Chapter 4: Facility Requirements

4.1 INTRODUCTION

Facility requirements are a determination of necessary improvements to Airport infrastructure based on the condition of the existing airport infrastructure (2008) and its capability to accommodate the anticipated levels of passengers and operations as determined in the forecast of aviation activity. Requirements are also based on the Palm Springs International Airport (PSP) Master Plan Goals and Objectives as well as the concerns and future needs of Airport staff, Airport tenants, and stakeholders. This chapter presents the facility requirements for airside, terminal, landside, general aviation, and support facilities.

4.2 AIRSIDE FACILTY REQUIREMENTS

Airside facilities consist of runways, taxiways and apron areas where aircraft land, take-off, taxi, and park. The following section describes the airside facilities required to better accommodate future demand and maintain airfield safety at Palm Springs International Airport (PSP). The airside facility requirements are determined by comparing the operations forecast to the operational capacity of existing airside facilities. Airside facility requirements are determined for the following areas:

- Runway system – capacity, length, pavement strength
- Runway safety areas,
- Navigational aids, and
- Taxiways and aprons.

4.2-1 Runway Capacity Requirements

Runway facility requirements for Palm Springs International Airport are based upon the existing two runway system's capability of accommodating an anticipated volume of operations in future years at a given acceptable level of delay. Acceptable future delay levels are determined based partly on the Airport Goals and Objectives (see *Chapter 1: Goals and Objectives*), and the desired level of service. The discussion begins with a general description of the factors that influence runway capacity.

Factors Influencing Runway Capacity

One of the most important statistical metrics for an airport is its runway capacity. Runway capacity is best defined as the maximum sustainable throughput of aircraft operations. Several factors influence an airport's runway capacity, including fleet mix, weather, wind, visibility, runway occupancy time, location of runway exits, noise abatement procedures, and hubbing characteristics.

Fleet Mix

Fleet mix is an important factor that influences runway capacity via the involvement of personnel at the Air Traffic Control (ATC) Tower. To maintain a level of safety for all aircraft, air traffic controllers are responsible for separating arriving and departing aircraft to maintain safe operating distances between

successive aircraft. Wake turbulence, the counter-rotating air masses generated by heavy aircrafts' engines and wingtips, necessitate controllers to increase the separation distance for any (small and large) aircraft trailing a heavy aircraft. Small aircraft are defined as those aircraft that weigh less than 12,500 lbs. Large aircraft are defined as those aircraft that weigh more than 12,500 lbs but less than 300,000 lbs. Heavy aircraft are defined as those aircraft that weigh in excess of 300,000 lbs. Arrival separation is quantified by the distance, in nautical miles (nm), between successive arrivals. Departure separation is quantified by a time interval, in seconds, between successive departures. **Table 4-1** and **Table 4-2** present the minimum separations under Visual Meteorological Conditions (VMC) as required by the FAA for arrivals and departures, respectively. A very homogeneous fleet mix will result in a higher runway capacity than a very heterogeneous fleet mix. In a congested environment, controllers will group like-aircraft together where possible to enhance runway capacity and reduce overall delay.

Table 4-1: Arrival Separation under VMC Conditions

	Trailing Aircraft		
Leading Aircraft	**Small**	**Large**	**Heavy**
Small	1.9 nm	1.9 nm	1.9 nm
Large	2.7 nm	1.9 nm	1.9 nm
Heavy	3.7 nm	2.9 nm	2.9 nm

Source: FAA Air Traffic Control Guidance

Table 4-2: Departure Separation under VMC Conditions

	Trailing Aircraft		
Leading Aircraft	**Small**	**Large**	**Heavy**
Small	50 sec	50 sec	50 sec
Large	60 sec	60 sec	60 sec
Heavy	120 sec	120 sec	120 sec

Source: FAA Air Traffic Control Guidance

Weather

Weather is a critical component for runway capacity. In a visually dependent Air Traffic Control environment, as found at PSP, poor visibility conditions generally result in an increase in minimum aircraft separations. **Tables 4-3** and **4-4** present the minimum separations for Instrument Meteorological Conditions (IMC) as required by the FAA for arrivals and departures, respectively.

Wind

Wind can considerably affect the operability of runways. For aircraft operations, it is preferable to depart and arrive into the wind as a headwind reduces the amount of speed required by an aircraft to take off and reduces the ground speed upon touchdown. Arriving to and departing from Runway 13R could be limited by a tail-wind as the 3,000-foot displaced threshold and additional declared distance restrictions inhibit the usable runway length.

Table 4-3: Arrival Separation under IMC Conditions

	Trailing Aircraft		
Leading Aircraft	**Small**	**Large**	**Heavy**
Small	2.5 nm	2.5 nm	2.5 nm
Large	4.0 nm	2.5 nm	2.5 nm
Heavy	5.0 nm	4.0 nm	4.0 nm

Source: FAA Air Traffic Control Guidance

Table 4-4: Departure Separation under IMC Conditions

	Trailing Aircraft		
Leading Aircraft	**Small**	**Large**	**Heavy**
Small	60 sec	60 sec	60 sec
Large	60 sec	60 sec	60 sec
Heavy	120 sec	120 sec	120 sec

Source: FAA Air Traffic Control Guidance

Runway Occupancy Time and Location of Runway Exits

Runway occupancy time (ROT), the time it takes for an arriving aircraft to exit and clear the runway, directly impacts runway capacity. The longer an aircraft remains on the runway, the longer a successive aircraft must wait to utilize the runway. ROT is a function of the aircraft type, the location and type of runway exits, and the weather conditions at the Airport. Aircraft with a slow approach speed generally require a shorter landing distance and in most cases can exit the runway more quickly than heavier aircraft. When a runway exit is being designed, research is done to determine an optimal exit location. High speed, acute angle runway exits allow aircraft to exit the runway more quickly as the arriving aircraft does not have to slow down as much to utilize these types of exit taxiways.

Noise Abatement Procedures

Noise abatement procedures can negatively impact runway capacity. Noise abatement procedures, including imposing operational curfews (limiting the days and time aircraft can use the airport), implementing runway usage restrictions (only certain types of aircraft can use a specific runway), modifying flight paths, and limiting operations, impact runway capacity. At PSP, the Air Traffic Control Tower (ATCT) is closed nightly between 11:00 p.m. and 6:00 a.m. This encourages the vast majority of airport operations to use the runways during less noise-sensitive hours.

Hubbing Characteristics

The location of the Airport in the southwestern quadrant of the United States contributes to its role as a "spoke" airport. As a spoke airport, airlines do not utilize PSP as a hub for connecting through-passengers to other final destinations. Typically the first round of flights each day is inbound from spoke airports to the hubs, while the last round of flights is outbound from hubs to spoke airports. A hub airport is subject to extreme modal peaking; hubs typically have a high arrival demand in a short time frame so that passengers from different origins can make their connecting flights. Conversely, spoke

airports experience a larger modal diversity throughout the day as the spoke airport feeds and receives flights to and from different hub airports.

Existing Runway Capacity

The existing capacity of the two-runway airport system is calculated by applying the Federal Aviation Administration (FAA) methodology for estimating the hourly and annual service capacity of an airport. The methodology is summarized in Section 2.9-3.

Applying the hourly service capacity methodology to Palm Springs International Airport, in Visual Meteorological Conditions (VMC), the hourly capacity of the two-runway system is approximately 80 operations. VMC allows the Airport, when possible, to have simultaneous operations on Runways 13L-31R and 13R-31L. Under Instrument Meteorological Conditions (IMC), the Airport is effectively reduced to a single runway. Departing aircraft must hold on the runway until arriving aircraft on the parallel runway have touched down. The hourly runway capacity under IMC is 56 operations.

The Airport's annual service capacity is estimated by applying the FAA methodology for calculating an annual service volume (ASV), which generally takes into account runway use, runway exit locations, aircraft fleet mix, weather and operational curfews. This calculation serves more as a benchmark for operational performance than an ultimate capacity. As the actual number of operations approaches the ASV, average delay begins to increase. Typically the ASV estimates average delays between one and four minutes. The ASV estimation is sensitive to fleet mix, the ratio of average daily demand to average peak hour demand during the peak month, and the ratio of annual demand to average daily demand, all of which are projected to change in the forecast horizon.

Following the FAA's methodology for determining ASV as discussed in Section 2.9-3, the ASV was determined for the existing two-runway system to be approximately 130,000 annual operations. In 2007, the Airport handled approximately 85,000 operations. Total annual operations at PSP are not projected to reach the ASV within the planning horizon.

Finally with regards to the existing runway capacity, it should be noted that Runway 13L-31R is restricted to Aircraft Design Group (ADG) II (those aircraft with wingspans between 49 feet and 79 feet) and smaller aircraft, which forces both of these runways to act as mixed-mode runways (i.e. aircraft arrive and depart regularly to both runways). A single mixed-mode runway can offer greater capacity than a segregated operation runway because a mixed-mode runway can insert a departure between successive arrivals. It is advantageous to operate with segregated flows in order to minimize departing aircraft runway crossings.

4.2-2 Runway Length Requirements

The Airport's two parallel runways, Runway 13R-31L and Runway 13L-31R are oriented in the southeast-northwest direction and are 10,001 feet long by 150 feet wide and 4,952 feet long by 75 feet, respectively. The parallel runways are separated by 700 feet, and are located northeast of the passenger terminal.

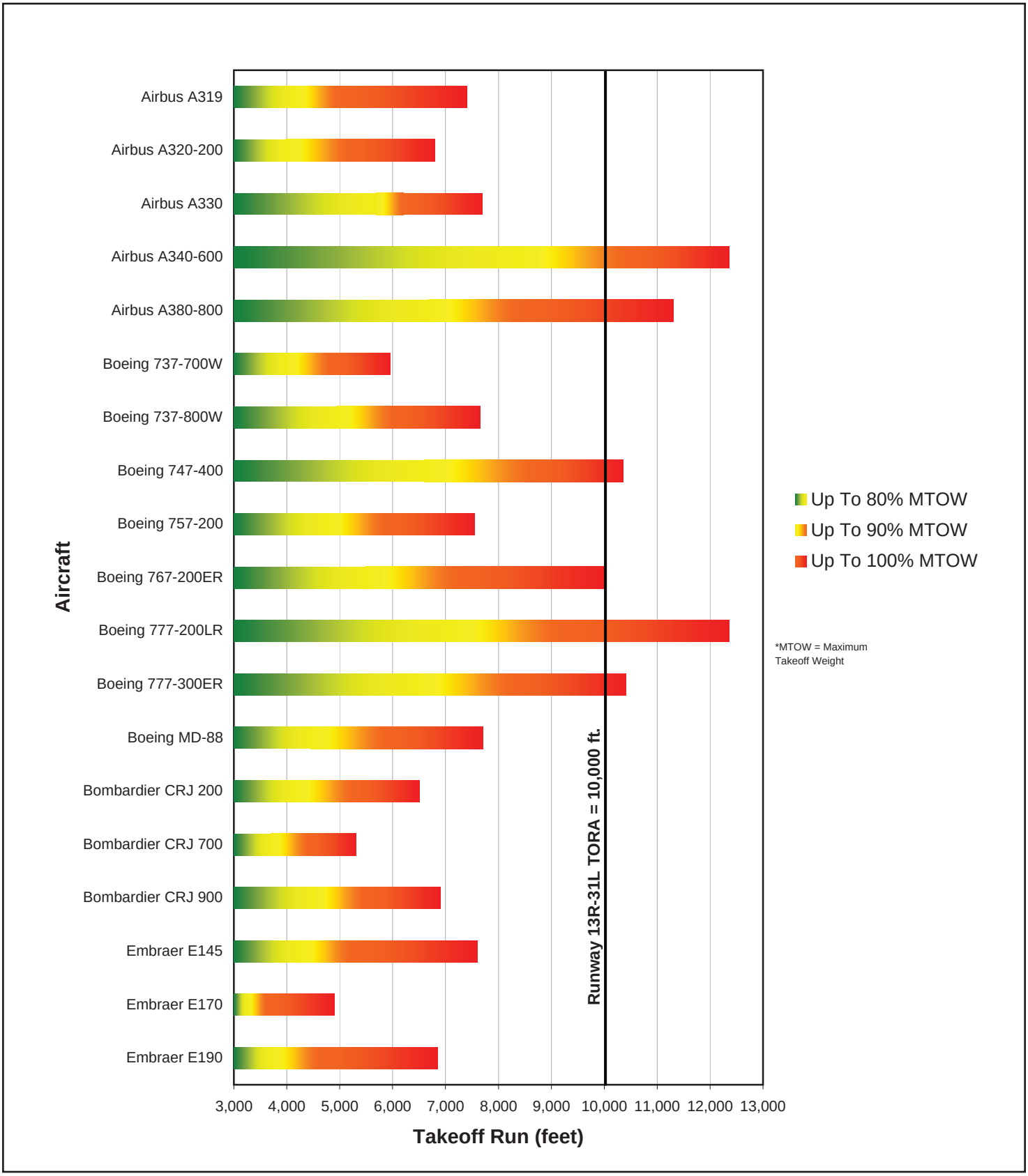
Runway 13R-31L has a 200-foot blast pad on each end of the runway to protect the runway pavement from the effects of jet blast. Each end of the runway has a displaced landing threshold in order to reduce and mitigate community noise impacts. Runway 13R has a 3,000-foot displaced threshold and Runway 31L has a 1,500-foot displaced threshold.

The largest aircraft that regularly uses the Airport is the Boeing 737-800W. On a standard temperature day, at its maximum take-off weight, the Boeing 737-800W requires approximately 7,700 feet of take-off run. On a warm summer day, the Boeing 737-800W requires approximately 8,200 feet of take-off run. **Figure 4-1** depicts a wide range of aircraft take-off performance metrics in standard temperatures at an altitude of 500 feet. The take-off run for Runway 13R-31L is shown for comparative purposes.

Runway length is analyzed for each aircraft at 80, 90, and 100 percent of its maximum take-off weight. As shown on **Figure 4-1**, the largest aircraft that PSP can accommodate without a payload restriction is the Boeing 767-200ER. From a runway length perspective, with a payload restriction, Runway 13R-31L can accommodate virtually every aircraft currently in service. Due to the large seasonal temperature variations in the Palm Springs area, it is necessary to examine take-off performance in hot climates. Similar to the **Figure 4-1**, **Figure 4-2** depicts a wide range of aircraft take-off performance metrics in hot temperatures at an altitude of 500 feet. On a hot day, without a payload restriction, the Airport cannot accommodate the Boeing 767-200ER. All of the aircraft that regularly use PSP can operate on Runway 13L-31R without a payload restriction, even during hot days. *Chapter 3: Aviation Activity Forecasts* anticipates that the largest aircraft that will regularly use PSP in the future is the Boeing 757-200. Under all circumstances, the Boeing 757-200 can depart Runway 13L-31R without a payload restriction.

Landing distance is usually less demanding on runway length than take-off run. However it is still useful to understand the maximum aircraft size capable of landing on Runway 13R-31L because the landing distance available is considerably shorter than the take-off run available. Declared distances, as a result of the displaced thresholds on each end of the runway and the non-standard runway safety area on the departure end of Runway 13R, create landing distances that are not uniform among the two runway directions. Runway 31L's landing distance available is 8,500 feet; Runway 13R's landing distance available is only 6,857 feet. Similar to **Figure 4-1** and **Figure 4-2**, **Figure 4-3** presents the required landing distances for a range of aircraft types at their maximum landing weights at an elevation of 500 feet. Every commercial service aircraft currently in wide use, with the exceptions of the Boeing 747-400 and Airbus A340-600, is capable of landing on Runway 13R. All aircraft are capable of landing on Runway 31L. At this time, PSP has not been identified as a principal airport for aircraft diversions from other regional airports, namely LAX. LA/Ontario International Airport is a more suitable site for aircraft diversions with its longest runway at 12,197 feet and an ILS Category I approach devoid of mountainous terrain.

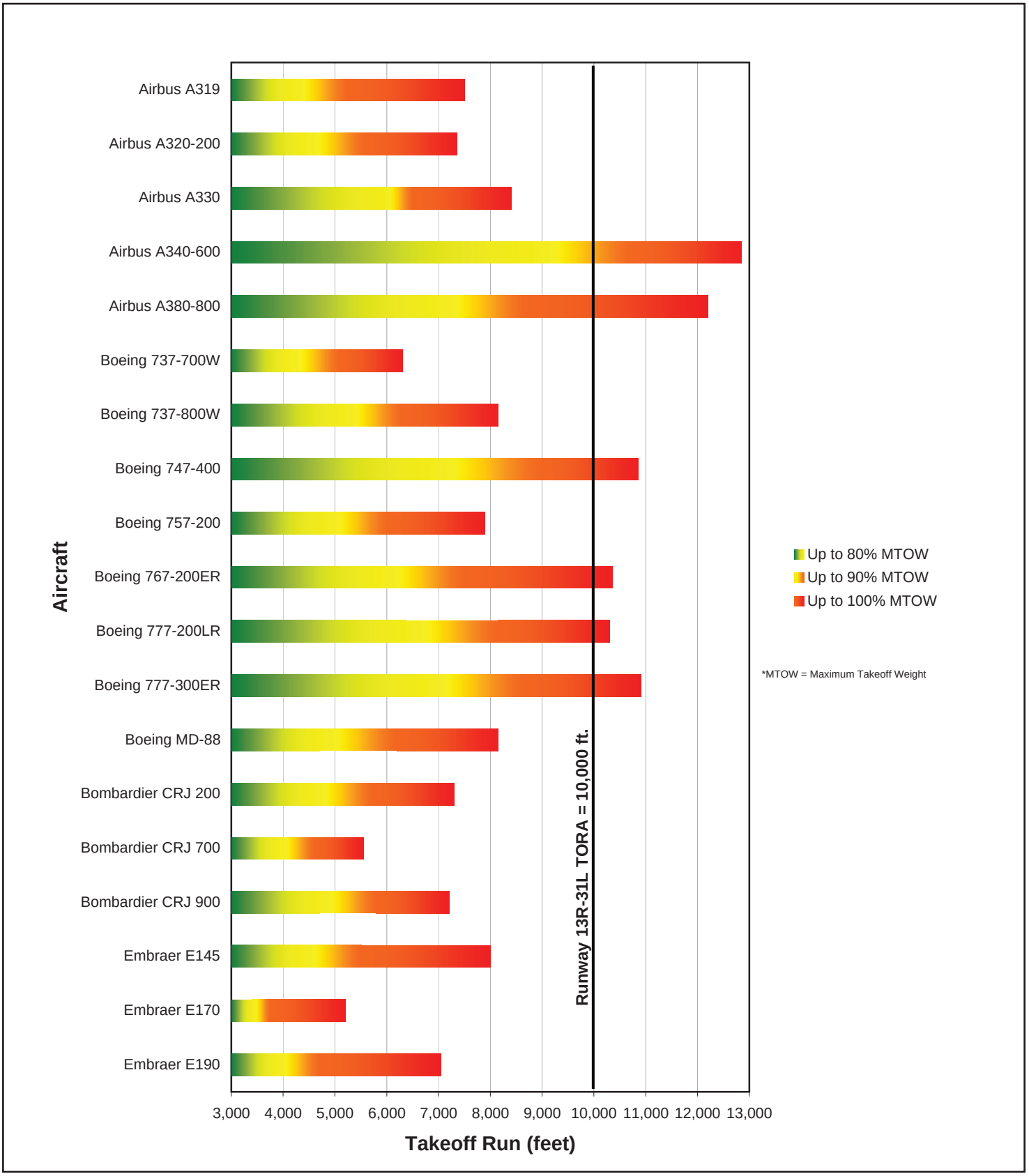
Based on the fleet mix at PSP and the limitations with regards to their maximum take-off weight and required landing distances, the existing lengths of the runway system at PSP are adequate through the 2028 planning horizon.



