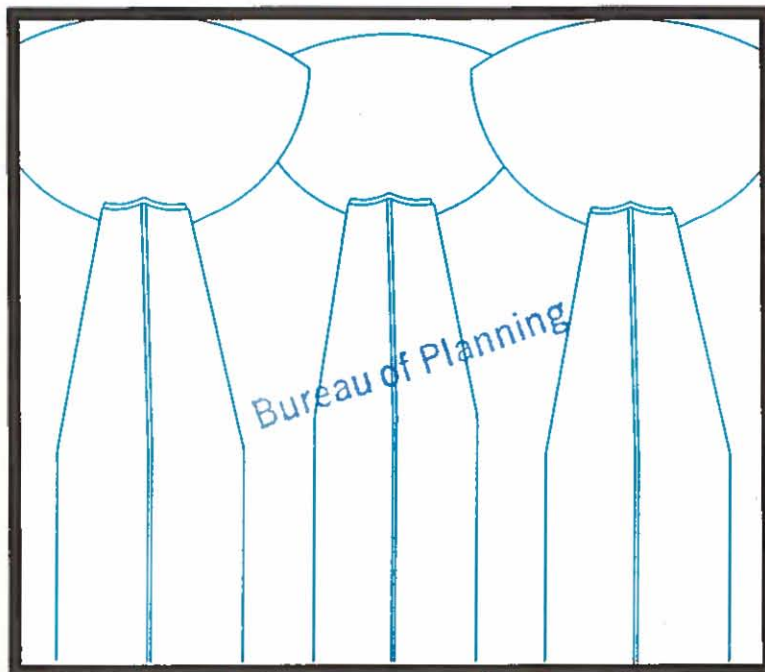


Antonio B. Won Pat
**Guam International Air Terminal
Master Plan Update Program**

MASTER PLAN UPDATE REPORT



Prepared for:
Guam Airport Authority, Government of Guam



By:
Parsons Overseas Company



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Prepared for
Guam Airport Authority
Government of Guam
P.O. Box 8770
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Prepared under AIP Planning Grant No. 3-66-0001-06

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SUMMARY

SUMMARY

Conclusions Of The Plan

Three principal conclusions have been reached regarding the future development of Guam International Air Terminal (GIAT).

- 1) For the next five years, Guam can expect a sharp increase in visitors followed by a steady growth of tourism for fifteen years thereafter. Almost all visitors to Guam will be transported by air.
- 2) A substantial increase in the size of the passenger terminal at GIAT will be required to accommodate these visitors and support Guam's burgeoning tourism industry. Other facilities on the airport will grow in size and degree of sophistication to match this increasing visitor demand.
- 3) The Guam Airport Authority (GAA) does not possess enough land at the airport to meet these development demands in either the short or long term.

Rationale For Planning

At present, Guam has a passenger terminal with supporting airside and groundside facilities that are used intensively during one peak period and moderately during a second peak period each day, but are underutilized for the remainder of the day. For reasons peculiar to Guam's visitor industry and existing air route structure, these extreme peaks are expected to persist in the short term. In order to provide an acceptable level-of-service in accommodating the near term peak period demand, additional facilities will have to be constructed. These facilities will, however, be underutilized except during peak periods.

Precedent set by other maturing markets that are similar to Guam's indicates that as time goes on, peaking will progressively diminish and facilities will become better utilized throughout the day. It is expected that this characteristic smoothing of peaks and levelling of

demand will take place at Guam and markedly so beyond 1993. In any case, it is imprudent to base long term facility expansion on short term growth trends.

Accordingly, a plan has been devised that will relieve short term pressures on facilities while leaving options open for further expansion if expected growth rates are exceeded or severe peaking persists. It is also possible that the proposed initial expansion of airport facilities will last for years beyond the point of planned capacity if peaks subside more rapidly than forecast.

Initial Stage Of Development

An initial stage of development is planned that will expand terminal and airfield facilities to meet all requirements to the year 1995. The principal features of the planned initial expansion are as follows:

- Expand the passenger terminal building to the east to provide an additional 135,000 square feet of floorspace.
- Provide a total of ten gate related aircraft parking positions for large, wide-body jet aircraft, six to be served by a concourse and passenger loading bridges and four to be served by apron level busing.
- Expand transportation facilities on groundside of the terminal including public and employee parking as well as space for rental car, tour bus, taxi and limousine operations.
- Provide more positions for parking based air carrier and transient air carrier/all-cargo aircraft.
- Provide a site for private development of an expanded air cargo facility including cargo buildings and allocate space for storing and staging containers and pallets on or adjacent to the ramp.
- Add bulk fuel storage tanks to the aircraft fueling facility for both jet fuel and aviation gas.
- Provide sites for private development of general aviation facilities on the airport to include aircraft parking, fixed base operator support facilities and a heliport for rotorcraft operations.
- Provide a commuter/air taxi terminal in the old passenger terminal building and space for parking

aircraft and loading and unloading passengers on the adjacent apron.

- Develop a GIAT Base Maintenance Facility.
- Provide sites for the private development of maintenance facilities for ground support equipment and allocate space for staging ground support equipment on the ramp.
- Provide space for expansion of the based air carrier aircraft maintenance building by the based air carrier.

Future Stage Of Development

Future development takes place from the time the facilities which are added or expanded in the initial stage of development become saturated (nominally 1995), until 2008 (the long range planning horizon of this Plan) and beyond to the point at which the airport can no longer accommodate growth. The principal features of the future stage of development (to 2008) are described below. It is noted that actual future development will depend on whether or not overall growth is realized and peak smoothing takes place.

- Further expand the passenger terminal to the east to provide an additional 70,000 square feet of floorspace.
- Provide two more gate related aircraft parking positions for large, wide-body jet aircraft, eight to be served by a concourse and passenger loading bridges and four to be served by apron level busing.
- Expand all of the other facilities that were added or expanded in the initial stage of development to accommodate forecast growth.
- Construct a parallel taxiway for Runway 6L/24R to serve the GIAT ramp.

Need For Additional Land

GIAT needs more land for both of the above stages of development. To be functionally useful, the land must come from Agana Naval Air Station (NAS). The availability of Federal land for the expansion of GIAT is unknown; the Navy has declined to comment on this planning issue on the basis that is inappropriate to do so at this time.

In the initial stage of development, approximately 120 acres of land are needed for based air carrier apron, general aviation facilities, commuter / air taxi facilities and a heliport. The 120 acres also includes land needed for the potential development of an aircraft maintenance hangar and associated apron.

In the future stage of development, an additional 142 acres of land are needed for expansion of the initial stage facilities as well as addition of a parallel taxiway and new access road right-of-way.

This Master Plan Update is based on the assumption that GIAT will continue to operate as a joint use civil-military airport out to its planning horizon of 2008 and GIAT will be a NAS tenant. If the Federal land occupied by the NAS became the property of the Government of Guam and the Navy was no longer at the airport or became a tenant of GAA, land use planning would proceed from a different perspective and result in entirely different land use needs for GIAT.

Development Schedule And Cost

The initial stage of development can essentially be completed by the end of 1992 at a cost of approximately 61.4 million mid-1989 dollars.

The extent of the future stage of development considered by this Plan will depend on the uncertain factors previously discussed. A minimum of 43 million mid-1989 dollars should be budgeted for expansion beyond 1995 to the year 2008.

SECTION 1

SECTION 1

1.0 Introduction

This Master Plan Update Program was produced for the Guam Airport Authority (GAA) by Parsons Overseas Company (Parsons), a subsidiary of the Ralph M. Parsons Company. The program was jointly funded by the GAA and a grant from the U.S. Federal Aviation Administration (FAA).

1.1 Background

In October, 1977, the Guam International Air Terminal (GIAT) Master Plan Report was published which planned airport development for the period from 1977 to 1995. It proposed that the airport be improved in two stages, with the first stage carrying development through the year 1985. The proposed Stage 1 program was subsequently carried out and a new passenger terminal was dedicated and began operation on January 19, 1982.

In February, 1988, Parsons was authorized by the GAA to proceed with Phase 1 of an update of the 1977 Master Plan. Phase 1 consisted of three work elements: 1) Data Collection and Review, 2) Forecasts and 3) Facility Requirements; Facility Requirements were limited to the passenger terminal building.

The Phase 1 work was completed in April, 1988 and results were reported to the GAA in three working papers (Working Papers Nos. 1, 2 & 3; Appendix B, References 4, 5 & 6). The results of the forecast and facility requirements studies made it clear that Guam would experience a dramatic increase in visitors in the five year period 1988-1993 and steady growth thereafter to the year 2008. It was determined that a substantial increase in passenger terminal facilities would be required to accommodate the predicted growth of tourism.

In September, 1988, the FAA approved a grant to the GAA to continue the work begun in Phase 1 and completely update the 1977 GIAT Master Plan.

1.2 Scope

In addition to work done in Phase 1, commissioned by GAA and described above, the FAA funded portion of the program consists principally of development of requirements for airport facilities other than the passenger terminal, development of conceptual designs for expansion of the terminal and airfield, preparation of a schedule and an estimate of costs for proposed developments, and assessment of environmental impacts resulting from the development program.

Because GIAT is a joint use civil-military airport with the U.S. Navy being responsible for operation of all major airfield facilities and systems, the Master Plan Update program is focused on the civil passenger terminal and associated aprons, taxiways and support facilities. For that reason, the conceptual designs of the passenger terminal expansion and new terminal related apron are done in much more detail than is customary in a master planning program such as is described in Advisory Circular 150/5070-6A.

1.3 Purpose & Objectives

It is the purpose of this Master Plan Update program to provide the GAA with a comprehensive plan for the systematic and efficient development of new and expanded facilities at GIAT to meet aviation demand to the year 2008. It will essentially extend the planning horizon of the 1977 Master Plan from 1995 to 2008.

The principal objectives of the program are to identify and address development issues that must be dealt with at GIAT in the next two decades, develop solutions for the problems associated with those issues, and provide a record of what was decided.

It is also an objective of the program to make use of and build on the work that was done in the 1977 Master Plan and adopt all valid principles of that Plan. It will not repeat background information contained in the original Plan or readdress issues that were resolved therein and validated in the intervening years since implementation of the Plan.

1.4 Contents

The results of the GIAT Master Plan Update program are reported in three volumes.

- 1) An Executive Summary.
- 2) The Master Plan Update Report.
- 3) A Volume of Working Papers.

This volume, the Master Plan Update Report, is composed of a summary, this introductory section and nine other sections as follows:

- Section 2, Data Collection & Review, which contains historical information about airport related activities and an inventory of existing facilities.
- Section 3, Forecasts, which contains forecasts of passenger, aircraft, cargo, mail and ground transportation activity at the airport for the next twenty years.
- Section 4, Facility Requirements, which contains requirements for new and expanded passenger terminal, airfield and support facilities for the twenty year forecast period.
- Section 5, Expansion Requirements, which compares existing facility capacity with future requirements.
- Section 6, Staged Development Program and Conceptual Design, which contains conceptual plans for new and expanded passenger terminal, airfield and support facilities and a plan for their development in time sequenced stages.
- Section 7, Use of Federal Land, which presents plans for the future use of land to the west of the terminal and elsewhere by both GAA and the U.S. Navy.
- Section 8, Phased Cost Estimates, which contains estimates of cost for the developments described in Section 5 with capital requirements phased according to the time sequence given there.
- Section 9, Revised Airport Layout Plan, Terminal Area Plan and Land Use Plan which contains two updated plans plus a new Land Use Plan.

- Section 10, Environmental Impact Overview, which assesses the impact of proposed developments on the airport and its environs based on existing information and identifies further environmental investigations that may be required.

The ten sections of the report are supplemented by several appendices which contain a glossary of terms and abbreviations used in the report; references to other documents which relate to the Master Plan Update; a list of preparers of the report; a list of members of the Master Plan Technical Advisory Committee; and a copy of the joint use agreement between the GAA and the U.S. Navy and associated waiver documents.

SECTION 2

SECTION 2

2.0 Data Collection And Review

A data collection and review program was carried out to gather data relevant to the master planning process. These data were used as a basis for most sections of this report and are recorded in detail there or in appendices or working papers. This section contains a summary of these data including a history of the airport; description of the airport service area; description of the socioeconomic environment of the airport; description of existing airport facilities; and data pertaining to historical aviation activity.

2.1 Overview of Guam International Air Terminal

Figure 2-1 shows GIAT in relation to its surrounding environment on the western side of the island of Guam overlooking Tumon Bay. It shares the airfield of the Agana Naval Air Station (NAS) under terms of a Joint Use Agreement between the GAA and United States Navy (see Appendix E). The airport is located approximately six miles northeast of Agana, the capitol city, and about two miles from the Tumon Bay tourist area.

2.1.1 Airport History¹

Civil aviation began on Guam with the flights of the famous Pan American China Clipper in 1936, which stopped in Apra Harbor enroute to its Far East destinations. However, for the general public, the arrival of the Clipper was an interesting and colorful event but not a viable form of scheduled air transportation.

Clipper service halted abruptly with the advent of World War II in the Pacific. After the war, in 1946, Pan American resumed service to Guam, this time with land-based planes greatly improved during the

1 Source: Guam Airport Authority

war. The post-war "terminal" was a quonset in the Navy Operations area of the NAS about a mile west of where Guam's terminal was to be erected in 1967. The 1967 terminal, now referred to as the "*Old Terminal*," consists of two buildings, a departure and arrivals facility with an attractive mall separating them.

The *Old Terminal* attracted new air service to Guam. Pan American inaugurated its Japan service in April of 1967. Continental Air Micronesia began service from Honolulu and within the Trust Territory islands in May of 1968. August, 1969 saw TWA inaugurate flights to Guam and onward to Hong Kong. Japan Airlines began its Guam route with three flights weekly on October 1, 1970. Many international airlines used the new airport facility for service, or technical stops for refueling during that period.

A joint-use agreement with the Navy was signed on July 19, 1974, which permits GIAT the use of NAS facilities, such as the runway, air traffic control tower and crash fire rescue equipment. A further benefit to GIAT was that this agreement permitted the airport to apply for Federal grants for airport improvement. The GAA also received 68 acres of Navy land in the agreement. An equitable cost sharing arrangement has been worked out between the Navy and GAA for the joint use of federal facilities.

A large impact upon the history of civil air transportation in Guam took place in September, 1975, when Public Law 13-57 created the Guam Airport Authority, and in January, 1976, the new Authority took over operation of the air terminal from the Department of Commerce. Plans were immediately formulated for much-needed expansion and improvement of the terminal. This upgrading project included more space in the departure and arrival buildings, plus a structure which joined them and housed a boarding lounge and duty free shop, with an observation deck above. A new baggage delivery system was installed in the passenger terminal, and an air cargo building was constructed with aircraft aprons for loading and unloading passengers and cargo. Finally, two new lighted public parking lots were built.

Still, this was only *stop-gap* for the old, obsolete terminal, and in 1977, GAA formulated a Master Plan for airport improvement which called for a new, large terminal with three levels, modern facilities and amenities, a new, larger automobile parking lot, passenger loading bridges connecting terminal to aircraft, and many other innovations heretofore unheard of on Guam.

A ground breaking ceremony was held and Governor Ricardo J. Bordallo turned the first spadeful of earth on October 20, 1978. On January 19, 1982, the new terminal complex opened and began operation. Shortly before, a new GAA fueling facility was inaugurated, constructed and operated by Lockheed Air Terminal, Inc.

Now, Guam is serviced by the largest of the jet airliners, and is connected to Hawaii and the U.S. Mainland, to the Far East in the opposite direction, and to the island nations of the South Pacific and Australasia.

A new phase in the development of GIAT began when an update of the 1977 Master Plan was commissioned by GIAT in February, 1988.

2.1.2 Description of the Airport Service Area

GIAT is the hub of air transportation in the western Pacific Basin Ocean area. It connects the west coast of the United States with Pacific Basin and Rim destinations of east Asia and Australia through Hawaii. Figures 2-2 and 2-3 show the relationship of Guam to major origins and destinations in the Pacific area. The Pacific airline route structure presently connects Guam directly with Hawaii, Japan, Philippines, Australia, Indonesia, New Guinea, Nauru, and ten Micronesian destinations in the Pacific Ocean area. Direct connections are made through Hawaii, Japan and the Philippines to most major U.S. and Asian destinations.

At present, five air carriers serve Guam with regularly scheduled service: Continental Air Micronesia, Northwest Airlines, Hawaiian Airlines, Japan Airlines and All Nippon Airways. Air Nauru was a scheduled air carrier until late 1989. Commuter service between Guam and the northern Mariana Islands is provided by Guam Marianas Air and Continental's Air Mike Express. Guam is also the destination of charter airline and all-cargo flights, principally from Japan, and U.S. Military Airlift Command (MAC) flights between Hawaii and the Philippines.

In 1987, approximately 95% of total passenger enplanements at Guam were accounted for by air carrier airlines and the remaining 5% by commuters and charters. With the cessation of operation of Maui Airlines, however, air carrier enplanements increased to 97.5% of the total in 1988. Over seven hundred thousand passengers were enplaned at GIAT and nine thousand landings and takeoffs by air carrier and commuter aircraft were recorded in FY 1988.

2.1.3 Socioeconomic Environment

This subsection describes the physical characteristics of Guam, its demographics, and the general social and economic situation that prevailed at the end of 1987 (or 1988, where data are available).

PHYSICAL CHARACTERISTICS²

Guam, an unincorporated territory of the United States, is the largest and southernmost island in the Mariana Archipelago. The island is 30 miles long, ranges from 5 to 8.5 miles in width, and has a total land area of 209 square miles. Guam lies at 13 degrees 28 minutes North and 144 degrees 44 minutes East. The island was formed through an uplift of undersea volcanoes and is surrounded by coral reefs near the shore. Guam is composed of two distinct geologic areas of about equal size. The northern part of the island is a high coralline limestone plateau rising up to 850 feet above sea level. This area contains the northern water lens which is the main source of fresh water on Guam.

The southern region is mountainous, of volcanic origin with elevations of 700 to 1,300 feet. Apra Harbor, one of the largest protected harbors in the Pacific, is located on the central-western side of the island.

Guam's tropical climate is warm regardless of the time of year; temperatures range between 75 and 86 degrees Fahrenheit, with a mean annual temperature of 81 degrees. May and June are the hottest months, with most rainfall occurring from July through October. The average yearly precipitation is approximately 90 inches. Constant tradewinds blow from the Northeast during the dry season which is December through April. Drought-like conditions can occur during the middle and latter parts of the dry season, however, Guam's subterranean water lens is capable of supplying fresh water far in excess of the island's present needs.

Guam periodically experiences tropical storms and typhoons. A typhoon is a cyclonic storm with sustained winds in excess of 64 nautical miles per hour. Although an average of 2.5 storms per year

2 Source: 1987 Guam Annual Economic Review (Appendix B, Reference 2).

pass within 180 nautical miles of Guam, few do serious damage to the island.

Guam is the westernmost territory of the United States and also has the finest deep water harbor between Hawaii and the Philippines. With its strategic location and harbor, it can be expected to assume a growing importance for American military and trade activities in the Western Pacific.

DEMOGRAPHY³

Guam's 1987 population stood at 123,700 including 23,900 military personnel and dependents representing 19% of the total population. Since 1976, population has increased 27%, or an annual increase of 2.2%. The following provides the salient demographic trends identified by the 1980 Guam census (Appendix B, Reference 22) which are increasing urbanization, a young but aging population, "westernization" in terms of family size and mores, high but decreasing fertility, and an increasing ethnic mix. Guam continues its development as a "modern" society that is in the mainstream of world growth and change.

A shift in the geographic distribution of Guam's population has occurred in the last 20 years, from the Central region to the Northern region. The age distribution of the population was not "normal" in 1980 due to the military presence and immigration here. While Guam's median age (22.2 years) was less than that of the U.S. (30.0 years), the population was still aging. The proportion of Guam's population that was under 5 years old was about 12 percent; the proportion of elderly was 3 percent.

From 1930 onwards, the sex ratio (male to female) of the population was greater than 103; it was 109 in 1980. The sex ratio was higher for the military than for the civilian population. The dependency ratio was 60.5 in 1980. The military dominated in the populations less than 5 years old and from 20 to 34, while civilians were predominant at all other ages.

The average household size decreased from over 5 persons per household to just over 4 in 1980. The distribution of households

3 Source: 1987 Guam Annual Economic Review (Appendix B, Reference 2).

mirrored that of persons moving from the Central region to the North. The South had the largest household sizes for many census periods, but the percentage of households located there has steadily decreased since 1960. The proportion of households headed by females with children under 18 years of age has increased while married couple families with children less than 18 years have decreased.

Both marriages and divorces were increasing; between 1970 and 1980 the number of divorced males grew by 16 percent and divorced females by 78 percent. The age at first marriage of females increased by 8 percent, showing that females were delaying first marriage, most likely in favor of finishing school and starting careers. Between 1980 and 1984, the Japanese contributed the greatest number of grooms, with Chamorros second; this was true for brides for most of that period as well. White males were most likely to get divorced during this period while for females, Chamorros were most likely. For both sexes, Chinese were least likely to get a divorce.

Both census and vital statistics data show fertility is still high compared to U.S. figures, though it is slowly decreasing. The average number of children has dropped from 3.20 in 1980 to 3.15 in 1985. The mean age of mothers has also decreased slightly, from 26.54 years to 26.50 years in the same five year period. The mean length of a generation (the time it takes for a woman to have a female child to replace herself) fell from 27.22 years in 1980 to 26.44 years in 1985.

Mortality is also decreasing, mostly due to improved living conditions. Recent death data show that both males and females die most often between 45 and 64 years of age, but more males do so than females. Life table analysis has shown that life expectancy at birth has increased for both sexes between 1971 and 1981, but more so for males than for females, although females have a higher life expectancy than males.

Chamorros continued to be the largest single ethnic group on Guam in 1980 (45.1 percent of the total population), though at the lowest levels recorded in any census this century. Whites were second in numbers (25.4 percent) and Filipinos third (21.2 percent). The proportions of Whites and Filipinos is increasing, that of Chamorros is decreasing.

ECONOMIC OVERVIEW

Guam's future air traffic development will depend on the direction of the island's economic growth. The following discussion presents a general overview of the economy and focuses on the prime economic sectors most relevant to the continued growth of visitor traffic which in turn directly affects GIAT's future growth potential. Guam's plans for development are outlined in its Overall Economic Development Plan (Appendix B, Reference 24).

Employment

Total island employment reached 49,560 as of the end of 1988 to record an all-time high. Nearly 63% were employed by the private sector. Until 1984, public sector employment comprised more than 50% of the total labor force. The shift to the private sector is attributable to the recent rapid increase in the tourist industry which employs nearly one-third of the private sector labor force. The March, 1987 unemployment rate was 5.4% and forecast to drop below 3.5% by 1990. There are about 3000 foreign workers in Guam, over half of which are in the construction industry. Trade and construction make up the next two most important private sector employment areas. Even with the growth in the size of Guam's labor force, it is likely that Guam's private industries will experience a shortage of workers by 1989. There are many job-creating developments, particularly those related to the tourist industry, that will require more workers to be employed than ever before. It is of concern to the Government of Guam that limited growth of the labor force could restrain economic growth.

Consumer Prices

Consumer prices on Guam are higher than the United States average by between 25 and 30 percent. Guam experienced a 9.5% annual increase over the 1972-1985 period versus 7.5% for the United States. Approximately 80-90% of consumer goods are imported which is the main cause of higher prices.

Gross Island Product and Per Capita Income

Gross Island Product in 1984 amounted to \$877.8 million equating to a per capita income of \$7,583. This is approximately 50% below the U.S. level for the same period. Guam's relatively low per capita

income and high cost of living, compared to the U.S., emphasizes the relatively depressed nature of Guam's economy in terms of standard of living. As of June 1987, there were 16,500 individuals participating in the food stamp program; nearly 18% of Guam's population receives some form of public assistance. This percentage is expected to decrease as the demand for labor increases.

Public Revenues

Federal expenditures continue to be Guam's leading source of revenue. In FY 1986, \$620 million was distributed to Guam by the federal government.

Tourism

Tourism is Guam's largest private sector industry and the second highest generator of revenue next to federal expenditures. A recent study conducted by SRI International for the Guam Visitors Bureau, estimated that tourism contributed some \$250 million to the local economy in 1986, and generated approximately 5,510 jobs directly and 7,751 jobs indirectly for a total of 13,261 jobs, or nearly one-third of private sector employment. Total visitor arrivals in 1988 reached 576,200, representing a 20.7% increase over 1987.

Construction

Guam is presently in the midst of a construction boom brought on by demand in residential housing, and commercial, apartment/condominium and hotel/resort startups. Employment in this area has tripled since 1983.

Increased construction activity is attributable to population growth, falling interest rates and world oil prices, the improved value of the Yen against the dollar which has contributed to increased tourism plant expenditures, government spending on infrastructure improvement, and federal spending on military projects.

Although Guam's construction industry is currently very active, there is concern as to how long this pace will continue. The main issue is whether there will be adequate infrastructure to support a continued increase in private development projects. The lack of infrastructure, primarily water and sewer systems throughout parts of the Island, will likely limit future construction projects. A lack of government funds for infrastructure expansion may necessitate keeping major

construction projects such as apartments, hotels and condominiums at the planning stage until funding for water and sewer projects is secured.

In FY 1986, daily demand for water exceeded water production by nearly 3.9 million gallons. This deficit was offset by water produced for the military. It is estimated that by FY 1990, the daily average deficit will increase to 5.3 million gallons. The solution to this problem cannot be remedied by purchases from the military, but by increasing the efficiency of the current system and tapping further available water resources.

The biggest constraint to development, however, especially in the Tamuning area where a number of existing hotels are located and others planned, is the overloaded condition of the sewerage system.

Although water and sewerage are major infrastructure concerns insofar as sustaining construction growth, particularly in the tourism area, electric power, communications and roads are also in danger of becoming constraints to economic development.

In 1987, the 1972 Power Pool Agreement was terminated leaving the Guam Power Authority (GPA) with responsibility for the power supply for the entire island. The GPA can currently generate 284 megawatts of power and in 1987, approximately five hundred million kilowatt hours (KWH) were sold. Sales are expected to rise by about 20% to six hundred million KWH by 1991, and increases in generating and transmitting capacity will be required. The Guam Telephone Authority (GTA) became an autonomous agency in 1974, and the communication system inherited from the U.S. Navy has been steadily expanded and improved since then. Technological improvements such as digital switching and fiber optic transmission are being incorporated in GTA's system. International service to Guam will be greatly enhanced by the fiber optic underwater cable system linking the island to the U.S. mainland through Hawaii and to East Asia through Japan. In 1987, the number of primary lines in GTA's network reached approximately 24,000 and commercial growth over the next five years will require new capital equipment and significant expenditures from either the government or private sectors if demand is to be met.

Vehicular traffic growth on Guam has been increasing at a 3.5% annual rate for the past five years. At this rate, the demand for Guam's roadways will nearly double in 20 years. The heaviest concentration

of traffic is currently in the Agana - Tamuning corridor which most directly affects the construction of tourism facilities in the near term and their subsequent operation in the long term.

Industry

This sector of the economy is not highly developed. Limitations to industrialization on the Island are related to scale and remoteness. Manufacturing and other facilities often cannot reach economies of scale by producing for the domestic market alone. Expanding the market by exporting to reach scale is difficult. Some or all of the inputs of the manufactured product must be imported. To this must be added transportation costs, which makes it difficult to compete in the world market. Lack of outside investment plus infrastructure inadequacy are also key factors limiting growth in this sector. The most promising course of future growth may lie in the development of light industrial manufacturing of such commodities as electronics and textiles.

Agriculture

Once the mainstay of the Guam economy, agriculture remains the smallest industry representing less than 0.5% of those employed and it contributes only approximately \$6 million annually to the economy. Most food products are imported. It is unlikely that a significant improvement will be made in agricultural production in the future, most of this due to lack of labor and the high cost of land.

Aquaculture

This area has the greatest untapped potential of the smaller industries, and could contribute significantly to Guam's export value. Guam presently imports \$6 million worth of fish products. So far the value of aquaculture output is small, but could be substantial in the future.

The Role of the United States in Guam's Future Development

The U.S. has agreed to provide over \$3 billion in financial and economic assistance to Micronesia. At least 40% of this aid is to be spent to develop the infrastructure of the region in the next 15 years.

In 1987, the United States entered into a "Compact of Free Association" with the Federated States of Micronesia and the Republic of the

Marshall Islands. This association defines the relationship between the U.S. and these neighboring islands of Guam in terms of immigration, defense, trade, U.S. financial assistance and other matters. Accordingly, the United States has agreed to provide over \$3 billion in financial assistance to the region. Since Guam is the most developed island in Micronesia, the possibility exists that Guam may serve as the focal point for the region's development, and could substantially benefit as a supplier of goods and services to other islands.

2.2 Existing Airport Facilities

Figure 2-4 shows existing facilities at GIAT except for the NAS airfield facilities which are shown on the Airport Layout Plan contained in Section 9. Brief descriptions of major facilities are given below.

2.2.1 Airfield⁴

The Joint Use Agreement grants the GAA the use of the two parallel runways and associated taxiways on Agana N.A.S. The Authority also shares in financial responsibility for part of this airfield area. Local air traffic control at the airport is provided by the U.S. Navy. The air traffic control tower is located on the opposite side of the airport from the GIAT terminal building. Enroute and terminal area air traffic control is provided by the FAA. The Authority also shares in operation of the aircraft rescue and fire fighting (ARFF) system.

Runways

The existing runway system consists of two parallel runways oriented northeast-southwest. Their separation is only 700 feet which limits them to simultaneous VFR operations. The orientation and physical dimensions of the runways are as follows:

4 Source: Airport Layout Plan

Runway Designation	6L-24R	6R-24L
Orientation	N64°56'E	N64°56'E
Length (Feet)	10,015	8,000
Width (Feet)	150	150
Lighting Intensity	High	Medium
Marking	Precision Instrument	Non-Precision Instrument
Pavement Strength (Pounds)		
Single	135,000	135,000
Dual	235,000	235,000
Dual Tandem	390,000	390,000
Dual Dual Tandem	780,000	780,000
Double Grooving ⁵	Yes	No

Taxiways

There is a partial parallel taxiway fronting the GIAT terminal apron. There are no parallel taxiways extending the full length of the runways which are usable for heavy aircraft. Aircraft must travel on the runways to get to the terminal or runway thresholds. Taxiways are lighted with medium intensity taxiway lights. There are six intersecting taxiways to Runway 6L-24R.

Apron

There are ten aircraft parking positions located in front of the new terminal building. The apron is constructed of Portland Cement concrete. Each position is equipped with a fueling hydrant system installed in the pavement. Eight of these positions can accommodate any aircraft up to the B-747-300 size and two can accommodate B707/DC8/B727 size aircraft. Five of the positions are served by fixed passenger loading bridges and have aircraft lead-in guidance

5 Source: Airport Layout Plan

systems installed. Apron floodlighting is provided on the apron. An access taxiway fronts the apron and is connected to the east end of runway 6L-24R. The entire apron and taxiway complex is designed to accommodate the heaviest current commercial aircraft. The apron is in good condition.

There are two former air carrier positions located in front of the old terminal building, however, these positions lie within Navy safety area restrictions and as part of the Joint Use Agreement, their use depends on the granting of waivers by the Navy.

An area to the west of the maintenance building is designated as the general aviation apron in the present Airport Master Plan. This area is surfaced with old asphalt pavement which is in poor condition. At present, part of the area is also used by Continental Airlines for aircraft and G.S.E. maintenance activities.

Aids to Air Navigation

The airfield is equipped with an instrument landing system (ILS) including glide slope and localizer on Runway 6L. A Medium Intensity Approach Light System with Sequence Flashers (MALSF) is also provided for this runway. A VASI system is provided on both ends of runway 6L-24R and on the northeast end of runway 26R. Also available for approaches and as terminal aids are a Precision Approach Radar (PAR) and a VORTAC.

2.2.2 Buildings

The existing buildings located on GAA land are shown on Figure 2-4. These facilities, beginning at the western end of the property and proceeding eastward, are described as follows.

Maintenance Building

This is a reinforced concrete building with two associated wooden buildings. They are leased by Continental Airlines. The wooden buildings are in poor condition and have limited remaining life. The concrete maintenance building contains approximately 12,000 square feet of floorspace and is in good structural condition. It has four large openings for vehicle access along its apron side.

Old Terminal Building

This building is in fair condition, and with a small amount of maintenance and upgrading it can be returned to good condition. The basic building contains approximately 42,000 square feet of floorspace and appears to be structurally sound. The shed addition on the east side encloses approximately 5,800 square feet and appears to be in poor condition. Continental Airlines is presently the major user of this building. Other airport related users are a few local charter, taxi or commuter airlines. The building is also used by the Motor Vehicle registration branch of the Government of Guam.

This building fronts the old air carrier apron alongside the runway. The apron is too close to the runway for use by large aircraft, however, the east side of the building is close to aircraft parking position number one and it is possible to provide for aircraft parking on this side of the building. There is also a large vehicle parking space and access road in front of the building.

Guam Airport Authority Offices

The Authority owns two former Navy housing units which have been remodeled to serve as offices for administrative and accounting functions. In addition, the GAA Board of Directors offices and board room are located in one of these buildings. The buildings are conveniently located and have adequate parking.

Old Cargo Building

This 10,000 square foot reinforced concrete building appears to be in good condition. The building has been subdivided into offices and work areas and no longer serves as a cargo facility. At the time of the inventory, there was no available space in the building. The building is located on the apron, and several small apron related activities use space in it. It has vehicle access on the public side, but access is very limited and it would be difficult to expand vehicle access due to adjacent roads and grades. There is a large amount of public parking space available alongside and in front of the building.

New Cargo Building

This rigid frame metal building containing 28,000 square feet of floorspace plus some mezzanine space is in good condition. A recent expansion adds 6,000 square feet of floorspace to the east end of the

building which has internal two story offices and toilets. The structure is bolted together, so it can be dismantled and moved or sold if it is desired to make other use of the land. The building is located adjacent to the aircraft apron and has truck access on the public side. There is presently some public and employee parking on grade in front of the building and additional parking is available across the access road. Most, but not all of the building is used for processing air cargo.

International Terminal Building

The present "new" passenger terminal building was opened on January 19, 1982. It is constructed of reinforced concrete and steel and is sited adjacent to apron extensions designed to handle aircraft as large as the B747-300. Access is via route 10-A and a terminal frontage road. Parking for airport tenants, VIP's, taxis and tour buses is provided adjacent to the building. Public parking is available in a parking lot across the frontal road at one level below the building.

The basement level of the passenger terminal building is occupied by an arcade entrance from the public parking lot; escalators and an elevator to the upper floors; mechanical rooms; offices, storage and workspace for GAA; and warehouse space for Dairy Farm and Duty Free Shoppers who are the two major concessionaires at the airport.

The ground floor of the building is devoted primarily to arrival and departure processing. The western portion of the building is the departure lobby with ticket counters, airline offices and a baggage makeup area. The central portion consists of vertical circulation, restrooms, GAA, Guam Customs and Agriculture offices, and mechanical equipment. The eastern portion consists of baggage breakdown and baggage claim areas, Customs inspection, an arrivals lobby and car rental booths. Various other GAA and tenant activities are located on this floor including operations and administrative functions.

The second floor contains a wellwishers lobby, security inspection, departure lobby, Duty Free Shoppers store, the U.S. Immigration and Public Health areas including processing facilities and offices, and the Dairy Farm food service and lounge areas. Also located on this floor are restrooms and airline lounges.

The third floor consists of only two areas open to the public. One is the lounge which has been recently opened to the public for a fee or

upon invitation by an airline. The other is the open air viewing area overlooking the apron. Also on this level are rooms for mechanical equipment. There is a ramp control tower one floor above this level which is accessible from this level.

2.2.3 Other Facilities

Roads

Ground access to the airport is presently via route 10-A which begins at Marine Drive and extends into airport property. An extension of this road provides access to the airport from Route 16. Route 10-A brings ground vehicles directly to the passenger terminal frontal curb and to the entrances to the public and employee parking lots. This route also brings ground vehicles to the bus/limo, taxi, VIP, and rental car areas.

A service road runs from Route 10A to the cargo building, the old terminal building, the GAA offices, and finally ends at the entrance to the Naval Air Station.

Parking Lots

The main parking lot is located in front of the new terminal building. It is one level below the terminal building and directly accessible from the passenger terminal through an arcade below the frontal road. The public portion of this lot contains 442 parking spaces. Employee parking, consisting of 303 spaces, is located on the north side of the lot.

A parking lot whose use is restricted to permittees, including persons with VIP passes, is located on the west side of the terminal building. This lot also contains tour bus unloading stalls to be used by departing tour groups.

Another restricted parking lot which has access controlled by a guard 24 hours daily is located on the east side of the terminal building. This lot is primarily used by tour buses for picking up arriving passengers. It also contains rental car stalls as well as some reserved parking for official use. The pavement of these lots is in good condition.

Additional parking for employees or visitors is available at the old terminal building. These lots are used by tenants and visitors to the facilities located in the cargo buildings, old terminal building and

GAA offices. There is no charge for the use of these lots which are underutilized at present. One of the lots is used by the Motor Vehicle Licensing Agency for road testing of driver applicants. The pavement in these lots has some areas which show distress.

Fuel Farm and Aircraft Fueling System

The GAA owns a complete aircraft fueling system which serves GIAT. The system consists of two 10,000 barrel jet fuel storage tanks, one 15,000 gallon aviation gas storage tank, a truck loading stand, and an operations building located close to Route 16 near the east end of the Authority property. Land adjacent to this site is to be reserved for possible future expansion of the fuel farm. The storage facility is connected to a distribution system located beneath the aircraft apron by an underground 16 inch diameter pipeline. Each of the ten gate related aircraft parking positions has fuel pits installed in the pavement and located conveniently for service to almost every type of aircraft. The fueling system is operated under contract to GAA by Lockheed Air Services Company (LAS).

Airport Industrial Park

An Airport Industrial Park is under construction on GAA owned land at the extreme eastern end of the GIAT property. The site is bounded on the north by the extension of Route 10A as far as the existing fuel farm and thereafter by the northern airport boundary; on the east by Route 16; and on the south by the airport boundary along the northern side of the Naval air Station. The western boundary of the Industrial Park is not exactly defined because of uncertainties connected with land needed for eastern expansion of the passenger terminal building and the air carrier apron; its approximate location is shown on Figure 2-4. In general, the fifty-foot wide restricted easement for the Air Force fuel line which prevents contiguous development of the total land area is the extremity of park expansion to the west. A more complete layout of the Industrial Park site is shown on Figure 9-1, "Land Use Plan". The site, as now defined, comprises approximately 55 acres of land, of which about 24 acres have been subdivided into lease lots. The right-of-way of a portion of Route 10A is included within the GIAT boundary. The Industrial Park provides land for aeronautical related commercial developments such as air freight forwarders; airport mail facilities; aircraft parts manufacturing, servicing and repair; in-flight food kitchens and facilities; airport concession related activities; and airport hotels. The aircraft fueling system's bulk fuel storage facility is presently located in the Industrial Park. In-

frastructure provided to park developers includes paved roads, storm drainage, wastewater disposal, water, electric power and communications.

2.2.4 Utilities

Water System

The new passenger terminal building is served by a water line connected to a reservoir tank located on Barrigada Heights. The portion of the pipeline owned by the GAA extends from the Public Utilities Agency Waterline at the bottom of Barrigada Heights to the new passenger terminal building. This pipeline provides domestic and fire protection water for the fuel farm, Airport Industrial park, and the new passenger terminal building.

At present, there is low pressure in this line which is due primarily to the inadequate capacity of pumps serving this portion of the system. Plans for the Industrial Park include a site for a new water tank which will be located outside the area of any aviation and airspace constraints.

The remaining airport buildings are served by water lines which connect to lines inside the adjacent NAS.

Studies of the water system problem at GIAT have been commissioned by GAA and are reported in the Water Facilities Master Plan (see Appendix B, Reference 18).

Sewerage System

Sanitary sewage from the terminal is collected and taken to Guam sewerage system mains located along Marine Drive. A new sewerage system was installed as part of the new passenger terminal building and was constructed in 1981. This system is sized to collect all present and future flows resulting from long range developments proposed by the 1977 GIAT Master Plan. The system consists of gravity mains and manholes located on airport property and in the right-of-way of Route 10-A. Although the airport line has adequate capacity, the Marine Drive system is currently overloaded and plans by the Guam Public Works Department for a diversion to resolve this problem are in process.

An additional sewer line serves the fuel farm. This line connects to the Route 16 sewerage system and future industrial development in this area will also connect to the Route 16 lines.

Electric Power System

Electric power for the airport is provided by the Guam Power Authority (GPA). Incoming power is carried overhead along the lower perimeter of the NAS and Route 10-A from Marine Drive. The new passenger terminal building is supplied by underground feeders from a connection at the old portion of Route 10-A. A substation is located in an electrical vault in the basement of the new passenger terminal building.

