Chapter 4

FACILITY REQUIREMENTS

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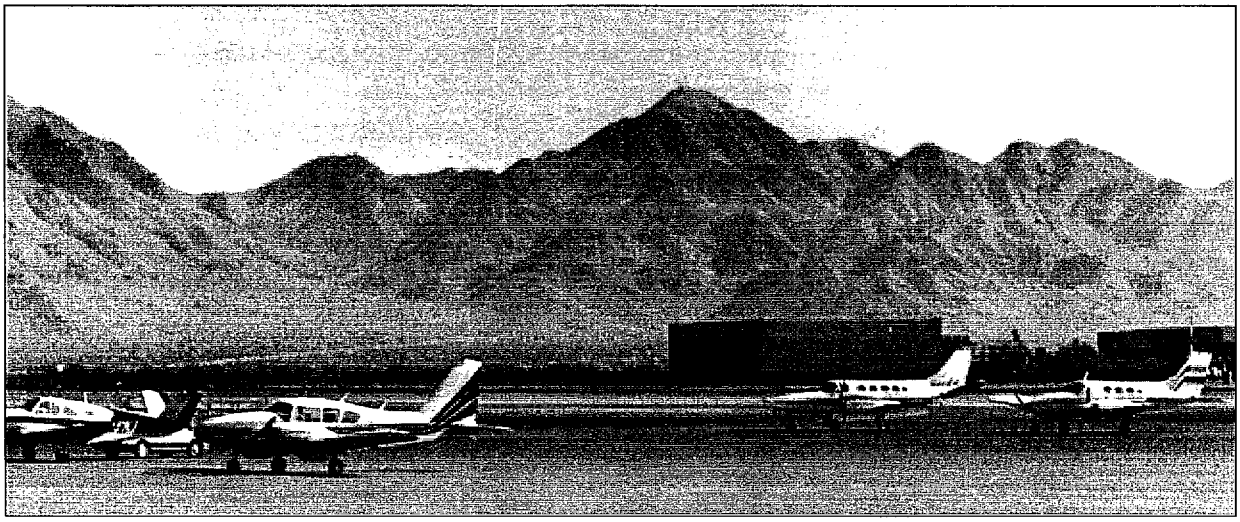
Airport Master Plan

Chapter 4



To properly plan for the future of Scottsdale Airport, it is necessary to convert forecast aviation demand into the specified types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the demand/capacity analyses conducted in the previous chapter and established planning criteria to determine the airside (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, terminal building, aircraft parking apron, fueling, automobile parking, and access) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy or inadequacy of existing airport facilities, outline what new facilities may be needed, and when these facilities may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing the various facilities will be evaluated in Chapter Five, Development Alternatives, to determine the most functional and efficient means for implementation.

AIRSIDE FACILITY REQUIREMENTS

Airside facilities are those that are related to the arrival and departure of aircraft. These facilities are comprised of the following items.

- Runways
- Taxiways
- Navigational Aids
- Marking and Lighting

The FAA has established criteria for use in the sizing and design of airfield facilities. The selection of the appropriate FAA design standards for the development of airfield facilities is based primarily upon the characteristics of the aircraft which are expected to use the airport. The most important characteristics in airfield planning are the approach speed and the wingspan of the critical design aircraft anticipated to use the airport now or in the future. Planning for future aircraft use is particularly important because design standards are used to plan separation distances between facilities that could be extremely costly to relocate at a later date.

The FAA standards include airport design criteria relating to the size of an aircraft as well as its performance and speed. According to *FAA Advisory Circular (AC) 150/5300-13, Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in the landing configuration at the particular aircraft's maximum certificated weight. The five approach categories used in airport planning are described below.

Category A: Speeds less than 91 knots.

Category B: Speeds of 91 knots or more but less than 121 knots.

Category C: Speeds of 121 knots or more but less than 141 knots.

Category D: Speeds of 141 knots or more but less than 166 knots.

Category E: Speeds of 166 knots or more.

Categories A and B include small, propeller aircraft and certain smaller business jets. Categories C, D and E consist of the remaining business jets as well as larger jet and propeller aircraft generally associated with commercial and military use.

The second basic design criteria relates to the size of an airplane. The Airplane Design Group (ADG) is based upon wingspan. The six groups are as follows.

Group I: Up to but not including 49 feet.

Group II: 49 feet up to but not including 79 feet.

Group III: 79 feet up to but not including 118 feet.

Group IV: 118 feet up to but not including 171 feet.

Group V: 171 feet up to but not including 214 feet.

Group VI: 214 feet up to but not including 262 feet.

FAA AC 150/5300-13, Airport Design, identifies a coding system which is used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. This code, called the Airport Reference Code, has two compo-

nents: operational and physical characteristics. The first characteristic is the aircraft approach category, defined above, and is depicted by a letter; the second is the airplane design group, also defined above, and is depicted by a Roman numeral.

In general, one type of aircraft may determine runway width, while another may determine other appropriate design parameters. Typically, aircraft approach speed applies to runways and runway-related facilities, while airplane design group categories primarily relates to separation criteria involving taxiways and taxilanes. In order to determine facility requirements for the design of an airport, the Airport Reference Code (ARC) should first be determined so that the airport design criteria contained within AC 150/5300-13 can be applied.

