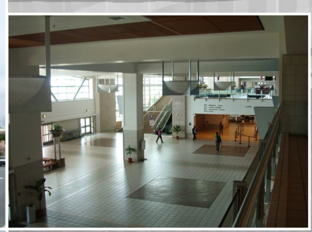
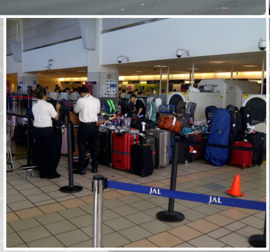
A.B. Won Pat International Airport

MASTER PLAN UPDATE

Prepared For:

A.B. Won Pat International Airport Authority, Guam (GIAA)

April 2012

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A. B. Won Pat Airport Master Plan Update

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Acronyms

AAFB	Anderson Air Force Base
ACI-NCI	ACI-NA Airports Council International-North America
ACRP	Airport Cooperative Research Program
ADG	Aircraft Design Group
ADRM	Airport Development Reference Manual
AFFF	aqueous film-forming foam
AIP	Airport Improvement Program
Airport	A.B. Won Pat International Airport
ALP	Airport Layout Plan
ARFF	Aircraft Rescue and Fire Fighting
ASDA	Accelerate-Stop Distance Available
ATM	Automated Teller Machine
ATPSF	Annual Tons per Square Foot
CAGR	Compounded Average Annual Growth Rate
CBP	Customs and Border Protection
CCSP	Certified Cargo Screening Program
CNMI	Commonwealth of the Northern Mariana Islands
DBE	Disadvantaged Business Enterprises
DFS	Duty Free Shop
DGS	Defense and Government Services
EDS	Explosive Detection System
ERF	Emergency Response Facility
ESTA	Electronic System for Travel Authorization
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FIS	Federal Inspection Services
GA	General Aviation
GCQA	Guam Customs and Quarantine Agency (CQ&A)
GIAA	A.B. Won Pat international Airport Authority, Guam
GSE	Ground Service Equipment
GVB	Guam Visitors Bureau
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LCG	La Costa Group
LDA	Landing Distance Available
LOS	Level of Service
MAG	Minimum Annual Guarantee
MALSR	Medium Approach Lighting System with Runway Alignment Indicator Lights
MPPA	Million Passengers per Annum
NBEG	Narrow Body Equivalent Gate
NEM	Noise Exposure Map

Acronyms – Continued

NFPA	National Fire Protection Association
NGFA	Net Ground Floor Area
O-D	Origin-Destination
PAPI	Precision Approach Path Indicator
PFC	Passenger Facility Charge
PPH	Passengers per Hour
POO	Point-of-Origin
RFP	Request for Proposal
ROM	Rough Order of Magnitude
RPZ	Runway Protection Zone
RSA	Runway Safety Area
SARS	Severe acute respiratory syndrome
SSCP	Security Screening Check Point
TODA	Take-Off Distance Available
TORA	Take-Off Run Available
TRB	Transportation Research Board
TSA	Transportation Security Administration
V/C	Volume to Capacity
VFR	Visual Flight Rules
VIP	Very Important Person

1. INTRODUCTION

1.1 Purpose of the Master Plan Update

The A.B. Won Pat International Airport Authority, Guam (GIAA) has initiated this study to update to the current Master Plan, completed in 2005, and to obtain Federal Aviation Authority (FAA) approval for this Master Plan Update. The current Master Plan is over five years old and its aviation forecasts do not account for recent developments in Guam, such as the planned redeployment of members of the United States Marine Corps, currently deployed in Japan and on the island of Okinawa, and their dependents. Other recent developments include the US Visa Waiver Program modifications, and the Republic of Guam as First Point of Entry Declaration by the United States.

This Master Plan Update will be used to determine a reasonable development program that provides a way forward for continued improvements at A.B. Won Pat International Airport (Airport) to support these new aviation forecasts. This *Master Plan Update* will be eligible for Federal funding for development projects once this document is accepted by the Federal Aviation Authority (FAA).

The *Master Plan Update* process consisted of the following:

- Conduct an inventory of existing facilities, surveys and observations of key functional areas of the passenger terminal, and cargo terminal
- Forecast aviation activity including passengers, cargo, and operations
- Determine facility requirements based on a demand/capacity analysis
- Develop alternative concepts and plans
- Prepare an Airport Layout Plan (ALP)
- Prepare an environmental evaluation including a noise exposure map (NEM)
- Determine a 20-year development program together with capital improvement costs

The work in this Master Plan Update was conducted by Parsons as the prime consultant with a team of subconsultants that included HNTB, SNC Lavalin, LaCosta Consulting Group, AmOrient Engineering, Bowers + Kubota, and PCR Environmental

The GIAA mission statement and objectives provide a guideline for goals of this *Master Plan Update*.

Mission Statement

The Authority strives to ensure the safety and security of the traveling public; is dedicated to maintaining a superior and reliable level of airport services for our island residents and tourists; and committed to supporting the development of air linkages and facilities which are integral parts of the island's future economic growth.

Objectives

To deliver improvements in customer service, facilities and access infrastructure, economic development, competitive positioning, community relations, and governance and organization.

The goals of this *Master Plan Update* include:

Determine the Airport's physical facilities to meet the future needs for passengers and cargo

Enhance the passenger's overall experience from curbside to aircraft boarding and vice-versa.

Develop a plan that separates arriving uninspected passengers destined to federal inspection services (FIS) at the international arrivals facilities from departing passengers that conform to Transportation Security Administration (TSA) and Custom and Border Patrol (CBP) requirements.

Provide a terminal and cargo facilities plan that confirms the GIAA strategic vision and sense of arrival thematic objectives

Develop a landside plan that accommodates the loss of public parking for the widening of Route 10A.

Develop a concessions program to meet the needs of the international Asian tourist

The work for this Master Plan Update is supported by the FAA Airport Improvement Program (AIP) Grant No. 3-66-0001-66 and the GIAA. The preparation of this work effort was guided by *Airport Master Plans*, FAA Advisory Circular AC 150/5070 and, *Planning and Design of Airport Facilities at Non-Hub Locations*, FAA Advisory Circular 150/5360-9.

1.2 Changes to the Airport's Operations Post-2005 Master Plan Update

Subsequent to the completion of the Antonio B. Won Pat Guam International Airport Master Plan Update, April 2005, Leo A. Daly the following key Airport and airline changes haves occurred:

- United Airlines acquisition of Continental Airlines
- Northwest Airlines merger with Delta Airlines
- Jin Air launched daily service
- Electronic System for Travel Authorization (ESTA) holders pilot program for travelers from visa waiver countries such as Hong Kong, Japan, South Korea, and Taiwan
- Skymark Airlines began charter service
- Freedom Air began charter service

1.3 Implementation of 2005 Master Plan Update Projects

The previous Master Plan Update Facilities Requirement Plan included three phases to address improvements to the airfield, terminal, North Tiyan area, South Tiyan area, Airport's industrial park, roadways and access, and other improvements. Phase I projects were recommended to be complete by 2008, Phase II projects recommended to be implemented between 2008 – 2013, and Phase III recommended to be implemented between 2014 -2023. Major projects that have been completed or that are underway include the following:

- Extension and strengthening of Runway 6L-24R
- Extension of parallel taxiway
- Seismic upgrade of terminal structure
- International transfer facility (partial)
- High speed outbound baggage diverters
- Independent underground power system
- Consolidated Air Cargo Center
- Utilities infrastructure upgrade

1.4 Organization of the Master Plan Update

The Master Plan Update work program consisted of a number of "White Papers", separate reports and presentation deliverables that were incorporated into this document. Each major element of the Airport is addressed in a separate section of the report addressing existing conditions, demand/capacity analysis, alterative analysis, and when appropriate financial analysis. Therefore, this Master Plan Update has been organized as follows:

1. Executive Summary
2. Introduction and Report Organization
3. Aviation Activity Forecasts
4. Existing Conditions and Inventory
5. Facility Requirements and Development of Alternatives
6. Environmental Evaluation
7. Airport Layout Plan
8. Financial Feasibility Analysis
9. Facilities Implementation Plan
10. Concessions Program
11. Appendices

2. INVENTORY OF EXISTING CONDITIONS

2.1 Background

Existing conditions were inventoried for each key element of the Airport. This included the airfield, terminal, landside, cargo, aircraft rescue and fire fighting (ARFF), general aviation (GA), and fuel farm facilities. The existing conditions are presented for each of these key elements in Section 4 – *Demand/Capacity, Requirements and Recommendations.*

2.2 Post – 2005 Master Plan Update Studies

There were a number of studies prepared for the GIAA after the completion of the *Master Plan Update – 2005.* These studies included the following:

- *Alternate Runway in Support of Anderson Air Force Base (AAFB)*, E.M. Chen & associates, Inc., and AECOM, November 2008
- *GIAA Water System Operational Alternatives Report, Duenas & Camacho & associates, Inc.,* March 2009
- *Storm Water Drainage Master Plan,* Winzler & Kelly*,* September 2009 (Draft)
- *Sanitary Sewer System Utility Planning and Upgrade Master Plan Report, Winzler & Kelly,* November 2009 (Draft)
- *Terminal Building Structural Study*

2.3 Condition Rating of Existing Facilities

Sixteen of the Airport's facilities were field verified to determine existing conditions. These included the following:

- Terminal
- Transportation Building #16-6103
- Old Commuter Terminal
- JAL Cargo Building
- CTSI Building
- Triple "B" Building
- DHL Building
- Pac Air Building
- Air Cargo Building
- HC 5 Hanger
- VQ 1 Hanger
- VQ 5 Hanger
- Aircraft Rescue and Fire Fighting (ARFF) Building
- Warehouse Building 17-3120
- Nose Dock Hanger

- New Water Distribution System

2.3.1 Terminal

The terminal building was investigated in for the following areas: substructure, shell structure and interiors, electrical rooms, restrooms, cooling, generating, fire protection, power systems, plumbing, and waste water systems. Certain areas were not inspected due to restrictions imposed by Customs and Border Protection (CBP), and airlines. The overall rating of the terminal building is “Fairly-Good”. The building is structurally good with minor repairs and maintenance required particularly for electrical and fire protection systems. Major issues were noted for plumbing and waste water systems. The ***Appendix*** contains a copy of this evaluation.

3. AVIATION ACTIVITY FORECASTS

3.1 Introduction and Background

3.1.1 Executive Summary

La Costa Group's (LCG) objective is to provide short, medium, and long-term forecasts of passenger volume, aircraft operations, and cargo for purposes of facility and infrastructure planning. Our forecasts also project peak period operations and demand, providing further guidance for purposes of long-term planning.

Visitors from Asia (primarily Japan) and traffic originating from Guam drive the vast majority of GUM's demand and operational activity. As such, any forecast of long-term air traffic onto Guam must start with a detailed analysis of arrivals from Japan. Despite declining at a compound annual growth rate (CAGR) of 1% over the past fifteen years, air arrivals from Japan still represented 75% of the 2010 international arrival total. However, looming steep demographic declines – projected to accelerate throughout our forecast period – will almost assuredly drive a dramatic change to that mix. The population of Japan is projected to decline by nearly 10% through 2030 – with minimal per capita GDP gains layered on top. As such, our Base forecast projects only slight increases in Japanese arrivals through 2020 – transitioning to a decline pattern in subsequent years. In the near-term, we have incorporated moderate 2011 impacts from the recent earthquake and tsunami – with a quick projected recovery period.

Korea – the second largest demand source for arrivals onto Guam (approximately 11% in 2010) – projects a similarly shaped demographic profile as Japan, though not nearly as extreme. In addition, Korea's per capita GDP is projected to increase at a significantly higher rate, allowing for continuous traffic growth across forecast scenarios. Traffic from secondary demand sources – the U.S. mainland, Southeast Asia, neighboring Pacific islands, and others – is projected to increase at moderate, macroeconomic driven rates.

The most likely source of traffic to backfill the Japanese market is mainland China. For this to happen, a functioning visa waiver program and scheduled commercial air service are required. As of the development of this forecast, momentum appears to be strongly headed in that direction – our forecast scenarios all assume that the program is launched and that service is commenced. The Guam Visitors Bureau (GVB) assumes an annual latent demand from the Chinese market of approximately 250,000. We have assumed a run-rate estimate in that range, varying the number slightly between our scenarios (along with ramp-up periods, launch dates, and other variables).

While the vast majority of traffic through GUM will continue to originate internationally, Guam point-of-origin (POO) traffic should see a tangible boost from the military transition from Okinawa. This increase should occur in multiple phases – starting with the construction and development period, and continuing through a run-rate phase with several thousand new military personnel, their dependants, and support function personnel becoming long-term residents. Our forecast assumes that the three-year construction phase takes place from 2015-

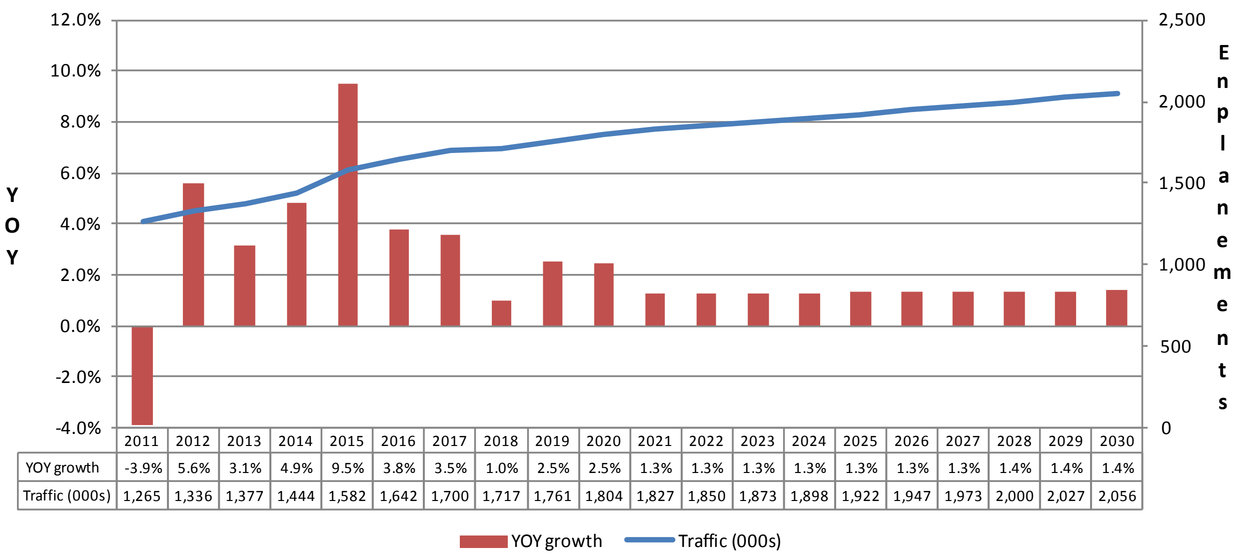
17 – a blended average of various estimates. Our personnel and population growth estimates come from previously developed forecasts.

In total, our Base enplanements forecast projects a compound annual growth rate (CAGR) of 2.2% through 2030, weighted heavily towards the first half of the period (weighting driven by the introduction of traffic from China, military transfer process, and less dramatic Japanese population decline). Our Upside and Downside forecasts, while following similar profiles, project CAGRs of 3.2% and 1.1% respectively.

While we feel that our scenarios appropriately reflect the broad range of likely possible outcomes, we see the most tangible downside risk to this forecast as a) possible further degradation of the Japanese arrival base, and b) the unlikely scenario that a China Visa Waiver program is not launched (or launched at a much later date). We have published an enplanements forecast without demand from China in Appendix 1.

Figure 3.1 shows passenger enplanements (and growth rate) in our most likely "Base" scenario. Note the early year growth impacts from earthquake/tsunami recovery (primarily 2012), the estimated launch of traffic from China (2014), and the estimated start of the military transition process (estimated 2015).

Figure 3.1: Base case enplanements and annual growth rate: 2011-2030



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
YOY growth	-3.9%	5.6%	3.1%	4.9%	9.5%	3.8%	3.5%	1.0%	2.5%	2.5%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%
Traffic (000s)	1,265	1,336	1,377	1,444	1,582	1,642	1,700	1,717	1,761	1,804	1,827	1,850	1,873	1,898	1,922	1,947	1,973	2,000	2,027	2,056

3.1.2 Key Deliverables

- 20-year enplanements forecasts by domestic/international/total – with Base, Upside, and Downside scenarios
- 20-year aircraft operations forecasts by signatory/non-signatory carrier – with Base, Upside, and Downside scenarios
- 20-year transit passenger forecasts – with Base, Upside, and Downside scenarios
- 20-year cargo volume forecasts by enplaned/deplaned volumes
- Detailed discussion of passenger demand drivers
- Detailed discussion of aircraft operations drivers
- Analysis of peak day/month/hour activity
- Review of previous forecasts and assumptions
- Review of recent Terminal Air Forecasts
- Interviews with key stakeholders
- Reviews of recently conducted surveys
- Analysis of peak operations and fleet
- Forecast of general aviation activity

3.2 Methodology

The discovery process for any forecast starts with an examination of underlying fundamentals. In this exercise, these include key drivers from the commercial airline industry, as well as demographic and econometric drivers from the countries driving the majority of demand. In addition, a scenario planning exercise offers systematic thinking into major events, and allows for the inclusion of external factors which are difficult to forecast with any degree of certainty. Guam is a unique airline market, in that the vast majority of traffic is driven by demand from a small number of international destinations. As such, fundamentally driven projections for major demand sources are crucial to constructing an accurate aggregate forecast. We have developed enplanement forecasts for traffic from five separate points of origin (POO): Japan, Korea, China, Guam, and “Other” (USA, Hong Kong, neighboring islands, etc...). Each of these forecasts is discussed in the sections below.

Our baseline data is provided by numerous sources including government and private entities, airlines, and numerous sources on Guam. These sources are detailed at the end of the document. Demand and passenger data stretching back more than a decade from each major demand source was provided by the GVB, and is supplemented by extensive support data to shed additional light on travel patterns. Monthly, carrier-specific data on enplanements, operations, cargo, mail, transit passengers, and other items was provided by the Guam International Airport Authority (GIAA) - also stretching back more than a decade. Our forward-looking projections are calibrated to these historical demand figures in an effort to provide continuity for the majority of end-users.

We have also leaned heavily on local intelligence for a number of items – including utilizing local estimates for timing of impactful events such as the military transition from Okinawa. In addition to surveying airline sources for the potential demand generated by a visa waiver program with

China, we have utilized estimates from the GVB. Detailed population and support personnel volume projections related to the upcoming military transition from Okinawa were prepared as part of the 2030 Guam Transportation Plan. In summary – this study has incorporated the input of locally and/or previously developed forecast projections where applicable, and discloses such use accordingly.

We have made extensive use of credible, documented outside data sources where appropriate – including for items related to airline traffic, schedules, and demographic/macroeconomic data and projections. The demographic and macroeconomic data is particularly important in driving our POO forecasts.

Regardless of the depth of analysis prepared using the information and methodology above, any forecast is susceptible to economic, geopolitical, natural disaster, and other unpredictable events. As such, “Base”, “Upside”, and “Downside” scenarios are developed to account of varying levels of external influence. These are shown in ***Table 3.1***.

3.2.1 Scenarios

Table 3.1: Scenarios

	Base	Upside	Downside
Geopolitical	Occasional periods of instability – but not enough to significantly impact long-term growth profile	Relative political stability in key markets – allowing for tourism growth above projected macroeconomic levels	Prolonged or frequent political instability – particularly in the key markets of China, Japan, and/or Korea
Natural disasters	Volume of high impact events in line with historical averages	Limited number of high impact events	Frequent high impact events – including (but not limited to) earthquakes, tsunamis, and typhoons
Airline industry	Moderate industry success throughout the period – resulting in stable capacity and a manageable level of impact on Guam tourism	Relative industry stability and economic success, allowing for capacity growth and minimal event-driven shocks	Multiple events impacting air service to Guam - including possible bankruptcies and/or consolidations
Economy	Economic growth throughout the period in line with historical trends	Sustained periods of economic growth above historical averages	Below average economic growth throughout the period
Oil/commodity prices	Oil price increases in line with macroeconomic and historical trends – limited number of high impact shocks	Long periods of relatively low oil prices, allowing for tourism and overall economic growth	Sustained periods of high oil prices, likely caused by economic and/or geopolitical shocks
Disease and health related	Limited-to-moderate number of impactful outbreaks	Limited-to-no impact outbreaks throughout the forecast period	Numerous outbreaks in key target markets, causing significant impacts to Guam-related tourism
China Visa Waiver program	Initiated in 2014	Initiated in 2012	Initiated in 2017

3.3 Discussion

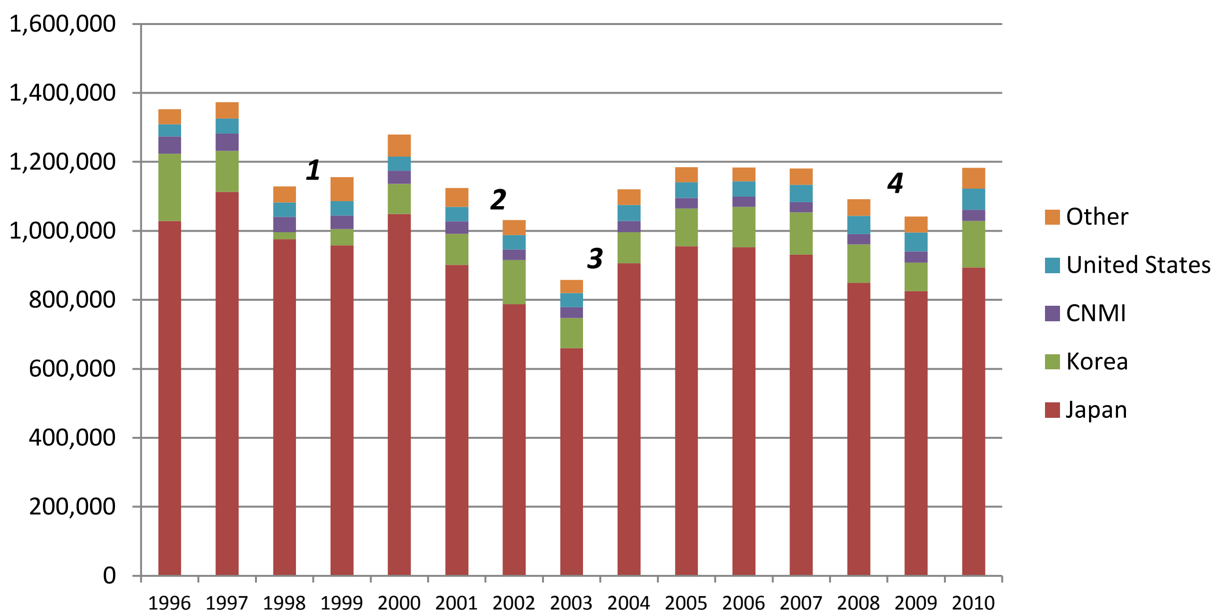
3.3.1 Overview

Recent air traveler visitor data into Guam has been influenced by several major external events, including:

1997-98: Asian Financial Crisis (“1” in graph below)
2001-02: Post 9/11 airline industry crisis (“2”)
2002-03: SARS (“3”)
2008-10: World economic crisis (“4”)

Given the items above, producing a true trend of run-rate traffic demand is challenging. However, a general decline in international arrivals over the fifteen-year period can be observed in ***Figure 3.2***.

Figure 3.2: Air Arrivals to Guam by Country of Origin: 1996-2010

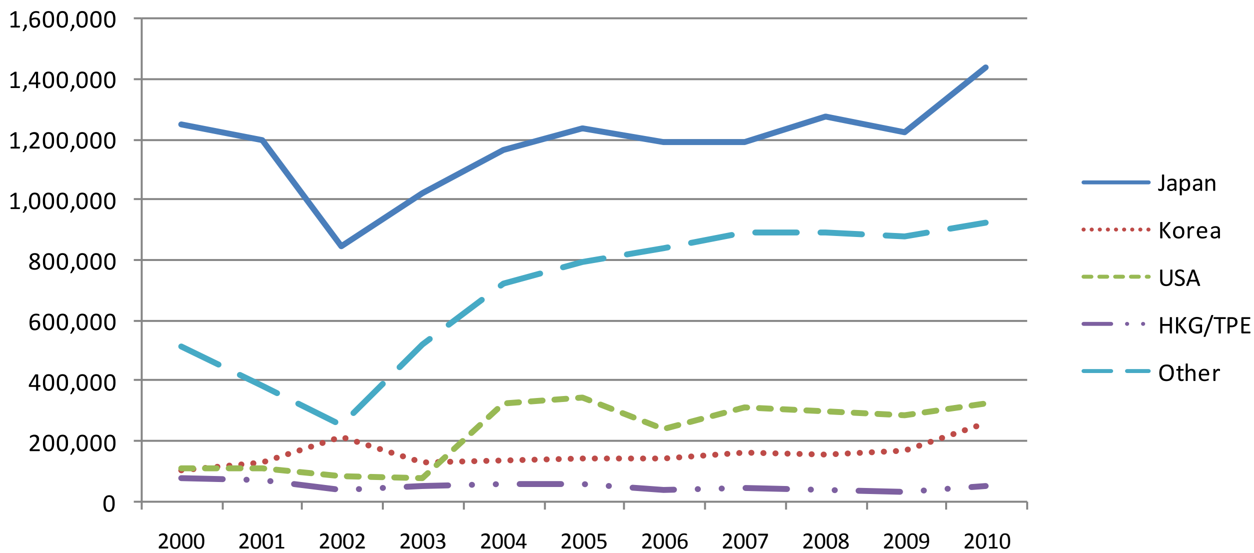


Source: Data provided by Guam Visitors Bureau

The Compound Annual Growth Rate (CAGR) over the fifteen-year observation period is -0.9%. While it can be argued that 2010 represents the latter stages of a trough period, recent peak years (2005-07) produced remarkably similar totals. Note also that the only three years during the period which generated more than 1.25 million air visitors to Guam were 1996, 1997, and 2000 – all ten-plus years ago.

Seat capacity onto Guam from key international destinations does not appear to be the causal driver of this decline, as shown in ***Figure 3.3***. According to data provided by the GIAA, capacity has fully recovered from prior declines and shows aggregate increases over the period 2000-2010.

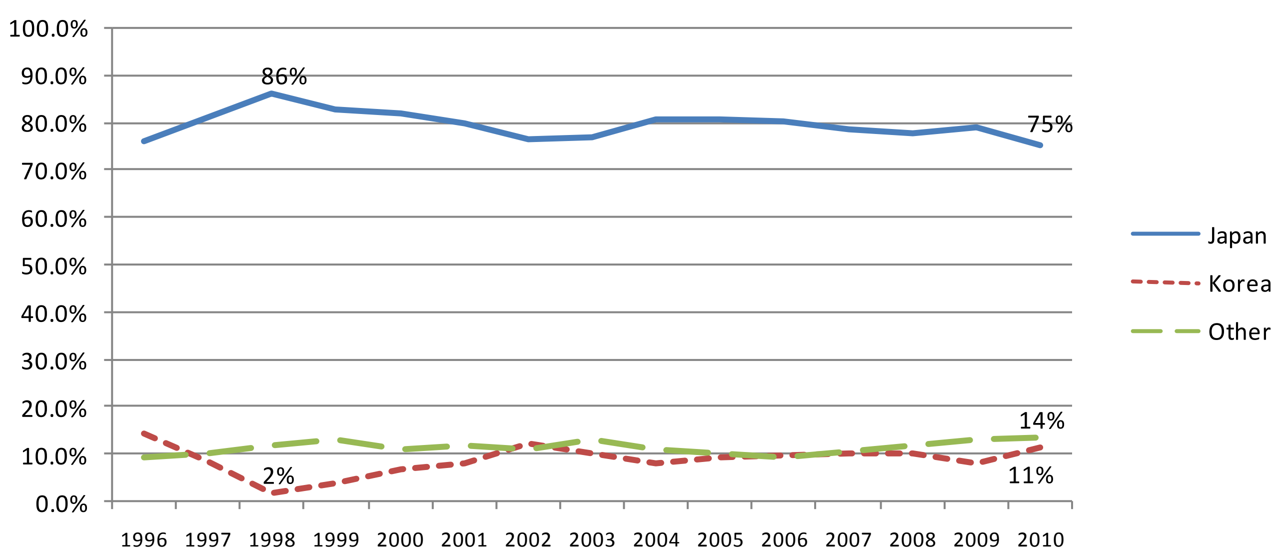
Figure 3.3: Airline Seat Capacity onto Guam: 2000-2010



Source: Data provided by Guam International Airport Authority

As shown on ***Figure 3.4*** the primary source of arrivals onto Guam is leisure traffic from Japan. Over the last decade, the percentage of air arrivals coming from Japan has remained within a tight range of 76-81% - before dropping to 75% in 2009. Korea has been the only other origination point to produce more than 10% of air arrivals in a given year – with a considerably more volatile demand profile.

Figure 3.4: Air Arrivals to Guam by Country of Origin (by Percentage): 1996-2010

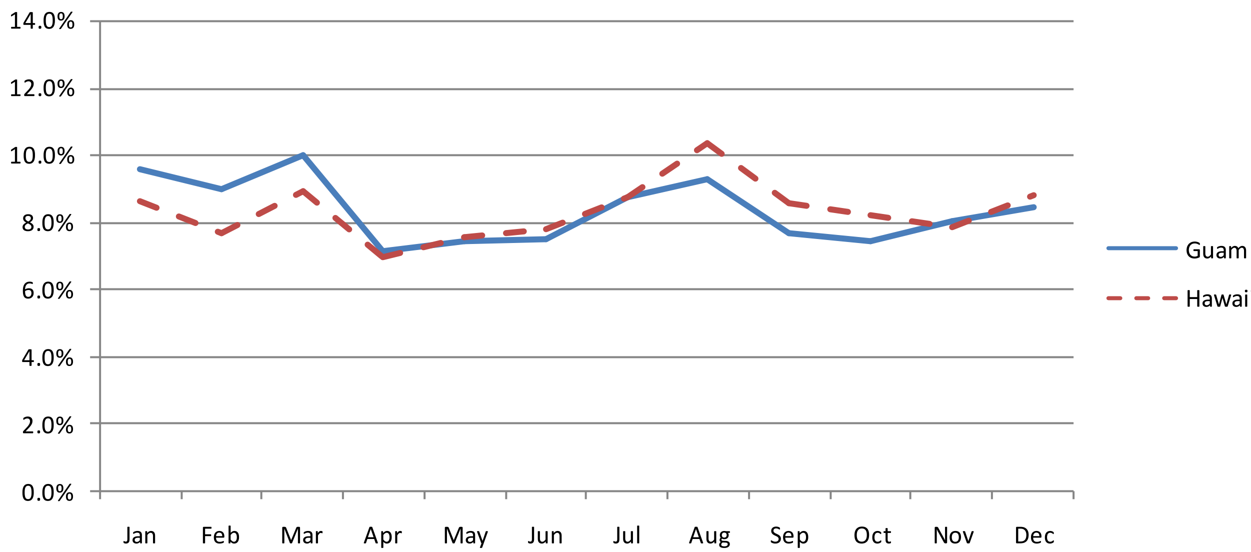


Source: Data provided by Guam Visitors Bureau

Based on 2008 data compiled by the GVB, 82% of air arrivals onto the island traveled for "pleasure". While this is not surprising, it is an important underpinning to all forward-looking projections, given the highly volatile and discretionary nature of leisure/holiday traffic.

Despite this profile, arrivals to Guam are reasonably spread throughout the calendar year. While peak periods are observable in the traditional leisure December-March and June-August time frames, trough period volumes remain respectable. With Japan driving such a large portion of the Guam arrival base, it's useful to look at its monthly distribution of air traffic to both Hawaii and Guam, as shown on ***Figure 3.5***.

Figure 3.5: Monthly Distribution of Arrivals from Japan to Guam and Hawaii: 2004-2008



Source: Guam Visitors Bureau; Hawaii Department of Business, Economic Development, and Tourism

Note the fairly tight monthly distribution in both markets – with Hawaii experiencing a more peaked August, likely due to its longer average stay and greater distance from Japan.

Guam is a reasonably short-stay market for the vast majority of arrivals, which is not surprising given its proximity to its two primary markets. For the three-year period 2006-08, 87% of arrivals stayed on the island for four or fewer nights – with 58% staying three of fewer nights. Only 8% of arrivals stayed for six or more nights. While the arrival profile of visitors to Guam will likely change over the next decade (discussed later), it remains likely that the vast majority of arrivals will still come from Northeast Asia – so this short-stay trend should remain relatively steady.

In upcoming sections, we examine each of the major demand groupings in more detail.

3.3.2 Japan

As discussed above, Japan has consistently generated the significant majority of the air arrivals into Guam – 75%+ each year over the last decade. Guam's share of total Japanese international outbound travelers has been remarkably consistent over the previous several years, as shown in ***Table 3.2***.

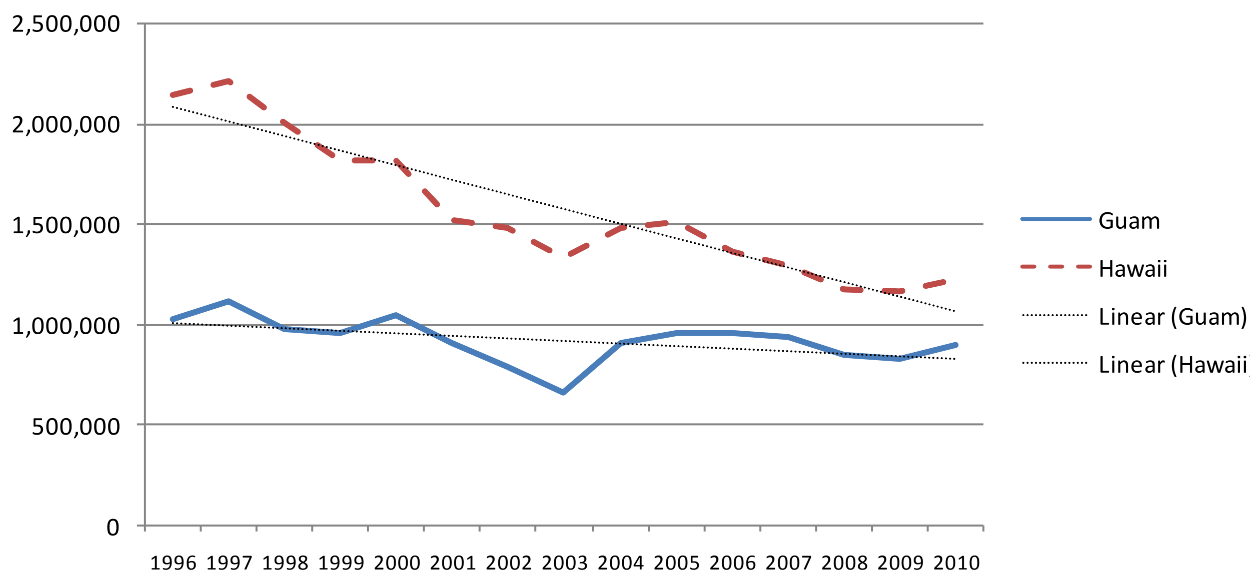
Table 3.2: Air Arrival Data from Japan: 2000-2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Arrivals from Japan (000s)	1,049	902	787	660	906	955	953	931	850	825	894
% of total air arrivals to Guam	82%	80%	76%	77%	81%	81%	81%	79%	78%	79%	75%
% of total Japan intl. outbounds	5.9%	5.6%	4.8%	5.0%	5.4%	5.5%	5.4%	5.4%	5.3%	5.3%	5.4%

Source: Guam Visitors Bureau; Japan Tourism Agency, Japan Tourism Marketing Company

However, as also discussed in the previous section, the last fifteen years has seen a gradual decline in volume, somewhat masked by a series of external shocks. Arrivals to Hawaii from Japan have experienced even a steeper decline, as shown on ***Figure 3.6***.

Figure 3.6: Annual Air Arrivals to Guam and Hawaii from Japan: 1996-2010



Source: Guam Visitors Bureau; Hawaii Department of Business, Economic Development, and Tourism

As of 2008, 89% of Japanese arrivals stayed four or fewer nights (62% stayed three or fewer nights), producing a length of stay slightly shorter than the overall market average. In addition – a full 88% of Japanese arrivals quoted “pleasure” as their purpose of travel, with another 5% selecting honeymoon or wedding, and 3% selecting golf. In summary, nearly all air arrivals from Japan to Guam are discretionary travelers – a profile which results in significant volatility.

From ***Table 3.2*** above, note that the 2010 Japan arrival total of 75% is the lowest of the selected period (and is the lowest dating back to at least 1995). Also, note that this low point still represented a stable 5.4% of all Japan international outbound trips in 2010 – consistent with prior years. One can consider this trend, which will intensify over a time, a “canary in the coal mine" when diagnosing future growth trends in Japanese airline traffic – and Japanese demographics in general, as shown in ***Table 3.3***.

Table 3.3: Actual/Projected Population of Japan: 1990-2030

	1990	1995	2000	2005	2010	2015	2020	2025	2030
Total Japan population (000s)	123,611	125,570	126,926	127,768	127,126	125,430	122,735	119.270	115,224
Five-year change		1.6%	1.1%	0.7%	-0.5%	-1.3%	-2.1%	-2.8%	-3.4%

Source: Japan Institute of Population and Social Security Research

This projected steep drop in Japanese population has potentially dire consequences on Guam's largest source of tourism. In the short-term, population declines should be gradual enough that enhanced marketing efforts and projected increases in GDP will likely keep overall Japan-originating volumes constant or near-constant. However, as the decline accelerates in the ten-to-twenty year time horizon, it will be challenging to maintain current arrival levels.

This population decline is projected in spite of a significant increase in Japanese life expectancy (2009 - 86.4 yrs. female/79.6 yrs. male). Coupled with a steadily declining birth rate, this will result in the most aged major society in the world by the middle of this century, as shown in ***Table 3.4***.

Table 3.4: Age Breakdown of Actual/Projected Japan Population: 1950-2050

	1950	2005	2009	2030	2050
0-14 years	35.4%	13.7%	13.3%	9.7%	8.6%
15-64 years	59.6%	65.8%	63.9%	58.5%	51.8%
65+ years	4.9%	20.1%	22.7%	31.8%	39.6%

Source: Japan Ministry of Internal Affairs and Communication, Statistics Bureau

By 2050, Japan's population is projected to be 30% lower than its recent peak, **with 40% of its people 65 years old or greater**. This portends even greater declines in the back half of this century if birth rate does not increase.

3.3.2.1 Summary - Japan

The structural shifts in Japanese demographics are the primary driver in our 20-year forecast. In addition, Japanese GDP per capita is projected to increase less than two percent throughout our forecast period. As such, the primary challenge will be to hold Japan-originating traffic constant (or perhaps generate minimal increases) in the short-term – and to minimize potential traffic losses in the longer term.

Our Japan-demand Base forecast reflects these trends. Arrivals increase slightly through 2020 before beginning a gradual decline through the back half of the forecast period – resulting in an aggregate 0.2% CAGR through 2030. Our upside scenario, while tracking the same general trend, maintains slight growth throughout the entire period (0.6% CAGR over the period), while our downside scenario shows traffic declines from the start, generating an aggregate CAGR of -0.8%. Regardless of which scenario eventually transpires, the era of Japan providing 75% of air arrivals to Guam is likely almost over (our three scenarios project the figure at between 45%

and 54% by 2030). In summary - maintaining 2010 traffic volumes from what will transition into a declining market will represent a significant challenge.

3.3.3 Korea

While Korea has consistently generated the second largest amount of air arrivals onto Guam, its numbers have been volatile over the past decade. However, Guam's share of total Korean international outbounds has recently remained quite constant – suggesting that the volatility has been driven by the macro Korean outbound market, as shown in ***Table 3.5***.

Table 3.5: Air Arrival Data from Korea: 2000-2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Arrivals from Korea (000s)	87	90	128	87	90	109	117	123	111	83	135
% of total air arrivals to Guam	6.8%	8.0%	12.4%	10.2%	8.0%	9.2%	9.9%	10.4%	10.1%	7.9%	11.3%
% of total Korea intl. outbounds	1.8%	1.7%	2.0%	1.4%	1.1%	1.2%	1.1%	1.0%	1.0%	1.0%	1.2%

Source: Guam Visitors Bureau; Korea Tourism Organization

As of 2008, 87% of Korean arrivals stayed four or fewer nights, although only 37% stayed three nights or fewer – a number tangibly smaller than Japan. While just under 90% of travelers identified pleasure or related as the reason for their journey to Guam, there was a slight convention component (5%) not seen in Japanese arrivals. In summary, as with demand from Japan, the discretionary nature of the Korea-originating traveler drives significant volatility.

Korea is also projected to reach a population inflexion point towards the end of our forecast period - although likely later and much less steep than in Japan, as shown in ***Table 3.6***. This will allow for a more sustained growth profile throughout the period.

Table 3.6: Actual/Projected Population of Korea: 1990-2030

	1990	1995	2000	2005	2010	2015	2020	2025	2030
Total Korea population (000s)	42,869	45,093	47,008	48,138	48,910	49,567	49,892	49,901	49,560
Five-year change		5.2%	4.2%	2.4%	1.6%	1.3%	0.7%	0.0%	-0.7%

Source: World Bank, IMF, United Nations estimates

In addition, Korea's per capita GDP is forecast to grow more robustly than Japan through most of the forecast period, providing the engine for more substantive traffic growth, as shown in ***Table 3.7***.

Table 3.7: Projected Per Capita GDP Growth Rate: Korea vs. Japan

	2015	2020	2025	2030
Korea	3.7%	3.2%	2.8%	2.4%
Japan	1.7%	0.5%	0.3%	0.3%

Source: Multiple sources compiled through USDA Economic Research

3.3.3.1 Summary – Korea

The combination of slight population growth and moderate GDP expansion drives a 20-year arrivals CAGR of 1.4% in our Base case, 2.0% in our Upside case, and 1.6% in our Downside case. This growth is more heavily weighted towards the first part of the forecast period, in line with the population and GDP projections detailed above.

3.3.4 China

With traffic from Japan and Korea likely producing minimal growth through our forecast period, additional sources of demand will be crucial. The primary source of incremental demand is likely to come from China.

Current arrival figures from China are in the 5,000 range (per GVB estimates), generated from charter and other non-traditional operations. However, the commencement of a visa waiver program – along with a corresponding launch of non-stop air service – is expected to release what is assumed to be a large amount of latent demand, as shown in ***Table 3.8***.

It is expected that a full-fledged visa waiver program will be launched at some point early during our forecast period (our Upside/Base/Downside scenarios assume 2012, 2014, and 2017 respectively). We assume that traffic and air service will gradually increase over a period of years before hitting a run-rate demand figure. In developing our forecasts, we have incorporated run-rate demand estimates provided to us by the GVB.

Table 3.8: Forecast Assumptions: China Arrival Growth Projections

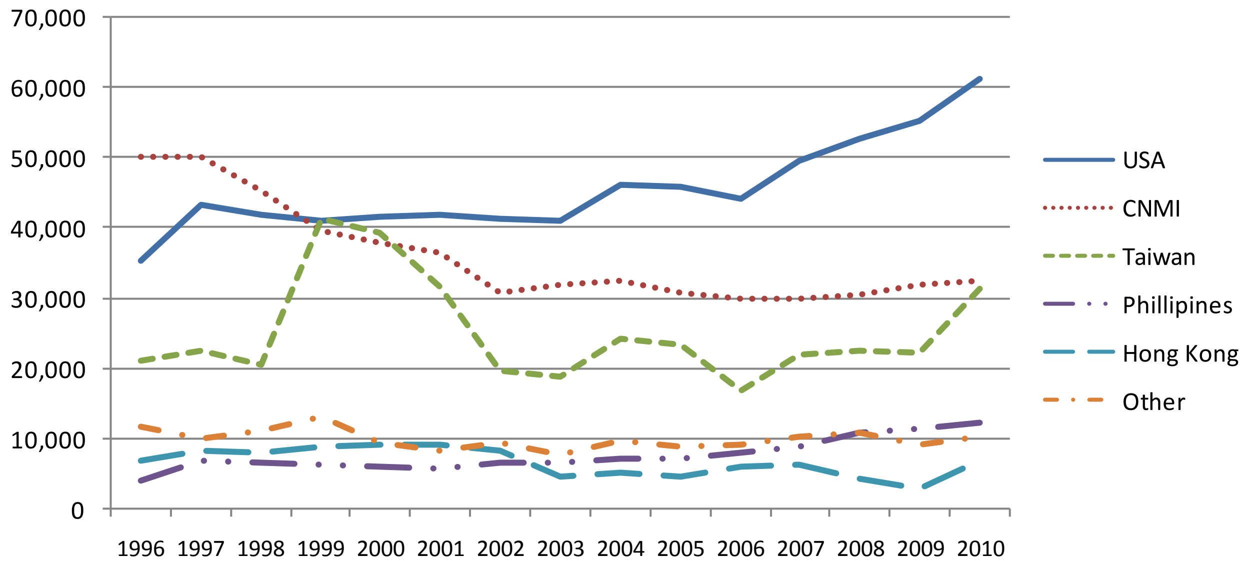
Scenario	Assumed visa waiver	Ramp-up period (yrs.)	Run-rate demand	Post-run rate growth
Base	2014	7	225,000	4%
Upside	2012	5	275,000	5%
Downside	2017	10	175,000	2%

It should be noted that these projections are subject to considerable change, and that deviations from the assumptions above can provide significant fluctuations in our forecast figures.

3.3.5 Other Markets

While Japan and Korea have consistently generated 85%+ of arrivals onto Guam, a handful of other demand sources produce tens of thousands of arrivals each year, as shown on ***Figure 3.7***.

Figure 3.7: Air Arrivals from Other Countries: 1996-2010



Source: Guam Visitors Bureau

While these totals represent a small piece of the total Guam arrival portfolio, a couple of them represent the only real non-leisure demand sources onto the island. Only 22% of the 2008 arrivals from the U.S. were classified as "leisure", with nearly 70% generated by business, government/military, or family (VFR) related travel. Likewise, travel from the CNMI region was driven by business and VFR related arrivals.

Our forecasts for these secondary demand sources reflect projected macroeconomic and demand growth across each region.

3.3.6 Guam Point of Origin/Military Transition

While the proportion of GUM traffic originating internationally clearly reflects Guam's primary status as a destination, there exists a tangible base level of locally generated traffic. In the coming years, the planned relocation of military operations from Japan to Guam will provide both one-time and run-rate support to this traffic source, as shown in ***Table 3.9***. Note that, for purposes of this discussion, we are classifying all traffic related to the military buildup as GUM point of origin (POO). For statistical purposes, we have classified the existing difference between total deplanements and international arrivals as "base level" GUM POO traffic.

Table 3.9: Base GUM POO Traffic: 2005-2010

	2005	2006	2007	2008	2009	2010
Total deplanements	1,330,843	1,325,617	1,308,080	1,220,149	1,170,295	1,320,230
International POO	1,184,928	1,183,943	1,180,416	1,091,907	1,044,491	1,187,831
Guam POO	145,915	141,674	127,664	128,242	125,804	132,399
Guam POO % of total	11.0%	10.7%	9.8%	10.5%	10.7%	10.0%

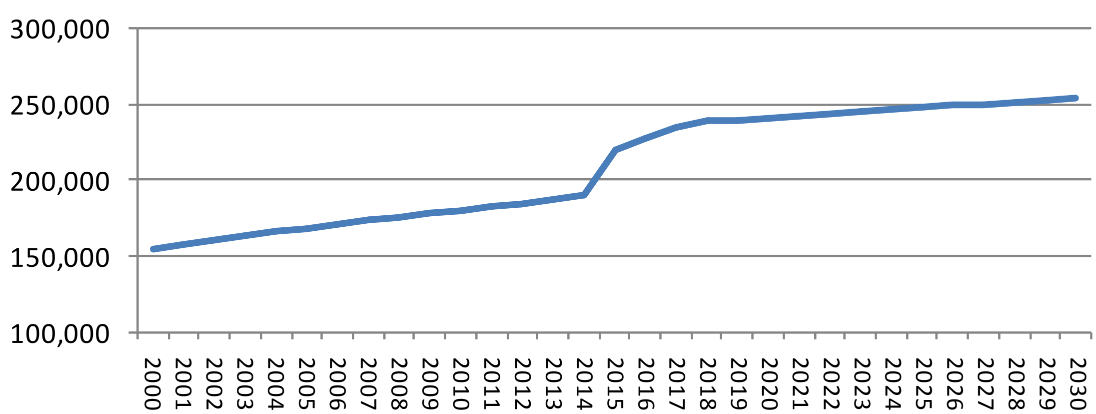
Source: Guam Visitors Bureau, Guam International Airport Authority

For purposes of projecting incremental traffic driven by the planned military relocation, we have assumed the following from the 2030 Guam Transportation Plan, with dates adjusted to reflect recent intelligence:

- Construction/development period: 2015-17
- One-time contractors (2013-15 only): 16,000
- New military population: 8,600 active duty personnel, 9,900 additional dependents
- Additional support and related population: varies by year, ranging from 11,000 to nearly 23,000

These additions will drive a step-function increase in Guam population, which should remain into perpetuity given the increase in locally-based troops (all data from 2030 Guam Transportation Plan), as shown on ***Figure 3.8***.

Figure 3.8: Projected Population of Guam, 2000-2030



Source: Guam 2030 Transportation Plan, CIA World Fact book via Indexmundi website

Our forecasts for Guam POO traffic (for all three scenarios) reflect these military buildup projections, as well as the aforementioned growth scenarios in the base Guam demand subset.

3.4 Forecast Summary

3.4.1 Enplanements

Each of our forecast scenarios generates a varying smoothed growth pattern from existing sources of demand, with incremental demand from China and the military transition layered on top. In reality, external shocks and cyclical economic trends will likely drive consistent volatility (beginning in 2011 with Japan earthquake/tsunami impact).

In the Base scenario, non-China demand sources generate a CAGR of 1.4% over the twenty-year forecast period – including 0.2% from Japan and 1.4% from Korea. By the end of the period, Japan's growth rate turns negative and Korea's slows considerably, driven by the demographic assumptions detailed previously. The China visa waiver program is assumed to launch in 2014 - coupled with a robust marketing plan, this program drives a seven-year burst of growth through 2020 before stabilizing into a run-rate pattern. Conditions required to meet the Base scenario are detailed in ***Table 3.1*** – but, in summary, long-term historical norms are assumed for frequencies of external, economic, and political shocks.

In the Upside scenario, non-China demand sources generate a CAGR of 1.9% over the forecast period, including 0.6% from Japan and 2.0% from Korea. In this scenario, the growth rate from all points of origin remains positive throughout the period, albeit declining over time from Japan and Korea. The China visa waiver program is assumed to launch in 2012 and ramp more quickly – providing a more intense five-year burst of growth. Conditions required to drive this scenario include optimistic assumptions across all external drivers. In addition, a moderate period of infrastructure development (e.g. hotels and related) would likely be required to accommodate these projections.

In the Downside scenario, non-China demand sources generate a CAGR of 0.5% over the forecast period. This includes a -0.8% CAGR in arrivals from Japan, which suffers an accelerating decline trend from the outset of our forecast period. The China visa waiver program is assumed to launch in 2017, with traffic ramping more gradually over a ten-year time horizon.

Table 3.10 shows a summary of the enplanements forecast for the three scenarios.

Table 3.10: Summary of Enplanements Forecast

	Base	Upside	Downside
2015	1,581,640	1,771,500	1,426,984
2020	1,804,341	2,001,854	1,517,039
2025	1,922,258	2,211,133	1,594,700
2030	2,055,547	2,460,475	1,629,200

3.4.2 Operations

To best ensure continuity with actual data being reported by the GIAA, we have broken out aircraft operations by signatory (commercial) and non-signatory (GA, private, local, etc…) operator. While the status of individual carriers may vary from year-to-year, we are treating signatory carriers as commercial air carriers for purposes of this section – and use the terms interchangeably in this discussion.

Over the long-term, signatory operations volume is driven primarily by passenger demand and aircraft size (gauge). We have spent the previous section discussing and developing passenger demand estimates for the next twenty years – which are detailed in output tables in the coming pages. In general, we expect aircraft gauge to remain reasonably constant throughout the period within each individual demand group (e.g. Japan, Korea, etc.). While it is plausible that a new aircraft type or change in fleet mix strategy could alter this dynamic, Guam does not fit a traditional profile to receive immediate service from a new fleet type – and, even if it does, it's likely that aircraft gauge will not change significantly.

The forecast operations also reflect the expected increase in demand from China. The full realization of this demand will require non-stop service from China, which is incorporated into our forecast. Note that the stage length from Beijing (2,506 mi.) is in the same general range as from Tokyo (1,558 mi.) and Seoul (1,995 mi.), making it likely that similarly sized aircraft will be utilized – particularly in the ramp-up phase of service. The increased weighting of service in this stage length category will drive a general increase in our passengers/operation ratio throughout the period.

While we expect long-term signatory operations to generally conform to projected demand – we do incorporate short-term bursts of increased traffic within existing service patterns (short-term load factor spikes). For instance, the military transition from Okinawa will drive a period of increased passenger demand – which may or may not result in immediately enhanced service levels.

For non-signatory operations – leisure, general/private aviation, etc… - we have assumed annual growth rates in line with previous TAF and macroeconomic forecasts, with Upside/Downside scenarios developed to handle long-term volatility.

Table 3.11 shows a summary of the operations forecast for the three scenarios.

Table 3.11: Summary of Operations Forecast

	Base	Upside	Downside
2015	50,798	54,023	47,550
2020	56,963	62,167	50,625
2025	61,340	69,643	52,502
2030	66,176	78,326	54,097

3.5 Forecast Output

Detailed enplanement, cargo, and operations forecasts are shown in ***Tables 3.12 through 3.18*** and in ***Figures 3.9 and 3.10***.

3.5.1 Enplanements

Table 3.12: Total Enplanements

	Base	Upside	Downside	Base yoy	Up yoy	Down yoy
2001	1,294,690					
2002	1,196,227			(7.6%)		
2003	1,001,580			(16.3%)		
2004	1,250,078			24.8%		
2005	1,333,520			6.7%		
2006	1,327,145			(0.5%)		
2007	1,312,214			(1.1%)		
2008	1,214,697			(7.4%)		
2009	1,167,430			(3.9%)		
2010	1,316,135			12.7%		
2011	1,265,188	1,337,013	1,191,678	(3.9%)	1.3%	(9.7%)
2012	1,335,559	1,427,378	1,262,388	5.6%	6.8%	5.9%
2013	1,377,375	1,513,253	1,329,410	3.1%	6.0%	5.3%
2014	1,444,218	1,599,256	1,335,366	4.9%	5.7%	0.4%
2015	1,581,640	1,771,500	1,426,984	9.5%	10.8%	6.9%
2016	1,641,977	1,864,025	1,445,295	3.8%	5.2%	1.3%
2017	1,700,046	1,914,506	1,494,691	3.5%	2.7%	3.4%
2018	1,717,229	1,925,036	1,484,587	1.0%	0.6%	(0.7%)
2019	1,760,947	1,963,089	1,500,990	2.5%	2.0%	1.1%
2020	1,804,341	2,001,854	1,517,039	2.5%	2.0%	1.1%
2021	1,827,052	2,041,173	1,532,571	1.3%	2.0%	1.0%
2022	1,850,029	2,081,539	1,547,971	1.3%	2.0%	1.0%
2023	1,873,479	2,123,207	1,563,403	1.3%	2.0%	1.0%
2024	1,897,566	2,166,401	1,578,995	1.3%	2.0%	1.0%
2025	1,922,258	2,211,133	1,594,700	1.3%	2.1%	1.0%
2026	1,947,402	2,257,281	1,610,359	1.3%	2.1%	1.0%
2027	1,973,244	2,305,159	1,614,664	1.3%	2.1%	0.3%
2028	2,000,003	2,355,074	1,619,352	1.4%	2.2%	0.3%
2029	2,027,337	2,406,716	1,624,121	1.4%	2.2%	0.3%
2030	2,055,547	2,460,475	1,629,200	1.4%	2.2%	0.3%

Figure 3.9: Annual Enplanements

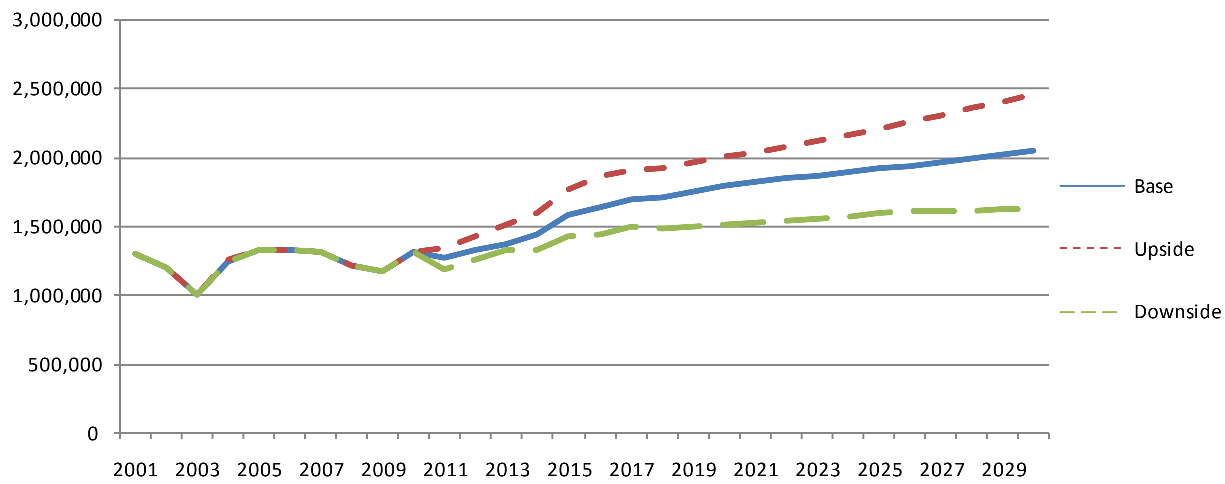


Table 3.13: Total Enplanements: International Only

	Base	Upside	Downside	Base yoy	Up yoy	Down yoy
2001*	1,177,314					
2002*	1,078,851			(8.4%)		
2003	884,649			(18.0%)		
2004	1,132,256			28.0%		
2005	1,194,870			5.5%		
2006	1,230,661			3.0%		
2007	1,217,618			(1.1%)		
2008	1,128,229			(7.3%)		
2009	1,085,165			(3.8%)		
2010	1,257,000			15.8%		
2011	1,202,336	1,273,562	1,129,425	(4.3%)	1.0%	(10.4%)
2012	1,269,576	1,360,132	1,197,656	5.6%	6.8%	6.0%
2013	1,308,510	1,442,397	1,262,498	3.1%	6.0%	5.4%
2014	1,372,452	1,524,706	1,266,304	4.9%	5.7%	0.3%
2015	1,505,905	1,692,083	1,354,794	9.7%	11.0%	7.0%
2016	1,562,277	1,779,655	1,370,047	3.7%	5.2%	1.1%
2017	1,616,405	1,825,121	1,416,475	3.5%	2.6%	3.4%
2018	1,629,550	1,830,441	1,403,377	0.8%	0.3%	(0.9%)
2019	1,669,164	1,863,120	1,416,790	2.4%	1.8%	1.0%
2020	1,708,365	1,896,320	1,429,835	2.3%	1.8%	0.9%
2021	1,726,740	1,929,817	1,442,300	1.1%	1.8%	0.9%
2022	1,745,230	1,964,087	1,454,564	1.1%	1.8%	0.9%
2023	1,764,036	1,999,376	1,466,792	1.1%	1.8%	0.8%
2024	1,783,322	2,035,898	1,479,111	1.1%	1.8%	0.8%
2025	1,803,049	2,073,653	1,491,473	1.1%	1.9%	0.8%
2026	1,823,061	2,112,509	1,503,721	1.1%	1.9%	0.8%
2027	1,843,571	2,152,732	1,504,520	1.1%	1.9%	0.1%
2028	1,864,793	2,194,613	1,505,606	1.2%	1.9%	0.1%
2029	1,886,376	2,237,826	1,506,675	1.2%	2.0%	0.1%
2030	1,908,614	2,282,740	1,507,952	1.2%	2.0%	0.1%

* 2001/02 international breakout is estimated

3.5.2 Transit passengers

Table 3.14: Total Transit Passengers (Arriving)

	Base	Upside	Downside	Base yoy	Up yoy	Down yoy
2001	254,472					
2002	215,491			(15.3%)		
2003	221,940			3.0%		
2004	197,699			(10.9%)		
2005	196,864			(0.4%)		
2006	189,483			(3.7%)		
2007	186,698			(1.5%)		
2008	175,992			(5.7%)		
2009	144,736			(17.8%)		
2010	181,028			25.1%		
2011	173,658	183,555	163,528	(4.1%)	1.4%	(9.7%)
2012	183,571	200,755	173,474	5.7%	9.4%	6.1%
2013	189,563	216,324	182,936	3.3%	7.8%	5.5%
2014	203,026	231,981	183,971	7.1%	7.2%	0.6%
2015	212,185	247,613	184,831	4.5%	6.7%	0.5%
2016	220,825	262,291	185,734	4.1%	5.9%	0.5%
2017	229,152	268,577	194,440	3.8%	2.4%	4.7%
2018	237,336	274,893	197,933	3.6%	2.4%	1.8%
2019	245,455	281,328	201,358	3.4%	2.3%	1.7%
2020	253,529	287,910	204,734	3.3%	2.3%	1.7%
2021	257,443	294,620	208,038	1.5%	2.3%	1.6%
2022	261,416	301,529	211,324	1.5%	2.3%	1.6%
2023	265,480	308,675	214,614	1.6%	2.4%	1.6%
2024	269,656	316,091	217,927	1.6%	2.4%	1.5%
2025	273,943	323,782	221,255	1.6%	2.4%	1.5%
2026	278,319	331,735	224,577	1.6%	2.5%	1.5%
2027	282,820	339,996	225,587	1.6%	2.5%	0.4%
2028	287,477	348,611	226,655	1.6%	2.5%	0.5%
2029	292,244	357,541	227,739	1.7%	2.6%	0.5%
2030	297,164	366,843	228,870	1.7%	2.6%	0.5%

Table 3.15: Total Transit Passengers (Arriving) – International

	Base	Upside	Downside	Base yoy	Up yoy	Down yoy
2008	149,906					
2009	125,223			(16.5%)		
2010	155,653			24.3%		
2011	149,160	157,661	140,459	(4.2%)	1.3%	(9.8%)
2012	157,675	174,137	149,002	5.7%	10.5%	6.1%
2013	162,821	189,044	157,129	3.3%	8.6%	5.5%
2014	175,812	204,034	158,018	8.0%	7.9%	0.6%
2015	184,516	219,010	158,757	5.0%	7.3%	0.5%
2016	192,772	233,156	159,533	4.5%	6.5%	0.5%
2017	200,758	238,948	168,154	4.1%	2.5%	5.4%
2018	208,622	244,786	171,583	3.9%	2.4%	2.0%
2019	216,430	250,746	174,954	3.7%	2.4%	2.0%
2020	224,199	256,855	178,283	3.6%	2.4%	1.9%
2021	227,818	263,097	181,550	1.6%	2.4%	1.8%
2022	231,499	269,533	184,802	1.6%	2.4%	1.8%
2023	235,268	276,198	188,057	1.6%	2.5%	1.8%
2024	239,145	283,121	191,331	1.6%	2.5%	1.7%
2025	243,127	290,308	194,619	1.7%	2.5%	1.7%
2026	247,199	297,749	197,901	1.7%	2.6%	1.7%
2027	251,391	305,486	198,869	1.7%	2.6%	0.5%
2028	255,730	313,558	199,889	1.7%	2.6%	0.5%
2029	260,177	321,934	200,924	1.7%	2.7%	0.5%
2030	264,770	330,666	202,002	1.8%	2.7%	0.5%

3.5.3 Operations

Table 3.16: Operations Forecasts

Total operations (For other operations, fly overs etc post 2009 per FAA count see Appendix last page)

	Base	Upside	Downside	Base yoy	Up yoy	Down yoy
2006	36,569			8.1%		
2007	38,051			4.1%		
2008	39,982			5.1%		
2009	42,771			7.0%		
2010	45,606			6.6%		
2011	46,192	46,832	45,547	1.3%	2.7%	(0.1%)
2012	47,770	48,939	46,442	3.4%	4.5%	2.0%
2013	48,822	50,982	47,265	2.2%	4.2%	1.8%
2014	50,449	53,090	47,912	3.3%	4.1%	1.4%
2015	51,125	54,374	47,895	1.3%	2.4%	(0.0%)
2016	52,909	56,811	48,922	3.5%	4.5%	2.1%
2017	54,697	58,941	50,274	3.4%	3.7%	2.8%
2018	55,847	60,471	50,757	2.1%	2.6%	1.0%
2019	57,039	62,157	51,381	2.1%	2.8%	1.2%
2020	58,175	63,807	51,929	2.0%	2.7%	1.1%
2021	59,657	65,779	52,707	2.5%	3.1%	1.5%
2022	61,243	68,082	53,710	2.7%	3.5%	1.9%
2023	62,885	70,489	54,739	2.7%	3.5%	1.9%
2024	64,361	72,764	55,599	2.3%	3.2%	1.6%
2025	65,900	75,151	56,492	2.4%	3.3%	1.6%
2026	67,723	77,898	57,608	2.8%	3.7%	2.0%
2027	69,615	80,773	58,658	2.8%	3.7%	1.8%
2028	71,581	83,786	59,743	2.8%	3.7%	1.9%
2029	73,617	86,937	60,861	2.8%	3.8%	1.9%
2030	75,732	90,239	62,015	2.9%	3.8%	1.9%

Other operations, flyovers, military fly by, engine runs, etc. can be found in ***Appendix I***.

Figure 3.10: Operations Forecasts

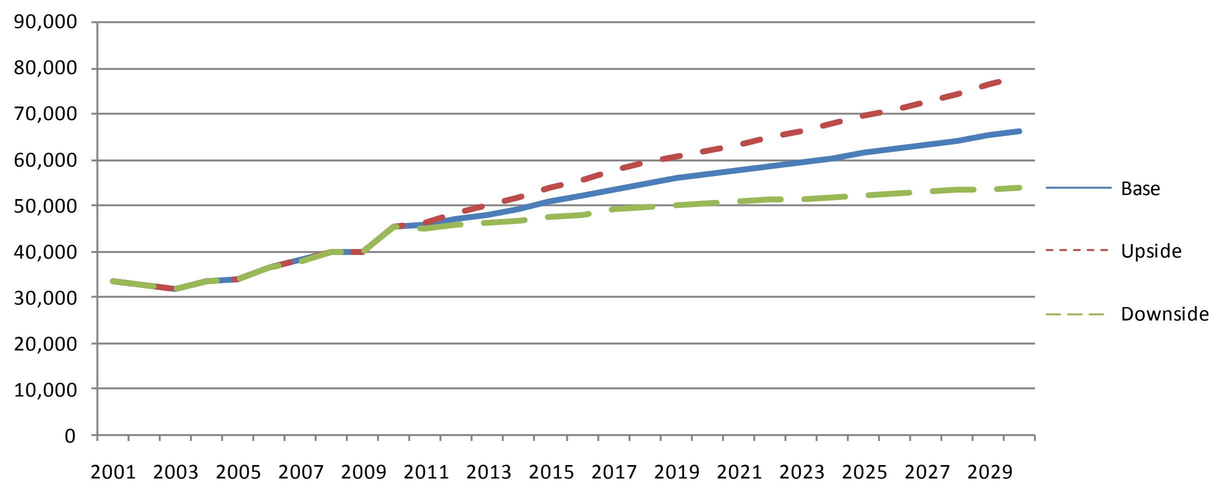


Table 3.17: Total Operations – Signatory Carriers

	Base	Upside	Downside	Base yoy	Up yoy	Down yoy
2006	23,963					
2007	23,354			(4.6%)		
2008	24,304			(0.7%)		
2009	21,492			(12.2%)		
2010	24,474			0.0%		
2011	24,225	24,652	23,794	(1.0%)	0.7%	(2.8%)
2012	25,131	25,859	24,240	3.7%	4.9%	1.9%
2013	25,476	26,955	24,585	1.4%	4.2%	1.4%
2014	26,299	27,994	24,675	3.2%	3.9%	0.4%
2015	27,467	29,525	25,340	4.4%	5.5%	2.7%
2016	28,271	30,673	25,661	2.9%	3.9%	1.3%
2017	29,304	31,727	26,534	3.7%	3.4%	3.4%
2018	30,174	32,655	26,982	3.0%	2.9%	1.7%
2019	30,691	33,208	27,135	1.7%	1.7%	0.6%
2020	31,203	33,767	27,282	1.7%	1.7%	0.5%
2021	31,533	34,328	27,419	1.1%	1.7%	0.5%
2022	31,865	34,901	27,554	1.1%	1.7%	0.5%
2023	32,202	35,488	27,689	1.1%	1.7%	0.5%
2024	32,547	36,095	27,828	1.1%	1.7%	0.5%
2025	32,900	36,720	27,968	1.1%	1.7%	0.5%
2026	33,256	37,361	28,108	1.1%	1.7%	0.5%
2027	33,621	38,024	28,152	1.1%	1.8%	0.2%
2028	33,998	38,713	28,203	1.1%	1.8%	0.2%
2029	34,381	39,423	28,255	1.1%	1.8%	0.2%
2030	34,775	40,159	28,312	1.1%	1.9%	0.2%

* Includes data for Cape Air in all years, even though they were only signatory for a portion of the period

3.5.4 Cargo

Table 3.18: GUM Cargo Forecasts

Total deplaned/enplaned cargo (000s)

	Deplaned	Enplaned	Depl YOY	Enpl YOY
2001	30,738	35,581		
2002	34,767	23,686	13.1%	(33.4%)
2003	39,011	33,524	12.2%	41.5%
2004	42,544	34,285	9.1%	2.3%
2005	39,402	32,206	(7.4%)	(6.1%)
2006	34,375	30,999	(12.8%)	(3.7%)
2007	36,782	27,555	7.0%	(11.1%)
2008	37,336	24,658	1.5%	(10.5%)
2009*	35,884	18,756	(3.9%)	(23.9%)
2010*	32,726	15,056	(8.8%)	(19.7%)
2011	33,337	15,336	1.9%	1.9%
2012	33,967	15,612	1.9%	1.8%
2013	34,452	15,913	1.4%	1.9%
2014	35,102	16,186	1.9%	1.7%
2015	39,283	18,092	11.9%	11.8%
2016	40,572	18,734	3.3%	3.6%
2017	41,973	19,368	3.5%	3.4%
2018	42,831	19,787	2.0%	2.2%
2019	43,223	20,065	0.9%	1.4%
2020	43,613	20,340	0.9%	1.4%
2021	43,920	20,615	0.7%	1.4%
2022	44,230	20,893	0.7%	1.3%
2023	44,544	21,171	0.7%	1.3%
2024	44,863	21,452	0.7%	1.3%
2025	45,188	21,733	0.7%	1.3%
2026	45,517	22,016	0.7%	1.3%
2027	45,852	22,302	0.7%	1.3%
2028	46,195	22,592	0.7%	1.3%
2029	46,543	22,884	0.8%	1.3%
2030	46,898	23,180	0.8%	1.3%

* 2009/10 contain months with estimated data

4. FACILITY REQUIREMENTS AND RECOMMENDATIONS

4.1 Airfield

4.1.1 Introduction

GUM's two runways, Runway 6L-24R and Runway 6R-24L, dimension 10,015 feet by 150 feet and 10,014 feet by 150 feet, respectively. As noted in the facility requirements, the runway system provides sufficient capacity to serve forecast activity throughout the planning horizon with minimal operational delay. Out of the necessity to provide redundant airfield capacity for Andersen Air Force Base in the event of an accident, the previous Airport Master Plan recommended the following runway extensions:

- Extension of Runway 6L-24R by 1,000 feet to the west
- Extension of Runway 6L-24R by 1,000 feet to the east
- Extension of Runway 6R-24L by 1,000 feet to the west
- Extension of Runway 6R-24L by 2,000 feet to the east

Since the last Master Plan, GUM has completed the 2,000 foot eastward extension to Runway 6R-24L, however, the first 1,004 feet of the runway are displaced and only accommodates Runway 24L departures and Runway 6R arrivals. The most recently approved Airport Layout Plan (ALP) shows that this displaced threshold will become an arrival threshold in the future. The two runway extensions for Runway 6L-24R are currently under construction, leaving the Runway 6R-24L westward extension under planning/design. A current aerial view of the airfield is presented in ***Figure 4.1***.