Communications System

The GAA owns and operates an internal telephone switching system. This system provides service to GAA offices and tenants. The system is connected to the island-wide Guam Telephone Authority (GTA) system, and through it to the rest of the world.

Drainage

The terminal area is divided into two drainage areas. The area west of aircraft parking position 4, including the old terminal building, adjacent apron, parking lots, and associated buildings, drains into Harmon Sink. The remainder of the apron and the entire new passenger terminal complex drains into an infiltration basin located below Route 10-A. Where fueling activities are conducted, drainage from the apron areas east of parking position 4 is directed through an oil separator before being discharged into the drainage system. No oil separator exists for aprons west of parking position 4. On the east side, Route 10-A drains into a newly constructed infiltration basin. Plans for future development of the lease lots in the Airport Industrial Park indicate that these lots will drain either into this new basin or another basin to be constructed in the future.

2.3. Historical Aviation Activity

This section contains historical data pertaining to aviation activity at GIAT including passenger traffic, air cargo and mail volumes, and aircraft operations. Section 3 contains forecasts of future aviation demand which are based to some extent on the historical data presented herein.

2.3.1 Passenger Traffic Trends, FY 1978-1988

Airport passengers fall into three categories. The first category is defined as terminal passenger traffic and consists of passengers who either originate or terminate their journey at Guam. The second category consists of transit passengers who pass through Guam but arrive and depart on the same or a connecting flight. Since a transit passenger both arrives and departs at the airport, one transit passenger is equivalent to two movements and is counted twice. The third category of traffic is defined as total airport traffic and includes terminal passengers as well as transit passengers.

By the end of FY 1988, total terminal passengers grew to 1.44 million movements as shown in Table 2-1. This growth from 546,500 movements in 1978 represents an overall increase of 164%, or an average annual growth rate of 10.2%.

As also shown in Table 2-1, there has been a substantial drop in the level of transit passengers from about 284,000 in FY 1978, to a low of 20,400 in FY 1986, increasing to 49,600 in FY 1988. A significant increase in transit passengers carried on Continental Air Micronesia was noted in the last three months of FY 1988. This appears to be caused by early effects of Continentals' hubbing operation at Guam.

Table 2-1 shows that total passenger traffic, including transits, increased from 1.11 million in FY 1978 to 1.54 million in FY 1988. However, the large number of transit passengers contained in the figures for the earlier years tends to distort the area of real growth, which is in terminal passengers. For this reason, the Section 3 forecast analysis is primarily concerned with the past and future development of terminal passenger traffic.

Data presented in Table 2-2 indicate that in 1988, 97.5% of Guam's originating and terminating traffic is carried by seven scheduled air carriers. (Garuda Indonesian Airways was a scheduled carrier through March 1988 when it discontinued service.) Commuter airlines and non-scheduled carriers accounted for the remaining 2.5%. Continental Air Micronesia commands the largest air carrier market share at 47% followed by Japan Air Lines at 23%. Maui Airlines carried 70% of the FY 1987 commuter traffic but has since ceased operation and been replaced by Guam Marianas Air as the principal commuter operator. Continental Air Micronesia entered the commuter market in August, 1989 as Air Mike Express.

Transit passenger movements generated by scheduled air carriers are shown in Table 2-3. It should be noted that two airlines, Pan American and Braniff, which in the past produced large numbers of transit passengers, no longer serve the Guam market. Continental Air Micronesia's transit traffic declined steadily between FY 1980 and FY 1987. There has been a significant reversal of this trend in FY 1988 as the airline inaugurated a portion of its Guam hubbing plan. As shown in the table, Japan Airlines and Hawaiian Air carried most of the transit traffic in FY 1987. Transit passengers on Japan Air Lines appear to be associated with that airlines' stop at Saipan in one direction on flights to or from Japan, and direct connections to and from Air Micronesia flights. Some of the Saipan passengers are taken through Guam on the trip to or from Japan. Japan Air Lines and Continental have a transfer agreement whereby passengers connecting to Micronesian destinations can transfer at Guam.

Hawaiian Airlines transit passengers are on Military Contract (MAC) flights. These flights are between Clark Air Base in the Philippines and Los Angeles with a stop at Guam.

2.3.2 Major Passenger Generating Markets

Prior to 1988, major markets for Guam were Japan, the U.S., and Micronesia. Travellers fell into three categories: visitors, residents and military.

As shown in Table 2-4, total air visitor arrivals to Guam from all countries increased 2.4 times over the 1978-1988 period, registering an average annual growth of 9.2%. However, annual growth rates of 20.1% and 20.7%, were experienced in 1987 and 1988, respectively.

Of the three markets which provide most of Guam's visitor arrivals, i.e., Japan, North America/Hawaii and Micronesia, Japan is by far the largest market with almost 86% of all visitor arrivals to Guam, up from 69% in 1976. The North American/Hawaiian market is the second largest, although it represents only 6.5% of the total. Micronesia follows at 5.5%, while all other markets account for about 2%.

The Japanese market has almost tripled over the 1976-1988 period with an average annual growth rate of 11.1%. A 19.6% increase was registered in 1988.

The U.S./Hawaii market, on the other hand, showed growth fluctuations over the same period, and realized a lower 5.9% average annual increase. A 14% annual increase was experienced for the two year 1986-1988 period.

The Micronesian market appears to have grown at a modest 5.5% rate since 1976, for a net increase of about 15,000 visitors. The remaining markets recorded negative growth for the period 1976-1987 although they show a 22% growth for FY 1988.

2.3.3 Japanese Market Profile

A visitor exit survey was conducted by Merrill and Associates for the Guam Visitors Bureau (GVB) in the summer of 1986. Their findings concerning the Japanese market were as follows:

"Japanese visitors to Guam are young. They are younger as a group than the Japanese overseas travel market as a whole. Over 61% of the respondents surveyed were in their 20's. Only 27% of the Japanese travel market is in their 20's. Conversely, very few travelers over 40 visited Guam during the survey period. Only 10.3% of the respondents were over 40 years of age. Guam attracts a greater proportion of women than is found in the Japanese overseas travel market as a whole. Fifty percent of the respondents surveyed were women. Women make up only 34% of the Japanese overseas travel market."

"Visitors primarily visit Guam for its ocean environment and because of its proximity to Japan."

"Sight-seeing, swimming and shopping were the three most common activities participated in by tourists."

The survey also indicated that visitors to Guam stayed an average of 4 nights, and 94% of the Japanese visitors to Guam during the survey period came to Guam on a pleasure trip.

The recent large increase in Japanese visitor traffic to Guam can be attributed to several factors. The first and primary factor was the substantial appreciation of the Yen against the U.S. dollar. The Yen went from a high of 271 Yen to the dollar in early 1985 to a low of less than 120 in 1988. As a result, overseas travel became affordable to an increasing number of Japanese tourists, expanding Guam's most important market for visitors.

The second factor contributing to the increase in visitor arrivals was the anticipated expansion of existing hotel facilities and the construction of new hotels. During the past five years, occupancy rates have been consistently high, averaging more than 85%, thereby making it more difficult to bring in increasing numbers of visitors. As a result, tour operators began to level off their promotions and sales of Guam during this period due to the shortage of hotel rooms. Recently, it has become obvious that a substantial number of additional rooms are being added to Guam's inventory. This has resulted in an increase in marketing of Guam packages in Japan by the tour operators and hotels.

A third factor relates to the introduction of service on the Guam-Tokyo route by All Nippon Airways, Japan's largest domestic carrier.

It is evident that Guam represents a unique visitor destination area for the Japanese with many incentives such as good and frequent air service, low costs, and relatively short travel distances. These advantages do not apply to the next largest visitor-generating market, U.S./Hawaii, particularly in terms of distance and total vacation costs.

2.3.4 The Guam Resident/Military Market

Thus far, this analysis has focused on the development of Guam's visitor traffic. Others using GIAT are Guam residents, and U.S. military personnel. There are no statistics relating to this traffic sector, so travel by Guam residents and military personnel must be derived from the use of other statistics. Specifically, there are traffic figures for total airport terminal passengers and total air visitor arrivals. (It should be noted, however, that airport traffic is shown on a fiscal year basis, while visitor traffic is shown on a calendar year basis). Resident travel is therefore derived by deducting visitor arrivals and departures from airport terminal passenger traffic. The results are shown in Table 2-5. Resident traffic is seen to increase from 40,489 arrivals in 1978 to 146,164 arrivals in 1988. Resident travel has increased from 15% of airport terminal passenger movements in 1978 to 20% by 1988. There is, however, some doubt as to the reliability of the Guam resident travel figures which appear to be overstated, and it is difficult to account for the significant increases which have occurred since 1983.

2.3.5 Aircraft Arrivals

Aircraft arrivals for GIAT are shown on Table 2-6. Aircraft operations, which are arrivals plus departures, (landings plus takeoffs) are double these figures. They show an initial period of decline and little growth during the first several years, followed by strong growth in the last few years.

The underlying factors affecting in these figures is the shift in Guam's aviation activity from a stopover point for trans-Pacific flights to a destination airport. During the early years, many flights which stopped at Guam did so primarily for refueling purposes. As airlines changed their routes and longer range aircraft became available, Guam's role as a stopover point declined. Simultaneously Guam's tourist industry began to develop, and Guam took on the role of a destination airport.

Recently, a third type of activity has been initiated at Guam. This activity is the use of GIAT as a hub for Continental Air Micronesia Airline operations. Hubbing will tend to increase air carrier aircraft operations in the future.

As of FY 1986, three commuter carriers operated out of Guam. This number has since declined to just one operator, i.e., Guam Marianas Air, which FY 1988 operated an estimated 950 movements with the 22 seat Casa CN212 aircraft.

That the current air carrier aircraft mix averages 235 seats. However, when extra-section flights, which operate on a regular basis presently, are considered, the average aircraft size is somewhat higher, about 244 seats. Scheduled air carrier operations account for 95 percent of total commercial available weekly seats as of January, 1988.

2.3.6 Air Cargo and Air Mail

Air Cargo and Air Mail activity for the FY 1981 through FY 1988 period is shown in Table 2-7. Inbound cargo showed steady growth during this period although individual years showed wide variations in growth and even a slight decline between FY 1985 and FY 1986. The average growth rate for this period has been about 11 percent per year. Outbound cargo also showed strong, steady growth between 1980 and 1986 when a significant increase in outbound air cargo occurred. This increase is attributed primarily to fresh fish for Japan

which are both exported from and transshipped through Guam. Although the average annual growth rate has been high for the full period, use of this high rate may be misleading because the picture is distorted by this one segment (fish) of the market.

Inbound mail has shown overall growth during the past eight years. This growth, however, has been extremely irregular with two years of growth followed by a decline. Outbound mail has shown a constant lack of growth and an absolute overall decline during the same period. It is likely that the forces affecting mail volume are the increasing availability of alternative means of transmittal of information, including electronic means and courier services.

2.3.6 Air Cargo and Mail Trends

The trend of air cargo movements is shown in Table 2-7 for the FY 1976 - 1988 period. Over this period, cargo tonnage fluctuated from year to year with no overall net increase in total tonnage noted over the FY 1976 base year until FY 1987. In FY 1987, air cargo recorded a 35% increase over the previous year and in FY 1988 a 60% increase. In this case, the use of trend data for forecasting purposes is not applicable.

Additional data on the pattern of cargo growth is shown in Table 2-7. Continental Air Micronesia transported over 50% of air carrier cargo, with the remainder divided fairly evenly between Japan and Northwest Air Lines. It is interesting to note that Continental carries more cargo from Guam than to Guam.

Air Mail trend data is shown in Tables 2-7. The pattern of past growth in this area closely resembles that of air cargo. Here, also, the future growth of air mail will relate to the pace of the Island's development, the most notable factor being the tourist area.

TABLE 2-1
GUAM INTERNATIONAL AIRPORT PASSENGER MOVEMENTS
FY 1978-1988

FISCAL YEAR	ORIGINATING PASSENGERS	TERMINATING PASSENGERS	TERMINAL PASSENGERS	ANNUAL% CHANGE	TRANSIT PASSENGERS	ANNUAL% CHANGE	TOTAL PASSENGERS	ANNUAL% CHANGE
1978	274,081	272,464	546,545		283,678		1,113,901	
1979	305,997	302,274	608,271	11.3%	283,962	0.1%	1,176,195	5.6%
1980	325,239	322,127	647,366	6.4%	177,975	-37.3%	1,003,316	-14.7%
1981	356,648	355,910	712,558	10.1%	116,504	-34.5%	945,566	-5.8%
1982	363,483	369,133	732,616	2.8%	100,256	-13.9%	933,128	-1.3%
1983	392,381	396,551	788,932	7.7%	33,281	-66.8%	855,494	-8.3%
1984	440,839	441,115	881,954	11.8%	20,546	-38.3%	923,046	7.9%
1985	444,236	443,475	887,711	0.7%	24,471	19.1%	936,653	1.5%
1986	500,338	501,788	1,002,126	12.9%	20,405	-16.6%	1,042,936	11.3%
1987	599,091	595,432	1,194,523	19.2%	35,975	76.3%	1,266,473	21.4%
1988	722,168	722,334	1,444,502	20.9%	49,646	38.0%	1,543,794	21.9%
AVERAGE ANNUAL GROWTH:								
1976-1988	-	-	10.21%		-		3.32%	

SOURCE: GUAM AIRPORT AUTHORITY.

NOTE: TOTAL PASSENGER FIGURES INCLUDE TRANSIT PASSENGERS COUNTED TWICE.

TABLE 2-2
ORIGINATING AND TERMINATING AIR PASSENGERS BY TYPE OF OPERATOR
CY 1980-2008

TYPE OF OPERATOR	1980	1981	1982	1983	1984	1985	1986	1987	1988
MAJOR AIR CARRIER									
CONTINENTAL AIRLINES	113,455	149,734	183,683	225,484	332,609	447,926	471,708	511,132	674,128
JAPAN AIRLINES	271,105	330,082	330,573	325,122	299,538	302,380	294,236	317,111	334,228
PAN AMERICAN AIRLINES	179,964	134,917	105,019	80,790	32,332	-	-	-	-
BRANIFF AIRLINES	21,438	-	-	-	-	-	-	-	-
AIR NAURU	8,255	13,861	12,951	13,468	7,443	8,827	5,552	5,066	2,455
NORTHWEST AIRLINES	0	20,700	55,681	95,123	122,289	108,532	114,032	143,252	179,813
ALL NIPPON AIRWAYS	-	-	-	-	-	-	62,056	134,504	158,741
HAWAIIAN AIR	-	-	-	-	-	-	-	8,453	41,269
GARUDA INDONESIA	-	-	-	-	-	-	5,977	5,422	4,047
SUBTOTAL	594,217	649,294	687,907	739,987	794,211	867,665	953,561	1,134,940	1,394,681
COMMUTER/REGIONAL AIR CARRIER									
AIR GUAM	-	-	-	-	-	7,058	-	-	-
AIR MARIANAS	-	-	-	977	-	-	-	-	-
ALOHA PACIFIC	-	-	-	-	8,581	7,391	-	-	-
ARROW	-	-	-	1,365	-	-	-	-	-
MAUI AIRLINES	-	-	-	-	-	484	24,122	46,192	25,265
PACIFIC AIRWAYS/ISLAND AIR	30,595	42,172	37,652	-	-	-	-	-	-
ROYAL HAWAIIAN AIRLINES	-	-	-	-	-	-	5,924	-	-
SOUTH PACIFIC ISLAND AIRLINES	-	-	6,988	40,240	67,340	18,421	18,024	11,589	-
TRANSMICRONESIAN AIRWAYS	22,310	21,013	-	-	-	-	-	-	-
GUAM MARIANAS AIR	-	-	-	-	-	-	-	-	10,366
SUBTOTAL	52,905	63,185	44,640	42,582	75,921	33,354	48,070	57,781	35,631
OTHER OPERATORS									
AVIATION SERVICES	244	79	69	5	0	131	17	76	-
MISC	-	-	-	6,358	11,822	7,200	478	1,726	541
SUBTOTAL	244	79	69	6,363	11,822	7,331	495	1,802	541
TOTAL	647,366	712,558	732,616	788,932	881,954	908,350	1,002,126	1,194,523	1,430,853

SOURCE: GUAM AIRPORT AUTHORITY

TABLE 2-3
TRANSIT AIR PASSENGERS BY TYPE OF OPERATOR
FY 1980 - 1987

TYPE OF OPERATOR	1980	1981	1982	1983	1984	1985	1986	1987	1988
MAJOR AIR CARRIER									
CONTINENTAL AIRLINES	12,022	8,630	4,282	2,450	3,405	6,979	3,631	3,008	10,264
JAPAN AIRLINES	1,067	367	546	-	4,988	5,043	2,299	11,527	9,213
PAN AMERICAN AIRLINES	89,879	99,193	87,280	21,531	-	-	-	-	-
BRANIFF AIRLINES	35,355	-	-	-	-	-	-	-	-
AIR NAURU	7,047	6,709	7,304	7,967	5,042	5,122	3,886	3,612	2,895
HAWAIIAN AIR	-	-	-	-	-	-	-	15,040	13,364
GARUDA INDONESIA	-	-	-	-	-	-	5,749	308	-
NORTHWEST AIRLINES	-	-	-	-	-	-	-	-	-
ALL NIPPON AIRWAYS	-	-	-	-	-	-	-	-	-
SUBTOTAL	145,370	114,899	99,412	31,948	13,435	17,144	15,565	33,495	35,736
COMMUTER/REGIONAL AIR CARRIER									
ALOHA PACIFIC	-	-	-	-	3,748	6,804	-	-	-
PACIFIC AIRWAYS/ISLAND AIR	-	-	-	-	2,841	523	146	172	-
SUBTOTAL	-	-	-	-	6,589	7,327	146	172	-
OTHER OPERATORS	32,605	1,605	844	1,333	522	2,955	4,335	6,698	12,565
TOTAL	177,975	116,504	100,256	33,281	20,546	27,426	20,046	40,365	48,301

SOURCE: GUAM AIRPORT AUTHORITY

TABLE 2-4
GUAM VISITOR ARRIVALS BY MAJOR NATIONALITY
CY 1976-1988

CALENDAR YEAR	COUNTRY						PERCENTAGE DISTRIBUTION							
	JAPAN	ANNUAL PERCENT INCREASE	NORTH AMERICA/ HAWAII	ANNUAL PERCENT INCREASE	MICRONESIA	ANNUAL PERCENT INCREASE	OTHER	ANNUAL PERCENT INCREASE	TOTAL	ANNUAL PERCENT INCREASE	JAPAN	NORTH AMERICA/ HAWAII	MICRONESIA	OTHER
1976	139,733		18,926		16,711		25,974		201,344		69.4	9.4	8.3	12.9
		9.2%		58.3%		6.3%		54.7%		19.4%				
1977	152,560		29,961		17,771		40,175		240,467		63.4	12.5	7.4	16.7
		5.8%		7.8%		-4.2%		-47.2%		-3.5%				
1978	161,440		32,312		17,020		21,203		231,975		69.6	13.9	7.3	9.1
		18.2%		12.0%		38.2%		-34.8%		13.9%				
1979	190,810		36,177		23,525		13,814		264,326		72.2	13.7	8.9	5.2
		16.3%		-5.5%		-8.4%		-2.3%		10.1%				
1980	221,910		34,185		21,543		13,491		291,129		76.2	11.7	7.4	4.6
		15.0%		-25.7%		-3.3%		-14.7%		7.5%				
1981	255,130		25,384		20,842		11,506		312,862		81.5	8.1	6.7	3.7
		3.6%		-3.5%		-15.8%		-10.6%		1.2%				
1982	264,440		24,483		17,540		10,283		316,746		83.5	7.7	5.5	3.2
		11.3%		-9.3%		15.9%		-13.9%		9.2%				
1983	294,429		22,201		20,321		8,854		345,805		85.1	6.4	5.9	2.6
		2.4%		19.2%		12.6%		19.7%		4.5%				
1984	301,499		26,456		22,873		10,595		361,423		83.4	7.3	6.3	2.9
		0.1%		0.9%		7.6%		12.8%		1.0%				
1985	301,690		26,695		24,607		11,946		364,938		82.7	7.3	6.7	3.3
		10.2%		7.5%		-2.5%		5.4%		8.9%				
1986	332,317		28,688		23,984		12,586		397,575		83.6	7.2	6.0	3.2
		24.2%		9.8%		-5.7%		-14.7%		20.1%				
1987	412,637		31,513		22,609		10,732		477,491		86.4	6.6	4.7	2.2
		19.6%		19.5%		41.0%		22.0%		20.7%				
1988	493,543		37,655		31,875		13,097		576,170		85.7	6.5	5.5	2.3
AVERAGE ANNUAL INCREASE: 11.1%			5.9%		5.5%		-5.5%		9.2%		-	-	-	-

SOURCE: GUAM VISITORS BUREAU

NOTE: FIGURES ARE FOR AIR PASSENGER ARRIVALS ONLY.

TABLE 2-5
GUAM TERMINAL PASSENGER ARRIVALS
DISTRIBUTED BY SELECTED CATEGORIES
1978-1988

YEAR	VISITORS (CALENDAR YEAR)		GUAM RESIDENTS/OTHER		AIRPORT TERMINAL PASSENGERS (FISCAL YEAR) TOTAL
	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	
1978	231,975	85.1%	40,489	14.9%	272,464
1979	264,326	87.4%	37,948	12.6%	302,274
1980	291,129	90.4%	30,998	9.6%	322,127
1981	312,862	87.9%	43,048	12.1%	355,910
1982	316,746	85.8%	52,387	14.2%	369,133
1983	345,805	87.2%	50,746	12.8%	396,551
1984	361,423	81.9%	79,692	18.1%	441,115
1985	364,938	82.3%	78,537	17.7%	443,475
1986	397,575	79.2%	104,213	20.8%	501,788
1987	477,491	80.2%	117,941	19.8%	595,432
1988	576,170	79.8%	146,164	20.2%	722,334

SOURCES: GUAM AIRPORT AUTHORITY; GUAM VISITORS BUREAU

NOTE: 1. VISITOR DATA IS ON A CALENDAR YEAR BASIS

2. AIRPORT TERMINAL PASSENGER DATA IS ON A CALENDAR YEAR BASIS

**TABLE 2-6
AIRCRAFT ARRIVALS AT
GUAM INTERNATIONAL AIR TERMINAL
FY 1981-1988**

FISCAL YEAR	AIR CARRIER	% INCREASE	COMMUTER	% INCREASE	OTHER	% INCREASE	TOTAL	% INCREASE
1981	3331		4128		250		7709	
		1.77%		-48.13%		22.80%		-24.27%
1982	3390		2141		307		5838	
		3.39%		-14.20%		-15.96%		-4.08%
1983	3505		1837		258		5600	
		-1.51%		41.75%		6.59%		13.05%
1984	3452		2604		275		6331	
		11.04%		-26.19%		94.91%		-0.63%
1985	3833		1922		536		6291	
		4.83%		51.82%		-14.55%		17.53%
1986	4018		2918		458		7394	
		9.51%		4.59%		40.61%		9.49%
1987	4400		3052		644		8096	
		19.98%		-21.10%		106.06%		11.34%
1988	5279		2408		1327		9014	

SOURCE: GUAM AIRPORT AUTHORITY

NOTE: THESE ARE AIRCRAFT ARRIVALS RECORDED BY THE GUAM AIRPORT AUTHORITY FOR PURPOSES OF RECORD KEEPING AND ACCOUNTING. THEY DO NOT INCLUDE MILITARY OPERATIONS AND GENERAL AVIATION ACTIVITY BY THE MILITARY AERO CLUB.

TABLE 2-7
CARGO AND MAIL AT GUAM INTERNATIONAL AIR TERMINAL
FY 1981 - 1988

FISCAL YEAR	CARGO					MAIL						
	OFF	PERCENT CHANGE	ON	PERCENT CHANGE	TOTAL	PERCENT CHANGE	OFF	PERCENT CHANGE	ON	PERCENT CHANGE	TOTAL	PERCENT CHANGE
1981	3952		2212		6164		2517		1820		4337	
		8.63%		6.51%		7.87%		-3.42%		-12.53%		-7.24%
1982	4293		2356		6649		2431		1592		4023	
		24.67%		10.57%		19.67%		13.37%		9.30%		11.76%
1983	5352		2605		7957		2756		1740		4496	
		4.73%		31.94%		13.64%		9.29%		0.86%		6.03%
1984	5605		3437		9042		3012		1755		4767	
		18.16%		31.57%		23.26%		-2.29%		6.55%		0.96%
1985	6623		4522		11145		2943		1870		4813	
		-2.40%		-4.00%		-3.05%		28.64%		-3.42%		16.19%
1986	6464		4341		10805		3786		1806		5592	
		8.01%		75.19%		35.00%		6.21%		-6.76%		2.02%
1987	6982		7605		14587		4021		1684		5705	
		18.75%		98.97%		60.57%		-3.78%		-2.14%		-3.30%
1988	8291		15132		23423		3869		1648		5517	
AVERAGE ANNUAL GROWTH RATE FROM 1980 TO 1988												
		11.17%		31.61%		21.01%		6.33%		-1.41%		0.31%

Island of Guam



FIGURE 2-1

PARSONS

The Pacific Area

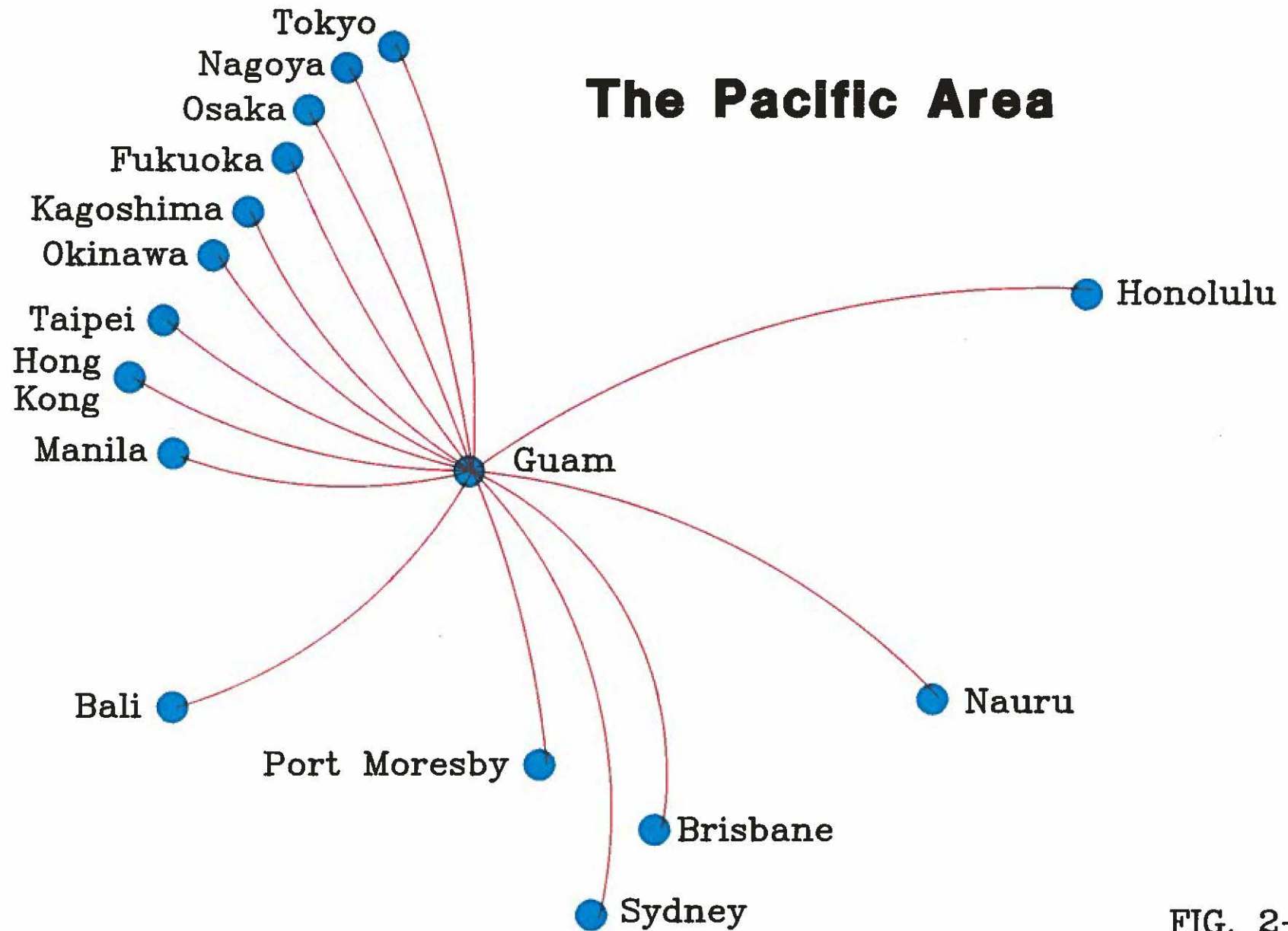


FIG. 2-2

PARSONS

Micronesia

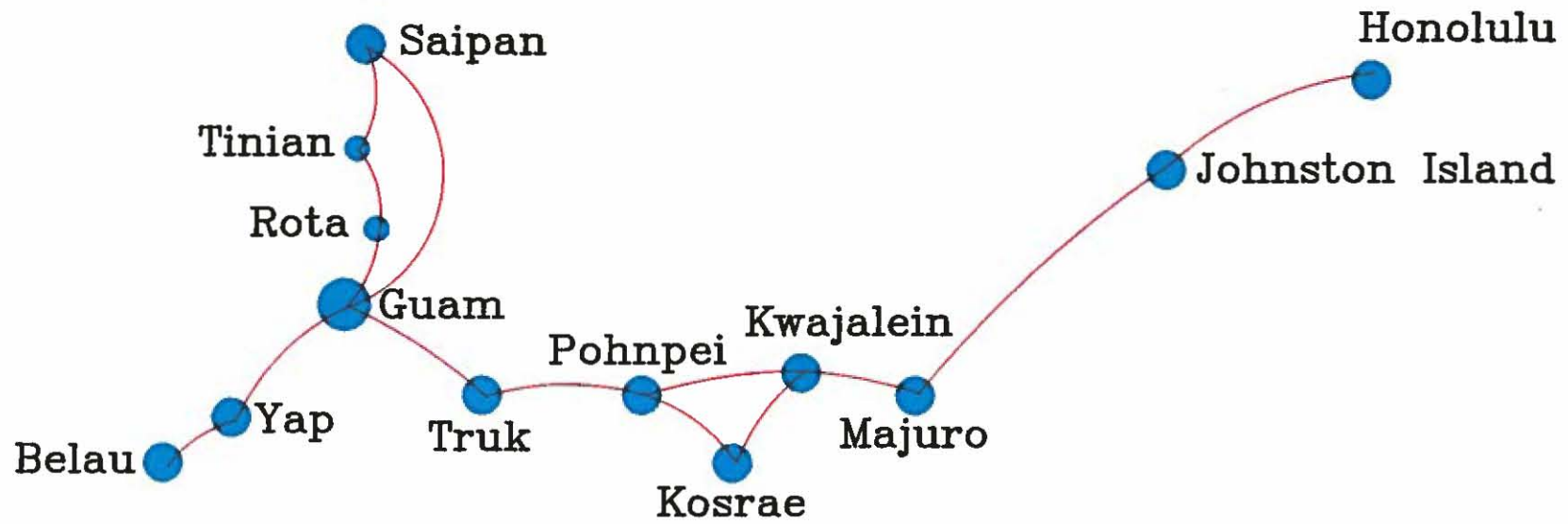


FIG. 2-3

PARSONS

EXISTING FACILITIES

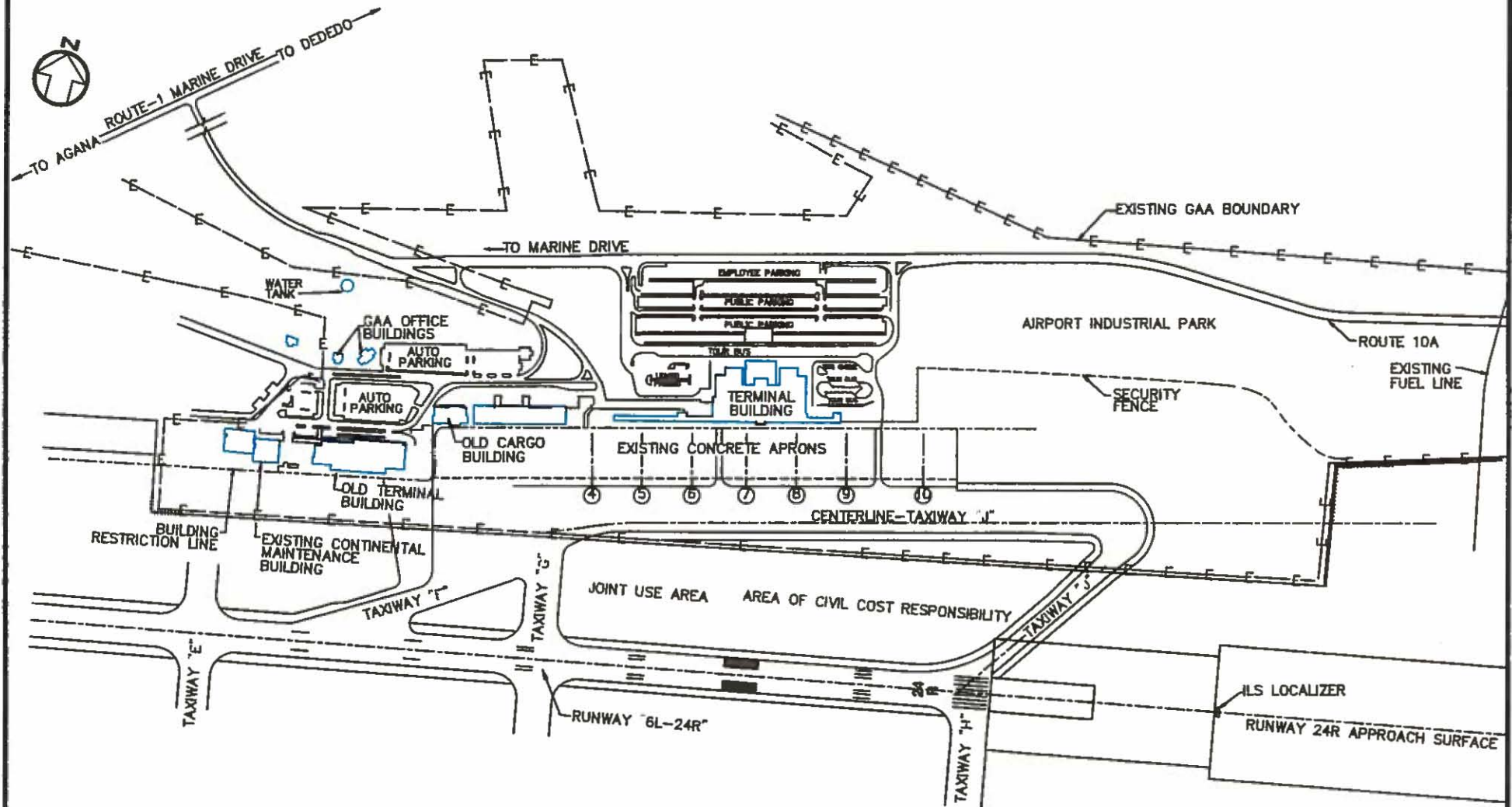


FIGURE 2-4

PARSONS

SECTION 3

SECTION 3

3.0 Forecasts

Forecasts of passengers using the Guam International Air Terminal (GIAT) indicate there will be a significant growth in the future. This growth is primarily the result of the development of tourism and related activities on Guam and nearby islands in the Mariana archipelago. During the past three years, the growth of tourism has resulted in almost full occupancy of all hotels on the island. Future growth will depend upon construction of additional facilities and provision of support infrastructure and necessary labor to operate the new facilities.

The results of the forecasts are summarized in Figures 3-1, 3-2, 3-3 and 3-4.

Figure 3-1 shows *high*, *most probable* and *low* forecasts of arriving visitors through the year 2008. Total visitors passing through the airport would be approximately double these figures. Of most interest is the sharp increase in passenger flow between 1988 and 1993, an increase of approximately 91% for the *most probable* forecast. Within 20 years of 1988, this same forecast shows an overall increase of approximately 212%.

Figure 3-2 shows forecast increases in the two factors that most affect airport facility requirements. The *most probable* forecast shows a very sharp increase in peak hour flow between 1988 and 1993 (an increase of approximately 51%), and a levelling thereafter. Peak hour flow increases only 96% between 1988 and 2008, a sharp contrast to the total passenger flow increase. Busy day flows more closely follow total growth by increasing approximately 210% between 1988 and 2008.

Figure 3-3 shows air cargo and mail thruput (total flow) volumes for the *most probable* forecast. Both cargo and air mail growth over the 20 year period 1988-2008 is approximately 156%.

Figure 3-4 shows the growth of air carrier and commuter aircraft operations for the period 1993-2008 according to the *most probable* forecast. During that period, air carrier movements grow by approximately 46% and commuter operations by approximately 69%.

An important characteristic of passenger traffic at GIAT is that arrival and departure movements of passengers are almost equal every year. Except for arrivals and departures through Andersen Air Force Base, Agana Naval Air Station, or by ship, everyone passes through the GIAT terminal. The number of permanent residents who move to or from Guam each year is small, and almost equal in each direction. As a result, a forecast of either arrivals or departures need only be multiplied by two to obtain a total forecast.

The procedure used to prepare this forecast was to estimate arrival passengers by selected categories; a separate forecast of transit passenger arrivals was also prepared. Total passenger movements and aircraft activity were then determined by multiplying these figures by two.

3.1 Factors Influencing Future Airport Activity

Many factors have been involved in the creation of the favorable environment within which Guam's airport activity has grown. The most significant and obvious of these is the dynamic growth of tourism in recent years. The challenge for this forecast is to examine the forces which created the changes, and determine how they will work in the future.

Guam's geographic position in the Pacific and its political status as a United States Territory, combined with its tropical climate, natural beauty, and availability of potable water, create favorable conditions for the development of tourism. External forces have recently combined to create the conditions under which investment in tourist facilities promise a favorable return. As initial investments produced favorable returns and the name "Guam" became better known in tourism circles, additional investment, promotion and recognition has occurred.

Guam presently experiences a very favorable position relative to Japanese tourism. It is close to Japan, offering a short flight at favorable rates, and has provided a satisfying experience to a significant number of visitors. The recently inaugurated Visa Waiver

Program of the U.S. government which permits a Japanese tourist to be admitted to the United States without first obtaining a Visa, removes a significant inconvenience to visitors. The Guam tourist industry has also tailored its facilities to meet the requirements of the Japanese traveler.

As a result of its significant economic success in recent years, Japan's citizens enjoy more disposable income than ever before. Accordingly, the Japanese government recently adopted a program intended to encourage ten million Japanese citizens to travel overseas annually by 1991. It appears that Guam will be able to capture a reasonable share of this market. Further strengthening Guam's market position is the fact that a significant portion of the investment in tourist facilities on Guam and nearby islands is from Japan. It is reasonable to assume that these investors will extend their best efforts to assure an adequate supply of visitors for their facilities.

Although Japan is presently the primary source of visitors to Guam, there are several other countries within reasonable travel distances which may also be future sources of tourists. These countries include Korea and Taiwan; Guam is already initiating promotional programs to get the island recognized there. Simultaneously, these countries are relaxing their restrictions on foreign travel and the transfer of money abroad. As their economies strengthen further, more relaxation of restrictions is expected.

The potential visitor market available to Guam is large. If the forecast considers only the size of this market, an unconstrained forecast of tourism can be made. Such a forecast will far exceed the available and anticipated capacity of visitor facilities on Guam. Therefore, the visitor forecast prepared in this report is a constrained forecast, which is based on the availability of tourism facilities, supporting infrastructure, and labor to exploit the market.

As with any forecast, several assumptions must be made concerning future events. Significant among these are that economic and political conditions will not change to a significant degree. For example, if the exchange rate of the Japanese Yen were to decline greatly, a significant decline in Japanese tourism might occur. Likewise, other unanticipated world or local events such as war or a worldwide economic depression could have an effect which could negate all the efforts of Guam to promote tourism.

3.2 Forecasts of Arriving Passengers

Three separate forecasts are provided in this plan. The *high* forecast assumes that most things go well for Guam with respect to tourism and that excellent worldwide economic conditions will prevail while tourism facilities are created apace. The *most probable* forecast assumes that some negative things happen to limit tourism growth while the *low* forecast assumes that a number of things go wrong. All of these forecasts are within the previously mentioned constraint of "significant" political and economic changes. In general, tourism facility development governs results.