The FAA recommends designing airport functional elements to meet the requirements of the most demanding ARC for that airport. Corporate jet aircraft currently utilizing Scottsdale Airport fall into Category C and D or below (approach speeds of less than 166 knots). Most general aviation and commuter airline aircraft using the facility fit into Groups I and II (wingspans less than 79 feet), however, the trend for newer business aircraft is towards Group III aircraft (i.e., Gulfstream V or aircraft with wingspans less than 118 feet), however, due to the significant FAA design separation constraints, Scottsdale Airport is anticipated to accommodate only Group II aircraft. As a result, it is recommended that design standards at Scottsdale Airport conform to the requirements of an ARC of D-II. Such design standards will provide a runway which accommodates approach category D aircraft, and provides separation distances between airfield elements which accommodates Design Group II aircraft.

The airfield facility requirements outlined in this chapter correspond to the design standards described in FAA's AC 150/5300-13, Airport Design. The following sections describe the scope of facilities that would be necessary to accommodate the airport's role throughout the planning period.

RUNWAY

The adequacy of the existing runway system was analyzed from a number of perspectives including runway orientation, airfield capacity, runway length, and pavement strength. From this information, requirements for runway improvements were determined for the Scottsdale Airport.

Runway Orientation

Wind conditions are of prime importance in determining runway orientation. Where prevailing winds are consistently from one direction, runways are generally oriented in that direction. In most areas, however, consistency of wind direction is not found. In such instances, a multiple runway system, with crosswind runways, may be required. The FAA has established guidelines indicating that an airport runway system should provide 95 percent us-

ability of the runway. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes (ARC) A-I and B-I; 13 knots for ARC A-II and B-II; and 16 knots for ARC A-III, B-III, and C-I through D-III.

According to the all-weather windrose illustrated in **Exhibit 1B**, Runway 3-21 meets the recommended wind coverage. There is no indication at this time that there is a demand or need for a crosswind runway at Scottsdale Airport.

Airfield Capacity

The evaluation of airfield capacity presented in the previous chapter, outlined the capacity of the airport at current and future stages of the planning period. Operations at Scottsdale Airport are currently at a level at which additional capacity should be given a priority consideration. The airport's annual service volume (ASV) is currently 199,000 operations, however, the estimated operational level is currently about 83 percent of the ASV. The unconstrained forecast levels for the year 2015 indicate that the airport will reach 139 percent of the ASV. FAA Order 5090.3B, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS) indicates that capacity improvements should be considered when operational levels reach 60 percent of ASV; therefore, consideration should be given to provide additional airside capacity. As stated in the previous chapter, the most common means of providing increased airside capacity is the addition of a parallel runway. At Scottsdale Airport, however, physical constraints preclude the development of a parallel runway. Other means of providing additional capacity, including alternatives, will be examined in **Chapter Five, Development Alternatives.**

Runway Length, Width and Pavement Strength

The determination of runway length requirements for the airport are based on four primary factors.

- Critical aircraft type expected to use the airport.
- Mean maximum daily temperature of the hottest month.
- Runway gradient.
- Airport elevation.

The recommended length for a runway is determined by considering either the family of airplanes having similar performance characteristics or a specific airplane needing the longest runway. In either case, the choice should be based on airplanes that are forecast to use the runway on a regular basis. According to *FAA Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design*, a "regular basis" is considered to be at least 250 operations a year. An analysis of the existing and future fleet mix indicates that general aviation business jet aircraft influences the runway length requirements at Scottsdale Airport.

Aircraft operating characteristics are affected by three primary factors. They include the mean maximum temperature of the hottest month, the airport's

elevation, and the gradient of the runway. The mean maximum temperature of the hottest month (July) is 104.8 degrees Fahrenheit. The airport elevation is 1,508 feet MSL and the runway gradient is 0.81 percent. Another factor is the length of haul (the distance from airport to airport) of aircraft over 60,000 pounds. It is assumed that the average length of haul for aircraft over 60,000 pounds would be 1,500 NM.

Utilizing the FAA Computer Model for determining runway length requirements, **Table 4A** indicates that a runway length between approximately 5,830 feet and approximately 8,640 feet would be required to accommodate 75 percent of aircraft 60,000 pounds or less at useful loadings between 60 percent and 90 percent. Due to the physical and policy constraints and the fact that the existing runway length appears to be adequate, no additional runway length will be examined.

The runway should be capable of accommodating aircraft in design group D-II. This would result in a required runway width of 100 feet. The existing runway width is currently 75 feet and if possible it is recommended that the runway width be increased to the 100 foot standard. The existing runway pavement strength ordinance was recently increased to 75,000 pounds certificated maximum landing weight, in order to accommodate a wide variety of business jet aircraft.

TABLE 4A
Runway Length Requirements
Scottsdale Airport

RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3,180 feet
95 percent of these small airplanes	3,790 feet
100 percent of these small airplanes	4,460 feet
Small airplanes with 10 or more passenger seats	4,810 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	5,830 feet
75 percent of these large airplanes at 90 percent useful load	8,640 feet
100 percent of these large airplanes at 60 percent useful load	7,540 feet
100 percent of these large airplanes at 90 percent useful load	11,620 feet
Airplanes of more than 60,000 pounds	7,530 feet

Source: AC150/5325-4A, Runway length requirements for airport design.