One of the main off-airport impacts that currently exists and will be further exacerbated by the future airfield expansion is that the existing and future Runway 6R approach Runway Protection Zone (RPZ) and future Runway 24L departure RPZ extend outside of the airport property line. Within the RPZ, there are several incompatible land-uses that would need to be relocated outside of the RPZ. Of note is a gas station and restaurant. The incompatible land-uses are likely holding up the implementation of the Runway 6R-24L runway extension.

As a result of the proposed airfield expansion, it is recommended that all properties within the RPZ be purchased and demolished. The Parsons Team expects that in the near term the FAA will place additional pressure on airports to maintain complete ownership of the entire area within the RPZ to eliminate incompatible land uses.

Figure 4.1: Airfield Overview

4.1.2 Development Plan:

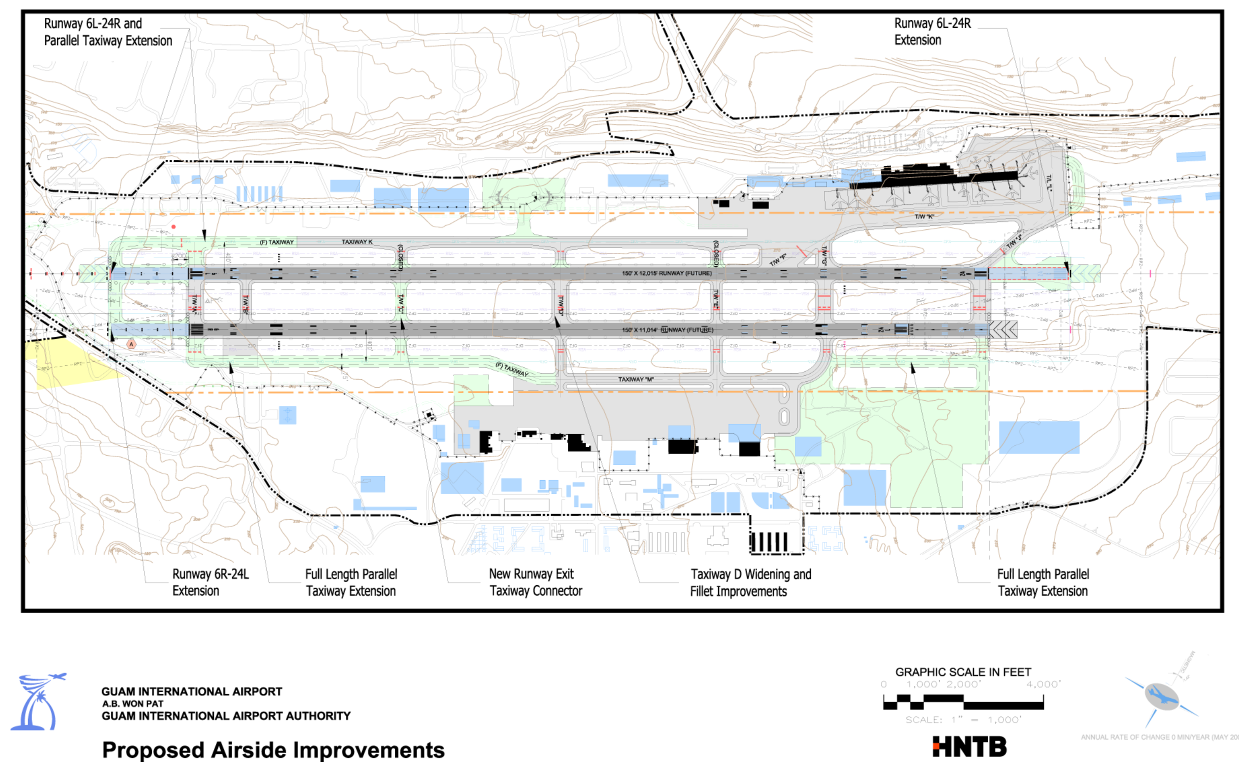
As noted in Facility Requirements, the Parsons Team has identified several airfield projects that could be implemented to improve operational flow. These recommended improvements include:

- An additional runway exit taxiway could be located between Taxiways D and B. This will allow arrivals in west flow to exit the runway more quickly, which will reduce the runway occupancy time.
- For operational redundancy, Taxiway G should be extended to the full length of Runway 6R-24L.
- The widening the pavement and fillets for taxiway connector D to accommodate ADG V aircraft.

As illustrated in Figure 4.2, The Parsons Team developed proposed enhancements to the airport geometry that address the facility requirement recommendations. A proposed runway exit taxiway connector, Taxiway C is sighted between existing runway exit taxiway connectors B and D. This 90 degree exit taxiway enables aircraft landing on Runway 24L to exit the runway more quickly than rolling out to Taxiway B. A high-speed taxiway was not proposed because of the added cost of design and construction and the minimal benefits it would provide in terms of reduction of runway occupancy time. Taxiway C is designed to accommodate ADG-V aircraft.

Another proposed improvement that is also depicted in ***Figure 4.2*** is the full-length extension of the south parallel Taxiway G. Taxiway G currently terminates at Taxiway D to the west and curves into northbound Taxiway G at the east. The proposed extension maintains a minimum of 400 feet of separation from the centerline of Runway 6R-24L to the centerline of the taxiway. This enables unrestricted ADG-V aircraft movements on Taxiway G and provides needed operational redundancy at the airport.

Figure 4.2: Airside Improvements



The final proposed airfield improvement is the widening of the pavement and fillet for Taxiway D between Runway 6R-24L and Runway 6L-24R. The widened fillet, as depicted in ***Figure 4.2*** allows ADG-V aircraft to be able to use Taxiway D to exit the runway. Judgmental over-steering now would not be required for ADG-V aircraft taxiing onto Taxiway D.

In addition to the improvements recommended from the facility requirements, ***Figure 4.2*** also depicts the proposed extensions to Runway 6L-24R and Runway 6R-24L. These extensions were recommended as a result of the B-2 Bomber crash at Anderson Air Force base in 2008 which closed the base. The extended runways at GUM provide a nearby alternative in the event such an emergency occurs again. The extensions to both ends of Runway 6L-24R are currently under construction. This project involves relocating the 24R arrival threshold by approximately 1,000 feet to the east. There is no additional expansion to the taxiway system at the east end of the runway to accommodate the threshold relocation. Aircraft requesting to use the full length of Runway 6L-24R for departure operations will back-taxi along the runway and perform a U-turn at the end of the runway. It is expected that few aircraft will request to depart full length on the runway—which is the primary reason why the taxiway system does not connect to the end of the runway.

The approach to existing Runway 24R is visual and will remain so in the future. As part of the threshold relocation, certain NAVAID equipment will need to be relocated including: the precision approach path indicator (PAPI) and the Runway 6L localizer. The west end of Runway 6L is also currently under construction and when finished will be extended approximately 1,000 feet to the west for a total runway length of 12,015 feet. Taxiway K will be extended to the west to tie into the runway extension. Associated with this threshold relocation, certain NAVAID equipment will need to be relocated including: The glideslope antenna, medium approach lighting system with runway alignment indicator lights (MALSR), and the PAPI.

There is a planned 1,000 foot westward extension of Runway 6R-24L in addition to the runway extension projects currently under construction. The existing arrival threshold will remain in its current location and a displaced departure threshold will begin 1,000 feet west. Some of the existing above ground MALSR lights will be converted to in-pavement MALSR lights to accommodate the displaced threshold. The combined expansions will sufficiently accommodate all forecast aircraft serving GUM throughout the planning horizon.

In order to maintain compliance with the congressional mandate of having a standard Runway Safety Area (RSA), the airfield will operate with declared distances. Declared distances are defined as the distances the airport owner declares available for the airplane's takeoff run, takeoff distance, accelerate stop distance, and landing distance requirements. These elements are defined as:

- Takeoff Run Available (TORA) – The runway length declared available and suitable for the ground run of an airplane taking off
- Takeoff Distance Available (TODA) – The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA
- Accelerate-Stop Distance Available (ASDA) – The runway plus stopway length declared available and suitable for the acceleration and deceleration of an airplane aborting takeoff
- Landing Distance Available (LDA) – The runway length declared available and suitable for a landing airplane

As a result of the proximity of future Runway 6R to Purple Heart Highway, declared distances will be implemented. There are no existing approved declared distances at GUM. ***Table 4.1*** below presents the declared distance requirements that are needed for the existing and future airfield to meet the FAA RSA standard.

Table 4.1: Existing and Future Airfield Proposed Declared Distances

Runway	TORA	TODA	ASDA	LDA
Existing 6R	10,014’	10,014’	10,014’	10,014’
Future 6R	11,014’	11,014’	11,014’	10,014’
Existing 24L	10,014’	10,014’	9,944’	8,940’
Future 24L	11,014’	11,014’	9,944’	9,944’
Existing 6L	10,015’	10,015’	10,015’	10,015’
Future 6L	12,015’	12,015’	12,015’	12,015’
Existing 24R	10,015’	10,015’	10,015’	10,015’
Future 24R	12,015’	12,015’	12,015’	12,015’

Source: Parsons Team Analysis

4.2 Terminal

4.2.1 Introduction

A passenger terminal's primary purpose is to provide safe, efficient, comfortable and convenient transfer of passengers and their baggage. This section determines the space and facility requirements for Guam's passenger terminal to satisfy this purpose and support the forecast passenger traffic demand to 2030. The work describes the existing passenger terminal and facilities, its functional operation, and determines the future development requirements for terminal building space and facilities, and aircraft gates. ***Figure 4.3*** shows the passenger terminal and curb front.

Figure 4.3: View of Passenger Terminal front and the departures drop off roadway

The development requirements have been established by analysis of the forecast demand for passengers, Air Traffic Movements and fleet mix, described in the forecasting report by LaCosta, together with a series of assumptions to reflect the airport characteristics at Guam. Planning standards presented in the International Air Transport Association (IATA) Airport Development Reference Manual (ADRM)[1], the Transportation Research Board (TRB) ACRP[2] report on Terminal Planning, US Department of Homeland Security/ Border and Customs

[1] ATA Airport Development Reference Manual 9th edition

[2] Transportation Research Board- Airport Cooperative Research Programme (ACRP) Report 25, Airport Passenger Terminal Planning and Design- Volume 1 Guidebook

Protection Manual[3] (CBP) and the most recent TSA Guidelines[4] were used to develop the forecast facility requirements.

4.2.2 Inventory

4.2.2.1 Terminal

Figures 4.4 and 4.5 show layout plans of the three main levels of the terminal building and the office level (4). The diagram is color coded by functionality. The terminal consists of approximately 944,000 square feet of space. The architecture of the building, which is a reinforced concrete and steel structure with large panels of glazing cladding the steel framing, is based on a central terminal concept with concourse pier fingers. This allows for centralized processing with air-bridge gates accessed by concourses running east and west. The concept requires passengers to travel relatively long distances to and from the aircraft gates. Moving walkways are located at intervals along the concourses to mitigate the long walking distances to the pier ends. The general condition of the building, which was opened in phases between 1996 and 1998, is generally in good condition overall, though as indicated in the field observations and condition survey reports, there are issues with passenger boarding bridges and washrooms, among others.

Level 1 of the terminal (basement level) contains the inbound baggage handling facilities and baggage hall (connected by stairs and escalators from the Immigration area (CBP) on level 3. There are 5 baggage claim units, additional area for a sixth unit and one oversize baggage claim unit. In addition, Guam Customs and Quarantine Agency (GCQA) offices are located here, as are 24 primary GCQA customs inspection counters[5] and 14 secondary customs inspection stations. (An additional 24 primary and 14 secondary stations located in the east half of the bag claim hall were recently removed from the area due to underutilization and this space is currently unused). This level also includes a general landside passenger lobby housing tourism, ground transportation and car rental counters, as well as a number of other passenger facilities. The passenger lobby leads out through two passages under the Level 2 access road to the arrival curbside and parking area. Other areas on the lower level comprise airport operations, administration and support offices/services, mechanical/electrical systems.

Level 2 (apron level) contains the ticketing lobby with 76 dedicated check-in counters, arranged in a linear format. The counters service ten international airlines and one commuter airline. There are currently no self-service check-in kiosks. Three temporary Transportation Security Administration (TSA) hold baggage screening areas are located between check-in counters 10 to18, 41 to 44 and 66 to 67. Twelve of these counters, 10 to18 and 41 to 44 are blocked from use by the TSA facilities. Baggage conveyors behind the check-in counters lead to a common use outbound baggage make-up area, which comprises 16 dual level and 2 single level baggage make-up stations, and the international transfer baggage screening/handling area.

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[3] US Department of homeland Security/ Border and Customs Protection “Airport Technical Design Standards, Passenger processing Facilities” August 2006

[4] Recommended Security Guidelines for Airport Planning, TSA, May 2011

[5] Guam is outside the United States customs jurisdiction. As such all terminating passengers from all arrival flights go through GCQA inspection

The level also contains airline and airport offices, mechanical, electrical and other airport functional areas, and one bus gate hold-room connected by stairs from Level 3. Stairs, escalators and elevators lead from the ticketing area to the outbound security check on Level 3.

Level 3 (concourse level) contains a small pre-security area with food and beverage, boarding card and TSA outbound security check[6], post security food and beverage and duty free concessions, inbound US Customs and Border Protection Agency (CBP) immigration[7], and the east/west arrival/departure concourses leading to gate departure hold rooms and arrival entry. The level also contains TSA and CBP offices, airline lounges and a maintenance area.

Food and beverage concessions are located in the pre-security area, immediately post the security check area (co-located with duty free concessions) and along the concourses. The outbound security clearance (TSA) comprises 5 x-ray carry–on baggage and 5 walk through passenger screening stations (though discussions with TSA indicated they typically only use 4 lanes due to interference of the elevators adjacent lane 5. There are 48 immigration counters and 18 hold rooms. Hold rooms for gates 8 and 9 are configured to process pre-clearance passengers to the US mainland.

Level 4 (roof level) contains a small area for airport administration/operations offices.

A summary of the various spaces in the terminal broken down by functional uses is provided in ***Table 4.2***.

This table shows that the various area totals, like concession space at about 7%, secure circulation areas at close to 30%, etc., are all within expected norms for an international terminal facility like Guam.

4.2.2.2 Aircraft Stands

Figure 4.5 shows the aircraft stand layout at the terminal. The terminal is served by 18 contact gates. Of these 12 are sized for B747-200 series aircraft (Group V) and 6 for B757 series aircraft (Group IV). All of the contact gates are served by apron drive passenger boarding bridges, except stand 11 which is a walk out stand only for B757 and turbo-prop aircraft. In addition to the contact gates there are three remote stands located to the west of the terminal building and immediately in front of the main cargo (Kunkle) terminal. Two of these stands are sized for B747-200 (Group V) series aircraft while the other stand can accommodate B757 (Group IV) sized aircraft. These remote stands are used infrequently by freighter aircraft. As well, much of the area around these remote stands is currently actually consumed by Ground Service Equipment (GSE), so that in fact it would be difficult to accommodate the largest sized aircraft on any of these positions, generally restricting these to smaller narrow body aircraft.

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[6] The TSA conducts security inspection for all departing passengers and all transit passengers not arriving from the States, which are already screened by TSA at their origins.

[7] CBP inspects all arriving passengers except nonstop flights from the States. It also conducts a pre-clearance of nonstop passengers bound for Honolulu. Transit passengers (except from Honolulu) are also inspected before being allowed to proceed to their connecting gate. However, since there is no need to clear Guam customs, no baggage claim is necessary.

Table 4.2: Current Space Allocation in Existing Terminal

Space	SF	% of Total
Airline Functions		
Ticket Counter (SF)	4,737	0.62%
Ticket Counter (LF)		
Ticket Counter Queuing	5,391	0.70%
Airline Ticket Office	17,553	2.29%
Curbside Baggage Check	0	0.00%
Operations/Maintenance/Storage	41,028	5.35%
Clubs	13,311	1.74%
Subtotal Airline Functions	**82,021**	**10.70%**
Concessions Space		
Food/Beverage	22,205	2.90%
Duty Free	16,125	2.10%
News/Gift/Sundry	9,998	1.30%
Rental Car	3,815	0.50%
Other Revenue	0	0.00%
Subtotal Concessions Space	**52,143**	**6.80%**
Federal Inspection Services		
CBP Office	10,328	1.35%
CBP Primary Check Counter	9,611	1.25%
CBP Primary Check Counter Queue	19,747	2.57%
Customs office	6,931	0.90%
Customes Counter	16,496	2.15%
Customes Counter Queue	14,889	1.94%
TSA Office	12,317	1.61%
TSA Check Area	2,998	0.39%
TSA Check Queue	1,647	0.21%
Subtotal FIS Space	**94,964**	**12.38%**
Secure Public Area		
Sterile Corridor	4,589	0.60%
Circulation	126,360	16.48%
Circulation - Baggage Claim 8,696	1.13%	
Restrooms	9,360	1.22%
Departure Lounge	61,420	8.01%
Other	0	
Subtotal Secure Public Area	**210,425**	**27.44%**

Space	SF	% of Total
Non-Secure Public Area		
Circulation – Ticketing	10,255	1.34%
Circulation - Baggage Claim	0	0.00%
Circulation – General	74,287	9.69%
Restrooms	6,196	0.81%
Other	0	0.00%
Subtotal Non-Secure Public Area	90,738	11.83%
Non-Public Area		
FAA	0	0.00%
Airport Administration	28,483	3.71%
Dock	10,925	1.42%
Maintenance	31,470	4.10%
Mechanical/Electrical/Bldg. Systems	35,223	4.59%
Restrooms	7,201	0.94%
BHS Baggage Claim (SF)	40,164	5.24%
BHS Baggage Claim (LF)		
BHS Baggage Service	3,014	0.39%
BHS Outbound	38,371	5.00%
BHS Inbound	24,220	3.16%
BHS HBS	17,507	2.28%
Miscellaneous	0	0.00%
Subtotal Non-Public Area	**236,579**	**30.85%**
Sub-total	**766,870**	
Miscellaneous Unaccounted for Sapc	**177,130**	
Total All Areas	**944,000**	

1. Concession spaces include areas allocated for this function but that are currently not being used for such as they may be vacant
2. Food and Beverage areas include the associated circulation and seating areas (not just the leased areas to operators)
3. Rental car areas include all ground transportation operators, including the various bus operators, etc.

4.2.2.3 Curbside Roadway

Figure 4.6 shows the Level 1 and 2 curbside areas. The Curbside roadways are located at Level 1 (basement level) for arrivals and on Level 2 (apron level) for departures. The departure curbside is 840 feet long and is immediately adjacent to the terminal building. The arrivals curb, reached through corridors passing from the terminal and under the Level 2 Departure road, comprises two separate areas, a pick-up area for cars and taxis that is 600 feet long, and a tourist bus park, for meeting tourist arrivals, with a capacity for 26 buses.

Figure 4.4: Guam Passenger Terminal Level 1 and 2

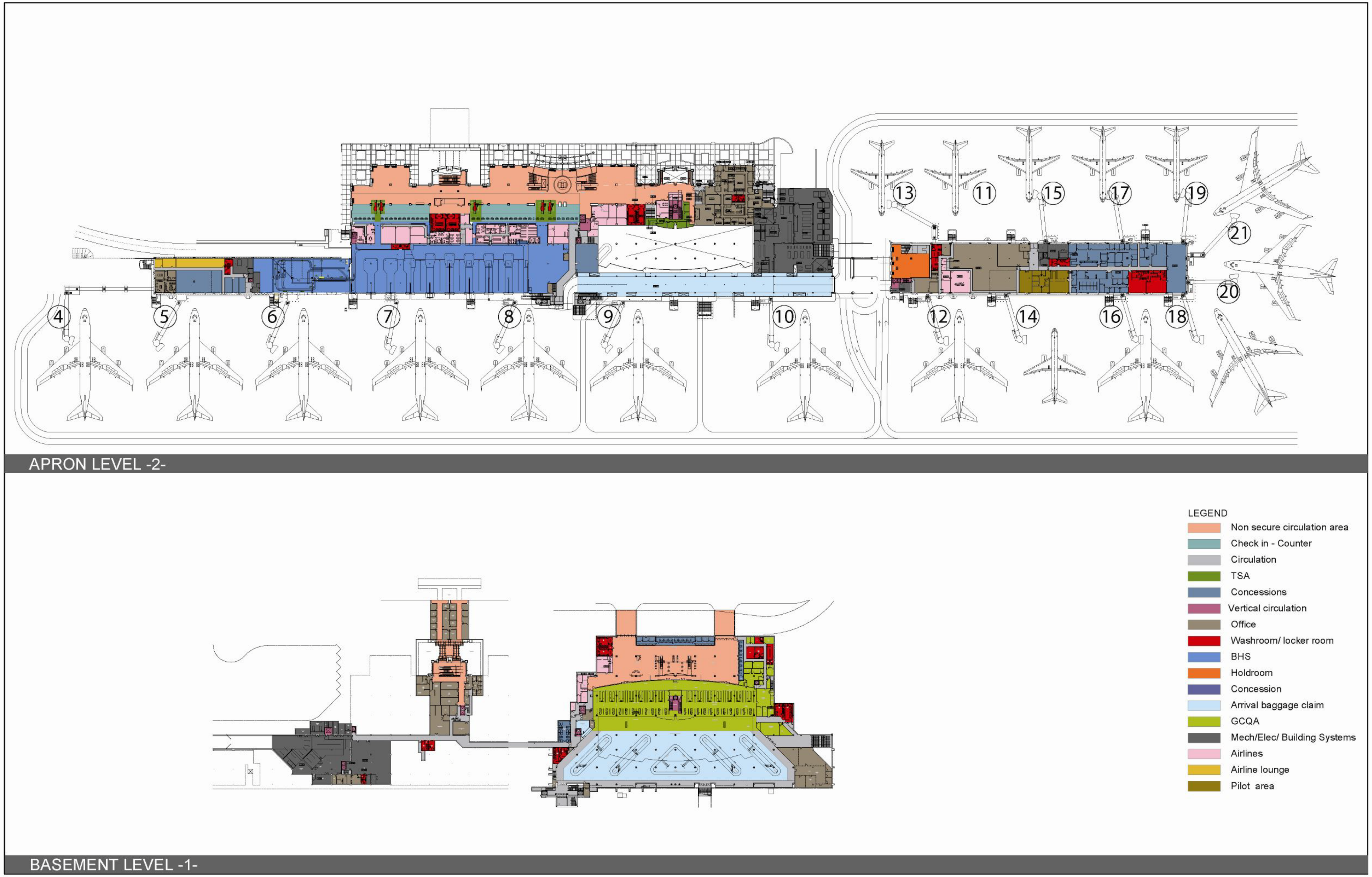


Figure 4.5: Guam Passenger Terminal Level 3 and Mezzanine/Roof Level

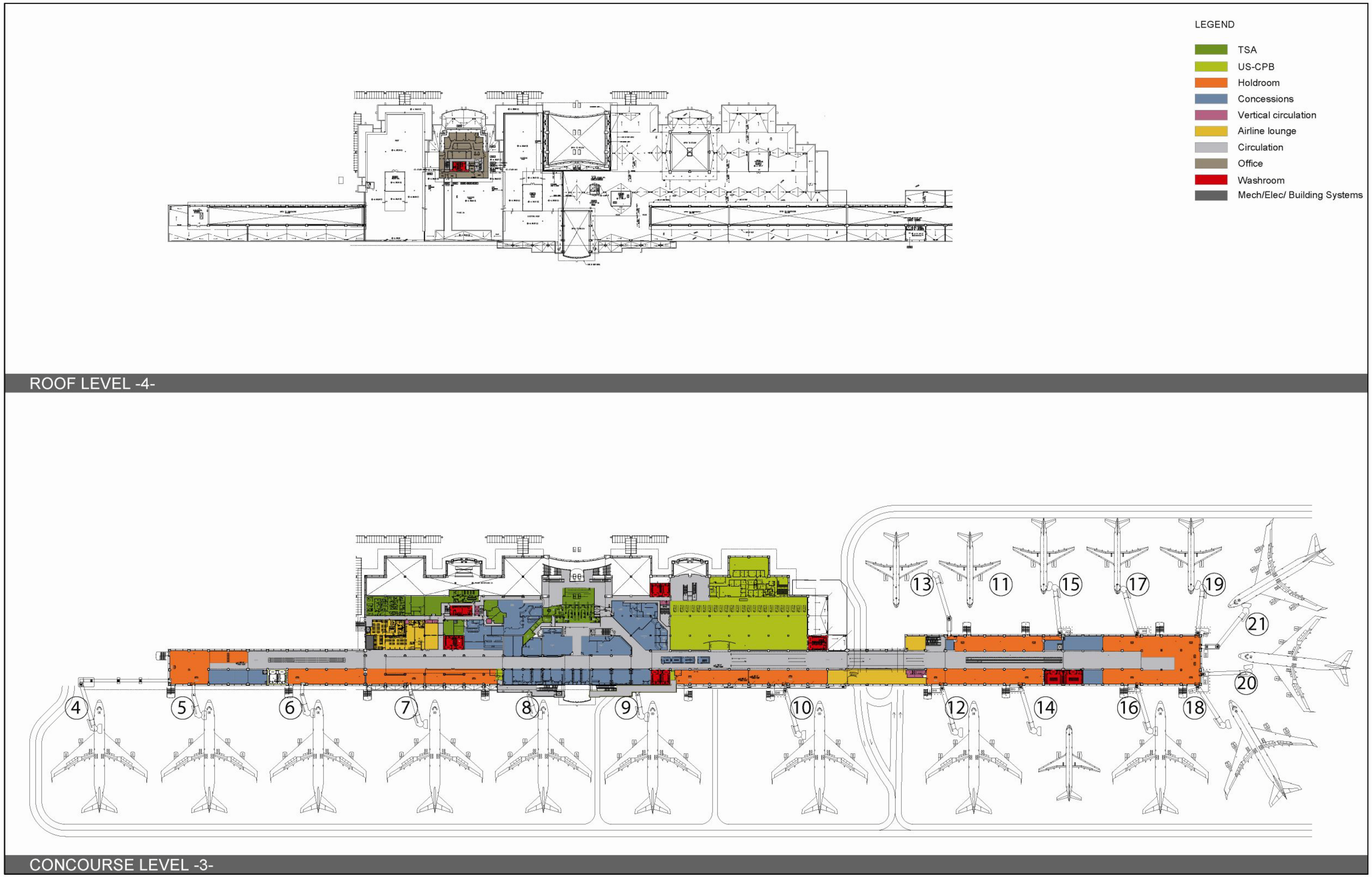
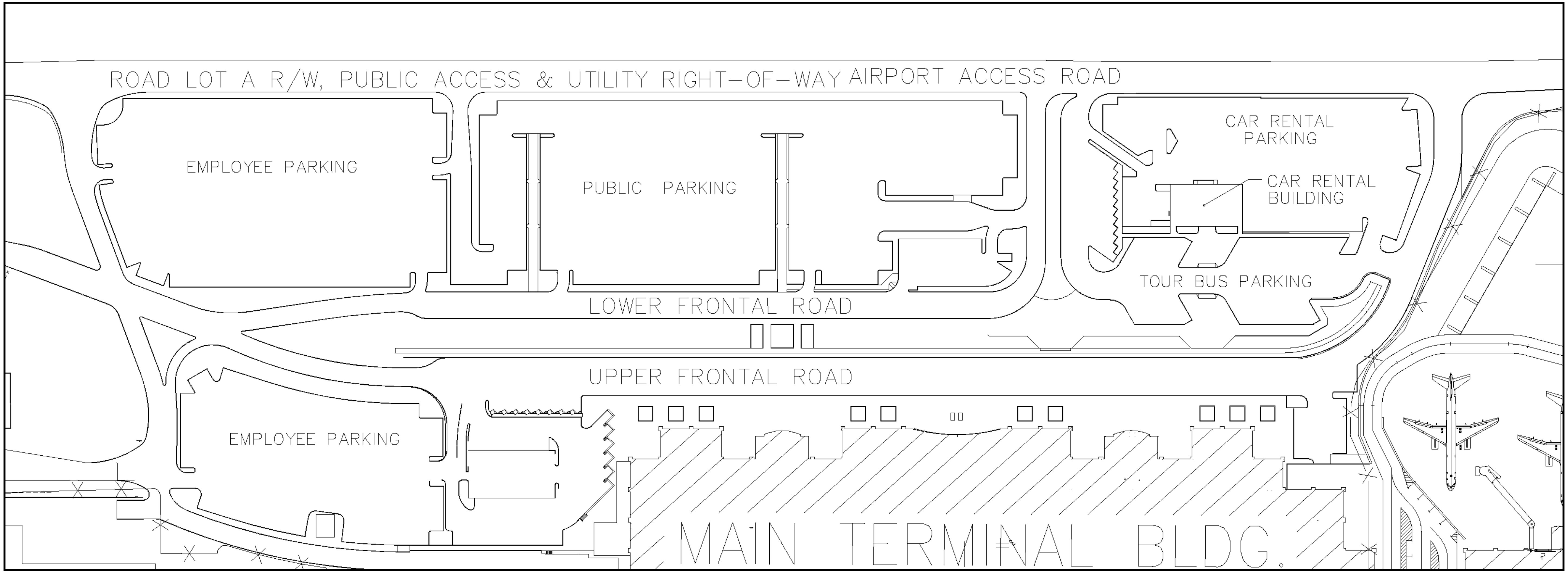


Figure 4.6: Guam Passenger Terminal Arrival and Departures Curbside



4.2.3 Terminal Operational Evaluation

An appraisal of the operational characteristics of the passenger terminal was undertaken at the airport in February 2011, during which a number of stakeholders were interviewed and the airport operations were inspected. In general, the terminal facilities work well. However, it was apparent that there is some disparity between the facility and space capacity and the traffic demand. While most facilities had ample capacity it was clear that there is concern regarding some of the facilities and passenger handling operational aspects, due particularly to the enhanced security arrangements that have been introduced since the terminal's original opening. A discussion of the issues discovered during the operational assessment and interviews is provided below:

4.2.3.1 Arrival /Departure Concourse / Co-Mingling

The single largest issue facing the current terminal is the co-mingling issue. This was mentioned by all the key stakeholders during interviews, including the ground handlers, CBP, TSA, the airlines and the GIAA. The problem with this issue is quite evident to anyone who arrives or departs the facility.

The original concourse design at Guam assumed co-mingling of arriving and departing passengers. However, this co-mingling has not been allowed for time. The change in rules has required the separation of international arriving passengers from departing passengers. The airport has identified a number of permanent options for dealing with the co-mingling issue, but these options have had price tags of upwards of $ 30 million and the GIAA has not had the funds required to fix this problem. Therefore, the GIAA has adopted an interim operational strategy that uses temporary partitions and security/CBP staff to effect the separation between arriving and departing passengers.

Currently, as shown on ***Figures 4.7 and 4.8,*** movable, temporary partitions are located along the central spine of the hold room concourse to effect the separation. In the current operation, arriving passengers are escorted by security personnel to the immigration area along a corridor by the airside of the concourse, separated from the departing passengers that are held on the opposite side of the temporary screens. Passengers deplaning on the south side of the concourse are required to cross over the central departure passenger area to reach Immigration. Arriving transit passengers are also escorted to the screening area before proceeding to their respective gates.

The temporary screens typically prevent departing passengers from reaching their designated hold room. They are required to wait in the central concessions area until it is closer to flight times. This not only causes congestion in the food and beverage, concessions and general lounge area, but is a very poor experience for the passengers and results in additional operating costs for the additional security and CBP staff required. There are also operational considerations that can lead to flight delays for departing flights.

Figure 4.7: Temporary Concourse Screens (West End of Concourse)

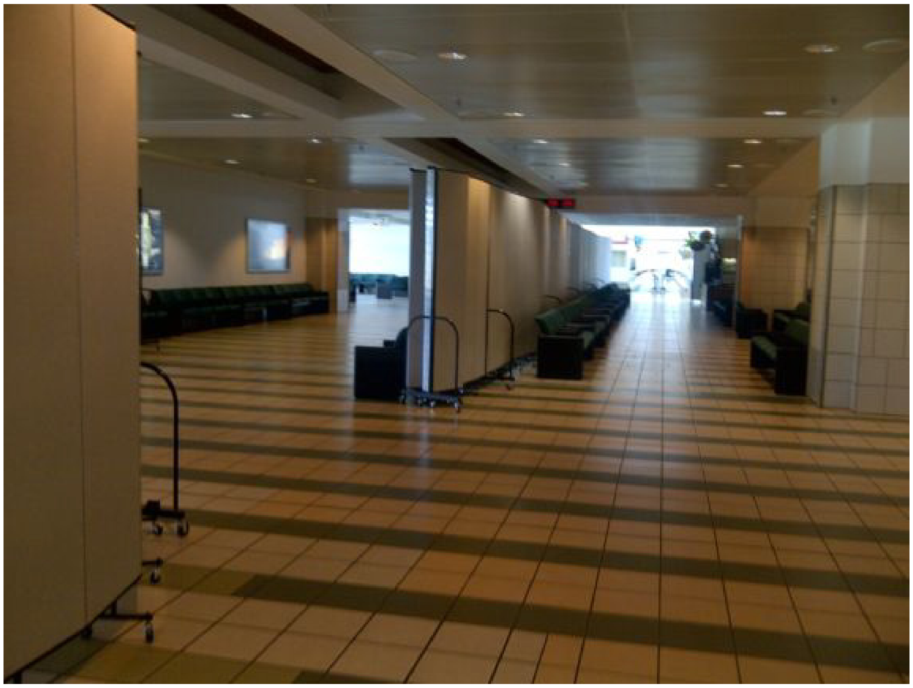
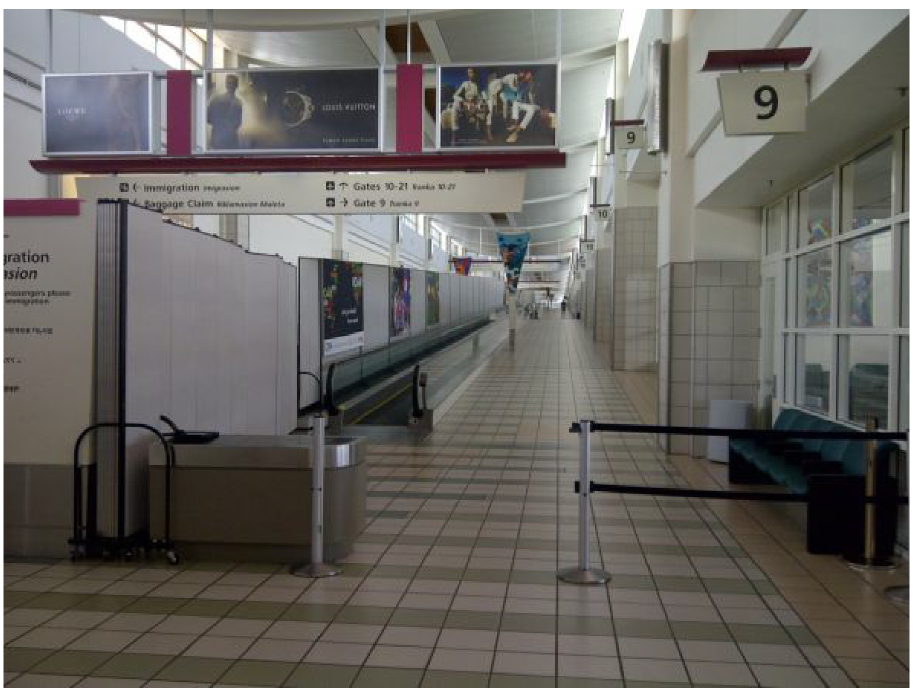


Figure 4.8: Temporary Concourse Screens (East End of Concourse)



4.2.3.2 TSA Hold Bag Screening / Airline Ticketing and Check-in Counters

The second biggest issue in the current terminal is the current process for handling hold bag screening by TSA. This was mentioned by the all of the airlines and ground handlers interviewed and the problems were clearly evident in the terminal walk around, as shown on ***Figures 4.9 and 4.10***.

As a result of 9/11, TSA had to implement hold bag screening for all flights within the US and its territories. In order to quickly implement the new procedures, in many cases, the TSA chose to install CTX machines in the main check-in lobby to be used for the hold bag screening. This was the case at Guam. In the intervening years since the initial implementation of these new procedures (2003), many of the airports and the TSA have moved the hold bag screening functions to “back-of-house” areas and away from the main check-in lobby. Because of a lack of funds, this has yet to occur at Guam.

Figure 4.9: TSA Hold Baggage Screening Area in Check-in Lobby

In the meantime, the hold bag screening functions remain in the main check-in lobby. With the current process, passengers are required to check-in with the airline ticket agents and once checked in, they take their bags to one of the three temporary TSA baggage screening areas for screening. Following screening, the bags are manually placed on the outbound takeaway conveyor belts by TSA agents and transported to the outbound make-up area. This operation causes considerable congestion during peak departure periods, as illustrated in the attached photos. The temporary TSA security areas also block 12 check-in counters from being utilized. In addition they reduce queuing capabilities at a variety of other counters. The current operation is very poor from a passenger perspective and during periods of very high activity, the current system can lead to significant congestion in the check-in area and sometimes leads to flight delays as bags cannot be processed in a timely enough fashion.

Figure 4.10: TSA Hold Baggage Screening Area in Check-in Lobby

4.2.3.3 TSA Passenger Screening

The final major issue facing the current terminal's operations is the TSA passenger screening area located on Level 3 (the departure concourse), as shown on ***Figure 4.11***. This area has 5 security lanes for processing passengers, though interviews with TSA management indicated that the 5th lane is difficult to fully utilise as the adjacent elevators affect the efficient operation of their X-ray machines. Interviews with the ground handlers and airlines indicated that this area often gets congested during the morning departure peak with long line-ups for passengers.

4.2.3.4 Other terminal Issues

Other issues related to current terminal operations or maintenance identified during the interviews with stakeholders and site visit, include the following:

- The passenger boarding bridges are old (approaching 20 years) and they suffer frequent breakdowns due to their age and level of current maintenance. Breakdowns often lead to flight delays
- Ground Power Units and Pre-Conditioned Air units on the bridges often do not work

Figure 4.11: TSA Departing Passenger Screening Area

- There is a lack of space to store all of the Ground Support Equipment (GSE) on the aircraft apron. Most of this is kept in the cargo area, where it can cause some operational issues there, but as well this is a long way from many of the aircraft gates
- Washrooms suffer frequent breakdowns and their level of cleanliness leaves something to be desired, especially given that the major users are Japanese tourists, who have high expectations on such issues
- Some airlines/ground handlers have issues with lack of check-in counters during certain peaks (due in part to loss of counters due to TSA screening and to the dedicated nature of the counters)
- CBP has a variety of issues with their area, including the following:
  - Low ceilings and poor air circulation
  - Poor lighting in their booths
  - Lack of storage to support their operations
  - Poor passenger control by the airlines in the queuing area in front of their booths
  - Handling and operation of transit passengers on exit from their area
  - Poor maintenance of their facility

- Guam Customs and Quarantine indicated a number of issues with their facilities, including:
  - Water leaks during big storms
  - Too many leaks in the security system for both passengers and staff. Need better surveillance and monitoring system
  - Poor design of their counters that make them hard to use properly, and poor maintenance that often leads to counters not being usable.
  - Lack of storage for unclaimed bags
  - Lack of storage in general
- TSA has a number of issues with their facilities, in addition to the key issues discussed above, including:
  - Need office space adjacent to screening lanes to support their operations for officers, briefing, etc
  - Need additional space to install full body scanners
  - Require facilities for their canine unit
  - Requirements to prevent vehicle intrusions from roadway into terminal building

4.2.4 Traffic Demand Forecasts

Traffic demand forecasts for this Master Plan were documented in the report by LaCosta. For convenience, the passenger and movement forecasts are summarized here.

Tables 4.3 and 4.4 show the twenty year demand forecast for passengers and aircraft movements respectively. Over the twenty year period the passenger enplanement demand is expected to rise from 1.32 million passengers per annum (mppa) in 2010 to 2.06 mppa by 2030. This represents an average annual increase of 2.2%. Of the total demand about 14% of passengers comprise transits. Base Case annual aircraft movements are forecast to increase from 46,000 in 2010 to 66,000 in 2030, an average annual increase of 1.8%pa.

Base case peak hour movements for passengers and commercial aircraft movements are shown in ***Table 4.5***. The passenger arriving and departing peak busy hour demand levels are 860 passengers per hour (pph) and 903 pph respectively in 2010, and increase to 1242 pph and 1799 pph respectively by 2030. The combined passenger arrival/departure busy hour demand level is forecast to increase from 1341 pph in 2010 to 2183 pph by 2030.

The peak busy hour arriving and departing commercial aircraft movement rate increases from 6 to 8 and from 9 to 13 movements respectively between 2010 and 2030. The combined peak hour arrival and departure aircraft movements increase from 9 movements in 2010 to 14 movements by 2030.

Table 4.3: Forecast Annual Passenger Demand

Forecast year	Annual Enplanements			Annual Transits			Annual Originating		
	Downside	Base	Upside	Downside	Base	Upside	Downside	Base	Upside
2010 actual		1,316,135			181,028			1,135,107	
2011	191,678	1,265,188	1,337,013	163,528	173,658	183,555	1,028,150	1,091,530	1,153,458
2015	1,426,984	1,581,640	1,771,500	196,875	224,229	259,657	1,230,109	1,357,411	1,511,843
2020	1,517,039	1,804,341	2,001,854	215,652	264,448	298,829	1,301,387	1,539,893	1,703,025
2025	1,594,700	1,922,258	2,211,133	231,228	283,915	333,755	1,363,472	1,638,343	1,877,378
2030	1,629,200	2,055,547	2,460,547	237,897	306,191	375,869	1,391,303	1,749,356	2,084,606

Table 4.4: Forecast Annual Aircraft Movement Demand

Forecast Year	Base	Upside	Downside
2010 actual	45,606		
2011	45,780	46,418	45,137
2015	50,798	54,023	47,550
2020	56,963	62,167	50,625
2025	61,340	69,643	52,502
2030	66,167	78,326	54,097

Table 4.5: Base Case Peak Hour Aircraft Movement and Passenger Demand

Forecast Year	Peak Hour Aircraft Movements			Peak Hour Passengers		
	Arriving	Departing	Arrival/ departure	Arriving	Departing	Arrival/ departure
2010 actual	6	9	9	860	903	1,341
2015	7	12	12	943	1,137	1,895
2020	8	13	13	1,164	1,639	1,984
2025	8	13	13	1,163	1,680	2,023
2030	8	13	14	1,242	1,799	2,183

4.2.5 Terminal Requirements

In establishing the future requirements for the terminal, two aspects have been considered. First, space and facility requirements are estimated to accommodate the forecast passenger demand in 2015, 2020 and 2030. These have been compared to existing facilities to see what, if any, shortfalls exist. Second, layout options are developed and evaluated to a) accommodate improvements in facility and space provision, b) provide more effective operational functionality, and c) eliminate temporary facilities. This second phase is addressed in Section 6.

4.2.5.1 Terminal Gross Floor Area

An estimate of the gross terminal floor space has been calculated to provide an overall guideline as to the future terminal sizing requirements. A general rule of thumb to establish this indicates that airports with international facilities are likely to require a gross floor area of between 220 and 270 sq. ft. per peak hour passenger. Based on the fact that Guam is essentially an all international airport, it is considered appropriate to utilize the higher estimate. Accordingly, the estimated overall gross floor space for Guam's passenger terminal, based upon 270 sq. ft. per Base Case peak hour passenger forecast for 2030, is about 600,000 sq. ft. While this appears comparatively low it should be noted that the estimate does not fully take into account the architectural aspects of a terminal building, which tend to increase building size, the provision of extensive duty free concessions (particularly relevant to international tourists airports), and the increasing requirement for security facilities. Despite these reasons the result does indicate that Guam's passenger terminal has a generally "generous" space provision, given that total area is over 900,000 sq. ft.

A second approach to estimating the overall gross floor area required for the terminal is to use a rule of thumb area per gate. Per ACRP Report 25 (Table VI-6), a reasonable estimate of gross floor area per gate for an international terminal would be between 28,000 and 40,000 square feet per Narrow Body Equivalent Gate (NBEG). At Guam, there are currently 26 NBEG's, so this estimate would work out to between 730,000 square feet and 1,000,000 square feet. As most of the aircraft gates are not used to capacity or to the maximum aircraft size, then the requirement should actually be in the lower portion of this range. As noted above, the current terminal is estimated at over 900,000 square feet, so this is consistent and within an expected range.

Figure 4.12 shows the main entrance lobby.

Figure 4.12: View of One of the Main Entrance Lobbies on the Ticketing/Check-in Level

4.2.5.1.1 Terminal Facilities by Functional Area

This section establishes facility requirements by specific functional areas of the terminal.

IATA planning guidelines calculate area requirements based upon providing a busy hour passenger flow rate with a defined level of service (LOS). The LOS standards provide space values per passenger to represent different qualities of service in terms of comfort, ease of passenger flow and delay. In a qualitative description these performance levels range from “excellent” to an “adequate” LOS. The general standard in planning passenger terminal requirements is to provide a “good” LOS. IATA defines this level as Level “C” and describes it as providing a stable flow of passengers, acceptable passenger delays in being serviced and a good level of passenger comfort.

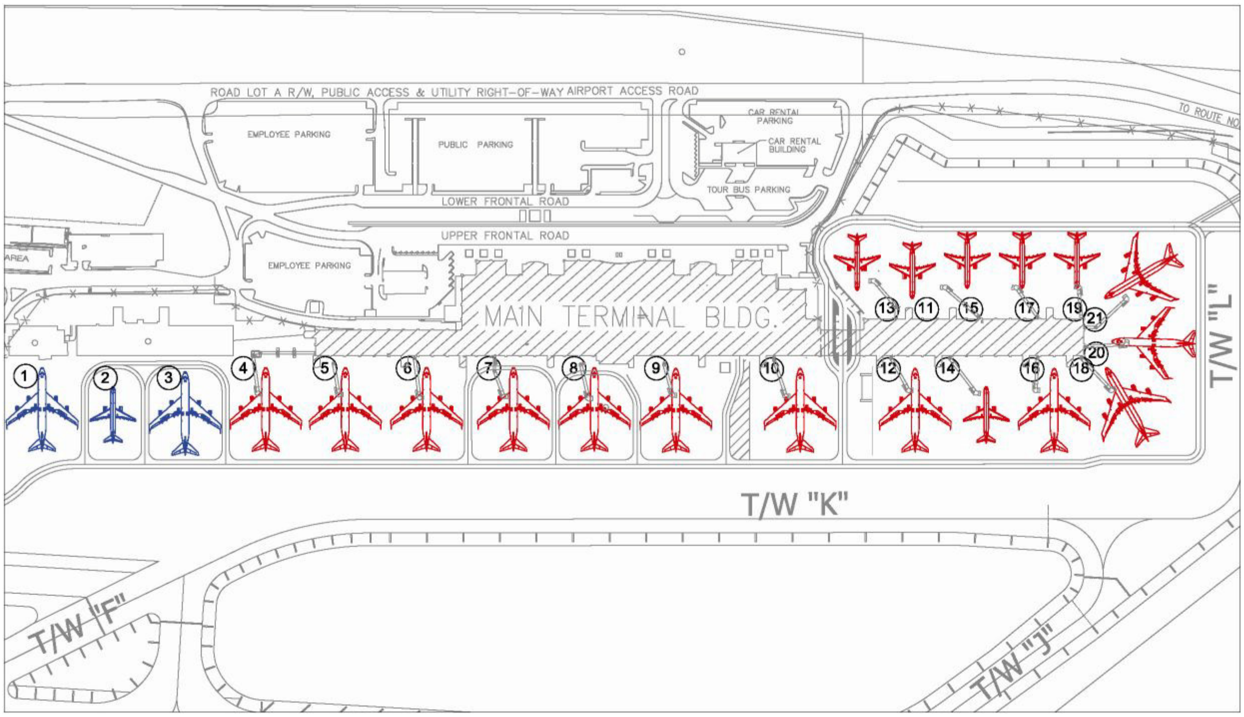
The following section will use IATA guidelines as well as the latest guidelines contained in ACRP Report 25, together with appropriate agency guidelines, such as US CBP and TSA, to develop forecast facility requirements for the Guam terminal associated with the forecast peak hour passengers and ATMs presented in the previous section.

4.2.5.1.2 Aircraft Stands

Figure 4.13 illustrates the current layout of the aircraft gates at the existing terminal. The existing aircraft positions consist of 18 aircraft that are laid out around the existing hold room concourse starting linearly on the west (left) side and then wrapping around the concourse at the east (right) end. There are 18 contact stands (shown in red), 17 of which are bridged and 1 of which is a walk out ground loading position. The 17 bridged stands can accommodate 12

Group V aircraft (wingspan less than 196 ft)[8] and 5 Group III aircraft (with wingspans up to 124 ft)[9]. The 1 ground loading position is a B757 stand (wingspan of 125 ft). In addition, there are 3 remote stands (shown in blue) located in front of the cargo area (left side of drawing). These stands are sized to accommodate 2 Group V aircraft (wingspan less than 196 ft) and 1 Group III aircraft (wingspan up to 125 ft). These remote stands are also used by cargo operations, though there are very infrequent dedicated freighter services at the airport.

Figure 4.13: Existing Aircraft Gate Layout



There are a number of approaches to forecasting aircraft gate requirements. A preferred method is to develop future nominal schedules that are built up from existing schedules to reflect projected additional traffic, new routes and changes in aircraft sizes, etc. These schedules are also used to develop a more detailed understanding of the peaking characteristics for both air passengers and ATMs.

For this study, nominal schedules were generated by the forecasting consultant to integrate the results of the various other forecasts with respect to annual passengers, annual aircraft movements, changes in fleet mix, new routes, especially into China to take advantage of the new Visa waiver program, etc. These nominal schedules were generated for 2010 (base year), 2015, and 2020. These were then turned into gate plots as illustrated in ***Figures 4.14, 4.15, and 4.16***.

8 With the wingspan limit of 196 ft, these gates generally exclude larger Group V aircraft such as the 747-400, B 772LR/773ER and A340-500/600, unless restrictions are placed on the adjacent gates to limit these to Group IV aircraft maximum, or to Group III aircraft, depending on the adjacent gate.

9 Group III aircraft have a wingspan limit of 118 ft. But the B757 is 125 ft and this aircraft is more like Group III than other Group IV which can have wingspans of up to 170 ft and most are between 148 and 170 ft.

Figure 4.14: Aircraft Gate Plot – Mondays 2010

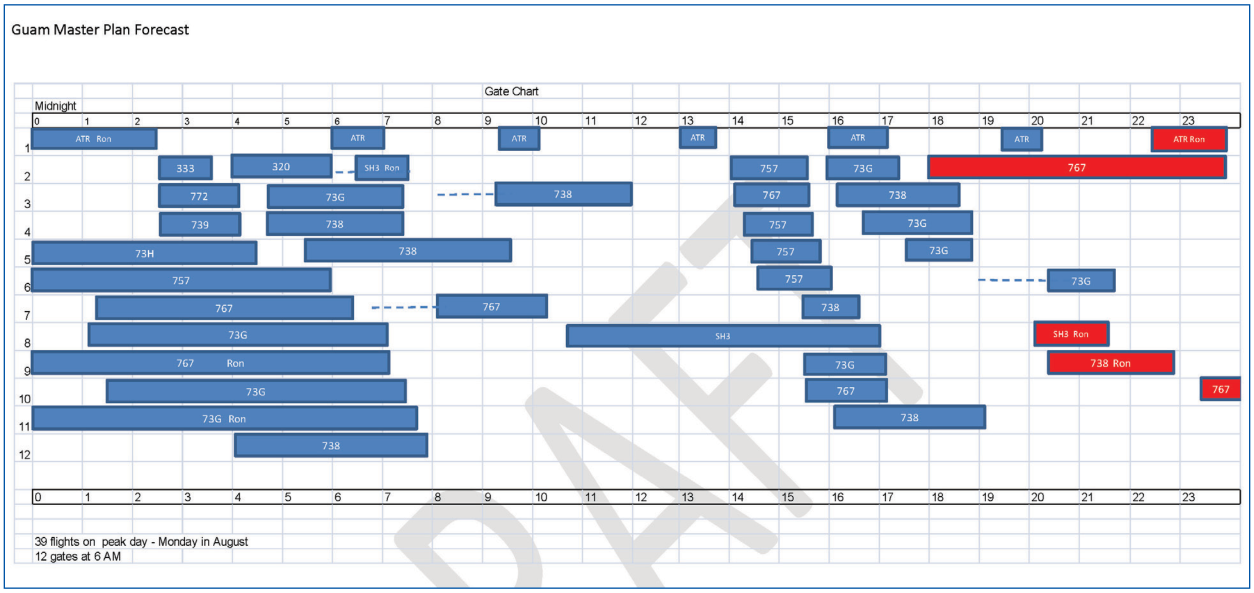


Figure 4.15: Aircraft Gate Plot – 2015

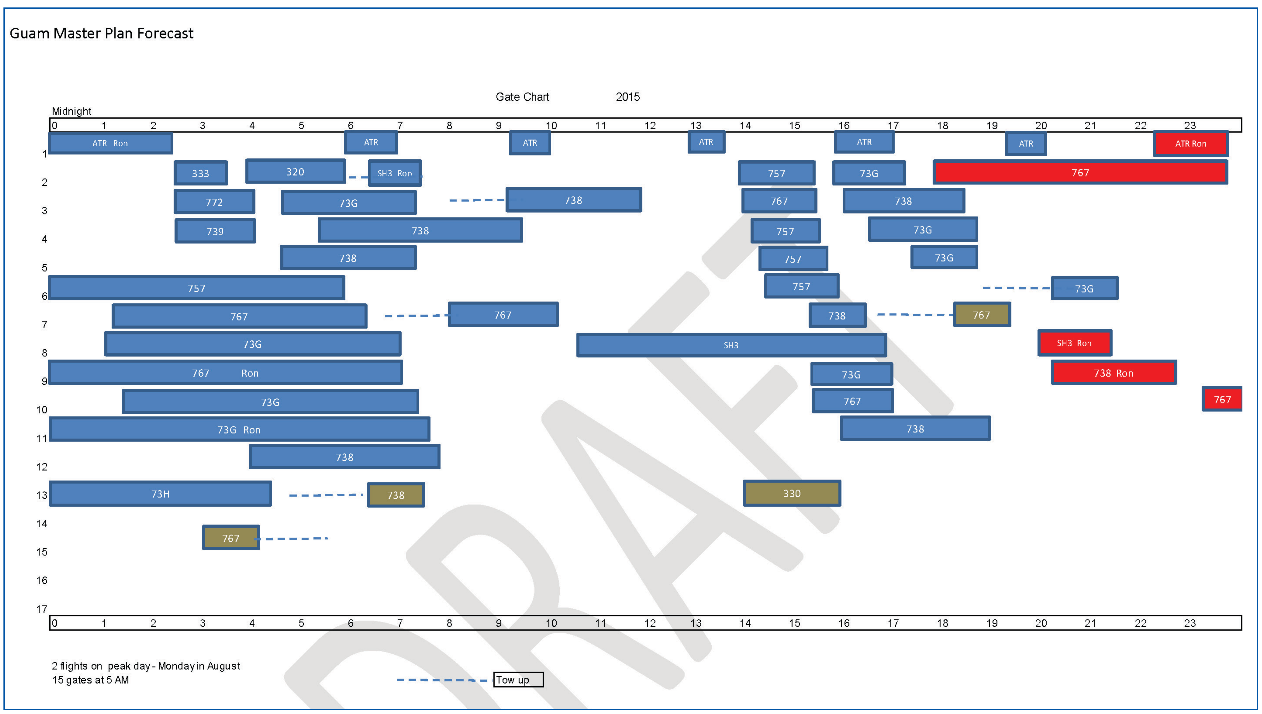
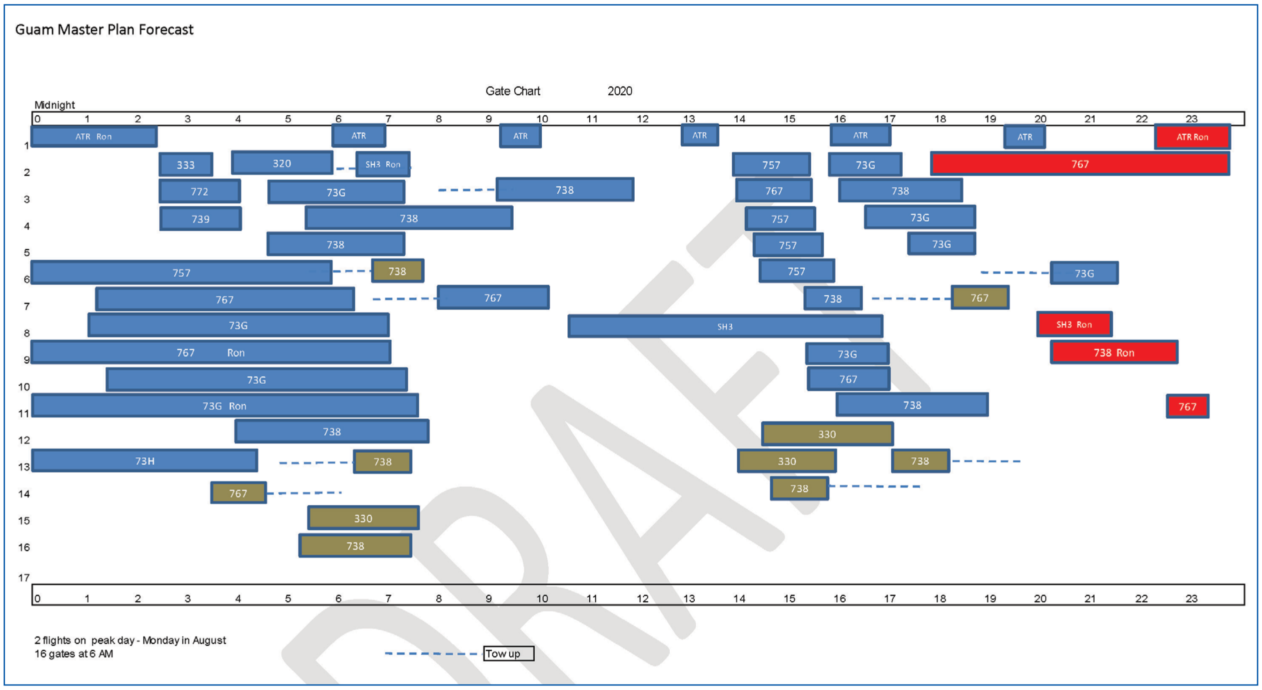


Figure 4.16: Aircraft Gate Plot - 2020



Based on the nominal schedules developed, gate requirements could be then determined from these. ***Table 4.6*** summarizes the gate requirements obtained from the gate plots developed.

Table 4.6: Forecast Gate Requirements for 2010 to 2030

	Forecast Gate Requirements					
	Contact				Remote[3]	Total
	Prop	III[2]	V	Total		
Existing	0	6	12	18	3	21
2010	1[1]	5	6	12	4	16
2015	1[1]	6	7	14	4	18
2020	1[1]	7	8	16	4	20
2025	1[1]	6	9	16	5	21
2030	1[1]	5	10	16	5	21

1. Actually 2 props required but one can share with adjacent jet gate
2. Existing narrow body gates are B757 which are technically Group IV
3. Remote positions are assumed for long stay or overnight

Forecast gate requirements for the years 2025 and 2030 were determined form the forecast peak ATMs and from the forecast peak hour passengers. Recall that from ***Table 4.5***,, the forecast peak departing ATMs remain constant from 2020 through to 2030. This implies that the gate requirements would also be the same as from the gate plots it is evident that the gate requirements are related to the number of peak departing aircraft. Therefore the total gate requirements are shown constant at 16 over this 10 year period. However, the peak hour departing passenger forecasts for this same period, are 1639, 1680 and 1799 for the years 2020, 2025 and 2030 respectively. In order to accommodate the higher peak passengers with the same number of ATMs average aircraft size needs to increase. This aircraft size increase has been accommodated in the forecast gate requirements by increasing the Group V positions in the years 2025 and 2030 by 1 in each period and decreasing the number of Group III positions by a corresponding amount.

The resulting gate requirement forecast in ***Table 4.6*** show that the current number of gates at the terminal should be more than adequate over the 20 year planning period for this plan. In fact, the forecasts show a requirement for only 16 contact gates by 2030 vs the currently available 18 gates. This excess capacity is reflected in 2 additional Group V gates over those required. On the other hand, the requirement for remote gates is shown at some 5 by the end of the planning period vs the 3 currently available. These were calculated on the assumption that long stay or over-nighting aircraft would be towed off to remote gates. However, given the surplus of contact gates, some of these aircraft could remain on gate as the total requirement for positions is shown at 21 vs the 21 that are available.

It should be noted that the above forecasts were generated on the basis of the base forecast. A higher forecast could require additional gates, depending on the make-up of this additional traffic, its peaking characteristics and the resulting aircraft mix. Given that the above forecasts have generally shown an excess of Group V gates over those required, there could be an opportunity to increase the number of existing gates available by converting pairs of adjacent Group V gates to three Group III gates as illustrated in ***Figure 4.17***. This conversion could be done at any adjacent pair of Group V gates and need not be restricted to only those as illustrated in the figure, except that at a number of gates (like gates 8,9 and10), this may not be possible. Implementing such an option could provide valuable flexibility in dealing with changing aircraft mix over the planning period as well as dealing with requirements that may be higher than forecast. Converting the gates to a “3 for 2” use would still allow these to be used for 2 Group V or 3 Group III aircraft and this conversion could happen both over the day as aircraft mix changes or over longer time periods as well. More discussion is provided on this topic in the following discussion on hold room sizing.

Figure 4.17: "Three for Two" Gate Arrangements

4.2.5.1.3 Gate Hold Rooms

The layout and location of the various hold rooms supporting the existing aircraft gates is illustrated in ***Figure 4.18***. The current hold rooms are a mix of dedicated hold rooms for certain gates, pairs of hold rooms supporting adjacent gates and effectively one large hold room supporting a large number of gates as is the case at the east end of the hold room concourse. The sizes of the current hold rooms or hold room combinations are summarized in ***Table 4.7***.

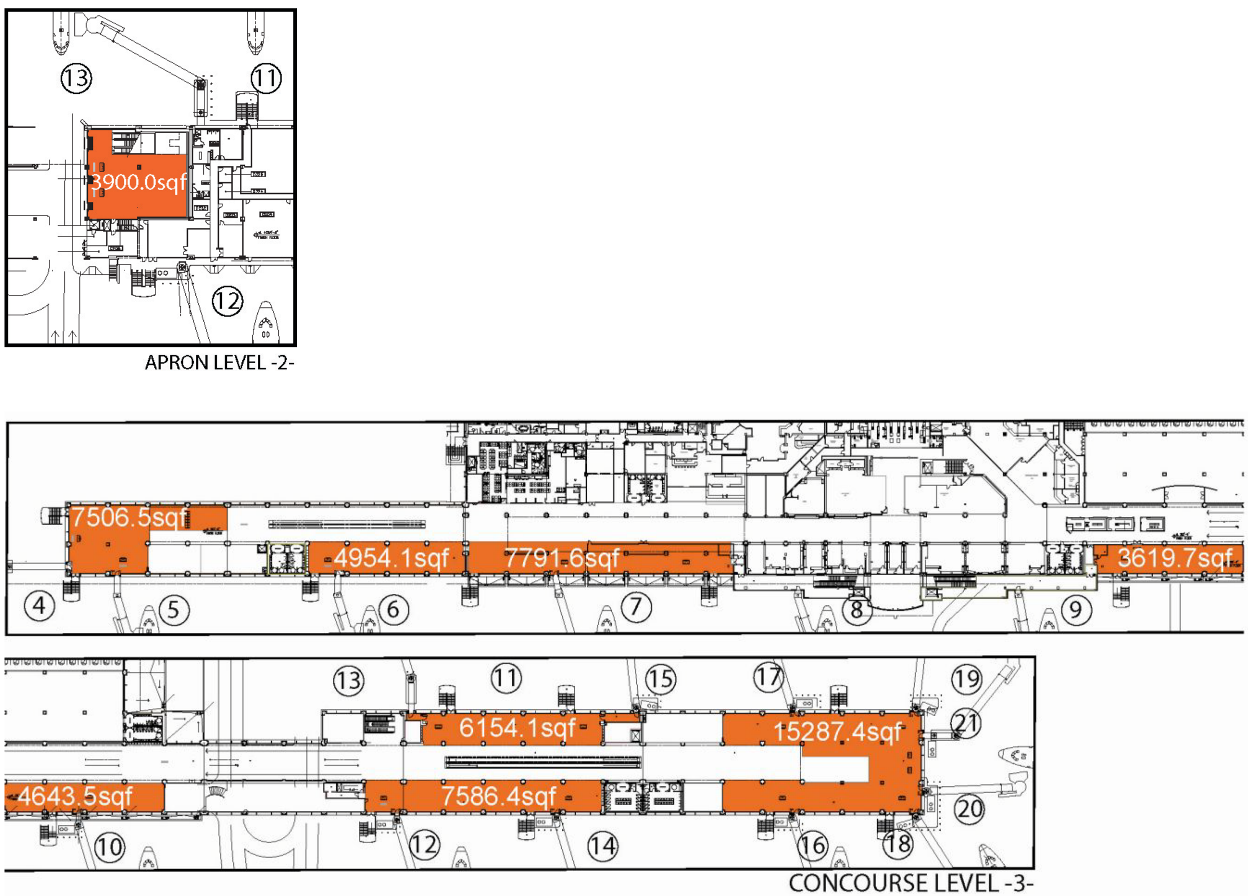
Hold rooms are normally sized for the largest aircraft that is intended to use the associated gate or group of gates. ACRP Report 25 notes that there are currently no generally accepted Level of Service (LOS) standards for hold rooms as the establishment of such standards has been in a state of flux recently. However, common practice currently seems to suggest that 15 square ft per seated passenger and 10 square ft per standing passenger may be appropriate. As well, in order to size the hold room, other assumptions are required or adjustments can be made, as follows:

- Aircraft load factor – here 80% is typically assumed. However, this number could be increased to 85% or 90% in the case of low cost carrier or charter operations.
- Seating to standing ratio – 50% was typically assumed in the past but recent experience has this ratio at between 60% and 80% depending on the type of operations and the arriving

profile of passengers to the hold rooms[10]. Given that the peak period at Guam is generally in the morning, this would result in an arrival distribution that would see passengers arriving closer to flight time than later in the day and consequently it may be acceptable to have a seating ratio closer to the lower end of the range, say 60%.

- An appropriate allowance needs to be made for the gate podium and exit corridor from the aircraft gate. Based on typical dimensions, the allowance assumed for this study is 500 square feet.
- For hold rooms that are combined, it is generally permissible to reduce the combined occupancies by 5%-10% for each additional gate added to the combination. For hub operations or for low cost airports, this factor should be closer to 5%. However, for an airport like Guam 10% is considered more appropriate.

Figure 4.18: Gate Hold Rooms



[10] The theory behind the ratio of seating to standing passengers is that seats should be provided for passengers who will be waiting in the hold room for a long time. For those passengers who arrive to the hold room closer to flight time, say within 10 minutes or so of boarding, then it is acceptable for them to stand.

Table 4.7: Hold Room Capacity Available vs. Required for LOS C – Base Design Aircraft Definition

Gate	Maximum	Gate Type	Aircraft Seating	Holdroom	Size Required
Number	Aircraft size		Maximum	Size (ft^2) [1]	for LOS C[2]
1	V	Remote	-	-	-
2	V	Remote	-	-	-
3	V	Remote	-	-	-
4	V	Contact	350	7,500	7,650
5	V	Contact	350	-	-
6	V	Contact	350	4,950	3,820
7	V	Contact	350	7,790	7,650
8	V	Contact	350	-	-
9	V	Contact	350	3,620	3,820
10	V	Contact	350	4,620	3,820
12	V	Contact	350	7,580	6,430
14	IV	Contact	220	-	-
11	IV	Apron Load	220	3,900	2,840
13	IV	Contact	220	6,150	6,170
15	IV	Contact	220	-	-
16	V	Contact	350	15,300	15,850
17	IV	Contact	220	-	-
18	V	Contact	350	-	-
19	IV	Contact	220	-	-
20	V	Contact	350	-	-
21	V	Contact	350	-	-
			Total	**61,410**	**58,050**

1. Yellow shaded cells reflect holdrooms that are undersized
2. LOS calculated on maximum seating configuration

- Experience has shown that the availability of concessions close by to hold rooms can reduce the peak hold room occupancy as some passengers will choose to wait in these concessions before boarding. This can reduce peak occupancies by as much as 10%.
- The availability of club or business class lounges can also reduce the peak occupancy of the hold rooms. However, given that Guam is primarily a leisure destination, it is difficult to predict which carrier or flights will use which gates and which will have access to club lounges and which will not, on a consistent basis.

With respect to the largest aircraft that is intended to use each gate, ***Table 4.7*** shows one set of assumptions. Typically these days most Group V aircraft that are configured for international services tend to have a maximum of 350[11] seats +/-. This includes the larger aircraft in this group like the B747-400, B777-300 and A340-600. With respect to the Group III gates, the largest aircraft that can use these gates is the B757-200/300. These aircraft could have as many as 220 seats +/- typically (the -300).

Table 4.7 shows that the existing hold rooms are generally sized appropriately for the largest aircraft that can serve each of the gates and that overall the total hold room size exceeds the total required. However, there are a number of hold rooms, such as at Gate 4/5, Gate 9 and the combined hold room for gates 16 to 21 that can be considered to be just slightly undersized. This marginal difference should not be an issue as the likelihood of having the largest aircraft on any of these gates is quite remote. This is especially the case with the combined hold rooms, where the likelihood of having the largest aircraft on all of the gates in the combination would be very unlikely. Some further discussion is provided on this topic in the following section on development options with respect to the co-mingling issue.

Table 4.8 presents an alternate approach to the above analysis with respect to design aircraft for the hold room sizing. In this approach, the size of the largest aircraft for each gate is tailored more closely to the actual aircraft that are currently being operated or projected to be operated at Guam by the carriers currently serving the market.

Table 4.9 presents a summary of the seating configurations for the various aircraft operated by the current carriers at Guam. This table shows that the following:

- Among the Group III aircraft the highest seating configuration has some 188/189 seats by the Korean low cost operations.
- B757s, classified as Group IV aircraft , but more similar to the Group III, have similar seating configurations to the Group III aircraft, at around 174 to 186 seats, at least for the -200 models. The -300 models can have up to 226 seats, but there are few if any operating at Guam.
- Group IV aircraft like the 767 typically have about 174 to 261 seats
- For Group V aircraft, there appear to be 2 groupings with respect to seating:

[11] Many of these Group V aircraft in domestic services can have higher seating configurations, especially in Japan, but Guam services are generally considered international, at least from Asia and though they may be considered domestic from the US or Hawaii, the route lengths are such that aircraft configured for international services would be expected to be used.

Table 4.8: Hold Room Capacity Available vs. Required for LOS C – Alternative Design Aircraft Definition

Gate Number	Maximum Aircraft size	Gate Type	Aircraft Seating Maximum	Holdroom Size (ft^2) [1]	Size Required for LOS C[2]
1	V	Remote	-	-	-
2	V	Remote	-	-	-
3	V	Remote	-	-	-
4	V	Contact	300	7,500	6,720
5	V	Contact	300	-	-
6	V	Contact	300	4,950	3,360
7	V	Contact	300	7,790	6,160
8	V	Contact	300	-	-
9	V	Contact	300	3,620	3,360
10	V	Contact	300	4,620	3,360
12	V	Contact	300	7,580	5,690
14	IV	Contact	190	-	-
11	IV	Apron Load	190	3,900	2,880
13	IV	Contact	190	6,150	4,660
15	IV	Contact	190	-	-
16	V	Contact	300	15,300	14,080
17	IV	Contact	190	-	-
18	V	Contact	300	-	-
19	IV	Contact	190	-	-
20	V	Contact	300	-	-
21	V	Contact	300	-	-
			Total	**61,410**	**50,270**

1. Yellow shaded cells reflect holdrooms that are undersized
2. LOS calculated on maximum seating configuration

- There are aircraft like the A330/340 (except -600), B772, B788, B789 that typically have under 300 seats, and
- Then there are the larger variety like the B744 and B773 that have seating configurations that are typically around 330 to 375

Based on the noted seating configurations, it is proposed that:

- The Group III gates be designed for aircraft with a maximum of say 190 seats. This would accommodate all of the Group III aircraft and the B752. The B753, should it show up, could be assigned to the Group V gates.
- The Group V gates be designed for aircraft with maximum seating configuration of 300 seats. This should satisfy close to 100% of these operations as B744 aircraft are generally

being phased out quite quickly and they are generally not seen any more at Guam. The B773 aircraft generally have less than 300 seats, but in some cases can have up to 370 seats as shown in ***Table 4.9***. However, it is expected that services by these aircraft with more than 300 seats would be rare. For the few occurrences of these aircraft they could be assigned to gates that have shared hold rooms so that the extra loads could be accommodated.