The passengers using GIAT are placed into two major groups: terminal passengers and transit passengers. Terminal passengers are those arriving or departing and therefore using the full range of services and facilities provided at GIAT. Transit passengers are those who do not leave the secure side of the terminal, and normally do not require any special processing or services other than provision of boarding passes for connecting flights, and in some cases, isolation in a sterile area while awaiting boarding calls.

The total number of terminal passengers is the sum of arriving plus departing passengers. At Guam, this number is essentially equal on an annual basis. Therefore, forecasts will be made for arrival passengers and the assumption made that departing passengers will be an equal number.

Terminal passengers are further divided into two groups. The first group is "visitors," as defined by the Guam Visitors Bureau (GVB). This group includes both tourists and other persons identifying themselves as "visitors." The number of "visitors" is reported monthly and annually by the GVB.

The second group of terminal passengers consists of Guam residents, military personnel, business travelers, persons making one day trips around Guam or to nearby islands, and others. The volume of these passengers is calculated by subtracting the visitor count provided by the GVB from the total passenger arrival count provided by the Guam Airport Authority (GAA).

Annual visitor arrivals have increased from about 365,000 in 1985 to over 576,000 in 1988. The greatest portion of this increase has been attributable to Japanese visitors. Their numbers increased from about

302,000 in 1985 to almost 494,000 in 1988 which accounted for almost 91 percent of the total increase in visitor arrivals.

Closely associated with the increase in visitor arrivals has been hotel occupancy. A paper presented by the GVB to the Aviation Policy Task Force on September 1, 1988 listed 2,738 hotel rooms on Guam in 1985. This number had increased to 3,950 as of August, 1988, and the paper indicated that it would increase to about 4,725 by 1990. The paper also identified specific additional development projects which would result in over 9,500 rooms being available sometime around 1995.

The Office of Economic Development and Planning, Department of Commerce, Government of Guam, published a new list of hotel rooms that are extant, under construction, and proposed to be constructed as of June 13, 1989. Some new projects have been announced, others have been cancelled, and hotel room counts have changed. This report indicates that as of that date, there were 4,006 hotel rooms on Guam, and by 1992 this number will increase to about 7,600 rooms. The total of identified hotel rooms has increased from previous projections of over 9,500 rooms to a new projection of about 10,760 rooms. Availability of infrastructure, hotel workers, financing, and construction labor will govern the rate and number of hotels completed each year. Hotel room data are shown in Tables 3-1 and 3-2.

In 1988 there were 3,950 hotel rooms for visitors and 576,170 visitors to Guam. This averages 146 visitors per hotel room for the year. It is interesting to note that if a hotel room is occupied by 2 persons for an average stay of five days, a 100 percent occupancy for that room provides accommodations for 146 persons per hotel room per year. This factor seems appropriate in view of the high utilization of hotel rooms experienced during the past few years and seems to fit the Japanese tourist travel pattern fairly well. It is expected, however, that the average number of visitors per hotel room will decline in the future as additional accommodations are placed in service.

The number of available hotel rooms forecast in Tables 3-3, 3-4, and 3-5 is based on the list provided by the Department of Commerce shown in Tables 3-1 and 3-2. These numbers represent the rooms which will be available for most of the year. Thus, as new hotel rooms become available, they are added to the following year's inventory. The number of hotel rooms added during 1989 and 1990 are similar for each forecast because these rooms are either under construction or committed to be built. Some slowdown in completion of new

facilities is reflected in the low forecast which reflects a conservative attitude about investment and other factors. The tables include tour ship and golf excursion visitors that will be discussed later.

After 1990, the *high* forecast reflects an optimistic development schedule and a minimum number of rooms to be removed from service for major renovation. The *low* forecast reflects a slower development schedule and a fairly high removal of existing rooms for renovation; it is expected that each year, a significant number of existing hotel rooms will be temporarily removed from inventory for several months. For example, by 1993 most of the existing (1988) hotel room inventory will have been in full time use for almost ten years. Maintaining the quality of service in these rooms will require renovation.

Since hotel occupancy during 1988 was very high, and almost no new hotel rooms were added during that year, the visitors per hotel room rate is expected to remain high in 1989. After that, as hotel rooms are added, it is expected that the number of visitors per hotel room will decline to provide less crowded conditions and allow lower occupancy during off peak seasons. It should be noted that this lower figure does not mean a significant lowering of annual room occupancy rates. An annual occupancy rate of 85 percent based on two persons staying five nights results in a visitor ratio of 124 persons per hotel room per night per year. Such occupancy rates are compatible with Hawaii during its peak season.

Both *high* and *most probable* forecasts assume that a cruise ship will be based at Guam sometime during 1989 and become fully operational by 1990. Specific proposals have been made to the Government of Guam by two different operators of tour ships relative to providing service. Although plans are not firm at this time, the likelihood of cruise ship operation to Guam seems high enough to be included this forecast.

The assumed size of the tour ship is 800 passengers. The *high* forecast also assumes that a second ship, with a passenger capacity of 1000 passengers, will be added to the fleet by 1993. Both forecasts assume the ship operates 45 weeks per year which allows for maintenance and a few longer cruises during the year. Occupancy rates for the ships are indicated in Tables 3-3 and 3-4. The *low* forecast in Table 3-5 assumes that no cruise ship is based at Guam during the first five year time period.

During the past few years, golf has become very popular as a form of recreation for Japanese visitors to Guam. Rumor has it that the cost of playing golf in the Tokyo area is so high that it is less expensive to travel to Guam for a weekend and play two rounds of golf than to play one round in Tokyo. Another important factor is that at Guam, it is possible to play golf all year round.

At present, most visiting golfers stay in hotels, however, several projects which will provide new golf courses and living accommodations have been announced by developers and some are under construction. No historic data exist to indicate travel characteristics of the users of these facilities, therefore, assumptions have been made regarding the average number of visitors per golf course per week. The forecast number of courses and visitors are indicated on Tables 3-3 through 3-5.

Tables 3-3, 3-4 and 3-5 provide *high*, *most probable* and *low* forecasts for 1989 through 1993. These forecasts are based on anticipated developments and assumed utilization factors. They also introduce the effects of adding golf courses with associated living accommodations and cruise ship based at Guam. Forecasts beyond 1993 are provided in Table 3-6.

The *high* forecast assumes the eventual development of about 17,000 to 19,000 hotel rooms, additional golf courses beyond those indicated for the *most probable* forecast, a significant resident retirement community, and other favorable economic activities. Such a level of visitor activity would have a profound impact on the entire social and economic structure of Guam, due in part to a major influx of outside workers. It would also represent a significant challenge to the Government of Guam to develop the island's infrastructure.

The *low* forecast reflects a relatively slow growth in the numbers of visitors beyond 1993, but not necessarily a lower economic growth. An increase in the average length of stay and a shift to an upscale class of visitor could readily provide significant economic growth without a major numerical growth in numbers of visitors. Limitations on the availability of infrastructure, service labor, construction capability, and financial resources are key factors which could significantly limit further economic development.

The *most probable* forecast assumes an inventory of approximately 11,000 to 13,000 hotel rooms by 2008, a slight lengthening of visitor stay, additional golf courses and residential accommodations, and

continued cruise ship growth. It is also believed to represent the most reasonable growth that can be expected within the physical and economic capabilities of the island as they are presently understood.

Tables 3-7, 3-8 and 3-9 contain the *high, most probable* and *low* forecasts of total terminal passenger arrivals through the year 2008. As shown in the Tables, the Guam residents/other group of arrivals represents about 20 percent of the total terminal passenger arrivals for the past several years. This percentage is forecast to decline slightly during the next several years to about 15 percent of total passenger arrival volume.

3.2.1 Transit Passenger Forecasts

Historically, transit passengers have declined from being a major to becoming a small portion of total passenger volume. This decline continued until it reached a low of only about 20,400 in 1986. Since then, the transit passenger volume has grown significantly during each of the succeeding two years.

Several factors have influenced this reversal of the declining trend. Tourism and business in Saipan and Micronesia have begun to grow and Continental Air Micronesia has begun a hubbing operation at Guam. As a result, larger numbers of Continental's travelers are passing through Guam on direct connections instead of having to lay over for a day or more. Continental's promotion of its route from Hawaii to Manila has resulted in growth on that route and an increase in transit passengers at Guam. Hawaiian Airlines conducts a Military Contract operation through Guam connecting Clark Air Base with the mainland United States which also results in an increase in transit passengers.

Two significant near term events have been announced which will further increase transit activity. The first, and most significant of these, is the announcement by Continental Air Micronesia of its intention to make Guam the Hub of its Pacific operations. Continental plans to base several aircraft at Guam, and have three arrival/departure periods each day. They further anticipate that within the first few years of the start of hubbing, their passenger load will consist of approximately 40 percent transit passengers. This forecast believes that is a high estimate and assumes lower percentages of transit passengers as shown in Tables 3-10 and 3-11.

The second near term impact is the announcement by Northwest Orient that it will begin service to Saipan by stopping there on the way from Honolulu to Guam. The Saipan to Tokyo passengers will be carried through Guam, adding transit passengers to the holdroom volume during the late night hours. From a long term viewpoint, however, it is anticipated that at some point, the volume of Saipan and Guam passengers will grow to a point where separate service will be warranted. Assuming Northwest could obtain additional gate slots at airports in Japan, this transit volume would then decline.

Transit passengers are generated primarily as a result of decisions that are only minimally related to activity on Guam. As a result, there is no reason to assume that the *high* transit forecast would occur only if the *high* terminal forecast occurs. Any combination of terminal passenger forecasts and transit passenger forecasts is possible.

Forecasts of transit passengers are contained in Table 3-10. The *high* forecast assumes a high degree of hubbing by Continental Air Micronesia plus additional transiting of passengers by at least one other airline, probably Northwest. The existence of a strong Continental Airline long range route structure, with good service to numerous points, could also encourage the development of small regional commuter airlines. These commuter airlines would provide frequent service to small nearby islands, permitting passengers to make connections to the Continental route structure. For example, if tourism develops on Rota it is likely that the tourists would be well served by direct flights to Rota, however, residents, workers, and businessmen related to Rota activity would most likely find their travel needs better served by taking a commuter airline to Guam and then transiting to Continental Airlines for their overseas flight.

The *low* forecast assumes the inability of Continental airlines to successfully develop a large transiting operation at Guam. This could occur for many reasons, and does not mean that Continental's hubbing operation would be unsuccessful. A low transit figure could occur if a large portion of Continental's passengers decide to stay over for a day or longer during their passage through Guam. The *low* forecast therefore reflects small growth, paralleling a slow development of Micronesia.

The *most probable* forecast follows a middle road. It assumes a relatively large growth in transit activity in each of the next few years. After that, the growth rate begins to slow as hotel rooms become available due to increased development and more passengers elect to

stay overnight or longer on Guam. This depends to a large extent on marketing strategies employed by tourism wholesalers. Also, a slowing of the growth rate reflects the bypassing of Guam with transit passengers as will occur when Northwest establishes a direct flight between Japan and Saipan.

3.2.2 Total Passenger Arrival Forecasts

Table 3-11 contains forecasts of total terminal and transit passenger arrivals. This Table is prepared by adding high values for the terminal passengers to high values for the transit passengers, and similarly adding the comparable values for the *most probable* and *low* forecasts. As noted in the discussion above, there is no direct relationship between terminal and transit passengers. By combining the high and low values of each, however, a maximum envelope is produced that provides information about the highest and lowest ranges which might occur.

3.3 Busy Day Passenger Forecasts

Busy day forecasts are presented in Table 3-12. Terminal passenger arrival forecasts are based on the assumption that the peak month comprises 11 percent of annual total arrival passengers. The peak month for Guam is historically August, and in recent years March has become a second peak month. Transit passenger forecasts assume a high peak month of 14 percent of annual total transit passengers. These peaking factors indicate a rather strong seasonal demand by Guam visitors and this pattern is expected to continue in the foreseeable future.

Monthly figures are then divided by the length of the month to achieve the average busy day figures. It should be noted that busy day forecasts are not the absolute highest single day event of the year, but represent an industry standard value which is used for economical design of facilities, i.e., average day of the peak month (ADPM).

3.4 Peak Hour Passenger Forecasts

Peak hour forecasts are based on a percentage of busy day traffic. For the past several years, Guam peak-hour passenger activity has been extremely high by industry standards. For example, in 1988, an estimated average of about 2,000 arriving passengers were accommodated at GIAT within a 60-minute period. The highest single hour reported was over 2,200 passengers. This represented about 80% of

busy day arriving passengers. Ordinary peak hour activity at most airports ranges from 10-20% of busy day traffic.

The Guam market is unique in that its peak hour passengers consist primarily of Japanese visitors arriving and departing Guam between the hours of 0100 and 0400. Curfews at Tokyo and Osaka, the origin points of most of this Japanese traffic, prohibit aircraft activity between late evening and early morning hours. The Guam market offers airlines an opportunity to utilize aircraft which might otherwise be out of service during these hours. By departing Tokyo and Osaka just prior to the imposition of the curfews, and returning shortly after the curfews have been lifted, aircraft can remain in use. This results in high aircraft utilization and provides additional revenues to the airlines which would not otherwise be received. In order to stimulate travel at these hours, very attractive fares are offered. This, in turn, provides high aircraft passenger load factors.

The intensity of Guam's peaking pattern can be better placed into perspective by comparing it with that of another Pacific area airport, i.e. Hong Kong International Airport. In 1988, Hong Kong generated an estimated 20,500 arriving busy day terminal passengers compared to about 2,560 for Guam. Thus, on a busy day basis, Hong Kong will generate approximately 8 times more passenger arrivals than Guam. Hong Kong's estimated 1988 peak hour figure of 3,285 arriving terminal passengers, however, is only 1.65 times greater than the Guam figure of 2,000. For Hong Kong, peak-hour arrivals represent an estimated 16% of busy day passenger arrivals, which is much more typical of Pacific area airports than Guam.

There is no known historical precedent on which to forecast the future trend of Guam's peak hour pattern. In the case of most airports, initial sharp peaks always diminish in intensity as more operations are added and traffic is spread more uniformly throughout the operating day. It can be expected that Guam will experience the same trend, and that the current 75% figure of peak-hour arrivals (including transits) to total busy day arrivals will decline.

Judgment must be used to estimate how much of a drop in the peaking factor will occur. It can be expected that Japanese traffic during the early morning hours in Guam will continue for some time. There are, however, a number of possible developments which could affect this traffic sector. Specifically, the new Kansai International Airport at Osaka which is under construction and scheduled to open in 1993, will not be subject to curfew restrictions. Tokyo may relax its

curfew somewhat as it searches to find more airfield capacity, perhaps by excluding from its curfew the new generation of quieter jet aircraft or by permitting some arrivals during curfew hours. Also, the long wait for new aircraft being experienced worldwide may necessitate higher utilization of existing equipment and lead to reassignment of aircraft away from Guam to other markets.

The world's airport and aircraft capacity problems affect airlines and airports everywhere. Long term solutions will force changes in airline route structures and equipment utilization practices in ways that are only vaguely foreseen at this time. Factors that bring the extreme peaking situation to Guam are likely to be altered in the next few years. Other, higher yield routes may compete for the aircraft that are currently engaged in the Guam trade. For example, Hong Kong may find that their curfew may have to be changed to avoid loss of service, and Japanese carriers may elect to reassign equipment to that route. The same forces could make Korea and Taiwan routes more profitable than Guam, as travel restrictions are removed in these countries. Curfews do not presently exist in either country.

As Pacific region tourism markets develop, there will certainly be route adjustments that may affect Guam's peak hour demand. Most importantly, as Guam's tourism market matures and the travel industry perceives opportunities in high yield markets, services are likely to spread to other hours of the day.

In any case, it is prudent planning to adopt a wait-and-see approach to programming long term facility development where only short term trends have been experienced. Because the peaking pattern is the major determinant of facility requirements, it will be wise to base longer term forecasts on reasonably conservative assumptions.

On the basis of these considerations, and from experience with peak-hour patterns and developments at other Asian airports such as Hong Kong, Manila, Taipei and Singapore, it would seem reasonable to limit Guam's future forecasts to a range between 3,000 and 4,000 passenger arrivals during the peak hour, thereby doubling its current level of peak-hour traffic over the planning period. This is accomplished by gradually reducing the percentage of peak-hour to busy day traffic from its current level of 75%, to 50% by the year 2008. As shown in Table 3-13, peak-hour terminal passenger arrivals for the *most probable* case would increase from nearly 2,100 in 1989, to 3,000 by 1993, 3400 by 1998 and ultimately to more than 3,700 by 2008.

Excluding transit passengers, the peaking factor will drop from its present 75% level to 44% in 2008.

Transit passengers to be accommodated during peak hour are forecast in Tables 3-14, 3-15, and 3-16; they will arrive or depart during the peak period in the early morning hours. Many years ago, especially during the Pan American Airlines Honolulu to Manila flights, a large percentage of the passengers in the terminal were transits during this time of the morning. Recently, the shift to early morning tourist arrival/departure activity peak periods has been accompanied by a shift to very few transit movements during these hours. The forecasts assume a small increase in transit passengers in the future.

Table 3-17 contains forecasts of peak hour transit passenger arrivals. Peak hour for transits is expected to occur during the highest daytime hubbing period, concurrent with Continental Airlines peak period activity. The forecasts provided in this Table are for use in planning the size of transit passenger facilities.

For planning and development purposes, the 3,400 to 3,800 peak hour figure should set the requirements for the initial development stage. By the time such development is completed, more evidence will be available to judge whether or not the extreme peaking pattern will continue.

3.5 Annual Aircraft Operations

Annual aircraft operations are calculated based on assumed future aircraft types, seating capacity and load factors. Air carrier aircraft are categorized as B-747, other wide body, and narrow body aircraft. It is forecast that the percentage of widebody aircraft at GIAT will increase in the future, however, there will still be a significant number of narrow body aircraft in use which will provide service to nearby islands, Micronesian destinations, and operate on low density routes.

Based on these assumptions, it is forecast that the average annual aircraft seat capacity will increase from its present value of slightly under 250 seats to about 312 seats in 2008. Average aircraft load factor on an annual basis will be 70 percent, which is expected to be the overall Asian area rate in the future. Air Carrier aircraft are assumed to provide service to 95 percent of the passengers using GIAT.

As noted in the discussion of historic aviation activity at Guam, commuter airlines have been a volatile element. Continental Air Micronesia recently announced plans to initiate commuter airline service to Saipan in August, 1989 and Rota and Tinian soon thereafter using F-27 aircraft; Continental Air Mike is the result. Because of frequent changes, it is difficult to forecast future commuter airline activity with precision. The forecasts assume an average aircraft size of 19 seats and an occupancy rate of 65 percent. This aircraft size allows for some larger as well as some smaller aircraft. Commuter airlines are assumed to provide service to about five percent of the passengers using the airport.

Tables 3-18, 3-19 and 3-20 provide the *high, most probable* and *low* forecasts of air carrier and commuter aircraft operations. Each operation is either an arrival (landing) or a departure (takeoff). These values are different in that all prior values were one way movements only.

3.6 Busy Day Aircraft Arrivals

The busy day is defined as an average day in the peak month. It represents a day which will be exceeded about ten to thirty times during the year and is related to the discussion of busy day passenger activity. Busy day aircraft activity generally occurs in the peak months when airlines add extra flights to their schedules to accommodate passengers. Charter activity, if any, is also usually higher during this period.

Table 3-21 presents the busy day forecast for air carrier and commuter aircraft arrivals. These forecasts assume that a slightly larger size of aircraft will be used during busy periods of the year. The busy day average aircraft capacity is expected to increase from a current value of about 260 seats to about 318 seats in 2008. A higher load factor of about 75 percent on air carrier aircraft and 70 percent on commuter aircraft is assumed.

3.7 Peak Hour Air Carrier Arrivals and Operations

Forecasts of peak hour activity assume a significant change in the distribution of arriving passengers throughout the day. As noted earlier in Section 3.3, it is assumed that as traffic at GIAT grows, the high peaking experienced in the late night hours will decline as a percentage of daily activity. Simultaneously, it is expected that airlines will assign larger aircraft to these peak hours, and that load factors will also be higher.

Table 3-22 presents forecasts of peak hour activity. It is assumed that peak hour will continue to be related to the Japan curfew situation and will occur slightly after midnight; it is expected that there will be no commuter airline activity during this period. The peak hour average aircraft size is assumed to be the largest of those operating at the airport. Average aircraft capacity is forecast to increase from a current value of about 340 seats during peak hour to about 384 seats in 2008. The forecasts also assume a peak hour load factor of about 80 percent. The two way movement data assumes that in the early years there will be one departing aircraft during this period, and that this will increase to two departing aircraft by 2008.

It is interesting to note that there is a wide spread between *high* and *low* aircraft operations forecasts in the future. This is because of the combination of the high transit forecast with the high terminal passenger forecast and conversely with the low forecast. This information is of interest in determining what the range of aircraft support needs might be, however, the *most probable* forecast should be used for determining facility requirements.

3.8 Air Cargo and Air Mail Forecasts

Both air cargo and air mail forecasts show substantial growth during the master planning period.

3.8.1 Air Cargo Forecasts

Air freight services are an area in which considerable growth is expected to take place in the future. Until recently, air cargo traffic at GIAT has remained fairly constant. Because of a rapidly increasing tourist population as well as a growing military and resident population in the past two years, the demand for perishable consumer goods, additional mail service and other low volume, high profit consumer goods has gone up.

The investment of large sums of U.S. Government money which are being utilized to develop the infrastructure of the new nations of Micronesia, is expected to attract investors. As a result, the standard of living in these islands is expected to improve, stimulating an increased demand for consumer goods. Much of these goods will probably be trans-shipped through Guam resulting in an increased flow of air cargo through GIAT.

Between 1976 and 1986, air cargo traffic fluctuated from year to year, but overall, the net tonnage changed very little. In 1987 there was a significant increase in both inbound and outbound cargo, mostly in outbound cargo. This trend continued in 1988 which is largely attributed to fish being exported to Japan.

Inbound cargo, (cargo off), is forecast to grow at a rate close to the rate of growth of tourism. However, outbound cargo flow, (cargo on), is expected to grow at a slower rate. The reason for this is that as volumes of fish to be exported reach higher levels, alternative, less expensive transportation modes will be used. Also, as other islands in Micronesia develop their fishing industries, shippers will arrange for direct flights rather than transship the fish through Guam. This anticipated decline in perishable products will offset the higher growth rates expected for other outbound air cargo.

Forecasts of annual cargo volumes are presented in Table 3-23. Total cargo is forecast to increase over 2.6 times from about 23,400 tons in 1988 to 60,000 tons in 2008. This represents an overall average growth rate of 4.8 percent per year. Growth will be accompanied by a gradual shift from the current situation where outbound cargo is almost double inbound cargo, to one where the two are about equal.

Busy day cargo forecasts are presented in Table 3-24. These volumes also indicate a more balanced two-way split of cargo movements in the future.

3.8.2 Air Mail Forecasts

Total cargo has shown a slow but steady growth during the past several years, however, a noticeable slowdown and even decline in airmail volumes has been observed. It is believed that this trend represents a response to competitive private sector courier companies as well as new technology such as facsimile machines and computer modems.

Because of the explosive growth of tourism, the forecasts assume that the overall growth of airmail will follow the same average growth rate as air cargo. This average rate of 4.7 percent per annum results in an annual growth of airmail from 5,517 tons in 1988 to over 13,700 tons in 2008. The *most probable* forecasts of annual mail activity are shown in Table 3-25. Busy day mail forecasts, shown in Table 3-26, indicate the volume will be about 49 tons on the busy day in 2008. A busy day peaking factor which is higher than the cargo factor is used

for the mail forecasts. This reflects highly seasonal mail activity which occurs during holiday periods.

TABLE 3-1
CURRENT HOTEL INVENTORY
AS OF JUNE 13, 1989

YEAR BUILT	NAME OF HOTEL	NO. OF ROOMS
1968	FUJITA GUAM TUMON BEACH HOTEL	283
1969	PACIFIC ISLANDS CLUB	272
1970	GUAM BEACH	80
1971	OKURA	224
1971	DIA-ICHI ¹	333
1972	HILTON ²	486
1972	JOINUS	36
1973	HORIZON	104
1974	TROPICANA	192
	SUEHIRO	38
	TERRAZA	20
	GUAM REEF	295
	GUAM INTERNATIONAL TRADE CENTER	35
1980	ISLAND	40
1982	COCOS	128
1983	HARMON PLAZA	50
	GUAM PLAZA ³	313
	EXECUTIVE	13
	CENTRAL STUDIO	7
	HOTEL MARINA	50
	PLUMERIA	78
	CLIFF	40
	ISLAND GARDEN GUEST HOUSE	3
	POLYNESIAN	13
1984	MAI'ANA	77
1985	INARAJAN SHORES	9
	HABA ADAI	14
1986	PAGODA	41
	KINA COURT	30
1987	PACIFIC STAR	436
	GOLDEN	18
	MICRONESIAN	60
	ORANGE	12
	SUN ROUTE	70
1988	MID TOWN MOTEL	36
	TAN ANA'S MOTEL	4
1989	RODIN CO MOTEL	12
YEAR NOT IDENTIFIED	GUAM TOWERS	3
	DOWNTOWN HOTEL	46
	CASA DE FLORES	5
TOTAL		4,006

NOTES: 1. 130 OF THESE ROOMS WERE ADDED IN 1987.

2. 104 OF THESE ROOMS WERE ADDED IN 1985.

3. 194 OF THESE ROOMS WERE ADDED IN 1987.

SOURCE: DEPARTMENT OF COMMERCE, ECONOMIC DEVELOPMENT AND PLANNING DIVISION,
 GOVERNMENT OF GUAM

TABLE 3-2
PROJECTED ROOM INVENTORY
AS OF JUNE 13, 1989

YEAR	NAME OF HOTEL	NO. OF ROOMS	
1989 (JUNE 13)	CURRENT (SUBTOTAL FROM TABLE 3-1)	4,006	
1989	DAVID HERNANDO	3	
	ACHANG BAY	6	
	D. LUJAN	10	
	POLYNESIAN	8	
	GENERAL ENTERPRISES	99	
	SAM BYUNG HAN MOTEL	38	
	TUMON HOLIDAY PLAZA	130	
	GUAM PLAZA	140	
	CORNERSTONE	113	
	INN ON THE BAY	70	
	JAY EASE	12	
	SUBTOTAL		629
1990	NIKKO	500	
	PALACE HOTEL	405	
	PACIFIC ISLANDS CLUB	200	
	GUAM REEF	172	
	HOTEL OKURA	176	
	JAPAN PACIFIC DEV. HOTEL	140	
	HILLSIDE	126	
	SACHDEV/CORNERSTONE	113	
	ELY DEL CARMEN	60	
	SUBTOTAL		1,892
1991	HILTON	121	
	HOTEL LEO PLACE	382	
	WORLD BELL	300	
	SUNSET VIEW/FIRST LIVING	300	
	SUBTOTAL		1,103

TABLE 3-3
VISITOR ARRIVALS FORECASTS BASED ON
HOTEL ROOMS, CRUISE SHIPS AND GOLF COURSES
HIGH FORECAST

CALENDAR YEAR	HOTEL ROOMS ¹⁾	ROOMS ADDED	HOTEL VISITORS	VISITORS PER HOTEL ROOM	BASED CRUISE SHIP PAX SIZE	PERCENT OCCUPANCY	CRUISE SHIP PASSENGERS ²⁾	NUMBER OF GOLF COURSES	VISITORS TO GOLF COURSES ³⁾	TOTAL VISTORS
ACTUAL										
1985	2,738		364,938	133						364,938
1986	2,866		397,575	139						397,575
1987	2,942		477,491	162						477,491
1988	3,950		576,170	146						576,170
FORECAST										
		36								
1989	3,986		597,900	150	0	0%	0	2	31,200	629,100
		739								
1990	4,725		685,125	145	800	80%	28,800	4	62,400	776,325
		1,500								
1991	6,225		840,375	135	800	85%	30,600	6	93,600	964,575
		1,150								
1992	7,375		958,750	130	800	90%	32,400	9	140,400	1,131,550
		1,125								
1993	8,500		1,062,500	125	1,600	80%	57,600	11	171,600	1,291,700

NOTES: 1. NUMBER OF HOTEL ROOMS INDICATED ARE THOSE AVAILABLE AT THE BEGINNING OF THE YEAR.

2. ASSUMES SHIP OPERATES 45 WEEKS PER YEAR.

3. ASSUMES 300 VISITORS PER COURSE PER WEEK

SOURCES: 1. HOTEL ROOMS FROM GUAM VISITORS BUREAU PRESENTATION TO THE AVIATION POLICY TASK FORCE, SEPTEMBER 1, 1988

2. 1985 TO 1988 VISITOR DATA FROM GUAM VISITORS BUREAU

TABLE 3-4
VISITOR ARRIVALS FORECASTS BASED ON
HOTEL ROOMS, CRUISE SHIPS AND GOLF COURSES
MOST PROBABLE FORECAST

CALENDAR YEAR	HOTEL ROOMS ¹⁾	ROOMS ADDED	HOTEL VISITORS	VISITORS PER HOTEL ROOM	BASED CRUISE SHIP PAX SIZE	PERCENT OCCUPANCY	CRUISE SHIP PASSENGERS ²⁾	NUMBER OF GOLF COURSES	VISITORS TO GOLF COURSES ³⁾	TOTAL VISITORS
ACTUAL										
1985	2,738		364,938	133						364,938
1986	2,866		397,575	139						397,575
1987	2,942		477,491	162						477,491
1988	3,950		576,170	146						576,170
FORECAST										
		36								
1989	3,986		577,970	145	0	0%	0	2	26,000	603,970
		739								
1990	4,725		661,500	140	800	75%	27,000	4	52,000	740,500
		1,200								
1991	5,925		799,875	135	800	80%	28,800	5	65,000	93,675
		1,000								
1992	6,925		865,625	125	800	85%	30,600	7	91,000	987,225
		875								
1993	37,800		936,000	120	800	90%	32,400	10	130,000	1,098,400

NOTES: 1. NUMBER OF HOTEL ROOMS INDICATED ARE THOSE AVAILABLE AT THE BEGINNING OF THE YEAR.

2. ASSUMES SHIP OPERATES 45 WEEKS PER YEAR.

3. ASSUMES 250 VISITORS PER COURSE PER WEEK.

SOURCES: 1. HOTEL ROOMS FROM GUAM VISITORS BUREAU PRESENTATION TO THE AVIATION POLICY TASK FORCE, SEPTEMBER 1, 1988

2. 1985 TO 1988 VISITOR DATA FROM GUAM VISITORS BUREAU

TABLE 3-5
VISITOR ARRIVALS FORECASTS BASED ON
HOTEL ROOMS, CRUISE SHIPS AND GOLF COURSES
LOW FORECAST

CALENDAR YEAR	HOTEL ROOMS ¹⁾	ROOMS ADDED	HOTEL VISITORS	VISITORS PER HOTEL ROOM	BASED CRUISE SHIP PAX SIZE	PERCENT OCCUPANCY	CRUISE SHIP PASSENGERS ²⁾	NUMBER OF GOLF COURSES	VISITORS TO GOLF COURSES ³⁾	TOTAL VISITORS
ACTUAL										
1985	2,738		364,938	133						364,938
1986	2,866		397,575	139						397,575
1987	2,942		477,491	162						477,491
1988	3,950		576,170	146						576,170
FORECAST										
		36								
1989	3,986		577,970	145	0	0%	0	1	10,400	588,370
		650								
1990	4,636		649,040	140	0	0%	0	3	31,200	680,240
		950								
1991	5,586		754,110	135	0	0%	0	4	41,600	795,710
		850								
1992	6,436		804,500	125	0	0%	0	5	52,000	856,500
		764								
1993	7,200		864,000	120	0	0%	0	7	72,800	936,800

NOTES: 1. NUMBER OF HOTEL ROOMS INDICATED ARE THOSE AVAILABLE AT THE BEGINNING OF THE YEAR.

2. ASSUMES NO CRUISE SHIP BASED AT GUAM.

3. ASSUMES 200 VISITORS PER COURSE PER WEEK.

SOURCES: 1. HOTEL ROOMS FROM GUAM VISITORS BUREAU PRESENTATION TO THE AVIATION POLICY TASK FORCE, SEPTEMBER 1, 1988

2. 1985 TO 1988 VISITOR DATA FROM GUAM VISITORS BUREAU

TABLE 3-6
FORECASTS OF TOTAL ANNUAL
VISITOR ARRIVALS
1989-2008

YEAR	HIGH FORECAST		MOST PROBABLE FORECAST		LOW FORECAST	
	ANNUAL VISITOR ARRIVALS	ANNUAL PERCENT INCREASE	ANNUAL VISITOR ARRIVALS	ANNUAL PERCENT INCREASE	ANNUAL VISITOR ARRIVALS	ANNUAL PERCENT INCREASE
ACTUAL						
1985	364,938		364,938		364,938	
		8.9%		8.9%		8.9%
1986	397,575		397,575		397,575	
		20.1%		20.1%		20.1%
1987	477,491		477,491		477,491	
		20.7%		20.7%		20.7%
1988	576,170		576,170		576,170	
FORECAST						
		9.2%		4.8%		2.1%
1989	629,100		603,970		588,370	
		23.4%		22.6%		15.6%
1990	776,325		740,500		680,240	
		24.2%		20.7%		17.0%
1991	964,575		893,675		795,710	
		17.3%		10.5%		7.6%
1992	1,131,550		987,225		856,500	
		14.2%		11.3%		9.4%
1993	1,291,700		1,098,400		936,800	
		6.5%		4.5%		2.5%
1998	1,769,741		1,368,806		1,059,903	
		3.9%		3.0%		2.0%
2003	2,142,829		1,586,822		1,170,219	
		3.4%		2.5%		2.0%
2008	2,532,737		1,795,343		1,292,016	
AVERAGE ANNUAL GROWTH:						
1989-2008		7.6%		5.9%		4.2%

SOURCE: 1985-1988 DATA FROM GUAM VISITORS BUREAU

TABLE 3-7
FORECASTS OF TOTAL ANNUAL
TERMINAL PASSENGER ARRIVALS
1989-2008

HIGH FORECAST					
GUAM					
YEAR	VISITOR ARRIVALS	PERCENT OF TOTAL	RESIDENTS/ OTHERS	NUMBER OF PASSENGERS	ANNUAL % INCREASE
ACTUAL					
1985	364,938	82.3%	78,537	443,475	
					13.1%
1986	397,575	79.2%	104,213	501,788	
					18.7%
1987	477,491	80.2%	117,941	595,432	
					21.3%
1988	576,170	79.8%	146,164	722,334	
FORECAST					
					8.9%
1989	629,100	80.0%	157,275	786,375	
					21.9%
1990	776,325	81.0%	182,101	958,426	
					22.7%
1991	964,575	82.0%	211,736	1,176,311	
					15.9%
1992	1,131,550	83.0%	231,763	1,363,313	
					12.8%
1993	1,291,700	84.0%	246,038	1,537,738	
					6.2%
1998	1,769,741	85.0%	312,307	2,082,048	
					3.9%
2003	2,142,829	85.0%	378,146	2,520,975	
					3.4%
2008	2,532,737	85.0%	446,954	2,979,691	
AVERAGE ANNUAL INCREASE:					
1989-2008					
					7.3%

SOURCE: 1985-1988 DATA FROM GUAM AIRPORT AUTHORITY STATISTICS, FY '84 THRU '88

**TABLE 3-8
FORECASTS OF TOTAL ANNUAL
TERMINAL PASSENGERS 1989-200**

MOST PROBABLE FORECAST					
YEAR	VISITOR ARRIVALS	PERCENT OF TOTAL	GUAM		ANNUAL % INCREASE
			RESIDENTS/ OTHERS	NUMBER OF PASSENGERS	
ACTUAL					
1985	364,938	82.3%	78,537	443,475	13.1%
1986	397,575	79.2%	104,213	501,788	18.7%
1987	477,491	80.2%	117,941	595,432	21.3%
1988	576,170	79.8%	146,164	722,334	
FORECAST					
1989	603,970	80.0%	150,993	754,963	4.5%
1990	740,500	81.0%	173,698	914,198	21.1%
1991	893,675	82.0%	196,173	1,089,848	19.2%
1992	987,225	83.0%	202,203	1,189,428	9.1%
1993	1,098,400	84.0%	209,219	1,307,619	9.9%
1998	1,368,806	85.0%	241,554	1,610,360	4.3%
2003	1,586,822	85.0%	280,027	1,866,849	3.0%
2008	1,795,343	85.0%	316,825	2,112,168	2.5%
AVERAGE ANNUAL INCREASE: 1989-2008					5.6%

SOURCE: 1985-1988 DATA FROM GUAM AIRPORT AUTHORITY STATISTICS, FY '84 THRU 88

TABLE 3-9
FORECASTS OF TOTAL ANNUAL
TERMINAL PASSENGERS 1989-2008

LOW FORECAST					
GUAM					
YEAR	VISITOR ARRIVALS	PERCENT OF TOTAL	RESIDENTS/ OTHERS	NUMBER OF PASSENGERS	ANNUAL % INCREASE
ACTUAL					
1985	364,938	82.3%	78,537	443,475	
					13.1%
1986	397,575	79.2%	104,213	501,788	
					18.7%
1987	477,491	80.2%	117,941	595,432	
					21.3%
1988	576,170	79.8%	146,164	722,334	
FORECAST					
					1.8%
1989	588,370	80.0%	147,093	735,463	
					14.2%
1990	680,240	81.0%	159,562	839,802	
					15.5%
1991	795,710	82.0%	174,668	970,378	
					6.3%
1992	856,500	83.0%	175,428	1,031,928	
					8.1%
1993	936,800	84.0%	178,438	1,115,238	
					2.3%
1998	1,059,903	85.0%	187,042	1,246,945	
					2.0%
2003	1,170,219	85.0%	206,509	1,376,728	
					2.0%
2008	1,292,016	85.0%	228,003	1,520,019	
AVERAGE ANNUAL INCREASE:					
1989-2008					
					3.9%

SOURCE: 1985-1988 DATA FROM GUAM AIRPORT AUTHORITY STATISTICS, FY '84 THRU '88

TABLE 3-10
TRANSIT PASSENGER FORECASTS
1989-2008

FISCAL YEAR	ACTUAL TRANSIT PASSENGERS	ANNUAL PERCENT INCREASE	TOTAL TERMINAL PASSENGER ARRIVALS	TRANSIT AS PERCENT ARRIVALS		
ACTUAL						
1985	24,471	443,475	5.5%	-16.6%		
1986	20,405	501,788	4.1%	76.3%		
1987	35,975	595,432	6.0%	38.0%		
1988	49,646	722,334	6.9%			
	HIGH FORECAST	ANNUAL PERCENT INCREASE	MOST PROBABLE FORECAST	ANNUAL PERCENT INCREASE	LOW FORECAST	ANNUAL PERCENT INCREASE
FORECAST						
		75.0%		60.0%		25.0%
1989	86,881	50.0%	79,434	50.0%	62,058	20.0%
1990	130,321	30.0%	119,150	20.0%	74,469	8.0%
1991	169,417	25.0%	142,980	15.0%	80,427	6.0%
1992	211,771	20.0%	164,428	10.0%	85,252	4.0%
1993	254,125	13.0%	180,870	5%	88,662	3.0%
1998	468,210	9.0%	259,663	5.0%	102,784	2.0%
2003	720,399	5.0%	331,403	4.0%	113,482	2.0%
2008	919,432		403,202		125,293	

NOTE: ABOVE TRANSIT PASSENGER FIGURES REFLECT ONE MOVEMENT ONLY.

SOURCE: 1985 - 1988 DATA FROM GUAM AIRPORT AUTHORITY STATISTICS, FY '84 THRU FY '88.

