



E1-2595
FD 34836
Daw

PLANNING & COMMUNITY SERVICES

808 S. 8th Ave.
P.O. Box 272
Safford, AZ 85548-0272
Phone: (928) 348-8514
FAX: (928) 348-8515
TDD: (928) 428-0778

November 20, 2006

Diane Wood
Surface Transportation Board
Department of Environmental Analysis
5th Floor
1925 K St. NW
Washington DC 20423

Dear Ms. Wood:

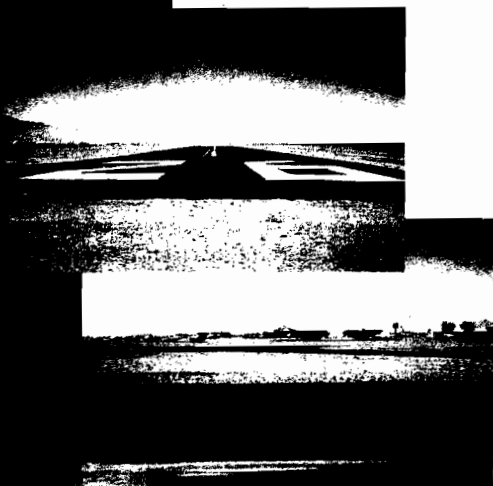
Enclosed is the information you requested on the Safford Regional Airport Master Plan. We look forward to working with you. If you have any questions please call me.

Sincerely,

Peter Stasiak
Community/Economic Dev. Dir.
P.O. Box 272
Safford, Arizona 85548
(928) 348-8514

Safford Regional Airport Master Plan Update 2000

Safford, Arizona



AIRNAV.COM

Airports

NavAids

Airspace Fixes

Aviation Fuel

KSAD Safford Regional Airport
Safford, Arizona, USA**GOING TO SAFFORD?**Reserve a
Hotel Room**FAA INFORMATION EFFECTIVE 15 MAY 2003**

Loc	Ops	Rwys	Biz	Links
Com	Nav	Svcs	Stats	Notes

Location

FAA Identifier: SAD

Lat/Long: 32-51-11.926N / 109-38-05.895W

32-51.19877N / 109-38.09825W

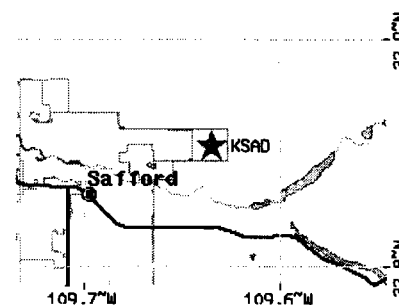
32.8533128 / -109.6349708

(estimated)

Elevation: 3177 ft. / 968.3 m (surveyed)

Variation: 12E (1985)

From city: 3 miles E of SAFFORD, AZ

**Airport Operations**

Airport use: Open to the public

Sectional chart: PHOENIX [CLICK TO BUY IT NOW](#)

Control tower: no

ARTCC: ALBUQUERQUE CENTER

FSS: PRESCOTT FLIGHT SERVICE STATION [1-800-WX-BRIEF]

NOTAMs facility: SAD (NOTAM-D service available)

Attendance: MON-SAT 0700-1730, SUN 0700-1530

Pattern altitude: 4177 ft. MSL

Wind indicator: lighted

Segmented circle: yes

Lights: DUSK-DAWN

Beacon: white-green (lighted land airport)

No photo available

If you have an aerial photo of this airport that you would like to share with other users of AirNav.com, click here to [send us your photo](#).**Airport Communications**

CTAF/UNICOM: 122.8

WX ASOS: 124.175 (928-428-5178)

- APCH/DEP SERVICE PRVDD BY ALBUQUERQUE ARTCC ON FREQS 134.45/327.15 (SILVER CITY RCAG).

Nearby radio navigation aids

VOR radial/distance	VOR name	Freq	Var
SSOr319/39.8	SAN SIMON VORTAC	115.40	13E

Airport Services

Fuel available: 100LL JET-A

Parking: tiedowns

Sunrise and sunset

Times for 05-Jun-2003

	Local (UTC-7)	Zulu (UTC)
Morning civil twilight	04:43	11:43
Sunrise	05:11	12:11
Sunset	19:23	02:23
Evening civil twilight	19:51	02:51

METAR

KSAD 052350Z AUTO 28017G26KT
10SM CLR 37/04 A2977 RMK
AO2 PK WND 28027/2334
SLP021 T03670039 10383
20339 56010 TSNO

Airframe service: MAJOR
Powerplant service: MAJOR
Bottled oxygen: NONE
Bulk oxygen: NONE

Runway Information

Runway 12/30

Dimensions: 6015 x 100 ft. / 1833 x 30 m	
Surface: asphalt, in good condition	
Weight limitations: Single wheel: 33000 lbs	
Runway edge lights: medium intensity	
RUNWAY 12	RUNWAY 30
Latitude: 32-51.56633N	32-50.86067N
Longitude: 109-38.55800W	109-37.73200W
Elevation: 3163.0 ft.	3167.0 ft.
Traffic pattern: left	left
Markings: basic, in good condition	basic, in good condition
Visual slope indicator: 2-box VASI on left (3.00 degrees glide path)	2-box VASI on left (3.00 degrees glide path)
Obstructions: 7 ft. fence, 425 ft. from runway, 32:1 slope to clear	none

Runway 8/26

Dimensions: 4800 x 75 ft. / 1463 x 23 m	
Surface: asphalt, in good condition	
Weight limitations: Single wheel: 23000 lbs	
Runway edge lights: medium intensity	
RUNWAY 8	RUNWAY 26
Latitude: 32-51.28933N	32-51.28483N
Longitude: 109-38.58350W	109-37.64583W
Elevation: 3158.0 ft.	3177.0 ft.
Traffic pattern: left	left
Markings: basic, in good condition	basic, in good condition
Visual slope indicator: 2-light PAPI on left	2-light PAPI on left
Runway end identifier lights: no	no
Obstructions: 7 ft. fence, 233 ft. from runway, 4:1 slope to clear	none
	+6 FT FENCE 145 FT FROM END OF RY.

Helipad H1

Dimensions: 72 x 72 ft. / 22 x 22 m
Surface: concrete
Traffic pattern: left left

Airport Operational Statistics

Aircraft based on the field: 29	Aircraft operations: avg 39/day
Single engine airplanes: 21	56% transient general aviation
Multi engine airplanes: 7	20% local general aviation
Ultralights: 1	15% military
	9% air taxi

Additional Remarks

- MILITARY TFC NEAR AIRPORT.

ACKNOWLEDGEMENT

Stantec Consulting Inc. would like to thank the Safford Airport Planning Advisory Committee for their efforts in the creation of the Safford Regional Airport Master Plan Update.

Planning Advisory Committee

Doug Benson – Airport Manager
Ray Boucher – ADOT Aeronautics Division
Terry Cooper – Graham County Manager
Margie Drilling – FAA, Aviation Planner
Manny Escobar – FAA, Engineer
Gene Fowler – Resident, City of Safford
Ron Jacobson – Safford City Manager
Howard Jenkins – Independent Flight Instructor
Georgia Luster – Secretary, City of Safford
John Martin – Safford Airport Authority
Sheldon Miller – Exec. Director of Chamber of Commerce
Ed Ragland – City Council Member
Robert Porter – Public Works Director
Ed Zappia – Safford Airport Authority

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Safford Regional Airport Master Plan Update 2000

Safford, Arizona

Introduction 

1.1 STUDY BACKGROUND

The City of Safford received and executed a grant from the FAA in May 1998 to conduct an airport master plan study. In June 1998, the first Planning Advisory Committee (PAC) meeting was held to present the scope and purpose of the study, define the Plan's goals and objectives, and identify the key issues at the airport to be addressed within the scope of the Plan. Although the 1990 Master Plan addressed several issues and made recommendations for future development, a number of current issues required attention. This Airport Master Plan addresses those issues.

Since this study was initiated in 1998, the Master Plan uses 1997 as the base year for the collection of data – the latest “complete” year. However, more recent data has been noted throughout the Study, where appropriate. The base year represents the “existing conditions” of the Study.

1.2 STUDY PURPOSE

The purpose of this study is to update the January 1990 Airport Master Plan. This master plan is designed to be responsive to the goals and objectives of the Safford Regional Airport. The study provides guidelines for the twenty-year master planning future that will satisfy aviation demand, support land use compatibility planning with community development plans, and minimize environmental impacts.

The Master Plan should serve as a tool to enable the City of Safford to make rational aviation investment plans and ensure that airport facilities remain viable in providing long-term aviation benefits to the community.

1.3 GOALS & OBJECTIVES

Careful preparation of goals (broad policy statements) and objectives (specific, attainable, and measurable actions) are essential to the success of a master plan process. The goals and objectives selected for this study were designed to meet

community guidelines, address relevant public concerns, and consider the different interests and factors that exist at the airport.

The following study goals and objectives were compiled as a result of pre-project research and the first Planning Advisory Committee (PAC) meeting held in June 1998. They were used throughout the study to guide the work effort.

Goal: To provide airport facilities and services for all users in a fiscally responsible manner that maximizes safety, efficiency, and opportunity for use.

Objectives:

To develop the airport in a manner that balances the need to conform to physical design standards as established by federal, state, and local agencies, with community needs and the financial constraints.

To document rationale for recommendations through a complete investigation of concepts and alternatives on technical, economic, and environmental grounds.

To establish an action plan for the state and federal future capital improvement program.

Goal: To develop aviation demand forecasts that are responsive to expected socioeconomic factors and demand levels in the Safford area.

Objectives:

To develop estimates of short- (2005), intermediate- (2010), and long-term (2020) aviation activity levels at Safford.

To identify the possible characteristics of future air travel demand.

Goal: To ensure airport compatibility with local land use patterns and plans.

Objectives:

To define airspace requirements of the airport and identify existing and potential obstructions to these.

To identify airport influence areas (AIA) to address off-airport land use issues.

To identify specific recommendations regarding compatible land use development adjacent to the airport and associated need for coordination amongst the varying interests (City and County government, community residents, etc.).

To identify on-airport land uses and assess their impacts on the contiguous areas.

To examine alternative uses of airport property, considering site constraints, that would enhance compatibility.

To strive for the minimal amount of environmental impact in the development of the airport facilities.

To identify potential conflicts between Airport use and development related to adjacent land use and offer strategies for dealing with them.

Goal: To produce a plan for airport development that meets the needs and desires of the Safford area.

Objectives:

To develop a public awareness of the airport planning and development process.

To encourage and utilize comments from all sectors of the aviation community in developing an airport master plan update that can be adopted, endorsed, and implemented.

To ensure that the public, along with federal, state, and local officials, have an opportunity to participate in the decision-making process during the development of the plan.

To develop a phased program of specific airside and landside facility improvements to accommodate the forecasts of future aviation demand for Safford.

1.4 ISSUES

Early identification of airport issues facilitates the formulation of the Study's strategy. Airport issues of greatest concern were defined by meeting with personnel associated with the airport in the early stages of the planning process and soliciting discussion during the first PAC meeting held June 18, 1998. As a result, the following issues were identified:

1.4.1 Compatible Land Use

In the early stages of the master planning process and during the June 1998 meeting, the PAC and airport-related staff noted that assuring compatible land use development adjacent to the airport was considered the most important issue requiring attention during the master planning process. This issue evolved throughout the planning process.

As part of the off-airport land use planning effort, it was noted that additional recommendations to build on the City-adopted Airport Influence Area (AIA) were needed. Since two jurisdictions (City and County) exist at and around the airport, it was also noted that State law requires that the adjacent jurisdiction review any development within a three-mile radius of community development.

In October 1999, the City, in coordination with the PAC, took the 20-year master planning process one step further in terms of land use planning. The City identified "ultimate" development plans (beyond 2020 - the master planning window) in an effort to look at the airport's adjacent land use requirements nearly 50 years down the road. This produced a conceptual development scenario that included the extension of Runway 8-26 under the assumption that Runway 12-30 would become the crosswind runway. Consequently, this effort resulted in the identification of long-term land acquisition needs and areas of compatible land use development concern. Please see Section 5.4, Beyond 2020, for additional details.

1.4.2 Auto Access

The existing airport access roadway requires improvement. The previous master plan proposed rerouting the access road. The current PAC stated that relocation was not significant development priority for the airport. However, preliminary discussions

revealed concerns over potential conflict with future helicopter operations just south of the access road.

1.4.3 Hangar Demand

Hangar demand has been increasing. In addition, the FBO hangar is in poor condition and inadequate in size to accommodate current aircraft maintenance and storage demand. Since this development is ineligible for FAA funding, other funding is needed.

1.4.4 Terminal Building

The PAC identified the terminal building as inadequate and inflexible. There is a need for a conference room as well as more lobby space. During firefighting season, there are nearly 100 people in and out of the terminal area. A separate Terminal Building Study has been programmed for future funding by the airport. However, the PAC requested that preliminary terminal building requirements be addressed in the Master Plan.

1.4.5 Aircraft Fuel Storage and Dispensing

Aircraft fueling and storage was identified as an issue in the early stages of the master planning process. However, the underground storage tanks have been replaced with new aboveground tanks which are in compliance with current environmental regulations. In addition, the self-serve fueling island has been removed – all fueling is now done by truck.

1.4.6 Helicopter Operations Area

Helicopter parking needs have remained a high priority for the airport. During peak periods for the helicopters, the apron becomes congested and, occasionally, the crosswind runway is closed and converted to helicopter parking -- this happens during military exercises and firefighting operations.

1.4.7 Utilities

The airport's existing utility infrastructure is inadequate. While some utility improvements are eligible for federal funding, other utility improvements are not. Thus, funding alternatives are necessary.

1.5 APPROACH

The study approach was designed with guidance from the FAA Advisory Circular 150/5070-6A, *Airport Master Plans*. This approach required a series of interdependent steps for systematic development of the airport master plan.

The methodology incorporated four basic phases. First, study purpose, program goals and objectives, and airport issues were identified. Next, airport requirements were defined based on forecast activity. Alternatives were then identified and evaluated, with one subsequently selected to best serve the future needs. Finally, the selected (preferred alternative) was planned and programmed.

The development of the plan took place within the context of a public coordination program to assure community input at each important decision stage. The work program, designed to accomplish the study objectives, was organized according to the following tasks.

<u>TASK</u>	<u>DESCRIPTION</u>
1	STUDY INITIATION
2	INVENTORY
3	AVIATION DEMAND FORECASTS
4	FACILITY REQUIREMENTS
5	ALTERNATIVES ANALYSIS
6	ENVIRONMENTAL OVERVIEW
7	LAND USE ANALYSIS
8	AIRPORT PLANS
9	IMPLEMENTATION PLAN
10	ADMINISTRATION AND COORDINATION
11	MASTER PLAN DOCUMENTS

The first task, Study Initiation, concluded with the preparation of this chapter – Chapter 1, Introduction. Thereafter, the completion of tasks 2 through 9 produced Master Plan Chapters 2 through 9. In addition, appendices were produced for support materials not included in the chapters.

Safford
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Inventory 

2.1 INTRODUCTION

This chapter presents information collected on the Safford Regional Airport and surrounding community to establish baseline conditions for the Airport Master Plan Update. Data was collected through various sources including an on-site visit, excerpts from the 1990 Airport Master Plan, and a review of other pertinent documents and files. Local, state, and national sources were also used to provide updated information representing airport conditions through the year 1997, which is the base year for the plan.

Airport and community background information, existing airside and landside facilities, and key socioeconomic characteristics are presented.

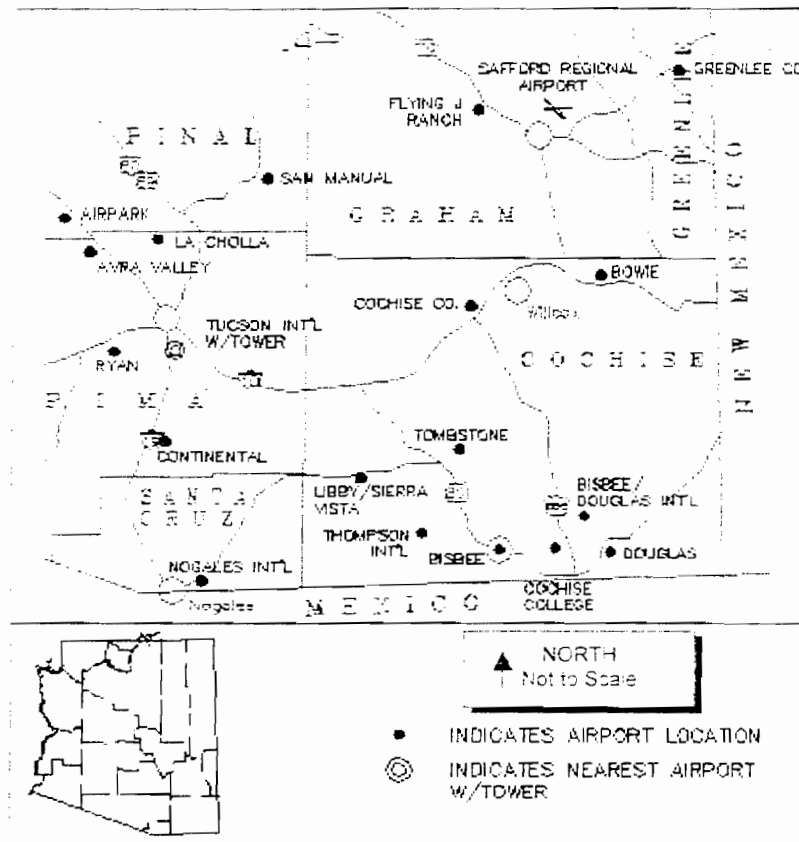
2.2 BACKGROUND

The City of Safford is in southeastern Arizona (**Exhibit 2-1**) on the south bank of the Gila River near the foothills of the Pinaleno Mountains. Mt. Graham is the highest peak in the mountain range at 10,720 feet elevation. Safford is approximately 10 miles north of the Coronado National Forest.

Safford was originally established in 1874 as an agricultural community. The existing airport, constructed as a training site during World War II by the United States Army Air Forces, was activated on November 11, 1941. According to the airport's files, the City of Safford officially acquired the airport on March 8, 1946. Further, a patent for the property was recorded in April 1956, pursuant to the authority contained in Section 16 of the Federal Airport Act, which restricts the use of airport property to aviation use only.

Safford serves as the county seat to Graham County. Safford Regional Airport is located approximately four miles northeast of the City. Tucson is the closest major metropolitan area, located 130 miles southwest of Safford.

EXHIBIT 2-1 LOCATION MAP



The Safford Regional Airport consists of 630 acres at an elevation of 3,176 feet. Primary facilities include two runways with parallel taxiways, a terminal building, one centralized aircraft apron with tiedowns, aircraft conventional hangars and t-hangars, vehicle parking, and an access road. The airport reference code (ARC) for Safford Regional Airport is currently B-II. This means the airport primarily serves aircraft with approach speeds of less than 121 knots and wingspans of up to but not including 79 feet.

The existing airport is owned by the City of Safford. The administrative responsibility for the airport lies with the Public Works Department. However, the Airport Authority oversees the operation and maintenance of the airport through a 1988 agreement with the City of Safford. Further, the fixed base operator (FBO), Safford Aviation, has an

agreement with the Safford Airport Authority to provide hands-on management of the airport on a day-to-day basis.

2.2.1 Airport Development History

Major improvements made to the airport in the last five years include the rehabilitation of the aircraft apron, the reconstruction of Runway 12-30, the installation of perimeter fencing, the construction of a public-use helipad, and the installation of an Automated Surface Observation System (ASOS). A more detailed history of airport development is provided in Appendix A. The last airport master plan was completed in 1989 and published in January 1990.

2.2.2 Regional Transportation

Highways

Safford is located at the junction of U.S. Highway 70 and 191. Truck transportation is provided by the interstate trucking companies and delivery services.

Railroads

Arizona Eastern Railway Company provides freight delivery service to Solomon, southeast of Safford. AMTRAK, passenger rail service, is available in Lordsburg, New Mexico, 77 miles east of Safford, or Benson, 80 miles south.

Air

The closest scheduled air passenger service is in Tucson, Arizona (2½ hours drive), but non-scheduled passenger and cargo air taxi service is available out of Safford Regional. UPS aircraft also serve the cargo needs of Safford. Greenlee County Airport, located 23 nautical miles (nm) to the northeast, and Flying J Ranch Airport, located 12 nm to the west are the closest public use airports to Safford Regional Airport. According to AirNav, Greenlee County Airport is at an elevation of 3,811 feet MSL with one paved 4,970-foot runway (Runway 7-25) and three based aircraft. The Flying J Ranch Airport is at an elevation of 3,100 feet MSL with one 2,580-foot dirt runway (Runway 01-19) and four based aircraft. Fuel service is unavailable at both airports. Cochise County Airport (39 nm to the south) is the closest airport with fuel service available.

2.3 AIRSIDE FACILITIES

Exhibit 2-2 illustrates the existing airside and landside facilities at Safford Regional. A description of each follows.

2.3.1 Runways

Safford Regional Airport has two runways. Runway 12-30, the primary runway, is 6,000 feet by 100 feet with a load bearing capacity of 33,000 lbs. single wheel gear (SWG). Runway 8-26 is the crosswind runway with dimensions of 4,800 by 75 feet with a weight bearing capacity of 23,000 lbs. SWG. Both runway pavements are asphalt and in good condition. In 1998, Runway 8-26 received a microsurface pavement surface treatment as part of an airport-wide pavement maintenance program. Subsequently, Runway 12-30 received a coal tar treatment as part of the same program.

2.3.2 Taxiways

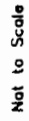
Both Runways 12-30 and 8-26 have full-length parallel taxiways. The following summarizes the identifiers and separations for these taxiways.

<u>Runway</u>	<u>Taxiway Identifier</u>	<u>Approx. Separation from Runway Centerline</u>
12-30	"A" (NW of intersection)	233 feet
	"B" (SE of intersection)	238 feet
8-26	"C" (East of intersection)	239 feet
	"D" (West of intersection)	479 feet

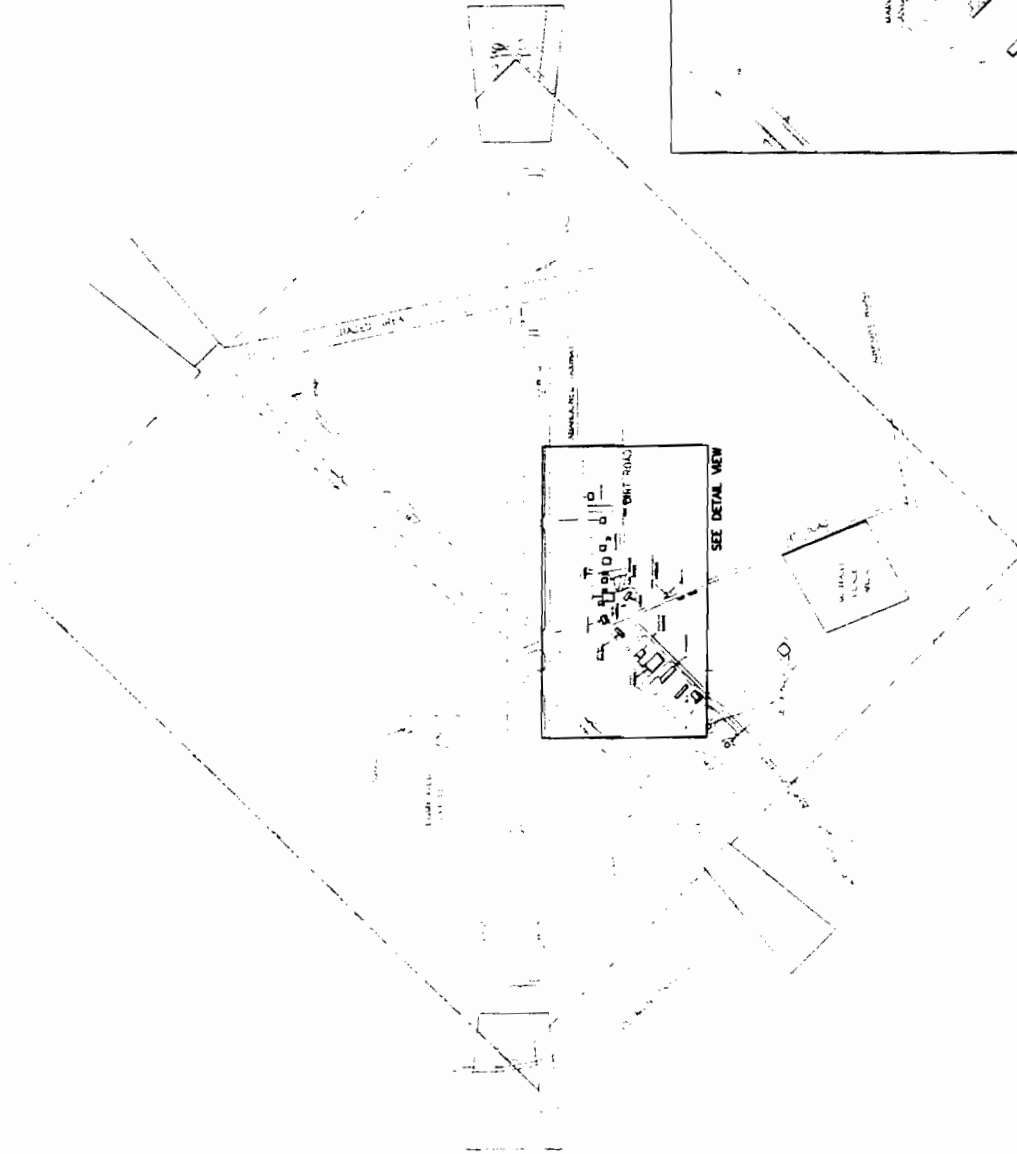
Runway 12-30's parallel taxiway has six connecting taxiways and Runway 8-26's taxiway has five. All parallel and connecting taxiways are asphalt and approximately 35 feet wide with the exception of two that are 48 and 50 feet wide. Parallel Taxiway C received a microsurface treatment as part of a pavement preservation project in 1998.

2.3.3 Aprons

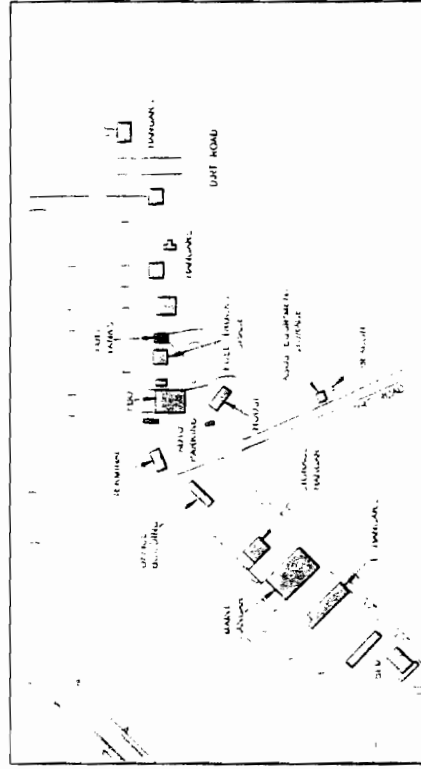
As shown in Exhibit 2-2, Safford Regional Airport has a large centralized aircraft apron on the south side of the intersecting runways. The apron area is approximately 48,800 square yards for tiedowns, taxilanes, and circulation. There are a total of 34 physical



LEGEND	
DESCRIPTION	KEY
EXISTING EASEMENT	---
PROPERTY LINE	---
FENCE	---



TERMINAL AREA DETAIL VIEW



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Master Plan Update

EXHIBIT 2-2 Existing Facilities

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tiedowns for based and transient aircraft -- 15 large on the west side of the apron and 19 small on the east side. However, only 10 of the 15 large tiedowns have chains and are properly marked.

2.3.4 Helicopter Operations Area

There are three helipads at the Safford Regional Airport: one public use and two private BLM pads. The public use helipad is located southwest of the terminal area on the south side of Aviation Way – the airport access road. Although the helipad is new, it quite often goes unused since there are no parking facilities immediately adjacent to the pad. Thus, helicopters continue to use the apron as an alternative. The two private BLM helipads are west of BLM's existing buildings and on the north side of Aviation Way. During peak firefighting operations, the BLM also uses the apron.

2.3.5 Navigation Aids, Visual Aids, and Markings

Both Runways 12-30 and 8-26 have medium intensity runway lighting (MIRL) systems (lights running the length of a runway). Both MIRL systems are variable intensity (radio-controlled). Runway 12-30 has visual approach slope indicators (VASI's) and Runway 8-26 has precision approach path indicators (PAPI's) – both provide vertical guidance for VFR approaches and the visual portion of an instrument approach and landing. Both runways have basic markings (for visual approaches), but Runway 12-30 has a global positioning system (GPS) instrument approach for both runway ends. GPS is a satellite-based navigational system operated by the U. S. Department of Defense and made available for civilian use for en route navigation, aircraft instrument approaches and other purposes. Runway 12-30's GPS approaches were published October 8, 1998. Appendix B includes an illustration of these approaches. Runway 12-30 is currently being re-marked with non-precision markings. The San Simon VORTAC station (approximately 40 nm southeast) is also used for navigation to the airport.

A segmented circle providing traffic pattern information along with a wind tee is located on the north side of the airport near the ASOS.

All taxiways are marked with centerlines and equipped with medium intensity taxiway lighting (MITL) systems. The MITL systems, like the MIRL systems on both runways, are pilot-/radio-controlled.

2.4 LANDSIDE FACILITIES

This section describes the existing landside facilities for Safford Regional Airport as previously illustrated in Exhibit 2-2.

2.4.1 Terminal Building

Safford Regional Airport has a terminal building with approximately 1,100 square feet. The terminal building is occupied by the FBO (Safford Aviation). The building includes administrative space along with a pilot lounge/waiting room, restrooms, and an equipment/utilities room. The terminal building, estimated at over 30 years old, is in good condition.

2.4.2 Aircraft Storage and Other Airport Structures

Aircraft Storage

Safford Regional Airport has a combination of conventional, shade, and T-hangars. **Table 2-1** summarizes these hangars, their ownership, current tenant, total area, and existing condition. The condition of each hangar has been rated by the Airport Authority as poor, fair, good, or excellent. A rating of poor describes a facility needing immediate attention. Fair and good ratings represent buildings which may not need significant maintenance or replacement for several years. An excellent rating represents buildings which are fairly new and/or will not require attention during the planning period.

Table 2-1
Summary of Airport Hangars

Hangar Type	Owner (Tenant)	Area*	Condition
Conventional	City (FBO)	4,800 s.f. (H1)	Poor
Conventional	City (FBO)	2,000 s.f. (H2)	Good
Conventional	City (Clay Richardson)	2,668 s.f. (H3)	Fair
Conventional	Caribou, Inc	NA (P1)	Excellent
T-hangar (1 unit)	Joe Hyde	NA (P2)	Fair
Conventional	Howard Jenkins	NA (P3)	Excellent
Conventional	City (Ron Bryce)	NA (C2)	Excellent
Conventional	City (SE Air Tankers)	NA (C8)	Excellent
T-hangars (4 units)	(John Martin) (Terry Nichols) (Arylin Feight) (Allen Pump)	5,158 s.f. total (T1-T4)	Good

Source: City of Safford. *City-assigned references in parentheses.

Other Airport Structures

Other airport structures include three BLM-owned and occupied buildings; an emergency generator facility; an ASOS facility; fuel tanks; a newly constructed (1999) fuel truck shade; and two homes used by the FBO – one as a residence and the other as an office building (for storage space).

The BLM structures include a new 3,000-square foot administrative building (built in 1999), firefighting facilities, and a storage shed.

2.4.3 Surface Access and Parking

There is one paved access road into the airport. The access road is off of Airport Road which runs east-west just south of the airport. The access road leads up to the paved terminal parking area. The terminal parking area has 30 general public parking spaces, 4 employee spaces, and 2 handicapped spaces. Other unmarked parking is available adjacent to the other airport buildings for individual tenants/users.

2.4.4 Support Facilities

Support facilities, presented here, include FBO services, fueling, maintenance, ARFF, security, and utilities.

FBO

The FBO, Safford Aviation, provides numerous services to include:

- Aircraft rentals
- Charter flights for passengers and freight
- Flight instruction
- Aircraft servicing
- Pilot services
- Major and minor airframe and powerplant maintenance
- Car rental
- Aircraft assistance services (parking assistance to incoming aircraft)
- Administration and public service /fuel sale

The FBO staffs the airport during operating hours: Monday through Saturday from 7:30 A.M. to 5:30 P.M., and Sunday from 7:30 A.M. to 3:30 P.M.

Fueling

Both Jet A and 100 LL fuel types are available at Safford Regional Airport. Two newly installed (1998) fuel tanks provide storage. Both tanks are in excellent condition and store 10,000 gallons of 100LL and 12,000 gallons of Jet A. These aboveground tanks are owned by the City of Safford and operated by the FBO for public fuel sales. The aboveground tanks replace the underground storage tanks recently removed. As of 1999, the self-service fuel tanks have also been removed so aircraft fueling is accomplished solely with fuel trucks.

Maintenance

Airport maintenance is provided by the City of Safford through the Airport Authority and FBO agreements. Maintenance equipment comes from the City fleet as well as some stored at the airport. Equipment used at the airport includes a tractor (mower and bucket), ATV sprayer for weeds, sweeper, pick-up truck, and an aircraft tug.

Aircraft Rescue and Firefighting Facilities (ARFF) and Security

Firefighting support is provided by the City's 28 volunteers. All firefighting personnel are trained in aircraft rescue and firefighting (ARFF) procedures. The City's firefighting response time is approximately 8-10 minutes as they are only 6½ miles from the airport. The City provides the volunteers with required equipment and support.

Airport security is provided by the City's 15 police officers on an as-needed basis as well as through surveillance conducted approximately twice per week. Like the fire department, emergency response time is approximately 8-10 minutes. Safford's police station is located near the fire station – approximately 6½ miles from the airport.

Security fencing at the airport along the north and east side consists of four-foot tall, three-strand fencing topped with double-barbed wire. Chainlink fencing lies generally along the west and south side of the airport. Security lighting in the terminal area is provided adjacent to the terminal building and parking lot.

Safford does not have an air traffic control tower (ATCT) since Safford's current activity is well below the 200,000 operations threshold for an FAA-operated ATCT.

Utilities

Utilities at the airport include electric, propane, water, telephone, and sewage. Some hangar facilities do not have utilities. However, the terminal building does have access to all utilities.

The City provides electricity and water; a private vendor (Matlock) provides the propane. The appropriate capacity of the existing power line serving the airport is 2100 KVA. The existing load is approximately 150 KVA. The existing power line to the airport is fed by a Graham County Electrical Corporation transmission line and transformers with limited capacity. The water comes from a five-inch diameter, 6,000-foot long line connected to a City of Safford pump station. It is estimated that no more than 200 gallons per minute through the existing line can be provided. Telephone service is provided by U.S. West. Sewage needs are supported by on-site septic tanks.

The airport's diesel-powered emergency generator provides sufficient power to operate the airfield lighting, beacon, ASOS, terminal building, and radio communications.

2.5 AIRSPACE AND AIR TRAFFIC ACTIVITY

This element included an inventory of airspace, procedures, and operations at the Safford Regional Airport. **Exhibit 2-3** illustrates the current airspace for the Safford area. This illustration is an excerpt from the Phoenix Sectional Aeronautical Chart. Safford as well as the nearby Greenlee County and Flying J Ranch Airports are identified.

As shown on Exhibit 2-3, there are Military Operating Areas (MOAs) surrounding Safford area. These MOAs primarily include the Jackal MOA encompassing Safford which is operational Monday through Friday, 0700 to 1800, and the Morenci MOA located just east of the Jackal MOA and operating Monday through Friday, 0600 to 2100. The Jackal MOA's eastern border is just east of the Safford Regional Airport. However, its northern boundary extends over 60 nm past Whiteriver. The western and southern boundaries are approximately 22 and 50 nm, respectively from Safford. The Morenci MOA extends into New Mexico. These areas are for military use and under FAR 73, Subpart B - Restricted Areas, military aircraft operations are restricted between the

designated altitudes and during the time of designation. Other aircraft may enter the area above the restricted altitudes or with advance permission from the controlling agency and continual contact with Albuquerque Air Route Traffic Control Center (ARTCC) while operating in the MOA.

The Gila Box Riparian National Conservation Area lies approximately 15 miles northeast of the airport. Both the Fishhooks Wilderness Area to the northwest and the North Santa Teresa Wilderness Area to the west are at least 30 miles from the airport.

Aircraft flight pattern altitude is 4,000 feet mean sea level (MSL) for light aircraft and 4,200 for larger aircraft. Safford Regional Airport uses a standard left-turn traffic pattern. There are no noise abatement procedures in place.

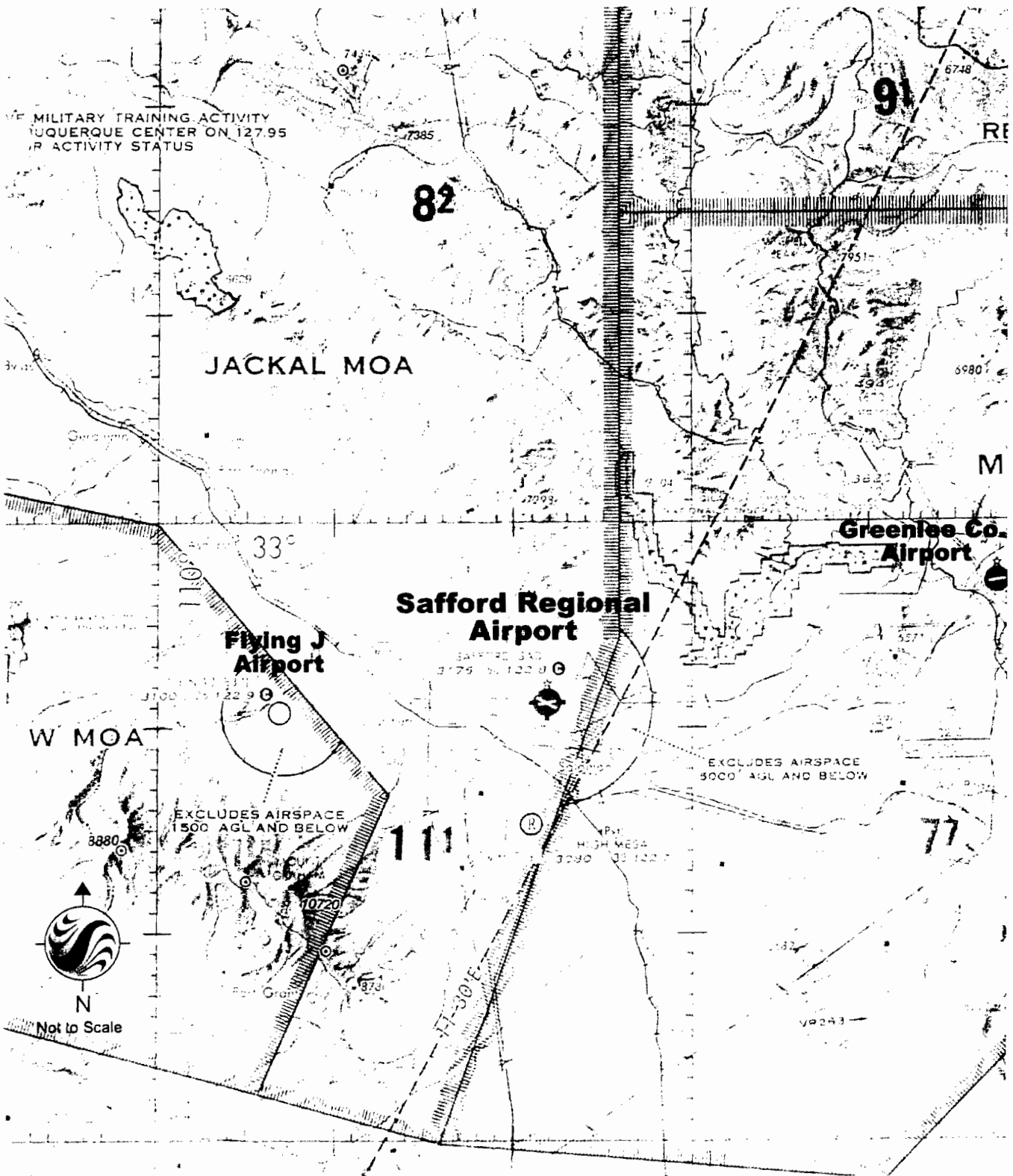
The airport has a rotating beacon which operates from sunset to sunrise. As previously mentioned, Safford Regional was a visual airport up until October 8, 1998, when GPS instrument approaches were published for Runways 12 and 30. Prescott Flight Service Station and Albuquerque Center serve the flight service and ARTCC needs of the airport.

Obstructions to the airport airspace include Solomon Pass Road and the airport's perimeter fencing. Details of these obstructions are identified in Chapter 8, Airport Plans. All other runways are identified as clear of obstructions.

According to the airport, estimated annual operations at Safford Regional Airport for 1997 totaled 14,100 with 28 aircraft based at the airport (estimates for 1998 are similar). Appendix C includes information available, to date, on based aircraft including type and tail number.

2.6 ENVIRONMENTAL CONDITIONS

This section summarizes the existing airport environs to include climate, soils, vegetation, drainage, and land use.



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SAFFORD REGIONAL AIRPORT
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EXHIBIT 2-3
Safford Area Airspace

2.6.1 Climate

High temperatures during the summer months are typically in the low-to-mid 90° F range, while lows in December and January average around 30° F. Average precipitation for Safford is about nine inches per year.

The current wind data (January 1992 to December 1996) for Safford indicates that each runway has more than 99 percent wind coverage and that both runways combined have nearly 100 percent wind coverage (specifically 99.9 % coverage). With the airport's new ASOS (operational in mid-1997), this wind data can be updated in the future through its National Weather Service link. However, the ASOS (located on the north side of the runway intersection) has not been in-place for an adequate time period to accurately update the last five-year wind data report. The existing windrose is illustrated on the airport layout plan (ALP) in Chapter 8.

2.6.2 Soils

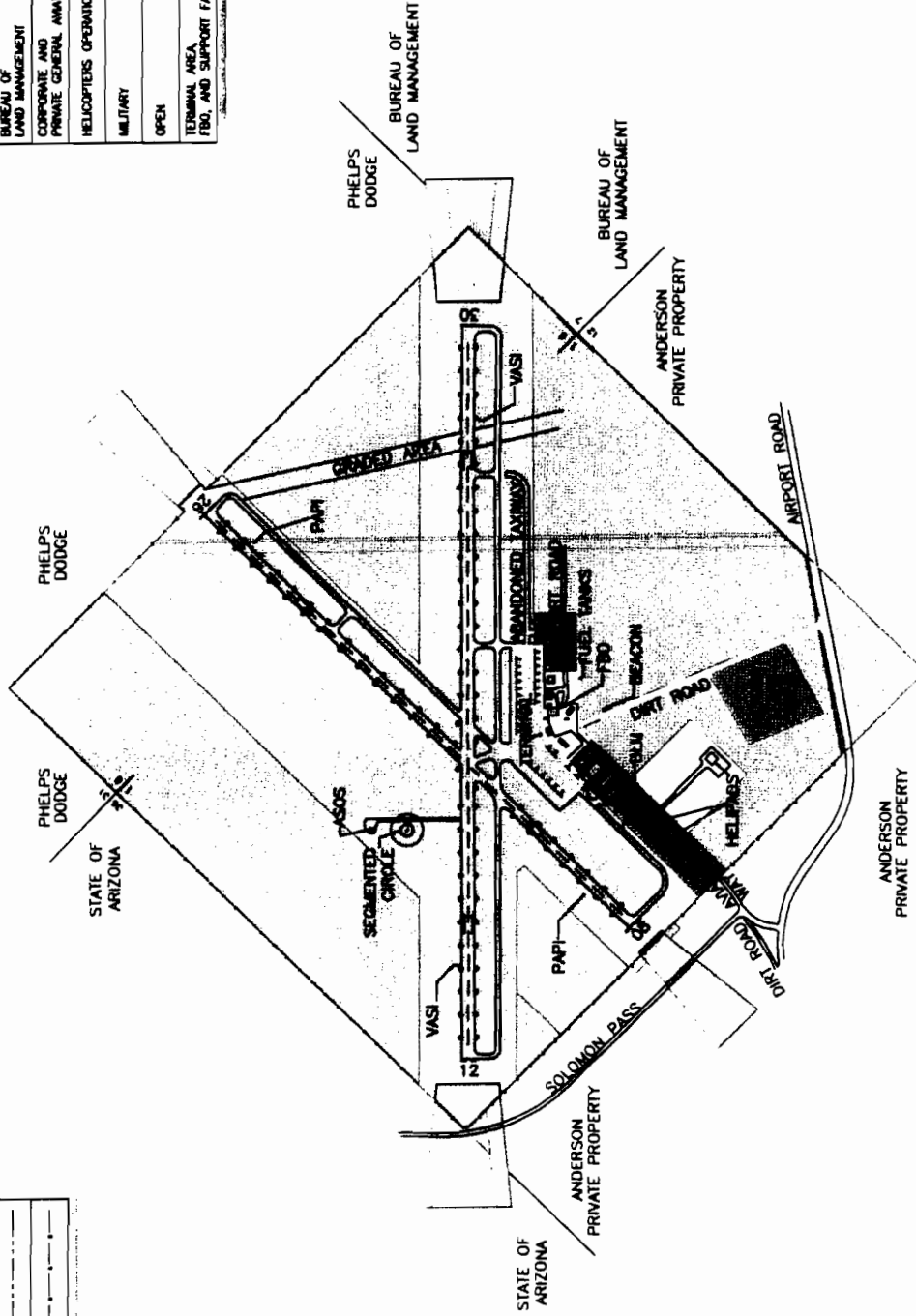
According to the City of Safford records, soils in Safford vary depending upon location with respect to the Gila River and surrounding mountain areas. Virtually all developed portions of the City are located in Grabe, Anthony, and Gila soils, providing an adequate base for low buildings and road development. Scattered erosional remnants of Pima soils (clay and clay loams) are also found in the valley, although they are less desirable for building purposes. Pinaleno soils (gravely loam surface with a weakly cemented layer of lime at depths below 2-3 feet), along with rough broken land cover much of the south end of the City of Safford.

