H. A. CLARK MEMORIAL FIELD

Airport Master Plan

AIRPORT MASTER PLAN

for

H.A. CLARK MEMORIAL FIELD
Williams, Arizona

FINAL REPORT

Prepared for the

CITY OF WILLIAMS

by

Stantec Consulting, Inc.

And

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Approved by City Council on May 10, 2007

Table of Contents

CONTENTS

H.A. CLARK MEMORIAL FIELD
Williams, Arizona

Airport Master Plan
Final

INTRODUCTION

Chapter One
INVENTORY

Chapter One (Continued)

Chapter Two
AVIATION DEMAND FORECASTS

Chapter Three
FACILITY REQUIREMENTS

Chapter Three (Continued)

Chapter Four
AIRPORT ALTERNATIVES

Chapter Five
AIRPORT PLANS

Chapter Five (Continued)

Chapter Six
CAPITAL IMPROVEMENT PROGRAM

EXHIBITS

Appendix A
GLOSSARY OF TERMS

Introduction

Introduction

The H.A. Clark Memorial Field Master Plan Update has been undertaken to evaluate the airport's capabilities and role, to forecast future aviation demand, and to plan for the timely development of new or expanded facilities that may be required to meet that demand. The ultimate goal of the Master Plan is to provide systematic guidelines for the airport's overall maintenance, development, and operation.

The Master Plan is intended to be a proactive document which identifies and then plans for future facility needs well in advance of the actual need. This is done to ensure that the City of Williams can coordinate project approvals, design, financing, and construction in a timely manner, prior to experiencing the detrimental effects of inadequate facilities.

An important result of the Master Plan is reserving sufficient areas for future facility needs. This protects development areas and ensures they will be readily available when required to meet future needs. The intended result is a detailed land use concept which outlines specific uses for all areas of airport property.

The preparation of this Master Plan is evidence that the City of Williams recognizes the importance of air transportation to the community and the associated challenges inherent in providing for its unique operating and improvement needs. The cost of maintaining an airport is an investment which yields impressive benefits to the community. With a sound and realistic Master Plan, H.A. Clark Memorial Field can maintain its role as an important link to the national air

transportation system for the community and maintain the existing public and private investments in its facilities.

The City of Williams initiated this Master Plan in 2005 to reevaluate and adjust as necessary the future development plan for the H.A. Clark Memorial Field. The last Master Plan for H.A. Clark Memorial Field was completed in May 1995. Since then, there has been interest from the private sector in initiating an air tour operation at the airport. A tour operation would be provided over the Grand Canyon and other natural features near the City of Williams. This Master Plan is being undertaken to more fully understand the requirements of an air tour operation at the airport. Additionally, this Master Plan is to consider the needs of the future entertainment district planning near the City of Williams.

The City is responsible for funding all capital improvements at the airport and matching Federal Aviation Administration (FAA) and Arizona Department of Transportation (ADOT) - Aeronautics development grants. This Master Plan is intended to provide guidance through an updated capital improvement and financial program to demonstrate the future investments required by the City of Williams at the H.A. Clark Memorial Field. Additionally, the City of Williams desires guidance in operational revenue production at the airport through the use and development of airport property.

The City of Williams desires to understand how the continued growth of the local economy and community will affect demand at the H.A. Clark Memorial Field and also how the airport can act as a catalyst for this growth.

This Master Plan is also intended to assist the City of Williams in protecting the airport from incompatible development, as well as minimizing the impacts of the airport on the local community.

Finally, this Master Plan was initiated to consider the ever-changing needs of the air transportation industry. Since the completion of the last Master Plan, significant changes in the general aviation industry have occurred including the development and introduction of the very light jet or microjet, the Sport Pilot rule, and the continued expansion of corporate aviation and fractional jet ownership. Each of these factors needs to be considered in terms of future facility needs at H.A. Clark Memorial Field.

MASTER PLAN GOALS AND OBJECTIVES

The primary objective of the H.A. Clark Memorial Field Master Plan is to develop and maintain a financially feasible, long term development program which will satisfy aviation demand and be compatible with community development, other transportation modes, and the environment. The accomplishment of this objective requires the evaluation of the existing airport and a determination of what actions should be taken to maintain an adequate, safe, and reliable airport facility to meet the air transportation needs of the area. The completed Master Plan will provide an outline of the necessary development and give responsible officials advance notice of future needs to aid in planning, scheduling, and budgeting.

Specific goals and objectives of the H.A. Clark Memorial Field Master Plan are:

- **Preserve Public and Private Investments**

The City of Williams, United States Government (through the Federal Aviation Administration [FAA]), and State of Arizona (through the Department of Transportation – Aeronautics Division [ADOT]) have made considerable investments in the airport's infrastructure. Private individuals and businesses have made investments in buildings and other facilities. The Master Plan will provide for continued maintenance and necessary improvements to the airport's infrastructure to ensure maximum utility of the private facilities at H.A. Clark Memorial Field and ensure the continued use of publicly-funded facilities.

- **Be Reflective of Community Goals and Objectives**

The H.A. Clark Memorial Field is a public facility serving the needs of the local residents and businesses. The Master Plan needs to be reflective of the desires and visions the local communities have for quality of life, business and development, and land use. The Master Plan will consider existing community planning documents for surrounding communities and the County in the ultimate design and use of the airport.

- **Maintain Safety**

Safety is an essential consideration in the planning and development at the airport. The Master Plan will focus on maintaining the highest levels of safety for airport users, visitors, employees, and surrounding communities.

- **Preserve the Environment**

Protection and preservation of the local environment are essential concerns in the Master Plan. Any improvements called for in the Master Plan will be mindful of environmental requirements.

- **Attract Public Participation**

To ensure that the Master Plan reflects the concerns of the public, the local communities, airport tenants, airport users, and businesses throughout the region, the Master Plan process will include an active public outreach program to solicit comments and suggestions and include them in the final Master Plan, to the extent possible.

- **Strengthen the Economy**

In continuing support of the area's growing economy, the Master Plan is aimed at retaining and increasing jobs and revenue for the region and its businesses.

The Master Plan will accomplish these objectives by carrying out the following:

- Determining projected needs of airport users through the year 2025.
- Identifying existing and future facility needs including those of an air tour operator.
- Determining the optimal length of Runway 18-36 and whether a runway extension is needed.
- Identifying land on existing airport property that may be in excess of aviation demand through the planning period and may be used for non-aviation purposes in the interim.
- Developing a realistic, commonsense plan for the use and/or expansion of the airport.
- Developing land use strategies for the use of airport property.
- Establishing a schedule of development priorities and a program for improvements.
- Analyzing the airport's financial requirements for capital improvement needs and grant options.
- Coordinating this Master Plan with local, regional, state, and federal agencies.
- Conducting active and productive public involvement through the planning process.

BASELINE ASSUMPTIONS

While the ultimate recommendations of this Master Plan have yet to be determined, a study such as this typically requires several baseline assumptions that will be used throughout the analysis. The baseline assumptions for this study are as follows:

- H.A. Clark Memorial Field will remain as a general aviation airport through the planning period.
- The City of Williams and Coconino County population, employment, and economy will continue to grow positively through the 20-year period of this Master Plan. Specifics of projected growth are contained in Chapter Two, Aviation Demand Forecasts.
- The general aviation industry will continue to grow positively through the planning period. Specifics of projected growth in the national general aviation industry are contained in Chapter Two, Aviation Demand Forecasts.
- Both a federal program and state program will be in place through the planning period to assist in funding future capital development needs.

MASTER PLAN ELEMENTS AND PROCESS

The H.A. Clark Memorial Field Master Plan Update is being prepared in a systematic fashion following FAA guidelines and industry-accepted principles and practices. The Master Plan update for H.A. Clark Memorial Field has six general elements that are intended to assist in the discovery of future facility needs and provide the supporting rationale for their implementation. **Exhibit IA** provides a graphical depiction of the process and elements involved in the H.A. Clark Memorial Field Master Plan Update.

Element One encompasses the inventory efforts. The inventory efforts are focused on collecting and assembling relevant data pertaining to the airport and the area it serves. Information is collected on existing airport facilities and operations. Local economic and demographic data are collected to define the local growth trends. Planning studies which may have relevance to the Master Plan are also collected. Information collected during the inventory efforts is summarized in Chapter One, Inventory.

Element Two examines the potential aviation demand for aviation activity at the airport. This analysis utilizes local socioeconomic information, as well as national air transportation trends to quantify the levels of aviation activity which can reasonably be expected to occur at H.A. Clark Memorial Field though the year 2025. This includes general aviation based aircraft and annual aircraft operations by type. The number of based aircraft and operations from an air tour operation will also be considered. The results of this effort are used to determine the types and sizes of facilities which will be required to meet the projected aviation demands for the airport through the planning period. The results of this analysis are presented in Chapter Two, Aviation Demand Forecasts.

Element Three comprises the facility requirements analysis. The intent of this analysis is to compare the existing facility capacities to forecast aviation demand and determine where deficiencies in capacities (as well as excess capacities) may exist. Where deficiencies are identified, the size and type of new facilities to accommodate the demand are identified. The airfield analysis focuses on improvements needed to serve the type of aircraft expected to operate at the airport in the future, as well as navigational aids to increase the safety and efficiency of operations. This element also examines aircraft storage hangars and apron needs. The findings of this analysis are presented in Chapter Three, Facility Requirements.

Element Four considers a variety of solutions to accommodate the projected facility needs. This element proposes various facility and site plan configurations to efficiently and effectively use the available airport property. A thorough analysis is completed to identify the strengths and weaknesses of each proposed development alternative, with the intention of determining a single direction for development. These results are presented in Chapter Four, Airport Development Alternatives.

Element Five comprises two independent, yet interrelated work efforts: a recommended development plan and an environmental overview. Chapter Five, Airport Plans, presents a graphic and narrative description of the recommended plan for the use, development, and operation of the airport, and a review of federal environmental requirements applicable to H.A. Clark Memorial Field. The official Airport

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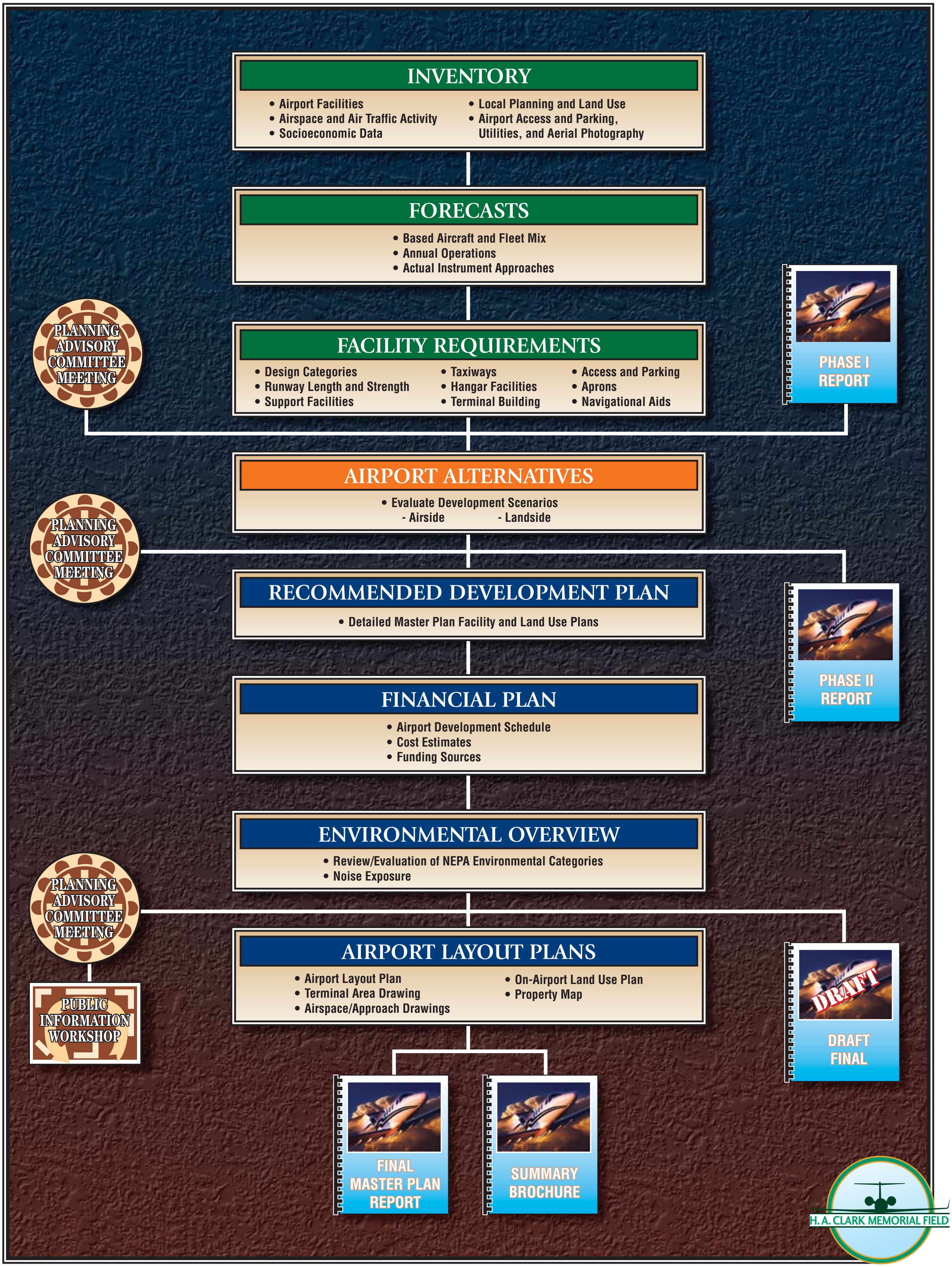

Exhibit IA
MASTER PLAN PROCESS

Layout Plan (ALP) drawings used by the FAA and the ADOT in determining grant eligibility and funding will be included as an appendix to the Master Plan.

Element Six focuses on the capital needs program. This program defines the schedules, costs, and funding sources for the recommended development projects. The Capital Improvement Program will be included in Chapter Six.

COORDINATION

The H.A. Clark Memorial Field Master Plan Update is of interest to many within the local community. This includes local citizens, community organizations, airport users, airport tenants, area-wide planning agencies, and aviation organizations. As an important component of the regional, state, and national aviation systems, the Master Plan Update is of importance to both state and federal agencies responsible for overseeing air transportation.

To assist in the development of the H.A. Clark Memorial Field Master Plan Update, the City of Williams has identified a cross-section of community members and interested persons to act in an advisory role in the development of the Master Plan. As members of the Planning Advisory Committee (PAC), the committee members will review phase reports and provide comments throughout the study to help ensure that a realistic, viable plan is developed.

To assist in the review process, draft phase reports are prepared at three milestones in the planning process as shown on **Exhibit IA**. The draft phase report process allows for input and review during each step of the Master Plan process to ensure that all Master Plan issues are fully addressed as the recommended program is developed.

One public information workshop is also included as part of the plan coordination. The public information workshop allows the public to provide input and learn about general information concerning the Master Plan. The Master Plan report will also be available on the internet via the consultant's web page: www.coffmanassociates.com.

SUMMARY AND RECOMMENDATIONS

The proper planning of a facility of any type must consider the demand that may occur in the future. For H.A. Clark Memorial Field, this involved updating forecasts to identify potential future aviation demand. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty year-to-year fluctuations in activity when looking five, ten, and twenty years into the future.

Recognizing this reality, the Master Plan is keyed more to potential demand "horizon" levels than future dates in time. These "planning horizons" were established as levels of activity that will call for consideration of the implementation of the next step in the Master Plan program. By developing the airport to meet the aviation demand levels instead of specific points in time, the airport will serve as a safe and efficient aviation facility which will meet the operational demands of its users while being developed in a cost-efficient manner. This program allows airport management to adjust specific development in response to unanticipated needs or demand. The forecast planning horizons are summarized in **Table A**.

TABLE A
Planning Horizon Summary
H.A. Clark Memorial Field

	Current	Short Term	Intermediate Term	Long Range
Based Aircraft	13	19	25	34
Annual Operations				
General Aviation Itinerant	3,840	4,700	5,300	6,900
Air Tour Itinerant	--	4,500	7,500	12,000
General Aviation Local	360	800	1,800	2,900
Total Operations	4,200	10,000	14,600	21,800

The Airport Layout Plan set has also been updated to act as a blueprint for everyday use by management, planners, programmers, and designers. These plans were prepared on computer to help ensure their continued use as an everyday working tool for airport management.

This Master Plan is an update of the previous Master Plan completed in 1995. Since the completion of that plan, Runway 18-36 has been resurfaced, widened to 100 feet, line of sight enhanced, and Runway 2-20 has been closed. The terminal apron and the airline terminal building were constructed in 2000 on the southeast side of the runway. The general aviation apron area was expanded to the north in the spring of 2006. This expansion provides additional aircraft tie-downs and space for up to two 20-unit T-hangars. Both 100LL and Jet-A fuel storage and dispensing have been developed in the area between the airline terminal apron and the main apron area. Several hangar facilities have also been removed. An AWOS has been installed at the airport on the west side of the runway adjacent to the segmented circle and wind cone. **Exhibit IB** depicts the updated plan.

The airfield plan for H.A. Clark Memorial Field focuses on meeting Federal Aviation Administration (FAA) design and safety standards, widening all taxiways to 50 feet, constructing additional exit taxiways along Runways 18-36, establishing a precision instrument approach to Runway 36 and a new approach to Runway 18, and preserves the ability to lengthen primary Runway 18-36 2,000 feet to the north to achieve an ultimate length of 8,000 feet.