TAXIWAYS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between apron and runways, whereas other taxiways become necessary as activity increases and safer and more efficient use of the airfield is needed. Parallel taxiways greatly enhance airfield capacity and are essential to aircraft movement about an airfield. At Scottsdale Airport, Runway 3-21 is supported by a full-length parallel taxiway with 13 exit taxiways and a partial-parallel taxiway with five exit taxiways.

The extension of the partial-parallel taxiway to the north would provide a slightly higher airside capacity. The locations of additional exit taxiways and the potential of providing an additional parallel taxiway will be examined in the following chapter.

MARKING AND LIGHTING

In order to facilitate the safe movement of aircraft about the airfield, particularly at night, airports use markings, lighting and signage to alert pilots as to their location. Runway markings are designed according to the type of approach available on the runway. Taxiway and apron areas are marked to assure that aircraft remain on the pavement. *FAA Advisory Circular 150/5340-1F, Marking of Paved Areas on Airports*, provides guidance necessary to design airport markings.

The runway at Scottsdale Airport currently has visual runway markings. These are utilized to identify Runway 3-21 as having only visual approach capabilities. If, however, additional navigational aids are installed (i.e., GPS), the runway markings will need to be updated according to the types of approaches established.

Airport lighting systems provide critical guidance to pilots during nighttime and low visibility operations. An airport is universally identified by a rotating beacon. Visible for several miles, the airport rotating beacon consists of an alternating white and green light to indicate a lighted, land airport. The existing rotating beacon was recently replaced and relocated. This beacon would appear to be adequate throughout the planning period.

Visual glide path indicators are a system of lights located adjacent to the runway which provide visual guidance information during an approach to the runway. At Scottsdale Airport, both ends of the existing runway are equipped with visual approach slope indicator (VASI) lights. It is recommended that these lights ultimately be replaced with the new state-of-the-art precision approach path indicators (PAPIs) during the planning period.

Runway end identifier lights (REILs) are installed to provide rapid and positive identification of the approach end of the runway. REILs consist of one high intensity flashing strobe light on each side of the threshold. These visual aids are most effective at airports located near cities where many ambient

lights are prominent. REILs should be considered for all lighted runways not equipped with an approach lighting system. At Scottsdale Airport, REILs are currently installed on both runway ends.

Runway 3-21 is currently equipped with medium intensity runway edge lighting (MIRL), providing a pilot with further identification of the runway edge limits at night or in periods of low visibility. Runways with precision instrument approach capabilities are typically equipped with high intensity runway edge lighting (HIRL); since Scottsdale Airport is not anticipated to provide precision approaches in the future, the existing MIRL on Runway 3-21 should be maintained.

Effective ground movement of aircraft at night also involves the use of taxiway lighting. Presently, medium intensity taxiway lighting (MITL) is provided along all taxiway edges. MITLs should be installed on the partial-parallel taxiway and should be provided on any new or extended taxiways.

Airfield signage provides another means of informing pilots as to their location on the airport. A system of signage strategically located at several locations on the airport is the method used to provide this guidance. Signs located at intersections of runways and taxiways provide crucial information to avoid conflicts between moving aircraft. Directional signage instructs pilots as to the location of taxiways and terminal aprons. Signage placed in accordance with FAA criteria can minimize pilot confusion and enhance airfield capacity. Most signage at Scottsdale Airport does meet FAA design standards. Additional sigwage should be installed as necessary.

NAVIGATIONAL AIDS

Airport and runway navigational aid requirements are based on recommendations as depicted in *DOT/FAA Handbook 7031.2C, Airway Planning Standards Number One*, and *FAA Advisory Circular 150/5300-13, Airport Design*. Navigational aids provide visual, nonprecision or precision guidance to a runway(s) or to the airport itself. The basic difference between a nonprecision and precision navigational aid is that the latter provides electronic decent, alignment (course), and position guidance, while the nonprecision navigational aid provides only alignment and position location information. The necessity of such equipment is predicated on safety considerations and operational needs. The type, purpose and volume of aviation activity expected at the airport are factors normally used in the determination of the airport's eligibility for navigational aids. The existing navigational aid at Scottsdale Airport provide only directional information to the airport, not to a specific runway end, therefore, are considered visual approaches.

Another type of instrument approach system is currently being tested and installed by the FAA. The use of orbiting satellites to confirm an aircraft's location is the latest military development to be made available to the civil aviation community. Global positioning

systems (GPS) uses two or more satellites to derive an aircraft's location by using triangulation. The accuracy of the systems has been remarkable, with initial degrees of error of only a few meters. As the technology improves, it is anticipated that GPS may be able to provide accurate enough position information to allow Category II and III precision instrument approaches, independent of any existing ground-based navigational facilities. In addition, it has been estimated that GPS equipment will be much less costly than existing precision instrument landing systems. For Scottsdale Airport, GPS technology is likely to provide a future means of gaining additional instrument approach capability. It is recommended that GPS nonprecision approaches be provided to both runway ends.