2.6.3 Vegetation

Natural vegetation in the Safford Valley Region is typical of many desert valleys in the American Southwest. Creosote bush, saltbush, sagebrush, yucca, burrsage mesquite, and Indian wheat are the dominant species in the area. A riparian vegetation regime occurs in river valley areas adjacent to the Gila River. These areas are characterized by scattered stands of cottonwood and black willow amidst dense thickets of water motie and arrowweed.

DESCRIPTION	LEGEND	KEY
EXISTING EASEMENT		
PROPERTY LINE		
FENCE		

LAND USE	LAND USE TABLE	KEY
AIRFIELD OPERATIONS AREA		
BUREAU OF LAND MANAGEMENT		
CORPORATE AND PRIVATE GENERAL AVIATION		
HELICOPTERS OPERATION AREA		
MILITARY		
OPEN		
TERMINAL AREA FBO, AND SUPPORT FACILITIES		



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EXHIBIT 2-4 Existing Land Use

2.6.4 Drainage

According to the drainage analysis completed in 1998, Safford Regional Airport is situated between three major washes. Tidwell Wash is located east of the airport, Lone Star Wash is located northwest of the airport, and Dry Lake Wash is located west of the airport. Tidwell and Lone Star Washes convey the majority of the Gila Mountain runoff around the airport toward the Gila River. Dry Lake Wash conveys off-site runoff west of the airport toward the Gila River. An off-site area between Lone Star and Tidwell Washes contribute runoff toward the north boundary of the airport. There is currently a berm along the north section line of the airport boundary which protects the airport from these off-site flows. The berm conveys the off-site flows toward the west and eventually outlets into Dry Lake Wash. On-site runoff around the unimproved perimeter is managed by dirt channels and within the improved areas by culverts and storm drain systems. The ultimate outfall of the on-site runoff is west and south.

Appendix D contains the Drainage Analysis Executive Summary.

2.6.5 Land Use

Although the airport is City-owned, the property surrounding the Safford Regional Airport lies in Graham County. The State of Arizona, the Bureau of Land Management (BLM), Phelps Dodge, and a private owner have property adjacent to the airport boundary. **Exhibit 2-4** identifies the location of these landowners along the airport boundary and in relation to existing on-airport land uses. All land immediately adjacent to the airport is zoned agricultural.

The private property owner (west and southwest of the airport boundary) submitted a rezoning application for residential development to include mobile homes. To date, this application has been denied.

Recent land use actions taken that impact the airport include the adoption of an Airport Influence Area (AIA). This AIA was identified and adopted in the spring of 1998. Further details on the AIA are presented in Chapter 7, Land Use Analysis.

2.7 SOCIOECONOMIC FACTORS

Safford and the surrounding communities of Pima and Thatcher have seen steady growth in population and employment over the last several years. According to Department of Economic Security statistics, population for the area grew by 21.8% from 12,890 in 1990 to a total of 15,695 in 1997. Employment for the same area grew by 15.9% for the same period.

Additional details on the socioeconomic characteristics of the area are presented in the next chapter, Aviation Demand Forecasts.

2.8 SUMMARY OF INVENTORY

Table 2-2 summarizes the key inventory items for the Safford Regional Airport.

Table 2-2
Inventory Summary

Regional Transportation	
Highways	AZ State Routes 70 & 191
Railroads	Freight - AZ Eastern Railway Company (Solomon, SE of Safford); Passenger - AMTRAK (Lordsburg, NM or Benson, AZ)
Air	Safford Regional Airport - no scheduled passenger service; air taxi service supports passenger and cargo; UPS also serves cargo demand. Other area airports (GA) - Flying J Ranch and Greenlee County.
Airport Facilities	
Airport (General)	Constructed 1941; Currently 630 Acres; 3,176' elevation
Airside Facilities	
Runways	Runway 12-30 - 6,000x100; standard left traffic pattern; asphalt pavement (good cond.), 33,000 lbs SWG strength Runway 8-26 - 4,800x75; standard left traffic pattern; asphalt pavement (good cond.), 23,000 lbs SWG strength
Taxiways	Parallel taxiways for both runways Exit/connecting taxiways to aprons(35' wide)
Apron Area	48,800 s.y. (34 tiedowns, taxilanes, circulation)
Helicopter Operations Area	One public-use helipad Two private (BLM) helipads
Nav aids, Visual Aids, Markings	Radio-controlled, variable intensity lighting on both runways; PAPIs on Runway 8-26; VASI's on Runway 12-30; Markings - basic, good condition; GPS approaches for Runway 12-30
Airport Landside Facilities	
Terminal	1,100 s.f.; FBO / pilot lounge/waiting room; good condition
Hangars	7 conventional; 5 t-hangars
Surface Access & Parking	One primary paved access road; terminal area parking w/30 public spaces; 4 employee spaces; 2 handicapped

Table 2-2 (Continued)**Inventory Summary**

Aviation Support Facilities	
Fueling	100LL – 10,000 gal, Jet A – 12,000 gal; tanks in excellent condition (constructed in 1998)
ARFF and Security	Provided by City of Safford
Utilities	City Electric & Water (5-inch, 6-000-foot line), Telephone- US West; LP Gas – 500-gal tank; Sewage – on-site septic tanks
Other Facilities	BLM Facilities – firefighting, office space, storage Emergency Generator, 50KW (for runway lights, taxiways, ASOS, and radios) ASOS – constructed in 1997, excellent condition House- FBO Office, Storage House- Living Quarters

Safford Regional Airport Master Plan Update 2000

Safford, Arizona

Forecasts 

3.1 INTRODUCTION

Aviation demand forecasts presented in the Master Plan are the basis for identifying the type, size, and timing of airport facility requirements. For example, increases in based aircraft numbers may drive the need for more hangars while increased helicopter activity may require more helicopter parking. Further, aviation demand forecasts contribute to the assessment of potential environmental impacts as well as the operational feasibility of development alternatives.

The primary objective of this chapter is to forecast, by phase, Safford's based aircraft, aircraft operations, fleet mix, and peaking characteristics through the planning period (2020). Further, the Safford Regional Airport demand forecasts presented in this chapter are intended to update the 1990 Master Plan forecasts. This chapter compares activity levels forecast in the 1990 Plan with activity levels actually experienced through 1997.

The planning period for this update is divided into short-term (current to 2005), medium-term (2006 to 2010), and long-term (2011 to 2020).

The activity forecasts in this chapter should be used only as guidelines for the formation of a long-term development program for the airport. Implementation of recommended future facilities should take place upon reaching specific demand thresholds, as determined by the analysis of the capacity of existing airport facilities, rather than on an inflexible schedule based solely on these forecasts.

3.2 FORECASTING METHODOLOGY

Aviation demand forecasts are developed through a combination of mathematical, analytical, and judgmental techniques. Historical patterns are examined for trends and possible relationships between different conditions. From these, projections are made and then evaluated in comparison to forecasts from other sources.

Forecasts presented in this chapter resulted from the review and assessment of existing federal, state and local forecasts, the evaluation of historical and current activity data, and consideration of current socioeconomic trends. The forecasts include based aircraft, annual aircraft operations (including operation type and fleet mix), and airfield peaking characteristics.

The following summarizes the basic elements used in determining current and future aviation activity:

- Identification of forecasting guidelines and assumptions
- Identification of airport service area
- Evaluation of available data on historical and current activity
- Consideration of current socioeconomic trends
- Testing of forecasting models (where input data is available)
- Reviewing existing federal, state and local forecasts
- Interviewing airport-related staff

The results of the forecasting process provide input for the facility requirements analysis in the next chapter as well as all subsequent elements of this study.

3.2.1 Forecasting Guidelines and Assumptions

The following outlines the guidelines and assumptions used in the Safford Regional Airport demand forecasting effort:

- The base year for forecasting is 1997 (where data is available).
- Existing and historical annual operations and based aircraft figures are derived from airport estimates with other data sources identified for comparison.
- Forecasting results are based on unconstrained demand.
- Operations by type are estimated for current airport users to include general aviation, air taxi and military.
- Operations by fleet mix are estimated for aircraft currently operating at the airport to include single engines, multi-engines, jets, and helicopters.
- Peaking characteristics are based on airport estimates.

- Applicable FAA Advisory Circulars and other federal, state, and local published resources are used.
- The most current Department of Economic Security (DES) population statistics are used (as available during forecasting effort).

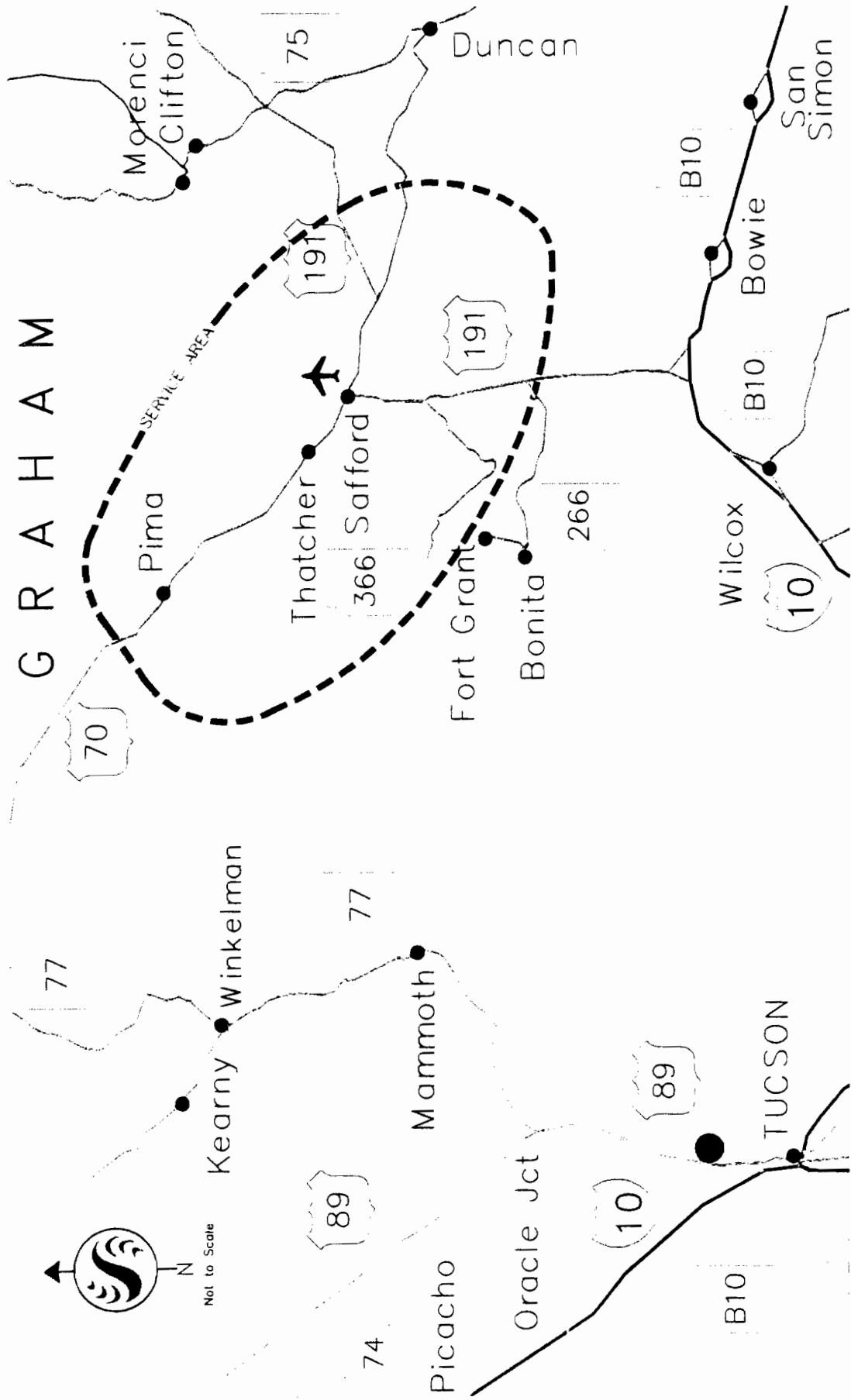
3.2.2 Airport Service Area

An Airport Service Area boundary is defined with respect to time and convenience associated with reaching other airport facilities. Factors associated with time and convenience include mileage, prevailing highway speeds, traffic flow and attractions in the area. The National Plan of Integrated Airport Systems (NPIAS) defines a service area as “reasonable access” to facilities in 30 minutes surface travel time (also commonly called door-to-door travel time). Since Safford does not have scheduled commercial service, the service area relates primarily to general aviation facilities. Based on this guidance, the Safford Regional Airport service area is identified as the City of Safford, Town of Pima, and Town of Thatcher. **Exhibit 3-1** geographically illustrates this service area. This area represents nearly half of the Graham County population. The service area is used to identify key socioeconomic characteristics for the forecasting effort. It is important to note that different communities may have overlapping service areas based on the location of various airport facilities.

For the purpose of the airport service area definition used, the Bylas and Ft. Thomas areas have been excluded. However, the City and airport acknowledge that there may be residents of those communities using the airport. For master planning purposes, the airport service area has been used to collect demographic data, which resulted in a current service area population of approximately 15,700. This data has been used for the aviation demand forecasts. For comparison, the current population for Bylas is estimated at approximately 1,760 while Ft. Thomas is not specifically listed in the DES population estimates.

3.2.3 Forecasting Models

Forecasting models are used to identify historical trends as well as relationships between aviation demand and other variables (e.g. population). Some of the typical forecasting models/techniques used for this purpose are described here:



SAFFORD REGIONAL AIRPORT
Master Plan Update

EXHIBIT 3-1
Service Area



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- Market Share Analyses: This technique involves a review of aviation activity indicators in terms of a larger aviation market. The local share-of-the-market factor is then multiplied by forecasts of the larger total market, resulting in a projection of the local activity.
- Correlation Analyses: Examines the direct relationship between two or more sets of historic data. Used primarily as a statistical test on several variables, this analysis will detect significant relationships between sets of variables; the closer the relationship, the greater the degree of correlation. These sets of variables can then be evaluated further using several types of regression analyses.
- Regression Analyses: Projections of a specific aviation demand element (dependent variable) are prepared based upon its relationship to one or more other factors (independent variable) which influence aviation demand elements in question. Aircraft operations and based aircraft are examples of dependent variables, while population, per-capita income, or other socioeconomic factors are examples of independent variables. Linear, curvilinear, and multiple regression analyses can all be tested in an attempt to define the best relationship from which future activity can be projected.
- Time Series: This technique is the simplest, most widely used method of forecasting. The time series technique identifies trend lines based upon historical relationships extended into the future with the assumption that events in the past will continue to happen in the future.

All four of these general forecasting techniques were integrated into more specific forecasting models defined for Safford.

The following is a summary of the Safford-specific models used to identify or dismiss specific aviation trends and relationships.

Historical Model: Measures the “trend” in Safford’s based aircraft over the past six years and projects a straight-line continuation of this trend into the future.

Population Model: Establishes a statistical relationship (correlation) between Safford based aircraft and the population of the Airport Service Area and projects a continuation of this relationship into the future using population projections. This is the preferred forecast model.

Arizona Market Share Model 1: Establishes a statistical relationship between Safford based aircraft and total Arizona based aircraft and projects a continuation of this trend

into the future. This trend uses the projected Arizona registered aircraft growth rate of approximately 2% from the 1995 SANS (higher growth than recent trends).

Arizona Market Share Model 2: Establishes a statistical relationship between Safford based aircraft and total Arizona based aircraft and projects a continuation of this trend into the future. This trend uses a recent and fairly flat growth rate of .4%.

While an employment model can also serve to forecast aviation demand, Safford's recent employment trends have been quite variable while based aircraft have been more stable. Therefore, an employment model was not considered.

3.2.4 Preferred Forecasting Model

Of these forecasting models, the Population Model demonstrated the most reliable relationship. This model was selected for use in this Master Plan Update. A correlation has been established between population and based aircraft using 1997 based aircraft and airport service area population of 28 and 15,695, respectively. This is equivalent to approximately 1.8 based aircraft per 1,000 population. Based aircraft are then forecast using the most recent population projections published by Arizona Department of Economic Security (DES). It should be noted that earlier DES population projections as well as other sources of population forecasts have reflected lower growth rates for the service area. Use of such forecasts would result in a slightly lower based aircraft forecast. The following section presents the socioeconomic data evaluated as part of the forecasting effort.

3.3 SOCIOECONOMIC ACTIVITY

The anticipated economic future of the Safford Regional Airport Service Area is important to help determine the probable growth in Safford aviation activity.

This section briefly discusses what is known about the socioeconomic activity in the area to include population, economic base and employment, and per capita income.

3.3.1 Population

Service Area population estimates for 1990 to 1997 are summarized in **Table 3-1**. The population has increased by 2,800 over the past seven years. This translates to

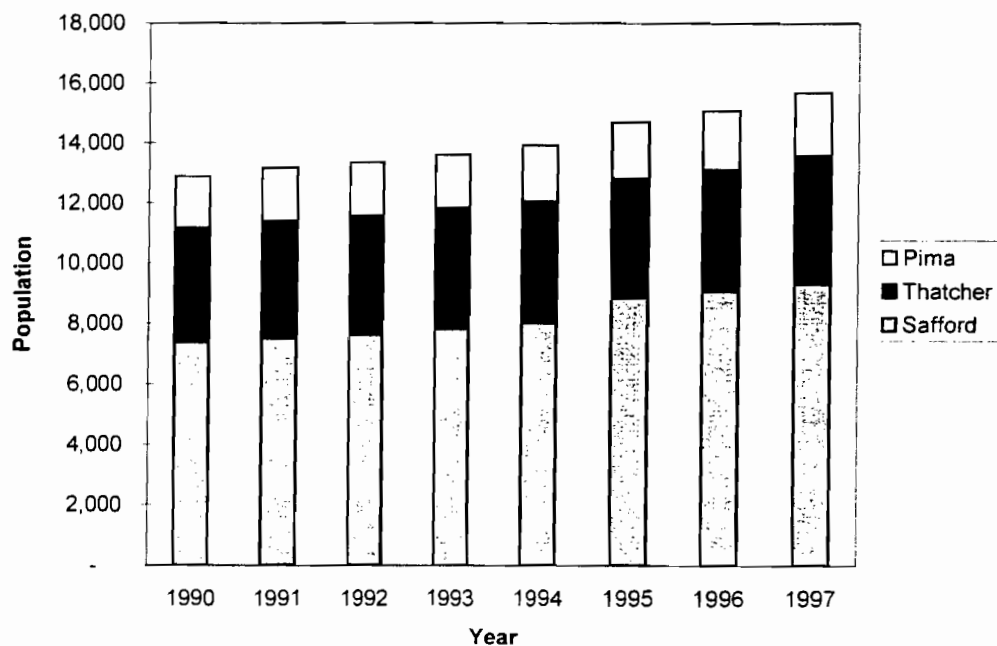
approximately 22 percent growth while State population has grown approximately 2 percent for the same period. **Exhibit 3-2** graphically illustrates the Service Area growth.

Table 3-1
Historical Population Estimates

Year	Safford	Thatcher	Pima	Service Area Total	% Change
1990	7,385	3,775	1,730	12,890	--
1991	7,525	3,875	1,775	13,175	2.21%
1992	7,620	3,945	1,790	13,355	1.37%
1993	7,815	4,000	1,800	13,615	1.95%
1994	8,020	4,040	1,875	13,935	2.35%
1995	8,855	3,975	1,875	14,705	5.53%
1996	9,095	4,025	1,970	15,090	2.62%
1997	9,320	4,295	2,080	15,695	4.01%

Source: AZ Department of Economic Security (DES), 1997

Exhibit 3-2
Service Area Population Trends



Since the Safford forecasting effort includes DES population projections, **Table 3-1** presents the Service Area population forecast through the planning period. As shown,

population is expected to reach nearly 22,000 by the year 2020 – a 40 percent increase over current (1997) population levels. Population for the State is projected to increase 48 percent between 1997 and 2020.

Table 3-2**Forecast Population Estimates**

Year	Safford	Thatcher	Pima	Service Area Total	% Change
2000	10,624	4,303	2,122	17,049	--
2005	11,837	4,650	2,278	18,765	10.1%
2010	12,569	5,036	2,422	20,027	6.7%
2015	12,969	5,417	2,548	20,934	4.5%
2020	13,473	5,763	2,669	21,905	4.6%

Source: AZ Department of Economic Security (DES), 1997

3.3.2 Economic Base and Employment

Farming continues to be the chief economic contributor to the community. Cotton is the primary agricultural commodity. Livestock also makes a substantial contribution to the farm economy. Phelps Dodge Corporation, one of the largest copper producers of the world, employs over 2,000 in the region. While mining production in Graham County is now quite limited, Gila, Greenlee, Cochise and Pima Counties, all bordering on Graham County, account for 90 percent of Arizona's dollar volume in mining production. Astrophysical industries are expected to develop as spin-offs of the Mount Graham International Observatory (\$200 million site).

According to the Department of Commerce, retail trade and services continue to play a significant role in the economy of the area as Safford serves as a trade center for 55,000 to 60,000 people in a wide area of eastern Arizona and western New Mexico. Major employers in the area include the following:

- Arizona State Prisons System
- City of Safford (government)
- Eastern Arizona College
- Federal Prison Facility
- Impressive Labels
- Mt. Graham Hospital
- Safford Unified School District
- Wal-Mart

Recent historical employment figures for the service area are provided in **Table 3-3**. Employment for the service area grew approximately 16 percent between 1990 and

1997. This growth is six percent lower than the population growth for the same period shown in Table 3-1. **Exhibit 3-3** graphically illustrates the employment growth for the Service Area. For comparison, Graham County's employment growth is also illustrated.

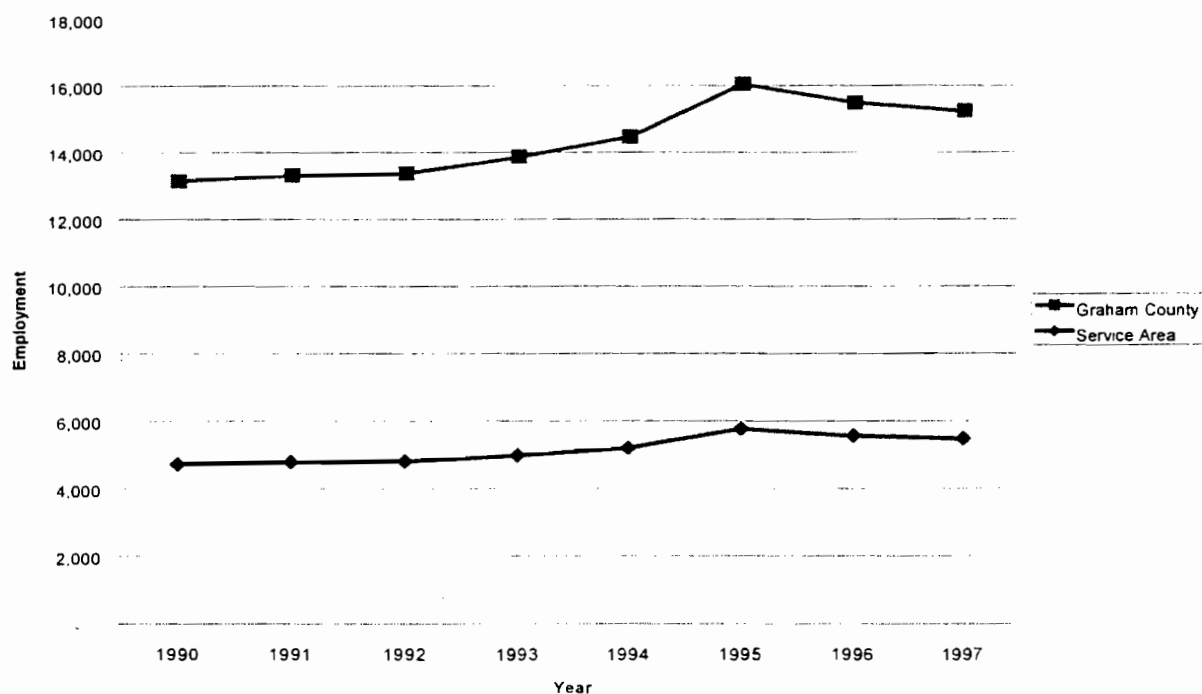
Table 3-3
Historical Employment Estimates

Year	Safford	Thatcher	Pima	Service Area Total	% Change
1990	2,724	1,432	571	4,727	--
1991	2,759	1,450	578	4,787	1.27%
1992	2,772	1,457	581	4,810	0.48%
1993	2,874	1,511	602	4,987	3.68%
1994	3,000	1,577	628	5,205	4.37%
1995	3,326	1,748	697	5,771	10.87%
1996	3,209	1,687	672	5,568	-3.52%
1997	3,157	1,660	661	5,478	-1.62%

Source: AZ Department of Economic Security (DES), 1997

Note: DES has indicated that these are rough estimates and may be inconsistent with other sources.

Exhibit 3-3
Employment Trends



3.3.3 Income

While Safford aviation demand is not directly driven by fluctuations in income levels, this particular factor can indirectly influence aviation since income represents a part of the bigger socioeconomic picture of a community. According to the Bureau of Economic Analysis, Graham County's most recent per capita personal income figures show steady growth. Since 1995, per capita personal income has grown from \$11,919 to \$12,835 (1997) – a 7.7 percent increase. However, the State figures surpassed this growth with a 9.6 increase for the same period (\$20,078 to \$21,998).

3.4 AVIATION DEMAND FORECASTS

3.4.1 National Trends

Since general aviation (GA) represents the largest aviation activity segment at Safford Regional Airport, it is important to understand this industry on a national level. The general aviation (GA) industry is a significant element of aviation. More than 90 percent of all U.S. airports and active aircraft are categorized as GA. Further, GA accounts for more than 70 percent of all aircraft operations.

The general aviation industry has been influenced by a number of factors over the years to include: airline deregulation in 1978; continued increases in the cost of owning and operating a general aviation aircraft (including purchase price, fuel and maintenance costs, product liability costs); reductions in leisure time and disposable income (particularly during the 1981 and 1990 economic recessions); consumer preferences; and increases in airspace restrictions applied to VFR aircraft. While these factors reduced demand for general aviation aircraft and subsequently impacted future growth in the general aviation fleet, this negative trend has seen a gradual upturn in recent years. This upturn has been partially attributed to the 1994 legislation termed the General Aviation Revitalization Act. This legislation established an 18-year product liability limit for general aviation aircraft manufacturers and consequently has helped initiate restoration to this previously healthy industry. In fact, the FAA Aviation Forecasts (1998-2009) cited a recent increase in active general aviation and air taxi aircraft (between 1994 to 1997) following earlier decreases (between 1992 and 1994). FAA projections reflect this continued positive trend through 2009. These positive trends are representative of the anticipated demand at the local and regional level, too.

3.4.2 General Aviation Demand

This section presents the GA demand forecasts for based aircraft and operations through the year 2020 for Safford Regional Airport. **Exhibits 3-4** and **3-5** illustrate, for comparison, the various based aircraft and operations forecasts for Safford Regional Airport as described in the sections that follow.

Exhibit 3-4
Comparison of Based Aircraft Forecasts

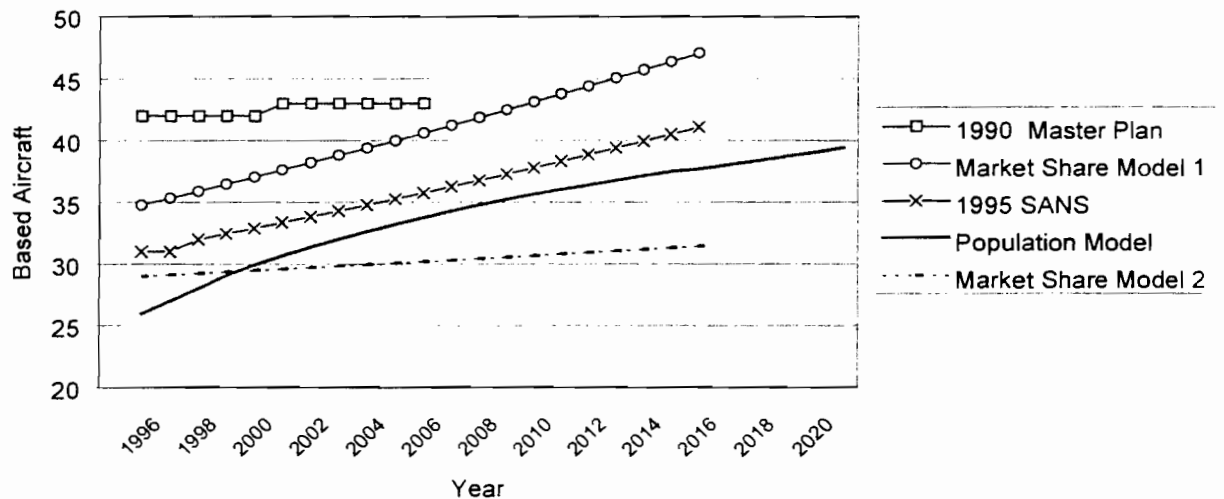
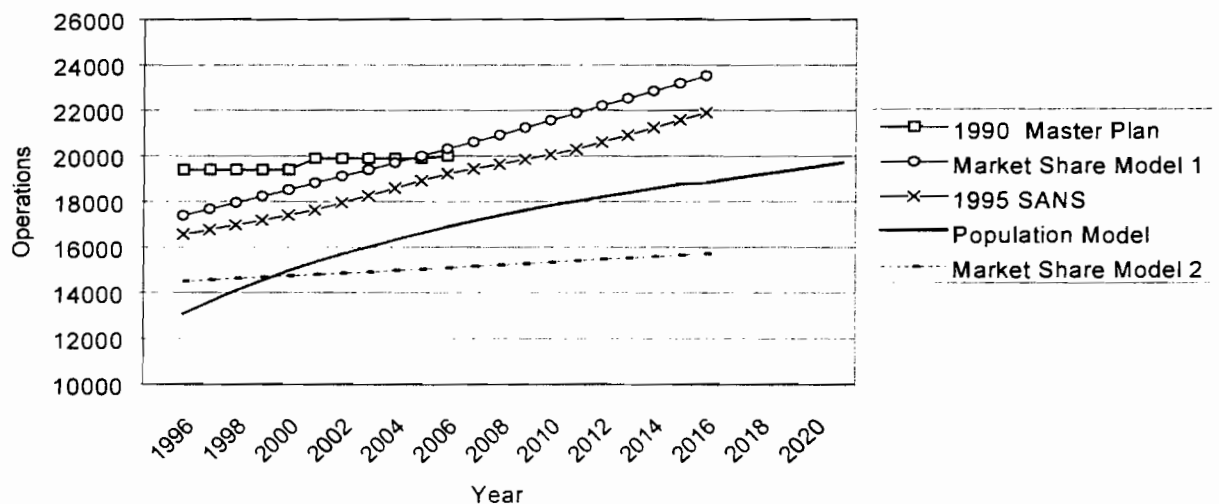


Exhibit 3-5
Comparison of Operations Forecasts



Historical

The accuracy of records on based aircraft and operations is questionable, and different sources provide inconsistent data. For example, Safford's January 1998 Airport Master Record (FAA Form 5010) indicates that 22 aircraft were based at the airport with 18,800 operations in 1997. According to airport staff, 1997 estimates included 28 based aircraft at the airport and 14,100 operations. Such inconsistencies are quite common amongst uncontrolled airports.

For the purpose of this study, the following estimated figures from airport staff for historical based aircraft and operations were used:

<u>Year</u>	<u>Based Aircraft</u>	<u>Operations</u>	<u>Year</u>	<u>Based Aircraft</u>	<u>Operations</u>
1990	23	11,500	1994	25	12,400
1991	24	11,850	1995	26	13,150
1992	24	12,000	1996	27	13,500
1993	25	12,400	1997	28	14,100

The 1995 State Aviation Needs Study (SANS) reflected 31 based aircraft and over 16,000 operations for 1995, while the airport states that based aircraft were closer to 26 or 27 and operations were 13,100 or 13,200 for the same period. Recent AirNav Website information provided for Safford identified an estimated 27 based aircraft (plus an ultralight) and approximately 18,615 annual operations for Safford.

1990 Master Plan Forecasts

The previous Airport Master Plan reflected 39 based aircraft for 1989, 40 for 1990, and a forecast of 43 based aircraft for the year 2005. Operations were identified as 17,850 for 1989 (base year), a total 18,400 for 1990, and 20,000 in the year 2005. This equates to 465 operations per based aircraft in 2005.

1995 State Aviation Needs Study (SANS)

The 1995 SANS forecast, calculated the number of based single engine aircraft for Safford using growth rate information contained in the previous master plan. Using based aircraft data available, the SANS projected 41 based aircraft for Safford in the year 2015. If this same growth rate were applied beyond 2015, a total of 44 based aircraft would result for 2020. The SANS does state that while Master Plans for Arizona

airports were used for forecasting, it is estimated that many forecasts are overstated based on industry trends.

The GA operations forecast in the 1995 SANS reflects a total of 21,907 operations in the year 2015, or 32% growth over the 20-year planning period covered in the Study (1995-2015).

These projected activity levels equate to an estimated 534 OPBA for Safford, slightly higher than the 504 OPBA calculated for the 1997 activity levels (per Safford FBO).

Current Master Plan Forecasts

As previously identified, the preferred forecasting model is the Population Model which established a ratio of 1.8 aircraft per 1,000 population. This results in a forecast of 39 based aircraft in 2020, an increase of 11 based aircraft over current 1997 figures of 28. This represents a total growth of 41 percent over 23 years (1997-2020) and 28 percent over 20 years (2000-2020). This growth is comparable to the 32 percent growth projected over 20 years in the 1995 SANS.

The current (1997) fleet mix of the Safford Regional Airport based aircraft includes 75 percent single engine and 25 percent multi-engine. This same percentage split is projected through the planning period (2020) which equates to 29 single engine and 10 multi-engine.

Once based aircraft projections are developed, a relationship between based aircraft and total annual airport operations is established. This is identified as an operations-per-based-aircraft (OPBA) relationship. As discussed in the 1995 State Aviation Needs Study, OPBA relationships for general aviation airports can have a significant range—typically anywhere from 200 to 1,000 OPBA. This does not imply that each based aircraft actually flies 500 annual operations, but rather it represents the character of the airport as a whole. A high OPBA could imply a high number of training operations are conducted at the airport. In other words, based or transient aircraft could be conducting numerous touch-and-go's. A low OPBA might indicate an airport with less training operations, less frequent transient aircraft operations, and/or less frequent activity by based aircraft operators.

Comparing the various historical sources of based aircraft and operations figures, OPBA ranged from 504 to 689. However, 500 is closer to the airport's estimates.

Operations forecasts are projected using the OPBA ratio. The current OPBA for Safford Regional Airport is 504. Rounded to 500 OPBA and projected through the planning period, this translates to approximately 19,710 operations in the year 2020.

Operations by type are forecast by first reviewing the current (1997) type split estimated by the airport to be:

GA Local	20%
GA Itinerant	56%
Air Taxi	9%
Military	15%

By 2020, GA operations are still expected to maintain a share of 76 percent of total operations. Military operations are projected to remain at current activity levels (2,200 operations annually) through the planning period which results in a decreased share (11 percent) of total operations and an increased share for air taxi operations (from current 9 percent to future 13 percent share).

3.4.3 Air Taxi Operations

Air taxi operations for 1997 are estimated at 1,200. Based on projected growth for airport operations through the planning period, air taxi operations will total 2,490 by the year 2020. Air taxi operations currently consist of 15 percent single engine aircraft and 85 percent multi-engine aircraft. This split is projected to remain through 2020. All air taxi operations are itinerant operations.

3.4.4 Military

Current (1997) military operations are estimated at 2,160 annually. This is significantly higher than the 200 estimated military operations identified in the 1995 SANS.

Military activity consists of both local and itinerant operations since the military does conduct training operations at Safford to include touch and go's. Military aircraft vary,

but primarily include King Airs and helicopters. Military traffic is projected to remain at current levels (approximately 2,200) through the planning period.

3.4.5 Air Cargo

United Parcel Service (UPS) currently operates an aircraft out of Safford for air cargo service. UPS flies approximately 250 days per year (one flight per day), with approximately one ton per flight. This translates to an estimated 500 operations and 250 tons of cargo annually. While there are no evident plans for expansion of the current operations, it is estimated that cargo operations and volume will follow the same growth patterns identified for other GA categories since such projections are tied to socioeconomic activity (i.e. population growth). Thus, air cargo activity is expected to reach nearly 700 operations and 350 tons by 2020. Air cargo operations are included in total GA operations activity. Other forecasting sources reviewed do not present air cargo projections for Safford.

3.4.6 Enplanements

The Safford Regional Airport is not served by scheduled commercial air service. However, according to the 1998 State Air Service Study, Copper State Airlines provided passenger service between Safford and Tucson in 1982. Operating an eight-seat Piper, the airline carried a total of 22 enplanements (109 departures) for the year. Today, the majority of the scheduled passenger service demand is accommodated by driving to Phoenix (68 percent) or Tucson (30 percent) with a small number of passengers driving to El Paso, Texas (2 percent). Phelps Dodge employees have historically used air charter service from Silver City, New Mexico, to fly to Phoenix to depart on scheduled airlines. The 1998 State Air Service Study also identified other potential users of Safford air service to include the Federal Bureau of Prisons, Impressive Labels, Open Loop Energy, Mt. Graham Hospital, Bureau of Land Management, University of Arizona, and Eastern Arizona Community College.

The State Air Service Study estimates that Safford may be able to capture, at most, 15 percent of its total unconstrained passenger service demand based on the close proximity of large jet service in Phoenix and Tucson. This translates to approximately 5,640 potential enplanements. Thus, for forecasting purposes, it is anticipated the Safford's scheduled passenger service demand will continue to be served primarily by

Phoenix and Tucson. However, the City supports the possibility of such service and, in the future, may strive to market for the same.

3.4.7 Total Operations Split and Fleet Mix

Based on the projected types of operations (GA Local/Itinerant, Air Taxi, and Military), the operations fleet mix can be defined. For Safford, single engine aircraft will remain the dominant aircraft traffic with an estimated 61 percent of total operations. Multi-engine traffic is expected to increase slightly from its current 34 percent share of total operations to 35 percent by 2020. Jets are expected to represent approximately one percent of the total operations throughout the planning period with nearly 180 operations by 2020. Helicopter operations are projected to drop from four percent of total operations to three percent over the planning period since military and firefighting helicopter traffic is not anticipated to increase like other aviation elements. According to airport staff, helicopters currently operating at the airport include the Skycrane for firefighting operations and the Blackhawk and Apache for military operations. In addition, a Russian-built helicopter (gunship type) also flies in twice per month.

Although the local/itinerant operations split for GA was presented earlier, the military conducts local operations, too. All air taxi operations are itinerant. Therefore, the total local/itinerant split is projected to include GA and military activity. This equates to a 28/72 percent split for 1997 and a 26/74 percent split by 2020. Touch-and-go operations represent approximately 20 percent of the total local operations.

3.5 PEAK DEMAND

Calculation of peak aviation demand is important as it is one of the driving factors in determining facility requirements for an airport. Three key factors are presented for peak demand at Safford Regional Airport: peak month, average day of peak month, and peak hour.

Peak Month: It is estimated that the peak month (July) for aircraft operations at Safford Regional Airport represents approximately **10 percent** of total operations for the year. This represents **1,410** operations for existing activity levels and **1,970** for activity levels in the year 2020.

Average Day of Peak Month: Activity is calculated for the average day of the peak month by dividing the total peak month activity by the number of days in the month. This translates to **45** operations for 1997 and **64** operations for 2020.

Peak Hour (Design Hour): Peak hour activity levels are derived by multiplying an established percentage of the average day. For Safford Regional Airport, it is estimated that peak hour represents **15 percent** of the average day. Current (1997) peak hour operations are estimated at **seven**. Forecast peak hour operations total **10** for 2020.

Table 3-4 summarizes the calculation of peaking characteristics

Table 3-4
Peak Demand

	1997	2000	2005	2010	2015	2020
Total Operations	14,100	15,350	16,900	18,000	18,850	19,700
Peak Month	1,410	1,535	1,690	1,800	1,885	1,970
Average day of Peak Month	45	50	55	58	61	64
Peak Hour	7	8	8	9	9	10

These peaking characteristics are reviewed to determine future facility requirements such as transient aircraft parking. Such requirements are presented in the next chapter.

3.6 SUMMARY OF FORECASTS

Table 3-5 summarizes the aviation demand forecasts for Safford Regional Airport. As shown, positive growth is anticipated for all forecast elements. This growth is comparable to national trends and projections for general aviation.

Chapter 4 will translate this growth into future facility requirements for the Safford Regional Airport through 2020 and beyond.

Table 3-5

Summary of Forecasts

	1997 % Split	1997	2005	2010	2020	2020 % Split
Based Aircraft		28	34	36	39	
SE	75%	21	26	27	29	75%
ME	25%	7	8	9	10	25%
Operations		14,100	16,900	18,000	19,700	
GA Local	20%	2,840	3,400	3,630	3,970	20%
GA Itinerant	56%	7,900	9,470	10,090	11,040	56%
Air Taxi	9%	1,200	1,830	2,080	2,490	13%
Military	15%	2,160	2,200	2,200	2,200	11%
OPBA		504	500	500	500	
Operations Fleet Mix						
SE	61%	8,641	10,336	11,009	12,035	61%
ME	34%	4,805	5,827	622	6,849	35%
Jets	1%	126	152	161	177	1%
Helicopters	4%	528	586	607	639	3%
		14,100	16,900	18,000	19,700	
Local/Itinerant Split						
Local	28%	3,920	4,500	4,730	5,070	26%
Itinerant	72%	10,180	12,400	13,270	14,630	74%
Total Operations		14,100	16,900	18,000	19,700	

Safford
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Facility Requirements 

4.1 INTRODUCTION

This chapter summarizes the results of the facility requirements master planning task for the various airport components under two major categories: 1) airside and 2) landside.

The facility requirements task serves to:

- determine whether the existing airside and landside facilities at Safford Regional Airport can accommodate the forecast demand levels presented in the previous chapter and quantify the shortfalls;
- translate the capacity shortfalls into specific airport development needs through the planning year 2020; and
- define other requirements relating to meeting FAA airport design standards and remedying facilities in poor condition.

While this master plan chapter's primary objective is to address airport needs through the year 2020, additional discussion is presented regarding possible facility needs beyond that timeframe.

4.2 AIRSIDE FACILITIES

Airside facility requirements presented in this section include: runways; taxiways; aircraft apron; helicopter facilities; airfield pavement; navigation aids; visual aids; marking; signage; and airspace. A brief summary of airside facility requirements for Safford Regional Airport is presented here with a detailed discussion following.

- For the master planning window, Runway 12-30 is defined as a B-II runway serving large (greater than 12,500 lbs.) aircraft and Runway 8-26 is defined as a B-II runway serving small (less than 12,500 lbs.) aircraft (approach category B is an aircraft with an approach speed of 91 knots or more but less than 121 knots; design group II is an aircraft with a wingspan from 49 feet up to but not including 79 feet).