TABLE 3-11
TOTAL ANNUAL TERMINAL PASSENGER ARRIVAL PLUS
TRANSIT ARRIVAL FORECASTS 1989-2008

YEAR	HIGH FORECAST		MOST PROBABLE FORECAST		LOW FORECAST	
	NUMBER OF PASSENGERS	ANNUAL % INCREASE	NUMBER OF PASSENGERS	ANNUAL % INCREASE	NUMBER OF PASSENGERS	ANNUAL % INCREASE
ACTUAL						
1985	467,946		467,946		467,946	
		11.6%		11.6%		11.6%
1986	522,193		522,193		522,193	
		20.9%		20.9%		20.9%
1987	631,40		631,407		631,407	
		22.3%		22.3%		22.3%
1988	771,980		771,980		771,980	
FORECAST						
		13.1%		8.1%		3.3%
1989	873,256		834,396		797,520	
		24.7%		23.8%		14.6%
1990	1,088,747		1,033,348		914,271	
		23.6%		19.3%		14.9%
1991	1,345,728		1,232,828		1,050,805	
		17.0%		9.8%		6.3%
1992	1,575,084		1,353,855		1,117,180	
		13.8%		9.9%		7.8%
1993	1,791,864		1,488,489		1,203,900	
		7.3%		4.7%		2.3%
1998	2,550,258		1,870,023		1,349,729	
		4.9%		3.3%		2.0%
2003	3,241,373		2,198,252		1,490,210	
		3.8%		2.7%		2.0%
2008	3,899,122		2,515,370		1,645,312	
AVERAGE ANNUAL INCREASE:						
1989-2008		8.2%	-	6.0%	-	3.9%

SOURCE: 1985-1988 DATA FROM GUAM AIRPORT AUTHORITY STATISTICS, FY '84 THRU FY '88

TABLE 3-12
BUSY DAY TERMINAL PASSENGER ARRIVAL AND
TRANSIT PASSENGER ARRIVAL FORECASTS
1989-2008

FISCAL YEAR	HIGH FORECAST			MOST PROBABLE FORECAST			LOW FORECAST		
	TERMINAL	TRANSIT	TOTAL	TERMINAL	TRANSIT	TOTAL	TERMINAL	TRANSIT	TOTAL
	PASSENGER ARRIVALS	PASSENGER ARRIVALS	PEAK DAY ARRIVALS	PASSENGER ARRIVALS	PASSENGER ARRIVALS	PEAK DAY ARRIVALS	PASSENGER ARRIVALS	PASSENGER ARRIVALS	PEAK DAY ARRIVALS
ACTUAL									
1988	2,564	223	2,788	2,564	223	2,788	2,564	223	2,788
FORECAST									
1989	2,792	391	3,183	2,680	357	3,038	2,611	279	2,890
1990	3,402	586	3,989	3,245	536	3,782	2,981	335	3,316
1991	4,176	762	4,938	3,869	643	4,512	3,445	362	3,807
1992	4,840	953	5,793	4,222	740	4,962	3,663	384	4,047
1993	5,459	1,144	6,603	4,642	814	5,456	3,959	399	4,358
1998	7,391	2,107	9,498	5,717	1,168	6,885	4,427	463	4,889
2003	8,949	3,242	12,191	6,627	1,491	8,119	4,887	511	5,398
2008	10,578	4,137	14,715	7,498	1,814	9,313	5,396	564	5,960

NOTES: 1. BUSY DAY TERMINAL PASSENGER ARRIVALS CALCULATED AS 0.00355 TIMES THE ANNUAL FORECASTS IN TABLE 3-7 THROUGH TABLE 3-9, WHICH REPRESENTS 11 PERCENT IN PEAK MONTH DIVIDED BY 31 DAYS.

2. BUSY DAY TRANSIT PASSENGER ARRIVALS CALCULATED AS 0.0045 TIMES THE ANNUAL FORECASTS IN TABLE 3-10 WHICH REPRESENTS 14 PERCENT IN PEAK MONTH DIVIDED BY 31 DAYS.

TABLE 3-13
PEAK HOUR AIR CARRIER TERMINAL PASSENGER
ARRIVALS FORECAST
1989-2008

YEAR	PERCENT OF BUSY DAY IN PEAK HOUR	HIGH ¹⁾	MOST PROBABLE ¹⁾	LOW ¹⁾
ACTUAL				
1988	80.0%	2,051	2,051	2,051
FORECAST				
1989	79.0%	2,205	2,117	2,063
1990	76.0%	2,586	2,467	2,266
1991	72.0%	3,007	2,786	2,480
1992	68.0%	3,291	2,871	2,491
1993	65.0%	3,548	3,017	2,573
1998	60.0%	4,435	3,430	2,656
2003	55.0%	4,922	3,645	2,688
2008	50.0%	5,289	3,749	2,698

NOTES: 1. ONE-WAY PEAK HOUR DERIVED BY MULTIPLYING PEAK DAY
BY PERCENTAGE SHOWN

TABLE 3-14
PEAK HOUR AIR CARRIER TERMINAL PASSENGER ARRIVAL
PLUS TRANSIT PASSENGER ARRIVAL FORECAST
1989-2008

YEAR	HIGH FORECAST			
	PERCENT TRANSIT ARRIVALS IN PEAK HOUR	TRANSIT ARRIVALS IN DAILY HIGH PEAK HOUR	PEAK HOUR TERMINAL PASSENGER ARRIVALS	TOTAL ARRIVALS IN PEAK HOUR
ACTUAL				
1988	15.0%	34	2,051	2,085
FORECAST				
1989	15.0%	59	2,205	2,264
1990	16.0%	94	2,586	2,680
1991	17.0%	130	3,007	3,136
1992	18.0%	172	3,291	3,463
1993	19.0%	217	3,548	3,766
1998	20.0%	421	4,435	4,856
2003	20.0%	648	4,922	5,571
2008	20.0%	27	5,289	6,116

TABLE 3-15
PEAK HOUR AIR CARRIER TERMINAL PASSENGER ARRIVAL
PLUS TRANSIT PASSENGER ARRIVAL FORECAST
1989-2008

YEAR	MOST PROBABLE FORECAST			
	PERCENT TRANSIT ARRIVALS IN PEAK HOUR	TRANSIT ARRIVALS IN DAILY HIGH PEAK HOUR	PEAK HOUR TERMINAL PASSENGER ARRIVALS	TOTAL ARRIVALS IN PEAK HOUR
ACTUAL				
1988	15.0%	34	2,051	2,085
FORECAST				
1989	15.0%	54	2,117	2,171
1990	16.0%	86	2,467	2,552
1991	17.0%	109	2,786	2,895
1992	18.0%	133	2,871	3,004
1993	19.0%	155	3,017	3,172
1998	20.0%	234	3,430	3,664
2003	20.0%	298	3,645	3,943
2008	20.0%	363	3,749	4,112

TABLE 3-16
PEAK HOUR AIR CARRIER TERMINAL PASSENGER ARRIVAL
PLUS TRANSIT PASSENGER ARRIVAL FORECAST
1989-2008

YEAR	LOW FORECAST			
	PERCENT TRANSIT ARRIVALS IN PEAK HOUR	TRANSIT ARRIVAL IN DAILY HIGH PEAK HOUR	PEAK HOUR TERMINAL PASSENGER ARRIVALS	TOTAL ARRIVALS IN PEAK HOUR
ACTUAL				
1988	15.0%	34	2,051	2,085
FORECAST				
1989	15.0%	42	2,063	2,104
1990	16.0%	54	2,266	2,319
1991	17.0%	62	2,480	2,542
1992	18.0%	69	2,491	2,560
1993	19.0%	76	2,573	2,649
1998	20.0%	93	2,656	2,748
2003	20.0%	102	2,688	2,790
2008	20.0%	113	2,698	2,811

TABLE 3-17
PEAK HOUR TRANSIT ARRIVAL PASSENGER FORECASTS
1989-2008

YEAR	HIGH FORECAST		MOST PROBABLE FORECAST		LOW FORECAST	
	PERCENT	PEAK	PERCENT	PEAK	PERCENT	PEAK
	PEAK DAY	HOUR	PEAK DAY	HOUR	PEAK DAY	HOUR
	IN	TRANSIT	IN	TRANSIT	IN	TRANSIT
	PEAK HOUR	ARRIVALS	PEAK HOUR	ARRIVALS	PEAK HOUR	ARRIVALS
ACTUAL						
1988	80.0%	179	80.0%	179	80.0%	179
FORECAST						
1989	70.0%	274	70.0%	250	70.0%	195
1990	50.0%	293	50.0%	268	50.0%	168
1991	45.0%	343	45.0%	290	45.0%	163
1992	44.0%	419	44.0%	326	44.0%	169
1993	43.0%	492	43.0%	350	43.0%	172
1998	40.0%	843	40.0%	467	40.0%	185
2003	40.0%	1,297	40.0%	597	40.0%	204
2008	40.0%	1,655	40.0%	726	40.0%	226

NOTE: PEAK HOUR TRANSIT ARRIVALS HOUR IS NOT SIMULTANEOUS WITH PEAK HOUR TERMINAL ARRIVAL PASSENGERS.

TABLE 3-18
ANNUAL COMMERCIAL PASSENGER AIRCRAFT OPERATIONS¹⁾
1993-2008

YEAR	HIGH FORECAST		
	ANNUAL AIRCRAFT OPERATIONS (AIR CARRIER)	ANNUAL AIRCRAFT OPERATIONS (COMMUTERS)	TOTAL AIRCRAFT OPERATIONS ²⁾
1988	10,558	4,816	15,374
1993	18,098	14,509	32,607
1998	24,014	20,650	44,664
2003	28,799	26,246	55,045
2008	33,975	31,572	65,547

Note: 1. An Aircraft Operation is an Arrival (Landing) or Departure (takeoff)
2. Total Aircraft Operations Do Not Include Aircraft Identified as "Other"

TABLE 3-19
ANNUAL COMMERCIAL PASSENGER AIRCRAFT OPERATIONS¹⁾
1993-2008

MOST PROBABLE FORECAST			
YEAR	ANNUAL AIRCRAFT OPERATIONS (AIR CARRIER)	ANNUAL AIRCRAFT OPERATIONS (COMMUTERS)	TOTAL AIRCRAFT OPERATIONS ²⁾
1988	10,558	4,816	15,374
1998	17,609	15,142	32,751
2003	19,531	7,800	37,330
2008	21,918	20,367	42,285

Note: 1. An Aircraft Operation is an Arrival (Landing) or Departure (takeoff)
2. Total Aircraft Operations Do Not Include Aircraft Identified as "Other"

TABLE 3-20
ANNUAL COMMERCIAL PASSENGER¹⁾
AIRCRAFT OPERATIONS
1993-2008

YEAR	LOW FORECAST		
	ANNUAL AIRCRAFT OPERATIONS (AIR CARRIER)	ANNUAL AIRCRAFT OPERATIONS (COMMUTERS)	TOTAL AIRCRAFT OPERATIONS ²⁾
1988	10,588	4,816	15,374
1998	12,710	10,929	23,639
2003	13,240	12,066	25,307
2008	14,337	13,322	27,659

NOTE: 1. An Aircraft Operation is an Arrival (Landing) or Departure (takeoff)

2. Total Aircraft Operations Do Not Include Aircraft Identified as "Other"

TABLE 3-21
BUSY DAY AIR CARRIER AND
COMMUTER AIRCRAFT ARRIVAL FORECAST
1993-2008

YEAR	AIR CARRIER			COMMUTER			TOTAL		
	MOST			MOST			MOST		
	HIGH	PROBABLE	LOW	HIGH	PROBABLE	LOW	HIGH	PROBABLE	LOW
1988	14	14	14	10	10	10	24	24	24
1993	31	26	20	25	21	16	56	47	36
1998	41	30	21	36	26	18	77	56	39
2003	49	33	22	46	31	20	95	64	42
2008	59	37	24	55	35	22	114	72	46

TABLE 3-22
PEAK HOUR AIR CARRIER AIRCRAFT
ARRIVALS AND TWO WAY MOVEMENTS
1993-2008

YEAR	HIGH		MOST PROBABLE		LOW	
	ARR	2 WAY	ARR	2 WAY	ARR	2 WAY
1988	8	9	8	9	8	9
1993	14	15	11	12	10	11
1998	17	18	13	14	9	10
2003	18	19	13	14	9	10
2008	20	22	13	15	9	11

TABLE 3-23
MOST PROBABLE
ANNUAL CARGO FORECASTS
1993-2008

YEAR	CARGO OFF (TONS)	ANNUAL % INCREASE	CARGO ON (TONS)	ANNUAL % INCREASE	TOTAL (TONS)	ANNUAL % INCREASE
ACTUAL						
1984	5,605		3,437		9,042	
		18.2%		31.6%		23.3%
1985	6,623		4,522		11,145	
		-2.4%		-4.0%		-3.1%
1986	6,464		4,341		10,805	
		8.0%		75.2%		35.0%
1987	6,982		7,605		14,587	
		18.7%		99.0%		60.6%
1988	8,291		15,132		23,423	
AVERAGE ANNUAL GROWTH RATE						
1984-1988		8.1%		34.5%		21.0%
FORECAST						
		17.5%		4.0%		9.6%
1993	18,569		18,410		36,980	
		5.0%		3.0%		4.0%
1998	23,700		21,343		45,042	
		4.0%		2.5%		3.3%
2003	28,834		24,147		52,982	
		3.5%		1.5%		2.6%
2008	34,246		26,013		60,260	
AVERAGE ANNUAL GROWTH RATE						
1988-2008		7.3%		2.7%		4.8%

**TABLE 3-24
MOST PROBABLE
BUSY DAY CARGO FORECASTS
1993-2008**

YEAR	CARGO OFF (TONS)	PERIOD % INCREASE	CARGO ON (TONS)	PERIOD % INCREASE	TOTAL (TONS)	PERIOD % INCREASE
ACTUAL						
1988	24		44		68	
FORECAST						
1993	54		53		107	
		27.6%		15.9%		21.8%
1998	69		62		131	
		21.7%		13.1%		17.6%
2003	84		70		154	
		18.8%		7.7%		13.7%
2008	99		76		175	

Busy Day Forecast Calculated As 9 Percent Of Annual Volume In Peak Month Divided By 31 Days.

**TABLE 3-25
MOST PROBABLE
ANNUAL AIR MAIL FORECASTS
1993-2008**

YEAR	MAIL OFF (TONS)	ANNUAL % INCREASE	MAIL ON (TONS)	ANNUAL % INCREASE	ANNUAL % TOTAL (TONS)	INCREASE
ACTUAL						
1984	3,012		1,755		4,767	
		-2.3%		6.6%		1.0%
1985	2,943		1,870		4,813	
		28.6%		-3.4%		16.2%
1986	3,786		1,806		5,592	
		6.2%		-6.8%		2.0%
1987	4,021		1,684		5,705	
		-3.8%		-2.1%		-3.3%
1988	3,869		1,648		5,517	
AVERAGE ANNUAL GROWTH RATE 1984-1988						
		5.1%		-1.3%		3.0%
FORECAST						
		7.0%		14.0%		9.3%
1993	5,426		3,173		8,600	
		4.0%		4.0%		4.0%
1998	6,602		3,861		10,463	
		3.0%		3.0%		3.0%
2003	7,654		4,475		12,129	
		2.5%		2.5%		2.5%
2008	8,659		5,064		13,723	
AVERAGE ANNUAL GROWTH RATE 1988-2008						
		4.1%		5.8%		4.7%

**TABLE 3-26
MOST PROBABLE
BUSY DAY MAIL FORECASTS
1993-2008**

YEAR	MAIL OFF (TONS)	PERIOD % INCREASE	MAIL ON (TONS)	PERIOD % INCREASE	PERIOD % TOTAL (TONS)	INCREASE
ACTUAL						
1988	14		6		20	
FORECAST						
1993	19		11		30	
		21.7%		21.7%		21.7%
1998	23		14		37	
		15.9%		15.9%		15.9%
2003	27		16		43	
		13.1%		13.1%		13.1%
2008	31		18		49	

Busy Day Forecast Calculated As 11 Percent Of Annual Volume In Peak Month Divided By 31 Days.

Visitor Forecast

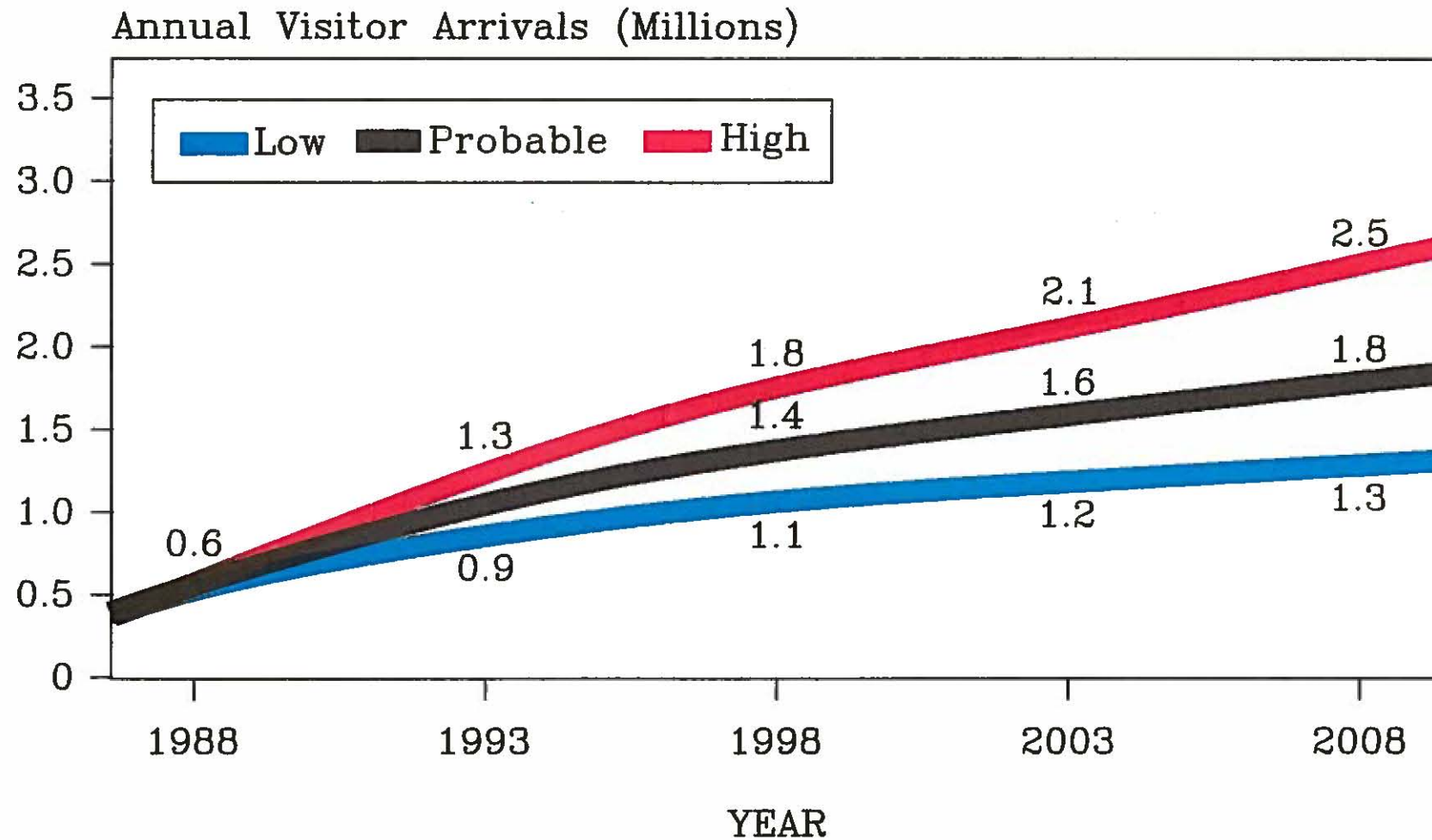


FIG. 3-1

PARSONS

Busy Day and Peak Period Passenger Forecasts (Most Probable Forecast)

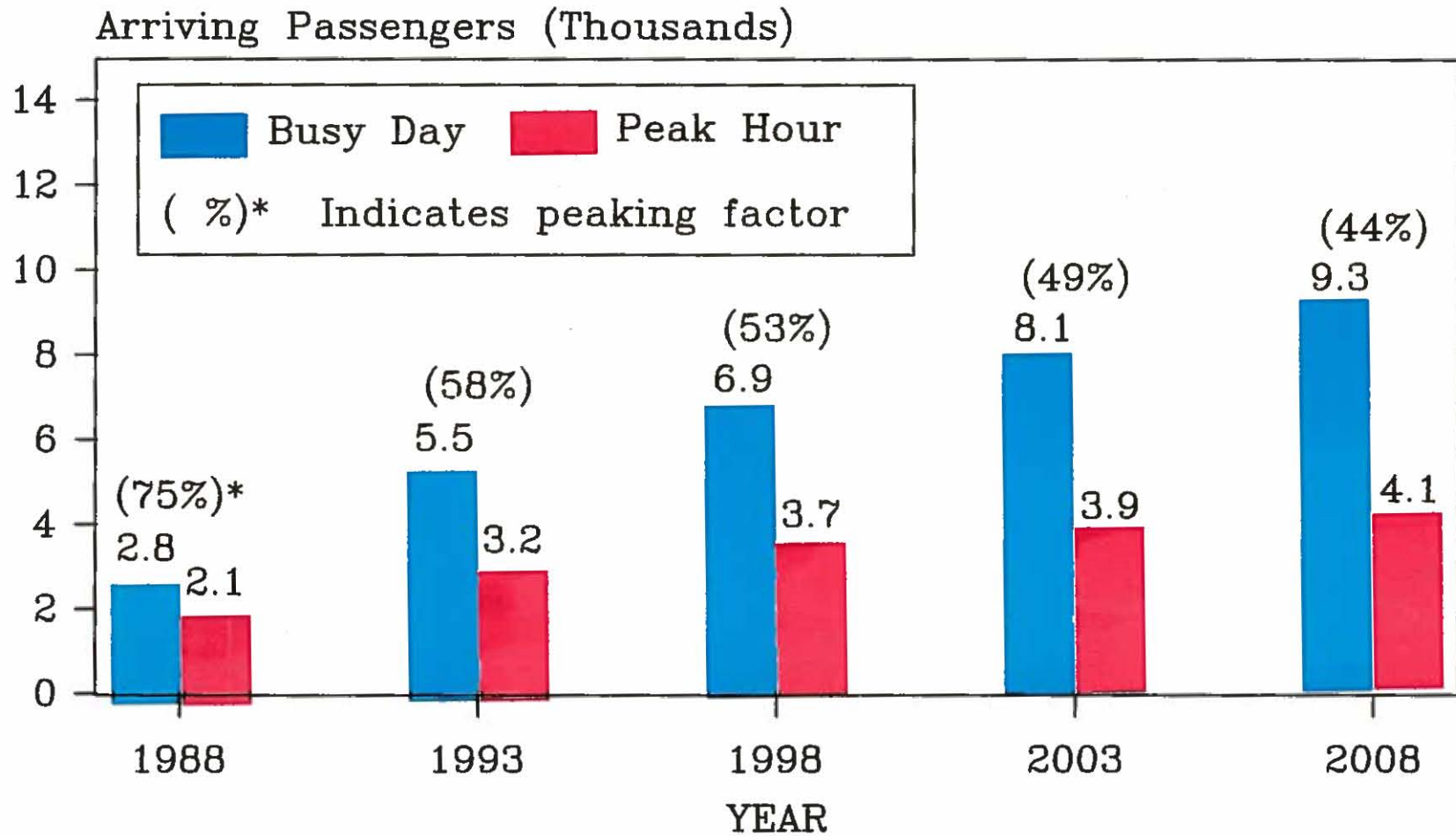


FIG. 3-2

Cargo and Mail Forecasts (Most Probable Forecast)

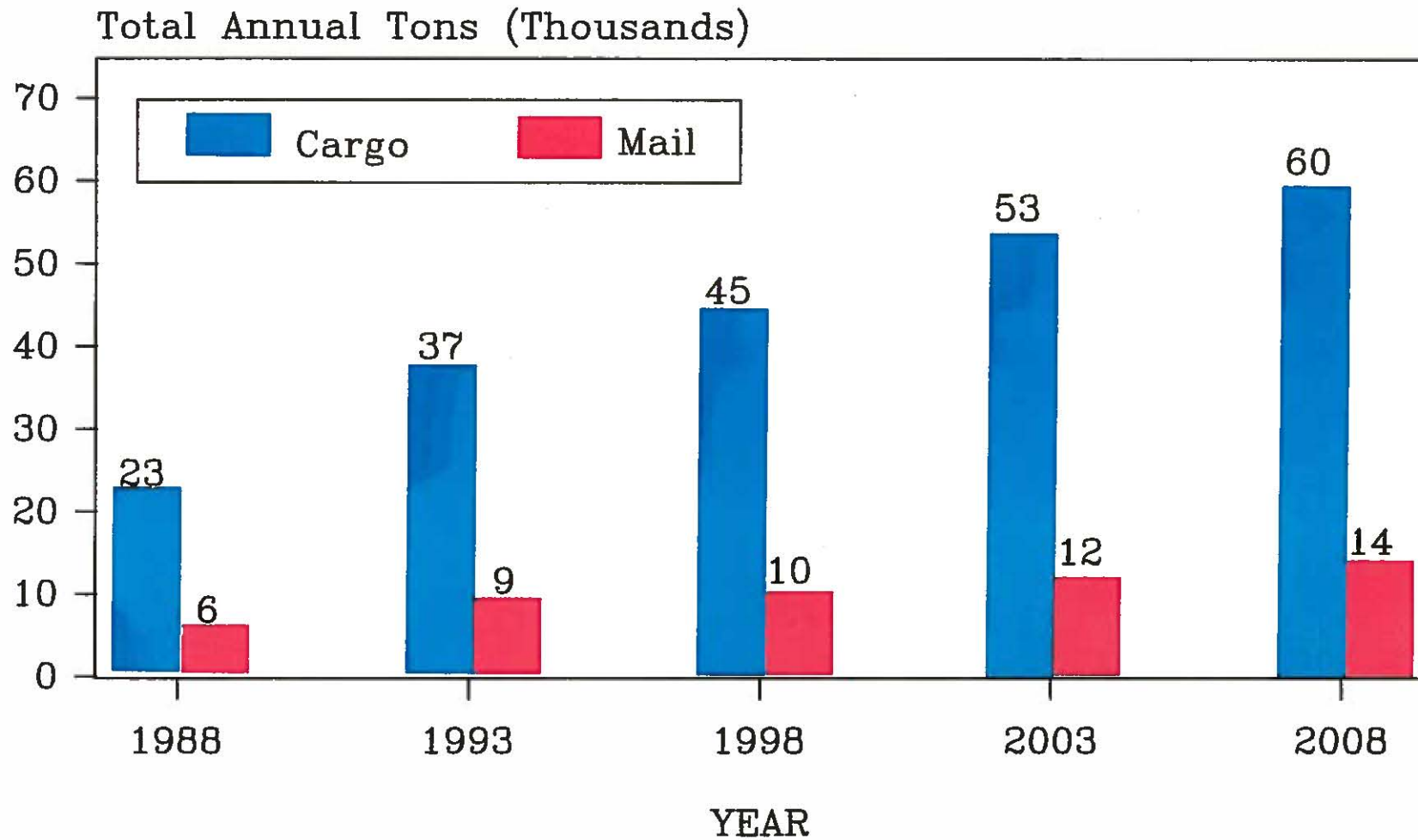


FIG. 3-3

PARSONS

Commercial Aircraft Movement Forecast (Most Probable Forecast)

Annual Aircraft Takeoffs and Landings

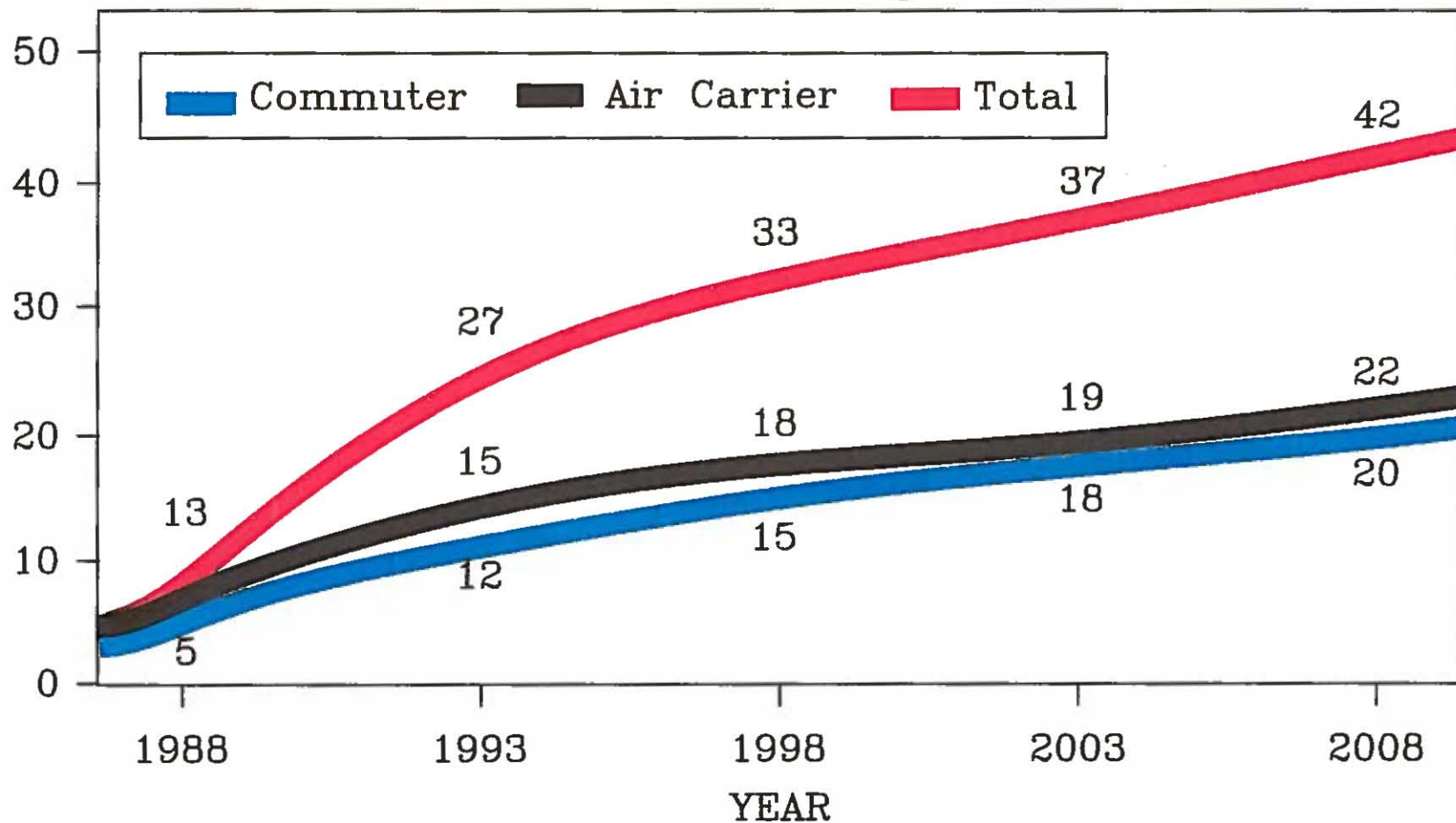


FIG. 3-4

PARSONS

SECTION 4

SECTION 4

4.0 Facility Requirements

Requirements for new and expanded facilities at GIAT to accommodate growing aviation demand to the year 2008 are presented in this section. The detailed work connected with development of facility requirements is contained in Working Papers 3, 4 and 5 (Appendix B, References 6, 7 and 8). As described in the working papers, facility requirements change as the master planning process proceeds in order to account for new data as well as operational changes. Requirements are also affected by the insertion into the planning process of the judgment and expertise of the GAA, airlines, the FAA and other government agencies and the architects and engineers who are involved in developing facility design concepts. Facility requirements are generated on the basis of the "most probable" forecasts of aviation demand.

4.1 Survey Research Program

A survey research program was conducted at GIAT to update the program that was carried out for the 1977 Master Plan. The program, which is described below, deals principally with passenger terminal facilities.

4.1.1 Description, Scope and Methodology

A Survey Research Program deals with factors which affect facility requirements that are governed by the behavior of people and the procedures they use to operate facilities. When combined with forecasts of aviation demand and level-of-service factors, survey research information establishes facility requirements. By means of interviews and observations, a Survey Research Program determines such things as the average time required to process a passenger through security inspection; the average number of bags a passenger checks into the hold of an aircraft; and the time when the Immigration and Naturalization Service will incorporate electronic document

reading equipment into its primary processing stations. Such information directly relates to the need for new and expanded facilities. Because the original Master Plan included a comprehensive Survey Research Program, it was not considered necessary to repeat it again but rather to update its major components. Although changes in both procedures and the behavior of people were certain to occur in the eleven year period between survey research programs, experience at other airports indicates some factors change very slowly over time. For example, passengers habits relating to time-of-arrival at an airport to catch a departing flight change slowly when compared with the behavior of wellwishers. Whereas the average number of wellwishers attending a departing passenger may decrease significantly over a period of a decade due to changing social factors, the margin of time allowed by an independent (non-tour) passenger to ensure connection with his departing flight seems to change very little.

4.1.2 Interview and Observational Data Collection Programs

Survey research data were collected by two methods; interview and observation. Interviews were restricted to airport users, tenants, operators and affected community groups and agencies. A passenger interview program was not considered to be necessary at this time. Twenty six formal interviews were conducted with airlines; concessionaires; GAA operational personnel; GAA consultants and contractors; ground transportation operators; federal and local (Guam) government agencies; members of the Guam Legislature; and the Japanese Consul General.

Observations were made to measure ten significant factors for comparison with data collected for the original Master Plan. They include passenger processing time for various functions; bag and well-wisher ratios; ground vehicle mix and passenger occupancy; and parking lot occupancy. This was done over a four week period on selected days at selected times-of-day.

4.1.3 Results

Results of the survey research program are presented in Table 4-1. Some of the results of the program that were reported in Working Paper No. 3 (Appendix B, Reference 6) have been updated by subsequent observations and interviews.

4.2 Passenger Terminal Requirements

By combining information from the Survey Research Program and Aviation Demand Forecasts, it is possible to develop requirements for passenger terminal facilities. These requirements include not only space needed for performing various functions (such as holding departing passengers) but requirements for processing stations and equipment (such as passenger check-in stations and baggage handling devices).

Another factor that is involved in determining passenger terminal requirements is level-of-service. Level-of-service is, to a large extent, a policy matter to be decided by the airport owner, airlines and government tenants whose decisions are largely influenced by economics. For example, even if the airport owner was willing to provide enough check-in counter space to the airlines to ensure that no passenger would ever wait in a queue to be processed, it would be prohibitively expensive for the airlines to provide enough staff to man such a large number of counters. On the other hand, no airline would want to have its passengers wait in a queue for two hours to be processed for check-in. Industry norms were used to guide decisions about level-of-service requirements for this Master Plan.

It is acknowledged that whatever decisions are made in the planning and design phases of passenger terminal development regarding level-of-service, facilities provided must be manned by their operators to achieve the desired result. There are abundant examples of understaffed facilities in airports worldwide that have resulted in inconvenience and excessive delays to passengers. Facility operators such as airlines and customs and immigration services cannot, or will not, fully staff available facilities for a variety of reasons. In addition, facility requirements that are determined on the basis of measured processing efficiencies may become inadequate when user operator efficiencies deteriorate. Therefore, level-of-service is a goal sought by designers and owners that is entirely at the mercy of facility operators.

Facility requirements cannot be precise because the design of something as complicated as an airport passenger terminal has too many interrelationships between its many components for total quantification to be reasonably accomplished. The requirements contained herein are only guidelines for the architects and engineers who perform the design of what may certainly be classified as a complex system. In addition, the architect must deal with the aesthetic factor,

which is very significant in a public building such as an airport terminal. Accordingly, there may be valid reasons for designers to overrule facility requirements developed by planners.

Floorspace requirements listed in Table 4-2 are functional space requirements and cannot be compared directly with architectural floorspace information taken from drawings. Table 4-2 gives passenger terminal facility requirements for the planning horizons of 1993, 1998 and 2008.

4.3 Non-Passenger Terminal Facility Requirements

The major non-passenger terminal facilities at GIAT are:

- Aircraft Apron
- Air Cargo (and Air Mail)
- Aircraft Fuel Storage
- General Aviation
- Commuter/Air Taxi
- GIAT Base Maintenance
- GSE Maintenance & Storage
- Aircraft Maintenance*

Facility requirements for non-passenger terminal facilities are not the result of a directed survey research program (except for interviews) but rather depend initially on industry data and aviation demand forecasts. As in the case of passenger terminal requirements, other airport facility requirements cannot be precise and they serve only as a guide to the architects and engineers who develop facility design concepts. Users of the facilities, the GAA, airlines, and other airport tenants, generally determine final requirements for non-passenger terminal facilities.

Table 4-3 presents the facility requirements for non-passenger terminal facilities.

* At GIAT, the requirement for a maintenance hangar has yet to be established. Requirements are developed for a based air carrier maintenance building only.

4.4 Airport Industrial Park

The 1977 GIAT Master Plan called for development of an Airport Industrial Park to be located on airport land. A Master Plan for the Park has been prepared by others (see Appendix B, Reference 19) and the leasing of lots and construction of infrastructure for the Park is in progress at the time of preparation of this Master Plan Update. No requirements for the Park are developed herein except as may be related to its interface with the rest of GIAT.

TABLE 4-1

SURVEY RESEARCH PROGRAM RESULTS

Passenger Check-in Processing Time:

Japan Flights, 0.30 Min. per PAX;
US/Pacific Flights, 3.2 Min. per PAX.

Carry-on Bag Ratio:

All Flights, 1.5 Bags per PAX.

Wellwisher Ratio:

Japan Flights,
Arriving and
Departing = 0.10 Wellwisher per PAX
US/Pacific Flights,
Departing = 3.8 Wellwishers per PAX,
Arriving = 0.9 Wellwishers per PAX.

**Immigration-Primary:
Processing Time**

Japan Flights,
0.70 Min. per PAX;
Philippine and Pacific Nation Flights,
1.23 Min. per PAX.

Vehicle Passenger Occupancy:

2.3 PAX per Private Car
1.3 PAX per Rental Car
1.9 PAX per Taxi
2.4 PAX per Limousine
16.2 PAX per Bus/Van

Vehicle Mix:

70.4 percent Private Car
1.3 percent Rental Car
4.8 percent Taxi
3.8 percent Limousine
11.9 percent Bus/Van
7.8 percent Service Vehicles

Security Inspection Processing Time:

All Flights, 600 PAX per hour.

Hold Bag Ratio:

Japan Flights, 1.2 Bags per PAX;
US/Pacific Flights, 1.6 Bags per PAX.

**Customs-Primary plus
Secondary Processing Time:**

Japan Flights:
0.58 Min. per PAX;
US/Pacific Flights:
2.2 Min. per PAX.

Parking Lot Occupancy:

Max. Employee, 135 vehicles;
Max. Public, 255 vehicles;
Max. Total, 390 vehicles.