Source: HNTB Analysis

Runway Takeoff Distance Requirements - Standard Day Diagram

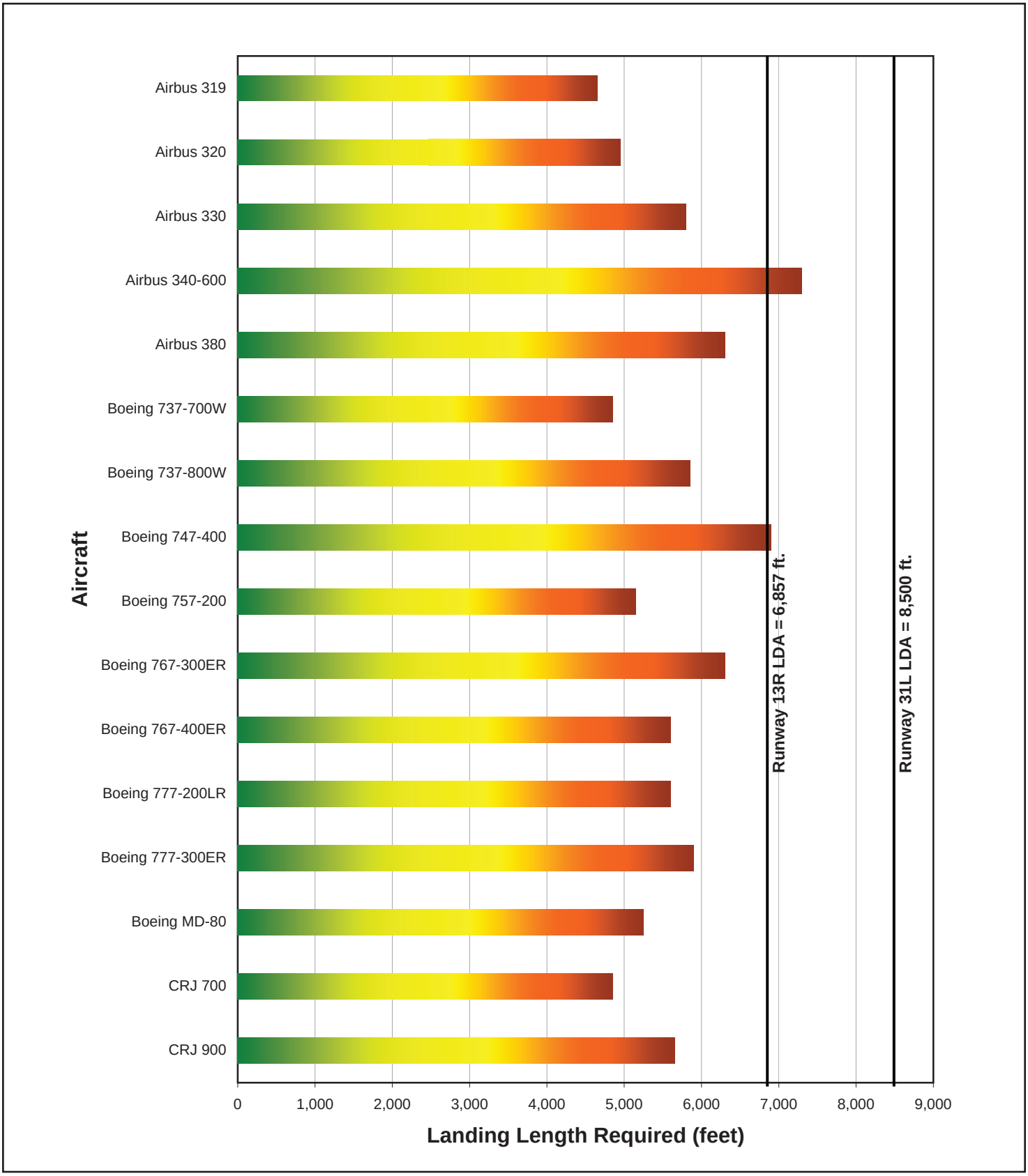
Figure 4-1



Source: HNTB Analysis

Runway Takeoff Distance Requirements - Hot Day Diagram

Figure 4-2



Source: HNTB Analysis

Runway Landing Distance Requirements Diagram

Figure 4-3

Runway Pavement Strength Requirements

Runway pavement bearing strengths define the weight limits at or below which an aircraft may operate on the runways. Runways are designed to provide pavement bearing strengths to meet the maximum operational weight of critical aircraft operating on the airfield. Bearing strengths are defined for Single Wheel (SW), Dual Wheel (DW), Dual Tandem (DT), and Double Dual Tandem (DDT) landing gear systems. A Single Wheel landing gear system, as typically found on light general aviation aircraft, refers to aircraft with a single wheel on each side of the main landing gear system. A Dual Wheel landing gear system, as found on a Boeing 737, refers to aircraft with two wheels on each side of the main landing gear. A Dual Tandem landing gear system, as found on a Boeing 757, refers to aircraft with four wheels on each side of the main landing gear. A Double Dual Tandem landing gear system, as found on a Boeing 747, refers to aircraft with two sets of four wheels on each side of the main landing gear. Table 4-5 summarizes the runway pavement bearing strengths for each runway and also includes the pavement classification number (PCN).

Table 4-5: Runway Pavement Bearing Strengths and Pavement Classification Number

Landing Gear System	Runway 13R-31L	Runway 13L-31R
Single Wheel (SW)	105,000 lbs	12,500 lbs
Dual Wheel (DW)	200,000 lbs	60,000 lbs
Dual Tandem (DT)	330,000 lbs	N/A
Double Dual Tandem (DDT)	800,000 lbs	N/A
Pavement Classification Number (PCN)	54/F/B/W/T	5/F/B/W/T

Source: FAA Facility Database

The operating pavement bearing strength requirements of selected aircraft are presented in **Table 4-6** for comparative purposes.

Table 4-6: Runway Pavement Bearing Strengths

Aircraft	Max Gross Take-off Weight	Landing Gear Type
Boeing 737-400	150,000 lbs	Dual Wheel
Boeing 737-700	154,500 lbs	Dual Wheel
Boeing 737-800	174,200 lbs	Dual Wheel
Airbus A320	145,505 lbs	Dual Wheel
Boeing 757-200	255,500 lbs	Dual Tandem
Boeing 767-300	350,000 lbs	Dual Tandem
Boeing 777-200	580,000 lbs	Triple Tandem
Boeing 747-400	870,000 lbs	Double Dual-Tandem
McDonald Douglas MD-11	602,500 lbs	Dual Tandem

Source: Boeing and Airbus Product Specifications

Fully loaded aircraft in **Table 4-6**, specifically the Boeing 747-400, 767-300, and the McDonald Douglas MD-11 are not able to operate on Runway 13R-31L without a payload restriction due to pavement bearing weight restrictions. Given the forecast fleet mix for the planning horizon, runway bearing strength enhancements are not necessary.

4.2-3 Runway Safety Area Requirements

A runway safety area (RSA) is a graded area surrounding a runway that provides added protection from aircraft overrunning and undershooting a runway. A standard RSA for an air-carrier runway dimensions 500 feet wide, centered on the runway centerline, and extends 1,000 feet past both runway ends. The Federal Aviation Administration (FAA) encourages all airports to provide a standard RSA for each runway. However, at PSP, the southerly portion of Runway 13R-31L's RSA is bisected 143 feet from its southern end by the airport property boundary at East Ramon Road. The airport currently employs declared distances to provide the standard RSA dimensions. Effectively, the available runway pavement length for aircraft arriving to Runway 13R is reduced by 143 feet to account for the distance necessary to provide a standard RSA length of 1,000 feet beyond the end of the runway. Similarly, the runway pavement length available for an aborted take-off, known as the accelerate-stop distance available (ASDA), is reduced by 143 feet for aircraft departing Runway 13R. A summary of the declared distances is presented in **Table 4-7**. Though declared distances provide the required RSA dimensions, the FAA prefers a more permanent solution. *Chapter 5*: *Master Plan Alternatives* explores potential alternatives for meeting the standard RSA requirement.

Table 4-7: Runway 13R-31L Declared Distances

Declared Distance	Runway 13R Distance	Runway 31L Distance
Take Off Distance Available (TODA)	10,000 feet	10,000 feet
Take Off Run Available (TORA)	10,000 feet	10,000 feet
Landing Distance Available (LDA)	6,857 feet	8,500 feet
Accelerate-Stop Distance Available (ASDA)	9,857 feet	10,000 feet

Source: FAA Facility Database

4.2-4 NAVAIDS Requirements

An evaluation of NAVAID technology and the potential for establishment of an instrument approach was completed. The analysis considers future activity levels and existing weather factors that limit airport operations due to the lack of an ILS. Evaluation of the timing of establishing an ILS was also considered. Emerging technologies including satellite based navigation systems were evaluated for their potential benefit at PSP and the timing of FAA's implementation of such a system.

Review of Existing NAVAIDS and Lighting

The Airport's existing NAVAIDS are limited to visual approach aids including a Visual Approach Slope Indicator (VASI) (Runway 13R-31L) and Precision Approach Path Indicator (PAPI) (Runway 13L-31R) and GPS. The Airport currently does not have an Instrument Landing System (ILS) with a localizer or glide slope indicator.

The Airport operates approximately 97% of the year under Visual Meteorological Conditions (VMC). The high percentage of visible weather coupled with the operational characteristics of the Airport allows PSP to efficiently operate as a visual airport. Runway 13R-31L is a visual runway, and has a six-box Visual Approach Slope Indicator (VASI) on each end of the runway that helps pilots maintain the approach descent angle. The alignment of the boxes indicates whether the pilot is on the correct glide slope angle, is

too steep, or is too shallow. Runway 13L-31R is a non-precision runway, and has a four-box Precision Approach Path Indicator (PAPI) on each end of the runway that functions similarly to the VASI. The Airport has an ASR-9 Airport Surveillance Radar, an Air Traffic Control Tower that is operated from 6:00 a.m. to 11:00 p.m. daily, a GPS VOR, and a rotating beacon. Runway 13R-31L is supported by High Intensity Runway Lighting (HIRL), High Intensity Taxiway Lighting (HITL), and Runway End Identification Lighting (REIL). Runway 13L-31R is supported by Medium Intensity Runway Lighting (MIRL), Medium Intensity Taxiway Lighting (MITL), and REIL.

A modest incompatibility sometimes exists between the region's many wind turbines and the ASR-9. When the velocities of the turbine blades exceed 60 mph, the radar electronically disregards a 200-foot by 200-foot column of space around the wind turbine. The sheer number of wind turbines sometimes makes air traffic control over these areas less reliant on technology and requires more interaction of air traffic controllers.

Instrument Landing System (ILS)

An Instrument Landing System (ILS) provides horizontal electronic guidance from a localizer antenna and vertical electronic guidance from a glide slope antenna. ILS antennas are extremely susceptible to signal interference. Mountainous or hilly terrain can interfere with the effective usable distance of an ILS. The mountains surrounding PSP would limit an ILS installation to an effective usable distance of approximately three nautical miles. The typical final approach course length for an ILS for a stabilized approach is ten miles. In addition to the terrain interference issues, the percentage of time that the airport operates under VMC essentially negates the need for an ILS. The installation of ILS would be an expensive initial investment and be costly to maintain. It is anticipated that PSP will continue to operate efficiently with its current NAVAIDS for the foreseeable future.

Next Generation Air Transportation System (NEXTGEN)

The Next Generation Air Transportation System (NEXTGEN) is a federally mandated program to overhaul the nation's air traffic network. NEXTGEN's goals include "significantly increasing the safety, security, capacity, efficiency, and environmental compatibility of air transportation operations…." (FAA NEXTGEN). NEXTGEN uses an Automatic Dependent Surveillance-Broadcast (ADS-B) system that employs satellite based GPS navigation. Aircraft will continuously transmit their GPS location along with altitude, destination, azimuth, and range. Air Traffic Control will be able to manage flights with 4-dimensional trajectories, three-dimensional space and time. NEXTGEN will safely and efficiently guide aircraft to and from their destinations regardless of the visibility conditions at an airport. The NEXTGEN program will replace ILS and existing radar surveillance once it is deployed. The primary difference between NEXTGEN and today's navigational technology is that NEXTGEN is satellite based while today's system depends upon ground based navigational aids. NEXTGEN technology is expected to be widely available to commercial airlines in possibly the next decade. At that time, PSP will have the opportunity to implement a satellite based precision approach.

Airfield Lighting Requirements

Runway edge lighting allows pilots to identify the runway edge limits at night and under poor visibility conditions. The primary air carrier runway, Runway 13R-31L is equipped with High Intensity Runway Light (HIRL), and Runway 13L-31R is equipped with Medium Intensity Runway Light (MIRL). The existing runway edge lights are adequate for the planning horizon. Taxiway lighting systems allow for the safe taxiing of aircraft at night and under poor visibility conditions. The taxiways supporting the primary air carrier runway are equipped with High Intensity Taxiway Lights (HITL) while the taxiways supporting Runway 13L-31R are equipped with Medium Intensity Taxiway Lights (MITL). All taxiway lighting is L.E.D., the current most advanced type of lighting certified by the FAA. The existing taxiway lighting system is adequate for the planning horizon. Neither runway currently has an approach lighting system. Approach lighting systems are generally associated with ILS landing systems. It is not recommended that an approach lighting system upgrade be implemented during the planning horizon.

4.2-5 Taxiway and Apron Requirements

The forecast of operations does not warrant any improvements to the existing taxiway system (runway exit taxiways, circulation, and staging areas) to enhance capacity. The airfield will continue to operate efficiently beyond the planning horizon without any taxiway improvements. It is useful, however, to identify potential improvements that can be made to the taxiway/apron system should air traffic track higher than the forecast.

Section 2.9-4 discusses the geometric layout of the taxiways at PSP. The Airport has three full length parallel taxiways: Taxiway W north of the passenger terminal and south of Runway 13R-31L, center Taxiway C north of Runway 13R-31L and south of Runway 13L-31R, and Taxiway E north of Runway 13L-31R. Parallel Taxiway W primarily serves air carrier aircraft. It serves both as a means for reaching the departure end of the runway and as a means for reaching the passenger terminal upon arrival. At many busy airports, depending on the layout of the terminals in relation to the runway, a second parallel taxiway is necessary to segregate opposing taxiing operations. The forecast operations level in conjunction with the location of the passenger terminal does not necessitate a second parallel taxiway south of Runway 13R-31L.

As discussed in Section 4-2.1, runway exit placement and type influences runway capacity. **Table 4-8** below presents the runway exit taxiways for PSP.

Table 4-8: Runway Exit Taxiways Description

Taxiway	Width	Description
B	75 feet	Exit taxiway for Runway 13R-31L connecting the runway with Taxiway W and the terminal area, also connects to Runway 13L-31R and Taxiway C
C-1	75 feet	East Flow high speed exit taxiway linking Runway 13R-31L with Taxiway C
D	50 feet	Connects the Sky West maintenance facility with Runway 13L-31R and Taxiway C
F	50 feet	Exit taxiway for Runway 13L-31R connecting the runway with Taxiway E
G	75 feet	Exit taxiway connecting Runway 13R-31L with Taxiway W
H	75 feet	Cross-field taxiway connector linking Taxiway W with Taxiway E
J	75 feet	Cross-field taxiway connector linking Taxiway W with Taxiway E, also serves as a runway entrance and exit at the Runway 13R displaced threshold
K	300 feet	Runway 13R-31L runway exit, entrance, and holding point at the base of the bend in Taxiway W
L	300 feet	Runway 13R-31L runway exit, entrance, and holding point at the far west end of the runway
W-1	75 feet	East flow high speed exit taxiway linking Runway 13R-31L with taxiway W

Source: HNTB Analysis

Runway occupancy time (ROT) impacts runway capacity. The longer an aircraft remains on the runway, the longer a successive aircraft must wait to utilize the runway. High speed, acute angle runway exits allow aircraft to exit the runway more quickly as they can turn onto the exit runway at a higher speed. A ninety degree perpendicular runway exit taxiway requires aircraft to decelerate to a very slow taxi speed prior to exiting the runway. An acute angle high speed taxiway allows an aircraft to exit the runway more quickly because aircraft can still be decelerating while exiting. A shorter runway occupancy time will yield a greater runway capacity as it shortens the duration of each arrival on the runway.

The main air carrier runway has a total of four high speed runway exit taxiways, two connecting to Taxiway W and two connecting to Taxiway C. Three of the four high speed exit taxiways (W-1, H, and C-1) can be used as a high speed taxiway exclusively in east flow. The west flow high speed exit taxiway (also Taxiway H) connects to Taxiway C. East flow high speed exit Taxiway W-1 is located approximately 3,800 feet from the Runway 13R threshold. A more useful high speed exit taxiway would be located in excess of approximately 5,500 feet from the runway threshold. It is not recommended that a high speed runway exit taxiway be included for Runway 13L-31R. General aviation aircraft have a slow final approach speed and their required landing distances are less predictable.

An additional future improvement to the apron and taxiway system would be to relocate and reconstruct the closed portion of Taxiway A further to the north. The relocation would allow for a sufficient envelope for potential landside improvements. A reconstructed Taxiway A would improve ingress and egress to/from the regional concourse. As peak traffic levels increase, a potential bottleneck may exist at the intersection of Taxiways B, W, and W-1. A reconstructed Taxiway A would better segregate inbound and outbound flows and improve congestion if it develops in this location.

4.2-6 Airside Requirements Summary

PSP's airside facilities have sufficient capacity to safely and efficiently carry the Airport through 2028. In summary, the following recommendations are made for PSP's airside facilities:

- Runways:
  1. Runway 13R-31L RSA improvement (short-term (2008-2018))
- Taxiways:
  1. Taxiway A reconstruction and relocation (long-term (2019-2028), beyond 2028):
  2. Relocate T/W W-1 further from the Runway 31L threshold (long-term, beyond 2028)
- NAVAIDS:
  1. Implement NEXTGEN (long-term)
- Airfield Lighting:
  1. No improvements required until or unless required by implementation of a precision approach.

4.3 GENERAL AVIATION RUNWAY IMPROVEMENT FEASIBILITY STUDY

PSP has two runways. The second, smaller runway, Runway 13L-31R, is designed to accommodate light general aviation aircraft. A feasibility study was conducted to determine the potential for improvements to the GA runway such that it could potentially accommodate air carrier operations. The purpose of the study was to determine whether limited improvements to the GA runway could both increase capacity and provide an alternative runway to utilize during maintenance or reconstruction of the primary air-carrier runway at PSP or during emergencies. Currently, when the primary air-carrier runway is closed for rehabilitation, Taxiway C is utilized on a temporary basis as a runway. This is a standard practice for single runway airfields where no runway redundancy is available.

Existing GA Runway Geometry

FAA Advisory Circular 150/5300-13 provides guidance for runway design. A discussion of the existing runway design geometry and associated runway elements is necessary to understand what improvements will be needed to potentially convert Runway 13L-31R into an Category C approach speed air-carrier runway.

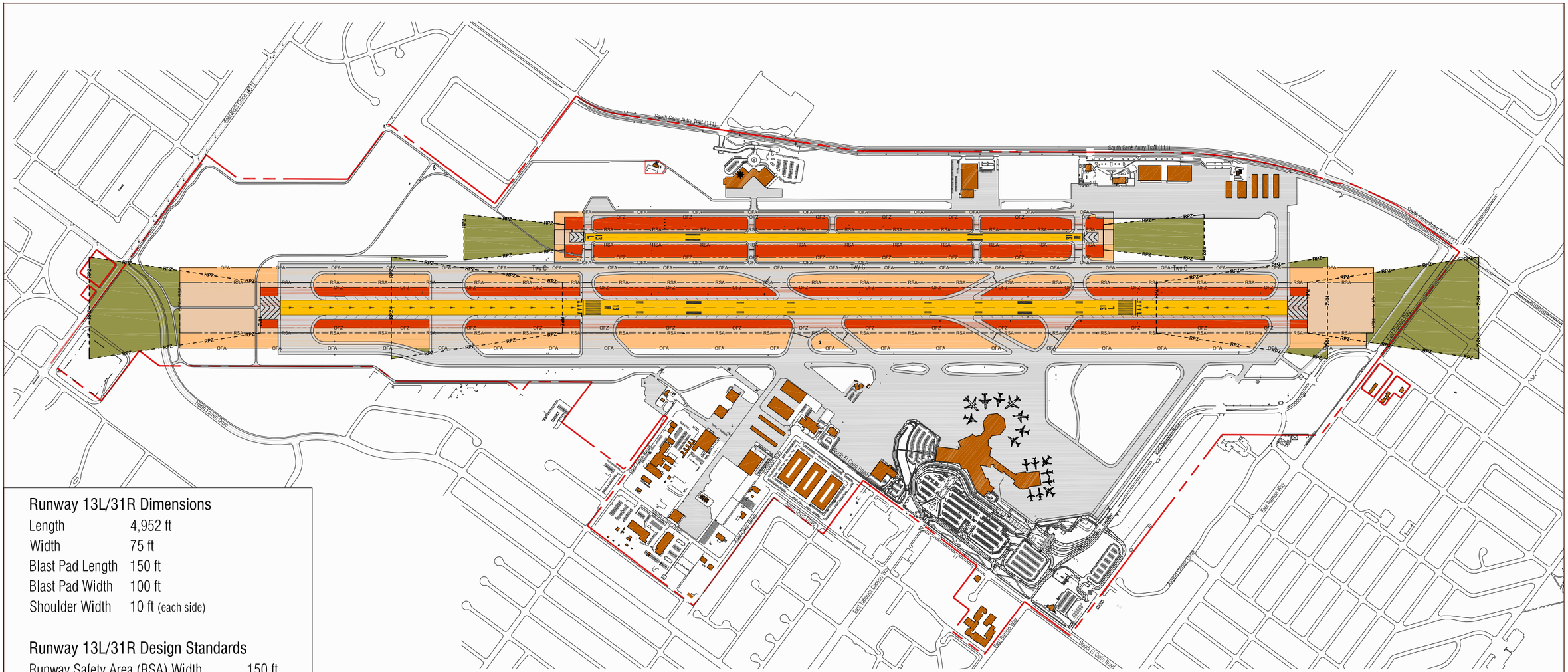
Runway 13L-31R dimensions 4,952 feet long by 75 feet wide. Each end of the asphalt constructed runway has a 150-foot blast pad. The threshold of Runway 13L is aligned with the end of the displaced threshold of Runway 13R. Runway 13L-31R is constructed on a 0.8 percent slope. The east end has an elevation of 407 feet above mean sea level (MSL) and the west end has an elevation of 449 feet above mean sea level (MSL). In addition to the main design components of the runway (length, width, shoulders, and blast pad), the associated runway elements such as Runway Safety Area, Obstacle Free Zone, Obstacle Free Area, and Runway Protection Zone must be considered. The Runway Safety Area (RSA) surrounds the runway and extends past both ends of the threshold. The Obstacle Free Zone (OFZ) is a three dimensional imaginary surface where no object penetrations are allowed including aircraft maneuvering except for frangible navigation equipment. The Object Free Area (OFA) provides clearing standards for

non-essential air equipment near the runway. The Runway Protection Zone (RPZ) is a trapezoidal area designed to protect people and property on the ground. Table 4-9 presents an inventory of the main runway design elements and the associated runway design elements. Figure 4-4 graphically depicts the existing primary and related runway geometry.

Table 4-9: Existing Runway 13L-31R Primary and Related Geometry

Design Element	Dimension
ADG	II
Approach Speed Category	B
Runway Length	4,952 feet
Runway Width	75 feet
Runway Shoulder Width	10 feet
Blast Pad Length	150 feet
Blast Pad Width	95 feet
RSA Length	5,552 feet
RSA Width	150 feet
OFZ Length	5,352 feet
OFZ Width	400 feet
OFA Length	5,552 feet
OFA Width	500 feet
RPZ Length	1,000 feet
RPZ Width	W1 = 250 feet, W2 = 450 feet

Source: HNTB Analysis



Runway 13L/31R Dimensions

Length	4,952 ft
Width	75 ft
Blast Pad Length	150 ft
Blast Pad Width	100 ft
Shoulder Width	10 ft (each side)

Runway 13L/31R Design Standards

Runway Safety Area (RSA) Width	150 ft
RSA Length beyond Runway	300 ft
Obstacle Free Zone Width	400 ft
Obstacle Free Zone beyond Runway	200 ft
Object Free Area Width	500 ft
Object Free Area beyond Runway	300 ft
Runway Protection Zone Length	1,000 ft
Runway Protection Zone Widths W1/W2	250/450 ft

Source: HNTB Analysis

PALM SPRINGS INTERNATIONAL AIRPORT
MASTER PLAN UPDATE

0 1000'

- Airport Property Line
- Object Free Area (OFA)
- Obstacle Free Zone (OFZ)
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Runways
- Taxiways / Apron

Existing Runway Design

Figure 4-4

Palm Springs International Airport
Master Plan

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Runway 13L-31R is currently designated for small and medium general aviation aircraft. Specifically, the runway is currently capable of accommodating aircraft up to Airplane Design Group (ADG) II and up to Category B approach speed aircraft. Airplane Design Group standards are presented in **Table 4-10**, and approach speed categories are presented in **Table 4-11**.