The landside plan provides for the expansion of the existing terminal building, the construction of a new airport maintenance building, an aircraft res-

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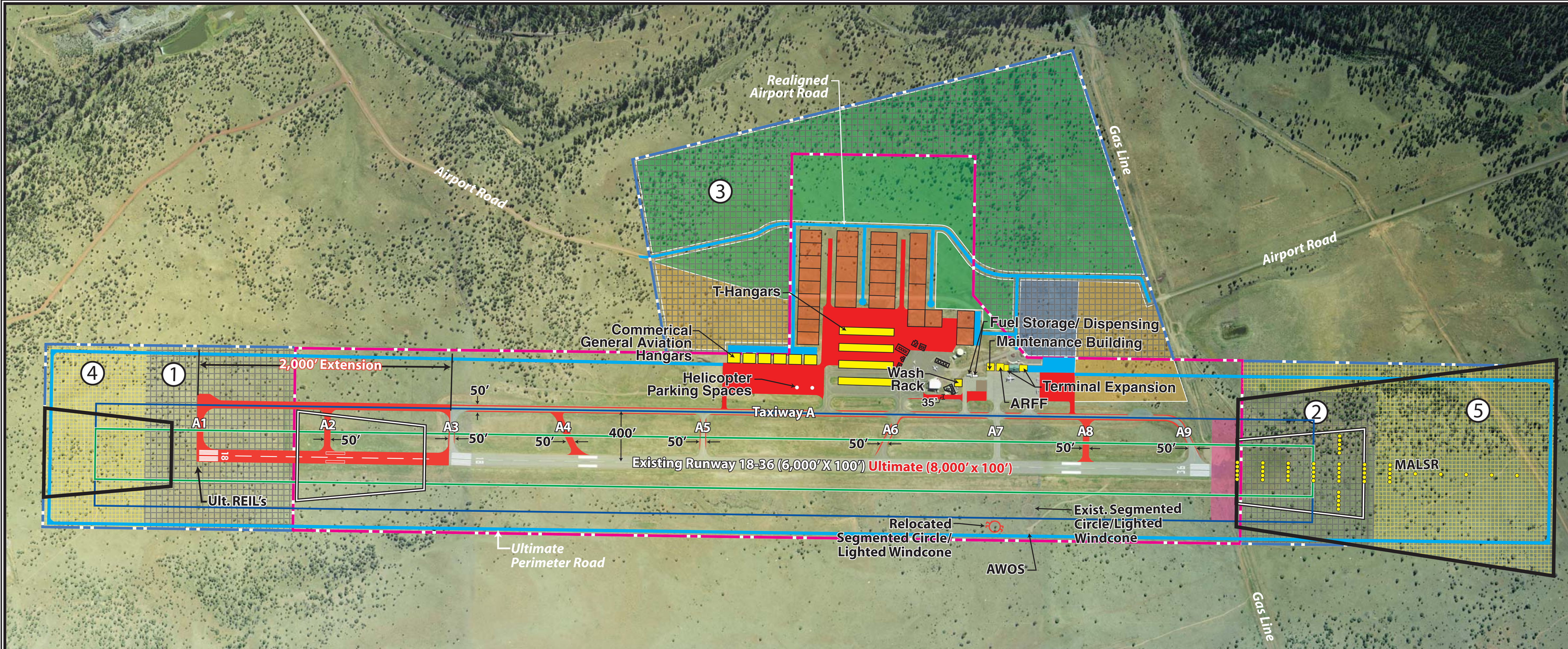

LEGEND

- Existing Property Line
- Ultimate Property Line
- Ultimate Runway Safety Area (RSA)
- Ultimate Object Free Area (OFA)
- Ultimate Pavement
- Ultimate Roads/Parking
- XXX Buildings to be Removed
- Aircraft Storage Parcels
- Reserved for Non-Airfield Access Revenue Support
- Reserved for Terminal Support
- Reserved for Airfield Access Revenue Support
- Yavapai Ranch Land Exchange Areas
- Land for Approach Protection
- Precision Obstacle Free Zone
- Existing Runway Protection Zone (RPZ)
- Ultimate Runway Protection Zone (RPZ)

KEY

1 - 40 Acres
2 - 30 Acres
3 - 124 Acres
4 - 27 Acres
5 - 56 Acres
RPZ - Runway Protection Zone
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Lighting
AWOS - Automated Weather Observing System
ARFF - Aircraft Rescue and Firefighting

NORTH

0 800 1600
SCALE IN FEET

H.A. CLARK MEMORIAL FIELD

Exhibit IB
AIRSIDE DEVELOPMENT PLAN

cue and firefighting (ARFF) facility, development of aircraft storage facilities and parcels, non-airfield access revenue support development parcels, construction of an aircraft wash rack, and helicopter parking spaces.

SHORT TERM PLANNING HORIZON IMPROVEMENTS

- Widen Taxiway A to 50 feet
- Replace rotating beacon
- Land acquisition for airside and landside expansion
- Construct airport perimeter road
- Terminal apron expansion
- Terminal building expansion
- Terminal automobile parking lot expansion
- Install medium intensity taxiway lighting (MITL)
- Construct aircraft wash rack
- Construct helipads
- Construct maintenance facility

INTERMEDIATE TERM PLANNING HORIZON IMPROVEMENTS

- Install instrument landing system (ILS)
- Expand fuel apron
- Expand terminal automobile parking lot
- Construct commercial hangar apron
- Airport Road realignment
- Construct additional hangar facilities
- Pavement preservation

LONG RANGE PLANNING HORIZON IMPROVEMENTS

- Construct additional hangar facilities
- Construct high-speed exit taxiway
- Construct 90-degree exit taxiway
- Expand general aviation and commercial aprons
- Construct parcel taxilanes and ground access roads
- Extend Runway 18-36 and Taxiway A 2,000 feet
- Pavement preservation

Detailed costs were prepared for each development item included in the program. As shown in **Table B**, complete implementation of the plan will require a total financial commitment of approximately $41.2 million dollars over the long-term planning horizon. Over 96 percent of the recommended program funding could be funded through state or federal grant-in-aid programs. The source for federal monies is through the Airport Improvement Program (AIP) administered by the FAA established to maintain the integrity of the air transportation system. Federal monies could come from the Aviation Trust Fund, which is the depository for federal aviation taxes such as those from airline tickets, aviation fuel, aircraft registrations, and other aviation-related fees. Federal AIP funding of 95 percent can be received from the FAA for eligible projects.

The Arizona Department of Transportation (ADOT) also provides a separate state funding mechanism which receives annual funding appropriation from collection of statewide aviation-related taxes. Eligible projects can receive up to 90 percent funding from ADOT for non-federally funded projects, and one-half (2.5 percent) of the local share for projects receiving federal AIP funding. The following table depicts the breakdown of federal, state, and local funding for the implementation of the Master Plan.

TABLE B
Development Funding Summary
H.A. Clark Memorial Field

PLANNING HORIZON	Total Costs	FAA Share	ADOT Share	Local Share
Short Term Program	$11,535,625	$8,848,134	$2,232,466	$455,026
Intermediate Program	12,757,900	12,120,005	318,948	318,948
Long Range Program	16,888,500	13,962,863	2,339,119	586,519
TOTAL PROGRAM COSTS	**$41,182,025**	**$34,931,001**	**$4,890,532**	**$1,360,492**

With the airport master plan completed, the most important challenge is implementation. The cost of developing and maintaining aviation facilities is an investment which yields impressive benefits for the community. This plan and associated development program provides the tools airport management will require to meet the challenges of the future. By providing a safe and efficient facility, the H.A. Clark Memorial Field will continue to be a valuable asset to the City of Williams and the surrounding community.

Chapter One

Inventory

Chapter One

Inventory

The initial step in the preparation of the airport master plan for H.A. Clark Memorial Field (CMR) is the collection of information pertaining to the airport and the area it serves. The information summarized in this chapter will be used in subsequent analyses in this study. It includes:

- Physical inventories and descriptions of the facilities and services currently provided at the airport, including the regional airspace, air traffic control, and aircraft operating procedures.

- Background information pertaining to Coconino County and the Williams community, including descriptions of the regional climate, surface transportation systems, H.A. Clark Memorial Field's role in the regional, state, and national aviation systems, and development that has taken place recently at the airport.

- Population and other significant socioeconomic data which can provide an indication of future trends that could influence aviation activity at the airport.

- A review of existing local and regional plans and studies to determine their potential influence on the development and implementation of the airport master plan.

The information in this chapter was obtained from several sources, including on-site inspections, interviews with City staff and airport tenants, airport records, related studies, the Federal Aviation Administration (FAA) and a number of internet sites.

A complete listing of the data sources is provided at the end of this chapter.

AIRPORT SETTING

The City of Williams, founded in 1880, is located in the north central portion of Arizona, approximately 35 miles west of Flagstaff and 110 miles east of Kingman. Williams is easily accessible off Interstate 40, which crosses northern Arizona. H.A. Clark Memorial Field is located approximately three miles north of the City on approximately 303 acres in the Kaibab National Forest in west-central Coconino County. **Exhibit 1A** illustrates the location of H.A. Clark Memorial Field in its regional setting. The airport is accessible via Airport Road.

REGIONAL ACCESS

Interstate 40 provides automobile access to the City of Williams. Amtrak currently provides rail service to the City of Williams. The Amtrak platform has been in operation since its construction near the Fray Marcos Hotel in 1999. The platform is located approximately two miles south of H.A. Clark Memorial Field. There are currently no bus services to the City of Williams.

OWNERSHIP AND MANAGEMENT

H.A. Clark Memorial Field is owned, operated, and maintained by the City of Williams. An Airport Advisory Committee provides recommendations to the City Council on the administration and development of the airport. The Airport Advisory Committee is made up of ten members and is headed by the Chairman who is appointed by the Mayor and serves a term of one year. The City of Williams currently employs a part-time airport manager. The airport manager handles the administrative duties at the airport.

AIRPORT DEVELOPMENT HISTORY

To assist in funding capital improvements, the FAA has provided funding assistance to H.A. Clark Memorial Field through the Airport Improvement Program (AIP). The AIP is funded through the Aviation Trust Fund, which was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances a portion of the operation of the FAA. It is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts.

Table 1A summarizes FAA AIP grants received by H.A. Clark Memorial Field since 1999. The FAA has provided more than $5.7 million for airport improvements at H.A. Clark Memorial Field over the past seven years.

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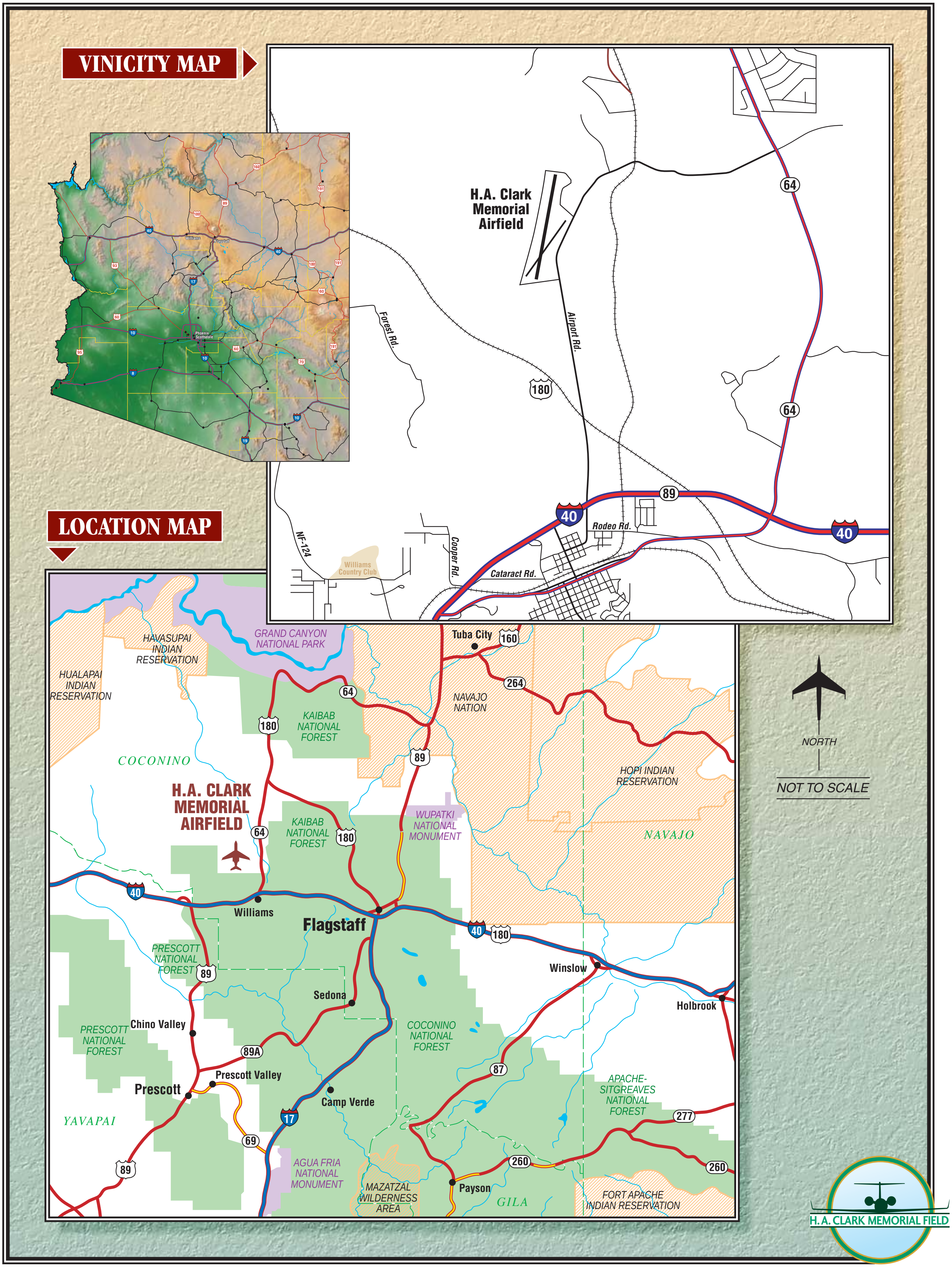

Exhibit 1A
LOCATION MAP

TABLE 1A AIP Grants Offered to City of Williams			
Fiscal Year	**AIP Grant Number**	**Project Description**	**Total Grant Funds**
1999	AIP-10	Rehabilitate Runway 18-36; Runway Gradient Modifications and Widening (Phase I)	$779,492
2000	AIP-11	Rehabilitate Runway 18-36; Runway Gradient Modifications and Widening (Phase II); Install Wildlife Fence	$1,932,839
2001	AIP-12	Airport Rescue Fire Fighting Equipment	$227,650
2002	AIP-13	Airport Apron Expansion (Phase I)	$292,056
2002	AIP-14	Airport Apron Expansion (Phase II)	$590,000
2003	AIP-15	Airport Rescue Fire Fighting Building (Phase I)	$150,000
2004	AIP-16	Airport Rescue Fire Fighting Building (Phase II); PAPI; REILs Runway 18-36	$364,240
2004	AIP-17	Update Airport Master Plan	$122,931
2005	AIP-18	Airport Apron Expansion (Phase III)	$1,187,500
2006	AIP-19	Environmental Assessment – Land Acquisition	$150,000
Total Grant Funds			$5,796,708

Source: Airport Records
PAPI – Precision Approach Path Indicator
REIL – Runway End Identifier Lights

Between 1994 and 2005, the Arizona Department of Transportation (ADOT), Aeronautics Division, invested $3.3 million in improvements at H.A. Clark Memorial Field. **Table 1B** summarizes these projects and their total expenditures over this period.

THE AIRPORT'S SYSTEM ROLE

Airport planning exists on many levels: local, regional, and national. Each level has a different emphasis and purpose. This master plan is the primary local airport planning document.

The previous H.A. Clark Memorial Field Airport Master Plan was completed in 1995. The primary recommendations from this master plan were to extend Runway 18-36 to 8,000 feet, to develop an airport terminal facility and apron, to develop a general aviation apron for aircraft parking, and the development of T-hangar and fixed base operator (FBO) facilities. Since the last master plan, the terminal facility has been constructed, a general aviation apron is currently in the process of being constructed, and an FBO conventional hangar was constructed.

At the state level, H.A. Clark Memorial Field is included in the *Arizona State Aviation System Plan* (SASP). The purpose of the SASP is to ensure that the State has an adequate and efficient system of airports to serve its aviation needs. The SASP defines the specific role of each airport in the State's aviation system and establishes funding needs. Through the State's continuous aviation system planning process, the SASP is updated every five years. The most recent update to the SASP was in 2000, when the State Aviation Needs Study (SANS) was prepared. The SANS provides policy guidelines that promote and maintain a safe aviation system in the State, assess the State's airport's capital improvement needs, and identify resources and strategies to implement the plan. H.A. Clark Memorial Field is one of 112 airports included in the 2000 SANS, which includes all airports and heliports in Arizona that are open to the public, including American Indian and recreational airports. The SANS classifies H.A. Clark Memorial Field as a general aviation airport.