TABLE 4-2
PASSENGER TERMINAL REQUIREMENTS

Facility	Existing	Future Requirements		
	1988	1993	1998	2008
1a. Departure (Ticketing) Lobby (Exclusive Use Stations)				
Floorspace (SQ. FT.) w/o X-Ray	14,800	17,880	20,150	22,350
Floorspace (SQ. FT.) with X-Ray	14,800	23,350	26,525	29,575
No. Check-in Stas. w/ or w/o X-Ray	24	33	38	42
1b. Departure (Ticketing) Lobby (Common Use Stations)				
Floorspace (SQ. FT.) w/o X-Ray	14,800	13,150	14,625	15,975
Floorspace (SQ. FT.) with X-Ray	14,800	16,975	18,875	20,650
No. Check-in Stas. w/ or w/o X-Ray	24	22	25	27
2. Security Inspection				
Equipment Space (SQ. FT.)	800	2,400	2,400	3,200
No. Inspection Stas.	1	3	3	4
3. Wellwisher Lobby				
Floorspace (SQ. FT.)	8,400	9,180	9,310	9,310
4. Passenger Hold (Waiting) Room				
Originating PAX				
Floorspace (SQ. FT.)	13,600	27,520	31,170	34,300
No. of Seats	540	1,375	1,555	1,720
In-Transit PAX				
Floorspace (SQ. FT.)	-0-	6,030	8,060	12,530
No. of Seats	-0-	300	400	630
5. Immigration				
Primary Inspection Floorspace (SQ. FT.)	7,500	8,000	8,950	9,740
Primary Inspection No. Stas.	17	27	30	39
Secondary Inspection Floorspace (SQ. FT.)	400	3,430	4,030	5,430
Secondary Inspection No. Stas.	2	4	5	6
6. Customs				
Floorspace (SQ. FT.)	7,050	14,750	17,110	18,680
No. Inspection Stas.	13	27	30	39
7. Arrival (Greeters) Lobby				
Floorspace (SQ. FT.)	9,400	10,950	12,200	12,200
Japanese Tour Groups				
Floorspace (SQ. FT.)				
Local/U.S. Flights	9,400	4,820	4,960	4,960

TABLE 4-2 (cont.)
PASSENGER TERMINAL REQUIREMENTS

Facility	Existing	Future Requirements		
	1988	1993	1998	2008
8. Baggage Makeup				
Floorspace (SQ. FT.)	13,400	24,000	26,850	31,600
No. Handling Devices ² +BELT	5	5	6	
Lineal Ft. Display	169	800	940	970
9. Baggage Breakdown				
Floorspace (SQ. FT.)	6,680	13,430	15,640	15,640
No. Handling Devices	3	6	7	7
Lineal Ft. Display	144	325	390	390
10. Baggage Claim				
Floorspace (SQ. FT.)	13,800	23,760	27,720	27,720
No. Handling Devices	3	6	7	7
Lineal Ft. Display	296	825	950	950
11. Administrative and O&M				
GAA Floorspace (SQ. FT.)	3,500	6,340	7,800	10,200
Airlines Floorspace (SQ. FT.)	17,780	32,190	39,650	51,990
Imm./Pub. Health Floorspace (SQ. FT.)	3,700	5,800	6,820	8,980
Customs/Agr. Floorspace (SQ. FT.)	2,380	4,530	5,180	6,710
12. Concessions				
Duty Free Sales Floorspace (SQ. FT.)	7,800	17,100	19,520	21,350
Duty Free W.H. Floorspace (SQ. FT.)	9,300	9,300	10,060	10,990
Restaurant Sales Floorspace (SQ. FT.)	11,200	12,980	14,750	16,130
Restaurant W.H. Floorspace (SQ. FT.)	2,200	4,320	4,920	5,370
Ground Transport. Floorspace (SQ. FT.)	600	890	980	1,060
Other Concessions Floorspace (SQ. FT.)	7,600	9,200	9,200	9,200
13. Public Amenities				
Floorspace (SQ. FT.)	3,400	6,030	6,860	7,500
14. Mechanical & Electrical				
Floorspace (SQ. FT.)	9,570	15,160	17,120	18,440
15. Terminal Gates (Aircraft Parking Positions)				
No. of Gates	5	10	12	12
Size of Gates (A/C Type)	B747	B747	B747	B747

TABLE 4-2 (cont.)
PASSENGER TERMINAL REQUIREMENTS

Facility	Existing	Future Requirements		
	1988	1993	1998	2008
16. Surface Transportation				
Departure Curb (LIN. FT.)	400	740	880	910
Arrival Curb (LIN. FT.)	400	740	880	910
Departure Bus/Van Parking	7	16	18	20
Arrival Bus/Van Parking	14	95	110	120
Public Parking		495	565	615
	745(TOTAL)			
Employee Parking		240	270	300

TABLE 4-3
NON-PASSENGER TERMINAL REQUIREMENTS

Facility	Existing 1988	1993	Future Requirements	
			1998	2008
1. Air Carrier Aircraft Apron (Aircraft Parking Positions)				
Gate Related:				
Number	8+2	10	12	12
Size	B747 B727	B747	B747	B747
Transient Aircraft:				
Number	-0-	1	1	2
Size		B747	B747	B747
Based Aircraft:				
Number	4	2 lg + 4 sm	3 lg + 4 sm	4 lg + 4 sm
Size	B727	DC10-B727	DC10-B727	DC10-B727
2. Air Cargo Facility^a				
Building/s Ground Floorspace (SQ. FT.)	31,000	58,500	71,100	94,700
Container/Pallet Storage Ramp Space (SQ. FT.)	NA	36,000	42,000	52,000
3. Aircraft Fuel Storage Facility				
Jet Fuel Storage (THOUSAND BBL)	20.0	43.1	50.9	63.3
Av. Gas Storage (THOUSAND GAL)	15.0	16.4	20.6	32.9
4. General Aviation Facility				
Small A/C Tiedowns	NA	15	20	30
Large A/C Tiedowns	NA	4	5	7
Helipad	-0-	1	1	1
5. Commuter/Air Taxi Facility				
Parking Positions	3	8	10	14
Terminal Floorspace (SQ. FT.)	NA	11,000	14,000	19,000
6. GIAT Base Maintenance Facility				
Building Ground Floorspace (SQ. FT.)	NA	7,500	10,000	15,000
Equipment/Material Space (SQ. FT.)	NA	7,500	10,000	15,000
7. GSE Maintenance & Storage Facility				
Maint. Building Floorspace (SQ. FT.)	NA	35,000	41,000	51,000
Ramp Space (SQ. FT.)	NA	193,000	226,000	281,000
8. Aircraft Maintenance Facility- Based Air Carrier				
Maint. Building Floorspace (SQ. FT.)	18,000	33,800	39,600	49,300

^a. Includes building floorspace for the makeup and breakdown of air mail containers and pallets in the cargo building/s.

SECTION 5

SECTION 5

5.0 Expansion Requirements

This section compares existing facilities with future facility requirements. Tables 5-1 and 5-2 give expansion requirements for passenger terminal and non-passenger terminal facilities for the planning horizons of 1993, 1998 and 2008. All Facility Requirements are based on the *most probable* forecasts of aviation demand.

USE OF TABLES

Tables 5-1 and 5-2 give requirements for expansion that must take place in the intervening years between planning horizons. For example, required expansion of floorspace for the departure lobby (Table 5-1, item 1a), without a requirement for the X-Ray of hold baggage, is 3,080 sq. ft. between 1988 (which has 14,800 sq. ft. of existing floorspace) and 1993 which requires 17,880 sq. ft. of floorspace. Similarly, the number of check-in stations must increase by 9 during the same period.

TABLE 5-1
EXPANSION REQUIREMENTS
PASSENGER TERMINAL FACILITIES

Facility	Existing		Future Requirements			
	1988	1993	1998	2008		
1a. Departure (Ticketing) Lobby- (Exclusive Use Stations)						
Req'd. Floorspace (SQ. FT.)	14,800 ^a	17,880	20,150	22,350		
w/o X-Ray						
Expansion (SQ. FT.)		3,080	2,270	3,200		
Req'd. Floorspace (SQ. FT.)	14,800 ^a	23,350	26,525	29,575		
w/ X-Ray						
Expansion (SQ. FT.)		8,550	3,175	3,050		
No. Check-in Stas. w/ or w/o X-Ray	24	33	38	42		
Expansion (No. Stas.)		9	5	4		
1b. Departure (Ticketing) Lobby- (Common Use Stations)						
Req'd. Floorspace (SQ. FT.)	14,800 ^a	13,150	14,625	15,975		
w/o X-Ray						
Expansion (SQ. FT.)		0	0	1,350		
Req'd. Floorspace (SQ. FT.)	14,800 ^a	16,975	18,875	20,650		
w/ X-Ray						
Expansion (SQ. FT.)		2,175	1,900	1,775		
No. Check-in Stas.	24	22	25	27		
w/ or w/o X-Ray						
Expansion (No. Stas.)		0	1	3		
2. Security Inspection						
Req'd. Equipment Space (SQ. FT.)	800	2,400	2,400	3,200		
Expansion (SQ. FT.)		1,600	0	800		
No. Inspection Stas.	1	3	3	4		
Expansion (No. Stas.)		2	0	1		
3. Wellwisher Lobby						
Req'd. Floorspace (SQ. FT.)	8,400	9,180	9,310	9,310		
Expansion (SQ. FT.)		780	130	0		
4. Passenger Hold (Waiting) Room						
Originating PAX Req'd. Floorspace (SQ. FT.)	13,600	27,520	31,170	34,300		
Expansion (SQ. FT.)		13,920	3,650	3,130		
No. of Seats	540	1,375	1,555	1,720		
Expansion (No. Seats)		835	180	165		
In-Transit PAX Req'd. Floorspace (SQ. FT.)	0	6,030	8,060	12,530		
Expansion (SQ. FT.)		6,030	2,030	4,470		
No. of Seats	0	300	400	630		
Expansion (No. Seats)		300	100	230		

^a) Excludes Group Check-in Area

TABLE 5-1 (cont)
EXPANSION REQUIREMENTS
PASSENGER TERMINAL FACILITIES

Facility	Existing		Future Requirements			
	1988	1993	1998	1998	2008	2008
5. Immigration						
Req'd. Primary Inspection Floorspace (SQ. FT.)	7,500	8,000		8,950		9,740
Expansion (SQ. FT.)		500	950		790	
No. Primary Inspection Stas.	17	27		30		39
Expansion (No. Stas.)		10	3		9	
Req'd. Secondary Inspection Floorspace (SQ. FT.)	400	3,430		4,030		5,430
Expansion (SQ. FT.)		3,030	600		1,400	
No. Secondary Inspection Stas.	2	4		5		6
Expansion (No. Stas.)		2	1		1	
6. Customs^b						
Req'd. Floorspace (SQ. FT.)	7,050	14,750		17,110		18,680
Expansion (SQ. FT.)		7,700	2,360		1,570	
No. Inspection Stas.	13	27		30		39
Expansion (No. Stas.)		14	3		9	
7. Arrival (Greeters) Lobby						
Req'd. Floorspace (SQ. FT.)	9,400	10,950		12,200		12,200
Japanese Tour Groups Expansion (SQ. FT.)		1,550	1,250		0	
Req'd. Floorspace (SQ. FT.)	9,400	4,820		4,960		4,960
Local/U.S. Flights Expansion (SQ. FT.)		0	0		0	
8. Baggage Makeup						
Req'd. Floorspace (SQ. FT.)	13,400	24,000		26,850		31,600
Expansion (SQ. FT.)		10,600	2,850		4,750	
No. Handling Devices	2+BELT	5		5		6
Expansion (No. Devices)		2.5	0		1	
Lineal Ft. Display (Ft.)	169	800		940		970
Expansion (Ft.)		631		140		30
9. Baggage Breakdown						
Req'd. Floorspace (SQ. FT.)	6,680	13,430		15,640		15,640
Expansion (SQ. FT.)		6,750	2,210		0	
No. Handling Devices	3	6		7		7
Expansion (No. Devices)		3				10
Lineal Ft. Display (Ft.)	144	325		390		390
Expansion (Ft.)		181	65		0	

b) Two Step Processing

TABLE 5-1 (cont)
EXPANSION REQUIREMENTS
PASSENGER TERMINAL FACILITIES

Facility	Existing	Future Requirements				
	1988	1993	1998	2003	2008	
10. Baggage Claim						
Req'd. Floorspace (SQ. FT.)	13,800	23,760	27,720		27,720	
Expansion (SQ. FT.)		9,960	3,960	0		
No. Handling Devices	3	6	7		7	
Expansion (No Devices)		3	1	0		
Lineal Ft. Display (Ft.)	296	825	950		950	
Expansion (Ft.)		529	125	0		
11. Administrative & O&M						
Req'd. GAA Floorspace (SQ. FT.)	3,500	6,340	7,800		10,200	
Expansion (SQ. FT.)		2,840	1,460	2,400		
Req'd. Airlines Floorspace (SQ. FT.) ^c	17,780	32,190	39,650		51,990	
Expansion (SQ. FT.)		14,410	7,460	12,340		
Req'd. Imm./Pub. Health Floorspace (SQ. FT.)	3,700	5,800	6,820		8,980	
Expansion (SQ. FT.)		2,100	1,020	2,160		
Req'd. Customs/Agr. Floorspace (SQ. FT.)	2,380	4,530	5,180		6,710	
Expansion (SQ. FT.)		2,150	650	1,530		
12. Concessions						
Req'd. Duty Free Sales Floorspace	7,800	17,100	19,520		21,350	
Expansion (SQ. FT.)		9,300	2,420	1,850		
Req'd. Duty Free W.H. Floorspace (SQ. FT.)	9,300	9,300	10,060		10,990	
Expansion (SQ. FT.)		0	760	930		
Req'd. Restaurant Sales ^d Floorspace (SQ. FT.)	11,200	12,980	14,750		16,130	
Expansion (SQ. FT.)		1,780	1,770	1,380		
Req'd. Restaurant WH Floorspace (SQ. FT.)	200	4,320	4,920		5,370	
Expansion (SQ. FT.)		2,120	600	450		
Req'd. Ground Transport Floorspace (SQ. FT.)	600	890	980		1,060	
Expansion (SQ. FT.)		290	90	80		
Req'd. Other Concessions Floorspace (SQ. FT.)	7,600	9,200	9,200		9,200	
Expansion (SQ. FT.)		1,600	0	0		

c) Includes Ground and Second Level

d) Second Level Only

**TABLE 5-1 (cont.)
EXPANSION REQUIREMENTS
PASSENGER TERMINAL FACILITIES**

Facility	Existing	Future Requirements				
	1988	1993	1998	2003	2008	
13. Public Amenities						
Req'd. Floorspace (SQ. FT.)	3,400	6,030	6,860		7,500	
Expansion (SQ. FT.)		2,630	830	680		
14. Mechanical & Electrical						
Req'd. Floorspace (SQ. FT.)	9,570	15,160	17,120		18,440	
Expansion (SQ. FT.)		5,590	1,960	1,320		
15. Terminal (Aircraft) Gates						
Req'd. No. of Gates,	5	10	12		12	
Size of Gates	B747	B747	B747		B747	
Expansion (no. Gates)		5	2	0		
16. Surface Transportation						
Req'd. Departure Curb (LIN. FT.)	400	740	880		910	
Expansion		340	140	30		
Req'd. Arrival Curb (LIN. FT.)	400	740	880		910	
Expansion		340	140	30		
Req'd. Departure Bus/Van Parking	7	16	18		20	
Expansion (Parking)		9	2	2		
Req'd. Arrival Bus/Van Parking	14	95	110		120	
Expansion (Parking)		81	15	10		
Public Parking ^e		495	565		615	
745 (TOTAL)						
Employee Parking ^e		240	270		300	
Expansion (Total Parking)		0	90		170	

^{e)} At the passenger terminal only

TABLE 5-2
EXPANSION REQUIREMENTS
NON-PASSENGER TERMINAL FACILITIES

Facility	Existing	Future Requirements			
	1988	1993	1998	2008	
1. Air Carrier Aircraft Apron (Aircraft Parking Positions)					
Req'd. Gate Related Aprons	8+ 2	10	12		12
A/C Size	B747 B727	B747	B747		B747
Expansion (Positions)		2	2	0	
Req'd. Transient A/C Apron	0	1	1		2
A/C Size		B747	B747		B747
Expansion (Positions)		1	0	1	
Req'd. Based A/C Apron (A/C Parking Positions)	4	2LG +	3LG +		4LG +
A/C Size	B727	4SM (DC10) (B727)	4SM (DC10) (B727)		4SM (DC10) (B727)
Expansion (Positions)		2	1	1	
2. Air Cargo Facility					
Req'd. Building Ground Floorspace (SQ. FT.)	31,000	58,500	71,100		94,700
Expansion (SQ. FT.)		27,500	12,600	23,600	
Req'd. Storage Space for Containers/Pallets (SQ. FT.)	NA	36,000	42,000		52,000
Expansion (SQ. FT.)		36,000	6,000	10,000	
3. Aircraft Fuel Storage Facility					
Req'd. Jet Fuel Storage (THOUSAND BBL)	20.0	43.1	50.9		63.3
Expansion (THOUSAND BBL)		23.1	7.8	12.4	
Req'd. Av. Gas Storage (THOUSAND GAL)	15.0	16.4	20.6		32.9
Expansion (THOUSAND GAL)		1.4	4.2	12.3	
4. General Aviation Facility					
Req'd. Small A/C Tie-Down Spaces	NA	15	20		30
Expansion (No. Spaces)		15	5	10	
Req'd. Large A/C Tie-Down Spaces	NA	4	5		7
Expansion (No. Spaces)		4	1	2	
Req'd. Helipad	0	1	1		1
Expansion (Helipad)		1	0	0	
5. Commuter/Air Taxi Facility					
Req'd. Parking Positions	3	8	10		14
Expansion (No. Positions)		5	2	4	
Req'd. Terminal Floorspace (SQ. FT.)	NA	11,000	14,000		19,000
Expansion (SQ. FT.)		11,000	3,000	5,000	

**TABLE 5-2 (cont.)
EXPANSION REQUIREMENTS
NON-PASSENGER TERMINAL FACILITIES**

Facility	Existing 1988	1993	Future Requirements		2008
			1998		
6. GIAT Base Maintenance Facility					
Req'd. Building Ground Floorspace (SQ. FT.)	NA	7,500	10,000		15,000
Expansion (SQ. FT.)		7,500	2,500	5,000	
Req'd. Equipment/Material Space (SQ. FT.)	NA	7,500	10,000		15,000
Expansion (Sq. FT.)		7,500	2,500	5,000	
7. G.S.E. Maintenance & Storage Facility					
Req'd. Maintenance Bldg. Floorspace (SQ. FT.)	NA	35,000	41,000		51,000
Expansion (SQ. FT.)		35,000	6,000	10,000	
Req'd Ramp Space (SQ. FT.)	NA	193,000	226,000		281,000
Expansion Space (SQ. FT.)		193,000	33,000	55,000	
8. Aircraft Maintenance Facility Based Air Carrier					
Req'd. Maint. Bldg. Floorspace (SQ. FT.)	18,000 ^a	33,800	39,600		49,300
Expansion (SQ. FT.)		15,800	5,800	9,700	

^a) Estimated

SECTION 6

SECTION 6

6.0 Staged Development Program And Conceptual Design

This section contains conceptual designs for all airport facilities and proposes their development in two stages.

Facilities are divided into passenger terminal and non-passenger terminal categories. The passenger terminal category includes the terminal building, the gate related apron interface including passenger loading bridges, and the frontal roadway system and associated vehicular parking. The non-passenger terminal category includes apron, a taxiway, air cargo facilities, aircraft fueling facilities, general aviation facilities (including helicopters), commuter / air taxi facilities, GIAT base maintenance facilities, GSE maintenance facilities, aircraft maintenance facilities and an access road.

The stages of development consist of an initial stage which expands existing or develops new facilities to satisfy aviation demand to 1995. The remainder of the development is carried out in a future stage which expands existing or develops new facilities to meet demand to the year 2008.

6.1 Passenger Terminal Facility

The passenger terminal facility should develop in stages as the overall airport facility grows. This Master Plan determines the size of the terminal's Initial Development Stage, the probable location for expansion upon the site thereafter, and identifies criteria governing the size, shape, cost, timing and architectural character of the facility. These criteria are guidelines for the architectural designer who will translate them into a specific facility configuration.

6.1.1 Functional Relationships and Development Options

The GIAT Passenger Terminal is composed of those functional spaces listed as "Plan Areas" in Working Paper No. 4 (Appendix B, Reference 7) and Section 4 of this report. The following Basic Relational Diagram (Figure 6-1) shows the interrelationship between those areas. This terminal, like most airline terminals, may be considered to have a grouping of "Departure" functions and one of "Arrival" functions. The relationship between these two groupings is not a strong one. The "Cross Connecting Functions" listed in the figure do not require proximity between Departure and Arrival functions. Unless relationships between the terminal and outside functions prohibit doing so, and except for maintenance of the enplaning/deplaning interface, it would be possible to separate departure from arrival functions entirely, even providing a separate building for each as has been done at a number of airports worldwide.

The existing terminal incorporates Departure and Arrival functions side-by-side, within the same structure. Two floors of the existing terminal contain Departure and Arrival functions; the building's east end houses Arrivals while the building's west end houses Departures. See Figure 6-2 for floor plans of the existing terminal.

Outside of the terminal itself, the most important function which influences terminal layout is aircraft parking, specifically the location of gate related aircraft parking positions. This includes future parking positions as well as existing ones. The geometry of the GIAT site virtually dictates a "linear" arrangement of the apron, both now and for future expansion. Future apron development will be linear, expanding eastward from the existing line of parking positions. A detailed discussion of apron layout is included later in this section under Non-Passenger Terminal Facilities.

It is functionally desirable now, and will probably remain so in the future, to preserve the option of connecting as many aircraft parking positions directly to the terminal as possible. The most straightforward way of doing this is by passenger loading bridges which connect the door of the aircraft to a permanent concourse that is a part of the terminal building itself. It is not economically desirable, however, to provide loading bridges for all aircraft parking positions if some are infrequently used. Loading bridges should probably not be purchased for positions which are utilized only a few hours per day.

Also, passenger walking distances should be kept below 1,000 feet, with the objective of keeping them below 600 feet in most cases. Long concourses require that moving walkways or some other form of intra-airport transportation be provided to maintain acceptable walking distances. One alternative to long concourses, moving sidewalks and loading bridges is to provide apron level bus service to infrequently used and remote parking positions.

The second major outside function which affects terminal expansion at Guam is vehicular surface transportation and access. A feeder road (Route #10A) and airport access road is in place. Consideration was given to the ability of this overall ground transportation network to accommodate parking needs while maintaining efficient traffic circulation. Efficient traffic circulation means minimizing cross traffic and pedestrian vehicle mix, as well as providing terminal access for as many vehicular related functions as possible (i.e. passenger drop-off, tour group pick-up, delivery of concession goods, maintenance access and rental car access).

The final major outside consideration is available land. A limited amount of undeveloped land lies to the east of the existing terminal. This land is largely ungraded and rising in elevation. Portions of the land at the far end of possible terminal expansion may need to be excavated as much as 50 feet. Some land is available for limited expansion to the west of the existing terminal but the quantity is small when compared with projected needs for new facilities over the next twenty years.

The internal and external functional relationships introduced above were thoroughly investigated during the master planning period. Proposals were entertained to expand the terminal to the east, to the west, to provide an entirely new building and to do so in a number of construction stages. Very basically, there are four ways by which the existing terminal might be expanded (see Figure 6-3) They are:

- a) Construct a separate Arrivals Building and convert the existing terminal to Departure uses.
- b) Major expansion to the east.
- c) Expansion east and west in relatively equal amounts.
- d) Expansion all to the east.

Not included is expansion entirely to the west. Site size, building structural difficulties and eastward apron development prevent implementation of this concept.

The four possible ways to expand the terminal were studied and extensively reviewed with all users and operators at a meeting held in Honolulu in December, 1988 (Working Paper No. 6, Appendix B, Reference 9). Option A (a separate arrivals building) was selected by GAA for detailed development. The advantages of a separate arrivals building are as follows.

- (a) It could result in less terminal remodeling throughout a staged development program.
- (b) It would tend to spread terminal operations farthest to the east, potentially connecting more aircraft parking positions directly to the terminal.
- (c) It would more easily separate arriving passengers from departing passengers (including the separation of provisions for wellwishers and greeters).
- (d) It would extend the length of the terminal curb and allow for more close-in vehicular parking.

Further study of Option A determined that a minimum and immediate expenditure of about sixty million 1988 dollars for the terminal alone would be required. While overall expansion of Option A would probably cost less than the other three options considered, the cost for construction of the first portion of a separate arrivals building would represent a relatively large percentage of the total cost necessary to achieve all terminal functions through the year 2008. This need to make such a large capital investment early in the development program is the principal disadvantage of Option A. Another disadvantage of Option A is that terminal use patterns could change, leaving the separate arrivals building underutilized for several years; forecasts become progressively less reliable beyond the five year planning horizon.

The site has room for a separate arrivals building, perhaps beyond the year 2008. For the immediate future, however, an extension of the existing terminal to provide service through the mid-1990's will best satisfy the short term predicted needs. A well planned extension of the existing terminal may prove to be a long term solution to space requirements if passenger demand grows more slowly than expected and peaking characteristics change to further improve facility utilization. It also leaves open the option of constructing a separate arrivals building if that should prove to be desirable in the future.

The existing terminal can reasonably be expanded only to the east or the west because of site limitations. Study of the westward expansion

indicated that while the Wellwishers Lobby, Hold Room area and the Departure Lobby would benefit from a small expansion, arrival side functions could not easily be increased. A modest westward expansion would work best when coupled with the immediate development of a new Arrivals Building. It is concluded that the initial stage of development should be an eastward addition to the existing terminal building of sufficient size to accommodate forecast mid-1990's traffic levels, and that the option for a separate arrivals building should be preserved for the long term.

6.1.2 Initial Stage of Development

The recommended initial development stage includes an eastward expansion of the existing terminal sized to accommodate user needs until 1995. In addition to cost considerations, there are limitations to the size of the initial eastward expansion as follows.

- a) The initial expansion must be further expandable according to the planned future position of functions upon the site.
- b) The preservation of the eventual option for a separate arrivals building and the conversion of the existing building into a departures building supposes that the larger the initial expansion of the existing terminal, the longer it would be able to serve as a departures building. It follows that the larger the initial expansion, the later a separate arrivals building would be built.
- c) Redesign of vehicular parking and circulation, including service vehicle access.
- d) Apron vehicle access.

Figures 6-4 and 6-5 show workable building and site layouts for initial expansion to the east. These plans provide the required floor areas to the year 1995 (expansion floor area is approximately 135,000 sq. ft. including concourse and apron bus stop). The floor area shown for each terminal facility is interpolated from the requirements of Section 4 with allowances for the shape of the space and its efficiency. Some areas such as the Passenger Hold Room, Departure Concessions and Transit Lounge are planned to partially share occupant loads.

Salient features of the planned eastward expansion of the Initial Stage of Development are as follows.

- a) The existing east exterior wall at ground level contains a concrete shear wall between each column. The plan proposes that these panels stay intact except perhaps in

the Baggage Claim area because they will be difficult and costly to move.

- b) The Transit Hold Area is arranged so that it can also serve as additional Hold Room space in peak periods which do not presently coincide with peak transit periods. Figure 6-6 shows how the Hold Room might be functionally arranged to efficiently handle transit passengers.
- c) An Apron Bus Stop is planned as a part of the Initial Stage of Development. The bus stop will provide service for passengers moving between the terminal and aircraft that are not directly connected to the concourse. Figure 6-7 shows one possible way of arranging a bus stop. Currently, aircraft parked west of Gate 5 are not connected to a concourse and could utilize the bus service (although parking positions 1 and 2 are not normally used for passengers). In the initial stage of development, positions 5 through 10 are served by passenger loading bridges and 3, 4, 11 and 12 are served by buses. If the aircraft apron is expanded beyond existing parking position 10 prior to any eastward concourse extension, the apron bus would then be available to transport passengers there. The bus stop should be designed so as to ensure the separation of arriving and departing passengers. It should be located far enough to the east to allow future Baggage Claim expansion.
- d) Incorporation of the existing elevator at Immigration into a space allocated to Duty Free Shoppers in the expansion might prove useful for airside delivery of merchandise in conjunction with planned Duty Free warehousing in the Industrial Park.
- e) Additional Hold Room toilets are located so as to make use of existing plumbing penetrations. New penetrations through the second floor prestressed concrete slabwork are possible but costly.
- f) The new Greeters Lobby Area is placed so as to aid tour group assembly. Figure 6-8 shows a possible functional arrangement of that area. Greeters are expected to utilize the connecting area between the new lobby and the existing Greeters Lobby. Non-tour passengers will tend to go left out of Customs toward the rental cars or to the public parking lot via the Hafa Adai Garden. Tour passenger will be directed to the right into the tour group assembly area.

- g) Generally, the locations of major facilities relative to one another remain the same as in the existing terminal.
- h) The office area requirements for GAA and the airlines include 8000 sq. ft. of space which could be constructed along the north side of the west concourse. If office space is found in other buildings, there could be a corresponding reduction of office space in the initial stage of development.
- i) Vehicular parking areas should be expanded to the east ahead of terminal expansion, excavating the site down to approximately the elevation required for future terminal expansion. Figure 6-5 shows the parking facility layout for the mid-1990's.

The initial stage of development is large enough to meet expected needs to 1995. Table 6-1 lists existing floorspace plus expansions of floorspace for major functional areas in the initial stage of development. If peaking factors decline even more than they are forecast to do (Section 3), the initial expansion may last for years beyond 1995.

6.1.3 Potential Intermediate Development Actions

In addition to improvements included in the initial stage of development described above, there are other ones which might be included or be a part of intermediate stages in the development of GIAT. These are not included in the layouts or cost estimates for the initial stage, nor are they recommended by the Master Plan. They are recorded here as optional improvements that were previously considered in the master planning process that might relieve pressures on facilities while the initial stage of development is being implemented, or after the initial stage is in place as a transition to future development.

- a) **Concourse Extensions.** Concourse extensions beyond the length of the terminal building could be built after the initial stage building expansion is in place. One concourse extension in particular, extension westward to Gate 4, has been investigated. A West Concourse extension could be designed with one passenger loading bridge to serve Gate No. 4 or it could be designed to serve both Gates 4A and 4B, with an apron drive type bridge. In addition, the West Concourse extension could incorporate a stairway and elevator (at the least) or an Apron Bus Stop with escalators and elevator (at the most) in order to serve passengers associated with Gate 3 and gates westward. However, the walking distance between Gate 4 and the initial

stage Immigration expansion would be greater than the 1000 feet generally considered a maximum practical walking distance (approximately 1140 feet). Furthermore, the Apron Bus Stop planned in the initial stage of development will lessen the need for a west concourse extension.

For separation of departing and arriving passengers, concourse extensions to the east beyond Gate 10 should have two levels: one level for arriving passengers and one for departing passengers. This vertical separation of passengers would prevent their comingling as desired by Federal Inspection Services Agencies. Horizontal separation would increase concourse width and require more elaborate stairways and/or escalators to keep arriving and departing passengers separated when crossing the concourse. There is no feasible method of providing arrival/departure separation in the existing concourse and it and the initial stage extension to Gate 10 should continue to rely on procedural methods of keeping arrival and departure passengers separated.

b) West End Improvements. Two improvements which would aid airline operations could be made to the Departure (west) end of the terminal. Such improvements should be considered only in conjunction with airline interest.

- *Revision of the Ticket Counters.* There are now 24 ticket counter stations within the terminal. Each counter could be shortened from about 4 feet to 3 feet and each scale slot narrowed so that 33 counters could replace the existing 24.
- *Enclosure of the Existing Exterior "Tour Group" Counters.* Airlines could be allowed to enclose the exterior counters if they wish to do so. The exit stair at the west wall behind the existing counters must be preserved as an exit to the exterior according to the building code. This enclosure may later be converted to office space.
- *Common Use Checkin Stations.* Computer software systems are in existence that allow several airlines to use a common terminal at a single checkin station (Example: Common Use Terminal Equipment - "CUTE"). Utilization of such a system at GIAT would substantially reduce requirements for numbers of stations.

c) Passenger Amenities. There are modifications which could be made to the existing terminal or incorporated into the

expansion which would improve passenger service. Some considerations are:

- *Observation Areas.* At Guam, there are two external views from the terminal site worth exploiting. One view is the scenic overlook of Tamuning and the ocean to the north. The other, as at all airports, is the observation of aircraft movements on the airfield. The existing observation deck is oriented toward the latter view but it is exposed to the weather and relatively remote from most terminal facilities. The first view is only available to passengers and the public from the roof lounge for a fee. Future design should consider the assets afforded by these views and if properly exploited, they could be used to enhance the restaurant concession and airline lounges and increase the use of both. Hold Room space might be increased vertically with observation access directly from the hold room area.
- *Airline Lounges.* Although largely up to individual airlines, future terminal design should consider spaces leasable as Airline Lounge areas. These spaces would be situated for easy access to the Hold Room, Food Service, Restrooms and perhaps to take advantage of a view.
- *Lockers, Showers and Sleeping Rooms.* Perhaps this option is only valid if a large transit passenger operation develops as a result of airline hubbing, however, these features could eventually provide the Authority with revenue while providing fuller service to passengers. Should transit passenger operations continue to grow as they are expected to do, such things as lockers, showers and sleeping rooms should be considered for incorporation into future expansion plans.

6.1.4 Future Development

Figure 6-9 shows anticipated expansion beyond 1995. The facilities shown exceed predicted area requirements for the year 2008. Although a separate Arrivals Building is indicated as being a future option, the eventual overall terminal building facility could be contiguous depending upon future reassessment of needs. If the recommended initial stage of development is later converted to a Departures Building, it would provide for predicted departure space requirements beyond the year 2008. Therefore, it may prove desirable not to build a separate Arrivals Building until the existing building could be fully utilized for departures and sometime during the mid-

1990's, another eastward addition might be built as an intermediate step to a fully developed site. Facility requirements of Section 4 require the addition of approximately 70,000 sq. ft. of terminal floorspace and two gate related aircraft parking positions to satisfy 2008 needs. The site will accommodate all vehicle parking without constructing a parking garage provided the area east of the existing public parking lot is excavated. An arrangement for all required parking is included on Figure 6-9, assuming the excavation will take place.

6.1.5 Architectural Planning Considerations

This section has addressed facility size, site location, and timing for development of the passenger terminal building. An initial stage of development is defined and future development outlined. All stages of development will require architectural design work compatible with the unique character of the existing building and the most up-to-date needs and solutions for airport terminal design. In general, the architectural design is left to the appointed designer, but major elements which affect design solutions are properly discussed here. For GIAT, two categories are addressed:

- a) **Airport Security** requirements as they are generated by the FAA, Guam Customs Service, U.S. Immigration and other Federal Inspection Services. Likely future security requirements affecting design are:
 - *X-ray of All Hold Baggage.* This will greatly affect the Departure Lobby and Ticket Counter areas since the x-ray baggage inspection must occur in the presence of the passenger checking the bag.
 - *Security Check for Commuters.* Transfer commuter passengers arriving via small, non-security checked aircraft will have to go through an x-ray security check prior to entering the transit hold area.
- b) **Taga Stone Motif.** The existing terminal, particularly from the exterior, strongly expresses itself with massive columns reminiscent of the large latte or taga stones of the Ancient Chamorro people. This motif is a powerful one and should be given due consideration in the creation of building additions. The relatively large initial development stage expansion should not be more ornate or more elaborate than the existing building. Success will probably be achieved by either duplicating the existing motif or contrasting it with construction more simplified or perhaps

more "sleek". Contrasting construction would be of best visual advantage as a separated building, divorced from the existing one, and therefore not consistent with the proposed initial development stage. Attached expansion of contrasting appearance will require very careful aesthetic consideration, namely, a good sense of materials and proportion. At a very minimum, any change of material or motif will require separation from the existing one (either actual or implied separation) as in the offsetting of plane surfaces or by elevational change. It would be a major visual mistake not to give enough consideration to harmony with the existing motif.

6.2 Non-Passenger Terminal Facilities

This section of the master plan discusses the various site improvements and facilities to be developed outside of the main passenger terminal complex. The facilities discussed in this section include the apron, commuter terminal facilities, general aviation facilities, maintenance facilities, airport access, and other features. The plan proposes a phasing program for the development of the required facilities and identifies areas where future requirements, beyond those presently identified, can be located.

6.2.1 Alternatives Considered

The principal alternatives considered in planning non-passenger terminal facilities had to do with the layout of the apron on the airfield. Several alternative apron layouts were studied. These included aircraft parking for air carrier aircraft at right angles to the present positions with a north - south taxiway connecting the apron to Taxiway "J" and a layout which had the terminal concourse front laid out on a large radius curve. Also considered was a setback of the air carrier apron front to provide for possible future longer aircraft. Each of these alternatives required a considerable amount of land on the east side of the existing apron. Apron alternatives are discussed in detail in Appendix B, References 9, 12 and 13.

Alternatives to other facility planning were few because of the limited amount of land available on GIAT. For example, there were no viable alternatives to siting general aviation, commuter/air taxi and aircraft maintenance facilities on Navy land. A potential site for location of a large aircraft maintenance hangar on GIAT property to the west of the Industrial Park was considered, but loss of space for air carrier

apron and passenger terminal expansion was determined to be too high a penalty to pay for this facility. Although a site for cargo located at the western-end of the air carrier apron was investigated, relocation of air cargo facilities in the initial stage of development was determined to be prohibitively expensive as well as functionally undesirable. Minor variations in the location of GSE maintenance and GIAT base maintenance facilities were investigated but no significant advantages could be identified relative to these choices. In general, GIAT is located on such a constrained site that viable alternatives for most facility locations were difficult to find.

6.2.2 Facility Plans

The following are plans for non-passenger terminal facilities that were adopted after examination of available alternatives.

- *Air Carrier Apron.* It is planned that the existing ten position apron should continue in use and new aircraft parking positions provided by expanding eastward in a linear direction. This will reserve as much land as possible between Route 10A and the apron for future expansion of the passenger terminal building or other landside uses. This arrangement is shown on Figure 6-10. A variation of this plan may involve the easternmost part of the apron, near the Air Force fuel line, if that space is required for parking air carrier aircraft in the future. A change in alignment may be required for aircraft parking positions which are located beyond the limits of the existing permanent Navy waiver in order to accommodate larger aircraft.

Although it is possible the Boeing B-747 aircraft may be lengthened in the future, there are no plans at present for a fuselage extension. The Boeing Company has a several year backlog of orders for B-747 aircraft, none of which have longer bodies. Also, airports worldwide continue to design and construct new terminals and aprons to accommodate aircraft no larger than the B-747-400. Therefore, there is no reason to plan aprons for a stretched B-747 at this time. If longer aircraft are built in the future, the easternmost apron area can be configured to accommodate one or more of these aircraft.

Initially, apron expansion should be constructed to have centerline spacing to accommodate the B-747-400 aircraft.

For planning purposes, future parking positions should also accommodate B-747-400 aircraft, however, the actual size to be constructed should be determined prior to initiating design. New gates need not all be designed for B747-400 aircraft.

- *Commuter/Air Taxi Facilities.* Commuter airline and air taxi operators are a constantly changing group whose needs and activities also change. Generally, they prefer to operate from a separate terminal facility, although some may want access to the main terminal building. For example, Continental Air Micronesia plans to operate a commuter airline to provide service to support their hubbing operations. In such a case, their passengers might be best served if they could use the existing terminal building.

The apron at aircraft parking position 1 should be expanded to the west as far as possible by removing the shed extension to the Old Terminal Building. Doing so will provide about 170 lineal feet of new apron. This space, combined with the adjacent apron, will permit parking of about eight commuter airline aircraft during daytime. The apron layout is shown on Figure 6-11. At night, these aircraft can be parked in the area west of the Continental maintenance hangar and the expanded apron used to park larger aircraft. As activities increase, the commuter apron (for daytime use) can expand into the aircraft parking position 2 area.

A separate commuter terminal could be located in the Old Terminal Building. The central portion of that building could be the departure check-in area and the eastern portion, which was the old baggage claim and arrival area, could become the departure lobby and arrival area. Space is available in the building for offices and other facilities. Provisions could be made for immigration and customs facilities in the arrivals area, or passengers could be bused to Federal Inspection Service facilities in the main passenger terminal. If a commuter airline uses the main passenger terminal for processing, passengers could be bused to and from the aircraft.

There will be a need for additional apron space where commuter airline and air taxi aircraft can be parked and maintained. The commuter/air taxi site should be large

enough to accommodate parking of layover aircraft and other aircraft currently not in use and provide for overnight parking of all aircraft. Sites adjacent to the apron should also be provided where maintenance hangars, shops and administrative facilities can be constructed by the operators.

The plan proposes that the commuter/air taxi site be located to the north of the 750 foot building restriction line on the airfield side of the Navy housing area. This site would be west of the proposed air carrier aprons that will be adjacent to the existing Continental maintenance building. The site elevation is low enough so the buildings could be sited below the 7:1 transitional surface. This site can expand in the future into the Navy housing area to accommodate more or larger aircraft. The site is shown on Figure 6-12.

An additional site should be included in the area proposed for aviation related development on the south side of the airfield and to the west of the Navy flight line. This site could provide facilities for other types of commuter/air taxi operators who provide services which do not require access to the commuter terminal. This area is shown on Figure 6-13.

- *Based Air Carrier & Transient Aircraft Aprons.* There is already a need for additional parking positions for air carrier aircraft based at Guam by Continental Air Micronesia Airlines. This need is expected to increase as Continental expands its hubbing operation. In addition, at times there are charter or other special aircraft which layover at Guam for several hours or days. There is no room on the apron in front of the terminal building to accommodate these aircraft.

An economical location for parking based carrier and transient aircraft is on the presently unused area west of the existing Continental maintenance building. The area is shown on Figure 6-12. It is recommended that this area be acquired by the GAA from the Navy so that it can be properly paved for aircraft use. Some penetration of the Navy transitional surface may occur with larger aircraft, however, it will be less than the penetration of the existing Old Terminal Building. As the aircraft become even larger, it will be necessary to expand the apron northward into the Navy housing area to reduce or eliminate penetration.

- *Parallel Taxiway.* There is a need for a parallel taxiway extending from the existing taxiway in front of the new terminal building to the west end of Runway 6L-24R. At the present time, aircraft must taxi on one of the runways to get into takeoff position. This is undesirable and will cause delays as aircraft traffic increases. The plan proposes construction of the parallel taxiway as shown on Figure 9-1.

Negotiation should be initiated with the Navy for acquisition of this land by the GAA, or as a minimum, provide GAA with sufficient interest in the land to enable qualification for FAA funds.

- *General Aviation Facilities.* General aviation includes a wide range of aircraft. It is usually perceived solely in terms of small, private single engine planes flown by individuals for pleasure. However, this category technically includes all privately owned aircraft, many of which are used for commercial purposes. Helicopters, which may or may not be classified as general aviation, will be discussed in a following subsection.

