONAL AIRPORT (2020)

A/C	TOTAL DAILY LAND'S.	--------- RWY 08L --------- ITIN. TR17	ITIN. TR18	ITIN. TR19
B-74710A	6.54	2.56	1.99	1.99
B-74720A	19.59	7.43	6.08	6.08
B-747SP	0.23	0.23	0.00	0.00
DC-101A	6.39	0.00	3.19	3.20
DC-103A	3.98	0.35	1.85	1.78
B-737QN	17.93	15.90	0.00	2.03
B-757RB	3.26	2.89	0.00	0.37
DCH7	5.48	4.42	0.00	1.06
DC-910	2.40	2.07	0.00	0.33
DC-950	9.61	8.28	0.00	1.33
DC-980	43.18	37.25	0.00	5.93
DHC6	7.07	7.07	0.00	0.00
C-130	1.76	0.59	0.00	1.17
C-141	1.80	0.90	0.90	0.00
B-707CFM	1.36	0.68	0.68	0.00
C-5A	0.74	0.37	0.37	0.00
F-15	6.96	6.49	0.00	0.47
L-10115	0.94	0.00	0.47	0.47
L-1011	0.90	0.00	0.45	0.45
B-777	28.21	10.93	8.64	8.64
TOTAL DAY:	168.33	108.41	24.62	35.30
B-74710A	0.00	0.00	0.00	0.00
B-74720A	0.00	0.00	0.00	0.00
B-747SP	0.00	0.00	0.00	0.00
DC-101A	0.00	0.00	0.00	0.00
DC-103A	0.00	0.00	0.00	0.00
B-737QN	0.00	0.00	0.00	0.00
B-757RB	0.00	0.00	0.00	0.00
DCH7	0.00	0.00	0.00	0.00
DC-910	0.00	0.00	0.00	0.00
DC-950	0.00	0.00	0.00	0.00
DC-980	0.00	0.00	0.00	0.00
DHC6	0.00	0.00	0.00	0.00
C-130	0.01	0.00	0.00	0.01
C-141	0.02	0.01	0.01	0.00
B-707CFM	0.00	0.00	0.00	0.00
C-5A	0.00	0.00	0.00	0.00
F-15	0.00	0.00	0.00	0.00
L-10115	0.00	0.00	0.00	0.00
L-1011	0.00	0.00	0.00	0.00
B-777	0.00	0.00	0.00	0.00
TOTAL NITE:	0.00	0.01	0.01	0.01