Table 4-10: Airplane Design Group

Airplane Design Group (ADG)	Wingspan	Example
I	Up to but less than 49 feet	Cessna 172
II	49 feet up to but less than 79 feet	CRJ 200, ERJ 145
III	79 feet up to but less than 118 feet	Boeing 737, Airbus A320
IV	118 feet up to but less than 171 feet	Boeing 757, Boeing 767, Boeing 787-3
V	171 feet up to but less than 214 feet	Boeing 777, Boeing 747, Airbus A340
VI	214 feet up to but less than 262 feet	Boeing 747-8, Airbus A380

Source: FAA AC 150/5300-13

Table 4-11: Approach Speed Categories

Approach Categories	Speed	Example
A	Less than 91 knots	Cessna 172
B	91 knots up to but less than 121 knots	Beach King Air
C	121 knots up to but less than 141 knots	CRJ 200. Boeing 737, Airbus A320
D	141 knots up to but less than 166 knots	Boeing 747, Airbus A380
E	166 knots and greater	-

Source: FAA AC 150/5300-13

Preliminary Runway 13L-31R Design Requirements

Without fully developing a runway design concept to allow Runway 13L-31R to operate as a Category C runway, a preliminary design layout can test the feasibility of undertaking such a project. The design requirements for runways accommodating Airplane Design Group III and Category C approach speed (Group C-III) aircraft are considerably more taxing on land area due to the increased size of object free areas and other safety areas. A preliminary design methodology will follow the design elements presented in Table 4-9. Primary runway design elements require physical changes to the runway and surrounding area. The following design elements are intended to serve as a preliminary feasibility analysis for accommodating Group C-III aircraft. The design elements depict minimums for upgrading Runway 13L-31R and should only be used for informative purposes.

Given the forecast fleet mix presented in the forecast, it would be advantageous for Runway 13L-31R to be able to accommodate mixed mode operations for Group C-III aircraft (Boeing 737, Airbus A320). Utilizing the runway length requirements analysis presented in Section 4.2-2, a suitable runway length can be determined for Runway 13L-31R. A key assumption in this analysis is to identify the runway length requirements for aircraft operating during hot day conditions. If the runway is intended to be used as a replacement during the rehabilitation of Runway 13R-31L, it will most likely be used during the summer season. A runway length of 6,500 feet can accommodate the majority of Group C-III aircraft operating at

PSP with a 90% maximum take-off load. A minimum runway width of 150 feet is required to accommodate Group C-III aircraft with a gross maximum take-off weight (MTOW) of more than 150,000 lbs. The required runway shoulder width is 25 feet. The runway blast pads, paved areas that protect the runways from the effects of jet blast, would be increased to a length of 200 feet and a width of 200 feet.

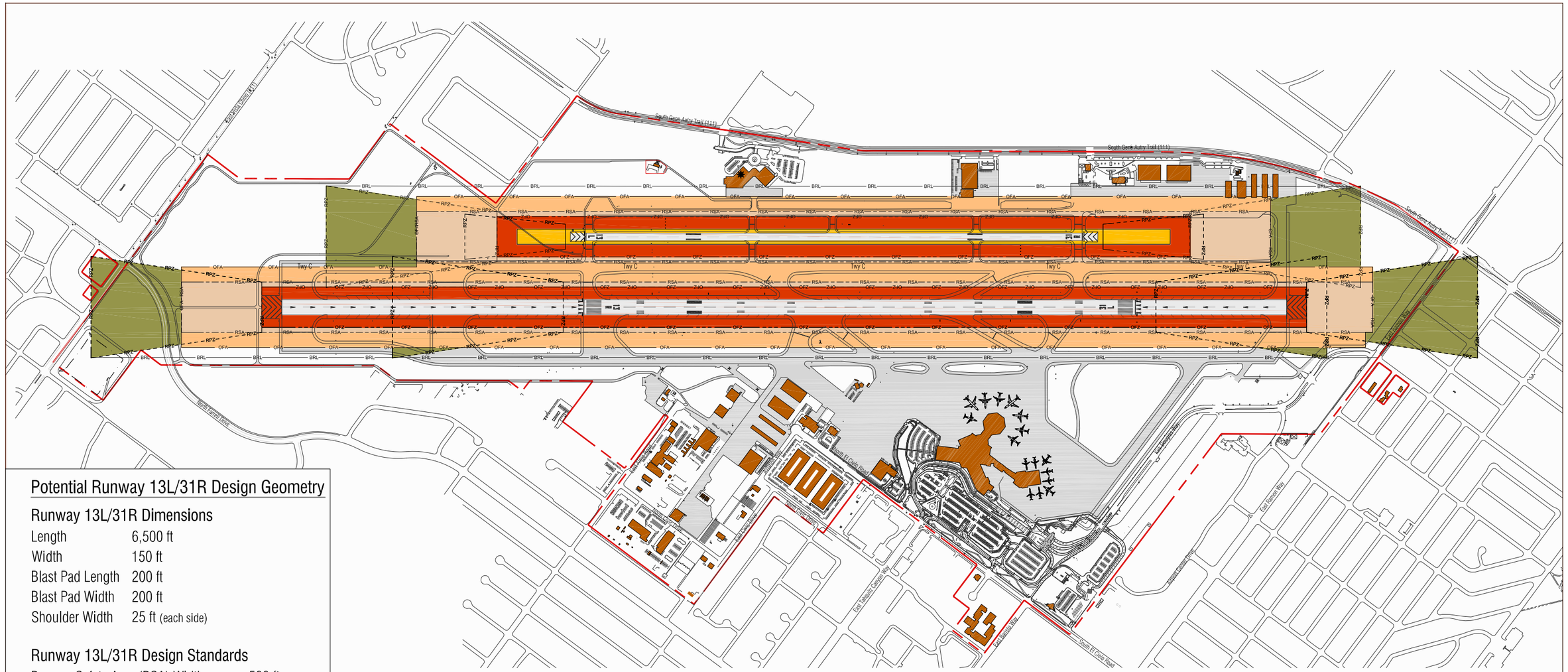
The pavement bearing strengths for Runway 13L-31R would have to be considerably enhanced in order to accommodate Group C-III aircraft. **Table 4-6** presents the current bearing capacity of both runways at PSP. Runway 13L-31R is rated for a dual wheel bearing strength of 60,000 lbs. The air carrier runway is rated for a dual wheel bearing strength of 200,000 lbs. Runway 13L-31R would eventually require a pavement redesigned to accommodate a dual wheel bearing strength of at least 175,000 lbs.

The associated runway design elements should also be redefined. The associated elements are directly correlated to the primary elements; the geometry of the areas is based off of the centerline and thresholds of the redesigned runway. The RSA would require widening to 500 feet and an extension to protrude 1,000 feet beyond the thresholds of the runway. The OFZ width could remain at its current 400 feet, but the length would require extension to protrude 200 feet beyond both thresholds. The OFA would require widening to 800 feet and would require an extension to the back of the RSA. The RPZ dimensions would be the same as the primary air carrier runway: a length of 1,700 feet, an inner width of 500 feet, and an outer width of 1,010 feet. The proposed requirements are summarized in **Table 4-12** and are presented with the existing runway geometry, and graphically presented in **Figure 4-5**.

Table 4-12: Proposed Runway 13L-31R Primary and Related Geometry

Design Element	Existing Geometry	Proposed Geometry
ADG	II	III
Approach Speed Category	B	C
Runway Length	4,952 feet	6,500 feet
Runway Width	75 feet	150 feet
Runway Shoulder Width	10 feet	25 feet
Blast Pad Length	150 feet	200 feet
Blast Pad Width	95 feet	200 feet
RSA Length	5,552 feet	8,500 feet
RSA Width	150 feet	500 feet
OFZ Length	5,352 feet	6,900 feet
OFZ Width	400 feet	400 feet
OFA Length	5,552 feet	8,500 feet
OFA Width	500 feet	800 feet
RPZ Length	1,000 feet	1,700 feet
RPZ Width	W1 = 250 feet, W2 = 450 feet	W1 = 500 feet, W2 = 1,010 feet

Source: HNTB Analysis



Potential Runway 13L/31R Design Geometry

Runway 13L/31R Dimensions

Length	6,500 ft
Width	150 ft
Blast Pad Length	200 ft
Blast Pad Width	200 ft
Shoulder Width	25 ft (each side)

Runway 13L/31R Design Standards

Runway Safety Area (RSA) Width	500 ft
RSA Length beyond Runway	1,000 ft
Obstacle Free Zone Width	400 ft
Obstacle Free Zone beyond Runway	200 ft
Object Free Area Width	800 ft
Object Free Area beyond Runway	1,000 ft
Runway Protection Zone Length	1,700 ft
Runway Protection Zone Widths W1/W2	500/1,010 ft
Aircraft Parking Limit Line (from Centerline)	500 ft

Source: HNTB Analysis

PALM SPRINGS INTERNATIONAL AIRPORT
MASTER PLAN UPDATE

0 1000'

- Airport Property Line
- Building Restriction Line
- Object Free Area (OFA)
- Obstacle Free Zone (OFZ)
- Runway Safety Area (RSA)
- Runway Protection Zone (RPZ)
- Runways
- Taxiways / Apron
- Potential Runway Extension

Runway 13L-31R Design Requirements

Figure 4-5

Palm Springs International Airport
Master Plan

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Restrictions and Benefits

Prior to discussing the capacity enhancing benefits of upgrading Runway 13L-31R, restrictions and limitations need to be examined. Runways 13L-31R and 13R-31L are spaced 700 feet apart centerline to centerline. Center Taxiway C is located 400 feet north of Runway 13R-31L and 300 feet south of Runway 13L-31R. FAA requires 400 feet of runway centerline to taxiway centerline separation to use a taxiway when the runway is active. From an aircraft safety and efficiency perspective, it is advantageous to have a center taxiway where aircraft can safely queue without disrupting runway operations. The additional queuing space provided by a center taxiway reduces the frequency of aircraft crossing an active runway. Taxiway E would require relocation to accommodate the larger RSA for upgraded Runway 13L-13R. Perhaps the most significant limitation associated with upgrading the runway is the impact to the aircraft parking limit line. FAA restricts aircraft from parking closer than 500 feet to an active Group C-III runway. This would impact the Atlantic Aviation FBO apron parking area. As depicted in Figure 4-5, the aircraft parking restriction line runs through Atlantic's tie-down apron. The restricted area also runs through the SkyWest Airlines maintenance facility and the apron for the flight museum. A portion of the OFA intersects some of Atlantic's hangars. An industrial property on the corner of Montalvo Way and East Tachevah Drive would likely require some level acquisition to accommodate the larger OFA that would bisect the property.

A dual air-carrier runway airfield would, however, offer two benefits. First, with constant demand, the two runways could provide an increased hourly capacity up to approximately 120 operations. PSP's consistently clear weather would allow for simultaneous runway operations without any usage restrictions. Second, the additional air-carrier runway would also provide redundancy during maintenance or rehabilitation events. The likely cost of implementing these improvements including the cost of mitigating land-use impacts, would be difficult to justify because PSP's airfield already provides sufficient capacity to meet forecast demand and has, in fact, operated at higher operations levels in the past than are forecast in the future. Further evaluation would be required if airfield delay became problematic at PSP.

4.4 TERMINAL FACILITY REQUIREMENTS

This section presents the terminal facility requirements. Functional components of the terminal facility analyzed and presented for the PSP Master Plan are listed below.

- Aircraft gates
- Passenger ticketing and check-in
- Passenger Security Screening Check Point (SSCP)
- Outbound baggage and baggage screening
- Inbound baggage
- Baggage claim
- Concessions
- International arrivals facilities

Terminal Level of Service

Terminal requirements are determined to meet a specified level of service. Level of service (LOS) applied to terminals is a description of the effectiveness of terminal facilities in accommodating passenger demand. LOS is indicated by lettered grades ranging from A to F. A LOS with a grade A (LOS A) indicates an optimally performing terminal facility. For example, in the passenger ticketing lobby, a LOS A would indicate ample room for passengers to maneuver in the queue area, sufficient number of agent positions at the ticketing counters, and overall, ample space to allow for an expedient and efficient passenger ticketing and baggage check-in process even during peak periods. However, given airport operational realities such as limited building space, fluctuating patterns in how passengers use airports throughout the day and year, and the cost of operating and maintaining terminal facilities, terminal planning efforts typically aim to provide a LOS B or C. The International Air Transport Association (IATA) describes a LOS B as a terminal facility that, "in a condition of stable flow, is characterized by very few delays and a high level of comfort".

Terminal requirements are determined by analyzing the capability of terminal facilities in handling peak existing and future passenger demand. Existing utilization rates are first determined based on existing peak hour passenger activity levels from an average day of the peak month (ADPM) and the current space allocation of each terminal functional component. They are then used in part to determine future terminal planning factors, which are indicative of how the terminal components should be utilized in the future. These planning factors are determined based on an analysis of the existing utilization rates. Utilization rates are determined based on on-site observations, how passengers utilize terminal functional components at comparable airports, industry standards, the Planning Team's experience, and LOS B considerations. The resulting planning factors are applied to existing and future peak hour average day peak month (PHADPM) passenger data to determine terminal facility requirements.

4.4-1 Terminal Planning Factors

Existing terminal utilization and future terminal planning factors, separated into the applicable functional components, are shown in **Table 4-13**. They are also described in the following sections.

Table 4-13: Terminal Planning Factors

Category	Existing Utilization Rate	Future Planning Factor
Passenger Ticketing and Check-In		
Ticket Counter Length	0.30 LF/PHOP	0.25 LF/PHOP
Ticket Counter Area	2.51 SF/PHOP	2.70 SF/PHOP
Ticket Counter Queuing	4.43 SF/PHOP	4.90 SF/PHOP
Ticketing Circulation	6.18 SF/PHOP	7.35 SF/PHOP
Airline Ticket Office	11.48 SF/PHOP	7.35 SF/PHOP
Passenger Screening		
Passenger Screening Checkpoint	140 PHOP/Lane	160 PHOP/Lane
Passenger Screening Area	1,226 SF/Lane	1,300 SF/Lane
Baggage Transfer		
Outbound Baggage Make-up	8.81 SF/PHOP	14.14 SF/PHOP
Inbound Baggage Area	3.03 SF/PHTP	11.50 SF/PHTP
EDS In-Line Baggage Screening Area	Encompassed in Outbound Baggage	7.13 SF/PHOP
Baggage Claim		
Baggage Claim Area	17.14 SF/PHTP	30.00 SF/PHTP
Baggage Claim Frontage	0.87 LF/PHTP	1.00 LF/PHTP
Baggage Claim Devices	225 LF/Device	225 LF/Device
Baggage Service Office Area	0.45 SF/PHTP	1.97 SF/PHTP
Baggage Claim Circulation Area	12.6 SF/PHTP	12.6 SF/PHTP
Concessions		
Concessions Area	0.020 SF/ANNEP	Held Constant
Public Areas		
Circulation – General	0.0182 SF/ANNEP	0.015 SF/ANNEP
Restrooms	1.65 SF/PHP	2.0 SF/PHP
Non-Public Areas		
TSA Offices	11.40 SF/PHOP	1.85 SF/PHOP
Airport Administration	0.016 SF/ANNEP	Held Constant
Airport Operations	-	Held Constant
Mech/Elec/Maint/Stor	0.10 Of Total Area	0.12 Of Total Area

Source: HNTB Analysis
SF = Square Feet; LF = Linear Feet; PHOP = Peak Hour Originating Passengers; PHTP = Peak Hour Terminating Passengers; ANNEP = Annual Enplaning Passengers

4.4-2 Gate Requirements

Gate requirements are a function of passenger aircraft operations and average gate utilization. Base year gate requirements are calculated using the March 2008 schedule from the Official Airline Guide (OAG) and in general assume a twenty-minute buffer between a departing aircraft and the next arriving aircraft at any given gate. Note that the existing number of gates that are required, based on schedule, is less than the available number of gates, indicating that there is excess gate capacity at this time. Since airlines cannot always operate according to their schedules, additional spare gate capacity is included to allow for off-schedule flights. This additional spare gate capacity is assumed to be 8 percent of the requirements calculated based solely on schedule.

Gate requirements in each category (wide-body, 757-class, etc.) are assumed to increase at the same rate as aircraft departures in that category. For the purpose of calculating gate requirements, however, it is assumed that mainline aircraft will be able to use any gate sized to accommodate their type or larger. Therefore, a new 757-class gate requirement is not assumed if there is available wide-body gate capacity. Consistent with existing practice, regional gate requirements are calculated separately from mainline gate requirements. The estimated gate requirements are modified slightly to reflect the anticipated additions of new airlines and new hub service from Table C-1 in Appendix C of the Aviation Activity Forecasts. In general, gate requirements are expected to increase more if new aircraft departures are the result of flights by new airlines to new hubs rather than increased frequencies by existing airlines to existing hubs.

As shown in **Table 4-14**, a requirement of 19 total gates is anticipated by 2028. Of these, 8 will need to be capable of accommodating mainline aircraft, and 9 will need to be capable of accommodating regional aircraft. Two additional gates or positions are needed to accommodate off-schedule or special low-frequency airline operations. However, there are several factors that could impact future gate requirements at PSP including:

- Changes in forecast activity,
- Adjustments in the spare gate percentage,
- Increased future gate utilization among the carriers,
- Changes from preferential use to common use gate lease arrangements,
- Use of hardstands, and
- Introduction of international service from locations without pre-clearance which would require sterile facilities for international arrivals processing.

New gates are not anticipated to be needed at PSP until after 2023. However, many factors can influence the need for additional gates and if passenger enplanements and operations at PSP grow faster than anticipated, new gates may be required at an earlier time. The alternatives analysis will identify potential locations for gate expansion but will not recommend a specific development plan for additional gates. By doing so, the potential for future gate development will be preserved and enhanced. It is expected that an update to this Master Plan will be prepared within five to ten years and that the gate requirements will be updated at that time.

Table 4-14: Forecast of Gate Requirements

		2008	2013	2018	2023	2028
Annual Aircraft Operations						
	Widebody	0	0	0	0	0
	757-Class	0	52	52	0	0
	Narrowbody	4,569	5,100	6,207	6,955	7,723
	Regional	8,736	9,552	10,335	10,764	11,218
Total		13,305	14,704	16,594	17,719	18,941
Gate Requirements*						
	Widebody	0	0	0	0	0
	757-Class	0	1	1	0	0
	Narrowbody	5	4	5	7	8
	Regional	7	8	8	9	9
	Spares**	1	2	2	2	2
Total		13	15	16	18	19
Utilization Rate * **						
	Average Annual	2.8	2.7	2.8	2.7	2.7
	Peak Month	4.3	3.9	4.2	4.0	4.0

Source: HNTB Analysis and as noted.
Notes: *Existing requirements based on March 2008 airline schedule. Assumed to increase at same rate as projected aircraft departures with some minor adjustments to reflect the number of airlines and hubs being served. ** Estimated at 8% of gate requirements without spares. *** Daily departures divided by number of gates.

4.4-3 Ticketing & Check-In Requirements

Passenger ticketing & check-in requirements are determined by an analysis of peak hour originating passengers during an average day during the peak month of activity. Passenger ticketing and baggage check-in area requirements are determined for the following functional components:

- Ticket counter positions (length and area),
- Ticket counter queue area,
- Circulation area within the ticketing hall, and
- Airline Ticket Office (ATO) area.

The length of the ticket counters today is 248 feet and comprises a total area, including the space directly behind and in front of the counter of approximately 2,369 square feet. Based on future planning factors, which account for emerging technology and trends in airline ticketing such as remote check-in, self service ticketing kiosks, and gate information display systems, ticket counter length and area requirements will be 363 feet in 2028 and 3,997 square feet of ticket counter area. The existing length of the ticket counter and total area of the ticket counters will need to be increased sometime after 2013.

The existing ticket counter queue area is approximately 2,384 square feet in area. Field observations and interviews with airport and airline staff revealed notable congestion in the ticketing lobby. The 2008 requirement indicates an almost doubling of queuing area. This requirement will grow to 7,268 square feet in 2028.

The existing ticketing circulation area is approximately 6,452 square feet. The circulation area requirement in 2013 of 7,308 square feet indicates a deficiency in total ticketing circulation area between 2008 and 2013. This deficiency will grow to approximately 4,500 square feet by 2028 with a total area requirement of 10,902 square feet.

Airline Ticket Offices (ATOs) support the day-to-day customer service and administrative operations of the airlines. Airline staffing reductions, electronic ticketing, and other efficiency improvements have reduced the demand for ATO space. The existing PSP ATOs provide sufficient area to accommodate ATO operations through the planning period.

The total ticketing area will need to be increased by approximately 10,000 square feet by 2028. This represents a sizeable increase in the ticketing area. This is primarily due to the PSP's very busy peak tourist season and the characteristics of PSP travelers. In addition to PSP travelers having a tendency to check more baggage, their baggage tends to be larger. As an example, PSP travelers carry nearly ten times the number of golf bags that a typical airport would see. In order for PSP to continue operating with a high level of service, the ticketing queue and lobby area will likely need to double in space to serve passenger activity levels in 2028. The passenger ticketing and baggage check-in requirements for PSP are presented in **Table 4-15**.