- For the 50-year airport outlook (beyond the master planning window), Runway 12-30 is defined as a C-II runway (approach category C is an aircraft with an approach speed of 121 knots or more but less than 141 knots; design group II is an aircraft with a wingspan from 49 feet up to but not including 79 feet) serving large aircraft.
- Airfield operational capacity is more than adequate to accommodate demand throughout the planning period (2020) and beyond.
- Wind data available reveals that each individual runway has more than 95 percent wind coverage.
- Runway dimensions (length and width) are adequate to accommodate projected aviation demand throughout the planning period and beyond. The gradient for both runways also meets FAA standards.
- Runway 8-26 object free area (OFA) is not within airport control (inside airport boundary) as required by current FAA design standards. The runway protection zones (RPZs) for Runway 12-30 are only partially controlled with aviation easements. Additional easements (or fee simple purchases) are required.
- Minimum parallel and connecting taxiway dimensions and separations are adequate. However, Taxiway D should be relocated to align with Taxiway C and a new Taxiway E should be constructed to serve future hangar development needs.
- Aircraft parking apron area is adequate to meet projected aviation demand through the planning period.
- Helicopter parking is nonexistent. A total of 12 helicopter parking spaces are needed during the planning period.
- All airfield pavement strengths are adequate to accommodate projected aircraft fleet mix through 2020. Beyond 2020, the terminal apron should accommodate an area for 30,000 lbs. single wheel loading (SWL) aircraft up from the current strength of 15,000 lbs. SWL
- Airfield signage needs to be replaced/upgraded. Existing signage is antiquated and not up to current FAA standards.
- The current airfield lighting system is outdated and should be upgraded from direct-buried to conduit.
- Runway 12-30's VASI system and Runway 8-26's PAPI system should be replaced with new PAPI systems.
- Utility improvements are needed to serve existing and forecast demand to include fire protection.

4.2.1 Runways

Runway Demand/Capacity Analysis

The capacity of the runway system to accommodate existing and forecast demand is determined by three statistical measurements. Standard techniques for producing these measurements are derived from FAA Airport Capacity and Delay (Advisory Circular 150/5060-5) to include:

- Annual Service Volume (ASV): The number of annual aircraft operations that can be accommodated on a runway system under a full range of airport operating conditions that would be encountered over a year's time.
- Hourly Capacity: The maximum number of aircraft operations that can occur on a runway system in a particular hour under two operating scenarios -- visual flight conditions and instrument flight conditions.
- Aircraft Delay: The average amount of time aircraft will be delayed as a result of a demand/capacity deficit, expressed in minutes per operation or annual hours.

According to the 1995 State Aviation Needs Study (SANS), the existing ASV for Safford Regional is estimated at 286,700 operations. In comparison, FAA's Airport Capacity and Delay Advisory Circular 150/5060-5, reflects an estimated ASV of 200,000 operations for an airport configuration similar to Safford. This capacity analysis used the lower ASV of 200,000.

Table 4-1 presents a comparison between ASV and forecast demand at Safford. As shown, the runway system capacity is well above the demand projected throughout the planning period.

Table 4-1
Forecast Demand vs. Annual Service Volume (ASV)

Year	Operations Demand Forecast	ASV	Demand as % of ASV
1997	14,100	200,000	7.1
2005	16,900	200,000	8.5
2010	18,000	200,000	9.0
2020	19,700	200,000	9.9

Note: ASV is based on existing airfield configuration. For comparison, 1995 State Aviation Needs Study (SANS) reflects an estimated ASV of 286,700.

Sources: FAA Airport Capacity and Delay (Advisory Circular 150/5060-5), and Stantec Forecasts.

Table 4-2 presents the estimated hourly capacity and peak hour demand under VFR and IFR conditions. This comparison reveals that hourly capacity is more than adequate during the planning period. Therefore, airfield delay is not an issue for Safford.

Table 4-2
Hourly Demand / Capacity Analysis

Year	Peak Hour Operations Demand		Average Hourly Capacity		Peak Demand as Percent of Hourly Capacity	
	VFR	IFR	VFR	IFR	VFR	IFR
1997	7	5	77	57	9.1 %	8.8 %
2005	8	6	77	57	10.4 %	10.5 %
2010	9	6	77	57	11.7 %	10.5 %
2020	10	7	77	57	13.0 %	12.3 %

Note: IFR Demand is estimated at 70 percent of VFR demand. This assumes that approximately half of all single engine operations demand will not happen during IFR conditions.

Source: FAA Airport Capacity and Delay (Advisory Circular 150/5060-5) and Stantec Forecast.

Runway Dimensions

In addition to runway capacity and delay measurements, it is important to determine whether the runway dimensions (length, width) are adequate to serve the type of aircraft operating at Safford. To accomplish this, the airport's classification and service role within the region must be identified first. In developing the airport's classification and facility requirements, the two criteria to be considered are:

- **Determination of Aircraft Approach Category:** This identifies the operational characteristics (approach speed) of the aircraft. This information is derived for the most demanding aircraft (highest approach speed) that will operate at the airport.
- **Determination of the Airplane Design Group:** This identifies the physical characteristics (wingspan) of the aircraft. This information should be derived from the most demanding aircraft (largest wingspan) that will operate at the airport on a regular basis (typically more than 500 annual operations).

Based on a review of the aircraft that are projected to operate at Safford, the Aircraft Approach Category is B and the Airplane Design Group is II. This combination, B-II, forms the FAA alphanumeric Airport Reference Code (ARC) for Safford. **Table 4-3** specifically defines the criteria associated with each approach category and design group.

Table 4-3**Aircraft Approach Categories and Design Groups**

Aircraft Approach Categories		Aircraft Design Groups	
Category	Approach Speed	Group	Wingspans
A	Less than 91 knots	I	up to but not including 49 feet
B	91 knots or more but less than 121 knots	II	49 feet up to but not including 79 feet
C	121 knots or more but less than 141 knots	III	79 feet up to but not including 118 feet
D	141 knots or more but less than 166 knots	IV	118 feet up to but not including 171 feet
E	166 knots or more	V	171 feet up to but not including 197 feet
		VI	197 feet up to but not including 262 feet

Source: FAA AC 150/5300-13, Airport Design

Some typical airport reference codes derived from these characteristics are:

- A-I Single Engine Aircraft (i.e. Cessna 182)
- B-II Multi-Engine and Small Jet Aircraft (i.e. Beech 1900, King Air, Cessna Citation)
- C-II Larger Multi-Engine and Corporate Jet Aircraft (i.e. Gulfstream III, Sabre 80)
- C-III Medium-Sized Air Carrier Aircraft (i.e. Boeing 737, 727, DC-9)
- D-IV Larger Air Carrier Aircraft (i.e. Boeing 707, Lockheed 1011)
- D-V All Larger Air Carrier Aircraft (i.e. Boeing 747, B-52)

It is important to note that while the airport is currently experiencing Approach Category C operations (i.e. jet traffic), activity levels are not projected to reach 500 annual operations (activity level for critical aircraft designation) by the year 2020. However, long-term projections (20- to 50-year outlook) of aviation traffic (Approach Category C) should be considered when developing the airport to ensure that development does not preclude accommodating larger/faster aircraft.

While an ARC can represent the most demanding aircraft operating regularly (500 annual operations or more) at the Airport, aircraft with less demanding characteristics may use a secondary runway (e.g. crosswind). Although both runways are designated as B-II, primary Runway 12-30 is defined as serving both small and large aircraft (greater than 12,500 lbs.) and crosswind Runway 8-26 is defined as serving primarily small aircraft.

Since the airport is serving some C-II traffic now and it is anticipated that this activity will grow beyond the 20-year planning period to levels requiring that the design standards be upgraded from B-II to C-II after 2020, these differences are provided for comparison in **Table 4-4**. Definitions of key terms presented in Table 4-4 follows.

Table 4-4**Design Standards**

Aircraft Type Served:	B-II		C-II	
	Visual and not lower than ¾-mile	Lower than ¾-mile	Visual and not lower than ¾-mile	Lower than ¾-mile
Runway width	75	100	100	100
Runway Safety Area width	150	300	500	
Runway Safety Area length ¹	300	600	1,000	
Runway Object Free Area width	500	800	800	
Runway Object Free Area length ¹	300	600	1,000	
Runway to Taxiway separation	240	300	300	400
Runway to Parking Area Separation	250	400	400	500
Runway Protection Zone dimensions	1,000x250x450 ² 1,000x500x700 ³ 1,700x1,000x1,510 ⁴	2,500x1,000x1,750	1,700x500x1,010 ³ 1,700x1,000x1,510 ⁴	2,500x1,000x1,750

¹Beyond runway end. ²Serving small aircraft. ³Visual and not lower than 1 mile. ⁴Not lower than ¾-mile

Note: All dimensions shown in feet.

Source: FAA AC 150/5300-13

Visibility Minimums: Visibility required before executing an approach to the designated runway. For Safford, Runway 12-30 has a new GPS approach (published in October 1998) with visibility minimums of one mile. For planning purposes, Safford is projected (beyond 2020) to have an instrument approach to Runway 12-30 for C-II aircraft with visibility minimums as low as ¾-mile.

Runway Safety Area (RSA): The purpose of the RSA is to enhance the safety of aircraft which overshoot, undershoot, or veer off the runway and to provide greater accessibility for firefighting and rescue equipment during such incidents. The RSA is an area (cleared and graded) centered about the runway centerline for the full length of the runway plus an extended distance off each runway end. The width and length off each

runway end is a function of the type of aircraft and approach visibility minimums associated with the runway.

Runway Object Free Area: The purpose of the OFA is to maintain a clear area (beyond that required by the RSA) surrounding the runway. The OFA does not have a grading requirement like the RSA, but no object can protrude above ground level within its boundary. The OFA is an area centered about the runway centerline for the full length of the runway plus an extended distance off each runway end. The width and length off each runway end is a function of the type of aircraft and approach visibility minimums associated with the runway.

Runway Protection Zone (RPZ): The function of the RPZ is to enhance the protection of people and property on the ground. The RPZ is an area (trapezoidal in shape) centered about the extended runway centerline and beginning 200 feet from the runway end. The size of the RPZ is a function of the type of aircraft and approach visibility minimums associated with the runway end. FAA desires that all objects are clear of the RPZ, but some uses (under certain conditions) are permitted. See Chapter 5 for an illustration of the RPZ located off each runway end at Safford.

Runway dimensions (length and width) were reviewed with respect to the B-II and C-II aircraft forecast to operate at Safford. The FAA Airport Design Model was used in the runway length analysis. Results for Safford are reflected in **Table 4-5**.

As shown, primary Runway 12-30 at an actual length of 6,000 feet falls within the category of “large airplanes of less than 60,000 lbs. at 60% useful load.” This length is adequate to accommodate the fleet mix forecast to operate at Safford (through 2020) which will typically include small aircraft as well as large aircraft up to 15,000 lbs. Beyond 2020, aircraft up to 30,000 lbs. SWL are forecast to operate at Safford. Crosswind Runway 8-26, at an actual length of 4,800 feet, is adequate as it will serve 95% of the small aircraft fleet.

Table 4-5

FAA Computer Model - Runway Length Requirements for Safford

AIRPORT AND RUNWAY DATA	
Airport elevation.....	3176 feet
Mean daily maximum temperature of the hottest month	99.70 F.
Maximum difference in runway centerline elevation.....	4 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
Dry Runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots.....	400 feet
Small airplanes with approach speeds of less than 50 knots.....	1050 feet
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3810 feet
95 percent of these small airplanes	4750 feet
100 percent of these small airplanes	5200 feet
Small airplanes with 10 or more passenger seats.....	5210 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load....	6000 feet
75 percent of these large airplanes at 90 percent useful load.....	8640 feet
100 percent of these large airplanes at 60 percent useful load.....	8250 feet
100 percent of these large airplanes at 90 percent useful load.....	10,660 feet
Airplanes of more than 60,000 pounds	Approximately 6,130 feet
REFERENCE: Chapter 2 of AC 150/5325-4A, Runway Length Requirements for Airport Design, no Changes included.	

Note: **Bold italicized data** represents key lengths for runways at Safford. The 4-foot difference in runway end elevation is based on Runway 12-30.

Source: Chapter 2 of AC 150/5325-4A, Runway Length Requirements for Airport Design

Runway width is also adequate for both runways during the master planning period as shown here:

	<u>Required Width</u>	<u>Existing Width</u>
Runway 12-30	75 feet*	100 feet
Runway 8-26	75 feet	75 feet

* Required width for B-II aircraft (design aircraft for Safford through 2020) is 75 feet. C-II aircraft (ultimate design aircraft for Safford) require 100 feet.

Runway Gradient

Runway 12-30 has a 0.1 percent gradient and Runway 8-26 has a 0.4 percent gradient. The gradient for both runways meets FAA standards.

Wind Coverage

As described in Chapter 2, Inventory, both Runways 12-30 and 8-26 have an individual wind coverage greater than the FAA threshold of 95 percent. This threshold is used to help determine the need for a crosswind runway in cases where one is non-existent. For other airports, like Safford, it may be a factor in determining to what extent an existing crosswind should be maintained. According to airport staff, the crosswind runway plays an important part in supporting airport operations regardless of the fact that each runway provides over 99 percent wind coverage. However, the wind data used is only half of the 10-year data compilation recommended. Therefore, the existing crosswind runway should continue to be maintained until a more comprehensive set of data can be compiled from the ASOS installed in 1997. Refer to the airport layout plan (ALP) in Chapter 8 for a summary and illustration of the current windrose data.

Runway Facility Requirements

Primary Runway 12-30 and crosswind Runway 8-26 are both considered adequate in length and width to meet projected demand through 2020. However, Runway 8-26's object free area (OFA) is not completely contained within airport property as required by FAA guidelines. Approximately 50 feet off Runway 8 end and approximately 150 feet off Runway 26 end are outside the airport boundary. These areas should be controlled by the airport and, therefore, acquired in fee simple. Further, the City's desire to prevent encroachment and incompatible development from occurring around the airport as well as their plans to extend Runway 8-26 (beyond the master planning window) will require the acquisition of additional property along the westerly and southerly boundaries of the airport. It is recommended that the City purchase this additional property as soon as feasible. See Chapter 5, Sections 5.3.3 and 5.4 for additional details.

4.2.2 Taxiways

Safford Regional Airport has parallel taxiways for both runways. Taxiways A, B, and C are approximately 240 feet from runway centerline (Note: Electronic files indicate that these separations vary slightly from 233 to 240 feet). The 240-foot separation meets the requirement for existing and forecast operations at the airport through 2020. However, Taxiway D is located more than 450 feet from centerline and is, thus, not aligned with Taxiway C at the opposite end of the runway. It is recommended that Taxiway D be relocated to align with its parallel counterpart to improve aircraft taxiing flow patterns and ultimately accommodate apron expansion where Taxiway D is located now.

In addition, a new parallel Taxiway E is recommended to replace the taxiway previously abandoned to the east of the terminal area. This new taxiway, in conjunction with associated taxilanes, is recommended to support the additional hangar development needs described later.

There are six connecting taxiways to Runway 12-30 and five connecting taxiways to Runway 8-26. All are at least 35 feet wide as required for Design Group II aircraft operations. According to FAA standards, existing taxiways including widths and separations are adequate to accommodate demand through the planning period.

4.2.3 Aircraft Parking Apron

Similar to the previous taxiway discussion, aircraft parking to runway and taxiway separation distances at Safford are also in compliance with FAA standards. Further, the existing aircraft parking apron capacity is adequate to meet demand during the planning period. The aircraft apron area serves transient aircraft, based aircraft, helicopter parking overflow, and air cargo staging. Transient aircraft spaces are based on peaking characteristics identified in the previous chapter with additional spaces for periods of parking demand overlap. Based aircraft not stored in hangars also require apron area. Appendix E includes the detailed calculation that outlines the apron demand for 1997 and 2020 conditions. Apron parking needs for each phase are summarized in **Table 4-6**.

While the demand/capacity ratio implies that the existing aircraft parking area will only be used to 33 percent of its capacity by 2020, these figures are theoretical as they are based on the most efficient distribution of the parked aircraft. Current distribution of

aircraft apron reveals that a more practical demand/capacity ratio in the year 2020 would be closer to 60 percent. In both cases, apron area is more than adequate to accommodate ultimate demand through the planning period.

Table 4-6**Apron Area Demand/Capacity Analysis**

Requirements	1997	2005	2010	2020
Transient Apron	7 spaces 3,000 s.y.	7 spaces 3000 s.y.	9 spaces 3960 s.y.	9 spaces 3960 s.y.
Based Aircraft Apron	12 spaces 3600 s.y.	12 spaces 3600 s.y.	13 spaces 3900 s.y.	14 spaces 4200 s.y.
Subtotal	19 spaces 6,600 s.y.	19 spaces 6,600 s.y.	22 spaces 7,860 s.y.	23 spaces 8,160 s.y.
Circulation (1x Reqmt)	6,600 s.y.	6,600 s.y.	7,860 s.y.	8,160 s.y.
Total Apron Reqmt	13,200 s.y.	13,200 s.y.	15,720 s.y.	16,320 s.y.
Existing Apron Area	48,800 s.y.	48,800 s.y.	48,800 s.y.	48,800 s.y.
Demand/Capacity Ratio	27%	27%	32%	33%

4.2.4 Helicopter Facilities

BLM has two private helipads adjacent to the BLM offices. Other helicopter operators are using the new helipad, constructed in July 1998, located south of the BLM helipads. The new helipad facilities serve the military, forest firefighting operations, as well as other private use operations that were previously accommodated on the runway. Designated helicopter parking at the airport is currently nonexistent. Twelve additional helicopter parking spaces are needed immediately to accommodate the current and forecast demand through the planning period. However, this development can be phased if the continued use of the apron area for overflow parking is permitted. During firefighting operations, between 12 and 15 helicopters are on the ground at one time. Military helicopters may arrive during this same period. Currently, the majority of helicopters are parked on the ramp and in the dirt. However, when dust abatement becomes a problem, Runway 8-26 is closed and used for helicopter parking. While BLM's helipads are also used for parking, this only provides two spaces. Although the

helicopter parking requirement will exceed, on occasion, the twelve recommended spaces, the additional apron area available can be used for overflow.

Once the helicopter parking facilities are completed, they will be adequate through the planning period.

4.2.5 Airfield Pavement

Airfield pavement (including runways, taxiways, and aircraft aprons) is measured by its ability to accommodate the load of specific aircraft types at a design volume of traffic as well as by its condition. A Pavement Maintenance Management Program Report, dated July 1997, was prepared for the Safford Regional Airport. This report summarized the pavement inventory data collected for the airport. The following summarizes the current pavement strengths for the airfield:

➤ Runway 12-30:	30,000 lbs. SWL
➤ Runway 8-26:	23,000 lbs. SWL
➤ Taxiways A, B, and D:	30,000 lbs. SWL
➤ Taxiway C:	23,000 lbs. SWL
➤ Terminal Apron:	15,000 lbs. SWL
➤ Helipad (Heavy Helicopter):	42,000 lbs.
➤ Helipad Taxiway:	12,500 lbs. SWL

Based on aircraft projected to operate at Safford through 2020, all pavement strengths are adequate. Beyond 2020, the terminal apron should provide an area to accommodate large aircraft up to 30,000 lbs. such as a Cessna Citation III (max takeoff 22,000 lbs). The current pavement strength currently accommodates regular use by King Airs and Beech 1900's weighing less than 15,000 lbs. SWL as well as occasional use by larger aircraft.

The airport's most recent pavement preservation projects (1998-99) provided microsurface and coal tar treatments to the airfield pavements. These treatments should last five to seven years. It is recommended that future pavement preservation projects be included in the airport's CIP every five years.

4.2.6 Navigation Aids, Visual Aids, Marking, and Signage

A global positioning system (GPS) instrument approach has been published for both Runways 12 and 30. These approaches, published October 8, 1998, are the first instrument approaches published for Safford. As a result, Runway 12-30 is currently being re-marked as part of the 1999 pavement preservation project. Runway 8-26's basic visual markings should be maintained through the planning period.

The MIRL and MITL systems described in the Inventory Chapter for the runways and taxiways, are operational, but outdated. These pilot-controlled, variable intensity, systems are currently direct-buried and should be replaced with conduit.

PAPI and VASI systems provide pilots with vertical guidance on approach. Runway 12-30's VASI system and Runway 8-26's PAPI system are outdated and not working properly and, therefore, should be replaced with more modern PAPI systems.

The existing airfield signage is antiquated and not current per FAA standards. Signage should be replaced/upgraded.

It is also important to note that signage outside the airport boundary which provides guidance to the airport is inadequate. The City of Safford should consider improving the type, location, and number of directional signs to the airport.

4.2.7 Airspace

Based on projected aviation activity and airport configuration, no airspace conflicts with other facilities will be encountered. Current military operating areas (MOAs) will not impact Safford Regional Airport operations (see Chapter 2, Inventory, for additional airspace details).

Airspace in the vicinity of an airport should be clear and free of obstructions which can be hazardous to aircraft. All future airport improvement projects should ensure that airspace surfaces are not penetrated.

4.3 LANDSIDE FACILITIES

Landside facilities consist of the terminal building, aircraft storage (hangars), surface access, vehicle parking, and aviation support facilities. Here, a brief summary of the landside capacity analysis and facility requirements are presented with a detailed discussion following.

- Existing terminal building of 1,100 square feet is inadequate. A Terminal Building Concept Study/Design is currently programmed. Preliminary terminal requirements have been estimated at 2,640 square feet.
- Additional aircraft storage will be required to accommodate approximately nine additional based aircraft. Other based aircraft will park on the apron. Note: hangars in poor condition (i.e. FBO hangar) may require replacement within the 20-year planning period. It is assumed that such replacement of hangars will occur on the same lot where they are currently located – such development is separate from the additional nine hangars required to accommodate growth.
- The airport access road should be relocated beyond the new helicopter operations area. Terminal area vehicle parking is adequate through the planning period for GA operations. However, based aircraft owner parking should continue to be provided adjacent to hangar development areas in conjunction with hangar construction.
- Existing FBO hangar facilities are in poor condition and inadequate in size. A new facility is required (also addressed under aircraft storage).
- Utility improvements at the airport are adequate in the short-term with the exception of water. More specific improvements may evolve based on future tenants.
- Fuel storage for 100 LL and Jet A is adequate.
- Security fencing around the airport is currently adequate.

4.3.1 Terminal Building

The airport's existing terminal building contains 1,100 square feet. While this size may be adequate for many GA airports, airport-related staff have expressed the need for additional space. This need is based on its current and projected use in the future. The existing terminal building currently accommodates FBO office space, a pilot lounge/waiting room and restrooms. The airport has expressed interest in continuing efforts to provide a larger terminal facility, also identified in the previous master plan,

that will accommodate a meeting room, expanded office space, and a larger pilot lounge/waiting room. A terminal building with 2,640 square feet (similar to the previous master plan) is identified for ultimate development, but a Terminal Building Concept Study/Design is currently programmed to address this issue in more detail and may result in revised space requirements. Preliminary requirements are based on a pilot/passenger lobby area with 800 s.f., administrative/office space of 340 s.f., restroom facilities totaling 300 s.f., utility and equipment storage room with 400 s.f.; and a conference room with 800 s.f. for a total terminal building square footage of 2,640.

4.3.2 Aircraft Storage

There are currently 16 of the 28 based aircraft in hangars at the airport. It is estimated that of the 39 based aircraft forecast for 2020, 25 aircraft (64%) will require hangar space. This translates to nine additional hangar space requirements by the year 2020 – six in Phase I (2005), one in Phase II (2010), and two in Phase III (2020). This phasing is tied to the based aircraft forecast in the previous chapter. Hangar demand can be accommodated by conventional and/or t-hangar units. However, for planning purposes, it is assumed that the area required for each based aircraft will range from 1,200 to 1,500 square feet. This translates to approximately 13,500 square feet of total hangar space needed during the planning period. Approximately 9,000 square feet (6 hangars) are needed in Phase I. The FBO hangar (rated as “poor condition” in the Inventory Chapter) will require replacement. However, the FBO hangar replacement facility, can be constructed in the same lot where the FBO currently resides. Additional discussion of FBO facilities is provided in a later section.

4.3.3 Surface Access and Vehicle Parking

The airport is served by one paved access road into the airport. Although this road, with improvements, could serve the future needs of the airport, it is recommended that the road be relocated south of the new helicopter operations area as a safety measure to avoid vehicle and helicopter traffic conflicts in the future as activity levels for both increase.

The terminal parking area has 30 general public parking spaces, four employee spaces, and two handicapped spaces. Terminal area vehicle parking demand is estimated at a

total of 20 parking spaces by the year 2020 (17 by 2005, 18 by 2010). Therefore, existing vehicle parking in the terminal area is adequate through the planning period.

Many based aircraft owners currently park in unmarked areas in the existing hangar development area. It is anticipated that, for the size of Safford's based aircraft and operational levels, that this practice will continue. Thus, future hangar development (nine hangars) should accommodate this need.

4.3.4 Aviation Support Facilities

Aviation support facilities include FBO facilities, fuel storage, airport maintenance facilities, aircraft rescue and firefighting facilities (ARFF), security facilities, and utilities. Drainage requirements are also addressed for the airport and are published in a separate report. However, a summary of the conclusions and recommendations are included in this chapter.

FBO Facilities

Current FBO facilities are inadequate to meet projected demand. The existing FBO hangar is 4,800 square feet and does not meet the FBO's current space requirements. In addition, the hangar is in poor condition and requires replacement. While the proposed terminal building expansion project would accommodate additional administrative space that could be used by the FBO, additional space is needed for FBO services to include aircraft storage/maintenance.

A preliminary FBO hangar needs analysis, previously prepared in February 1998 by the airport in coordination with the FBO, identified a hangar totaling 7,500 square feet. This concept is under internal airport review. This facility would include approximately 90 percent of the space for three to four aircraft in the hangars for maintenance and the remaining 10 percent for administrative and equipment storage space. Currently, the FBO's facility cannot accommodate all aircraft necessary at one time based on wingspan and tail height.

Utilities

Utilities at the airport include water, electric, septic, propane, and telephone. While some hangar facilities do not have utilities, the terminal building does have access to all

utilities. Generally, utility systems at the airport are adequate in the short-term, with the exception of water, based on existing facilities served. However, it is recommended that the airport make utility infrastructure improvements in conjunction with future airport improvements as the specific needs evolve from future airport tenants and users. Further, specific utilities available to hangar tenants may be driven by cost since utilities are not typically eligible for federal and state funding (See Chapter 9, Implementation, for more information).

Water

The City water line has inadequate pressure to provide fire protection as well as serve the ultimate needs of the airport. The existing waterline is operated by a booster pump that was rebuilt in 1999. The line from the booster pump (currently serving only the airport) is approximately 6,000 feet long. It is estimated that no more than 200 gallons per minute through the existing line can be provided. The existing line must be replaced. In addition, the Utility Department has been planning a large water storage tank for the airport. This storage tank will not provide pressure. While ARFF trucks can meet initial emergency needs, water resupply and pressure needs cannot be met with the existing infrastructure. Therefore, utility improvements should be programmed during the planning period to accommodate these needs.

Electric

The existing power line to the airport is fed by a Graham County Electrical Corporation transmission line and transformers with limited capacity. While the transformers at the airport power line connection will need upgrading to carry more than 150 KVA, the increase in aviation demand and associated facilities are not expected to significantly increase power requirements. Therefore, an upgrade to the power system is not required during the planning period. The existing power system can handle limited expansion. The appropriate capacity of the existing power line serving the airport is 2100 KVA.

Septic

Although the existing septic systems are functioning, the existing septic system for the terminal has limited capacity. The soils at the airport consist of significant clay with severe limitations for use related to a septic tank filter field. The existing systems are

not failing, but it is important to note that the existing soils provide poor suitability for septic systems. Heavy use of a septic system could cause problems. While the total aviation activity demand is not anticipated to overload the existing septic system, the City should plan for septic system needs beyond the 20-year planning period.

Propane

Heating fuel is provided by onsite propane storage tanks. These tanks will continue to serve the needs of existing and future demand at the airport.

Telephone

Telephone service is provided by U.S. West. It is anticipated that the existing telephone wiring system is more than adequate to accommodate future airport development needs.

Fuel Storage

Two new aboveground fuel storage tanks (1998) have been installed to replace the underground tanks discussed in the previous master plan. These tanks, which store 10,000 gallons of 100LL and 12,000 gallons of Jet A, are more than adequate to meet the weekly fuel storage requirements through the planning period. This is based on the assumption that average fuel consumption per operation for 100 LL and Jet A will not exceed 26 gallons and 31 gallons, respectively, in any average week.

Current estimates for Safford indicate that consumption averages 5.4 gallons per operation for all aircraft activity. This is based solely on a ratio between total estimated 1997 annual operations and fuel sales. The FBO has not encountered fuel storage shortages in the past.

The airport recently acquired two additional fuel trucks for a total of three: two with 100LL and one with Jet A fuel. These fueling vehicles are currently parked under a new truck shade (constructed in 1999) adjacent to the FBO hangar. No additional storage is required.

Maintenance

The City of Safford as well as the FBO, through an agreement with the Airport Authority, provide airport maintenance. While most maintenance equipment comes from the City fleet, some equipment is stored at the airport. However, airport staff have indicated that outside equipment storage/staging adjacent to the FBO is adequate and the proposed new FBO facility will provide some additional storage when completed.

Aircraft Rescue and Firefighting Facilities (ARFF) and Security

As detailed in the Inventory Chapter, the City of Safford provides both firefighting support (approximately 28 volunteers) and airport security (approximately 15 City of Safford police officers). Based on the type of operations at Safford Regional Airport, an ARFF facility is not required. Further, firefighting equipment staging at the airport is not necessary. However, water pressure is currently inadequate to provide proper firefighting capability on the airport (beyond the City's equipment capabilities) and should be remedied.

Security fencing currently exists for the perimeter of the airport. No additional fencing is required. Double-barbed wire runs along the north and east side of the airport while chainlink fencing lies generally along the west and south side of the airport. The City's police department provides security surveillance at the airport on an as-needed basis.

Air Traffic Control Tower (ATCT)

As mentioned in the Inventory Chapter, Safford does not have an air traffic control tower (ATCT). Air Traffic can be handled by establishing a control tower on a contract basis (private) or an FAA-operated ATCT. In most cases, general aviation airports establish an ATCT operated by the FAA due to cost and staffing. The FAA has established criteria for qualifying for a FAA-operated ATCT. According to the Airways Planning Standard Number 1 (APS-1) standard, an airport is eligible for a tower when annual operations reach 200,000. The 2020 forecast of 19,700 annual operations is well below this threshold. Therefore, an FAA operated control tower is not proposed during the planning period.

Drainage

According to the April 1999 Drainage Analysis Report, the Safford Regional Airport drainage layout can safely convey on-site and off-site flows for the five-year storm event per the FAA criteria through and around the airport. Based on the drainage report for the apron reconstruction, the airport aerial photo, and field visit, no flooding problems or excessive ponding at the catch basins or culvert inlets are evident. In the event of a storm greater than a five-year event, there are potential flooding problems due to the ends of the culverts and catch basin grates becoming clogged with debris and sediment, and excessive vegetation in the channels. It is recommended that the current drainage system continually be maintained by cleaning all debris, vegetation, and sediment from catch basin grates, inlets and outlets of culverts and drainage channels. In addition, all damaged culverts should be repaired in conjunction with future improvements.

4.4 SUMMARY

Table 4-7 summarizes the airside and landside facility requirements identified in this chapter. Additional information regarding these necessary improvements is outlined in Chapter 5, Alternatives Analysis, and Chapter 9, Implementation.

Table 4-7**Summary of Facility Requirements**

Airside Facilities	
Runways	Acquire remaining parts of Runway 12-30 RPZs, Runway 8-26 OFA, and large parcels adjacent to the west and south boundaries of the airport to protect for City-proposed development beyond 2020
Taxiways	Relocate Taxiway D. Construct Taxiway E and associated taxilanes for hangar area development.
Apron Area	No additional development required.
Helicopter Operations Area	Construct 12 helicopter parking spaces (short-term need).
Pavement	Continue pavement preservation projects (ongoing).
Nav aids, Visual Aids, Markings, Signage	Replace PAPIs/VASIs on both runways with new PAPIs. Upgrade airfield signage and lighting.
Airport Landside Facilities	
Terminal	Expand existing or construct new terminal building with approximately 2,640 s.f. following Terminal Building Study/Design already programmed (short-term need).
Hangars	Construct 6 additional hangars in Phase I; 1 in Phase II, and 2 in Phase III. Replace old FBO hangar with new facility to meet space requirements (short-term need).
Surface Access & Parking	Relocate airport access road. Terminal area parking is adequate. Based aircraft owner parking should be provided adjacent to and in conjunction with hangar development.
Aviation Support Facilities	
Fueling	No additional development required.
ARFF and Security	No additional development required.
Utilities	Water line and storage improvements required. Specifics on other necessary improvements may evolve based on future airport tenants.

Safford
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Alternatives Analysis 

5.1 INTRODUCTION

The objective of the alternatives analysis is to determine the most suitable development to meet the needs of the Safford Regional Airport. The four primary steps in this process included:

- Identification of opportunities and constraints
- Identification of various airside/landside development alternatives to meet the existing and future needs of the Airport
- Evaluation and refinement of the development alternatives
- Selection of the most suitable development alternative (preferred alternative)

This process was conducted in close coordination with the Planning Advisory Committee (PAC). The PAC actually completed the alternatives analysis process at a February 1999 meeting when they selected and refined a “preferred alternative” for the 20-year planning period. A summary of this process, which concluded in February 1999, is summarized in Sections 5.1 through 5.3.

Since the City, Airport Board, and PAC recognized the need to address airport development beyond the 20-year planning period, a “50-Year Outlook” Development Plan was also identified. This Plan was also prepared in coordination with the PAC at the February 1999 meeting. However, in late 1999, the PAC requested changes to this plan based on evolving circumstances and modified long-term plans for the airport and its surrounding environs. Thus, the “50-Year Outlook” illustrated and discussed in Section 5.4, Beyond 2020, is the result of the late 1999 revisions.

5.2 OPPORTUNITIES AND CONSTRAINTS

Opportunities and constraints that have the greatest influence on possible future development for Safford Regional Airport are presented here. Airport opportunities offer flexibility in the alternatives identification process by increasing the possibilities for development. Airport constraints are challenges or limitations to future airport development. While some constraints may limit or prohibit development in certain

areas, other constraints may be overcome by responding with mitigation and / engineering solutions.

Opportunities

- Vacant lease areas east of the existing terminal area development with Runway 12-30 frontage
- Undeveloped/ underutilized property within the terminal area
- Undeveloped/ underutilized property on the north side of the airport with runway frontage
- Undeveloped/ underutilized property south and east of helicopter operations area
- Existing Infrastructure (roads, utilities)
- Clear approaches to runways

Constraints

- BLM, Phelps Dodge, State, and private property ownership immediately adjacent to the airport
- Lack of access and utilities on north side of airport
- Inadequate utility systems across airport including existing developed areas
- Terrain on southeast side of airport
- Drainage constraints (berm) on north side of airport
- Non-aviation use restrictions (non-aviation use permitted with FAA approval only)
- Military lease south of new helicopter operations area

5.3 ALTERNATIVES IDENTIFICATION

Following review of the Airport's opportunities and constraints as well as the facility requirements analysis, alternative development concepts were identified. These alternatives were identified using the following assumptions:

- Future development will be demand-driven as identified by aviation forecasts and facility requirements analysis
- Proposed development alternatives will include consideration for all current applicable FAA design standards and airspace regulations

- Proposed development alternatives will be identified with long-term (beyond 20-year master planning period) considered
- Some development projects proposed will include previous and ongoing planning and conceptual design efforts undertaken by the airport such as helicopter parking, new FBO hangar, etc.

The following sections present the airside and landside development alternatives.

5.3.1 Airside Alternatives

Airside alternatives typically include development concepts for runway extensions, additional taxiways, helicopter operation areas, etc. Based on the facility requirements analysis and the development which has already occurred at Safford Regional Airport in recent years, no major airside development alternatives were identified. However, there were seven key airside requirements identified as follows:

1. Land acquisition for runway object free area off Runway 8-26 ends
2. Land acquisition for larger runway protection zones off Runway 12-30 ends
3. Airfield signage to comply with current FAA standards
4. New PAPI systems on Runways 12-30 and 8-26
5. Helicopter parking adjacent to existing helipad to accommodate demand
6. Relocation of Taxiway D to align with Taxiway C and accommodate future apron expansion to the west
7. Construction of Taxiway E (and associated taxilanes) to serve hangar area development east of the terminal area

The first four development needs noted above are “located by function.” In other words, their placement is dictated by other existing facilities. Consequently, various development alternatives do not exist for these facilities. Therefore, these four requirements are identified as “givens” or “additive projects” since they are necessary to meet FAA standards or maintain operation of existing facilities.

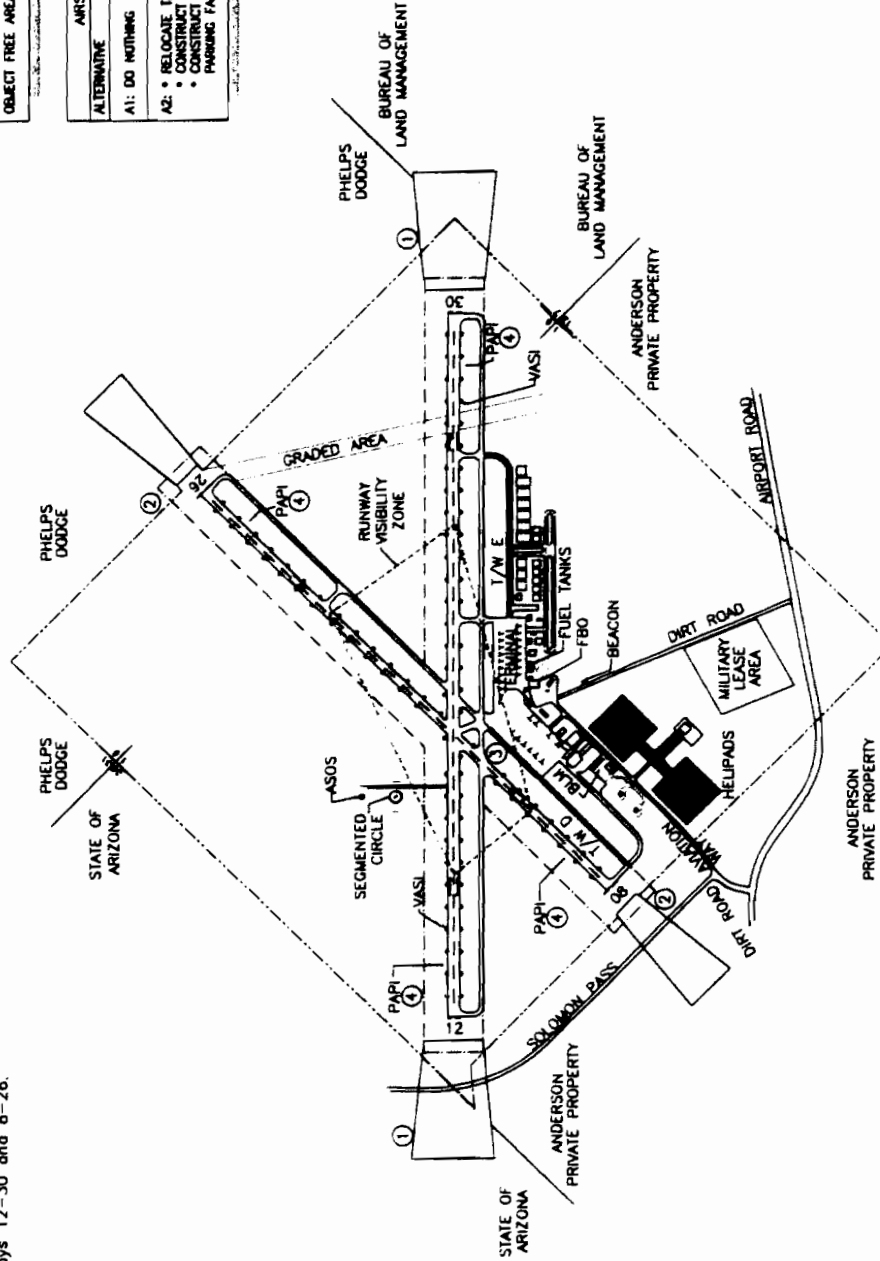
The fifth requirement, helicopter parking, represents the continuation of development in progress – the helipad has been constructed and associated parking has been conceptually designed. The relocation of Taxiway D, the sixth requirement, has been planned and programmed by the airport in the past. Further, the facility requirements

Additive Projects:

- ① Runway protection zones (RPZs) shown supersede previous Master Plan clear zones identified. Area outside former clear zones should be acquired in fee simple or easement.
- ② Runway object free area (OFA) extends outside airport boundary. Per FAA, OFA should be controlled in fee simple.
- ③ New signage required throughout airfield.
- ④ New PAPIs required on Runways 12-30 and 8-26.

DESCRIPTION	LEGEND	KEY
EXISTING EASEMENT	---	
PROPERTY LINE	---	
RUNWAY VISIBILITY ZONE	---	
OBJECT FREE AREA	---	

ALTERNATIVE	KEY
A1: DO NOTHING	
A2: • RELOCATE TOWER D • CONSTRUCT TOWER E • CONSTRUCT HELICOPTER • PARKING FACILITIES	



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Master Plan Update

EXHIBIT 5-1
Airside Alternatives

analysis reinforced the need to align this taxiway with Taxiway C and ultimate accommodate apron expansion. Finally, the construction of Taxiway E is identified to serve the existing and ongoing hangar area development east of the terminal area.

These three latter requirements have been combined and designated as the only airside development alternative for comparison to the "Do Nothing" alternative.

Exhibit 5-1, Airside Alternatives, lists the four additive projects and illustrates the possible development. The "Do Nothing" option is identified as Alternative A1 and the possible development is defined as Alternative A2.

It should be further noted that landside development, such as hangar construction, might drive the need for additional connecting taxiways (beyond that shown in the airside alternatives). Such needs are considered inherent in certain proposed development projects.

Alternative A1 Advantages and Disadvantages

This alternative is a "no development" alternative which translates to three primary advantages -- low cost, least environmental impact, and no disruption to airfield operations for construction. However, this approach presents a significant long-term problem for the airport. "No development" would magnify the facility deficiencies over time as based aircraft and operations demand increased. This would progressively impact both local and transient airport users and, thus, make the airport less desirable to business traffic. While the primary advantage is the low cost, inadequate facilities could negatively impact the airport's long-term economic viability and contribution to the community and regional airport system. Further, this alternative is not consistent with the ultimate goals and objectives of the City of Safford.

Alternative A2 Advantages and Disadvantages

Alternative A2 costs approximately \$2.5 million for all airside development proposed. While this is a substantial cost for the City and represents the largest disadvantage, the federal and state funding assistance available to the City coupled with the long-term economic benefits to the community make this the most desirable alternative. Further it is anticipated that the possible environmental impacts will be minimal since the

proposed airside development does not include any development outside the existing airport boundary nor on any significant area of undisturbed land. Disruption to airfield operations is also minimal since the majority of the improvements are taxiway-related and can be constructed without disruption to fixed wing and rotorcraft air operations. Finally, the City's goals and objectives for this airport are well-served by this alternative.

Preferred Airside Alternative

Alternative A2 is the preferred airside alternative. The City, Airport Board, and the PAC do not view Alternative A1 "No Development" as an acceptable option for this airport based on the goals and objectives established for this community asset.

5.3.2 Landside Alternatives

Landside alternatives address airport development with respect to aircraft storage (hangars), terminal facilities, surface access, vehicle parking, and aviation support facilities. The *facility requirements analysis* for Safford Regional Airport identified the need for additional hangar space, additional terminal building space, and relocated airport access. Development defined as "givens" or "additive projects" include utility improvements and FBO hangar replacement.

Exhibit 5-2, Landside Alternatives, graphically depicts the proposed development concepts for future hangars, the terminal building, and the primary airport access road. The following sections describe and evaluate these alternatives.