TABLE 1B
State Grants Offered to City of Williams

Fiscal Year	ADOT Grant Number	Project Description	Total Grant Funds
1994	N439	Grade, Drain & Surface Parallel Taxiway; Fire Protection	$44,179
1995	N542	Grade, Drain & Surface Runway 18/36; AWOS; Environmental Assessment	$472,200
1995	N562	Grade, Drain & Surface Runway 18/36 Width & Extension & Taxiway; MIRL; AWOS	$54,534
1998	EN854	Terminal	$315,000
1998	EN874	Grade, Drain & Surface Runway, Apron, Access Road; Taxiway Signage; Security Fence; Utilities	$270,000
1999	E9031	Grade, Drain & Surface Apron; Fencing; AWOS	$591,750
2000	E0126	Runway Construction; Runway Structural Upgrade; Terminal; AWOS	$760,000
2001	E1134	Widen & Overlay Runway 18/36; Runway Gradient Modifications; Install Taxiway Guidance Signs; Construct General Aviation Parking Apron; Wildlife Fence	$94,880
2002	E3F36	Airport Rescue Fire Fighting Equipment	$11,175
2002	E3F37	Airport Apron Expansion (Phase I)	$14,337
2002	E3F78	Airport Apron Expansion (Phase II)	$28,962
2003	E4F50	Airport Rescue Fire Fighting Building (Phase I)	$7,363
2004	E5F74	Airport Rescue Fire Fighting Building (Phase II); PAPI; REIL Runway 18-36	$9,585
2004	E5F75	Update Airport Master Plan	$90,000
2004	E5S22	Pave Terminal Parking Lot	$90,000
2004	E5S23	Drainage/Fire Protection Upgrade Study	$90,000
2005	E6S09	Construct Helicopter Parking Apron; Fire Protection Facilities & ARFF Building; Runway Drainage and Erosion Control; Parallel Taxiway Extension;	$405,000
Total State Grant Funds			$3,348,965

Source: Airport Records

AWOS – Automated Weather Observation System
PAPI – Precision Approach Path Indicator
REIL – Runway End Identifier Lights

At the national level, H.A. Clark Memorial Field is designated within the FAA's *National Plan of Integrated Airport Systems* (NPIAS). Inclusion within the NPIAS allows the airport to be eligible for Federal Airport Improvement Program (AIP) funding. H.A. Clark Memorial Field is classified as a general aviation airport in the NPIAS. A total of 3,489 airports across the country are included in the NPIAS. This number includes existing and proposed airports. H.A. Clark Memorial Field is one of 59 airports in the State of Arizona that are included in the NPIAS and one of 37 airports in Arizona classified as a General Aviation Airport.

AIRPORT FACILITIES

Airport facilities can be functionally classified into two broad categories: airside and landside. The airside category includes those facilities directly associated with aircraft operations. The landside category includes those facilities necessary to provide a safe transition from surface to air transportation and support aircraft servicing, storage, maintenance, and operational safety.

AIRSIDE FACILITIES

Airside facilities include runways, taxiways, airfield lighting, and navigational aids. Airside facilities are identified on **Exhibit 1B. Table 1C** summarizes airside facility data.

TABLE 1C
Airside Facility Data
H.A. Clark Memorial Field

	Runway 18-36	
Length (ft.)	6,000	
Width (ft.)	100	
Surface Material	Asphalt	
Load Bearing Strength (SWL)	15,000	
Instrument Approach Procedures	None	
Runway Edge Lighting	Medium Intensity	
Pavement Markings	Nonprecision	
Taxiway Edge Lighting	None	
Approach Aids	**Rwy 18**	**Rwy 36**
Global Positioning System (GPS)	No	No
Precision Approach Path Indicators (PAPI)	Yes	Yes
Runway End Identifier Lights	Yes	Yes
Elevation	6,624.5	6,684.7
Fixed Wing Aircraft Traffic Pattern	Left	Left
Weather or Navigational Aids	AWOS-III; Segmented Circle Lighted Wind Cone; Rotating Beacon	

Source: 1996 Airport ALP, 5010 Airport Master Record
AWOS – Automated Weather Observing System

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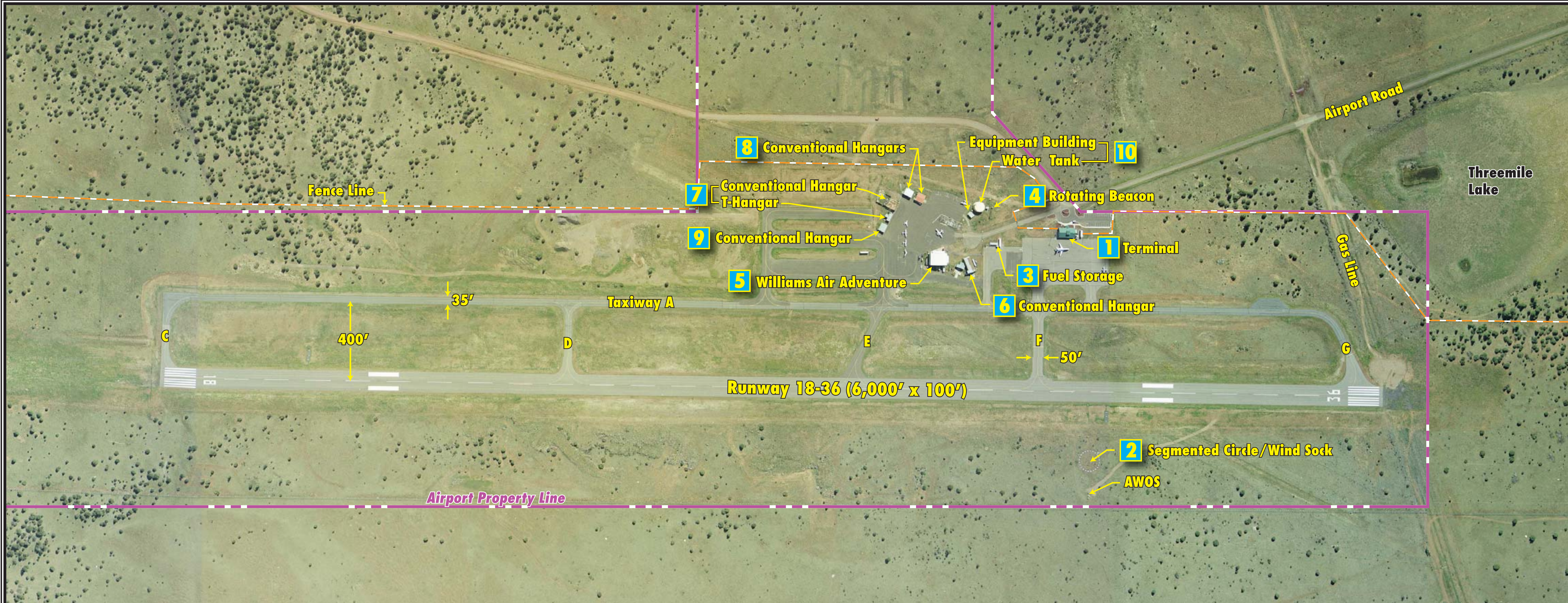
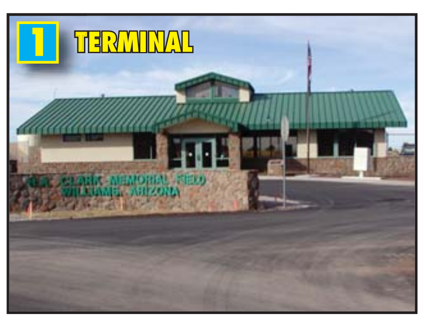


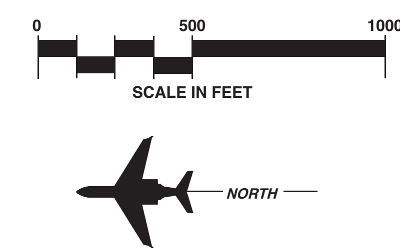

1 TERMINAL


2 SEGMENTED CIRCLE/ WIND SOCK


3 FUEL STORAGE


4 ROTATING BEACON


5 WILLIAMS AIR ADVENTURE




6 CONVENTIONAL HANGARS


7 CONVENTIONAL HANGARS


8 CONVENTIONAL HANGARS


9 CONVENTIONAL HANGARS


10 WATER TANK & EQUIPMENT BUILDING

H.A. CLARK MEMORIAL FIELD

Exhibit 1B
EXISTING FACILITIES

Runway

H.A. Clark Memorial Field is served by a single asphalt runway. Runway 18-36 is 6,000 feet long and 100 feet wide. Runway 18-36 is oriented in a north-south manner and has a load bearing strength of 15,000 pounds single wheel loading (SWL). SWL refers to the design of certain aircraft landing gears having a single wheel on each main landing gear. The runway slopes upward from south to north. The Runway 36 elevation is 60.6 feet higher than the Runway 18 end. This equates to a runway gradient (difference in runway elevations divided by the length of the runway) of 1.0 percent.

Taxiways

The existing taxiway system at H.A. Clark Memorial Field is shown on **Exhibit 1B**. Taxiway A is the full-length parallel taxiway located on the east side of Runway 18-36 and connects to the main public apron areas. Taxiway A is located 400 feet from the Runway 18-36 centerline. Taxiway A has an additional five exit taxiways serving Runway 18-36 (Taxiways C, D, E, F and G); all are 35 feet wide. The taxiway system at H.A. Clark Memorial Field is not currently equipped with any type of lighting.

Pavement Condition

As a condition of receiving federal funds for the development of the airport, the Federal Aviation Administration requires the airport sponsor receiving and/or requesting federal funds for pavement improvement projects implement a pavement maintenance management program.

Part of the pavement maintenance management program is to develop a Pavement Condition Index (PCI) rating. The rating is based on the guidelines contained in FAA Advisory Circular 150/5380-6, *Guidelines and Procedures for Maintenance of Airport Pavements.*

The PCI procedure was developed to collect data that would provide engineers and managers with a numerical value indicating overall pavement conditions and that would reflect both pavement structural integrity and operational surface condition. A PCI survey is performed by measuring the amount and severity of certain distresses (defects) observed within a pavement sample unit.

In July 2000, a pavement inspection was conducted at H.A. Clark Memorial Field by the Arizona Department of Transportation. Runway 18-36 was found to have a PCI rating of 69 out of a possible 100. The runway had cracking, weathering/raveling distress. Taxiway A was found to have a PCI rating of 99 out of a possible 100. The terminal apron was found to have a PCI rating of 100, and the hangar apron area was found to have a PCI rating of 76 out of a possible 100 with cracking distress.

Airfield Lighting

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the airport for this purpose. These lighting systems, categorized by function, are summarized as follows.

Identification Lighting: The location of an airport at night is universally identified by a rotating beacon. A rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The rotating beacon at H.A. Clark Memorial Field is located on the east end of the field adjacent to Airport Road and the equipment building as shown on **Exhibit 1B**.

Pavement Edge Lighting: Pavement edge lighting utilizes light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runway and aircraft parking areas. Runway 18-36 is equipped with medium intensity runway lighting (MIRL).

Pilot-Controlled Lighting: Airfield lighting systems can be controlled through a pilot-controlled lighting system (PCL). A PCL allows pilots to turn on or increase the intensity of the airfield lighting systems from the aircraft with the use of the aircraft's radio transmitter. The Runway 18-36 MIRL is connected to the PCL system at H.A. Clark Memorial Field.

Visual Approach Lighting: A precision approach path indicator (PAPI-2) is available for Runways 18 and 36. The PAPIs provide approach path guidance with a series of light units. The two-unit PAPIs give the pilot an indication of whether their approach is above, below, or on-path, through a pattern of red and white light visible from the light units.

Airfield Signs: Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. Current airfield signage includes a mixture of lighted and unlighted signs installed at all taxiway and runway intersections.

Runway Threshold Lighting: Runway threshold lights identify the runway end. Runway threshold lights have specially designed lights that are green on one side and red on the other. The green side is oriented towards the landing aircraft. There are eight threshold lights at each runway end.

Runway End Identification Lighting: Runway end identifier lights (REILs) provide rapid and positive identification of the approach end of a runway. REILs are typically used on runways without more sophisticated approach lighting systems. The REIL system consists of two synchronized flashing lights, located laterally on each side of the runway facing the approaching aircraft. REILs are installed at each runway end.

Pavement Markings

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. The nonprecision markings on Runway 18-36 identify the runway centerline, threshold, designation, touchdown point, and aircraft holding positions.

Taxiway and apron taxilane centerline markings are provided to assist aircraft using these airport surfaces. Centerline markings assist pilots in maintaining proper clearance from pavement edges and objects near the taxilane/taxiway edges. Pavement markings also identify aircraft parking positions.

Weather Reporting

H.A. Clark Memorial Field is equipped with an Automated Weather Observing System (AWOS). The AWOS-III provides automated aviation weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The AWOS system reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The AWOS is located west of the segmented circle and wind cone.

H.A. Clark Memorial Field is equipped with a lighted wind cone and segmented circle. The wind cone provides wind direction and speed information to pilots. The segmented circle provides aircraft traffic pattern information. All this equipment is located west of the runway and apron.

Area Airspace and Air Traffic Control

The *Federal Aviation Administration (FAA) Act of 1958* established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Airspace System (NAS) to protect persons and property on the ground and to establish a safe and efficient airspace environment for civil, commercial, and military aviation. The NAS covers the common network of U.S. airspace, including air navigation facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. The system also includes components shared jointly with the military.

Airspace Structure

Airspace within the United States is broadly classified as either "controlled" or "uncontrolled." The difference between controlled and uncontrolled airspace relates primarily to requirements for pilot qualifications, ground-to-air communications, navigation and air traffic services, and weather conditions. Six classes of airspace have been designated in the United States as shown on **Exhibit 1C**. Airspace designated as Class A, B, C, D, or E is considered controlled airspace. Aircraft operating within controlled airspace are subject to varying require-

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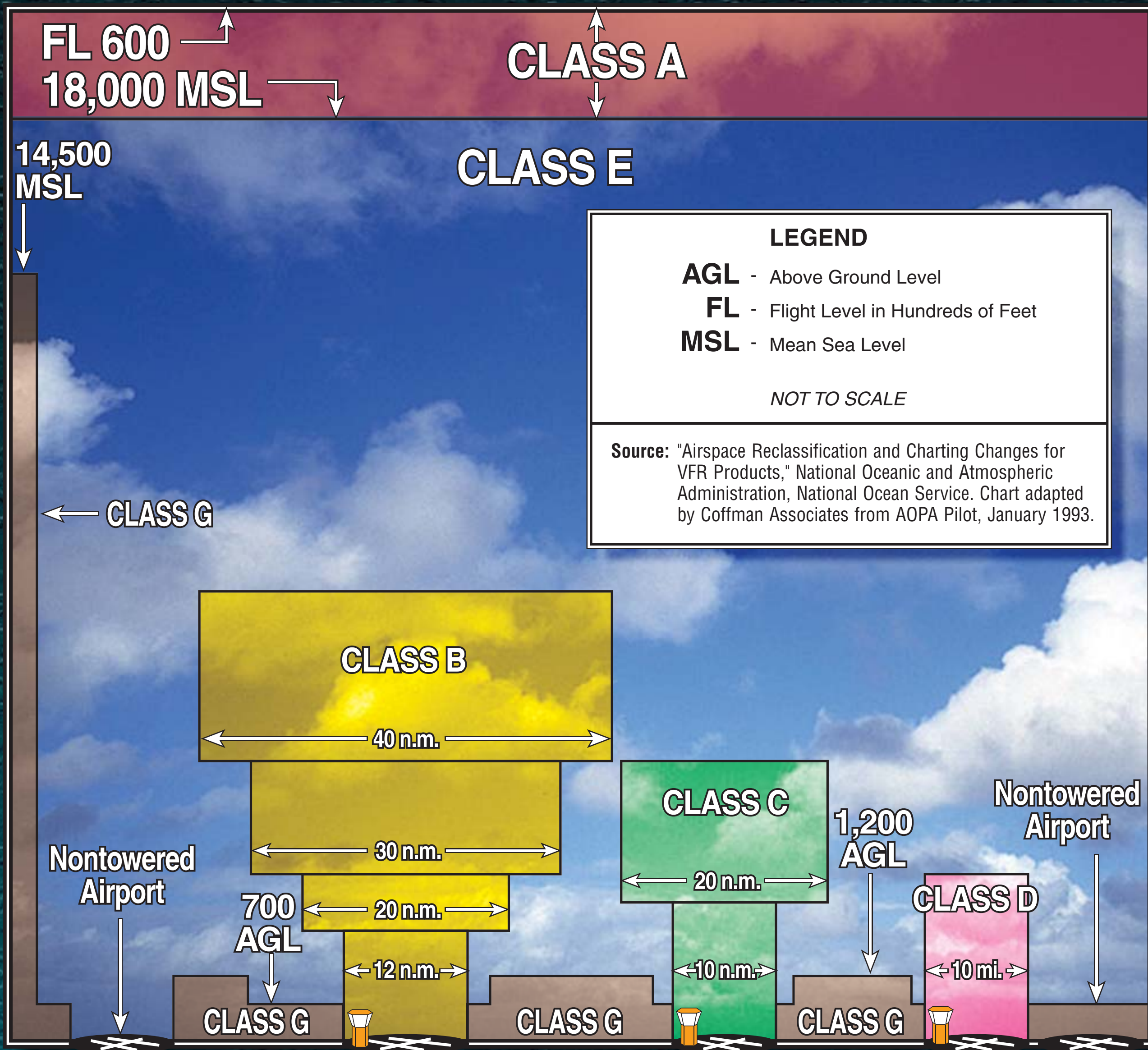

CLASSIFICATION	DEFINITION
CLASS A	Generally airspace above 18,000 feet MSL up to and including FL 600 .
CLASS B	Generally multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports.
CLASS C	Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.
CLASS D	Generally airspace from the surface to 2,500 feet AGL surrounding towered airports.
CLASS E	Generally controlled airspace that is not Class A, Class B, Class C, or Class D.
CLASS G	Generally uncontrolled airspace that is not Class A, Class B, Class C, Class D, or Class E.

H. A. CLARK MEMORIAL FIELD

Exhibit 1C
AIRSPACE CLASSIFICATION

ments for positive air traffic control. Airspace in the vicinity of H.A. Clark Memorial Field is depicted on **Exhibit 1D**.