Each of the airside facility requirements are presented in **Exhibit 4A, Airside Facility Requirements**, at the end of the chapter.

GENERAL AVIATION REQUIREMENTS

The purpose of this section is to determine the space requirements needed during the planning period for the following types of facilities normally associated with general aviation terminal areas.

- Hangars
- Local and Itinerant Apron
- General Aviation Terminal Building
- Vehicle Parking

HANGARS

The demand for hangar facilities typically depends on the number and type of aircraft expected to be based at the airport. Based upon an analysis of general aviation facilities and the current demand at Scottsdale Airport, percentages representing hangar requirements for various types of general aviation aircraft have been calculated.

General aviation airports have been experiencing an increasing trend toward the use of T-hangars. T-hangars provide the aircraft owner more privacy and greater ease in obtaining access to the aircraft. The principal uses of conventional hangars at general aviation airports are for large aircraft storage, storage during maintenance and for housing fixed based operator's activities.

For planning purposes, it was assumed that 70 percent of the single engine aircraft, 80 percent of the twin engine aircraft and 100 percent of the helicopters and turbine powered aircraft would desire hangars. It was also assumed that 30 percent of single engine, 60 percent of twin engine aircraft and 100 percent of the helicopters and turbine powered aircraft would be stored in conventional hangars. The remaining aircraft would be stored in either a T-hangar or T-shade with approximately 64 percent of stored in T-hangars and 36 percent in T-shades.

A planning standard of 1,500 square feet (SF) was used for T-hangars or T-shades. Space requirements for conventional hangar space were based on

1,000 SF per single engine and rotary wing aircraft, 2,000 SF per twin engine and turboprop aircraft, and 2,500 SF per jet aircraft. In addition, service or maintenance hangar areas were estimated at 10 percent of the total hangar/shade storage area. This maintenance hangar area will be in addition to the individual hangar/shade facilities.

Table 4B, Forecast Hangar/Shade and Hangar Apron Requirements, compares the existing hangar/shade availability to the future hangar/shade requirements at Scottsdale Airport. As shown in **Table 4B**, the number of T-hangars needed by the end of the planning period is approximately twice the number currently available. Similarly, the amount of T-shade and conventional hangar space needed by the end of the 20-year planning period also exceeds the currently amount available.

TABLE 4B
Forecast Hangars/Shades and Hangar Apron Requirements
Scottsdale Airport

	Available	1994	2000	2005	2010	2015
Based Aircraft[1]	N/A	393	424	448	474	500
Aircraft to be Hangared or Shaded						
Single Engine	N/A	189	199	204	209	214
Multi Engine	N/A	66	71	75	82	88
Turboprop	N/A	8	12	18	24	30
Business Jet	N/A	24	28	32	36	40
Rotorcraft	N/A	9	11	12	13	15
Total	N/A	296	321	341	364	387
T-hangar Positions	62	101	107	111	114	118
T-hangar Area (SF)	N/A	151,500	160,500	166,500	171,000	177,000
T-shade Positions	53	57	60	62	65	67
T-shade Area (SF)	N/A	85,500	90,000	93,000	97,500	100,500
Conventional Hangar Positions	N/A	138	154	168	185	202
Aircraft Storage Area (SF)	N/A	202,000	229,500	256,500	287,500	318,500
Aircraft Maintenance Area (SF)	N/A	43,900	48,000	51,600	55,600	59,600
Total Conventional Hangar Area (SF)	86,460[1]	245,900	277,500	308,100	343,100	378,100

Notes: N/A - Not Applicable
[1] Includes FBO facilities only

AIRCRAFT PARKING APRON

Adequate aircraft parking apron should be provided to accommodate those local aircraft not stored in hangars as well as transient aircraft. At Scottsdale Airport, the local aircraft are parked in a number of different areas, while the transient parking is located in front of the general aviation terminal building or at one of the two FBO facilities. There are currently 312 tiedown spaces available at the airport.

In determining future apron requirements, it is necessary to examine local and transient tiedown facilities as separate entities. The local apron should at least meet the demand established by the unhangared (and/or uncovered) based aircraft. The number of based aircraft requiring local tiedown facilities was determined and the results depicted in **Table 4C, Forecast Apron Requirements.** There are sufficient number of local tiedowns at Scottsdale Airport to meet the demand.

Transient parking requirements can be determined from a knowledge of busy-day operations. The number of transient spaces required at Scottsdale Airport was determined to currently be 20 percent of the busy-day general aviation itinerant operations due to the nature of the airport. A planning criterion of 300 square yards (SY) per local aircraft and 360 SY per transient aircraft was used for the analysis presented in **Table 4C.** As shown, there are not a sufficient number of transient tiedowns available to meet the projected demand. Additional transient tiedowns will be needed in the short-term.