There are two measures that have the potential to improve the efficiency of the ticketing lobby including an increased use of self check-in kiosks and implementation of common-use ticket counters. Self check-in allows passengers traveling without checked baggage an opportunity to print their boarding passes without waiting in line for an airline agent. New developments in check-in kiosks also allow passengers with checked baggage to use the kiosks. Typically, an airline agent will staff multiple check-in positions and will assist passengers once their baggage-tags are printed. Passengers would still check-in and print their boarding passes themselves. This reduces the staffing requirement and generally allows for a shorter average passenger processing time. Another effective measure to increase utilization is to implement a common-use system ticketing system. A common-use system allows any airline to use any of the ticketing counters. Airlines would have the ability to spread out their ticketing operation to reduce lines during peak times. If two airlines that are currently located next to each other in the ticketing lobby have similar departure pushes, one could move to another part of the ticketing lobby to provide more space for their passengers. Common use ticketing positions may provide an interim solution to crowding in the ticketing area. It should be noted, however, that implementation of these systems would require modifications to existing airline lease and use agreements and it is not always the best alternative depending on the specific variables at any airport.

Table 4-15: Passenger Ticketing and Check-in Requirements

	Existing	2008	2013	2018	2023	2028
Ticket Counter Length (Linear Feet)	248	206	244	278	319	363
Ticket Counter Area (Square Feet)	2,369	2,264	2,680	3,063	3,506	3,997
Ticket Counter Queuing (Square Feet)	2,384	4,116	4,872	5,568	6,374	7,268
Ticketing Circulation (Square Feet)	6,452	6,174	7,308	8,353	9,561	10,902
Airline Ticket Office (Square Feet)	12,846	6,174	7,308	8,353	9,561	10,902
Total Required Area (Square Feet)	24,051	18,728	22,168	25,337	29,002	33,069
Ticketing Area Deficiency (Square Feet)	--	--	--	1,286	4,951	9,018

Source: HNTB Analysis

4.4-4 Passenger Screening Requirements

Passenger screening requirements were developed for the Transportation Security Administration (TSA) Security Screening Checkpoint (SSCP) facilities at PSP. Security screening facilities for passengers were recently expanded to include more queuing space and screening lanes in order to meet current TSA passenger screening guidelines. The facility currently has 6 screening lanes (three walk through metal detectors, one advanced imaging technology unit, six hand-carry x-ray belts), including a priority lane, and three search corrals. Each screening lane is equipped with a walk through metal detector (shared between two lanes) and an x-ray bag belt. The facility requirements analysis determined the existing SSCP's capacity and ability to accommodate future demand. The existing SSCP area, which includes passenger queue and screening areas totals approximately 7,354 square feet.

Future planning factors for the SSCP are derived from comparable airports and industry standards. The number of required lanes is driven by the number of peak hour originating passengers. The typical hourly throughput of each SSCP lane is on average, 160 passengers. Total throughput is effectively determined by the processing rate of the bag belts (as opposed to the walk through metal detectors). Since the events of September 11, 2001, security screening protocols have changed several times. Emerging technology and changing protocols will influence future SSCP requirements.

SSCP requirements are presented in **Table 4-16**. By 2028, the number of required checkpoints will increase by 3 lanes. The total 2028 screening area requirement of 11,700 square feet indicates a near doubling of the SSCP area is needed.

Table 4-16: Passenger Security Screening Requirements

	Existing	2008	2013	2018	2023	2028
Passenger Screening Checkpoints	6	5	6	7	8	9
Passenger Screening Area (Square Feet)	7,354	6,500	7,800	9,100	10,400	11,700
Area Deficiency (Square Feet)	--	--	446	1,746	3,046	4,346

Source: HNTB Analysis

4.4-5 Outbound Baggage and Baggage Screening Requirements

Following the baggage check-in process in the ticketing lobby, baggage is transported to the outbound baggage make-up and baggage screening area to be screened and sorted before being placed on an

outbound aircraft. Specifically, baggage is taken off of the outbound baggage conveyor belts manually and are loaded onto the CTX machines and screened for explosives through the explosive detection screening (EDS) system.

Outbound baggage make-up requirements are driven by peak hour originating passengers. Based on data from comparable airports, the future planning factor for outbound baggage is 14.14 square feet per peak hour originating passenger. Explosive detection screening is directly related to the peaking characteristics observed for outbound baggage. The EDS planning factor is 7.13 square feet per peak hour originating passenger. The EDS requirements assume that the system becomes an in-line system where no manual baggage loading is required; a conveyor directly links the ticket counters to the CTX machines. The forecast outbound baggage and EDS facility requirements for PSP are presented in **Table 4-17** below.

The existing outbound baggage and EDS area is inefficiently organized and undersized, with a total area deficiency today of approximately 3,155 square feet. This deficiency will grow to approximately 16,834 square feet by 2028.

Table 4-17: Outbound Baggage Requirements

	Existing	2008	2013	2018	2023	2028
Outbound Baggage Make-up (Square Feet)	7,404	11,874	14,055	16,064	18,387	20,967
EDS In-Line Baggage Screening (Square Feet)	7,303	5,988	7,088	8,101	9,273	10,574
Area Deficiency (Square Feet)	--	3,155	6,436	9,458	12,953	16,834

Source: HNTB Analysis

4.4-6 Inbound Baggage Requirements

The inbound baggage system includes the stripping lanes where baggage removed from arriving aircraft is unloaded from tugs onto the bag belts for passengers to retrieve in the bag claim hall. Inbound baggage requirements are driven by the volume of peak hour terminating passengers.

As discussed in Chapter 2, the inbound baggage system is currently congested during peak passenger arrival periods. A principal problem is that the baggage stripping lanes are too close to one another. The distances between baggage carousels 1 and 2 and between baggage carousels 2 and 3 are 8 feet- 9 inches and 11 feet, respectively. The baggage stripping lanes, where baggage is placed onto bag belts from arriving aircraft, presents a problem for airline personnel when simultaneously unloading bag carts from different flights. The existing utilization factor for inbound baggage area is 3.03 square feet per peak hour terminating passenger. Based on facilities at comparable airports, the planning factor for inbound baggage is 11.50 square feet per peak hour terminating passenger.

Requirements based on the planning factor indicate a current deficiency of approximately 6,620 square feet. This deficiency will grow to 13,480 square feet when requirements reach 15,819 square feet in 2028. The inbound baggage requirement is presented in **Table 4-18**.

Table 4-18: Inbound Baggage Requirements

	Existing	2008	2013	2018	2023	2028
Inbound Baggage (Square Feet)	2,339	8,959	10,604	12,120	13,872	15,819
Inbound Baggage Deficiency	--	6,620	8,265	9,781	11,533	13,480

Source: HNTB Analysis

4.4-7 Baggage Claim Requirements

The baggage claim area requirements include baggage claim device frontage, the number of devices, baggage service office area, and baggage claim circulation area. The existing baggage claim area is approximately 13,247 square feet. The area includes 3 flat-bed baggage claim devices with a total linear frontage of approximately 675 feet, a 516 square foot baggage claim service office, and approximately 9,800 square feet of baggage claim circulation.

Baggage claim facility requirements are driven by peak hour terminating passengers. Observations of the overall baggage claim area during peak arrival periods revealed congested conditions with low levels of passenger convenience. Interviews with airport staff further confirm concerns regarding congestion levels within the existing bag claim area during peak periods.

The existing planning factor for baggage claim frontage is approximately 0.87 feet per peak hour terminating passenger. To improve the level of service and to better capture the unique baggage requirements of visitors to Palm Springs, a planning factor of 1.00 square foot per peak hour terminating passenger was utilized. The planning factor for determining the number of baggage claim devices required is based directly on the required linear frontage. The existing average linear frontage per device is approximately 225 feet. This factor is expected to hold constant throughout the planning horizon. Observations reveal baggage service office areas are deficient at PSP. The planning factor selected for baggage service offices is 1.97 square feet per peak hour terminating passenger. Required baggage claim circulation area is based on a planning factor of 12.6 square feet per peak hour terminating passenger. **Table 4-19** below presents the facility requirements for the baggage claim area through 2028. By 2028, the total baggage claim area will need to nearly triple in size from 13,247 square feet to 41,267 square feet in 2028. The same characteristics of PSP travelers that influence the volume of space required for bag check-in facilities also influence bag claim facilities. The higher than average volume of baggage and large size of baggage, including golf clubs, combined with the very busy peak season at PSP, will require a substantial expansion of PSP bag claim facilities. It should be noted, however, that these requirements are predicated on maintaining a high level of service, even during peak times.

Table 4-19: Baggage Claim Facility Requirements

	Existing	2008	2013	2018	2023	2028
Baggage Claim Frontage (Linear Feet)	675	779	922	1,054	1,206	1,376
Baggage Claim Devices	3	3	4	5	5	6
Baggage Service Office (Square Feet)	516	1,535	1,817	2,076	2,376	2,710
Baggage Claim Circulation (Square Feet)	9,834	9,815	11,619	13,279	15,199	17,332
Baggage Claim Total Area (Square Feet)	13,247	23,370	27,663	31,617	36,189	41,267
Baggage Claim Deficiency (Square Feet)	--	10,123	14,416	18,370	22,942	28,020

Source: HNTB Analysis

4.4-8 Concessions Requirements

A total of 11 concessionaires are located in the terminal pre-security and post-security areas, encompassing a total of 15,200 square feet. A determination of concession requirements is based on providing a high level of service for airport customers relative to PSP peer airports in the domestic U.S. market. Depending on the recommended terminal expansion plans, additional concessions may be added or existing concessions may be reconfigured.

4.4-9 International Facility Requirements

The Forecast of Aviation Activity does not forecast international air carrier flights from destinations other than Canada. Currently, all scheduled air carrier passengers traveling from Canadian airports to the United States clear customs prior to departure in Canada. Accordingly, there is no requirement for Customs and Border Protection (CBP) facilities for scheduled air carrier aircraft at PSP. The current facility, which caters exclusively to international general aviation arrivals, is capable of processing flights with a maximum of 15 passengers and crew. The alternatives analysis explores potential alternations to the existing international arrivals facility.

4.4-10 Terminal Facility Requirements Summary

Table 4-20 presents a summary of terminal facility requirements for Palm Springs International Airport broken down by functional area. The total processor size requirement is approximately 237,000 square feet representing 66% increase in area as compared to the existing 106,180 square feet.

Table 4-20: Processor Terminal Facility Requirements Summary

	Existing	2008	2013	2018	2023	2028
Gates	16	13	15	16	18	19
Ticketing	3	3	4	5	5	6
Ticket Counter Length (Lin. Feet)	248	206	244	278	319	363
Ticket Counter Area (Sq. Feet)	2,369	2,264	2,680	3,063	3,506	3,997
Ticket Counter Queuing (Sq. Feet)	2,384	4,116	4,872	5,568	6,374	7,268
Ticketing Circulation (Sq. Feet)	6,452	6,174	7,308	8,353	9,561	10,902
Airline Ticket Offices (Sq. Feet)	12,846	6,174	7,308	8,353	9,561	10,902
Passenger Security Screening						
Security Screening Checkpoint (lanes)	6	5	6	7	8	9
Security Screening Area (Sq. Feet)	7,354	6,500	7,800	9,100	10,400	11,700
Baggage Transfer						
Outbound Baggage Make-up (Sq. Feet)	7,404	11,874	14,055	16,064	18,387	20,967
Inbound Baggage (Sq. Feet)	2,339	8,959	10,604	12,120	13,872	15,819
EDS In-Line Baggage Screening (Square Feet)	7,303	5,988	7,088	8,101	9,273	10,574
Baggage Claim						
Baggage Claim Frontage (Lin. Feet)	675	779	922	1,054	1,206	1,376
Baggage Claim Devices	3	3	4	5	5	6
Baggage Service Office (Sq. Feet)	516	1,535	1,817	2,076	2,376	2,710
Baggage Claim Circulation (Sq. Feet)	9,834	9,815	11,619	13,279	15,199	17,332
Baggage Claim Total Area (Sq. Feet)	13,247	23,370	27,663	31,617	36,189	41,267
Public Area						
USO (Sq. Feet)	1,252	1,252	1,252	1,252	1,252	1,252
General Circulation (Sq. Feet)	24,325	11,611	14,338	16,388	18,757	21,390
Restrooms (Sq. Feet)	2,021	2,444	2,893	3,306	3,785	4,316
Concessions (Sq. Feet)	6,764	6,764	6,764	6,764	6,764	6,764
Non Public Area						
TSA Offices (Sq. Feet)	2,202	1,554	1,839	2,120	2,406	2,744
Airport Administration (Sq. Feet)	5,750	5,750	5,750	5,750	5,750	5,750
Airport Operations (Sq. Feet)	4,858	4,858	4,858	4,858	4,858	4,858
Other						
Mech/Elec/Maint/Storage (Sq. Feet)	7,529	15,271	17,738	19,953	22,515	25,361
Total Processor Area (Sq. Feet)	116,399	124,923	144,811	162,712	183,211	205,831
Total Processor Area Deficiency (Sq. Feet)		8,542	28,412	46,313	66,812	89,432

Source: HNTB Analysis

4.5 LANDSIDE FACILITY REQUIREMENTS

This section presents the airport landside facility requirements. The functional components of the airport landside include:

- Airport roadways
- Terminal curbside
- Parking facilities
- Rental car facilities

The facility requirements analysis determines the required capacities to accommodate the forecast passenger demand levels. A discussion of these requirements as it relates to providing an acceptable level of service (LOS) is also presented.

Summary of Forecast Passenger Demand

The Aviation Activity Forecast projects passenger activity levels to grow from an existing 1.55 million annual passengers (MAP) in 2008 to 1.83, 2.19, 2.50, and 2.85 MAP, respectively, in 2013, 2018, 2023, and 2028. While enplaned and deplaned passenger data on the average day peak month (ADPM) are used as the metric for determining terminal facility requirements, it is the peak hour origination and destination (O&D) passenger data which is typically used to determine landside facility requirements. O&D data excludes connecting and non-revenue passengers and is derived from ADPM passenger data. Enplaned and deplaned passenger data is used to determine landside facility requirements because O&D data is unavailable. The enplaned and deplaned passenger data comprises only a small percentage (1-2%) of connecting and non-revenue passengers which, for a high-level master planning purpose, is negligible.

Landside facility requirements are determined for the 2008, 2013, 2018, 2023, and 2028 planning activity years (referred as the planning horizon) and compared to a level of service deemed acceptable for the airport. Landside requirements are presented for four airport areas:

- Airport roadways – peak hour traffic volumes
- Terminal curbside - length of curb
- Parking facilities (public and employee) – number of stalls, acreage of facilities
- Rental car facilities - number of stalls, acreage of facilities (ready / return parking lot, service / quick turn-around (QTA), maintenance, and storage areas)

Roadway Level of Service

Level of service (LOS) is a lettered grade description of traffic operating conditions ranging from LOS A to LOS F. It is an indicator of the amount of congestion and delay on a particular roadway segment, intersection, or other study area. LOS for vehicular traffic is defined in terms of the volume to capacity ratio (V/C) (i.e. the existing or forecast volume of vehicles per hour (vph) (demand) divided by the maximum vehicles per hour (capacity) that a specific roadway segment or specific traffic study area can accommodate). A level of service with a grade A represents excellent, free-flow traffic conditions. A level of service with a grade F represents a critical failure of roadway conditions with slow speeds and considerable delays. As the vehicle capacity ratio (V/C) approaches 1.0, the roadway approaches LOS F. The roadway level of service definitions as set by the City of Palm Springs are shown in Table 4-21.

Table 4-21: Airport Roadway System Level of Service Definitions

Level of Service	Volume-to-Capacity Ratio	Definition
A	0.00 – 0.60	EXCELLENT – Free flow, light volumes
B	0.61 – 0.70	VERY GOOD – Free to stable flow, light to moderate volumes
C	0.71 - 0.80	GOOD – Stable flow, moderate volumes, freedom to maneuver noticeably restricted
D	0.81 – 0.90	FAIR – Approaches unstable flow, moderate to heavy volumes, limited freedom to maneuver
E	0.91 – 0.99	POOR – Extremely unstable flow, heavy volumes, maneuverability and psychological comfort extremely poor
F	≥ 1.00	FAILURE – Forced or breakdown conditions, slow speeds, tremendous delays with continuously increasing queue lengths

Source: City of Palm Springs General Plan

A roadway LOS C is typically regarded for airport landside planning efforts as an acceptable level of service to plan for. This level of service is characterized by moderate congestion levels during the busiest or peak periods of the day. Traffic operations during the remainder of the day typically operate at LOS A or B.

4.5-1 Airport Roadway System Requirements

The Airport roadway system comprises all on-airport property access and circulation roads, including the airport loop road that circulates traffic to and from the terminal area. Requirements are determined for all roadways, excluding those serving general aviation facilities, rental car quick turn-around facilities, and other support facilities not located near the terminal building, by comparing the existing and forecast ground transportation demand (measured in the volume of vehicles utilizing Airport roadways) to the existing and future capacity of the roadways.

Airport Roadway System Demand

Average daily traffic counts at on-airport access points provide demand information regarding volumetric (number of vehicles), spatial (location) and temporal (time) distributions of traffic generated by passengers and employees. Together with existing roadway capacity information, traffic volume information is used to evaluate roadway LOS, indicating efficiencies and deficiencies in the use of the roadway system. Considered jointly with air passenger activity levels, traffic volumes also provide benchmark information for determining airport trip generation rates, which are used to estimate future airport roadway traffic activity levels.

Existing 24-hour vehicular traffic volumes were collected via automated traffic recorders (ATR) placed at airport entrance and exit points between March 2009 and April 2009. As necessary, traffic volumes were estimated based on traffic volumes collected by airport staff between December 2007 and March 2008. The ATRs, each assigned with an identifying number, and the airport roadway system are shown in **Figure 4-6** and listed in **Table 4-22**.

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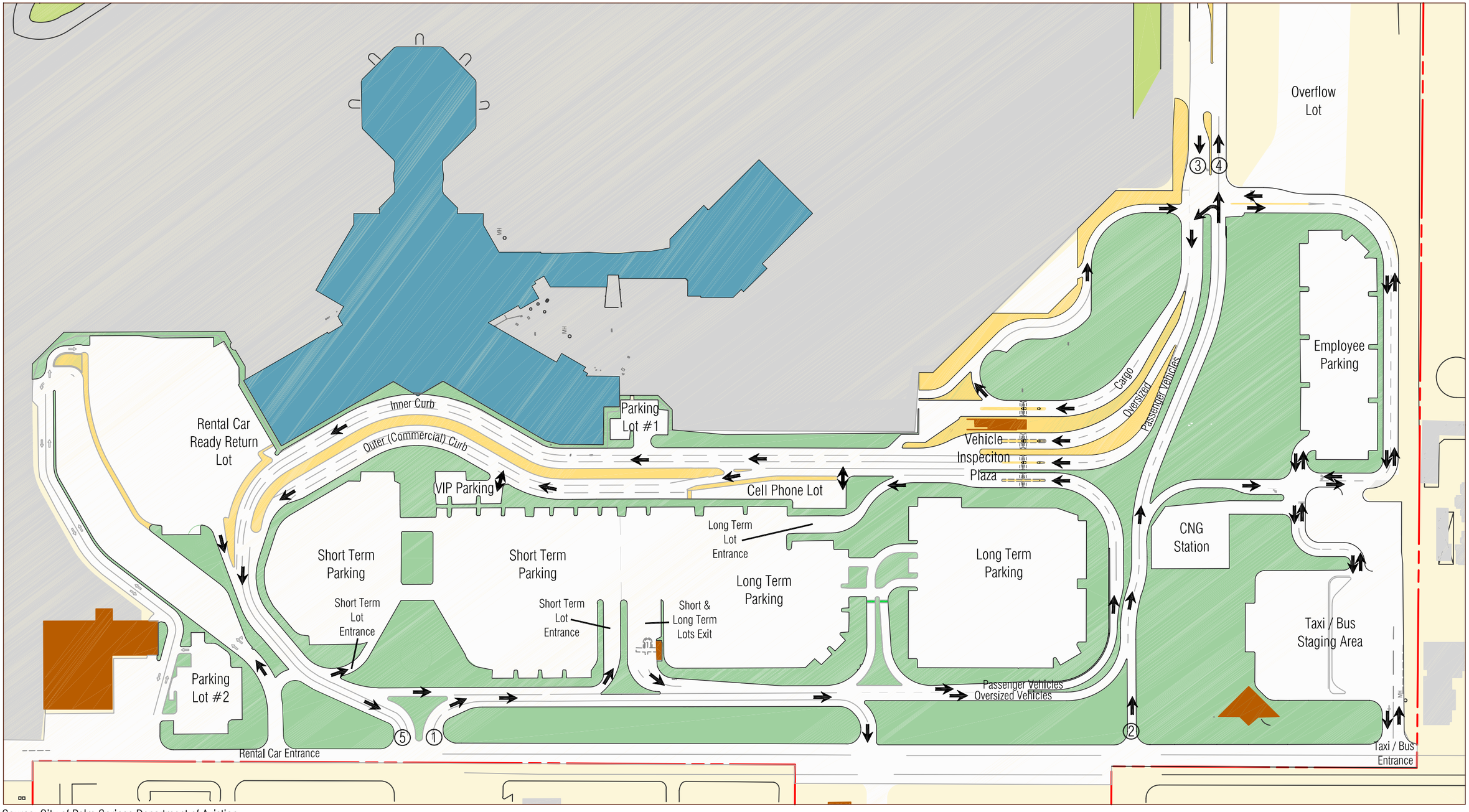

Source: City of Palm Springs Department of Aviation

PALM SPRINGS INTERNATIONAL AIRPORT
MASTER PLAN UPDATE

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Airport Access and Roadway Circulation System

Figure 4-6

Palm Springs International Airport
Master Plan

Table 4-22: 2009 Existing Traffic Volumes and Roadway Capacities at Airport Roadway Locations

ID	Airport Roadway Location	Average Daily Traffic Volume (ADT)	Peak Hour Traffic Volume*	No. of Lanes	Max Lane Capacity (vph / lane))	Max Roadway Capacity at LOS E (vph)	Roadway Capacity at LOS C (vph)
Entrances							
E1	East Tahquitz Canyon Way / South El Cielo Road	1,653	230	2	900	1,800	1,440
E2	Baristo Road (to Kirk Douglas Way)	2,816	483**	1	700	700	560
E3	Kirk Douglas Way (to the Airport)	2,806	422	2	900	1,800	1,440
E4	Rental Car Ready/Return Lot	626	132	1	700	700	560
E5	Taxi / Bus Staging Entrance (near the intersection of El Cielo Road and East Ramon Road)	284	64	1	700	700	560
Exits							
E6	Kirk Douglas Way (to Resort Cities)	5,083	641	2	900	1,800	1,440
E7	East Tahquitz Canyon Way / South El Cielo Road	2,039	522**	3	900	2,700	2,160
E8	Airport Loop Exit (near the intersection of El Cielo Road and Gary Kitchen Way)	745	111	1	700	700	560
E9	Taxi / Bus Staging Exit (near the intersection of El Cielo Road and East Ramon Road)	238	38	1	700	700	560
Entrance / Exit Total		**16,290****	**2,642**				
Airport Roadway Segments							
R1	Air Cargo Road	78	17	1	700	700	560
R2	Kirk Douglas Way to Terminal Curbside	2,993	469	3	900	2,700	2,160
R3	Airport Loop Road from East Tahquitz Canyon Way to Terminal Curbside	933	157	1	700	700	560
R4	Airport Loop Road from East Tahquitz Canyon Way to Baristo Road	2,150	295	1	700	700	560
R5	BaristoRoad to Employee Parking Lot	107	27	1	700	700	560
R6	Employee Parking Lot to Kirk Douglas Way	639	102	1	700	700	560
R7	Kirk Douglas Way to Employee Parking Lot	653	102	1	700	700	560
R8	Baristo Road to Kirk Douglas	5,073	751	2	900	1,800	1,440

ID	Airport Roadway Location	Average Daily Traffic Volume (ADT)	Peak Hour Traffic Volume*	No. of Lanes	Max Lane Capacity (vph / lane))	Max Roadway Capacity at LOS E (vph)	Roadway Capacity at LOS C (vph)
	Way						
Terminal Curbside							
C1	Inner Curb	4,589	631	3	900	2,700	2,160
C2	Outer Curb	840	115	3	900	2,700	2,160
Public Parking Lot							
PP1	Short-Term Lot South Entrance	114	36	1	700	700	560
PP2	Short-Term Lot North Entrance	502	91	1	700	700	560
PP3	Long-Term Lot Entrance	256	89	1	700	700	560
PP4	Short- and Long-Term Lot Exit	842	153	2	900	1,800	1,440
Employee Parking Lot							
EP1	Employee Parking Lot Entrance	150	28	1	700	700	560
EP2	Employee Parking Lot Exit	125	23	1	700	700	560
Rental Car Facility (adjacent to Terminal Building)							
RC1	Ready / Return Lot Exit to Airport Loop Road	656	135	1	700	700	560

Source: Palm Springs International Airport traffic count data (March 2009 – April 2009), HNTB Analysis
Note: * Peak hour traffic volume data were collected from a survey conducted in March 2009. The peak hour traffic volumes are adjusted based on an 11.82% decrease in passenger activity levels from March 2008 to March 2009. **Traffic volumes were estimated based on traffic data collected between March 2009 and April 2009 at nearby roadway locations.
Note: vph = vehicles per hour

Historical operations and air passenger data indicates March as the peak airport activity month. For the purposes of this study, the average daily traffic (ADT) traffic volume collected during the study period is used as a surrogate measure of the ADPM. Traffic counts indicate the peak hour for vehicular activity on airport roadways occurs between 10 AM and 12 PM along the airport loop road.