Class A Airspace: Class A airspace includes all airspace from 18,000 feet mean sea level (MSL) to flight level (FL) 600 (approximately 60,000 feet MSL). This airspace is designated in Federal Aviation Regulation (F.A.R.) Part 71.193 for positive control of aircraft. The Positive Control Area (PCA) allows flights governed only under IFR operations. The aircraft must have special radio and navigation equipment, and the pilot must obtain clearance from an air traffic control (ATC) facility to enter Class A airspace. In addition, the pilot must possess an instrument rating.

Class B Airspace: Class B airspace has been designated around some of the country's major airports to separate arriving and departing aircraft. Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. This airspace is the most restrictive controlled airspace routinely encountered by pilots operating under visual flight rules (VFR) in an uncontrolled environment. The nearest Class B airspace to H.A. Clark Memorial Field is located at Phoenix Sky Harbor International Airport.

In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigational equipment and must obtain clearance from air traffic control. To operate within the Class B airspace of Phoenix Sky Harbor International Airport, a pilot must have at least a private pilot's certificate or be a student pilot who has met the requirements of F.A.R. Part 61.95, which requires special ground and flight training for the Class B airspace. Helicopters do not need special navigation equipment or a transponder if they operate at or below 1,000 feet and have made prior arrangements in the form of a Letter of Agreement with the FAA controlling agency. Aircraft are also required to have and utilize a Mode C transponder within a 30-nautical-mile (NM) range of the center of the Class B airspace. A Mode C transponder allows the ATCT to track the location of the aircraft.

The Phoenix Terminal Radar Approach Control Facility (TRACON) controls all aircraft operating within the Phoenix Class B airspace. The TRACON operates 24 hours per day.

Class C Airspace: The FAA has established Class C airspace at 120 airports around the country as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. In order to fly inside Class C airspace, the aircraft must have a two-way radio, an encoding transponder, and have established communication with ATC. Aircraft may fly below the floor of the Class C airspace or above the Class C airspace ceiling without establishing communi-

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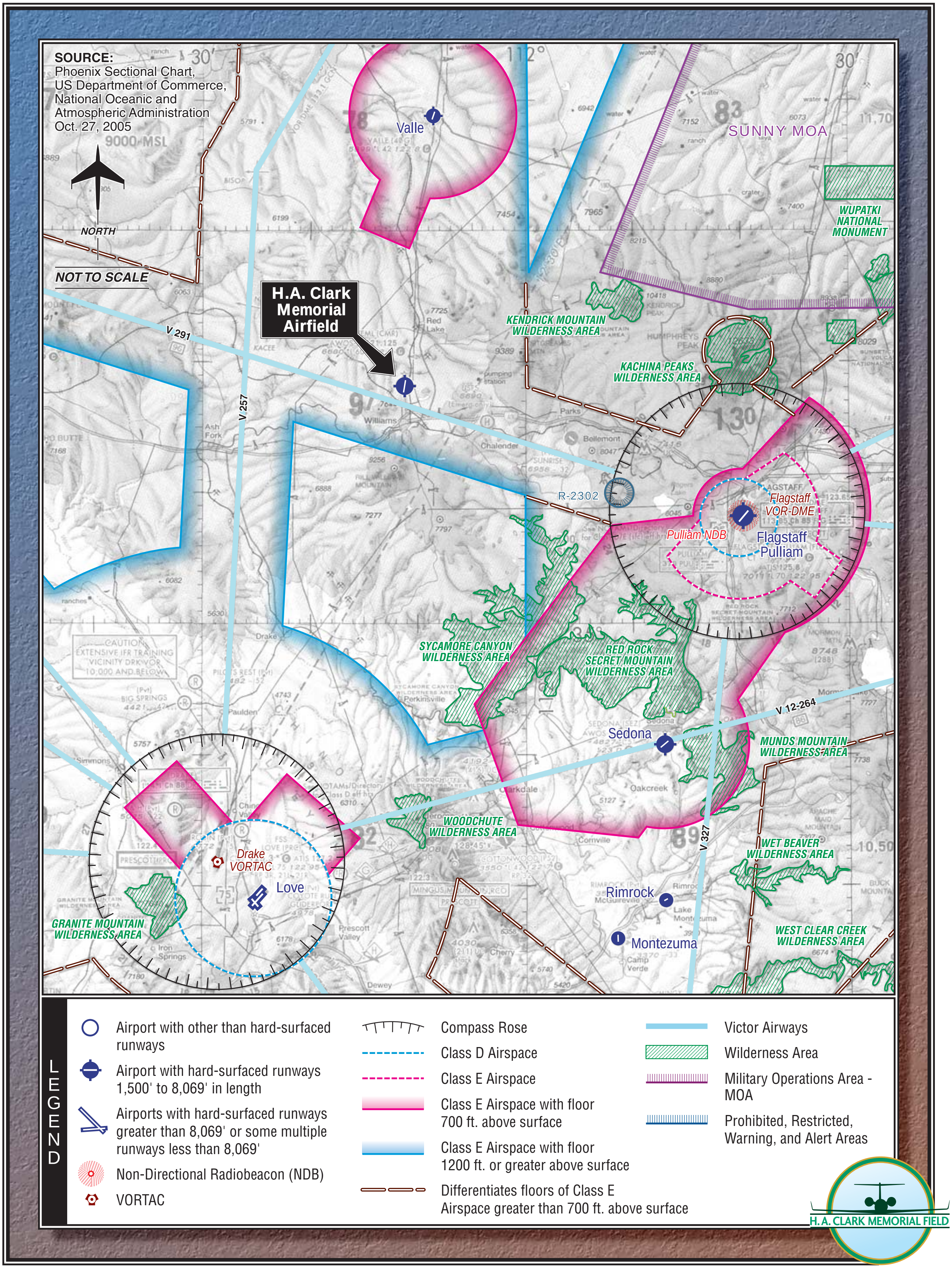

Exhibit 1D
VICINITY AIRSPACE

cation with ATC. There is no Class C airspace in the vicinity of H.A. Clark Memorial Field.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an airport traffic control tower (ATCT). The Class D airspace typically constitutes a cylinder with a horizontal radius of four or five nautical miles (NM) from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path.

Flagstaff Pulliam Airport is the nearest Class D airspace airport to H.A. Clark Memorial Field. The Class D airspace extends for approximately three nautical miles around the airport, from the surface to 9,500 feet MSL. The Flagstaff Pulliam Airport Class D airspace is effective between April 1st and September 30th starting at 6:00 a.m. to 9:00 p.m. October 1st to March 31st, it is effective between 7:00 a.m. to 7:00 p.m. At all other times, the airport is in Class E airspace.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain instrument flight rules (IFR) operations near an airport and while aircraft are transitioning between the airport and enroute environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

H.A. Clark Memorial Field is in Class E airspace. This area of controlled airspace has a floor of 1,200 feet above the surface and extends to Class A airspace. This transition area is intended to provide protection for aircraft transitioning from enroute flights to the airport for landing.

Class G Airspace: Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level [AGL]). Class G airspace extends below the floor of the Class E airspace transition area in the H.A. Clark Memorial Field area.

While aircraft may technically operate within Class G airspace without any contact with ATC, it is unlikely that many aircraft will operate this low to the ground. Furthermore, federal regulations specify minimum altitudes for flight. F.A.R. Part 91.119, *Minimum Safe Altitudes*, generally states that except when necessary for takeoff or landing, pilots must not operate an aircraft over any congested area of a city, town, or settlement, or over any open air assembly of persons, at an altitude of less than 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft. Over less congested areas, pilots must maintain an altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure. Finally, this section states that helicopters may be operated at less than the minimums prescribed above if the operation is conducted without hazard to persons or property on the surface. In addition, each person operating a helicopter shall comply with any routes or altitudes specifically prescribed for helicopters by the FAA.

Special Use Airspace

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. These areas are depicted on **Exhibit 1D** by blue and purple-hatched lines, as well as with the use of green shading.

Military Operating Areas: Military Operations Areas (MOAs) are depicted in **Exhibit 1D** with the purple-hatched lines. The MOA in the vicinity of H.A. Clark Memorial Field is the Sunny MOA to the northeast. A Notice to Airmen (NOTAM) will be posted 24 hours prior to the MOA's use. The Sunny MOA has operations at an altitude of 12,000 feet MSL.

Military Training Routes: Military training routes near H.A. Clark Memorial Field are identified with the letters VR and a four digit number or with IR and a three digit number. The arrows on the route show the direction of travel. Military aircraft travel on these routes below 10,000 feet MSL and at speeds in excess of 250 knots.

Wilderness Areas: As depicted on **Exhibit 1D**, a number of wilderness areas are located in the Williams area. Aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface of designated National Park areas, which includes wilderness areas and designated breeding grounds. FAA Advisory Circular 91-36C defines the "surface" as the highest terrain within 2,000 feet laterally of the route of flight or the uppermost rim of a canyon or valley.

Victor Airways: For aircraft arriving or departing the regional area using very high frequency omnidirectional range (VOR) facilities, a system of Federal Airways, referred to as Victor Airways, has been established. Victor Airways are corridors of airspace eight miles wide that extend upward from 1,200 feet AGL to 18,000 feet MSL and extend between VOR navigational facilities. Victor Airways are shown with solid blue lines on **Exhibit 1D**. V291 passes to the south of H.A. Clark Memorial Field and extends from the Flagstaff VOR/DME to the west. V257 passes to the west of H.A. Clark Memorial Field and extends from the Drake very high frequency omnidirectional range facility with military tactical air navigation aid (VORTAC) to the north.

Restricted Areas: Restricted areas are depicted on **Exhibit 1D** with bluehatched lines. There is one restricted area to the southeast of H.A. Clark Memorial Field near Flagstaff. Restricted airspace is off-limits for public use unless granted permission from the controlling agency. These restricted areas are used by the military for training purposes.

Restricted area R-2302 includes altitudes from the surface to 10,000 feet MSL and is operational Monday through Saturday from 8:00 a.m. to 12:00 a.m. The controlling agency for this restricted area is the Albuquerque Air Route Traffic Control Center (ARTCC).

Airspace Control

The FAA is responsible for the control of aircraft within the Class A, Class C, Class D, and Class E airspace described above. The Albuquerque ARTCC controls aircraft operating in Class A airspace. The Albuquerque ARTCC located in Albuquerque, New Mexico, controls IFR aircraft entering or leaving the H.A. Clark Memorial Field area. The area of jurisdiction for the Albuquerque center includes most of the states of New Mexico and Arizona, and portions of Texas, Colorado, and Oklahoma.

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which pilots of properly equipped aircraft translate into point-to-point guidance and position information. The types of electronic navigational aids available for aircraft flying to or from H.A. Clark Memorial Field include the VOR, the nondirectional beacon (NDB), global positioning system (GPS), and Loran-C.

The VOR provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility to provide distance as well as direction information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. A VORTAC provides distance and direction information to civil and military pilots.

The Flagstaff VOR/DME, located approximately 27 nautical miles east of the field, serves H.A. Clark Memorial Field area. This facility is identified on **Exhibit 1D**.

The NDB transmits nondirectional radio signals, whereby the pilot of a properly equipped aircraft can determine the bearing to or from the NDB facility and then “home” or track to or from the station. The nearest NDB to H.A. Clark Memorial Field is the Pulliam NDB, located approximately 27 nautical miles east of the field.

Loran-C is a ground-based enroute navigational aid which utilizes a system of transmitters located in various locations across the continental United States. Loran-C allows pilots to navigate without using a specific facility. With a properly equipped aircraft, pilots can navigate to any airport in the United States using Loran-C.

GPS was initially developed by the United States Department of Defense for military navigation around the world. However, GPS is now used extensively for a wide variety of civilian uses, including the civil aircraft navigation.

GPS uses satellites placed in orbit around the globe to transmit electronic signals, which pilots of properly equipped aircraft use to determine altitude, speed, and navigational information. This provides more freedom in flight planning and allows for more direct routing to the final destination.

Instrument Approach Procedures

Instrument approach procedures are a series of predetermined maneuvers established by the FAA, using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions. H.A. Clark Memorial Field currently does not have any published instrument approach procedures.

Visual Flight Procedures

All flights into and out of H.A. Clark Memorial Field are currently conducted under VFR. Under VFR flight, the pilot is responsible for collision avoidance. Typically, the pilot will make radio calls announcing his/her intentions and the position of the aircraft relative to the airport.

In most situations, under VFR and basic radar services, the pilot is responsible for navigation and choosing the arrival and departure flight paths to and from the airport. The results of individual pilot navigation for sequencing and collision avoidance are that aircraft do not fly a precise flight path to and from the airport. Therefore, aircraft can be found flying over a wide area around the airport for sequencing and safety reasons.

While aircraft can be expected to operate over most areas of the airport, the density of aircraft operations is higher near the airport. This is the result of aircraft following the established traffic patterns for the airport. The traffic pattern is the traffic flow that is prescribed for aircraft landing or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach.

- **a.** Upwind Leg - A flight path parallel to the landing runway in the direction of landing.
- **b.** Crosswind Leg - A flight path at right angles to the landing runway off its upwind end.
- **c.** 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.
- **d.** 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.

e. 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.

Essentially, the traffic pattern defines the side of the runway on which aircraft will operate. For example, at H.A. Clark Memorial Field, Runway 18 and Runway 36 have an established left-hand traffic pattern. For these runways, aircraft make a left turn from base leg to final for landing. Therefore, aircraft operating to Runway 18 remain east of the runway. For Runway 36, aircraft remain west of the runway.

While the traffic pattern defines the direction of turns that an aircraft will follow on landing or departure, it does not define how far from the runway an aircraft will operate. The distance laterally from the runway centerline an aircraft operates or the distance from the end of the runway is at the discretion of the pilot, based on the operating characteristics of the aircraft, number of aircraft in the traffic pattern, and meteorological conditions. The actual ground location of each leg of the traffic pattern varies from operation to operation for the reasons of safety, navigation, and sequencing, as described above. The distance that the downwind leg is located laterally from the runway will vary based mostly on the speed of the aircraft. Slower aircraft can operate closer to the runway as their turn radius is smaller.

The FAA has established that piston-powered aircraft operating in the traffic pattern fly at 1,000 feet above the ground (or 7,700 feet MSL) when on the downwind leg. Turbine-powered aircraft fly the downwind leg at 8,800 feet MSL. The traffic pattern altitude is established so that aircraft have a predictable descent profile on base leg to final for landing.

Area Airports

A review of public-use airports within the vicinity of H.A. Clark Memorial Field has been made to identify and distinguish the type of air service provided in the area surrounding the airport. Information pertaining to each airport was obtained from FAA records.

Valle Airport is located approximately 21 nautical miles north of H.A. Clark Memorial Field. Valle Airport is privately owned and operated by the Grand Canyon Valle Corporation; however, it is open to the public. There is a single runway available for use. Runway 1-19 is 4,199 feet long and 45 feet wide. Valle Airport does not have an operating ATCT. There are two published GPS instrument approaches and a single VOR/DME instrument approach into Valle Airport. There are five based aircraft at Valle Airport. A full range of general aviation services are available at the airport.

Flagstaff Pulliam Airport is located approximately 27 miles southeast of H.A. Clark Memorial Field. Flagstaff Pulliam Airport is owned and operated by the City of Flagstaff. A single runway 6,999 feet long by 150 feet wide is available for use. The Flagstaff Pulliam ATCT is in operation from 6:00 a.m. to 9:00 p.m. between April 1st and September 30th, and from 7:00 a.m. to 7:00 p.m. between October 1st and March 31st. There are 134 based aircraft at Flagstaff Pulliam Airport. A full range of general aviation services are available at the airport.

LANDSIDE FACILITIES

Landside facilities are the ground-based facilities that support the aircraft and pilot/passenger handling functions. These facilities typically include aircraft storage/maintenance hangars, aircraft parking aprons, and support facilities such as fuel storage, automobile parking, and roadway access. Landside facilities were previously identified on **Exhibit 1B.**

Terminal Building

The existing terminal building is located on the southeast side of the airport, adjacent to Airport Road. The terminal building was constructed in 2000 and encompasses approximately 3,000 square feet. It contains office space, restrooms, and waiting areas for passengers. There are no tenants in the building; however, the City of Williams Airport Manager's office is located in the terminal.

Aircraft Hangar Facilities

There are nine separate hangar buildings at H.A. Clark Memorial Field, totaling approximately 21,400 square feet. Seven of the hangar facilities are open conventional hangars, with the remaining two hangars configured as T-hangars. The two T-hangars are able to house a single aircraft. All of the hangar facilities are located off Taxiway E on the east side of the airport.

Fixed Base Operators (FBOs)

Aviation Services of Northern Arizona serves as the airport's full-service FBO. Aviation Services of Northern Arizona currently occupies the 5,530 square foot conventional hangar north of the fuel storage facility. The following is a list of services provided by Aviation Services of Northern Arizona.

- Aviation Fuel (100LL)
- Line Services
- Aircraft Parking (Ramp or Tie-down)
- Aircraft Maintenance
- Courtesy Transportation
- Pilots Lounge
- Public Telephone

Apron and Aircraft Parking

The aircraft parking aprons at H.A. Clark Memorial Field are located east of Runway 18-36. The general aviation apron area encompasses approximately 10,200 square yards, including 15 tiedown spaces and access to the hangar facilities. A new section of apron is currently being constructed and will encompass approximately 19,500 square yards. This new apron will have locations for future T-hangar development and aircraft parking. The main apron adjacent to the terminal facility encompasses approximately 11,000 square yards and provides approximately 16 transient tiedown spaces.

Fueling Facilities

Fuel storage tanks at H.A. Clark Memorial Field are located above ground on the main apron, as previously shown on **Exhibit 1B**. The fuel island consists of one self-serve storage tank, which holds 8,000 gallons of 100LL fuel. The fuel island is privately owned by Aviation Services of Northern Arizona.