TABLE 4C
Forecast Apron Requirements
Scottsdale Airport

	Available	1994	2000	2005	2010	2015
Total Tiedowns	312	169	185	193	205	218
Local	292	97	103	107	110	113
Transient	20	72	82	86	95	105
Total Aircraft Apron (SY)	N/A	55,000	60,500	63,100	67,200	71,700

GENERAL AVIATION TERMINAL BUILDING

A general aviation terminal building has several functions which include providing space for passenger waiting, pilot's lounge and flight planning, concessions, management, storage, and various other needs. This space is not necessarily limited to a single, separate terminal building, but also includes the space offered by fixed base operators for these functions and services.

The methodology used to evaluate terminal building capacity generally calculates the square footage requirements for terminal facilities based on the num-

ber of design hour pilots and passengers forecast to use the facility. Space requirements were determined using 75 square feet per design hour passenger. **Table 4D, General Aviation Terminal Building Requirements**, outlines the space requirements for a general aviation terminal building facility at Scottsdale Airport during the planning period. The available lobby and flight planning areas of each of the FBO's may provide adequate area to meet the general aviation terminal needs throughout the planning period.

TABLE 4D
General Aviation Terminal Building Requirements
Scottsdale Airport

	Available	1994	2000	2005	2010	2015
Design Hour Pilots and Passengers	N/A	140	158	171	187	203
Terminal Building (SF)	8,419	10,500	11,850	12,825	14,025	15,225

Notes: N/A - Not Applicable

AUTOMOBILE PARKING

The requirements for automobile parking at general aviation airports are largely dependent upon the level of operations in addition to the type of general aviation facilities and activities at the airport. General aviation terminal area parking facilities are determined under guidelines set forth in FAA publications, while the number of automobile parking spaces for other general aviation facilities would be based on other factors.

The requirements for tenants and visitor parking at a general aviation terminal at Scottsdale Airport were based upon the number of design hour pilots and passengers. The total number of public parking positions was projected based on one space per design hour pilot and passenger and 350 square feet per automobile parking space (providing both the parking stall and a share of the parking aisles).

General aviation parking requirements were calculated under the assumption that 25 percent of the based aircraft will require automobile parking positions at any one time. The amount of parking area required per space is the same as that used in determining terminal area parking requirements. **Table 4E, Public Vehicle Parking Requirements**, reflects parking facilities that are currently available and those that will be required in the future.

General aviation facility requirements are summarized in **Exhibit 4B, General Aviation Facility Requirements**, at the end of the chapter.

TABLE 4E
Public Vehicle Parking Requirements
Scottsdale Airport

	Available	1994	2000	2005	2010	2015
Pilots and Design Hour Passengers	N/A	140	158	171	187	203
Terminal Vehicle Spaces	N/A	140	158	171	187	203
Parking Area (SY)	N/A	5,450	6,150	6,650	7,280	7,900
General Aviation Spaces	N/A	98	106	112	119	125
Parking Area (SY)	N/A	3,820	4,130	4,360	4,630	4,870
Total Parking Spaces	2,631	238	264	283	306	328
Total Parking Area (SY)	N/A	9,270	10,280	11,010	11,910	12,770

Notes: N/A - Not Applicable
[1] includes the number of auto parking spaces at the terminal building and long-term parking.

COMMERCIAL SERVICE TERMINALREQUIREMENTS

Components of the commercial service terminal area complex include the terminal building, gate positions and apron area. The following discussion outlines the facilities required to meet the commercial service terminal needs (in addition to the general aviation needs) at Scottsdale Airport throughout the planning period.

The analysis of facility requirements for various terminal complex functional areas at the Scottsdale Airport was performed within the guidelines of *FAA AC 150/5360-9, Planning and Design of Airport Terminal Facilities at Nonhub Locations*. This document was used along with results of inventory, forecast, and demand/capacity to prepare estimates of various terminal building requirements.

Facility requirements were developed for the planning period based upon enplanement levels projected for the 20-year planning period. It should be noted that actual construction of any of the facility requirements should be related to the enplanement levels rather than the forecast year.

COMMERCIAL SERVICE TERMINAL BUILDING

The size of the terminal building will depend upon the type of airline operations it must accommodate as well as the peak activity periods that can regularly be expected. As discussed in the Forecast Chapter, commercial airline service is anticipated to begin during the planning period.

Utilizing the criteria established in the aforementioned FAA Advisory Circulars, the gross size of the commercial service terminal building was esti-

mated. **Table 4F, Commercial Service Terminal Building Requirements**, depicts the recommended gross size of the terminal building based upon the forecast enplanement levels.

TABLE 4F
Commercial Service Terminal Building Requirements
Scottsdale Airport

	Available	1994	2000	2005	2010	2015
Annual Enplanements	N/A	6,900	11,200	36,300	65,100	98,000
Design Hour Enplanements	N/A	5	7	24	43	65
Peak Hour Passengers	N/A	12	17	58	103	156
Terminal Building Elements						
Public Waiting Area	N/A	500	500	600	1,000	1,300
Airline Ticketing/ Operations	N/A	500	500	1,000	1,400	1,800
Ticket Lobby	N/A	100	150	200	280	320
Ticket Counter (LF)	N/A	5	7	10	14	18
Baggage Claim Area	N/A	400	500	550	600	700
Baggage Claim Counter (LF)	N/A	15	15	18	20	25
Food, Beverage and Terminal Services[1]	N/A	1,500	1,500	1,700	2,000	2,400
Airport Management	N/A	1,000	1,000	1,200	1,500	2,000
Building Mechanical Systems	N/A	500	525	650	920	1,180
Total Area (SF)	**8,419[2]**	**4,500**	**4,700**	**5,900**	**7,700**	**9,700**

Notes: N/A - Not Applicable
[1] Terminal Services includes area for rental cars, retail shops, vending machines, restrooms, security, concessions, and maintenance and storage.
[2] Existing Terminal Building

Source: *FAA Advisory Circular 150/5360-9*, Planning and Design of Airport Terminal Facilities at Nonhub Locations.