Hangar Development

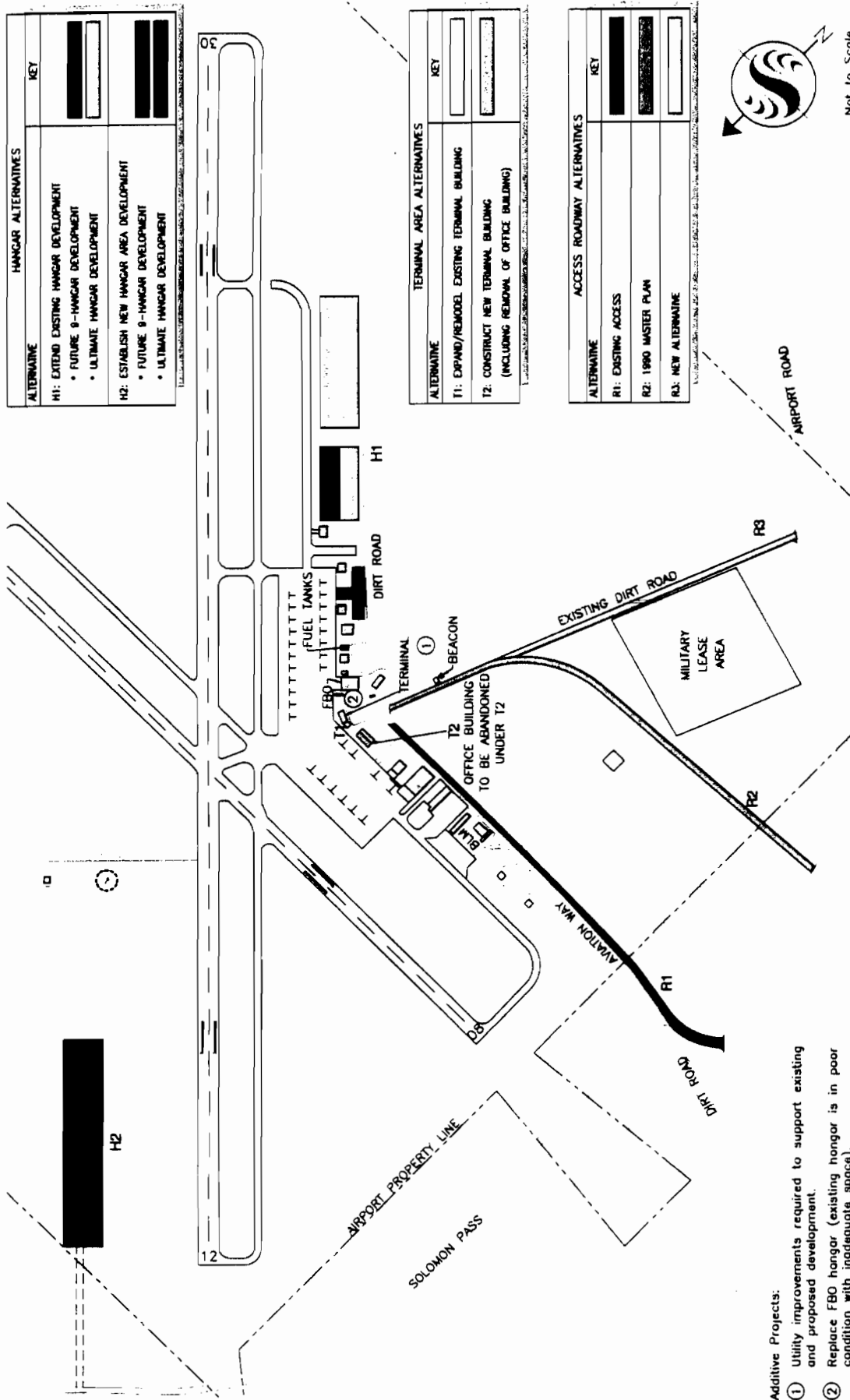
Two alternative development concepts were identified to address future hangar needs. These alternatives, H1 and H2, depict the general location of possible hangar development. Specific size and location of each hangar are not identified since this may vary slightly for individual tenants. Alternatives H1 and H2 are defined as follows:

H1: *Hangar development east of the existing terminal area facilities.* This is the same lease area identified by the City for future expansion and illustrated in the 1990 Master Plan.

HANGAR ALTERNATIVES	
ALTERNATIVE	KEY
H1: EXTEND EXISTING HANGAR DEVELOPMENT • FUTURE 9-HANGAR DEVELOPMENT • ULTIMATE HANGAR DEVELOPMENT	
H2: ESTABLISH NEW HANGAR AREA DEVELOPMENT • FUTURE 9-HANGAR DEVELOPMENT • ULTIMATE HANGAR DEVELOPMENT	

TERMINAL AREA ALTERNATIVES	
ALTERNATIVE	KEY
T1: EXPAND/REMODEL EXISTING TERMINAL BUILDING	
T2: CONSTRUCT NEW TERMINAL BUILDING (INCLUDING REMOVAL OF OFFICE BUILDING)	

ACCESS ROADWAY ALTERNATIVES	
ALTERNATIVE	KEY
R1: EXISTING ACCESS	
R2: 1990 MASTER PLAN	
R3: NEW ALTERNATIVE	



- Additive Projects:
- ① Utility improvements required to support existing and proposed development.
 - ② Replace FBO hangar (existing hangar is in poor condition with inadequate space).

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EXHIBIT 5-2
Landside Alternatives

H2: Hangar Development on the north side of the airport near Runway 12 end. This area of the airport is not currently developed.

Both development concepts can accommodate the nine hangar spaces needed during the master planning period as well as additional hangar demand beyond this plan.

Hangar Alternatives Evaluation

During the alternatives evaluation process, advantages and disadvantages of each alternative were outlined for discussion at the Planning Advisory Committee (PAC) and public meetings. Then, each alternative was evaluated based on the airport's issues, goals and objectives. This process guided the selection of the preferred alternative.

Alternative H1 Advantages and Disadvantages

Alternative H1's advantages include its close proximity to the existing terminal building and apron area, fueling facilities, airport access road, and existing auto parking areas. In addition, this area is near midfield and has prime runway frontage. Development costs would be lower for this area as a result of the existing infrastructure.

The primary disadvantage of Alternative H1 is that the long-term development potential of the airport may be somewhat constrained if private hangar development is allowed along this runway frontage in lieu of future aviation-related commercial/ corporate development. This can be remedied by the City's current plan, which reflects commercial hangars along the runway frontage and private hangars south of them. This would mean that general aviation and commercial/corporate aviation land uses would be mixed.

Alternative H2 Advantages and Disadvantages

Alternative H2's advantages include its long-term GA development potential in an area separate from growing commercial/corporate development. Its close proximity to Runway 12 end is beneficial for takeoffs in the summer when prevailing winds are from the southeast. Additional facilities constructed to support this GA area have more than adequate space for expansion in this undeveloped part of the airport. Increased activity in the helicopter operations area may also make the north side more attractive to existing and future GA tenants.

The disadvantages of Alternative H2 are opposite of those advantages outlined for Alternative H1. The area is much farther from the existing terminal building, fueling facilities, airport access road, auto parking areas, and other existing general aviation development. It also requires that aircraft cross Runway 12 to access the parallel taxiway for takeoffs on Runway 30 (primarily during the winter when winds are from the northwest). For crosswind Runway 8 departures, a less direct taxiing route is available. A second access road would need to be constructed to serve this side of the airport and other infrastructure would need to be made available (i.e. utilities). Further, the drainage (berm area) along the north side of the airport would need to be evaluated and modified to redirect current drainage patterns. Costs associated with this alternative would be significantly higher than Alternative H1.

Preferred Hangar Development Alternative

The PAC selected Alternative H1 as the preferred development for the airport. This selection was based primarily on the preference to reserve the north side for aviation-related industrial park development and the desire to continue the City-established lease lot development to the east of the existing terminal area. In addition, future hangar needs can be accommodated in this area sooner and at a lower cost to the City and/or tenant.

Terminal Building Development

Safford requires a terminal building significantly larger than the existing building. Although a terminal building study/design is planned to address the specific details of terminal configuration and size, the alternatives analysis process identified two general development concepts defined as:

- T1: *Expand/Remodel Existing Terminal Building.* This consists of expanding the existing 1,100-square foot building to 2,640 square feet.
- T2: *Construct New Terminal.* This alternative requires the removal of the office building (former house) to the west of the existing terminal building and constructing a new 2,640-square foot terminal facility.

Terminal Building Alternatives Evaluation

Like the hangar alternatives evaluation process, advantages and disadvantages of each alternative were identified and the evaluation of both alternatives resulted in the selection of the preferred development. However, the majority of this effort evolved from the Planning Advisory Committee (PAC) and public meetings following the identification and publication of the hangar development and access road alternatives.

Here, the advantages and disadvantages are documented based on discussions at the meetings as well as discussions with the airport board and airport-related staff:

Alternative T1 Advantages and Disadvantages

The most apparent advantage of T1 is the lower cost (compared to Alternative T2) for construction since this alternative assumes that the existing facility will make up 1,000 to 1,100 square feet of the new 2,640-square foot facility. In addition, T1 remains more centrally located on the aircraft apron providing greater airfield visibility.

The primary disadvantage of T1 is the necessity to work with a facility offering little flexibility in design configuration to meet the individual space and layout needs. In addition, the construction period would disrupt terminal operations -- potentially requiring temporary terminal facilities.

Alternative T2 Advantages and Disadvantages

Alternative T2 provides the opportunity to develop a more efficient and effective use of terminal space. In addition, the original facilities would be modernized as part of construction rather than remodeled as required with T1. The construction of T2 would also allow terminal operations to go uninterrupted with a relocation to the new facility once construction was completed. The existing terminal building could also be converted to other uses dependent on potential tenant and airport needs in the future.

Alternative T2's location is a disadvantage since the location is west of the more centralized existing facility -- reducing total airfield visibility, particularly to Runway 30 end. Further, the cost of a new facility will surpass the cost of a terminal expansion and require the initial removal of the existing office building (former house) in the same location.

Preferred Terminal Building Development Alternative

T2 was selected as the preferred terminal building development alternative. The PAC's position is that the inflexibility of the existing terminal building makes it impractical to consider expansion. Further, the long-term costs associated with T1 (terminal expansion) may near the short-term costs of T2 (new terminal) depending on maintenance and remodeling requirements.

While the terminal building study/design will further address this development project, a preliminary cost estimate is provided in Chapter 9, Implementation.

Primary Airport Access Development

Three development concepts for the primary airport access roadway were identified in the early stages of the alternatives analysis process. They included:

- R1: *Existing east-west access just north of new helicopter operations area and south of BLM facilities. This access road is programmed for future improvements to bring it up to roadway design standards.*
- R2: *Relocated east-west access just south of new helicopter operations area. This relocation was proposed in the 1990 Master Plan.*
- R3: *Relocated access to run north-south through the airport directly to the terminal area along east side of new helicopter operations area. This proposed location generally runs along an existing dirt road proposed for abandonment in the 1990 Master Plan.*

Airport Access Alternatives Evaluation

Advantages and disadvantages of these three roadway alternatives were presented to the PAC and public for consideration. Similar to the evaluation process for the other proposed development, the airport's issues, goals and objectives guided the discussion surrounding these alternatives and the resultant selection.

Alternative R1 Advantages and Disadvantages

The obvious advantage of leaving the existing access road where it is today is the minimal cost and disruption to current traffic flows. This location is also the most direct route to the terminal area off the main road when coming from the City of Safford. Further, this road provides direct access to airport tenants and users operating on the west side of the airport.

The primary disadvantage of Alternative R1 is its potential safety hazard in the long-term when helicopter activity and vehicle traffic increases. Safety is enhanced when a well-established boundary is drawn between airside and landside operations. Other disadvantages include the limitations associated with development options for a “distinctive” entrance to the airport since development has already occurred on both sides of this existing roadway. Vehicle traffic desiring to go directly to the terminal building will have to travel between two helicopter traffic areas (BLM and public use helipads) and existing hangar development before visual contact with the terminal building (on the left side of the road) is made. This may appear confusing to first-time visitors looking for the terminal building.

Alternative R2 Advantages and Disadvantages

The primary benefit associated with Alternative R2 is that it moves the road so it no longer runs down the middle of the helipads. Vehicle and helicopter traffic are more separate with very little time added to the vehicle trip to get to the terminal or other airport areas. Further, a more distinctive airport entrance could be constructed.

The primary disadvantage of Alternative R2 is that it does not provide a “clean” direct route. In addition, the road is still fairly close to the public use helipad and cannot be located any further south without crossing the military lease area. R2’s connection to the main road is near a curve that could present line-of-site concerns for vehicles turning left into the airport. The construction of R2, a new road, would also cost more than R1 with a portion constructed outside the airport’s official property boundary.

Alternative R3 Advantages and Disadvantages

The advantages of Alternative R3 build on those in R2 since it also moves the road away from the helicopter area. However, R3's advantage over both R1 and R2 is that it offers a centered and direct entrance to the terminal facilities with a greater opportunity to develop a "distinctive" entrance. Further, any additional future development can occur on either side of this north-south roadway and access to such development is reasonable for all tenants. R3 would be fully constructed within the airport's official property boundary.

The primary disadvantage of Alternative R3 is that the turnoff for the airport is farthest from the existing access road -- increasing travel by nearly a half-mile from the City. R3's development costs would be similar to that associated with R2.

Preferred Airport Access Development Alternative

The PAC selected R3 as the preferred airport access based on its long-term development benefits such as its clean separation from other airport functions, its direct and potentially distinctive future entrance, and its centralized location in the south part of the airport providing access to and a distinctive boundary for the proposed aviation-related industrial development. Its central location also offers a distinct separation of helicopter operations and future landside development for fixed wing aircraft (i.e. hangars).

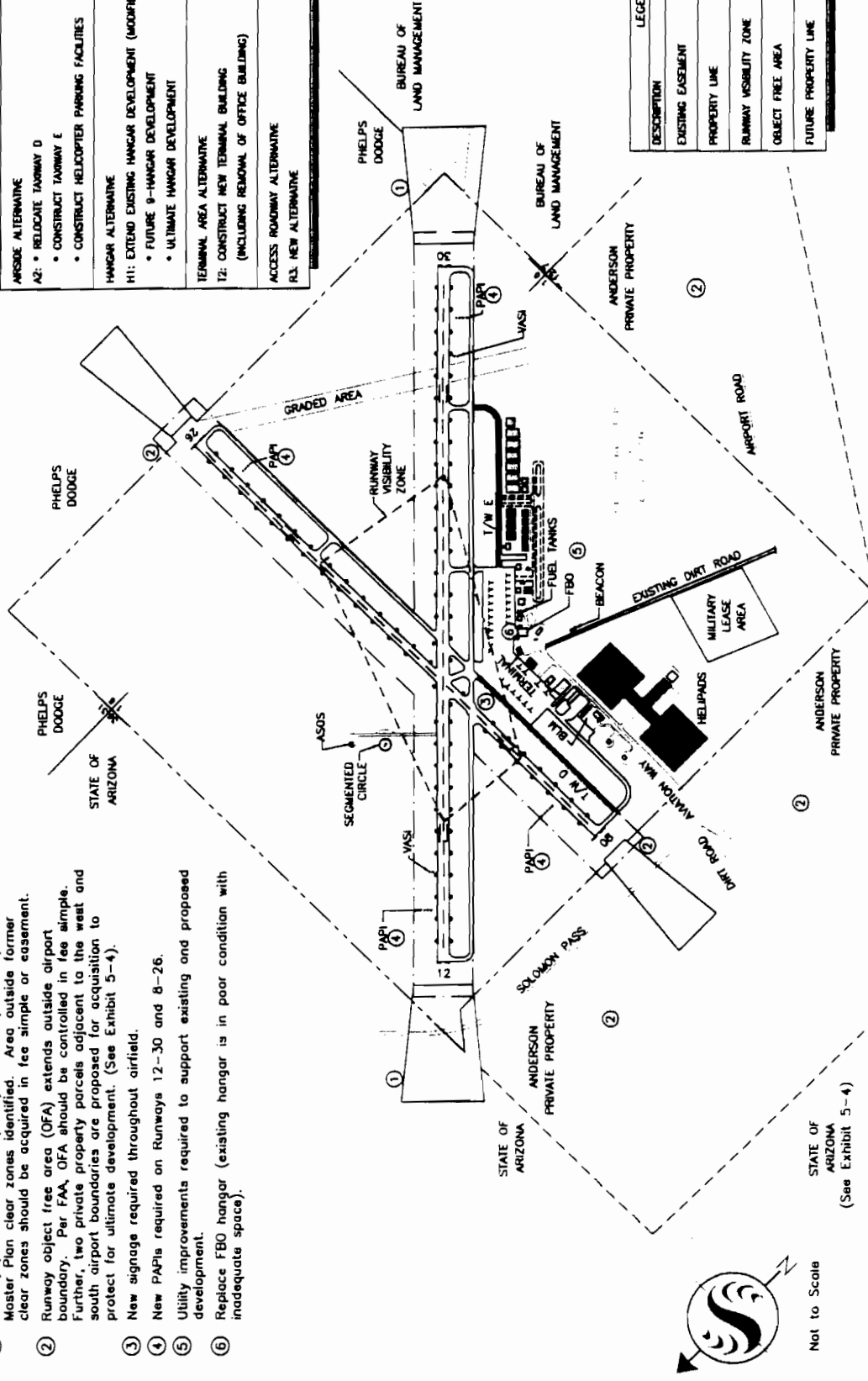
5.3.3 Preferred Airport Development

Exhibit 5-3 provides an illustration of the combination of the preferred airside and landside development projects selected for the Safford Regional Airport. This development includes the acquisition of several small parcels (in fee and avigation easement) off Runway 26, 12, and 30 ends for object free area and runway protection zone surfaces. In addition, two large parcels are proposed for acquisition which lie along the west and south boundaries of the airport. These parcels, also shown in Exhibit 5-3, total approximately 272 acres with the westerly parcel consisting of 152 acres and the southerly parcel consisting of 120 acres. Further, the potential acquisition of a 640-acre parcel owned by the State is under consideration. This parcel is west of the 152-acre parcel. Like both the 152-acre and 120-acre parcels along the existing airport boundary,

Additive Projects:

- ① Runway protection zones (RPZs) shown supersede previous Master Plan clear zones identified. Area outside former clear zones should be acquired in fee simple or easement.
- ② Runway object free area (OFA) extends outside airport boundary. Per FAA, OFA should be controlled in fee simple. Further, two private property parcels adjacent to the west and south airport boundaries are proposed for acquisition to protect for ultimate development. (See Exhibit 5-4).
- ③ New signage required throughout airfield.
- ④ New PAPIs required on Runways 12-30 and 8-26.
- ⑤ Utility improvements required to support existing and proposed development.
- ⑥ Replace FBO hangar (existing hangar is in poor condition with inadequate space).

ALTERNATIVE	PREFERRED ALTERNATIVE	KEY
APSIDE ALTERNATIVE A2: • RELOCATE TARMAY D • CONSTRUCT TARMAY E • CONSTRUCT HELICOPTER PARKING FACILITIES		■
HANGAR ALTERNATIVE H1: EXTEND EXISTING HANGAR DEVELOPMENT (MODIFIED) • FUTURE 9-HANGAR DEVELOPMENT • ULTIMATE HANGAR DEVELOPMENT		■
TERMINAL AREA ALTERNATIVE T2: CONSTRUCT NEW TERMINAL BUILDING (INCLUDING REMOVAL OF OFFICE BUILDING)		■
ACCESS ROADWAY ALTERNATIVE R3: NEW ALTERNATIVE		■



DESCRIPTION	KEY
EXISTING EASEMENT	---
PROPERTY LINE	---
RUNWAY VISIBILITY ZONE	---
OBJECT FREE AREA	---
FUTURE PROPERTY LINE	---

SAFFORD REGIONAL AIRPORT
Master Plan Update

EXHIBIT 5-3
Preferred Alternative



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the 640-acre parcel would be acquired to protect the airport for ultimate developer plans.

These proposed acquisitions were added after the alternatives analysis was completed as a result of recent events and further discussion of the City's ultimate development plans for the airport. Currently, the City and the Airport Authority are undertaking an aggressive marketing and economic development program that will have a marked impact on development priorities for the Airport.

While current forecasts do not justify it at this time, the economic development movement will make it imperative for the City to move forward at the earliest possible time with acquisition of the 272 acres of land (adjacent to the airport boundary) for two paramount reasons.

First, the acquisition will prevent encroachment and incompatible development to occur on this land (see Chapter 7, Section 7.4). Secondly, it will accommodate the Beyond 2020 development (see Section 5.4 below) which includes the lengthening of Runway 8-26 and its redesignation as the primary runway in order to accommodate larger aircraft and provide instrument capability required for these operations.

As this land continues to appreciate in value, early acquisition will result in substantial cost savings and ultimately contribute to the airport's ability to achieve financial independence as economic development efforts come to fruition.

Plans are currently under way to promote such economic development in the short-term on a 78-acre parcel south of the terminal area for commercial/industrial use (as noted on Exhibit 5-3). The City is in the process of submitting an application to the FAA to release this parcel for non-aviation use since ultimate development plans (Section 5.4) propose significant aviation development along the Runway 8-26 extension.

5.4 BEYOND 2020

While the airport master planning window addresses 20 years of airport development, planning beyond this is critical since airport improvements seek to serve the community well beyond 20 years. This section briefly addresses the issues surrounding the need to plan beyond 2020.

As previously discussed in the Facility Requirements Chapter, the airport's current and projected design aircraft in the 20-year planning period is the B-II aircraft group. The airport is currently serving C-II aircraft, too, but these aircraft do not conduct at least 500 annual operations (threshold for identifying critical aircraft).

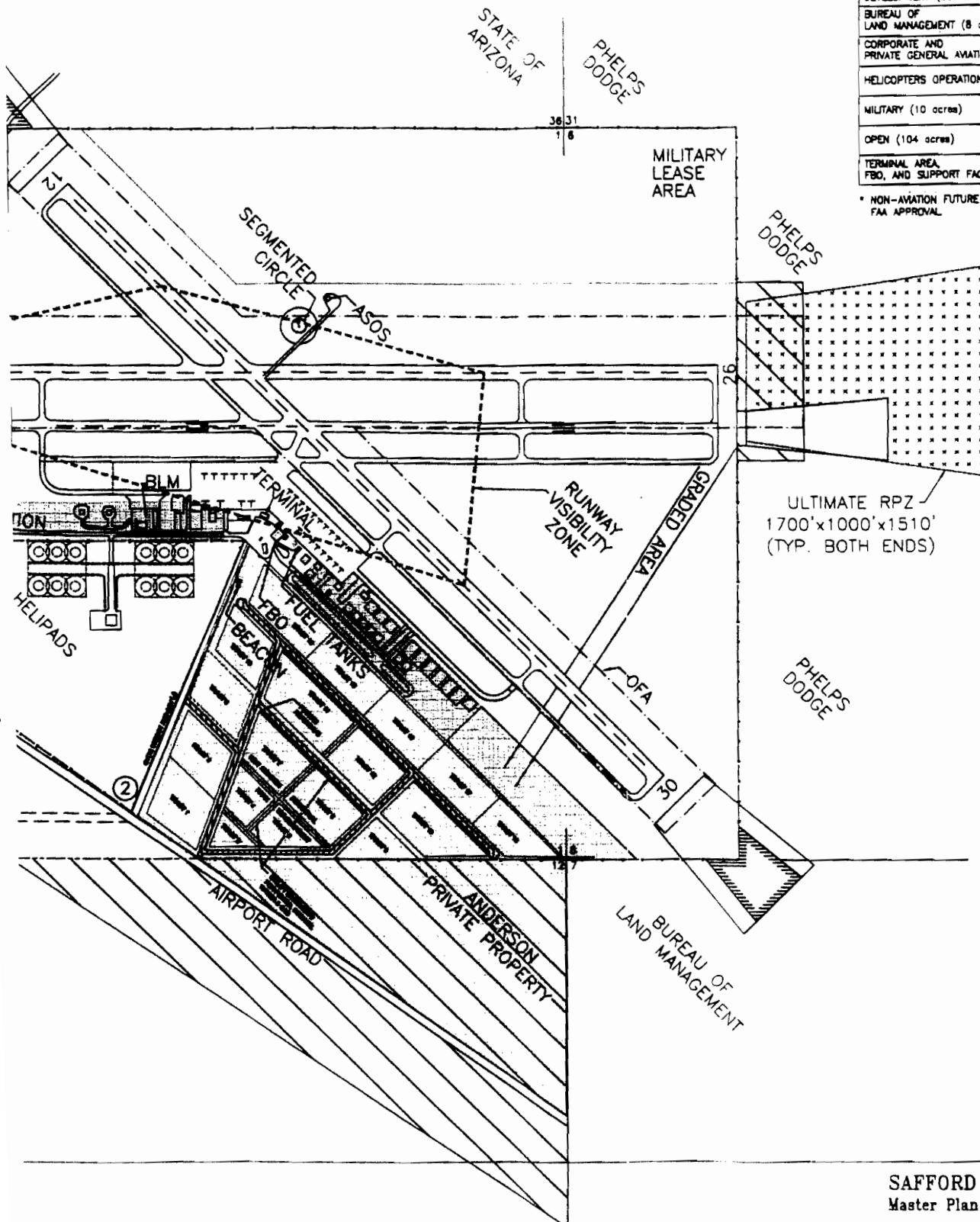
While this dictates that the airport be developed to the associated B-II design standards in this 20-year period, it does not mean that the airport will not require an upgrade to C-II standards thereafter when C-II operations do exceed 500 annual operations. In other words, the airport may begin serving aircraft that require greater separation standards and pavement widths than aircraft served up to the year 2020. It's important to consider this issue when developing facilities to ensure that an upgrade to another set of design standards is not precluded, limited, or too costly.

For Safford Regional Airport, it is anticipated that the airport will serve C-II aircraft regularly after 2020. This translates to increased runway to taxiway separation standards as well as other airport design changes. Examples of these increased dimensions for C-II aircraft were presented in Chapter 4.

Further, the City of Safford, in coordination with the PAC in late 1999, expressed a desire to ultimately (beyond 2020) make the existing crosswind Runway 8-26 the primary runway at a total length of 10,000 feet. Existing primary Runway 12-30 would become the crosswind runway remaining at its current length of 6,000 feet. The new 10,000-foot long Runway 8-26 would accommodate a large portion of the C-II aircraft fleet (such as the Gulfstream III) as well as many aircraft in the C-III aircraft fleet (such as the Boeing 737). However, this aircraft fleet as well as the airport's projected instrument approach needs require an increased separation from other facilities such as aircraft parking and parallel taxiways. Thus, ultimate development at the Safford Regional Airport would require a relocation of Runway 8-26 to the north by 400 feet to provide this increased separation required by the projected runway instrument approach and aircraft operation needs. **Exhibit 5-4** illustrates a possible 50-Year development outlook for the Airport to include the relocated and extended Runway 8-26. As shown, the existing Runway 8-26 becomes a parallel taxiway (fully extended) for the new Runway 8-26. The 50-Year Outlook represents a land use development plan that incorporates the City's long-term goals and preliminary development plans for the

LAND USE TABLE	
LAND USE	KEY
AIRFIELD OPERATIONS AREA (547 acres)	
AVIATION RESERVE (415 acres)	
AVIATION OR NON-AVIATION* RELATED DEVELOPMENT (94 acres)	
COMMERCIAL/INDUSTRIAL DEVELOPMENT (335 acres)	
BUREAU OF LAND MANAGEMENT (8 acres)	
CORPORATE AND PRIVATE GENERAL AVIATION (15 acres)	
HELICOPTERS OPERATION AREA (27 acres)	
MILITARY (10 acres)	
OPEN (104 acres)	
TERMINAL AREA, FBO, AND SUPPORT FACILITIES (7 acres)	

* NON-AVIATION FUTURE DEVELOPMENT WILL REQUIRE FAA APPROVAL

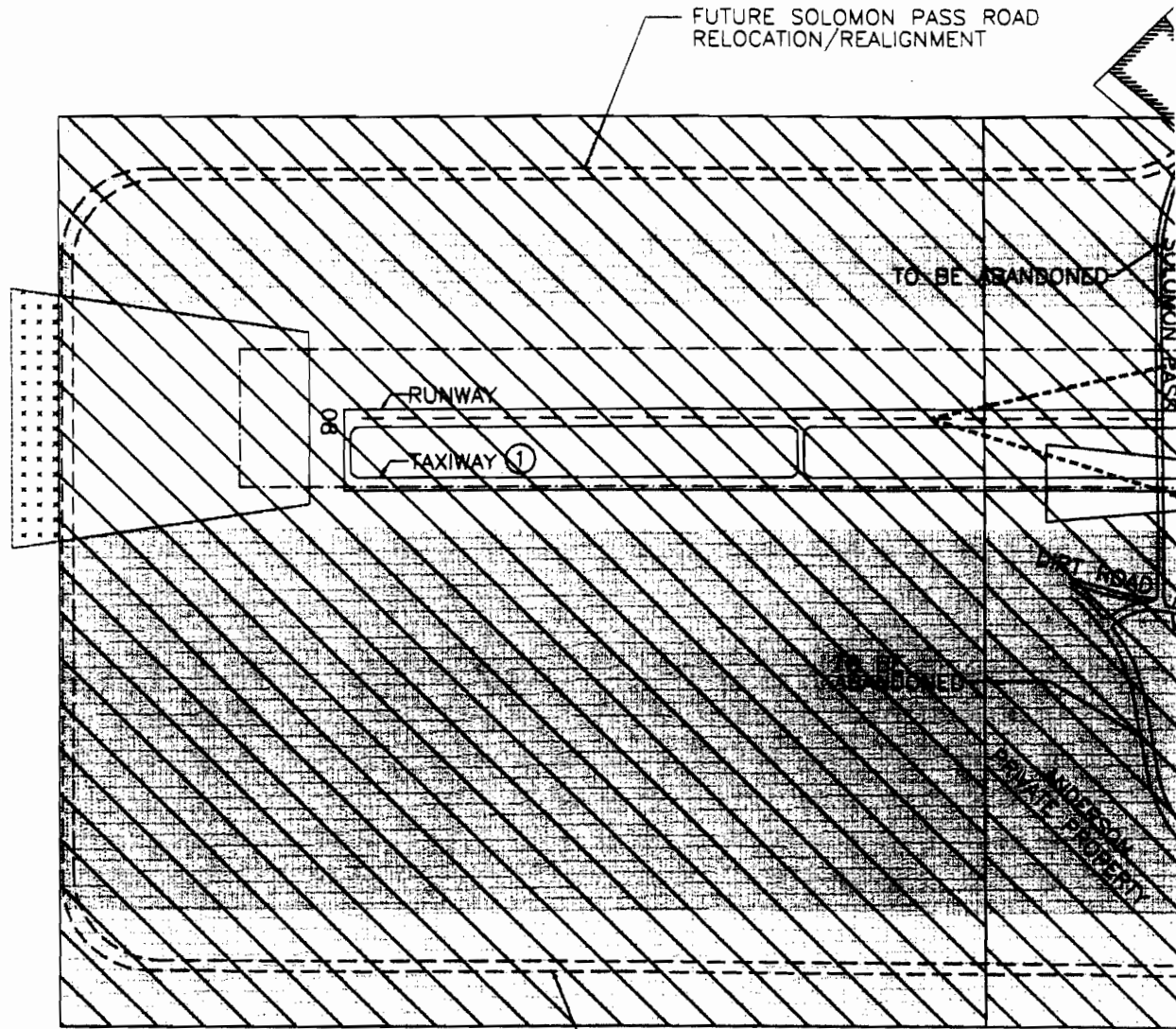


SAFFORD REGIONAL AIRPORT
Master Plan Update

EXHIBIT 5-4
50-Year Outlook

Notes:

- ① Existing Runway 08-26 becomes parallel taxiway. New Runway 08-26 is constructed to the north to accommodate increased separation requirements for instrument approach and C-III aircraft. Runway 12-30 (currently designated as the primary runway) will become the secondary/crosswind runway serving B-II aircraft.
- ② Airport/Industrial Park main entrance



LEGEND	
DESCRIPTION	KEY
EXISTING EASEMENT	
FUTURE AVIATION EASEMENT (50 acres)	
PROPERTY LINE	
FENCE	
RUNWAY VISIBILITY ZONE	
OBJECT FREE AREA	
FUTURE PROPERTY ACQUISITION (920 acres)	



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Modified Runway Visibility Zone (RVZ): The runway visibility zone (RVZ) on an airport is an imaginary boundary that should remain clear to provide pilots with an unobstructed view of other runways at specified distances from runway intersections to avoid conflicts with aircraft operating on other runways. This is especially important at uncontrolled airports. While the RVZ boundary for the existing and 2020 airfield configuration is generally clear, the proposed Runway 8-26 extension beyond 2020 enlarges the RVZ, which cuts across the majority of the aircraft apron area and a portion of the buildings in the terminal area.

Land Acquisition: Two small parcels of land just east of the airport are required to accommodate the future Runway 26 object free area. In addition, two large parcels of land to the west of the airport and one large parcel to the south of the airport are required to accommodate the Runway 08 extension to 10,000 feet, future aviation development (identified as aviation reserve), and future commercial/industrial development along the relocated/realigned roadways around the airport. Finally, aviation easements for portions of the runway protection zones (RPZs) for the future 10,000-foot Runway 8-26 are required. As described earlier, it is imperative that the City acquire property necessary to accommodate the City's ultimate development plans as soon as possible to ensure that such development is not precluded, limited, or too costly when it's time for construction. Thus, Chapter 9, Implementation, includes property acquisition in Phase I of the Capital Improvement Program (CIP) for the airport.

Relocated Roadways: Based on the City's proposed land acquisition for the airport and subsequent aviation and commercial/industrial development, Airport Road and Solomon Pass Road will require realignment and relocation (as shown in Exhibit 5-4). The City has already discussed the preliminary feasibility of this roadway project with Graham County and no significant concerns have been identified.

In addition, the City will need to coordinate with the FAA and ADOT Aeronautics Division prior to changing the primary runway designation from Runway 12-30 to Runway 8-26 and implementing the proposed development. The majority of the issues surrounding the implementation of the 50-Year Outlook development can be addressed in the next Master Plan Update or to some extent in an airport layout plan (ALP) drawing update.

airport to increase the airport's economic benefit to the community as well as protect its long-term viability.

As shown in Exhibit 5-4, 50-year Outlook, long-term development plans are illustrated using 10 separate land uses to include:

- Airfield Operations Area
- Helicopter Operations Area
- Terminal Area, FBO, and Support Facilities
- Corporate and Private General Aviation (GA)
- Bureau of Land Management (BLM)
- Military
- Aviation Reserve
- Aviation- or Non-aviation-related Industrial Development
- Open
- Commercial/Industrial Development

These land uses are described in detail in Chapter 7, Land Use Analysis, which addresses the importance of land use planning. Land uses shown provide for a distinct separation of airport functions. It is also important to point out that if and when the 50-Year Outlook development plan is implemented, there are four critical issues inherent in the proposed development that will require further consideration. A summary of these issues follows:

Modified Airport Influence Area (AIA) after 2020: The current AIA is based on the existing airfield configuration to include Runway 12-30 as the primary runway and Runway 8-26 as the crosswind runway. These designations assume that the majority of air traffic (up to aircraft in the C-II fleet) will operate on Runway 12-30 and that only smaller aircraft (up to aircraft in the B-II fleet) will operate on Runway 8-26 when crosswinds deem this necessary. However, the 50-year outlook changes the primary and crosswind runway designations and lengths and thus implies a change to the AIA which is based on runway lengths, traffic patterns, and types of traffic on specific runways.

Safford
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Environmental Evaluation 

6.1 INTRODUCTION

The purpose of this environmental evaluation is to identify any potential adverse environmental impacts related to the continued operation, maintenance, and improvement of the Safford Regional Airport as set forth in the 1999 Airport Master Plan Update. In accordance with FAA guidelines, this environmental evaluation considers twenty specific impact categories, ranging from noise to construction impacts. These categories, outlined in FAA Order 5050.4A, *Airport Environmental Handbook* (FAA, 1985), must be addressed for any project that involves any of the following:

- Airport location
- New runway
- Major runway extension
- Runway strengthening creating specific noise conditions within specified boundaries
- Major change of entrance or access roads
- Land acquisition
- Establishment or relocation of an instrument landing system, or an approach lighting system
- Development involving historic sites, Section 4(f) land, farmland, wetlands, coastal zones, floodplains, or endangered or threatened species

The *Airport Environmental Handbook* describes actions for which either no environmental documentation is required or for which the preparation of an Environmental Impact Statement (EIS) is mandatory. Only a small number of projects qualify in either category.

For all others, an Environmental Assessment (EA) is required. An EA is basically a significance testing process. If a project produces an impact greater than some established threshold level, then preparation of an EIS is required. If the impact is less than the threshold, a Finding of no Significant Impact (FONSI) results, unless some compelling reason for further investigation exists.

The Safford Regional Airport Master Plan Update proposes the following future development projects:

- relocation of the airport access road
- land acquisition for expansion of the runway protection zones (RPZs) and object free areas (OFAs)
- new Precision Approach Path Indicator (PAPI) light systems
- terminal building development
- expansion of helicopter facilities
- new hangar construction.

6.2 ENVIRONMENTAL EVALUATION CATEGORIES

6.2.1 Noise

The Safford Regional Airport is a general aviation airport facility that currently bases 28 aircraft primarily belonging to Airplane Design Groups I and II. Annual operations estimated for 1997 totaled 14,100. By the year 2020, the number of based aircraft is projected to grow to 39 and annual operations are expected to increase to nearly 20,000.

According to FAA Order 5050.4A (Airport Environmental Handbook, p. 28), no noise analysis is needed for proposals involving Design Group I and II airplanes on utility (small GA aircraft) or transport type airports whose forecast operations in the period covered by the environmental assessment do not exceed 90,000 adjusted propeller operations or 700 annual adjusted jet operations. These numbers of propeller aircraft operations result in cumulative noise levels, which do not exceed 60 day-night average sound level (DNL) more than 5,500 feet from, start of takeoff roll or 65 DNL on the runway itself.

However, for the purpose of identifying current and future noise impacts, this study performed a noise analysis for the existing and forecast operating conditions at the airport. Noise contours were prepared for the 55, 60, 65 and 75 DNL. Details of the noise analysis assumptions are contained in Chapter 7, Land Use, with illustrations of the noise contours on the Off-Airport Land Use Plan/Noise Map contained in Chapter 8, Airport Plans.

6.2.2 Compatible Land Use

The compatibility of existing and planned land uses in the vicinity of an airport is generally associated with the level of noise impact related to the airport. The FAA has developed guidelines for land-use compatibility based on noise levels and the nature of the land use being impacted. Commercial, industrial, and most public uses are considered compatible with airport operations, as long as they are consistent with performance standards of Federal Aviation Regulation (FAR) Part 77 relative to height and safety. The FAA has identified the 65 DNL noise level as the threshold of incompatibility with residential land uses.

The Safford Regional Airport is sited approximately four miles northeast of the City of Safford on the Gila Mountains' bajada at an elevation of 3,160 feet above mean sea level. The airport facilities are the only occupants of the area within a radius of one mile. The closest residential structure to the airport is located approximately 1.15 miles to the southeast at an elevation of 2,980 feet. The primary runway of the Safford Regional Airport (12-30) is oriented northwest southeast. The secondary (crosswind) runway (8-26) is oriented east west. Airplanes approaching or departing in either direction within the traffic pattern do not fly over any residential developments.

No noise abatement procedures are planned for use at the Safford Regional Airport. This is because the noise levels do not exceed noise compatibility standards contained in Federal Aviation Regulation (FAR), Part 150, Airport Noise Compatibility Planning.

The object free area (OFA) of Runway 8-26 does not comply with FAA standards. Part of the OFA is outside the airport boundary. The runway protection zones (RPZs) of Runway 12-30 should be widened. It will be necessary for the airport to acquire additional area and expand its boundaries to comply with the FAA standards for OFA for Runway 8-26. The airport may add additional RPZ area to Runway 12-30 by acquiring additional easement or through the purchase of additional land.

Currently, the land uses adjacent to the Safford Regional Airport are compatible with airport operations. However, an Environmental Assessment will be required to assess the impacts of future land acquisition by the airport to comply with FAA requirements for the OFAs and increase the size of the RPZs. Further, the City of Safford has adopted an Airport Influence Area (AIA) in support of the effort to maintain compatible land uses

around the airport. The AIA and other land use issues are described in detail in Chapter 7, Land Use.

6.2.3 Social Impacts

The continued operation of the Safford Regional Airport will not require relocation of residences or businesses. No adverse social impacts or community disruptions are anticipated. The overall effect of the proposed continued operation of the airport will be the continued availability of air access to the Safford area for private and corporate aircraft.

Any modification of airport access roads outside of the airport property which alter surface transportation patterns will require an Environmental Assessment to determine the social impacts of access modification.

6.2.4 Induced Socioeconomic Impacts

This category refers to impacts such as shifts in business and economic activity, demands on public services, or patterns of population growth associated with major airport development proposals.

The City of Safford and the Safford Regional Airport Authority continue to promote the development of the Airport to improve the economy of the area and to generate revenue from airport activity.

6.2.5 Air Quality

National Ambient Air Quality Standards (NAAQS) have been established by the Environmental Protection Agency (EPA) for seven criteria pollutants; carbon monoxide, lead, nitrogen dioxide, ozone, PM2.5, PM10 and sulfur dioxide. For each of these (except carbon monoxide), the EPA has adopted Primary standards to protect public health and Secondary standards to protect public welfare. Each state must adopt standards at least as strict as the federal standards. The standards adopted by Arizona are the same as those utilized by EPA. The Safford Regional Airport is located within an area that complies with all NAAQ Standards.

Arizona does not have indirect source review (ISR) requirements. Because the Safford Regional Airport has less than 180,000 operations forecast annually, it is not subject to air quality analysis (FAA Order 5050.4A, Airport Environmental Handbook, p. 33).

6.2.6 Water Quality

The Safford Regional Airport property drains southward to an unnamed pond and small wash that flows southward to the Gila River at the foot of the Gila Mountains bajada. Normal contaminants from airport operations are petroleum products. The Safford Regional Airport contains one fixed base operator (FBO) which provides aircraft fueling and maintenance services. Two aboveground storage tanks containing airplane fuel are present at the airport. The sizes and contents are 10,000 gallons grade 100LL aircraft fuel and 12,000 gallons grade A jet fuel. The tanks were newly installed in 1998, are in excellent condition, are owned by the City of Safford and maintained by the Safford Airport Authority. There are no plans for the expansion or relocation of the fuel storage system within the planning period. Waste petroleum from servicing of aircraft is collected and disposed by the FBO and the City of Safford. The potential for degradation of local water quality resulting from the continued operation of the Safford Regional Airport is very small.

6.2.7 Special Land Uses, Dot Section 4(F)

Section 4(f) of the Department of Transportation (DOT) Act specifies that no project will be approved that requires use of any publicly owned land from a public park, recreation area, or wildlife refuge. Currently, there are no special land uses, as defined by the Department of Transportation, which exist within the potential impact area of the Safford Regional Airport. However, if special land uses are identified in the future, an Environmental Assessment will be required.

6.2.8 Cultural Resources

Research was conducted at the State Historic Preservation Officer (SHPO) for information regarding the proposed improvements. In addition, a record search was conducted at the Arizona State Museum for information regarding significant cultural resources in or near the project area. The project area has not been surveyed for cultural resources and

a survey will be required under the National Historic Preservation Act if an Environmental Assessment is prepared.

6.2.9 Biotic Communities

The Safford Regional Airport is surrounded by undeveloped grazing land. Potential impacts to the surrounding biotic communities must be addressed in any Environmental Assessment(s) prepared for future airport land acquisitions, expansions, major lighting modifications, or access modifications.

6.2.10 Threatened and Endangered Species

The U.S. Fish & Wildlife Service (USFWS) Threatened and Endangered Species List for Graham County, Arizona was reviewed and the Arizona Game & Fish Department (AG&FD) was contacted for information regarding threatened, endangered, candidate, or special status species in the project area (see response in Appendix F). Although a number of species are listed as Threatened or Endangered on a county basis, it is unlikely that habitat utilized by these species is contained within the Safford Regional Airport area. Potential impacts to threatened and endangered species must be addressed in any Environmental Assessment(s) prepared for future airport land acquisitions, expansions, major lighting modifications, or access modifications.

6.2.11 Wetlands

No wetlands are located within or adjacent to the Safford Regional Airport. There will be no impacts to wetlands resulting from the continued operation of the airport under the Master Plan.

6.2.12 Floodplains

Safford Regional Airport is sited on the bajada of the Gila Mountains at an elevation of approximately 3,160 feet. It is not located within or adjacent to a floodplain. Continued operation of the Safford Regional Airport will not indirectly support secondary development within a floodplain. There will be no floodplain impacts.

6.2.13 Shoreline Management

A shoreline management program does not cover the vicinity of Safford; thus, evaluation under this category is not applicable.

6.2.14 Coastal Barriers

This impact category refers exclusively to islands on the Atlantic and Gulf coasts; thus, it is not applicable to development at the Safford Regional Airport.

6.2.15 Wild and Scenic Rivers

There are no wild or scenic rivers in the vicinity of the Safford Regional Airport which could be impacted by its continued operation or any future modification or expansion.

6.2.16 Farmland

The Farmland Protection Policy Act (FPPA) directs federal agencies to take into account the adverse effects of federal programs on the preservation of Prime or Unique Farmland. The Act protects such farmland from being converted, directly or indirectly, to nonagricultural uses. Farmland adjoins the Safford Regional Airport on its west and south sides and it is currently utilized for grazing. Previous contacts with the U.S. Department of Agriculture, Natural Resource Conservation Service, for activities under the previous Master Plan indicated that there are no prime or unique farmlands located adjacent to the Safford Regional Airport. Environmental evaluations prepared for expansion and modifications of the Safford Regional Airport under the proposed Master Plan should assess impacts to prime and/or unique farmland.