The ADT in both directions on airport roadways between March 11, 2009 and April 22, 2009 averaged 16,290 vehicles. Traffic volumes at the airport entrance at Baristo Road, airport exit at East Tahquitz Canyon Way, and Terminal Loop exit at the intersection of El Cielo Road and Gary Kitchen Way are estimated based on traffic volumes on nearby segments. The peak hour volume at the Airport is 2,642 vehicles. The ADT and peak hour traffic volumes at the airport entrance and exit locations are summarized in **Table 4-22**.

Trip Generation

Daily and peak hour trip generation rates are used to estimate future roadway traffic volumes based on existing (2008) ADT volumes and air passenger activity levels. Mathematically, the daily trip generation rate, assumed to remain constant through the planning horizon (e.g. no change in traffic or roadway conditions), is determined for PSP by dividing the ADT of 16,290 vehicles by the average annual day enplaning and deplaning passengers of 4,241 passengers. The resulting trip generation rate is 3.841 vehicles per day (VPD) per passenger. The peak hour ratio is mathematically determined by dividing the

peak hour traffic volume by the ADT, resulting in a ratio of approximately 16%. This rate represents the ratio for all roadways and is applied to future air passenger activity levels to obtain future traffic volumes. The trip generation rates and resulting future traffic are shown in Table 4-23. Average daily and peak hour traffic volumes will nearly double by 2028.

Table 4-23: Airport Roadway System Trip Generation Rates

	2008	2013	2018	2023	2028
Airport Activity Level					
Annual Passengers (enplaned and deplaned)	1,548,112	1,827,801	2,185,020	2,500,900	2,851,937
Average Daily Passengers	4,241	5,008	5,986	6,852	7,814
Airport Roadway Trip Generation					
Average Daily Terminal Traffic (ADT)	16,290	19,233	22,992	26,317	30,009
Trip Rate (ADT / Average Daily Passengers)	3.841	3.841	3.841	3.841	3.841
Peak Hour Ratio	~16%	~16%	~16%	~16%	~16%
Actual Peak Hour Traffic	2,363	2,790	3,335	3,817	4,353
Adjusted Peak Hour Traffic*	2,642	3,120	3,729	4,269	4,868

Source: HNTB Analysis

Note: * Actual peak hour traffic volume data were collected from a survey conducted in March 2009. The actual peak hour traffic volumes are adjusted based on a 11.82% decrease in passenger activity levels from March 2008 to March 2009.

Airport Roadway System Capacity

The future capacity of the airport roadway system is determined for each roadway segment based on, the peak hour ratio, number of lanes, and the industry standard maximum lane capacity of 900 vehicles per hour per lane for roads with 2 or more lanes and 700 vehicles per hour for roads with 1 lane. The maximum lane capacity is determined based on the typical usage of the road and vehicle speeds. To determine the roadway segment capacity at a LOS C, the roadway segment capacity is multiplied by 80%, representing traffic conditions characteristic of a stable flow, moderate volumes and where the freedom to maneuver is noticeably restricted. The existing roadway capacity for each roadway segment is summarized in Table 4-22. The existing and future peak hour traffic and level of service for each roadway segment is summarized in Table 4-24.

Table 4-24: Airport Roadway System – Existing and Future Levels of Service

	Roadway Segment	Peak Hour Traffic (vph)					Level of Service				
		2008	2013	2018	2023	2028	2008	2013	2018	2023	2028
Airport Entrances											
E1	East Tahquitz Canyon Way / South El Cielo Road	230	272	325	372	424	A	A	A	A	A
E2	Baristo Road (to Kirk Douglas Way)	483	570	682	780	890	D	F	F	F	F
E3	Kirk Douglas Way (to the Airport)	422	498	595	681	777	A	A	A	A	A
E4	Rental Car Ready/Return Lot	132	156	186	213	243	A	A	A	A	A
E5	Taxi / Bus Staging	64	75	90	103	117	A	A	A	A	A
Airport Exits											
E6	Kirk Douglas Way (to Resort Cities)	641	756	904	1,035	1,180	A	A	B	C	D
E7	East Tahquitz Canyon Way / South El Cielo Road	522	617	737	844	962	A	A	A	A	A
E8	Airport Loop Exit	111	131	156	179	204	A	A	A	A	A
E9	Taxi / Bus Staging	38	45	54	61	70	A	A	A	A	A
Airport Roadway Segments											
R1	Air Cargo Road	17	20	24	27	31	A	A	A	A	A
R2	Kirk Douglas Way to Terminal Curbside	469	553	661	757	863	A	A	A	A	A
R3	Airport Loop Road from East Tahquitz Canyon Way to Terminal Curbside	157	185	221	253	288	A	A	A	A	A
R4	Airport Loop Road from East Tahquitz Canyon Way to Baristo Road	295	349	417	477	544	A	B	C	D	E
R5	Baristo Road to Employee Parking Lot	27	32	38	43	49	A	A	A	A	A
R6	Employee Parking Lot to Kirk Douglas Way	102	120	144	164	187	A	A	A	A	A
R7	Kirk Douglas Way to Employee Parking Lot	102	120	144	164	187	A	A	A	A	A
R8	Baristo Road to Kirk Douglas Way	751	887	1,061	1,214	1,384	A	B	C	D	E
Terminal Curbside											
C1	Inner Curb	631	745	890	1,019	1,162	A	A	A	A	B
C2	Outer Curb	115	136	163	186	212	A	A	A	A	A
Public Parking Lot											
PP1	Short-Term Lot South Entrance	36	42	51	58	66	A	A	A	A	A
PP2	Short-Term Lot North Entrance	91	107	128	146	167	A	A	A	A	A

	Roadway Segment	Peak Hour Traffic (vph)					Level of Service				
		2008	2013	2018	2023	2028	2008	2013	2018	2023	2028
PP3	Long-Term Lot Entrance	89	106	126	145	165	A	A	A	A	A
PP4	Short- and Long-Term Lot Exit	153	181	216	247	282	A	A	A	A	A
Employee Parking Lot											
EP1	Employee Parking Lot Entrance	28	33	39	45	51	A	A	A	A	A
EP2	Employee Parking Lot Exit	23	28	33	38	43	A	A	A	A	A
Rental Car Facility (adjacent to Terminal Building)											
RC1	Ready/Return Lot Exit to Airport Loop Road	135	160	191	219	249	A	A	A	A	A

Source: HNTB Analysis
Notes: vph = vehicles per hour

Airport Roadway System Requirements

Peak hour traffic volumes are highest at airport entrances via Kirk Douglas Way (16%) and Baristo Road (18%). The LOS on Kirk Douglas Way will remain at a LOS A through 2028. The Baristo Road segment is currently at an unacceptable LOS D. Contributing to this traffic are vehicles entering the Airport from the west directly onto Baristo Road and from East Tahquitz Canyon Way on the loop road. The LOS on Baristo Road will reach LOS F by 2013. It is believed most of this traffic is not airport-related, but rather bypass traffic from the surrounding community. One possible solution to prevent the bypass traffic is to close the entrance at Baristo Road.

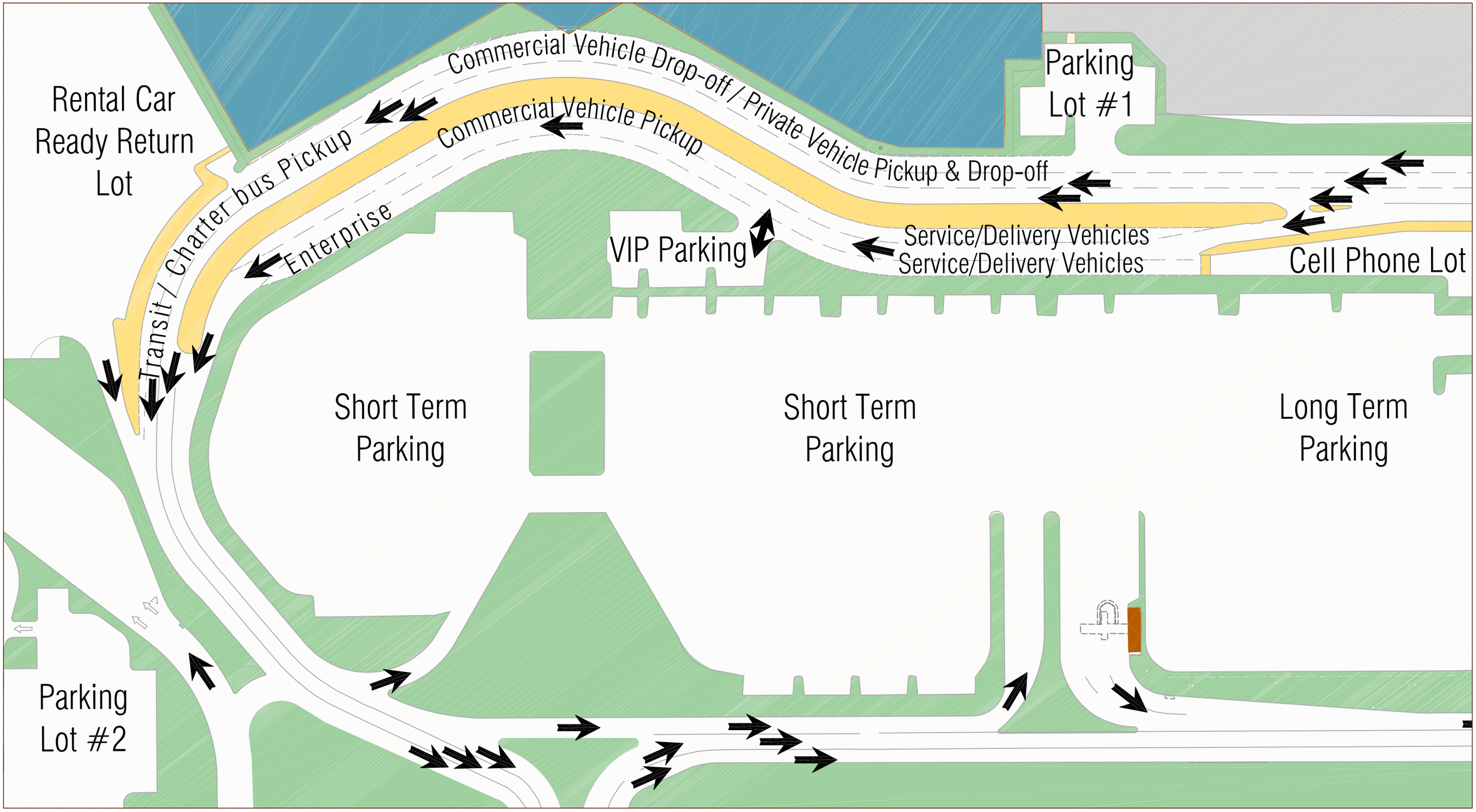
Peak hour traffic volumes are highest at airport exists via East Tahquitz Canyon Way (20%) and Kirk Douglas Way (24%). The LOS on East Tahquitz Canyon Way will remain at a LOS A through 2028. Traffic levels for the Airport exit on Kirk Douglas Way will reach LOS D sometime around 2028 when the total annual passenger count climbs above 2.85 million annual passengers. Much of this traffic may be reduced by the closure of the airport entrance at Baristo Road.

4.5-2 Terminal Curbside Requirements

Terminal curb requirements are determined to accommodate the forecast volume of passengers. Requirements are developed for the terminal curbside based on passenger activity levels and the number of and usage of ground transportation vehicles at the terminal curbside. Requirements are developed specifically in the area where passengers are picked-up and dropped off and where vehicles drive through the terminal curbside area.

Curbside Passenger Pick-up and Drop-off Area

The Airport terminal curbside area consists of two curbs, the inner (private vehicle) curb and the outer (commercial vehicle) curb. The terminal curbside layout and the allocation of vehicles at each curbside are shown in Figure 4-7 and are described in Table 4-25. The modal splits are summarized by mode and specified curbside in Table 4-26.



Source: City of Palm Springs Department of Aviation

PALM SPRINGS INTERNATIONAL AIRPORT
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Terminal Curbfront Ground Transportation Vehicle Allocation

Figure 4-7

Palm Springs International Airport
Master Plan

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Table 4-25: Terminal Curbs and Associated Vehicle Types

Terminal Curb	Vehicle Types
Inner (Passenger Vehicle) Curb	*Private vehicles* – pick-up and drop-off (attended parking) *Taxi* – drop-off (attended parking) *Limo* – drop-off (attended parking) *Hotel / Motel shuttle* – drop-off (attended parking) *For-hire van / shuttle* – drop-off (attended parking) *Charter / Tour buses* – pick-up and drop-off (attended parking) *Transit buses* - pick-up and drop-off (attended parking) *Airport operations and security* - (unattended parking)
Outer (Commercial Vehicle) Curb	*Taxi* – pick-up (attended parking – queue) *Limo* – pick-up (attended parking) *Hotel / Motel shuttle* – pick-up and drop-off (attended parking) *For-hire van / shuttle* – pick-up (attended parking) *Rental car shuttle* – pick-up and drop-off (attended parking) *Airport operations and security* - (unattended parking) *Service / Delivery vehicles*- loading and unloading (unattended parking)

Source: HNTB Analysis

Table 4-26: Terminal Curb Mode Splits

Mode	Mode Split	Location	Inner / Outer Curb Split
Private Vehicle	89.42%	Inner Curb Drop-off	52%
		Inner Curb Pick-up	48%
Taxi	5.89%	Inner Curb Drop-off	33%
		Outer Curb Pick-up	67%
Limo	0.68%	Inner Curb Drop-off	75%
		Outer Curb Pick-up	25%
Hotel / Motel Shuttle	1.11%	Inner Curb Drop-off	15%
		Outer Curb Drop-off / Pick-up	84%
Rental Car Shuttle	0.60%	Outer Curb Drop-off / Pick-up	100%
For-Hire Van / Shuttle	0.77%	Inner Curb Drop-off	78%
		Outer Curb Pick-up	22%
Charter / Tour Bus	0.26%	Inner Curb Drop-off / Pick-up	100%
Public Transit Bus	0.01%	Inner Curb Drop-off / Pick-up	100%
Airport Operations and Security Vehicles	0.68%	Inner Curb	50%
		Outer Curb	50%
Service / Delivery Vehicles	0.60%	Outer Curb Loading / Unloading	100%

Source: HNTB Analysis, Vehicle Classification Survey conducted March 18, 2009

Curbside Passenger Pick-up and Drop Off Area Demand

Traffic volumes at the terminal curbside were collected via traffic counting devices between March 2009 and April 2009. The existing average daily number of vehicles at the terminal curbside total 3,534 vehicles, with an estimated (based on the ratio of vehicles at the inner and outer curbs taken from traffic counts collected in December 2007 to March 2008) 2,987 vehicles utilizing the inner curb and 547

utilizing the outer curb. Future average daily traffic volumes are determined by multiplying a trip generation rate (vehicles per passenger per day) to future passenger activity levels.

The existing peak hour number of vehicles at the terminal curbside totals 667 vehicles. Future peak hour traffic volumes are determined by multiplying the peak hour traffic volume ratio (peak hour traffic volume divided by the average daily traffic volume) to future passenger activity levels. Peak hour traffic data collected in 2009 are adjusted to levels in 2008. Existing and future terminal curbside demand is summarized in **Table 4-27**. Finally, the levels of service definitions for the terminal curbside are shown in **Table 4-28.**

Table 4-27: Terminal Curbside Demand

Terminal Traffic Forecasts	2008	2013	2018	2023	2028
Airport Activity Level					
Annual Passengers (enplaned and deplaned)	1,548,112	1,827,801	2,185,020	2,500,900	2,851,937
Average Daily Passengers	4,241	5,008	5,986	6,852	7,814
Peak Hour Passengers	573	676	808	925	1,055
Terminal Activity Level					
Average Daily Terminal Traffic (ADT)	3,534	4,172	4,988	5,709	6,510
Inner (Passenger Vehicle) Curb	2,987	3,527	4,216	4,826	5,503
Outer (Commercial Vehicle) Curb	547	646	772	883	1,007
Trip Rate (ADT / O&D Passengers)	0.833	0.833	0.833	0.833	0.833
Peak Hour Ratio	~18.9%	~18.9%	~18.9%	~18.9%	~18.9%
Actual Peak Hour Traffic (2009)	667	778	941	1,078	1,229
Adjusted Peak Hour Traffic (2008)*	746	881	1,053	1,205	1,374

Source: HNTB Analysis

Note: * The actual peak hour traffic data is taken from 2009 data. It is adjusted based on a 11.82% decrease in passenger activity levels between March 2008 and March 2009.

Table 4-28: Terminal Curbside Level of Service Definitions

Level of Service	Volume-to-Capacity Ratio	Definition
A	≤1.00	Drivers experience free flow conditions and can park anywhere at the curbside without interference.
B	1.01 – 1.10	Drivers experience relatively free flow conditions and can park with some interference (double parking can be observed).
C	1.11 - 1.30	Drivers experience some unstable flow and double parking is common. This LOS is considered appropriate for peak period design conditions at major airports.
D	1.31 – 1.70	Drivers experience more unstable flow with some interference (triple parking can be observed).
E	1.71 – 2.00	Drivers experience extremely unstable flow with frequent double and triple parking throughout the entire curbside area.
F	≥ 2.00	Drivers are unable to access the curbside and with vehicles stopped.

Source: City of Palm Springs General Plan

Trip Generation

Applying the same methodology and assumptions used to determine airport roadway requirements, the trip generation rate for the terminal curbside is 0.833 vehicles per day (VPD) per passenger.

Curbside Passenger Pick-up and Drop Off Area Capacity and Requirements

Terminal curbside requirements include the length of the curb necessary to meet forecast passenger activity levels. The terminal curbside length requirement is determined based on the peak hour number of vehicles utilizing the curbside, the types of vehicles utilizing the curbside, and how long each vehicle on average remains at the curbside (dwell time). Existing vehicle dwell times are based on data collected in March, 2009 by HNTB Corporation. The average dwell time is the amount of time each vehicle occupies a stall at the curbside (approximately 1.5 minutes).

Based on the amount of space each vehicle takes up (stall length), requirements for the total number of stalls and overall curb length are determined and shown in **Table 4-29**. The standard stall length for each vehicle type includes the space for a vehicle to maneuver into the stall. The standard vehicle stall lengths by vehicle type are listed below.