Public Waiting Area

The public waiting area is the designated waiting area for passengers immediately prior to boarding an aircraft. This area includes the lobby, circulation, security screening, and departure areas. The public area requirements are generally based on design hour activity, gate requirements and fleet mix projections. The Scottsdale Airport currently has a small departure area within the existing terminal facility.

Table 4F depicts the lobby waiting area requirements for the commercial airlines. The lobby waiting area at Scottsdale Airport should be approxi-

mately 1,300 square feet by the end of the planning period.

Airline Support Areas

Airline ticket counter, length, counter area, airline ticket office, ticketing lobby, and baggage handling area requirements were calculated in accordance with *FAA Advisory Circular 150/5360-9*. These requirements were based upon peak hour activity. **Table 4F** outlines the airline ticketing/operations requirements for the Scottsdale Airport over the twenty year planning period. Approximately 2,820 square feet will be needed by the end of the planning period.

Baggage Claim Facilities

Baggage claim facility requirements are depicted in **Table 4F**. These were based upon the anticipated peak hour activity at Scottsdale Airport during the planning period.

It is estimated that approximately 700 square feet of baggage claim area will be needed by the end of the planning period. A baggage claim counter of 25 feet is also anticipated to be needed by the year 2015.

Food, Beverage, and Terminal Services

Food, Beverage, and Terminal Services include passenger and visitor-oriented amenities, concessions and services other than those provided by the airlines. For planning purposes this area includes rental car companies, retail shops, vending machines, restrooms, security, concessions, and maintenance and storage operations. It is expected that approximately 2,400 square feet will be needed by the end of the planning period. **Table 4F** outlines the terminal services facility requirements throughout the planning period.

AIRCRAFT GATE POSITIONS AND APRON AREA

At the present time there is one gate position at the Scottsdale Airport. Currently, this gate is not assigned to a particular airline. The two existing aircraft gates for loading and unloading of passengers are utilized by the charter operator located within the terminal building. As enplanements increase during the planning period, additional gates may be required. **Table 4G, Airline Gate and Apron Area Requirements**, depicts the number of gates anticipated throughout the planning period.

TABLE 4G
Airline Gate and Apron Area Requirements
Scottsdale Airport

	Available	1994	2000	2005	2010	2015
Peak Hour Passengers	N/A	12	17	58	103	156
Commuter Aircraft Gate Positions (aircraft with 19 seats or less)[1]	2	2	2	2	2	2
Apron Area (SY)	N/A	4,000	4,000	4,000	4,000	4,000
Regional Aircraft Gate Positions (aircraft with 30-70 seats)	N/A	0	0	1	1	1
Apron Area (SY)	N/A	0	0	2,500	2,500	2,500
Total Gate Positions	2	2	2	3	3	3
Total Apron Area (SY)	N/A	4,000	4,000	6,500	6,500	6,500

Notes: N/A - Not Applicable
[1] Includes charter aircraft gate positions

The size and configuration of the airline apron will vary with the level of airline service. A commuter airline generally can be expected to operate smaller aircraft with less than 30 passenger seats, however, the regional aircraft can seat nearly 70 passengers. According to the table, the existing apron area at the Scottsdale Airport will be adequate to meet the demand through the planning period, however, reconfiguration may be necessary.

Airlines serving Scottsdale Airport will primarily serve origin-destination traffic with minimum numbers of connecting passengers; therefore, a linear concept gate area with a minimum distance from curb to gate would work best. In this configuration, the aircraft would pull up to the face of the terminal building to load and unload passengers. The aircraft could then be "power-out" from the gate for departure.

AUTOMOBILE PARKING

Vehicle parking in the terminal area includes those spaces utilized by passengers, visitors and employees. Parking spaces are classified as public, employee, and rental car. Requirements for public and rental car parking are dictated by origin-destination passenger levels and the availability of other modes of ground transportation. Employee parking is dependent upon total passenger levels.

The requirements for public vehicle parking was determines using *Advisory Circular 150/5360-9, Planning and Design of Airport Terminal Facilities at Nonhub Locations*. Employee parking was determined to be 10 percent of the spaces needed for public parking and rental car requirements were determined to be 20 percent of public parking. Approximately 62 parking spaces are needed by the end of the planning period. Each parking space will require

approximately 350 square feet of area for parking and maneuvering. **Table 4H, Commercial Service Terminal Automobile Parking Requirements,** depicts the results of this analysis. According to the table, additional parking at Scottsdale Airport should be considered over the long-term.