Maintenance and Aircraft Rescue and Fire Fighting

Maintenance at H.A. Clark Memorial Field is performed by the City of Williams. City-owned equipment is used to perform maintenance when needed. This equipment is maintained off the airport.

There are no aircraft rescue and fire fighting (ARFF) facilities located on the airport. An ARFF vehicle was recently purchased and personnel are currently in the process of being trained to respond to on-airport emergencies using the ARFF equipment. The local fire station located two miles from the airport in Williams responds to on-airport emergencies. A new ARFF facility is planned to be constructed adjacent to the north hangars.

Utilities

The availability of utilities at the airport is an important factor in determining the development potential of the airport property. Of primary concern in the inventory investigation is the availability of water, sanitary sewer, and electricity. Some, if not all, of these utilities will be necessary for any future development. Water is provided by the City of Williams via a water storage tank located at the terminus of Airport Road. This tank is replenished by trucks as a dedicated water line is not available to the airport. Sanitary sewer is provided utilizing individual septic tank systems. Electrical power is supplied to the City of Williams by Arizona Public Service. Telephone service is provided by Qwest. A natural gas pipeline runs east to west through the airport property, approximately 300 feet south of the Runway 36 end. This gas line is owned by El Paso Gas Corporation.

Security Fencing and Gates

The airport perimeter and apron areas are equipped with 8-foot chain-link fencing with three strands of barbed-wire. An automated access gate is located near the Aviation Services of Northern Arizona hangar at the terminus of Airport Road. In addition to the automated access gate, there are five manual lock gates around the airport.

ACCESS & CIRCULATION

GENERAL ACCESS TO H.A. CLARK MEMORIAL FIELD - SURROUNDING ROADS

The airport is located approximately three miles north of Interstate Highway 40, and is accessible via Airport Road. Airport Road is a rural two-lane road in good condition, which runs from north to south and approaches the airport from the southeast.

A designated paved vehicle parking lot providing 25 vehicle parking spaces is located east of the airport terminal building.

SOCIOECONOMIC PROFILE

The socioeconomic profile provides a general look at the socioeconomic makeup of the community that utilizes H.A. Clark Memorial Field. It also provides an understanding of the dynamics for growth and the potential changes that may affect aviation demand. Aviation demand forecasts are often directly related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time. Current demographic and economic information was collected from the Arizona Department of Economic Security, the City of Williams, and the 1990 and 2000 census reports.

POPULATION

Population is a basic demographic element to consider when planning for future needs of the airport. The State of Arizona has been one of the fastest growing states in the country. **Table 1D** shows the total population growth since 1990 for the State of Arizona, Coconino County, and the City of Williams. Arizona has grown at an annual average rate of 3.4 percent since 1990. Since 1990, the State of Arizona population has increased by 2.3 million. The population of the City of Williams grew at an average annual rate of 1.5 percent between 1990 and 2005, increasing by more than 600 residents. During the same period, Coconino County's population grew by more than 33,600 and at an average annual rate of 2.0 percent.

Population growth in Williams has been behind Coconino County and the State of Arizona, historically. Between 1990 and 2005, the state population grew by 64.2 percent and the county population grew by 34.7 percent, whereas the Williams population grew by 24.3 percent.

EMPLOYMENT

Employment opportunities affect migration to the area and population growth. As shown in **Table 1E,** the City of Williams' unemployment rate has been well below county, state, and national levels over the last 14 years. Williams' unemployment rate for 2005 was not available at the time of this study.

TABLE 1D
Total Population
State of Arizona, Coconino County, City of Williams

Year	State of Arizona	Percent Change	Coconino County	Percent Change	City of Williams	Percent Change
1990	3,680,800	N/A	96,900	N/A	2,530	N/A
1991	3,767,000	2.3%	99,150	2.3%	2,620	3.6%
1992	3,858,825	2.4%	101,350	2.2%	2,625	0.2%
1993	3,958,875	2.6%	104,700	3.3%	2,635	0.4%
1994	4,071,650	2.8%	107,500	2.7%	2,680	1.7%
1995	4,228,900	3.9%	109,400	1.8%	2,690	0.4%
1996	4,462,300	5.5%	113,475	3.7%	2,705	0.6%
1997	4,600,275	3.1%	117,475	3.5%	2,735	1.1%
1998	4,764,025	3.6%	121,625	3.5%	2,800	2.4%
1999	4,924,350	3.4%	122,825	1.0%	2,845	1.6%
2000	5,130,632	4.2%	116,320	-5.3%	2,842	-0.1%
2001	5,319,895	3.7%	122,770	5.5%	2,885	1.5%
2002	5,472,750	2.9%	125,420	2.2%	2,910	0.9%
2003	5,629,780	2.9%	128,925	2.8%	2,910	0.0%
2004	5,833,685	3.6%	129,570	0.5%	2,940	1.0%
2005	6,044,985	3.6%	130,530	0.7%	3,145	7.0%

Arizona Population Growth Rates	
1990 – 2005 Change in Total Population 2,364,185	**1990 – 2005 Average Annual Population Growth Rate 3.4%**
Coconino County Population Growth Rates	
1990 – 2005 Change in Total Population 33,630	**1990 – 2005 Average Annual Population Growth Rate 2.0%**
Williams Population Growth Rates	
1990 – 2005 Change in Total Population 615	**1990 – 2005 Average Annual Population Growth Rate 1.5%**

Source: Arizona Department of Economic Security, 2005

TABLE 1E
Unemployment Rates
City of Williams, Coconino County, State of Arizona, The United States

Year	City of Williams	Coconino County	State of Arizona	United States
1990	3.5%	7.8%	5.5%	5.6%
1991	3.5%	7.3%	5.8%	6.8%
1992	4.5%	9.4%	7.6%	7.5%
1993	4.1%	8.7%	6.3%	6.9%
1994	4.4%	9.2%	6.4%	6.1%
1995	3.6%	7.8%	5.1%	5.6%
1996	4.1%	8.7%	5.5%	5.4%
1997	4.0%	8.4%	4.6%	4.9%
1998	3.4%	7.3%	4.1%	4.5%
1999	3.2%	6.7%	4.4%	4.2%
2000	2.7%	5.8%	4.0%	4.0%
2001	2.5%	5.4%	4.7%	4.7%
2002	2.7%	5.9%	6.2%	5.8%
2003	3.0%	6.4%	5.6%	6.0%
2004	2.8%	6.1%	4.8%	5.5%
2005	N/A	5.1%	4.7%	5.1%

Source: Arizona Department of Economic Security, 2005

Table 1F summarizes total employment by sector for Coconino County from 2001 to 2005. As shown in the table, with the exception of 2003, Coconino County recorded growth in total employment each year. Over the four-year period, total employment grew by 4,500, a 7.7 percent increase. The sectors that experienced the greatest average annual growth rate were the mining and construction sector (9.6 percent annually), manufacturing (7.2 percent annually), and services and miscellaneous (3.5 percent annually). The only sector experiencing a negative growth rate was the government sector, which declined 1.6 percent annually over the same four-year time period.

TABLE 1F
Employment By Sector (Non-Farm)
Coconino County

Sector	2001	2002	2003	2004	2005	Average Annual Growth Rate
Manufacturing	2,800	2,800	3,000	3,200	3,700	7.2%
Mining and Construction	2,700	2,800	2,900	3,400	3,900	9.6%
Trade, Transportation, and Utilities	9,100	9,400	9,200	9,200	9,500	1.1%
Information	500	500	500	500	500	0.0%
Financial Activities	1,500	1,500	1,500	1,600	1,600	1.6%
Services and Miscellaneous	21,800	21,900	22,500	23,700	25,000	3.5%
Government	20,200	20,000	18,600	18,400	18,900	-1.6%
Total Employment*	**58,600**	**58,900**	**58,200**	**60,000**	**63,100**	**1.9%**

Source: Arizona Department of Economic Security, 2005

PER CAPITA PERSONAL INCOME

Per capita personal income (PCPI) for Coconino County is summarized in **Table 1G.** PCPI is determined by dividing total income by population. For PCPI to grow significantly, income growth must outpace population growth. As shown in the table, PCPI has grown significantly in Coconino County since 1990, growing at an average annual rate of 4.8 percent between 1990 and 2003. The State of Arizona has also seen an increase in PCPI, at 3.7 percent annually over the same time period.

CLIMATE

Weather plays an important role in the operational capabilities of an airport. Temperature is an important factor in determining runway length required for aircraft operations. The percentage of time that visibility is impaired due to cloud coverage is a major factor in determining the use of instrument approach aids.

Temperatures typically range from 46 to 83 degrees Fahrenheit (F) during the summer months. The hottest month is typically July with an average high of 83 degrees. August is the wettest month averaging 3.21 inches of precipitation annually. January is the coldest month with average minimum temperatures around 19 degrees. Williams averages 12.5 inches of snowfall annually. **Table 1H** summarizes typical temperature and precipitation data for the region.

TABLE 1G
Per Capita Personal Income
Coconino County and Arizona

Year	Coconino County	Arizona
1990	$13,847	$17,005
1991	$14,386	$17,260
1992	$15,314	$17,777
1993	$15,573	$18,293
1994	$16,422	$19,212
1995	$17,034	$19,929
1996	$17,975	$20,823
1997	$18,883	$21,861
1998	$20,191	$23,216
1999	$21,232	$24,057
2000	$22,814	$25,660
2001	$23,710	$26,214
2002	$24,331	$26,680
2003	$25,345	$27,232
Average Annual Growth Rate		
1990-2003	4.8%	3.7%

Source: U.S. Department of Commerce, Bureau of Economic Analysis

TABLE 1H
Temperature and Precipitation Data
Williams, Arizona

	Temperature (Fahrenheit)			
	Mean Maximum	Mean Minimum	Precipitation (Inches)	Snow Fall (Inches)
January	45.1	19.6	2.03	16.2
February	47.5	21.8	2.21	13.6
March	52.2	25.4	2.10	13.6
April	61.0	31.4	1.32	5.8
May	70.0	38.5	0.71	1.3
June	80.4	46.2	0.47	0.0
July	83.7	53.0	2.84	0.0
August	80.9	52.0	3.21	0.0
September	75.8	46.0	1.75	0.0
October	66.3	35.6	1.47	0.9
November	55.0	26.1	1.44	5.4
December	47.1	20.6	2.05	12.5
Annual	63.7	34.7	21.58	69.3

Source: Western Regional Climate Center

ENVIRONMENTAL INVENTORY

Available information about the existing environmental conditions at H.A. Clark Memorial Field has been derived from the 1997 *Environmental Assessment for Proposed Development*, as well as from internet resources, agency maps, and existing literature. The intent of this task is to inventory potential environmental sensitivities that might affect future improvements at the airport.

HISTORIC AND CULTURAL RESOURCES

Previous coordination with the State Historic Preservation Office (SHPO) and the Hopi Tribe indicated that potential presence of cultural resources in the area is highly likely. As part of the 1997 Environmental Assessment (EA), a cultural resource assessment was conducted on portions of airport property proposed for development, as well as land proposed for acquisition. Results of the study identified three historic archaeological sites, one isolated feature, and 15 isolated occurrences. None of these sites were determined to be to be potentially eligible for inclusion to the National Register. A copy of this report was forwarded to the Forest Service, SHPO, and the Hopi Tribe. The SHPO and the Forest Service concurred with the findings; no response was received from the Hopi Tribe.

WETLANDS

The U.S. Army Corps of Engineers (ACOE) regulates the discharge of dredge and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the Clean Water Act.

Wetlands are defined by *Executive Order 11990, Protection of Wetlands,* as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction." Categories of wetlands includes swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine area, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: hydrology, hydrophytes (plants able to tolerate various degrees of flooding or frequent saturation), and poorly drained soils.

Correspondence included in the 1997 EA received from the Arizona Game and Fish Department and the Northern Arizona Council of Governments indicated that Threemile Lake is a naturally occurring wetland. No other wetland areas are known.

FLOODPLAINS

As defined in the *FAA Order 5050.4A,* floodplains consist of "lowland and relatively flat areas adjoining inland and coastal water including flood prone areas of offshore islands, including at a minimum, that area subject to one percent or greater chance of flooding in any given year." Federal agencies are directed to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by floodplains. Floodplains have natural and beneficial values, such as providing ground water recharge, water quality maintenance, fish, wildlife, plants, open space, natural beauty, outdoor recreation, agriculture and forestry. *FAA Order 5050.4A (12) (*c) indicates that "if the proposed action and reasonable alternatives are not within the limits of a base floodplain (100-year flood area)," that it may be assumed that there are no floodplain impacts. The limits of base floodplains are determined by Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency (FEMA). As the airport is surrounded by land which is managed by the Forest Service, floodplain mapping has not been completed. Within the 1997 EA, it was determined through conversations with the Forest Service that the airport does not fall within a 100-year floodplain.

WATER SUPPLY AND QUALITY

The airport has an on-airport tank which holds 250,000 gallons of water. This tank is used as both fire protection and potable water.

Domestic sewage is currently handled by one individual sewage disposal system which is connected to the general aviation terminal facility.

The airport is considered an industrial facility and therefore is required to be covered under a National Pollutant Discharge Elimination System (NPDES) general permit. Previous concerns expressed by the Arizona Department of Environmental Quality (ADEQ) indicated that a surface hydraulic connection exists between the Colorado River and the airport via Havasu Creek, Cataract Creek, and other unnamed washes. The ADEQ has submitted recommendations for the airport to lessen water quality impacts to these tributaries.

BIOTIC RESOURCES

Biotic resources refer to those flora and fauna (i.e., vegetation and wildlife) habitats which are present in an area. Impacts to biotic communities are determined based on whether a proposal would cause a minor permanent alteration of existing habitat or whether it would involve the removal of a sizable amount of habitat, habitat which supports a rare species, or a small, sensitive tract.

A search of the U.S. Fish and Wildlife Service website indicated 20 species that are listed as threatened or endangered or as a candidate species. An initial review of the habitat of these species indicated that four species have habitat in close vicinity of the airport. **Table 1J** summarizes these species.

TABLE 1J
Listed Threatened and Endangered Species in Coconino County

Common Name	Status	Habitat
Bald eagle	Threatened	Large trees or cliffs near water
Black-footed ferret	Endangered	Grassland Plains; usually associated with prairie dogs
Mexican spotted owl	Threatened	Nests in canyons and dense forests with multi-layered foliage structure.
Yellow-billed cuckoo	Candidate	Large blocks of riparian woodlands

Source: U.S. Fish and Wildlife Service

AIR QUALITY

The Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O_3), Carbon Monoxide (CO), Sulfur Dioxide (SO_x), Nitrogen Oxide (NO_x), Particulate Matter (PM_{10}), and Lead (Pb).

Primary air quality standards are established at levels to protect the public health and welfare from any known or anticipated adverse effects of a pollutant. All areas of the country are required to demonstrate attainment with NAAQS. Arizona has adopted the federal ambient air quality standards.

Air contaminants increase the aggravation and the production of respiratory and cardiopulmonary diseases. The standards also establish the level of air quality which is necessary to protect the public health and welfare, including among other things, affects on crops, vegetation, wildlife, visibility, and climate, as well as affects on materials, economic values, and on personnel comfort and well-being.

According to the EPA 'Greenbook' website, Coconino County is in attainment for all criteria pollutants.

Public Airport Disclosure Map

Arizona Revised Statutes (ARS) 28-8486, *Public Airport Disclosure*, provides for a public airport owner to publish a map depicting the "territory in the vicinity of the airport." The territory in the vicinity of the airport is defined as the traffic pattern airspace and the property that experiences 60 day-night noise level (DNL) or higher in counties with a population of more than 500,000, and 65 DNL or higher in counties with less than 500,000 residents. The DNL is calculated for the 20-year forecast condition. ARS 28-8486 provides for the State Real Estate Office to prepare a disclosure map in conjunction with the airport owner. H.A. Clark Memorial Field does not have a public airport disclosure map on file.

Storm Water Pollution Prevention Plan (SWPPP)

Stormwater runoff is simply rainwater or snowmelt that runs off the land and into streams, rivers, and lakes. When stormwater runs through sites of industrial or construction activity it may pick up pollutants and transport them into national waterways and affect water quality.

Mandated by Congress under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) Stormwater Program is a comprehensive two-phased national program for addressing the non-agricultural sources of stormwater discharges which adversely affect the quality of our nation's waters. The program uses the NPDES permitting mechanism to require the implementation of controls designed to prevent harmful pollutants from being washed by stormwater runoff into local water bodies.

The State of Arizona has been delegated the authority to administer the NPDES program. Administratively, this is the responsibility of the Arizona Department of Environmental Quality (ADEQ). The ADEQ's Arizona Pollutant Discharge Elimination System (AZDES) program now has regulatory authority over discharges of pollutants to Arizona surface water.

Under the regulations, separate permits are required for construction activities that disturb one or more acres of land and for general stormwater permits. H.A. Clark Memorial Field does not currently have a SWPPP plan.

Spill Prevention Control and Countermeasure (SPCC) Plan

Title 40 of the Code of Federal Regulations (CFR) Part 112, defines the EPA's *Oil Pollution Prevention Rule*. The purpose of the rule is to prevent the discharge of oil into the navigable waters of the United States or adjoining shorelines as opposed to response and cleanup after a spill occurs. The EPA revised these prevention rules on July 17, 2002, to establish the Spill Prevention, Control and Countermeasure (SPCC) Plan to meet the purpose of this rule. All SPCC Plans were to be completed by August 18, 2003.

Before a facility is subject to the SPCC rule, it must meet the following three criterions:

1) It must be non-transportation-related,

2) It must have an aggregate above-ground storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons, and

3) There must be a reasonable expectation of a discharge into or upon navigable waters of the United State or adjoining shorelines.

H.A. Clark Memorial Field does not currently have an SPCC plan.