- Privately owned vehicles and taxis 25 feet
- Limos 30 feet
- Hotel / motel shuttles, rental car shuttles, for-hire vans and shuttles, and airport operations and security vehicles 35 feet
- Service and delivery vehicles 40 feet
- Charter, tour, and public transit buses 60 feet

Table 4-29: Existing Terminal Curb Demand and Capacity Requirements

		Existing Peak Hour Volumes*	Vehicle Dwell Time (min)**	Required Vehicle Stalls***	Standard Vehicle Stall Length (feet)	Required Curb Length (feet)
Inner (Private Vehicle) Curb		**697**				
Private vehicle	*Drop-off*	347	1.89	17	25	425
	Pick-up	320	1.11	10	25	250
Taxi	*Drop-off*	15	1.91	2	25	50
Limo	*Drop-off*	4	0.97	1	30	30
Hotel / Motel Shuttle	*Drop-off*	1	0.53	1	35	35
For-Hire Van / Shuttle	*Drop-off*	5	3.08	1	35	35
Charter / Tour Bus	*Drop-off / Pick-up*	2	5.13	2	60	60
Public Transit Bus	*Drop-of / Pick-up*	0	1.5	1	60	60
Airport Operations / Security Vehicle						
	Inner Curb	3	-	1	35	35
Total Demand		**697**				
LOS C Requirement ****						**754**
Outer (Commercial Vehicle) Curb		**49**				
Taxi	*Pick-up (queued)*	29	1.91	6	20	120
Limo	*Pick-up*	1	0.97	1	30	30
Hotel / Motel Shuttle	*Drop-off / Pick-up*	7	1.11	1	35	35
Rental Car Shuttle	*Drop-off / Pick-up*	4	1.63	1	35	35
For Hire Van / Shuttle	*Pick-up*	1	3.08	1	35	35
Airport Operations / Security Vehicle		3	-	1	35	35
Service / Delivery Vehicle		4	5.13	1	40	40
Total Demand / Requirement						**330**

Source: HNTB Analysis

Notes: * Peak hour volumes are based the multiplication of the 1) existing peak hour traffic mode splits (collected March 2009 by HNTB Corporation), and 3) share of peak hour passengers during the average day peak month. The existing peak hour vehicle counts were adjusted based on the change in passenger activity levels between March 2008 and 2009 to reflect 2008 data. ** Dwell times were collected March 2009 by HNTB Corporation. *** A calculated number of vehicle stalls was determined based on the peak hour vehicle trips and dwell times. A poisson distribution was applied to the calculated number of vehicles to account for randomness. **** A 130% utilization was assumed for the inner curb to account for double parking.

The existing length of the inner and outer curb for passenger pick-up and drop-off, respectively, are 1,056 (two 12' lanes - one curbside lane allowing for double parking) and 1,512 feet (two 12' lanes, one on either side of the outer lane). The existing curb length demand in 2008 is 980 feet for the inner curb and 330 feet for the outer curb. The current utilization of the inner and outer curbs, respectively are 71% and 22%. However, to plan for curbside conditions at a LOS C, the utilization factor is increased to 130% to account for double parking in the inner curb. The utilization factor of the outer curb is set at 100% as commercial vehicles do not double park. The resulting existing requirement is 754 feet for the inner curb with a peak hour vehicle throughput of 697 vehicles and 330 feet for the outer curb with a peak hour vehicle throughput of 49 vehicles.

The capacity of the existing curb is adequate to meet existing peak hour demand, with a surplus of 302 feet in the inner curb and 1,182 feet in the outer curb. The curbside requirements assume vehicles do not stop at multiple points along the curbside as may occur at airports with multiple terminals.

The demand and LOS C requirements for the planning horizon are determined based on the observed peak hour traffic collected during a survey conducted in March, 2009 by HNTB Corporation, adjusted from 2009 to 2008 based on (11.82% increase in vehicles). The existing terminal curb demand and LOS C requirements by mode are shown in **Table 4-30** and summarized for 2028 in **Table 4-31**. The requirements assume mode share and vehicle occupancies are constant through the planning horizon.

Table 4-30: Peak Hour Traffic Volumes and Terminal Curbside Length Demand by Mode

		2008		2013		2018		2023		2028	
Inner Curb		# Peak Hour Vehicles	Curb Length (feet)	# Peak Hour Vehicles	Curb Length (feet)	# Peak Hour Vehicles	Curb Length (feet)	# Peak Hour Vehicles	Curb Length (feet)	# Peak Hour Vehicles	Curb Length (feet)
Private vehicle	*Drop-off*	347	425	409	475	489	550	560	625	639	700
	Pick-up	320	250	378	300	452	325	517	375	590	425
Taxi	*Drop-off*	15	50	17	50	21	50	24	50	27	75
Limo	*Drop-off*	4	30	5	30	5	30	6	30	7	30
Hotel / Motel Shuttle											
	Drop-off	1	35	2	35	2	35	2	35	2	35
For-Hire Van / Shuttle											
	Drop-off	5	35	5	35	6	35	7	70	9	70
Charter / Tour Bus											
	Drop-off / Pick-up	2	60	2	60	3	60	3	60	4	60
Public Transit Bus											
	Drop-off / Pick-up	0	60	0	60	0	60	0	60	0	60
Airport Operations / Security Vehicle		3	35	3	35	4	35	4	35	5	35
Total Demand		**697**	**980**	**821**	**1,080**	**982**	**1,180**	**1,123**	**1,340**	**1,283**	**1,490**
Total Curb Length LOS C Requirement			**754**		**831**		**908**		**1,031**		**1,146**
Outer Curb											
Taxi	*Pick-off (queued)*	29	120	35	140	41	160	47	180	54	200
Limo	*Pick-up*	1	30	2	30	2	30	2	30	2	30
Hotel / Motel Shuttle											
	Drop-off / Pick-up	7	35	2	35	2	35	2	35	2	35
Rental Car Shuttle											
	Drop-off / Pick-up	4	35	5	35	6	35	7	35	8	35
For-Hire Van / Shuttle											
	Drop-off / Pick-up	1	35	2	35	2	35	2	35	2	35
Airport Operations / Security Vehicle		3	35	3	35	4	35	4	35	5	35
Service / Delivery Vehicle		4	40	5	80	6	80	7	80	8	80
Total Demand / Requirement		**49**	**330**	**54**	**390**	**63**	**410**	**71**	**430**	**81**	**450**

Source: HNTB Analysis

Table 4-31: Existing and Future Terminal Curbside Length Requirements

	2008	2013	2018	2023	2028
Inner Curb					
Demand (feet)	980	1,080	1,180	1,340	1,490
Capacity (feet)	1,056	1,056	1,056	1,056	1,056
Demand / Capacity Ratio	0.92	1.02	1.12	1.27	1.41
LOS	A	B	C	C	D
LOS C Requirement	754	831	908	1,031	1,146
Surplus / (Deficit) (feet)	302	225	148	25	(90)
Outer Curb					
Demand (feet)	330	390	410	430	450
Capacity (feet)	1,512	1,512	1,512	1,512	1,512
Demand / Capacity Ratio	0.22	0.26	0.27	0.28	0.30
LOS	A	A	A	A	A
Surplus / (Deficit) (feet)	1,182	1,122	1,102	1,082	1,062

Source: HNTB Analysis

In the inner curb, the LOS C requirement for the curbside length reaches 1,146 feet in 2028 with a peak hour vehicle throughput of 1,283 vehicles. At a LOS C, 90 feet of additional curb length is required in 2028. In the outer curb, a LOS A is obtainable through the planning horizon. In 2028, the outer curb length demand is 450 feet. With the existing capacity of 1,512 feet, the outer curb has a surplus of 1,062 feet. The capacity of the inner and outer curb is sufficient to accommodate vehicles at the curbside through the planning horizons at a LOS C with the exception of the inner curb, which will need to be increased by 90 feet in 2028 to accommodate LOS C requirements for the inner curb.

Curbside Travel Lanes

The vehicle throughput demand in the through or travel lanes determines whether new lanes will be required in the planning horizon. **Table 4-30** shows the peak hour throughput demand. It is assumed for planning purposes the capacity of the lanes is as follows:

- First Travel Lane: 300 vehicles
- Second Travel Lane: 600 vehicles
- Third and any Subsequent Travel Lane: 900 vehicles (currently non-existent at PSP)

Given the capacity of the throughput, or travel lanes, one additional through lane will be required in the inner curb as early as 2018 to accommodate a deficiency of 82 vehicles. With a vehicle throughput demand of 1,490 vehicles, one lane remains sufficient to accommodate the deficiency of 590 vehicles. This may be possible by reconfiguring the inner and outer curb to meet demand requirements. No additional lanes are required in the outer lane through the planning horizon.

4.5-3 Airport Parking Requirements

Parking requirements are determined for the public parking (short- and long-term) and employee parking lots. Requirements include parking stall requirements and acreages.

Public Parking

Traffic volume data collected at parking lot entrances and exits and passenger activity levels are used to determine public parking demand. Transaction data (tickets issued or processed) in 2008 and 2009 indicate March as the peak month for parking activity. Traffic counts were collected at the short-term and long-term parking lot entrances and exits during an average week in March 2009 (March 18th, 2009 – March 25th 2009). Adjusted to 2008 activity levels, the average day peak month number of transactions is 950 transactions in the short-term parking lot and 195 transactions in the long-term parking lot. In determining the number of transactions, it is assumed all hourly parking of less than 1-day occurred in the short-term parking lot. Future parking transaction demand is determined by applying the constant ratio of the existing number of transactions to passengers to future passenger activity levels. The distribution of transactions between the two parking lots and parking rates are assumed to remain constant throughout the planning horizon.

To obtain parking stall requirements, transactional demand is determined by dividing the transactions during the average day of the peak month by the number of turns per stall. The number of turns per stall is determined by the total parking transaction demand during the average day of the peak month divided by the peak hour parking stall demand. The analysis indicates 3.83 turns per stall in the short-term lot and 0.45 turns per stall in the long-term lot. Finally, assuming a maximum of 90% of the parking facilities are used to provide a 10% search factor, parking stall requirements are determined. The resulting transaction and stall demand, as well as the parking stall requirements are summarized in Table 4-32.

Table 4-32: Public Parking Demand and Requirements

	Existing Supply	2008	2013	2018	2023	2028
Airport Activity Level						
Annual Passengers (enplaned and deplaned)	-	1,548,112	1,827,801	2,185,020	2,500,900	2,851,937
Average Daily Passengers	-	4,241	5,008	5,986	6,852	7,814
Parking Transactions (ADPM)						
Short-Term Lot	-	950	1,122	1,341	1,535	1,750
Long-Term Lot	-	195	230	275	315	359
Public Parking Transactions/Passenger						
Short-Term Lot	-	0.224	0.224	0.224	0.224	0.224
Long-Term Lot	-	0.046	0.046	0.046	0.046	0.046
Public Parking Stall Requirement						
Short-Term Lot	377	275	325	388	444	507
Long-Term Lot	538	480	567	677	775	884
Total Stalls	915	755	891	1,066	1,220	1,391
Public Parking Area Requirement (acres)**						
Short-Term Parking Area (Acres)	3.86	2.53	2.98	3.56	4.08	4.65
Long-Term Parking Area (Acres)	4.78	4.41	5.21	6.23	7.13	8.13
Total Acres	8.64	6.93	8.19	9.79	11.20	12.77
Surplus / (Deficiency)						
Short-Term Parking Stalls	-	102	52	(11)	(67)	(130)
Long-Term Parking Stalls	-	58	(29)	(139)	(237)	(346)
Total Stalls	**-**	**160**	**24**	**(151)**	**(305)**	**(476)**
Short-Term Parking Area (Acres)	-	1.33	0.88	0.30	(0.22)	(0.79)
Long-Term Parking Area (Acres)	-	0.37	(0.42)	(1.44)	(2.34)	(3.34)
Total Acres	**-**	**1.71**	**0.45**	**(1.15)**	**(2.56)**	**(4.13)**

Source: HNTB Analysis

Note: * ADPM = Average Day Peak Month **Each stall, including maneuvering room and lane spacing are planned to total 400 square feet.

The existing capacity of the public parking lots is 377 in the short-term lot and 538 in the long-term lot, for a total of 915 parking stalls. Parking stall requirements indicate a need for 507 in the short-term lot and 884 in long-term lot stalls, resulting in a deficiency, respectively, of 130 and 346 stalls. It is recommended additional parking facilities be constructed to accommodate the deficiency of 476 stalls in 2028, but as early as 2018 to accommodate the deficiency of 150 stalls.

Finally, assuming a stall size of 400 square feet per stall based on current utilization that is held constant throughout the planning horizon, the total number of acres required for public parking facilities totals 12.77 acres in 2028. With respect to the public parking stall and acreage requirements public parking facilities will start to be deficient as early as 2013 in the long-term public parking lot and as early as 2018 in the short-term public parking lot.

Employee Parking

Employee parking requirements are determined based on the ratio of existing employee parking supply to annual passenger activity levels at PSP, and adjusted for observed parking occupancies. PSP currently provides 210 employee parking stalls, resulting in a current utilization of approximately 136 employee parking spaces per million annual enplaned and deplaned passengers (MAP).

Currently the demand for employee parking stalls is greater than the supply. Interviews conducted with airport staff indicate many employees park their vehicles elsewhere because the lot is oftentimes full and that employees are concerned about their safety because the location of the employee parking lot requires them to cross heavily trafficked Kirk Douglas Way to the terminal building. To account for this, the employee parking demand assumes a 100% occupancy rate for the existing employee parking lot, but applies a 90% occupancy as the target demand occupancy for the employee parking lot. In addition, the analysis applies a 1.40 surge factor to account for employee shift changes.

Accounting for parking utilization observations at PSP, the current employee parking lot utilization ratio translates to approximately 211 (136*1.40*1.00 / 0.90) stalls per MAP. With the assumption that the growth in employees matches the growth in air passengers, this ratio, assumed to remain constant through the planning horizon, is applied to future passenger activity levels to determine future employee parking requirements. Acreage requirements are determined from stall requirements by assuming each stall is 350 square feet in area. Employee parking stall and acreage requirements are summarized in Table 4-33. Employee parking facilities are deficient today by approximately 117 stalls or 0.94 acres. By 2028, this deficiency will grow to 391 stalls and 3.14 acres.

Table 4-33: Employee Parking Requirements

	Existing Supply	2008	2013	2018	2023	2028
Airport Activity Level						
Annual Passengers (enplaned and deplaned) (MAP)	-	1.55	1.83	2.19	2.50	2.85
Employee Parking Stalls per MAP	-	211	211	211	211	211
Employee Parking Stall Requirement	210	327	386	462	528	601
Employee Parking Stall Deficiency	-	117	176	252	318	391
Employee Parking Acreage Requirement*	1.69	2.63	3.10	3.71	4.24	4.83
Employee Parking Acreage Deficiency	-	0.94	1.41	2.02	2.56	3.14

Source: HNTB Analysis

Note: * Employee parking stall requirements are based on a stall size of 350 square feet per stall.

4.5-4 Rental Car Facility Requirements

Rental car facility requirements are determined for both on-Airport and off-Airport rental car facilities. On-Airport rental car companies include Hertz, National, Avis, Dollar, and Budget. Enterprise is located off-Airport. Rental car requirements are presented for:

- Customer service area
- Ready / return stalls and area, and
- Vehicle Service / Maintenance / Storage area.

Existing Rental Car Facility

Approximately 90% of rental car facilities and activity occurs on airport property. On-airport rental car facilities at the airport include the customer service area (rental counters) adjacent to baggage claim areas inside the terminal building, ready / return parking lot located adjacent to the baggage claim area outside the terminal building, and rental car service (quick-turn around), storage, and maintenance facilities located along North and East Civic Drive. All rental car service providers at PSP utilize the on-airport ready / return parking lot with the exception of Enterprise, which operates their facility approximately one mile from the Airport, near the intersection of Kirk Douglas Way and Ramon Road. The areas of the rental car facilities are summarized in **Table 4-34**.

Table 4-34: Existing On-Airport Rental Car Facilities

	Square Feet	Acres	Stalls
Customer Service Area			
Main Terminal	2,837	-	-
Enterprise*	2,473	-	-
Total	**5,310**	-	-
Ready / Return Area			
Adjacent to Main Terminal Baggage Claim	148,396	3.41	449
Enterprise*	16,077	0.64	46
Total	**164,473**	**3.78**	**495**
Vehicle Service / Maintenance / Storage Areas			
Hertz, National, Avis, Dollar, Budget	323,862	7.43	-
Enterprise*	17,433	0.40	-
Total	**341,295**	**7.84**	-
Grand Total	**511,078**	**11.73**	-

Source: HNTB Analysis
Notes: * The data for the Enterprise facility was obtained via analysis of aerial photography and airport layout plan.

Rental Car Customer Service Facility Requirements

Customer service rental car facility requirements, where rental car reservations, rental car offices, and other customer service related activities are carried out, are determined based on the existing utilization of rental car counters and peak hour rental car passenger demand. PSP currently has a total of 9 rental car providers. Assuming three positions per provider and 3 feet of counter length per position, a total of approximately 90 feet of counter space is required today. Assuming no new rental car service providers are added or removed, the 90 feet of counter space remains constant throughout the planning horizon.

Utilizing similar planning factors used to determine passenger ticketing and check-in requirements for counter area, queue area, and office area of respectively, 7 linear feet, 20 linear feet, and 15 linear feet per rental car passenger, rental car customer service area requirements are determined. The total share of

rental car passengers is derived from peak hour ADPM passenger activity levels assuming, based on passenger analysis for PSP, approximately 73% visitors, 1.85 passengers per party, and 58% rental car share factors. The customer service area requirements are summarized in Table 4-35. The existing customer service area is adequate through 2028 with the exception of the passenger queue area, which requires 1,800 square feet of space today. Currently, the majority of the area used for queuing is shared with area allocated for general terminal circulation traffic and encroaches upon passengers waiting to pick up luggage on the baggage carousels. The total rental car customer service area requirement for the planning horizon is 3,780 square feet, requiring expansion by approximately 943 square feet.

Rental Car Ready / Return Lot Requirements

Rental car ready / return lot stall and area requirements are based on 2008 rental car ready / return lot transaction data and peak hour average day peak month enplaned and deplaned passenger data, assuming based on passenger data analysis that approximately 18% of all passengers utilize the airport during the peak hour and the percentage share of passengers that are enplaned and deplaned are respectively 52% and 48%. The passenger activity data is summarized in Table 4-35.

Table 4-35: Rental Car Requirements

	Existing	2008	2013	2018	2023	2028
Passenger Activity Levels						
Annual Passengers (enplaned and deplaned) (MAP)		1.55	1.83	2.19	2.50	2.85
Peak Month Passengers*		231,356	273,356	326,538	373,758	426,205
Average Day Peak Month (ADPM) Passengers		7,463	8,811	10,533	12,057	13,749
Peak Hour ADPM Passengers		1,350	1,600	1,930	2,190	2,520
Peak Hour ADPM Enplaned Passengers		700	830	1,000	1,140	1,310
Peak Hour ADPM Deplaned Passengers		650	770	930	1,050	1,210
Peak Hour ADPM Rental Car Passengers		307	364	439	498	573
Peak Hour ADPM Enplaned Passengers		159	189	227	259	298
Peak Hour ADPM Deplaned Passengers		148	175	211	239	275
Rental Car Transactions						
Peak Month Transactions		839	991	1,184	1,355	1,546
Rental Car Facility Requirements						
Customer Service Area						
Counter Length (linear feet)	148**	90	90	90	90	90
Counter Area (square feet)	1,041**	630	630	630	630	630
Office Area (square feet)	1,645**	1,350	1,350	1,350	1,350	1,350
Passenger Queue Area (square feet)	151**	1,800	1,800	1,800	1,800	1,800
Total Customer Service Area (square feet)	**2,837****	**3,780**	**3,780**	**3,780**	**3,780**	**3,780**
Ready / Return Area						
Ready Stalls	279	273	324	391	442	509
Ready Stalls (square feet)***	92,542	77,700	92,050	110,950	125,300	144,550
Ready Stalls (acres)	2.12	1.78	2.11	2.55	2.88	3.32
Return Stalls	164	191	226	273	311	357
Return Stalls (square feet)***	55,854	42,020	49,720	60,060	68,420	78,540
Return Stalls (acres)	1.28	0.96	1.14	1.38	1.57	1.80
Enterprise Ready / Return Stalls	~46					
Ready / Return Stalls (square feet)***	~16,077	Combined with on-Airport ready/ return stall requirements				
Return / Return Stalls (acres)	~0.64					
Ready / Return Stalls (stalls)	**489**	**464**	**550**	**664**	**753**	**866**
Ready / Return Lot (acres)	**3.78**	**3.16**	**3.74**	**4.52**	**5.12**	**5.89**
Vehicle Service / Maintenance / Storage (acres)	**7.84**	**7.84**	**9.26**	**11.07**	**12.67**	**14.44**
Total Acreage (acres) (w/o cust. svc. area)	**11.61**	**11.00**	**13.00**	**15.59**	**17.79**	**20.34**

Source: HNTB Analysis

Notes: * The peak month passengers number is the peak month enplaned passenger number multiplied by 2. *** The total square footage for the customer service area excludes the square footage for the Enterprise customer service area. ** Ready stalls square footage assumes 350 square feet per stall. Return stalls square footage assumes 220 square feet per stall.

Rental car ready / return lot stall requirements are determined by applying the deplaned (ready) and enplaned (return) passengers to a factor, respectively, of 1.85 and 1.20 spaces per rental car party. Acreage requirements are determined by applying industry standards of 350 square feet per stall for ready spaces and 220 square feet per stall for return spaces. Stall and acreage requirements for the rental car ready / return parking lot are summarized in **Table 4-35.** The rental car ready / return parking lot requirements indicate a total of 866 stalls and 5.89 acres for the ready / return parking lot in 2028.

The existing area used for all rental car service or quick turn-around (wash bays, fueling stations), maintenance and storage facilities is 7.84 acres. Based on the peak hour (ADPM) transactions, the utilization rate for maintenance and storage areas is 0.06 acres per transaction. Assuming a constant utilization, the requirements for service and maintenance will grow to 14.44 acres by 2028. This represents an approximate doubling of the existing size of the service, maintenance and storage facilities. The acreage breakdown for the QTA, and maintenance / storage areas is 5.86 acres for the QTA and 8.58 acres for maintenance / storage areas.

If non-rental car facilities surrounding the existing rental car maintenance and storage facilities are available for development, the maintenance and storage area could be expanded to meet the forecast demand based requirements. However, considering the 10-minute average time to bring a service rental car from the return lot to the maintenance area and 7 minutes from the maintenance / service area to the ready lot, a consolidated rental car facility is recommended to accommodate approximately 19 acres of required rental car functions by 2028. A consolidated facility could reduce the number of employees required by rental car providers, especially during the peak season.