There is no land available on GIAT property for a general aviation facility. The plan proposes that one be developed on the apron area west of the existing Continental maintenance building as shown on Figure 6-12. It will be connected to GIAT property by a secured road. Space will be provided to park and tie down aircraft and permission should be sought from the Navy for construction of a limited number of small hangars, offices and shops. These facilities will be located behind the 750 foot building restriction line, and structures and aircraft would be below the 7:1 transitional surface. It is noted that Navy and FAA airfield geometry requirements are different in some particulars because of differences in civil versus military aircraft operations.

A separate master plan for general aviation on Guam is presently being completed (Appendix B, References 16 and 21). It identifies several types of general aviation activities which may expand and develop on Guam. These include private flying, business flying, commercial sightseeing tours of Guam and nearby islands, flight training, aerial photography, and a number of other activities.

As Guam continues to develop and attract larger numbers of visitors, there is a strong possibility that a new type of general aviation activity will also develop. It will be the utilization of private aircraft by businessmen and wealthy visitors to travel to Guam from distant locations. This type of aviation activity is presently in existence at many locations in the United States as well as elsewhere in the world. Types of aircraft used range in size from larger prop and turbo prop aircraft to jet aircraft that might include the largest narrow body models. A major factor in the development of executive aircraft activity at Guam will be the degree of freedom granted by various countries in the Pacific region to their citizens and corporations to operate and use private aircraft. However, Guam's location is a reasonable distance from many east Asian and Pacific Basin locations from which many private aircraft can easily make direct flights. If Guam wishes to attract this type of activity, it must have a first class general aviation facility with fixed base operator (FBO) support.

The existing apron area discussed above for general aviation use is inadequate for this type of activity because many of these private aircraft are too large to fit into a hangar which would not penetrate the transitional surface. Two sites where such a facility could be located are the existing Navy housing area and the area on the south side of the runway west of the Navy flight line planned for aviation related uses. The amount of land needed could be significant in size if this segment of general aviation grows to meet its potential. The proposed area for this and other aviation related uses is shown on Figure 6-13.

Steps must be taken to specifically identify and obtain a permanent general aviation site. It is expected that many of these facilities will be needed within the next five years. The GAA should make all arrangements to have the land available, provide planning services to potential tenants, and control the quality and quantity of development. Development costs should be borne by private corporations which will operate the facilities.

- *Helicopter Facilities.* Helicopters have become increasingly popular and economical for many uses within the past

decade. On Guam, they may be used for sightseeing as well as other commercial purposes. As an upscale tourism market develops, they may provide rapid and comfortable air taxi transportation between the airport and distant resorts.

The aircraft apron designed to support heavy aircraft represent a significant investment and when not occupied could be used by helicopters. The actual takeoff and landing point might be on the apron at one or more designated helicopter landing pads. During peak hours, however, when helicopter taxi service would be most desirable, these aprons will not be available.

Accordingly, a helipad for air taxi service should be located on graded land east of the last air carrier apron at each stage of apron development. This should be built only when justified by demand. Passengers could utilize buses or other vehicles to travel between the passenger terminal and helipad. Paving for this pad should be adequate to support ground vehicles and helicopters. The finished grade of the pavement should be below the bottom of future concrete pavement for the aircraft apron. This will permit the helipad pavement to be incorporated into future aircraft apron pavement as a stabilized base.

A fixed base site for helicopters should be located on the south side of the airfield to the west of the Navy flight line in the area designated for aviation related activities shown on Figure 6-13. The helipad for takeoff and landing operations should be located close to the parallel taxiway (recognizing separation standards for operation) or at a nearby location designated jointly by the FAA and the Navy.

- *Air Cargo Facilities.* Forecasts of air cargo demand indicate that cargo building floor space at GIAT must be tripled by 2008. Most cargo will be carried in the holds of passenger aircraft, therefore, cargo facilities should be located as close to the passenger aircraft apron as possible. It is recommended that the existing cargo site be utilized in the near term and facilities expanded at that site.

Aircraft parking positions 1 and 2 which are located in front of the existing cargo buildings are restricted by the

permanent Navy waiver to B-707 or smaller size aircraft. However, the waiver permits parking of B-747 size aircraft on position 3. Although present forecasts do not indicate a requirement for high capacity front loading of all-cargo B-747 type aircraft, a facility for such could be constructed at that apron area if ever needed. Meanwhile, other all-cargo aircraft can use position 3 and be loaded and unloaded in the more conventional manner. Positions 1 and 2, as proposed above, will be used by commuter aircraft.

It is recommended that initial expansion of the cargo facilities take place at the existing site as shown on Figure 6-14. This expansion will require widening and raising the elevation of the site. The existing access road leading to the Old Terminal Building and Navy housing area can be relocated northward and raised in grade.

Additional future growth will require development of cargo facilities in the Navy housing area as shown on Figure 6-12. If a larger than expected cargo operation develops, an apron and building complex could also be developed on the south side of the airfield in the area designated for aviation related activities shown on Figure 6-13.

- *GSE Maintenance Facilities.* Additional maintenance facilities for ground support equipment, should be located in the Navy housing area adjacent to the existing maintenance building occupied by Continental Airlines. The proposed sites are shown on Figure 6-12. The new facilities will have access to both the public side of the airport and the apron side.
- *Aircraft Maintenance Hangar.* This Master Plan Update has not studied the economic feasibility of providing a maintenance base for large jet aircraft at GIAT, however, planning is done in the event such a base is determined to be viable. Based on the limited information available, there appears to be justification for one DC-10 size hangar by the year 1993 which would support the based air carrier. However, if other business is to be sought in the region and Guam is to become an aircraft maintenance hub, it is recommended that a hangar be planned to accommodate B-747 size aircraft. A single-bay hangar for this size aircraft requires a minimum site about 400 feet along the apron front by 350 feet deep. This will allow room for ground level

workshops and the building structure including door pockets. A two bay B-747 hangar would require a frontage of about 700 to 800 feet along the apron front by about 350 feet deep. If the hangars and maintenance facilities are to be placed at one site, the site will probably require a linear frontage along the apron of 1000 feet with a depth of 400 feet. Additional space should be provided for access, delivery of supplies, employee and visitor parking, offices, and other support facilities. These spaces can be located alongside or behind the hangar.

It is not practical to locate a site of the size described above on the north side of the runway complex. The steep dropoff of land on that side of GIAT and close proximity to the runways presents problems for both lateral and vertical clearances. Therefore, it is recommended that the hangar be located in the area designated for aviation related activities located on the south side of the runways as shown on Figure 6-13.

- *Western Access Road* . When the new terminal building opened in 1982, access to the airport was limited to Route 10-A; this road connected to Marine Drive on the north. The 1977 master plan also proposed an access road connecting the terminal to Route 16 on the east. This road was proposed to relieve some of the traffic congestion which occurred on Marine Drive. The Route 10-A access road has recently been completed and does allow eastbound traffic on Marine Drive to bypass some of the congestion.

As the economy of Guam has grown, Marine Drive has become more and more congested in the area between the Route 10-A intersection and Agana. Airport traffic moving south is delayed by this congestion which continues to grow worse keeping pace with economic growth. To relieve congestion, the airport access road should be extended along the cliff line north of GIAT and the NAS to connect with Route 8 and provide access to the airport from the south. This road will require access through Navy housing land and cross the approach path to the runways beyond the 3000 foot Navy clear zone. An approximate route for this road is shown on Figure 7-1.

- *Aircraft Fueling Facilities*. The existing fuel farm, pipe line, and delivery systems are in good condition and should remain in

service. The new air carrier apron should be equipped with fueling pits at all aircraft parking positions. As the number of aircraft operations increase, fuel storage facilities at the tank farm should be increased accordingly.

The plan proposes that during the initial stage of development, an additional jet fuel storage capacity of 20,000 barrels be added. As traffic continues to grow during the final stage of development, a further expansion of 20,000 barrels storage capacity should be provided.

Requirements for aviation gas storage are more difficult to predict. Requirements will depend heavily on the development of general aviation, air taxis, helicopters, and commuter aircraft. As noted, this segment of aviation has had a volatile history of activity. Further complicating the forecasting of storage requirements is the question of the aircraft type, specifically turbine or piston engine, that will be used in the future. The plan proposes no increase in storage requirements during the initial period. An additional 15,000 gallons of storage is proposed for future development based on the assumption that general aviation growth at GIAT will be dominated by propeller driven aircraft with reciprocating engines fueled by aviation gasoline.

- *GIAT Base Maintenance Facility.* As GIAT has grown, airport base maintenance requirements have also grown. Currently, maintenance is performed in several makeshift facilities scattered around the airport. A central maintenance building should be provided along with outdoor storage space for materials and equipment. This space should be accessible to both the public and airfield sides of the airport.

The plan recommends that the GIAT maintenance facility be located in the Navy housing area adjacent to the existing GIAT boundary. Initially, cost could be saved by using one or two of the Navy housing units for shops and storage. The site should be planned to double in size in the future stage of development. This expansion will require relocating the access road to the Navy housing area as shown on Figure 6-12.

6.2.3 Initial Stage of Development

Facilities to be provided in the initial stage of development are identified in this section. The initial stage is planned to provide facilities needed for the 1995 time period. Where the plan proposes the acquisition of Navy land, only a brief identification of its location and proposed use is presented in this section. More specific information on Federal land requirements is presented in Section 7.

- Construct aircraft parking positions 11 and 12.
- Construct the commuter apron west of existing parking position 1.
- Provide commuter airline facilities in the existing terminal building.
- Acquire Navy land on airside of the Navy housing area for development of apron space for overnight parking of air carrier and transient aircraft, for development of commuter airline and air taxi facilities, and for development of general aviation facilities.
- Develop apron parking facilities for 2 large and 4 small air carrier aircraft on acquired Navy land.
- Initiate acquisition of Navy land for construction of the parallel taxiway. Construction is scheduled to begin early in the future stage of development.
- Initiate design of the parallel taxiway.
- Construct the access road, security fencing, apron, taxiways and site improvements for the commuter airline, air taxi and general aviation areas.
- When justified by demand, construct a helicopter apron east of aircraft parking position 12. Site preparation for and construction of this facility should be planned for future use as aircraft parking position 13.
- Prepare the site of the cargo facility for expansion by others.
- Acquire the Navy land west of the Navy flight line on the south side of the airfield for use as a maintenance site; general aviation and helicopter fixed base site; and future cargo site.
- Acquire land in the Navy housing area for initial development of airline maintenance facilities, Guam Airport

Authority maintenance facilities, GSE maintenance facilities and related uses.

- Prepare a preliminary study of alignments for the westward extension of the airport access road through the Navy housing area.
- Initiate acquisition of Navy land for the westward extension of the airport access road.

6.2.4 Future Stage of Development

Facilities to be provided in the future stage of development are identified in this section. This future stage is planned to provide facilities needed beyond the 1995 time period. Where the plan proposes the acquisition of Navy land, only a brief identification of its location and proposed use is presented in this section. More specific information on the land required is presented in Section 7.

- Construct aircraft parking positions 13 and 14.
- Expand commuter airline facilities in the Old Terminal Building.
- Acquire Navy housing area land to permit expansion of apron and other facilities.
- Develop additional apron parking facilities for 2 more large aircraft on the land on the airfield side of the Navy housing area. Expand the apron as necessary into the Navy housing area to provide clearances below the Navy transitional surface.
- Construct the parallel taxiway from the vicinity of the Old Passenger Terminal to the west end of the runway.
- Construct additional security fencing, apron, taxiways and site improvements for the commuter airline, air taxi and general aviation area.
- Construct a helicopter apron east of aircraft parking position 14 when needed. Site preparation and construction of this facility should be planned for future use as aircraft parking position 15.
- Prepare a site or sites for additional cargo buildings and apron development by others. Possible sites will be in the Navy housing area or in the area south of the runway complex and west of the Navy flight line. Specific site planning should be performed at the time the need develops

to determine if a separate facility or one close to the apron is most desirable.

- Construct the westward extension of the airport access road through the Navy housing area.

TABLE 6-1
INITIAL DEVELOPMENT STAGE
AVAILABLE FLOOR SPACE
MAJOR FUNCTIONAL AREAS

FACILITY	FLOOR AREA SQ. FT.
1. Departure Lobby	18,400
2. Security Inspection	2,400 (3 Stations)
3. Wellwisher Lobby	9,000
4. Passenger Hold Room	26,800
4B. Transit Passengers	8,000
5. Immigration (Primary & Secondary) /Public Health (Including Secure Hold)	23,600
6. Customs Inspection/Customs Office /Agriculture	17,600
7. Arrival Lobby (Greeters and Tour Groups)	18,200
8. Baggage Makeup	24,600
9. Baggage Breakdown	11,000
10. Baggage Claim	27,600
11A. GAA	2,600
11B. Airline Offices	20,600
11C. GAA/Airline Offices	8,000
12A. Duty Free	16,800
12B. Restaurant (Not Including Roof Area)	14,400

NOTE: This includes space in the existing building plus Initial Development Stage expansion.

Basic Relational Diagram

CROSS CONNECTING FUNCTIONS

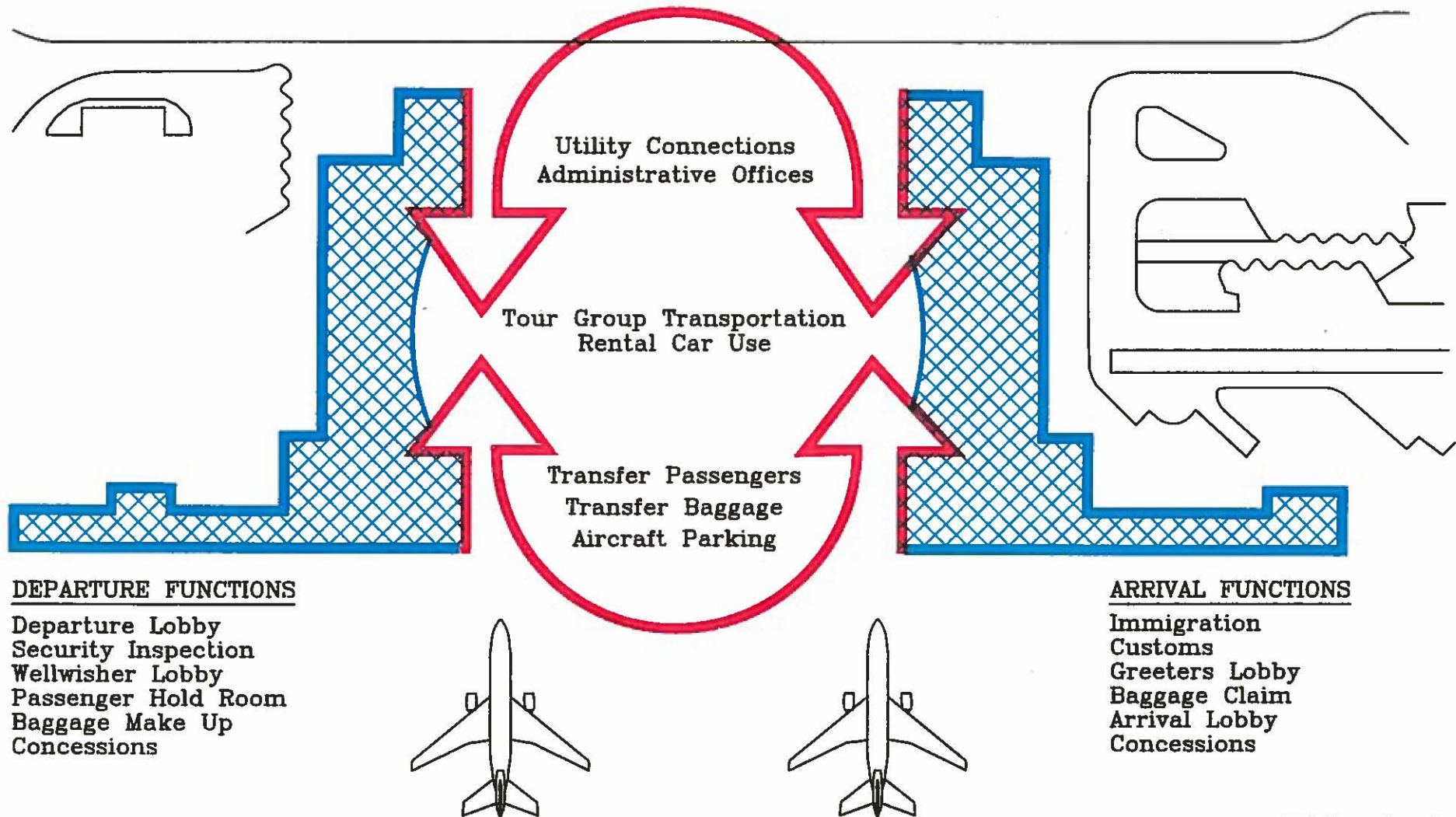
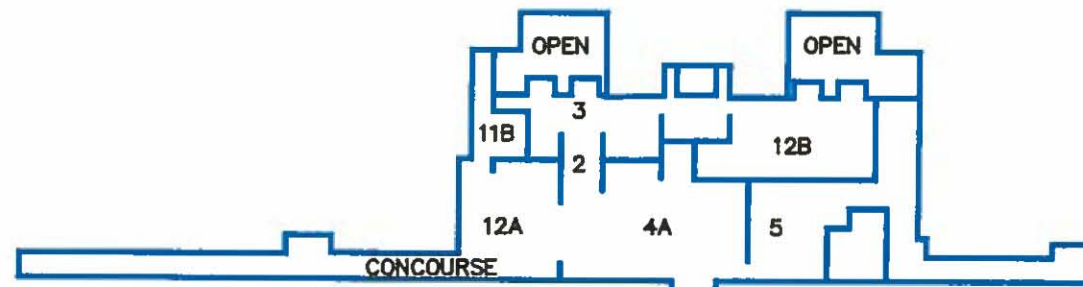


FIG. 6-1

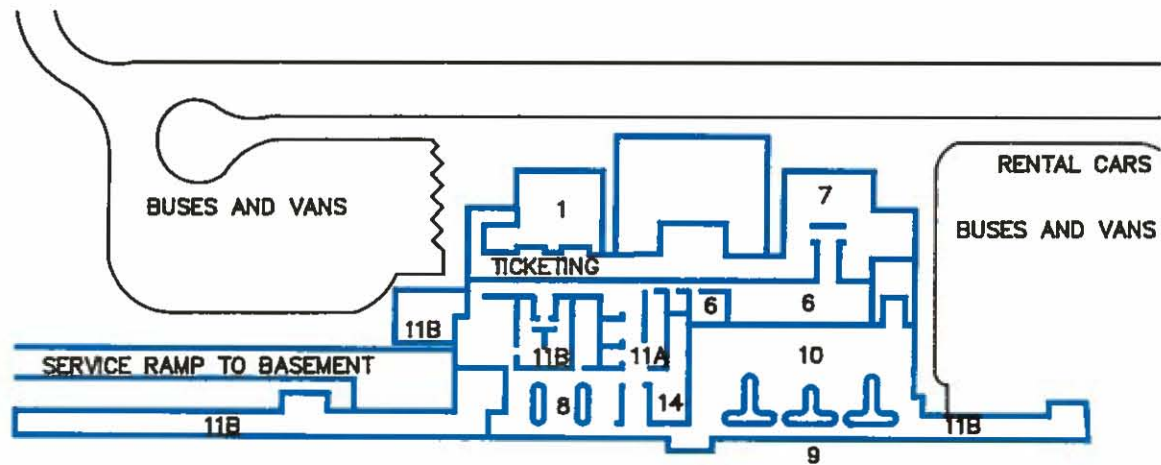
PARSONS

Existing Terminal Plans

- 1 DEPARTURE LOBBY
- 2 SECURITY INSPECTION
- 3 WELLWSHER LOBBY
- 4A PASSENGER HOLD ROOM
- 5 IMMIGRATION
- 6 CUSTOMS
- 7 ARRIVAL LOBBY
- 8 BAGGAGE MAKEUP
- 9 BAGGAGE BREAKDOWN
- 10 BAGGAGE CLAIM
- 11A GUAM AIRPORT AUTHORITY
- 11B AIRLINES
- 12A DUTY FREE
- 12B RESTAURANT
- 14 MECHANICAL



SECOND FLOOR



GROUND FLOOR

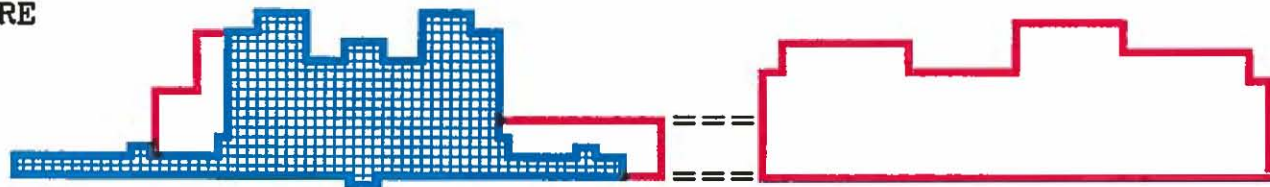
FIGURE 6-2

PARSONS

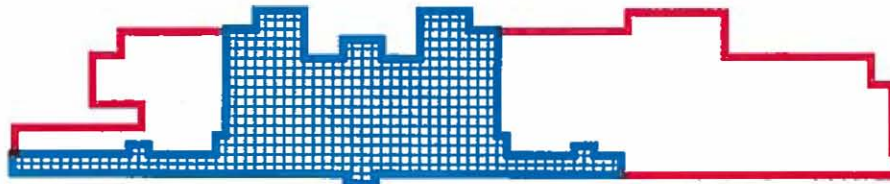
Terminal Expansion Options

DEPARTURE
SIDE
(WEST)

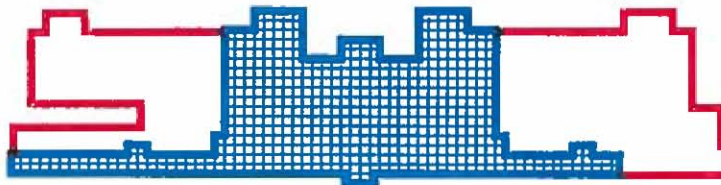
ARRIVAL
SIDE
(EAST)



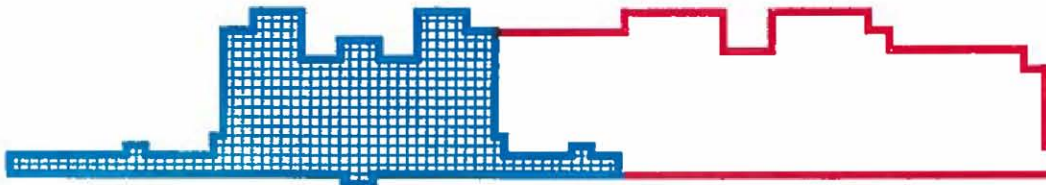
A SEPARATE BUILDINGS



B MAJOR EXPANSION EAST



C EXPANSION BOTH SIDES

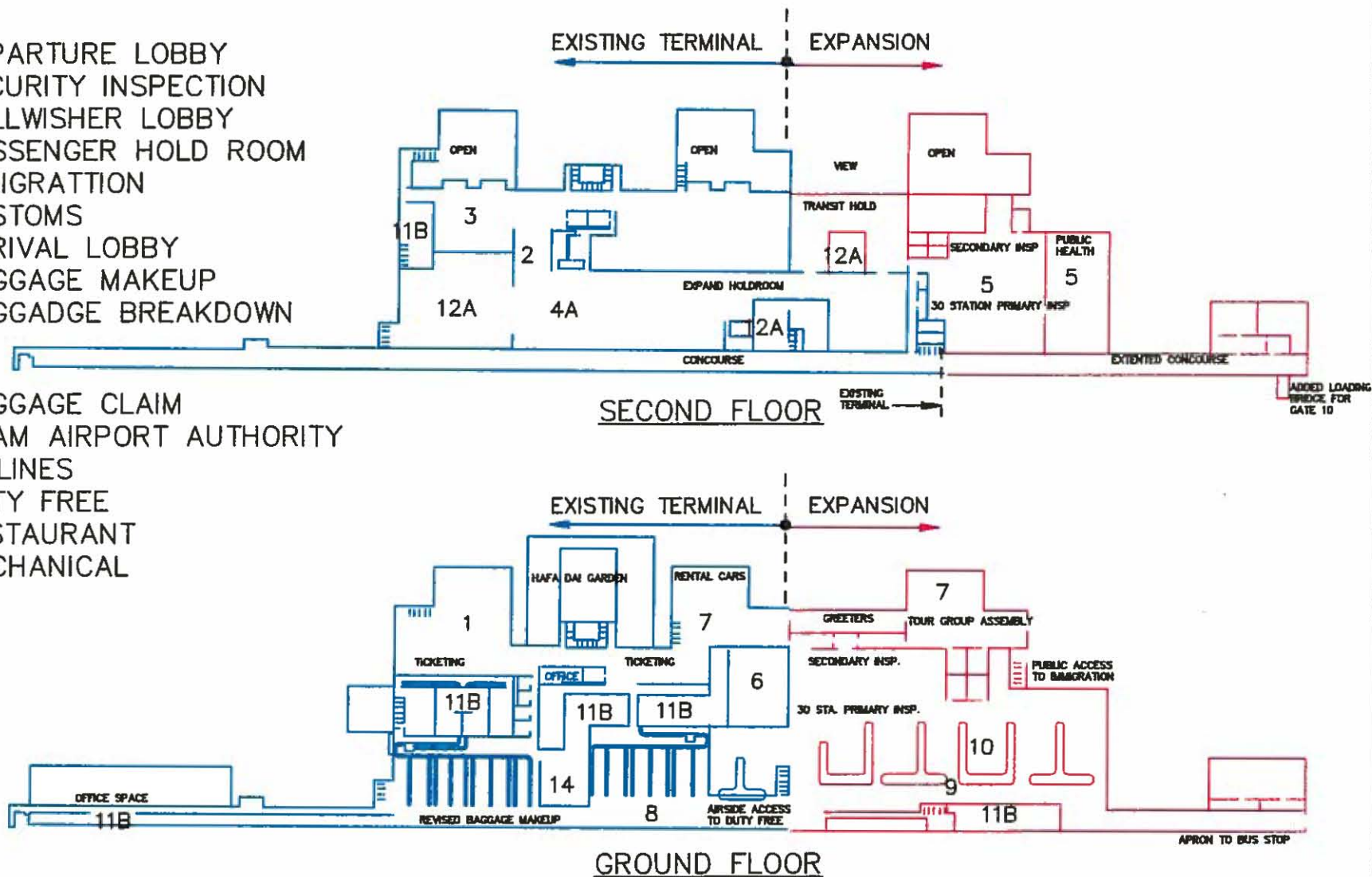


D EXPANSION EAST SIDE ONLY

FIG. 6-3

PARSONS

- 1 DEPARTURE LOBBY
- 2 SECURITY INSPECTION
- 3 WELLWISHER LOBBY
- 4A PASSENGER HOLD ROOM
- 5 IMMIGRATION
- 6 CUSTOMS
- 7 ARRIVAL LOBBY
- 8 BAGGAGE MAKEUP
- 9 BAGGAGE BREAKDOWN
- 10 BAGGAGE CLAIM
- 11A GUAM AIRPORT AUTHORITY
- 11B AIRLINES
- 12A DUTY FREE
- 12B RESTAURANT
- 14 MECHANICAL

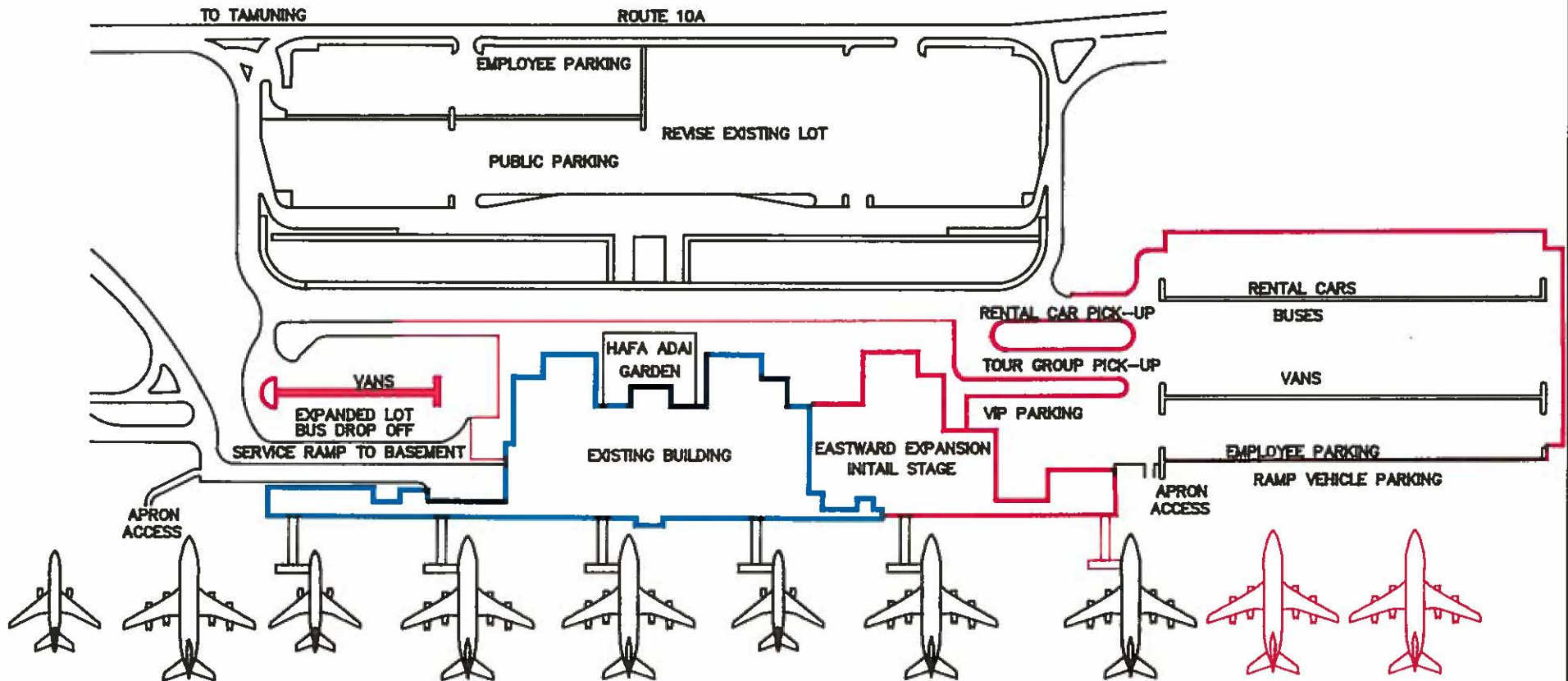


INITIAL EXPANSION PLANS

FIGURE 6-4

PARSONS

Initial Developement Stage



PASSENGER TERMINAL SITE PLAN

FIGURE 6-5

PARSONS

Holding Area Diagram

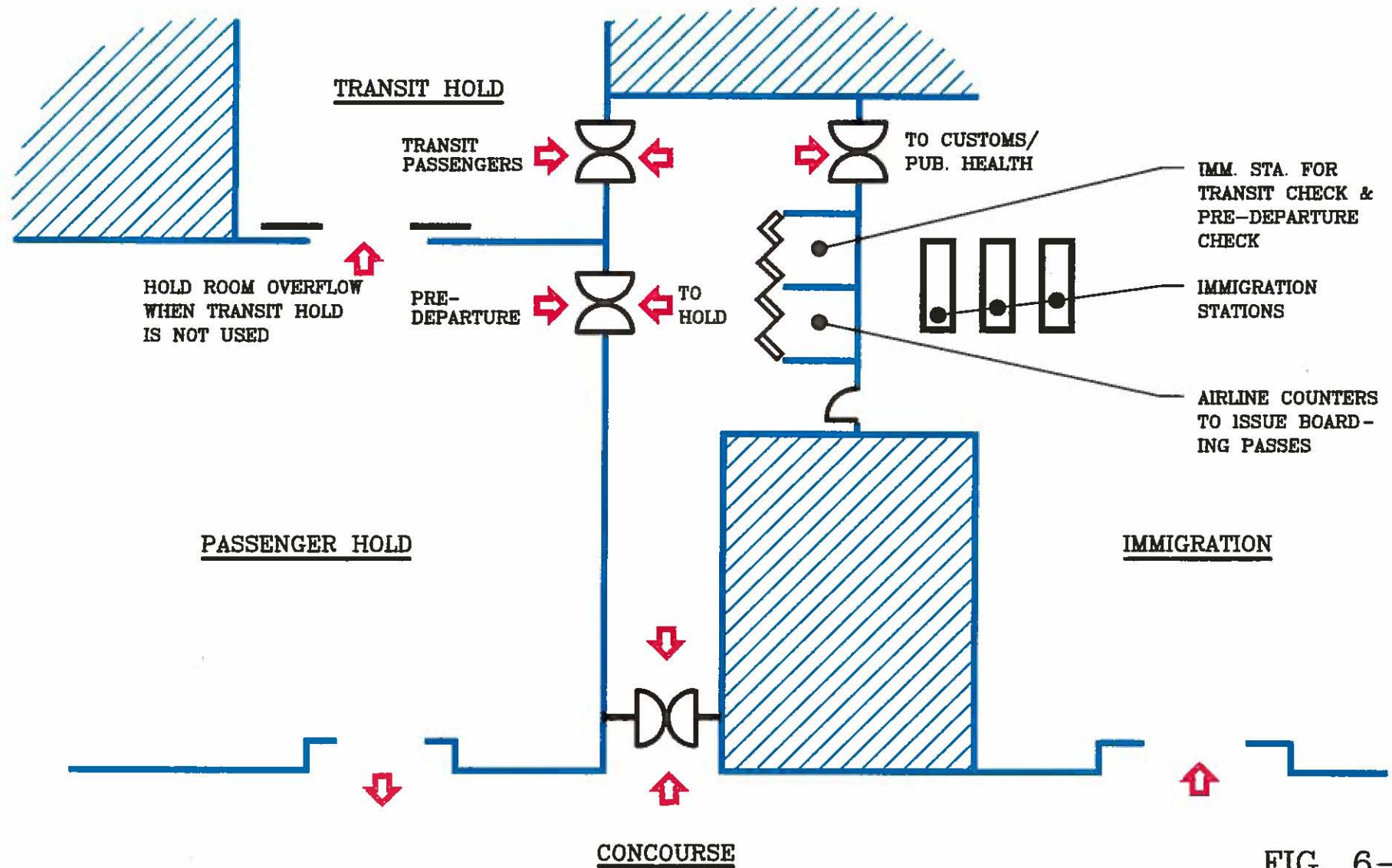


FIG. 6-6

PARSONS

Apron Bus Stop Diagram

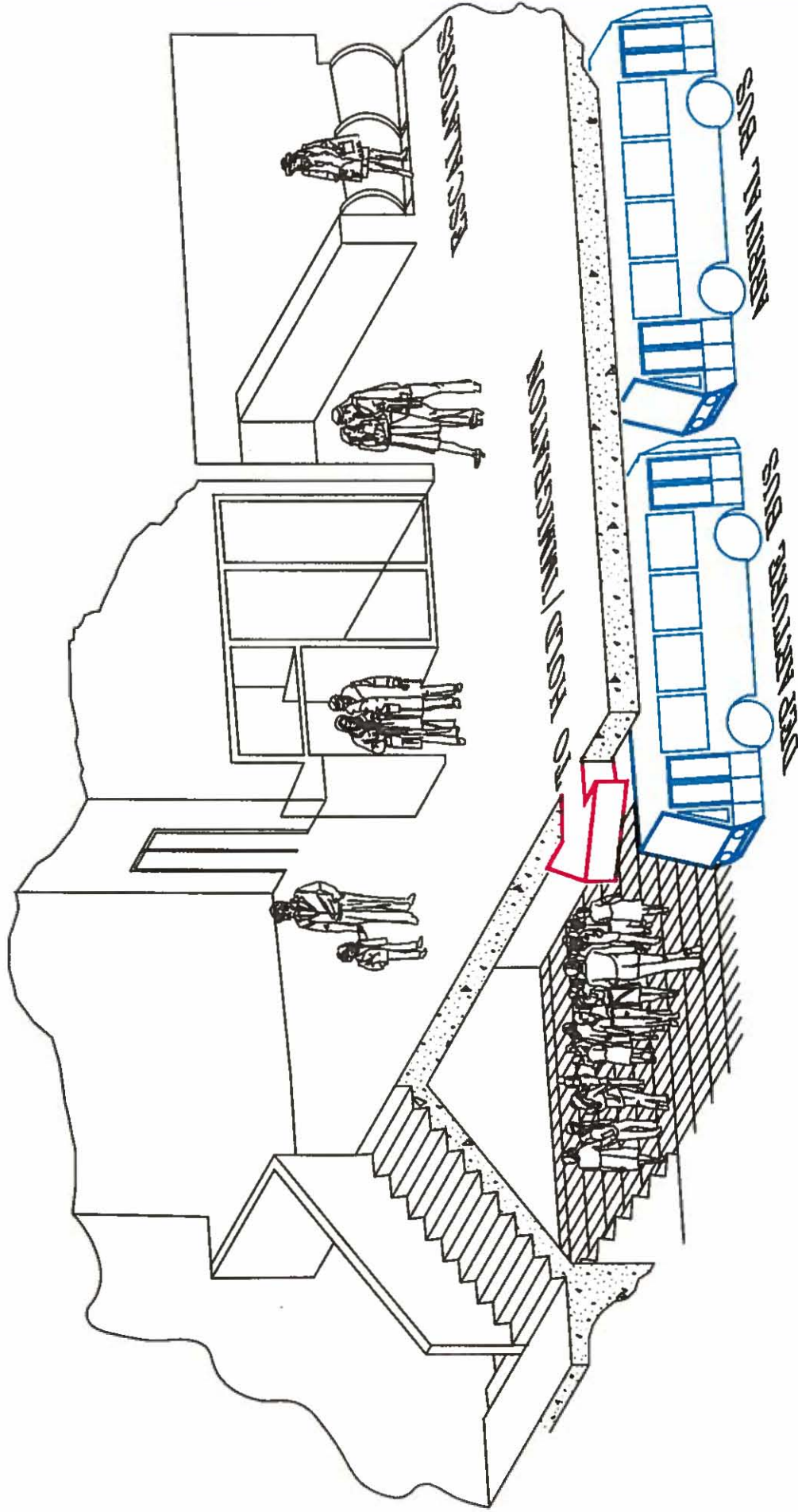


FIG. 6-7

PARSONS

Greeters Lobby Area Diagram

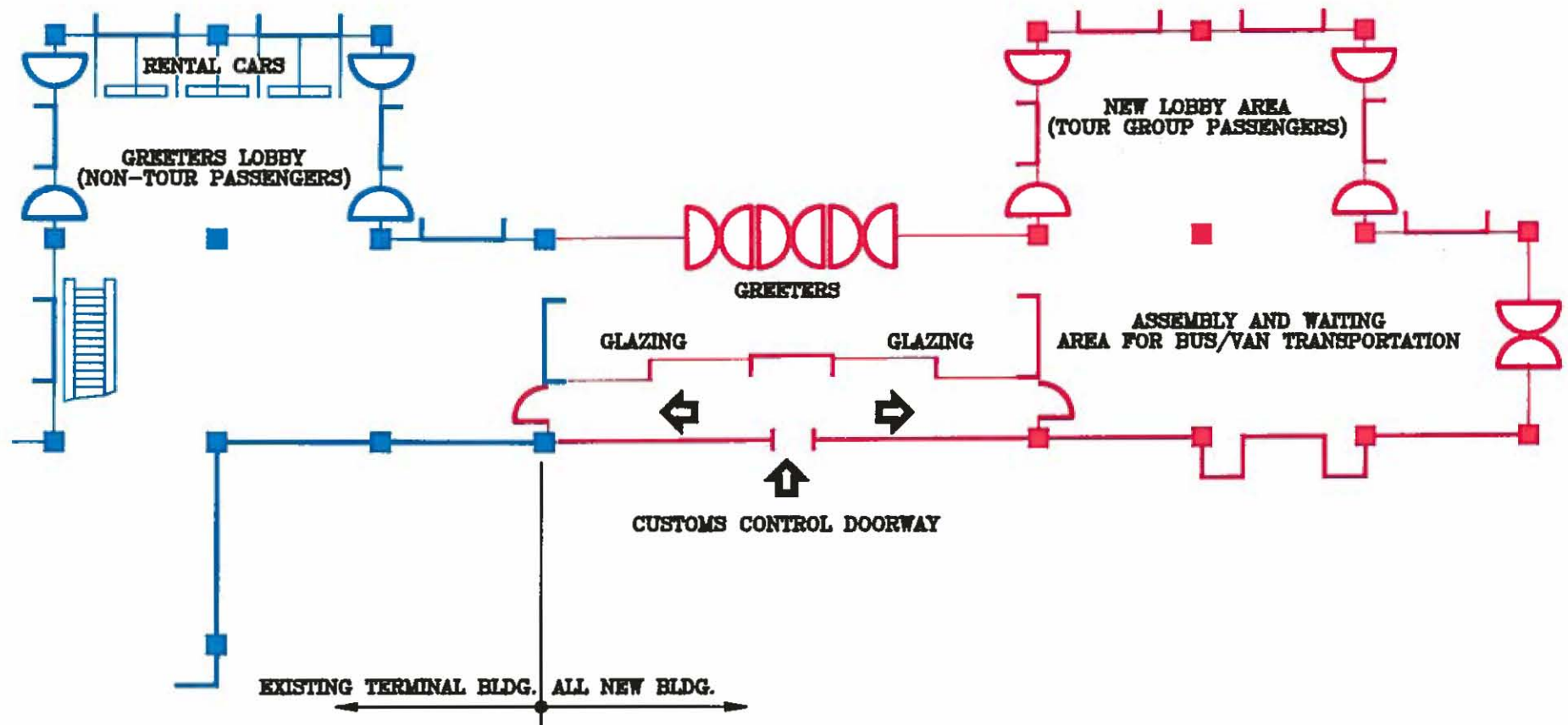
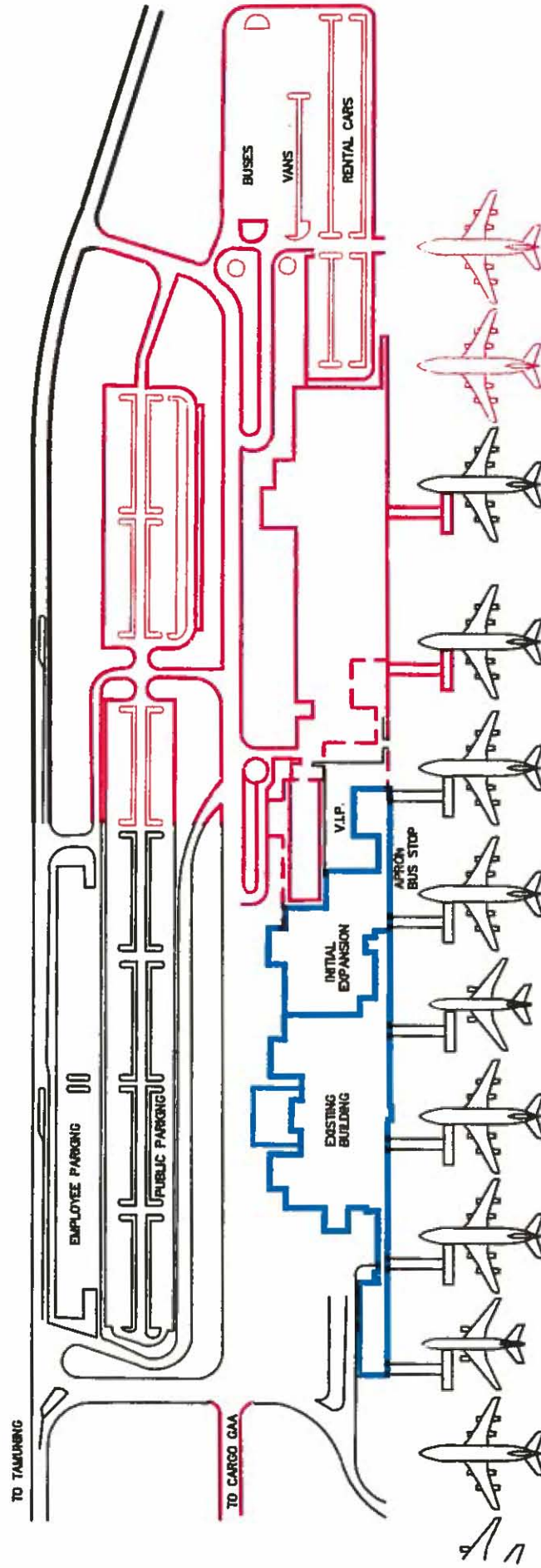