Table 1K provides a summary of the status of the various regulatory and administrative plans and studies discussed above.

TABLE 1K Summary of Regulatory and Administrative Plans, Studies, and Facility Improvements	
Description	**Status**
Storm Water Pollution and Prevention Plan (SWPPP)	No plan currently in place.
Spill Prevention, Control and Countermeasure (SPCC) Plan	No plan currently in place.
Minimum Standards	No minimum standards in place.
Airport Rules and Regulations	No published airport rules and regulations.
Height Zoning Ordinance	There is currently no height zoning ordinance in place for the airport.
Public Airport Disclosure Map	There is currently no public airport disclosure map.
Aircraft Wash Rack	There is no aircraft wash rack at the airport.

LAND USE

Exhibit 1E depicts the existing land use around the airport as derived from the 2003 *Williams General Plan*. The majority of the land surrounding the airport is designated as national forest land. Most of the developed areas of Williams are located south of the airport. Future land use is also depicted on **Exhibit 1E**; however, land use in the vicinity of the airport is shown to continue to be reserved as national forest land.

HEIGHT AND HAZARD ZONING

Height and hazard zoning establishes height limits for new construction near an airport and within the runway approaches. Height and hazard zoning ordinances are typically based on Federal Aviation Regulation (FAR) Part 77, which defines imaginary surfaces surrounding the airport that are to remain free of obstructions for the purpose of safe air navigation. Currently, the City of Williams has no height and hazard zoning restrictions specific to new construction near the airport or within the runway approaches.

SUMMARY

The information discussed on the previous pages provides a foundation upon which the remaining elements of the planning process will be constructed. Information on current airport facilities and utilization will serve as a basis, with additional analysis and data collection, for the development of forecasts of aviation activity and facility requirement determinations. The inventory of existing conditions is the first step in the process of determining those factors which will meet projected aviation demand in the community and the region.

DOCUMENT SOURCES

A variety of sources were used in the inventory of existing facilities. The following listing presents a partial list of reference documents. The list does

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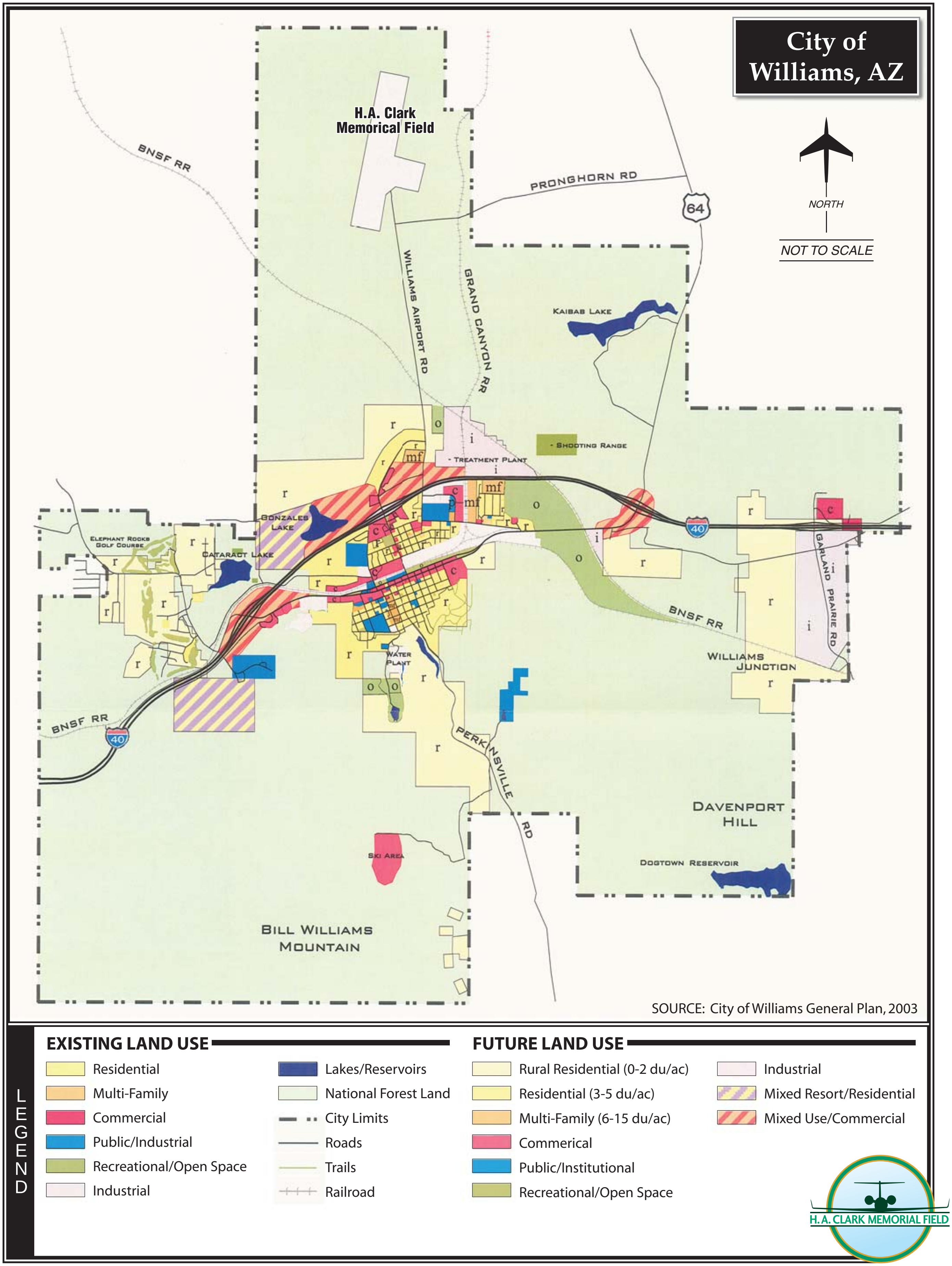

Exhibit 1E
EXISTING & FUTURE LAND USE

not reflect some information collected by airport staff or through interviews with airport personnel.

Aircraft & Airmen CD, Avantex, Inc. (February 2004)

AirNAV Airport information, website: http://www.airnav.com

Airport/Facility Directory, Western U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, edition, December 22, 2005 Edition

Arizona Department of Economic Security; 2005

Arizona Department of Transportation

City of Williams General Plan; 2003

FAA 5010 Form, Airport Master Record; 2005

H.A. Clark Memorial Field Airport Master Plan; 1995

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 2001-2005

U.S. Department of Commerce, Bureau of Economic Analysis

Western Regional Climate Center; 2005

Chapter Two

Aviation Demand Forecasts

Chapter Two

Aviation Demand Forecasts

Facility planning must begin with a definition of the demand that may reasonably be expected to occur at the facility over a specific period of time. For H.A. Clark Memorial Field, this involves forecasts of aviation activity indicators through the year 2025. In this master plan, forecasts of based aircraft, the based aircraft fleet mix, and annual aircraft operations will serve as the basis for facility planning.

It is virtually impossible to predict, with certainty, year-to-year fluctuations of activity when looking twenty years into the future. Because aviation activity can be affected by many influences at the local, regional, and national level, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to unforeseen facility needs.

Recognizing this, it is intended to develop a master plan for H.A. Clark Memorial Field that will be demand-based rather than time-based. As a result, the reasonable levels of activity potential that are derived from this forecasting effort will be related to the planning horizon levels rather than dates in time. These planning horizons will be established as levels of activity that will call for consideration of the implementation of the next step in the master plan program.

The following forecast analysis examines recent developments, historical information, and current aviation trends to provide an updated set of

aviation demand projections for H.A. Clark Memorial Field. The intent is to permit the City of Williams to make the planning adjustments necessary to ensure that the facility meets projected demands in an efficient and cost-effective manner.

NATIONAL AVIATION TRENDS

Each year, the Federal Aviation Administration (FAA) publishes its national aviation forecast. Included in this publication are forecasts for air carriers, regional air carriers, general aviation, and military activity. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was *FAA Aviation Forecasts - Fiscal Years 2006-2017*. The forecast uses the economic performance of the United States as an indicator of future aviation industry growth.

Declining through the late 1980s and early 1990s, the general aviation industry was revitalized with the passage of the *General Aviation Revitalization Act* in 1994, which limits the liability on general aviation aircraft to 18 years from the date of manufacture. This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product liability, as well as renewed optimism for the industry. The high cost of product liability insurance had been a major factor in the decision by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft.

The sustained growth in the general aviation industry slowed considerably in 2001, negatively impacted by the events of September 11. Thousands of general aviation aircraft were grounded for weeks due to no-fly zone restrictions imposed on operations of aircraft in security-sensitive areas. This, in addition to the economic recession that began in early 2001, had a negative impact on the general aviation industry.

While the recession ended a seven-year period of growth in the aviation industry, it was early in 2002 before the severity of the recession was realized. The domestic economy declined for three consecutive quarters in 2001. In 2002 the recovery was underway, and although weak, it has picked up in the last three years. The FAA projects the U.S. economy to continue to strongly grow through 2006 into 2007. This will positively influence the aviation industry, leading to passenger, air cargo, and general aviation growth throughout the forecast period (assuming that there will not be any new successful terrorist incidents against either U.S. or world aviation).

According to the General Aviation Manufacturers Association (GAMA), aircraft shipments in 2005 were up 20.8 percent from 2004, to 3,580 shipments. This followed a static level of growth between 2002 and 2003 and healthy growth in 2004. The number of general aviation hours flown is forecast to increase by 3.2 percent annually over the next 12 years.

After a recent slowdown in business jet shipments (down 31.9 percent in 2003), the business/corporate segment of general aviation began to grow again in 2004 and offers the most growth potential. For 2005, business jet shipments were up 26.9 percent. The FAA expects this segment will continue to expand at a faster rate than personal/sport flying. Safety concerns, combined with increased security processing time at commercial terminals, make business/corporate flying an attractive alternative.

In 2005, there were an estimated 214,591 active general aviation aircraft, representing an increase of 3,296 aircraft (1.6 percent) over the previous year. **Exhibit 2A** depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation aircraft to increase at an average annual rate of 1.4 percent over the 12-year forecast period, to 252,775. Piston-powered aircraft are expected to grow at an average annual rate of 1.0 percent. This slow growth rate is offset by piston-powered rotorcrafts which are expected to grow at 6.7 percent annually, while single-engine and multi-engine aircraft increase at rates of 0.3 and 0.1 percent, respectively.

Turbine-powered aircraft (turboprop and jet) and helicopters are expected to grow at an average annual rate of 4.0 percent over the forecast period. Even more significantly, the jet portion of this fleet is expected to grow at an average annual growth rate of 4.1 percent. This growth rate for jet aircraft can be attributed to growth in the fractional-ownership industry, new product offerings (which include new entry-level aircraft and long-range global jets), and the shift away from commercial travel by many travelers and corporations.

Microjets are expected to enter the active general aviation aircraft fleet in 2006 and could potentially redefine business jet travel and air-taxi business services. It is expected that 100 of these relatively inexpensive twin-engine jets will be active this year and are forecast to grow by 400 to 500 aircraft per year, growing to 4,950 aircraft by 2017.

In summary, business aviation, by nature of its ownership and use, will experience cyclical movements in activity relating to economic conditions. Over the long term, however, it is anticipated to continue to be the strongest growth market in general aviation.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships are tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and their assessment of the local situation, is important in the final determination of the preferred forecast.

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five

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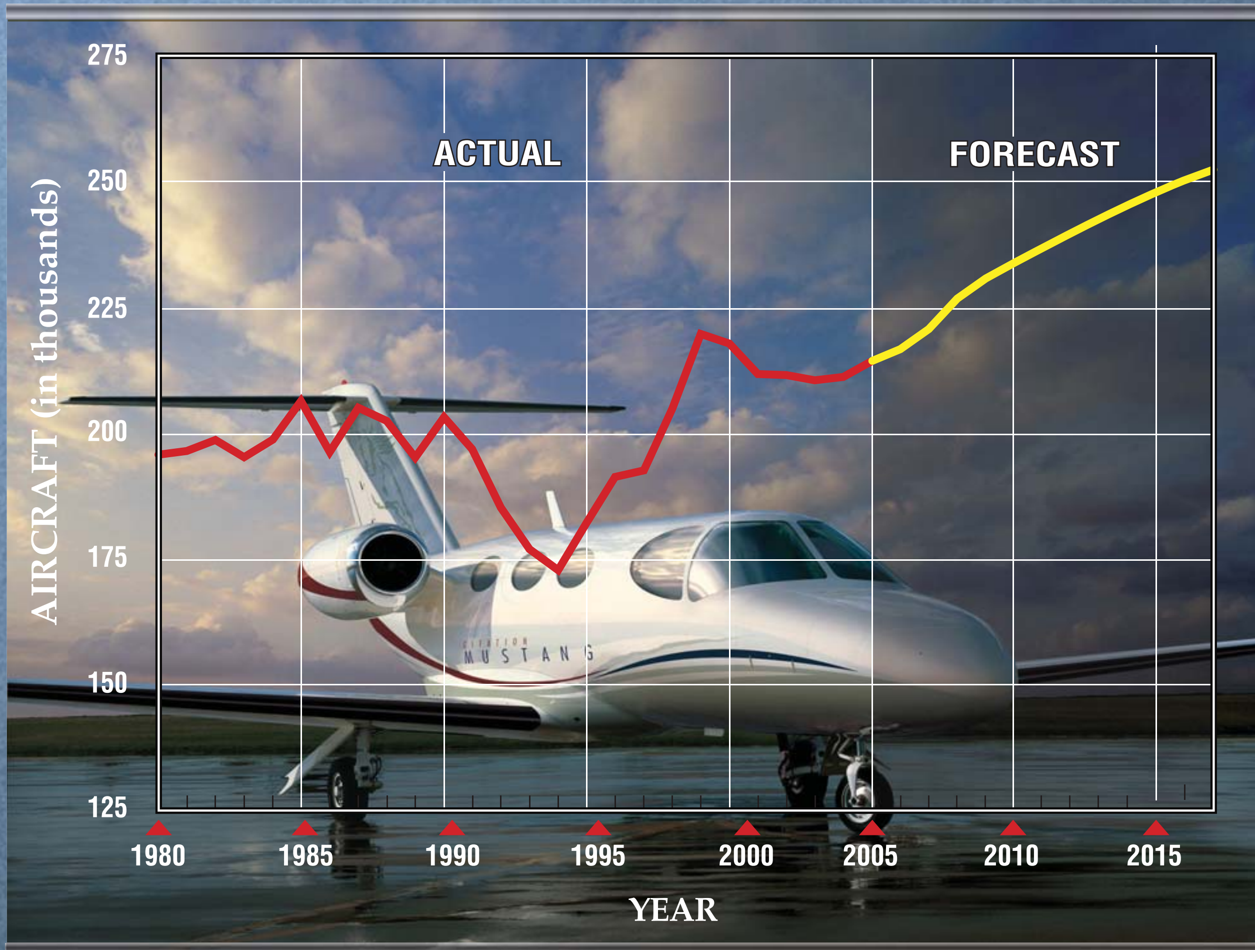
U.S. ACTIVE GENERAL AVIATION AIRCRAFT



U.S. ACTIVE GENERAL AVIATION AIRCRAFT (in thousands)

	FIXED WING									
	PISTON		TURBINE		ROTORCRAFT					
Year	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine	Experimental	Sport Aircraft	Other	Total
2005 (Est.)	144.5	17.5	8.0	8.6	2.8	4.8	22.3	N/A	6.0	214.6
2009	146.7	17.6	8.8	10.8	4.1	5.4	23.5	8.2	5.9	231.0
2013	148.4	17.6	9.6	14.0	5.2	6.0	24.6	11.6	5.8	242.8
2017	149.7	17.7	10.4	17.2	6.0	6.7	25.7	13.6	5.7	252.8

Source: FAA Aerospace Forecasts, Fiscal Years 2006-2017.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

H.A. CLARK MEMORIAL FIELD

Exhibit 2A
U.S. ACTIVE GENERAL AVIATION AIRCRAFT FORECASTS

years. Facility and financial planning usually require at least a ten-year preview, since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

A wide range of factors are known to influence the aviation industry and can have significant impacts on the extent and nature of air service provided in both the local and national market. Technological advances in aviation have historically altered and will continue to change the growth rates in aviation demand over time. The most obvious example is the impact of jet aircraft on the aviation industry, which resulted in a growth rate that far exceeded expectations. Such changes are difficult, if not impossible to predict, and there is simply no mathematical way to estimate their impacts. Using a broad spectrum of local, regional, and national socioeconomic and aviation information and analyzing the most current aviation trends, forecasts are presented in the following sections.

To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. Indicators of general aviation demand include:

- Based aircraft
- Based aircraft fleet mix
- Annual operations

The remainder of this chapter will examine historical trends with regard to these areas of general aviation and will project future demand for these segments of general aviation activity at the airport.

BASED AIRCRAFT

The number of aircraft based at an airport is, to some degree, dependent upon the nature and magnitude of aircraft ownership in the local service area. Therefore, the process of developing forecasts of based aircraft for H.A. Clark Memorial Field begins with a review of historical aircraft registrations in the area.

REGISTERED AIRCRAFT FORECASTS

Historical records of aircraft ownership in Coconino County presented in **Table 2A** were obtained from the U.S. Census of Civil Aircraft for the years 1990 through 1992; Aviation Goldmine for the years 1993 through 2000; Avantext, Inc., Aircraft & Airmen for the years 2001 to 2004; and the Federal Aviation Administration for the year 2005. Since 1990, registered general aviation aircraft in the county have grown from 256 to 296, for an annual average growth rate of 1.0 percent.