4.6 GENERAL AVIATION FACILITY REQUIREMENTS

General Aviation (GA) facility requirements account for based aircraft and forecast increases in GA and corporate jet activity. GA requirements include aircraft hangar facilities including GA and corporate hangar facilities, apron facilities, tie down facilities, corporate terminal facilities including United States Customs and Border Protection (CBP), GA landside access and parking, and aircraft maintenance.

Review of General Aviation Forecast Activity

The forecast of aviation activity through 2028 is presented in Chapter 3. General Aviation is expected to grow on average 2.2% per year through 2028. **Table 4-36** below presents a summary of the general aviation forecast.

Table 4-36: General Forecast Summary

Forecast	2008	2013	2018	2023	2028
Based Aircraft	116	126	131	136	143
Air Taxi Operations	5,590	5,865	6,289	7,341	8,642
General Aviation Operations	39,181	41,161	44,184	51,640	60,863
Total GA Operations	44,771	47,026	50,473	58,981	69,505

Source: Chapter 3: Inventory of Existing Conditions

Review of General Aviation Facilities

GA activity at the airport is handled by two full service fixed base operators (FBOs), Signature Flight Support and Atlantic Aviation. Signature Flight Support is located west of the runways and north of the passenger terminal. Atlantic Aviation is located east of the runways and south of the SkyWest maintenance facility. Table 4-37 and Table 4-38 present the land and facilities summary for Signature Flight Support and Atlantic Aviation, respectively.

Table 4-37: Signature Flight Support FBO Functional Areas

Facility	Area
Ramp	84,000 square yards
Signature Terminal	6,700 square feet
Conventional Hangar	30,000 square feet
Conventional Hangar	30,000 square feet
Desert Springs Hangar	31,500 square feet
T-Hangar	11,000 square feet
T-Hangar	11,000 square feet
Conventional Hangar	10,500 square feet
Conventional Hangar	10,500 square feet
Desert Aero Maintenance Hangar	10,500 square feet
Landside	108,000 square feet
Fuel	10, 00 square feet
Total Area	**23.5 Acres**

Source: HNTB Analysis

Table 4-38: Atlantic Aviation FBO Functional Areas

Facility	Area
Ramp	89,400 square yards
Atlantic Terminal	7,800 square feet
Conventional Hangar	30,000 square feet
Conventional Hangar	30,000 square feet
Conventional Hangar	15,000 square feet
T-Hangar	9,900 square feet
T-Hangar	12,400 square feet
T-Hangar	12,400 square feet
T-Hangar	12,400 square feet
Restaurant	3,500 square feet
Landside	30,400 square yards
Fuel	274,000 square feet
Total Area	**33.8 Acres**

Source: HNTB Analysis

While the leased land areas for the two FBO's are nearly equivalent in size, Signature Flight Support is more spread out throughout the west side of the Airport. The Atlantic Aviation facility is more consolidated. Figures 2-18 and 2-19 depict the land area of the FBOs. A total of 116 based aircraft reside at PSP. The majority of the based aircraft, approximately 78%, are single engine piston aircraft. Approximately 11% and 10% are twin engine piston and jet aircraft, respectively. Based single engine and twin engine piston aircraft are typically stored in t-hangars, while conventional hangars are commonly used for based jet aircraft and transient itinerant aircraft. Aircraft tie-down space is primarily used for light transient aircraft. During the peak season, available apron space and hangar space become scarce.

Comparative Airports

It is useful to study the GA facilities at comparable airports to create facilities and operations benchmarks for PSP. Four peer airports have been identified as comparable to PSP: Myrtle Beach International Airport (Myrtle Beach, SC), Sarasota/Brandenton International Airport (Sarasota, FL), Pensacola Regional Airport (Pensacola, FL), and Savannah International Airport (Savannah, GA). The most common denominators among the peer airports identified are their operations levels, size, enplanements, based aircraft, GA facilities, and market sector (leisure). Using existing aerial photography, estimates were created of the hangar space (both conventional and t-hangar) and apron space at the general aviation facilities at these four benchmark airports. **Table 4-39** presents the based aircraft, local GA operations (those flown by based aircraft), itinerant GA operations (those flown by transient aircraft), t-hangar area, conventional hangar area and apron area for the benchmark airports as well as for PSP.

Table 4-39: Benchmark Airport Facilities

Airport	Based Aircraft	Local GA Ops	Itinerant GA Ops	T-Hangar Area (ft^2)	Conv. Hangar Area (ft^2)	Apron Area (yd^2)
Myrtle Beach (MYR)	52	4,420	17,428	--	221,000	137,850
Sarasota (SRQ)	255	31,399	83,715	227,000	182,000	88,750
Pensacola (PNS)	85	28,042	28,003	48,000	74,500	86,900
Savannah (SAV)	121	10,958	41,628	77,000	192,800	126,600
Palm Springs (PSP)	115	13,426	39,852	69,000	198,000	173,400

Source: HNTB Analysis , Google Earth, AirNav.com, and FAA TAF

In addition to serving as a benchmark for operational and facilities characteristics, these peer airports can help predict the need for future general aviation facilities at PSP. Using linear regression in conjunction with the results from the forecast, it is possible to estimate general aviation facility requirements for t-hangar area, conventional hangar area and apron area.

T-Hangar Facility Requirements

T-hangars are primarily used by small piston aircraft that are based at the airport. In an effort to capture an estimation of future t-hangar area, based aircraft was taken to be the independent variable in the regression equation with t-hangar area as the dependent variable. Myrtle Beach has negligible t-hangar facilities and was consequently removed from the regression analysis for t-hangar area. The range of based aircraft and t-hangar area allows for an effective regression analysis. With a highly significant statistical result, the predicted equation for t-hangar space is as follows: $A_{T-hangar} = 1085\beta_{Based} - 51170$

Using the forecast based aircraft at PSP; the requirement for t-hangar area is summarized in **Table 4-40**. There is an existing deficiency of t-hangar area at PSP. This deficiency grows to approximately 51,200 square feet in 2028.

Table 4-40: T-Hangar Area Requirement

T-Hangar Area	2008	2013	2018	2023	2028
Required Area (Square Feet)	73,600	87,700	97,400	108,300	120,200
Existing Area (Square Feet)	69,000	69,000	69,000	69,000	69,000
Deficient Area (Square Feet)	4,600	18,700	28,400	39,300	51,200

Source: HNTB Analysis

Conventional Hangar Requirements

At Palm Springs International Airport, conventional hangars are frequently used by transient jet aircraft as well as based aircraft. The approach for establishing conventional hangar facility requirements is different than the approach for t-hangars due to the dual dependency on both based and transient aircraft. To generate a planning factor for conventional hangar area at PSP, it is useful to look at the ratio of conventional hangar space to the number of combined general aviation operations at the benchmark airports. The average rate at the peer benchmark airports is approximately 2.57 square feet of conventional hangar space per general aviation operation. Due to Palm Springs hot climate during the summer months, there will be a greater demand for conventional hangar space than the average requirement for the benchmark airports. The existing ratio of conventional hangar area to general aviation operations is 3.71. There is an existing deficiency of corporate hangar space available at the Airport. To better reflect the demand on the facilities and to provide a higher level of service for general aviation users and providers, a planning factor of 5.50 square feet per forecast general aviation operations is applied. Table 4-41 presents the required conventional hangar area in square feet after applying the forecast number of general aviation operations. By 2028, approximately 382,300 square feet of conventional hangar space will be required at the Airport.

Table 4-41: Conventional Hangar Area Requirement

Conventional Hangar Area	2008	2013	2018	2023	2028
Required Area (Square Feet)	246,200	258,600	277,600	324,400	382,300
Existing Area (Square Feet)	198,000	198,000	198,000	198,000	198,000
Deficient Area (Square Feet)	48,200	60,600	79,600	126,400	184,300

Source: HNTB Analysis

Apron Facility Requirements

Apron areas are generally used to park aircraft. Both based and transient aircraft can be expected to park at the GA aprons. Light piston aircraft are typically tied down to the apron while heavier jet aircraft can also be parked on an apron. A comparative analysis of the apron areas at the benchmark airports reveals that the average ratio of apron area to total GA operations is 2.86. The existing ratio at PSP is 3.87 square yards per general aviation operation. During the peak season, the apron areas at the two fixed base operators become congested with parked aircraft. To provide a higher level of service during the peak season, a planning factor of 4.25 square yards of apron per general aviation operation. Table 4-42 presents an order of magnitude requirement for general aviation apron area (measured in square yards) for PSP. Considerable apron development is required to sustain a high level of service.

Table 4-42: Apron Area Requirement

Apron Area	2008	2013	2018	2023	2028
Required Area (Square Yards)	190,300	199,900	214,500	250,700	295,400
Existing Area (Square Yards)	173,400	173,400	173,400	173,400	173,400
Deficient Area (Square Yards)	16,900	26,500	41,100	77,300	122,200

Source: HNTB Analysis

Aircraft tie-down area is anticipated to stay proportional to total apron area throughout the planning horizon.

FBO Terminal Facility Requirements

FBO terminal facilities provide rest and relaxation areas for pilots and passengers and offices for tenants. In early 2008, Signature Flight Support constructed a new FBO terminal. The Signature Terminal will be adequate for the duration of the planning period. Atlantic Aviation's FBO terminal is in good condition as well, and should be adequate for the planning period. If a new FBO enters the PSP market, approximately 10,000 square feet of land would be needed for the building footprint to provide a comparable facility.

Customs and Border Protection

United States Customs and Border Protection (CBP) service is available 24 hours a day at Palm Springs International Airport with a minimum advanced notice of four hours. The facility is located in the same building that Signature Flight Support FBO used to occupy. The facility has the capability of handling aircraft with a maximum of 15 passengers and crew. Arriving international aircraft taxi to the ramp in front of the CBP facility and an officer will instruct the passengers to deplane and enter the facility for immigration processing. The existing facility should provide adequate capacity for international general aviation activity throughout the planning horizon.

Landside and Parking Requirements

Landside facilities are critical to an FBO's success. Providing a high level of service for parking and valet service is a key consideration in attracting business. Currently, landside area accounts for approximately 14% of the total area available designated general aviation. For planning purposes, a factor of 10% will be applied to the total required land area requirement for general aviation at PSP. The existing landside provides a high level of service, and it is anticipated that a high level of service will continue in the future. Table 4-43 below presents the landside requirements for general aviation. Landside area is more than adequate throughout the planning horizon.

Table 4-43: Landside Requirement

Landside Area	2008	2013	2018	2023	2028
Required Area (Square Feet)	203,400	214,500	230,600	268,900	316,100
Existing Area (Square Feet)	381,600	381,600	381,600	381,600	381,600
Deficient Area (Square Feet)	0	0	0	0	0

Source: HNTB Analysis

Summary

Hangar footprint, apron area, terminal, and landside comprise the general aviation land area. **Table 4-44** below presents the total requirements for general aviation land area throughout the planning period.

Table 4-44: General Aviation Land Area Requirements Summary

Area	2008	2013	2018	2023	2028
T-Hangar Area (ft^2)	73,600	87,700	97,400	108,300	120,200
Conventional Hangar Area (ft^2)	246,200	258,600	277,600	324,400	382,300
Apron Area (yd^2)	190,300	199,900	214,500	250,700	295,400
Landside Area (sf^2)	203,400	214,500	230,600	268,900	316,100
Total Land Area (acre)	51	54	58	68	80
Total Existing Area (acre)	57	57	57	57	57
Deficiency (acre)	0	0	1	11	23

Source: HNTB Analysis

Despite showing no deficit in total land area allocated to general aviation development until 2018, it should be noted that there are deficits in t-hangar space, conventional hangar space, and apron space. This is mostly attributable to, given the shape of the general aviation land available, the inefficiency in how general aviation land is used on the west side of the Airport. From a facilities and level of service perspective there will be an ultimate land deficiency of 23 acres in 2028.

In the near term, additional conventional hangars and apron areas are recommended to be developed. Already under the leasehold of Atlantic Aviation, half of the 7.4-acre parcel located between Atlantic and SkyWest is available for potential development. It is anticipated that this parcel will be developed as demand returns following the current economic recession. Another parcel suitable for general aviation development is the 11.2-acre seasonal rental car overflow storage area north of Signature's leasehold. An extension of Taxiway J could stimulate development of this parcel. A third viable general aviation parcel on the Airport is the 13.7-acre property immediately south of the Palm Springs Air Museum. For planning purposes, all three of the identified parcels should be preserved for general aviation growth and development.

4.7 SUPPORT FACILITY REQUIREMENTS

Support facilities include but are not limited to:

- Fueling facilities,
- Aircraft rescue and fire fighting,
- Airline maintenance,
- Airport maintenance and operations, and
- Utilities.

4.7-1 Fueling Facilities

Atlantic Aviation Fixed Base Operator (FBO) and Signature Flight Support FBO are responsible for all aircraft fueling at PSP. Both FBOs provide Jet A and 100 LL AVGAS to their customers. Chapter 2 describes the fueling facilities at both FBOs. Currently, Signature Flight Support is the sole provider of fuel for commercial aircraft. Atlantic Aviation previously serviced Air Canada when the airline served PSP, but is no longer under contract with any airline.

Future fueling requirements are developed for fuel storage (gallons) and land area (acres). **Table 4-45** below summarizes the fuel storage capacity of the two fixed base operators for Jet A and AVAGAS fuel. Total on-Airport Jet A storage is 208,000 gallons. Total on-Airport AVGAS storage is 26,750 gallons.

Table 4-45: Fuel Services Inventory

Storage Unit	Capacity (Gallons)	
Jet A Fuel Inventory		
***Signature Flight** Support*		
Aboveground Storage TanksAST	20,000	
Aboveground Storage TanksAST	20,000	
Aboveground Storage TanksAST	20,000	
Aboveground Storage TanksAST	20,000	
Aboveground Storage TanksAST	20,000	
Mobile Tanker	10,000	
Mobile Tanker	5,000	
Mobile Tanker	5,000	
Mobile Tanker	5,000	
Mobile Tanker	3,000	
Mobile Tanker	7,000	
Signature Jet A Storage Subtotal	**135,000**	
Atlantic Aviation		
Aboveground Storage Tanks	20,000	
Aboveground Storage Tanks	20,000	
Aboveground Storage Tanks	20,000	
Mobile Tanker	5,000	
Mobile Tanker	5,000	
Mobile Tanker	3,000	
Atlantic Jet A Storage Subtotal	**73,000**	
Total Jet A Storage		**208,000**
100 Low Lead AVGAS Fuel (100 LL) Inventory		
Signature Flight Support		
Aboveground Storage TanksAST	12,000	
Mobile Tanker	1,000	
Mobile Tanker	750	
Signature AVGAS Subtotal	**13,750**	
Atlantic Aviation		
Aboveground Storage Tanks	12,000	
Mobile Tanker	1,000	
Atlantic AVGAS Subtotal	13,000	
Total AVGAS Storage	**26,750**	

Source: Signature Flight Support and Atlantic Aviation

Fuel storage requirements are broken down into three categories: Jet A for commercial aircraft, Jet A for general aviation aircraft, and AVGAS for general aviation aircraft. The methodology for determining storage and area requirements for all three categories are similar. The FBOs store detailed monthly fuel consumption data by category (e.g. commercial Jet A, corporate aircraft Jet A, etc…). **Table 4-46** below presents the monthly consumption of fuel for commercial aircraft in 2007, the average daily consumption (the consumption in a given month divided by the number of days), the number of monthly operations, the number of average daily operations per month, and the average number of gallons dispensed per departure.

Table 4-46: Fuel Dispensing Breakdown – Commercial Aircraft (Jet A)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	
Fuel Dispensed (Gal)	1,618,289	1,579,699	1,889,115	1,301,639	870,504	571,947	
Avg. Daily Consum. (Gal)	52,203	56,418	60,939	43,388	28,081	19,065	
GA Operations	3,104	3,059	3,622	3,028	2,338	1,654	
Avg. Daily Operations	100	109	117	101	75	55	
Gal / Departure	1,043	1,033	1,043	860	745	692	
	Jul.	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Total**
Fuel Dispensed (Gal)	555,869	528,859	648,564	906,211	1,244,021	1,330,864	13,045,581
Avg. Daily Consum. (Gal)	17,931	17,060	21,619	29,233	41,467	42,931	35,741
GA Operations	1,627	1,538	1,618	2,044	2,742	2,707	29,082
Avg. Daily Operations	52	50	54	66	91	87	80
Gal / Departure	683	688	802	887	907	983	897

Source: HNTB Analysis, Atlantic Aviation, Signature Flight Support

The same process is carried forward in **Table 4-47** and **Table 4-48** for general aviation aircraft that require Jet A and for general aviation aircraft that require AVGAS, respectively.

Table 4-47: Fuel Dispensing Breakdown – General Aviation Aircraft (Jet A)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	
Fuel Dispensed (Gal)	595,281	473,121	519,609	443,372	303,726	145,451	
Avg. Daily Consum. (Gal)	19,203	16,897	16,762	14,779	9,798	4,848	
GA Operations	4,525	4,452	5,508	4,543	3,928	2,934	
Avg. Daily Operations	146	159	178	151	127	98	
Gal / Departure	263	213	189	195	155	99	
	Jul.	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Total**
Fuel Dispensed (Gal)	53,141	145,244	76,550	222,258	334,389	360,414	3,672,576
Avg. Daily Consum. (Gal)	1,715	4,685	2,552	7,170	11,146	11,626	10,062
GA Operations	2,104	2,019	2,126	2,798	3,626	2,981	41,547
Avg. Daily Operations	68	65	71	90	121	96	114
Gal / Departure	51	144	72	159	184	242	177

Source: HNTB Analysis, Atlantic Aviation, Signature Flight Support

Table 4-48: Fuel Dispensing Breakdown – General Aviation Aircraft (AVGAS)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	
Fuel Dispensed (Gal)	8,019	9,908	8,475	7,840	16,207	7,842	
Avg. Daily Consum. (Gal)	259	354	273	261	523	261	
GA Operations	4,525	4,452	5,508	4,543	3,928	2,934	
Avg. Daily Operations	146	159	178	151	127	98	
Gal / Departure	4	4	3	3	8	5	
	Jul.	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Total**
Fuel Dispensed (Gal)	7,932	7,840	7,954	7,841	16,223	11,987	118,068
Avg. Daily Consum. (Gal)	256	253	265	253	541	387	323
GA Operations	2,104	2,019	2,126	2,798	3,626	2,981	41,547
Avg. Daily Operations	68	65	71	90	121	96	114
Gal / Departure	8	8	7	6	9	8	6

Source: HNTB Analysis, Atlantic Aviation, Signature Flight Support

Several assumptions need to be stated prior to analyzing future fuel storage requirements. The analysis assumes that the peak month, March, will hold constant and that 13% of all GA operations will occur during the peak month. Another key assumption is that the fleet mix maintains the proportion of piston aircraft to jet aircraft. This assumption is key to determining whether general aviation at PSP requires Jet A fuel or AVGAS. Additionally, a 10% fuel reserve is added to the storage requirements. The required area for the tanks is determined by examining the existing facility utilization (square feet per gallon of storage). A utilization rate of 0.14 square feet per gallon of fuel is assumed constant throughout the planning period. The average gallons dispensed per departure is used to project future requirements and is assumed to remain constant. Requirements are determined for 4 storage intervals in each planning horizon (1 day, 3 day, 5 day, and 7 day requirements). The Jet A fuel requirements are presented in **Table 4-49** below.

Table 4-49: Jet A Fuel Requirements Summary

	2008	2013	2018	2023	2028
Commercial ADPM Departures	56	59	67	72	77
GA ADPM Departures	94	99	106	124	146
ADPM Commercial Fuel Dispensed Per Departure (gal)	1,043	1,043	1,043	1,043	1,043
ADPM GA Fuel Dispensed Per Departure (gal)	189	189	189	189	189
Jet A 1-Day Fuel Demand (gal)	76,150	80,173	89,883	98,470	107,855
Jet A 3-Day Fuel Demand (gal)	142,834	267,243	299,610	328,232	359,517
Jet A 5-Day Fuel Demand (gal)	423,057	445,405	499,350	547,053	599,195
Jet A 7-Day Fuel Demand (gal)	592,280	623,567	699,090	765,875	838,873
Jet A Existing Capacity (gal)	*208,000*	*208,000*	*208,000*	*208,000*	*208,000*
Jet A 1-Day Area Req. (ft^2)	11,119	11,706	13,124	14,378	15,748
Jet A 3-Day Area Req. (ft^2)	37,062	39,020	43,746	47,925	52,493
Jet A 5-Day Area Req. (ft^2)	61,771	65,034	72,910	79,875	87,489
Jet A 7-Day Area Req. (ft^2)	86,479	91,047	102,074	111,825	122,484
Existing Fuel Storage Area (ft^2)	160,000	160,000	160,000	160,000	160,000

Source: HNTB Analysis

The range of storage requirements are depicted for the average day of the peak month. The fuel requirements will be considerably less in the off-season. Since fuel is trucked to the airport by providers, it is not always feasible to maintain a 5-day supply during the peak month. It is more realistic to accommodate the 3-day fuel requirement. Sufficient area is available to add fuel tanks. A nearly identical methodology is performed for AVGAS requirements. The main difference is that May is the peak month for AVGAS distribution. The AVGAS requirements are presented in **Table 4-50** below. Sufficient capacity exists for AVGAS storage at the Airport for the foreseeable future.

Table 4-50: AVGAS Fuel Requirements Summary

	2008	2013	2018	2023	2028
GA ADPM Departures	94	99	106	124	146
ADPM GA Fuel Dispensed Per Departure (gal)	8	8	8	8	8
AVGAS 1 Day Fuel Demand (gal)	751	789	847	989	1,166
AVGAS 3 Day Fuel Demand (gal)	2,503	2,629	2,822	3,298	3,886
AVGAS 5 Day Fuel Demand (gal)	4,172	4,382	4,704	5,496	6,477
AVGAS 7 Day Fuel Demand (gal)	5,841	6,135	6,585	7,695	9,068
AVGAS Existing Capacity (gal)	*26,750*	*26,750*	*26,750*	*26,750*	*26,750*
AVGAS 1 Day Area Req. (ft^2)	110	115	124	144	170
AVGAS 3 Day Area Req. (ft^2)	366	384	412	482	567
AVGAS 5 Day Area Req. (ft^2)	609	640	687	803	946
AVGAS 7 Day Area Req. (ft^2)	853	896	961	1,124	1,324
Existing Fuel Storage Area (ft^2)	160,000	160,000	160,000	160,000	160,000

Source: HNTB Analysis

4.7-2 Aircraft Rescue and Fire Fighting

Aircraft rescue and fire fighting (ARFF) requirements and recommendations are provided in 14 CFR Part 139. Airports certified under Part 139 must comply with specific ARFF requirements including response time requirements and extinguishing agent requirements.