FIG. 6-8

PARSONS

Future Expansion



PASSENGER TERMINAL SITE PLAN

FIGURE 6-9

PARSONS

Air Carrier Apron Layout

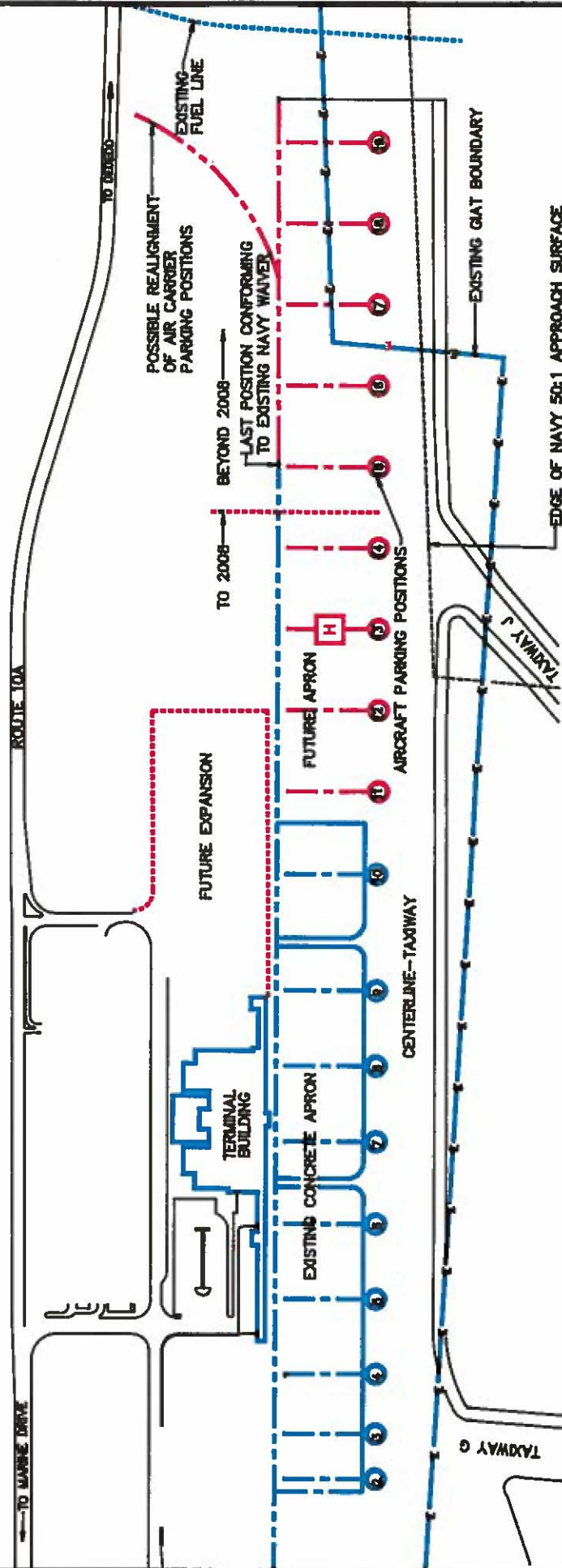


FIGURE 6-10

Commuter Airline Facility

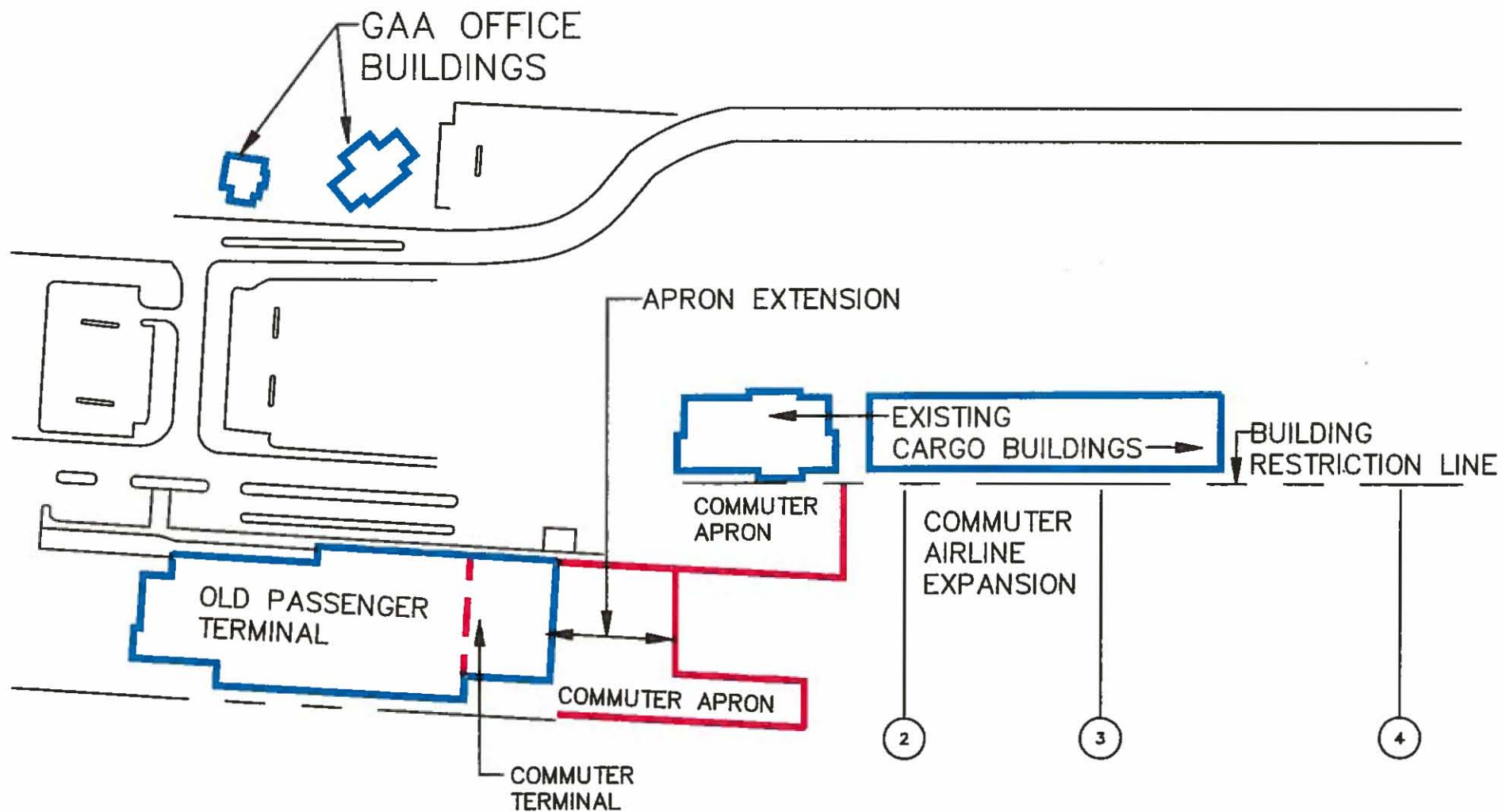


FIG. 6-11

PARSONS

Airfield Developement West of Continental Maintenance Building

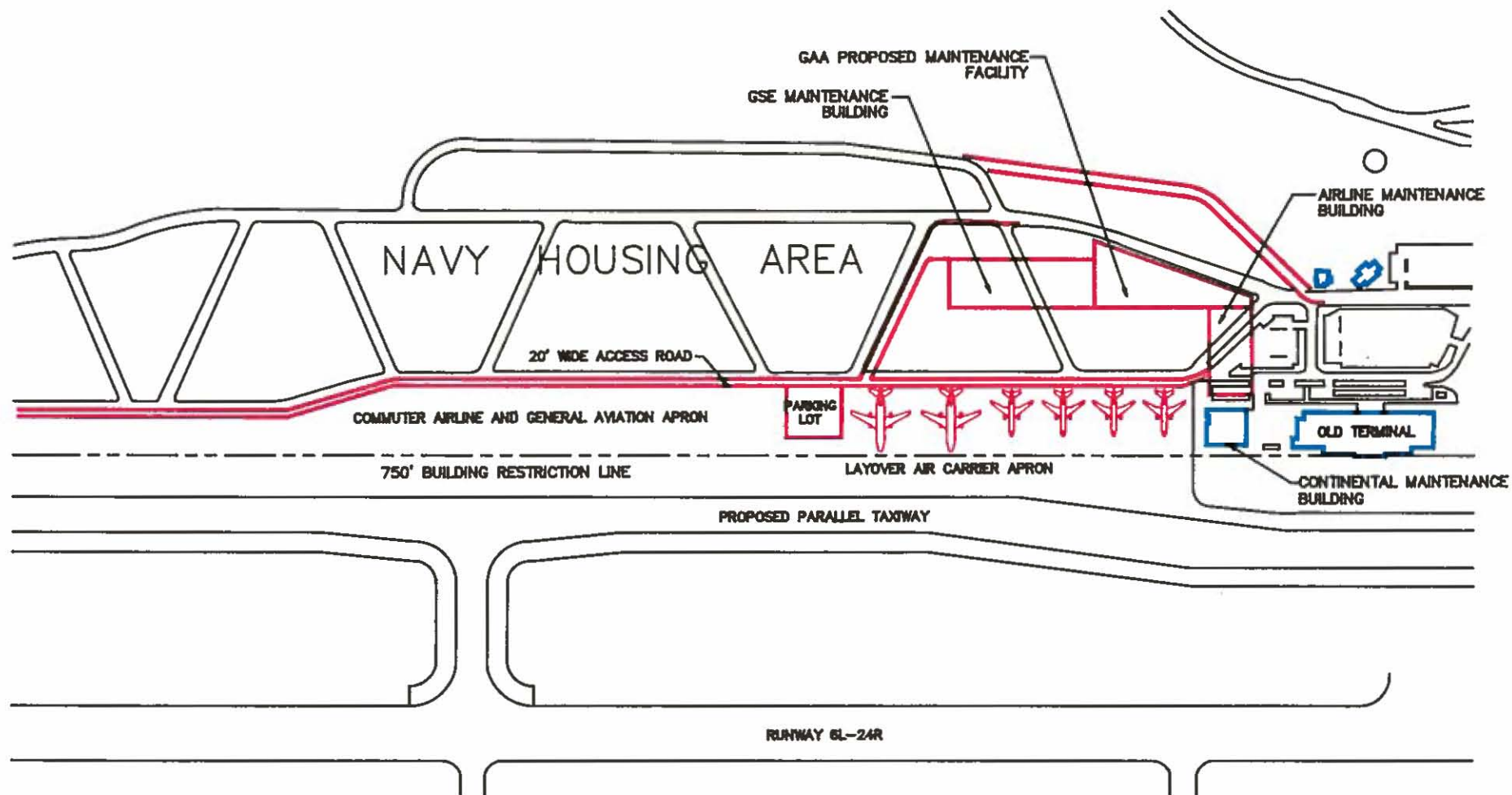


FIGURE 6-12

PARSONS

Site for Aviation Related Facilities

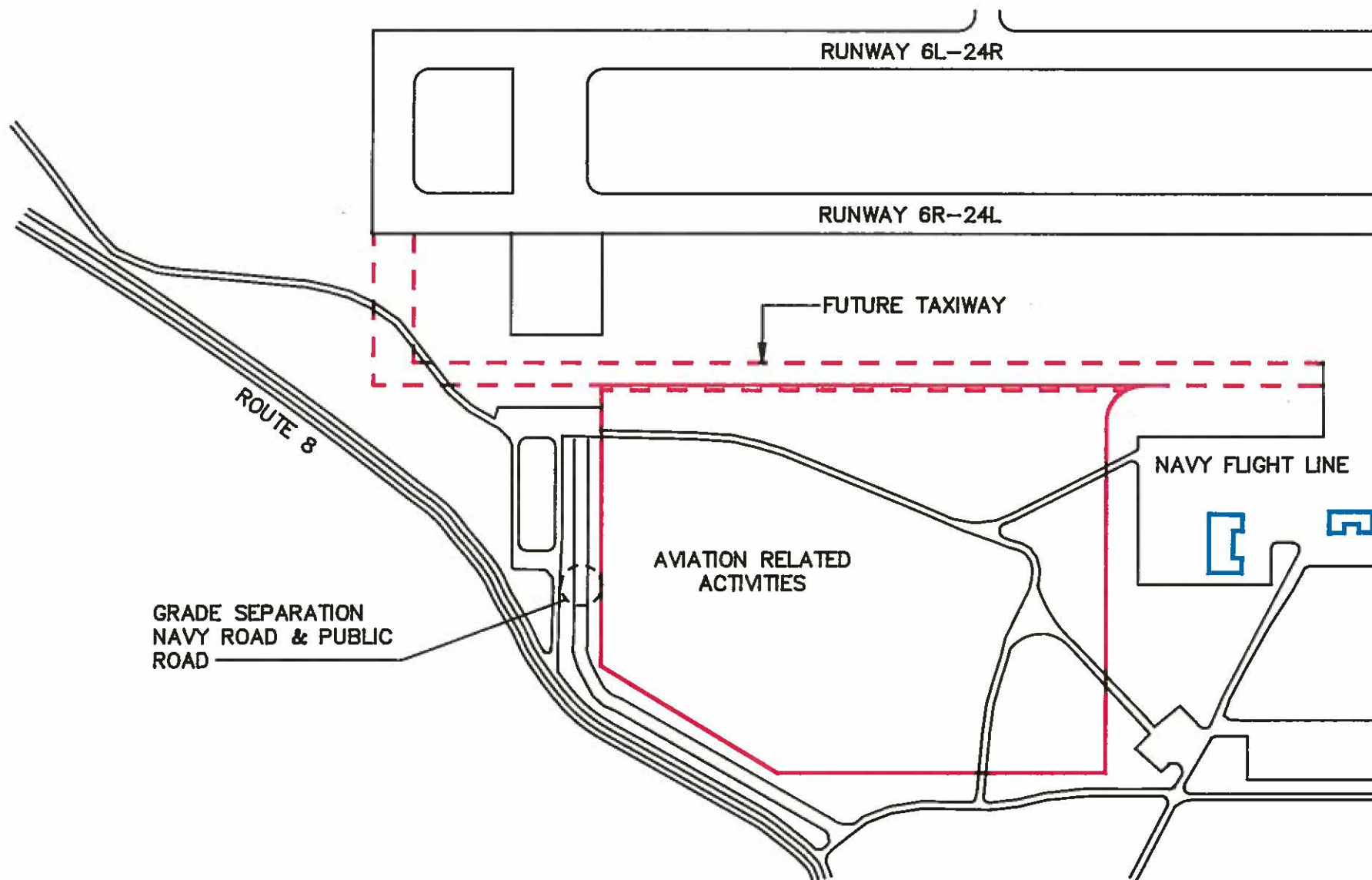


FIGURE 6-13

PARSONS

Cargo Site

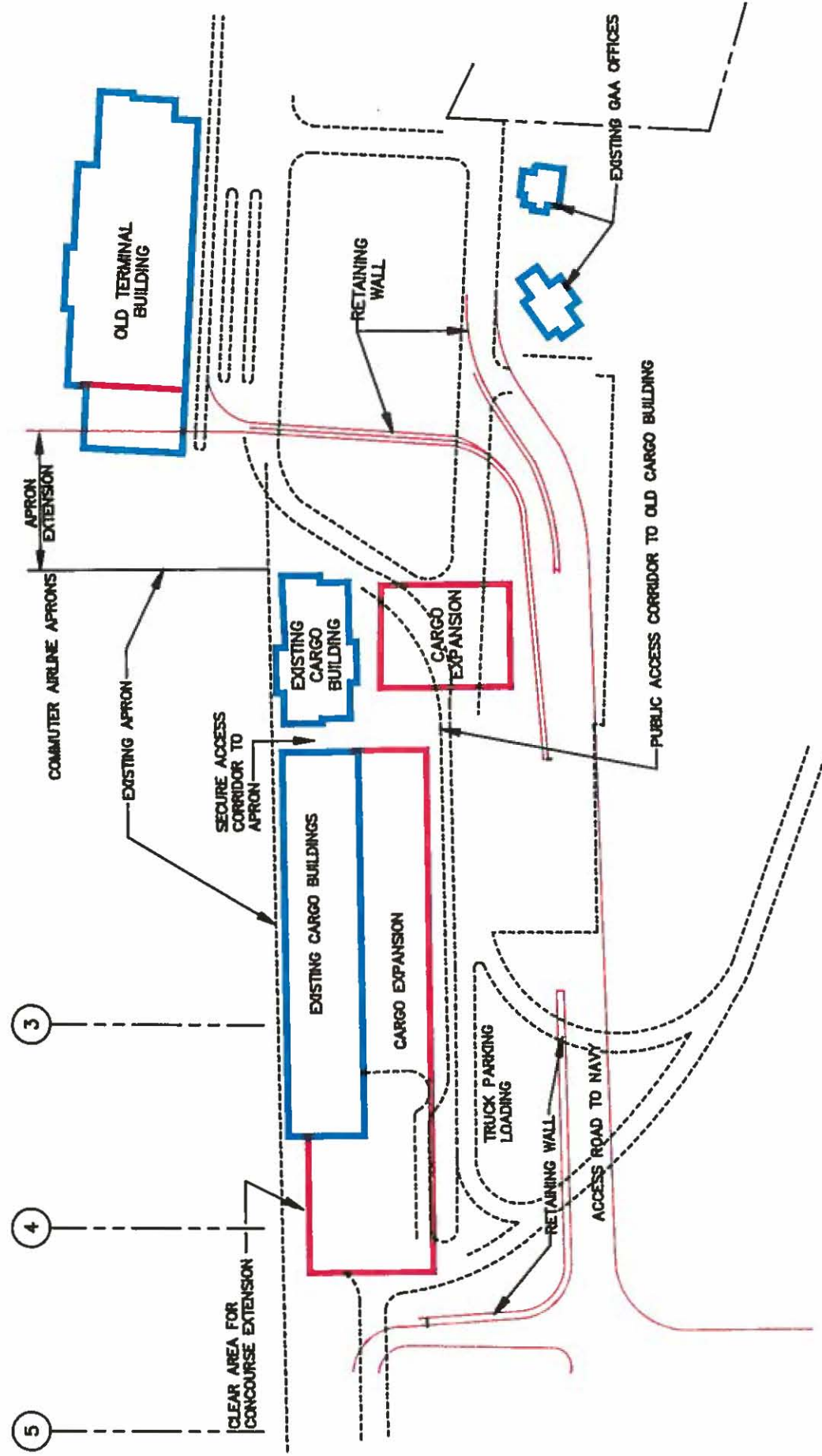


FIGURE 6-14

SECTION 7

SECTION 7

7.0 Use Of Federal Land

The purpose of this section is to identify needs for Federal land to meet the operational and facility requirements of the Guam International Air Terminal (GIAT). The location of Federal land required for the expansion of GIAT is at the Agana Naval Air Station (NAS). These requirements are predicated on the assumption that GIAT will remain a tenant of NAS throughout the planning period.

Operational and facility requirements have grown dramatically in the last few years as a result of Guam's dynamic growth of tourism. Paralleling this growth has been an equally dynamic growth in the overall economy of the Island of Guam and the surrounding region. GIAT sits at the hub of this activity.

An effect of this dynamic growth has been to overload GIAT passenger terminal facilities. Considerable expansion of these facilities will be required to accommodate current and future growth. Related activities such as commuter airlines, air taxis, general aviation, helicopters, cargo, and mail must also expand. Although the Guam Airport Authority (GAA) has sufficient land for passenger processing facilities, there is insufficient land for other critical needs. Mindful of Guam's growing air transportation needs, there is a frequently expressed public sentiment for takeover of the entire Agana Naval Air Station by the Government of Guam for civil aviation use.

Figure 7-1 shows the location of Federal land needed by GIAT and indicates whether it is needed for the Initial (1989-1995) or Future (1996-2008) Stage of Development of the Airport. It is desirable to transfer all land needed for both stages of development from the Navy to GAA at one time to permit orderly and economical development of facilities in response to demand. The following subsections describe the land and its intended use.

7.1 Land for Parallel Taxiway

The airport master plan proposes a parallel taxiway extending from existing Taxiway J at the terminal building to the west end of the runway. This taxiway is required to permit aircraft to taxi for takeoff without having to utilize one of the runways. It will also permit aircraft to exit the runway sooner than is possible at present.

There are no facilities in this area which will preclude the development of the taxiway. The amount of land required for it, including safety areas and allowance for grading, is approximately 80 acres.

7.2 Apron Area West of Continental Airlines Maintenance Building

This is the large clear area which lies to the west of the existing GIAT boundary and south of the Navy housing area. The land to be used lies behind the 750 foot primary surface line. The area required for development, however, lies between the proposed parallel taxiway and the Navy housing area. At the present time, there are large paved areas, concrete slabs and covered building foundations on the site.

The land is required for aircraft parking and development of related facilities. The largest portion of the area is required for parking based air carrier aircraft. It appears that the land elevation is already lower than the elevation of the runway and after final grading may possibly be even lower. The primary aircraft to be parked in this area is Continental's B727. By parking these aircraft tail-in, it appears that they will not penetrate the 7:1 transitional surface. Other aircraft to be parked here are the Continental DC-10 and similar transient aircraft. These aircraft may cause minor penetrations of the Navy primary surface.

Additional land is required for parking commuter airline, air taxi and general aviation aircraft. Small maintenance hangars and servicing facilities will also be provided in the area. All aircraft and facilities will be below the 7:1 transitional surface. The total land area required for these functions is approximately 18 acres.

7.3 Area West of Existing Navy Hangars and Aprons

This is the large open area on the south side of the runway complex shown on Figure 7-1. Sink holes are known to exist there and a portion of it was once used as a sanitary land fill. The sink holes are

designated as recharge basins for the island's groundwater supply. This will be taken into account in the design of facilities. Development of the land will depend on site conditions so a conceptual layout plan cannot be provided at this time.

There is only one small Navy facility in this area and it would be relocated to an acceptable site. The Navy master plan (Appendix B, Reference 17) does not propose any significant development for this land. The Navy's proposed uses for a small part of the site are a compass calibration pad and an alternative location for the engine test cell. A major advantage of this location is that by constructing an overpass on Route 8 at the entrance to the site, it can be accessible to the public without their having to enter Navy property. The overall slope of the site is downward (away from the runways) so buildings and aprons can be located below the 7:1 transitional surface.

The proposed use of the land is for a maintenance hangar and apron, possible air cargo or express package type operations, general aviation and helicopter operations, commuter airline and air taxi facilities and other aviation related uses. At present, there is interest in developing these facilities, however, without definite availability of a site it is not possible to get potential developers to make firm commitments.

The land area required for these functions is approximately 82 acres. The facilities to be constructed will all be aviation related, and as such are compatible with military activities conducted on the airfield.

7.4 Land East of the Terminal Complex

A small area of land lies to the east of the GIAT boundary line which will ultimately be required for construction of the future taxiway serving the eastern apron. Much of this land will be required for construction of the safety areas and gentle slopes required by Navy criteria. It is recommended that the land be acquired at an early time so it can be included in the plan for excavation of the hill to the east of the existing passenger terminal building. By excavating this area and using the material for other projects, the Guam Airport Authority will be able to realize considerable savings. The land area required is approximately 4 acres.

7.5 Navy Housing Area

A large Navy housing area exists to the west of the existing GIAT boundary. The Navy Master Plan recommends that in the future, housing be removed to a more desirable site and the land be turned into a buffer zone or used for aviation compatible activities. The plan also notes that the housing is in good condition and there are no funds programmed for its replacement, therefore, it recommends that the housing remain at its present location and continue to be maintained for the time being.

There are several immediate needs for a portion of this land. The housing area immediately to the west of the GIAT property line has both public and rampside access. This site is well suited for future expansion of airline maintenance and ground support facilities. In addition, the GIAT base maintenance facility should be located in this area. These facilities should be located close to the terminal and apron, but also adequately separated so that they do not interfere with each other's day-to-day operations. They also need public access for delivery of supplies and conduct of business. No unoccupied site exists on property owned by the Guam Airport Authority which meets these criteria.

These initial development stage needs will require acquisition of approximately 16 acres of Navy housing land containing about 34 housing units. These and subsequent figures are based on a review of the Navy master plan document, and must be verified for accuracy. GAA acquisition of this land requires that the Navy gate, security fence and guard house be relocated.

The forecasts of future needs beyond the first stage of development indicate additional land requirements for most of the facilities noted above. The cargo facilities, which can initially expand at their present site, will require more space on the terminal side of the airfield. The apron used by based air carrier aircraft is closer to the runway than is desirable for clearances below the transitional surfaces and provision of adequate clearance will necessitate expanding this apron into the housing area. Commuter, air taxi and general aviation aircraft and the hangars and other facilities built to accommodate them, will also require room for expansion.

The exact amount of land to be acquired for these developments cannot be accurately determined due to numerous unknowns about

future requirements, however, a conservative approach to estimating indicates that the land area required might be on the order of 22 acres and 52 housing units. Included within the area to be acquired is one community center.

An airport access road right-of-way will also be required through this area to provide access to GIAT from the south. Planning and preliminary design of the road will begin during the initial stage of development. Actual construction of the access road will take place in the future stage of development. Until preliminary studies and plans are complete, it is not possible to determine the exact amount of Navy property that is required, however, a preliminary estimate indicates a requirement for about 40 acres of land and removal of at least 37 additional housing units. The impact of the access road on the remaining housing units will be assessed as part of the preliminary design study.

7.6 Total Land Requirements

It is estimated that in the initial stage of development, approximately 120 acres of land will be required.

It is estimated that in the future stage of development, approximately 142 additional acres will be needed for a total of approximately 262 acres.

FEDERAL LAND USE INITIAL & FUTURE DEVELOPMENT

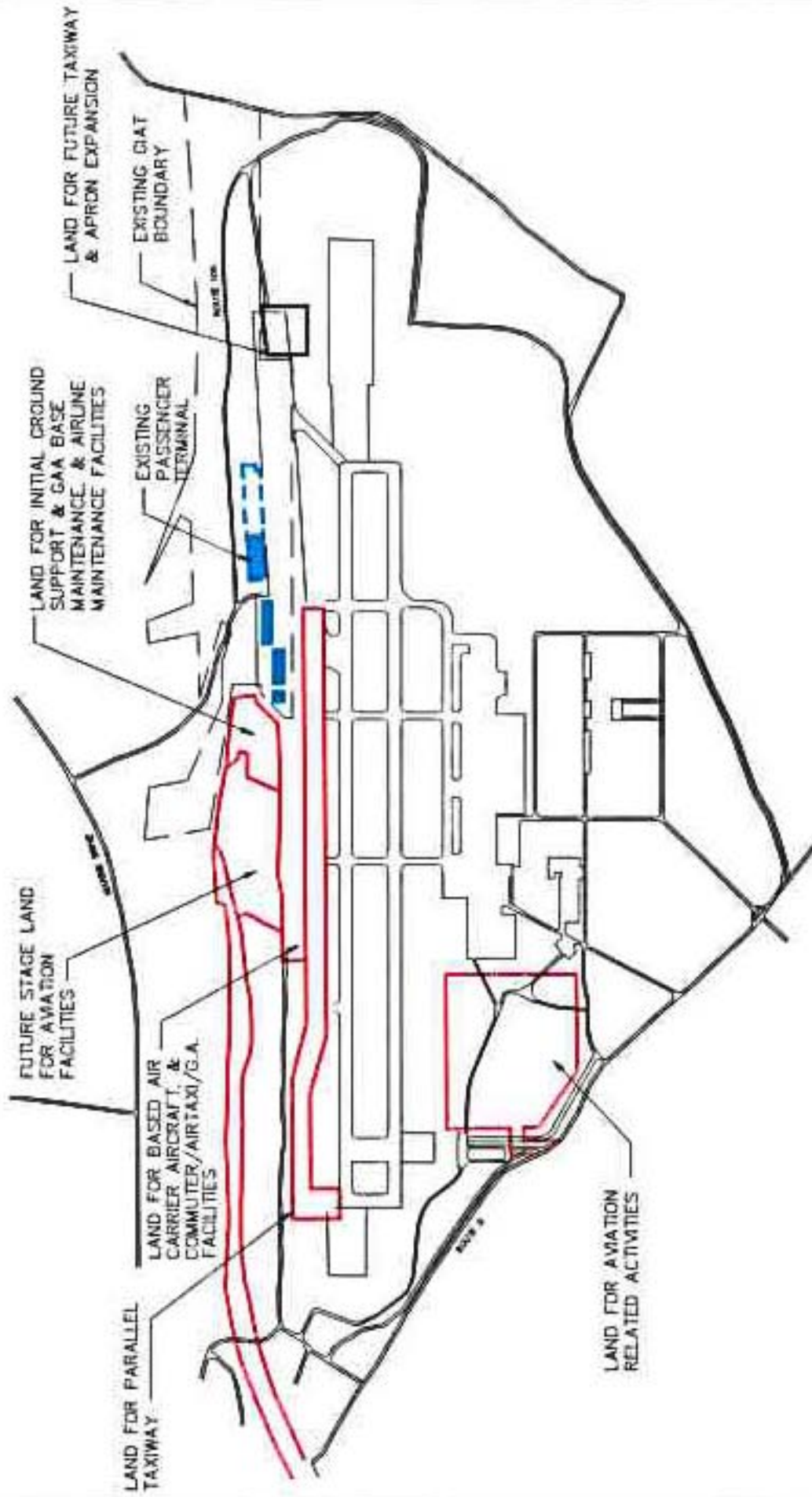


FIGURE 7-1

PARSONS

SECTION 8

SECTION 8

8.0 Phased Cost Estimates

This section contains time-phased costs for the initial stage of development of GIAT and a lump sum budget estimate for capital improvements for the future stage of development. High and low estimates of cost are provided for the initial development program in addition to the more detailed estimate which is based on the *most probable* forecast of aviation demand.

Costs are in mid-1989 U.S. dollars and are not escalated to the time of construction to account for inflation. The accuracy of the cost estimates is Rough Order of Magnitude (ROM) which at this time is believed to range from 15% below the estimates to 25% above them. Costs are for construction only and are exclusive of A&E fees, land acquisition, taxes, and financing costs. Planning factors are provided for A&E fees based on experience with similar airport development projects including the existing GIAT facilities.

Sources of financing for GIAT development, such as bond issues, the GAA, Airlines, Airport Concessionaires and others are not addressed in the Master Plan Update except for possible Federal Government funding under existing FAA aid programs.

8.1 Initial Stage of Development

Costs for the initial development stage are listed in Table 8-1 and the time sequencing of the costs is shown on Figure 8-1.

Throughout the Master Plan, facility requirements are based on the *most probable* aviation demand forecasts. Figure 8-1 shows the range of project costs encompassed by the *high* and *low* demand forecasts in order to give an indication of the magnitude of uncertainty that is connected with planning GIAT's capital needs.

While this Master Plan Update does not deal specifically with financial planning and associated sources of development capital, it is possible to give an indication of what the Federal Government's role may be in assisting the GAA with the GIAT development program. Approximately 1.5 to 2.0 million dollars should be available annually from enplanement disbursements made through the FAA's Airport Improvement Program. Discretionary Funds may or may not be available to the GAA under the FAA Airport Improvement Program, however, certain of the planned improvements will be eligible for Federal assistance. While it is not possible to determine exactly which improvements (if any) will be declared eligible for funding by the FAA, the following appear to be so under present groundrules for awarding aid grants.

Facility	Estimated % Eligible for FAA Funds
1. Passenger Terminal	75
2. Air Carrier Apron	100
3. General Aviation Apron	100
4. Commuter / Air Taxi Facility	75

8.2 Future Stage of Development

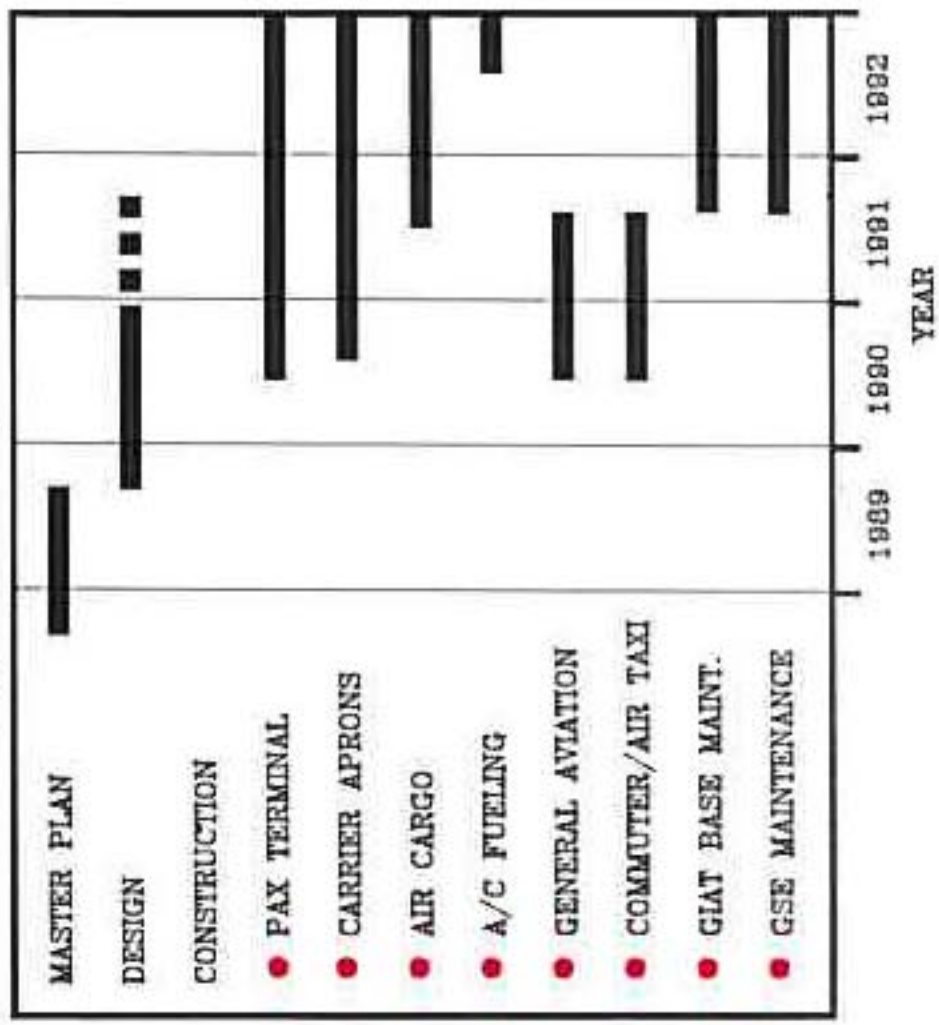
As indicated in Section 6, the extent of development beyond the initial stage is dependent on a number of variables that are difficult if not impossible to predict. If total growth and peaking factors develop as expected in the aviation demand forecasts of Section 3, a capital budget of 43 million Mid-1989 dollars should be planned for needed improvements to the year 2008, based on "most probable" aviation demand forecasts.

TABLE 8-1
ESTIMATED CONSTRUCTION COST
INITIAL DEVELOPMENT STAGE
(mid-1989 dollars)

FACILITY	ESTIMATED COST (MILLION DOLLARS)
1. Passenger Terminal	
Terminal Building	25.1
Concourse	4.1
Remodel Existing Building	4.4
Elevators & Escalators	0.4
Loading Bridge (Gate 10)	0.5
Emergency Generators	0.9
Vehicular Parking Area	0.9
Baggage Handling System	0.8
Miscellaneous	0.2
Sub Total	37.3
2. Air Carrier Apron	6.0
3. Air Cargo Facility	2.2
4. Aircraft Fueling	0.6
5. General Aviation Facility	1.0
6. Commuter/Air Taxi Facility	3.8
7. GIAT Base Maintenance Facility	1.0
8. GSE Maintenance Facilities	2.0
Sub Total	16.6
Total for Items 1-8	53.9
A&E Fees at 14%	7.5
Total Stage 1 Cost	61.4

Time Phased Costs - Initial Development Stage

Development Schedule



Project Cost (Millions)

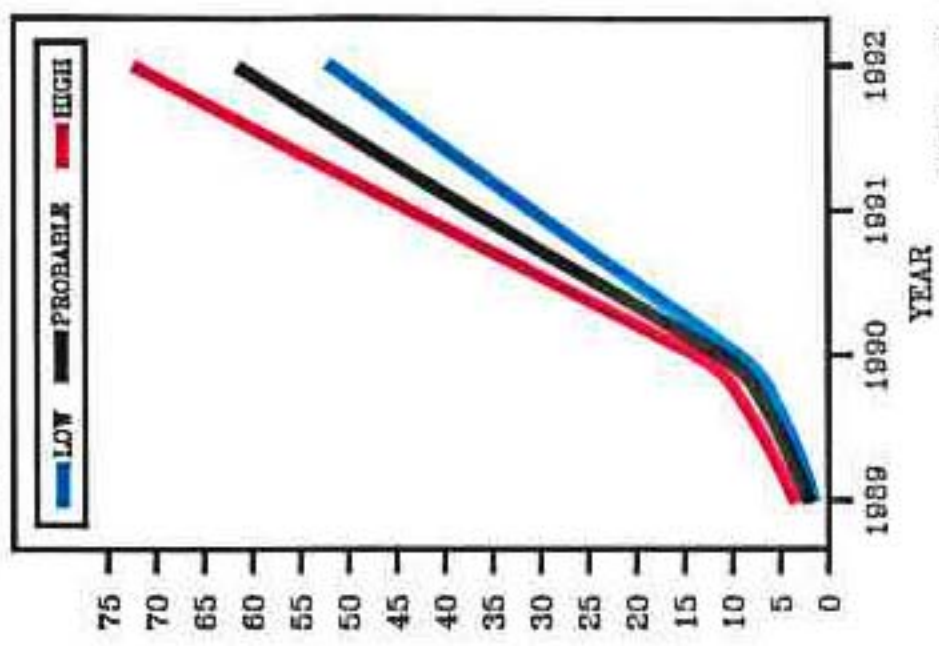


FIG. 8-1

SECTION 9

SECTION 9

9.0 Revised Airport Layout Plan, Terminal Area Plan And Land Use Plan

This section contains revised Airport Layout and Terminal Area Plans and a new Land Use Plan for GIAT.