6.2.17 Energy Supply and Natural Resources

The proposed Master Plan for the operation of the Safford Regional Airport contains plans to modify and improve airport lighting, specifically new Precision Approach Path Indicators (PAPI) and Runway End Marker Lights (REML). The power requirements for these improvements with respect to current power availability should be assessed in the Environmental Assessments prepared for them.

6.2.18 Light Emissions

The runways of the Safford Regional Airport are currently lighted by medium intensity runway lighting (MIRL) systems that can be changed by radio control to variable intensity lighting for both runways and taxiways. Runway 12-30 has visual approach slope indicator (VASI) system and Runway 8-26 has a precision approach path indicator (PAPI) system. Environmental Assessment(s) prepared for the modification and improvement of the airport lighting systems which are a part of the proposed Master Plan should address potential light emission impacts.

6.2.19 Solid Waste Impacts

The activity generated by the continued operation of the Safford Regional Airport is not expected to create an increase in solid waste sufficient to cause an adverse impact on disposal facilities.

The FAA and EPA regulations indicate that solid waste sites should not be located within 5,000 feet of an airport utilized by smaller piston-engine aircraft nor within 10,000 feet for turbine-powered aircraft. No landfills have been identified within these distances from the Safford Regional Airport.

6.2.20 Construction

The proposed Master Plan contemplates modification of the airport access. Environmental Assessment(s) prepared for the construction activities contained in the proposed Master Plan should address construction impacts.

6.3 CONCLUSIONS

Although there are no significant environmental impacts anticipated for Safford Regional Airport which would prevent the development of proposed projects, further evaluation is required.

No development actions described in this Master Plan Update categorically require preparation of an Environmental Impact Statement. However, three actions may require the preparation of an Environmental Assessment (EA). These are:

- Land Acquisition
- Relocation of the main airport entrance
- Major lighting improvements

While the land acquisition proposed is primarily for the runway protection zones (RPZs) and object free areas (OFAs) in support of the existing and future (20-year planning period) development, it is important to note that the City is currently pursuing the acquisition of land beyond this need. This additional land is currently sought to ensure that the airport is protected from incompatible development, such as residential, and to protect for proposed airport development, such as the Runway 8-26 extension described in Section 5.4 of the previous chapter.

Safford
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Land Use Analysis 

7.1 INTRODUCTION

The purpose of this land use analysis is to document the anticipated impacts of airport improvements on the land within the airport boundary, on adjacent properties, and on the community as a whole.

7.2 ON-AIRPORT LAND USE

The on-airport Land Use Plan for Safford Regional Airport adopts general FAA criteria for the use of airport property (FAA Advisory Circular 150/5070-6A, Airport Master Plans):

- Adherence to standards in support of safe aircraft operations.
- Non-interference with line of sight or other restrictions for navigation aids and weather equipment.
- Use of existing facilities, to the extent possible, depending on their location, condition, and obligations with respect to their use.
- Consideration of topography and available infrastructure that might affect development costs.
- Flexibility in accommodating changes in demand and expansion.
- Effective and safe ground circulation for aircraft and vehicles.

Exhibit 7-1 illustrates the Land Use Plan for Safford Regional Airport. The plan depicts both existing and future land uses. The categories of on-airport land use include:

- Airfield Operations Area
- Helicopter Operations Area
- Terminal Area, FBO, and Support Facilities
- Corporate and Private General Aviation (GA)
- Bureau of Land Management (BLM)
- Military
- Aviation Reserve

- Aviation or Non-Aviation* Related Development
- Commercial/Industrial Development**
- Open

* Non-aviation development proposed is subject to future FAA review and approval

** Pending FAA review and approval – currently in progress

7.2.1 Airfield Operations Area

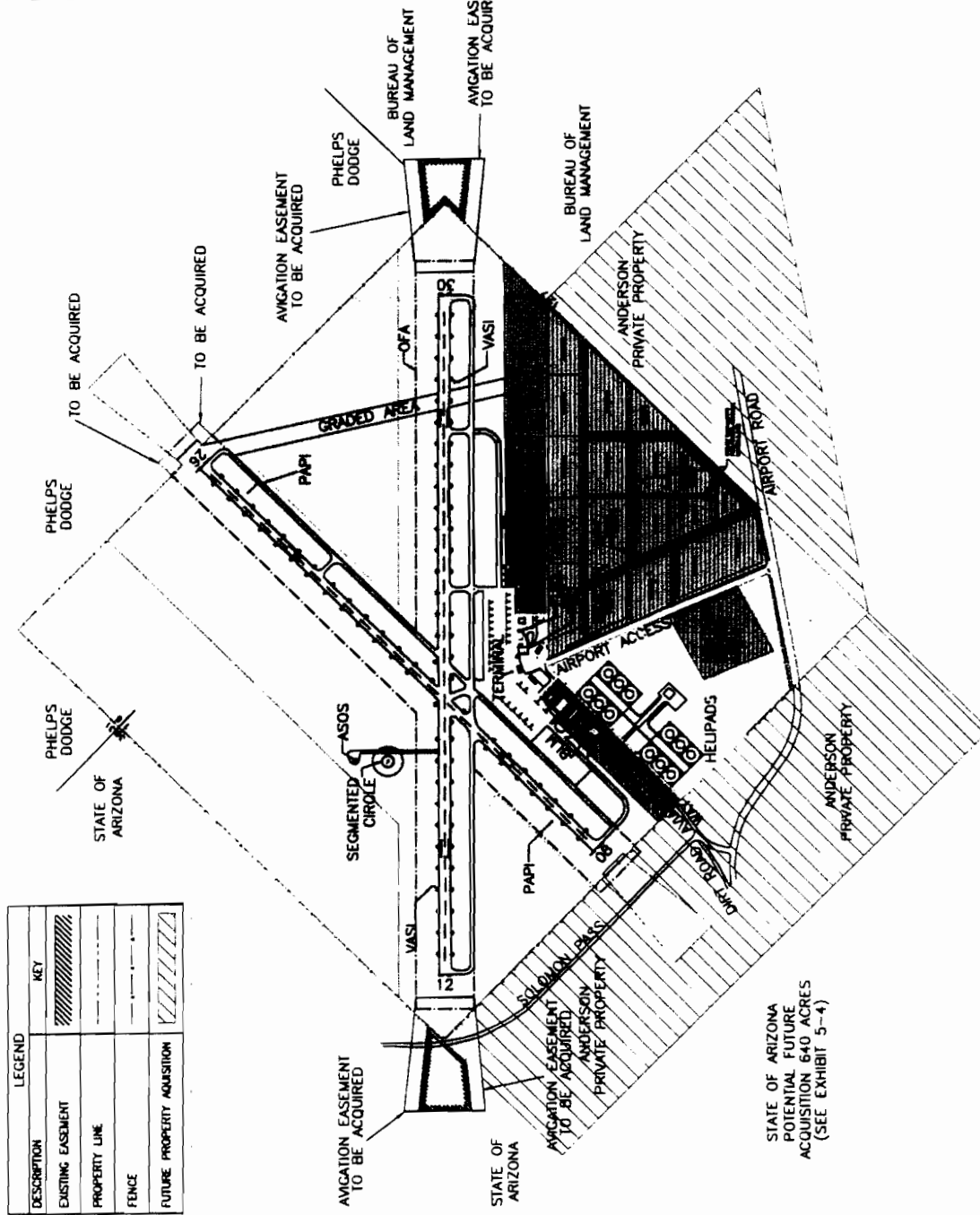
The highest priority use for airport land is present and future air operations. This category includes runways, taxiways, aprons, navigation aids, and their associated clearances. The boundary of the air operations land use is generally equivalent to the Building Restriction Line (BRL) which includes approximately 300 acres of existing airport property and existing aviation easements as well as proposed acquisitions (10 acres). The BRL is defined by:

- 780-foot wide area centered on Runway 12-30, protecting a 500 foot-wide primary surface and the 7:1 slope transitional surface to a height of 20 feet.
- 1300-foot wide area across Runway 8-26, protecting an existing 250 foot-wide primary surface, the 7:1 slope transitional surface to a height of 20 feet, and an additional area to the north in support of the City's Beyond 2020 development plans (see Chapter 5, Section 5.4 and Exhibit 5-4).
- Taxiway and taxilane object free areas
- Aircraft apron areas
- Line-of-sight critical area (also referred to as the Runway Visibility Zone)

The trapezoidal runway protection zones (RPZs) at the end of each runway are also a part of the airfield operations area. These RPZs should not contain buildings. However, some ancillary land uses other than air operations are permitted within the RPZ, provided they do not attract wildlife, are outside the runway object free area, and do not interfere with navigational aids. Automobile parking is discouraged, but permitted. Fuel storage, residences, and places of public assembly should not be located in the RPZ. The RPZs at Safford Regional Airport are clear with the exception of a roadway that traverses both Runway 12 end and Runway 8 end RPZs.

DESCRIPTION	LEGEND	KEY
EXISTING EASEMENT	---	---
PROPERTY LINE	---	---
FENCE	---	---
FUTURE PROPERTY ACQUISITION	---	---

LAND USE	LAND USE TABLE	KEY
AIRFIELD OPERATIONS AREA	(310 acres)	---
AVIATION RESERVE	(56 acres)	---
NON-AVIATION OR AVIATION RELATED DEVELOPMENT	(104 acres)	---
BUREAU OF LAND MANAGEMENT	(6 acres)	---
CORPORATE AND PRIVATE GENERAL AVIATION	(15 acres)	---
HELICOPTERS OPERATION AREA	(27 acres)	---
MILITARY	(10 acres)	---
OPEN	(90 acres)	---
TERMINAL AREA, FBI, AND SUPPORT FACILITIES	(6 acres)	---
COMMERCIAL INDUSTRIAL DEVELOPMENT	(78 acres)	---



* NON-AVIATION DEVELOPMENT WILL REQUIRE FIA APPROVAL



SAFFORD REGIONAL AIRPORT Master Plan Update

EXHIBIT 7-1 On-Airport Land Use Plan



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7.2.2 Helicopter Operations Area

The helicopter operations area boundary is generally defined by the existing public use helipad, adjacent future helicopter parking spaces, and protected helicopter approach airspace. This land use is identified separately from the airfield operations since the parcel is not contiguous to the airfield and to distinguish between the rotorcraft and fixed wing future development needs. The helicopter operations area land use totals approximately 27 acres.

7.2.3 Terminal Area, FBO, and Support Facilities

The terminal, FBO, and support facilities land use area is centrally located on the south side of the airport. This land use consists of approximately six (6) acres and includes the existing terminal building, location of future terminal building, terminal area parking, future airport access, fuel storage, and the FBO's two hangars, service building, and residence. While the FBO will generally remain in the same leased area, there are current plans to rebuild and expand the FBO facilities within this designated land use area.

7.2.4 Corporate and Private General Aviation (GA)

For the purpose of the land use analysis, corporate and private GA includes all of the existing and proposed hangar development which does not belong to the FBO or BLM, such as based aircraft hangars or future corporate hangars. Existing private GA hangars are located on the south side of the airport to the east and west of the terminal area. Future private GA hangar development is planned to the east of the existing terminal area where contiguous land is available for expansion. Locating this development in a contiguous area simplifies future taxilane development, utility expansion, and overall management of facilities by separating various airport activities. Airport property identified for corporate and private GA land use total approximately 15 acres.

7.2.5 BLM

BLM facilities are located in the southwest part of the airport just west of a row of private GA T-hangars and north of the helicopter operations area. This land use designation is dedicated for firefighting facilities under a lease between the City of Safford and BLM.

This BLM land use designation extends to the western boundary of the airport for a total of approximately eight (8) acres.

7.2.6 Military

A military lease totaling approximately ten (10) acres controls a portion of the south side of the airport between the helicopter operations area and the southwest boundary of the airport. While this area is not needed for airport development in the twenty-year planning period, consideration of airport needs beyond the planning period should be addressed in conjunction with any future lease negotiations. As previously shown in Chapter 5, Exhibit 5-4, 50-year Outlook, the military lease currently contained in this area is proposed for relocation to the northeast part of the airport.

7.2.7 Aviation Reserve

Undeveloped land provides an airport with flexibility to meet unforeseen needs and with expansion capability beyond the 20-year planning period. Although the primary master planning drawings have identified a small 14-acre parcel southeast of the proposed hangar development area as aviation reserve, the City's ultimate development plans beyond 2020 (see Chapter 5, Section 5.4) designate two more large parcels for aviation reserve totaling approximately 400 acres. It is anticipated that these aviation reserve areas will be consumed for development beyond 2020 as terminal area, FBO, GA, and support facility needs grow.

7.2.8 Aviation or Non-aviation Related Development

Undeveloped land on the north side of the airport beyond the airfield operations area is designated as aviation or non-aviation related development and totals approximately 104 acres. The City is interested in pursuing non-aviation industrial development on this parcel in the future. In the past, Section 16 requirements prohibited the use of Safford Regional Airport's property for any non-aviation purpose. However, recent Federal legislation revised some of the Section 16 requirements for the Airport. The legislation allows, with FAA approval, non-aviation development for those portions of the airport not necessary for aviation needs. The City of Safford and the Airport Authority must submit and obtain FAA review/approval on an application to release subject property for non-

aviation use and development. This area can serve economic development efforts and potentially improve the airport's future financial position. If the area remains designated as aviation use, potential development could include aircraft part manufacturers or air/ground cargo staging areas.

7.2.9 Commercial/Industrial Development

Additional undeveloped property south of the terminal area and east of the future airport access road is designated as commercial/industrial development since this area is in close proximity to the main road and adequately separated from the aviation development requiring runway access. However, as noted in Section 7.2.8, this proposed non-aviation development must be reviewed and approved by the FAA. The City is preparing an application to the FAA to "release" this property (totaling 78 acres) from its current "aviation use only" restriction.

7.2.10 Open

The "Open" land use represents remaining parcels of property not designated for other uses. There are three parcels with this designation, two of which are located in areas without existing or planned auto access. The third parcel is in the southwest section of the airport around the existing military lease area. The "Open" land use areas total approximately 90 acres.

7.3 LAND ACQUISITION AND CONTROL

Based on the aviation demand forecasts, Safford Regional Airport has sufficient land for proposed airport development during the planning period. However, the airport has insufficient control of the RPZs off both Runway 12 and 30 ends and the object free area (OFA) off both Runway 8 and 26 ends. Currently, the inner portion of the Runway 12-30 RPZ is controlled with an easement at each end. The easements are the size of the former RPZs for Runway 12-30 which were defined for small aircraft exclusively. These easements should be expanded to the boundary of the existing RPZs (for larger aircraft). Although Runway 8 and 26 end RPZs are owned in fee simple, four small segments (two on each end) of the runway's OFA are outside airport property. Per FAA guidelines, these areas should also be controlled in fee simple. As previously discussed in Chapter 5,

Section 5.4, additional land acquisition is necessary to protect for the City's ultimate (beyond 2020) airport development plans and to prevent incompatible development around the airport.

7.4 OFF-AIRPORT LAND USE

The major concerns for land use compatibility with airports are noise and airspace. In addition, activities near the airport should not emit smoke, produce glare, produce electromagnetic interference that could affect radio navigation and approach aids, nor attract wildlife, so that they do not interfere with aviation activity.

Off-airport land use planning seeks to maximize compatibility between airport activities and other land uses in the vicinity of the airport and minimize the impacts of aircraft activity on the surrounding community.

According to FAA Order 7400.2C, "When airport design standards are combined with appropriate state and local zoning ordinances, the resultant effect will: assure the lowest possible operational altitudes for aircraft; protect the economic investment in the airport; and promote safety in the areas affected by the airport by assuring, through proper development, land use most beneficial to the community."

Currently, Safford Regional Airport is surrounded by undeveloped land. This land, under the jurisdiction of Graham County, is held by four separate property owners to include Phelps Dodge, Bureau of Land Management (BLM), State of Arizona, and private property owners (the Anderson's).

Graham County has a planning and zoning commission. Although the County's current land use plan does not depict future residential development adjacent to the airport, the Anderson property owners previously submitted a rezoning request in order to develop their property along the southeast end of the airport with residences including mobile homes and high density residential development. To date, the Graham County Board of Supervisors has denied such rezoning.

It is the position of the City of Safford that it is essential to develop the area around the airport in a manner that will ensure compatible land use in consideration of the long term viability of the airport and to minimize future aircraft noise impacts to the

community as the airport grows. To that end, Safford will continue to discuss this land use with adjacent property owners and Graham County in a continuing effort to maintain compatible land use. Based on recent discussions, the City of Safford is considering the possible purchase of certain parcels and reserving them for long-term aviation and commercial/industrial development. The primary objective is to protect the airport from residential encroachment – a significant and ongoing problem for existing airports across the country. Residential encroachment results in noise complaints against the airport which conflicts with the FAA's mission to develop and maintain a safe, efficient, and environmentally compatible air transportation system. Further, residential encroachment places the most pressure on an airport over time to “close” or relocate. Therefore, land acquisition around an airport may be the best alternative to ensure compatible land use development when other measures are unsuccessful or more costly.

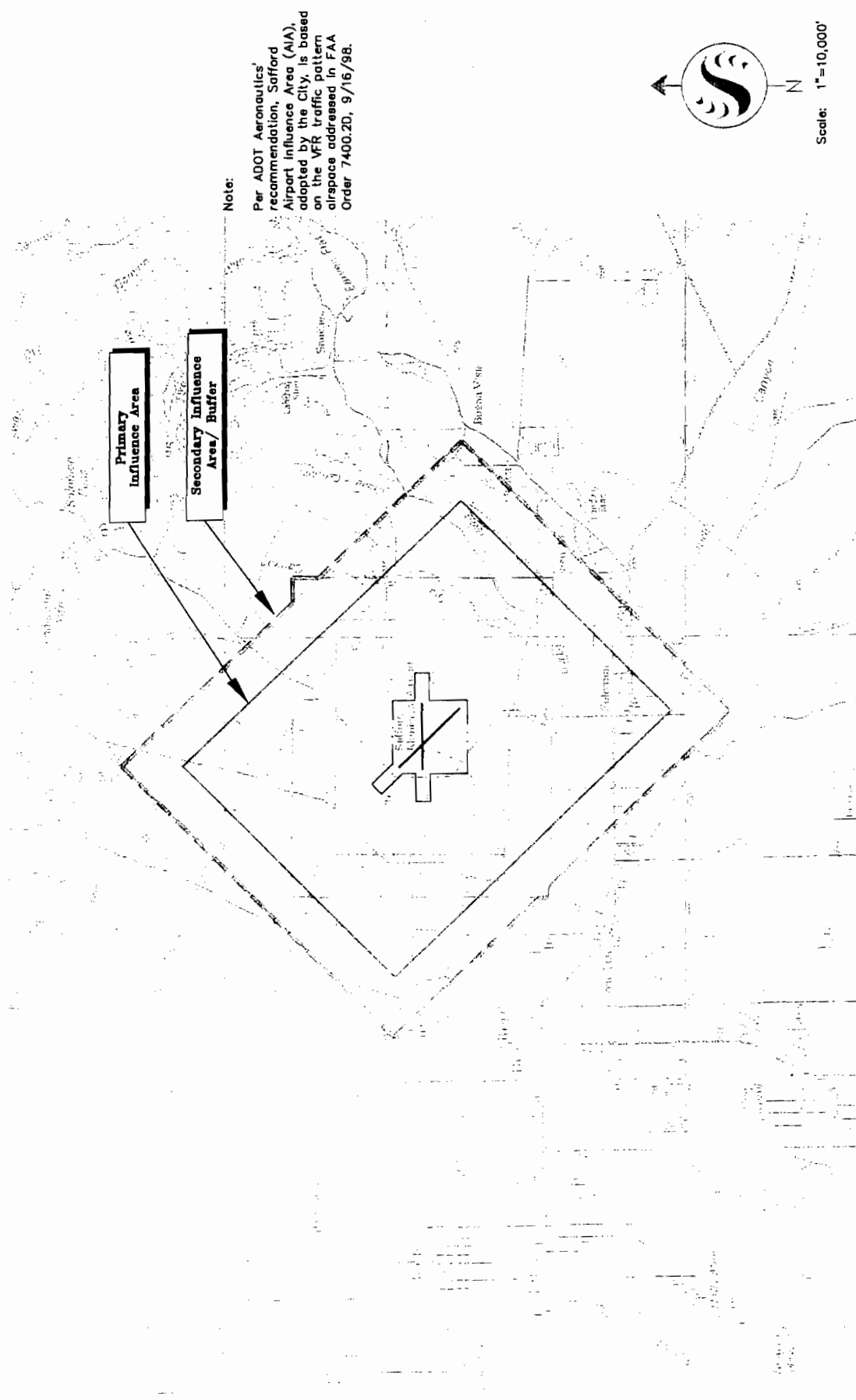
It is the intent of the City to pursue funding from Arizona Department of Transportation (ADOT), Aeronautics Division, for the purchase of property adjacent to the airport to assure compatible land use development.

Additional discussion of off-airport land use is presented in this section to specifically address the following topics:

- Airspace
- Airport Influence Area
- Noise

7.4.1 Airspace

The airspace drawing in the Airport Layout Plan drawing set (see Chapter 8) indicates the sloped imaginary approach, departure, and transitional surfaces that define the airspace that should remain unobstructed by structures, vegetation, or terrain. Further, consideration of any future development plans adjacent to the airport should include the submittal of an FAA Form 7460-1, Notice of Proposed Construction, to allow the FAA the opportunity to review its potential adverse impact on the airspace surrounding the airport. A copy of FAA Form 7460-1 is included in Appendix G.



SAFFORD REGIONAL AIRPORT
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EXHIBIT 7-2
Airport Influence Area

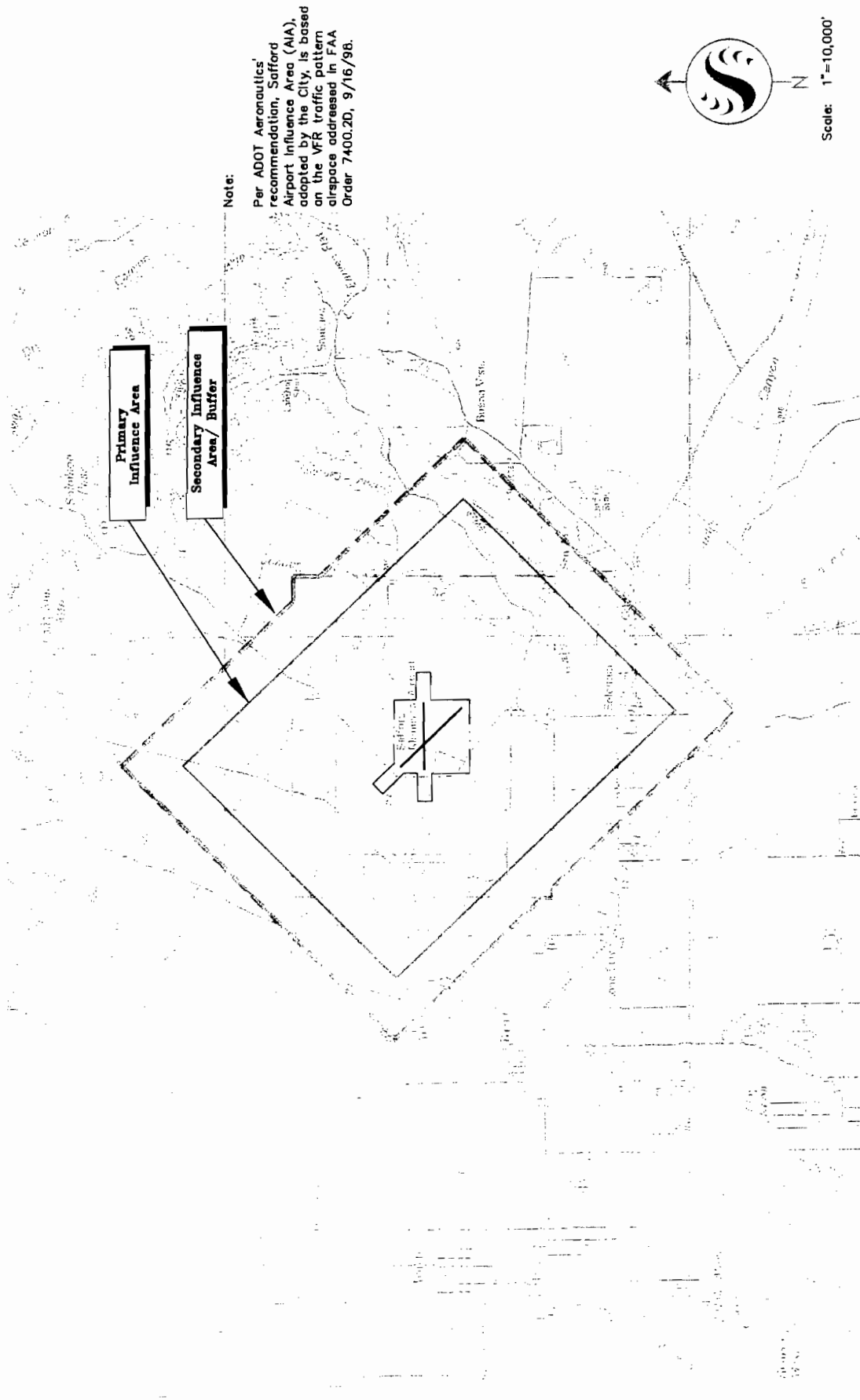
7.4.2 Airport Influence Area

The City of Safford has continued to grow since the last airport master plan. Fortunately, the Safford Regional Airport is located four miles northeast of the City so residential encroachment adjacent to the airport has not occurred. In order to provide continued protection of the airport's viability, the City of Safford developed and adopted an Airport Influence Area (AIA) under House Bill 2491 (see Appendix H), effective October 1, 1997, regarding the same. The legislation gave airport owners the ability to designate an area around the airport which is exposed to noise and overflights as determined by the airport owner or operator. Arizona Department of Transportation, Aeronautics Division, recommended that this area be based on the airport traffic patterns as defined in FAA guidance. Thus, the City of Safford adopted an AIA which takes into account both existing and ultimate aircraft operations at the airport. This AIA is shown in **Exhibit 7-2**. Solid lines represent the primary influence area boundary; dashed lines represent the secondary (buffer) area boundary. As shown, primary Runway 12-30's Influence Area is larger than crosswind Runway 8-26's Influence Area, but small corner parts of Runway 8-26's Influence Area do extend beyond Runway 12-30's Influence Area. While the AIA does not extend over the core of the City of Safford, it does extend over the community of Solomon.

The AIA was developed and adopted in the early stages of the master planning process before the aviation demand forecasts were prepared to identify the future aircraft fleet mix and operations. However, the previous master plan as well as a preliminary assessment of aviation demand guided the AIA process. This effort resulted in the establishment of a set of guidelines and assumptions under which the City could define and adopt an AIA. As the master plan progressed, these guidelines and assumptions, listed below, were validated.

7.4.3 Noise

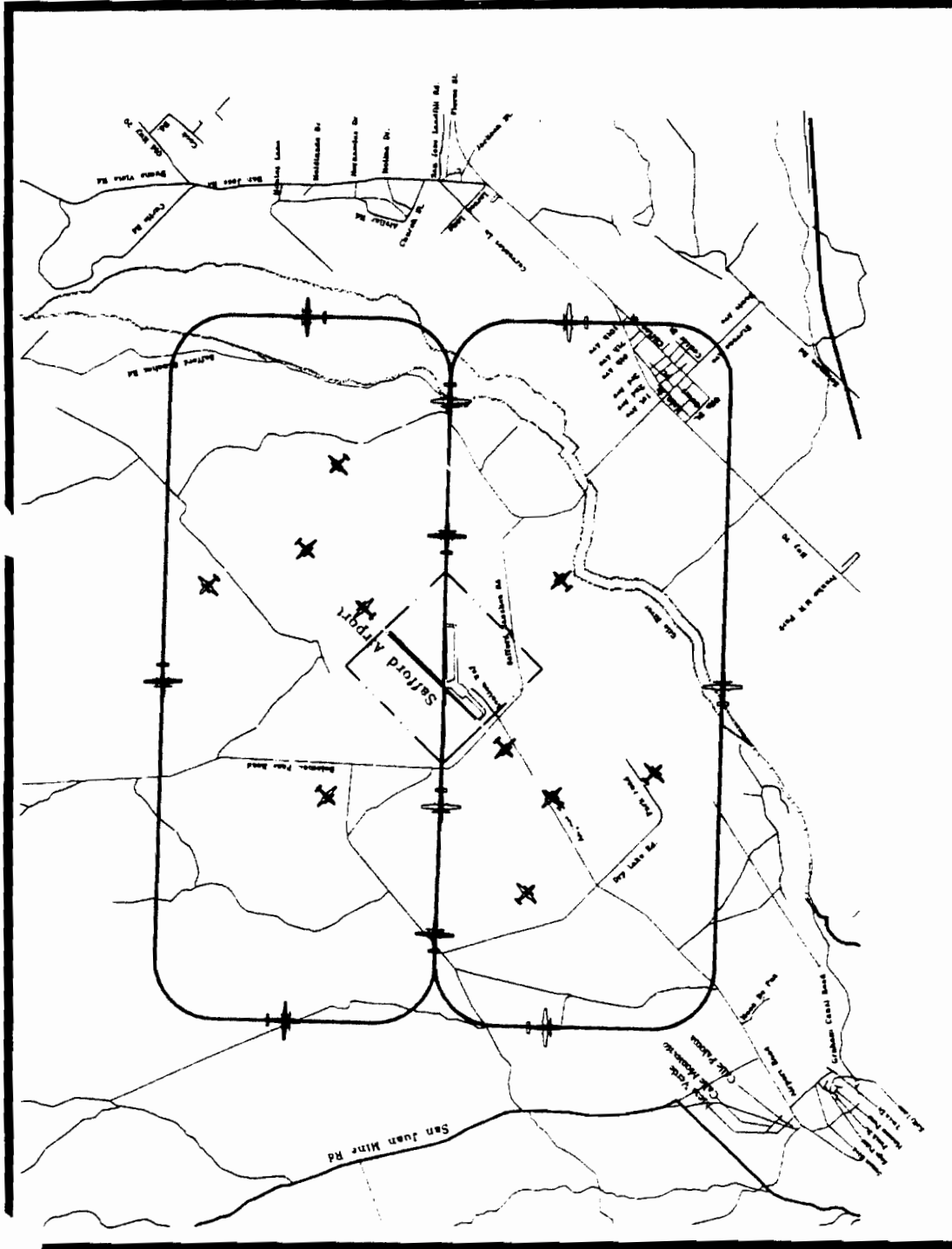
As described earlier, the primary cause of incompatibility between an airport and the surrounding community is aircraft noise. Noise-sensitive development often surrounds an airport before the problem is recognized. Noise is a major source of environmental pollution and represents a threat to the serenity and quality of life for those individuals exposed to it.



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SAFFORD REGIONAL AIRPORT
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EXHIBIT 7-2
Airport Influence Area



Note:
Traffic pattern based on
future aircraft activity
identified in Airport Master
Plan, 2000.

Source:
Street map provided by
Graham County.



Scale: 1"=6,000'

SAFFORD REGIONAL AIRPORT
Master Plan Update

Exhibit 7-2
Airport Influence Area



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The degree of which people will suffer from the nuisance of aircraft noise varies depending on their activities at any given time. While people are less disturbed by noise when they are driving, working, or shopping, they are more disturbed when they are at home. Many residents living near airports already complain that aircraft noise is disturbing regardless of whether their home is inside what is considered an incompatible “noise contour” around an airport. While FAA has published noise compatibility guidelines, they explicitly state that determination of noise compatibility and regulation of land use are purely local responsibilities. There are variations in human tolerance to aircraft noise. For example, it may be tolerated more by people living in a noisier urban environment than by people living in rural communities.

Methodology

To define the effect of aircraft-generated noise on a community, an effective and appropriate measure of cumulative noise exposure is needed. The Federal Aviation Administration Integrated Noise Model (INM 5.1) was used to measure noise in this study. The Integrated Noise Model, over a 24-hour period, accounts for separate aircraft flying along flight tracks identified as straight-line or curved segments. These flight tracks are coupled with other data relating to noise, slant range, and engine thrust for each distinct aircraft type in the fleet mix to provide a cumulative measure of daily noise, with a penalty for nighttime aircraft activity (Day-Night Sound Level [DNL] metric). This methodology is consistent with existing measurement technologies. This methodology has been adopted by the FAA in response to the requirements of the Airport Safety and Noise Abatement Act of 1979 for a standardized noise system and is also recognized by the Environmental Protection Agency (EPA), and the Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure.

Noise is expressed as the Day-Night Average Sound Level, or DNL (formerly referred to as Ldn). DNL is the national standard accepted by the FAA for describing cumulative noise exposure and identifying noise/land use compatibility issues. DNL is the average noise level in decibels (dB) over a full 24-hour period with a 10-decibel (dB) penalty applied to noise events occurring at night (10:00 p.m. to 7:00 a.m.). DNL contours do not represent actual noise conditions present on any specific day or absolute boundaries of acceptability in personal response to noise.

Application of the DNL measurement methodology produces a series of noise level contour lines (DNL contours) which depict noise levels. These are superimposed on a map of the airport and its environs. Contour lines are a summation of all the noise produced by aircraft operations for a year. The DNL levels for Safford Regional Airport use forecast information pertaining to daily aircraft operations, and actual runway utilization, flight track utilization, and aircraft flight track profiles.

DNL mapping is primarily a planning tool. Noise exposure contours should be viewed as a means for comparing average noise impacts, not precisely defining them relative to a specific location at a specific time.

Integrated Noise Model (INM 5.1) Input Data

Noise modeling for the Safford Regional Airport used the following type of information as input.

- Existing (1997) and forecast operations (through 2020)
- Runway utilization by departure-arrival track usage
- Day/night operations split
- Touch-n-go (T&G) operations
- Flight tracks for arrivals, departures, and T&G's
- Airport Elevation
- Mean Maximum Temperature

Please see Appendix I for details of the airport noise input.

Since Safford does not have an air traffic control tower, some operational information used for the INM Model had to be estimated. Estimates were prepared using input from FAA records and the FBO (on-site airport management).

Noise Modeling Output

For the purpose of this study, a set of four noise contours were modeled to include the 55, 60, 65, and 75 DNL. These contours were modeled for the base year (1997) and the end of the planning period (2020). The Off-Airport Land Use/Noise Maps, **Exhibits 7-3**

and 7-4, illustrate the 1997 and 2020 noise contours, respectively. The existing off-airport land use served as the base sheet for the contours to provide a better gauge of the potential noise impacts. As shown, both the 75 and 65 DNL contours are contained on airport property with the exception of the west end of the airport near the helicopter operations area. The 60 and 55 DNL contours extend well outside the airport boundary for both the existing and 2020 conditions.

While FAA guidance states that all land uses are compatible with levels below 65 DNL, it is important to reiterate that this does not imply that the population beyond the 65 DNL contour will not experience noise. In fact, there are many airports receiving significant noise complaints and airport opposition from a population well outside the 65 DNL. Further, many of the residents located adjacent to these airports were not complaining until airport activity grew – typically synonymous with community growth. Thus, those land uses that are the most sensitive to noise should be carefully sited with long-term growth in mind. Such noise-sensitive land uses include residential areas, schools, hospitals, churches, and auditoriums. The firefighting operations based out of the Safford Regional Airport, while not regular throughout the year, can impose significant noise exposure well outside the airport boundary and for a number of days until a fire is controlled or extinguished.

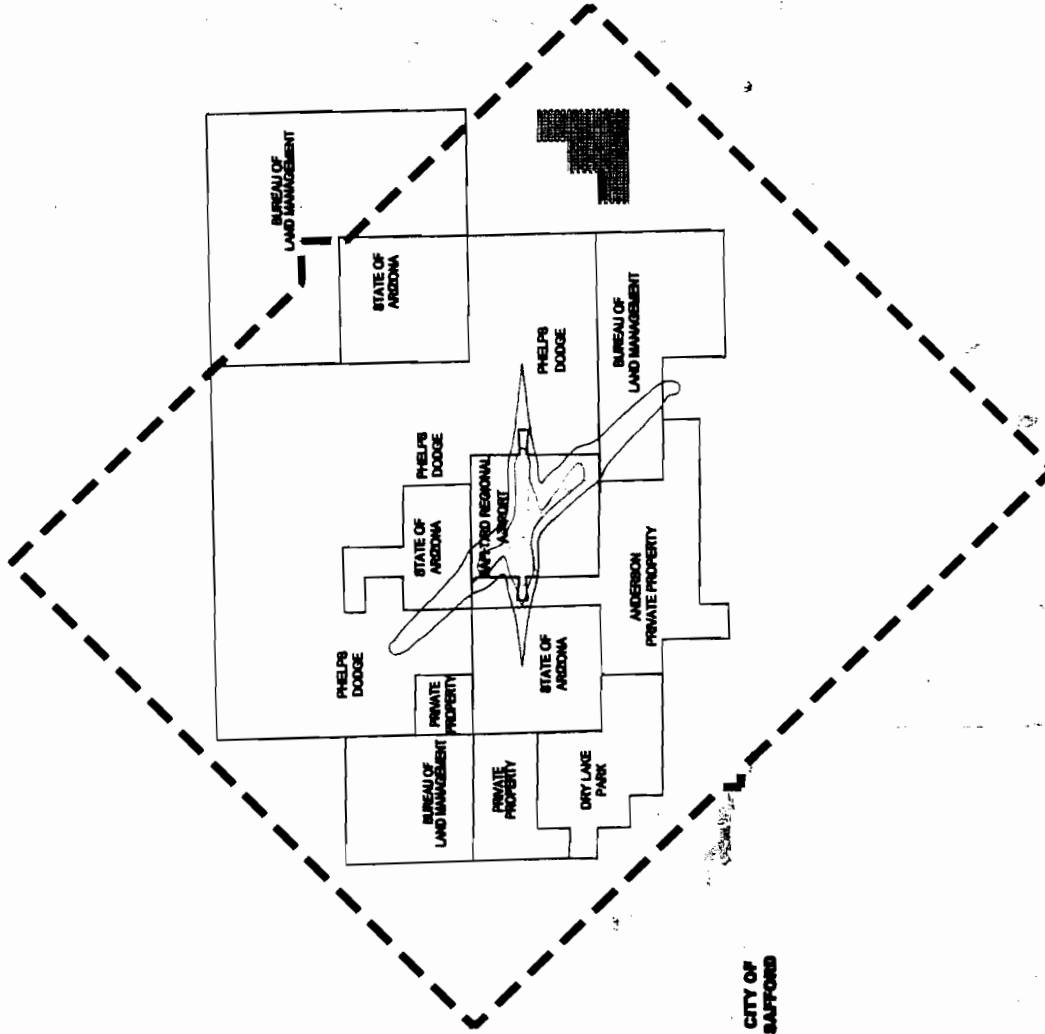
7.5 RECOMMENDATIONS

Safford Regional Airport is in a fortunate and rare position -- the airport's surrounding environs are currently compatible with the airport's existing and forecast activity. However, maintaining this compatibility requires continued efforts. As previously stated, the City of Safford's position is to protect the airport environs and ensure all development adjacent to the airport is compatible with airport operations. This Plan recommends that the City and County coordinate all future land use planning efforts with respect to the airport and its environs. This effort will serve to maintain the integrity of the airport, protect the large investment in the airport, and minimize the growing community's exposure to noise from the airport. Further, this Plan recommends that Graham County recognize and take into consideration the City-adopted AIA in future planning efforts.

DESCRIPTION	LEGEND	KEY
55 DNL NOISE CONTOUR		
60 DNL NOISE CONTOUR		
65 DNL NOISE CONTOUR		
75 DNL NOISE CONTOUR		
AIRPORT INFLUENCE AREA		
LAND USE PROPERTY BOUNDARY		
LAND USE AGRICULTURAL ZONE		
LAND USE UNLIMITED MANUFACTURING ZONE		

Notes:

1. Airport Influence Area (AIA) adopted by City of Safford.
2. Off-Airport Land Use depicted within AIA only. Land use designation provided by Graham County and City of Safford.



Not to Scale

SAFFORD REGIONAL AIRPORT
Master Plan Update

EXHIBIT 7-3
Off-Airport Land Use/1997 Noise Map/AIA

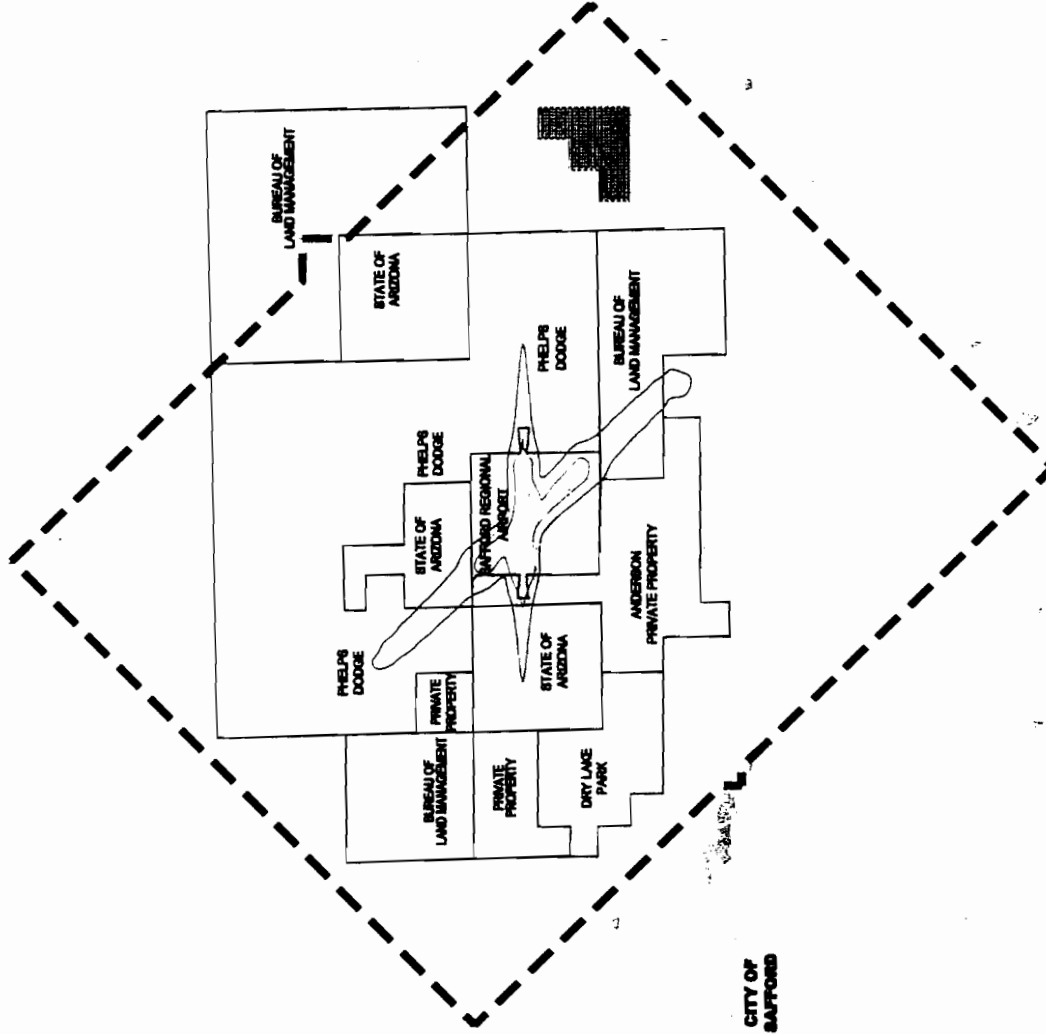


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DESCRIPTION	LEGEND	KEY
55 DNL NOISE CONTOUR		
60 DNL NOISE CONTOUR		
65 DNL NOISE CONTOUR		
75 DNL NOISE CONTOUR		
AIRPORT INFLUENCE AREA		
LAND USE PROPERTY BOUNDARY		
LAND USE AGRICULTURAL ZONE		
LAND USE UNLIMITED MANUFACTURING ZONE		

Notes:

1. Airport Influence Area (AIA) adopted by City of Safford.
2. Off-Airport Land Use depicted within AIA only. Land use designation provided by Graham County and City of Safford.



Not to Scale

SAFFORD REGIONAL AIRPORT
Master Plan Update

EXHIBIT 7-4
Off-Airport Land Use/2020 Noise Map/AIA

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Safford
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Airport Plans 

8.1 INTRODUCTION

A set of airport layout plans is prepared to graphically depict the proposed improvements for the Safford Regional Airport. These drawings, commonly referred to as the Airport Layout Plan (ALP) set, provide the physical details of the long-term development plan. Chapter 9, Implementation, identifies the phasing of this development. Projects eligible to receive federal funding under the Airport Improvement Program (AIP) must be shown on an approved Airport Layout Plan in order to qualify for assistance.

The primary drawing of the Plan set is the Airport Layout Plan (ALP) sheet, which is the overall development plan for the airport, showing both existing and proposed facilities. Other drawings in the set show existing and future airport conditions in terms of airspace, land use, and property ownership.