Table 4.9: Aircraft Seating Configurations for Operations at Guam

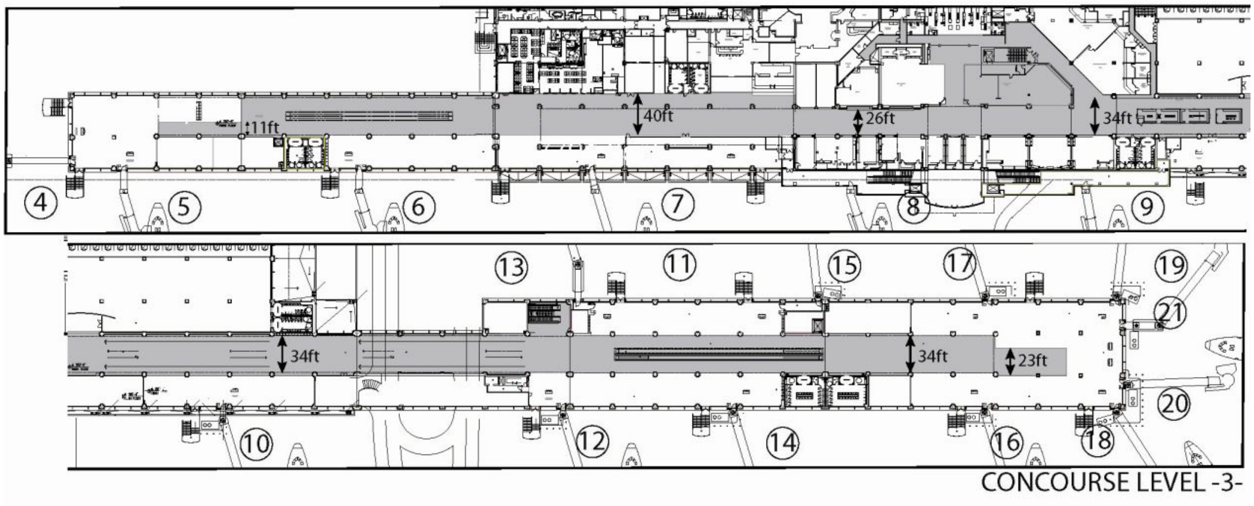
	Aircraft Seating Configurations For Carriers Serving Guam						
	Continental	**United**	**Delta**	**JAL**	**Korean**	**Jin Air**	**Philippines**
Group III							
737	124		124				
738	160		160	165	162	189	
739	173		180		188		
320		144	148				156
Group IV							
752	174	186	184				
753	216		224				
762	174						
763		244	261	261			
764	256		246				
Group V							
333			298		280		302
772		270	269	300	261		
773				246	291		370
788	250	220		237			
789	290						
744		374	376		335		

Based on this revised approach to the hold room sizing, ***Table 4.8*** shows that all of the hold rooms, or groups of hold rooms, would easily meet the required sizing requirement. In fact, on this basis, all of the hold rooms could be considered over sized, at least per LOS C.

4.2.5.1.4 Airside circulation

Figure 4.19 shows the airside concourse circulation area providing access to the gate hold areas. The circulation corridor down the centre of the concourse is typically about 33 ft wide effective width and has moving walkways located at a number of locations along its length to mitigate the long walking distances to the ends of the hold room concourse. Clear widths on either side of the moving walks are typically about 10 ft wide.

Figure 4.19: Airside Circulation



ACRP Report 25 recommends that these corridors be at least 20 ft for single sided concourses or 30 ft for double side ones in medium to high volume terminals with mostly O&D traffic, if 2-way circulation is required. This report also recommends that at least 15 ft be provided on either side of the moving walks, if bi-directional movement is required.

The current holdroom circulation should be considered adequate to meet the requirements at Guam, for the following reasons:

- The overall width is generally consistent with typical guidelines, even for airports busier than Guam
- The clear widths on either side of the walkways, while only at 10 ft vs 15 ft recommended, should be adequate because typically only one way circulation is required in the piers, especially once the co-mingling issue is resolved.

4.2.5.1.5 Landside Departures Lobby and Check-in

Figure 4.20 shows the layout of the landside departures concourse and check-in area. There are a total of 76 check-in counters provided in 2 separate banks. These counters are generally leased to the individual airlines and are not available for common use. The current counters are all conventional in layout and function and no carriers are currently making use of any self service check-in kiosks at the airport, or for that matter, any web check-in.

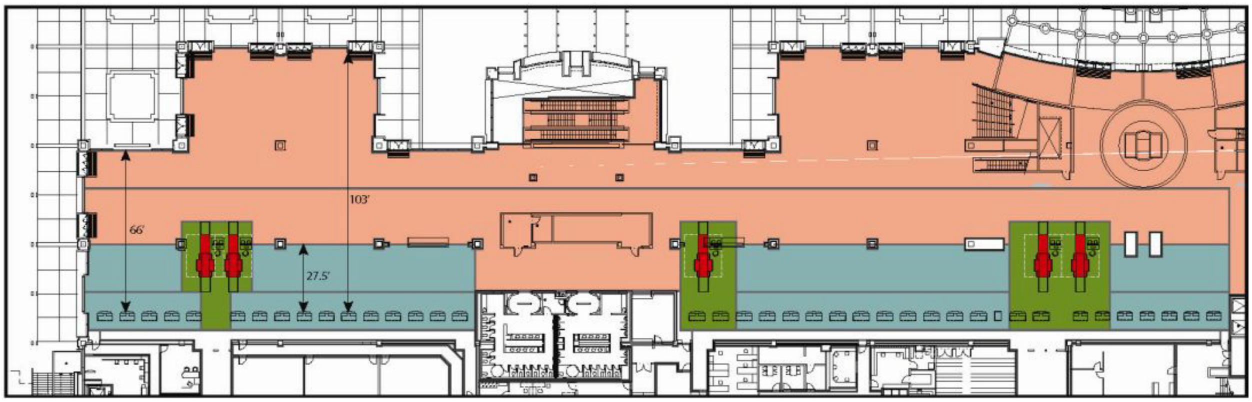
Total distance provided between the face of the check-in counters to the rear wall of the lobby is typically about 66 feet. This is consistent with international practice that would see about 55 feet being provided in high activity domestic terminals or about 50-70 feet in high activity international terminals[12],[13]. Based on the consultant's site visit this area typically functioned quite well during peak periods, except as noted below with respect to the TSA Hold Bag Screening functions currently located in the check-in lobby.

[12] ACRP VI-3.2.7

[13] Per CBP guidelines, Guam is classified as a high volume, mid size international airport

As illustrated on ***Figure 4.20*** and as discussed in an earlier section, there are currently 5 CTX machines located within the check-in lobby. These machines eliminate access to a total of 12 check-in counters, reducing the number available to 64, and they compromise the queuing associated with a number of counters towards the left portion of the drawing (Delta and JAL).

Figure 4.20: Landside Departures Lobby and Check-In Area



Forecast check-in counter requirements were calculated using methodologies contained in the IATA ADRM (2004) and ACRP Report 25. The basic model used made the following assumptions:

- Peak 30 minute passengers arriving at check-in = 50% of peak hour passengers, as the peak is in the morning between 6:00 and 7:00
- Shoulder hours in peak account for an average of 40% of the peak hour level
- Processing time at check-in is an average of 2 minutes
- Maximum queuing time is assumed to be 30 minutes (as most travelers are leisure)
- Business passengers require an average of 20% of the check-in counters
- All counters are initially assumed to be common use
- All counters use conventional check-in with no self service kiosks and no web check-in
- Dedicated use of counters is assumed to add an additional 30% to the common use number.

On the basis of the model used, the resulting forecast requirements in ***Table 4.10***, show that under the common use assumption, the number of counters available would be more than sufficient to satisfy requirements until 2030. Even with the additional requirements resulting from a dedicated use operation, the current counters should be adequate to close to 2030, with an estimated requirement in 2030 of 77 vs. the 76 currently available.

Table 4.10: Forecast Check-in Counter Requirements

Facility	Requirement	Current Facilities	2015	2020	2030
Check-In	Number of check-in counters – CUTE	76[1]	41	51	59
	Number of check-in counters – dedicated	76[1]	54	67	77

These forecast requirements are based on the base forecasts. Should the passenger forecasts be higher than the base and say closer to the high assumption, then the check-in counter requirements would be higher. However, there are a number of factors and options available to ensure that the current check-in area would be adequate over the next 20 year period. These include:

- Implementing common use of check-in counters whereby the foreign carriers (due to their limited schedules) would all share counters in a CUTE configuration while the based carriers like Continental and Delta could maintain dedicated or mostly dedicated use. This would lower the requirement for counters by 10% to 20% depending on level of common use.
- Moving to web check-in as many carriers have done and as proposed by organizations like IATA would reduce the counter requirement. The level of reduction would be dependent on the level of web check-in use.
- Installing self service check-in kiosks and converting many of the current counters to merely bag drop stations could significantly reduce the number of counters required. Some studies have shown this to reduce counter requirements by 30% to 40%.
- The ultimate check-in process of the future would see passengers either checking in on line or through the on-site (or even off-site) kiosks, then tagging their own bags, if any, and dropping them on the bag belts themselves, with little need for airline staff, other than to monitor the process and scan the bag tags and boarding passes into their computers. Some studies have shown that this new process could double or triple the passenger handling capacity of current check-in halls.

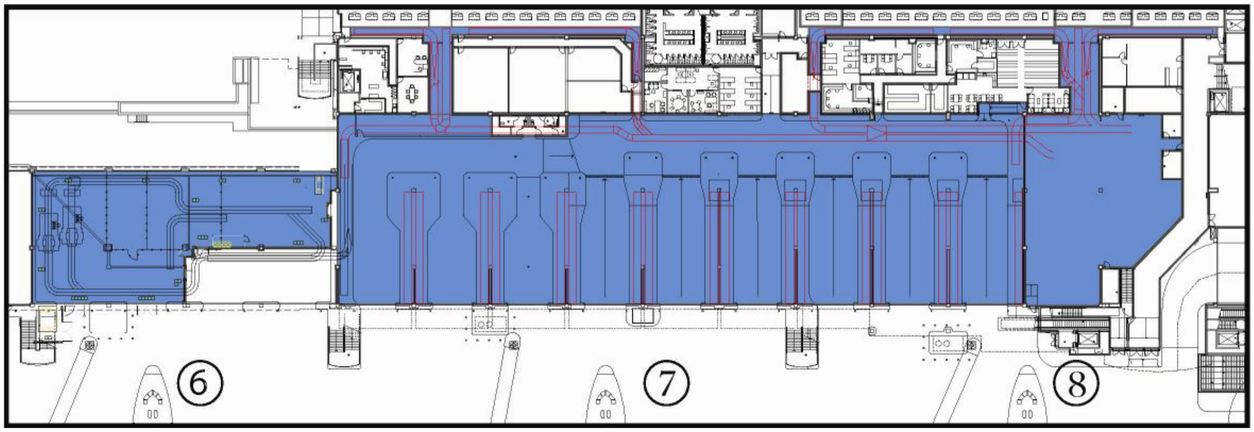
Based on the above, it is considered that the current check-in hall should be more than adequate to handle projected volumes until well past the end of the 20 year planning period of this plan.

4.2.5.1.6 Baggage Make-up Area

Figure 4.21 shows the layout of the baggage make-up area. The area comprises 16 dual height and 2 single height baggage make-up piers, for a total of 34 piers. These make-up piers are each close to 60 feet long, allowing up to 4 carts and a baggage tug to be staged at each pier. In the case of the dual height piers, there would be sufficient room to stage 2 assemblies comprising a bag tug and 2 bag carts to allow 2 narrow body flights to be sorted simultaneously. Based on past experience, these amounts of piers should be capable of supporting up to 18 gates with up to 18 or so peak hour flights, depending on the mix of flights and the number of flights in adjacent hours[14]. The forecast gate requirement for 2030 and the forecast number of departing flights in this year are 16 and 13 respectively, so that the number of make-up piers should be easily capable of satisfying forecast demand to well beyond 2030.

[14] International flights are typically staged over a 3 hour period. The 2030 forecast has 17 flights in the peak 3 hour window. However, allowing 4 carts per wide body flight and 2 carts per narrow body flight these 17 flights, assuming an even split between narrow and wide, would only require some 14 to 15 piers.

Figure 4.21: Existing Baggage Make-up Area



4.2.5.1.7 Hold Bag Screening

As indicated in earlier discussions, Hold Bag screening is currently carried out in the main check-in lobby. However, this is only for passengers whose bags are originating at Guam. For passengers who are just transiting Guam, there is an area adjacent to the baggage make-up area (to the left of this area in ***Figure 4.21***) that is used to screen hold bags for transiting bags. This area currently consists of 2 CTX machines and a series of belts that feed these machines and then transfer the screened bags back into the sorting/make-up system. This area was originally planned to handle all of the Hold Bag Screening for the terminal but lack of funds has hampered the full implementation of the "back-of-house" hold bag screening system. A layout of the full "back-of-house" screening system is presented in the following section on discussions of development options to meet capacity shortfalls or to solve operational issues.

4.2.5.1.8 Boarding Pass Check and Departing Passengers Security Screening

Figure 4.22 shows the TSA boarding pass check and departing passenger screening area. There are currently 2 boarding pass check desks and 5 screening lanes. However, discussions with TSA staff indicated that the right most lane (in the figure) cannot generally be used due to the proximity to the adjacent elevators which interfere with the X-ray machines. So, in effect, there are only 4 lanes. As noted earlier, TSA also indicated that they require additional support space in the area for staff space and briefings.

Experience with TSA processing at similar airports has indicated that each screening lane should be capable of processing some 200 passengers per hour. Discussions with local TSA officials confirmed that this is a reasonable assumption for Guam. Based on the forecast peak hour passengers, it is projected that 2 boarding pass check desks would be required in 2015 with 5 security lanes rising to 3 check desks and 8 screening lanes by 2030, as summarized in ***Table 4.11***. Options for expanding this area are presented in the following section.

Figure 4.22: Boarding Card Check and Departure Security Check

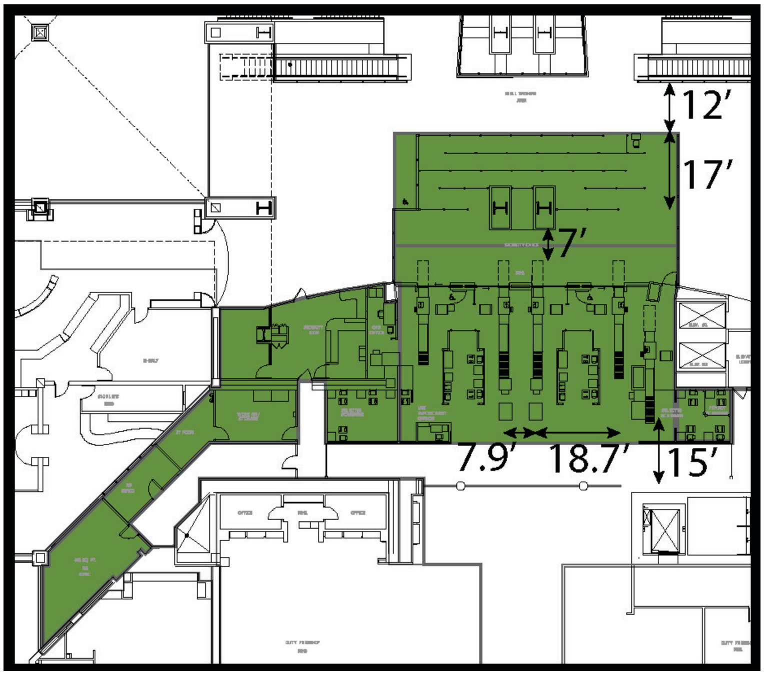


Table 4.11: Forecast Requirements for Boarding Pass Check and TSA Passenger Screening Lanes

Facility	Requirement	Current Facilities	2015	2020	2030
Boarding Pass Check	Number of desks	2	2	3	3
Departure Security Check	Number of screening lanes	4	5	7	8

4.2.5.1.9 US CBP (Immigration)

Figure 4.23 shows the US inbound Immigration hall. This current hall has 24 double booths for a total of 48 booths. The distance between the face of the booths and the back wall is about 80 feet, except at the entrance to the facility, where the distance from the booths to the entrance partition is only 60 feet. Based on the CBP immigration guidelines the required number of booths is projected at 18, 22 and 24 in 2015, 2020 and 2030 respectively[15], as illustrated in ***Table 4.12***. These numbers are considerably less than the current provision of 48 counters.

[15] The arrival passenger peak is assumed to include 10% transfers/transits

Figure 4.23: Inbound Immigration Hall

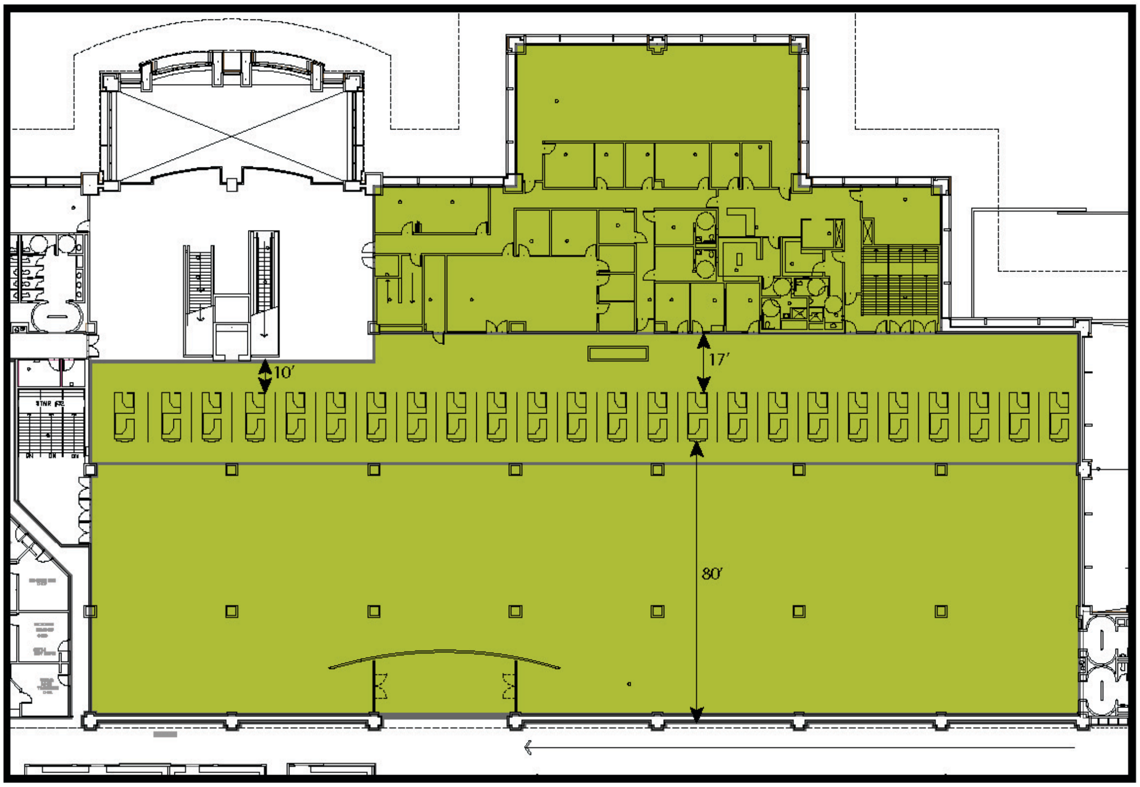


Table 4.12: Forecast Requirements for US Immigration Booths

Facility	Requirement	Current Facilities	2015	2020	2030
US CBP (Immigration)	Number of immigration (passport control) desks	48	18	22	24

Discussions with CBP officials had indicated that there are current queuing problems in this area, some of which relate to how the queues are managed, and some may relate to the queuing depth available. Current CBP guidelines require a depth of at least 94 feet from the counters to the rear wall of the hall. As noted above, there is currently only 80 feet typically, with this being reduced to 60 feet at the entrance. Given the extra width of the hall as a result of there being more booths than required, it should be possible to better manage the queuing with appropriate bank style queues to ensure the hall works well in peak periods for the remainder of the 20 year planning period.

Discussions with CBP officials also brought up the issue that they have insufficient office and support space for the processing area and volumes being handled. Given that there are a surplus of booths, consideration could be given to eliminating a number of booths at the right end of the hall (per ***Figure 4.23***) to create the required additional support/office space.

4.2.5.1.10 Baggage Claim

Figure 4.24 illustrates the layout of the baggage claim area. There are 5 island (carousel) type bag claim devices, with 4 of these being oval and 1 a triangular shape. There is also space reserved for a 6th unit which would be an oval type device similar in size and shape to the other oval devices (illustrated in red dashed lines in ***Figure 4.24***). Each of these devices has 2 separate belt feeds on the airside, allowing for efficient bag delivery. The 4 oval devices have a display length of 243 feet each while the triangular unit has a display length of 260 feet. Based on LOS C, these devices could accommodate about 175 and 185 peak passengers respectively, making all of them capable of handling wide body flights (as peak occupancies are typically only about 60% of flight load). Distances between the devices are typically about 35 feet while end clearances are a minimum of 15 feet. These are all consistent with accepted standards and any observations of this area or discussions with airlines and ground handlers confirmed that this area generally functioned quite well, except during some very severe peaks when bags needed to be off loaded form the devices as passengers may have been delayed in CBP/Immigration.

Based on a peak hour demand comprising 8o% narrow bodied and 20% wide body aircraft and changing gradually to over 25% wide body by the end of the planning period, it is estimated that the requirement for baggage claim units will be 3 narrow body and 2 wide body claim units by the end of the 20 year planning period, as shown in ***Table 4.13***. This compares to the total of 5 units that are currently available and capable of each handling wide body flights. It is therefore projected that the current bag claim units should be adequate over the entire planning period. There would appear to be no need to install the planned 6th bag claim device. Consequently, this space could be used on an interim basis to satisfy other needs, such as unclaimed bag storage or additional space for Guam Customs and Quarantine office and support (see further discussion later).

Figure 4.24: Existing International Baggage Claim Area

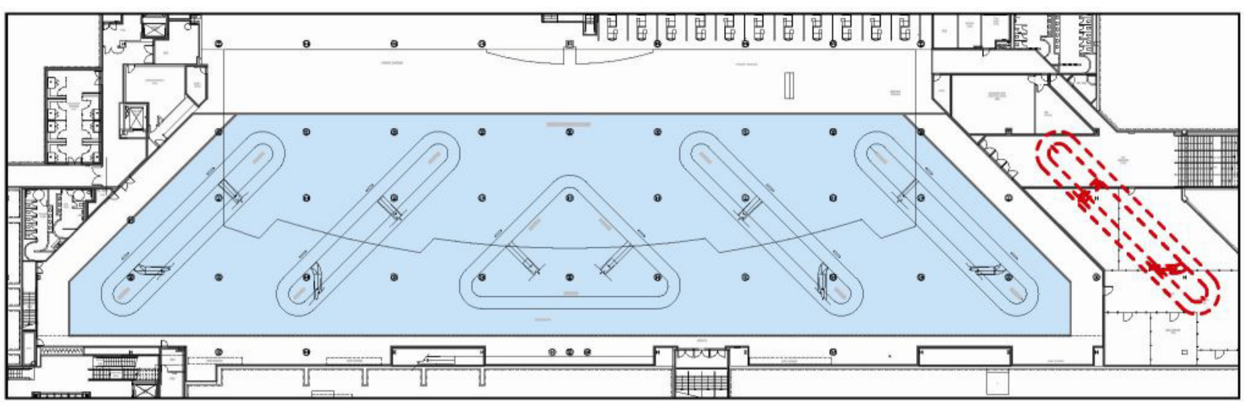


Table 4.13: Forecast Requirements for International Bag Claim Devices

Facility	Requirement	Current Facilities	2015	2020	2030
Baggage Claim Units	Number of wide body claim devices	5	1	1	2
	Number of narrow body claim devices	0	3	3	3

4.2.5.1.11 Guam Primary and Secondary Customs

The layout of the current Guam Customs and Quarantine (CQ&A) primary and secondary inspection areas is illustrated in ***Figure 4.25***. Until recently, the area had identical layouts to the left and right of the central escalator/stair/elevator core down from CBP. However, the area to the left of the vertical core was recently vacated by CQ&A as this was considered surplus to their requirement.

The current area utilized by CQ&A has 22 primary booths and 14 secondary booths. A total depth of just over 40 feet is provided between the primary booths and the nearest bag claim devices. Discussions with CQ&A indicated that this area generally worked well during peaks. But as noted earlier, they have a number of issues with their areas that relate more to support space, maintenance and design issues. Many of these issues need to be addressed on an on-going basis, but the space related issues should be considered in this plan. These will be considered in the options development discussions in the following section.

Figure 4.25: Guam Primary and Secondary Customs and Quarantine

There are no specific design guidelines available to establish CQ&A facility requirements. But using the CBP guidelines, which should be expected to somewhat similar, it would be possible to establish that the number of primary booths required may be estimated at 18, 22 and 24 for 2015, 2020 and 2030, respectively. This would appear to indicate that the number of primary booths may be adequate at least until 2020, with a projected shortfall of 2 booths by 2030. With respect to the secondary belts, as no guidelines exist, it has been assumed that a similar ratio of secondary to primary booths would be appropriate for the forecasts. On this basis, 12, 14 and then 16 booths would be required for 2015, 2020 and 2030, respectively, with consequent similar conclusions to the analysis of the primary units, therefore, these would be adequate to about 2020 and thereafter there would be a shortfall of up to 2 belts by 2030. Experience has shown that inspection agencies can generally process passengers faster than their guidelines indicate, especially during very busy periods, so that it may be possible that the current facilities may actually be sufficient until very close to the end of the 20 year planning period. These requirements are shown in ***Table 4.14***.

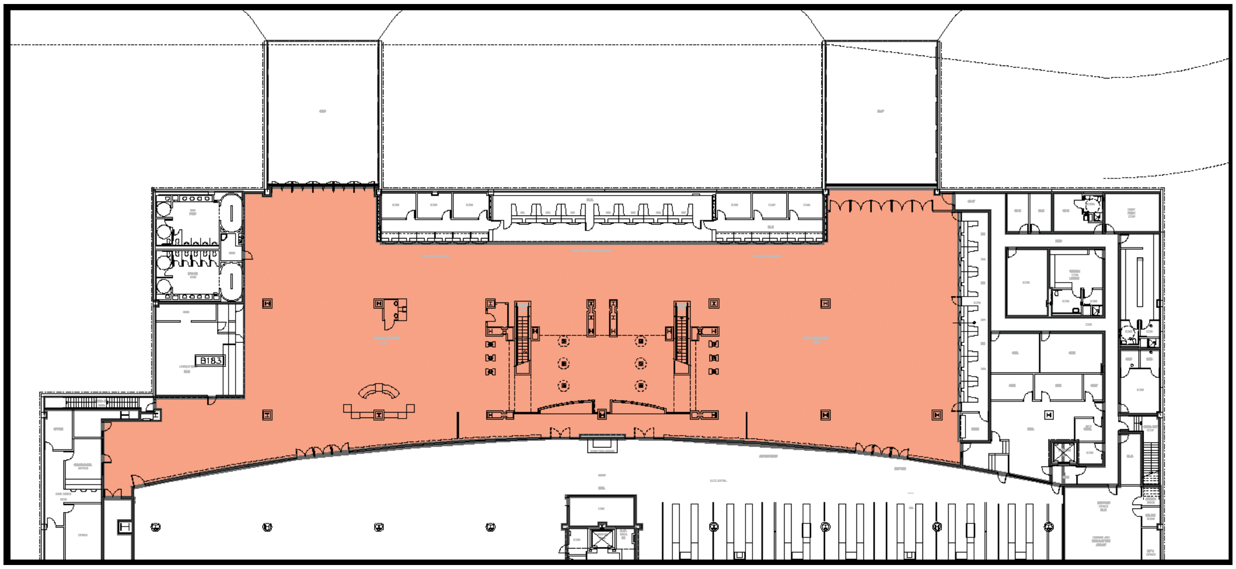
Table 4.14: Forecast Requirements for Guam Customs and Quarantine Facilities

Facility	Requirement	Current Facilities	2015	2020	2030
Guam Primary Customs Check	Number of primary desks	22	18	22	24
Guam Secondary Customs Inspection	Number of secondary inspection desks	14	10	14	16

4.2.5.1.12 Arrival Hall

Figure 4.26 shows the arrivals hall area layout. This area contains the exit from the Guam CQ&A and bag claim area and the variety of car rental and ground transportation counters, tourism counters and tour group assembly areas, as well as a greeter area. This area also contains escalators that lead up to/down from the check-in lobby area above. The total size of the arrivals hall is about 12,000square feet.

Figure 4.26: Existing Arrivals Hall



Based on IATA guidelines the estimated area required for the arrivals hall based on the forecast peak hour passengers for 2030 is in the order of some 10,000 square feet. The current requirement is estimated at around some 7,000 square feet. This would indicate that this hall should be sufficient for the entire 20 year planning period for this study.

The requirement for an arrivals area is very dependent upon the dwell time of passengers and the number of greeters that come to meet their passengers. Guam is primarily a tourist destination, and as such, there are few greeters at the airport. The amount of space required for the arrivals area is therefore dependent on how tour operators assemble their clients, and then take them out to their waiting buses. An efficient process whereby this gathering function and movement to waiting buses is done in a timely fashion should ensure that this area will continue to function well for the entire period of this master plan. It should be noted that comments from the airlines and ground handlers indicated that this area has consistently worked quite well and this was the case during the site visit to carry out an operational assessment. ***Table 4.15*** shows the area requirements for the Arrival Hall.

Table 4.15: Forecast Requirements for Size of Arrivals Hall

Facility	Requirement	Current Facilities	2015	2020	2030
Arrival Hall	Arrival Hall area – square feet	12,000	8,000	9,000	10,000

4.2.5.1.13 Other Terminal Areas

Other major functional areas of the terminal comprise mechanical/electrical systems and maintenance, airline, airport and security support and administration offices.

Since it is not proposed to extend the terminal the existing mechanical/electrical services should be considered adequate in size to continue to support the existing building. In respect of the support and administration offices for airlines, GCQA, TSA and CBP, the lack of any recommendations to increase additional facilities, save for the outbound security check, implies there should be little if any requirement to add to these functional support areas. However, despite this assessment, a number of comments received during stakeholder interviews noted that the CBP offices and/or associated storage may be too small. As well, Guam CQ&A also indicated their offices and storage requirements may be too small. These are very real concerns and should be addressed, though spaces seem to be available in this plan that can be converted to such uses, if required.

With respect to GIAA and airline offices, no indication was provided by any of the stakeholders that there are any concerns in this area. However, the amount of airline spaces required for offices, ATO and ramp offices is highly dependent on the number of carriers operating at the airport as well as the operating philosophy. During the preparation of this plan a number of airlines like ANA had actually ceased operations at the airport and others like JAL had cut back operations due to re-structuring and due to weak traffic. This is one area along with GIAA space that should be monitored more carefully over the life of the plan and adjustments made accordingly. However, as noted in the discussions on the overall terminal size, there would appear to be excess space overall in the terminal. If space shortages occur in certain areas, there should be sufficient space to accommodate these other requirements by reallocating underutilized spaces. The ease with which these may be done would depend on the actual requirements and the location of the underutilized spaces.

4.2.5.1.14 Summary of Terminal Deficiencies

Table 4.16 shows a summary of the forecast facility requirements and queuing levels by functional area, to accommodate 2015, 2020 and 2030 forecast busy hour passenger demand, together with the provision of existing facilities. The following provides a description, by functional area, of the forecast requirements vs the capacity of the existing facilities.

Table 4.16: Summary of Facility Requirements

Facility	Requirement	Current	2015	2020	2030
Check-In	No. of check-in counters -CUTE	76[1]	41	51	59
	No. of check-in counters-dedicated	76[1]	54	67	77
Boarding Pass Check	No. of desks	2	2	3	3
Departure Security Check	No. of screening lanes	4	5	7	8
US CBP (Immigration)	No. of passport control desks	48	18	22	24
Baggage Claim Units	No. of wide body claim devices	5	1	1	2
	No. of narrow body claim devices	0	3	3	3
Guam Primary Customs Check	No. of desks	22	18	22	24
Guam Secondary Customs Inspection	No. of inspection desks	14	10	14	16
Arrival hall	Arrival Hall area -square feet	12,000	8,000	9,000	10,000

1. 12 of these counters are currently not in use due to TSA CTX machines located in front of these.

While the above analysis and discussion has shown that the existing terminal should be capable of accommodating the forecast requirements over the 20 year planning period of this master plan, there are a number of deficiencies that require addressing. These include the following, in general order of descending priority:

- The co-mingling issue that requires that arriving and departing passengers be completely separated is the single biggest issue that requires attention as this is currently consuming a lot of operational resources to deal with. As well, the current solution for dealing with this issue that involves the use of partitions results in poor customer service and is impacting on the performance of the current concessions.
- The TSA Hold Bag Screening that is currently occurring in the main check-in lobby needs to be moved “back-of-house’ in order to reactivate the current check-in counters that are closed. As well, moving these ‘back-of-house’ will improve the customer service experience as they will no longer have to haul their bags around and queue up, sometimes for long periods, as is currently the case.
- The existing TSA passenger screening area requires expansion in order to better process the departing passengers. In addition, TSA requires additional support space to allow them to carry out their functions in a more efficient manner.
- Domestic passengers are currently not handled very well as there are no specific facilities for them, especially in the arrivals process. They must queue at Immigration with the rest of the international passengers and there is no specific domestic bag claim area for these passengers.
- CBP office and support space appears to be inadequate according to discussions with CBP and should be enlarged.
- Guam CQ&A office and support space is also insufficient to support the current operation and needs to be expanded.

4.2.6 Development Options and Evaluation

This section outlines development options to respond to the facility deficiencies identified in the previous chapter.

4.2.6.1 Options to Solve the Co-mingling Issue

Three concepts were developed to solve the co-mingling issue, as described below.

Option 1, illustrated in ***Figures 4.27 and 4.28***, proposes to hang an arriving corridor in the clear storey space within the new concourse areas, with cables. A cross section of this concept is illustrated in ***Figure 4.29*** and some 3-D views are presented in ***Figures 4.34 and 4.35***. The width of the walkway at about 15 to 16 ft would be capable of accommodating a moving walk where necessary and still leave 10 ft for walkers, similar to the circulation concourse below. This width is also such that it leaves plenty of space for light to still get down into the hold room areas and corridor below. As well, the arriving passengers get a good feeling of light and can see out through the clear storey windows and down to the concourse below, making for a pleasant arrival experience. This is a very similar concept to the arrivals corridor in the terminal at Vancouver International Airport.

To get up to this upper level walkway it is proposed to use a set of switch back ramps essentially between every pair of aircraft gates joined by a corridor so that every aircraft gate has access to the sterile corridor without affecting any other adjacent aircraft gate. In some cases this connecting corridor is located inside the existing building (generally in the east portion of the concourse – gates 12 and higher) and in others it is outside, depending on whether the hold room is sufficient in size or if there may be physical restrictions, such as adjacent washrooms, club lounges, etc. The up ramps are always shown built external to the building as this should make it easier to establish the foundations and associated structure. These up ramps go up one level from the hold room level (3) to reach the sterile corridor on Level 4 (roof level). Cross connecting corridors are required on Level 4 (to be located on the current hold room roof) to reach the suspended walkways. The sloping ramps are at 1:12 (to meet ADA requirements with appropriate landings). Sloping ramps are used as these are cheaper than the alternative of a stair/elevator/escalator combination at each pair of gates.

Within the central part of the building, which is the oldest and most difficult part to deal with, it is proposed to route the corridor along the airside (south) side of the terminal by constructing a small extension in this direction (in places) or routing along the roof of the current building where there is already the external walkway feeding gates 8 and 9.

This upper level corridor eventually arrives in the vicinity of the CBP area where a stair/elevator/escalator is used to drop the passengers down into the west (left) side of the CBP area. Passengers at this point would join the main line ups for Immigration or they could be routed to dedicated booths for transfer/transit passengers. This vertical block may require that the last 2 or so CBP booths at this end be closed, but as identified in the previous chapter, there is a surplus of booths anyway. Transfer passengers could be provided dedicated booths immediately adjacent this area and once cleared could be provided a dedicated corridor to the main TSA area (to be expanded) so they could then get back into the (hold room) concourse. This latter flow is not shown in the drawing, but is dealt with later in discussions on concepts for expanding the TSA passenger screening area.

Figure 4.27: Option 1 Sterile Corridor – West Portion

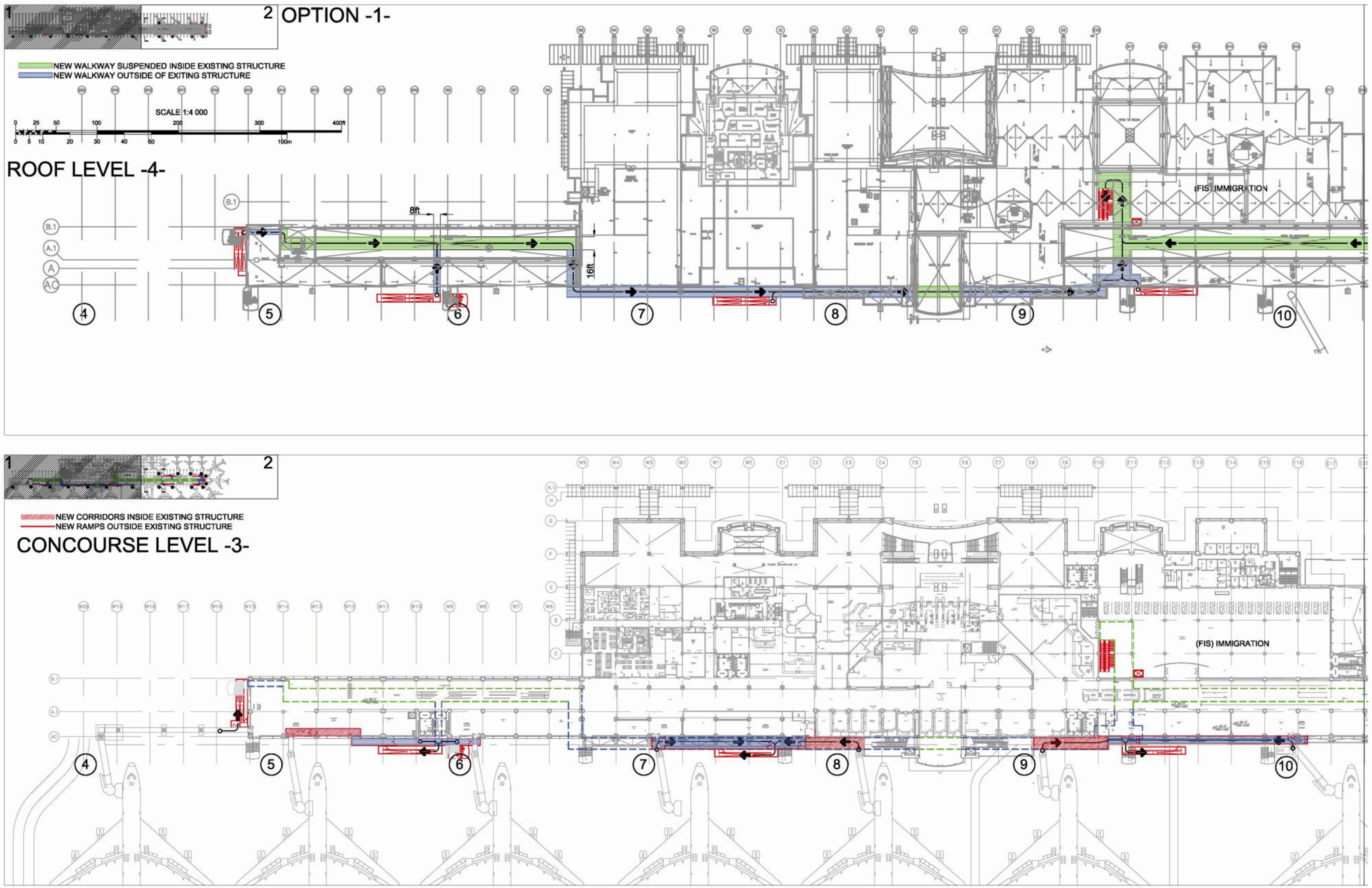


Figure 4.28: Option 1 Sterile Corridor – East Portion

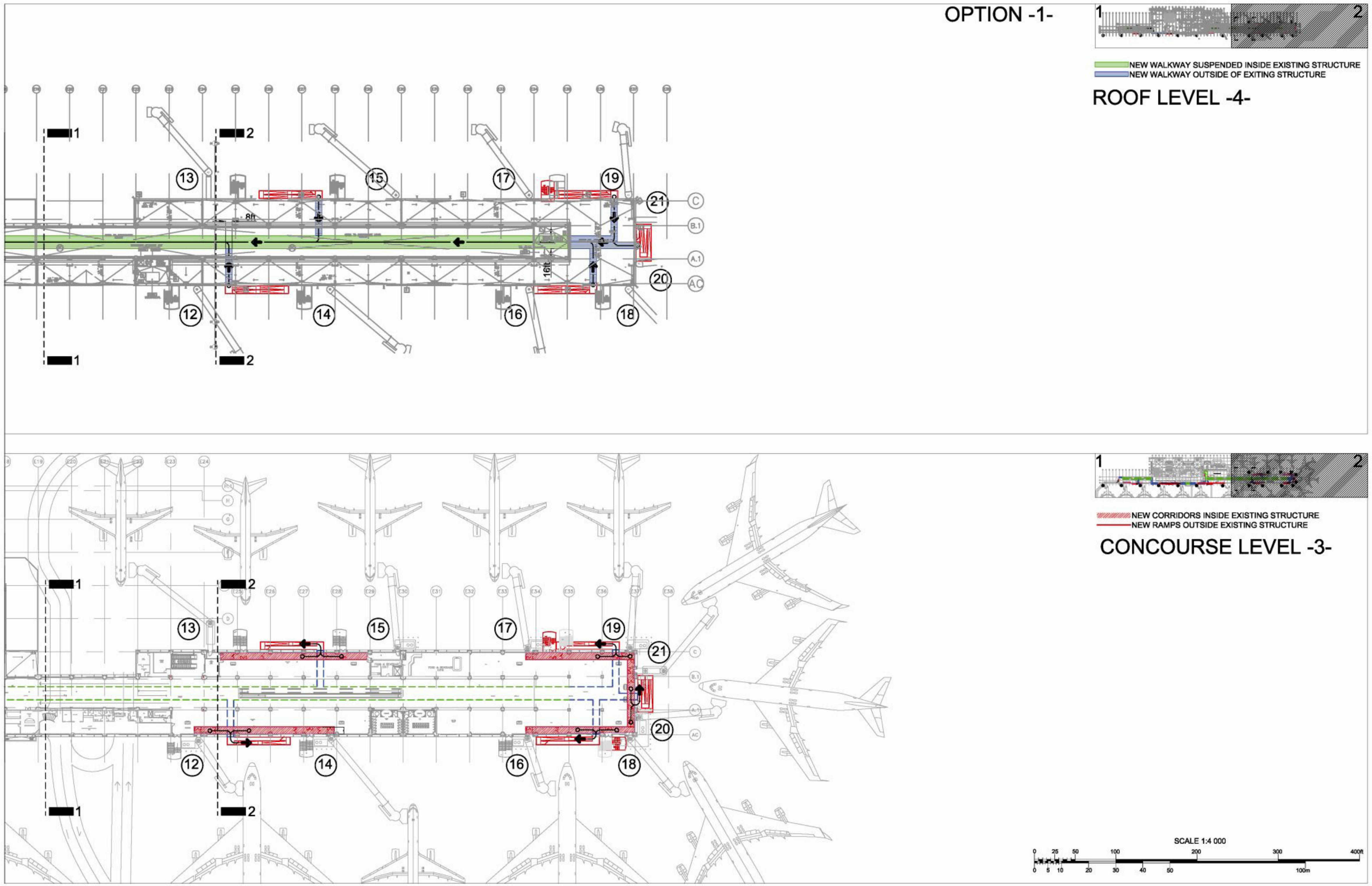
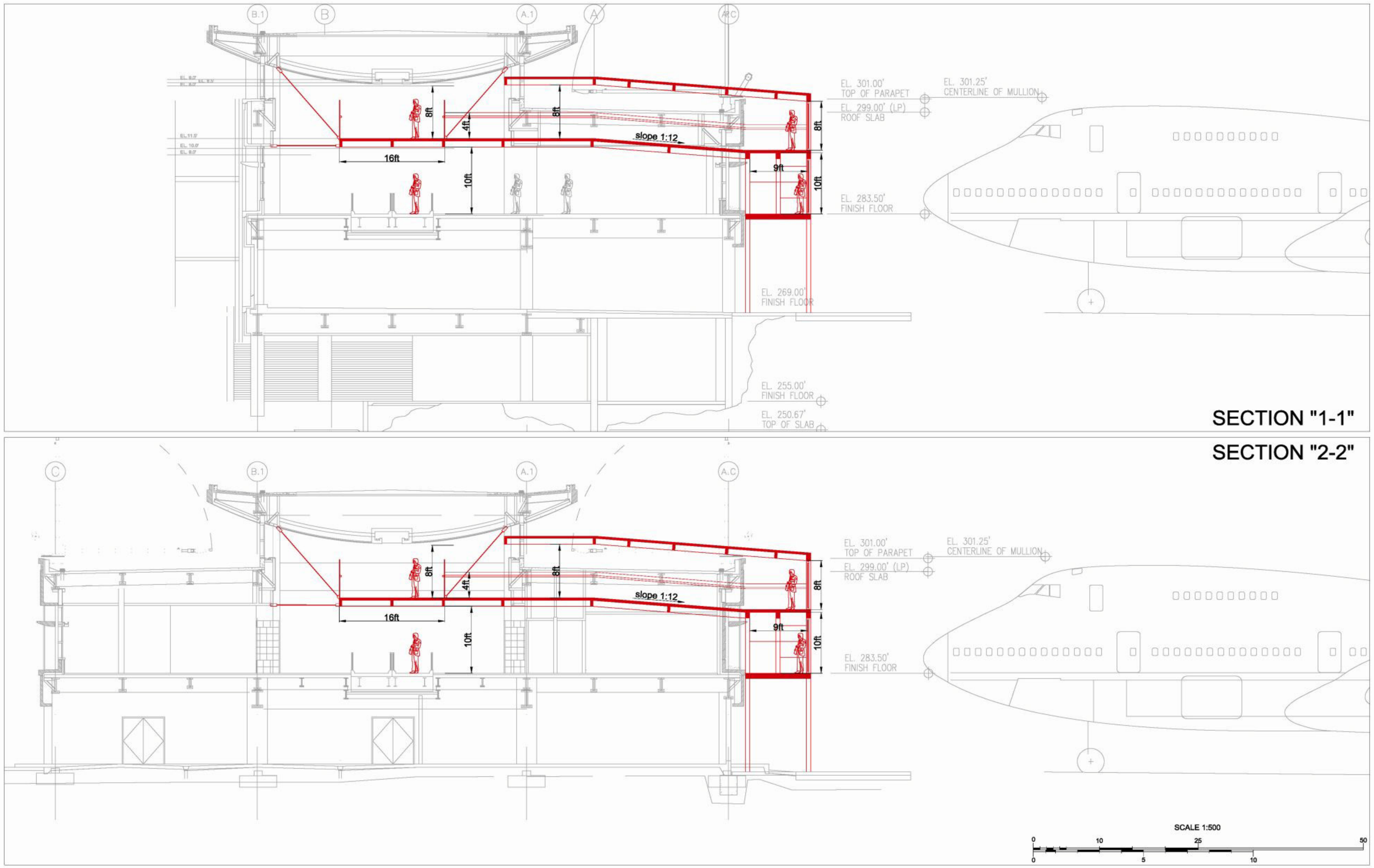


Figure 4.29: Option 1 Sterile Corridor – Cross-sections



This concept reduces the size of the hold rooms at Gates 13/15 and 16 to 21 in order to keep the sterile corridor internal to the building and therefore save on costs. However, the lost hold room space can be made up by converting some of the unused concession spaces in this area, still leaving some 1,000 ft2 for concessions. While this may seem low, this space is currently all unused. As more demand builds in the future, some additional concessions can be provided via the use of carts/mobile kiosks.

This option is considered the best operational solution and the one that would best satisfy TSA and CBP requirements as there is no potential for arriving and departing passenger flows to cross and there is no need for any intervention on the part of TSA and CBP staff, other than to define the operating procedures for the airlines to follow in opening and closing the various doors involved and then monitoring compliance. This option would be expected to cost about $47.8 Million to construct and as such would be more the most expensive of the options developed.

Option 2 develops a simpler and less costly approach to the co-mingling issue. This option is illustrated in ***Figures 4.30 and 4.31***. In this option, a glass wall would be built just inside the airside (south) edge of the building to create the sterile corridor. In the west (left) portion of the building, the glass wall would only be on the airside portion of the building while in the right (east) portion, this glass wall would be on both sides of the building, as there are hold rooms on both sides. This corridor would cross connect at the level below the hold rooms in the area of gates 12/13, so that all of the passengers could be gathered to the same single point in the centre to be eventually dropped down into CBP as in Option 1. In the central part of the building (Gates 8/9) this corridor essentially already exists, though a number of modifications would be required to remove existing escalators located there to create the required clear corridor.

An obvious problem with this option is that any arriving flight, especially one that comes from the extremes of the hold room concourse, impacts the boarding process at quite a number of gates between it and the main access to CBP. For instance, when an aircraft arrives at Gate 4 it potentially affects boarding flows at Gates 5, 6, 7, 8 and 9. But this is no worse operationally than today, and in fact this option is so much better from a hold room perspective in that it opens these back up and finally makes the concessions work as they were originally designed to. An additional advantage with this option is that staffing for this process is less as doors at each of the gates can be used instead of staff.

Figure 4.30: Option 2 Sterile Corridor

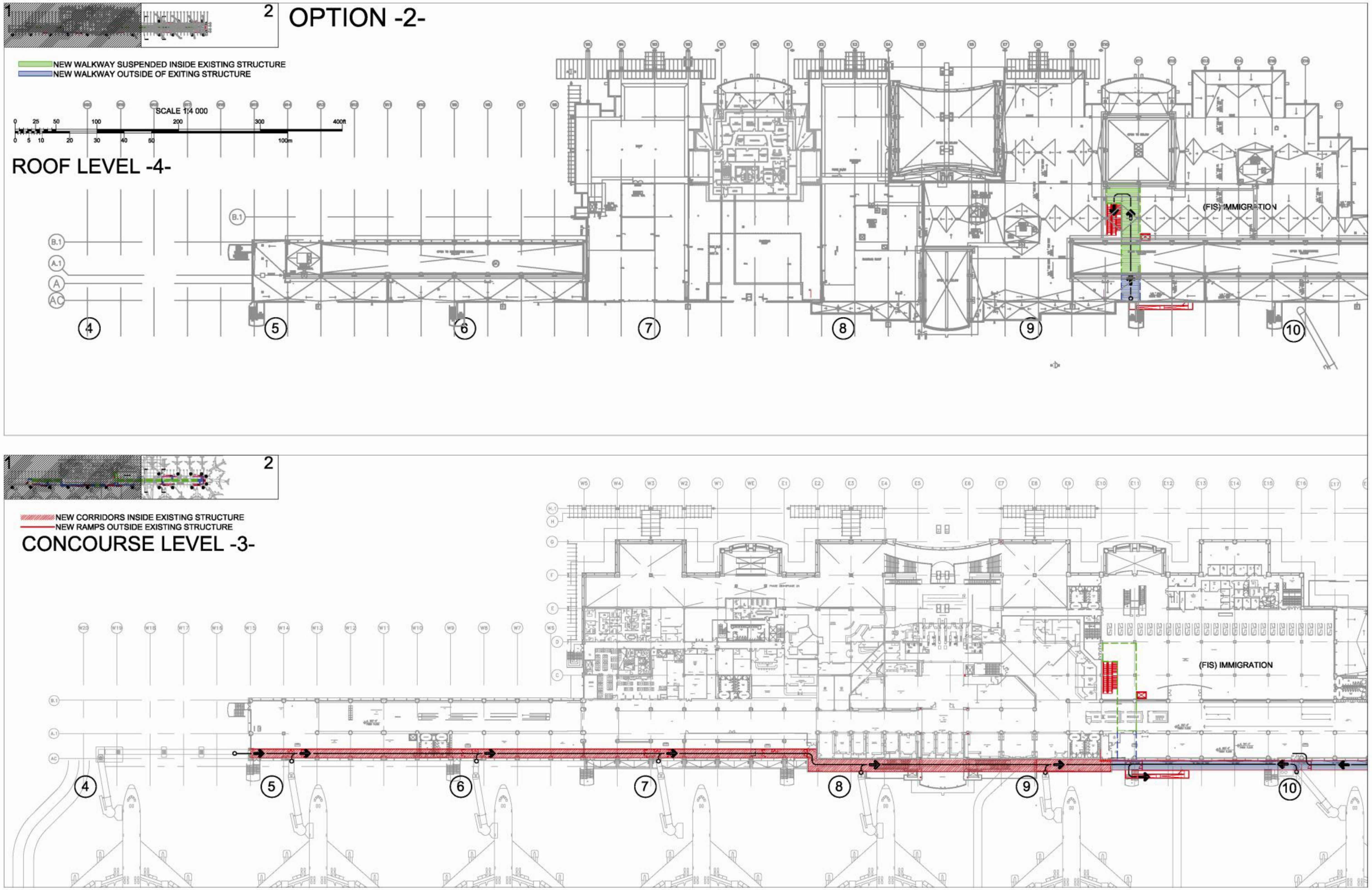
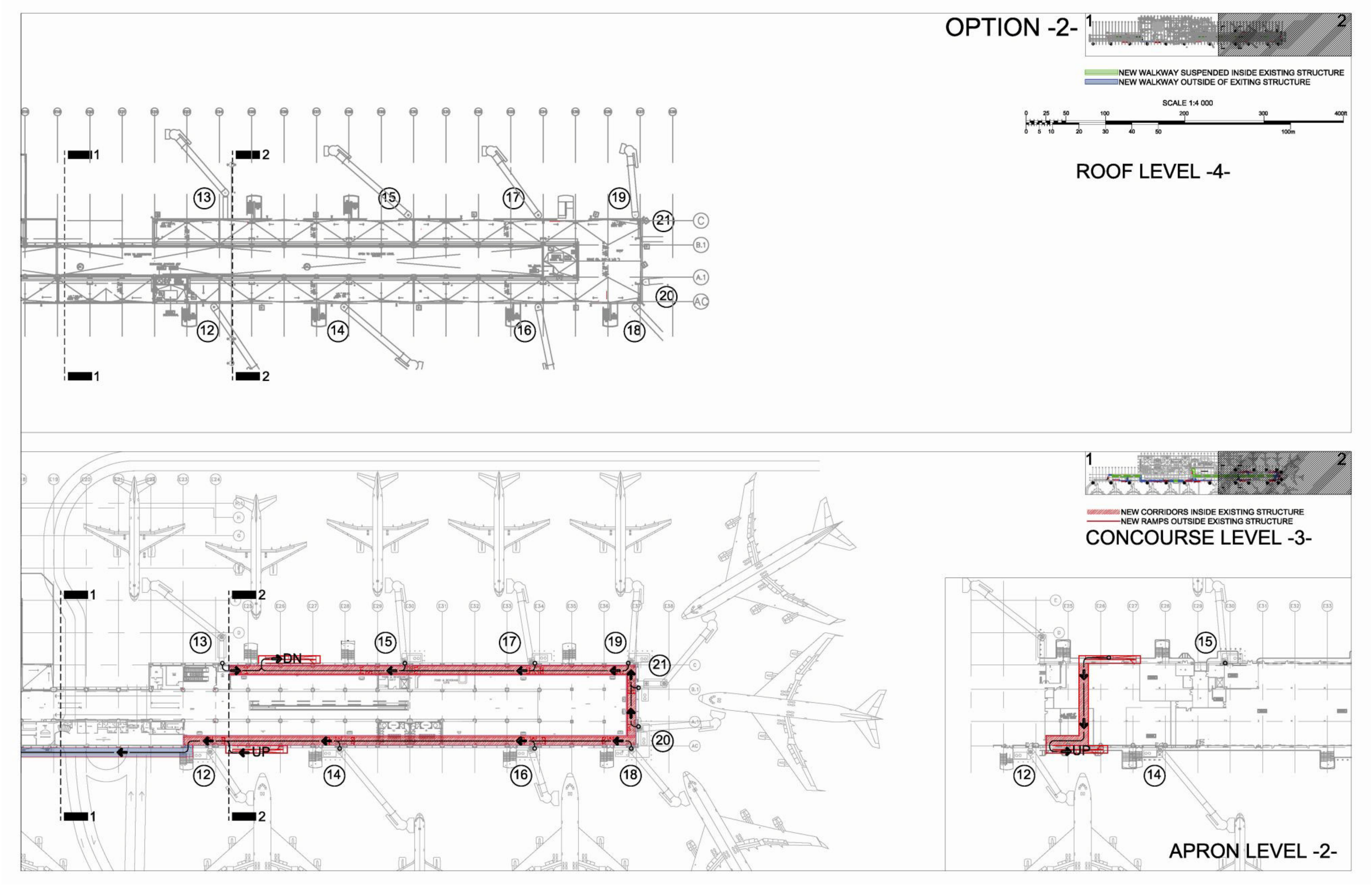


Figure 4.31: Option 2 Sterile Corridor



Another obvious issue with this option is that it reduces the size of all of the hold rooms so that most of the hold rooms would now be deficient in size, as illustrated in ***Table 4.17***. However, these hold room deficiencies can be handled in the following manner:

- At Gates 4, 5 the deficiency can be addressed by converting a portion of the currently unused concession space in this area to hold room.
- For Gates, 6, 7 and 8 removing the wall between the Gate 6 and Gate 7 hold rooms will help, but in addition, scheduling to ensure that no more than 2 wide bodies use the three gates will also alleviate the situation.
- With Gates 12, 14 careful scheduling of these adjacent gates can be used to ensure that the hold room does not get over crowded
- At Gates 13, 15 the deficiency can be addressed by converting a portion of the currently unused concession space in this area to hold room, and
- Similarly at Gates 16 to 21, conversion of the unused concessions space in this area can be used to make up the deficiency while still leaving some 1,000 ft2 of concession space. Additional concession space, if and when required could be provided through the use of mobile carts or kiosks, which would not occupy much space.

Option 2 would be expected to cost some $22.5 Million and would be the cheapest of the three options, but with the most significant operational implications.

Option 3, illustrated in ***Figures 4.32 and 4.33***, is a compromise between Options 1 and 2. In this option, in the right or east portion of the building, the perimeter corridors are as in Option 2. As a consequence, there would be the same hold room issues and associated hold room adjustments required as in Option 2 for gates 12 and higher. But in this option, these corridors then feed an upper level corridor up in the clear storey area, as in Option 1, but only for a much shorter length than in Option 1, starting at Gates 12/13. In the left or west portion of the hold room concourse, gates 4, 5 and 6 are connected by a hold room level sterile corridor (created by a glass wall) and then the passengers get elevated to an upper level corridor along the airside (south) face of the building so that from gates 7 to the right and into the central portion of the building, this option is the same as in Option 1. Effectively this option eliminates the clear story walkway in the left (west) portion of the building. A clear advantage of this option over Option 2 is that it eliminates some of the conflicts between arrivals and departures along or thru the sterile corridor, but it does not eliminate all of them, as in Option 1. This option only eliminates the conflicts at the key central gates (5 through to 13 or half of the gates).

This last option clearly shows a compromise between Option 1 and Option 2. This option would cost about $31.9 Milllion or more than Option 2 but less than Option 1. In terms of operational issues, it is also midway between these 2 options in that half of the gates have unrestricted use. Looking more closely at each of these options, it is evident that there could be a whole series of variations to especially the last of these concept that would mix and match varying portions of the Option 1 and Option 2 elements.

Table 4.17: Hold Room Capacities with Reduced Size Due to Internal Sterile Corridor

Gate Number	Maximum Aircraft size	Gate Type	Aircraft Seating Maximum	Holdroom Size (ft^2) [1]	Required for LOS –C[2]
1	V	Remote	-	-	-
2	V	Remote	-	-	-
3	V	Remote	-	-	-
4	V	Contact	300	6,670	6,710
5	V	Contact	300	-	-
6	V	Contact	300	3,290	3,360
7	V	Contact	300	5,180	6,150
8	V	Contact	300	-	-
9	V	Contact	300	3,620	3,360
10	V	Contact	300	4,620	3,360
12	V	Contact	300	5,010	5,680
14	IV	Contact	190	-	-
11	IV	Apron Load	190	3,900	2,880
13	IV	Contact	190	3,770	4,660
15	IV	Contact	190	-	-
16	V	Contact	300	10,110	14,080
17	IV	Contact	190	-	-
18	V	Contact	300	-	-
19	IV	Contact	190	-	-
20	V	Contact	300	-	-
21	V	Contact	300	-	-
			Total	**46,190**	**50,240**

1. Yellow shaded cells reflect holdrooms that are undersized
2. LOS calculated on maximum seating configuration

In summary, Option 1 is the most expensive, but it solves the problem well. Option 2 is a very basic approach and the cheapest, but has a whole series of operational issues associated with having the corridor on the same level as the hold rooms. Option 3 is a compromise between these two incorporating features from both of the previous options. Effectively Option 3 shows how you could start with Option 2, evolve to Option 3 and then finally to Option 1.

Based on the above comparisons, and subsequent discussions with GIAA management, Option 3 was chosen as the preferred option to implement to solve the co-mingling issue. Subject to further discussions with TSA, CBP, and CQ&A staff, this option should be implemented as soon as funding can be secured. A more detailed plan that includes phasing should also be prepared after detailed discussions and more detailed cost estimates are obtained.

As a result of the discussions with GIAA management, some 3D images were prepared to better illustrate the preferred concept. These images are presented in ***Figures 4.34 and 4.35***.