TABLE 4H
Commercial Service Terminal Automobile Parking Requirements
Scottsdale Airport

	Avail-able	1994	2000	2005	2010	2015
Annual Enplanements	N/A	6,900	11,200	36,300	65,100	98,000
Public Parking Spaces	N/A	20	30	80	130	170
Employee Parking Spaces	N/A	2	3	8	13	17
Rental Car Parking Spaces	N/A	4	6	16	26	34
Total Parking Spaces	159[1]	26	39	104	169	221
Parking Area (SY)	N/A	1,020	1,520	4,050	6,580	8,600

Note: N/A - Not Applicable
[1] Includes only existing terminal area auto parking spaces

If paid parking is established, the public lot is typically subdivided into short and long term parking areas. The short term parking lot is located most conveniently to the terminal building and parking rates are higher than in the long term lot. Approximately 20 percent of all public parking should be designated as short term parking.

The commercial aviation facility requirements that should be developed during the planning period are illustrated at the end of this chapter in **Exhibit 4C, Commercial Service Facility Requirements.**

AIRPORT ACCESS

Access to the Scottsdale Airport is currently available off of Scottsdale Road via Butherus Drive. Both of these access roads would appear to be capable of accommodating the anticipated vehicular activity to and from Scottsdale Airport. The access roadways through the terminal area may require additional roadway capacity. The development associated with additional access road capacity will be examined in the following chapter.

SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield, terminal building or general aviation requirements have been identified as support facilities. The following paragraphs describe the Airport Rescue and Firefighting (ARFF), Fuel Storage, and Airport Maintenance facility requirements.

AIRPORT RESCUE AND FIREFIGHTING

Requirements for Airport Rescue and Firefighting (ARFF) services at an airport are established under *Federal Aviation Regulation (F.A.R.) Part 139.* F.A.R. Part 139.49 establishes an ARFF index determination.

If commercial aircraft serving Scottsdale Airport in the future are capable of passenger capacities in excess of 30 passengers, an ARFF facility will be required. The ARFF would have a ARFF rating of Index A. This index rating is based on the number of departures conducted by aircraft within a specific length category. The longest length air carrier aircraft with an average of at least five daily departures determines the required Index group for the airport. The equipment and fire fighting capability of the Index A category meets requirements for commercial airline aircraft with lengths less than 90 feet. Index A requires at least one vehicle carrying at least 500 pounds of sodium-based dry chemical or halon 1211, or 450 pounds of potassium based dry chemical and water with an equal quantity of foaming agent to total 100 gallon, for simultaneous application. The existing ARFF facility and equipment would meet these requirements throughout the planning period.

FUEL STORAGE

Fuel at airports is normally stored in underground tanks. This practice has undergone a great deal of scrutiny in the past few years because of the potential for fuel leaks and contamination of soil and groundwater. Consequently, the installation, design and monitoring requirements from both the State and Federal government, related to underground fuel storage, have increased significantly. The location of the fuel storage area depends upon the airport's operational activity and management procedures. A remote location of the fuel storage facility will require the use of a service vehicle to make the fuel available to the aircraft on the apron area.

Future fuel storage requirements for Scottsdale Airport were projected following an analysis of the historical fuel use characteristics at the airport for the past year, both for Jet A fuel and Av-Gas. The average rate of fuel consumption for this period was 14.5 gallons per operation. This ratio can be expected to increase slightly as the size of the aircraft fleet increases.

The FBO's at Scottsdale Airport have indicated that on average they receive fuel deliveries every two weeks. This delivery schedule varies throughout the year, depending upon the activity level at the airport. Based on this information, **Table 4J, Fuel Storage Requirements**, provides a forecast of the bi-weekly fuel storage capacity that will be required at Scottsdale Airport. Storage requirements are based on a two-week on-hand supply; however, more frequent deliveries can reduce the fuel storage capacity requirement. As indi-

cated in **Table 4J**, the current fuel storage capacity of 129,000 gallons is not adequate to meet the bi-weekly fuel storage requirements for the 20-year planning period.

TABLE 4J
Fuel Storage Requirements
Scottsdale Airport

	Available	1994	2000	2005	2010	2015
Annual Operations	N/A	166,738	193,100	211,000	232,400	250,700
Peak Month Operations	N/A	17,541	20,143	22,185	24,121	26,239
Average Fuel Ratio	N/A	14.5	14.6	14.7	14.8	14.9
Bi-Weekly Fuel Storage Requirements (Gallons)	129,000[1]	127,200	147,100	163,100	178,500	195,500

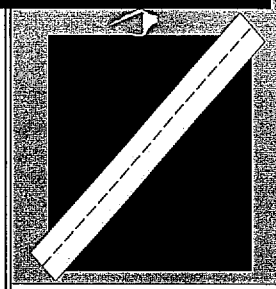
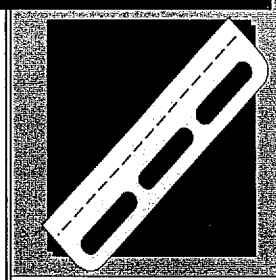
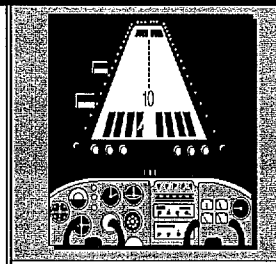
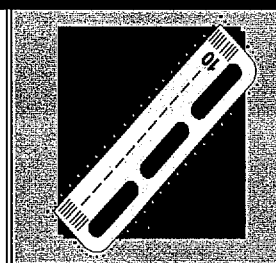
Notes: N/A - Not Applicable
[1] Total on-airport fuel storage capacity, does not include private fuel storage facilities.