The ALP set is an important tool for airport development. All ALP set drawings should be reviewed and revised, as appropriate, upon completion of airport improvement projects. Each ALP set submitted for FAA review should include a completed ALP checklist. A reduced version of the ALP set is included at the end of this chapter.

Drawings developed in the ALP set for Safford Regional Airport include the following:

- Title Sheet and Index
- Airport Layout Plan
- Terminal Area Plan
- Airspace Plan/Part 77
- Approach Plan and Profiles
- On-Airport Land Use Plan
- Off-Airport Land Use Plan /Noise Contour Map
- Airport Property Map

A brief description of the purpose of each drawing follows.

8.2 TITLE SHEET AND INDEX

The Title Sheet and Index serve as an introduction to the ALP set of drawings. This sheet outlines the title and exhibit number of each drawing within the set.

8.3 AIRPORT LAYOUT PLAN

Safford's Airport Layout Plan reflects all projects recommended in the Master Plan Update through the year 2020 to include relocation of the airport access roadway, a new terminal building, land acquisition, helicopter parking development, taxiway and taxilane improvements, and additional hangar development.

The ALP is incomplete without several other required pieces of information related to the drawings. The Airport Data Table, Runway Data Table, All-Weather Wind Rose, and the Legend are all included on the ALP. Much of this data is illustrated directly on the drawing. This information is given for the existing and future conditions.

The Airport Data Table includes information related to the airport overall such as airport elevation, airport reference point (ARP) coordinates, mean maximum daily temperature, and airport reference code. The airport reference code (ARC) is defined in FAA AC 150/5300-13, Airport Design, as a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to use the airport. The designation "B-II" indicates that aircraft using Safford Regional Airport are in Approach Category B, and Airplane Design Group II. Approach Category relates to aircraft approach speed, and Design Group relates to aircraft wingspan.

The Runway Data Table presents the information for each runway such as runway end elevations, approach category, aircraft design group, runway dimensions, runway surface and pavement strength, runway instrumentation, runway lighting and marking, approach aids, and runway safety area dimensions.

The all-weather wind rose, also shown on the ALP sheet, covers wind conditions under all weather conditions. The all-weather wind rose indicates by compass sector the frequencies at which winds in a given velocity range occur. Runway orientation is superimposed on the wind rose and the percentage of wind coverage for the all-weather

condition is provided. For Safford, wind coverage for each runway is in excess of 99 percent at 12 mph.

A vicinity map and location map are also shown on the ALP sheet. The location map shows the general geographic location of Safford and the Safford Regional Airport relative to other cities and towns in the State of Arizona. The vicinity map shows the location of the airport in relation to the City of Safford.

8.4 TERMINAL AREA PLAN

The Terminal Area Plan represents a large scale plan view of facilities such as the terminal building, aircraft apron, hanger development, auto parking, and future non-aviation industrial park. This plan serves to provide additional detail on the terminal area beyond that included on the ALP sheet including building elevations.

8.5 AIRSPACE PLAN

Ideally, airports should be located so that the surrounding airspace is free and clear of obstructions that could be hazardous to aircraft. It is necessary to keep the surrounding airspace free from obstacles by preventing, where possible, the development and growth of obstructions that could interfere with the navigation of aircraft.

The regulations for the protection of airspace in the vicinity of airports are established by the definition of a set of "imaginary surfaces," penetration of which is an obstruction affecting navigable airspace. The geometry of these imaginary surfaces is governed by the regulations set forth in Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace. The Airspace Plan depicts the airspace for Safford Regional Airport, showing imaginary surfaces described in FAR Part 77. It is important to illustrate the airspace for the ultimate airport development condition in order to prevent introduction of obstructions that would inhibit realization of the plan.

The principal imaginary surfaces shown in the airspace plan are:

- Primary Surface
- Approach Surface
- Horizontal Surface
- Transitional Surface
- Conical Surface

8.5.1 Primary Surface

The primary surface is a surface longitudinally centered on a runway. When the runway has a prepared hard surface, the primary surface extends 200 feet beyond each end of the runway. Existing and future primary Runway 12-30 is a runway with a non-precision approach and a primary surface width of 500 feet. Crosswind Runway 8-26 is a visual runway serving small aircraft with a primary surface of 250 feet.

8.5.2 Approach Surface

The approach surface is a surface longitudinally centered on the extended runway centerline, which extends outward and upward from each end of the primary surface. Approach slope and dimensions are determined for each runway end based on the type of approach.

Runway 12-30 is categorized as a non-precision runway and requires a 34:1 approach slope out a horizontal length of 10,000 feet. The approach surface measures 500 feet at the inner edge, where it matches the primary surface for this runway. Runway 8-26 is a visual runway with a 20:1 approach slope out with a horizontal length of 5,000 feet. The approach surface measures 250 feet at the inner edge, where it matches the primary surface for this runway.

8.5.3 Horizontal Surface

The horizontal surface is a horizontal plane 150 feet above the established airport elevation. At the Safford Regional Airport, the elevation is approximately 3,176 feet MSL so the horizontal surface is at an elevation of 3,326 feet. The plan dimensions of the horizontal surface are set forth by arcs of specified dimensions from the end of the

primary surface for each runway. A tangent line connects the arcs. These arcs correspond with the approach surface length described earlier.

8.5.4 Transitional Surface

The transitional surface is an inclined plane with a slope of 7:1 extending upward and outward from the primary and approach surfaces, terminating at the point where they intersect with the horizontal surface or any other surface where more critical restrictions are intercepted.

8.5.5 Conical Surface

The conical surface is an inclined plane extending upward and outward from the outer boundary of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet. The top of the conical surface is at a height of 350 feet above the airport elevation, which is 3,526 feet for Safford Regional.

8.6 APPROACH PLAN AND PROFILES

The Approach Plan and Profiles Drawing provides a detailed look at the physical features near each runway's extended centerline including topography, roads, obstructions and incompatible objects in these critical areas. A table on each runway's plan and profile drawing summarizes the existing obstructions (road, fence, brush) to the airspace and their disposition. For Safford, the primary concern is the roadway in the approaches to Runway 12 end and Runway 8 end which penetrate between three and four feet of the protected airspace.

8.7 ON-AIRPORT LAND USE PLAN

The On-Airport Land Use Plan prepared for Safford reflects recommended land uses in support of the preferred development plan. The ten (10) land use designations, as described earlier in Chapter 7, include airfield operations area; helicopter operations area; terminal area, FBO, and support facilities; corporate and private GA; BLM; military; non-aviation or aviation reserve; aviation-related development; commercial/industrial development; and open area. These land uses are represented by various hatches on Sheet 7 of the drawing set.

8.8 OFF AIRPORT LAND USE PLAN AND NOISE CONTOUR MAP

The Off-Airport Land Use Plan/Noise Contour Maps illustrate the boundaries of the airport property, the adjacent land owners, designated off-airport land use as designated by the controlling jurisdiction, and noise contours for the base year (1997) and end of the planning period (2020). Noise contours presented include the 55, 60, 65, and 75 DNL contours. Chapter 7, Land Use Analysis, presents the details of the 1997 and 2020 drawings.

8.9 AIRPORT PROPERTY MAP

The Airport Property Map is the last drawing of the ALP set. This drawing is provided to show details on how the various parcels of land within the boundaries of the airport were acquired. All of the documents recording the land acquisitions are described in a table as well as the type of instrument used to acquire the property. The Property Map also reflects future acquisitions, easements, and/ or use agreements. For Safford, land acquisition is required to accommodate a portion of both RPZ's on Runway 12-30 as well as a small portion of the object free area (OFA) off both ends of Runway 8-26. Further, a large parcel (1/4 section) along the west boundary of the airport is proposed for acquisition during the planning period. This parcel acquisition will accommodate the City's development plans beyond 2020 (see Chapter 5, Exhibit 5-4) and ensure compatible land use development.

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SAFFORD

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ONAL AIRPORT

ARIZONA

ER PLAN UPDATE

LAYOUT PLANS

3-04-0031-09

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LAYOUT PLAN

AREA PLAN

IRSPACE PLAN

12-30 APPROACH PLAN AND PROFILE

8-26 APPROACH PLAN AND PROFILE

ORT LAND USE PLAN

ORT LAND USE/1997 NOISE MAP

ORT LAND USE/2020 NOISE MAP

PROPERTY MAP



Stantec

Stantec Consulting Inc.
9211 South 48th Street
Phoenix AZ, U.S.A.
85044
Tel: 602.438.2200
Fax: 602.431.3562
www.stantec.com

1. Master Plan and ALP Update	AM	WR	00.05.31
Revision	By	Appd	Date
File Name: 1aad_cover.dwg	AM/TS	AM	00.05.31
	Desn.	Desgn.	Desgn. Date

Title

COVER SHEET
SAFFORD REGIONAL AIRPORT
SAFFORD, ARIZONA

Project No.

81440007

Drawing No.

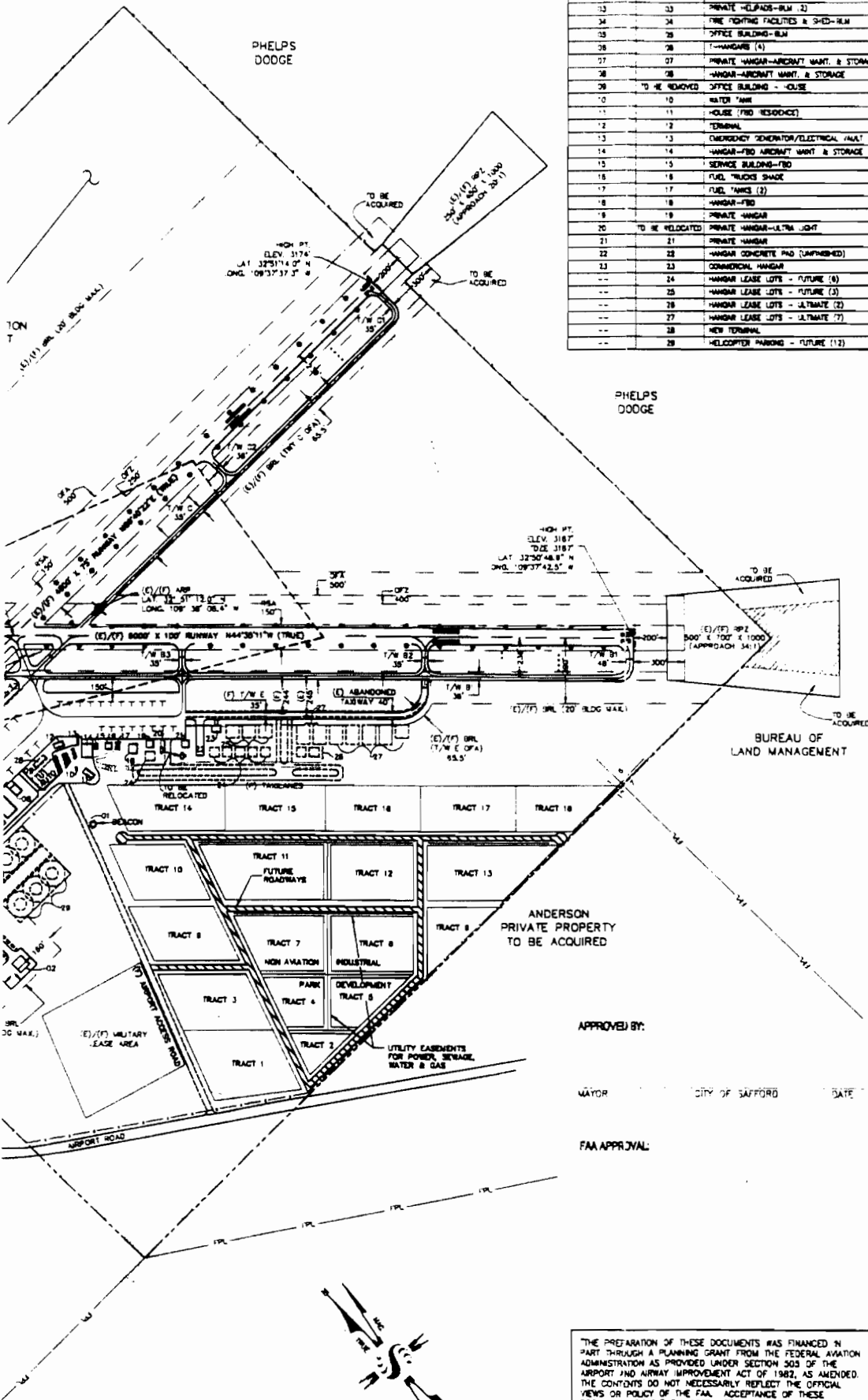
Sheet

Revision

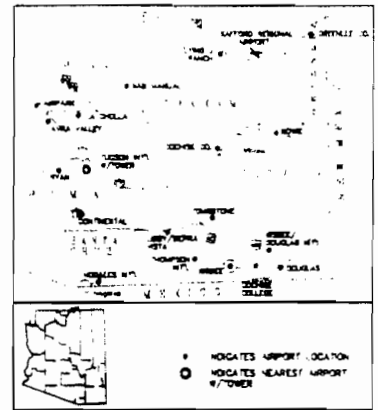
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1 of 10

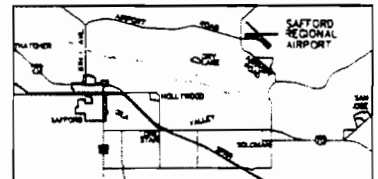
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EXISTING (E)	FUTURE (F)	DESCRIPTION
1	1	ASPH. EQUIPMENT STORAGE
2	2	HELIPAD
3	3	PRIVATE HELIPAD - RUN (2)
4	4	FIRE FIGHTING FACILITIES & SHED - RUN
5	5	OFFICE BUILDING - RUN
6	6	1 - HANGAR (4)
7	7	PRIVATE HANGAR - AIRCRAFT MAINT. & STORAGE
8	8	HANGAR - AIRCRAFT MAINT. & STORAGE
9	9	TO BE REMOVED OFFICE BUILDING - HOUSE
10	10	WATER TANK
11	11	HOUSE (780 RESIDENCE)
12	12	TERMINAL
13	13	EMERGENCY GENERATOR/ELECTRICAL HAUL
14	14	HANGAR - FBO AIRCRAFT MAINT. & STORAGE
15	15	SERVICE BUILDING - FBO
16	16	FUEL TANKS (2)
17	17	FUEL TANKS (2)
18	18	HANGAR - FBO
19	19	PRIVATE HANGAR
20	20	TO BE RELOCATED PRIVATE HANGAR - ULTRA LIGHT
21	21	PRIVATE HANGAR
22	22	HANGAR CONCRETE PAD (UNFINISHED)
23	23	COMMERCIAL HANGAR
24	24	HANGAR LEASE LOTS - FUTURE (8)
25	25	HANGAR LEASE LOTS - FUTURE (3)
26	26	HANGAR LEASE LOTS - ULTIMATE (2)
27	27	HANGAR LEASE LOTS - ULTIMATE (7)
28	28	NEW TERMINAL
29	29	HELICOPTER PARKING - FUTURE (12)



AIRPORT LOCATION MAP



VICINITY MAP

AIRPORT DATA TABLE			
AIRPORT: SAFFORD REGIONAL AIRPORT (SAD)		F 28 C/T 1 S	
RANGE AND TOWNSHIP: 30 N 10 W		T 1 S	
COUNTY: COCHISE		CITY OF SAFFORD	
OWNER: SA		CITY OF SAFFORD	
DATA ELEMENTS	EXISTING (E)	FUTURE (F)	
AIRPORT MPAS CATEGORY	CA	SAME	
DESIGN AIRCRAFT	MULTI-ENGINE	SAME	
AIRPORT REFERENCE CODE	B-I	SAME	
AIRPORT ELEVATION (FEET/MSL)	3176	SAME	
MEAN MAXIMUM TEMPERATURE (FAHRENHEIT/HOTTEST MONTH)	100.3 F	SAME	
AIRPORT REFERENCE POINT (AMP)	32°31'12.0" N	SAME	
	109°38'08.4" W	SAME	
AIRPORT & TERMINAL HAZARDS (ON- AND OFF-AIRPORT)	SEASON	SAME	
INSTRUMENT APPROACH TYPES (GPS, VOR, ILS, ETC.)	GPS, VOR	SAME	

GENERAL NOTES

- NORTH AMERICAN DATUM (NAD 83) USED FOR ALL LAT/LONG IDENTIFICATIONS.
- THE BUILDING RESTRICTION LINE (BRL) IS ESTABLISHED BASED ON 100 FT CLEARANCE FOR A 70-FT HIGH OBJECT, AIRWAY OF A RUNWAY VISIBILITY ZONE, AND APPROX. FENCE.
- THERE ARE NO OFF PENETRATIONS.
- BASE MAP AND CONTOUR DATA FROM PREVIOUS AIRPORT LAYOUT PLAN (1983). UPDATED INFORMATION PROVIDED BY CITY OF SAFFORD AND ON-SITE INVENTORY.
- RUNWAY 12-30 HAS REELS AT EACH RUNWAY END. HOWEVER, THEY HAVE BEEN DEACTIVATED BY THE FAA.
- AIRPORT DEVELOPMENT IDENTIFIED FOR THE PLANNING PERIOD IS REFERRED TO AS FUTURE (F) DEVELOPMENT VERSUS ULTIMATE (U), WHICH REFERS TO DEVELOPMENT PROJECTED BEYOND THE PLANNING PERIOD.
- SEE THE 1999 SAFFORD REGIONAL AIRPORT MASTER PLAN'S "10 YEAR OUTLOOK" FOR ADDITIONAL DETAILS ON DEVELOPMENT BEYOND THE YEAR 2020 INCLUDING THE RELOCATION AND EXTENSION OF FUTURE RUNWAY 8-26 TO THE NORTH. THE PROPOSED RUNWAY RELOCATION ANTICIPATES INSTRUMENT APPROACH VISIBILITY MINIMUMS AS LOW AS 3/4 MILE COUPLED WITH REGULAR C-4 AIRCRAFT OPERATIONS. RUNWAY 12-30 WOULD BECOME THE SECONDARY/CROSSING RUNWAY.

APPROVED BY:

MAYOR CITY OF SAFFORD DATE

FAA APPROVAL:



Stantec

Stantec Consulting Inc.
8211 South 48th Street
Phoenix, AZ 85044
Tel: 602.438.2200
Fax: 602.431.9562
www.stantec.com

1 MASTER PLAN AND ALP UPDATE	AM	WR	00.05.31
Revision	By	Appd.	Date
File Name: 2 sad_alp.dwg	TS/AM	AM	00.05.31
	Desn	Sign.	Sign.

AIRPORT LAYOUT PLAN
SAFFORD REGIONAL AIRPORT
SAFFORD, ARIZONA

Project No.	Scale
81440007	1"=400'
Drawing No.	Sheet
	Revision

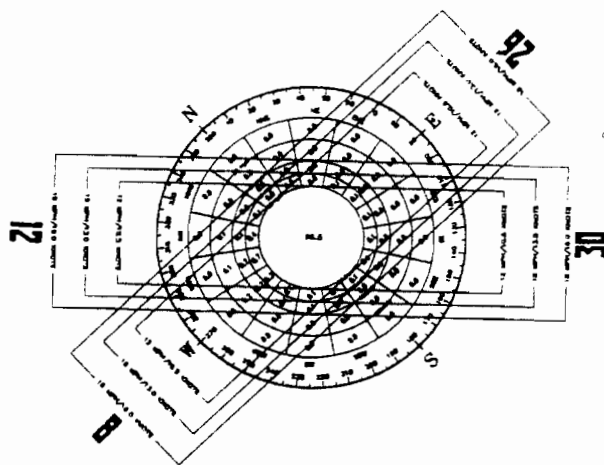
THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 503 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

MAGNETIC DECLINATION = 11°27.1'E (1999)
ANNUAL RATE OF CHANGE = 1.0"W
SOURCE: NOAA 1999

RUNWAY DATA TABLE				
DATA ELEMENTS	Rwy 12/30		Rwy 30/28	
	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)
RUNWAY CATEGORY/DESIGN GROUP CODE	B-1	SAFELY	B-1	SAFELY
RUNWAY ADJUSTMENT	148°51'55" / 128°51'55"	148°50'55" / 128°50'55"	101°07'18" / 281°07'18"	101°04'28" / 280°44'28"
RUNWAY BEARING (TRUE)	N 44°18'11" W	SAFELY	N 38°40'22" E	SAFELY
UNDEVELOPED RUNWAY ELEVATION (MSL)	3183/3187	SAFELY	3156/3174	SAFELY
WIND COVERAGE (W)	12 MPH 99.35	SAFELY	99.85	SAFELY
	15 MPH 99.75	SAFELY	100.05	SAFELY
	18 MPH 100.05	SAFELY	100.05	SAFELY
RUNWAY DIMENSIONS	WIDTH 100	SAFELY	75	SAFELY
	LENGTH 6000	SAFELY	4800	SAFELY
RUNWAY INSTRUMENTATION	HP/HP	SAFELY	RECAL/VISUAL	SAFELY
APPROACH SLOPE	34:1	SAFELY	20:1	SAFELY
APPROACH VISIBILITY MINIMUMS	1 MILE	SAFELY	3 MILES	SAFELY
THRESHOLD DISPLACEMENT	NONE	SAFELY	NONE	SAFELY
RUNWAY STOPWAY	WIDTH NONE	SAFELY	WIDTH NONE	SAFELY
	LENGTH NONE	SAFELY	LENGTH NONE	SAFELY
RUNWAY SAFETY AREA (RSA)	DIMENSIONS 150' X 600'	SAFELY	150' X 540'	SAFELY
	LENGTH BEYOND RUNWAY END 300'	SAFELY	300'	SAFELY
OBSTACLE FREE AREA	DIMENSIONS 300' X 600'	SAFELY	300' X 540'	SAFELY
	LENGTH BEYOND RUNWAY END 300'	SAFELY	300'	SAFELY
OBSTACLE FREE ZONE	DIMENSIONS 400' X 600'	SAFELY	250' X 5200'	SAFELY
	LENGTH BEYOND RUNWAY END 200'	SAFELY	200'	SAFELY
TWO-DIGIT RUN AVAILABLE (TORA)	6000'	SAFELY	4800'	SAFELY
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	6000'	SAFELY	4800'	SAFELY
LANDING DISTANCE AVAILABLE (LDA)	6000'	SAFELY	4800'	SAFELY
PAVEMENT STRENGTH	POUNDS (1000) 30	SAFELY	23	SAFELY
	TYPE SINGLE WHEEL	SAFELY	SINGLE WHEEL	SAFELY
RUNWAY SURFACE TYPE	ASPHALT	SAFELY	ASPHALT	SAFELY
PAVEMENT SURFACE TREATMENT	DOAL TAR	SAFELY	MICROSURFACE	SAFELY
RUNWAY MARKING	BASIC	SAFELY	BASIC	SAFELY
RUNWAY EFFECTIVE GRADIENT (W)	0.15	SAFELY	0.45	SAFELY
RUNWAY LIGHTING (LWL, MSL, HSL)	MSL	SAFELY	MSL	SAFELY
RUNWAY APPROACH LIGHTING (ODALS, MALSA, ETC.)	NONE	SAFELY	NONE	SAFELY
WINDS (E, S, H, D, S, H)	SPR, VOR	SAFELY	NONE	SAFELY
VISUAL AIDS (ODAL, MALSA, ETC.)	PAV, (NOTE 3)	SAFELY	PAV	SAFELY
TAXIWAY CATEGORY	HP/HP	SAFELY	RECAL/VISUAL	SAFELY

LEGEND		
DATA ELEMENTS	EXISTING (E)	FUTURE (F)
AIRPORT PROPERTY LINE	---	---
AIRPORT REFERENCE POINT	+	+
AIRPORT ROTATING BEACON	+	+
BUILDINGS	+	+
SEGMENTED CIRCLE	○	○
ASOS	○	○
RUNWAY THRESHOLD LIGHTS	+	+
RUNWAY END IDENTIFIER LIGHTS (REIL)	+	+
PAV	----	----
VAS	----	----
RUNWAY LIGHTS	+	+
TOWERS	+	+
TOPOGRAPHIC CONTOURS	---	---
BUILDING RESTRICTION LINE (BRL)	---	---
OBSTACLE FREE AREA (OFA)	---	---
RUNWAY SAFETY AREA (RSA)	---	---
OBSTACLE FREE ZONE (OFZ)	---	---
RUNWAY VISIBILITY ZONE	---	---
SECTION CORNERS	+	+
AVIATION CASUALTY	+	+
FUTURE/LATENT DEVELOPMENT	---	---
TO BE ABANDONED	---	---

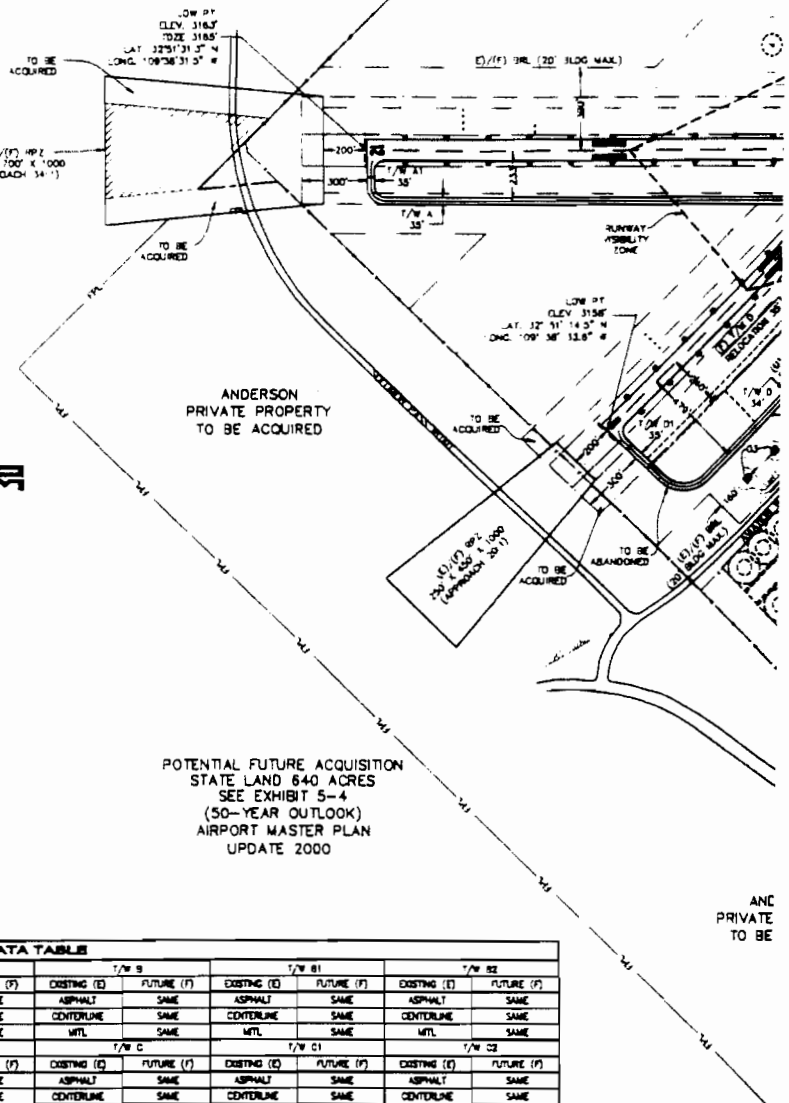
RUNWAY END COORDINATES			
RUNWAYS	EXISTING	FUTURE	
RUNWAY 12	LAT 32°51'31.3" N LONG 109°38'31.3" W	SAFELY	
RUNWAY 30	LAT 32°51'43.3" N LONG 109°37'43.3" W	SAFELY	
RUNWAY 30	LAT 32°51'43.3" N LONG 109°38'33.3" W	SAFELY	
RUNWAY 28	LAT 32°51'43.3" N LONG 109°37'37.3" W	SAFELY	



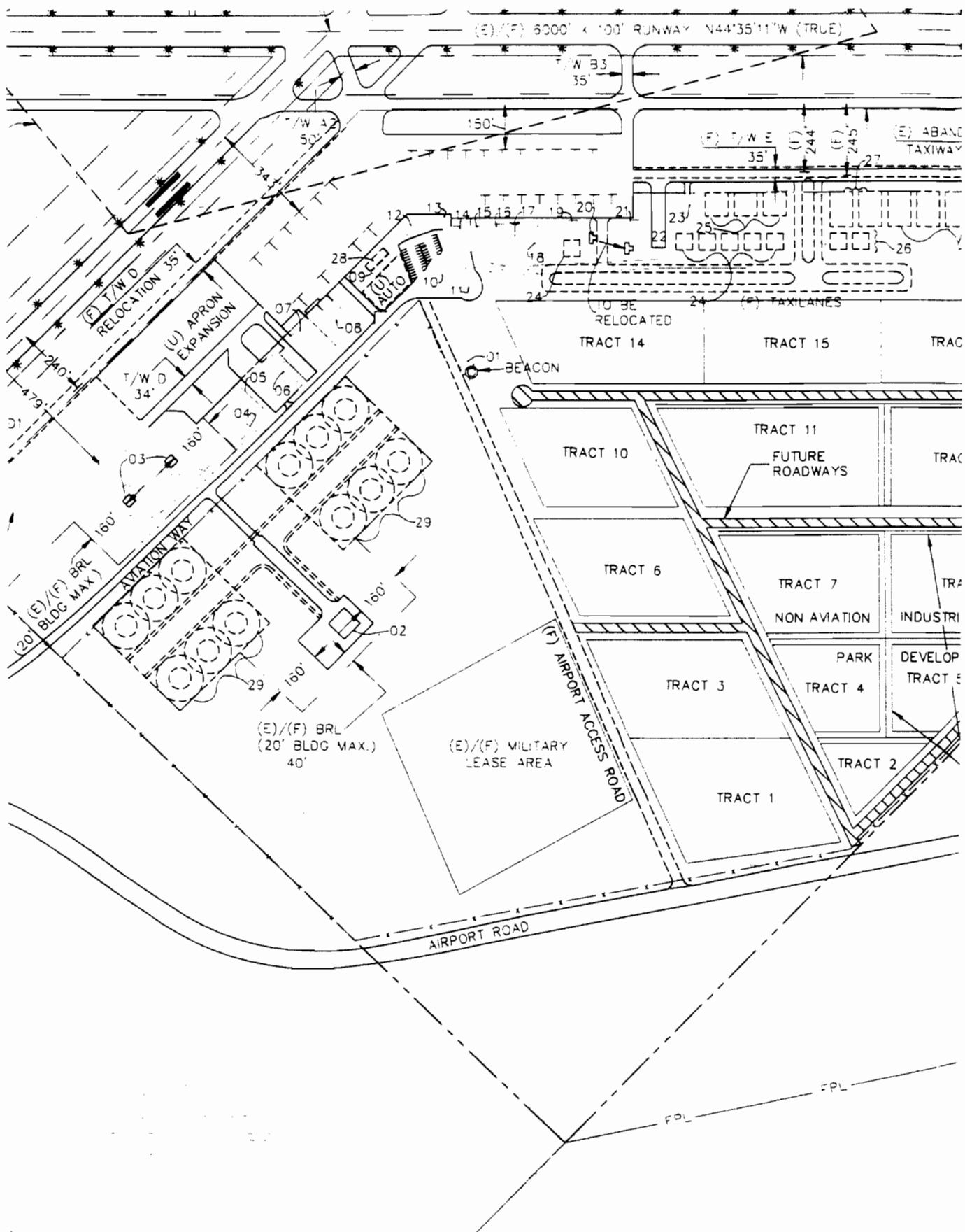
SOURCE: WESTERN REGIONAL CLIMATE CENTER
RENO, NEVADA
SITE: SAFFORD REGIONAL AIRPORT
PERIOD: JANUARY 1, 1992 - DECEMBER 31, 1996

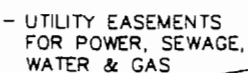
WIND COVERAGE			
RUNWAYS	12 MPH (14.3 MPH)	15 MPH (17.5 MPH)	18 MPH (20.7 MPH)
RUNWAY 12-30	99.35	99.75	100.05
RUNWAY 30-28	99.85	100.05	100.05
COMBINED	99.85	100.05	100.05

TAXIWAY DATA TABLE											
DATA ELEMENTS	T/W A		T/W A1		T/W B		T/W B1		T/W B2		
	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	
	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME	
	CENTERLINE	SAME	CENTERLINE	SAME	CENTERLINE	SAME	CENTERLINE	SAME	CENTERLINE	SAME	
	MTL	SAME	MTL	SAME	MTL	SAME	MTL	SAME	MTL	SAME	
DATA ELEMENTS	T/W B3		T/W B4		T/W C		T/W C1		T/W C2		
	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	
	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME	ASPHALT	SAME	
	CENTERLINE	SAME	CENTERLINE	SAME	CENTERLINE	SAME	CENTERLINE	SAME	CENTERLINE	SAME	
	MTL	SAME	MTL	SAME	MTL	SAME	MTL	SAME	MTL	SAME	
DATA ELEMENTS	T/W D		T/W D1		T/W E		---		---		
	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	EXISTING (E)	FUTURE (F)	
	ASPHALT	SAME	ASPHALT	SAME	---	ASPHALT	---	---	---	---	
	CENTERLINE	SAME	CENTERLINE	SAME	---	CENTERLINE	---	---	---	---	
	MTL	SAME	MTL	SAME	---	MTL	---	---	---	---	

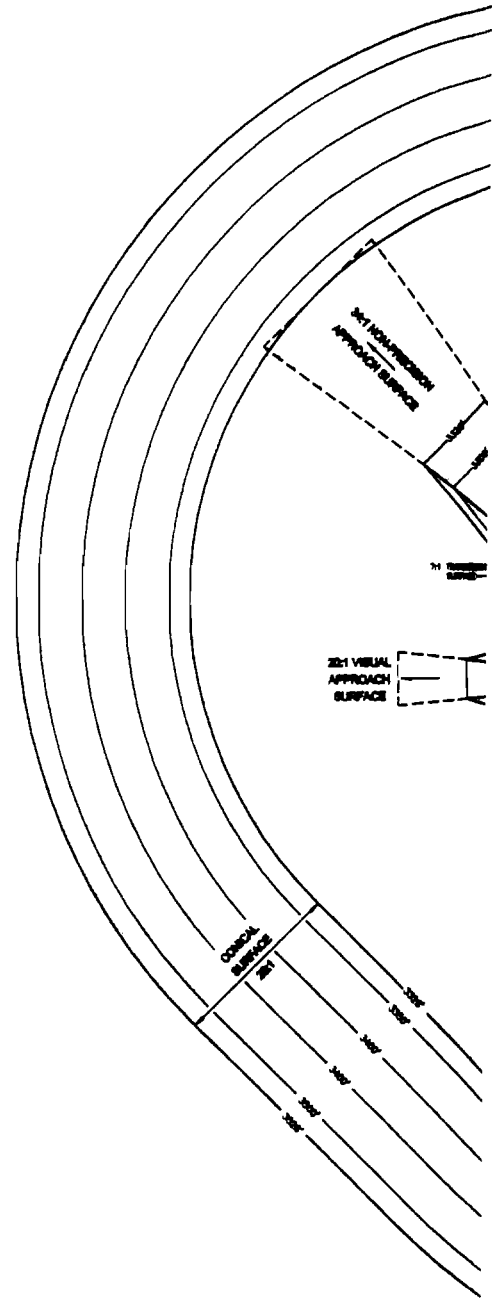


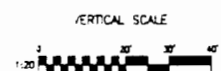
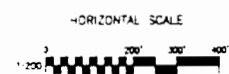
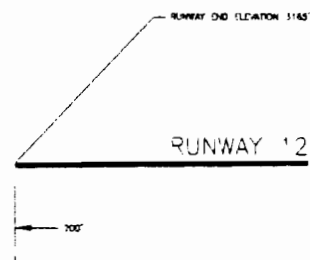
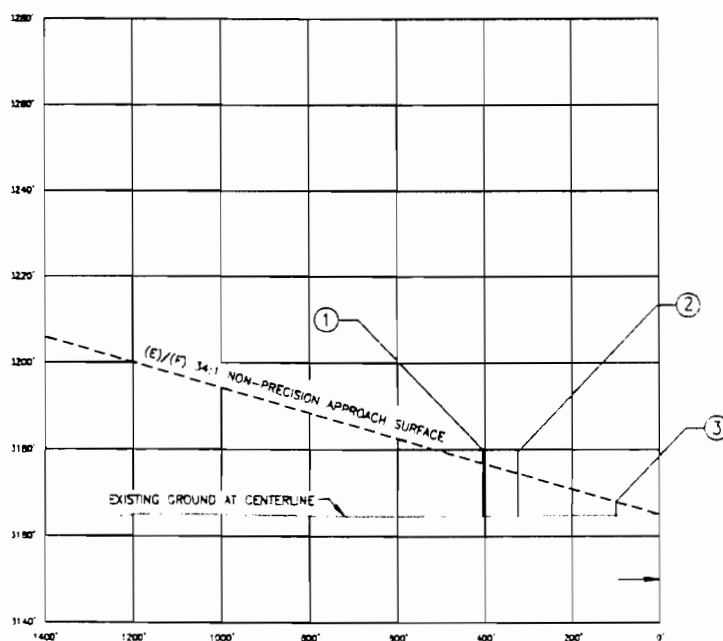
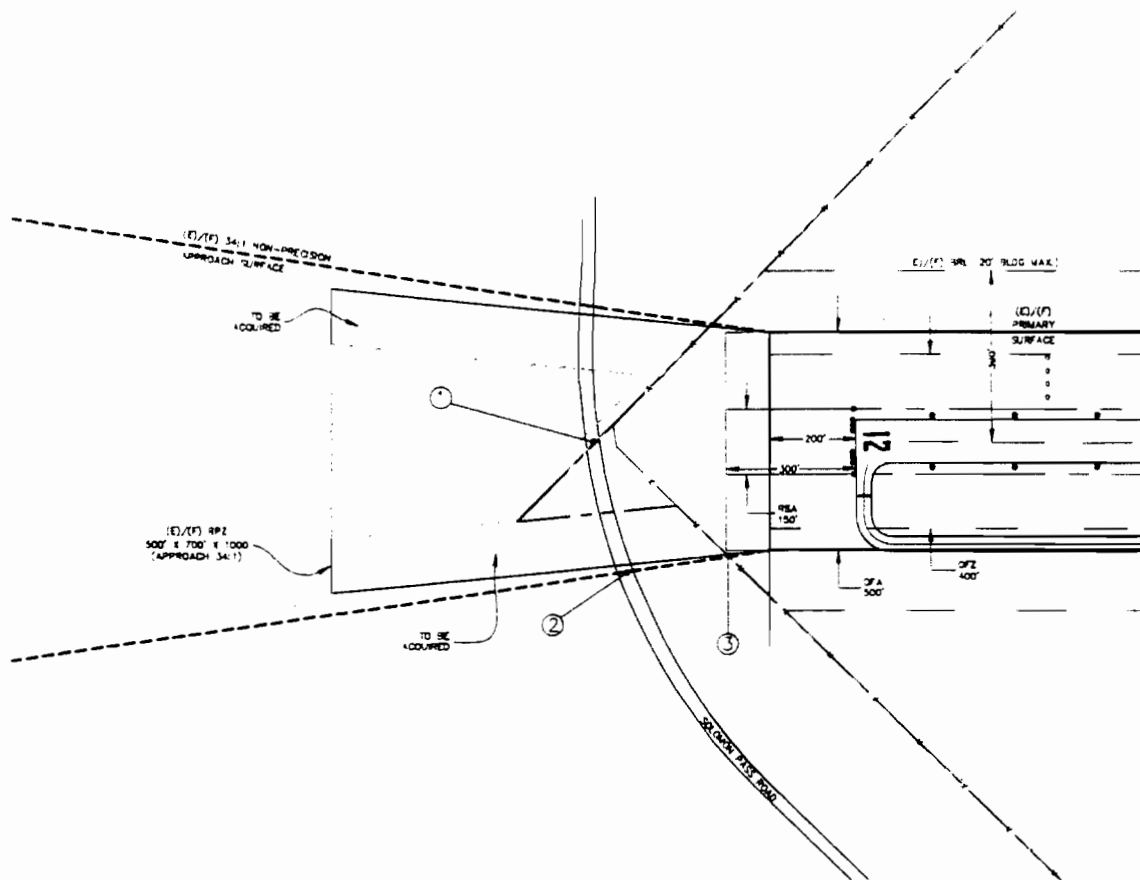
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SAFFORD**

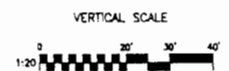




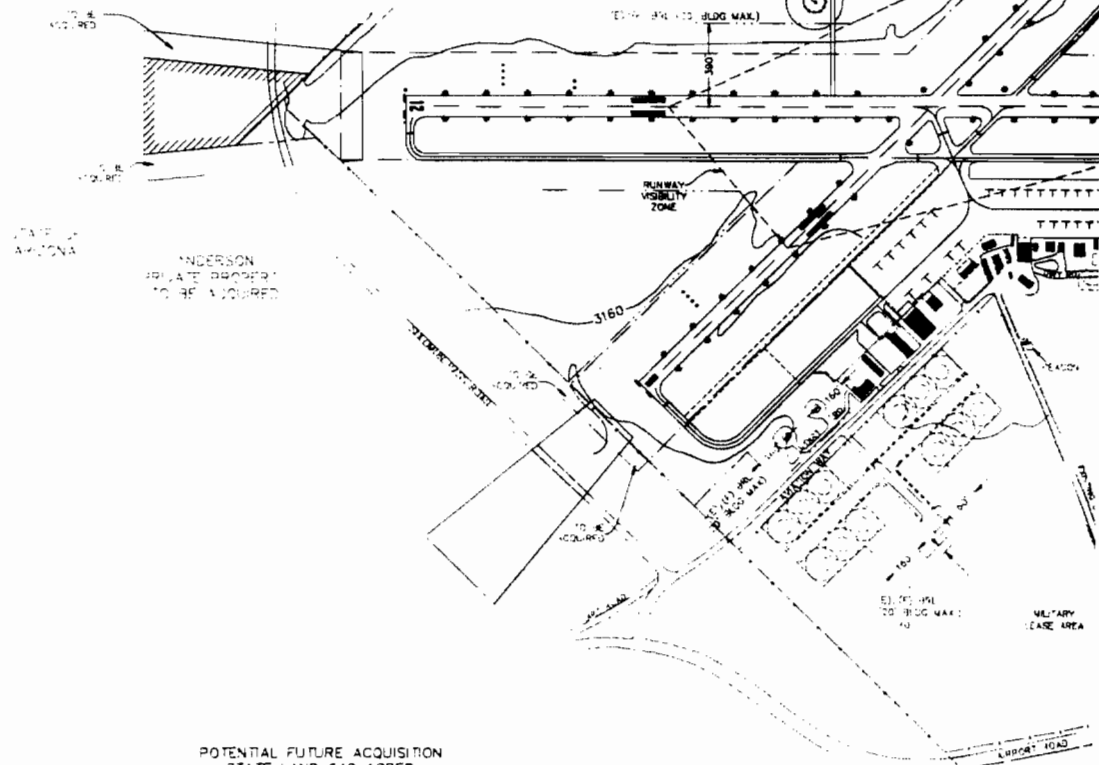
LEGEND		
DATA ELEMENTS	EXISTING (E)	FUTURE (F)
AIRPORT PROPERTY LINE	—	—
BUILDINGS		
RUNWAY THRESHOLD LIGHTS	—	—
RUNWAY END IDENTIFIER LIGHTS (REIL)	• •	• • • •
PAVE	• • • •	• • • •
ASPH	• •	• •
RUNWAY LIGHTS	—	—
REMOVE	—	—
TOPOGRAPHIC CONTOURS	— 750	—
BUILDING RESTRICTION LINE (BRL)	—	—
SUBJECT FREQ AREA (SFA)	—	—
RUNWAY SAFETY AREA (RSA)	—	—
OBSTACLE FREE ZONE (OFZ)	—	—
PART 77 TERMINAL SURFACE	—	—
PART 77 APPROACH SURFACE	—	—
SECTION CORNERS	HP	—
AVIGATION EXISTENT		—
FUTURE/ALTIMETER DEVELOPMENT	—	



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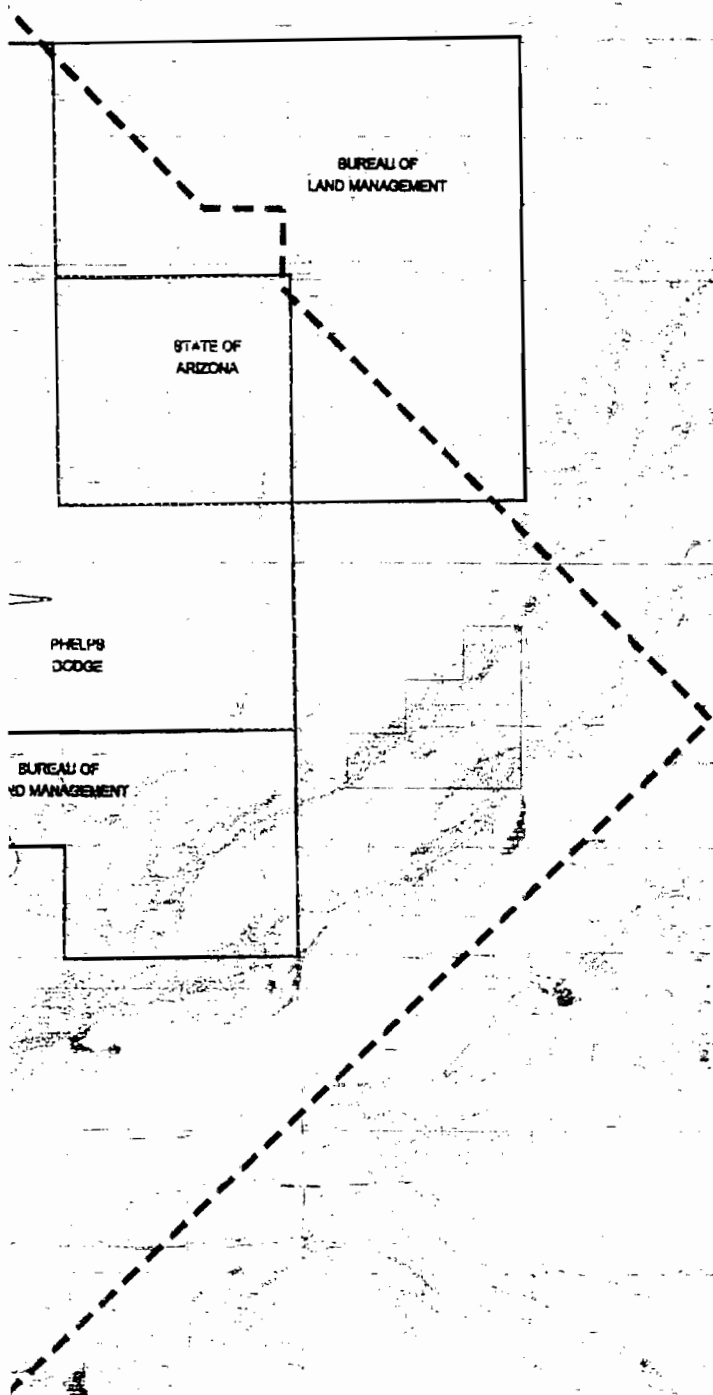


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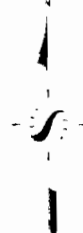


POTENTIAL FUTURE ACQUISITION
 STATE LAND 540 ACRES
 SEE EXHIBIT 5-4
 (50-YEAR OUTLOOK)
 AIRPORT MASTER PLAN
 UPDATE 2000

ANDERSON
 PRIVATE PROPERTY
 TO BE ACQUIRED



LEGEND	
DESCRIPTION	KEY
30 DNL NOISE CONTOUR	
60 DNL NOISE CONTOUR	
65 DNL NOISE CONTOUR	
75 DNL NOISE CONTOUR	
AIRPORT INFLUENCE AREA (AIA)	
LAND USE: PROPERTY BOUNDARY	
LAND USE: AGRICULTURAL ZONE	
LAND USE: UNLIMITED MANUFACTURING ZONE	



GENERAL NOTES

1. TOPGRAPH DATA FROM U.S. GEOLOGICAL SURVEY
2. AIRPORT INFLUENCE AREA (AIA) ADOPTED BY CITY OF SAFFORD.
3. OFF-AIRPORT LAND USE DEPICTED WITHIN AIA ONLY. LAND USE DESIGNATION PROVIDED BY GRADHAM COUNTY AND CITY OF SAFFORD.