Figure 4.32: Option 3 Sterile Corridor – West Portion

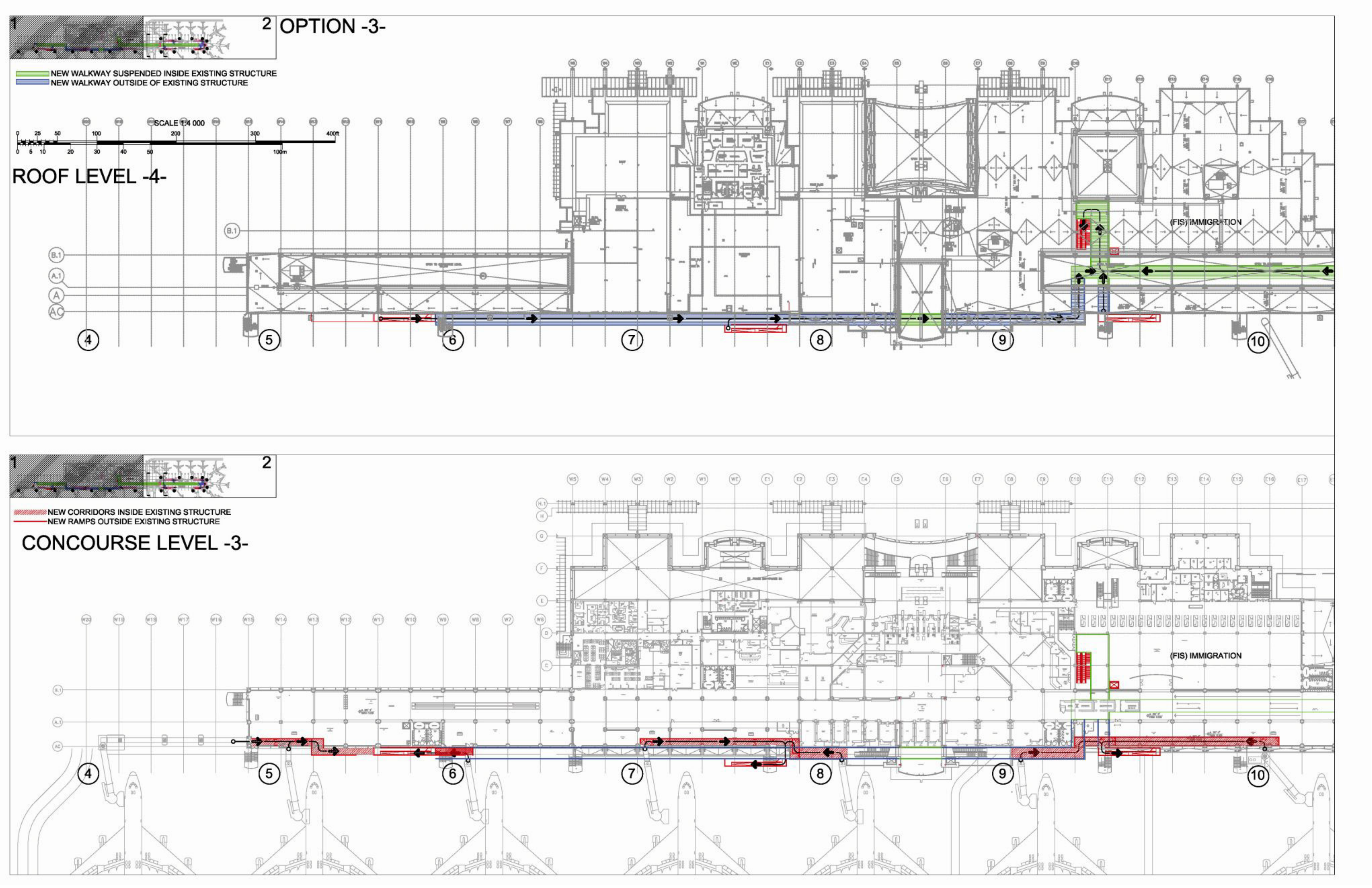


Figure 4.33: Option 3 Sterile Corridor – East Portion

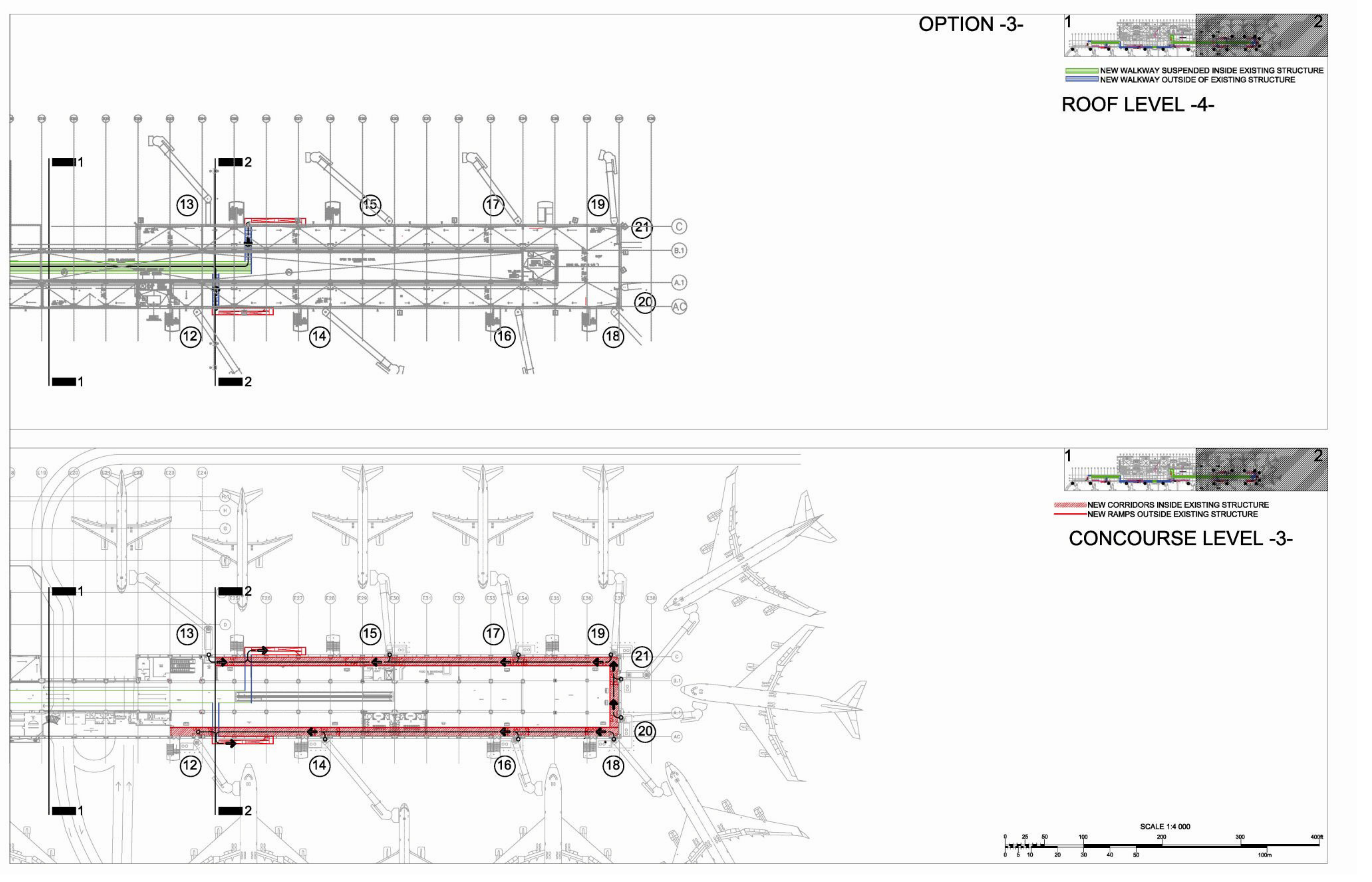
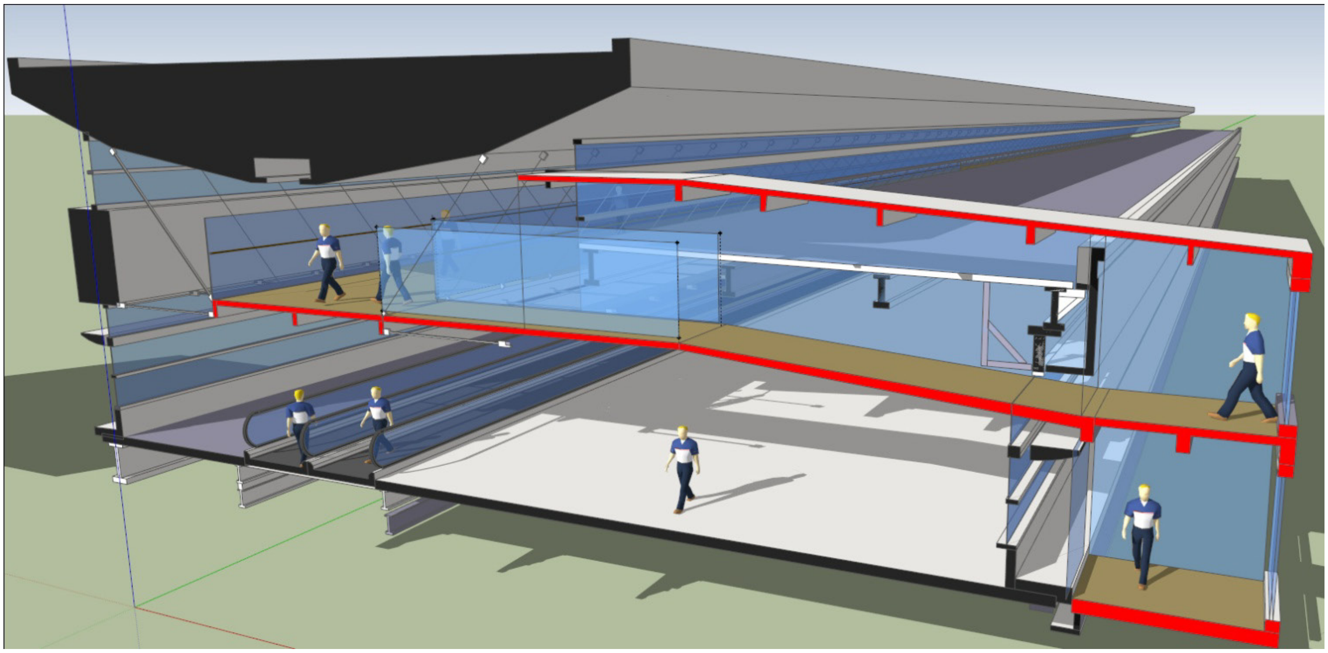


Figure 4.34: Interior 3D Images of Option 3 for the Sterile Corridor



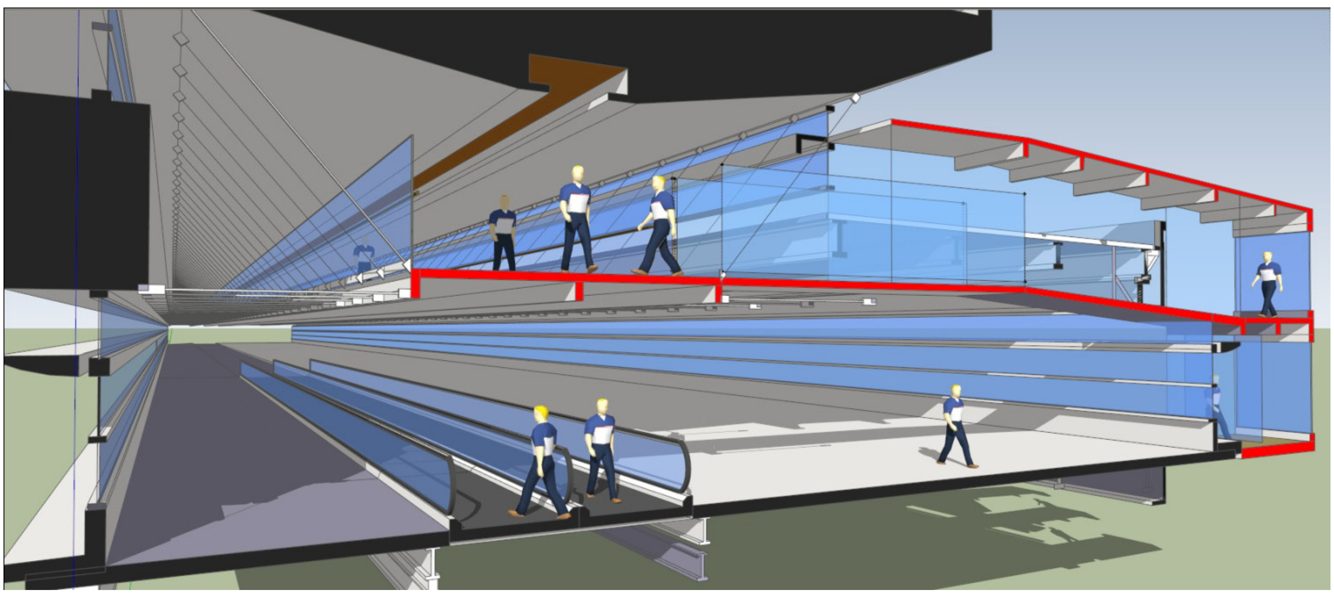
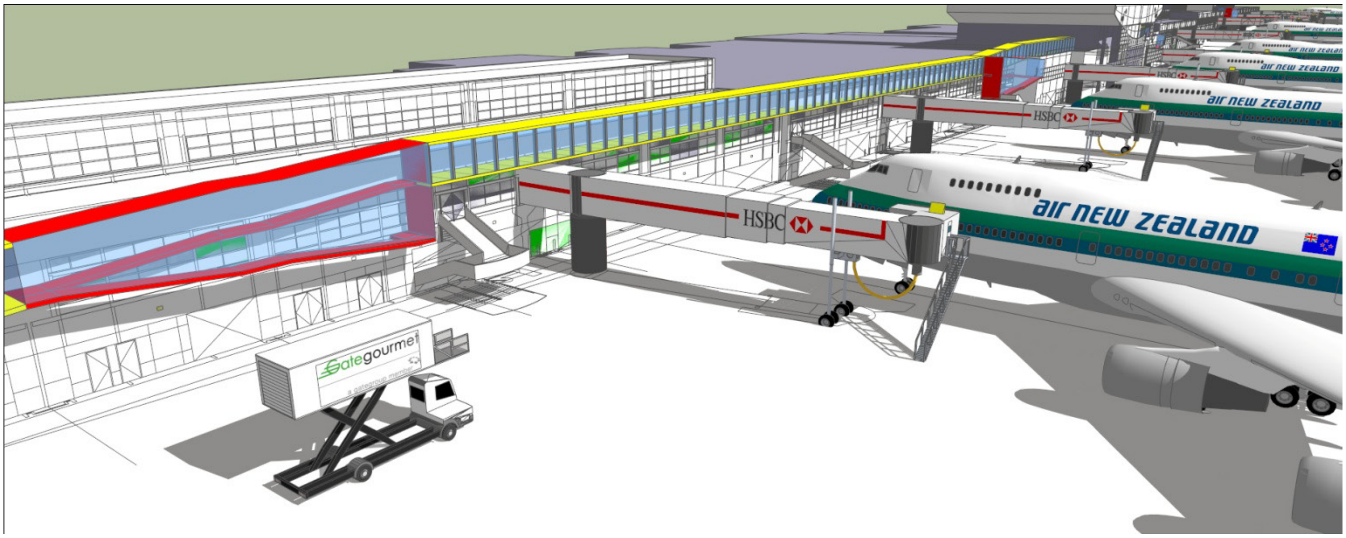
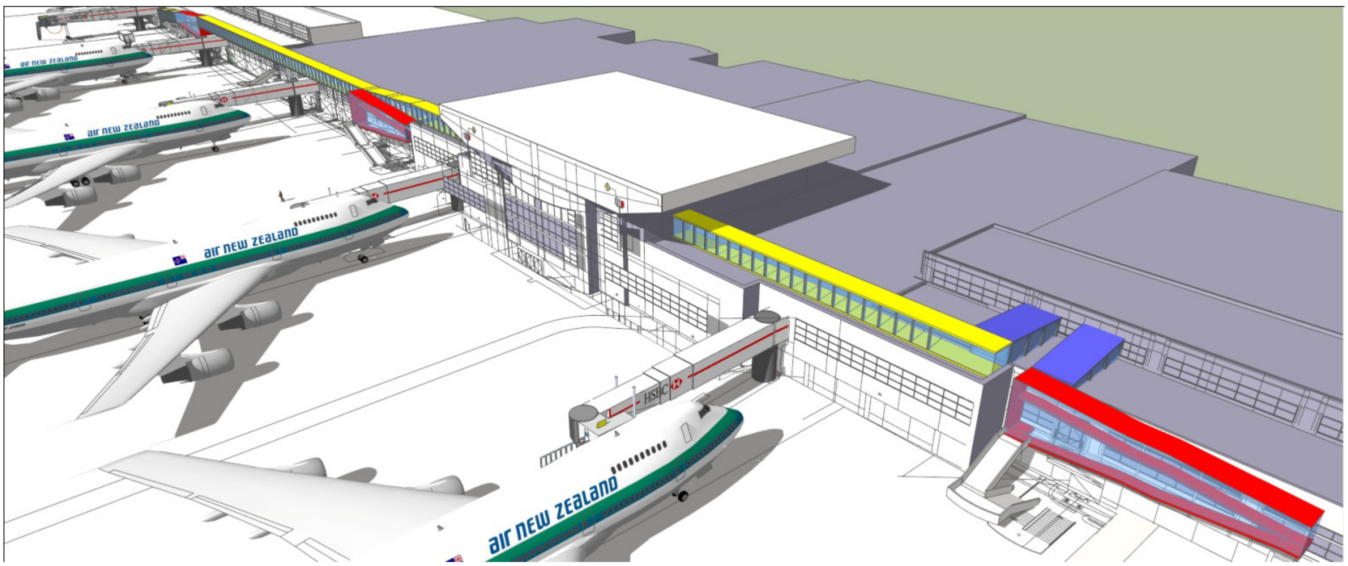


Figure 4.35: Exterior 3D Images of Option 3 for the Sterile Corridor





4.2.6.2 A Concept for a "Back-of House" Hold Bag Screening System

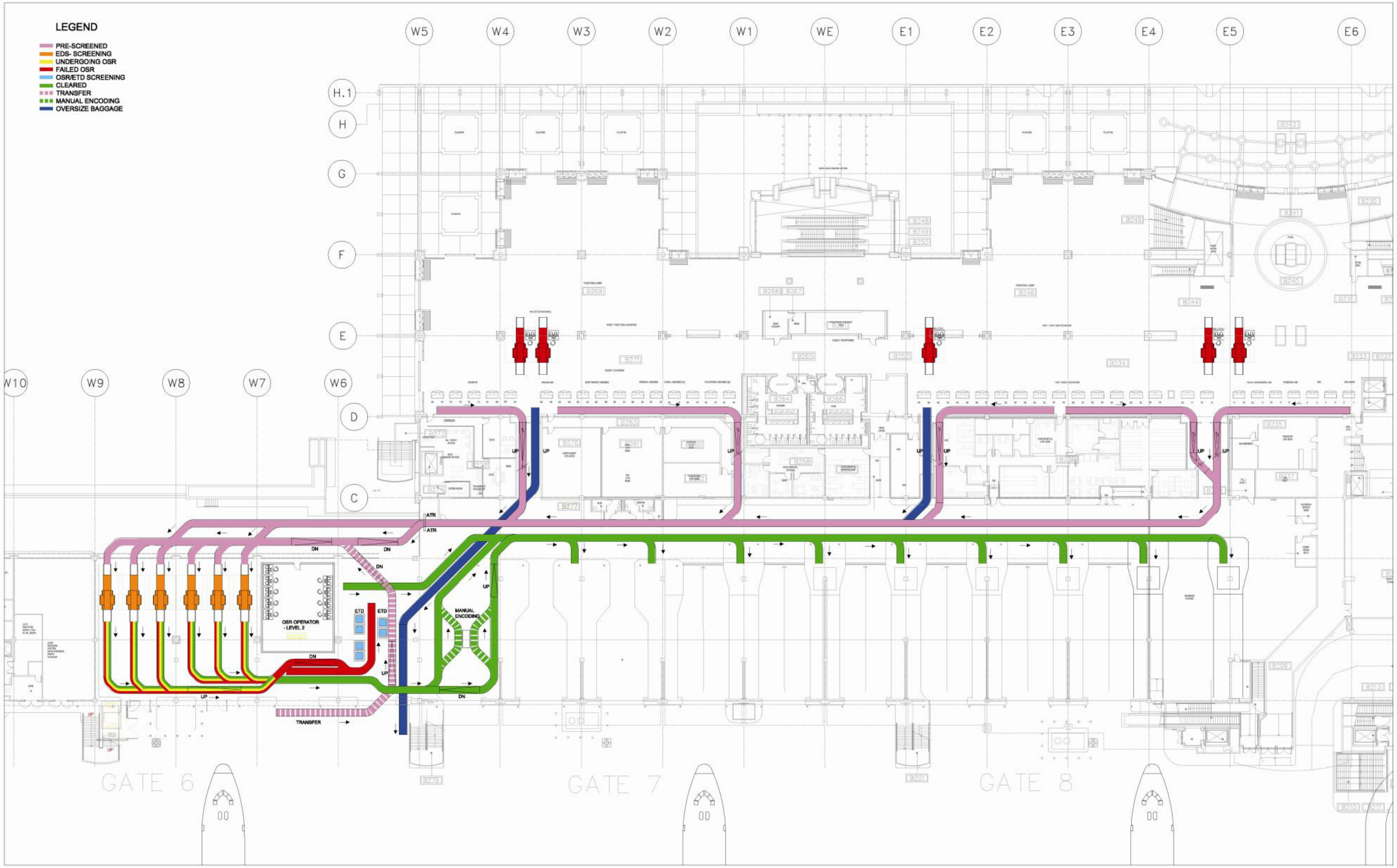
Figure 4.36 illustrates the preferred concept for the HBS system. This concept is based on the updated TSA guidelines for a medium capacity screening system. This concept effectively just expands the current in-transit bag screening system that is there today.

For all of the bags to be screened at the current in transit bag screening area, all of the current bag conveyors that currently flow the bags to the right into the matrixing (sorting) area located to the right of the drawing would need to be redirected and routed to the left into the new HBS area. Then once screened, cleared, and sorted, the bags would be returned to the conveyors feeding the sorting piers (which would now need to run in the opposite direction from today).

The HBS system is shown with 6 CTX machines in the main screening area and these should be adequate to the end of the planning period, so that they would not all need to be installed initially. These could be phased-in with four initially, increasing to 5 within 5 to 10 years and then finally to the ultimate 6. In order to get a misread bag (re-reading) station into the system immediately after screening the first sorting/make-up conveyor bay to the left of the sorting area is eliminated. But this pier/make-up conveyor is replaced to the right in the area of the current matrixing area, as this would no longer be required.

The estimated cost for this HBS concept is about $3.2 Million Including all of the screening equipment, new bag belts, etc. The system could be built for a lower cost if the much of current belt system, associated motors, etc can be re-used, but this would need to be determined at alter date when a more detailed assessment cold be made of the existing system and the associated costs of the improvements.

Figure 4.36: "Back-of-House" Hold Bag Screening System



4.2.6.3 A Concept for Expansion of the TSA Passenger Screening Area

As noted in the requirements section, the current number of TSA screening lanes may just be adequate to meet today's requirements, but this area will require expansion to satisfy projected future growth in passenger traffic.

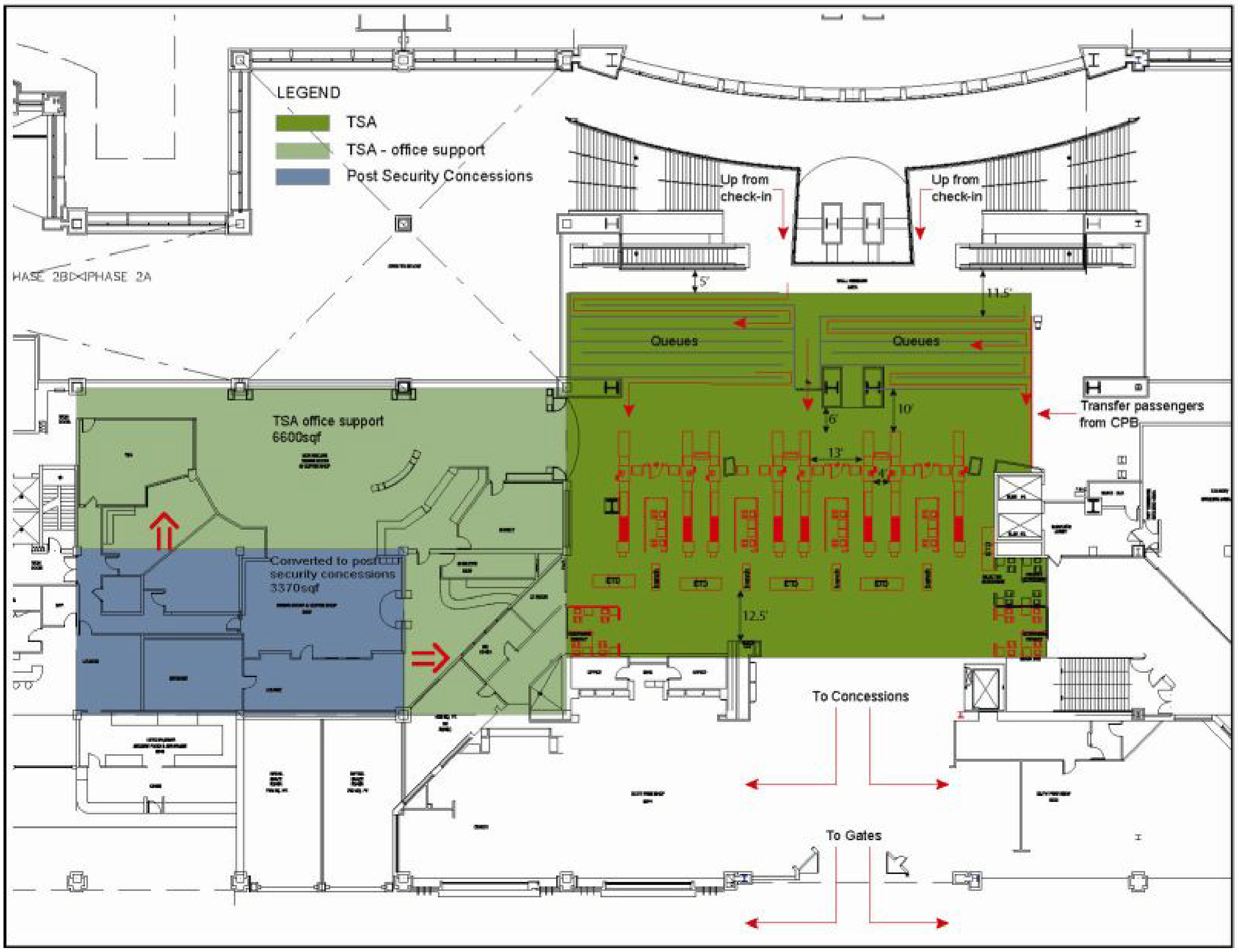
Figure 4.37 illustrates how the current TSA screening area and its associated support space could be expanded to meet the future requirements. By 2030, this area would consist of a total of 8 screening lanes and up to 3 boarding pass checking desks. The additional 4 screening lanes would be provided by reconfiguring the existing lanes (to move these closer together and to account for the interference problems with the current elevators) and then adding another 4 lanes to the left in the drawing. To add these additional lanes would require the relocation of the TSA's current support spaces and the closing of the Food and Beverage facility located here. This F&B facility is poorly utilized and the space would be best used for TSA expansion and conversion of some of the space to post security F&B as shown. It should be noted that none of the secure side retail area is affected by this expansion.

The TSA expansion to meet their office and support requirements is nominal at this time and the actual boundaries of the TSA space vs the reconfigured secure F&B space would still need to be determined based on detailed discussions with TSA and more market assessment for the commercial space.

Figure 4.37 illustrates that transfer passengers that have exited the CBP area would enter the TSA screening area from the right on the drawing. At this point they would mix with the departing passenger queues. It would be more desirable to be able to potentially dedicate 1 or 2 of the screening lanes on the right side of the TSA area for these transfer passengers, as required. However, the elevators located in the same area are the only means for passengers to get from the check-in lobby up to this screening area, so this dedication would be difficult to achieve unless these elevators were relocated. As well, there are public washrooms that are located along this transfer corridor that would no longer be accessible if this corridor were dedicated to transfer passengers. It is suggested that further studies should be carried out on the feasibility of providing a dedicated transfer passenger route through this area and providing dedicated TSA screening lanes for these passengers in order to speed up their processing and provide a better experience as they traverse this area.

The layout shown in ***Figure 4.37*** would meet the ultimate requirement for this area. This concept could be staged by first expanding to 6 screening lanes in the short term and then expanding to the eight lanes by around 2020, or as required. However, any expansion would have immediate implications on the adjacent F&B facility, especially to account for some of the space deficiencies that TSA currently have with respect to support space for this area. Therefore, it may be appropriate to shell out the space for the ultimate configuration and only install the equipment and occupy the space required in the interim.

Figure 4.37: Expanded TSA Departing Passenger Screening Area



4.2.6.4 Options for Handling Domestic Passengers

Currently, there are no dedicated facilities for handling domestic passengers at the airport. For passengers arriving on flights from Saipan and Rota they must go through the Immigration line ups and show their ID cards and then use the same bag claim area as the international passengers. This is a very poor level of service as line-ups in Immigration can get long. To improve the level of service for these passengers, it is important to provided some dedicated facilities that cater to their specific needs and that avoid any un-necessary processing and queuing.

In Option 1A, illustrated in ***Figure 4.38***, domestic flights are shown operating from the Gate 13 area. There would be 2 prop operations designated here with the Gate 13 one dedicated while the Gate 11 position would be a combination position with prop use maybe once per day and jet use otherwise. Note that the Gate 13 boarding bridge should be relocated to Gate 11, as illustrated, for this to happen. From a capacity point of view, there is no loss in a bridged gate position as the bridge at 13 is merely being moved to 11 and the capacity analysis in any case indicates that there are excess gates, even by 2030.

In this option, the domestic passengers would check-in in the main lobby, proceed through TSA screening and then to the old ground level hold room under Gate 13, actually designated Gate 11. They would walk out from this hold room to board either position as shown. Upon arrival, the passengers would be bussed to an area between Gates 8 and 9 where there is a stair/escalator/elevator core down to the baggage area.

On the baggage level there would be a need to create a sterile corridor that bypasses the international baggage area out to a new bag claim carousel that would be located in the area recently vacated by Guam Customs.

Option 1B, illustrated in ***Figure 4.39***, is a variation of Option1A in that instead of bussing the arriving passengers, they would walk into the hold room and then up to the concourse level where they would proceed to around the Gate 9 arae where they would then use that stair/escalator/elevator core to get down to the bag claim level as in Option 1A. To be able to use this core, and not affect Gate 9 boarding, the Gate 9 aircraft would need to be adjusted as shown in ***Figure 4.39*** with the Gate 9 bridge relocated to come straight out of the hold room. (The bridge location and aircraft rotation/position is conceptual and would need to be worked to more detail depending on a survey of the apron elevations, etc.).

Option 2A, as shown in ***Figure 4.40***, would just close Gate 4 to jets and use it for 2 prop ground loading positions as shown. This bridge could be relocated to Gate 11 to serve the narrow body position there, so there would be no net loss of bridged positions. There would however be a loss of wide body positions, though the capacity analysis shows there are too many wide body gates available, even by the end of the planning period.

The passengers would use the existing Gate 4 hold room and would get down to ramp level via a new switch back ramp to be built outside the end of the building, similar to the ramps used in the sterile corridor options above. Arriving passengers would enter the building via this same ramp and then would proceed to access the existing stair/escalator/elevator core at Gate 8 to get down to the Bag Claim level, which would consist of the same facilities/operations as Option 1. To be able to use this core, there would be a need to relocate the Gate 8 bridge to exit directly from the Gate 8 hold room as shown. The new bridge would need a fixed link for locate the bridge properly to get appropriate serviceability with the design aircraft at this gate.

Option 2B, as illustrated in ***Figure 4.41***, is a slight variation of 2A that shows the prop positions located in front of the current cargo terminal, if there was a desire not to lose the Gate 4 jet position. But then walking distances would be further from the gate 4 hold room. Hold room capacity should not be an issue as the abandoned retail area here could be converted to provide the additional hold room space that would be required.

Figure 4.38: Option 1A – Handling Domestic Passengers

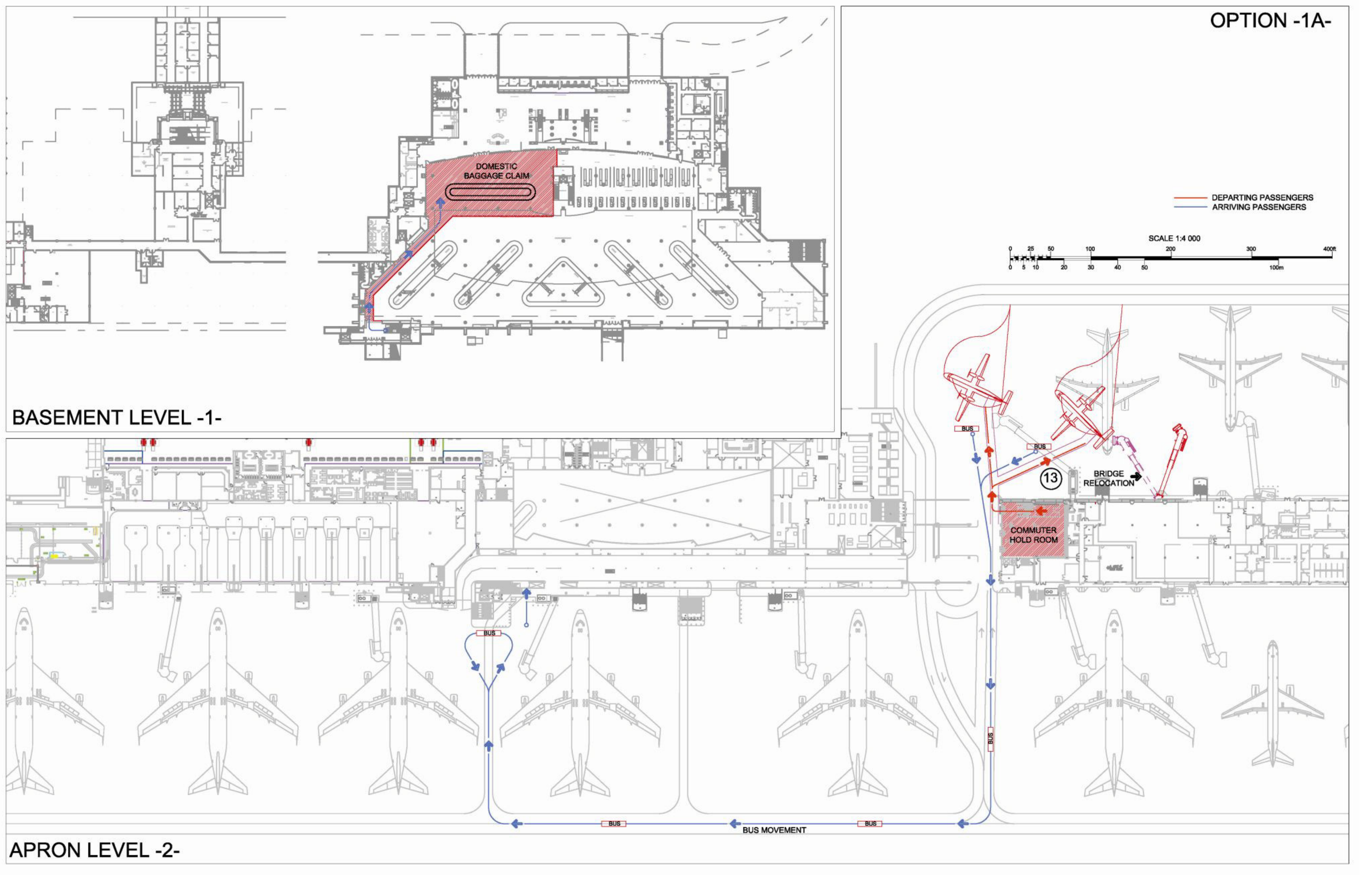


Figure 4.39: Option 1B – Handling Domestic Passengers

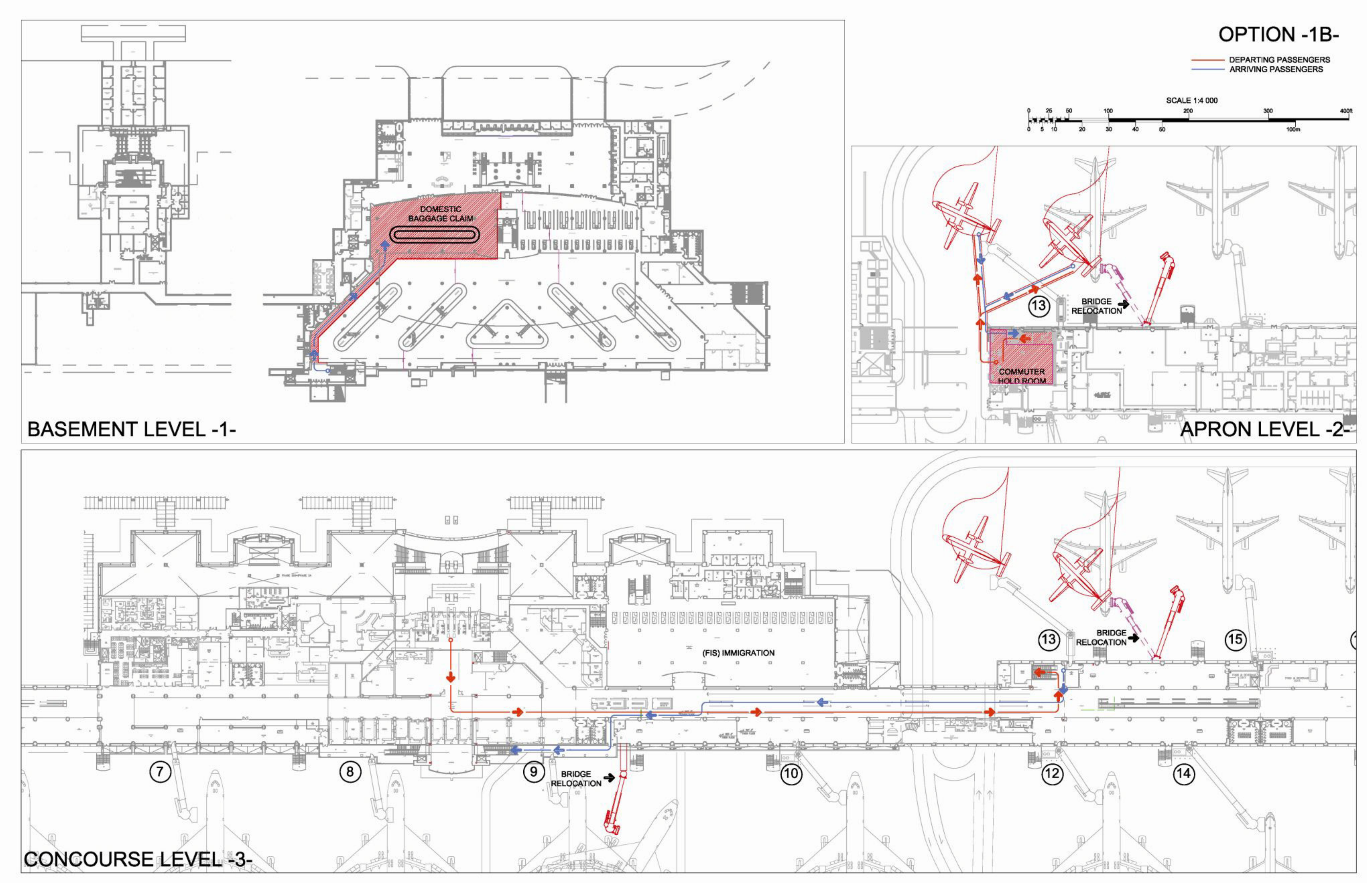


Figure 4.40: Option 2A – Handling Domestic Passengers

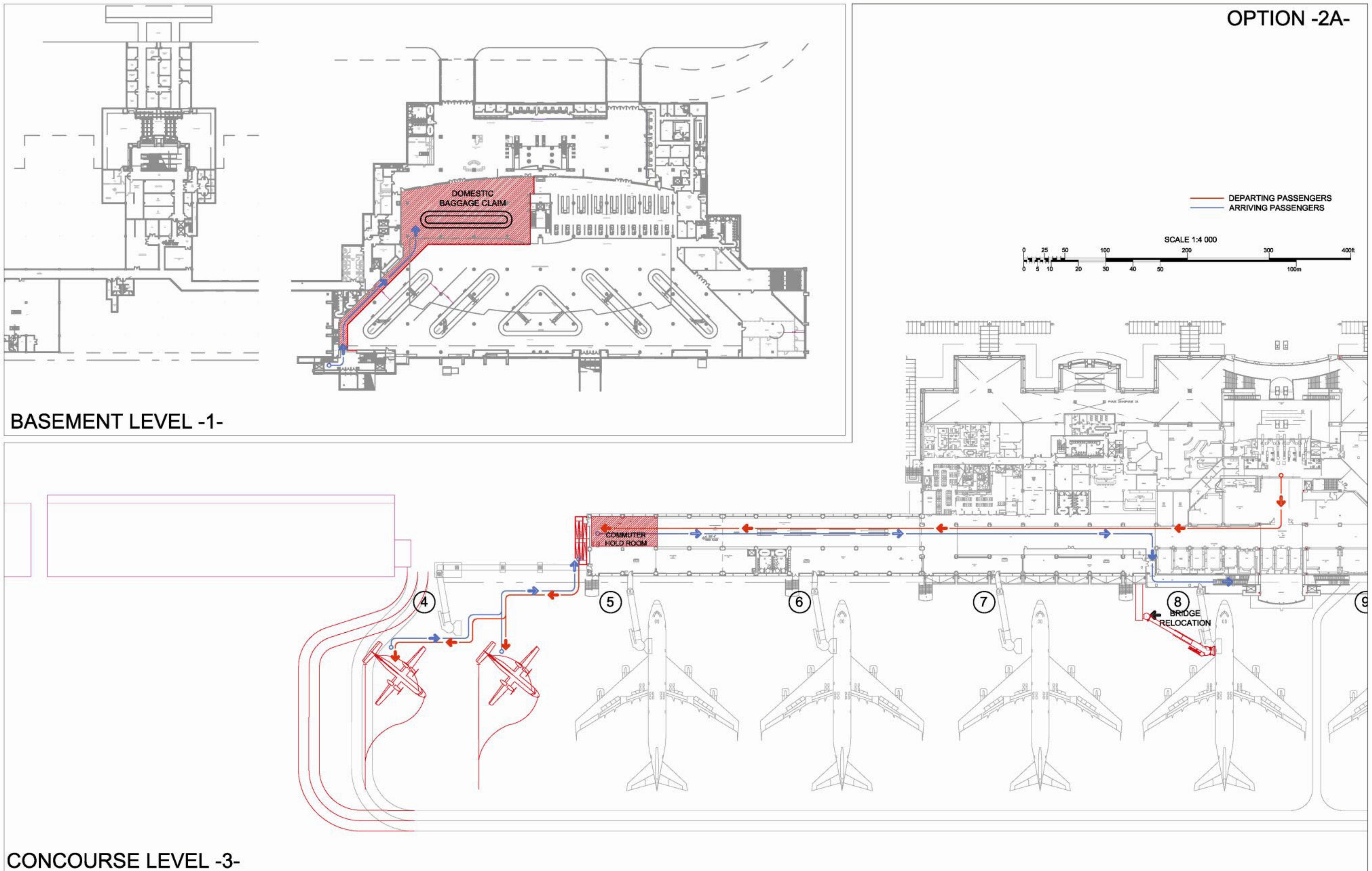
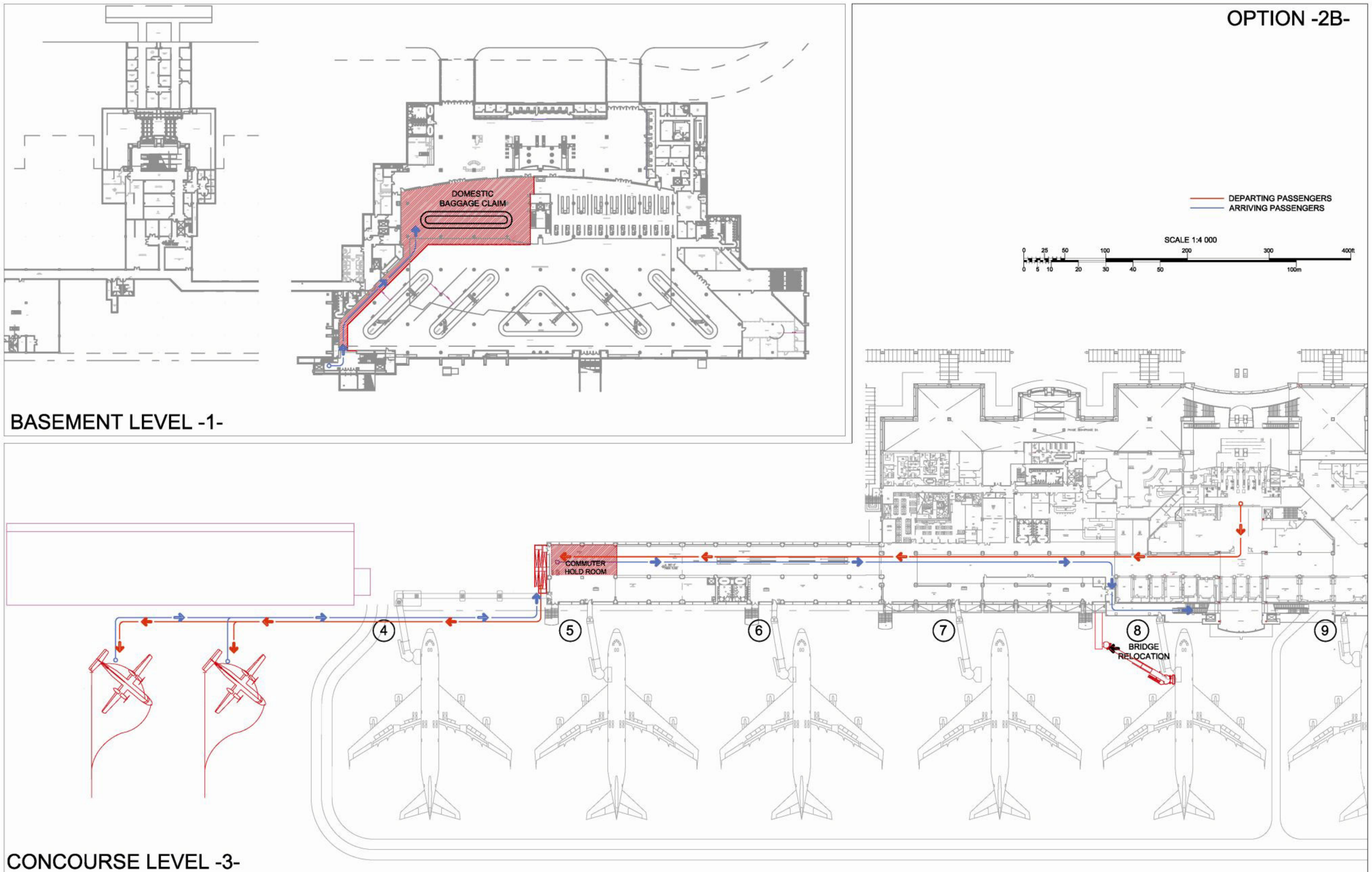


Figure 4.41: Option 2B – Handling Domestic Passengers



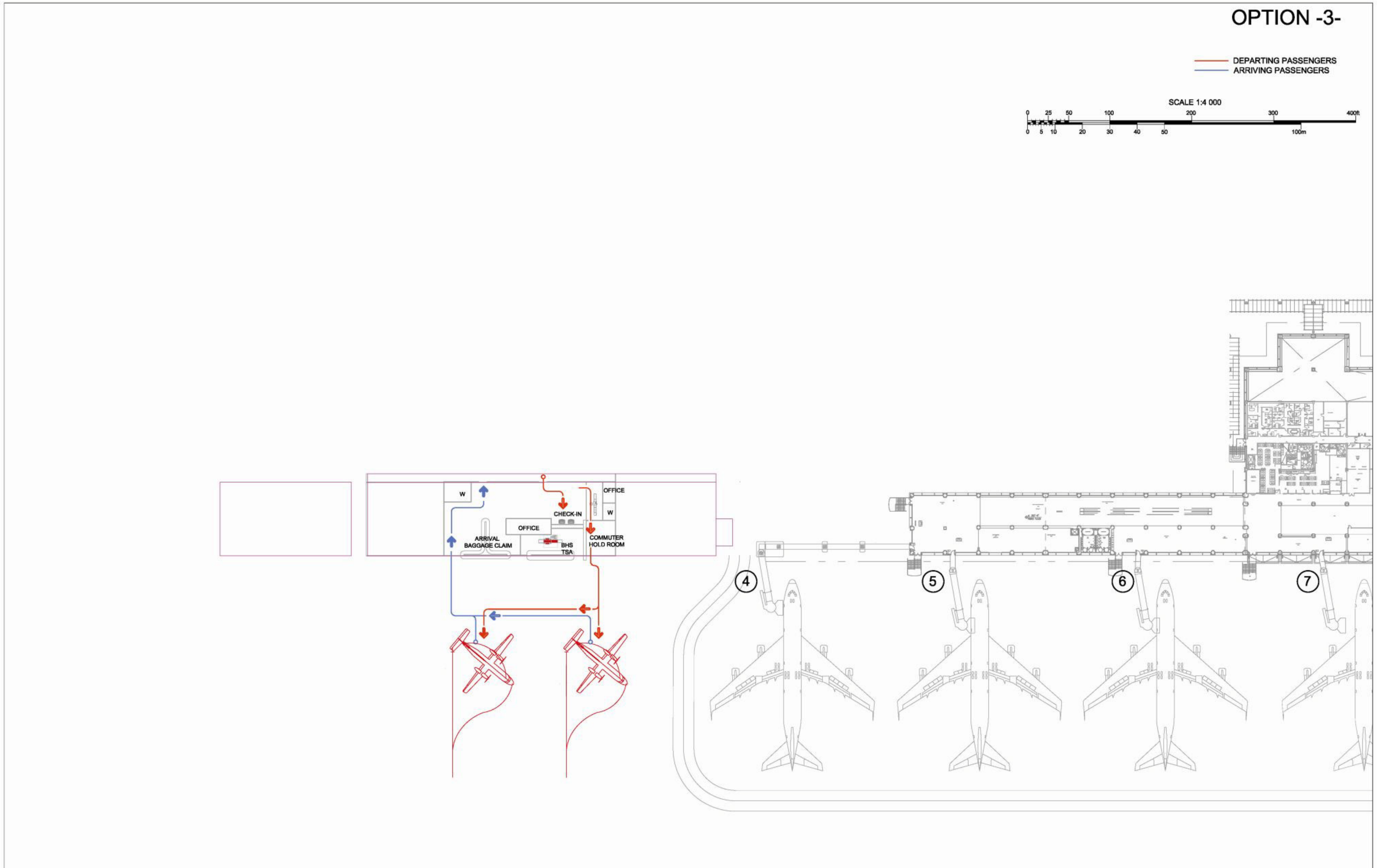
In each of the above options, the domestic carousel in the basement is shown in the same location and this location is the area formerly occupied by Guam CQ&A. As an alternative to this, as part of the work carried out with respect to concession facilities, it was deemed desirable to look at providing some concession facilities in this basement level for arriving passengers who arrive in the early morning period but cannot check into their hotels until later in the day. ***Figure 4.42*** illustrates a concept for integrating the new retail facilities with the domestic bag claim area.

In this concept, the area previously reserved for an additional bag claim carousel (shown to the right of the drawing in dashed red) would be activated for that use. The left most device in the drawing would then be converted to domestic use by putting up a wall around this device. Domestic arriving passengers would still arrive via the stair/escalator/elevator core located immediately adjacent and they would then exit to the main greeter lobby. The area previously occupied by Guam CQ&A would in this case be converted to the new retail uses, with some adjacent space reserved for Guam CQ&A to provide for their additional storage and office requirements. This reconfiguration could be used with any of the above options 1A, 1B, 2A or 2B.

Figure 4.42: Optional Arrangement for Domestic Bag Claim – Including Some Arriving Retail

Option 3 converts a portion of the existing cargo building, which is planned to be vacated (and the capacity analysis has shown is not required), into a commuter terminal. This terminal, as illustrated in ***Figure 4.43***, would have full facilities, including check-in, HBS, TSA passenger screening, etc. The aircraft would use the ramp in front of the building (similar to Option 2B).

Figure 4.43: Option 3 – Handling Domestic Passengers



In terms of an evaluation of the above options, it is suggested that it would be best to leave the domestic passengers in the existing building. Here they have access to existing services like check-in, concessions, existing hold room spaces, easy roadside access and parking, etc. The costs of making the limited changes to the existing terminal are expected to be much less than building new or renovating the cargo terminal as in Option 3. As well, the passengers then also have easier connections to international flights.

There will be an issue with respect to phasing these services in as the sterile corridor/co-mingling issue needs to be resolved first, or at least in conjunction with these changes. For instance, the above options for arriving domestic passengers to use the stair/escalator/elevators cores around Gates 8 or 9 would be inconsistent with Option 2 of the sterile corridor options, though this would be OK with respect to the other 2 options. To solve this problem, Option 2 could be modified to be like Options 1 or 3 in this particular area. There may also be an issue with respect to CBP/TSA with the co-mingling of the domestic arriving passengers with the departing passengers. Further discussions need to occur with these agencies, but this should not be considered a problem once the greater co-mingling issue is solved.

Overall, the recommendation would be to go with something like Option 1B. This uses a hold room area which is currently not used, but is perfectly suited to the ramp loading operations. The passengers get to stay in the building and have access to all the services there, including good connections. Maneuvering the prop aircraft into this area would be easy and be more fuel efficient than using these positions for jet aircraft.

As a second choice, Option 2A would be preferred. This would actually be a better and more pleasant operation for these passengers in that the hold room is much more pleasant and the passengers have more convenient access to concessions. Walking distances and other issues are generally comparable to Option 1B. The key concern with this option maybe the giving up of a wide body gate (4), but given that there is an excess of gates in any case, and an excess of wide body gates, especially, this should not be insurmountable. But this appears to be a preferred gate on the part of many of the jet carriers as it minimizes their taxiing distances. The hold room here also has convenient access to concessions and the Delta lounge (in the case of Delta and Skyteam carriers).

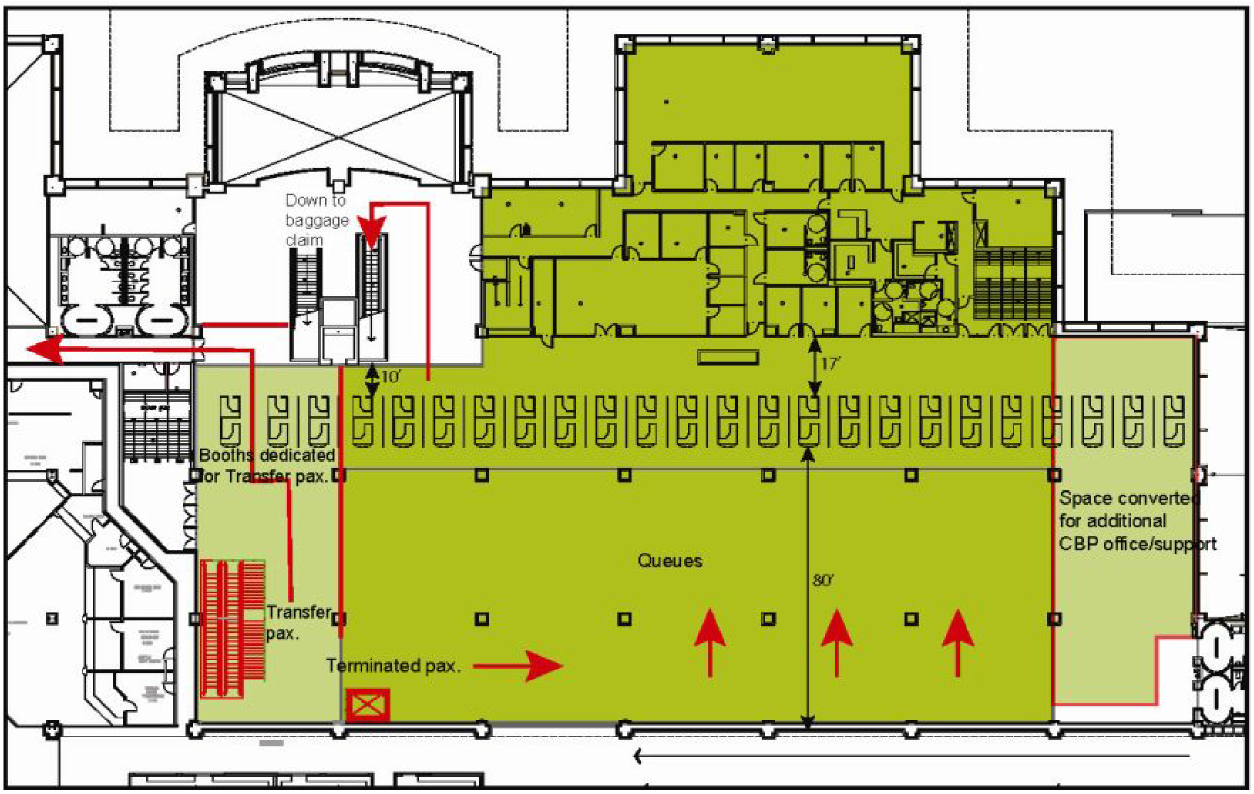
In discussions with GIAA staff, they indicated a preference for Options 1A or 2B. Option 1A manages walking distances by providing a bus for arriving passengers. This option also deals with the issue of mixing arriving domestic passengers departing passengers by bussing them directly from the flight to the bag claim area. On the other hand, Option 2B does not take away an active jet gate. GIAA staff also specified a preference for the bag claim layout as illustrated in ***Figure 4.42*** as opposed to the layouts shown in ***Figures 4.38 to 4.41***, i.e., the domestic bag claim device should be provided by adding the previously designated 6th device to the area and converting the west most device to domestic. Based on all of the input and discussions, it is recommended that Option 1A be considered the preferred option for dealing with the domestic passenger issue and that the bag claim area be reconfigured as illustrated in ***Figure 4.42***.

4.2.6.5 A concept for Accommodating Additional CBP Office/Support Space

Discussions with CBP officials indicated that they were unhappy with the level of office and support space. As well, in order to solve the co-mingling issue, a number of changes will be required to the CBP area. ***Figure 4.44*** shows how the CBP area can be reconfigured to address some of CBP's concerns and how to integrate the co-mingling issue and transfer passengers.

With respect to the lack of office and support space, this can be addressed by converting some space to the right (east) portion of the CBP area from primary processing to offices/support. The concept shown is nominal and for illustrative purposes only. The number of booths that would be eliminated and the actual additional space required or to be provided would be subject to discussions and negotiations with CBP. However, it should be noted that the requirement section identified that there is only a need for 24 primary booths, even by the end of the planning period, vs. the 48 currently provided. This opens up an opportunity to convert quite a bit of this area, if required.

Figure 4.44: Concept for CBP Area Re-Configuration



In terms of the co-mingling issue, recall that all of the concepts brought the arriving passengers to a central area just above the CBP area and then dropped these passengers down into this level via a stair/escalator/elevator core, as illustrated in ***Figure 4.42***. Once down to this level there would be a filter at the bottom of this core where terminating passengers could be separated from transfer passengers. The terminating passengers would proceed to the normal booths for CBP processing while the transfer passengers could be kept separate and be processed through some dedicated booths to speed up their processing. Once through CBP these transfer passengers would exit to the public area to then be screened by TSA (see discussion on TSA screening above).

One final change to this area would be that the current main entrance to the CBP area from the hold room concourse level could now be closed as passengers would be entering this area from above. Closing this entrance will provide better flow and queuing arrangements in the CBP area.

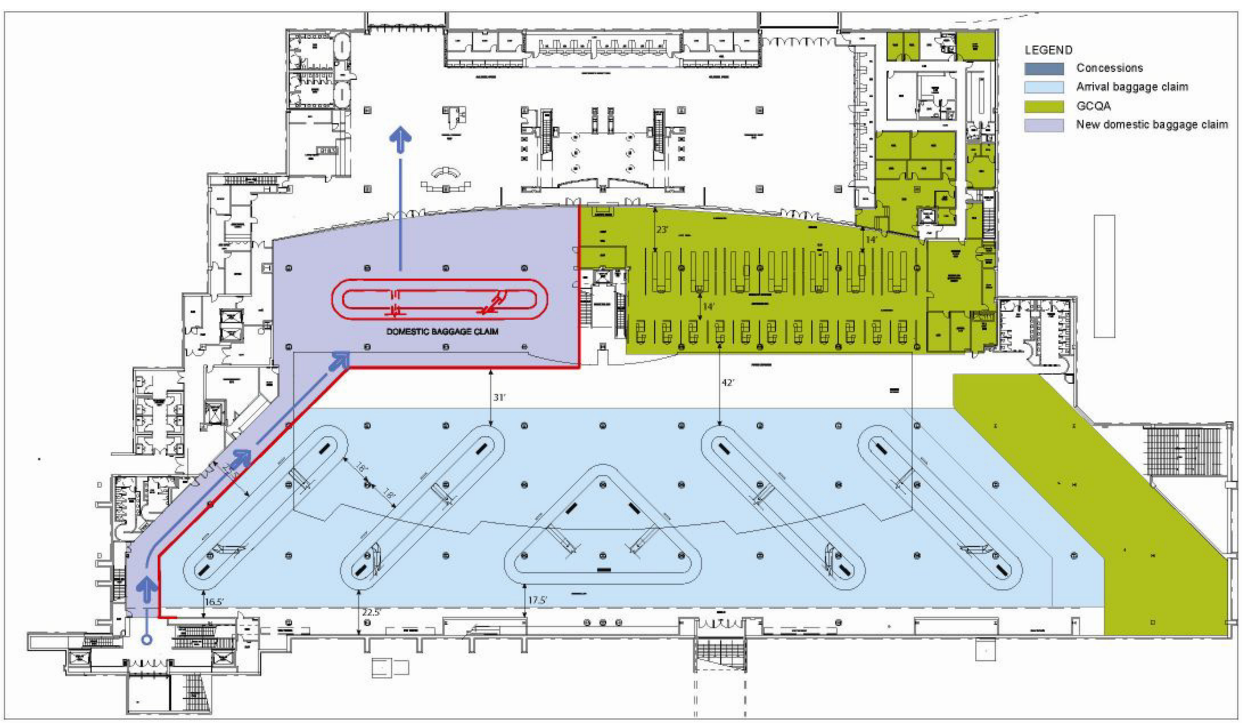
4.2.6.6 Concepts for Accommodating Guam CQ&A Office/Support Space

A number of options were generated for providing additional Guam CQ&A space in the basement area. These are illustrated in ***Figures 4.45 and 4.46*** following.

Option 1 for this area, illustrated in ***Figure 4.45***, is consistent with the option to convert the vacated Guam CQ&A space at the left (west) side of the basement level for use by a domestic bag claim carousel. In this case the area previously reserved for the 6th bag claim carousel can be used for expanded office and storage for Guam CQ&A as the requirements section only identified a need for up to 5 claim devices by 2030.

Option2, shown in ***Figure 4.46***, is compatible with the option to provide arrival retail facilities in the area vacated by Guam CQ&A to the left of the bag claim area. In this option, the area for the future 6th carousel would actually be used and would also consequently eliminate some current CQ&A office and support space. This lost office/support space as well as any additional space that may be required could be provided on the left side of the vertical core down from CBP and adjacent to the new retail facility.

Figure 4.45: Option 1 for Expanding Guam CQ&A Area

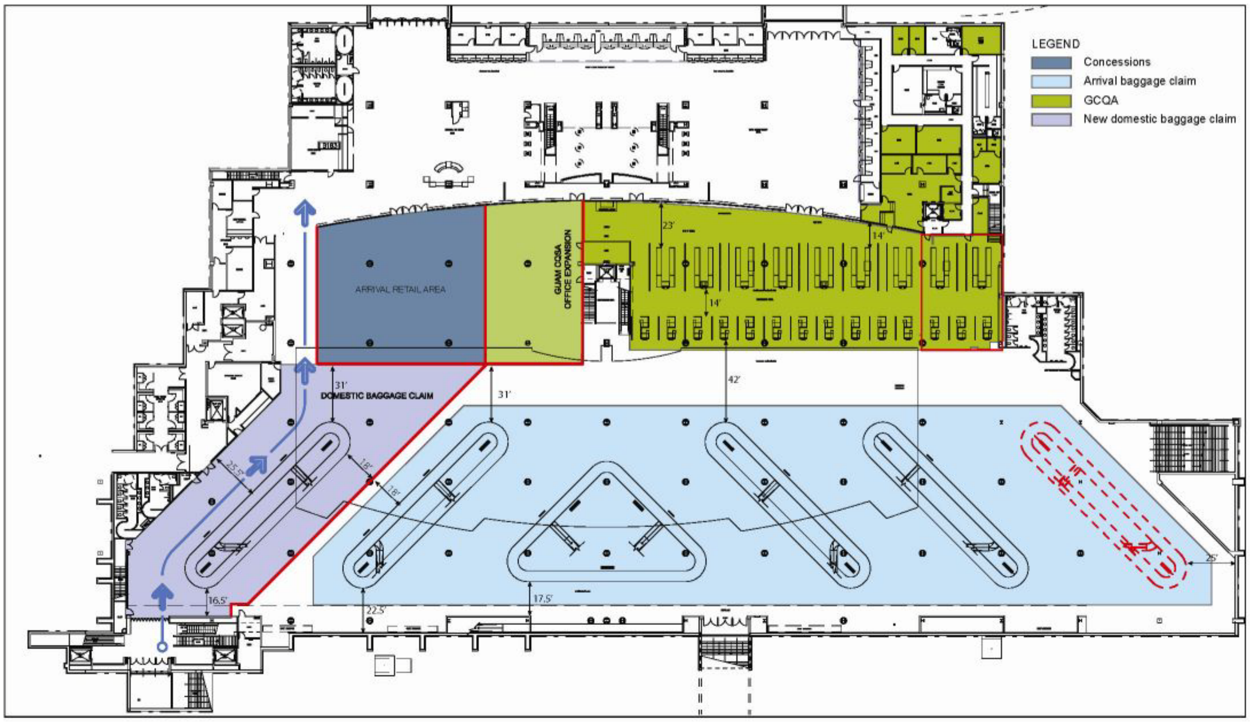


Based on discussions with GIAA management, Option 2 was determined to be the preferred option for the redevelopment of this area. The key reasons for this decision were as follows:

- Locating some retail space inside the arrivals lobby, as permitted by this option, was a preferred way of addressing the need to have some arrival shopping facilities to cater to passengers arriving in the early morning and not being able to check into their hotels yet
- The bag claim arrangement with this option appeared to be more flexible to adjust to future changes in requirements and the various feeds from airside would be easier to run with this arrangement as provision had already been made in previous plans for the 6th device to the right of the drawing

It should be noted that implementation of this option is still subject to further discussions with Guam CQ&A.

Figure 4.46: Option 2 for Expanding Guam CQ&A Area



4.2.7 Recommendations

Based on the forecasting, analysis and evaluation work carried out as part of this study, the following recommendations are made with respect to expanding or improving the passenger terminal facilities at the Guam airport:

- Generally the overall size of the passenger terminal and its associated apron and number of aircraft gates will be more than adequate to meet the forecast demands at the airport over the next 20 years without any need for expanding outside the current footprint or adding any apron
- However, there are a number of areas within the terminal itself, processes and functions that require addressing in order to improve the experience of passengers using the facilities as well as the level that they experience, in addition to providing additional space for some supporting functions for a number of inspection agencies
- The co-mingling issue that requires that arriving and departing passengers be completely separated is the single biggest issue that requires attention at the terminal as this is currently consuming a lot of operational resources to deal with. The preferred solution to dealing with this issue is to construct a series of sterile corridors at the hold room level and the level above that would permit complete segregation of these passengers. The preferred solution is referred to as Option 3 in the text of this plan.
- The TSA Hold Bag Screening that is currently occurring in the main check-in lobby needs to be moved “back-of-house’ in order to reactivate the current check-in counters that are closed. As well, moving these ‘back-of-house’ will improve the customer service experience as they will no longer have to haul their bags around and queue up, sometimes for long periods, as is currently the case. To move these functions to “back-of-house“ will involve expanding the existing in-transit bag screening area and making a number of changes to the current belt system connecting the screening area to the sorting area.
- The existing TSA passenger screening area requires expansion in order to better process the departing passengers. In addition, TSA requires additional support space to allow them to carry out their functions in a more efficient manner. The current area should be expanded from 4 effective screening lanes today to 8 screening lanes by the end of the planning period and adjustments made in adjacent areas to provide additional office and support space for TSA.
- Domestic passengers are currently not handled very well as there are no specific facilities for them, especially in the arrivals process. They must queue at Immigration with the rest of the international passengers and there is no specific domestic bag claim area for these passengers. To improve the situation for domestic passengers, they should be handled at gates 11/13 in a ground level hold room and walk out to their aircraft positions. Upon arrival they would be bussed directly to a revised bag claim area (without the need to go through Immigration as they currently do) that would have a dedicated domestic claim device in a reconfigured bag claim hall
- CBP office and support space should be enlarged to meet CBP requirements
- Guam CQ&A office and support space also needs to be enlarged to meet their space requirements in the short term and in the longer term may require some expansion of their processing space, depending on how traffic materializes and how their operations may evolve over time

- Associated with the Guam CQ&A changes, the arrivals hall should be reconfigured to provide additional concessions for arriving passengers
- There are a number of other improvements that should be considered, but these relate more to maintenance issues like proper maintenance of boarding bridges, washrooms and other support functions within the terminal itself.

4.2.8 Implementation Plan

A more detailed implementation plan should be developed for the projects identified in this plan. However, in terms of priorities and phasing into a typical master plan format, the following grouping of projects is relevant:

0-5 years

- Implement the co-mingling issue solution (Option 3). Depending on budgets and discussions with the various inspection agencies involved, this project might be phased to be completed in the next 5 year interval.
- Move the TSA HBS screening functions to “back-of-house” by expanding the existing in-transit bag screening area and making appropriate modifications to the associated belt system
- Expand the existing TSA passenger screening lanes from 4 to 6 and add additional support space
- Reconfigure the bag claim hall to add the previously planned 6th device and as a result create a separate area for domestic bag claim. Included with this work should be the reconfiguration of gates 11 and 13 for domestic commuter aircraft operations
- Reconfigure the arrivals hall to provide additional concession space for arriving passengers and additional office and support space for Guam CQ&A
- Reconfigure portions of the CBP area to provide additional office and support space

6-10 years

- Complete the co-mingling/sterile corridor project (if necessary).
- Expand the TSA passenger screening area from 6 lanes to 8 lanes to satisfy the projected growth during this period
- Consider implementing common use check-in counters for international carriers to get better use of the check-in area
- Also consider the use of common use self service check-in kiosks to improve the level of service for international carriers and their passengers

11-20 years

- Expand Guam CQ&A processing space to meet potential traffic growth towards the end of the planning period
- Expand the TSA passenger screening are from 6 lanes to 8 lanes to satisfy the project growth during this period
- Consider converting some of the wide body aircraft gates to “3 Group III for 2 Group V” to improve the capacity and operational flexibility and efficiency of the aircraft gates

4.2.9 Concessions Program

4.2.9.1 Background

Concessions at A.P. Won Bat International Airport (the Airport) consist of general merchandise, ground transportation, car rental, food and beverage, in-flight catering, parking and advertising. For the purposes of this master plan document, the analysis will focus on terminal concessions which include general merchandise (including duty free), food and beverage and advertising.

Currently, the airport has a total of 64,641 square feet (s.f.) dedicated to general merchandise, food and beverage and rental car space. ***Table 4.18*** outlines the Airport's general merchandise concession space size in s.f. by type and base level. The Airport has four levels. Base level 1, or the basement level, houses the Airport's arrival concourse, bag claim customs and greeter lobby. Base level 2 contains the ticketing lobby, the Transportation Security Administration's (TSA) CTX checked-baggage scanning machines, airline office space and the outbound baggage claim system. Base level 2, or the apron level, is located at the same height as the Airport's aircraft parking apron. Base level 3, or the concourse level, houses the TSA security check-point and associated queuing area, all gates and holdrooms and a majority of the Airport's concessions space. Base level 4 contains administrative office space.

Table 4.18: Terminal General Merchandise Concessions by Base Level and Type of Space

Type of Space/Level	**Area (s.f.)**
Basement Level:	
Trash Dumpster	320
Loading Dock	434
Storage Space 1	9,322
Storage Space 2	585
Sub-total:	10,661
Apron Level:	
Retail/General Merchandise	3,039
Sub-total:	3,039
Concourse Level:	
Retail/General Merchandise	25,795
Storage Space	221
New Retail (2012)	925
New Retail (2012)	600
Sub-total:	27,541
TOTAL RETAIL/GENERAL MERCHANDISE	**41,241**

Source: A.P. Won Bat International Airport

Table 4.19 outlines the Airport's food and beverage concession space by location and space size in s.f. The total area of food and beverage concession space which equals 19,585 s.f., includes both vacant and storage spaces.

Table 4.19: List of Food & Beverage Concessions by Type of Space

East Concourse Level	East Apron Storage space	Concourse Level Food Court	West Concourse Level	West Apron Level	Basement Level	Concourse Level Traveler's Lounge	Meeting Point East	Area (s.f.)
Vacant Space								2,336
Vacant Space								364
	Storage Space							2,466
		Big Nama						350
		Weinerschnitzel						276
		Burger King						959
		Golden Bowl						268
		Domino's						382
		Micronesian Munchies						367
		Airport Tentekomai						360
		Lounge/Smoking Area						979
			Ramen Ya					1,150
			Clipper's Lounge					2,878
			Vacant Location					2,071
				Vacant Space				280
					Storage Space			1,028
						Ben N Yan 1		880
						Vacant Space		1,825
							Captain Kid Mobile Café	366
TOTAL								**19,585**

Source: A.P. Won Bat International Airport

Currently, the airport has executed commercial contracts with 11 international food and beverage outlets, three retail and duty free outlets (duty free has multiple contracts expiring on different dates) and on currency exchange. In addition, the Airport has executed contracts with 6 banks for Automated Teller Machine (ATM) space. ***Table 4.20*** outlines the Airport's current terminal concessions/vendors, a description of their merchandise and the expiration date of their commercial contracts with the Airport.

Table 4.20: List of Terminal Concessions by Type

Concessionaire	Description of Merchandise	Expiration Date of Contract
Food and Beverage		
Captain Kidd Mobile Café	Restaurant: Panini Sanwiches	7/29/2011
Dominos (Denny's of Guam)	Restaurant: Pizza	12/6/2012
Golden Bowl (Denny's of Guam)	Restaurant: Japanese Cuisine	12/6/2012
Weinerschnitzel (Dennny's of Guam)	Restaurant: Hot Dogs	12/6/2012
Big Nama (Denny's of Guam)	Bar	12/6/2012
Micronesian Munchies	Coffee Bar: Gourmet Coffee	12/6/2012
Clipper's Lounge (JMC Guam)	Bar	12/6/2012
Ramen Ya (JMC Guam)	Restaurant: Japanese Cuisine	12/6/2012
Airport Tentekomai (KGD)	Restaurant: Japanese Cuisine	12/6/2012
Burger King (Pacific Fastfood Associates)	Restaurant: Hamburgers	12/6/2012
Ben N Yan 1 (Espino)	Restaurant: Filipino Cuisine	12/9/2016
General Merchandise		
Duty Free Shoppers, Guam	General Merchandise	1/20/2013
Duty Free Shoppers, Guam	Mama Bear Area - Boutiques	03/16/2011
Duty Free Shoppers, Guam	Marc Jacobs & Le Sport Sac	09/22/2014
Micronesia Media Distribution	Books, Magazines, Newspapers	5/31/2015
Sony Audio Vision Center	Electronics	05/16/2015
Lenlyn	Money Exchange	03/31/2013
Services		
Bank of Guam	Automated Teller Machine (ATM)	9/30/2012
Bank of Hawaii	Automated Teller Machine (ATM)	9/30/2012
Citibank	Automated Teller Machine (ATM)	6/10/2013
Coast 360 Federal Credit Union	Automated Teller Machine (ATM)	6/30/2012
First Hawaiian Bank	Automated Teller Machine (ATM)	6/30/2012
Pacific Amusement	Automated Teller Machine (ATM)	4/30/2011

Source: A.P. Won Bat International Airport

4.2.9.2 Goals and Objectives

The main goal of the passenger terminal concessions plan is to optimize merchandise, food and beverage and services options for customers to increase revenue per enplanement. Another objective is to grow new revenue streams from sponsorships, communications and advertising which are not tied directly to enplanements.

Concessions, both for food and beverage and merchandise, need to be themed and well designed. They provide entertainment for the traveling public and should project local themes and flavors. When passengers are entertained and are given an atmosphere that relaxes them before boarding an airplane for a long-haul flight, they are more likely to spend, especially if the items offered are well priced and reflective of the customers' needs and wants. The location of concessions is also optimally important. Given new security rules and more options for passengers to print their boarding passes in their homes, hotels or through airlines kiosks, the trend is to put a higher emphasis on concession outlets post TSA check-points. Once a passenger passes security, they should come into direct contact with a well-designed, easy to navigate concession "plaza" with a mix of name brand and local merchandise along with a visible and open food court. Lighting and signage should be optimal for passengers to have a virtual menu of retail and dining choices at plain sight before they reach their boarding gates.

A successful concession plan should be enterprising and designed with quality products at reasonable prices with exceptional customer service. This formula helps maximize

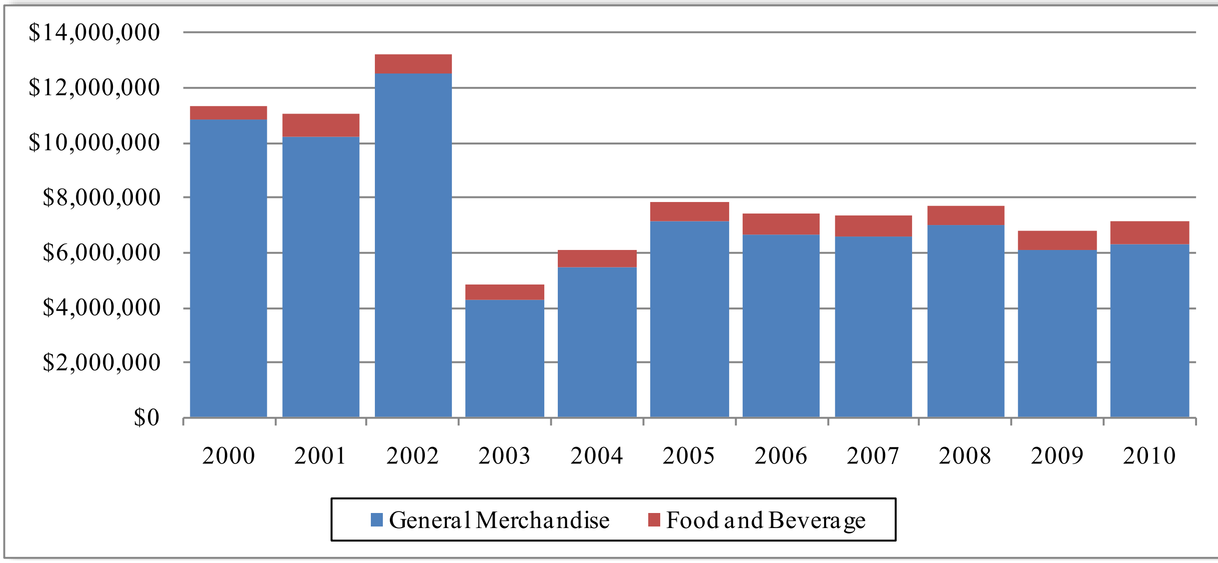
profits and in-turn, increases the Airport's returns. As a major tourism destination, Guam is known for its natural wonders and tropical flair. The Airport's concessions should draw an inspiration from this theme and leave a positive impression of the community to local, incoming and transit passengers.

4.2.9.3 Concession Metrics

Concession agreements are generally structured for a term of 3 to 10 years and include a Minimum Annual Guarantee (MAG) and percentage rent. The Airport frequently combines several concessions locations into one concessions package.

Figure 4.47 and ***Table 4.21*** show total general merchandise and food and beverage gross sales at the Airport from CY 2000 until CY 2010. As is shown in this historical time series, from CY 2000 until CY 2003, the Airport's terminal concession gross sales grew by 15.7 percent in the merchandise sector and 33.4 percent in the food and beverage sector. This robust growth superseded even the traffic slow-down caused by the events of September 11. In 2003, however, the Severe Acute Respiratory Syndrome (SARS) epidemic affected Southeast Asia and many other parts of the Pacific Rim. From CY 2003 until CY 2004, general merchandise gross sales at the Airport decreased by -65.6 percent and food and beverage by -20.5 percent. From CY 2003, terminal concession gross sales started to slowly increase at a slow pace but took another dip in 2009 as fuel prices rose and the US economy entered a period of economic recession.

Figure 4.47: Historical Terminal Concession Gross Sales CY 2000 – CY 2010 (Merchandise and Food and Beverage)



Source: A.P. Won Bat International Airport

Table 4.21: Historical Terminal Concession Gross Sales CY 2000 – CY 2010 (Merchandise and Food and Beverage)

	General Merchandise	Food and Beverage
2000	$10,823,297	$522,608
2001	$10,238,158	$837,008
2002	$12,521,844	$696,920
2003	$4,312,865	$553,884
2004	$5,438,143	$673,229
2005	$7,162,700	$691,349
2006	$6,664,069	$735,984
2007	$6,608,661	$722,593
2008	$6,985,111	$729,385
2009	$6,064,436	$707,835
2010	$6,326,954	$810,174
Average Annual Compound Growth Rate		
2000 - 2010	-5.2%	4.5%
2003 - 2010	5.6%	5.6%

Source: A.P. Won Bat International Airport

Overall, terminal concession gross sales at the Airport have grown from the period between CY 2003 and CY 2010 at a rate of 5.6 percent for general merchandise and 5.6 percent for food and beverage. Total gross sales per square foot on the general merchandise category was $836.57. For food and beverage, total gross sales per square foot was $98.37. ***Table 4.22*** shows total gross sales per square foot and total gross sales per enplaned passenger on a pre- and post-security basis.

4.2.9.4 Rental Revenue

Rental revenue to the Airport in CY 2010 was approximately $1.1 million. Broken down by type of revenue, approximately $1.0 million was attributed to general merchandise and $100,000 to food and beverage. Unlike other airports in the continental U.S., the Airport centers the majority of its gross sales on general merchandise, specifically Duty Free merchandise which accounted for 82.0 percent of total gross sales in this category. Approximately 20.0 percent of terminal concession gross sales occurred pre-security checkpoint. The remaining 80.0 percent occurred post-security.