CONCLUSIONS

Few of the facilities at the Scottsdale Airport will be capable of meeting the unconstrained forecast demand through the planning period. Many will need to be improved or expanded in order to adequately service the anticipated increase in both aircraft operations and passengers utilizing the facility. **Exhibits 4A, Airside Facility Requirements, 4B, General Aviation Facility Requirements**, and **4C, Commercial Service Facility Requirements** provide a summary of the facility requirements determinations.

The next step in the master planning process is to analyze development alternatives that can accommodate these requirements. The next chapter will provide this analysis and recommend the best alternative for the future development of the Scottsdale Airport. A recommended development alternative will be identified that will accommodate as much of the unconstrained forecast as possible, under the physical and policy constraints of the Airport. Based on the evaluation of both physical and policy constraints as well as airport expansion potential, "constrained" forecasts will be developed.

93MP1:3-4A-4/5/95

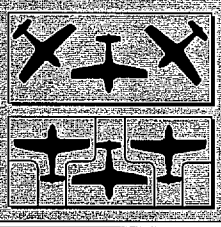
	EXISTING	2000	2005	2015
RUNWAYS 	Runway 3-21 8,251' x 75' 45,000 lbs SWL 75,000 lbs DWL	Runway 3-21 8,251' x 100' 45,000 lbs SWL 75,000 lbs DWL	Runway 3-21 SAME	Runway 3-21 SAME
TAXIWAYS 	Runway 3-21 Full Parallel Partial Parallel High Speed Connecting	Runway 3-21 Full Parallel Full Parallel High Speed Connecting	Runway 3-21 SAME	Runway 3-21 SAME
NAVIGATIONAL AIDS 	Beacon, ATCT ASOS Runway 3-21 NDB (circling) VOR (circling) VASI REIL	Beacon, ATCT ASOS Runway 3-21 GPS VOR (circling) PAPI REIL	SAME Runway 3-21 SAME	SAME Runway 3-21 SAME
LIGHTING and MARKING 	Runway 3-21 MIRL Visual Taxiways MITL Reflectors Centerline	Runway 3-21 MIRL Non Precision Taxiways MITL Centerline	Runway 3-21 SAME Taxiways SAME	Runway 3-21 SAME Taxiways SAME

SCOTTSDALE AIRPORT

Exhibit 4A
AIRSIDE FACILITY REQUIREMENTS

93MP13-4B-3/3/97

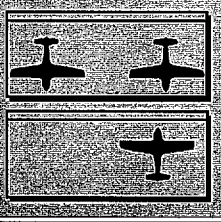
HANGARS



	EXISTING	2000	2005	2015
T-Hangars	62	107	111	118
T-Shades	53	60	62	67
Conventional Hangar (S.F.)	86,460*	245,900	308,100	378,100

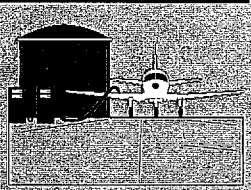
* FBO Facilities Only

APRON TIE-DOWNS



Local Tiedowns	292	103	107	113
Itinerant Tiedowns	20	82	86	105
Total Apron Area (S.Y.)	N/A	60,500	63,100	71,700

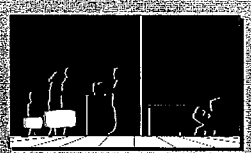
FUEL STORAGE



Bi-Monthly Fuel Storage Requirements (Gallons)	129,000*	147,100	163,100	195,500

* Existing On-Airport Capacity

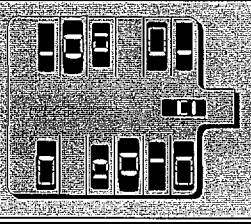
GENERAL AVIATION TERMINAL



Total Terminal Area (S.F.)	8,419*	11,850	12,825	15,225

* Existing Terminal Building

AUTO PARKING



Total Parking Spaces	263*	264	283	328
Terminal	159	158	171	203
General Aviation	104	106	112	125
Total Area (S.Y.)	N/A	10,280	11,010	12,770

* Existing Terminal Parking

SCOTTSDALE AIRPORT

Exhibit 4B
GENERAL AVIATION
FACILITY REQUIREMENTS

	EXISTING	2000	2005	2015
TERMINAL BUILDING	Total Area (S.F.) 8,419*	4,700	5,900	9,700
	* Existing Terminal Building			
TERMINAL GATE POSITIONS	Commuter Gates 2	2	2	2
	Regional Gates 0	0	1	1
AUTO PARKING	Total Parking 159	39	104	221
	Total Area (S.Y.) N/A	1,520	4,050	8,600

SCOTTSDALE AIRPORT

Exhibit 4C
COMMERCIAL SERVICE REQUIREMENTS