Stantec

Stantec Consulting Inc.
8211 South 48th Street
Phoenix AZ U.S.A.
85044
Tel. 602.438.2200
Fax. 602.431.9562
www.stantec.com

1. MASTER PLAN AND ALP UPDATE	AM	WR	00.05.31
Revision	By	Appd.	Date
File Name: SA_000007.mxd	TS/AM	AM	00.05.31
	Desn.	Desn.	Date

Title

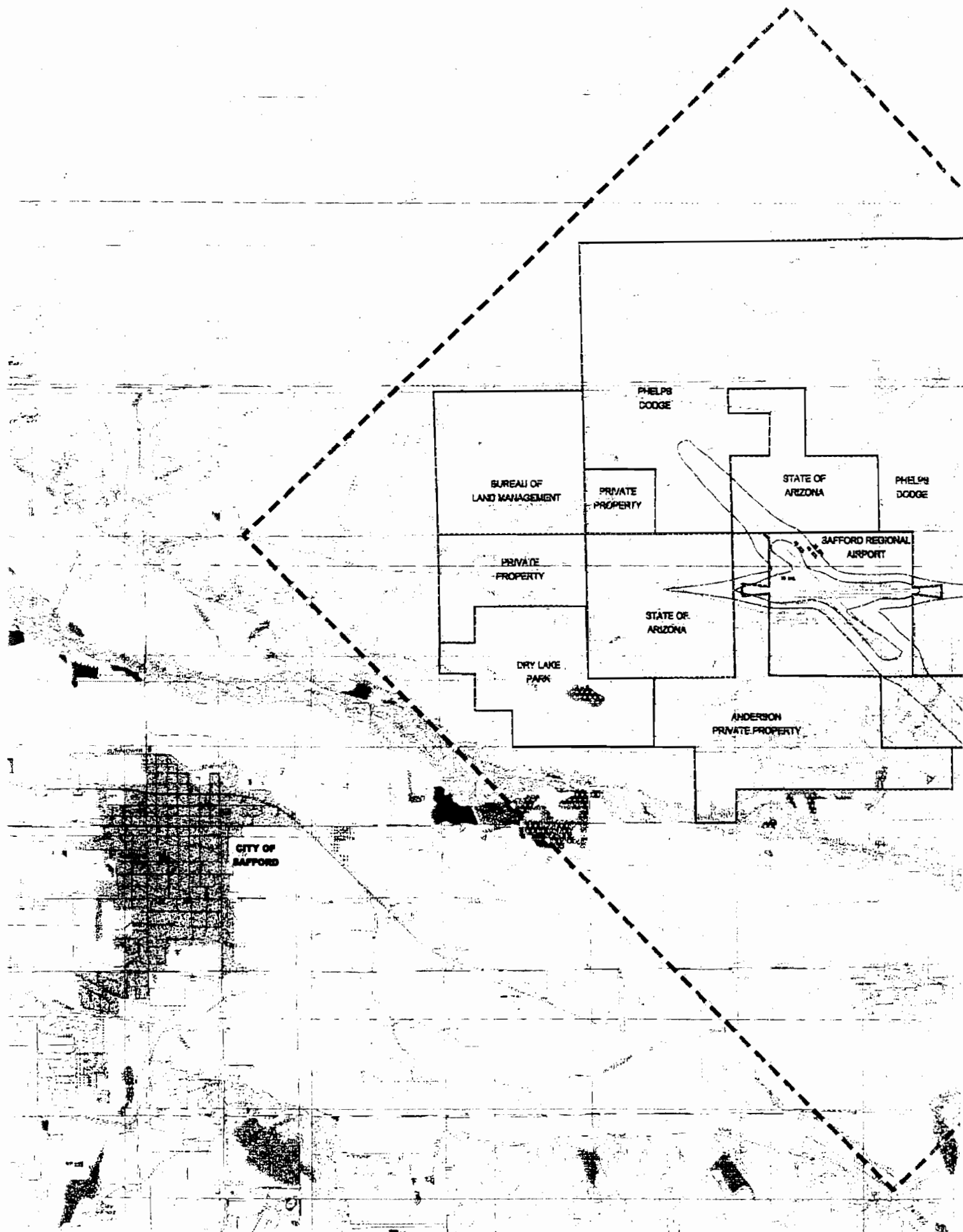
OFF-AIRPORT LAND USE/1997 NOISE MAP
SAFFORD REGIONAL AIRPORT
SAFFORD, ARIZONA

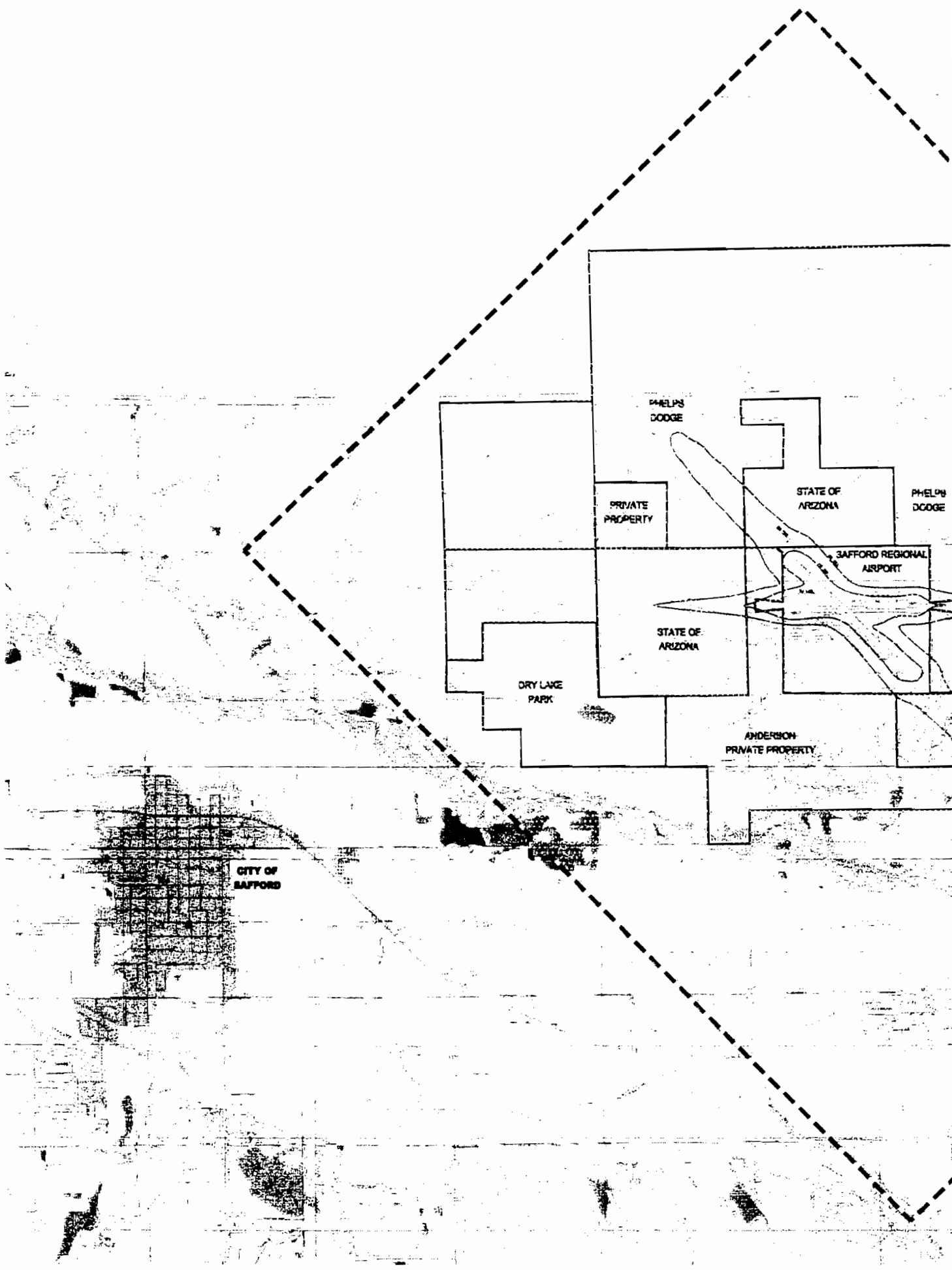
Project No.	Scale	Sheet	Revision
81440007	1:2000		
Drawing No.	Sheet	Revision	

P1

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CITY OF
SAFFORD

PHILPS
DODGE

PRIVATE
PROPERTY

STATE OF
ARIZONA

PHILPS
DODGE

STATE OF
ARIZONA

SAFFORD REGIONAL
AIRPORT

DRY LAKE
PARK

ANDERSON
PRIVATE PROPERTY

LEGEND		
DATA ELEMENTS	EXISTING (E)	FUTURE (F)
AIRPORT ROTATING BEACON		
BUILDINGS		
SEGMENTED CIRCLE		
ASOS		
RUNWAY THRESHOLD LIGHTS		
RUNWAY END IDENTIFIER LIGHTS (REIL)		
PAVE		
VASI		
RUNWAY LIGHTS		
FENCING		
TOPOGRAPHIC CONTOURS		
OBJECT FREE AREA (OFA)		
SECTION CORNERS		
AVIGATION EASEMENT		
FUTURE/ULTIMATE DEVELOPMENT		
PROPERTY BOUNDARIES		

PROPERTY TABLE				
PARCEL NUMBER	ACREAGE	ACQUISITION TYPE	DATE ACQUIRED	FUNDING SOURCE
1	628.88	PATENT NO. 1158878	2-17-58	N/A
102-1-5	0.79	WARRANTY DEED	12/29/81	CITY OF SAFFORD - EXCHANGE
102-1-6	7.78	WARRANTY DEED	12/29/81	CITY OF SAFFORD - EXCHANGE
107-30-34	8.35	QUIT-CLAIM DEED	4/16/82	CITY OF SAFFORD
N/W 18-48818	3.99	LEASE OF RIGHT-OF-WAY	6/11/79	CITY OF SAFFORD
CLEAR ZONE-4(a)	3.88	PERPETUAL RIGHT-OF-WAY	6/16/81	CITY OF SAFFORD - GRANTED AT NO COST
CLEAR ZONE-4(b)	0.84	AVIGATION EASEMENT	7/29/81	CITY OF SAFFORD - GRANTED AT NO COST
A	2.31	(F) EASEMENT	TO BE ACQUIRED	N/A
B	1.02	(F) EASEMENT	TO BE ACQUIRED	N/A
C	1.79	(F) EASEMENT	TO BE ACQUIRED	N/A
D	1.79	(F) EASEMENT	TO BE ACQUIRED	N/A
E	152	(F) FEE SIMPLE	TO BE ACQUIRED	N/A
F	0.46	(F) FEE SIMPLE	TO BE ACQUIRED	N/A
G	0.46	(F) FEE SIMPLE	TO BE ACQUIRED	N/A
H	120	(E) FEE SIMPLE	TO BE ACQUIRED	N/A



GENERAL NOTES

1. PROPERTY DATA PROVIDED BY THE CITY OF SAFFORD.
2. BASE MAP AND CONTOUR DATA FROM PREVIOUS AIRPORT LAYOUT PLAN (1983). UPDATED INFORMATION PROVIDED BY CITY OF SAFFORD AND ON-SITE INVENTORY.



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8211 South 48th Street
Phoenix AZ 85044
Tel. 602.438.2200
Fax. 602.431.9562
www.stantec.com

1 MASTER PLAN AND ALP UPDATE AM WR 00.05.31
Revision By Appd. Date

File Name: 10_sad_pm.dwg TS/AM AM 00.05.31
Dwn. Dgn. Date

Title

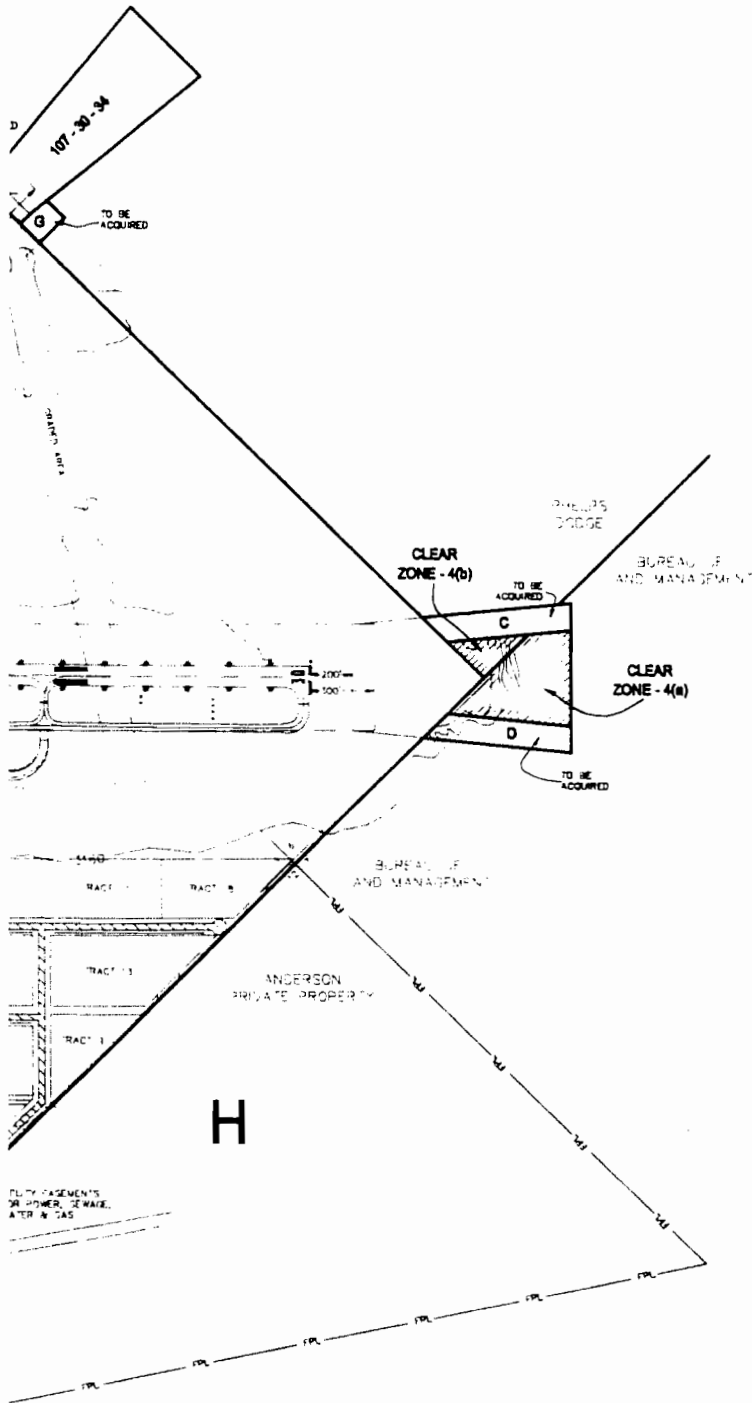
AIRPORT PROPERTY MAP
SAFFORD REGIONAL AIRPORT
SAFFORD, ARIZONA

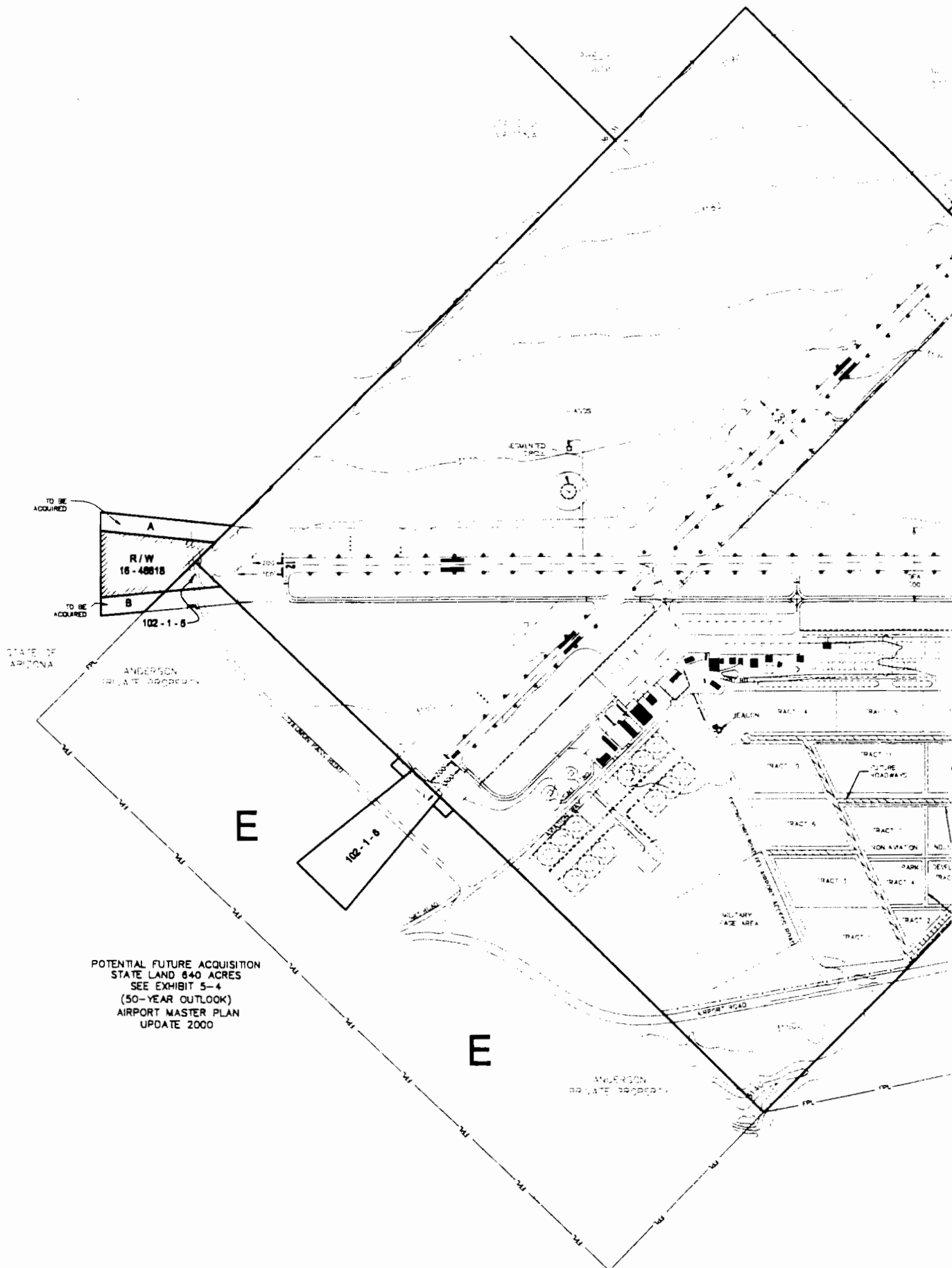
Project No. 81440007 Scale 1:400
Drawing No. Sheet Revision

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Safford
Regional Airport
Master Plan
Update 2000
Safford, Arizona

Implementation Plan 

9.1 INTRODUCTION

The objective of this chapter is to examine the financial implementation of proposed improvements at the Safford Regional Airport.

9.2 CAPITAL IMPROVEMENT PROGRAM

Table 9-1 summarizes the 20-year airport capital improvement program (CIP) for Safford. These projects are derived from the preferred development plan selected and documented earlier in Chapter 5. Preliminary cost estimates, in 1999 dollars, have been prepared for each project (including 10 to 20 percent for engineering and contingencies). As shown, the 20-year CIP totals \$7.1 million.

Projects have been scheduled according to anticipated demand and allocated to one of three phases during the twenty-year planning period -- two five-year phases and one ten-year phase. Phase I projects are outlined on an annual basis through 2005, while Phase II and Phase III projects are only identified by phase and listed by anticipated order of priority. **Exhibit 9-1** illustrates the three-phase development program of the preferred development alternative (identified earlier in Chapter 5). Phase I projects, illustrated in red, represent the Airport's highest priorities such as relocated Taxiway D, helicopter parking, and the new airport access road. Phase II projects, such as the new terminal building and additional helicopter parking, are color-coded green. Blue identifies Phase III development -- the last phase of the master planning window. Following Table 9-1 and Exhibit 9-1, a brief narrative description of each project is provided.

Additional projects excluded from the 20-year planning period, but addressed in the 20- to 50-year outlook, include aircraft apron expansion, additional hangar development, auto parking expansion, and Runway 8-26 relocation and extension to accommodate ultimate airspace, separation and aircraft operation needs anticipated. For illustrative purposes, these projects are included on Exhibit 9-1 in purple. However, the runway relocation and extension are excluded from this drawing for simplicity (see Exhibit 5-4, Chapter 5 for an illustration). "Beyond 2020" apron, hangar, and auto parking

development projects are identified to accommodate potential demand beyond the master planning window's 20-year forecasts.

Table 9-1
Capital Improvement Program

	Project	Cost
PHASE I (1998-2005)		
1999	Pavement Preservation Project	(see note)
2000	Relocate Taxiway D	270,000
2000	Replace FBO Hangar	194,500
2001	Relocate Airport Access Road	210,000
2001	New PAPIs on Both Runways	58,000
2002	Land Acquisition	1,000,000
2002	Construct West End of Taxiway E	73,340
2002	Upgrade Airfield Signage and Lighting	540,000
2003	Construct Stage I of Hangar Area Taxilanes	155,500
2003	Construct Six New Hangars	228,600
2003	Terminal Building Study/Design	110,000
2003	Construct Stage I of Helicopter Parking (3 spaces)	457,500
2004	Pavement Preservation Project	300,000
2005	Utility Improvements/Fire Protection (12" water line)	420,000
	Subtotal	\$4,017,440
PHASE II (2006-2010)		
	Remove Office Building West of Terminal Building	15,000
	New Terminal Building	300,000
	Master Plan Update (2006)	80,000
	Replace Beacon	20,000
	Construct East End of Taxiway E	119,660
	Construct Stage II of Helicopter Parking (3 spaces)	457,500
	Pavement Preservation Project (2009)	300,000
	Construct One New Hangar	38,100
	Water Storage Tanks	TBD
	Subtotal	\$1,330,260
PHASE III (2011-2020)		
	Construct Stage II of Hangar Area Taxilanes	30,000
	Master Plan Update (2012)	80,000
	Pavement Preservation Project (2014)	300,000
	Construct Two New Hangars	76,200
	Construct Stage III of Helicopter Parking (6 spaces)	885,000
	Master Plan Update	80,000
	Pavement Preservation Project (2019)	300,000
	Subtotal	\$1,751,200
	Total 20-Year CIP	\$7,098,900

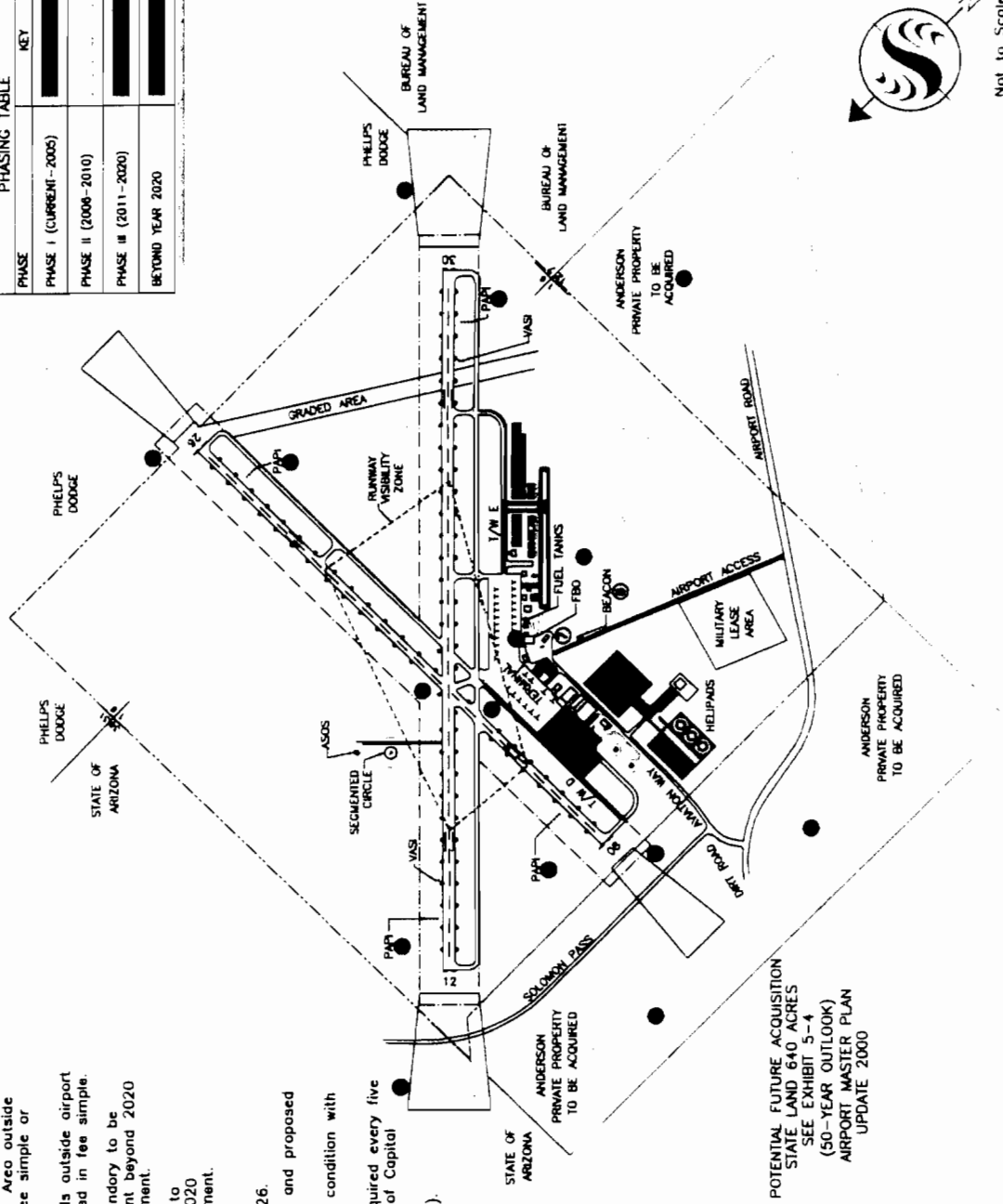
Note: Figures are rounded. Costs are in 1999 dollars. Funding for 1999 project has already been committed (\$240,000 total) and, thus, is excluded from total for future funding. TBD = To Be Determined.

Add: projects:

① Land Acquisition:

- a) Runway 12-30 protection zones (RPZs) shown supersede previous Master Plan clear zones identified. Area outside former clear zones should be acquired in fee simple or easement.
- b) Runway 8-26 object free area (OFA) extends outside airport boundary. Per FAA, OFA should be controlled in fee simple.
- c) Parcel (1/4 section) along west airport boundary to be acquired to protect for proposed development beyond 2020 and to ensure compatible land use development.
- c) Parcel along south boundary to be acquired to protect for proposed development beyond 2020 and to ensure compatible land use development.
- ② New signage required throughout airfield.
- ③ New PAPIs required on Runways 12-30 and 8-26.
- ④ Utility improvements required to support existing and proposed development.
- ⑤ Replace FBO hangar (existing hangar is in poor condition with inadequate space).
- ⑥ Pavement Preservation Project. Preservation required every five years, thus project programmed in each phase of Capital Improvement Program.
- ⑦ New water storage tanks (site to be determined).
- ⑧ Replace existing beacon at its current location.

PHASING TABLE	
PHASE	KEY
PHASE I (CURRENT-2005)	
PHASE II (2006-2010)	
PHASE III (2011-2020)	
BEYOND YEAR 2020	



LEGEND	
DESCRIPTION	KEY
EXISTING EASEMENT	
PROPERTY LINE	
RUNWAY VISIBILITY ZONE	
OBJECT FREE AREA	
FUTURE PROPERTY LINE	

POTENTIAL FUTURE ACQUISITION
STATE LAND 640 ACRES
SEE EXHIBIT 5-4
(50-YEAR OUTLOOK)
AIRPORT MASTER PLAN
UPDATE 2000

SAFFORD REGIONAL AIRPORT
Master Plan Update

Stantec

EXHIBIT 9-1
Airport Development Phasing

9.2.1 Phase I Development

Following is a detailed description of each project in the Phase I (Current-2005) development period. The year each project is proposed for development is also included in this Phase.

1999 - Pavement Preservation Project *(Funds Already Committed)*

This project consists of a pavement preservation effort identified as coal tar. Coal tar will be used on Runway 12-30, Taxiways A and B, and the apron area. In addition, Runway 12-30 will be re-striped for its non-precision instrument approach capability. Funds totaling \$230,000 have already been committed/ programmed for this project.

2000 - Relocate Taxiway D **\$ 270,000**

Existing Taxiway D, parallel taxiway for west end of Runway 8-26, is located farther south of Runway 8-26 than Taxiway C which is the parallel taxiway for the east end of Runway 8-26. This relocation will also serve the future apron expansion area beyond the planning period.

2000 - Replace FBO Hangar **\$ 194,500**

This project includes a 7,500-square foot pre-engineered metal hangar with utility connections. This hangar would accommodate aircraft maintenance and storage space, FBO office space, and equipment storage. This structure would replace the existing 4800-square foot FBO hangar on lease lot H-1 that is in poor condition.

2000 - Relocate Airport Access Road **\$ 210,000**

The primary airport access road runs between the helicopter operations area and landside development west of the terminal area. This project will relocate the primary access to run more north-south into the airport.

2001 - New PAPIs on both Runways **\$ 58,000**

Both Runways 12-30 and 8-26 require the installation of new PAPI's. Runway 12-30's existing visual approach slope indicators (VASI's) are outdated and in poor condition. Although Runway 8-26 has precision approach path indicators (PAPI's), they are also outdated and should be upgraded.

2002 - Land Acquisition

\$ 1,000,00

Land acquisition is required off the ends of both runways. Runway 8-26 requires acquisition of an area off Runway 26 end in fee simple to accommodate the required object free area (OFA). The City plans to purchase a large parcel consisting of approximately 152 acres off Runway 8 end to accommodate the existing OFA as well as ultimate development plans (beyond 2020) to extend Runway 8-26 (see Chapter 5, Section 5.4). Further, a large triangular parcel of approximately 120 acres is also proposed for acquisition to accommodate ultimate development plans and prevent encroachment, such as residential development, along the southerly boundary of the airport. Acquisition of these large parcels will also ensure that land surrounding the runway extension and the southerly portion of the airport is reserved for other aviation development and commercial/industrial development. Further, the potential acquisition of a 640-acre State-owned parcel is under consideration to protect for the westernmost part of the proposed Runway 8-26 extension and other ultimate development plans for the airport (see Chapter 5, Section 5.4). Runway 12-30 requires the acquisition of 8.3 acres of additional aviation easement. The total cost of this project is based on a preliminary estimate for appraisals, administration of the acquisitions, and the estimated purchase price of the property.

2002 - Construct West End of Taxiway E

\$ 73,340

Taxiway E is proposed for construction to serve the future expansion of the hangar development area. The west end of Taxiway E will provide access from the aircraft apron to the proposed two-way taxilane in the hangar development area. The west end consists of a 673-foot by 35-foot area. This area previously accommodated a taxilane which was abandoned, so there are some remaining pieces of pavement. However, the pavement has significantly deteriorated and is unusable for the future Taxiway E development. The east end of Taxiway E is proposed for construction in Phase II of the planning period.

2002 - Upgrade Airfield Signage & Lighting **\$ 540,000**

This project will bring the airport's signage up to current FAA standards. Airport signage will include runway and taxiway directional signs. In addition, the airfield's lighting system will also be upgraded to include replacing direct-buried lines with conduit.

2003 - Construct Stage I of Hangar Area Taxilanes **\$ 155,500**

Access is needed to the proposed hangar development for 2003. This requires two-way taxilanes running north-south and east-west to serve the proposed hangar development. The two-way taxilanes will consist of two 25-foot width lanes to accommodate Design Group I aircraft which are proposed to occupy the hangar development just south of and parallel to the Design Group II hangars along Taxiway E.

2003 - Construct Six New Hangars **\$ 228,600**

Six new hangars are needed in Phase I of the 20-year planning period to accommodate the forecast based aircraft. For planning purposes, these hangars are estimated to be 1500 s.f. each at a cost of \$20 per square foot plus engineering and construction administration costs.

2003 - Terminal Building Study/ Design **\$ 110,000**

To address the needs of the general aviation community, a new terminal building is proposed. However, details of these needs will be addressed in this Terminal Building Study and Design.

2003 - Construct Stage I of Helicopter Parking (3 spaces) **\$ 457,500**

This project includes the construction of three helicopter parking spaces (including lighting) adjacent to the helicopter pad, southwest of the terminal area. This helicopter parking area will replace the current use of the aircraft apron area on the north side of the terminal area.

2004 - Pavement Preservation Project

\$ 300,000

Airport-wide pavement preservation is necessary as part of an effective pavement maintenance program. Pavement preservation in the CIP is proposed every five years throughout the planning period.

2005 - Utility Improvements

\$420,000

This project is identified to provide utility and fire protection improvements. Utility improvements are proposed to support existing and future terminal and hangar development to include bringing the airport to fire protection code standards.

9.2.2 Phase II Development

Following is a detailed description of each project in the Phase II (2006-2010) development period.

Remove Office Building West of Terminal

\$ 15,000

The FBO is currently using the building to the west of the airport for additional administrative and storage space. However, this building (previously a home) is in poor condition. Once removed, this area will allow room for the proposed new terminal building.

New Terminal Building

\$ 300,000

The existing terminal building is approximately 1,100 square feet. Based on the findings of the terminal building study and design proposed earlier in Phase II, the construction of a new terminal building is anticipated. Preliminary needs have been defined as 2,640 square feet for an approximate cost of \$300,000.

Master Plan Update

\$ 80,000

The Safford Regional Airport Master Plan will likely require an update in Phase II of the planning period. The update should include a review of the existing conditions, aviation demand forecasts, and development alternatives (related to any changes in demand). Necessary adjustments to the future capital development program should also be determined.

Replace Beacon **\$ 20,000**

The existing rotating beacon at the airport is in poor condition and will require replacement early in Phase II of the planning period.

Construct East End of Taxiway E **\$ 119,660**

This project consists of constructing the remainder of Taxiway E to serve the future hangar development area -- similar to the Taxiway E project in Phase I.

Construct Stage II of Helicopter Parking (3 spaces) **\$ 457,500**

This project includes the development of three additional helicopter parking spaces (including lighting) to bring total helicopter parking to six spaces in Phase II.

Pavement Preservation Project (2009) **\$ 300,000**

Airport-wide pavement preservation is necessary as part of an effective pavement maintenance program. Pavement preservation in the CIP is proposed every five years throughout the planning period.

Construct One New Hangar **\$ 38,100**

This project consists of constructing one additional hangar to meet the based aircraft storage demand in Phase II of the planning period. For planning purposes, the hangar size is estimated at 1500 square feet at a cost of \$20 per square foot plus engineering and construction administration costs.

Water Storage Tanks **To Be Determined**

This project consists of the installation of water storage tanks for the airport. Specifics of this project have not been determined.

9.2.3 Phase III Development

Following is a detailed description of each project in the Phase III (2011-2020) development period.

Construct Stage II of Hangar Area Taxilanes **\$ 30,000**

Phase II of the hangar area taxilane project, as described earlier, will complete the aircraft access improvements needed to support the proposed hangar development.

Master Plan Update

\$ 80,000

The Safford Regional Airport Master Plan will require another update in Phase III of the planning period. Similar to the Phase II update, a review of the existing conditions, aviation demand forecasts, and development alternatives (related to any changes in demand) should be conducted. Necessary adjustments to the future capital development program should also be determined.

Pavement Preservation Project (2014)

\$ 300,000

Airport-wide pavement preservation is necessary as part of an effective pavement maintenance program. Pavement preservation in the CIP is proposed every five years throughout the planning period.

Construct Two New Hangars

\$ 76,200

This project consists of constructing two additional hangars to meet the based aircraft storage demand in Phase III of the planning period. For planning purposes, the hangar size is estimated at 1500 square feet at a cost of \$20 per square foot plus engineering and construction administration costs.

Construct Stage III of Helicopter Parking (6 spaces)

\$ 885,000

This project concludes the helicopter parking development for the planning period with six additional parking spaces (including lighting) to bring the total to 12 in the helicopter operations area.

Master Plan Update (2018)

\$ 80,000

The Safford Regional Airport Master Plan will require a second update in Phase III of the planning period. The update should include a review of the existing conditions, aviation demand forecasts, and development alternatives (related to any changes in demand). Necessary adjustments to the future capital development program should also be determined.

Pavement Preservation Project (2019)

\$ 300,000

Airport-wide pavement preservation is necessary as part of an effective pavement maintenance program. Pavement preservation in the CIP is proposed every five year throughout the planning period.

9.3 FINANCIAL ANALYSIS

The overall financial ability of Safford was reviewed relative to future capital expenditures required for the proposed projects. In addition to the earlier identification of capital outlays, airport revenues and expenses were projected through the end of the planning period. These projections were based on the historical revenue and expense figures provided by the City of Safford and the Safford Airport Authority.

9.3.1 Revenues

Local operating revenues for Safford Regional Airport include airport leases, tiedown fees, fuel sales, and other miscellaneous revenues (i.e. airshow). Airport leases contribute 45 percent of the total airport revenues. Revenue projections for the master planning period are based on a conservative 1.5 percent annual growth rate (beginning in 2000) plus estimated lease revenues for new hangar development.

9.3.2 Expenses

Airport expenses include maintenance and operating, administrative (including contracts), equipment, and other/miscellaneous expenses. Operating expenses are projected using a 1.0 percent increase annually.

9.3.3 Cash Flow

Table 9-2 outlines the estimated cash flow by phase at Safford Regional Airport through the planning period. As shown, the airport operates and will continue to operate at a deficit -- the City of Safford subsidizes the shortfall. The projections presented translate to an average annual deficit of \$65,900. Since Phase II only covers five years, compared to seven in Phase I and ten in Phase III, revenues and expenses presented are lower for that phase.

Table 9-2
Historical and Projected Cash Flow Summary

Year	Total Revenues	Total Expenses	Net Cash Flow
Historical (1998)	28,710	93,692	(\$ 64,982)
Phase I (1999-2005)	219,294	675,851	(\$ 456,557)
Phase II (2006-2010)	188,091	512,399	(\$ 324,308)
Phase III (2011- 2020)	436,095	1,104,543	(\$ 668,448)
Total	843,480	2,292,792	(\$ 1,449,312)

Notes: Historical figures (1998) are estimated using information provided by City of Safford and Safford Airport Authority. Revenue and Expense projections through 2020 are in 1999 dollars.

9.3.4 Funding Sources

Historically, capital funding for Safford Regional Airport has primarily been Federal AIP, State Aviation Grants, and local (City) funding. These and other funding sources are described here.

Federal

The primary source of airport funding for proposed capital improvements is the Federal Airport Improvement Program (AIP). The Airport and Airway Trust Fund supports the AIP. The Trust Fund provides a stable funding source whereby users pay for the services they receive. The Trust Fund is built on user fees/taxes derived from the aviation community off fuel, aircraft tires, airline tickets, domestic air cargo, and international departure fees. Congress prepares a budget for the outflows of this fund as part of the annual Federal Budget negotiations.

The Trust Fund appropriations peaked at \$2.264 billion in 1992, and then declined to a low of \$1.372 billion in 1996. Responding to concerns within the aviation community, AIP appropriations were increased to \$1.46 billion in 1997, \$1.7 billion in 1998, and \$1.95 billion in 1999.

The funding identified for Safford's 20-year CIP assumes the continued distribution of airport improvement funds based on the same formula used in the past. In Arizona, the standard AIP grant share is 91.06 percent of the project cost. Projects that are eligible for grants include airport planning, airport capacity enhancement/ preservation projects, noise compatibility programs, and some airport development projects. Eligible

development projects include facilities or equipment associated with the construction, improvement, or repair (excluding routine maintenance) of an airport. Hangars, auto parking areas, most airport buildings, art objects, and decorative landscaping are ineligible. With certain restrictions, buildings that house Aircraft Rescue and Firefighting (ARFF), security, and certain types of maintenance equipment, as well as terminal buildings, may be eligible for federal funding.

Entitlement Funds

For those airports with scheduled commercial passenger services, federal fund appropriations from the Airport and Airway Trust Fund have been based on a legislated apportionment formula relative to the number of enplaned passengers and state population. Enplaning passengers are the paid passengers departing an airport on commercial scheduled aircraft as reported by the airline to the FAA. These funds are often referred to as "Entitlements" and are traditionally used as a source of federal funds for CIP grants for commercial service airports. Since Safford Regional Airport does not have scheduled air carrier service with at least 10,000 annual enplanements, the airport is not eligible for an appropriation from this funding source. The 1998 Arizona Air Service Study identified approximately 5,640 potential enplanements for the Safford market area for the current time frame.

Discretionary Funds

Federal discretionary funds are monies from the Aviation Trust Fund that may be used at any eligible airport. Discretionary allocations are a function of project need and priorities according to the FAA priority rating system and as weighed against other projects. The 1996 reauthorization of the Trust Fund revised the distribution formulas to "set aside" a greater portion of discretionary funds for special projects and noise mitigation. Further refinements to Trust Fund allocations are likely to result from congressional debate.