Table 2A also compares registered aircraft to active general aviation aircraft in the United States. Since 2003, the Coconino County share of the U.S.

market of general aviation aircraft has remained steady near 0.138 percent. This indicates that registered aircraft in the County are growing at a similar rate to aircraft nationally. **Table 2A** presents a projection of registered aircraft in Coconino County based upon maintaining the 2003-2005 average percentage as a constant share of projected U.S. Active Aircraft in the future. This forecast results in registered aircraft growing to 389 aircraft in 2025, a 1.4 percent annual growth rate.

TABLE 2A
Registered Aircraft and Independent Variables
Coconino County

Year	Registered GA Aircraft	U.S. Active Aircraft	% of U.S. Market	Population	Registered GA Aircraft Per 1,000 Residents
1990	256	N/A	N/A	96,900	2.64
1991	249	N/A	N/A	99,150	2.51
1992	253	185,650	0.136	101,350	2.50
1993	276	177,120	0.156	104,700	2.64
1994	280	172,935	0.162	107,500	2.60
1995	286	182,605	0.157	109,400	2.61
1996	296	187,312	0.158	113,475	2.61
1997	308	189,328	0.163	117,475	2.62
1998	300	205,700	0.146	121,625	2.47
1999	308	219,500	0.140	122,825	2.51
2000	331	217,500	0.152	116,320	2.85
2001	311	211,400	0.147	122,770	2.53
2002	308	211,200	0.146	125,420	2.46
2003	290	210,600	0.138	128,925	2.25
2004	294	211,295	0.139	129,570	2.27
2005	296	214,591	0.138	130,530	2.27
CONSTANT SHARE OF U.S. ACTIVE AIRCRAFT					
2010	323	234,030	0.138	147,352	2.17
2015	342	248,120	0.138	158,753	2.09
2025	389	281,935	0.138	179,555	1.96
CONSTANT RATIO OF REGISTERED AIRCRAFT PER 1,000 RESIDENTS					
2010	334	234,030	0.143	147,352	2.27
2015	360	248,120	0.145	158,753	2.27
2025	408	281,935	0.145	179,555	2.27
SELECTED PLANNING FORECAST					
2010	**330**	234,030	0.141	147,352	2.24
2015	**355**	248,120	0.143	158,753	2.24
2025	**390**	281,935	0.138	179,555	2.17

Sources: Registered Aircraft: (1990-1992) U.S. Census of Civil Aircraft; (1993-2000) Aviation Goldmine; (2001-2004), Avantext Inc., Aircraft & Airmen; (2005) FAA.
U.S. Active Aircraft: FAA Aerospace Forecasts; 2025 Forecast Extrapolated by Coffman Associates
Population: Arizona Department of Economic Security

A separate forecast examined the ratio between the Coconino County population and the number of registered general aviation aircraft in Coconino County. As shown in **Table 2A**, there were 2.64 registered aircraft per 1,000 residents in 1990. This ratio has since decreased to 2.27 registered aircraft per 1,000 residents in 2005 as the population has grown at a faster rate than registered aircraft. The population grew at 2.0 percent annually through 2025, whereas registered aircraft grew at 1.0 percent annually.

A projection of registered aircraft was developed assuming that registered aircraft per 1,000 residents will remain static at 2.27. This projection results in registered aircraft growing at the same rate as the population, at an average annual growth rate of 1.6 percent. The forecast of registered aircraft per capita are presented in **Table 2A**.

Historically, registered aircraft have grown at a rate slightly lower than the population in the County and has recently grown at a rate consistent to aircraft nationally. The selected planning forecast assumes this trend will continue in the future, with registered aircraft growing at the same annual rate as U.S. Active Aircraft through the planning period. This selected forecast provides a reasonable growth rate over the planning period with registered aircraft in Coconino County growing at 1.4 percent annually through 2025. **Exhibit 2B** graphically depicts the selected forecast in comparison with the other projections.

BASED AIRCRAFT FORECAST

The number of based aircraft is the most basic indicator of general aviation demand at an airport. By first developing a forecast of based aircraft, the growth of other general aviation activities and demands can be projected. According to the 1995 H.A. Clark Memorial Field Airport Master Plan, there were 12 based aircraft at H.A. Clark Memorial Field in 1995. The number of based aircraft has since increased, with 13 reported by the airport in 2005.

Table 2B examines based aircraft as a percentage of aircraft ownership in Coconino County. As shown in the table, the airport's based aircraft were equivalent to 4.2 percent of aircraft registered in the County in 1995. The airport's share increased to 4.4 percent in 2005. This is the result of based aircraft at H.A. Clark Memorial Field growing at a faster rate than the registered aircraft in the county (0.8 percent annually for the airport versus 0.3 percent annually for the County since 1995).

Projections of based aircraft were developed by estimating the H.A. Clark Memorial Field's share of registered aircraft through 2025. The constant share forecast assumes the 2005 share will remain constant at 4.4 percent through the planning period. This would yield 17 based aircraft by 2025, with based aircraft growing at a rate of 1.4 percent annually.

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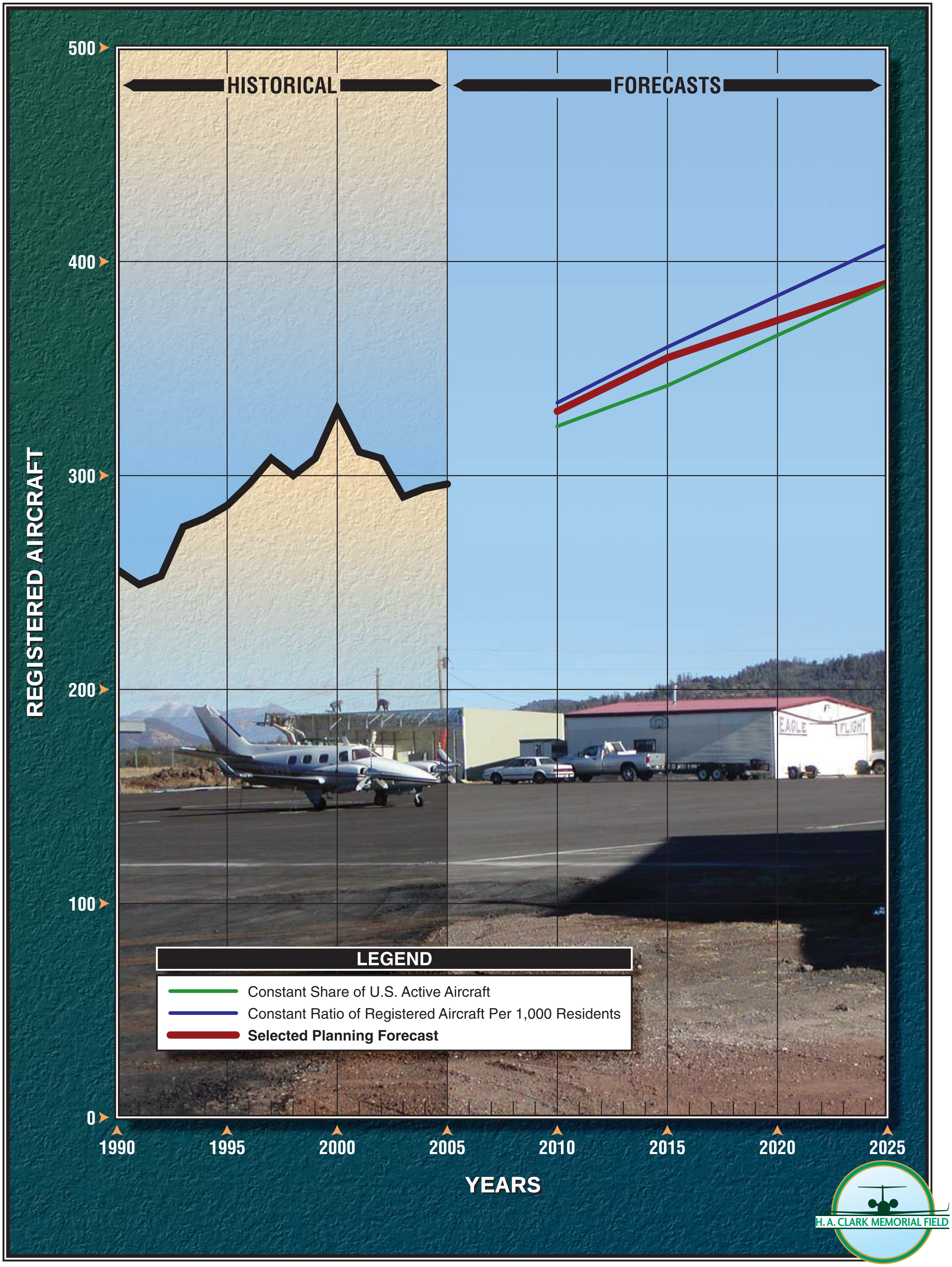

Exhibit 2B
REGISTERED AIRCRAFT

The increasing share forecast assumes the H.A. Clark Memorial share of Coconino County registered aircraft will gradually increase to 5.4 percent through the planning period. This would yield 21 based aircraft by 2025, with based aircraft growing at an average rate of 2.4 percent annually.

TABLE 2B
Share of Registered Aircraft

Year	H.A. Clark Memorial Based Aircraft	Coconino County Registered Aircraft	H.A. Clark Memorial Share of Registered Aircraft
Historical			
1995	12	286	4.2%
2005	13	296	4.4%
Constant Share Projection			
2010	15	330	4.4%
2015	16	355	4.4%
2025	17	390	4.4%
Increasing Share Projection			
2010	16	330	4.8%
2015	18	355	5.0%
2025	21	390	5.4%

Source for historical based aircraft: 1995, 1995 H.A. Clark Memorial Field Master Plan; 2005, Airport Records
Source for Historical Coconino County Registered Aircraft: 1995 - Aviation Gold Mine CD; 2005 – Federal Aviation Administration

Based aircraft were also examined as a ratio of the City of Williams residents. This analysis is summarized in **Table 2C**. The ratio of aircraft to residents has declined slightly from 4.46 aircraft per 1,000 residents in 1995, to 4.13 aircraft per 1,000 residents in 2005. Maintaining the 2005 ratio constant through the planning period yields 29 based aircraft by 2025. This represents an average annual growth rate of 4.1 percent.

TABLE 2C
Based Aircraft Per 1,000 Residents in Williams

Year	H.A. Clark Memorial Based Aircraft	Williams Population	Based Aircraft Per 1,000 Residents
Historical			
1995	12	2,690	4.46
2005	13	3,145	4.13
Constant Share Projection			
2010	18	4,305	4.13
2015	24	5,835	4.13
2025	29	6,920	4.13

Source for historical based aircraft: 1995, 1995 H.A. Clark Memorial Field Master Plan; 2005, Airport Records
Source for Historical Population: Arizona Department of Economic Security
Source for Population Forecast: City of Williams

For comparative purposes, projections for the 1995 H.A. Clark Memorial Field Airport Master Plan, the Federal Aviation Administration Terminal Area Forecast (TAF) and the 2000 *Arizona State Aviation System Needs Study* (SANS) have also been examined. The 1995 H.A. Clark Memorial Field Airport Master Plan forecast projected based aircraft growing to 20 by 2015. The FAA TAF projects based aircraft remaining stagnant at 12 through 2025. The SANS projects based aircraft at H.A. Clark Memorial Field remaining at 12 through 2015.

Table 2D and **Exhibit 2C** provide a summary of these general aviation based aircraft forecasts. The current based aircraft of 13 has already exceeded the SANS forecast. H.A. Clark Memorial Field has experienced slight growth in its share of registered aircraft in the last ten years; therefore, the increasing share of registered aircraft and the constant ratio of aircraft per 1,000 residents were selected as closest to what could be expected. This planning forecast allows for 13 additional based aircraft by 2025, for an average annual growth rate of 3.5 percent.

TABLE 2D
Based Aircraft Forecast Summary
H.A. Clark Memorial Field

Forecast	2005	2010	2015	2025
Constant Share of Registered Aircraft	--	15	16	17
Increasing Share of Registered Aircraft	--	16	18	21
Constant Ratio of Aircraft Per 1,000 Residents	--	18	24	29
H.A. Clark Memorial Field Airport Master Plan (1995)	16	18	20	--
FAA Terminal Area Forecast	15	15	15	15
Arizona State Aviation Needs Study (2000)	12	12	12	--
Selected Master Plan Forecast	**13**	**16**	**20**	**26**

BASED AIRCRAFT FLEET MIX

The aircraft fleet mix expected to utilize the airport is necessary to properly plan facilities that will best serve the level of activity and type of activities occurring at the airport. The existing based aircraft fleet mix is comprised primarily of single-engine piston aircraft, but also includes three multi-engine piston aircraft. Nationally, the general aviation fleet mix is around 80 percent single-engine aircraft; at H.A. Clark Memorial Field, single-engine aircraft comprise 77 percent of the fleet.

Table 2E outlines the projected fleet mix. The national trend is toward a larger percentage of sophisticated aircraft in the fleet mix. Growth within each category at the airport has been determined by comparison with national projections which reflect current aircraft in production.

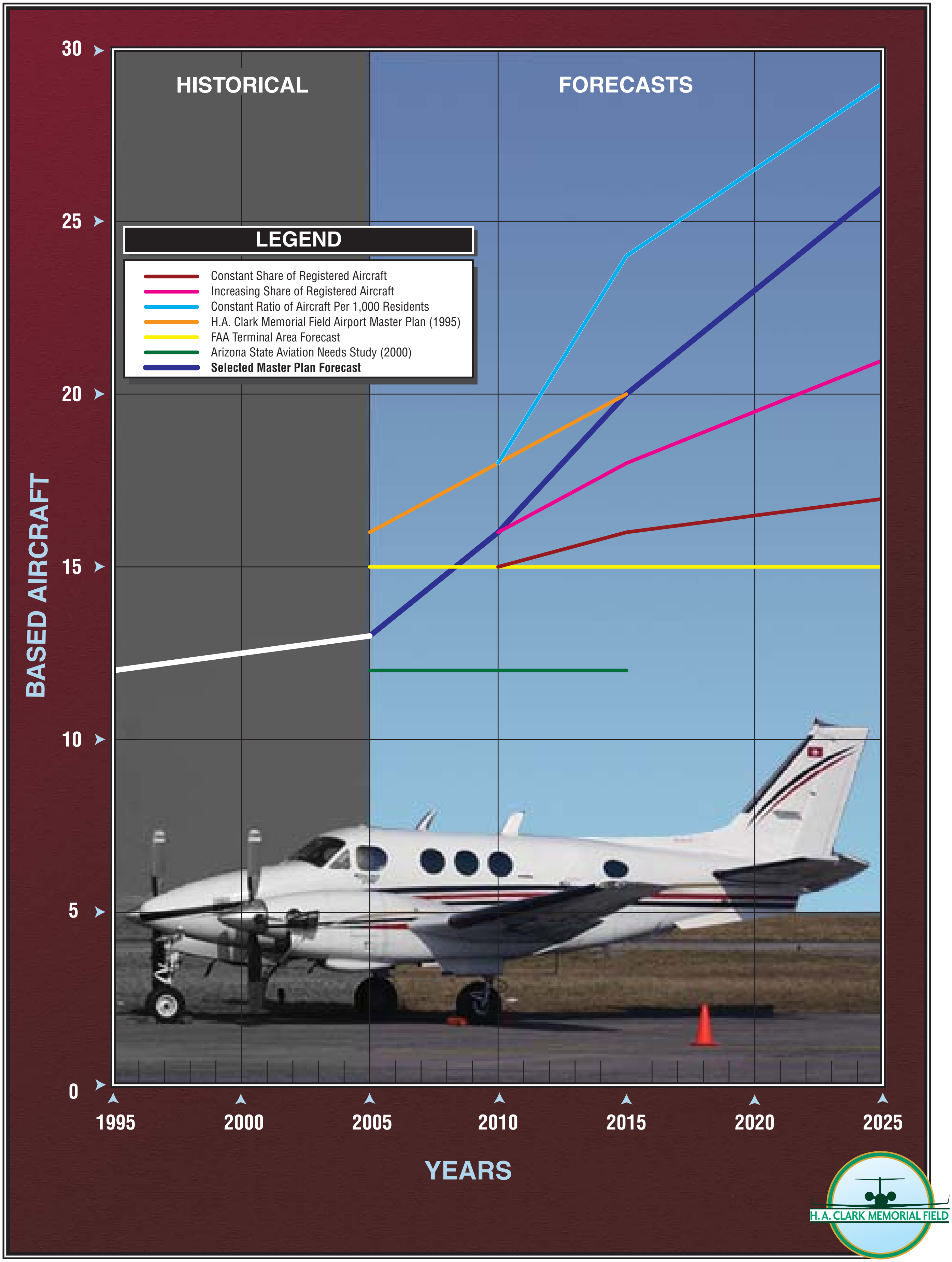

Exhibit 2C
BASED AIRCRAFT

TABLE 2E Based Aircraft Fleet Mix H.A. Clark Memorial Field		Piston		Turbine		
Year	Total	Single-Engine	Multi-Engine	Turboprop	Jet	Rotorcraft
ACTUAL						
2005	13	10	3	0	0	0
FORECAST						
2010	16	12	3	0	0	1
2015	20	14	3	1	1	1
2025	26	17	4	2	2	1

AIRCRAFT OPERATIONS

Aircraft operations at airports are classified as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within site of the airport, or which executes simulated approaches or “touch-and-go” operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and industrial use, since business aircraft are used primarily to carry people from one location to another.

H.A. Clark Memorial Field operations are comprised solely of general aviation operations. The FAA 5010 Airport Master Record for H.A. Clark Memorial Field estimates a total of 4,200 general aviation operations in 2005.