9.1 Airport Layout Plan

The Airport Layout Plan (ALP) is an official document signed by the GAA and submitted by the Authority to the FAA for approval. An approved ALP is one requirement to receive Federal funding for eligible airport development projects.

As conditions at any airport change, or as new safety features or other considerations arise, it becomes necessary to revise the ALP. The revised ALP for GIAT is shown on Figure 9-1. The plan incorporates the results of the master planning efforts contained in this report.

9.2 Terminal Area Plan

The Terminal Area Plan (TAP) is an enlarged scale drawing of the proposed development for the apron, taxiways, access roads, buildings, and other features in the terminal area. The revised TAP is shown on Figure 9-2. The plan represents a summation of the conclusions of this report.

9.3 Land Use Plan

The Land Use Plan, Figure 9-3, shows land use on existing GIAT property and proposed Navy land to be acquired. The plan represents the land uses on the airport as planned by this report.

Guam International Air Terminal Airport Layout Plan

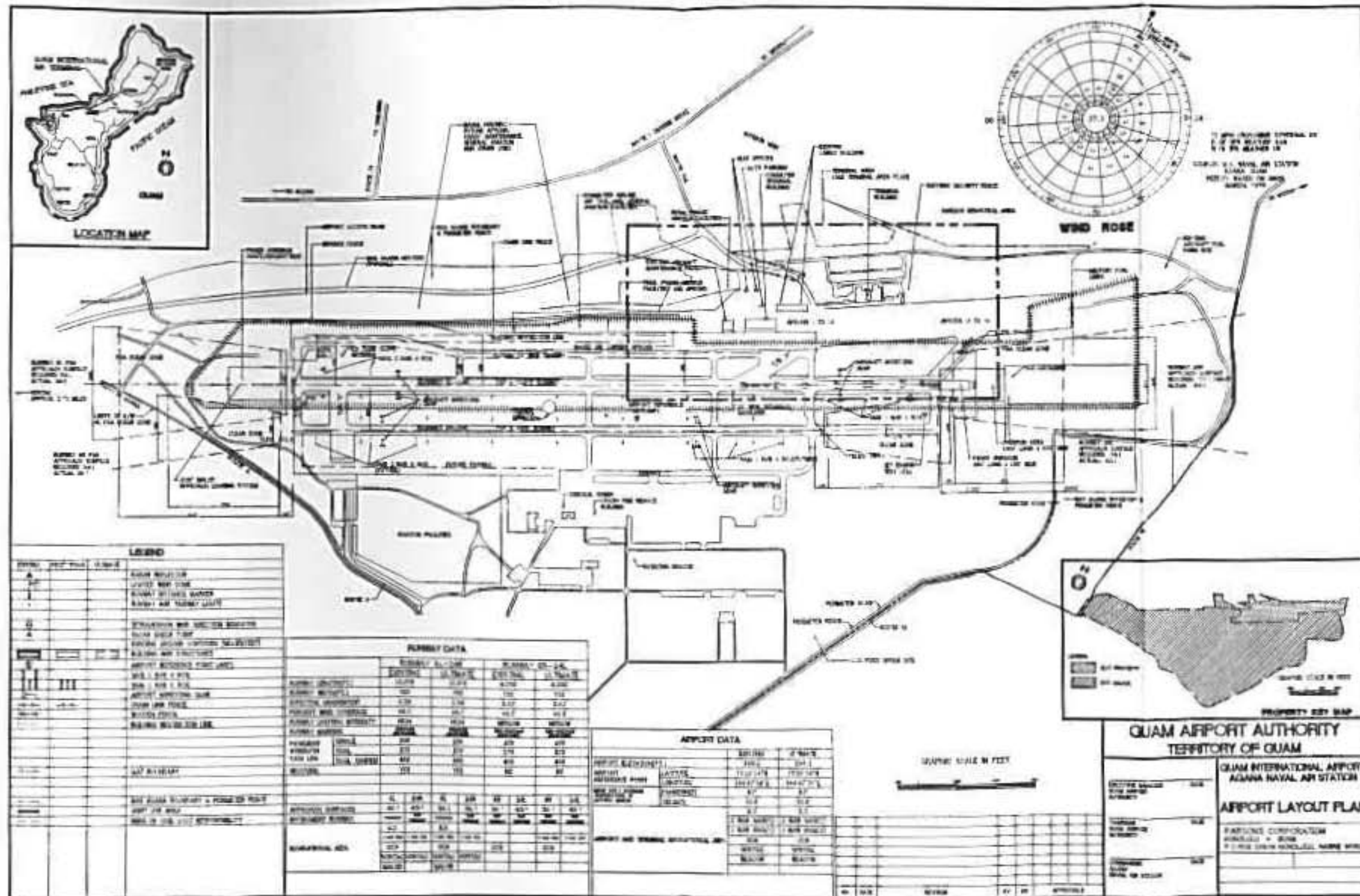


FIGURE 9-1

- PARSONS

Guam International Air Terminal Terminal Area Plan

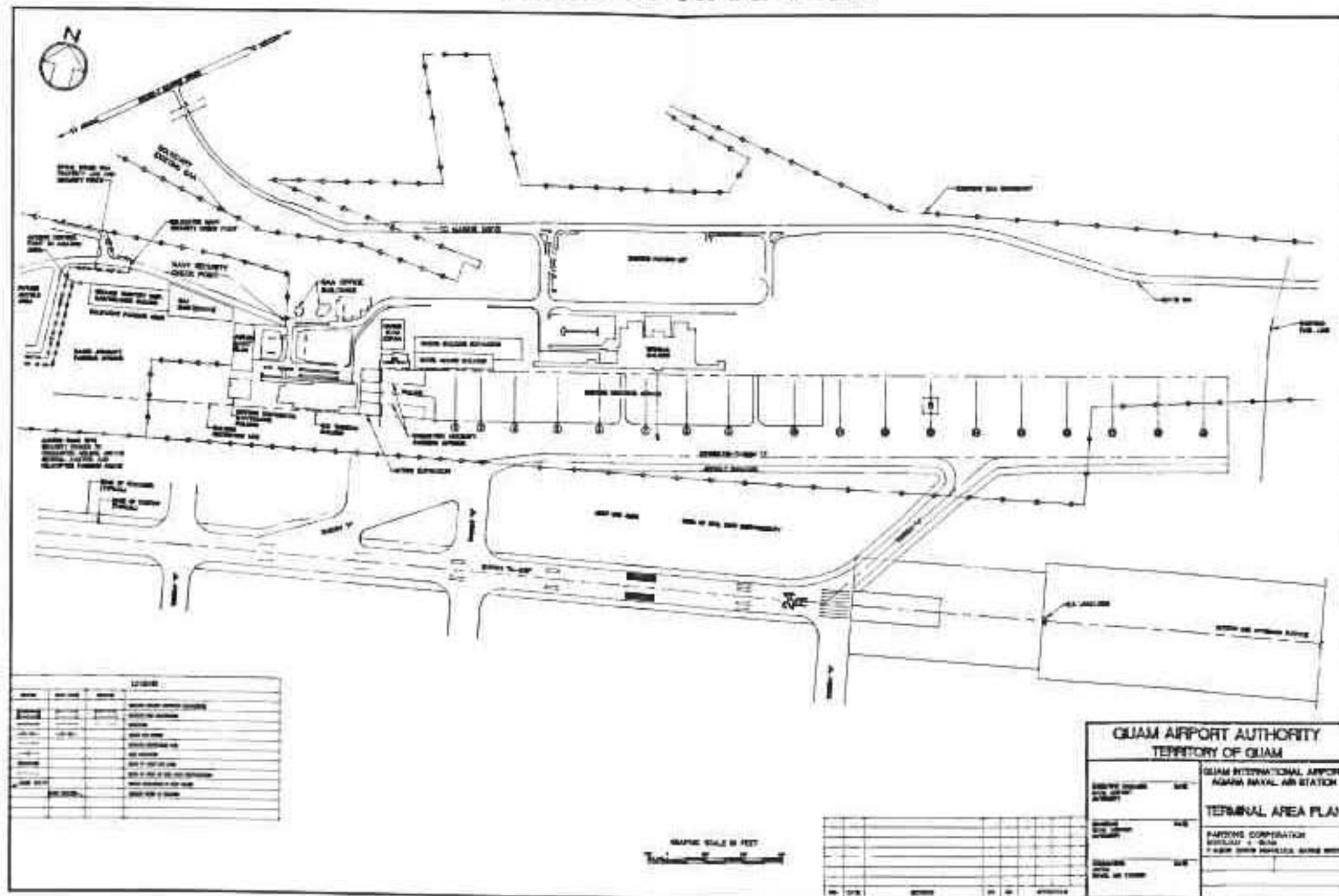
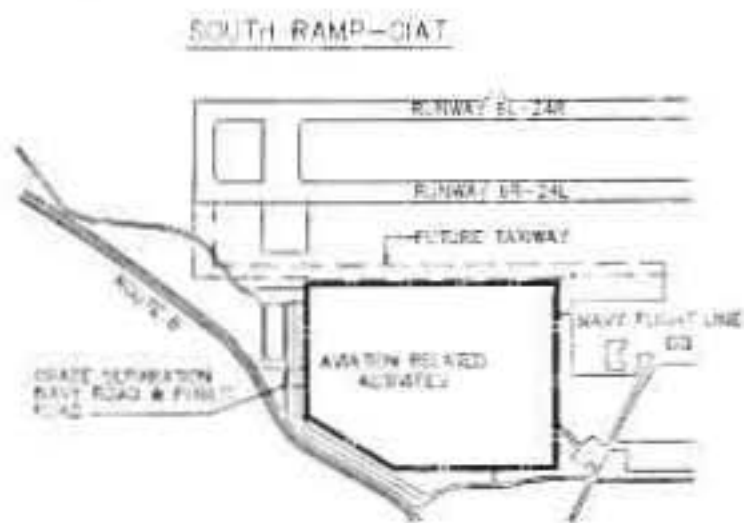
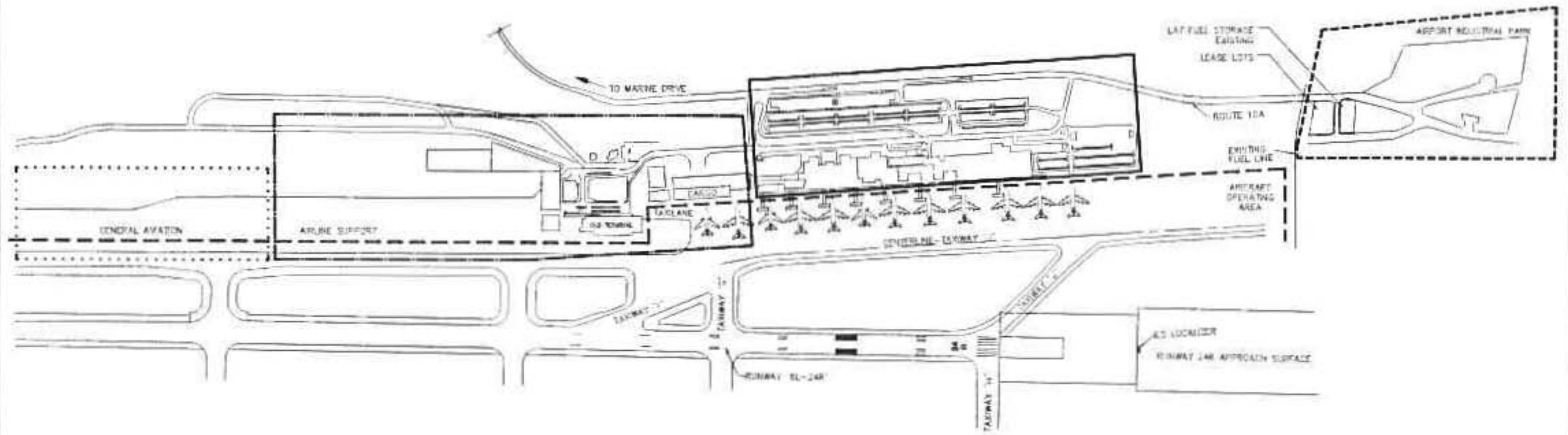


FIGURE 9-2

PARSONS

Guam International Air Terminal Land Use Plan



LEGEND

- - - - - GENERAL AVIATION AREA
 ===== AIRLINE/AIRPORT SUPPORT AREA
 ===== TERMINAL AREA
 - - - - - AIRCRAFT OPERATING AREA
 - - - - - INDUSTRIAL/COMMERCIAL AREA

FIGURE 9-3

- PARSONS -

SECTION 10

SECTION 10

10.0 Environmental Impact Overview

This section contains an assessment of the impact of proposed developments on the environment of the airport and its environs in terms of environmental investigations that may be required. Areas of potentially significant impact are identified and possible mitigative measures discussed.

10.1 Regulatory Basis

Procedural and substantive environmental requirements for federal actions are set forth by the Council on Environmental Quality in Regulations implementing the National Environmental Policy Act (NEPA). For actions where FAA is the lead agency, the Airport Environmental Handbook (FAA, 1985) provides guidance for compliance with NEPA. Compliance with NEPA will also satisfy the local requirements of the Guam Environmental Protection Agency (GEPA).

The present master plan update involves revisions to the Guam International Airport Layout Plan and use of federal funds for development planning, two categories of actions which trigger the NEPA process. The level of environmental analysis required by an action depends on the magnitude of potential consequent environmental impacts. Three levels are established in the regulations: categorical exclusions, environmental assessments (EAs) and environmental impact statements (EISs). The purpose of the present overview is to identify areas of potential impacts (preliminary scoping) and establish the appropriate level of analysis. To begin this process, it is first necessary to examine the proposed action (the developments included in the revised master plan) to determine the level of environmental action necessary.

10.2 Level of Environmental Analysis

Categories of actions which generally require a full environmental impact statement include new airport location or initial layout plan approval, or federal funding associated with development of a major new runway. Neither of these types of actions is included in the update of the GIAT Master Plan. Similarly, the actions normally requiring an environmental assessment were reviewed and none of them are included in the Master Plan update.

All of the actions included in the master plan update are categorically excluded from the requirement for formal environmental assessment. These actions are included in the below listed categories.

- Runway, taxiway, apron, or loading ramp construction or repair work including extension, strengthening, reconstruction, resurfacing, marking, grooving, fillets and jet blast facilities, and new heliports on existing airports, except where such action will create environmental impacts off airport property.
- Installation or upgrading of airfield lighting systems, including runway end identification lights, visual approach aids, beacons and electrical distribution systems.
- Installation of miscellaneous items including segmented circles, wind or landing direction indicators or measuring devices, or fencing.
- Construction or expansion of passenger handling facilities.
- Construction, relocation or repair of entrance and service roadway.
- Grading or removal of obstructions on airport property and erosion control actions with no off-airport impacts.
- Landscaping generally, and landscaping or construction of physical barriers to diminish impact of airport blast and noise.
- Land acquisition and relocation associated with any of the above items.
- Acquisition of: security equipment required by rule or regulation for the safety or security of personnel and property on the airport (14 CFR Part 107), safety equipment

required by rule or regulation for certification of an airport (14 CFR Part 139) or snow removal equipment.

- Issuance of airport planning grants.
- Airports Improvement Program actions which are tentative and conditional and clearly taken as a preliminary action to establish a sponsor's eligibility under the Program.

In some instances, however, even actions which qualify for categorical exclusion may be subject to environmental assessment. Review of these "extraordinary circumstances" in light of preliminary scoping meetings with FAA and GEPA representatives raised several possibilities for the actions included in the master plan update. These are actions that are likely to:

- have a significant impact on noise levels of noise sensitive areas;
- have a significant impact on air quality or violate the local, state, or Federal standards for air quality; or
- have a significant impact on water quality or contaminate a public water supply system.

These possibilities are discussed further below.

10.3 Potential Areas of Impact

There are three potential areas of impact: aircraft noise, air quality, and water quality. They are discussed in this section.

10.3.1 Noise

In early 1989, an aircraft noise study was conducted for NAS Agana (Harris Miller Miller & Hanson Inc., 1989, Appendix B, Reference 25). The study included assessment of noise from military aircraft operations, civilian air carriers and general aviation aircraft. Conditions in the base year of 1989 were compared with those a decade earlier (1978) and those forecasted for five years into the future (1994). Projections for future air carrier and general aviation operations were those developed for this master plan update.

Comparison of the updated (1989) noise level contours with those produced in the 1978 AICUZ study showed significant differences.

- The Ldn 65 contours of the 1978 AICUZ extend off each runway far beyond the updated 1989 Ldn 65 contours.

- The Ldn 65 contours of the 1978 AICUZ have "crab claws" that extend into Tumon and Agana Bays. These crab claws are absent from the 1989 contours.

The authors conclude that the differences are "... largely due to the absence in 1989 of A-3 jet operations and almost all military night-time operations, which dominated the 1978 contours. The disappearance of the crab claws is attributed to the absence of A-3 flight carrier landing practice."

Subsequent to removal of A-3 aircraft from NAS Agana, air carrier operations dominate the noise contours. The noise study concludes as follows:

"A comparison of the 1989 and 1994 contours reveals that Ldn levels off the departure end of Runway 06L remain relatively constant. Although total commercial jet operations are projected to increase in the future, this increase in operations is offset by the projected shift in fleet mix from B727s to B747s. B747 aircraft are less noisy on departure than their B727 counterparts.

Off the approach end of Runway 06L, there is a significant growth in the contours. Total commercial jet operations are projected to increase in the future and the projected shift in fleet mix from B727s to B747s. Since B747 aircraft are more noisy on approach than their B727 counterparts, approach noise will increase."

The growth in the contours referred to above constitutes less than a 10% lengthening of the Ldn 65 contour toward Agana Bay. Comparison of the 1994 projections with the 1978 contours shows a large overall decrease in the area under the Ldn 65 contour.

A thorough identification of all noise sensitive areas was not undertaken, but the 1989-1994 extension of the contour occurs over the fringe of downtown Agana, the most urbanized area of the island. The contour does not appear to extend westward as far as the Naval Regional Medical Center, which would likely qualify as a noise sensitive location, nor does the additional area covered appear to harbor any schools. Three churches (the Christian Science, Seventh Day Adventist and General Baptist) do appear to lie beneath the expanded contour. Nevertheless, in summary, the incremental increase in noise in this area does not appear to be a significant impact, but a more thorough environmental assessment may be warranted.

10.3.2 Air Quality

To examine the potential impacts to air quality resulting from the proposed actions, a study using the FAA's "Emissions and Dispersion Modeling System" should be completed. The results of this study would establish the significance of potential impacts, whether or not air quality standards would be violated as a result of the proposed actions, and hence whether or not an EA is required on this basis.

10.3.3 Water Quality

Preliminary scoping indicates that prevention of degradation of the potable water aquifer beneath the Barrigada Plateau is a concern. The porous limestone comprising the plateau allows rainwater to percolate through to the water table. The aquifer is recharged more rapidly by several sinks, particularly the Harmon Sink, a few hundred yards north of the airport.

An exploratory well, convertible to a production well, was drilled on GAA land near the northeastern end of the terminal (Barrett Consulting Group and J.F. Mink, 1989). The well, capable of producing more than 200 gpm, penetrates the Yigo Trough, the largest and most productive groundwater basin in Guam. The region tapped is termed the Macheche Basal Groundwater Management Zone, and consists of highly permeable Mariana limestone at the surface and equally permeable Barrigada limestone below. The sustained yield of the zone is estimated at 870 gpm. This zone could provide the water supply required to meet projected airport demand, and protection of its quality is essential. It is likely that GEPA will require water quality monitoring of the new source well or wells.

Measurements collected during sustained pump testing of the exploratory well indicated chloride concentrations between 80 and 102 mg/l, considerably below the recommended upper limit for drinking water (250 mg/l).

Potential water quality impacts could result from increased sedimentation during construction activities or from petrochemical contamination from airport operations. Mitigation measures designed into the airport improvements, however, would minimize potential water pollution.

The terminal area is divided into two drainage areas. The area west of Gate 4, including the Old Terminal Building, the apron and parking lots, and associated buildings drains into Harmon Sink. The remainder of the apron and the entire new terminal complex drains into an infiltration basin below Route 10A. Where fueling activities are conducted, the drainage from the apron areas east of Gate 4 is directed through an oil separator before being discharged into the drainage system. On the east side, the newly completed Route 10A drains into a newly constructed infiltration basin. Plans for future development of the lease lots indicate that these lots will drain either into this new basin or into another basin to be constructed in the future.

To avoid potential water quality impacts, the master plan includes several mitigation measures including provisions for trapping sediments generated during construction, as well as for installing oil separators in all existing and planned apron areas. With these measures, it is felt that potentially significant impacts to water quality would be avoided, and that an EA would not be required on this basis.

10.4 Conclusions

The appropriateness of a categorical exclusion for the present action appears to hinge on the results of the future air quality modeling studies, although an EA would provide decision makers a basis for more informed planning. Until air quality modeling is completed, however, we cannot determine if unavoidable significant impacts would result. The most prudent course of action would be to produce a formal environmental assessment to aid in making a determination about whether an EIS is warranted or a FONSI is appropriate.

GAA should entertain the initiation of an FAA Part 150 Noise Compatibility Program for GIAT. Although the Navy AICUZ study indicates the likelihood of a modest increase in aircraft noise within the next five years, the fact remains that commercial development (including residential development) is closing in on GIAT.

APPENDIX A

APPENDIX A

GLOSSARY OF TERMS AND ABBREVIATIONS

A & E:	Architect and Engineer
ALP:	Airport Layout Plan
ARFF:	Aircraft Rescue and Fire Fighting (formerly Crash Fire Rescue)
ATC:	Airline Technical Committee
ATCT:	Air Traffic Control Tower
Air Carrier: (Airline)	Aircraft operated by an airline that holds a certificate of public convenience and necessity authorizing performance of scheduled air transportation usually using large aircraft. Large aircraft have more than 12,500 pounds (5,700 kg) maximum certified takeoff weight.
Aircraft Parking Position:	A designated location on an apron for parking an aircraft. Usually demarcated by striping on an apron pavement and sometimes equipped with underground hydrant fueling and other aircraft servicing facilities.
Air Navigational Facility (NAVAID):	Any facility used for guiding or controlling flight in the air or during the landing or takeoff of aircraft.
Air Taxi:	Aircraft operated by a company or individual that performs air transportation on a scheduled or non-scheduled basis over either designated or unspecified routes, usually with light aircraft. Light aircraft have less than 12,500 pounds (5,700 kg.) maximum certified takeoff weight. Commuter flights are a special category of air taxi operations.
Aircraft Mix:	An arbitrary classification system which identifies and groups aircraft having similar operational characteristics for the purpose of computing runway capacity and determining facility requirements.
Aircraft Operating Area (AOA):	An AOA is the area on an airport set aside or used for the operation of aircraft including areas to be reserved for protection from encroaching obstructions or facilities.

Airport	An area of land or other hard surface, excluding water, that is used or intended to be used for the landing and takeoff of aircraft and includes its buildings and facilities, if any.
Airport Reference Point (ARP):	An ARP is a point having equal relationship to all existing and proposed landing and takeoff areas which is used to locate the airport geographically.
Airspace:	The space lying above the earth or above a certain area of land or water which is necessary to conduct aerodynamic operations.
ANA:	All Nippon Airways
AN:	Air Nauru
Apron:	A paved area on the airfield usually immediately adjacent to the terminal area or hangars on which aircraft are parked.
Aviation Forecast:	Estimates of future aircraft operations, passenger traffic, cargo and mail, based aircraft, mix of aircraft and other factors that affect airport facilities and operations.
BAG:	Baggage (Luggage)
Based Aircraft:	An aircraft permanently stationed at an airport, usually by some form of agreement between the aircraft owner and airport management.
BBL:	Barrel
BOD:	Beneficial Occupancy Date
Building Restriction Line (BRL):	A BRL is a line on the airfield surface denoting the required spacing or setback for Runway or Taxiway centerlines behind which buildings can be constructed.
CIP:	Capital Improvement Program
COAM:	Continental Airlines - Air Micronesia
Commuter Airlines:	Aircraft operated by an airline that performs scheduled air transportation over specified routes usually using light aircraft. Light aircraft have less than 12,500 pounds (5,700 kg) maximum certified takeoff weight.
Control Tower/ Air Traffic Control Tower (ATCT):	A central operations facility in the terminal air traffic control system consisting of a tower cab structure (including an associated IFR room if radar equipped) using air/ground communications and/or radar, visual signaling, and other devices to provide safe and expeditious movement of terminal air traffic.
Decibel:	A unit of measurement of sound intensity.
FAA:	Federal Aviation Administration
FAR:	Federal Aviation Regulation

FBO:	Fixed Base Operator
FIS:	Federal Inspection Services
FY:	Fiscal Year
Fleet Mix:	The proportion of aircraft types or models expected to operate at an airport.
FT.or ft.:	Foot, Feet
GAA:	Guam Airport Authority
GAL:	Gallon
Gate:	A passageway between the passenger terminal building and the aircraft. Usually includes the passenger holding area adjacent to the passageway and sometimes includes the aircraft parking position adjacent to the terminal building.
General Aviation (GA):	Refers to all civil aircraft and operations which are not classified as air carrier, commuter, air taxi or military.
GIAT:	Guam International Air Terminal
Greeters:	Persons who meet an arriving passenger at the airport.
Groundside:	The area on the access roadway side of the airport which is generally public.
Ground Support Equipment (GSE):	Equipment used for servicing aircraft on the apron.
HAL:	Hawaiian Airlines
Heliport:	An airport, or area of an airport, used or intended to be used for the landing and takeoff of helicopters (rotorcraft).
Hydrant Fueling System:	An underground system of pipes through which aircraft fuel is delivered directly from a central supply to fixed outlets (hydrant pits) at aircraft parking positions.
INS:	U. S. Immigration and Naturalization Service
Instrument Flight Rules (IFR):	The rules and regulations prescribed by government authorities covering aircraft flight operations under conditions that preclude the use of Visual Flight Rules (VFR).
Itinerant Operation:	All aircraft arrivals and departures other than local operations.
JAL:	Japan Air Lines

Ldm:	Day-Night sound level
Lg:	Large
Loading Bridge:	An adjustable protected passageway bridging the space between a terminal building pier or concourse and an aircraft passenger door (also called Airbridge or Jetway).
MSL:	Mean Sea Level
MTOW:	Maximum Takeoff Weight
Master Plan:	Long-range plan for identifying airport development requirements.
Military Operation:	A takeoff or landing by military aircraft.
Min.:	Minute(s)
NA:	Not applicable
NAS:	Naval Air Station; Agana
NAVAID:	See Air Navigation Facility
NM:	Nautical Mile
Noise:	Noise is any undesired electronic signal or, in acoustics, any undesired sound.
Noise Abatement:	Airport/air traffic control actions designed to lessen the effect of noise produced by aircraft engines.
NWA:	Northwest Airlines
O & M:	Operation and Maintenance
Obstacle Free Line (OFL):	A line on the airfield surface delineating the boundary of an Obstacle Free Zone.
Obstacle Free Zone (OFZ):	An OFZ is an area free of all objects, except frangible navigation aids (NAVAIDS), and clear of vehicles as well as parked, holding or taxiing aircraft in the proximity of an airplane conducting an approach, missed approach, landing or takeoff.
Operation:	An aircraft arrival (landing) at or departure (takeoff) from an airport.
PAX:	Passengers
RAMP:	That portion of the Aircraft Operating Area usually lying between runways and groundside facilities where aircraft are parked and serviced and passengers and cargo are loaded and unloaded (also see Apron).
RW & R/W:	Runway

Rotorcraft:	Referring to helicopters
Runway:	A runway is a defined rectangular area on an airport prepared for the landing or takeoff of aircraft.
sec.:	second(s)
sm.:	Small
SQ. FT. or sq. ft.:	Square Feet
TAP:	Terminal Area Plan
TW & T/W:	Taxiway
T-Hangar:	A T-shaped aircraft hangar which provides shelter for a single airplane, or generically, aircraft hangars for General Aviation aircraft.
Taxilane:	A taxilane is the portion of the aircraft parking area used for access from a taxiway to aircraft parking positions.
Taxiway:	A taxiway is a defined path, from one part of an airport to another, selected or prepared for the taxiing of aircraft.
Terminal:	A building or group of buildings on an Airport used for processing enplaning and deplaning passengers or air cargo.
Threshold:	The treshhold is the beginning of the portion of the runway available and suitable for the landing of airplanes. Usually, the physical end of runway pavement.
Transient Operations:	That portion of itinerant operations performed by aircraft other than those based at the airport in question.
Visual Flight Rules (VFR):	Rules that govern flight procedures in good weather, i.e. navigation by visual sighting of landmarks and collision avoidance on a see-and-be-seen basis.
Wide Body Aircraft:	Term used for high capacity aircraft of the types Boeing B747, Douglas DC-10, Lockheed L1011, Airbus A300 or similar, i.e. aircraft with double aisles in the passenger cabin and seating configurations exceeding six abreast.
Wellwishers (W/W):	Persons who accompany departing passengers to the airport to see them off.

APPENDIX B

APPENDIX B

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APPENDIX C

APPENDIX C

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APPENDIX D

APPENDIX D

MEMBERS OF TECHNICAL ADVISORY COMMITTEE

In order to maintain formal coordination between the Guam Airport Authority and affected parties during preparation of the Guam International Air Terminal Master Plan Update Program, a Technical Advisory Committee was formed. The committee, consisting of representatives of the Federal Aviation Administration and other federal and local government agencies, airport users and tenants, and other interested entities, received periodic progress reports from the consultants preparing the program. The Technical Advisory Committee is composed of the following members.

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APPENDIX E

APPENDIX E

JOINT USE AGREEMENT AND WAIVER DOCUMENTS

This Appendix contains a copy of the current Joint Use Agreement between the Guam Airport Authority and the United States of America which grants civilian use of air navigation facilities of the Naval Air Station at Agana, Guam.

In Addition, the Appendix contains a copy of Waivers of Airfield Safety Criteria for Parking Civilian Aircraft at Guam International Air Terminal granted to the Guam Airport Authority by the U.S. Navy.

Office of the Attorney General
Government of Guam
P.O. Box 2000
Agaña, Guam 96910
Telephone: 722-2221

1 JOINT USE AGREEMENT
2 BETWEEN
3 THE UNITED STATES OF AMERICA
4 AND

5 GOVERNMENT OF GUAM, TERRITORY OF GUAM, U.S.A.

6 THIS AGREEMENT, made and entered into this
7 10th day of July, 1974, by and between the
8 United States of America (hereinafter called the Government)
9 acting by and through the Commander, Naval Facilities
10 Engineering Command (hereinafter called the Contracting
11 Officer), and the Government of Guam, Territory of Guam,
12 U.S.A. (hereinafter called Guam).

13 WHEREAS, the parties desire to cancel and
14 supersede the Joint Use Agreement executed on 26 April 1972,
15 without acknowledging the validity of said agreement: and

16 WHEREAS, this Agreement is in no way dependent
17 upon the Land Exchange Agreement executed between the
18 Government and Guam on 26 April 1972: and

19 WHEREAS, the Government is the owner of certain
20 real property and improvements thereon, located at the U.S.
21 Naval Air Station, Agaña, Guam (Brewer Field) (hereinafter
22 called the Station): and

23 WHEREAS, Guam owns, maintains and operates
24 adjacent to the Station, a facility known as the Guam
25 International Air Terminal complex (hereinafter called
26 GIAT) which has been and is being served by the control
27 tower, landing and other related air navigation facilities
28 of the Station: and

WHEREAS, Section 1107 of the Federal Aviation Act of 1958 (72 Stat. 798, as amended, 49 U.S.C. 1507) provides that air navigation facilities owned or operated by the United States may be made available for public use under such conditions and to such extent as the head of the department or other agency having jurisdiction thereof deems advisable and may by regulation prescribe; and

WHEREAS, Section 101 of the Federal Aviation Act of 1958 (72 Stat. 737, as amended, 49 U.S.C. 1301) defines "air navigation facility" as any facility used in, available for use in aid of navigation, including landing areas, lights, any apparatus or equipment for disseminating weather information, for signalling, for radio direction finding, or for radio or other electrical communication, and any other structure or mechanism having a similar purpose for guiding or controlling flight in air or the landing and take-off of aircraft; and

WHEREAS, the Secretary of the Navy has determined that joint use of the air navigation facilities may be made available to Guam

NOW, THEREFORE, in view of the foregoing and pursuant to the authority set forth above and in consideration of the covenants hereinafter set forth:

a. The Joint Use Agreement executed on 26 April 1972 is hereby cancelled and is of no further force and effect; and

b. The Government grants unto Guam, for a term of thirty (30) years, exclusive rights of Joint Use with

the Government, for public airport purposes, of the air navigation facilities, as shown on Exhibit "A", attached hereto and made a part hereof, all upon the following terms and conditions, provided, however, that such exclusive use shall not prohibit the Government from authorizing use by any Government Aircraft as defined in SECNAV INSTRUCTION 3770.1B (Current Series) of the air navigation facilities, nor from issuing Aviation Facility Licenses as provided herein:

1. Guam agrees to provide and maintain at CIAT in accordance with good airport management practice, airport facilities, including aircraft parking aprons, as needed to serve the civil air traffic as may be allowed by the Government to use the air navigation facilities. However, any and all new construction at CIAT, or upon any additional lands used by Guam in expanding CIAT, shall conform to Navy and Federal Aviation Administration criteria. Plans for such construction must have prior approval of the Contracting Officer or his designee. In all cases when Navy criteria is higher than criteria of the Federal Aviation Administration, Guam will use and follow Navy criteria. New construction at CIAT, or upon additional land used by Guam for expansion of CIAT, will be subject to inspection by representatives of the Navy and Federal Aviation Administration to determine compliance with said

approved plans and specifications, and shall provide protective and provisions for existing Government improvements and facilities adjacent to CIAT.

2. Upon proper application by Guam to the FAA and a subsequent request to the Secretary of the Navy by the FAA pursuant to Section 23 of the Airport and Airway Development Act of 1970, the Navy will make available to Guam by proper instrument title to Navy lands as designated on Exhibit "B" for the sole purpose of the expansion of CIAT. The use of the transferred Navy lands for the expansion of CIAT will be in accordance with the approved "Long Range Development Plan" for CIAT which is attached hereto as Exhibit "C". To facilitate expeditious construction of said facilities, by Guam, as provided in Paragraph 6 hereof, Government will, upon application, grant to Guam, rights of entry onto said lands for construction pending acquisition of said land, as shown in Exhibit "B".

3. As Guam acquires land from the Government for expansion of CIAT as shown on Exhibit "B", Guam agrees to relocate and pay any and all costs in connection with any relocation of any existing Naval facilities, including but not limited to, buildings or structures, air navigation, facilities, roads, drainage ditches, fences, sewer and water lines, and other utility facilities, where such relocation is made necessary by reason of Guam's use of any land acquired for expansion of CIAT, or by reason of its use of the air navigation facilities except those buildings which must be relocated to enable the construction of the proposed north

parallel taxiway. All such relocation shall be completed in a condition satisfactory to the Contracting Officer.

4. Guam will construct and maintain such fencing and will maintain such security at the terminal area boundary as the Commanding Officer of the Station shall from time to time prescribe. Guam shall provide, at no cost to the Government and to the satisfaction of the Contracting Officer, any modifications made necessary to the physical security and control of the Station as a result of any expansion of GIAT.

5. For the purpose of this Agreement, Guam agrees that the use of the air navigation facilities shall be limited to:

- a. Scheduled passenger and cargo operations approved by the Civil Aeronautics Board;
- b. Non-scheduled supplemental and charter operations in aircraft of U.S. registry; and
- c. Scheduled and non-scheduled air taxi operations in aircraft of U.S. registry; and
- d. General aviation in trans-Pacific operations in aircraft of U.S. registry.

Aviation Facility Licenses for aircraft operations in Categories (a) through (d) will be issued by the Government in accordance with current procedures therefor, or as may be amended. The licenses for the above-enumerated aircraft operations shall be routinely issued and shall not be withheld except on the express determination of the Secretary of the Navy. Such determination shall not be redelegated.

- e. Any other General Aviation Operations in aircraft of U.S. registry unless the Secretary of the Navy

determines that the operation of such aircraft would be incompatible with flight safety. Aviation Facility Licenses for Category (e) will similarly be routinely issued and shall not be withheld except in the manner and for the reason stated therein.

f. Other civil aircraft that need to use the air navigation facilities at the Station will use them at the election of the Navy under its Aviation Facility Licensing authority.

6. After Guam acquires use of the additional lands as designated on Exhibit "B", Guam shall expeditiously construct thereon, in accordance with the Long Range Development Plan (Exhibit "C"), aircraft parking aprons upon which all civil aircraft using the Station shall be parked.

Until the completion of the aircraft parking aprons shown on Exhibit "C", or until five years after Guam's acquisition or commencement of use of the lands designated on Exhibit "B", whichever is sooner, parking on the Interim Parking Area, as designated on Exhibit "A", will be permitted subject to control by the Commanding Officer of the Station. However, the limited capability of said Interim Parking Area may require restrictions on the number of Aviation Facility Licenses granted. The final determination as to restrictions on the issuance of Aviation Facility Licenses will be made by the Secretary of the Navy in accordance with the terms of this Agreement. Such determination shall not be redelegated.

Upon completion of the aircraft parking areas, or at the end of the term of five (5) years after Guam acquires use of the additional lands designated above, whichever is earlier, no civil aircraft using CIAT shall be parked upon the Joint Use Area or on the Station; provided, however, that sufficient ADAP or equivalent funds have been made available for the construction of said parking aprons on CIAT within said five (5) year period. If such funds were insufficient to complete said construction in said period, the period may be extended upon mutual agreement of the parties hereto.

7. (a) Guam shall have the right and the obligation of determining appropriate landing and use fees for the civil use of the Joint Use Area and of CIAT facilities, provided, however, that the landing fees set by Guam shall be no less than those established in the general schedule in SECNAV INSTRUCTION 3770.1B (32 CFR, Part 766), as currently in force or hereafter modified.

(b) Guam shall collect and retain as CIAT revenues all fees for civil aircraft using the CIAT and the Joint Use Area, and shall pay monthly to the Treasurer of the United States through the Commanding Officer of the Station a user charge computed in the same manner as general landing fees in Paragraph 12 of SECNAV INSTRUCTION 3770.1B (32 CFR, Part 766) using a rate of six cents (\$0.06) per thousand pounds of maximum authorized gross take-off weight. This rate may be negotiated upon the request of either party whenever the schedule of general landing fees in SECNAV INSTRUCTION 3770.1B is changed or modified.

(c) No landing fee will be collected by Guam from any aircraft that is:

(1) A Government Aircraft as defined in
SECNAV INSTRUCTION 3770.1B (Current Series).
(11) A civil aircraft which lands in
connection with official Government business
(12) A civil aircraft under Government
charter or contract.
(14) An aircraft owned or operated by an
instrumentality of the Government.
(d) Guam shall keep adequate records and
books of account, showing the collection and disposition of the
landing fees collected by CIVI. The Government shall have
access to such records and books of account at all reasonable
times and shall be afforded proper facilities for inspection
of the same.
6. Guam assumes the responsibility for all
capital improvements required for civil needs and those required
to avoid interference with present or planned military air
operations on the joint use area. All civil-required
capital improvements shall be undertaken in accordance with
Federal Aviation Administration regulations and standards.
9. (a). Guam agrees to pay the cost of all
necessary utilities and assumes the responsibility for all
maintenance and repairs necessary to maintain in suitable,
current operating condition the "Area of Civil Cost
Responsibility" as designated in Exhibit "A", with the
exception of devices peculiar to military needs, including
but not restricted to arresting gear installation, those