Table 4.22: Terminal Concessions Gross Sales per Square Foot and per Enplaned Passenger CY 2010 (Merchandise and Food and Beverage)

	Terminal Concessions Square Feet (s.f.)	Total Gross Sales ($)	Sales per s.f.	Sales per Enplaned Passenger
General Merchandise				
Pre-Security	13,700	$0.00	$0.00	$0.00
Post-Security	27,541	$6,326,954.00	$229.73	$4.81
Sub-total	*41,241*	*$6,326,954.00*	*$153.41*	*$4.81*
Food and Beverage				
Pre-Security	3,071	$30,000.00	$9.77	$0.02
Post-Security	16,514	$780,174.00	$47.24	$0.59
Sub-total	*19,585*	*$810,174.00*	*$41.37*	*$0.62*
Rental Car				
Pre-Security	3,815	$931,766.00	$244.24	$0.71
Sub-total	*3,815*	*$931,766.00*	*$244.24*	*$0.71*
Grand Total	**64,641**	**$8,068,894.00**	**$124.83**	**$6.13**

Source: A.P. Won Bat International Airport

According to a 2010 Passenger Processing Regression Analysis prepared by the Airport, the average time an enplaning passenger spent in the post-security concourse area was 54 minutes. Other key observations of this report included the following:

- DFS Galleria (located in Guam) must come up with a new marketing strategy for the Airport's DFS, offering exclusive items only available at the Airport, as most tourists would have likely seen the current items for sale at the concourse DFS.

- Expand concourse area and procure other vendors such as JP Super Store or other local-owned shops that could offer souvenirs that brand the island.
- Develop a kids lounge to enable parents to leave children in a secure area while they shop.

In 2010, American Express conducted research about the changing spending behavior of Asian travelers at the TFWA Asia Pacific Conference. Revealing new insights on the tastes of the Japanese consumer, the Japan Tourism Marketing shared that value brands were performing the best in the Japanese market. Brands such as Uniqlo and H&M were among those raking in the highest profits.

Although still fearful of spending because of the financial crisis, Japanese consumers are still interested in the heritage of luxury brands and seek the best quality and good service. Their research found that in 2008 for overall Asian travelers, compared to the previous year, total passenger spend had grown by 34.0 percent at Singapore Changi International Airport, by 6.0 percent at Hong Kong International Airport and by 11.0 percent at London Heathrow Airport.

Given a high propensity to spend and an above average dwell time in the concourse area by the average passengers utilizing the Airport, emphasis should be prioritized on the placement and selection of the goods and services sold.

4.2.9.5 New Concession Program

4.2.9.5.1 Operating Structure

A new concession program should be managed by a single master concessionaire and increase the amount of general merchandise and food and beverage retail by 15.0 percent which means growing the current 15,799 square feet of terminal concession space to approximately 18,200 square feet. Disadvantaged Business Enterprises (DBE), or for-profit small businesses where socially and economically disadvantaged individuals own at least a 51.0 percent interest and also control management and daily business operations, should encompass 20.0 percent of the contract value. The lease term should be a total of 8 years with two one-year options to give the concessionaire enough time to grow the business, but not enough so competing firms can bid for the business if the program is performing on a sub-par basis. The initial capital investment should be in the order of magnitude of $200 to $250 per square foot or approximately of $3.5 to $4.5 million. A mid-term capital investment to refurbish the facility after five years of operations should be in the order of magnitude of $50 per square foot or approximately $910,000. The contract should include a MAG of at least $175 for general merchandise and $150 for food and beverage for the 1st year of the contract. Thereafter, a provision switching the Airport's revenue from a MAG structure to 90.0 percent of actual rent from the previous year should be applied. A strict policy of street pricing should be enforced and restrictions should be emphasized in writing with penalties and/or cancellation of contracts enforced. Any additional storage space for supplies, overstock would carry additional rental charges.

4.2.9.5.2 Timing

All food and beverage contracts expiring in December 2012, should be extended for one additional year to allow the Airport Authority time to draft a Request for Proposal (RFP) and work with procurement in selecting a qualified bidder. General merchandise contracts expiring after 2012 should be terminated on their expiration date and added to the new concessions contract thereafter.

4.2.9.5.3 Targets

Targets for a new concession program should be measured within the expected confines of enplaned passenger growth and a continuation in the passenger profile at the Airport with similar spending patterns. With an approximate growth in concession square footage of 15.0 percent from the current program, a target for gross sales per square foot of $513.23 and per enplaned passenger of $6.47 have been determined based on comparable airports around the U.S. ***Table 4.23*** shows a comparison of the key concession metrics of the new program compared to the existing program.

Table 4.23: Existing Program Metrics (Based on CY 2010 Enplanements) Compared to New Program Metrics (Based on Forecast CY 2014 Baseline Enplanements)

	Existing Floor Plan	Additional Requirements	Approximate Increase
Square Feet	64,641	*Approximately* 8,000 - 10,000	12% - 15%
Location Post Security	97.0%	89.6%	7.4%
Sales per s.f.	$450.00	$500+	10% - 20%
Sales per Enplaned Passenger	$6.13	$7.05	15.0%
Industry Average (ACI-NA)	*$3.11*		

Source: A.P. Won Pat International Airport; Airports Council International-North America (ACI-NA)

Table 4.24 shows the area and location of the proposed retail concession expansion and the current location and area of the current general merchandise concession program.

Table 4.24: Terminal General Merchandise Concessions by Base Level and Type of Space and Proposed Concession Expansion and Location.

Type of Space/Level	Area (s.f.)	Type of Space/Level	Area (s.f.)
Basement Level:		PROPOSED RETAIL LOCATIONS	
Trash Dumpster	320		
Loading Dock	434	*Basement Level:*	
Storage Space 1	9,322	Convenience Store	689
Storage Space 2	585	Back Wall 1	460
Sub-total:	10,661	Back Wall 2	460
		Sub-total:	1,609
Apron Level:			
Retail/General Merchandise	3,039	*Concourse Level:*	
Sub-total:	3,039	DFS West	1,158
		Former TSA Storage	688
Concourse Level:		Front of Sagan Bisita	581
Retail/General Merchandise	25,795	Right of Sagan Bisita	2,344
Storage Space	221	Left of Coach	1,998
New Retail (2012)	925	DFS Wall (Food Court)	125
New Retail (2012)	600	DFS East	1,152
Sub-total:	27,541	Sub-total:	8,046
TOTAL RETAIL/GENERAL MERCHANDISE	**41,241**	**TOTAL PROPOSED RETAIL LOCATIONS**	**9,655**

4.2.9.5.4 Operators

One single master concessionaire would be able to better handle the size and scope of the proposed concessions plan. It is recommended that the single master concessionaire be used as the leasing vehicle for all food and beverage as well as general merchandise vendors including Duty Free. One master concessionaire can be better managed by the Airport Authority, can better focus on “specialty” retail and is more attractive to local retailers who prefer a subcontracting arrangement with a master concessionaire. One or more shoe shine stands, a children’s play area and a stage for entertainment should all be part of the master concession agreement with the Airport and would increase the operators fixed costs. Additional specialty retail and services agreements should be specified in the agreement for the master concessionaire to vendors in the areas of (but not limited to) travel and business center, a pay-per-use Very Important Person (VIP) lounge, a nail salon, massage bar, medical clinic/pharmacy and a video game room. All concession contracts with banks/ATM’s should also be rolled into the purview of the master concessionaire contract once they expire.

4.2.9.6 Recommendations

Based on the passenger terminal concession analysis, it is recommended that the majority of pre-security concession space be relocated to the post-security areas of the terminal. All food court and food service concession space located in the Concourse Level (West), should be relocated to post-security areas to expand, centralize and alleviate the security checkpoint. The current food court in the Concourse Level (West), should be in essence flipped from the pre-security area to the post-security area allowing for better utilization of square footage and giving passengers more time to purchase concessions and consume them once they have cleared the security checkpoint. Additionally, the security check-point exit into the terminal's secure area should be located in-between the new food court and the Duty Free Shop (DFS).

Another key feature to be included as part of the new concessions package is the inclusion of an outlet dedicated to the sales of sundries, pharmacy items and toiletries. With restrictions for travelers in the carriage of said items, this concession would prevent passengers arriving in the late afternoon and evening from having to make an additional trip to a major pharmacy/retail chain store for the purchase of these items.

Other key features of the new concession program could potentially include the following:

- A redesign of the existing central DFS islands after the security check-point to expand and accommodate additional general merchandise outlets.
- Infrastructure of the concessions program to be enhanced.
- Create a new merchandising plan that combining national brand names with local flavors.
- Remove restaurant/food outlets from the ends of Concourse Level (east) and Concourse Level (west) in favor of more centralized locations to cater a broader group of passengers.
- Locate vending carts which can easily be relocated and placed at or near specific holdrooms at the end of the Concourse Level (east) and Concourse Level (west); items to be sold in these carts include but are not limited to:
    - To go branded and packaged snacks, sandwiches/wraps, salads and small meals from vendors already under contract with the Airport;
    - Coffee, tea, pastries and other snack items from vendors already under contract with the Airport;
    - Gifts, periodicals, packaged snacks, sundries, greeting cards and books from vendors already under contract with the Airport;
    - Merchandise from vendors already under contract with the Airport;
    - Same as above from new vendors either under contract with the Airport or sub-contracted by the Airport's master concessionaire.
    - Duty Free Items

4.2.9.7 Advertising Opportunities

Airport advertising is a key source of non-aeronautical revenues targeting mainly but not solely, to business travelers who have a higher amount of disposable income. With the continuous growth of air passengers, airport advertising has followed the trend and it is estimated that its growth has achieved a rate of 35.0 percent per annum since 2005 worldwide making it a billion dollar business. The core target groups for most airports are high-income travelers who spend

1 to 3 hours post-security prior to boarding their flight. The Airport has a large amount of business travelers flowing through the facility on a daily basis, however, most of the origin-destination (O-D) passengers represent the tourism segment and come to Guam on holiday. Given the high quantity of tourists travelling through the Airport, advertising should be targeted to their demographic, particularly the line of business most representative of the average passenger flying in and out of the airport. Given that the majority of visitors to Guam come from Japan and Korea, countries whose currencies have had favorable exchange rates against the US Dollar, advertising for products in their home countries is key to the airport's success in generating a high number of gross impressions

It is recommended that the Airport continue to work with one advertising/media company to plan, procure and execute all advertising programs. It is advised that the airport follow these key recommendations in conjunction with the selected advertising/media contractor to enhance and increase opportunities in this area:

- Negotiate a minimum of 50.0 percent of the advertising/media company's income to be paid to the Airport.
- Review and approve/disapprove all advertising (whether billboard, diorama, light box, plasma, showcases etc.) based on airport permit standards, Fire Marshall feedback and the overall impact of the look and feel of the airport facility.
- Focus on advertising opportunities with new technology in the interactive and visual incentive effects fields which can compete with those in major airports in Asia.
- Concentrate on the core Japanese and Korean markets for advertising products that are of an interest to these ethnicities in various languages – specifically in the secure area near holdrooms and inside air bridges.
- Continue the focus Clear Channel has emphasized on their current advertisement plan at the airport which includes:
    - Divider matrix frames;
    - Immigration area LCD screens;
    - Billboards and dioramas; and
    - Interior and exterior air bridge wraps
- After undertaking extensive market research, study utilizing the "showcase" approach which uses common-use space as a platform to show new to-be-released products such as cars, mobile phones and portable computers.

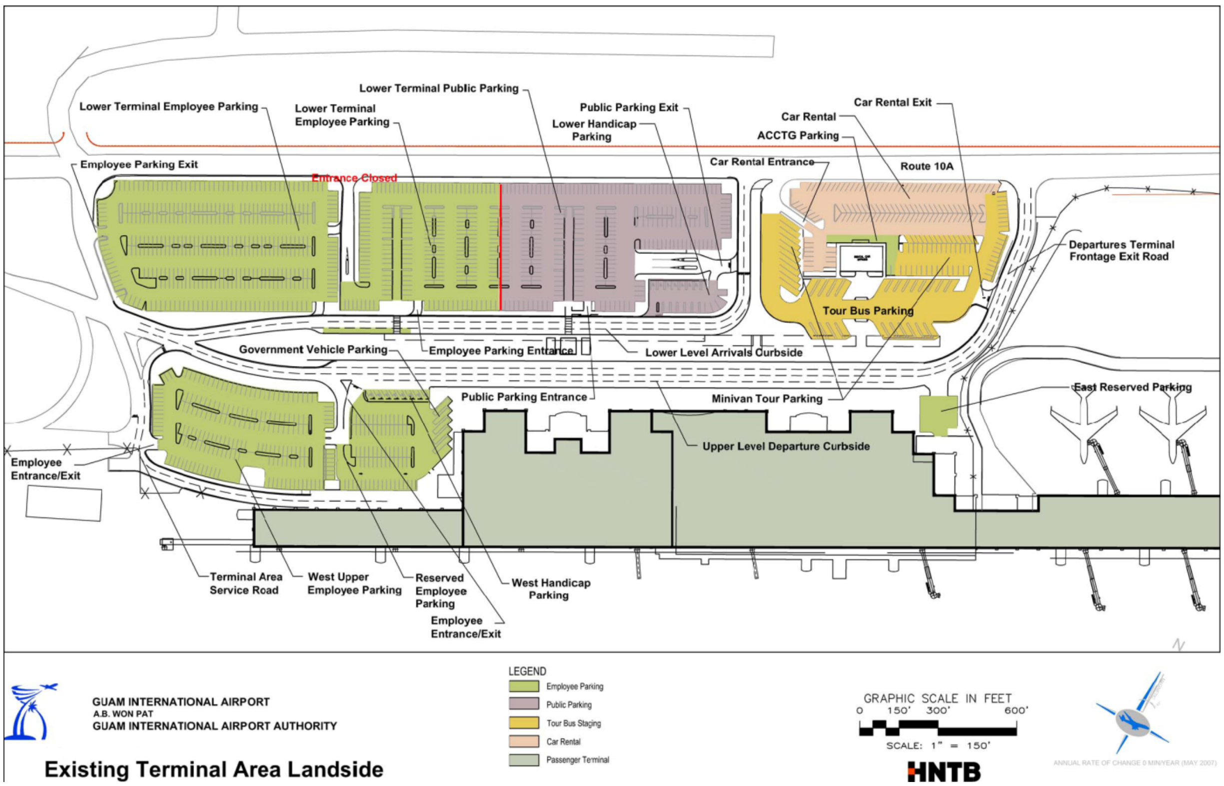
4.3 Landside

4.3.1 Existing Conditions

4.3.1.1 Ground Access and Parking

Existing ground access and parking facilities, defined as the terminal access roadways, terminal curbside roadways, commercial vehicle loading/staging areas along with public, employee and car rental parking, are described in this section. The terminal area existing conditions are shown on ***Figure 4.48***.

Figure 4.48: Terminal Area Existing Conditions



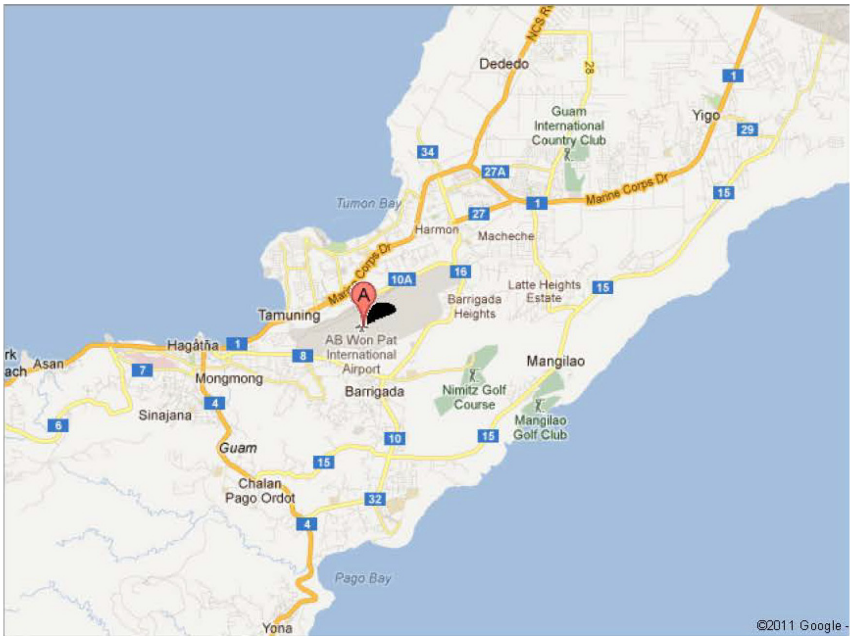
4.3.1.1.1 Access Roadways

Regional and terminal area access is described below.

Regional Access

Regional access to the Airport is provided via Route 1 and Route 3 from the north and Route 1 and Route 4 from the southern portions of the island. Both Routes 3 and 4 merge with Route 1 which intersects with Route 10A to provide access to the terminal and cargo areas. Route 10A connects to Route 1, also known as Marine Corps Drive, directly north of the cargo area and to Route 16, also known as Army Drive, east of the airfield. Routes 8 and 10 also provide access from the area directly south of the Airport and connect to Route 1 west of the airfield and Route 16 east of the airfield. ***Figure 4.49*** illustrates the regional road system.

Figure 4.49: Regional Airport Access



Source: Google maps 2011.

According to the 2030 Guam Transportation Plan prepared in December 2008 by the Government of Guam:

- **Route 10A is listed as unacceptable:** classified as roads that may have major alignment issues, may lack appropriate safety features, or may have pavement in need of immediate repair.
- **Route 10A 2008 Congestion levels:** in the AM and PM have volume to capacity (v/c) ratio over 1.51 and Route 10A is listed as one of the top 5 most congested roadways on the island. A v/c ratio approaching or greater than 1.0 represents congested conditions.

The July 2010 *Guam and the Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation Final Environmental Impact Statement* prepared by the U.S. Department of the Navy, also noted that Route 10A experiences unacceptable level of service during the AM peak hours. As a result the Government of Guam has plans to expand Route 10A by 2013. The project is described in more detail in following sections.

Terminal Access

Direct airport access is provided from Route 10A west of the terminal with the roadway continuing directly into the terminal area roadways and parking facilities and also diverging to the west connecting with E. Sunset Boulevard to provide access to the Commuter Terminal and cargo facilities. E. Sunset Boulevard also connects to Route 8 via N Street providing back door access to the terminal area.

After diverging from Route 10A heading east the main terminal access roadway diverges with the right lanes providing accesses to the upper level departures curb and west employee parking areas and the left lanes accessing the lower level arrivals curb. Vehicles approaching from the east, heading west on Route 10A, make a left turn after the lower level parking area and connect with the terminal access roadway.

Access to the lower level public and employee parking, bus staging, and rental car areas is provided directly off of Route 10A. Egress from the lower level parking areas is provided by making a left turn out of the parking lots and merging with exiting terminal arrival roadway traffic. The arrivals exit roadway then connects to Route 10A where vehicles can head east or west. Exiting rental cars and tour buses merge with the departures roadway traffic exiting the terminal and the departures exit roadway connects to Route 10A just past the east end of the terminal where vehicles can head east or west on Route 10A.

4.3.1.1.2 Terminal Curbsides

A two level curbside roadway system provides access to the terminal building with an upper level roadway serving departing passengers and a lower level roadway serving arriving passengers. The curbsides are depicted on ***Figure 4.48***.

The upper level departures curbside is located adjacent to the ticking lobby and provides 840 feet for private vehicles, taxis, limousines and shuttle buses to drop off passengers departing the airport. Tour buses typically drop-off passengers at the very beginning of the curb on the west end of the terminal occasionally causing congestion for other vehicles trying to access the curb. Access to the curb is provided by a two lane roadway that widens to four lanes directly in front of the terminal to provide one drop-off lane and three maneuvering and bypass lanes. After the terminal the inside drop-off lane merges back with the through lanes and three lanes are provided to the exit at Route 10A.

The lower level arrivals curbside is located on the baggage claim level but is offset from the building and passengers access it via underground corridors that pass under the upper level departures roadway. Access to the curb is provided by a two lane roadway that widens on the inside to three lanes at the terminal providing one drop-off lane and two maneuvering and bypass lanes. The curb is 600 feet long, providing space for private vehicles and taxis to pick-up passengers, and is located at the western most end of the Terminal. However, approximately 155 feet at the western most end of the curb is currently being used for airport employee vehicle parking leaving approximately 445 feet for passenger pick-up. The curb is currently underutilized for passenger pick-up and no congestion was witnessed on the curb. Just after the midpoint of the terminal building the inner lane merges back with the through lanes and the two lane roadway curves north to exit at Route 10A. The eastern end of the lower level roadway area serves as a tour bus parking area as described in the next section.

4.3.1.1.3 Commercial Vehicle Loading/Staging Areas

In addition to the curbside roadway a dedicated tour bus parking area is provided at the east end of the lower level roadway system for tour companies to stage vehicles and pick-up passengers (shown on ***Figure 4.48***). Parking for up to 26 buses is available within this area and currently many tour operators use it to stage while waiting for arriving passengers after dropping off passengers on the upper level curbside. As will be discussed in the requirements section, the wait times in these lots can be up to several hours and the lot becomes extremely congested at times.

An additional 11 spaces for Car Rental / Min Van Tour Bus Parking are provided in angled spaces on the entrance to the Tour Bus Parking area, as shown on ***Figure 4.48***, and an additional 62 spaces for tour minivan and sedan parking are provided in the east parking area. These spaces are summarized in ***Table 4.25*** in the following section.

4.3.1.1.4 Parking and Rental Car

A number of surface parking lots are provided around the airport to serve airport facilities. The three primary areas on the north side of the airport are the Main Terminal, the Commuter Terminal and the Cargo areas which are described in the following sections.

Main Terminal Parking

The Main Terminal Parking Facilities are identified in ***Figure 4.48*** and are summarized on ***Table 4.25***. This area is divided into three subareas: Lower Level Terminal, East Parking and West Parking. The Lower Level Terminal parking area is comprised of one employee and one public parking lot. The Lower Level Terminal Employee Parking Lot is located on the west end of the lower level and has approximately 581 parking spaces for employees between Route 10A and the lower level terminal arrivals curbside. Immediately adjacent to the Lower Level Employee Parking Lot on the east side is the Lower Level Terminal Public Parking Lot. This is the primary parking lot for passengers and those meeting or sending off passengers and has approximately 258 parking spaces. An additional 18 handicap spaces are located on the lower level adjacent to the east end of the Lower Level Terminal Public Parking Lot between the exit plaza and lower level terminal arrivals curbside. The parking space counts were provided by Airport staff and adjusted based on counts conducted from available airport mapping and parking lot layouts.

The East Parking Area is comprised primarily of the car rental parking area and tour bus parking. The Tour Bus Parking, described in Section 1.1.3 is located at the east end of the lower level closest to the terminal. Adjacent to the Tour Bus Parking Lot is the car rental parking area where car rental ready and return spaces are located. Avis, Budget, Dollar, Hertz, National and Nissan provide car rental services at the Airport. A tour mini van/sedan parking area is also provided for smaller tour company vehicles adjacent to the Tour Bus Parking area within the East Parking Area. The GIAA Accounting Office building maintains 10 parking spaces and 18 East Reserved Parking Area spaces are provided across the terminal arrivals roadway adjacent to the terminal building (shown on ***Figure 4.48***). GIAA has plans to develop a consolidated rental car servicing area to the east of the terminal along Route 10A.

The West Parking Area is comprised of primarily employee parking spaces located on the upper level immediately west of the terminal building, adjacent to the ticketing level, shown on ***Figure 4.48***. There are 205 spaces in the Upper Employee Parking Area, located in the westernmost portion of the West Parking Area. Another 73 spaces are provided closer to the terminal in the Reserved Employee Parking lot and another 6 spaces are provided for government parking immediately adjacent to the west end of the terminal building. Eight (8) handicap spaces are provided for airport passengers along west end of the upper level adjacent to the Reserved Employee Parking Lot.

Table 4.25: Main Terminal Parking Facilities

Lot Number	Lot Name	Public Spaces	Employee Spaces	Car Rental Spaces	Commercial Vehicle Spaces
Lower Level Terminal					
C-2	Lower Terminal Employee Parking Lot	--	581	--	--
C-3	Lower Terminal Public Parking Lot	258	--	--	--
C-3	Lower Terminal Handicap Parking	18	--	--	--
Subtotal		***276***	***581***	**--**	**--**
East Parking Area					
C-4	Car Rental Parking Area	--	--	118	--
C-4	Tour Bus Parking	--	--	--	26
C-4	Car Rental / Mini Van Tour Bus Parking	--	--	--	11
C-4	Tour Mini Van/Sedan Parking Area	--	--	--	62
C-4	ACCTG Building	--	10	--	--
C-4	East Reserved Parking Area	--	18	--	--
Subtotal		**--**	**28**	**118**	**99**
West Parking Area					
C-1	Upper Employee Parking Area	--	205	--	--
C-2	Reserved Employee Parking	--	73	--	--
C-3	Government Vehicle Parking	--	6	--	--
C-4	Handicap Parking	8	--	--	--
Subtotal		**8**	**284**	**--**	**--**
Main Terminal Parking Total		**284**	**893**	**118**	**99**

Source: GIAA staff and HNTB counts from parking layouts, 2011.

ACCTG = GIAA Accounting Office

Commuter Terminal Parking

Table 4.26 summarizes parking spaces provided in the Commuter Terminal Area along E. Sunset Boulevard west of the Main Terminal. The main Commuter Terminal parking lot provides 369 spaces with an additional four (4) spaces dedicated to Freedom Air. Pac-Sport and the PacAir office have 116 spaces. In addition approximately 102 spaces are provided in a car wash parking lot. The Kunkle Building houses Building houses the Kunkle and Yellow Cargo facilities with 41 combined spaces. Both are slated for demolition.

Table 4.26: Commuter Terminal Area Parking Facilities

Lot Number	Lot Name	Public/ Employee Spaces	Car Rental Spaces
Commuter Terminal / PacAir			
C-3	Commuter Terminal Parking Lot	369	--
C-3	Commuter Terminal Freedom Air	4	--
C-3	Pac-Sport and PacAir office	116	--
C-3	Car Wash Parking Lot		102
Subtotal		***489***	***102***
Kunkle Building Parking			
C-3	Kunkle Building Parking	14	--
C-3	Kunkle Building Handicap Parking	2	--
C-3	Yellow Cargo Building Parking	25	--
Subtotal		***41***	***0***
Commuter Terminal Parking Total		***530***	***102***

Source: GIAA staff 2011.

Cargo Area Parking

Table 4.27 summarizes parking spaces provided in the Cargo Area along E. Sunset Boulevard further west of the Commuter Terminal. As shown, parking is provided at each facility for customers and employees along with docks to receive cargo designated as the warehouse receiving slots.

Table 4.27: Cargo Area Parking Facilities

Facility	Customer / Employee Parking Spaces	Handicap Parking Spaces	Warehouse Receiving Slots
CTSI Building	30	3	10
DHL Building	29	2	--
Tripple B	18	2	9
PacAir	151	7	23
Cargo Area Total	***228***	***14***	***42***

Source: GIAA staff 2011.

4.3.2 Requirements

4.3.2.1 Ground Access and Parking

Future requirements for ground access and parking facilities, defined as the terminal access roadways, terminal curbside roadways, commercial vehicle loading/staging areas along with public, employee and car rental parking, are described in this section.

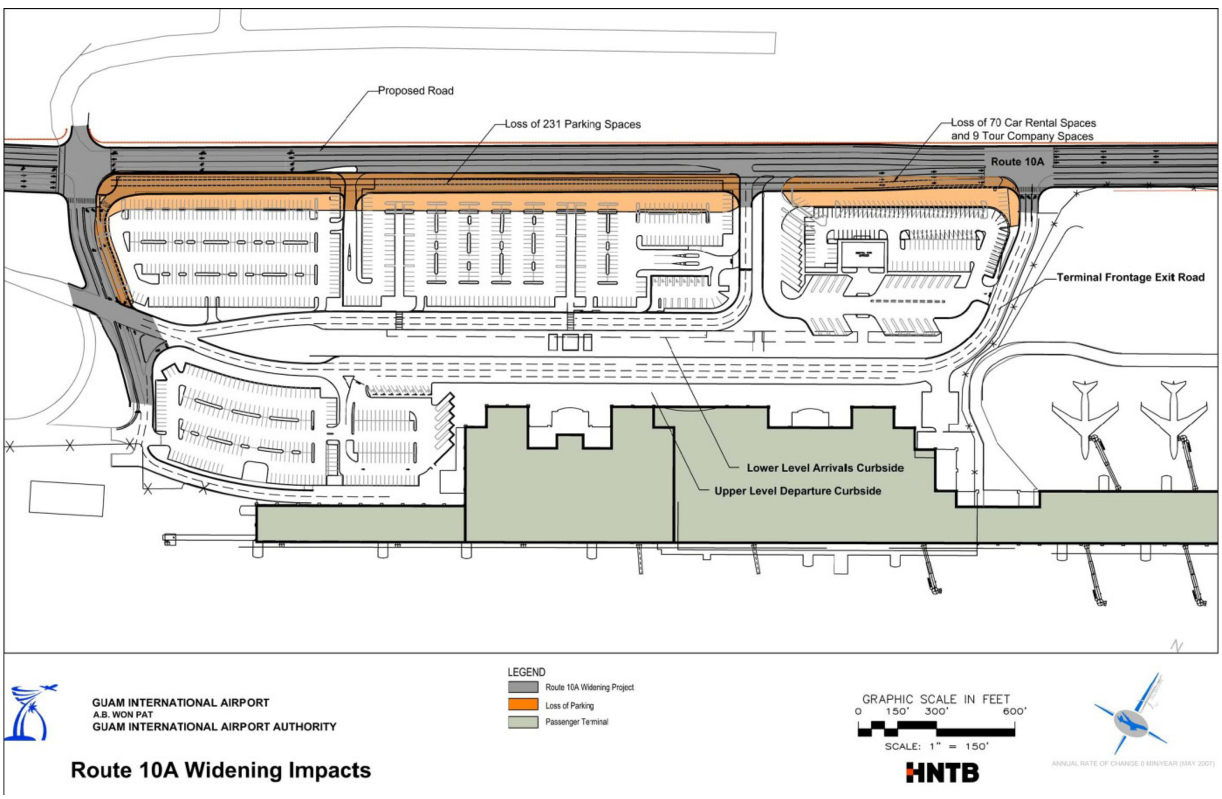
4.3.2.1.1 Access Roadways

Regional and terminal area access is described below.

Regional/Terminal Access

Route 10A is the primary access route to the main terminal building and due to AM and PM congestion levels on this roadway of over 1.51 v/c ratio and being listed as one of the top 5 most congested roadways on the island, the Government of Guam has plans to widen Route 10A by 2014 from two to four lanes between Route 1 and the Airport and from two to six lanes between the Airport and Route 16. The widened lanes for the widening of Route 10A in the vicinity of the Airport are shown on ***Figure 4.50***.

Figure 4.50: Route 10A Widening Impacts



In addition the planned runway expansion requires that part of the current Tiyan Roadway be moved outside of the airfield and runway safety areas. The project was originally scheduled to be completed by August 2013; however, the plan selected by the Department of Public Works selected involved construction of a four lane highway utilizing Federal Highway Administration funds which will require acquisition of private properties in area especially along East Sunset Drive. Funding for the property acquisition has not been finalized and may be cost prohibitive. The roadway provides access between Route 1 and Route 8 and a two lane roadway may be sufficient and would not require property acquisition if the FHWA determines it will fund a two lane roadway.

4.3.2.1.2 Terminal Curbsides

Traffic count data was not available for the terminal curbsides and as a result terminal curb length requirements were estimated based on peak hour passenger forecasts, observations of GIAA staff, relevant data collected in the Tour Bus Lot during the surveys conducted November 28, 2011 and professional judgment for private vehicles and taxicabs occupancies and dwell times based on industry standards and specific characteristics of Won Pat Guam International Airport passengers and operations. Peak hour passenger estimates for the base forecast were prepared and presented in the Terminal Requirements Section. As shown in ***Table 4.28***, the annual percent of transit passengers was subtracted from the arriving and departing peak hour passengers to estimate the peak hour originating and terminating passenger.

Table 4.28: Peak Hour Passenger Estimates

	Peak Hour Passenger Estimates (Base Forecast)				
	2010	**2015**	**2020**	**2025**	**2030**
Peak hour arriving passengers	*860*	*943*	*1 ,164*	*1,163*	*1,799*
Peak hour departing passengers	*03*	*1,137*	*1,639*	*1,680*	*1,799*
Annual percent transit passengers	*13.75%*	*14.18%*	*14.66%*	*14.77%*	*14.90%*
Peak hour originating passengers	*742*	*809*	*993*	*991*	*1,531*

Information provided by GIAA Staff indicated that 10% of curbside traffic is private vehicles, 70% buses and 20% vans. These allocations were adjusted slightly to account for taxicabs resulting in an assumed curbside mode share of 9% private vehicles, 68% buses, 18% vans, and 5% taxis.

As no passenger surveys were available indicating overall passenger mode choice, it was assumed that 80% of passengers would arrive/depart on the curb/tour bus & van parking areas with the remaining 20% parking or using rental cars to accessing the Airport. It is possible that more passengers utilize the parking facilities and rental cars but it was felt that 80% curbside represented a conservative estimate that would ensure sufficient requirements for future planning years were estimated.

Vehicle occupancies (Shown on ***Table 4.29***) were used to relate peak hour passengers to vehicle trips and estimate the number of vehicles on the curb during the arrivals and departures peak hours. Bus occupancies were estimated based on the 2011 surveys conducted in the tour bus lot, while occupancies for private vehicles, vans and taxis were developed based on observed occupancies at other airports adjusted for specific operational characteristics of Won Pat Guam International Airport which reflects the large tourist market and high use of high occupant vehicles. Estimated forecast peak hour passenger and vehicle volumes based on these assumptions are summarized in ***Table 4.29***

Dwell times for departures and arrivals curbside traffic was estimated based on industry standards as observed at airports throughout the United States and adjusted to reflect specific operational characteristics of Won Pat Guam International Airport. The dwell times and peak hour vehicle estimates were used to develop curb length requirements for the Base Forecast (peak hour passenger data was not available for the Downside and Upside forecasts). The Poisson distribution was applied to account for the random nature of vehicles arriving at the curb through the hour and reflects surges in activity throughout the hour. Requirements are presented in ***Table 4.30*** Typically some double parking to load or unload passengers is considered acceptable during peak periods. When at least 3 curb lanes are available, including the parking lane, a curbside utilization of 130%, which represents a LOS C, is considered acceptable. This represents approximately 30% of the curb double parked during periods within the peak hour and at this level vehicles are still able to maneuver around other vehicles to get in and out of the curb.

Tour buses, vans and taxicabs drop off departing passengers along with private vehicles on the upper level. In 2015 the upper level departures curbside, which is 840 feet long, requires 695 feet of curb representing a utilization of 83% and LOS A. By 2030 the departures curbside requires 1,175 feet of curb representing 140% utilization and LOS D. The lower level arrivals curbside is primarily utilized by private vehicles as tour buses, vans, and taxis utilize adjacent facilities to stage and load passengers. In 2015 through 2030 approximately 50 feet of the 600 available are needed to serve arriving passengers on the lower level curbside representing a utilization of 6% and LOS A.

Table 4.29: Peak Hour Curbside Vehicle Estimates (Base Forecast)

		2010		2015		2020		2025		2030	
	Occupancy	Peak Hour Passenger	Peak Hour Vehicles	Peak Hour Passenger	Peak Hour Vehicles	Peak Hour Passenger	Peak Hour Vehicles	Peak Hour Passenger	Peak Hour Vehicles	Peak Hour Passenger	Peak Hour Vehicles
Departures (Upper Level)											
Private vehicle	1.4	11	8	11	8	13	10	13	10	20	15
Bus	9.0	532	60	580	65	712	80	711	79	1,098	122
Van	3.0	47	16	52	18	63	21	63	21	97	33
Taxi	1.2	6	5	6	5	7	6	7	6	11	10
Total		596	89	649	96	795	117	794	116	1,226	23
Arrivals (Lower Level)											
Private vehicle	1.4	11	8	14	10	21	15	21	15	23	17
Bus	9.0	**557**		**700**		**1,003**		**1,027**		**1,098**	
Van	3.0	**49**		**62**		**88**		**91**		**97**	
Taxi	1.2	**5**		**7**		**10**		**10**		**11**	
Total		622	8	783	10	1,122	15	1,149	15	1,229	17

Note:
1. Buses, vans and taxis pick up in the east parking area and do not utilize the arrivals curbside.
2. Occupancies estimated based on surveys conducted November 28, 2011 in the tour bus lot and professional judgment for private vehicles and taxicab occupancies based on industry standards and characteristics of Won Pat Guam International Airport.

Table 4.30: Curb Length Requirements (Base Forecast)

			2010		2015		2020		2025		2030	
	Dwell Time (minutes)	Active Vehicle Length (feet)	Volume	Required Length (feet)	Volume	Required Length (feet)	Volume	Required Length (feet)	Volume	Required Length (feet)	Volume	Required Length (feet)
Departures (Upper Level)												
Private vehicle	1.5	25	8	25	8	25	10	25	10	25	15	50
Bus	5.0	60	60	540	65	540	80	660	79	660	122	960
Van	3.0	35	16	70	18	105	21	105	21	105	33	140
Taxi	1.0	25	5	25	5	25	6	25	6	25	10	25
Total Curbside Demand			**89**	**660**	**96**	**695**	**117**	**815**	**116**	**815**	**180**	**1,175**
Available Curbside				840		840		840		840		840
Utilization				**79%**		**83%**		**97%**		**97%**		**140%**
LOS				**A**		**A**		**B**		**B**		**D**
LOS C Requirement												**905 feet**
Arrivals (Lower Level)												
Private vehicle	2.5	25	8	25	10	50	15	50	15	50	17	50
Bus												
Van												
Taxi												
Total Curbside Demand			**8**	**25**	**10**	**50**	**15**	**50**	**15**	**50**	**17**	**50**
Available Curbside				840		840		840		840		840
Utilization				**3%**		**6%**		**6%**		**6%**		**6%**
LOS				**A**		**A**		**A**		**A**		**A**

4.3.2.1.3 Commercial Vehicle Loading/Staging Areas

A survey was conducted in the Tour Bus Parking Area on Monday November 28, 2011 between 1:00 PM and 6:00 PM to collect data on the usage of the lot during peak periods. Surveyors recorded the time vehicles entered and exited the lot along with the number of passengers that boarded each bus in order to estimate the accumulation of vehicles in the lot, average duration and average vehicle occupancy.

During the survey period it was noted that taxis and other vehicles lined up at the entrance and blocked the tour buses trying to enter the lot. During the peak period no parking zones were filled with vans, taxis and cars which also blocked buses and prevented them from backing out of spaces when needed. Limousines and tour vans parked in bus parking stalls for extensive periods of time. The Tour Bus Parking area and limousine and van activity can be seen in Figures ***4.51 and 4.52***.

Figure 4.51: Tour Bus Parking Area

Figure 4.52: Tour Bus Parking Area Limousine and Van Activity

The survey was conducted between 1:00 PM and 6:00 PM; however, the last recorded vehicle entry and exit were at 5:38 PM. At this point it is assumed that the activity had significantly decreased, vehicle dwell times were significantly shorter and the lot was clearing out. As shown on ***Table 4.31***, 107 vehicles entered the lot and 110 vehicles exited the lot during the survey period (not counting the approximately 23 rental car vehicles which exited the lot during the survey period). The peak hours for vehicles entering were between 1:00 and 2:00 PM with 28 vehicles entering the lot and between 4:00 and 5:00 PM with 29 vehicles entering the lot. The peak period for vehicles exiting was between 4:00 and 5:00 PM with 50 vehicles exiting. Four to five PM represents the hour with the most activity during the survey period with many vehicles entering and more than double the number of exiting vehicles during any other hour.

The average dwell time during the peak hours was 47 minutes with the longest average dwell time of 61minutes for vehicles entering the lot between 1:00 and 2:00 PM. The maximum dwell time during the survey period was 182 minutes for a vehicle which entered the lot between 2:00 and 3:00 PM. For vehicles entering the lot after 3:00 PM dwell times began to decrease. The long dwell times earlier in the afternoon are attributable to the practice of tour buses dropping off passengers on the upper level curbside and then entering the tour bus parking area to await arriving passengers. There is a gap of several hours between departures peak and the arrivals peak meaning many buses stage in the tour bus parking area for an hour or more, as witnessed by the long dwell times early in the afternoon.

Table 4.31: Tour Bus Lot Existing Vehicle Volumes and Dwell Times

			Average Dwell Time		Maximum Dwell Time	
Survey Period	Vehicles Entering	Vehicles Exiting	Vehicle Arrival to Vehicle Departure	Begin Passenger Loading to Vehicle Departure	Vehicle Arrival to Vehicle Departure	Begin Passenger Loading to Vehicle Departure
1:00 to 2:00 PM	28	14	61 min	31 min	111 min	87 min
2:00 to 3:00 PM	15	9	55 min	4 min	182 min	13 min
3:00 to 4:00 PM	24	13	53 min	7 min	106 min	103 min
4:00 to 5:00 PM	29	50	31 min	4 min	31 min	18 min
5:00 to 6:00 PM	11	24	2 min	1 min	2 min	1 min
Total	**107**	**110**	**47 min**	**12 min**	**182 min**	**103 min**

Source: Surveys conducted in the Tour Bus Lot by AmOrient Engineering, November 28, 2011. HNTB analysis.
Notes:
1. Vehicle volumes and dwell time do not include taxicabs or rental car vehicles.
2. 5:00 to 6:00 PM partial hour data. Last recorded entry at 5:38 PM.

As shown on ***Table 4.32***, the average tour bus had 9 passengers while the maximum occupancy recorded was 40 passengers. The taxicab average occupancy was three passengers and the maximum recorded was five passengers.

Table 4.32: Tour Bus Lot Existing Vehicle Occupancies

	Vehicle Occupancy	
Vehicle Type	Average	Maximum
Tour Buses	9	40
Taxis	3	5
Limousines	Insufficient Data	
Hotel	Insufficient Data	
Rental Car	Insufficient Data	

Source: Surveys conducted in the Tour Bus Lot by AmOrient Engineering, November 28, 2011.

In order to estimate demand for tour bus parking spaces if operations continue as they do currently with buses staging in the lot between dropping off departing passengers and picking up arriving passengers the accumulation of buses within the lot was estimated for each hour during the peak period. These volumes were adjusted up to represent activity occurring in August, the peak month, based on the percent of airport passenger activity occurring in November, the month surveys were conducted, and August. It was assumed that buses which are not full in November would be loaded with additional passengers in August in addition to additional buses being used to transport tour group customers, therefore half the growth rate between November and August was used. The average dwell time for each hour was applied to the number of vehicles entering the lot during each hour surveyed and these were added the vehicles remaining from the previous hour to determine the accumulation of vehicles during each hour. A 15% peaking factor was also applied to account for the non-uniform arrival pattern. The results of the demand analysis are shown in ***Table 4.33***. The 1:00 to 2:00 PM period was assumed to be the hour with the maximum accumulation of vehicles, requiring 37 spaces in 2011, with the 3:00 to 4:00 PM time period following closely with a requirement of 36 vehicles in 2011. The demand was projected to 2030 under the base, downside and upside forecast with the requirements ranging from 48, 43 and 51 spaces respectively. It was assumed that bus traffic would grow at half the rate of the growth in originating/terminating passengers as the tour companies currently in business would increase occupancy on some routes prior to adding new buses. However some buses are already full requiring additional buses to meet demand and new tour providers could also enter the market and serve the airport with additional buses.

Table 4.33: Tour Bus Lot Parking Space Demand

	Number of Tour Bus Parking Spaces (Base Forecast)					
	2010	**2011**	**2015**	**2020**	**2025**	**2030**
Annual passenger originations (base forecast)	*1,135,107*	*1,091,530*	*1,357,411*	*1,539,893*	*1,638,343*	*1,749,356*
1:00 to 2:00 PM	**38**	**37**	**42**	**45**	**46**	**48**
2:00 to 3:00 PM	35	34	38	41	42	43
3:00 to 4:00 PM	37	36	40	43	44	45
4:00 to 5:00 PM	33	32	36	38	39	40
5:00 to 6:00 PM	9	9	10	11	11	11
	Number of Tour Bus Parking Spaces (Downside Forecast)					
	2010	**2011**	**2015**	**2020**	**2025**	**2030**
Annual passenger originations (downside forecast)	*1,135,107*	*1,028,150*	*1,230,109*	*1,301,387*	*1,363,472*	*1,391,303*
1:00 to 2:00 PM	**39**	**37**	**41**	**42**	**43**	**43**
2:00 to 3:00 PM	36	34	37	38	39	39
3:00 to 4:00 PM	38	36	40	41	42	42
4:00 to 5:00 PM	34	32	35	36	37	37
5:00 to 6:00 PM	9	9	10	10	10	10
	Number of Tour Bus Parking Spaces (Upside Forecast)					
	2010	**2011**	**2015**	**2020**	**2025**	**2030**
Annual passenger originations (upside forecast)	*1,135,107*	*1,153,458*	*1,511,843*	*1,703,025*	*1,877,378*	*2,084,606*
1:00 to 2:00 PM	**37**	**37**	**43**	**46**	**48**	**51**
2:00 to 3:00 PM	34	34	39	41	43	45
3:00 to 4:00 PM	36	36	42	45	47	50
4:00 to 5:00 PM	32	32	37	39	41	43
5:00 to 6:00 PM	9	9	10	11	12	13

Source: Surveys conducted in the Tour Bus Lot by AmOrient Engineering, November 28, 2011. HNTB analysis.

Tour bus parking spaces were also estimated assuming no staging was allowed in the lot adjacent to the terminal. Staging would be accommodated elsewhere off-site and access to the tour bus lot would be restricted to active loading. In order to estimate demand for tour bus parking spaces under these operational conditions the overall average dwell time of 12 minutes from the beginning of passenger loading until vehicle departure was assumed, to be sure sufficient space was provided, with the exception of the 1:00 to 2:00 PM hour where the observed dwell time of 31 minutes was assumed. In addition a higher peaking factor of 40% was assumed to account for the increased overlapping of vehicles who are picking up for the same passenger arrivals peak. As shown in ***Table 4.34***, under the base forecast 21 spaces would be required currently, increasing to 28 spaces in 2030. Under the downside and upside forecasts the 2030 space requirement would range from 25 to 28 spaces, respectively.

Table 4.34: Tour Bus Lot Parking Space Demand – No Staging

	Number of Tour Bus Parking Spaces (Base Forecast)					
	2010	**2011**	**2015**	**2020**	**2025**	**2030**
Annaul passenger originations (base forecast)	1,135,107	1,091,530	1,357,411	1,539,893	1,638,343	1,749,356
1:00 to 2:00 PM	**21**	**21**	**24**	**26**	**27**	**28**
2:00 to 3:00 PM	14	14	16	17	18	19
3:00 to 4:00 PM	10	10	11	12	12	12
4:00 to 5:00 PM	13	13	15	16	17	18
5:00 to 6:00 PM	7	7	8	9	9	9
	Number of Tour Bus Parking Spaces (Downside Forecast)					
	2010	**2011**	**2015**	**2020**	**2025**	**2030**
Annaul passenger originations (downside forecast)	1,135,107	1,028,150	1,230,109	1,301,387	1,363,472	1,391,303
1:00 to 2:00 PM	**22**	**21**	**23**	**24**	**25**	**25**
2:00 to 3:00 PM	15	14	15	15	15	15
3:00 to 4:00 PM	11	10	11	11	11	11
4:00 to 5:00 PM	14	13	14	14	14	14
5:00 to 6:00 PM	7	7	8	8	8	8
	Number of Tour Bus Parking Spaces (Upside Forecast)					
	2010	**2011**	**2015**	**2020**	**2025**	**2030**
Annaul passenger originations (upside forecast)	1,135,107	1,153,458	1,511,843	1,703,025	1,877,378	2,084,606
1:00 to 2:00 PM	**21**	**21**	**24**	**26**	**27**	**28**
2:00 to 3:00 PM	14	14	16	17	18	19
3:00 to 4:00 PM	10	10	12	13	14	15
4:00 to 5:00 PM	13	13	15	16	17	18
5:00 to 6:00 PM	7	7	8	9	9	9

Source: Surveys conducted in the Tour Bus Lot by AmOrient Engineering, November 28, 2011. HNTB analysis.

4.3.2.1.4 Parking and Rental Car

Terminal area parking requirements were developed for each forecast scenario based on typical 2011 peak occupancies of 90% in the lower level public when the Hawaii flight arrives, as reported by GIAA. At other times the public lot has a low occupancy and almost no overnight parkers. The west reserved employee parking area is reserved for VIP and airline managers and requires a special permit. This lot is typically full. The upper west employee lot is used by general airport employees, tentants and airport staff, and is also typically full as it is the most desired employee parking location. The lower employee parking area is directly adjacent to the lower public parking area and is approximately 65% full at the peak times, as reported by GIAA staff. In addition, it was further assumed that smaller employee and other lots spaces such as the GIAA Accounting Office building and the East Reserved Lot were 90% full during the peak periods in 2011. A search factor of 5% was applied to the parking estimates in lots with over 100 parking spaces to account for the point at which a lot is deemed essentially full and a parker would have difficulty finding an available space. The search factor allows the requirements to reflect a 5% surplus over demand to ensure that sufficient spaces are available for a parker to find an open space within a reasonable amount of time. For lots under 100 spaces no additional search factor was applied as it was assumed that the lot was small enough for a parker to find an open space in a reasonable amount of time.

Terminal area parking requirements are summarized in ***Tables 4.35 through 4.37*** for the base, downside, and upside forecasts respectively. Public parking demand was assumed to grow relative to the growth in originating passengers as these are the passengers who utilize airport parking facilities either to park for the duration of their trip or for meeters-greeters and well-wishers to pick up or drop off passengers. Employee demand was assumed to grow relative to overall passenger growth as airport employees typically serve both originating/terminating and transit passengers. Requirements shown include a summary of tour bus parking requirements as detailed in the previous section. As shown, approximately 820 public and employee parking spaces are required on the lower level in 2015 increasing to 1,055 spaces by 2030 under the base forecast. An additional 365 employee parking spaces are required on the west upper level parking areas in 2015 increasing to 470 by 2030.

Additionally rental car requirements are summarized in ***Tables 4.35 through 4.37***. Requirements were calculated assuming the rental car facilities were adequately sized in 2010. Under the base forecast approximately 145 rental car ready-return spaces are required in 2015 increasing to 185 by 2030.

Commuter Terminal parking requirements for the base, downside and upside forecast are summarized in ***Table 4.38***. The requirements include the Kunkle and Yellow Cargo area parking. In 2015 the main Commuter Terminal parking lot will require 240 parking spaces increasing to 305 spaces in 2030. Requirements for the cargo facility parking areas area also summarized on ***Table 4.39*** for the cargo forecast. Cargo area parking requirements were grown based on projected growth in air cargo volume.

Table 4.35: Main Terminal Parking Requirements – Base Forecast

		Number of Parking Spaces (Base Forecast)							
		Existing Supply	Existing Percent full	2010	2011	2015	2020	2025	2030
Main Terminal Area									
Lot Number	**Lower Level Terminal**								
C-2	Lower Terminal Employee Parking Lot	581	65%	410	395	495	565	600	640
C-3	Lower Terminal Public Parking Lot	258	90%	255	245	305	345	365	390
C-3	Lower Terminal Handicap Parking	18	--	18	18	20	25	25	25
	Total	**857**		**683**	**658**	**820**	**935**	**990**	**1,055**
Lot Number	**East Parking Area**								
C-4	Car Rental Parking Area	118		118	115	145	165	175	185
C-4	Tour Bus Parking	26		38	37	42	45	46	48
C-4	Car Rental / Mini Van Tour Bus Parking	11		11	11	14	16	17	18
C-4	Tour Mini Van/Sedan Parking Area	62		64	62	77	87	93	99
C-4	ACCTG Building	10	100%	10	10	15	15	15	15
C-4	East Reserved Parking Area	18	90%	15	15	20	25	25	25
	Total	**245**		**256**	**250**	**313**	**353**	**371**	**390**
Lot Number	**West Parking Area**								
C-1	Upper Employee Parking Area	205	95%	215	205	255	290	310	330
C-2	Reserved Employee Parking	73	95%	75	70	90	105	110	120
C-3	Government Vehicle Parking	6		6	6	10	10	10	10
C-4	Handicap Parking	8		8	8	10	10	10	10
	Total	**292**		**304**	**289**	**365**	**415**	**440**	**470**

Table 4.36: Main Terminal Parking Requirements – Downside Forecast

		Number of Parking Spaces (Downside Forecast)							
		Existing Supply	**Existing Percent full**	**2010**	**2011**	**2015**	**2020**	**2025**	**2030**
Main Terminal Area									
Lot Number	**Lower Level Terminal**								
C-2	Lower Terminal Employee Parking Lot	581	65%	435	395	475	505	530	540
C-3	Lower Terminal Public Parking Lot	258	90%	270	245	295	310	325	330
C-3	Lower Terminal Handicap Parking	18	--	18	18	20	20	20	20
	Total	**857**		**723**	**658**	**790**	**835**	**875**	**890**
Lot Number	**East Parking Area**								
C-4	Car Rental Parking Area	118		118	105	125	130	135	140
C-4	Tour Bus Parking	26		39	37	41	42	43	43
C-4	Car Rental / Mini Van Tour Bus Parking	11		12	11	13	14	15	15
C-4	Tour Mini Van/Sedan Parking Area	62		68	62	74	78	82	84
C-4	ACCTG Building	10	100%	10	10	10	10	10	10
C-4	East Reserved Parking Area	18	90%	15	15	20	20	20	20
	Total	**245**		**262**	**240**	**283**	**294**	**305**	**312**
Lot Number	**West Parking Area**								
C-1	Upper Employee Parking Area	205	95%	225	205	245	260	275	280
C-2	Reserved Employee Parking	73	95%	75	70	85	90	95	95
C-3	Government Vehicle Parking	6		6	6	5	5	5	5
C-4	Handicap Parking	8		8	8	10	10	10	10
	Total	**292**		**314**	**289**	**345**	**365**	**385**	**390**

Table 4.37: Main Terminal Parking Requirements – Upside Forecast

		Number of Parking Spaces (Upside Forecast)							
		Existing Supply	Existing Percent full	2010	2011	2015	2020	2025	2030
Main Terminal Area									
Lot Number	**Lower Level Terminal**								
C-2	Lower Terminal Employee Parking Lot	581	65%	390	395	525	595	655	730
C-3	Lower Terminal Public Parking Lot	258	90%	240	245	320	360	395	440
C-3	Lower Terminal Handicap Parking	18	--	18	18	25	30	35	40
	Total	**857**		**648**	**658**	**870**	**985**	**1,085**	**1,210**
Lot Number	**East Parking Area**								
C-4	Car Rental Parking Area	118		118	120	155	175	195	215
C-4	Tour Bus Parking	26		37	37	43	46	48	51
C-4	Car Rental / Mini Van Tour Bus Parking	11		11	11	14	16	18	20
C-4	Tour Mini Van/Sedan Parking Area	62		61	62	81	91	100	111
C-4	ACCTG Building	10	100%	10	10	15	15	15	15
C-4	East Reserved Parking Area	18	90%	15	15	20	25	30	35
	Total	**245**		**252**	**255**	**328**	**368**	**406**	**447**
Lot Number	**West Parking Area**								
C-1	Upper Employee Parking Area	205	95%	200	205	270	305	385	375
C-2	Reserved Employee Parking	73	95%	70	70	95	105	115	130
C-3	Government Vehicle Parking	6		6	6	10	10	10	10
C-4	Handicap Parking	8		8	8	10	10	10	10
	Total	**292**		**284**	**289**	**385**	**430**	**470**	**525**

Table 4.38: Commuter Terminal Parking Requirements

		Number of Parking Spaces							
		Existing Supply	Existing Percent full	2010	2011	2015	2020	2025	2030
Commuter Terminal (Base Forecast)									
Lot Number	**Commuter Terminal / PacAir**								
C-3	Commuter Terminal Parking Lot	369	50%	205	195	240	270	285	305
C-3	Commuter Terminal Freedom Air	4		4	4	5	5	5	5
C-3	Pac-Sport and PacAir office	116	75%	90	85	105	120	130	140
C-3	Car Wash Parking Lot	102		105	102	125	140	150	160
Lot Number	**Kunkle Building Parking**								
C-3	Kunkle Building Parking	14	90%	15	15	Scheduled for Demolition			
C-3	Kunkle Building Handicap Parking	2		2	2	Scheduled for Demolition			
C-3	Yellow Cargo Building Parking	25	90%	25	25	Scheduled for Demolition			
Commuter Terminal (Downside Forecast)									
Lot Number	**Commuter Terminal / PacAir**								
C-3	Commuter Terminal Parking Lot	369	50%	215	195	235	250	260	265
C-3	Commuter Terminal Freedom Air	4		4	4	5	5	5	5
C-3	Pac-Sport and PacAir office	116	75%	95	85	100	105	110	110
C-3	Car Wash Parking Lot	102		115	102	120	125	130	135
Lot Number	**Kunkle Building Parking**								
C-3	Kunkle Building Parking	14	90%	15	15	Scheduled for Demolition			
C-3	Kunkle Building Hadicap Parking	2		2	2	Scheduled for Demolition			
C-3	Yellow Cargo Building Parking	25	90%	25	25	Scheduled for Demolition			
Commuter Terminal (Upside Forecast)									
Lot Number	**Commuter Terminal / PacAir**								
C-3	Commuter Terminal Parking Lot	369	50%	190	195	255	285	315	350
C-3	Commuter Terminal Freedom Air	4		4	4	5	5	5	5
C-3	Pac-Sport and PacAir office	116	75%	85	85	115	130	145	160
C-3	Car Wash Parking Lot	102		100	102	135	150	165	185
Lot Number	**Kunkle Building Parking**								
C-3	Kunkle Building Parking	14	90%	15	15	Scheduled for Demolition			
C-3	Kunkle Building Hadicap Parking	2		2	2	Scheduled for Demolition			
C-3	Yellow Cargo Building Parking	25	90%	25	25	Scheduled for Demolition			

Table 4.39: Cargo Area Parking Requirements (Base Forecast)

		Number of Parking Spaces (Base Forecast)							
		Existing Supply	Existing Percent full	2010	2011	2015	2020	2025	2030
Cargo Facilities									
CTSI Building									
	Customer / Employee Parking	30	60%	18	18	26	29	30	31
	Warehouse Receiving Slots	10		10	10	14	16	17	18
	Handicap Parking	3		2	2	3	3	3	4
DHL Building									
	Customer / Employee Parking	29	90%	26	26	37	41	43	45
	Warehouse Receiving Slots	0							
	Handicap Parking	2		2	2	3	3	3	4
Tripple B									
	Customer / Employee Parking	18	90%	16	16	23	26	27	28
	Warehouse Receiving Slots	9		9	9	11	13	14	15
	Handicap Parking	2		2	2	3	3	3	3
PacAir									
	Customer / Employee Parking	151	90%	136	136	195	217	227	238
	Warehouse Receiving Slots	23		23	23	29	33	35	37
	Handicap Parking	7		7	7	8	9	10	11

4.3.3 Recommendations

4.3.3.1 Terminal Curbside Operations

The terminal curbside operations are projected to operate an acceptable level of service through 2025. By 2030 the level of service on the upper level curbside is expected to degrade to a level of service D during peak periods which is below the typical design standard for level of service operations. An additional 65 feet of curbside is required on the upper level in order to maintain level of service C under current operating conditions (e.g. current allocation and dwell times) however the required length can be minimized by using curbside enforcement to minimize dwell times and better utilize the curb space.

Currently tour buses stop at the beginning of the curb to unload passengers making it difficult for other vehicles to move around the buses in the narrow lanes leading up to the curb and utilize curb space beyond the first terminal doors. It is recommended that traffic management personnel are used during peak periods to manage the curb space and direct tour buses to parts of the curb further downstream where there is more room for vehicles to maneuver around the buses. It is also recommended that enforcement is also used to ensure vehicle dwell time is limited to active loading and unloading only which will reduce the amount of curb length required in future years.

4.3.3.2 Commercial Vehicle Staging

During the tour bus parking lot survey a number of operational challenges were witnessed including:

- Excessive dwell times averaging one hour with many extending well beyond one hour
- Vehicles other than tour buses parking in the bus stalls for extensive periods of time
- Private vehicles entering and waiting for passenger arrival in the tour bus lot
- Vehicles parking in no parking zones during peak periods when all other spaces were full
- Vehicles lining up at the entrances and blocking buses from entering the lot or stopping behind buses preventing them from backing up

It is preferable from a safety standpoint to segregate private vehicles from other commercial vehicle traffic especially buses and shuttles. Large vehicles, such as buses, have a difficult time seeing smaller vehicles such as privately operated cars. In addition, private vehicles tend to be operated by drivers who are less familiar with the airport and are less likely to pay attention to their surroundings, including buses backing out of parking stalls with a limited line of sight.

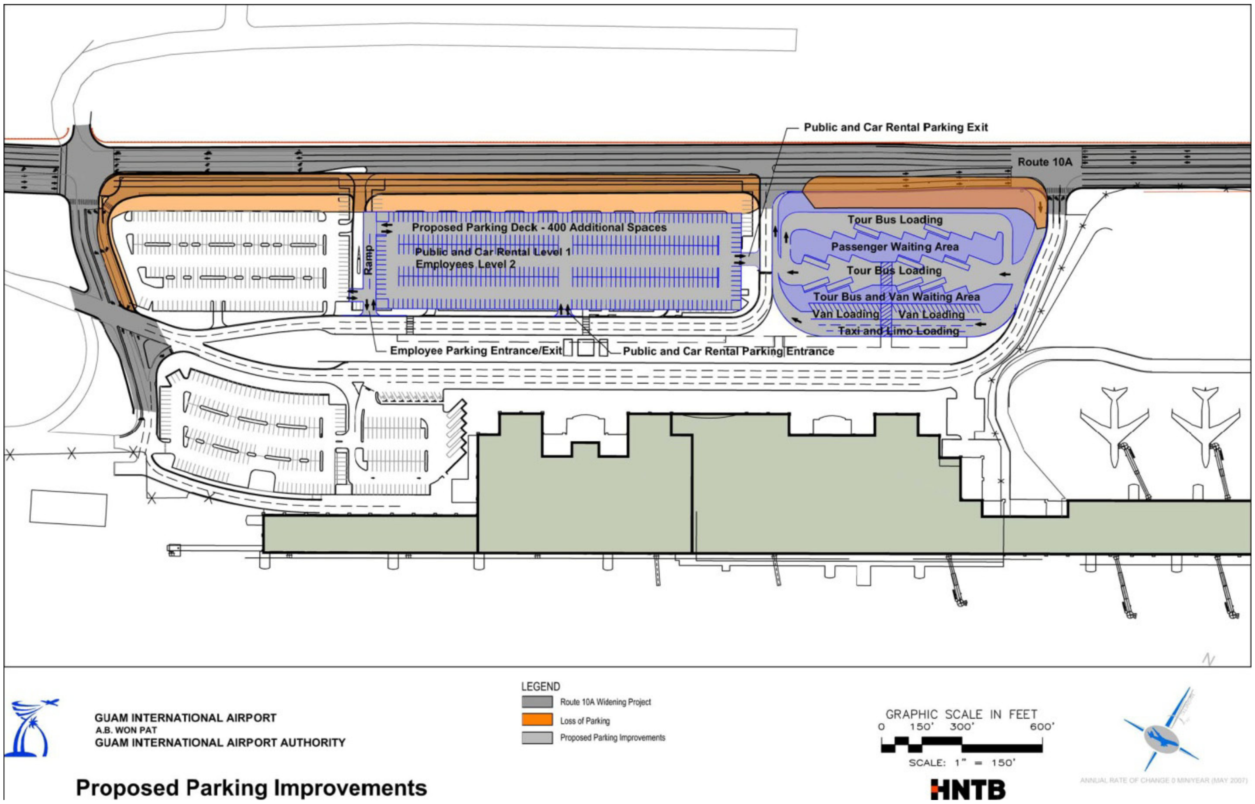
It is also typical at most airports around the United States to provide a separate staging area in a location away from the terminal area for buses, vans, taxis and limos to stage while waiting to pick up passengers. This saves precious terminal area space for active passenger loading and unloading, parking and rental car operations which need to be in close proximity to the terminal. By providing an offsite staging area congestion on the terminal roadways and parking facilities can be reduced. The offsite staging areas often include a building with restrooms and a break room for drivers to congregate. It is also possible to combine this staging area with a convenience store / gas station to allow drivers to refuel and buy snacks while also serving the public and generating extra revenue for the airport.

The following recommendations would improve the efficiency and operation of the Tour Bus Lot:

1. Restrict access to the bus lot to buses only and provide separate areas with separate entry and exit points for taxis, limousines. Area can be restricted with automatic vehicle identification tags and gate arms or by personnel such as security guards or ground transportation attendants. No parking areas should also be enforced and if vehicles stop in a no parking area blocking other vehicles.
2. Provide an entry and exit for rental cars that are separate from the tour bus lot entry and exit. This would keep unfamiliar rental car vehicle drivers from mixing with large bus traffic. Rental car drivers are typically the most distracted drivers at an airport as they are usually in unfamiliar surroundings and can be slow to make driving decisions or make abrupt last minute lane changes as they are many times looking at maps or reading directions.
3. Restrict use of the tour bus staging area to active loading and unloading only and provide an offsite staging area for buses to wait if they arrive early or plan to stay at the airport after dropping off departing passengers on the curbside. Potential locations include Parking Lot C west of the terminal area along Sunset Boulevard or the undeveloped parcel east of the terminal along Route 10A identified by GIAA for a potential consolidated rental car service area. Lot C could accommodate 20 to 25 tour buses and additional buses and vans could be accommodated in the adjacent lot when rental car activities are relocated (accommodating over 100 more van size vehicles). A modular building can be included on the site to provide an area for drivers to wait between dropping off and picking up passengers at the Terminal. The building can include an area with tables and chairs, snack machines and, if desired, bathrooms.
4. Alternately the tour bus lot could be expanded into the rental car area to provide more space for tour bus staging. The rental cars could be moved to the lower level of the parking deck providing more space adjacent to the current tour bus area to expand the bus staging. However, this alternative uses high value space near the terminal that could be used for parking or car rental ready-return activity that cannot be easily moved from the terminal area without introducing bussing of passengers between parking facilities and the terminal.
5. Review the layout of the tour bus lot to provide a more efficient parking configuration limiting the amount of backing up the buses need to do. As discussed in the requirements section, under the base forecast 21 spaces are needed for active loading and unloading in 2015. These spaces could be configured as parallel curbs or saw tooth spaces in a reconfigured bus area.

Figure 4.53 depicts a reconfigured staging area accommodating 22 active bus loading bays and a curbside accommodating taxicabs, limousines and 34 tour van positions and addressing all of the recommendations above. Vehicles not actively picking up passengers would wait in a remote staging area and tour bus loading would be provided in an area separate from the taxis, limos, and vans area. Tour bus parking is provided in a saw tooth configuration allowing buses to more easily maneuver into and out of parking spaces reducing the potential conflict with pedestrians, other vehicles that currently occurs when the tour buses back out of parking spaces. A linear curbside is provided for active taxi and limousine loading which is across the roadway from a tour bus loading area with angled spaces adjacent to a curb island designated for passenger waiting/loading. The taxis, limousines and vans are all located in an area segregated from the tour bus area which allows vehicles to maneuver in a safer manner without tour buses blocking the driver visibility.

Figure 4.53: Proposed Parking Improvements



4.3.3.3 Terminal Area Parking

As shown in ***Table 4.26***, the widening of Route 10A in 2014 will cause the loss of 231 public and employee parking spaces, 70 rental car spaces and 9 tour company spaces in the lower level parking lots. This loss in addition to the growth in demand for public, employee and rental car parking will result in a deficit of 267 public and employee spaces and 97 rental car spaces in 2015 resulting in a need for 367 additional parking spaces in 2015 increasing to a need for 744 additional spaces in 2030, as shown in ***Table 4.40***. As a result a one-level parking deck is proposed in the main lower level lot. As shown in ***Table 4.27***, the parking deck is envisioned to be built in phases with a one level 400 space deck constructed in the first phase to accommodate both parking and rental car demand in 2015. This deck would accommodate the rental car demand currently accommodated in the east parking area and allow space for the tour bus parking area to be expanded in a safer configuration, shown on ***Figure 4.53***. As shown this deck would cover the main lower level parking lot and be centered in front of the terminal providing good access to ticketing and baggage claim for all airlines and a total of 1,366 public/employee and car rental spaces. As configured on ***Figure 4.53***, public and rental car parking would be provided on the lower level and would provide shade for these vehicles. The top level along with the area to the west would be preserved for employee parking. The reconfigured tour bus parking area would accommodate active loading and vehicles could stage in a remote location as discussed in Section 4.1.3.2. In 2020 (Phase 2) the deck could be expanded to the west providing 200 additional spaces for a total of 1,566 spaces and in 2025 (Phase 3) another 150 spaces could be provided above the east rental car and tour bus parking area for a total of 1,716 which would accommodate forecast demand through 2030. In all phases the car rental demand would exceed the area remaining in the car rental ready-return parking area after Route 10A was expanded. To ensure sufficient space is available for car rental activity the car rental parking area could be moved to the parking deck and employee parking could be provided in the former car rental area at the easternmost end of the terminal parking area. In conjunction with the Route 10A widening and development of expanded on-Airport parking facilities the signal timing along Route 10A and the Airport access should be reviewed and optimized. The increase in traffic will continue to exacerbate issues along Route 10A without improvements and with the consolidation of the parking and commercial vehicle eixt and upper level curbside exit and commercial vehicle entrance into two intersections signalization of both intersections and coordination between the signals should be considered.

Table 4.40: Summary of Required Parking and Car Rental Parking

	Number of Parking Spaces				
	2011	**2015**	**2020**	**2025**	**2030**
Public/Employee Parking					
Existing Lower Level Parking	857	857	857	857	857
Existing Upper Level Parking	292	292	292	292	292
Loss due to Route 10A Widening	0	(231)	(231)	(231)	(231)
Total Available Public/Employee Parking Spaces	**1,149**	**918**	**918**	**918**	**918**
Required Public/Employee Parking	947	1,185	1,350	1,430	1,525
Surplus (Deficit) (Available Spaces less Required)	**202**	**(267)**	**(432)**	**(512)**	**(607)**
Car Rental Ready-Return					
Existing	118	118	118	118	118
Loss due to Route 10A Widening	0	(70)	(70)	(70)	(70)
Total Available Car Rental Spaces	**118**	**48**	**48**	**48**	**48**
Required Car Rental Ready-Return	115	145	165	175	185
Surplus(Deficit) (Available Spaces less Required)	3	(97)	(117)	(127)	(137)
Total Additional Required Parking and Car Rental	**0**	**367**	**549**	**639**	**744**
Proposed Structure Spaces	0	**400**	**600**	**750**	750
Total Spaces Available after Structure Construction	1,302	1,366	1,566	1,716	1,716

The parking plan presented in the previous Master Plan, which proposed a parking deck over the tour bus parking area at the east end of the lower level parking area, was reviewed as part of this study. However, due to the projected reduction in size of the east lot after widening of Route 10A this parcel is smaller than the area required to accommodate the forecast in demand by 2015, accounting for the loss of spaces due to the widening. In addition, the tour buses run on diesel fuel which produces heavy exhaust fumes when the buses are idling to run air conditioning to cool the interior for passengers. Locating the buses under a parking deck would require venting and fans to keep the exhaust fumes from collecting under the deck where passengers wait and buses load. Some buses could be located behind the deck in open air but the area would be limited to a small number of buses and would further reduce the potential size the parking deck footprint. The tour buses could also be moved to the center parking area however, their location adjacent to baggage claim is preferable as the vast majority of airport passengers utilize the buses and this location minimizes overall passenger walking distance and convenience.

4.4 Other Facilities

4.4.1 Airport Rescue and Fire Fighting (ARFF)

4.4.1.1 ARFF Regulations

Airports certified under Federal Aviation Regulation Part 139 (Certification and Operations: Land Airports Serving Certain Air Carriers) must comply with specific Airport Rescue and Fire Fighting (ARFF) operational requirements. These requirements were developed through research conducted by the FAA and the International Civil Aviation Organization (ICAO) Rescue and Firefighting Panel. Two primary considerations in determining compliance were established: vehicle response time requirements, and equipment and agent requirements. Five airport classes referred to as Indexes were established from this research, and their corresponding ARFF equipment requirements were identified. The airport Index is determined by the length of the longest aircraft operated by an air carrier performing an average of five scheduled departures per day (computed on an annual basis). ***Table 4.41*** lists the five ARFF Indexes and details the specific minimum requirements an airport must meet for each Index.