State

The State of Arizona has an Aviation Fund built on aviation flight property taxes. The fund is administered by the Arizona Department of Transportation Aeronautics Division. These funds are available to match both appropriated federal funds and local funds programmed for capital projects. For federally-funded projects, the State will contribute

4.47 percent. Other projects unfunded by or ineligible for federal funds may be State funded at 90%.

Local

In the past, the City of Safford has contributed the necessary funds for capital improvement projects. In addition, the City has provided financial assistance to the Safford Airport Authority for operations and maintenance expenses. While the Airport Authority maintains an Airport Fund derived from fuel sales, leases, tiedown fees, and other sources (i.e. air show), this income is and will continue to be insufficient to cover future capital improvement costs. However, development funding could be obtained from private investment.

Projects designed and constructed by the private sector represent another possible source for development funding. Such projects can involve substantial private commitments and result in significant contributions of facilities and amenities to meet the future needs of the users. Potential projects funded through private resources include additional general aviation hangars, fixed base operator (FBO) facilities, and aviation-related industrial development.

Table 9-3 summarizes the estimated federal, state, and local share for each airport development phase based on current federal and state funding formulas and eligibility. As shown, the local funding requirements for Phase I total over \$661,000.

Table 9-3
Summary of Project Funding Eligibility

Project	Federal ¹	State	Local ²	Total Cost
PHASE I				
Pavement Preservation Project				(see note)
Relocate Taxiway D	245,862	12,069	12,069	270,000
Replace FBO Hangar	-	-	194,500	194,500
Land Acquisition ³	9,106	891,447	99,447	1,000,000
Relocate Airport Access Road	191,226	9,387	9,387	210,000
New PAPIs on Both Runways	52,815	2,593	2,593	58,000
Construct West End of Taxiway E	66,783	3,278	3,278	73,340
Upgrade Airfield Signage and Lighting	491,724	24,138	24,138	540,000
Construct Stage I of Hangar Area Taxilanes	141,598	6,951	6,951	155,500
Construct Six New Hangars	-	-	228,600	228,600
Terminal Building Study/Design	-	99,000	11,000	110,000
Construct Stage I of Helicopter Parking	416,600	20,450	20,450	457,500
Pavement Preservation Project ⁴	-	270,000	30,000	300,000
Utility Improvements/Fire Protection	382,452	18,774	18,774	420,000
Subtotal	\$1,998,166	\$1,358,087	\$661,187	\$4,017,440
PHASE II				
Remove Office Bldg West of Terminal Bldg	13,659	671	671	15,000
New Terminal Building	-	270,000	30,000	300,000
Master Plan Update (2006)	72,848	3,576	3,576	80,000
Replace Beacon	18,212	894	894	20,000
Construct East End of Taxiway E	108,962	5,349	5,349	119,660
Construct Stage II of Helicopter Parking	416,600	20,450	20,450	457,500
Pavement Preservation Project ⁴ (2009)	-	270,000	30,000	300,000
Construct One New Hangar	-	-	38,100	38,100
Water Storage Tanks	-	-	-	TBD
Subtotal	\$630,281	\$570,940	\$129,040	\$1,330,260
PHASE III				
Phase II of Hangar Area Taxilanes	27,318	1,341	1,341	30,000
Master Plan Update (2012)	72,848	3,576	3,576	80,000
Pavement Preservation Project ⁴ (2014)	-	270,000	30,000	300,000
Construct Two New Hangars	-	-	76,200	76,200
Construct Stage III of Helicopter Parking	805,881	39,560	39,560	885,000
Master Plan Update (2018)	72,848	3,576	3,576	80,000
Pavement Preservation Project ⁴ (2019)	-	270,000	30,000	300,000
Subtotal	\$978,895	\$588,053	\$184,253	\$1,751,200
Total 20-Year CIP	\$3,607,342	\$2,517,079	\$974,479	\$7,098,900

¹ Indicates maximum eligibility for Federal Airport Improvement Program Grant (91.06%) and State Grant Funding (4.47%), except where noted.

² In addition to City and Airport Authority, funding may include private and/or other funding sources.

³ It is estimated that \$10,000 of the land acquisition total costs is eligible for federal funding for a total of \$9,106 (91.06%) in funding dollars from FAA

⁴ State funding only (90%)

NOTE Figures are rounded. Costs are in 1999 dollars. Funding for 1999 project has already been committed (\$240,000 total). TBD = To Be Determined.

9.3.5 Economic Feasibility

Table 9-4 summarizes the airport's cash position for each phase based on the figures presented earlier in Tables 9-2 and 9-3. These numbers represent total funding required beyond federal and state contributions. Local funds are assumed to come from the City and the Airport Authority. However, some of this financial burden can be passed on to private investors or other sources. This table is presented to determine the economic feasibility of implementing the 20-year CIP.

Table 9-4
Economic Feasibility

	Net Cash Flow (from Table 9-2)	Local* Funding Required for CIP (from Table 9-3)	Net Balance (Surplus/Deficit)
Phase I - 2005	(456,557)	661,187	\$ (1,117,744)
Phase II - 2010	(324,308)	129,040	\$ (453,348)
Phase III - 2020	(668,448)	184,253	\$ (852,701)
Total	\$ (1,449,312)	\$ 974,479	\$ (2,423,791)

* Represents total funding required beyond federal and state contributions.

9.4 CONCLUSIONS AND RECOMMENDATIONS

The Safford Regional Airport requires a total of \$7.1 million to fund the 20-year capital improvement program. Since federal and state funding will not cover approximately \$974,500 of this total amount, the funding will have to come from airport revenues, local government funding sources, and private investors.

In order to monitor the airport's true financial picture in the future, it is recommended that separate cost centers for the airport be established for this purpose. Then, airport cost information can be more easily accessed and evaluated when considering changes to the airport's rates and fees structure in the future.

Safford **Regional Airport** **Master Plan** **Update 2000** **Safford, Arizona**

Glossary 

GLOSSARY

AIR CARRIER - A commercial operator engaging in the carriage of persons or property in air commerce for compensation or hire. Air carriers are certificated in accordance with FAR Parts 121 and 127, and generally operate aircraft having a seating capacity of more than 30 passengers or a maximum payload capacity of more than 7,500 pounds.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC) - A facility established to provide positive air traffic control service to aircraft operating on IFR flight plans within controlled airspace. Controls only traffic en route between airports.

AIR TAXI - Schedule and/or nonscheduled aircraft operations carrying passengers and/or cargo for compensation. The capacity of air taxi aircraft is limited by Part 135 of the Federal Aviation Regulations.

AIR TRAFFIC - Aircraft operating in the air or on an airport surface, excluding loading ramps and parking areas.

AIRCRAFT APPROACH CATEGORY - A grouping of aircraft based on a speed of 1.3 times the stall speed in the landing configuration at maximum gross landing weight. An aircraft shall fit in only one category. If it is necessary to maneuver at speeds in excess of the upper limit of a speed range for a category, the minimum for the next higher category should be used. The categories are as follows:

Category A - Speed less than 91 knots.

Category B - Speed 91 knots or more but less than 121 knots.

Category C - Speed 121 knots or more but less than 141 knots.

Category D - Speed 141 knots or more but less than 166 knots.

Category E - Speed 166 knots or more.

AIRCRAFT MIX - The number of aircraft movements categorized by capacity group or operational group, and specified as a percentage of the total aircraft movements.

AIRCRAFT OPERATION - An aircraft takeoff or landing.

AIRPLANE DESIGN GROUP (PHYSICAL CHARACTERISTICS) - The airplane design group subdivides airplanes by wingspan. The airplane design group concept links an airport's dimensional standards to aircraft approach categories or to airplane design groups or to runway instrumentation configurations. The airplane design groups are:

1. **Airplane Design Group I:** Wingspan up to but not including 49 feet.
2. **Airplane Design Group II:** Wingspan 49 feet up to but not including 79 feet.
3. **Airplane Design Group III:** Wingspan 79 feet up to but not including 118 feet.
4. **Airplane Design Group IV:** Wingspan 118 feet up to but not including 171 feet.
5. **Airplane Design Group V:** Wingspan 171 feet up to but not including 197 feet.
6. **Airplane Design Group VI:** Wingspan 197 feet up to but not including 262 feet.

AIRPORT ELEVATION/FIELD ELEVATION - The highest point of an airport's runways measured in feet from mean sea level.

AIRPORT LAYOUT PLAN (ALP) - A graphic presentation, to scale, of existing and proposed airport facilities, their location on the airport, and the pertinent clearance and dimensional information required to show conformance with applicable standards. To be eligible for AIP funding assistance, an airport must have an FAA-approved Airport Layout Plan.

AIRPORT LIGHTING - Various lighting aids that may be installed on an airport. Types of airport lighting include:

1. **Approach Light System/ALS:** An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns with the extended centerline of the runway on his final approach for landing.

Condenser-Discharge Sequential Flashing Lights/Sequenced Flashing Lights may be installed in conjunction with ALS at some airports. Types of Approach Light Systems are:

- a) ALSF-I: Approach Light System with Sequenced Flashing Lights in ILS Cat-I configuration.
 - b) ALSF-II: Approach Light System with Sequenced Flashing Lights in ILS Cat-II configuration.
 - c) SSALF: Simplified Short Approach Light System with Sequenced Flashing Lights.
 - d) SSALR: Simplified Short Approach Light System with Runway Alignment Indicator Lights.
 - e) MALSF: Medium Intensity Approach Light System with Sequenced Flashing Lights.
 - f) MALSR: Medium Intensity Approach Light System with Runway Alignment Indicator Lights.
 - g) LDIN: Sequenced Flashing Lead-in Lights.
 - h) RAIL: Runway Alignment Indicator Lights (Sequenced Flashing Lights which are installed only in combination with other light systems).
 - i) ODALS: Omnidirectional Approach Lighting System consists of seven omnidirectional flashing lights located in the approach area of a nonprecision runway.
2. **Runway Lights/Runway Edge Lights:** Lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced at intervals of approximately 200 feet, and the intensity may be controlled or preset.
 3. **Touchdown Zone Lighting:** Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

-
4. **Runway Centerline Lighting:** Flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway.
 5. **Threshold Lights:** Fixed green lights arranged symmetrically left and right of the runway centerline, identifying the runway threshold.
 6. **Runway End Identifier Lights/REIL:** Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.
 7. **Visual Approach Slope Indicator/VASI:** An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is "on path" if he sees red/white, "above path" if white/white, and "below path" if red/red.
 8. **Precision Approach Path Indicator/PAPI:** (same function and description as for VASI but different configuration).
 9. **Boundary Lights:** Lights defining the perimeter of an airport or landing area.

AIRPORT MASTER PLAN - An assembly of appropriate documents and drawings covering the development of a specific airport from a physical, economical, social, and political jurisdictional perspective. The airport layout plan is a part of this plan.

AIRPORT NOISE ABATEMENT PROGRAM - A program designed to mitigate noise impacts around an airport through changes in the manner in which aircraft are flown, or changes in the operation or layout of the airport.

AIRPORT OVERLAY ZONE - A zone intended to place additional land use conditions on land impacted by the airport while retaining the existing underlying zone.

AIRPORT REFERENCE CODE (ARC) - A coding system of aircraft approach speed and wingspan used to related to operational and physical airport design standards.

AIRPORT REFERENCE POINT (ARP) - An ARIP is a point having equal relationship to all existing and proposed landing and takeoff areas which is used to locate the airport geographically.

AIRPORT RESCUE AND FIRE FIGHTING (ARFF) - Airport rescue and fire fighting facilities, including vehicles, personnel, and buildings.

AIRPORT ROTATING BEACON - A visual NAVAID operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport.

AIRSIDE - Portion of the airport directly related to the arrival and departure of aircraft, including such airfield facilities as runways, taxiways, navigational aids, marking, and lighting. (See LANDSIDE).

AIRSPACE - Space above the ground in which aircraft travel, divided into corridors, routes, and restricted zones.

AIR TRAFFIC CONTROL TOWER (ATCT) - A facility at an airport operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic within an airport traffic area.

AMBIENT NOISE - All encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far.

ANNUAL SERVICE VOLUME (ASV) - ASV is a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time.

APPROACH AND RPZ PLAN - The Approach and RPZ Plan is compiled from the criteria in FAR Part 77, **Objects Affecting Navigable Airspace**. It shows the area affected by the Airport Obstructions Zoning Ordinance and includes layout of runways, airport boundary, elevations, and area topography. Applicable height limitation areas are shown in detail.

APPROACH SLOPES - The ratios of horizontal to vertical distance indicating the degree of inclination of the Approach Surface. The various ratios include:

- | | |
|-----------|--|
| 20:1 | For all utility and visual runways extended from the primary surface a distance of 5,000 feet. |
| 34:1 | For all nonprecision instrument runways other than utility extended from the primary surface for a distance of 10,000 feet. |
| 50:1/40:1 | For all precision instrument runways extending from the primary surface for a distance of 10,000 feet at an approach slope of 50:1 and an additional 40,000 feet beyond this at a 40:1 Approach Slope. |

APPROACH SURFACE - An element of the airport imaginary surfaces longitudinally centered on the extended runway centerline, extending outward and upward from the end of the primary surface at a designated slope.

APPROVED INSTRUMENT APPROACH - An instrument approach approved for general use and publication by the FAA. It must meet design, accuracy, and equipment requirements set by the FAA, and is subject to periodic FAA flight checks.

APRON/RAMP - An area designated for aircraft use, other than taxiways and runways. Example uses for an apron include loading and unloading, parking, maintenance, refueling, before take-off engine runup, and as a temporary traffic holding area.

AREA NAVIGATION (RNAV) - A method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigation signals or within the limits of a self-contained system capability.

ARIZONA DEPARTMENT OF TRANSPORTATION (ADOT) - Arizona Department of Transportation - An agency of the State of Arizona government responsible for planning, design, construction and maintenance of transportation facilities.

AUTOMATIC DIRECTION FINDER (ADF) - An aircraft radio navigation system, which senses and indicates the direction to a NonDirectional radio beacon (NDB), ground transmitter. Direction is indicated to the pilot as a magnetic bearing or as a relative bearing to the aircraft, depending on the type of indicator installed in the aircraft.

AUTOMATED FLIGHT SERVICE STATION (AFSS) - An air traffic facility, which provides pilot briefing and en route communications; receives and processes flight plans; and offers other services to aviators. Some of these services are provided on an automated basis.

AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS) - The continuous broadcast of recorded noncontrol information intended to improve controller effectiveness and relieve frequency congestion by automating the repetitive transmission of essential but routine information.

AVIGATION AND HAZARD EASEMENT - An easement which provides right of flight at any altitude above the approach surface, prevents any obstruction above the approach surface, provides a right to cause noise vibrations, prohibits the creation of electrical interference's and grants right-of-way entry to remove trees or structures above the approach surface.

BASED AIRCRAFT - An aircraft permanently stationed at an airport.

BUILDING RESTRICTION LINE (BRL) - A line shown on the Airport Layout Plan beyond which airport buildings must not be positioned in order to limit their proximity to aircraft movement areas.

CAPACITY - Capacity (throughput capacity) is a measure of the maximum number of aircraft operations, which can be accommodated on the airport component in an hour. Since the capacity of an airport component is independent of the capacity of other airport components, it can be calculated separately.

COMMERICAL SERVICE - Commercial service airports are public-use airports, which receive, scheduled passenger service aircraft and which annually enplane 2,500 or more passengers.

COMMUTER AIR CARRIER - An air carrier, certificated in accordance with FAR Part 135, which operates aircraft with a maximum of 60 seats and provides at least five schedule round trips per week between two or more points, or which carries mail.

COMPREHENSIVE PLAN - A set of public decisions dealing with how the land, air, and water resources of an area are to be used. The plan provides for all resources, uses, public facilities, and services in an area. It also incorporates the plans and programs of the various governmental units into a single management tool for the planning area.

CONDITIONAL USE - A land use regulatory procedure in which an applicant must adhere to "standards for approval" as established by local officials. A conditional-use procedure allows extensive public review of any development being considered.

CONTROLLED AIRSPACE - An airspace of defined dimensions which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification.

- a. Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D and Class E airspace.
- b. Controlled airspace is also that airspace within which all aircraft operators are subject to certain pilot qualifications, operating rules and equipment requirements in FAR Part 91 (for specific operating requirements, please refer to FAR Part 91). For IFR operations in any class of controlled airspace, a pilot must file an IFR flight plan and receive an appropriate ATC clearance. Each Class B, Class C and Class D airspace area designated for an airport contains at least one primary airport around which the airspace is designated (for specific designations and descriptions of the airspace classes, please refer to FAR Part 71).
- c. Controlled airspace in the United States is designated as follows:
 1. CLASS A: Generally, that airspace from 18,000 feet MSL up to and including FL 600, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska. Unless otherwise authorized, all persons must operate their aircraft under IFR.
 2. CLASS B: Generally, that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of airport operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes) and is designed to contain all published instrument procedures once an aircraft enters the airspace. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. The cloud clearance requirement for VFR operations is "clear of clouds."

3. CLASS C: Generally, that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C area is individually tailored, the airspace usually consists of a surface area within a 5 nautical mile (NM) radius, an outer circle with a 10NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation and an outer area. Each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace. VFR aircraft are only separated from IFR aircraft within the airspace. (See OUTER AREA.)
4. CLASS D: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be Class D or Class E airspace. Unless otherwise authorized, each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. No separation services are provided to VFR aircraft.
5. CLASS E: Generally, if the airspace is not Class A, Class B, Class C or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Also in this class are Federal airways, airspace beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or en route environment, en route domestic and offshore airspace areas designated below 18,000 feet MSL. Unless designated at a lower altitude, Class E airspace begins at 14,500 MSL over the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska, up to, but not including, 18,000 feet MSL and the airspace above FL 600.

CONVENTIONAL HANGAR - A large building used to store more than one aircraft and/or to conduct aircraft maintenance.

CRITICAL AIRCRAFT - In airport design, the aircraft which controls one or more design items such as runway length, pavement strength, lateral separation, etc., for a particular airport. The same aircraft may not be critical to all design items.

CROSSWIND RUNWAY - A runway additional to the primary runway to provide for wind coverage not adequately provided by the primary runway.

DECISION HEIGHT (DH) - With respect to the operation of aircraft, DH means the height at which a decision must be during an ILS instrument approach to either continue the approach or to execute a missed approach.

DEPENDENT VARIABLE - The variable that is of interest to the researcher, the variable that is not forecast. In regression analysis, the variable on the left-hand side of the equation.

DISPLACED THRESHOLD - A threshold located at a point on the runway other than at the runway end. Except for the approach standards defined in FAR Part 77, approach surfaces are associated with the threshold location.

DISTANCE MEASURING EQUIPMENT (DME) - A navigation ground station capable of receiving interrogations from aircraft and transmitting signals which allow time, speed, and distance computations to be made. The station is usually sited with VOR and, at times, an ILS.

EASEMENT - The legal right held by one party to make use of the land of another for a limited purpose.

ECONOMETRIC METHODS - Regression correlation techniques applied to a great variety of forecasting problems to ascertain the relationships between the dependent variables and such explanatory and logically relevant economic variables as income, demographic variables such as population, and other market factors, such as usage impedance and intermodal competition. (See Regression Equation).

ENVIRONMENTAL ASSESSMENT (EA) - A concise public document, prepared under the guidelines of the **National Environmental Policy Act of 1969**, and for which a federal agency is responsible that serves to:

1. Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
2. Aid an agency's compliance with the Act when no environmental impact statement is necessary.
3. Facilitate preparation of a statement when one is necessary.

It includes brief discussions of the need for the proposal, of alternatives as required, of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons consulted.

FEDERAL AVIATION ADMINISTRATION AIRPORT IMPROVEMENT PROGRAM (AIP) - A grant-in-aid program funded by the Airport and Airway Trust Fund.

FEDERAL AVIATION REGULATIONS (FAR), PART 36 - FAR Part 36 contains noise certifications standards for most airplane types, generally requiring newly designed and manufactured aircraft to be significantly quieter than older aircraft.

FEDERAL AVIATION REGULATIONS (FAR), PART 77 - Part 77, *Objects Affecting Navigable Airspace*, establishes standards for determining obstructions to navigable airspace.

FEDERAL AVIATION REGULATIONS (FAR), PART 150 - Implements portions of Title I of the *Aviation Safety and Noise Abatement Act*. It specifically establishes a single system for the measurement of airport (and background) noise, a single system for determining the exposure of individuals to airport noise, and a standardized airport noise compatibility planning program.

FIXED BASE OPERATOR (FBO) - A private firm providing airport services such as fuel sales, aircraft maintenance, aircraft rental, and flight instruction.

FLIGHT SERVICE STATION (FSS) - A facility operated by the FAA to provide flight service assistance.

GENERAL AVIATION (GA) - The portion of civil aviation which includes all facets of aviation except scheduled air carriers.

GENERAL AVIATION AIRPORT - General Aviation airports are either publicly or privately owned airports which serve general aviation aircraft users.

GLIDE SLOPE (GS) - Provides vertical guidance for aircraft during approach and landing. The glide slope consists of the following:

1. Electric components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as an ILS, or
2. Visual ground aids, such as VASI, which provide vertical guidance for a VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM (GPS) - A satellite-based navigational system operated by the United States Department of Defense and made available for civilian use for en route navigation, aircraft instrument approaches and other purposes.

HEIGHT ABOVE TOUCHDOWN (HAT) - The height of the decision height or minimum descent altitude above the highest runway elevation in the touchdown zone (first 3,000 feet of the runway). HAT is published on instrument approach chart in conjunction with all straight-in minimums. (See DECISION HEIGHT, MINIMUM DESCENT ALTITUDE).

HELIPAD - A small, designated area, usually with a prepared surface, on a heliport, airport, landing/takeoff area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters.

HOLD HARMLESS AGREEMENT - An agreement that holds airport sponsors or jurisdictions harmless from alleged damages resulting from airport operations. Such agreements are recorded in deeds or permits as a condition of approval of a regulatory land-use decision.

IFR CONDITIONS - Weather conditions below the minimum for flight under visual flight rules (VFR).

IMAGINARY SURFACES - Those areas established in relation to the airport and to each runway consistent with FAR Part 77 in which any object extending above these imaginary surfaces is, by definition, an obstruction.

INDEPENDENT VARIABLE - An indicator on the basis of which the dependent variable is projected. The Independent Variable may or may not cause the interval change in a dependent variable with which it is associated.

INSTRUMENT APPROACH - The act of making an approach to an airport solely by reference to instruments. To be counted in FAA statistics as an instrument approach, the aircraft must descend through clouds at some interval from the initial approach fix to the airport.

INSTRUMENT APPROACH AID - Any of several FAA-approved electronic aids designed to provide guidance to pilots making instrument approaches.

INSTRUMENT FLIGHT RULES (IFR) - Rules governing the procedures for conducting instrument flight. Pilots are required to follow these rules when operating in controlled airspace with a visibility of less than three miles and/or a ceiling lower than 1,000 feet.

INSTRUMENT LANDING SYSTEM (ILS) - The instrument landing system is designed to provide electronic instrument guidance to the pilot to permit exact alignment and angle of descent of a properly equipped aircraft on final approach for landing.

INSTRUMENT OPERATION - A takeoff or landing of an aircraft which has an instrument flight clearance.

INTEGRATED NOISE MODEL (INM) - The FAA's Integrated Noise Model is the standard prediction analysis tool to which all computer-based airport noise exposure models are compared. The INM calculates the total impact of aircraft noise at or around airports. This noise exposure level can be presented in contours of equal noise exposure of any one of the following noise measures. Noise Exposure Forecast (NEF), Equivalent Sound Level (Leq), Day-Night Average Sound Level and Community Noise Equivalent Level (CNEL); however, only the DNL is approved for use with FAR Part 150.

ITINERANT OPERATIONS - All operations at an airport which are not local operations. (See LOCAL OPERATIONS).

LANDING GEAR - That part of an aircraft which is required for landing. Gear may be configured as Single-Wheel Gear (SWG or SW), Dual-Wheel Gear (DWG or DW), or Dual-Tandem-Wheel Gear (DTWG or DTW).

LANDSIDE - Portions of the airport interfacing with or supporting the airfield functions, including such facilities as terminal area buildings, aircraft parking apron, automobile parking area, fuel storage, air cargo, and ground access. (See AIRSIDE).

LAND USE - The present or planned utilization of a given parcel of land. Such land uses are normally indicated or delineated on a land-use map. Land-use maps may indicate usage's for any given time period past, present, or future, and such period should always be indicated.

LARGE AIRCRAFT - Aircraft of more than 12,500 pounds maximum certificated takeoff weight.

LIGHTING AND MARKING OF HAZARDS TO AIR NAVIGATION - Installation of appropriate lighting fixtures, painted markings, or other devices to such objects or structures that constitute hazards to air navigation.

LIMITED AVIGATION EASEMENT - An easement which provides right of flight above approach slope surfaces, prohibits any obstruction penetrating the approach slope surface, and provides right of entry to remove any structure or growth penetrating the approach slope surface.

LOCAL OPERATIONS - Operations by aircraft flying in the traffic pattern or within sight of the control tower, aircraft known to be arriving or departing from flight in local practice areas, or aircraft executing practice instrument approaches at the airport.

LOCALIZER - The component of an ILS which provides course guidance to the runway.

LORAN - An electronic navigational system by which hyperbolic lines of position are determined by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters.

LOW INTENSITY RUNWAY LIGHTS (LIRL) - runway edge lighting used to define the lateral limits of a taxiway. The intensity of the lights may be present or controlled to high (HITL), medium (MITL) and low (LITL) depending on the category of airport and use of the taxiway.

MARKET SHARE ANALYSIS - Proportions a large-scale activity down to a local level, assuming that the proportion of the large-scale activity, which can be assigned to the local level, is a regular and predictable quantity. Also known as "ratio" or "top-down" modeling, this method is commonly used to develop micro forecasts from the exogenous sources of macro forecasts.

MEAN SEA LEVEL (MSL) - A datum for defining elevations; usually termed mean sea level.

METEOROLOGICAL AVIATION REPORT (METAR) - Surface aviation weather observations taken and reported in a standard international format.

MOVEMENT AREA - The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

MICROWAVE LANDING SYSTEM (MLS) - An advanced form of precision approach equipment with improved accuracy and fewer siting problems than current ILS. An MLS also can permit curved path approaches to the runway instead of requiring a straight path as an ILS and PAR do.

MILITARY OPERATING AREA (MOA) - A MOA is airspace established outside of Class A airspace area to separate or segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.

MINIMUM DESCENT ALTITUDE (MDA) - The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glide is provided. (See NONPRECISION APPROACH PROCEDURE).

MISSED APPROACH - A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The routes of flight and altitude are shown on instrument approach procedure charts. A pilot executing a missed approach prior to the Missed Approach Point (MAP) must continue along the final approach to the MAP. The pilot may climb immediately to the altitude specified in the missed approach procedure. It is also a term used by the pilot to inform ATC that he is executing the missed approach. At locations where ATC radar service is provided, the pilot should conform to radar vectors, when provided by ATC, in lieu of the published missed approach procedure.

MULTI-ENGINE AIRCRAFT - Reciprocating-powered, fixed-wing aircraft having more than one engine and categorized as weighing more than or less than 12,500 pounds maximum gross weight.

MULTIPLE REGRESSION - regression model with more than one independent variable. (See REGRESSION EQUATION).

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) - An agency of the U.S. Department of Commerce responsible for the collection of weather data and its translation into products and services.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS (NPIAS) - A plan prepared annually by the FAA which identifies, for the Congress and the public, the composition of a national system of airports together with the airport development necessary to anticipate and meet the present and future needs of civil aeronautics, to meet requirements in support of the national defense, and to meet the special needs of the Postal Service. The plan includes both new facilities and qualitative improvements to existing airports to increase their capacity, safety, technological capability, etc.

NATIONAL WEATHER SERVICE (NWS) - An agency of the U. S. Department of Commerce and a branch of NOAA responsible for providing nationwide meteorological services to the public and nonmilitary government agencies.

NAVIGATIONAL AID (NAVAID) - Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight.

NOISE CONTOURS - A noise impact boundary line connecting places on a map where the level of sound is the same. Some of the terminology and methods used in developing noise contours include:

1. **A-Weighted Sound Level (DBA):** Commonly used sound measurement, which approximates the manner in which the human ear responds to sounds.
2. **Composite Noise Rating (CNR):** A measure, taken over a 24-hour period, of the noise environment produced by aircraft operations. The CNR is calculated from aircraft noise and is expressed in terms of the maximum perceived noise level (PNL) and the number of operations in daytime and nighttime periods.
3. **Day-Night Average Sound Level (DNL):** Equivalent noise level produced by airport/aircraft operations during a 24-hour time period, with a 10-decibel penalty applied to the level measured during the nighttime hours of 10pm to 7am.
4. **Equivalent Sound Level (Leq):** The constant sound levels which, in a given situation and time period, conveys the same sound energy, as does the actual time-varying sound in the same period. The equivalent sound level is the same as the average sound level.
5. **Noise Exposure Forecast (NEF):** A measure of the noise environment over a 24-hour period. It is based upon summation of individual noise events over the 24-hour period, with adjustments applied for nighttime noises.

NOISE EXPOSURE AREA/ZONE - An element of the airport impact zone or airport overlay zone used to identify areas sensitive to aircraft noise. Included in the corridor may be:

- Severe Noise Impact (75+)
- Substantial Noise Impact (65-75)
- Moderate Noise Impact (55-65)

NOISE IMPACT - A condition that exists when the noise levels that occur in an area exceed a level identified as appropriate for the activities in that area.

NONDIRECTIONAL BEACON/RADIO BEACON (NDB) - An L/MF or UHF radio beacon transmitting NonDirectional signals whereby the pilot of an aircraft equipped with direction-finding equipment can determine his bearing to or from the radio beacon and "home" on or track to or from the station. When the radio beacon is installed in conjunction with the instrument landing system marker, it is normally called a compass locator.

NONPRECISION APPROACH PROCEDURE/NONPRECISION APPROACH - A standard instrument approach procedure in which no electronic glide slope is provided; e.g., VOR, TACAN, NDB, LOC, LDA, SDF, or ASR.

NONPRECISION INSTRUMENT APPROACH AID - An electronic aid designed to provide an approach path for aligning an aircraft on its final approach to a runway. It lacks the high accuracy of the precision approach equipment and does not provide guidance. The VHF Omni-range (VOR) and the NonDirectional beacon (NDB) are two examples of nonprecision instrument equipment.

NONPRECISION INSTRUMENT RUNWAY - A runway having an existing or planned instrument approach procedure from which a straight-in landing is approved but no electronic glide slope information is available and for which no precision approach facilities are planned.

OBJECT FREE AREA (OFA) - A two-dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects whose location is fixed by function.

OBSTACLE FREE ZONE (OFZ) - The airspace defined by the runway OFZ and, as appropriate, the inner-approach OFZ and the inner-transitional OFZ, which is clear of object penetrations other than frangible NAVAIDS (NAVAIDS whose properties allow failure at a specified impact load).

Runway OFZ: The airspace above a surface centered on the runway centerline.

Inner-approach OFZ: The airspace above a surface centered on the extended runway centerline. It applies to runways with an approach lighting system.

Inner-transitional OFZ: The airspace above surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to precision instrument runways.

OBSTRUCTION - An object, which penetrates an imaginary surface, described in the FAA's Federal Aviation Regulations (FAR), Part 77.

OBSTRUCTION LIGHTS - Lights, often red and white, mounted on a surface structure or on natural terrain, to warn pilots of an obstruction.

PARALLEL RUNWAYS - Two or more runways at the same airport whose centerlines are parallel. Designated both by runway number and L (left) or R (right), or, if three parallel runways exist, L (left), C (center), and R (right).

PRECISION APPROACH PROCEDURE/PRECISION APPROACH - A standard instrument approach procedure in which an electronic glide slope is provided, e.g., ILS, MLS, and PAR.

PRECISION APPROACH RADAR/PAR - Radar equipment in some ATC facilities operated by the FAA, and/or the military services at joint civil/military locations and separate military installations, to detect and display azimuth, elevation, and range of aircraft on the final approach course to a runway. This equipment may be used to monitor certain non-radar approaches, but is primarily used to conduct a precision instrument approach (PAR) wherein the controller issues guidance instructions to the pilot based on the aircraft's position in relation to the final approach course (azimuth), the glide path (elevation), and the distance (range) from the touchdown point on the runway as displayed on the radar scope.

PRECISION INSTRUMENT APPROACH AID - An electronic aid designed to provide an approach path for exact alignment and descent guidance of an aircraft on final approach to a runway. Instrument Landing System (ILS), Precision Approach Radar (PAR), and Microwave Landing System (MLS) are the existing precision NAVAIDS.

PRECISION INSTRUMENT RUNWAY - A runway having an existing or planned instrument approach that is essentially aligned with the runway centerline and that has electronic glide slope information for guidance of the descent of the aircraft to the touchdown point on the runway.

PRIMARY SERVICE AIRPORT - Primary service airports are public-use airports which receive scheduled passenger service aircraft and which annually enplane one one-hundredth percent (0.01%) or more of the combined total domestic passenger enplanements for all United States air carriers.

PRIMARY SURFACE - A primary surface is longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway. When the runway has no specially prepared hard surface, or planned hard surface, the primary surface terminates at each end of the runway. The width of a primary surface ranges from 250 feet to 1,000 feet, depending on the existing or planned approach system. The elevation of any

point on the primary surface is the same as the elevation of the nearest point on the runway centerline.

r - The correlation coefficient. Measures the degree of association or covariance between the independent and dependent variable. Correlation does not equal causation. (See R^2).

R^2 - The coefficient of determination. Indicates the percentage variation in the dependent variable that is explained by variations in the causal variables.

RADIAL - A magnetic bearing extending from a VOR/VORTAC/TACAN navigational facility.

REGIONAL AIRLINE - An airline providing regularly scheduled passenger or cargo service with aircraft usually seating less than 60 passengers or cargo aircraft with 18,000-pound payload or less. Special provisions, however, enable regional airlines to operate any size aircraft under certain conditions.

REGRESSION EQUATION - A regression equation is the mathematical representation of a regression model. It states that one or more independent variables and a constant term are related to the dependent variable in an additive fashion. The relationship may be linear or one of several curvilinear types.

RELIEVER AIRPORT - Reliever airports are general aviation airports which have the function of relieving congestion at a primary service airport and which provide the general aviation user with an alternate for access to the overall community. Reliever airports receive higher priority for funding assistance than other general aviation airports.

RELOCATED THRESHOLD - A permanent threshold located at the relocated runway end.

ROTATING BEACON - An airport aid allowing pilots the ability to locate an airport while flying under VFR conditions at night.

RUNWAY - A defined rectangular area, on a land airport prepared for the landing and takeoff run of an aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees, e.g., Runway 01, Runway 26. (See PARALLEL RUNWAYS).

RUNWAY GRADIENT (EFFECTIVE) - The average gradient consisting of the difference in elevation of the two ends of the runway divided by the runway length may be used, provided that no intervening point on the runway profile lies more than five feet above or below a straight line joining the two ends of the runway. In excess of five feet, the runway profile will be segmented and aircraft data will be applied for each segment separately.

RUNWAY LENGTH - LANDING - The measured length from the threshold to the end of the runway.

RUNWAY LENGTH - PHYSICAL - The actual measured length of the runway.

RUNWAY LENGTH - TAKEOFF - The measured length from where the takeoff is designed to begin to the end of the runway.

RUNWAY LIGHTING SYSTEM - A system of lights running the length of a runway that may be high intensity (HIRL), medium intensity (MIRL), or low intensity (LIRL).

RUNWAY PROTECTION ZONE (RPZ) - An area (formerly the clear zone) used to enhance the safety of aircraft operations. It is at ground level beyond the runway end.

RUNWAY SAFETY AREA (RSA) - A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

SEGMENTED CIRCLE - A system of visual indicators designed to provide traffic pattern information at an airport without an operating control tower.

SIMPLE REGRESSION - Simple regression involves a single independent variable. It assumes a linear relationship between the independent variable and the dependent variable. That relationship is estimated using the method of "least squares" and a set of observed values.

SIMPLIFIED DIRECTIONAL FACILITY (SDF) - A NAVAID used for nonprecision instrument approaches. The final approach course is similar to that of an ILS localizer except that the SDF course may be offset from the runway, generally not more than 3 degrees, and the course may be wider than the localizer, resulting in a lower degree of accuracy.

SMALL AIRCRAFT - Aircraft of 12,500 pounds or less, maximum certificated takeoff weight.

SPECIAL-USE AIRSPACE - Airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Types of special-use airspace included:

1. **Alert Area:** Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. Alert areas are depicted on aeronautical charts for the information of nonparticipating pilots.

2. **Controlled Firing Area:** Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons and property on the ground.
3. **Military Operations Area (MOA):** An MOA is an airspace assignment of defined vertical and lateral dimensions established outside positive control areas to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted.
4. **Prohibited Area:** Designated airspace within which the flight of aircraft is prohibited.
5. **Restricted Area:** Airspace designated under FAR Part 73 within which the flight of aircraft, while not wholly prohibited is subject to restriction. Most restricted areas are designated joint use and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency. Restricted areas are depicted on en route charts.
6. **Warning Area:** Airspace, which may contain hazards to nonparticipating aircraft in international airspace.

STANDARD ERROR - A measure of the precision of a coefficient. It tells how reliable the relationship has been measured, the standard deviation for a relationship.

STOPWAY - An area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway, able to support an airplane during an aborted takeoff without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating an airplane during an aborted takeoff.

T-HANGAR - A-T-shaped aircraft hangar that provides shelter for a single plane.

TACTICAL AIR NAVIGATION (TACAN) - An ultra-high frequency electronic air navigation aid which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station. (See VORTAC).

TAXI - The movement of an airplane under its own power on the surface of an airport. Also, it describes the surface movement of helicopters equipped with wheels.

TAXILANE - The portion of the aircraft parking area used for access between taxiways, aircraft parking positions, hangars, storage facilities, etc. A taxilane is outside the movement area.

TAXIWAY - A defined path, from one part of an airport to another, selected or prepared for the taxiing of aircraft.

TERMINAL AREA - The area used or intended to be used for such facilities as terminal and cargo buildings, gates, hangars, shops, other service buildings, automobile parking, airport motels, restaurants, garages, and automobile service.

TERMINAL RADAR APPROACH CONTROL (TRACON) - An FAA traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service may be provided to both civil and military airports. A TRACON is similar to a RAPCON (USAF), RATCF (USN), and ARAC (Army).

TERMINAL RADAR SERVICE AREA (TRSA) - Airspace surrounding designated airports wherein ATC provides radar vectoring, sequencing, and separation on a full-time basis for all IFR and participating VFR aircraft. TRSA's are depicted on VFR aeronautical charts. Pilot participation is urged but is not mandatory.

TERMINAL VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION (TVOR) - An electronic navigation aid that provides guidance, both for en route flights on low altitude "Victor" airways and for non-precision approaches. (See also NONPRECISION APPROACH AID).

THRESHOLD - The beginning of that portion of the runway available and suitable for the landing of airplanes.

TIE-DOWN AREA - A parking area for securing aircraft; can be for overnight (transient operator) or permanent use (in lieu of a hangar).

TIME SERIES DATA - Data that examine a decision unit at different points in time. Trend extrapolation examines a historical pattern of activity and assumes that assumes that those factors, which determined the variation in activity level in the past, will continue to exhibit similar relationships in the future.

TOUCH-AND-GO/TOUCH-AND-GO LANDING - An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway.

TRAFFIC PATTERN - The traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport. The components of a typical pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach.

1. **Upwind Leg:** A flight path parallel to the landing runway in the direction of landing.
2. **Crosswind Leg:** A flight path at right angles to the landing runway off its upwind end.
3. **Downwind Leg:** A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.

4. **Base Leg:** A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.
5. **Final Approach:** A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. An aircraft making a straight-in approach VFR is also considered to be on final approach.

TRANSIENT - Operations or other activity performed by aircraft not based at the airport.

TRANSITIONAL SURFACE - An element of the imaginary surfaces extending outward and upward at right angles to the runway centerline and runway centerline extended at a slope of 7:1 from the sides of the primary and approach surfaces to where they intersect the horizontal and conical surfaces.

ULTRALIGHT VEHICLE - An aeronautical vehicle operated for sport or recreational purposes which does not require FAA registration, an airworthiness certificate, nor pilot certification. They are primarily single-occupant vehicles, although some two-place vehicles are authorized for training purposes. Operation of an ultralight vehicle in certain airspace required authorization from ATC.

UNICOM - A non-government communication facility, which may provide airport information at certain airports. Locations and frequencies of UNICOMS are shown on aeronautical charts and publications.

VISUAL APPROACH RUNWAY - A runway intended for visual approaches only, with no straight-in instrument approach procedure either existing or planned for that runway.

VISUAL DESCENT POINT/VDP - A defined point on the final approach course of a non-precision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided the approach threshold of that runway, or approach lights, or other markings identifiable with the approach end of that runway are clearly visible to the pilot.

VISUAL FLIGHT RULES (VFR) - Rules that govern flight procedures under visual conditions. Also indicates a type of flight plan.

VOR/VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION - A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the National Airspace System. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature. ATC or FSS may use voice features for transmitting instructions/information to pilots. (See Navigational Aid).

VORTAC/VHF OMNIDIRECTIONAL RANGE/TACTICAL AIR NAVIGATION - A navigational aid providing VOR azimuth. TACAN azimuth and TACAN distance measuring equipment (DME) at one site. (See Distance Measuring Equipment, Navigational Aid, TACAN, VOR).

WIDE AREA AUGMENTATION SYSTEM (WAAS) - A system of ground-based facilities providing differential corrections for GPS satellites and intended to support aviation navigation for the en-route, terminal area, nonprecision and Category I precision approaches phase of flight.

WIND COVERAGE - The percent of time for which aeronautical operations are considered safe due to acceptable crosswind components.

WIND ROSE - A graphic depiction of historical prevailing wind patterns by speed and direction at a given location. A series of concentric circles cut by radial lines indicates the average percentage of time during the observation period that winds were occurring at successive wind speed groupings and by true direction. Wind rose data are used primarily for determining optimal runway alignment for wind coverage.

ZONING - The demarcation of a jurisdiction by ordinance into zones and the establishment of regulations to govern the use of the land and the location, height, use, and coverage of structures within each zone.

ABBREVIATIONS

AC	-	Advisory Circular
ADO	-	Airports District Office (FAA)
AFSS	-	Automated Flight Service Station
AGL	-	Above Ground Level
AIP	-	Airport Improvement Program
ALP	-	Airport Layout Plan
ALS	-	Approach Lighting System
ARP	-	Airport Reference Point
ARSA	-	Airport Radar Service Area
ARFF	-	Airport Rescue and Fire Fighting
ASNA	-	Aviation Safety and Noise Abatement Act of 1979
ASR	-	Airport Surveillance Radar
ASV	-	Annual Service Volume
ATC	-	Air Traffic Control
ATCT	-	Airport Traffic Control Tower
BRL	-	Building Restriction Line
DNL	-	Day-Night Average Sound Level
DOT	-	Department of Transportation
EA	-	Environmental Assessment
EIS	-	Environmental Impact Statement
EPA	-	Environmental Protection Agency
FAA	-	Federal Aviation Administration
FAR	-	Federal Aviation Regulations
FBO	-	Fixed Base Operator
GA	-	General Aviation
GPS	-	Global Positioning System
GS	-	Glide Slope
HIRL	-	High-Intensity Runway Lighting
HUD	-	Housing and Urban Development
IFR	-	Instrument Flight Rules
ILS	-	Instrument Landing System
INM	-	Integrated Noise Model
LDA	-	Localizer Directional Aid
LIRL	-	Low-Intensity Runway Lighting
LOC	-	ILS Localizer
METAR	-	Meteorological Aviation Report
MIRL	-	Medium-Intensity Runway Lighting
MITL	-	Medium-Intensity Taxiway Lighting
MLS	-	Microwave Landing System
MOA	-	Military Operating Area
MSL	-	Mean Sea Level
NAVAID	-	Air Navigation Facility/Navigational Aid
NDB	-	Nondirectional Beacon
NEPA	-	National Environmental Policy Act of 1969
NPIAS	-	National Plan of Integrated Airport Systems
OFA	-	Object Free Area

ABBREVIATIONS (continued)

OFZ	-	Obstacle Free Zone
PAPI	-	Precision Approach Path Indicator
R/R²	-	Correlation Coefficient/Determination Coefficient
REIL	-	Runway End Identifier Lights
RPZ	-	Runway Protection Zone
SEPA	-	State Environmental Policy Act
STOL	-	Short Takeoff and Landing
TCA	-	Terminal Control Area
TRACON	-	Terminal Radar Approach Control
TRSA	-	Terminal Radar Service Area
VASI	-	Visual Approach Slope Indicator
VFR	-	Visual Flight Rules
VOR	-	Very High Frequency Omnidirectional Range
WAAS	-	Wide Area Augmentation System