Part 139 is used to determine the aircraft rescue and firefighting index (A through E) for airports serving certificated air carrier service based on 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). Determination of the appropriate amount of ARFF equipment for an airport is based on the airport Index. The five ARFF indices and associated requirements are presented in **Table 4-51**. PSP is an ARFF Index C Airport.

Table 4-51: ARFF Index Classifications

Airport Index	Required No. of Vehicles	Aircraft Length (feet)	Schedule Daily Departures	Agent Plus Water for Foam
A	1	< 90	> 1	500# Sodium-based DC or Halon 1211 or
		≥ 90, < 126	< 5	Clean Agent; or 450# Potassium-based DC plus water to produce 100 gal of AFFF.
B	1 or 2	≥ 90, < 126	≥ 5	Index A plus 1,500 gal Water
		≥ 126, < 159	< 5	
C	2 or 3	≥ 126, < 159	≥ 5	Index A plus 3,000 gal Water
		≥ 159, < 200	< 5	
D	3	≥ 159, < 200	≥ 5	Index A plus 4,000 gal Water
		≥ 200	< 5	
E	3	≥ 200	≥ 5	Index A Plus 6,000 gal Water

Source: 14 CFR Part 139
Notes: DC = Dry Chemical; AFFF = Aqueous Film Forming Foam

The existing ARFF facility is located at 300 N. El Cielo Road, north of the passenger terminal complex and west of the air traffic control tower. The ARFF facility is a dual use station that is capable of responding to city fires with conventional firefighting equipment and aircraft incidents on the airfield with ARFF equipment. One potential impediment to efficient ARFF egress is the relocation of general aviation tie down positions to the apron area directly in front of the ARFF station. Another potential impediment to efficient ARFF operations is the gravel bed located north of the existing Air Traffic Control Tower. ARFF rapid response events require ARFF vehicles to drive over gravel to reach Taxiway W.

The existing facility is a dual role station operating as a City of Palm Springs municipal fire station as well as operating as an ARFF facility. The facility stores both municipal fire response vehicles and equipment and ARFF vehicles and equipment. The facility has rapid response access to both the El Cielo Drive as well as the airfield. The ARFF facility does not currently meet its needs for storage. As a temporary solution, two storage containers have been placed adjacent to the facility. These containers are at capacity with firefighting equipment. A permanent solution for expanded storage should be developed.

During interviews with PSP ARFF personnel, a desire for additional land to conduct ARFF training exercises at PSP was expressed. A provision for these facilities will be considered in the development of the land-use plan.

4.7-3 Airline Maintenance

The Airport has approximately 5.6 acres of land allocated to airline maintenance (all to SkyWest Airlines) with approximately 50,000 square feet of office and hangar space, 11,630 square yards of ramp, and 90,250 square feet for landside functions. The facility provides C-checks for SkyWest's Embraer 120 Brasilia aircraft and overnight checks for SkyWest's CRJ fleet. SkyWest operates the Embraer 120, CRJ 200, CRJ 700, CRJ 700ER, and CRJ 900 LR on behalf of United Express and Delta Connection.

Airline maintenance hangars and facilities are typically built by airlines based on corporate business decisions that are not necessarily related to the volume of air traffic at a given airport. It is, therefore,

difficult to forecast the requirement for such facilities. The factors that typically influence construction of such facilities include airline headquarters location, hubbing characteristics, fleet size, maintenance scheduling, climate, and location of terminating flights. As the smaller turboprop Embraer 120s are retired from service, larger Bombardier regional jet aircraft will take over their air routes. For planning purposes, it is recommended that approximately 5 acres of additional land be preserved for potential maintenance expansion as this business is beneficial to the airport and region.

4.7-4 Airport Maintenance and Operations

Airport maintenance and operations facilities are located in and around the main passenger terminal. Maintenance and operations store their vehicles on the secure east side of the ticketing lobby. Airport maintenance offices are located on the ground floor of the Bono Concourse. Operations personnel are based on the ground level of the passenger concourse south of the passenger security screening checkpoint. The operations facility is approximately 4,000 square feet and provides direct access to both concourses and the maintenance and operations airport vehicle staging area. The weather in Palm Springs does not dictate the need for covered/indoor parking for airport maintenance and operations vehicles. The existing facilities for airport maintenance and operations should be adequate through 2028.

4.7-5 Utilities

The passenger terminal complex is powered by the City of Palm Springs' cogeneration plant. The City's cogeneration plant is approaching or already reached its maximum capacity. Any proposed terminal expansion will likely require additional sources of energy. With the selection of a preferred terminal alternative, a programmatic report should be prepared to discuss facility specifics including energy, sewer, water, heating, and cooling requirements. The locations identified for future expansion of general aviation will require minimal infrastructure improvements, to accommodate development.

4.7-6 Support Summary

In summary, the following recommendations are made for PSP's support facilities:

- Fuel Storage
    1. Increase the available Jet-A fuel storage to meet the 3-day 2028 storage requirement of 359,517 gallons (Short term to long term implementation)
- ARFF
    1. Designate additional area on the future land use plan devoted to ARFF equipment storage and ARFF training
- Airline Maintenance
    1. Protect the land adjacent to the SkyWest maintenance facility for potential future development
- Airport Maintenance
    1. Provide additional vacant area on the future land use plan devoted to Airport Maintenance

4.8 SUMMARY

Facility requirements for Palm Springs International Airport are methodically determined for 2008, 2013, 2018, 2023 and 2028 based on existing conditions, the aviation activity forecast for operations and passengers, various planning factors adjusted for the Airport, and which meet a LOS C. The requirements for each functional component (airside, terminal, landside, and support) are summarized quantitatively in **Table 4-52** and graphically in **Figure 4-8**.

Table 4-52: Facility Requirements Summary

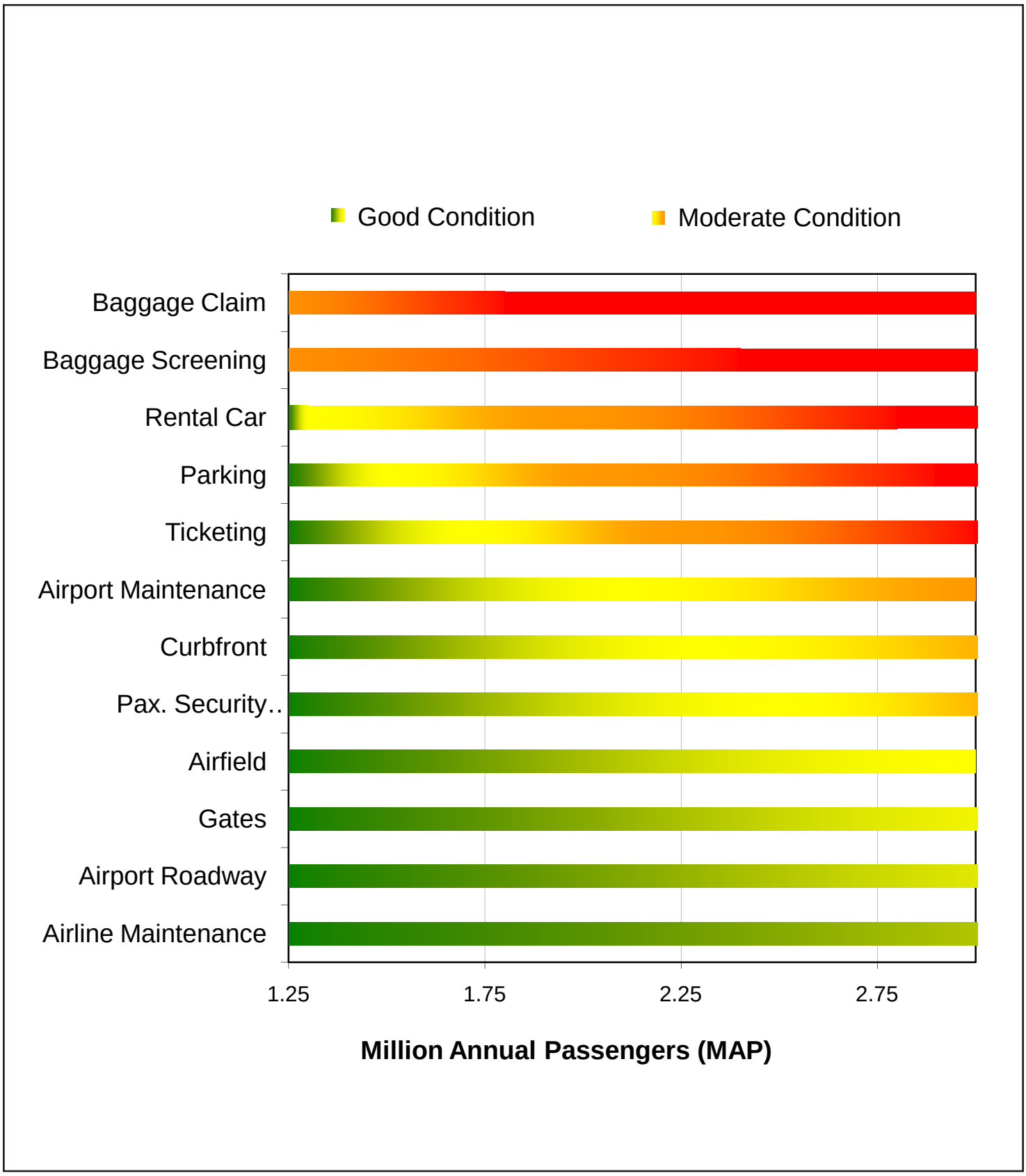
Functional Element	Existing	2008 Requirement	2013 Requirement	2018 Requirement	2023 Requirement	2028 Requirement	2008 Deficiency	2013 Deficiency	2018 Deficiency	2023 Deficiency	2028 Deficiency
Employee Parking											
Employee Parking Lot (stalls)	210	327	386	462	528	601	117	176	252	318	391
Employee Parking Lot Area (acres)	1.69	2.63	3.10	3.71	4.24	4.83	0.94	1.41	2.02	2.56	3.14
Rental Car (includes Enterprise)											
Customer Service Area (inside terminal)											
Customer Service Counter Length (linear feet)	148	90	90	90	90	90	0	0	0	0	0
Customer Service Counter Area (square feet)	1,041	630	630	630	630	630	0	0	0	0	0
Customer Service Office Area (square feet)	1,645	1,350	1,350	1,350	1,350	1,350	0	0	0	0	0
Customer Service Passenger Queue Area (square feet)	151	1,800	1,800	1,800	1,800	1,800	1,649	1,649	1,649	1,649	1,649
Ready / Return Parking Lot											
Ready Parking Lot (stalls)	302	273	324	391	442	509	0	22	89	140	207
Return Parking Lot (stalls)	187	191	226	273	311	357	4	39	86	124	170
Ready / Return Lot (acres)	3.78	3.16	3.74	4.52	5.12	5.89	0	0	0.74	1.34	2.11
Vehicle Service / Maintenance / Storage Area (acres)	7.84	7.84	9.26	11.07	12.67	14.44	0	1.42	3.23	4.83	6.60
Total Area (excludes Customer Service Area) (acres)	11.61	11.00	13.00	15.59	17.79	20.34	0	1.39	3.98	6.18	8.73
Support											
General Aviation (excluding terminal)											
GA T-Hangar (square feet)	69,100	73,600	87,700	97,400	108,300	120,200	4,500	18,600	28,300	39,200	51,100
GA Conventional Hangar (square feet)	198,000	246,200	258,600	277,600	324,400	382,300	48,200	60,600	79,600	126,400	184,300
GA Apron Area (square yards)	173,400	190,300	199,900	214,500	250,700	295,400	16,900	26,500	41,100	77,300	122,000
GA Landside Area (square feet)	381,600	203,400	214,500	230,600	268,900	316,100	-178,200	-167,100	-151,000	-112,700	-65,500
General Aviation Area Subtotal (square feet)	2,209,300	2,235,900	2,359,900	2,536,100	2,957,900	3,477,200	26,600	150,600	326,800	748,600	1,267,900
General Aviation Area Subtotal (acres)	51	51	54	58	68	80	1	3	8	17	29
Other Support											
Fuel Storage Jet-A (gallons) (3-day Requirement)	208,000	142,834	267,243	299,610	328,232	359,517	0	59,243	91,610	120,232	151,517
Fuel Storage AVGAS (gallons) (3-day Requirement)	26,750	2,503	2,629	2,822	3,298	3,886	0	0	0	0	0
ARFF Index	C	C	C	C	C	C	-	-	-	-	-
Airport Maintenance (acres)	5.6	5.6	6.6	7.6	8.6	10.6	0	1	2	3	5

Table 4-52: Facility Requirements Summary

Functional Element	Existing	2008 Requirement	2013 Requirement	2018 Requirement	2023 Requirement	2028 Requirement	2008 Deficiency	2013 Deficiency	2018 Deficiency	2023 Deficiency	2028 Deficiency
Baggage Claim											
Baggage Claim Area (square feet)	13,247	23,370	27,663	31,617	36,189	41,267	10,123	14,416	18,370	22,942	28,020
Baggage Service Offices (square feet)	516	1,535	1,817	2,076	2,376	2,710	1,019	1,301	1,560	1,860	2,194
Baggage Claim Frontage (linear feet)	675	779	922	1,054	1,206	1,376	104	247	379	531	701
Baggage Claim Devices (devices)	3	3	4	5	5	6	0	1	2	2	3
Baggage Claim Circulation (square feet)	9,834	9,815	11,619	13,279	15,199	17,332	0	1,785	3,445	5,365	7,498
Baggage Claim Area Subtotal (square feet)	13,247	23,370	27,663	31,617	36,189	41,267	10,123	14,416	18,370	22,942	28,020
Public Area											
USO (square feet)	1,252	1,252	1,252	1,252	1,252	1,252	0	0	0	0	0
General Circulation (square feet)	24,325	11,611	14,338	16,388	18,757	21,390	0	0	0	0	0
Restrooms	2,021	2,444	2,893	3,306	3,785	4,316	423	872	1,285	1,764	2,295
Concessions (square feet)	6,764	6,764	6,764	6,764	6,764	6,764	0	0	0	0	0
Public Area Subtotal (square feet)	34,362	22,071	25,247	27,710	30,558	33,722	0	0	0	0	0
Non Public Area											
TSA Offices (square feet)	2,202	1,554	1,839	2,102	2,406	2,744	0	0	0	204	542
Airport Administration (square feet)	5,750	5,750	5,750	5,750	5,750	5,750	0	0	0	0	0
Airport Operations	4,858	4,858	4,858	4,858	4,858	4,858	0	0	0	0	0
Non Public Area Subtotal (square feet)	12,810	12,162	12,447	12,710	13,014	13,352	0	0	0	204	542
Other											
Mech / Elec / Maint / Storage (square feet)	7,529	15,271	17,738	19,953	22,515	25,361	7,742	10,209	12,424	14,986	17,832
*Total Processor Area (square feet)**	116,399	124,923	144,811	162,712	183,211	205,831	8,524	28,412	46,313	66,812	89,432
**Other Components of the Processor are not included in this summary, but requirements were determined are included in the total area*											
Landside											
Terminal Curbside											
Lanes											
Private Vehicle Inner Curb (effective # of 12' lanes)	4	4	4	5	5	5	0	0	1	1	1
Commercial Vehicle Outer Curb (effective # of 12' lanes)	4	4	4	4	4	4	0	0	0	0	0
LOS C Requirement											
Private Vehicle Inner Curb (linear feet) (LOS C Requirement)	1,056	754	831	908	1,031	1,146	0	0	0	0	90
Commercial Vehicle Outer Curb (linear feet) (LOS C Requirement)	1,512	330	390	410	430	450	0	0	0	0	0
Public Parking											
Stalls											
Daily Short Term Parking (stalls)	377	275	325	388	444	507	0	0	11	67	130
Daily Long Term Parking (stalls)	538	480	567	677	775	884	0	29	139	237	346
	915	755	892	1065	1219	1391	0	0	150	304	476
Holiday Economy Parking (stalls)	1,000	1,000	1,000	1,000	1,000	1,000	0	0	0	0	0
Acres											
Daily Short Term Parking (acres)	3.86	2.53	2.98	3.56	4.08	4.65	0	0	0	0.22	0.79
Daily Long Term Parking (acres)	4.78	4.41	5.21	6.23	7.13	8.13	0	0.43	1	2.35	3.35
Holiday Economy Parking (paved area) (acres)	4.47	4.47	4.47	4.47	4.47	4.47	0	0	0	0	0

Table 4-52: Facility Requirements Summary

Functional Element		Existing	2008 Requirement	2013 Requirement	2018 Requirement	2023 Requirement	2028 Requirement	2008 Deficiency	2013 Deficiency	2018 Deficiency	2023 Deficiency	2028 Deficiency
Forecast Activity Levels												
Annual Enplaned Passengers		774,056	774,056	955,889	1,092,510	1,250,495	1,425,969	0	181,833	318,454	476,439	651,913
Peak Hour Originating Passengers (PHOP)		840	840	994	1,136	1,301	1,483	0	154	296	461	643
Peak Hour Terminating Passengers (PHTP)		779	779	922	1,054	1,206	1,376	0	143	275	427	597
Peak Hour Passengers		1,222	1,222	1,446	1,653	1,892	2,158	0	224	431	670	936
Annual Aircraft Operations		84,677	72,876	77,932	85,168	95,920	108,875	-11,801	-6,745	491	11,243	24,198
Domestic Passenger		28,070	25,602	28,072	31,472	33,362	35,380	-2,468	2	3,402	5,292	7,310
International Passenger		946	1,210	1,540	1,930	2,284	2,698	264	594	984	1,338	1,752
Passenger Charter		66	66	66	66	66	66	0	0	0	0	0
True Air Taxi		6,809	5,590	5,865	6,289	7,341	8,642	-1,219	-944	-520	532	1,833
Commercial Operations Subtotal		35,891	32,468	35,543	39,757	43,053	46,786	-3,423	-348	3,866	7,162	10,895
General Aviation		47,476	39,181	41,161	44,184	51,640	60,863	-8,295	-6,315	-3,292	4,164	13,387
Military		1,310	1,227	1,227	1,227	1,227	1,227	-83	-83	-83	-83	-83
General Aviation Based Aircraft		115	115	126	131	136	143	0	11	16	21	28
Airfield												
Number of Runways		2	2	2	2	2	2	0	0	0	0	0
Runway Length	13R-31L (feet)	10,001	10,001	10,001	10,001	10,001	10,001	0	0	0	0	0
	13L-31R (feet)	4,952	4,952	4,952	4,952	4,952	4,952	0	0	0	0	0
Runway Width	13R-31L (feet)	150	150	150	150	150	150	0	0	0	0	0
	13L-31R (feet)	75	75	75	75	75	75	0	0	0	0	0
Instrument	13R-31L (feet)	Visual	Visual	Visual	Visual	Visual	Visual	-	-	-	-	-
	13L-31R (feet)	Visual	Visual	Visual	Visual	Visual	Visual	-	-	-	-	-
Runway Lighting	13R-31L (feet)	HIRL	HIRL	HIRL	HIRL	HIRL	HIRL	-	-	-	-	-
	13L-31R (feet)	MIRL	MIRL	MIRL	MIRL	MIRL	MIRL	-	-	-	-	-
Approach Lighting	13R-31L (feet)	NONE	NONE	NONE	NONE	NONE	NONE	-	-	-	-	-
	13L-31R (feet)	NONE	NONE	NONE	NONE	NONE	NONE	-	-	-	-	-
High Speed Runway Exits		4	4	4	4	4	4	0	0	0	0	0
Runway Safety Area Mitigation		NEEDED	NEEDED	NEEDED	NEEDED	NEEDED	NEEDED	-	-	-	-	-
Terminal												
Ticketing												
Ticket Counter Area (square feet)		2,369	2,264	2,680	3,063	3,506	3,997	0	311	694	1,137	1,628
Ticket Counter Queuing (square feet)		2,384	4,116	4,872	5,568	6,374	7,268	1,732	2,488	3,184	3,990	4,884
Ticket Counter Length (linear feet)		248	206	244	278	319	363	0	0	30	71	115
Ticket Counter Circulation (square feet)		6,452	6,174	7,308	8,353	9,561	10,902	0	856	1,901	3,109	4,450
Airline Ticket Office (square feet)		12,846	6,174	7,308	8,353	9,561	10,902	0	0	0	0	0
Ticketing Area Subtotal (square feet)		24,051	18,728	22,168	25,337	29,002	33,069	0	0	1,286	4,951	9,018
Baggage Transfer												
Outbound Baggage Make-up (square feet)		7,404	11,874	14,055	16,064	18,387	20,967	4,470	6,651	8,660	10,983	13,563
EDS In-Line Baggage Screening (square feet)		7,303	5,988	7,088	8,101	9,273	10,574	0	0	798	1,970	3,271
Inbound Baggage Make-up (square feet)		2,339	8,959	10,604	12,120	13,872	15,819	6,620	8,265	9,781	11,533	13,480
Baggage Transfer Area Subtotal (square feet)		17,046	26,821	31,747	36,285	41,532	47,360	9,775	14,701	19,239	24,486	30,314
Passenger Screening												
Security Screening Lanes (lanes)		6	5	6	7	8	9	0	0	1	2	3
Passenger Screening Area (square feet)		7,354	6,500	7,800	9,100	10,400	11,700	0	446	1,746	3,046	4,346
Passenger Screening Subtotal (square feet)		7,354	6,500	7,800	9,100	10,400	11,700	0	446	1,746	3,046	4,346



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Facility Requirements Summary Stoplight Chart

Figure 4-8