Table 4.41: ARFF Index Classifications

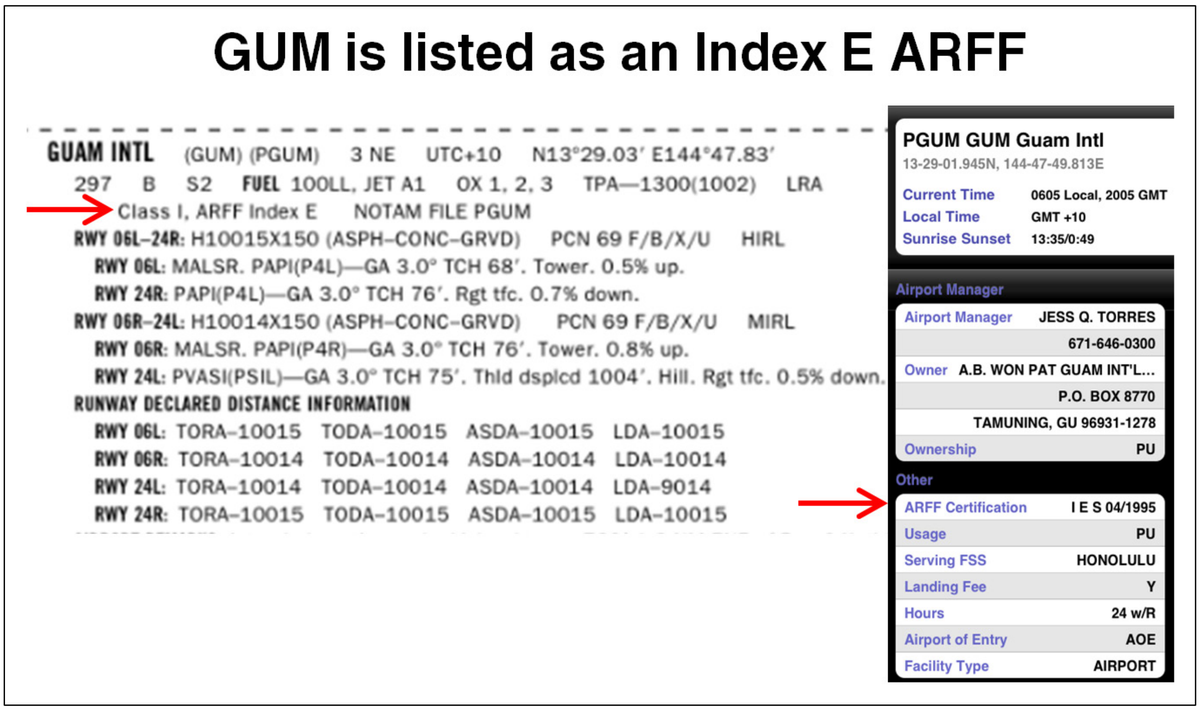
Airport Index	Required Vehicles	Aircraft Length (feet)	Scheduled Departures	Agent + Water for Foam
A	1	< 90 ft	>1	500 # DC or Halon 1211 or #450 DC +100 Gal. H_2O
B	1 or 2	>90 <126	> 5	Index A+ 1,500 Gal H_2O
C	2 or 3	>126 <159	> 5	Index A+ 3,000 Gal H_2O
D	3	>159<200	> 5	Index A+ 4,000 Gal H_2O
E	3	>200	> 5	Index A+ 6,000 Gal H_2O

Source: FAA and HNTB

GUM is currently classified as an Index E airport serving an average of 5 or more daily departures of aircraft that are 200 feet long or longer, as shown on ***Figure 4.54***. Index E requires airports to have at least one light weight, quick-response vehicle carrying at least 500 pounds of sodium based dry chemical or Halon 1211, or 450 pounds of potassium based dry chemical; and at least two additional fire fighting vehicles carrying an amount of water and the commensurate quantity of aqueous film-forming foam (AFFF). The total quantity of water for foam production carried by all three vehicles must be at least 6,000 gallons. Response time requirements for ARFF vehicles specify that at least one airport rescue and fire-fighting vehicle, at its assigned post, shall be able to reach the midpoint of the farthest runway serving air carrier aircraft within three minutes. These three minutes start from the time of the alarm to the time of initial agent application. All other required vehicles shall reach this same point from their assigned posts within four minutes from the time of alarm to the time of initial agent application.

The International Association of Firefighters presented a proposal to update FAR Part 139 requirements relating to Aircraft Rescue and Fire Fighting (ARFF). This proposal would update Part 139 Airport rescue and fire fighting criteria to more closely incorporate criteria currently mandated by the National Fire Protection Association (NFPA), OSHA, the Department of Defense, and the International Civil Aviation Organization (ICAO). The NFPA proposal would establish a requirement for additional firefighting equipment and personnel with an expanded mission of "initiating exterior and interior aircraft fire suppression, and extricating trapped victims." In addition, this proposal would require the capability for initial response to accidents within a period of 2 minutes, anywhere on the airfield or within 1650 feet of the runway ends, with secondary response within 2.5 minutes. The net result of this proposal could entail the need for additional ARFF vehicles, personnel, and stations at all Part 139 certified airports. This proposal however has not been adopted yet and the likelihood of its being adopted is remote.

Figure 4.54: GUM Airport Index (Airport Facility Directory)


GUM is listed as an Index E ARFF

GUAM INTL (GUM) (PGUM) 3 NE UTC+10 N13°29.03′ E144°47.83′
297 B S2 FUEL 100LL, JET A1 OX 1, 2, 3 TPA—1300(1002) LRA
Class I, ARFF Index E NOTAM FILE PGUM
RWY 06L–24R: H10015X150 (ASPH–CONC–GRVD) PCN 69 F/B/X/U HIRL
RWY 06L: MALSR. PAPI(P4L)—GA 3.0° TCH 68′. Tower. 0.5% up.
RWY 24R: PAPI(P4L)—GA 3.0° TCH 76′. Rgt tfc. 0.7% down.
RWY 06R–24L: H10014X150 (ASPH–CONC–GRVD) PCN 69 F/B/X/U MIRL
RWY 06R: MALSR. PAPI(P4R)—GA 3.0° TCH 76′. Tower. 0.8% up.
RWY 24L: PVASI(PSIL)—GA 3.0° TCH 75′. Thld dsplcd 1004′. Hill. Rgt tfc. 0.5% down.
RUNWAY DECLARED DISTANCE INFORMATION
RWY 06L: TORA–10015 TODA–10015 ASDA–10015 LDA–10015
RWY 06R: TORA–10014 TODA–10014 ASDA–10014 LDA–10014
RWY 24L: TORA–10014 TODA–10014 ASDA–10014 LDA–9014
RWY 24R: TORA–10015 TODA–10015 ASDA–10015 LDA–10015

PGUM GUM Guam Intl
13-29-01.945N, 144-47-49.813E

Current Time	0605 Local, 2005 GMT
Local Time	GMT +10
Sunrise Sunset	13:35/0:49

Airport Manager

Airport Manager	JESS Q. TORRES
	671-646-0300
Owner	A.B. WON PAT GUAM INT'L...
	P.O. BOX 8770
	TAMUNING, GU 96931-1278
Ownership	PU

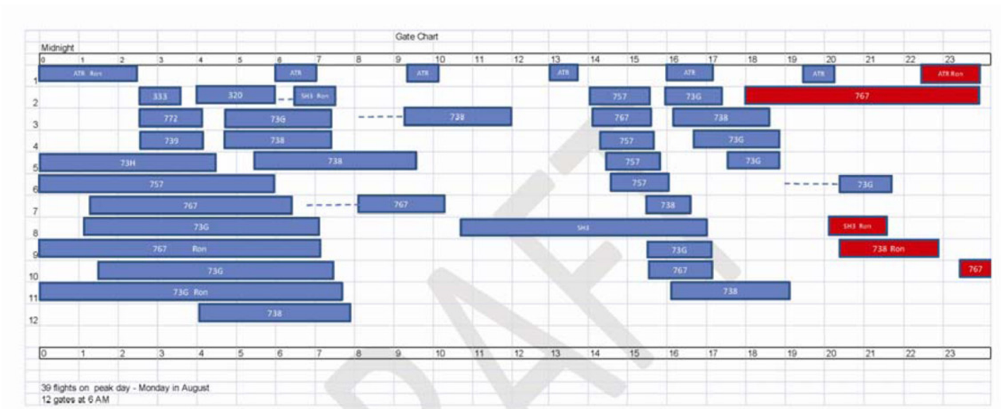
Other

ARFF Certification	I E S 04/1995
Usage	PU
Serving FSS	HONOLULU
Landing Fee	Y
Hours	24 w/R
Airport of Entry	AOE
Facility Type	AIRPORT

Figures 4.55 through 4.57 indicate the number of aircraft over 200 feet in length based on existing and future flight schedules.

Figure 4.55: Existing Peak Month Average Day Flight Schedule

Current and Future Flight Schedules



The Peak Month Average Day Flight Schedule shows 4 aircraft over 200 ft in length departing per day from GUM.

Figure 4.56: Peak Day Flight Schedule

Current and Future Flight Schedules

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Airport — A.B. Won Pat International Airport — DEPARTURES | ARRIVALS

DESTINATION	CARRIER	FLIGHT	GATE	TIME ▲	STATUS	
Seoul	KOREAN AIR	KE 112		3:23 AM	ARRIVED	B-744
Manila	Philippine Airlines	PR 105		3:56 AM	ARRIVED	B-744
Osaka	KOREAN AIR	KE 722		4:18 AM	ARRIVED	A-333
Manila	Philippine Airlines	PR 103		4:46 AM	ARRIVED	B-744

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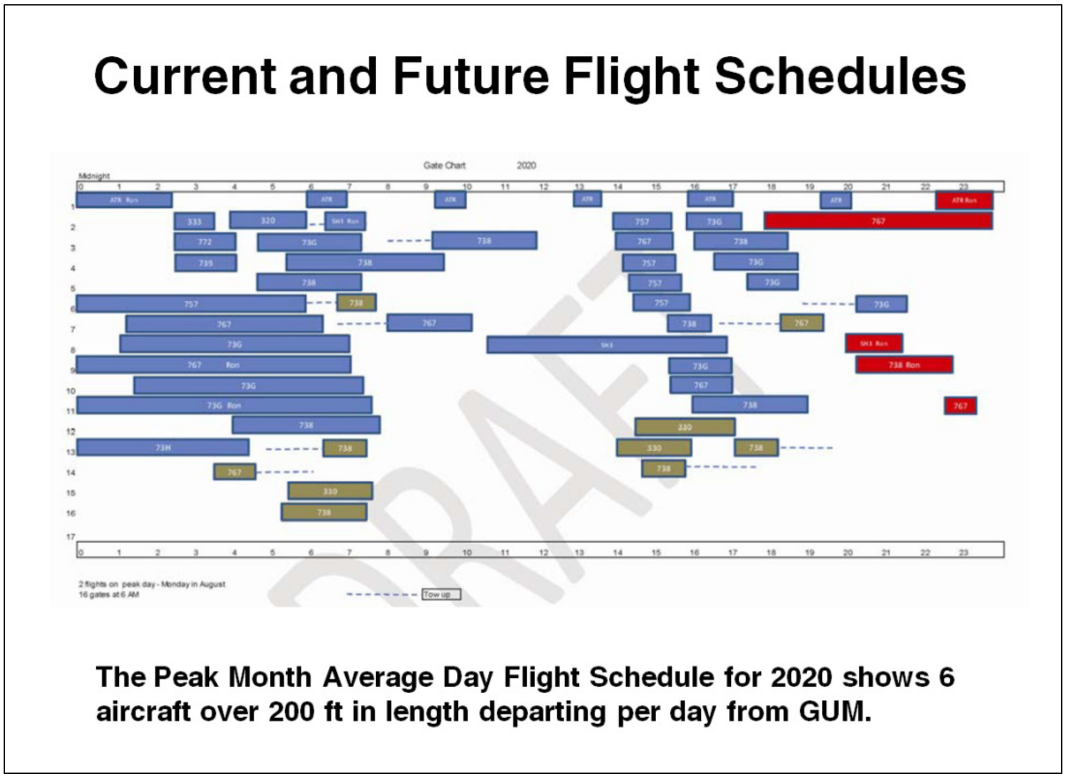
Airport — A.B. Won Pat International Airport — DEPARTURES | ARRIVALS

DESTINATION	CARRIER	FLIGHT	GATE	TIME ▲	STATUS	
Saipan	Freedom Air	FP 73		6:10 AM	ARRIVED	
Honolulu	UNITED	UA 200	9	6:41 AM	EN ROUTE	B-772
Manila	Philippine Airlines	PR 111		7:26 AM	EN ROUTE	A-330
Rota	Freedom Air	FP 100		7:30 AM	ON TIME	

However, a Peak Day in 2011 shows at least 6 aircraft over 200 ft long departing from GUM.

Figure 4.57: Year 2020 Peak Month Average Day Flight Schedule



4.4.1.1.1 Facility Requirements and Evaluation Criteria

ERF station facility requirements and specific factors relating to the GUM Fire Department operations procedures should be reviewed and incorporated in the facility development. Federal guidelines have been reviewed and the primary design criteria references have been summarized for the purposes of this study. These guideline include:

- Federal Aviation Regulations (FAR) Part 139 - Certification and
- Operations: Land Airports Serving Certain Air Carriers
- FAR Part 77 - Objects Affecting Navigable Airspace
- FAA AC 150/5210-15 - Airport Rescue and Fire Fighting Station

4.4.1.1.2 Building Design

- FAA AC 150/5300-13 - Airport Design
- FAA AC 150/5200-31 - Airport Emergency Plan
- CFR vehicle response - Response analysis based on FAR Part 139 requirements

Evaluation of vehicle response times requires determining the typical response performance that could be expected from GUM personnel and equipment. Response time is a combination of three components: 1) processing, 2) mobilization, and 3) vehicle performance. Information on vehicle performance specifications and response drills is very limited. A study developed for

Seattle-Tacoma International Airport provided some information relative to vehicle performance that was used in the GUM Airport Master Plan. This study included a drive in the largest tanker vehicle at Sea-Tac Airport, which provided information concerning acceleration and deceleration techniques and vehicle speed in turns. This information and other assumptions regarding typical vehicle performance were used in this study and are summarized below.

1. **Processing**

   Processing is transferring the emergency report or call through the tower to ARFF dispatch. Process time is taken to be about 15 seconds.

2. **Mobilization**

   The average elapsed time between an alarm call and a vehicle leaving the station is approximately 45 seconds.

3. **Vehicle Performance**

   There are four primary components of vehicle performance and operation that contribute to the vehicle performance element of response time. The components are acceleration, deceleration, cruising, and cornering. Traversing curves significantly increases the overall travelling time of all water carrying vehicles. To evaluate vehicle response times for the proposed alternatives, it is necessary to establish typical vehicle speeds. For the preliminary analyses of response times for the existing ARFF facility, response times will be determined using an average response speed derived from two clocked responses. However, more precise calculations should be performed using further test runs and will be reserved for future study. The following paragraphs address vehicle performance.

Traversing curves takes additional time due to limitations on the safe turning speed of the trucks. A certain amount of time will be required for a vehicle to slow from cruising speed to turning speed, and accelerate back to cruising speed. Time needed to traverse curves is dependent on the generally uniform factors of velocity in and out, deceleration in, and acceleration out but varies greatly with respect to the degree and radius of the curve traversed. Acceleration rate and maximum speed for a representative large fire truck are presented in ***Figure 4.42***.

Table 4.42: ARFF Vehicle Performance Data

Vehicle	Description	Acceleration	Max Speed
Oshkosh T-3000	3,000 gallon tanker	0-50 mph = 45s	65 mph

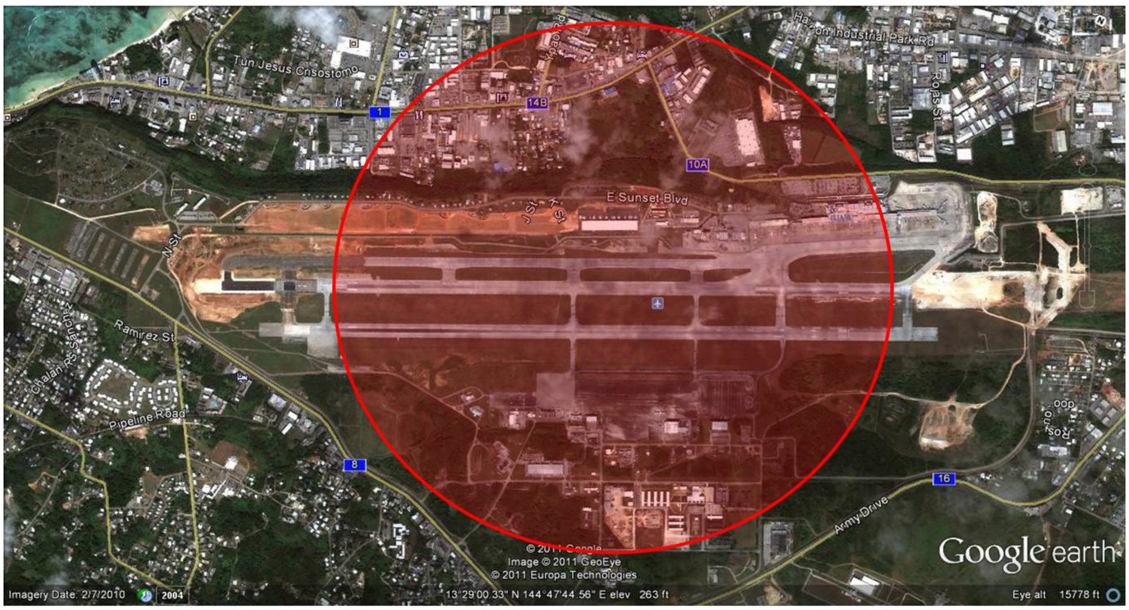
Source: Oshkosh & HNTB

4.4.1.2 ERF Siting Procedure

The range of coverage for the existing ARFF stations can be determined based on the information presented above. FAR Part 139 establishes a three minute response time requirement and it is assumed that approximately one minute will elapse between the time the initial alarm is sounded to the time the vehicle begins rolling from the station. Therefore, any emergency response vehicle must be able to reach the midpoint of the farthest runway serving air carrier aircraft within two minutes of its departure from the station. With an average vehicle speed of 26 miles per hour the vehicle can travel approximately 4,500 feet – less than one mile - in the two minute time frame. Therefore the midpoint of any existing or proposed runway located within a 4,500-foot radius of the existing ARFF station could theoretically be reached within the three-minute criteria.

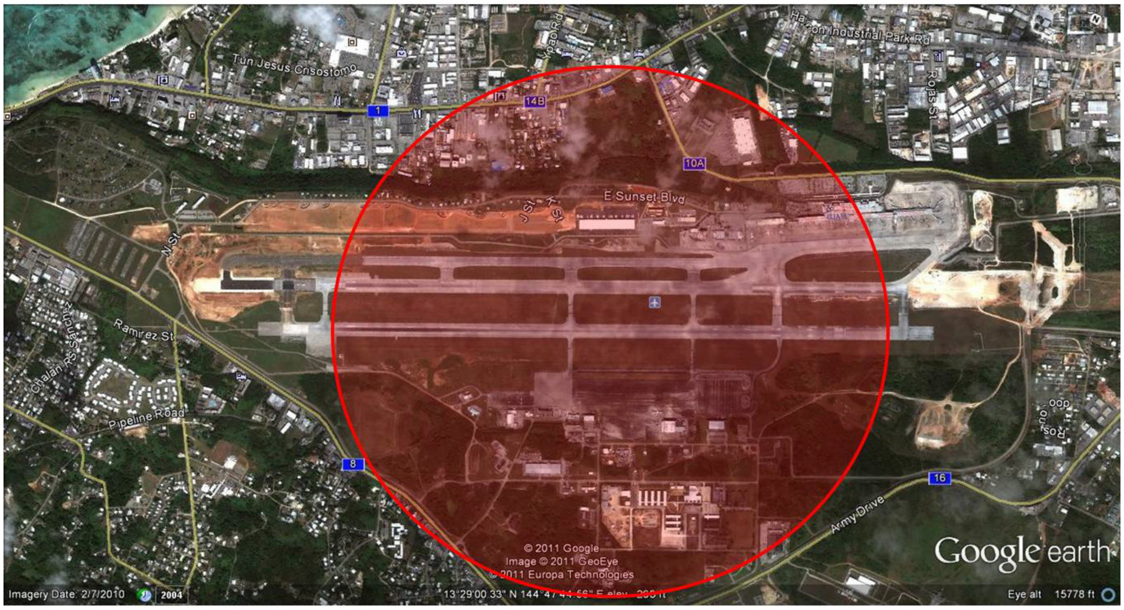
Currently, all existing runways fall within the radius for the three-minute response time of the ARFF facility. However, this facility needs replacement so a new site needs to meet these criteria. Appropriate locations for future Emergency Response stations can be identified by defining 4,500-foot radius circles at the midpoint of all proposed runways and identifying a site that falls within the respective circles. See ***Figures 4.58 through 4.62***.

Figure 4.58: Maximum Theoretical Response Radius – Existing Airfield



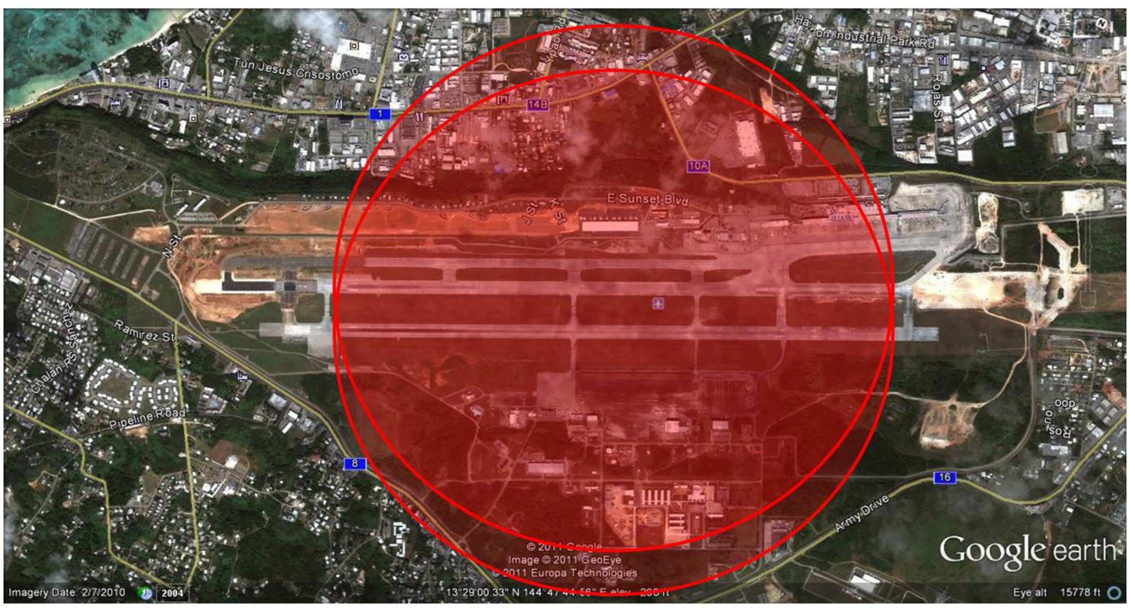
Above shows a 4500 ft radius from the center of Runway 6L-24R. In theory, an Emergency Response Facility can be anywhere in this radius and reach the mid point of Runway 6L-24R.

Figure 4.59: Maximum Theoretical Response Radius with Runways Extended



Above shows a 4500 ft radius from the center of Runway 6R-24L. In theory, an Emergency Response Facility can be anywhere in this radius and reach the mid point of Runway 6R-24L.

Figure 4.60: Overlap of Maximum Theoretical Response Radius with Both Runways Extended



Using the overlapping radius of each runway reach distance provides a general possible location for a replacement ERF.

Figure 4.61 depicts the proposed area for a replacement ARFF. This area is optimal for both runways for the existing and lengthened runway configurations.

Figure 4.61: Response Area within Existing GIAA Property

Narrowing the area to include land already owned by GIAA, and further narrowing the land to that which would have direct airside access is seen above.

Figure 4.62 shows that the proposed ARFF site is immediately adjacent to the existing ARFF location.

Figure 4.62: Potential Replacement Emergency Response Facility Site

This location was suggested as a potential replacement by the GIAA Fire Chief. This site would have nearly identical response time as the existing ERF.

4.4.1.3 ERF Site Evaluation

4.4.1.3.1 ERF Access Routes

The Emergency Response Facility supports airfield and nonairfield emergency response. In the event of a major airfield emergency operation, the emergency response team relies on support from nearby agencies in the form of vehicles and personnel. Alternative access routes should be identified for the efficient movement on and off the airport by participating agencies for this reason. The configuration of the access routes would rely on several access points connecting the airfield to public roads. Acceleration, deceleration, and turning capability of the largest and heaviest CFR trucks should be used to analyze access route configuration and geometrics. The full-length positioning of response vehicles along the runway(s) for response and location relative to high-speed exits should be taken into consideration in establishing emergency response vehicle access route positioning. Currently, in the event of an airfield emergency, the response vehicle has full use of all runways and taxiways to reach the identified accident. It is anticipated that these surfaces, along with the service roads, will continue to provide adequate access routes for emergency response vehicles.

4.4.1.3.2 ERF Station Elements[16]

The proposed ARFF building replicates the size of existing ARFF. The building should include the following elements:

- **Fire Fighting Vehicle Room**. - Side by side parking of six T- 3000 trucks with a minimum separation of 8 feet between trucks and 6 feet between vehicles and walls or storage areas. As with Firehouse #2, future expansion can be accommodated.
- **Station Apron** - Designed to provide straight access from the vehicle room floor to the aircraft movement area. The Apron operating surface should be large enough to allow the longest vehicle to back into any bay of the station.
- **Watch Alarm Room** - Turnout Gear Storage.
- **Fire Department Office**.
- **Workshop**.
- **Storage/Hose Drying Facility**.
    - Day Room.
    - Dormitories.
    - Locker Room/Lavatories.
    - Kitchen/Dining Room.
    - Training/Study Room.
    - Auto Parking Area. Minimum parking area of one space per person per duty shift plus visitor parking.

Note that vehicle fueling will not be carried out at the ARF station.

[16] Source: FAA AC 150/5210-15, Appendix 1.

To assist in assessing the facility needs, the following are characteristics of the T-3000 truck:

- Height/Width/Length = 12'/9.33'/36.75'
- Weight = 66,750 pounds
- Crew = 2 persons
- FAA Index = C, D and E
- Water Capacity = 3,000 gallons
- Foam Capacity = 405 gallons

4.4.1.4 Preliminary Recommendations

Currently, there is one emergency response facility (ERF) serving the existing runways, which all fall within the radius for the required three-minute response time. To serve the existing and lengthened runways within the above mentioned time constraint, the location for a replacement ERF has been identified, as shown in ***Figure 4.63***.

Figure 4.63: Potential Replacement Emergency Response Facility Site

This location was suggested as a potential replacement by the GIAA Fire Chief. This site would have nearly identical response time as the existing ERF.

The Airport is required, under FAR Part 139, to develop and maintain an Airport Emergency Plan in accordance with Section 139.325.

Federal Aviation Regulations (FAR) Part 139 Applicable to GUM

§ 139.315 Aircraft rescue and firefighting: Index determination. (As of December 21, 2011)

An index is required by paragraph (c) of this section for each certificate holder. The Index is determined by a combination of—

(a) The length of air carrier aircraft and

(1) Average daily departures of air carrier aircraft.

(2) For the purpose of Index determination, air carrier aircraft lengths are grouped as follows:

(b) Index A includes aircraft less than 90 feet in length.

(1) Index B includes aircraft at least 90 feet but less than 126 feet in length.

(2) Index C includes aircraft at least 126 feet but less than 159 feet in length.

(3) Index D includes aircraft at least 159 feet but less than 200 feet in length.

(4) Index E includes aircraft at least 200 feet in length.

(c) Except as provided in §139.319(c), if there are five or more average daily departures of air carrier aircraft in a single Index group serving that airport, the longest aircraft with an average of five or more daily departures determines the Index required for the airport. When there are fewer than five average daily departures of the longest air carrier aircraft serving the airport, the Index required for the airport will be the next lower Index group than the Index group prescribed for the longest aircraft.

§ 139.317 Aircraft rescue and firefighting: Equipment and agents. (As of December 21, 2011)

Unless otherwise authorized by the Administrator, the following rescue and firefighting equipment and agents are the minimum required for the Indexes referred to in §139.315:

(e) *Index E*. Three vehicles—

(1) One vehicle carrying the extinguishing agents as specified in paragraphs (a)(1) or (a)(2) of this section; and

(2) Two vehicles carrying an amount of water and the commensurate quantity of AFFF so the total quantity of water for foam production carried by all three vehicles is at least 6,000 gallons.

(f) *Foam discharge capacity*. Each aircraft rescue and firefighting vehicle used to comply with Index B, C, D, or E requirements with a capacity of at least 500 gallons of water for foam production must be equipped with a turret. Vehicle turret discharge capacity must be as follows:

(1) Each vehicle with a minimum-rated vehicle water tank capacity of at least 500 gallons, but less than 2,000 gallons, must have a turret discharge rate of at least 500 gallons per minute, but not more than 1,000 gallons per minute.

(2) Each vehicle with a minimum-rated vehicle water tank capacity of at least 2,000 gallons must have a turret discharge rate of at least 600 gallons per minute, but not more than 1,200 gallons per minute.

(g) *Agent discharge capacity*. Each aircraft rescue and firefighting vehicle that is required to carry dry chemical, halon 1211, or clean agent for compliance with the Index requirements of this section must meet one of the following minimum discharge rates for the equipment installed:

(1) Dry chemical, halon 1211, or clean agent through a hand line—5 pounds per second.

(2) Dry chemical, halon 1211, or clean agent through a turret—16 pounds per second.

(h) *Extinguishing agent substitutions*. Other extinguishing agent substitutions authorized by the Administrator may be made in amounts that provide equivalent firefighting capability.

(i) AFFF quantity requirements. In addition to the quantity of water required, each vehicle required to carry AFFF must carry AFFF in an appropriate amount to mix with twice the water required to be carried by the vehicle.

(j) Methods and procedures. FAA Advisory Circulars contain methods and procedures for ARFF equipment and extinguishing agents that are acceptable to the Administrator.

(k) *Implementation*. Each holder of a Class II, III, or IV Airport Operating Certificate must implement the requirements of this section no later than 36 consecutive calendar months after June 9, 2004.

[Doc. No. FAA–2000–7479, 69 FR 6424, Feb. 10, 2004; Amdt. 139–26, 69 FR 31523, June 4, 2004]

§ 139.319 Aircraft rescue and firefighting: Operational requirements. (As of December 21, 2011)

(h) Response requirements. (1) With the aircraft rescue and firefighting equipment required under this part and the number of trained personnel that will assure an effective operation, each certificate holder must—

(i) Respond to each emergency during periods of air carrier operations; and

(ii) When requested by the Administrator, demonstrate compliance with the response requirements specified in this section.

(2) The response required by paragraph (h)(1)(ii) of this section must achieve the following performance criteria:

(i) Within 3 minutes from the time of the alarm, at least one required aircraft rescue and firefighting vehicle must reach the midpoint of the farthest runway serving air carrier aircraft from its assigned post or reach any other specified point of comparable distance on the movement area that is available to air carriers, and begin application of extinguishing agent.

(ii) Within 4 minutes from the time of alarm, all other required vehicles must reach the point specified in paragraph (h)(2)(i) of this section from their assigned posts and begin application of an extinguishing agent.

4.4.2.1 Introduction

This section examines the requirement for future airside and landside facilities to support cargo operations at GIAA over a twenty year time horizon. The task will comprise six stages

- Outline current cargo handling facilities and calculate cargo terminal capacity
- Establish capacity levels of existing cargo facilities
- Determine future cargo facility requirements to satisfy forecast demand
- Identify facility shortfall to meet forecast demand
- Identify options to satisfy demand
- Generate concept layout plans

In addition to data gathering and analysis the study was aided by information provided through a series of interviews, conducted by the Consultant, with airport, airlines, ground handlers, freight forwarders, integrators, and security and TSA representatives.

4.4.2.2 Current Situation

Cargo activity at GUM is currently addressed by GIAA through leasing arrangements with several agents who represent the large integrated cargo carriers, such as DHL UPS, and Fed Ex, as well as with smaller ground handling companies and individual airlines.

4.4.2.2.1 Facilities

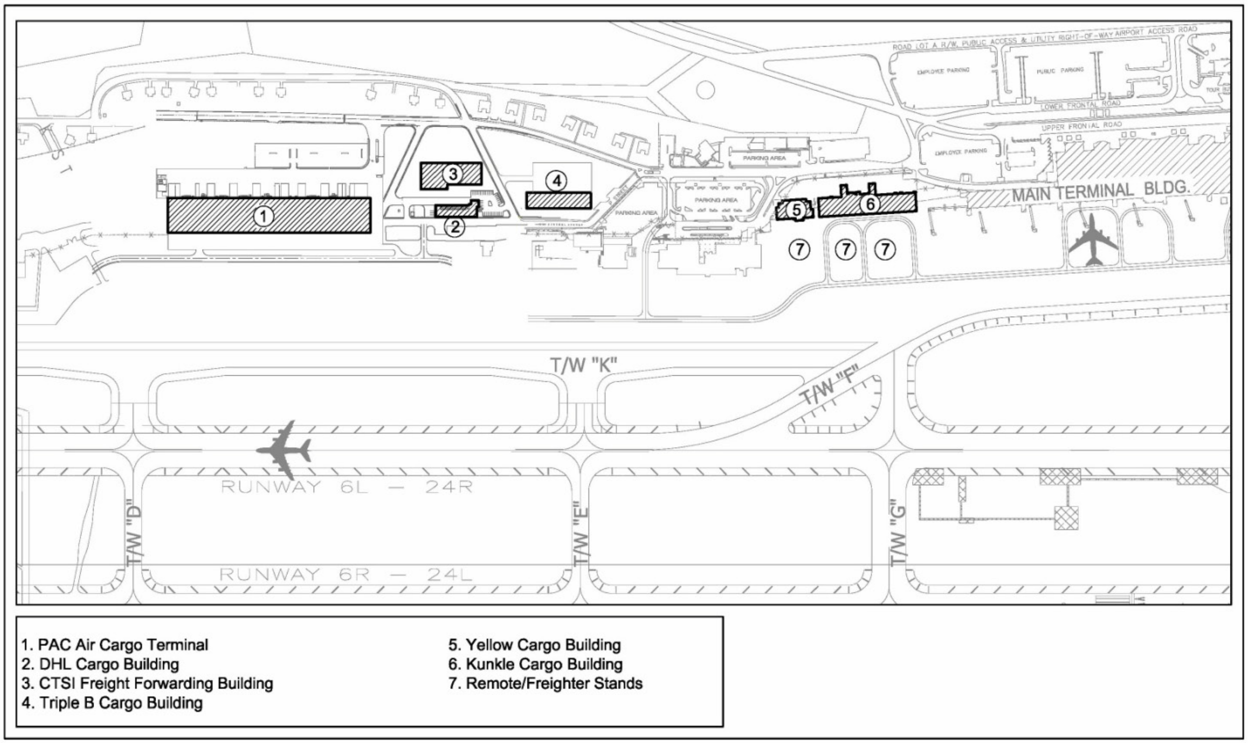
The existing cargo facilities at GUM are contained within a long narrow zone located directly West of the main terminal and bounded by Taxi K (the north parallel to Runway 06L-24R) and East Sunset Boulevard. The narrowness of the zone together with its proximity to the runway poses problems with height limitations. The existing facilities, shown in ***Figure 4.64***, comprise six cargo buildings; as follows:

1. PAC Air Integrated Cargo Terminal. This facility is located at the Western end of the cargo zone, and comprises a total Building area of 160,000 sq ft of integrated warehouse facilities, over 130,000 sq ft of which is warehouse space and about 30,000 sq ft office space located on a mezzanine level. The total land area[17] covers 400,000 sq ft. The building has recently been commissioned and is still only partially occupied. Refrigeration facilities are provided by mobile units only. The tenanted areas currently comprise:
    - Warehouse space allocation:
        - Ground Handling Agents ASIG with 9000sq ft, only 6,000sq ft of which is used for cargo handling; the remainder is currently used for GSE storage.
        - Ground handlers PACSEA with 3000sq ft.
        - JAL with 500 sq ft. This facility has landside access only
        - The National Guard with 15,000 sq ft. This is used for equipment storage
        - GIAA with 7,500sq ft. This facility is currently unused

[17] Total land area comprises the net ground floor area, landside parking, docking and manoeuvring area and airside area

– US Customs and Quarantine with 9,000 sq ft. This area is underutilised as currently freight is not required to pass through the customs facility and is processed directly in the airport terminal warehouses.
– Defense and Government Services (DGS) with 1080 sq ft.
– NW/DL maintenance with 600 sq ft
– In addition to these existing tenants, there are discussions underway that could see FedEx take some 4,000sq ft. of space

Figure 4.64: The Current Cargo Facilities at GUM



- Office space allocation:
  – PAC Air with 12,500 sq ft
  – Customs and Quarantine with 10,000 sq ft
  – Continental Airlines with 2,500sq ft
  – PAP with 1050 sq ft
  – Delta, AMI, Skybridge, NAG, Pacific West Builders, each with between 250 to 430 sq ft of space. NAG is a major freight operator in the USA, but does not currently offer freight services and are assessing potential opportunities.

- ○ The PAC Air terminal is accessed landside directly from East Sunset Boulevard into the terminal docking/ parking area. All of the facilities are operated using low levels of mechanization. Although the terminal has direct airside access there are no adjoining aircraft cargo stands. The terminal airside area is used for equipment storage and staging of cargo prior to being transferred to the apron. There is a significant elevation difference between this area and the airside road. A Phase 2 development for the site indicates a building (18,500 sq ft) and parking area west of the current landside parking lot. A specific use for the building has not yet been established.

2. DHL Cargo Terminal. This facility is located immediately to the east of the PAC Air terminal. The building is single story and has a gross floor area of approximately 7,400 sq ft and a total land area of 29,000 sq ft. The building has recently been commissioned and is used solely by DHL for Express services. Although directly fronting onto the airside the terminal does not currently have direct access, although this could be established in the future, if required.
3. Triple B's Building this building is located immediately to the east of the DHL Express Terminal building. The building is single story with offices on a mezzanine level, comprising a total floor area of close to 22,000 sq ft. (made up of 17,500 for cargo handling and 4500 for offices), with a total land area of 33,000 sq ft. At present the building is used for handling sea freight only. The building currently has no direct airside ramp access. However, a shared ramp access arrangement with the DHL Building is possible. Due to its location, this building could at some future date be used for air cargo ground handling, when demand dictates.
4. Kunkle Air Cargo Building. This is located immediately to the west of the passenger terminal. The building is designated for demolition to make way for future development.
5. Yellow Cargo building. This building is located immediately to the west of the Kunkle Air cargo building. The space is utilized for a variety of users and Triple B have 2,000 sq ft which is used for air freight. The building is designated for demolition to make way for future development.
6. CTSI Freight forwarding terminal. This facility is located immediately to the north of the DHL Building and the south of East Sunset Boulevard. This terminal was recently constructed and opened. This facility is estimated at about 27,000 sq ft and is used primarily by CTSI for distribution of their own products, few of which are air freight related at this time.

Other freight forwarding terminals exist off airport, handling both air and sea cargo. Both Fed Ex and UPS currently operate off airport.

Three aircraft stands opposite the Kunkle Cargo building are used for a combination of remote parking and cargo stands, though freighter services at this time are very limited and typically involve old B727 flying fish in during fishing season..

There are no areas formally designated for GSE and ULD /pallet storage and a variety of "informal" storage areas are located around the cargo zone.

4.4.2.2.2 Operational Factors

There is a considerable imbalance between inbound and outbound cargo at GUM with approximately two thirds of total cargo being imports, a large proportion of which comprises perishable produce. Practically, all cargo is carried in the belly hold of scheduled passenger aircraft. This includes express freight handled by FedEx, UPS and DHL. While FedEx and DHL deal with typical Express operations, UPS operations are broader and include a wider range of bulk cargo shipments. Occasional unscheduled dedicated freighter movements operate using B727 freighter aircraft from the remote aircraft stands (see ***Figure 4.64***). These freighters are importing Tuna fish for onward transfer to Japan with Delta Airlines; however these freighter movements are becoming less frequent. This reduction in frequency of freighters carrying Tuna for onward transfer to Japan appears to be as a result of importers choosing to bypass Guam to avoid extensive TSA procedures.

The majority of inbound cargo arrives during the peak arrival period between 2 and 4 am, the bulk of which is cleared by the following midday. Originating general cargo is delivered both as containerized cargo from nearby off airport freight forwarding warehouses, and as bulk cargo that requires build up. FedEx and UPS express cargo facilities are located off airport. Triple B and DHL cargo is handled airside through handlers located in the PAC Air facilities.

4.4.2.2.3 TSA

The 9/11 Act, passed by congress in August 2010, requires that all cargo at piece level, transported on a passenger aircraft, be screened for explosives as of August 1, 2010. To achieve this and in order to reduce the potential for delays at the airport the TSA has developed the Certified Cargo Screening Program (CCSP). This program enables freight forwarders and shippers to pre-screen cargo prior to arrival at the airport thereby reducing airport procedures to administrative processes. As a result, except in cases where cargo is deemed to warrant physical checking, the current TSA requirements, while affecting the administrative workload, are not considered to impact the overall processing time of cargo through the terminal.

4.4.2.2.4 Site Constraints

The planned demolition of the Kunkle and Yellow cargo buildings will reduce the available cargo capacity at GUM. However, there is scope for additional cargo development to the west of the PAC Air facilities. The area has similar physical limitations as the current cargo zone and comprises a long narrow zone bounded by Taxiway K and East Sunset Boulevard. Like the existing zone, the land falls away quite appreciably to the north. It is also impacted by runway/taxiway clearances. This poses some issues, in particular, in the location of future aircraft stands

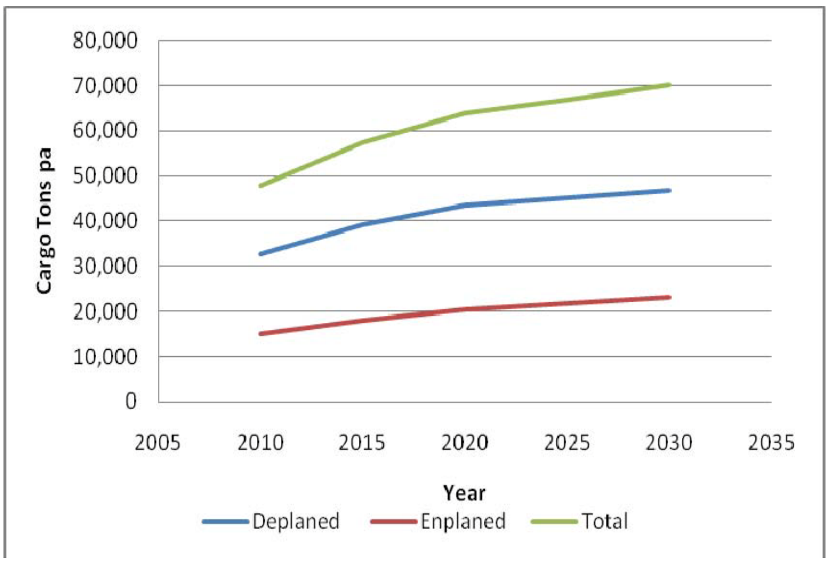
4.4.2.3 Traffic Demand

Table 4.43 and ***Figure 4.65*** show the twenty year demand forecast for general freight/mail, and express cargo. Over the twenty year period the cargo demand is expected to increase from 48,000 tons in 2010 to about 70,000 tons per annum by 2030. Approximately two thirds of the cargo handled is inbound freight. Notably, the forecast encompasses the potential demand for food stuffs and other domestic requirements arising from the proposed expansion of the US military on the island. While this planned expansion is envisaged, it has yet to be officially confirmed.

Table 4.43: Guam Air Cargo Forecast (tons)

	Deplaned	Enplaned	Total
2010	32,726	15,056	47,782
2015F	39,283	18,092	57,375
2020F	43,613	20,340	63,953
2025F	45,188	21,733	66,921
2030F	46,898	23,180	70,078

Figure 4.65: Guam Air Cargo Forecast (tons)



4.4.2.4 Planning Factors

The following sections establish the terminal and total land requirements to satisfy the forecast demand for future cargo volumes. The resulting plan is based on ensuring that the base case demand levels can readily be met while recommending prudent protection measures to ensure that the high demand levels can be accommodated if the need arises.

The size of a terminal building is dependent on many factors; these include the type of cargo handled, the amount of inbound/outbound cargo delivered at one time, the dwell time cargo spends in the terminal, the density of the cargo, and the degree of capitalizations (i.e. level of mechanization) in the provision of cargo terminal and stacking facilities. Freight carried in the belly hold of passenger aircraft will also tend to provide a less peaky profile than cargo carried by freighter aircraft[18]. The amount of transfer and originating/terminating freight also impacts the

[18] Smaller unit loads carried in the belly hold of aircraft call for smaller processed batch sizes and hence less space requirements

terminal space requirements[19]. Finally, there are customs and the security issues that can impact upon the time cargo spends in the terminal.

To take account of these factors and to provide a measure for establishing cargo operations for planning purposes, a standard measure of efficiency has been developed. This measure of efficiency of facility use for cargo operations is the ratio of annual cargo volumes to total warehouse ground floor area, expressed in Annual Tons per Square Foot (ATPSF); this area includes warehouse and office space. In general, office space accounts for about 20% to 25% of the total terminal area.

IATA recommends an ATPSF in the range of 0.5 to 1.8 ATPSF for bulk cargo processing. The range accounts for, in general, the degree of mechanization for cargo handling. A survey of cargo facilities at airports worldwide[20] supports this factor; it also indicates that smaller cargo terminals (i.e. those handling less than about 50,000 to 60,000 tons per annum) are closer toward the lower end of the range. Integrator operators also operate at the lower end of the range since they are likely to have a more peaky profile and also tend to have greater processing requirements compared to bulk cargo terminal. IATA suggests that smaller integrator facilities operate at an ATPSF of about 0.5 and this has been this consultant's experience as well.

At the current GUM cargo facilities, low levels of mechanization are utilized. However this negative influence on utilization rates is somewhat offset by the short dwell time freight spends in the airport terminals since typically, the majority of terminating cargo has left the airport within eight to ten hours. Customs and quarantine impacts are minimized by the current practice of providing clearance at the cargo terminal, though this may change in the future. On-airport TSA processes, while consuming administrative effort, do not currently impact the flow of freight through the terminal.

Given that the cargo terminals at GUM have yet to reach their capacity limits, it is difficult to establish any quantitative assessment of their ATPSF. However, data gathered regarding the JL Baker and Sons off-airport freight forwarding building, which is operating near to capacity, and serves UPS express and other general cargo provides a general indication of a generic ATPSM for ground handling facilities at GUM. This facility, which has 18,000 sq ft of warehouse space, 75% of which is utilized for air cargo, handles approximately 150,000lb of cargo per week. This equates to an ATPSF of roughly 0.6. Given that the facility operates both Express and general cargo and it not quite at capacity the estimate would support the IATA figures for small terminals. As well, discussions with ASIG indicated that they appeared to be handling some 0.8 tons per sq ft in their facility in Pac Air and they are virtually at capacity. Taking this into account and based on the IATA guidelines this plan has assumed an ATPSF of 0.8 tons per sq ft of for general cargo and 0.6 tons per sq ft for express cargo (DHL) for Guam ground handling cargo terminals.

Another factor that is used in cargo terminal planning is the net ground floor area (NGFA) to surrounding cargo related land area. Poorly planned buildings and roads create ground traffic

[19] A larger amount of originating/terminating freight usually requires more functions to be carried out resulting in a larger building

[20] "Airport Design and Operation" Kazda and Caves

congestion, which can reach critical levels, resulting in an inefficient interface between air and surface modes. Limited apron space creates congestion problems leading to delays. The average ratio for most cargo facilities worldwide is about 1:3.3[21]. Of this non building area about 15% to 20% comprises apron area and the remaining 80% to 85% landside truck maneuvering and parking area. The corresponding ratio for PACAir, DHL and Triple B are 1:3.1, 1:3.9 and 1:1.5 respectively (see Table.2). The low ratio for the Triple B terminal reflects its current use as a sea freight terminal. Should the terminal be utilized for air freight ground handling then additional area for apron space would be needed. Note that the Kunkle and Yellow cargo buildings have not been considered since they are intended for demolition.

Table 2: Total Cargo Terminal Land Area

	PAC Air Terminal*	Triple B Terminal**	DHL Terminal **	Total
Total Land Area (sq ft)	410,000	33,000	29,000	**472,000**
Total Land Area (acres)	9.4	0.8	0.7	10.8
Ratio of Warehouse Ground Floor Area to Total Land Area	1:3.2	1:1.5	1:3.9	1:2.9

* Office space located on mezzanine level ** Office space located on both ground level and mezzanine

4.4.2.5 Existing Cargo Capacity

For the exercise of calculating the current cargo capacity of GUM, in addition to the PACAir and the DHL terminal, it is assumed that the Triple B terminal, which currently handles sea freight only, will at some later date, when demand dictates, also handle air cargo. The CTSI freight forwarding terminal recently completed is excluded from the capacity calculation since, based on its general location, it is assumed to remain a freight forwarding terminal. It is also assumed that the Kunkle and the Yellow cargo building will be demolished and the area reallocated to other development (per the ALP this is reserved for future terminal expansion).

On this basis, the total terminal building area (i.e. including office space) available for the cargo ground handling facilities at GUM is 192,400 sq ft. Using the ATPSF factors defined above, the current cargo terminal capacity at GUM is estimated to be 152,000 tons per annum. This comprises PACAir at 130,000 tons, Triple B at 17,600 tons, and DHL at 4,400 tons (see ***Table 4.44***). This estimate assumes that all three buildings will be used solely for cargo ground handling operations and that Customs and TSA functions will remain in PacAir and all non cargo uses or tenants (such as GSE and storage uses) currently using cargo terminal space are relocated elsewhere.

[21] In more recent cargo terminal developments higher ratios of up to 1:5 have been used.

Table 4.44: Existing Cargo Ground Handling Capacity

	PAC Air Terminal*	Triple B Terminal**	DHL Terminal**	Total
Net Ground Floor Area – Building Footprint (Sq. Ft.)	130,000	17,500	7,400	159,400
Total Terminal Building Area Land Area (Acres)	163,000	22,000	7,400	192,400
Office Area (Sq Ft.)	33,000	4,500	2,200	37,400
Capacity (Tons PA)	**130,000**	**17,600**	**4,440**	**152,00**
Annual Tons per Square Foot of Total Terminal Floor Area (ATPSF)	0.8	0.8	0.6	

* Office space located on mezzanine level **Office space located on both ground level and mezzanine

4.4.2.6 Future Cargo Facility Requirements

4.4.2.6.1 Terminal Area

In establishing long term requirements for cargo handling facilities it is assumed that negative impacts affecting the ATPSF, such as a reduction in transfer cargo[22], will be offset by larger unit cargo facilities providing greater operational efficiency. It is therefore assumed that the long term ATPSF will be overall 0.8 tons per sq ft for the general cargo facilities and 0.6 for the express facilities like DHL. .

The cargo handling facility requirements needed to meet the forecast cargo demand are summarized in Table 4. Based on the current cargo forecast, a total cargo terminal building area of some 88,000 sq ft is required by 2030. A comparison with the current facilities shown in Table 3 indicates that this demand comprises around half of the available terminal area and thus can be readily accommodated. In fact, all of this demand can be easily be handled within the PacAir building alone.

The current excess cargo terminal space provides a more than adequate buffer to accommodate a higher cargo demand than forecast levels. However it is recognized that the PAC Air cargo building has some non-air cargo related tenants. This reduces the space available for air cargo use. It is expected that were these tenants to restrict the ability to serve an increasing demand for air cargo they would be relocated. Nevertheless it is important to note that maintaining US Customs and Quarantine in its present PAC Air location provides operational and administrative benefits.

[22] Transfer cargo typically does not require buildup and so requires less space for processing that the Triple B building can continue to be used for ocean freight. As well, this would indicate that many of the non processing uses in PacAir can remain for most of the 20 year planning period without a need to relocate.

Table 4: Cargo Ground Handling Space Requirements

	2010	2015	2020	2025	2030
Air Cargo Volume Forecast (000 tons)	40,000	57,375	63,953	66,921	70,078
Net ground Floor Area Required ** (sq ft)	45,000	64,800	72,000	75,600	79,200
Total Terminal Building Area Required * (sq ft)	50,000	72,000	80,000	84,000	88,000
Total land Area Required *** (sq ft)	148,500	213,840	237,600	249,480	261,360

* Based on an average ATPSF of .8 tons per square feet of warehouse ground floor area
** Based on 20% office space, 50% of which is located on mezzanine levels
*** Total land area includes terminal net ground floor area , Parking and Truck maneuvering area, and apron area

The Triple B building currently serves sea cargo only and uses the Yellow building, which is planned for demolition, for air cargo. Triple B has noted that they would like to transfer their air cargo operations to the PAC Air building. It is expected that were air cargo demand to warrant additional space over and above that provided in PAC Air and the DHL building then Triple B would provide this contingency with their building. However given the excess space available over the projected needs makes this event unlikely.

Table 4 also shows the total cargo facility land area requirements to 2030. It assumes that all future facilities will have direct airside apron space and access and is based on the "typical" average NGFA ratio to total land requirements of 1:3.3. Based on the current cargo forecast a total land area of 260,000 sq ft is required by 2030. A comparison of the current land area shown in Table 3 indicates that this is just over half of the available cargo facility land area and can readily be accommodated as well.

While the excess of available land allows for a suitable buffer to accommodate higher demand levels than forecast it is noted that were the Triple B terminal to operate at capacity serving air freight, its assigned land area would be less than ideal. It would therefore be prudent to protect additional land around this facility for this eventuality.

In summary, the existing ground handling terminal facilities for cargo are considered sufficient to handle the forecast growth in cargo over the next 20 years. Based on this assessment no further ground handling terminal facilities are therefore considered necessary.

4.4.2.6.2 Cargo Aircraft Stands

As previously noted, GUM handles very few freighter movements. Although the general consensus amongst operators was that freighter demand will decrease even further, and is likely to cease altogether, it is considered prudent to ensure that an allowance for freighter stands be protected in the plan. Currently freighter aircraft are parked at remote stands by the Kunkle Cargo Building in an area designated for potential passenger development (Gates 1, 2 and 3).

There is little flexibility in locating future freighter stands. The area immediately to the south of the PAC Air building and North of Taxiway K provides one site, but it is limited by obstacle height limitations and as such places restrictions on aircraft size. An alternative site is to the West of the PAC Air building. This site has already been designated in the current ALP for freighter stands. The site can allow aircraft up to A380F to be parked. It is therefore proposed that this site be maintained and protected for freighter stand use in the future.

4.4.2.6.3 GSE Storage

Discussions with freight forwarders have raised the issue of limited availability of storage area for cargo GSE. It is proposed that areas to the East and West of the DHL building and to the south of the PAC Air building be designated for airside GSE storage sites. These areas could also be used for GSE storage associated with passenger aircraft operations.

4.4.2.6.4 Warehousing

While freight forwarding warehousing facilities are located off-airport and are currently being constructed on airport north of the DHL building, it is proposed that the area of land to the West of the PAC Air building and the protected freighter stand area should be designated for future warehousing/freight forwarding facilities. These facilities could be developed in an incremental approach towards the West as demand dictates. The demand for these facilities will arise from increased cargo demand and the transfer of business from off-airport freight forwarding buildings. It may also attract other operators like J.L Baker and Sons who have chosen to move off-site to the Harmon area to move to these lands.

4.4.2.6.5 Phasing

Few additional facilities have been proposed to cope with the forecast cargo demand in this plan. Those that have are dependent on factors other than demand. The development of freighter stands depends upon the redevelopment of the Kunkle cargo building and the associated freighter stand. While this site has been protected for passenger redevelopment this report considers that passenger terminal expansion into this area is not seen as a requirement. It is therefore assumed that freighter movements will continue to use the current freighter/remote stands until such time, as yet undefined, when the site is redeveloped.

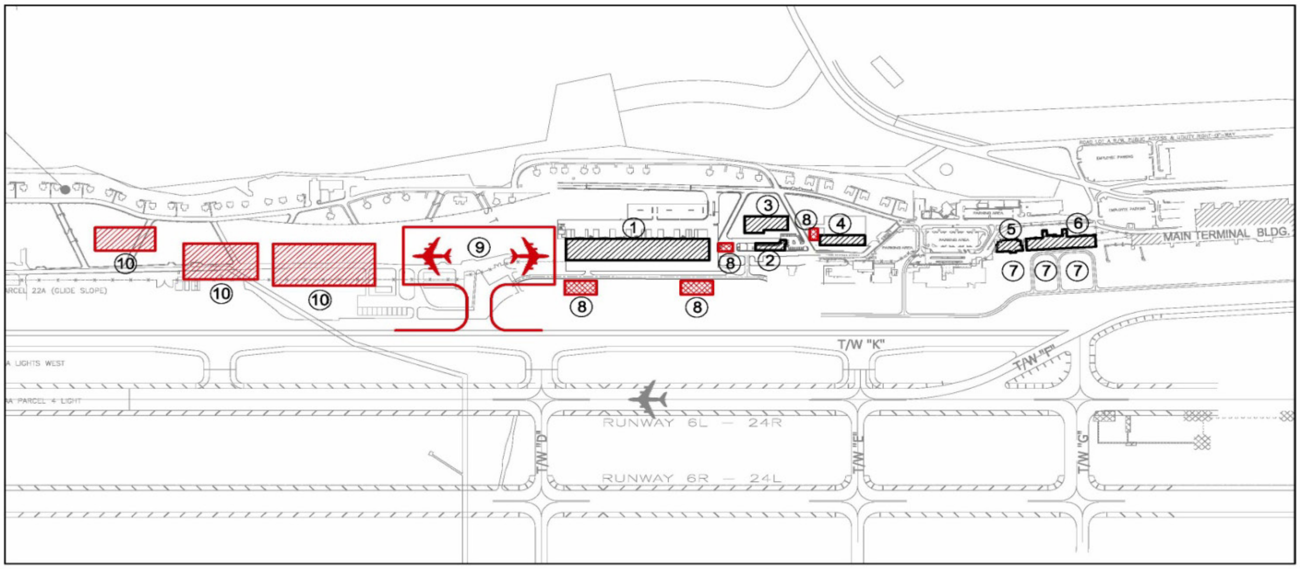
The proposed GSE storage areas relieve congestion in and around the current cargo facilities. The provision of these sites will aid in increased operational efficiency and better security.

It is expected that the incremental development of freight forwarding facilities will be ad hoc.

4.4.2.7 Summary

The evaluation of the cargo facilities for GIAA has shown the forecast demand for freight can be readily accommodated with the current ground handling terminal facilities. This assumes that the facilities give priority to accommodating ground handling operators over other non-cargo related serves. However, some additional land around the Triple B building may be required if the terminal begins to handle air cargo, though this is not anticipated. While freighter aircraft movements are infrequent and may reduce further in the future, two freighter stands have been designated for future protection. GSE storage areas have also been introduced. Land to the west of the cargo terminals has been designated for incremental development of warehousing/freight forwarding facilities. The proposed facilities are shown in ***Figure 4.66***.

Figure 4.66: Proposed Cargo Related Facilities



EXISTING
1. PAC Air Cargo Terminal
2. DHL Cargo Building
3. CTSI Freight Forwarding Building
4. Triple B Cargo Building
5. Yellow Cargo Building
6. Kunkle Cargo Building
7. Remote Freighter Stands

PROPOSED
8. GSE Storage Areas
9. Freighter Stands
10. Freight Forwarders

4.4.3 Flight Kitchen Facilities

4.4.3.1 Introduction

The A.B. Won Pat International Airport currently does not have on-Airport flight kitchen facilities. Existing kitchen facilities are located approximately two miles from the Airport in the Harmon Industrial area. Prepared food is delivered to the aircraft by trucks with lifting mechanisms. The GIAA recently advertised a request for proposal (RFP) for an on-Airport flight kitchen. There was only one respondent. Therefore it was determined that the development of an on-Airport flight kitchen facility was not viable at this time.

4.4.3.2 Recommendations

As shown in ***Figure 4.67***, the Airport Layout Plan (ALP) proposed a site for On-Airport flight kitchen facilities north of Runway 6L-24R proximate to its west end. The adjacent areas are designated for a future bonded warehouse and hangars. The site has excellent landside road access and airside ramp access. It is also on the same side of the airfield as the terminal.

Figure 4.67: Proposed Airport Flight Kitchen Site with Respect to the ALP

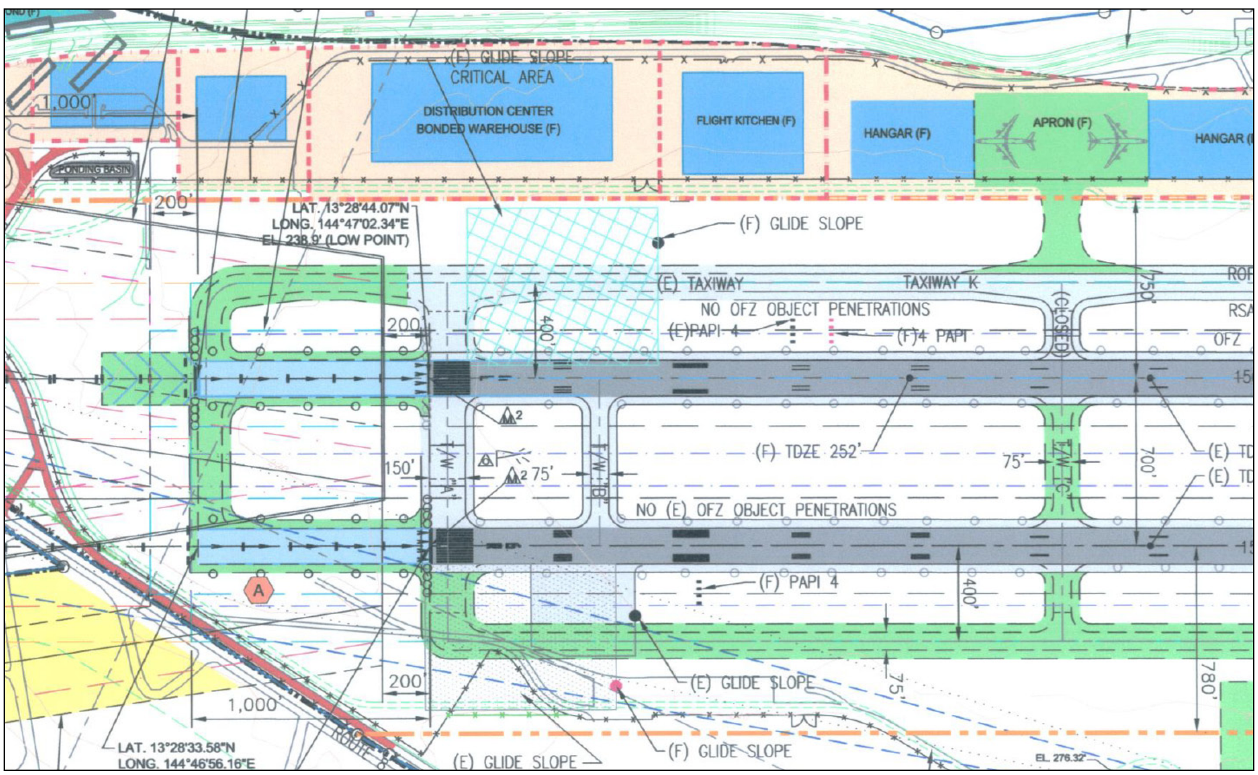
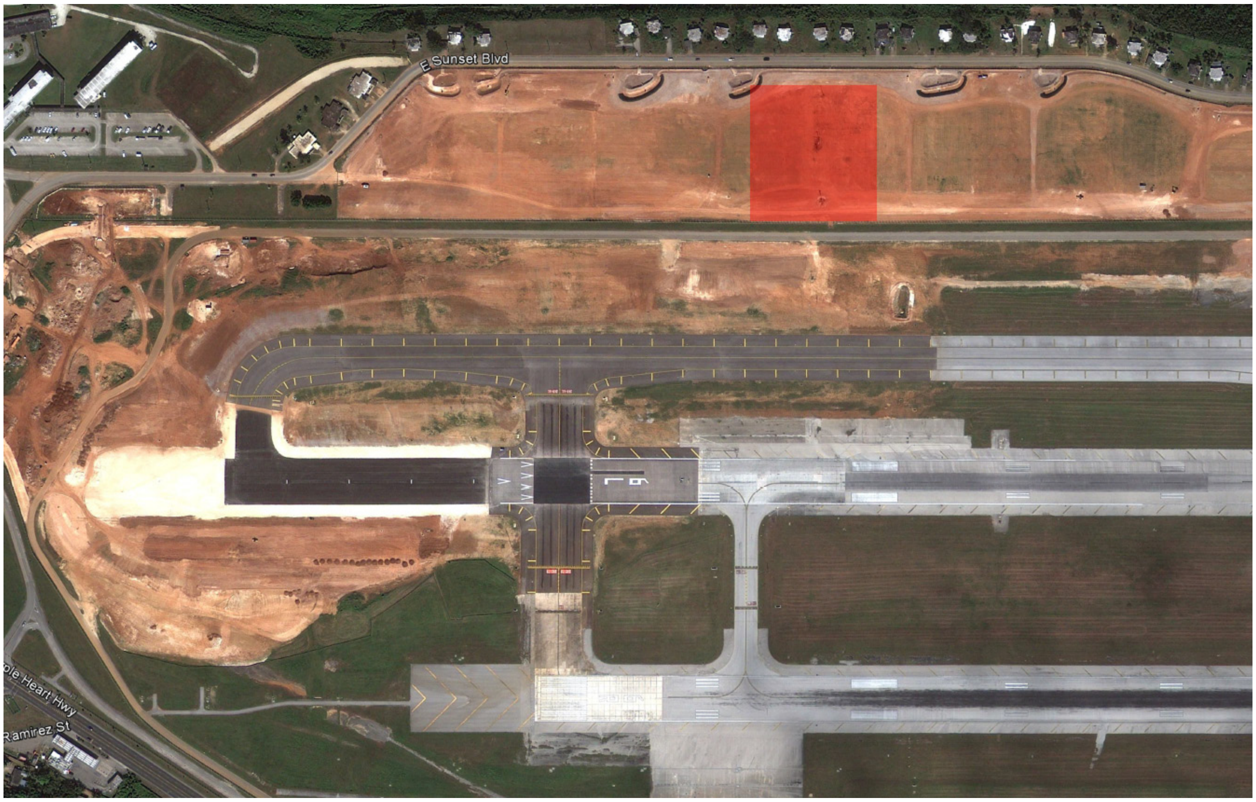


Figure 4.68 also shows the flight kitchen site (in red) in an area already prepared for new development. The passenger terminal is approximately 1.4 miles east of the site.

Figure 4.68: Flight Kitchen Site with Respect to Existing Environs



4.4.4 Fuel Farm Facilities

4.4.4.1 Inventory

A key support facility for the airport is the aircraft fuel storage facility often referred to as a fuel farm. Typically, a commercial air carrier airport such as A.B. Won Pat International Airport would maintain a three (3) to five (5) day of aviation fuel supply available.

The fuel farm is located at the extreme north-east corner of the airport property (see ***Figure 4.69***).

The previous master plan indicated the on-airport fuel supply to consist of the following:

- Two 320,000 gallon storage tanks of jet fuel
- one 15,000 gallon storage tank of aviation gas
- a 3rd 320,000 gallon storage tank for jet fuel is available but currently shut down due to limits of the fire suppression system

The fuel farm also includes:

- a truck loading stand
- an operations building located close to Route 16 near the east end of the GIAA property
- The fuel farm is connected to the terminal aircraft apron by a 16-inch diameter line. Each aircraft parking position at the terminal has in-ground aircraft hydrant fueling pits.

Figure 4.69: Aerial Photograph of the Airport and Surrounding Environs

Figure 4.70: Aerial Photograph of the Fuel Farm Area

4.4.4.2 Aircraft Fuel Requirements

To calculate the fuel storage requirements, it is necessary to examine the daily aircraft demand. Utilizing the Peak Month Average Day forecasts, it is possible to estimate the fuel demand.

Table 4.45 shows an example of the aircraft serving GUM and the maximum fuel requirements.

Table 4.45: Aircraft Serving GUM and the Maximum Fuel Requirements

	Trips	Fuel Cap (lbs)	Range (nm)	Lbs/Gal	Peak Day Demand
ATR	6	11023	1440	6.73	1,637.89
330-300	1	169236	3050	6.73	25,146.51
320	1	26233	2300	6.73	3,897.92
SH3	1	4480	500	6.73	665.68
757	1	75400	2600	6.73	11,203.57
73G	1	46082	3000	6.73	6,847.25
767	1	111890	3965	6.73	16,625.56
772	1	207700	3930	6.73	30,861.81
73g	1	46082	3000	6.73	6,847.25
738	1	46082	3000	6.73	6,847.25

Table 4.46 shows an example of the city pairs from the GUM forecasts. Most of the destinations are within 50% of the range of the aircraft's maximum range. Aircraft are required to carry additional fuel in the event the aircraft needs to divert to another airport. In addition, additional fuel is carried to account for headwinds and airborne delays. As such, the demand for fuel is in the range of 70% of the maximum per aircraft.

Table 4.46: GUM Forecast City Pairs

Peak period analysis Peak period modeling based on activity for Mondays in August.

1 DAILY DATED 01 08 2011 TO 31 08 2011
REPORT DATED AT: JULY 12-2011. TIME: 1:57(GMT)

								Date			
From	To	Carrie	Equip	Seats	Dept	Arr	Dayof Ops	20110801	20110808	20110815	20
GUM	ROP	CO	'ATR	46	2:20	2:50	1 5	1	1	1	
GUM	ICN	KE	'332	226	3:20	6:55	1	1	1	1	
GUM	KIX	KE	'772	248	4:10	6:50	1 345	0	1	1	
GUM	KIX	KE	'739	188	4:10	6:50	1234567	1	0	0	
GUM	PUS	KE	'73H	162	4:30	7:40	1 4	1	1	1	
GUM	NRT	CO	'738	157	5:45	8:30	1234567	1	0	0	
GUM	MNL	PR	'320	156	6:00	7:50	12 4 67	1	1	1	
GUM	KIX	DL	'757	183	6:00	8:40	123 567	0	0	0	
GUM	KIX	DL	'757	183	6:00	8:40	1234567	1	1	1	
GUM	HNL	CO	'767	235	6:30	17:55	123 567	1	1	1	
GUM	NRT	CO	'738	157	6:50	9:35	123 67	0	1	1	
GUM	SPN	CO	'ATR	46	7:00	7:50	12 45 7	1	1	1	
GUM	KIJ	CO	'73G	124	7:05	10:00	1	1	1	1	
GUM	NRT	CO	'767	235	7:10	9:45	1234567	1	1	1	
GUM	CTS	CO	'73G	124	7:20	11:00	1	1	0	0	
GUM	CTS	CO	'73G	124	7:20	11:00	1 5	0	1	1	

Figure 4.71 shows an estimation of fuel storage demand for GUM.

Figure 4.71: Daily Fuel Storage Requirements with Existing Two Tanks

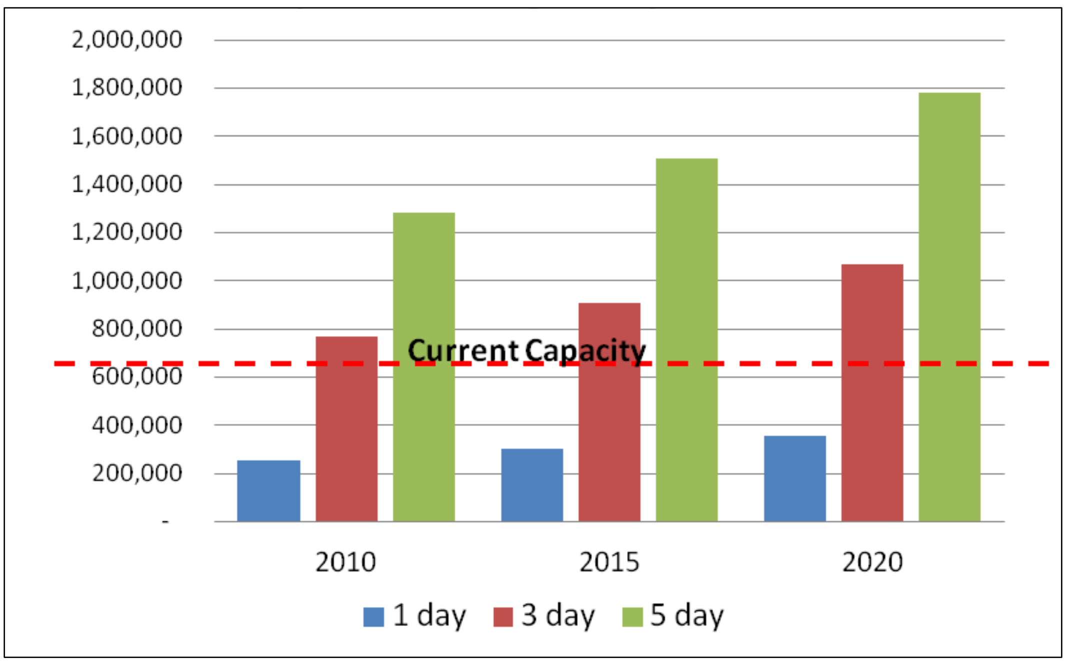
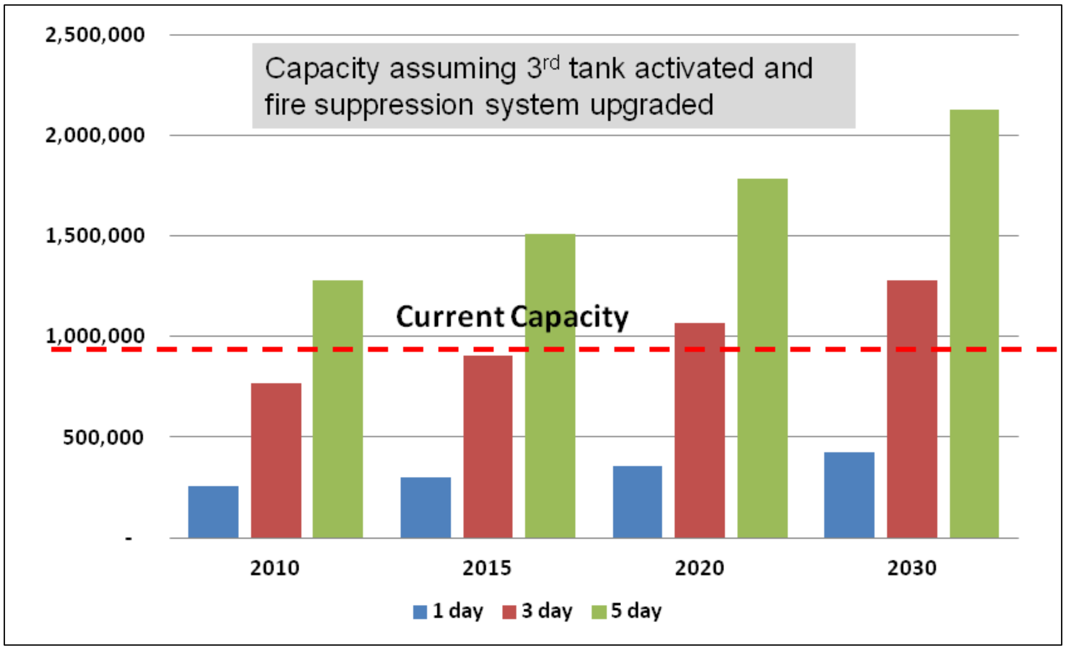


Figure 4.72 shows an estimation of fuel storage demand for GUM if the 3rd tank is made available and fire suppression system upgraded.

Figure 4.72: Daily Fuel Storage Requirements with 3rd Tank Activated



4.4.4.3 Recommendations

Being in an island location that is more than a 1,000 miles from fuel suppliers, it is recommended to maintain a five-day fuel supply on hand to preclude significant disruption of service in the event fuel delivery is disrupted for any reason. There is adequate land adjacent to the fuel farm to expand the facility to meet demand. Such adjacent land should be preserved to meet demand.

4.4.5 General Aviation Facilities

4.4.5.1 Inventory

As show on ***Figure 4.73***, the existing General Aviation Facilities consist of two main areas south of the runways just east and west of the air traffic control tower. The facility to the east services a Lear jet charter service and the facility to the west services small fixed wing aircraft primarily for sightseeing and flight training.

Currently there is no FBO Flight Based Operation Center. However, there is Avgas and Jet A fuel available. While the Airport is attended continuously and has lighted tower, transient aircraft need to provide 24 hrs advance information to Executive Manager Guam International Airport Authority.

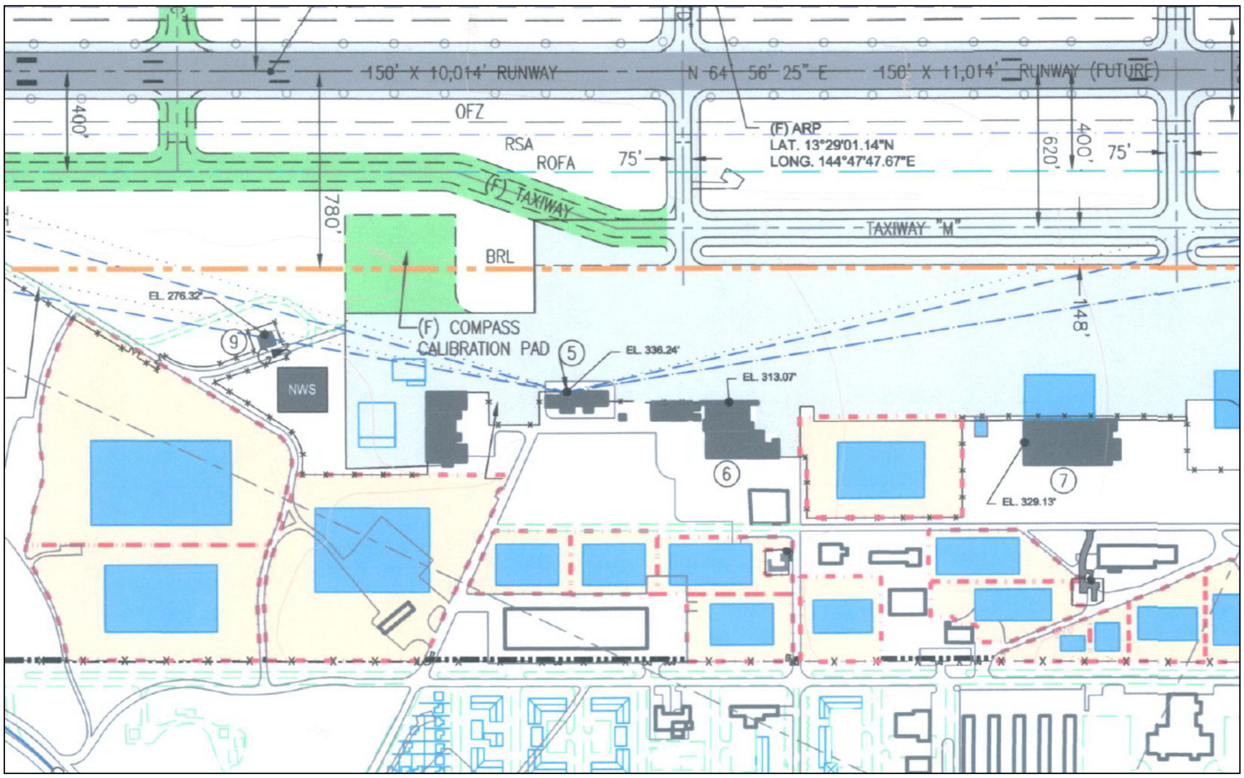
Figure 4.73: Existing General Aviation Facilities

4.4.5.2 Recommendations

The existing area utilized for General Aviation activity could be expanded to facilitate an FBO or Corporate Jet service facility if the demand materializes. The illustration on ***Figure 4.74*** shows the existing Hangar/Operations buildings that service General Aviation shown in black and the supporting apron area in light blue.

The Airport Layout Plan (ALP) anticipates maintaining that area with some possible expansion. The area could accommodate a future FBO or Corporate Jet service facility with rental car facility and on demand shuttles to the local hotels.

Figure 4.74: Existing Hangar/Operations Buildings



5. ENVIRONMENTAL EVALUATION

Environmental Evaluation will be completed by PCR Environmental, Inc. upon GIAA furnishing of outstanding information requests.

6. AIRPORT LAYOUT PLAN

As per a December 22, 2011 letter from the FAA Honolulu District Office to the Airport's Executive Manager the Federal Aviation Authority (FAA) conditionally approved a previous airport layout plan (ALP) with the following conditions:

- Proposed development listed below, but not limited to, will require an Environmental Assessment (EA) in accordance with FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions and FAA Order 1050.1E, Environmental Impacts: Policy and Procedures, prior to unconditional approval or funding of projects proposed in this ALP.
  - Acquire Land (if more than 3 Acres)
- The following projects may be categorically excluded provided there are no extraordinary circumstances and do not create impacts outside of the airport. If significant environmental impacts are anticipated, then an Environmental Assessment will be required.
  - Runway Extensions that will not change runway design group
  - Taxiway Development
  - Aircraft Apron Development
- Prior to a categorical exclusion determination, the FAA will need the appropriate documentation that shows there are no extraordinary circumstances.

The ALP contained in this document includes additional projects not included in the conditionally approved ALP. New projects are summarized by Terminal, Airside, Landside, and Other as follows:

Terminal

- International Arrivals Corridor
- Hold Bag Screening Relocation and Expansion
- Concessions Improvements and Expansion
- Security Screening Check Point (SSCP) Expansion
- Interisland Passenger Facility Improvements

Airside

- Cargo Apron Relocation
- Ground Service Equipment (GSE) Staging Area Relocation
- Airfield Improvements (continuing from previous ALP)

Landside

- Parking Garage

Other

- Fuel Facilities Improvements and Expansion
- Aircraft Rescue and Fire Fighting (ARFF) Facility

None of these facilities will require additional property to be obtained.

The Airport loses property to accommodate the widening of Route 10A requiring that a multi-level parking garage be developed to recoup lost parking spaces and to accommodate future passenger growth. The Fuel Facilities Improvements and Expansion take place within an already segregated and fenced area, and the ARFF Facility is a replacement of a facility. The new site of the ARFF is adjacent to the existing ARFF on a site with an existing building. This building will be demolished to accommodate the construction of the new ARFF.

Aircraft apron development for the relocated cargo apron is in a location that optimally provides access to newly developed integrated cargo facilities and does not create additional impacts outside the airport. The adjacent roadway, East Sunset Boulevard (Tiyan Parkway), serving the integrated cargo buildings will be improved to accommodate increases in traffic as a separate Guam Department of Public Works project. The relocated GSE apron is at a location that allows the existing location to better serve interisland aircraft stands and will not impact areas outside the airport.

Airfield improvements include the extension of Runway 6R/24L and Taxiway M. Additional improvements recommended include a new runways connector; Taxiway C, and the widening of runways connector Taxiway D. All airfield projects should be able to obtain a categorical exclusion for environmental studies because there are no extraordinary circumstances and do not create additional impacts outside the airport

The ALP is contained in Appendix III and full-size plans will also be provided under separate cover. The ALP consists of the following:

1. **Title Sheet and Data Sheet:** Including pertinent information about the Airport, including an airport location map, vicinity map, existing and proposed runway design standards, runway weight limitations, navigational aids (NAVAIDs), and wind coverage.
2. **Existing Airport Layout Plan:** Showing existing facilities on airport property, including representation of applicable design standards.
3. **Future Airport Layout Plan:** Showing facilities proposed within the 20 year planning period to meet forecast demand, including applicable design standards.
4. **Terminal Area Plan:** Depicting enlarged view of the existing and future terminal area including parking facilities and the on-airport roadways.
5. **Airspace and Inner Airspace Plans:** Showing the FAA Regulations (FAR) Part 77 Imaginary Surfaces, including a list of current known obstructions to the imaginary surfaces.
6. **Existing and Future Runway Approach Plan and Profiles:** Showing a large scale view of the interior portion of the approach surface for each existing and proposed runway end based on Part 77.
7. **Airport Property Map:** Showing parcels of land that constitute the airport property, including date acquired, acreage, source, and the Airport's interest in the property (such as whether the property is owned as fee-simple or as an easement).
8. **Airport Land Use Plan:** Depicts existing and proposed on-airport land use.

7. FACILITIES IMPLEMENTATION PLAN

7.1 Introduction

The facilities implementation plan presents the priority projects, program costs, and schedule necessary to meet projected requirements and other objectives of the Airport. There are eleven priority projects with the majority of the projects in and adjacent to the terminal area. Although the priority projects are presented in Section 4 – *Demand/Capacity, Requirements and Recommendations* each is summarized into four major airport elements; airfield, terminal, landside, and other. The majority of the projects and costs to implement are recommended to occur in the next five years.

The program costs for each priority project are rough order of magnitude (ROM) estimates based on planning level concepts. These include costs associated with planning, design, construction, program/construction management services, testing, insurance, and owner's reserve. Furthermore the construction cost includes a design evolution contingency ranging from ten percent to 30 percent of the construction value depending on the complexity of the project.

The total program costs for all projects are $108 million (2012 dollars) with approximately 60 percent of the costs in the first five years of a 20 year program

A description of each priority project together with the proposed time frame, and program costs follows.

7.2 Airfield

There are four improvements recommended to enhance airfield operations and include providing an additional exit taxiway between Taxiways B and D, extending Taxiway M to match the length of Runway 6R-24L, extending Taxiway K to match the length of Runway 6L -24R, and widening the pavement and fillets for Taxiway D to accommodate Airport Design Group (ADG) V aircraft. This program cost is $20.6 million with implementation in six to ten years.

7.3 Terminal

There are five terminal projects recommended to improve passenger level of service, commuter airline efficiencies, meet Transportation Security Administration (TSA) requirements, and improve concessions.

7.3.1 Sterile Corridor

This project will replace portable walls that presently separate departing screened passengers from non-screened arriving passengers. This will require renovation of interior areas and the construction of an external corridor of the terminal. The program cost is $31.9 million with implementation in one to five years.

7.3.2 Hold Bag Screening

This project will mitigate the congestion and increase the level of service in the ticketing/check-in lobby on the departures level by relocating and consolidating the five existing explosive detection system (EDS) machines to the baggage make-up room. An additional EDS machine would be added to this area in a later phase. The total program cost is $6.6 million.

7.3.3 Concessions

In addition to a new concessions management program for the concourse level new landside concessions are recommended adjacent to the arrivals area. Additional concession area beyond the security screening check point (SSCP) is addressed in the following project. The program cost for the new landside concessions is $0.2 million and the project would be implemented in one to five years.

7.3.4 Security Screening Check Point (SSCP)

This project includes the addition of four additional security lanes, and reconfiguration of TSA support space to include the creation of approximately 3,370 square feet of new post-security concessions area. The program cost is 3.1 million with implementation in six to ten years.

7.3.5 Commuter Airline Facilities

This project includes consolidating commuter aircraft parking positions to the west side of Gate 4, providing vertical circulation at an adjacent holdroom and converting an existing baggage claim area to domestic passenger use only. The accommodation of new commuter aircraft parking positions will require the relocation of an existing cargo apron and existing ground service equipment (GSE) area. These costs and schedules are independent of this project's. The program cost for the commuter airline facilities is $3.0 million with implementation in one to five years.

7.4 Landside

The widening of Route A10 together with increased demands will require the addition of 800 parking spaces for the terminal area. A three phase program is suggested that considers a single level parking deck with an initial phase of 400 parking spaces in one to five years, an additional 200 parking spaces in 11 to 15 years, and another 200 parking spaces in 16 to 20 years. The program cost for all three phases is $17.6 million.

7.5 Other

There are four other projects adjacent to the airfield that would improve airport services. These include the replacement of the existing aircraft rescue and fire fighting facility (ARFF), relocation of the cargo apron, relocation of GSE staging area, and fuel facilities improvements.

7.5.1 Aircraft Rescue and Fire Fighting (ARFF)

The development of a similar size facility on the south side of the runways is necessary to replace the existing aging and poorly maintained building. The program cost is $6.4 million with implementation in one to five years.

7.5.2 Cargo Apron

The relocation of commuter aircraft parking positions will require the relocation of the existing cargo apron to the west of the Pac Air Terminal. The program cost is $7.7 million with implementation in one to five years.

7.5.3 Ground Service Equipment (GSE) Staging Area

The relocation of commuter aircraft parking positions will require the relocation of the existing ground service equipment (GSE) staging area to one of four optional locations. The program cost is $1.2 million with implementation in one to five years.

7.5.4 Fuel Facilities

The recommendation to maintain a five day fuel supply will initially require an upgrade to the existing fire suppression system to energize an existing fuel tank, and later the expansion of these facilities to add additional fuel tanks to basically double the capacity. The program cost is $13.0 million with implementation in four phases. The initial phase cost is $1.0 million in one to five years. Subsequent five year phasing costs are $6.0 million, $3.0 million, and $3.0 million.

7.6 Summary

Table 7.1 summarizes these 11 priority projects schedule and program costs.

Table 7.1: Priority Projects, Schedule and Program Costs

Priority Project	Years 1-5 (in millions)	Years 6-10 (in millions)	Years 11-15 (in millions)	Years 16- 20 (in millions)
Sterile Corridor Improvements	$31.9			
Hold Bag Screening Relocation	$6.6		$1.0	
Concessions Improvements	$ 0.2			
Parking Expansion	$7.4		$5.1	$5.1
Commuter Airline Facilities	$ 3.0			
SSCP Improvements		$3.1		
ARFF Replacement	$6.4			
Cargo Apron Relocation	$7.7			
GSE Staging Area Relocation	$1.2			
Airfield Improvements		$20.6		
Fuel Facilities Improvements	$1.0	$6.0	$3.0	$3.0
Total	**$65.4**	**$29.7**	**$8.1**	**$8.1**

8. FINANCIAL FEASIBILITY ANALYSIS

8.1 Introduction

The total program costs for all projects are $111.3 million (2012 dollars) with approximately 60 percent of the costs in the first five years of a 20 year program.

Table 8.1 summarizes these 11 priority projects schedule and program costs.

Table 8.1: Priority Projects, Schedule and Program Costs

Priority Project	Years 1-5 (in millions)	Years 6-10 (in millions)	Years 11-15 (in millions)	Years 16- 20 (in millions)
Sterile Corridor Improvements	$31.9			
Hold Bag Screening Relocation	$6.6			
Concessions Improvements	$ 0.2			
Parking Expansion	$7.4		$5.1	$5.1
Commuter Airline Facilities	$ 3.0			
SSCP Improvements		$3.1		
ARFF Replacement	$6.4			
Cargo Apron Relocation	$7.7			
GSE Staging Area Relocation	$1.2			
Airfield Improvements		$20.6		
Fuel Facilities Improvements	$1.0	$6.0	$3.0	$3.0
Total	**$65.4**	**$29.7**	**$8.1**	**$8.1**

Over the next ten years $95.1 million is required to fund these projects. Actual implementation of these projects is dependent on the availability of federal funding for infrastructure upgrades, priorities of the GIAA, airline passenger demands, and availability of passenger facility charge (PFC) funding.

The distribution of costs among potential funding sources is of paramount concern to the GIAA Board. ***Table 8.2*** outlines a most likely scenario based upon discussions with FAA Honolulu Airport District Office but does not constitute an agreement. It is incumbent upon the GIAA administration to coordinate the plan with the airlines, concessionaires, and FAA to secure an approved plan which includes the plan to finance such a program including the costs to be shared by each stakeholder.

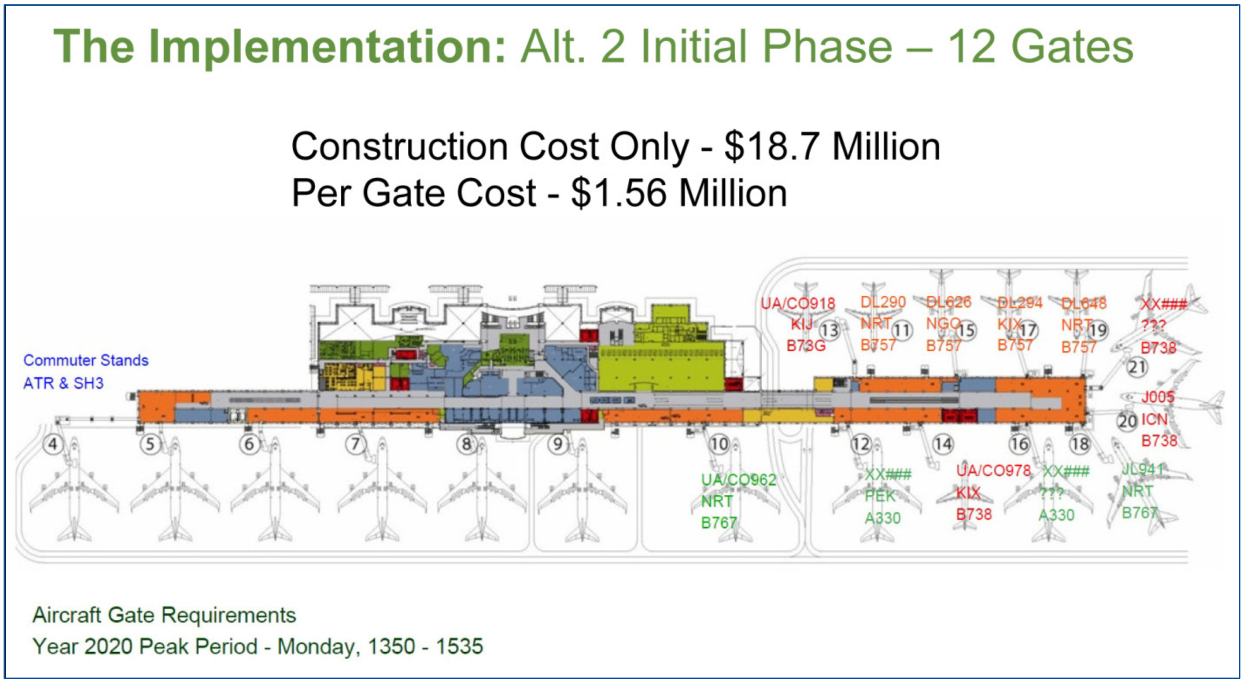
Table 8.2: Funding Distribution – Most Likely Scenario

Project Priority	Years 1-5 (in millions)	Years 6-10 (in millions)	Years 11-15 (in millions)	Years 16-20 (in millions)
Sterile Corridor Improvements	**$31.90**			
Federal Grant (FAA,TSA)	$28.71			
Bond	$3.19			
Other	$0.00			
Hold Bag Screening Relocation	**$6.60**			
Federal Grant (FAA,TSA)	$5.94			
Bond	$0.66			
Other	$0.00			
Concessions Improvements	**$0.20**			
Federal Grant (FAA,TSA)	$0.00			
Bond	$0.20			
Other	$0.00			
Parking Expansion	**$7.40**		**$5.10**	**$5.10**
Federal Grant (FAA,TSA)	$0.00		$0.00	$0.00
Bond	$7.40		$5.10	$5.10
Other	$0.00		$0.00	$0.00
Commuter Airline Facilities	**$3.00**			
Federal Grant (FAA,TSA)	$2.70			
Bond	$0.30			
Other	$0.00			
SSCP Improvements	**$0.00**	**$3.10**		
Federal Grant (FAA,TSA)	$0.00	$2.79		
Bond	$0.00	$0.31		
Other	$0.00	$0.00		
ARFF Replacement	**$6.40**			
Federal Grant (FAA,TSA)	$5.76			
Bond	$0.64			
Other	$0.00			
Cargo Apron Relocation	**$7.70**			
Federal Grant (FAA,TSA)	$6.93			
Bond	$0.77			
Other	$0.00			
GSE Staging Area Relocation	**$1.20**			
Federal Grant (FAA,TSA)	$1.08			
Bond	$0.12			
Other	$0.00			
Airfield Improvements	**$0.00**	**$20.60**		

Project Priority	Years 1-5 (in millions)	Years 6-10 (in millions)	Years 11-15 (in millions)	Years 16-20 (in millions)
Federal Grant (FAA,TSA)	$0.00	$19.57		
Bond	$0.00	$1.03		
Other	$0.00	$0.00		
Fuel Facilities Improvements	**$1.00**	**$6.00**	**$3.00**	**$3.00**
Federal Grant (FAA,TSA)	$0.00	$0.00	$0.00	$0.00
Bond	$0.00	$0.00	$0.00	$0.00
Other	$1.00	$6.00	$3.00	$3.00
Total	**$65.40**	**$29.70**	**$8.10**	**$8.10**
Federal Grant (FAA,TSA)	$51.12	$22.36	$0.00	$0.00
Bond	$13.28	$1.34	$5.10	$5.10
Other	$1.00	$6.00	$3.00	$3.00

The *Modernization and Reform Act of 2012*, or H.R. 658 signed by President Obama on February 14, 2012 includes the $63.3 billion Airport Improvement Program (AIP). This new legislation reduces the amount of federal funding for eligible FAA projects at small hub primary airports, like A.B. Won Pat International Airport, from 95 percent to 90 percent and is so reflected in ***Table 8.2***. It should be noted that as demand changes, projects may need to be accelerated or split and spread over additional years accordingly. For example, the International Arrivals Sterile Corridor Improvements may be split into two phases – one to meet current and near term demand as shown in ***Figure 8.1***, and a later phase to meet the remaining demand. Splitting the project would reduce the initial capital outlay but likely result in an overall increase in costs due to demobilization and remobilization, costs for additional design and procurement.

Figure 8.1: International Arrivals Sterile Corridor Phasing Option – Alt 2 Initial Phase



APPENDIX I– INVENTORY OF EXISTING CONDITIONS

APPENDIX II – AVIATION ACTIVITIES FORECAST

Appendix A

Table A.1: Projected Enplanements by Month and Percent Distribution by Period (Base Case)

Monthly forecasts

Base	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
January	117,113	123,627	127,498	133,685	146,406	151,991	157,366	158,957	162,001	165,169
February	109,839	115,949	119,579	125,382	137,312	142,551	147,592	149,084	151,939	164,103
March	115,923	122,371	126,202	132,327	144,918	150,446	155,767	157,341	160,354	163,491
April	92,402	97,542	100,596	105,478	115,514	119,921	124,162	125,417	127,819	126,689
May	94,596	99,858	102,984	107,982	118,257	122,768	127,110	128,395	130,853	124,907
June	93,838	99,057	102,159	107,117	117,309	121,784	126,091	127,366	129,805	132,236
July	119,739	126,398	130,356	136,682	149,688	155,398	160,894	162,520	165,632	168,872
August	124,886	131,832	135,960	142,558	156,122	162,078	167,810	169,506	172,752	172,562
September	98,409	103,882	107,135	112,334	123,023	127,716	132,233	133,570	136,127	138,790
October	93,695	98,906	102,003	106,953	117,130	121,598	125,898	127,171	129,606	149,984
November	99,383	104,911	108,196	113,446	124,241	128,981	133,542	134,892	137,475	129,457
December	105,365	111,226	114,708	120,275	131,719	136,744	141,580	143,011	145,750	148,101
Total	**1,265,188**	**1,335,559**	**1,377,375**	**1,444,218**	**1,581,640**	**1,641,977**	**1,700,046**	**1,717,229**	**1,750,114**	**1,784,360**

Base	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
January	169,123	171,250	173,420	175,650	179,846	182,199	184,617	187,120	189,677	192,317
February	168,031	170,144	172,300	174,516	180,631	182,994	185,422	187,937	190,505	193,156
March	167,404	169,509	171,658	173,865	176,127	178,431	180,799	183,251	185,755	188,340
April	129,722	131,353	133,018	134,728	136,481	138,267	140,101	142,001	143,942	145,945
May	127,897	129,506	131,147	132,833	134,562	136,322	138,131	140,004	141,918	143,892
June	135,401	137,104	138,842	140,627	140,534	142,373	144,262	146,218	148,217	150,279
July	172,914	175,088	177,308	179,587	180,002	182,357	184,776	187,282	189,842	192,483
August	176,693	178,915	181,183	183,512	182,825	185,216	187,674	190,219	192,818	195,502
September	142,112	143,899	145,723	147,596	147,595	149,525	151,510	153,564	155,663	157,829
October	153,574	155,506	157,477	159,502	167,344	169,533	171,782	174,112	176,492	178,947
November	132,556	134,223	135,925	137,672	139,464	141,288	143,163	145,104	147,087	149,134
December	151,646	153,553	155,499	157,498	156,856	158,908	161,017	163,200	165,431	167,733
Total	**1,827,072**	**1,850,050**	**1,873,499**	**1,897,587**	**1,922,267**	**1,947,412**	**1,973,253**	**2,000,013**	**2,027,347**	**2,055,557**

1/ Source - total enplanements- slight difference may occur to total due to rounding. Note distribution percentage on the following chart

Distribution by Month - In the future we don't expect these trends to alter much. However a slight change in the distribution of demand is noted in the months of February and October. These are the peak holiday periods for China and the future growth in these months is expected once a significant Chinese tourist pattern emerges. The Chinese New Year and official Chinese holiday weeks occur in those months. The growth will fill in the gaps and spread the peaks over multiple months. The bracketed months identify peak months.

Table A.2: Traffic Seasonality

Traffic Seasonality					
2010-19 Monthly Distribution		2020-24 Monthly Distribution		2025-30 Monthly Distribution	
Jan	***9.3%***	*Jan*	***9.3%***	*Jan*	***9.4%***
Feb	***8.7%***	*Feb*	***9.2%***	*Feb*	***9.4%***
Mar	***9.2%***	*Mar*	***9.2%***	*Mar*	***9.2%***
Apr	***7.3%***	*Apr*	***7.1%***	*Apr*	***7.1%***
May	***7.5%***	*May*	***7.0%***	*May*	***7.0%***
Jun	***7.4%***	*Jun*	***7.4%***	*Jun*	***7.3%***
Jul	***9.5%***	*Jul*	***9.5%***	*Jul*	***9.4%***
Aug	***9.9%***	*Aug*	***9.7%***	*Aug*	***9.5%***
Sep	***7.8%***	*Sep*	***7.8%***	*Sep*	***7.7%***
Oct	***7.4%***	*Oct*	***8.4%***	*Oct*	***8.7%***
Nov	***7.9%***	*Nov*	***7.3%***	*Nov*	***7.3%***
Dec	***8.3%***	*Dec*	***8.3%***	*Dec*	***8.2%***
Total	*100%*	*Total*	*100%*	*Total*	*100%*

A.1 Enplanement Data – without China

All of our enplanement forecast scenarios assume that a China Visa Waiver program is launched at some point during our forecast period. In the unlikely event that this does not happen, we have published below projected enplanement figures without arrivals from China.

Note that China enplanements are assumed as zero from 2001-08, although there were likely a small number of arrivals.

Table A.3: Total Enplanements (without China)

	Base	Upside	Downside	Base yoy	Up yoy	Down yoy
2001	1,294,690					
2002	1,196,227			(7.6%)		
2003	1,001,580			(16.3%)		
2004	1,250,078			24.8%		
2005	1,333,520			6.7%		
2006	1,327,145			(0.5%)		
2007	1,312,214			(1.1%)		
2008	1,214,697			(7.4%)		
2009	1,164,144			(4.2%)		
2010	1,311,370			12.6%		
2011	1,260,185	1,332,009	1,186,675	(3.9%)	1.3%	(9.8%)
2012	1,330,305	1,367,378	1,257,134	5.6%	2.7%	5.9%
2013	1,371,859	1,399,503	1,323,894	3.1%	2.3%	5.3%
2014	1,394,218	1,431,756	1,329,574	1.6%	2.3%	0.4%
2015	1,502,473	1,550,250	1,420,903	7.8%	8.3%	6.9%
2016	1,533,643	1,589,025	1,438,910	2.1%	2.5%	1.3%
2017	1,562,546	1,625,756	1,454,691	1.9%	2.3%	1.1%
2018	1,550,563	1,621,848	1,429,587	(0.8%)	(0.2%)	(1.7%)
2019	1,565,114	1,644,742	1,430,990	0.9%	1.4%	0.1%
2020	1,579,341	1,667,589	1,432,039	0.9%	1.4%	0.1%
2021	1,593,052	1,690,196	1,432,571	0.9%	1.4%	0.0%
2022	1,606,669	1,713,013	1,432,971	0.9%	1.3%	0.0%
2023	1,620,384	1,736,254	1,433,403	0.9%	1.4%	0.0%
2024	1,634,348	1,760,101	1,433,995	0.9%	1.4%	0.0%
2025	1,648,511	1,784,517	1,434,700	0.9%	1.4%	0.0%
2026	1,662,706	1,809,335	1,435,359	0.9%	1.4%	0.0%
2027	1,677,159	1,834,816	1,436,164	0.9%	1.4%	0.1%
2028	1,692,075	1,861,213	1,437,282	0.9%	1.4%	0.1%
2029	1,707,092	1,888,162	1,438,410	0.9%	1.4%	0.1%
2030	1,722,492	1,915,994	1,439,774	0.9%	1.5%	0.1%

Appendix B

B.1 Peak Period Analysis

The following chart exhibits the monthly enplanement totals over a six year period. August and January have the highest totals. Note the six year averages are highly compressed and don't exhibit any period of extreme peaking with similar seasonal peaks in the winter Jan-Mar. and summer Jul-Aug.

Figure B.1: Monthly Enplanements

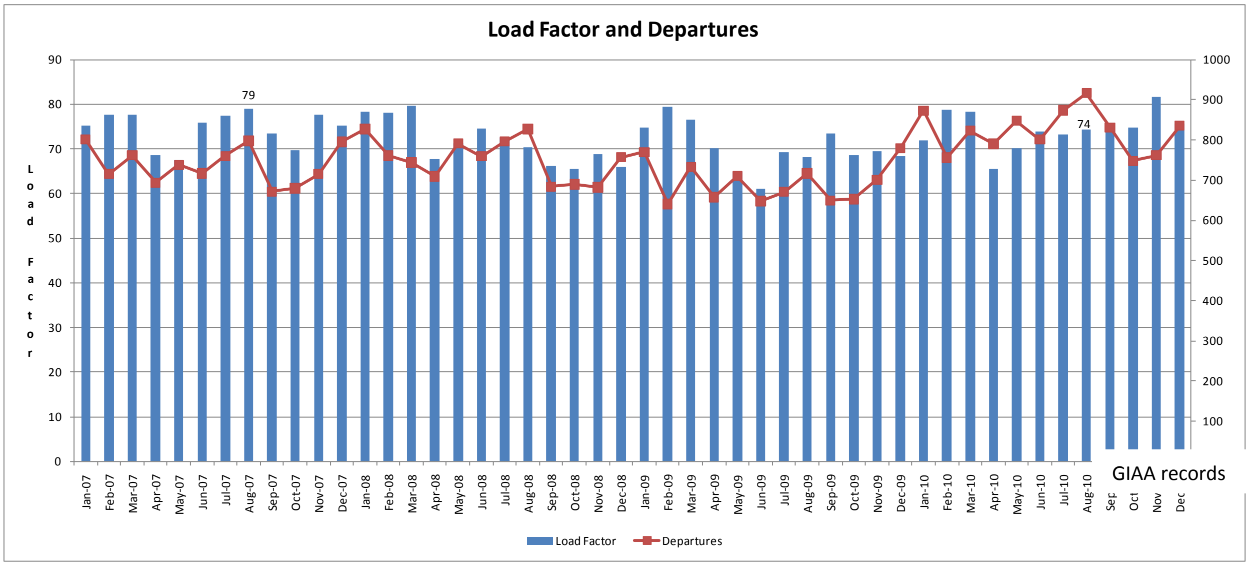


Table B.1: Monthly Enplanements

Total	2005	2006	2007	2008	2009	2010	Totals	6 year averages
Jan	*119,826*	*128,621*	*119,041*	*116,916*	*107,507*	*115,188*	707,099	9.21%
Feb	*107,463*	*112,203*	*111,883*	*111,346*	*101,953*	*113,411*	658,259	8.58%
Mar	*110,661*	*120,892*	*116,404*	*115,938*	*109,181*	*118,889*	691,965	9.02%
Apr	*93,666*	*96,971*	*95,131*	*89,256*	*89,472*	*92,528*	557,024	7.26%
May	*122,386*	*100,824*	*92,491*	*100,816*	*82,461*	*97,767*	596,745	7.77%
Jun	*104,633*	*100,707*	*101,311*	*98,909*	*73,084*	*96,546*	575,190	7.49%
Jul	*118,761*	*132,216*	*124,652*	*113,539*	*107,301*	*122,729*	719,198	9.37%
Aug	*122,024*	*125,667*	*133,440*	*111,533*	*122,490*	*133,118*	748,272	9.75%
Sep	*107,183*	*93,236*	*99,479*	*89,127*	*97,452*	*114,184*	600,661	7.83%
Oct	*104,331*	*97,683*	*99,719*	*86,180*	*85,909*	*100,347*	574,169	7.48%
Nov	*108,924*	*105,474*	*104,501*	*89,822*	*92,192*	*106,374*	607,287	7.91%
Dec	*110,985*	*111,123*	*110,028*	*96,767*	*101,293*	*109,149*	639,345	8.33%
Total	*1,330,843*	*1,325,617*	*1,308,080*	*1,220,149*	*1,170,295*	*1,320,230*	7,675,214	

The response by carriers to this market demand pattern also exhibits departure levels raised in the seasonal winter and summer periods.

Table B.2: Peak Period Analysis Peak Period Modeling Based on Activity for Mondays in August.

1 DAILY DATED 01 08 2011 TO 31 08 2011
REPORT DATED AT: JULY 12-2011. TIME: 1:57(GMT)

								Date				
From	To	Carrie	Equip	Seats	Dept	Arr	Dayof Ops	20110801	20110808	20110815	20110822	20110829
GUM	ROP	CO	'ATR	46	2:20	2:50	1 5	1	1	1	1	1
GUM	ICN	KE	'332	226	3:20	6:55	1	1	1	1	1	1
GUM	KIX	KE	'772	248	4:10	6:50	1 345	0	1	1	1	1
GUM	KIX	KE	'739	188	4:10	6:50	1234567	1	0	0	0	0
GUM	PUS	KE	'73H	162	4:30	7:40	1 4	1	1	1	1	0
GUM	NRT	CO	'738	157	5:45	8:30	1234567	1	0	0	0	0
GUM	MNL	PR	'320	156	6:00	7:50	12 4 67	1	1	1	1	1
GUM	KIX	DL	'757	183	6:00	8:40	123 567	0	0	0	0	1
GUM	KIX	DL	'757	183	6:00	8:40	1234567	1	1	1	1	0
GUM	HNL	CO	'767	235	6:30	17:55	123 567	1	1	1	1	1
GUM	NRT	CO	'738	157	6:50	9:35	123 67	0	1	1	1	1
GUM	SPN	CO	'ATR	46	7:00	7:50	12 45 7	1	1	1	1	1
GUM	KIJ	CO	'73G	124	7:05	10:00	1	1	1	1	1	1
GUM	NRT	CO	'767	235	7:10	9:45	1234567	1	1	1	1	1
GUM	CTS	CO	'73G	124	7:20	11:00	1	1	0	0	0	0
GUM	CTS	CO	'73G	124	7:20	11:00	1 5	0	1	1	1	1
GUM	KIX	CO	'738	157	7:20	10:00	1 3 7	1	0	0	0	0
GUM	KIX	CO	'738	157	7:20	10:00	1 345	0	1	0	0	0
GUM	KIX	CO	'738	157	7:20	10:00	1234567	0	0	1	1	1
GUM	OKJ	CO	'73G	124	7:25	10:15	1 5	1	1	1	1	1
GUM	ROP	FP	'SH3	17	7:30	8:00	1234567	1	1	1	1	1
GUM	FUK	CO	'73G	124	7:45	10:40	1234567	0	1	0	0	1
GUM	FUK	CO	'738	157	7:45	10:40	1	0	0	0	1	0
GUM	FUK	CO	'738	157	7:45	10:40	1 56	0	0	1	0	0
GUM	FUK	CO	'738	157	7:45	10:40	12 6	1	0	0	0	0
GUM	NGO	CO	'73G	124	7:50	10:30	12 6	0	0	0	1	0
GUM	NGO	CO	'73G	124	7:50	10:30	1234 67	1	0	0	0	0
GUM	NGO	CO	'738	157	7:50	10:30	1 45 7	0	1	0	0	0
GUM	NGO	CO	'738	157	7:50	10:30	1234567	0	0	1	0	1
GUM	TKK	CO	'738	157	9:00	10:40	1 5	1	1	1	1	1
GUM	SPN	CO	'ATR	46	10:05	10:55	12 45 7	1	1	1	1	1
GUM	NRT	DL	'767	216	10:25	13:15	1 5	1	0	0	0	0
GUM	NRT	DL	'767	216	10:25	13:15	1 3 5	0	1	1	1	1
GUM	NRT	CO	'738	157	12:00	14:45	12345	1	1	1	0	0
GUM	NRT	CO	'738	157	12:00	14:45	12345 7	0	0	0	1	1
GUM	SPN	CO	'ATR	46	13:40	14:30	1 45 7	1	1	1	1	1
GUM	NRT	DL	'757	183	15:20	18:10	1234567	1	1	1	1	1
GUM	NRT	JL	'767	270	15:30	18:15	1234567	1	1	1	1	1
GUM	KIX	DL	'757	183	15:40	18:30	1234567	1	1	1	1	1
GUM	NRT	DL	'757	183	15:55	18:45	1234567	1	1	1	1	1
GUM	NGO	DL	'757	183	16:10	18:55	1234567	1	1	1	1	1
GUM	ICN	LJ	'738	189	16:30	20:20	1234567	1	1	1	1	1
GUM	ROP	FP	'SH3	17	17:00	17:30	1234567	1	1	1	1	1
GUM	NGO	CO	'73G	124	17:05	19:45	1234 67	1	0	0	0	0
GUM	NGO	CO	'738	157	17:05	19:45	1 7	0	1	1	0	0
GUM	NGO	CO	'738	157	17:05	19:45	1 45	0	0	0	0	1
GUM	NGO	CO	'738	157	17:05	19:45	1234	0	0	0	1	0
GUM	NRT	CO	'767	235	17:05	19:45	1234567	1	1	1	1	1
GUM	SPN	CO	'ATR	46	17:10	18:00	1234567	1	1	1	1	1
GUM	KIX	CO	'73G	124	17:15	20:00	1 4567	0	0	0	1	1
GUM	KIX	CO	'73G	124	17:15	20:00	1 34 67	0	1	0	0	0
GUM	KIX	CO	'738	157	17:15	20:00	1	1	0	0	0	0
GUM	KIX	CO	'738	157	17:15	20:00	1234 67	0	0	1	0	0
GUM	HKG	CO	'738	157	18:40	21:25	1 5	1	1	1	1	1
GUM	CNS	CO	'73G	124	18:50	23:20	1 34 7	1	1	1	1	1
GUM	ROR	CO	'73G	124	18:50	19:50	1	1	1	1	1	1
GUM	MNL	CO	'738	157	19:05	20:40	123 67	1	0	0	0	0
GUM	MNL	CO	'738	157	19:05	20:40	1234567	0	1	1	1	1
GUM	SPN	CO	'ATR	46	20:10	21:00	1234567	1	1	1	1	1
GUM	NAN	CO	'73G	124	21:45	6:20	1 5	1	1	1	1	1

Source: OAG

The following two charts clearly shows Monday as the peak day in August. The first chart is both arrivals and departures and the second only departures.

Total Daily Operations - activity summary – August, 2011

Figure B.2: Commercial Operations by Day of Week – August, 2011

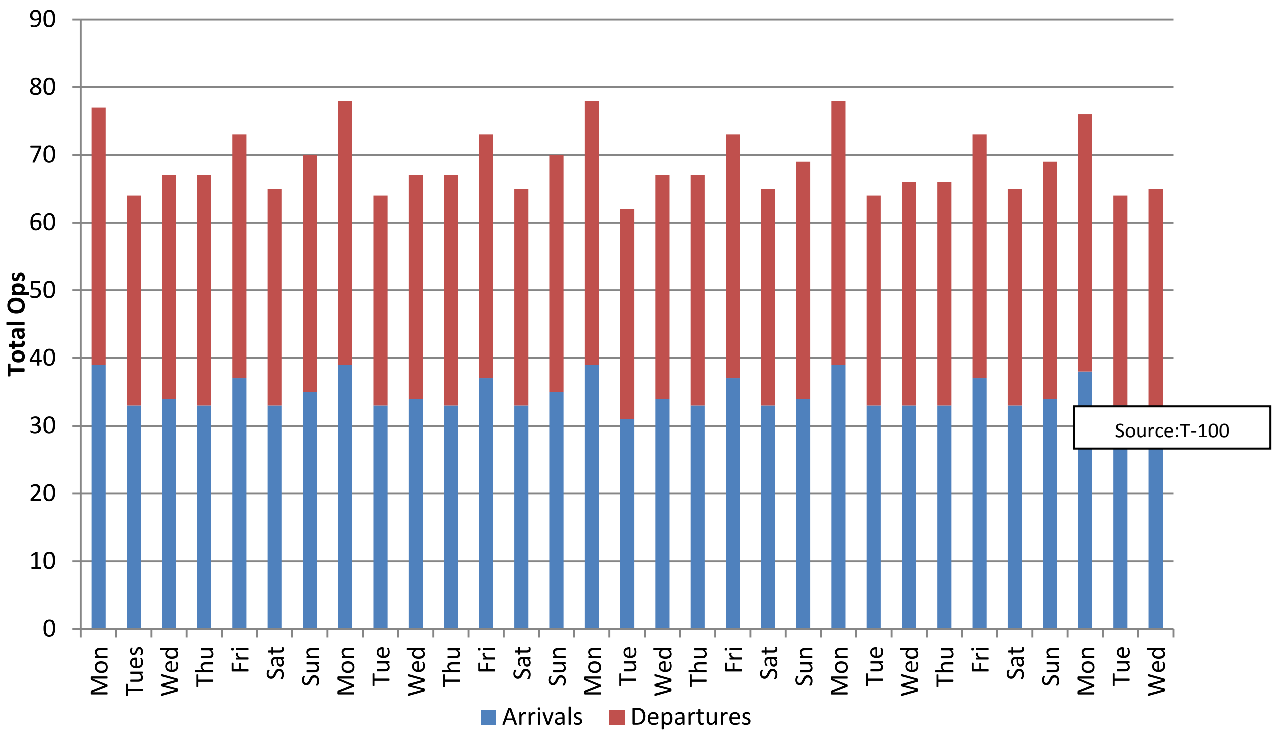
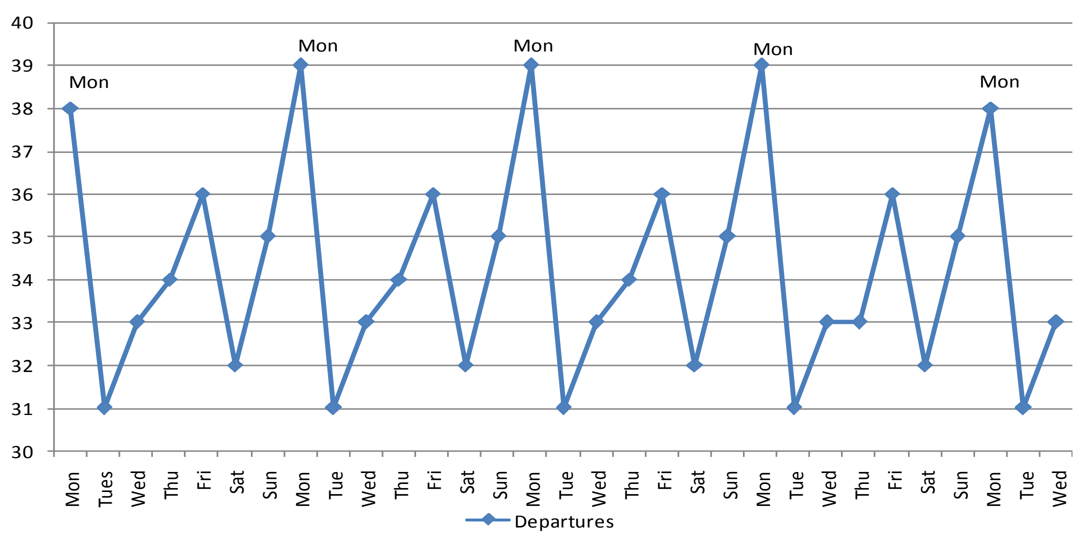
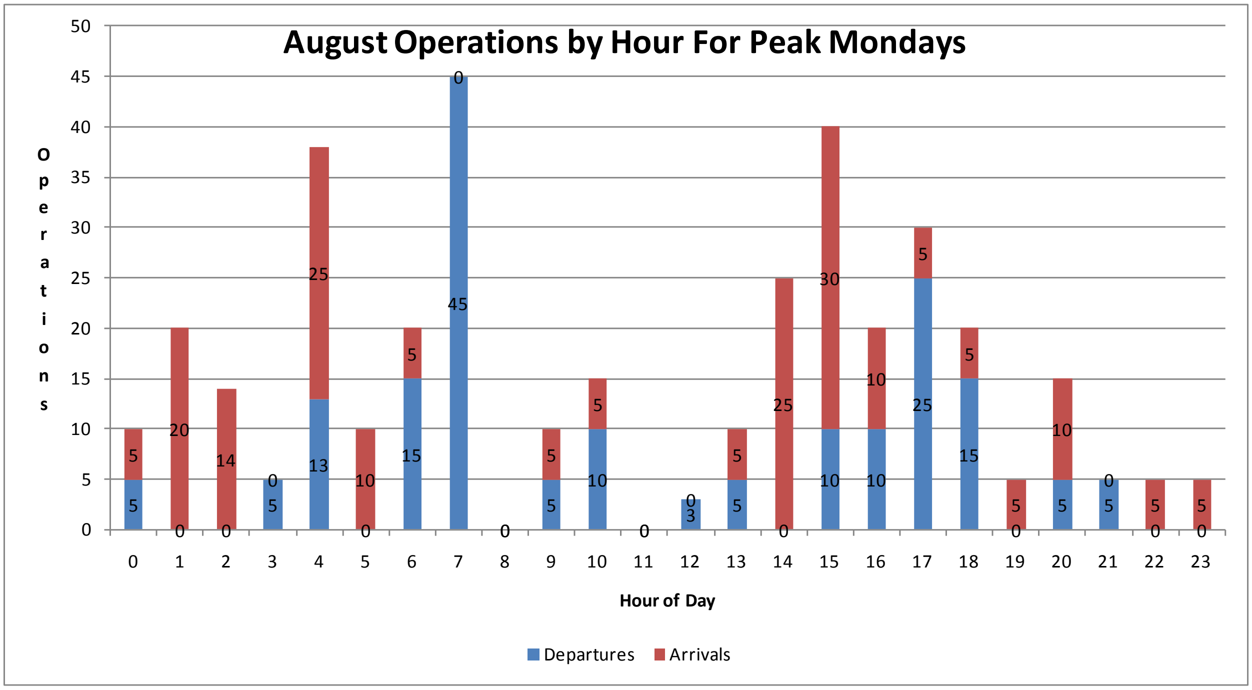


Figure B.3: Commercial Departures by Day of Week – August, 2011



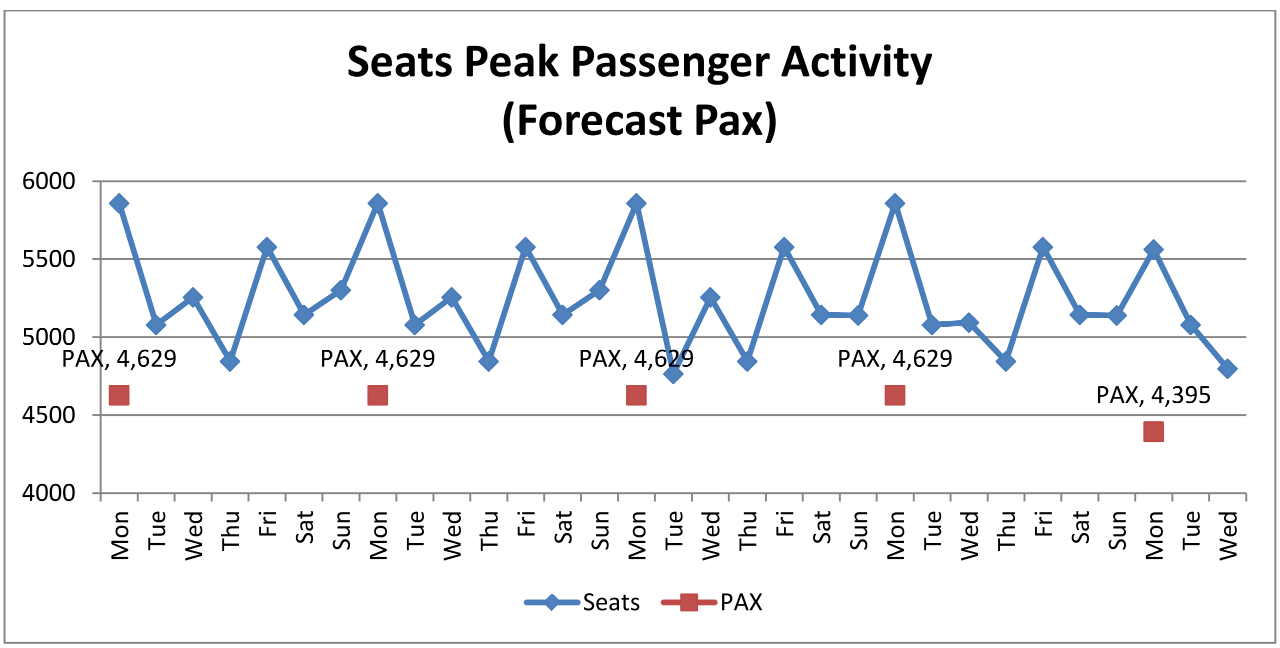
All Mondays' activity charted for arrivals and departures by hour.

Figure B.4: Commercial Operations by Hour on a Monday – August, 2011



It is assumed a 5 Load Factor point premium for a peak day. - Mondays in August (79% LF).

Figure B.5: Seat Capacity by Day of Week – August, 2011



B.2 Peak Period Analysis Fleet - Signatory Air Carriers

Fleet mix for average Monday (all Mondays in August 2011 divide by 5)

Figure B.6: Aircraft Type for Commercial Operations by Hour on a Monday – August, 2011

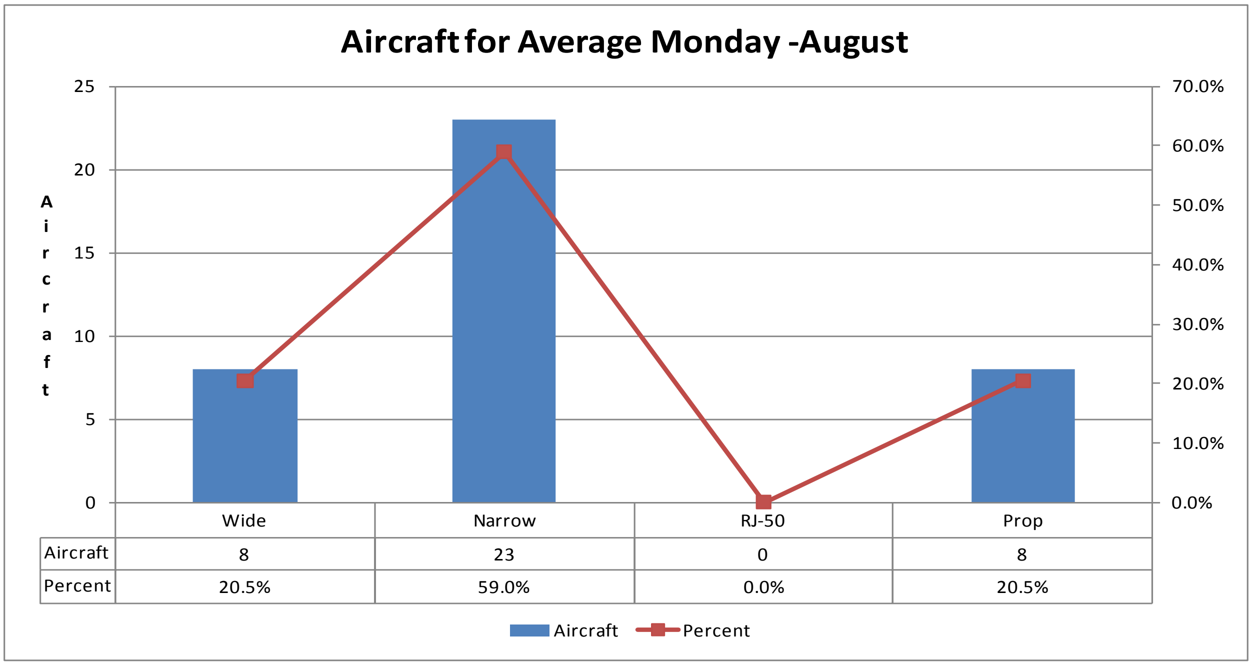


Table B.3: Fleet Mix Time Series – Base and Years 2015, 2020, 2030

Fleet Mix Time Series					
		Wide	Narrow	RJ-50	Prop
2011	Aircraft	8	23	0	8
	Percent	20.5%	59.0%	0.0%	20.5%
		Wide	Narrow	RJ-50	Prop
2015	Aircraft	10	24	0	8.4
	Percent	23.6%	56.6%	0.0%	19.8%
		Wide	Narrow	RJ-50	Prop
2020	Aircraft	12	26	0	8.9
	Percent	25.6%	55.4%	0.0%	19.0%
		Wide	Narrow	RJ-50	Prop
2030	Aircraft	14	31	0	10.5
	Percent	20.5%	59.0%	0.0%	20.5%

Table B.4: Legend Information

AIRPORTS AND CITIES SERVED FROM GUAM

==========

CNS-	Cairns QL Australia
CTS-	Sapporo(Chitose) Japan
FUK-	Fukuoka Japan
GUM-	Guam
HKG-	Hong Kong(Intl) China
HNL-	Honolulu Oahu HI USA
ICN-	Seoul(Incheon Intl) Rep. of Korea
KIJ-	Niigata Japan
KIX-	Osaka(Kansai Intl) Japan
MNL-	Manila Philippines
NAN-	Nadi Fiji
NGO-	Nagoya(Intl) Japan
NRT-	Tokyo(Narita) Japan
OKJ-	Okayama Japan
PUS-	Busan Rep. of Korea
ROP-	Rota Mariana Is.
ROR-	Koror Palau Is. Pacific Ocean
SPN-	Saipan Mariana Is.
TKK-	Truk Micronesia

EQUIPMENT TYPES

=================

ATR-	ATR 42 / ATR 72	TURBOPROP
SH3-	SHORTS 330 (SD3-30)	TURBOPROP
-320	AIRBUS INDUSTRIE A320	NARROW BODY JET
73G-	BOEING 737-700	NARROW BODY JET
73H-	BOEING 737-800 (WINGLETS)	NARROW BODY JET
-738	BOEING 737-800	NARROW BODY JET
-739	BOEING 737-900	NARROW BODY JET
-757	BOEING 757	NARROW BODY JET
-764	BOEING 767-400	WIDE BODY JET
-767	BOEING 767	WIDE BODY JET
-772	BOEING 777-200	WIDE BODY JET
-333	AIRBUS INDUSTRIE A330-300	WIDE BODY JET

AIRLINES

==========

CO -Continental Airlines
DL -Delta Air Lines
FP -Freedom Air (Guam)
JL -Japan Airlines
KE -Korean Air
LJ -Jin Air
PR -Philippine Airlines

B.3 Sources

Table B.5: Interim Sourcing List

Interim sourcing list (as of March 11, 2011): GUM Master Plan Forecast Update: 2011

	Item	Source
*	Extensive data re: recent arrivals to Guam - including various breakdowns by country of origin, length of stay, related	Guam 2008 Statistical Yearbook
*	2009/10 updates for key Guam Statistical Yearbook data	Ana Cid - Guam Visitors Bureau
*	Key information re: expections of future travel trends by country - including volume estimates for Japan, China, and Korea	Interview with Gerry Perez, Guam Visitors Bureau
*	GUM 2000-10 audited airport data by carrier - including en/deplanements, transit passengers, operations, cargo, etc..	Supplied by Fred Tupaz at GIAA
*	GUM 10-year frequency and capacity data by origin/carrier	Supplied by Fred Tupaz at GIAA
*	Current GUM air service incentive program	Supplied by Fred Tupaz at GIAA
*	Guam hotel capacity information	Guam Hotel and Restaurant Association
*	Recent estimates re: China visa waiver program	Compiled from various conversations
*	Projected military and related contractor buildup (volume)	GUM 2030 Transportation Plan - prepared by Parsons Brinckerhoff
*	Updated estimates re: military transition timing	Supplied by Fred Tupaz at GIAA
*	Total volume - outbound Korean international travelers	Korea Tourism Organization website
*	Total volume - outbound Japanese international travelers	Japan Tourism Marketing Agency website
*	Projected multiplier: GDP vs. airline traffic growth	Boeing long-term market outlook (website)
*	Historical GDP: Japan and Korea	Historical GDP data, World Bank website
*	Long-term GDP projections: multiple countries and regions	Japan Center for Economic Research website
*	Japan historical and projected population	National Institute of Population and Social Security Research, Japan
*	Korea historical and projected population	World Bank website(s)
*	APO Terminal Area Forecast Report: December, 2008	GIAA APO
*	Current and recent GUM schedule/station activity data	OAG
*	Recent GUM traffic, freight, and operations data	U.S. D.O.T. data
*	Guam historical population	CIA World Factbook via Indexmundi.com website
*	Guam estimated 2011 population	CIA World Factbook
*	Guam projected population through 2030	GUM 2030 Transportation Plan - prepared by Parsons Brinckerhoff
*	GDP projections through 2030 for Japan, Korea	USDA Economic Research Service (through multiple sources)
*	Monthly/annual visitor data of Japanese tourists to Hawaii	Hawaii Department of Business/Economic Development/Tourism
*	Average length of stay data: Japanese tourists to Hawaii	Hawaii Tourism Authority
	OAG for schedule data	
	DOT for origin and destination data and onboards	T-100 and DB1B surveys
	MIDT data for traffic composition	

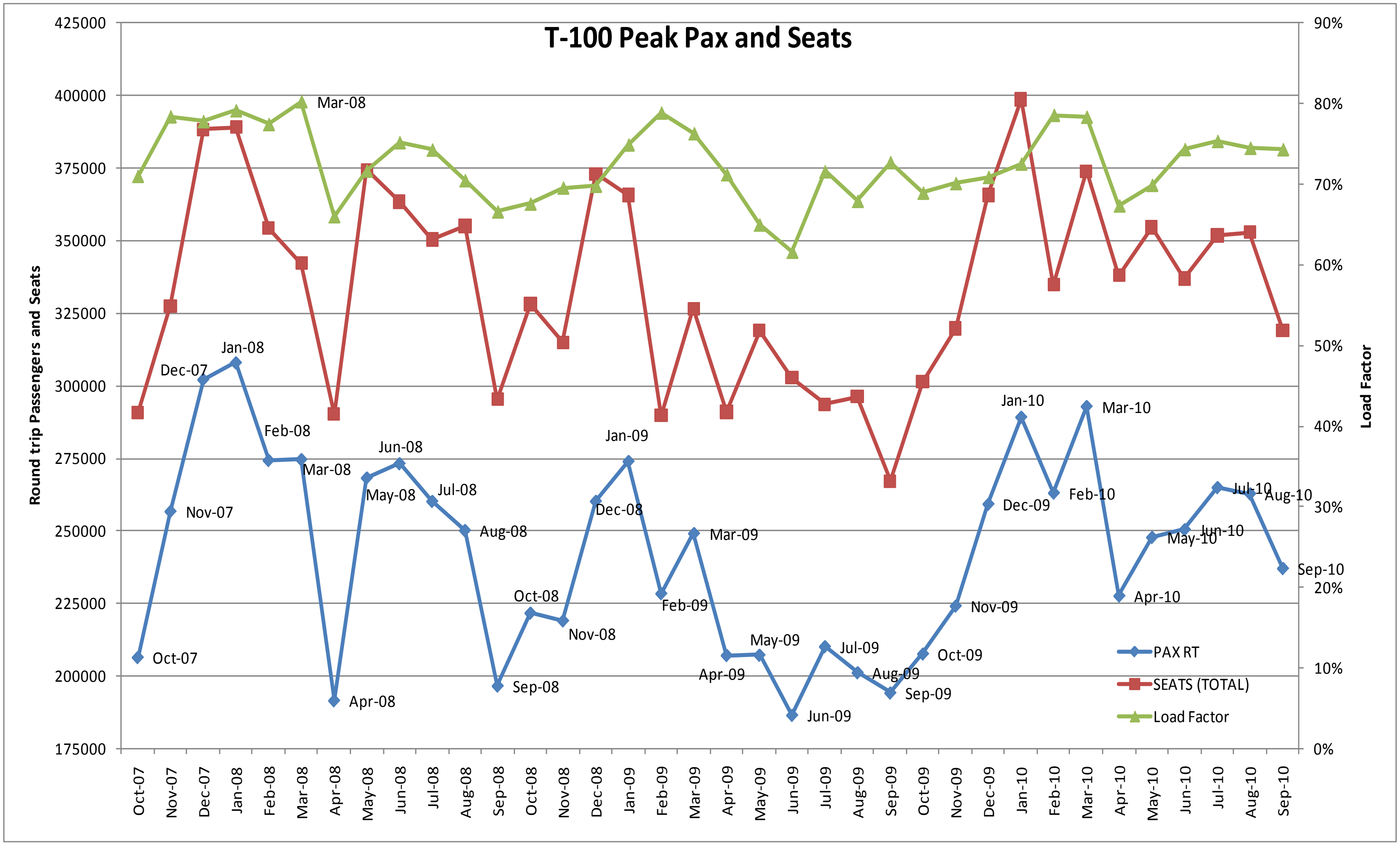
B.4 Appendix for TAF - Other Flights

Table B.6: Total Operations

Total operations (For other operations, fly overs etc post 2009 per FAA count)
GUM airport - operations forecasts

For TAF	Other operations
	Base
2001	33369
2002	32874
2003	31867
2004	33732
2005	33839
2006	36569
2007	38051
2008	39982
2009	59,771
2010	62,606
2011	63,192
2012	64,770
2013	66,822
2014	68,449
2015	69,125
2016	70,909
2017	72,697
2018	73,847
2019	75,039
2020	76,175
2021	77,657
2022	79,243
2023	80,885
2024	82,361
2025	83,900
2026	85,723
2027	87,615
2028	89,581
2029	91,617
2030	93,732

Figure B.7: T-100 Peak Passengers and Seats



Volatility of the industry and region show no real pattern.

Figure B.8: Current Peak Month Average Day Schedule

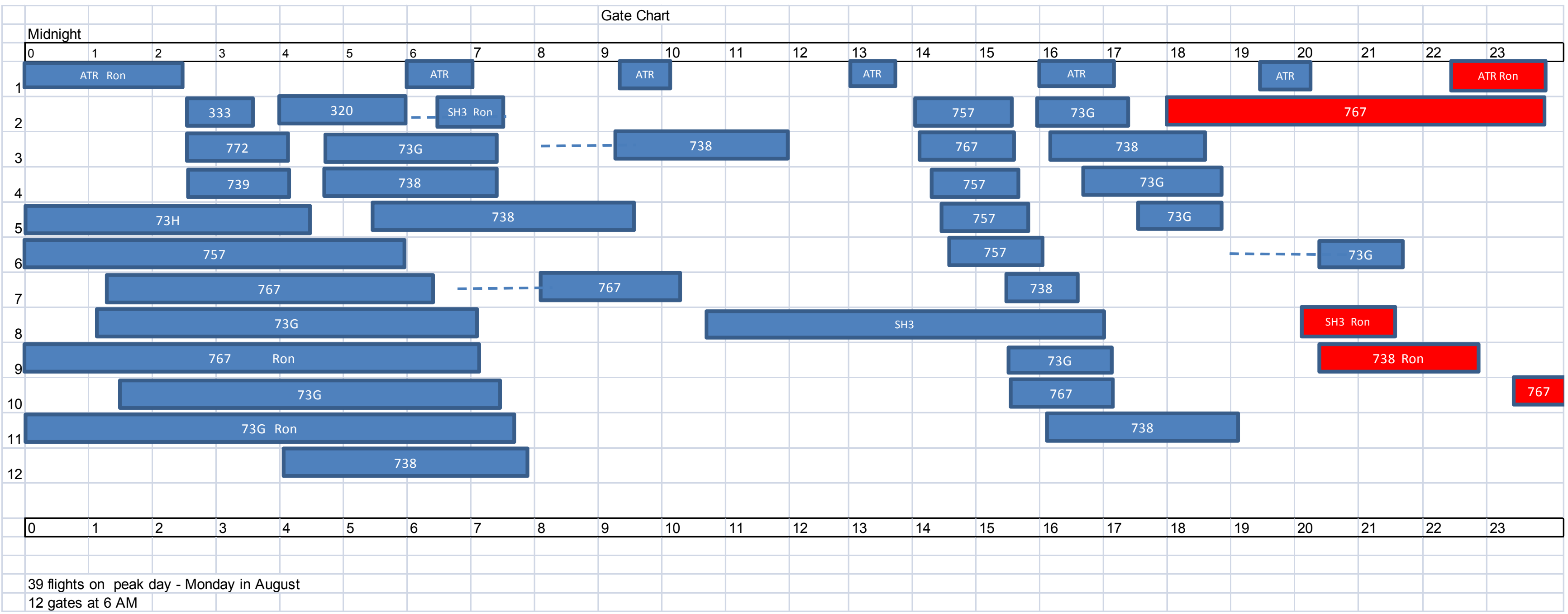


Figure B.9: 2015 Peak Month Average Day Schedule

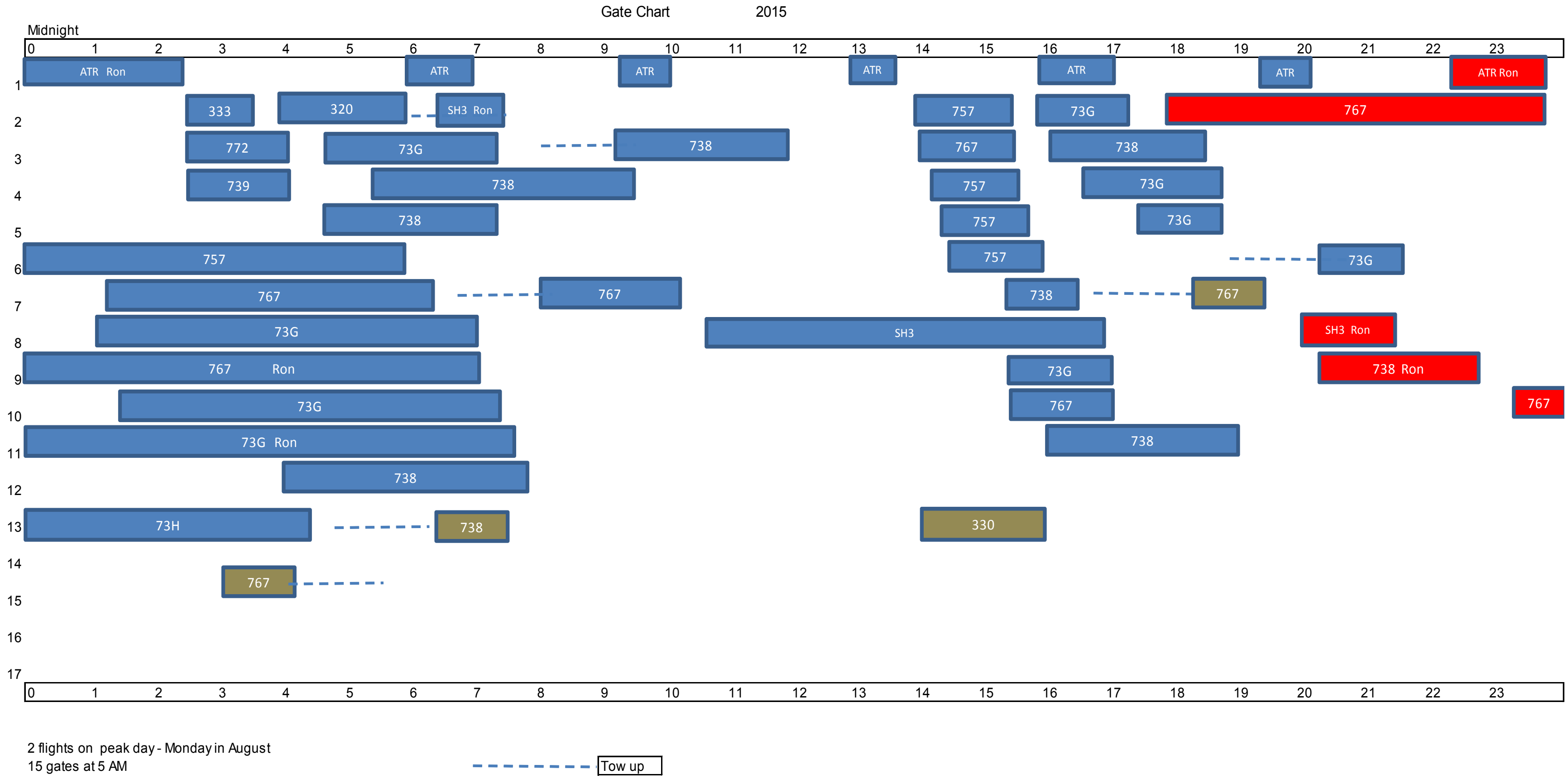


Figure B.10: 2020 Peak Month Average Day Schedule

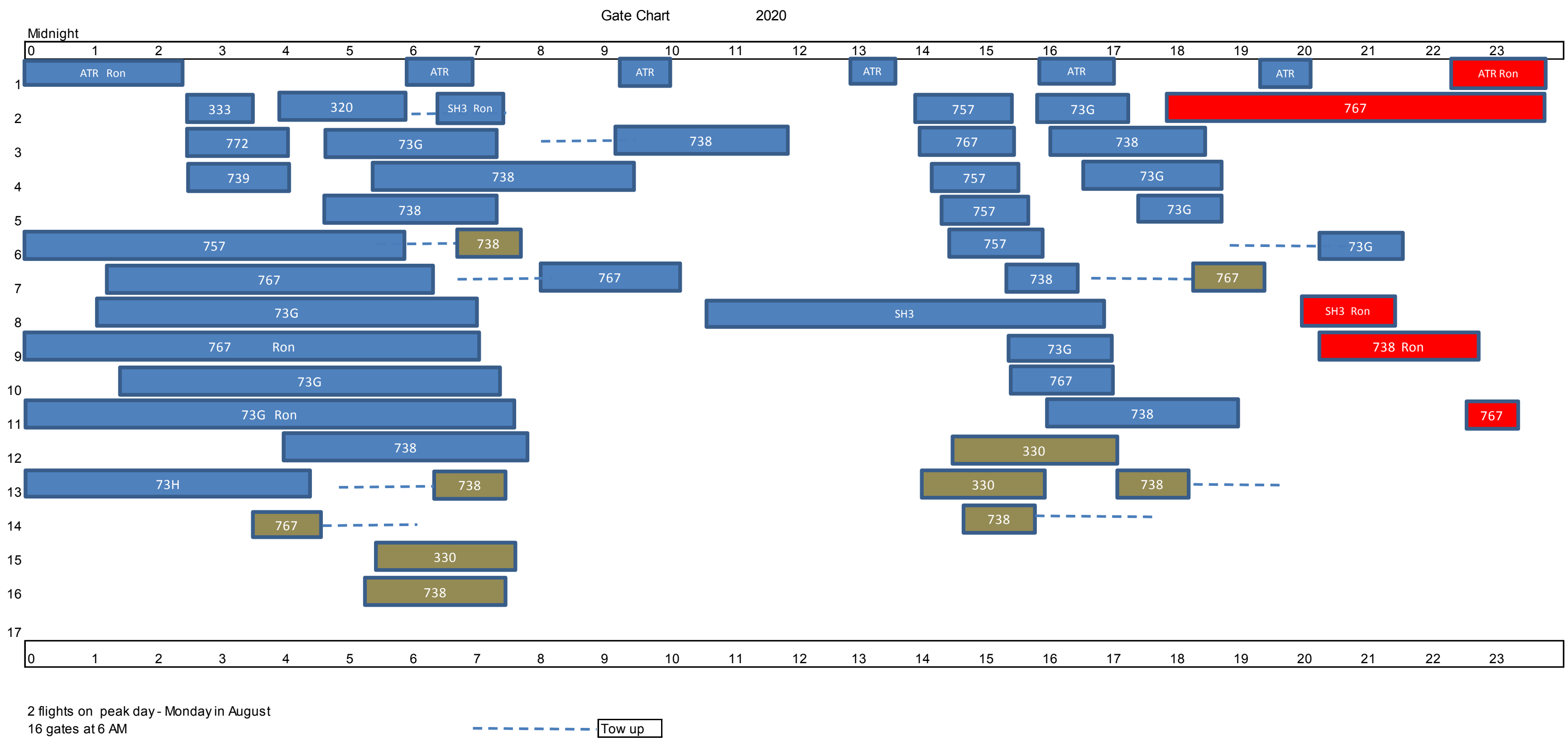


Table B.7: Potential New Flight Positions (Shown in Red)

ACTIVITY AT GUM - 2015

Seats	Equip	Op Days	Flight	Al	Origin	Time	Hub	Ar Time	Dest	Al	Flight	Op Days	Equip	Seats
183	757	1234567	292	DL	KIX	19:35	0:10							
124	73G	1234 67	972	CO	NGO	20:45	1:15							
235	767	1234567	964	CO	NRT	20:50	1:25							
124	73G	1234567	928	CO	KIX	21:00	1:35							
296	333	1234567	111	KE	ICN	20:20	1:40							
							2:20	2:50	ROP	9K	9314	1 5	ATR	46
296	333	1 3 5 7	113	KE	ICN	21:10	2:30							
188	739	1234567	733	KE	KIX	22:00	2:35							
248	772	1234567	721	KE	KIX	22:00	2:35							
							3:20	6:55	ICN	KE	112	1234567	333	296
156	320	1 3 567	110	PR	MNL	22:00	4:00							
157	738	1	959	CO	TKK	2:30	4:05							
							4:10	6:50	KIX	KE	722	1234567	772	248
							4:10	6:50	KIX	KE	734	1234567	739	188
							4:30	7:40	PUS	KE	116	1 4	73H	162
157	738	1	952	CO	MAJ	2:40	4:35							
157	738	1 34 67	934	CO	MNL	22:55	4:35							
124	73G	12 45	903	CO	CNS	0:20	4:45							
157	738	1 45	954	CO	ROR	2:35	5:30							
235	767	1234567		xx	OKA	23:55	4:15							
46	ATR	1 56	9315	9K	ROP	5:30	6:00							
							6:00	7:50	MNL	PR	111	12 4 67	320	156
							6:00	8:40	KIX	DL	291	1234567	757	183
							6:30	17:55	HNL	CO	2	123 567	767	235
							7:00	7:50	SPN	9K	9596	1234567	ATR	46
							7:05	10:00	KIJ	CO	917	1	73G	124
							7:10	9:45	NRT	CO	961	1234567	767	235
							7:20	10:00	KIX	CO	977	1234567	738	157
							7:20	11:00	CTS	CO	937	1 5	73G	124
							7:25	10:15	OKJ	CO	919	1 5	73G	124
							7:30	8:00	ROP	FP	100	1234567	SH3	17
							7:45	10:40	FUK	CO	915	1234567	73G	124
							7:50	10:30	NGO	CO	971	1234567	738	157
							7:55	10:30	HKG	xx		1567	738	157
46	ATR	1234567	9313	9K	SPN	8:30	9:20							
							9:30	11:10	TKK	CO	956	1 5	738	157
							10:05	10:55	SPN	9K	9600	1234567	ATR	46
							10:25	13:15	NRT	DL	97	1 3 5	767	216
17	SH3	1234567	200	FP	ROP	10:20	10:45							
							12:00	14:45	NRT	CO	6	12345 7	738	157
46	ATR	1234567	9601	9K	SPN	12:10	13:00							
							13:40	14:30	SPN	9K	9602	1234567	ATR	46
283	330	1234567		xx	PEK	6:00	13:50							
183	757	1234567	290	DL	NRT	9:25	14:05							
237	767	1234567	941	JL	NRT	9:35	14:10							
183	757	1234567	626	DL	NGO	9:50	14:25							
183	757	1234567	294	DL	KIX	10:00	14:35							
183	757	1234567	648	DL	NRT	10:00	14:40							
							15:55	20:45	PEK	xx		1234567	330	283
157	738	1234567	978	CO	KIX	11:00	15:25							
							15:25	18:15	KIX	DL	293	1234567	757	183
168	738	1234567	5	LJ	ICN	10:00	15:30							
							15:30	18:15	NRT	JL	942	1234567	767	237
124	73G	1	918	CO	KIJ	10:55	15:35							
235	767	1234567	962	CO	NRT	11:05	15:35							
							15:40	18:30	NRT	DL	289	1234567	757	183
46	ATR	1234567	9603	9K	SPN	15:05	15:55							
124	73G	1 5	920	CO	OKJ	11:15	15:55							
							15:55	18:45	NRT	DL	649	1234567	757	183
157	738	1234567	970	CO	NGO	11:40	16:10							
							16:10	18:55	NGO	DL	625	1234567	757	183
124	73G	1234567	916	CO	FUK	11:40	16:25							
							16:30	20:20	ICN	LJ	6	1234567	738	168
							17:00	17:30	ROP	FP	300	1234567	SH3	17
							17:05	19:45	NGO	CO	975	1234 67	73G	124
							17:05	19:45	NRT	CO	963	1234567	767	235
							17:10	18:00	SPN	9K	9604	1234567	ATR	46
							17:15	20:00	KIX	CO	927	1234567	73G	124
124	73G	1 5	938	CO	CTS	11:50	17:25							
235	767	1 34567	1	CO	HNL	14:15	18:00							
157	'738	1567		xx	HKG	11:30	18:05							
							18:40	21:25	HKG	CO	909	1 5	738	157
							18:50	19:50	ROR	CO	953	1	73G	124
							18:50	23:20	CNS	CO	902	1 34 7	73G	124
							19:05	20:40	MNL	CO	933	1234567	738	157
46	ATR	1234567	9605	9K	SPN	18:35	19:25							
							19:30	21:55	OKA	xx		12567	767	235
17	SH3	1234567	400	FP	ROP	19:40	20:10							
							20:10	21:00	SPN	9K	9606	1234567	ATR	46
157	738	1234567	7	CO	NRT	15:50	20:25							
							21:45	6:20	NAN	CO	948	1 5	73G	124
46	ATR	1234567	9599	9K	SPN	21:35	22:25							
216	767	1 3 5 7	96	DL	NRT	18:55	23:40							

* Position of Potential New flights in Red

ACTIVITY AT GUM - 2020

Seats	Equip	Op Days	Flight	Al	Origin	Time	Hub	Ar Time	Dest	Al	Flight	Op Days	Equip	Seats
183	757	1234567	292	DL	KIX	19:35	0:10							
124	73G	1234 67	972	CO	NGO	20:45	1:15							
235	767	1234567	964	CO	NRT	20:50	1:25							
124	73G	1234567	928	CO	KIX	21:00	1:35							
296	333	1234567	111	KE	ICN	20:20	1:40							
							2:20	2:50	ROP	9K	9314	1 5	ATR	46
296	333	1 3 5 7	113	KE	ICN	21:10	2:30							
188	739	1234567	733	KE	KIX	22:00	2:35							
248	772	1234567	721	KE	KIX	22:00	2:35							
							3:20	6:55	ICN	KE	112	1234567	333	296
156	320	1 3 567	110	PR	MNL	22:00	4:00							
157	738	1	959	CO	TKK	2:30	4:05							
							4:10	6:50	KIX	KE	722	1234567	772	248
							4:10	6:50	KIX	KE	734	1234567	739	188
							4:30	7:40	PUS	KE	116	1 457	73H	162
157	738	1	952	CO	MAJ	2:40	4:35							
157	738	1 34 67	934	CO	MNL	22:55	4:35							
124	73G	12 45	903	CO	CNS	0:20	4:45							
157	738	1 45	954	CO	ROR	2:35	5:30							
235	767	1234567		xx	OKA	23:55	4:15							
235	330	1234567		xx	SHA	23:55	5:15							
185	738	1234567		xx	YYY	21:55	5:15							
46	ATR	1 56	9315	9K	ROP	5:30	6:00							
							6:00	7:50	MNL	PR	111	12 4 67	320	156
							6:00	8:40	KIX	DL	291	1234567	757	183
							6:30	17:55	HNL	CO	2	123 567	767	235
							7:00	7:50	SPN	9K	9596	1234567	ATR	46
							7:05	10:00	KIJ	CO	917	1	73G	124
							7:10	9:45	NRT	CO	961	1234567	767	235
							7:20	10:00	KIX	CO	977	1234567	738	157
							7:20	11:00	CTS	CO	937	1 5	73G	124
							7:25	10:15	OKJ	CO	919	1 5	73G	124
							7:30	10:55	SHA	xx		12567	330	283
							7:30	8:00	ROP	FP	100	1234567	SH3	17
							7:45	10:40	FUK	CO	915	1234567	73G	124
							7:50	10:30	NGO	CO	971	1234567	738	157
							7:55	10:30	HKG	xx		1567	738	157
							7:35	10:30	YYY	xx		1567	738	185
							7:35	10:30	WWW	xx		1567	738	157
46	ATR	1234567	9313	9K	SPN	8:30	9:20							
							9:30	11:10	TKK	CO	956	1 5	738	157
							10:05	10:55	SPN	9K	9600	1234567	ATR	46
							10:25	13:15	NRT	DL	97	1 3 567	767	216
17	SH3	1234567	200	FP	ROP	10:20	10:45							
							12:00	14:45	NRT	CO	6	12345 7	738	157
46	ATR	1234567	9601	9K	SPN	12:10	13:00							
							13:40	14:30	SPN	9K	9602	1234567	ATR	46
283	330	1234567		xx	PEK	6:00	13:50							
183	757	1234567	290	DL	NRT	9:25	14:05							
237	767	1234567	941	JL	NRT	9:35	14:10							
183	757	1234567	626	DL	NGO	9:50	14:25							
183	757	1234567	294	DL	KIX	10:00	14:35							
283	330	1234567		XX	XXX	6:00	14:30							
183	757	1234567	648	DL	NRT	10:00	14:40							
157	738	1234567		xx	WWW	11:30	15:50							
							15:55	20:45	PEK	xx		1234567	330	283
157	738	1234567	978	CO	KIX	11:00	15:25							
							15:25	18:15	KIX	DL	293	1234567	757	183
168	738	1234567	5	LJ	ICN	10:00	15:30							
							15:30	18:15	NRT	JL	942	1234567	767	237
124	73G	1	918	CO	KIJ	10:55	15:35							
235	767	1234567	962	CO	NRT	11:05	15:35							
							15:40	18:30	NRT	DL	289	1234567	757	183
46	ATR	1234567	9603	9K	SPN	15:05	15:55							
124	73G	1 5	920	CO	OKJ	11:15	15:55							
							15:55	18:45	NRT	DL	649	1234567	757	183
157	738	1234567	970	CO	NGO	11:40	16:10							
							16:10	18:55	NGO	DL	625	1234567	757	183
124	73G	1234567	916	CO	FUK	11:40	16:25							
							16:55	20:45	XXX	xx		1234567	330	283
							16:30	20:20	ICN	LJ	6	1234567	738	168
							17:00	17:30	ROP	FP	300	1234567	SH3	17
							17:05	19:45	NGO	CO	975	1234 67	73G	124
							17:05	19:45	NRT	CO	963	1234567	767	235
							17:10	18:00	SPN	9K	9604	1234567	ATR	46
							17:15	20:00	KIX	CO	927	1234567	73G	124
124	73G	1 5	938	CO	CTS	11:50	17:25							
235	767	1 34567	1	CO	HNL	14:15	18:00							
157	'738	1567		xx	HKG	11:30	18:05							
							18:40	21:25	HKG	CO	909	1 5	738	157
							18:50	19:50	ROR	CO	953	1	73G	124
							18:50	23:20	CNS	CO	902	1 34 7	73G	124
							19:05	20:40	MNL	CO	933	1234567	738	157
46	ATR	1234567	9605	9K	SPN	18:35	19:25							
							19:30	21:55	OKA	xx		12567	767	235
17	SH3	1234567	400	FP	ROP	19:40	20:10							
							20:10	21:00	SPN	9K	9606	1234567	ATR	46
157	738	1234567	7	CO	NRT	15:50	20:25							
							21:45	6:20	NAN	CO	948	1 5	73G	124
46	ATR	1234567	9599	9K	SPN	21:35	22:25							
216	767	1 3 567	96	DL	NRT	18:55	23:40							

* Position of Potential New flights in Red

APPENDIX III – AIRPORT LAYOUT PLAN

AIRPORT LAYOUT PLAN

GUAM INTERNATIONAL AIRPORT
A.B. WON PAT

APRIL 2012

PREPARED FOR:

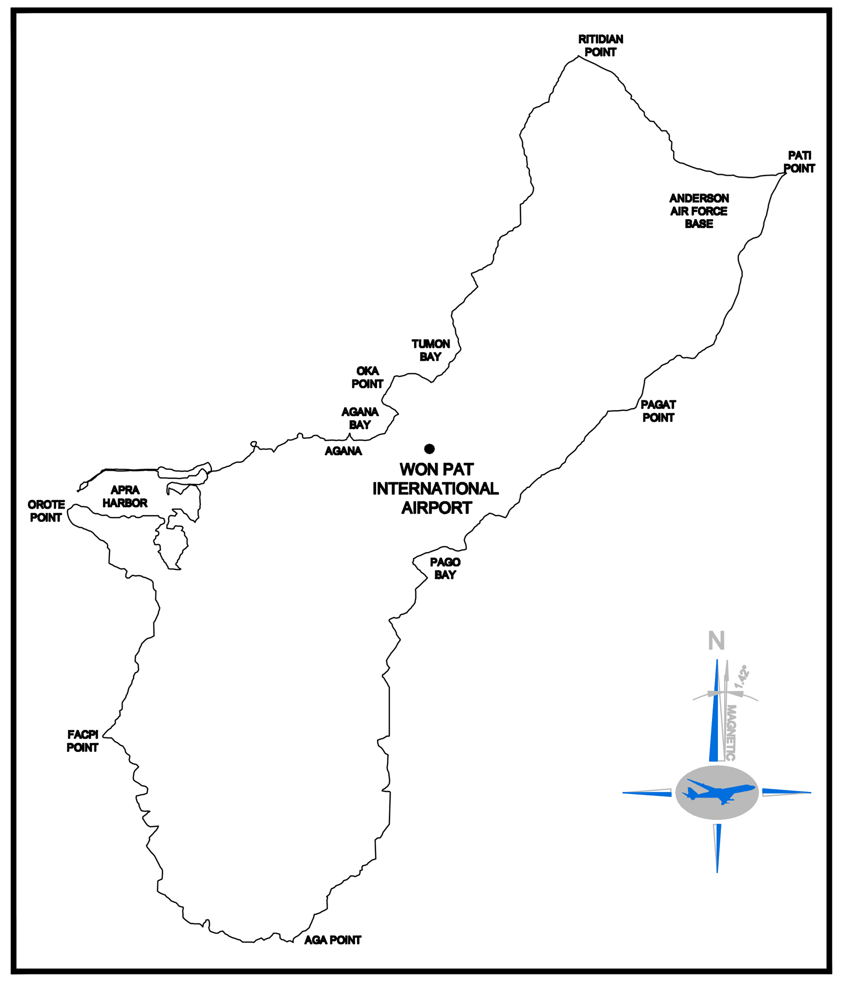
GUAM INTERNATIONAL AIRPORT AUTHORITY

PREPARED BY:

PARSONS CORPORATION

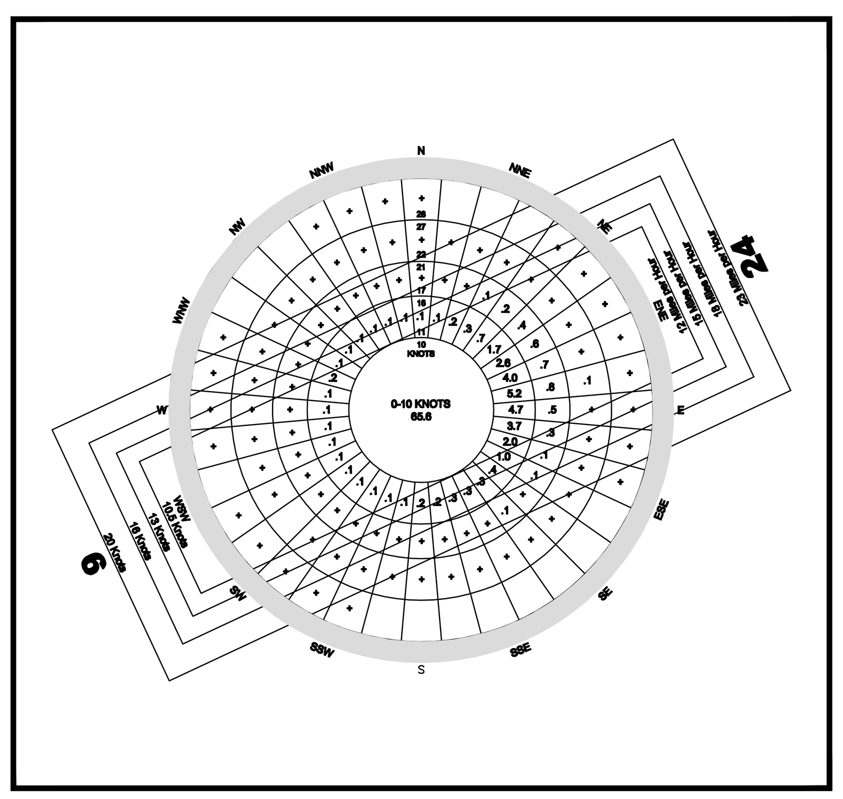
INDEX TO DRAWINGS

DRAWING NO.	DESCRIPTION
1	COVER SHEET
2	AIRPORT LAYOUT PLAN
3	TERMINAL AREA PLAN 1 - NORTHERN TERMINAL AREA
4	TERMINAL AREA PLAN 2 - NORTHERN TERMINAL AREA
5	TERMINAL AREA PLAN 3 - SOUTHERN TERMINAL AREA
6	TERMINAL AREA PLAN 4 - SOUTHERN TERMINAL AREA
7	AIRPORT APPROACH SURFACE DRAWING

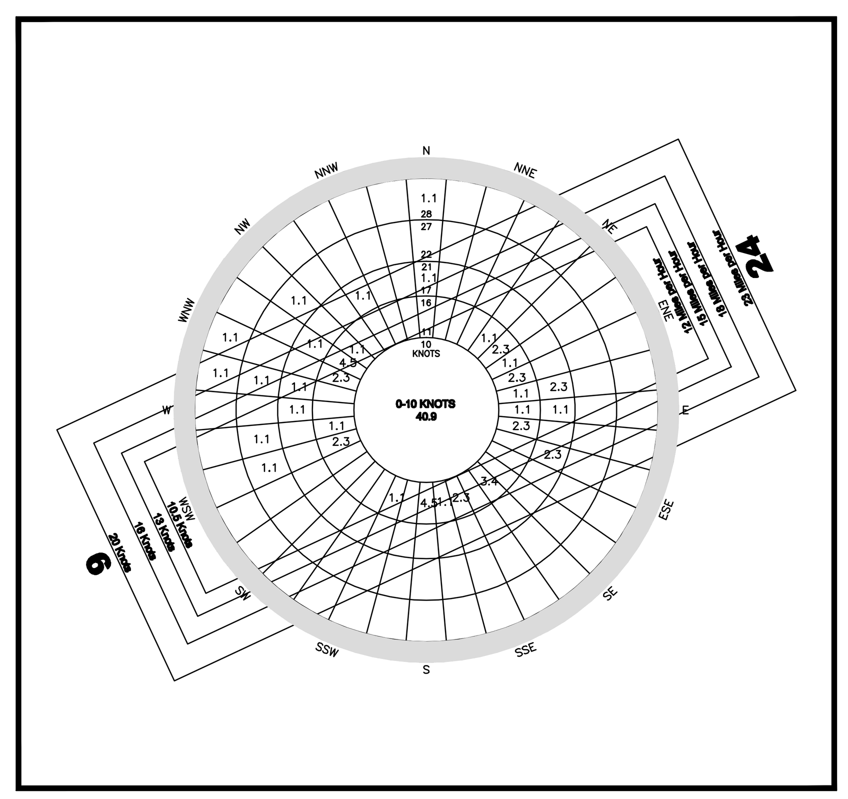


LOCATION MAP
NOT TO SCALE

VICINITY MAP
NOT TO SCALE



ALL WEATHER WIND ROSE



IFR WIND ROSE

FAA APPROVAL

FOR APPROVAL BY:

Mary C. Torres, Executive Manager — Date

RECOMMEND APPROVAL BY:

Victor J. Cruz, Acting Chief Engineer — Date

The preparation of this plan was financed in part through a planning grant from the Federal Aviation Administration as provided under Section 505 of the Airport and Airway Improvement Act of 1982, as amended. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this plan by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.

GUAM INTERNATIONAL AIRPORT
A.B. WON PAT
GUAM INTERNATIONAL AIRPORT AUTHORITY

AIRPORT LAYOUT PLAN

A.B. WON PAT
INTERNATIONAL AIPORT AUTHORITY, GUAM

GRAPHIC SCALE IN FEET
0 300' 600' 1200'
SCALE: 1" = 600'

GIAA ENGINEERING DIVISION

NO.	DATE	REVISION			APPROVALS

DEVIATIONS FROM FAA STANDARDS

	DESCRIPTION	REQUIRED	EXISTING	FUTURE	ACTION
A	PERIMETER ROAD WITHIN RSA (6R)	1,000'	950'	0'	TO REMAIN
	ROADS AND FENCE WITHIN ROFA (6R)	1,000'	750'	0'	APPLY DECLARED DISTANCES
	PERIMETER ROAD WITHIN (F) OFZ (6R)	200'	200'	0'	APPLY DECLARED DISTANCES
B	ROFA TERRAIN PENETRATION (24L)	1,000'	0'	1,000'	GRADE TERRAIN WITHIN ROFA TO MATCH EDGE OF RSA ELEVATION

DECLARED DISTANCES

DESCRIPTION	EXISTING		ULTIMATE		EXISTING		ULTIMATE	
	RUNWAY 6L	RUNWAY 24R	RUNWAY 6L	RUNWAY 24R	RUNWAY 6R	RUNWAY 24L	RUNWAY 6R	RUNWAY 24L
TAKEOFF RUN AVAILABLE (TORA)	12,015'	12,015'	12,015'	12,015'	10,014'	10,014'	11,014'	11,014'
TAKEOFF DISTANCE AVAILABLE (TODA)	12,014'	12,015'	12,015'	12,015'	10,014'	10,014'	11,014'	11,014'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	11,015'	12,015'	11,015'	12,015'	10,014'	9,014'	10,014'	10,014'
LANDING DISTANCE AVAILABLE (LDA)	11,015'	11,015'	11,015'	11,015'	10,014'	9,014'	10,014'	9,014'

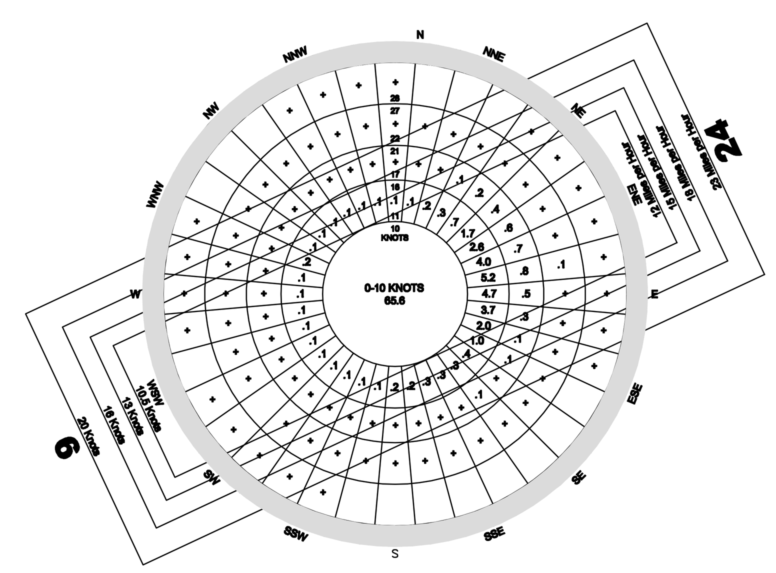
NOTES:

1. All elevations are in feet above mean sea level (MSL) and are NAVD 88.
2. Latitude and longitude coordinates are NAD 83.
3. Future buildings depicted are as recommended in Master Plan Update (2012).
4. The existing displaced threshold for Runway 24L is due to deficient runway object free area (ROFA). Grading of the ROFA will permit locating the landing threshold at the physical end of the runway.
5. The terrain east of the extended centerline of Runway 24L has been graded and complies with FAR Part 77 for a non-precision instrument runway. Some Steel Power Poles along Route 16 penetrate FAR Part 77 surfaces.
6. All runways and taxiways have 35-foot paved shoulders.
7. Previous ARP monument (1) is concrete with a brass cap. Runway end monuments are survey pins without concrete monument.
8. Tiyan Parkway alignment is pending DPW approval.
9. Declared distances pending FAA approval. Declared distances only apply to Runway 6R-24L. Declared distance schematics are on the Inner Approach OFZ sheet.
10. Threshold siting surface for Runway Type "9" as identified in Table A2-1 of AC 150/5300-13 (Change 11). This threshold siting surface has a slope of 34:1. No known objects penetrate the threshold siting surface. Objects close-in to future runway ends are assumed to be removed when the runway is extended.
11. Runway Protection Zones shown per AC 150/5300-13 (Change 11).
12. Existing and future blast pads are of concrete construction.
13. Guam has not been sectioned.
14. There is an existing tower 18,000 feet from Runway 6L end, 1,500 feet to the right of Runway 6L centerline, and 420 feet above the existing Runway 6L end. This object will remain, and is an obstruction to the FAR Part 77 Approach Surface.
15. Portion of existing Central Avenue, Perimeter Road and Connector Road within RSA anticipadted to be closed.

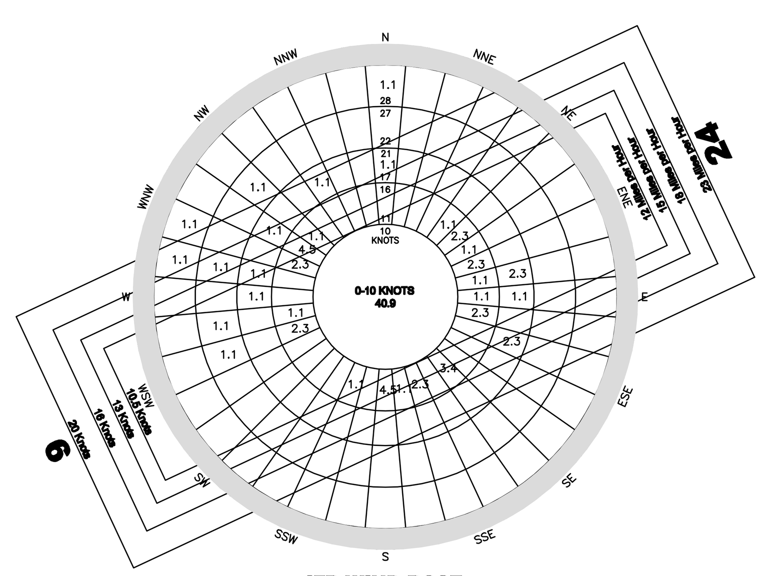
RUNWAY DATA

DESCRIPTION		RUNWAY 6L - 24R EXISTING	RUNWAY 6L - 24R ULTIMATE	RUNWAY 6R - 24L EXISTING	RUNWAY 6R - 24L ULTIMATE
EFFECTIVE GRADIENT (IN %)		0.58	0.57	0.70	0.71
MAXIMUM GRADIENT (IN %)		1.23	SAME	1.45	SAME
WIND COVERAGE % (20 KNOTS)		99.86	SAME	99.86	SAME
APPROACH VISIBILITY MINIMUMS	RUNWAY 6	1/2 MILE	300 FEET	1/2 MILE	300 FEET
	RUNWAY 24	2-1/2 MILE	800 FEET	2-3/4 MILE	900 FEET
DESIGN AIRCRAFT	MAKE AND MODEL	B747-400	SAME	B747-400	SAME
	WINGSPAN (FEET)	213	SAME	213	SAME
	UNDERCARRIAGE WIDTH (FEET)	36.1	SAME	36.1	SAME
	APPROACH SPEED (KNOTS)	154	SAME	154	SAME
	MAX. TAKEOFF WEIGHT (LBS)	870,000	SAME	870,000	SAME
RUNWAY MARKING		PRECISION	SAME	PRECISION	SAME
APPROACH CATEGORY (FAR PART 77)	RUNWAY 6	PRECISION	SAME	PRECISION	SAME
	RUNWAY 24	NON-PRECISION	SAME	NON-PRECISION	SAME
RUNWAY ℄ TO PARALLEL TAXIWAY ℄ (MIN)		400'	SAME	620'	400'
TAXIWAY ℄ TO FIXED OR MOVABLE OBJECT		160'	SAME	160'	SAME
TAXIWAY OBJECT FREE AREA (TOFA) WIDTH		320'	SAME	320'	SAME
TAXIWAY SAFETY AREA (TSA) WIDTH		214'	SAME	214'	SAME
TAXIWAY WINGTIP CLEARANCE		53'	SAME	53'	SAME
RUNWAY ELEVATIONS (NAVD 88)	TOUCHDOWN ZONE (TDZ)	256'/297'	252'/298'	258'/292'	SAME/301'
	HIGH POINT	296.9'	298.2'	301.2'	SAME
	LOW POINT	238.9'	230.3'	231.0'	223.3'
LINE OF SIGHT REQUIREMENT MET		YES	SAME	YES	SAME
RUNWAY LENGTH		10,015'	12,015'	10,014'	11,014'
RUNWAY WIDTH		150'	SAME	150'	SAME
RUNWAY/TAXIWAY SURFACE TYPE		ASPH-CONC	SAME	ASPH-CONC	SAME
APPROACH SLOPE		50:1/34:1	SAME	34:1	50:1 / 34:1
PAVEMENT STRENGTH (1,000 LBS) (S/D/DT/DDT)		135/235/390/780	135/235/390/870	135/235/390/780	135/235/390/870
PAVEMENT CONDITION NUMBER (PCN)		69/R/B/X/U	69/F/B/X/U	69/R/B/X/U	69/F/B/X/U
RUNWAY LIGHTING		HIRL	SAME	MIRL	SAME
NAVIGATIONAL AIDS		ILS(6), GPS(6-24)	SAME	GPS	ILS(6), GPS(6-24)
VISUAL AIDS	RUNWAY 6	MALSR, PAPI	SAME	NONE	PAPI
	RUNWAY 24	PAPI	SAME	NONE	PAPI
RUNWAY SAFETY AREA (RSA) BEYOND STOP END	LENGTH[1]	1,000'	SAME	1,000' [2]	SAME[2]
	WIDTH	500'	SAME	500'	SAME
RUNWAY OBJECT FREE AREA (ROFA) BEYOND STOP END	LENGTH[1]	1,000'	SAME	1,000' [2]	SAME[2]
	WIDTH	800'	SAME	800'	SAME
OBSTACLE FREE ZONE (OFZ) BEYOND STOP END	LENGTH[1]	200'	SAME	200'	SAME[2]
	WIDTH	400'	SAME	400'	SAME
RUNWAY CENTERLINE TO HOLD LINE		280'	SAME	250'	280'

[1] Length from runway end.
[2] Lengths of RSA, ROFA, and OFZ are based on application of declared distances.



ALL WEATHER WIND ROSE



IFR WIND ROSE

LEGEND

DESCRIPTION	EXISTING	ULTIMATE (FUTURE)
AIRPORT BOUNDARY		SAME
RUNWAY PAVEMENT		
TAXIWAY/APRON PAVEMENT		
ATCT LINE OF SIGHT		
BUILDING RESTRICTION LINE (BRL)		SAME
RUNWAY OBJECT FREE AREA (ROFA)		
OBSTACLE FREE ZONE (OFZ)		
RUNWAY SAFETY AREA (RSA)		
BUILDINGS		
GROUND CONTOURS	290	SAME
AIRPORT REFERENCE POINT (ARP)		
RUNWAY PROTECTION ZONE EASEMENT		
RUNWAY PROTECTION ZONE (RPZ)		
THRESHOLD SITING SURFACE		
NAVAID CRITICAL AREAS		
RUNWAY LIGHTS		
WIND CONE		SAME
RAMP LIGHTS	ON TERMINAL BUILDING	
ROAD/VEHICLE PARKING		
FENCE		
SURVEY MONUMENT (SEE NOTE 7)	1	SAME
GATE	G	SAME
AIRPORT LEASE PROPERTIES (F)		

WIND DATA

RUNWAY	ALL WEATHER CROSSWIND COVERAGE 10.5 Kts.	13 Kts.	16 Kts.	20 Kts.	IFR CROSSWIND COVERAGE 10.5 Kts.	13 Kts.	16 Kts.	20 Kts.
6	58.60%	87.67%	88.56%	88.76%	35.36%	37.52%	41.05%	42.03%
24	14.46%	15.06%	15.58%	15.70%	36.69%	45.28%	51.71%	54.42%
6-24	95.45%	98.13%	99.54%	99.86%	68.64%	19.39%	89.35%	93.05%

Based on 80,921 observations between 1996 through 2005 taken at Guam International Airport. Source: National Climatic Data Center, Asheville, NC.

Note: IFR conditions occur 0.1% of the time

EXISTING BUILDING TABLE

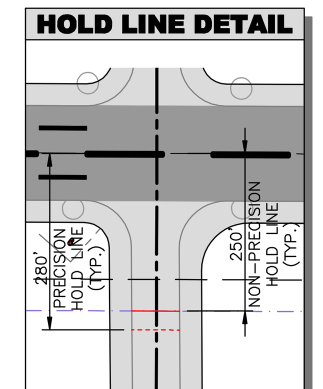
#	DESCRIPTION	TOP ELEV
1	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	358.67'
2	COMMUTER TERMINAL	293.90'
3	PACKAGE EXPRESS TERMINAL	293.66'
4	CARGO TERMINAL	293.26'
5	AIRPORT TRAFFIC CONTROL TOWER	336.24'
6	VQ5	313.07'
7	VQ1 HANGAR	329.13'
8	HC5 HANGAR	336.43'
9	TRANSMITTER BUILDING	276.32'
10	AIRCRAFT MAINTENANCE BUILDING	276.82'
11	ERF	---

Source: Virgilio P. Olivares PLS Survey, July 23, 2007.

FUTURE BUILDING TABLE

#	DESCRIPTION	TOP ELEV
A	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	---
B	DISTRIBUTION CNT WAREHOUSE	---
C	FLIGHT KITCHEN	---
D	FUTURE HANGAR	---
E	FUTURE HANGAR	---
F	FUTURE RESERVED	---
G	PARKING DECK PHASE 1	---
H	PARKING DECK PHASE 2	---
I	PARKING DECK PHASE 3	---
J	FUTURE ERF	---

HOLD LINE DETAIL



SCALE: 1"=200'

ABBREVIATIONS:

(E)	Existing
(F)	Future
ARP	Airport Reference Point
ATCT	Air Traffic Control Tower
BRL	Building Restriction Line
D	Dual
DT	Dual Tandem
DDT	Double Dual Tandem
E	Easting
EL	Elevation
ILS	Instrument Landing System
LAT	Latitude
LONG	Longitude
MALSR	Medium Intensity Approach Light System with RAIL
MIN	Minimum
MSL	Mean Sea Level
N	Northing
NAD	North American Datum
NAVD	North American Vertical Datum
OFZ	Obstacle Free Zone
PAPI	Precision Approach Path Indicator
RAIL	Runway Alignment Indicator Lights
ROFA	Runway Object Free Area
RPZ	Runway Protection Zone
RSA	Runway Safety Area
S	Single
TDZE	Touch Down Zone Elevation
VORTAC	Very High Frequency Omni-Directional Radio Range Tactical Air Navigation Aid

ANNUAL RATE OF CHANGE 0 MIN/YEAR (MAY 2007)

AIRPORT DATA

DESCRIPTION		EXISTING	ULTIMATE
AIRPORT ELEVATION (MSL)		301'	SAME
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	LATITUDE	13° 29' 01.95" N	13° 29' 01.14" N
	LONGITUDE	144° 47' 49.81" E	144° 47' 47.67" E
NAVAIDS (ILS, BEACON, ALS)		ATCT, ILS, MALSR BEACON, VORTAC	SAME
MEAN MAX. TEMP. OF HOTTEST MONTH		87°	SAME
AIRPORT REFERENCE CODE (ARC)		D-V	SAME
GPS AT AIRPORT		YES	SAME

RUNWAY END DATA

RUNWAY		EXISTING	ULTIMATE
6L	LATITUDE	13° 28' 44.07" N	13° 28' 39.87" N
	LONGITUDE	144° 47' 02.34" E	144° 46' 53.15" E
	ELEVATION	238.9'	230.3'
24R	LATITUDE	13° 29' 26.12" N	13° 29' 30.34" N
	LONGITUDE	144° 48' 34.29" E	144° 48' 43.47" E
	ELEVATION	296.9'	298.2'
6R	LATITUDE	13° 28'37.78" N	13° 28' 33.58" N
	LONGITUDE	144° 47' 05.34" E	144° 46' 56.16" E
	ELEVATION	231.0'	223.3'
24L	LATITUDE	13° 29' 19.82" N	SAME
	LONGITUDE	144° 48' 37.29" E	SAME
	ELEVATION	301.2'	SAME

FAA APPROVAL

FOR APPROVAL BY:

Mary C. Torres, Executive Manager — Date

RECOMMEND APPROVAL BY:

Victor J. Cruz, Acting Chief Engineer — Date

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GUAM INTERNATIONAL AIRPORT
A.B. WON PAT
GUAM INTERNATIONAL AIRPORT AUTHORITY

AIRPORT LAYOUT PLAN

A.B. WON PAT INTERNATIONAL AIPORT AUTHORITY, GUAM

GRAPHIC SCALE IN FEET 0 300' 600' 1200'
SCALE: 1" = 600'

GIAA ENGINEERING DIVISION

NO.	DATE	REVISION	BY	CK	APPROVALS
1	5/15/97	FAA COMMENTS DATED MARCH 21, 1997	VC	IQ	
2	09/01/00	FUTURE AIRFIELD IMPROVEMENTS	VC	IQ	
3	02/16/01	ADDED UTILITIES UPGRADE & FUTURE BUILDINGS	VC	IQ	
4	11/20/06	RUNWAY 6R-24L 10,014 FT. & RUNWAY 6R ILS	VC	IQ	
5	2/2008	UPDATED PER ALP CHECKLIST & FAA AC 150/5300-13 (Change 11)	AS	DS	
6	05/30/09	CORRECTED (F) RPZ ON RUNWAY 6L; ADDED PLASI TO RUNWAY 24L	VC	VC	
7	11/08/10	TIYAN PARKWAY (F) ; DRAINAGE DETENTION POND (F) ; ROAD CLOSURE PORTION OF CENTRAL AVE., PERIMETER ROAD, AND CONNECTOR ROAD TO BE CLOSED (F). RAMP LIGHTS (F).	VC	VC	

TERMINAL AREA PLAN - NORTHERN TERMINAL AREA

LEGEND

DESCRIPTION	EXISTING	ULTIMATE (FUTURE)
AIRPORT BOUNDARY		SAME
RUNWAY PAVEMENT		
TAXIWAY/APRON PAVEMENT		
ATCT LINE OF SIGHT		
BUILDING RESTRICTION LINE (BRL)		SAME
RUNWAY OBJECT FREE AREA (ROFA)		
OBSTACLE FREE ZONE (OFZ)		
RUNWAY SAFETY AREA (RSA)		
BUILDINGS		
GROUND CONTOURS		SAME
RUNWAY PROTECTION ZONE (RPZ)		
NAVAID CRITICAL AREAS		
WIND CONE		SAME
RAMP LIGHTS	ON TERMINAL BUILDING	
ROAD/VEHICLE PARKING		
FENCE		
SURVEY MONUMENT (SEE NOTE 7)		SAME
GATE		SAME
AIRPORT LEASE PROPERTIES (F)		

EXISTING BUILDING DATA TABLE

#	DESCRIPTION	TOP ELEV
1	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	358.67'
2	COMMUTER TERMINAL	293.90'
3	PACKAGE EXPRESS TERMINAL	293.66'
4	CARGO TERMINAL	293.26'
5	AIRPORT TRAFFIC CONTROL TOWER	336.24'
6	VQ5	313.07'
7	VQ1 HANGAR	329.13'
8	HC5 HANGAR	336.43'
9	TRANSMITTER BUILDING	276.32'
10	AIRCRAFT MAINTENANCE BUILDING	276.82'
11	ERF	---

Source: Virgilio P. Olivares PLS Survey, July 23, 2007.

FUTURE BUILDING DATA TABLE

#	DESCRIPTION	TOP ELEV
A	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL EXPANSION	---
B	DISTRIBUTION CTR BONDED WAREHOUSE	---
C	FLIGHT KITCHEN	---
D	FUTURE HANGAR	---
E	FUTURE HANGAR	---
F	FUTURE RESERVED	---
G	PARKING DECK-PHASE 1	---
H	PARKING DECK-PHASE 2	---
I	PARKING DECK-PHASE 3	---
J	FUTURE ERF	---

GUAM INTERNATIONAL AIRPORT
A.B. WON PAT
GUAM INTERNATIONAL AIRPORT AUTHORITY

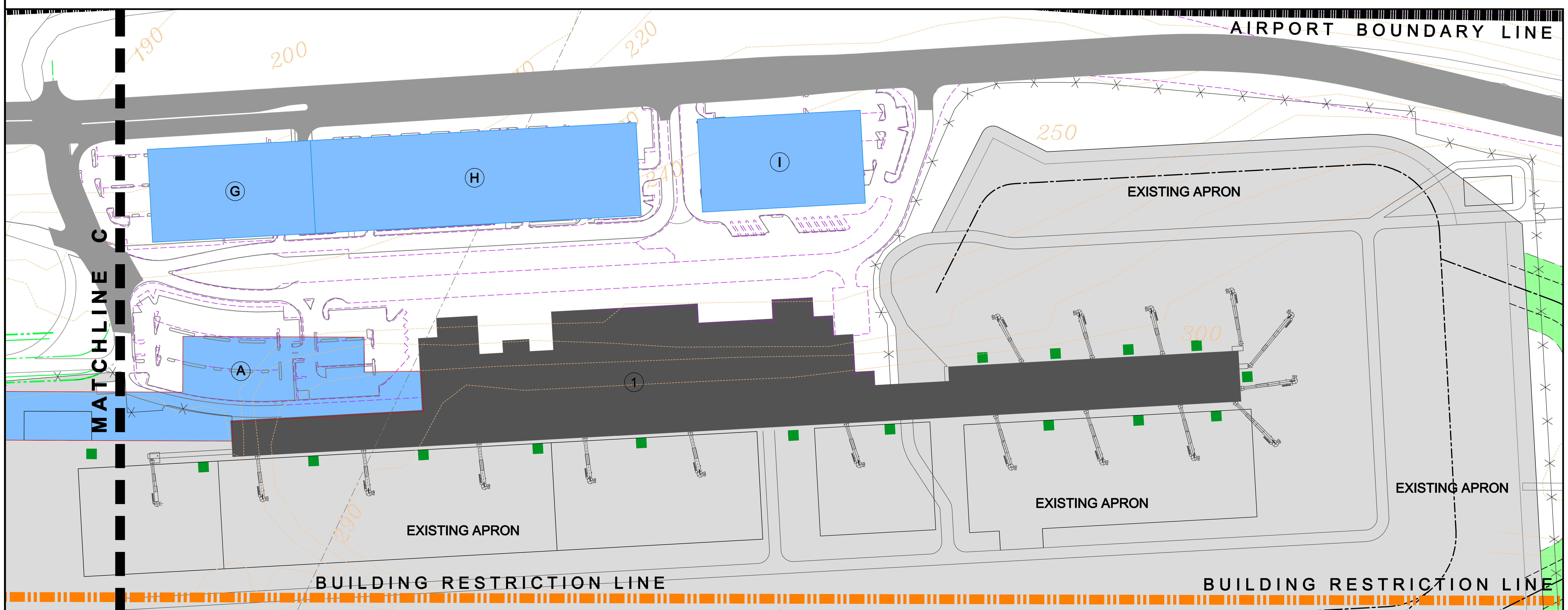
TERMINAL AREA PLAN 1
NORTHERN TERMINAL AREA

A.B. WON PAT
INTERNATIONAL AIPORT AUTHORITY, GUAM

GRAPHIC SCALE IN FEET
0 300' 600' 1200'
SCALE: 1" = 600'

GIAA ENGINEERING DIVISION

NO.	DATE	REVISION	BY	CK	APPROVALS



LEGEND

DESCRIPTION	EXISTING	ULTIMATE (FUTURE)
AIRPORT BOUNDARY		SAME
RUNWAY PAVEMENT		
TAXIWAY/APRON PAVEMENT		
ATCT LINE OF SIGHT		
BUILDING RESTRICTION LINE (BRL)		SAME
RUNWAY OBJECT FREE AREA (ROFA)		
OBSTACLE FREE ZONE (OFZ)		
RUNWAY SAFETY AREA (RSA)		
BUILDINGS		
GROUND CONTOURS	290	SAME
RUNWAY PROTECTION ZONE (RPZ)		
NAVAID CRITICAL AREAS		
WIND CONE		SAME
RAMP LIGHTS	ON TERMINAL BUILDING	
ROAD/VEHICLE PARKING		
FENCE		
SURVEY MONUMENT		SAME
GATE		SAME
AIRPORT LEASE PROPERTIES (F)		

EXISTING BUILDING DATA TABLE

#	DESCRIPTION	TOP ELEV
1	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	358.67'
2	COMMUTER TERMINAL	293.90'
3	PACKAGE EXPRESS TERMINAL	293.66'
4	CARGO TERMINAL	293.26'
5	AIRPORT TRAFFIC CONTROL TOWER	336.24'
6	VQ5	313.07'
7	VQ1 HANGAR	329.13'
8	HC5 HANGAR	336.43'
9	TRANSMITTER BUILDING	276.32'
10	AIRCRAFT MAINTENANCE BUILDING	276.82'
11	ERF	- - -

Source: Virgilio P. Olivares PLS Survey, July 23, 2007.

FUTURE BUILDING DATA TABLE

#	DESCRIPTION	TOP ELEV
A	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	- - -
B	DISTRIBUTION CTR BONDED WAREHOUSE	- - -
C	FLIGHT KITCHEN	- - -
D	FUTURE HANGAR	- - -
E	FUTURE HANGAR	- - -
F	FUTURE RESERVED	- - -
G	PARKING DECK-PHASE 1	- - -
H	PARKING DECK-PHASE 2	- - -
I	PARKING DECK-PHASE 3	- - -
J	FUTURE ERF	- - -

GUAM INTERNATIONAL AIRPORT
A.B. WON PAT
GUAM INTERNATIONAL AIRPORT AUTHORITY

TERMINAL AREA PLAN 2

NORTHERN TERMINAL AREA

A.B. WON PAT
INTERNATIONAL AIPORT AUTHORITY, GUAM

GRAPHIC SCALE IN FEET
0 300' 600' 1200'
SCALE: 1" = 600'

GIAA ENGINEERING DIVISION

NO.	DATE	REVISION	BY	CK	APPROVALS

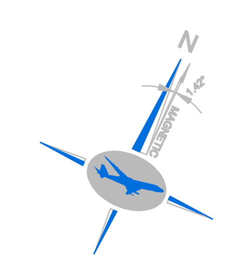
TERMINAL AREA PLAN - SOUTHERN TERMINAL AREA

LEGEND		
DESCRIPTION	EXISTING	ULTIMATE (FUTURE)
AIRPORT BOUNDARY		SAME
RUNWAY PAVEMENT		
TAXIWAY/APRON PAVEMENT		
ATCT LINE OF SIGHT		
BUILDING RESTRICTION LINE (BRL)		SAME
RUNWAY OBJECT FREE AREA (ROFA)		
OBSTACLE FREE ZONE (OFZ)		
RUNWAY SAFETY AREA (RSA)		
BUILDINGS		
GROUND CONTOURS	290	SAME
RUNWAY PROTECTION ZONE (RPZ)		
NAVAID CRITICAL AREAS		
WIND CONE		SAME
RAMP LIGHTS	ON TERMINAL BUILDING	
ROAD/VEHICLE PARKING		
FENCE		
SURVEY MONUMENT (SEE NOTE 7)	1	SAME
GATE		SAME
AIRPORT LEASE PROPERTIES (F)		

EXISTING BUILDING DATA TABLE		
#	DESCRIPTION	TOP ELEV
1	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	358.67'
2	COMMUTER TERMINAL	293.90'
3	PACKAGE EXPRESS TERMINAL	293.66'
4	CARGO TERMINAL	293.26'
5	AIRPORT TRAFFIC CONTROL TOWER	336.24'
6	VQ5	313.07'
7	VQ1 HANGAR	329.13'
8	HC5 HANGAR	336.43'
9	TRANSMITTER BUILDING	276.32'
10	AIRCRAFT MAINTENANCE BUILDING	276.82'
11	ERF	- - -

Source: Virgilio P. Olivares PLS Survey, July 23, 2007.

FUTURE BUILDING DATA TABLE		
#	DESCRIPTION	TOP ELEV
A	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	- - -
B	DISTRIBUTION CTR BONDED WAREHOUSE	- - -
C	FLIGHT KITCHEN	- - -
D	FUTURE HANGAR	- - -
E	FUTURE HANGAR	- - -
F	FUTURE RESERVED	- - -
G	PARKING DECK-PHASE 1	- - -
H	PARKING DECK-PHASE 2	- - -
I	PARKING DECK-PHASE 3	- - -
J	FUTURE ERF	- - -



GUAM INTERNATIONAL AIRPORT
A.B. WON PAT
GUAM INTERNATIONAL AIRPORT AUTHORITY

TERMINAL AREA PLAN 3

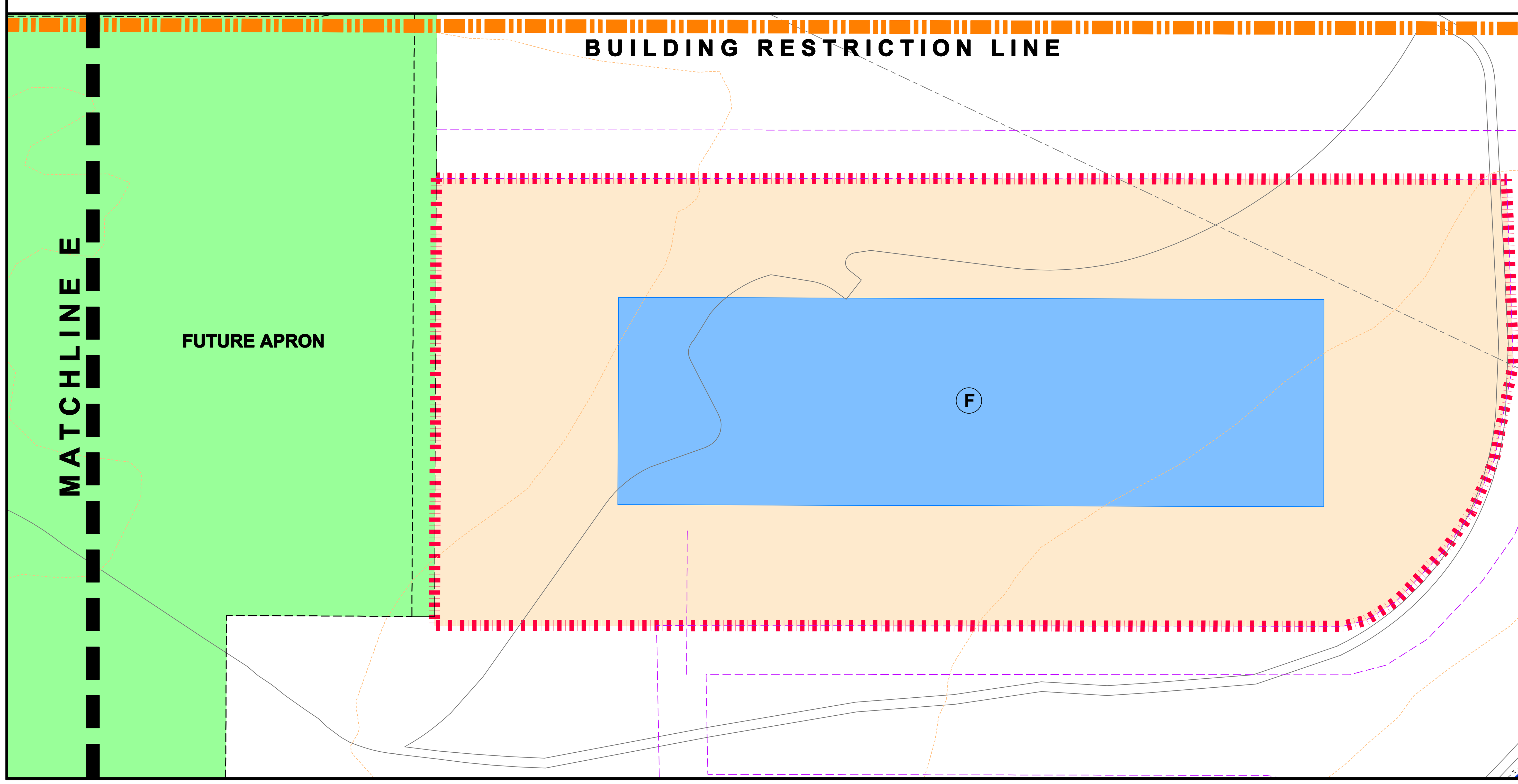
SOUTHERN TERMINAL AREA

A.B. WON PAT
INTERNATIONAL AIPORT AUTHORITY, GUAM

GRAPHIC SCALE IN FEET
0 300' 600' 1200'
SCALE: 1" = 600'

GIAA ENGINEERING DIVISION

NO.	DATE	REVISION	BY	CK	APPROVALS



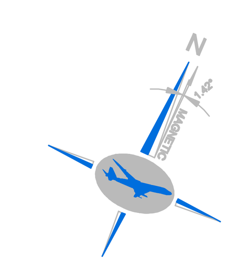
EXISTING BUILDING DATA TABLE		
#	DESCRIPTION	TOP ELEV
1	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	358.67'
2	COMMUTER TERMINAL	293.90'
3	PACKAGE EXPRESS TERMINAL	293.66'
4	CARGO TERMINAL	293.26'
5	AIRPORT TRAFFIC CONTROL TOWER	336.24'
6	VQ5	313.07'
7	VQ1 HANGAR	329.13'
8	HC5 HANGAR	336.43'
9	TRANSMITTER BUILDING	276.32'
10	AIRCRAFT MAINTENANCE BUILDING	276.82'
11	ERF	---

Source: Virgilio P. Olivares PLS Survey, July 23, 2007.

FUTURE BUILDING DATA TABLE		
#	DESCRIPTION	TOP ELEV
A	ANTONIO B. WON PAT GUAM INT'L PASSENGER TERMINAL	---
B	DISTRIBUTION CTR BONDED WAREHOUSE	---
C	FLIGHT KITCHEN	---
D	FUTURE HANGAR	---
E	FUTURE HANGAR	---
F	FUTURE RESERVED	---
G	PARKING DECK-PHASE 1	---
H	PARKING DECK-PHASE 2	---
I	PARKING DECK-PHASE 3	---
J	FUTURE ERF	---

LEGEND

DESCRIPTION	EXISTING	ULTIMATE (FUTURE)
AIRPORT BOUNDARY		SAME
RUNWAY PAVEMENT		
TAXIWAY/APRON PAVEMENT		
ATCT LINE OF SIGHT		
BUILDING RESTRICTION LINE (BRL)		SAME
RUNWAY OBJECT FREE AREA (ROFA)		
OBSTACLE FREE ZONE (OFZ)		
RUNWAY SAFETY AREA (RSA)		
BUILDINGS		
GROUND CONTOURS	290	SAME
RUNWAY PROTECTION ZONE (RPZ)		
NAVAID CRITICAL AREAS		
WIND CONE		SAME
RAMP LIGHTS	ON TERMINAL BUILDING	
ROAD/VEHICLE PARKING		
FENCE		
SURVEY MONUMENT (SEE NOTE 7)		SAME
GATE	G	SAME
AIRPORT LEASE PROPERTIES (F)		



GUAM INTERNATIONAL AIRPORT
A.B. WON PAT
GUAM INTERNATIONAL AIRPORT AUTHORITY

TERMINAL AREA PLAN 4

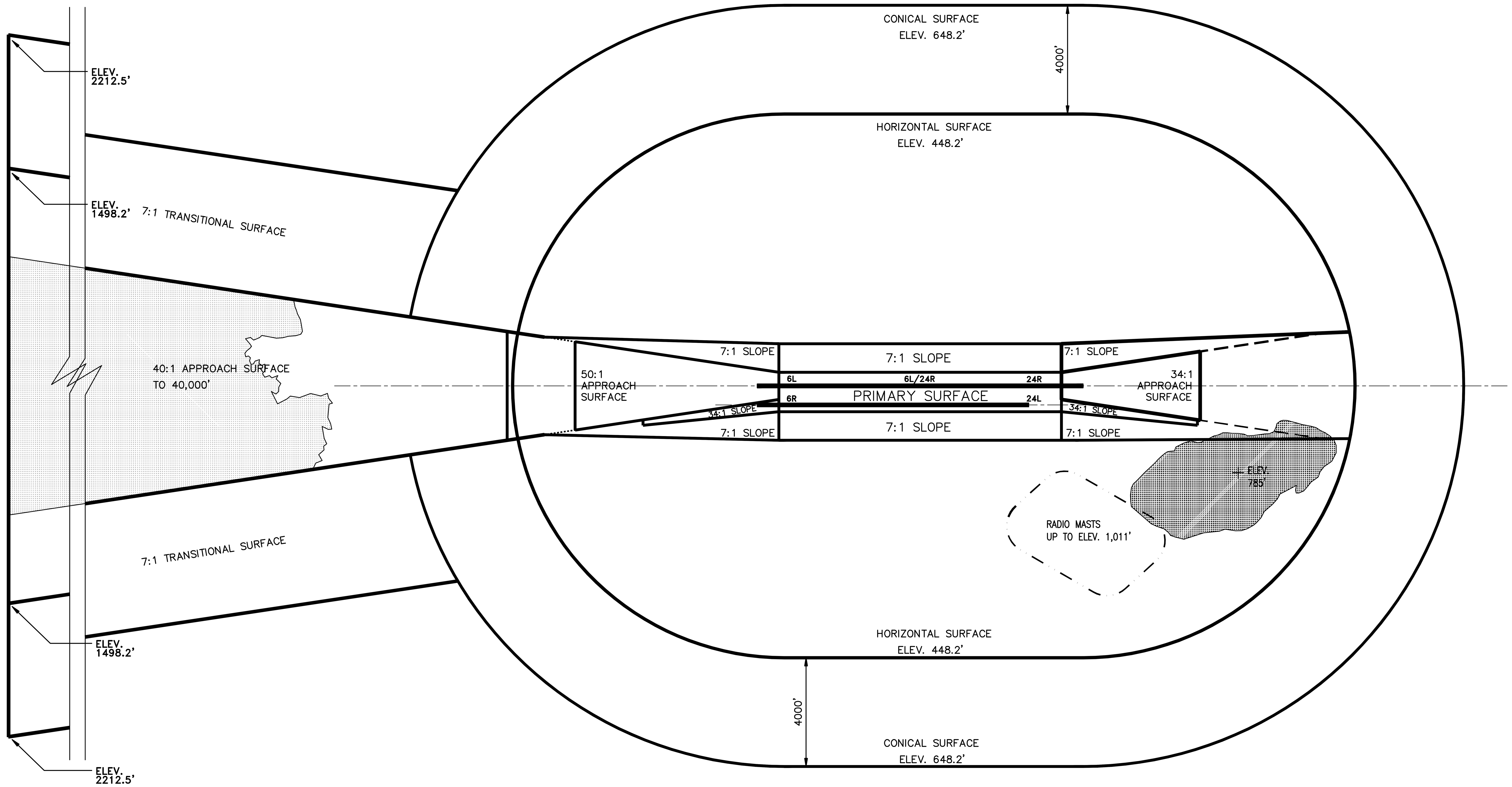
SOUTHERN TERMINAL AREA

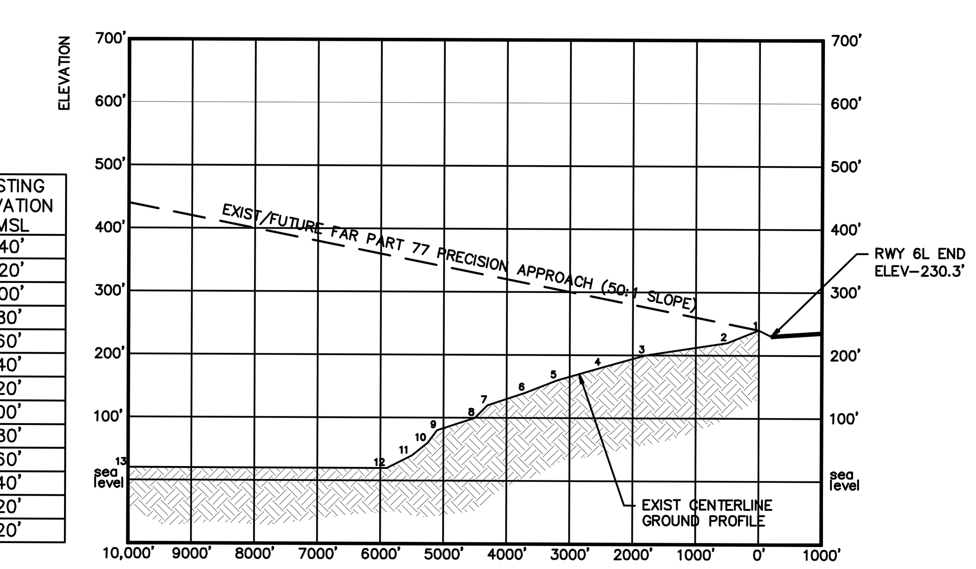
A.B. WON PAT
INTERNATIONAL AIPORT AUTHORITY, GUAM

GRAPHIC SCALE IN FEET
0 300' 600' 1200'
SCALE: 1" = 600'

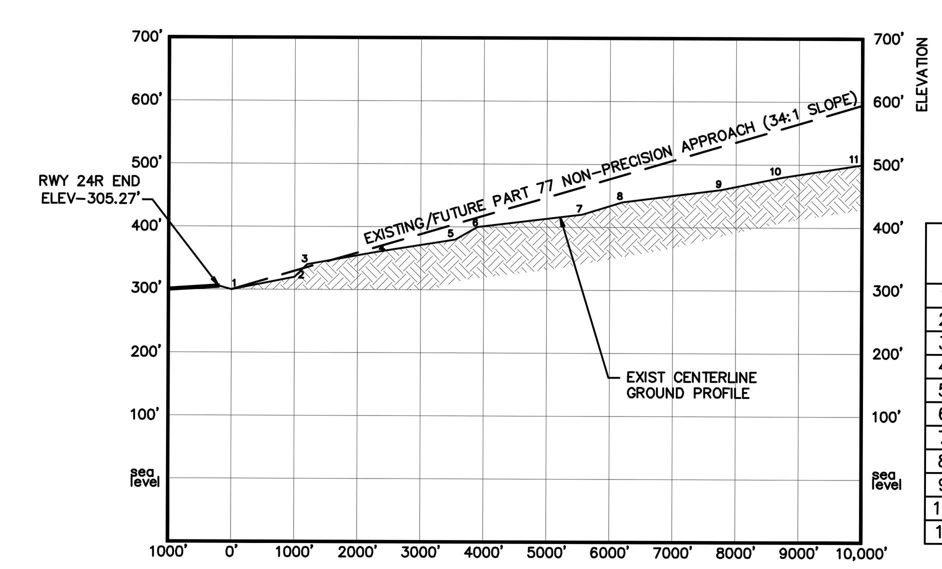
GIAA ENGINEERING DIVISION

NO.	DATE	REVISION	BY	CK	APPROVALS



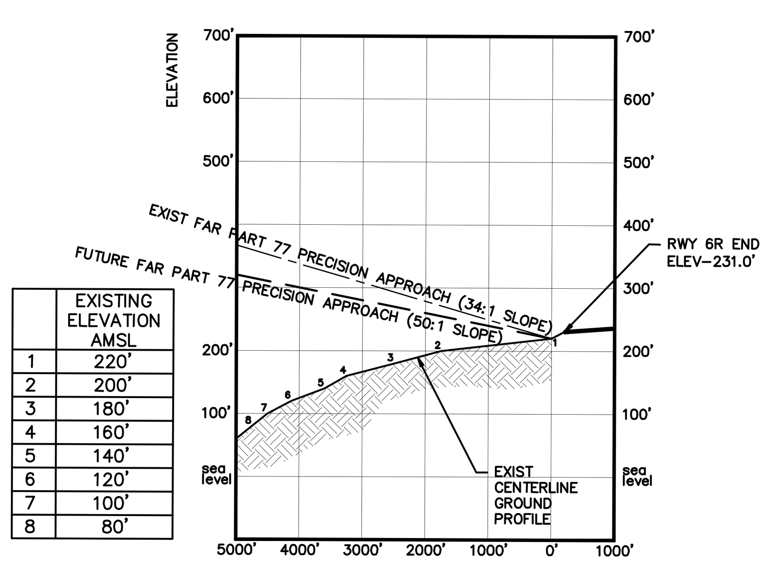


	EXISTING ELEVATION AMSL
1	240'
2	220'
3	200'
4	180'
5	160'
6	140'
7	120'
8	100'
9	80'
10	60'
11	40'
12	20'
13	20'

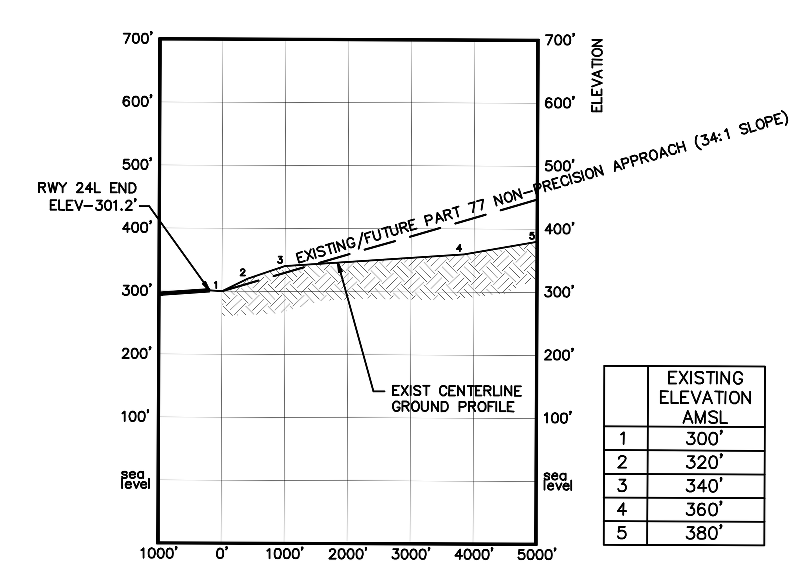


	EXISTING ELEVATION AMSL
1	300'
2	320'
3	340'
4	360'
5	380'
6	400'
7	420'
8	440'
9	460'
10	480'
11	500'

EXISTING AND FUTURE APPROACH TO RUNWAY 06L/24R



	EXISTING ELEVATION AMSL
1	220'
2	200'
3	180'
4	160'
5	140'
6	120'
7	100'
8	80'



	EXISTING ELEVATION AMSL
1	300'
2	320'
3	340'
4	360'
5	380'

EXISTING AND FUTURE APPROACH TO RUNWAY 06R/24L

NOTES:

1. FAA DISCLAIMER

   THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS PLAN BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

2. ESTABLISHED AIRPORT ELEVATION: 301 FEET
   AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83):
   LATITUDE 13° 29' 01.14" N (FUTURE)
   LONGITUDE 144° 47' 47.67" E (FUTURE)

3. U.S.G.S. QUADS, 7-1/2' SERIES
   AGANA, GUAM
   DEDEDO, GUAM

SCALES OF R/W PROFILES
VERTICAL 1"=200'
HORIZONTAL 1"=2,000'

GUAM INTERNATIONAL AIRPORT
A.B. WON PAT
GUAM INTERNATIONAL AIRPORT AUTHORITY

AIRPORT APPROACH SURFACE

GRAPHIC SCALE IN FEET
0 300' 600' 1200'
SCALE: 1" = 600'

A.B. WON PAT
INTERNATIONAL AIRPORT AUTHORITY, GUAM

GIAA ENGINEERING DIVISION

NO.	DATE	REVISION	BY	CK	APPROVALS