The projection of future annual general aviation operations is examined as a ratio of operations per based aircraft. Using the 2005 estimated annual operations for H.A. Clark Memorial Field, the ratio of operations per based aircraft currently average 323. A projection of annual operations which has the operations per based aircraft remaining static at 323 operations per based aircraft through 2025 yields 8,400 annual operations by the end of the planning period. As shown in **Table 2F**, an increasing ratio of operations per based aircraft yields 9,750 operations by the year 2025. The Arizona SANS forecasts operations at H.A. Clark Memorial Field to remain at 3,600 operations through 2015. The FAA TAF projects operations at H.A. Clark Memorial Field remaining static at 3,528 annual operations through 2015. The 1995 Master Plan projected annual operations growing to 6,000 by 2015. Each of the projections is presented in **Table 2F**.

TABLE 2F General Aviation Operations Forecast H.A. Clark Memorial Field					
Year	**Based Aircraft**	**Itinerant Operations**	**Local Operations**	**Total Operations**	**Operations Per Based Aircraft**
2005	13	3,840	360	4,200	323
Constant Ratio Projection					
2010	16	4,653	517	5,170	323
2015	20	5,740	710	6,450	323
2025	26	7,140	1,260	8,400	323
Arizona SANS Forecast					
2010	12	--	--	3,600	300
2015	12	--	--	3,600	300
2025	--	--	--	--	--
FAA TAF					
2010	15	3,175	353	3,528	235
2015	15	3,175	353	3,528	235
2025	15	3,175	353	3,528	235
1995 Master Plan					
2005	16	3,840	960	4,800	300
2010	18	4,050	1,350	5,400	300
2015	20	4,200	1,800	6,000	300
Increasing Ratio Projection (Preferred Planning Forecast)					
2010	16	4,700	800	5,500	344
2015	20	5,200	1,800	7,100	355
2025	26	6,900	2,900	9,800	377

The increasing ratio of operations per based aircraft has been selected as the preferred planning forecast. This projection has the operations per based aircraft increasing to 377 by 2025. This ratio will grow to a number similar to other Arizona airports, such as Avi Suquilla Airport, which currently experiences approximately 341 operations per based aircraft; Cottonwood Airport which experiences approximately 365 operations per based aircraft; and Sedona Airport which experiences approximately 411 operations per based aircraft. The preferred planning forecast yields 5,500 annual operations by 2010; 7,100 annual operations by 2015; and 9,800 annual operations by 2025. Local operations were estimated to currently account for just 8.6 percent of total operations. The percentage of local operations is projected to increase through the planning period as more training activity can be anticipated. A planned theme park in the City of Williams would potentially draw increased itinerant traffic at the airport from tourists.

ANNUAL INSTRUMENT APPROACHES

An instrument approach as defined by the FAA is "an approach to an airport with the intent to land an aircraft in accordance with an Instrument Flight

(IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." Due to the lack of an instrument approach at H.A. Clark Memorial Field, instrument approaches are not performed. With the addition of an instrument approach into H.A. Clark Memorial Field, it can be expected that annual instrument approaches (AIAs) would represent one percent of total itinerant operations. Applying this percentage to forecast itinerant operations yields 50 instrument approaches in 2010, 63 in 2015, and 83 in 2025.

AERIAL TOUR OPERATOR POTENTIAL

The proximity of H.A. Clark Memorial Field to the Grand Canyon, along with its proximity to Interstate I-40 and the attraction of the City of Williams, creates the potential for an aerial tour operator to base its operations at H.A. Clark Memorial Field. H.A. Clark Memorial Field currently has the necessary terminal facilities to accommodate an aerial tour operator. Airport Rescue and Fire Fighting facilities and equipment will be in place by 2007. An aerial tour operator would result in increased based aircraft, itinerant operations, and enplanements at the airport. Off-airport facilities such as hotels and restaurants would also benefit from an operation of this type due to the increased amount of tourist travel through the City of Williams.

An aerial tour operator could potentially base anywhere from one to eight aircraft depending on the level of demand at H.A. Clark Memorial Field. These aircraft could be rotorcraft or fixed-wing aircraft.

Table 2G depicts the aerial tour operator potential with regard to based aircraft, operations, and annual enplanements. This information was put together using information from aerial tour operators in the Grand Canyon region. It was estimated that each operation would average four enplanements. The mix of air tour aircraft is split evenly between fixed-wing and rotorcraft. In the early potions of the planning period, the fixed wing aircraft are assumed to be single engine piston aircraft. In later portions of the planning period, the introduction of turboprop air tour aircraft is assumed. The mix of air tour aircraft is shown in the table at the end of the chapter.

TABLE 2G
Aerial Tour Operator Potential
H.A. Clark Memorial Field

Year	Based Aircraft	Operations	Enplanements
2010	3	4,500	18,000
2015	5	7,500	30,000
2025	8	12,000	48,000

COMMERCIAL AIR SERVICE POTENTIAL

H.A. Clark Memorial Field has never been served by scheduled airline service. This is most likely due to the proximity of the City of Williams to Flagstaff Pulliam Airport, which provides regularly schedule airline activity. Flagstaff Pulliam Airport is approximately 35 miles east of the City of Williams. Air travel from Williams is also influenced by the Phoenix Sky Harbor International Airport. Many air travelers may also choose to fly directly from Phoenix Sky Harbor due to cost and schedules that are only available from that airport. In this case, these air travelers would also bypass Flagstaff Pulliam Airport.

Considering the proximity of the City of Williams to Phoenix, any potential airline service would likely be commuter/regional type airline service serving Phoenix Sky Harbor International Airport. Air service at Flagstaff Pulliam Airport is offered by regional airlines with service to Phoenix Sky Harbor International Airport.

An airline's decision to enter a market is purely a business decision based on the potential passenger market. Without a history of air service at H.A. Clark Memorial Field, it is difficult to estimate the air passenger market in Williams. However, examining similar airports and communities with existing scheduled airline service could provide an indication of the potential passenger market in Williams.

Communities near Williams with regional airline service include Show Low, Kingman, Lake Havasu, and Prescott. **Table 2G** compares 2004 population to enplanements in these communities. (An enplanement is a person boarding a scheduled airline.)

TABLE 2H
Enplanements Per Capita
Kingman, Lake Havasu, Show Low and Prescott, Arizona

	2004 Population	2004 Enplanements	Ratio of Enplanements to 100 Residents
Kingman	24,600	2,473	10
Lake Havasu	52,205	9,432	18
Show Low	9,885	4,895	49
Prescott	40,770	7,014	17

Source for Population: Arizona Department of Economic Security
Source for Enplanements: FAA ACAIS Database, 2004

Kingman, Lake Havasu, Show Low, and Prescott are all in the federal Essential Air Service (EAS) program. Under this program, a subsidy is paid to the airline serving these communities to guarantee regular service and reduce ticket prices. This likely increases the number of annual airline enplanements for these communities as tickets prices can be more competitively priced by the airline.

Two projections of potential enplanements in the City of Williams have been developed assuming a similar ratio of enplanements in the City of Williams as has occurred in the past for Show Low and Lake Havasu. **Table 2J** compares the forecast Williams' population and an enplanements factor to derive the potential air passenger market for Williams. As shown in the table, the potential air service market in 2010 could range from approximately 800 annual airline enplanements to over 2,200 enplanements. Assuming these ratios remain constants, the potential range in air passengers can be between 1,300 and 3,500 passengers in 2025.

TABLE 2J
Potential Air Passengers
H.A. Clark Memorial Field

Year	City of Williams Population	Ratio of Enplanements to 100 Residents Scenario I	Potential Air Passengers Scenario I	Ratio of Enplanements to 100 Residents Scenario II	Potential Air Passengers Scenario II
2010	4,305	50	2,200	18	800
2015	5,835	50	2,900	18	1,100
2020	6,410	50	3,200	18	1,200
2025	6,920	50	3,500	18	1,300

Source for Population: Arizona Department of Economic Security

An airline needs between 55 and 65 percent of the available seats on each flight filled for a flight to be profitable. One 19-seat aircraft serving the market daily provides a total of 6,935 seats annually into the market. This means that the market would need to provide at least 3,800 passengers annually to support one daily flight (55 percent loading). Typically, three daily flights are needed to ensure reliable and convenient service that will be used by air travelers. As many as 11,500 annual enplanements are needed to support three daily flights. As shown in **Table 2J**, the potential air travel market in Williams is considerably less than this level and may not ever be able to support regularly scheduled airline service.

Attracting scheduled air service to Williams would require a considerable commitment on the part of the City of Williams. The City of Williams would likely need to provide marketing and/or subsidies to attract scheduled air service as the City is currently not part of the EAS program.

The most important factors in creating and sustaining scheduled air service are the frequency of service and air fares. Competitive air fares would attract travelers who might otherwise choose to drive to Flagstaff Pulliam Airport or Phoenix Sky Harbor International Airport which can offer lower fares and frequency of service. Should the community be able to attract scheduled air service, it is likely that a number of potential local air passengers would still choose to drive to Flagstaff or Phoenix rather than flying directly from Williams.

SUMMARY

This chapter has outlined the various aviation demand levels anticipated over the planning period. In summary, general aviation activity at H.A. Clark Memorial Field has shown slow growth. However, the airport still has good growth potential for both based aircraft and general aviation operations due to a growing local economy and population and the potential for the theme park to be developed in the City. The proximity of H.A. Clark Memorial Field to the Grand Canyon could allow for an air tour operation to be based at the airport. The airport already has the terminal facilities in place to accommodate this type of operation. The potential for scheduled airline service is remote considering the proximity of the City of Williams to Flagstaff and Phoenix, which already provide scheduled airline service. Requirements for scheduled airline service will not be given further consideration in this Master Plan due to the low potential for this type of activity at the airport.

Table 2K and **Exhibit 2D** provide a summary of the aviation activity planning horizons for H.A. Clark Memorial Field. Activity for 2005 is included in the table as a baseline reference. In subsequent chapters, these forecasts will be converted to planning horizon milestones to emphasize that the Master Plan will be developed according to a demand-based schedule rather than a time-based schedule.

The next step in the Master Plan will be to assess the capacity of existing facilities to accommodate forecast demand and determine which facilities will need to be improved to meet these demands. This will be examined in the next chapter, Chapter Three, Facility Requirements.

TABLE 2K
Forecasts Summary
H.A. Clark Memorial Field

	2005	2010	2015	2025
ANNUAL OPERATIONS				
Itinerant Operations	3,840	4,700	5,300	6,900
Local Operations	360	800	1,800	2,900
Total Operations	4,200	5,500	7,100	9,800
ANNUAL OPERATIONS WITH AIR TOUR OPERATOR				
GA Itinerant Operations	3,840	4,700	5,300	6,900
Air Tour Itinerant Operations	--	4,500	7,500	12,000
GA Local Operations	360	800	1,800	2,900
Total Operations	4,200	10,000	14,600	21,800
BASED AIRCRAFT				
Single-Engine Piston	10	12	14	17
Multi-Engine Piston	3	3	3	4
Turboprop	0	0	1	2
Jet	0	0	1	2
Rotorcraft	0	1	1	1
Total Based Aircraft	13	16	20	26
BASED AIRCRAFT WITH AIR TOUR OPERATOR				
Single-Engine Piston	10	14	17	19
Multi-Engine Piston	3	3	3	4
Turboprop	0	0	1	5
Jet	0	0	1	2
Rotorcraft	0	2	3	4
Total Based Aircraft	13	19	25	34

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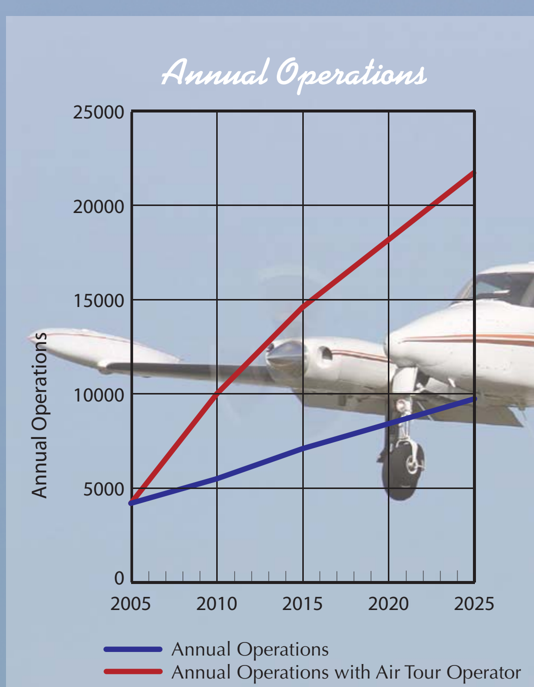
Summary of Aviation Activity Forecast

	2005	2010	2015	2025
Annual Operations				
Itinerant Operations	3,840	4,700	5,300	6,900
Local Operations	360	800	1,800	2,900
Total Operations	**4,200**	**5,500**	**7,100**	**9,800**
Annual Operations with Air Tour Operator				
General Aviation Itinerant Operations	3,840	4,700	5,300	6,900
Air Tour Itinerant Operations	- -	4,500	7,500	12,000
General Aviation Local Operations	360	800	1,800	2,900
Total Operations	**4,200**	**10,000**	**14,600**	**21,800**
Based Aircraft				
Single-Engine Piston	10	12	14	17
Multi-Engine Piston	3	3	3	4
Turboprop	0	0	1	2
Jet	0	0	1	2
Rotocraft	0	1	1	1
Total Based Aircraft	**13**	**16**	**20**	**26**
Based Aircraft with Air Tour Operator				
Single-Engine Piston	10	14	17	19
Multi-Engine Piston	3	3	3	4
Turboprop	0	0	1	5
Jet	0	0	1	2
Rotocraft	0	2	3	4
Total Based Aircraft	**13**	**19**	**25**	**34**



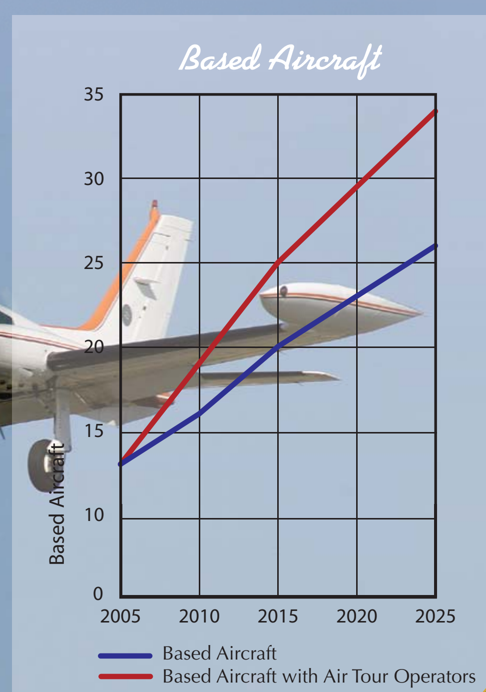


Exhibit 2D
FORECAST SUMMARY

Chapter Three

Facility Requirements

Facility Requirements

To properly plan for the future of H.A. Clark Memorial Field, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve projected demand levels. This chapter uses the results of the forecasts prepared in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, general aviation terminal, aircraft parking apron, fueling, automobile parking and access) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities and outline what new facilities may be needed as well as when they may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

PLANNING HORIZONS

The cost-effective, safe, efficient, and orderly development of an airport should rely more upon actual demand at an airport than a time-based forecast figure. Thus, in order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones have been established that take into consideration the reasonable range of aviation demand projections.

Over time, the actual activity at the airport may be higher or lower than the annualized forecast portrays. By planning according to activity milestones, the resultant plan can accommodate unexpected shifts or changes in the aviation demand in a timely fashion. The demand-based schedule provides flexibility in development, as the schedule can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially-responsible and needs-based program. **Table 3A** presents the planning horizon milestones for each activity demand category. These planning horizons assume the air tour operator scenario presented in Chapter Two.

TABLE 3A
Aviation Demand Planning Horizons
H.A. Clark Memorial Field

	2005	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
ANNUAL OPERATIONS				
Itinerant	3,840	9,200	12,800	18,900
Local	360	800	1,800	2,900
TOTAL OPERATIONS	4,200	10,000	14,600	21,800
Based Aircraft	13	19	25	34

PEAKING CHARACTERISTICS

Airport capacity and facility needs analyses typically relate to the levels of activity during a peak or design period. The periods used in developing the capacity analyses and facility requirements in this study are as follows:

- **Peak Month** - The calendar month when peak volumes of aircraft operations occur.

- **Design Day** - The average day in the peak month. This indicator is easily derived by dividing the peak month operations by the number of days in a month.

- **Busy Day** - The busy day of a typical week in the peak month. This descriptor is used primarily to determine general aviation transient ramp space requirements.

- **Design Hour** - The peak hour within the design day.

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

Itinerant Operations Peak Periods

Without an airport traffic control tower, adequate operational information is not available to directly determine peak operational activity at the airport. Therefore, peak period forecasts have been determined according to trends experienced at similar airports. Typically, the peak month for activity at general aviation airports approximates 10 to 15 percent of the airport's annual operations. Peak month itinerant operations and total operations were estimated at 12 percent of total annual operations. Current busy day operations were calculated as 1.5 times design day activity. This ratio can be expected to decline as activity increases and becomes more balanced throughout the week. Design hour operations were estimated at 30 percent of design day operations in 2005. This percentage can also be expected to decline slightly as activity increases over the long term. **Table 3B** summarizes the peak operations forecast for the airport.

TABLE 3B
Peaking Characteristics
H.A. Clark Memorial Field

	2005	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
OPERATIONS				
Itinerant				
Annual	3,840	9,200	12,800	18,900
Peak Month	461	1,104	1,536	2,268
Design Day	15	36	50	73
Busy Day	22	50	67	95
Design Hour	4	10	13	18
Total Airport				
Annual	4,200	10,000	14,600	21,800
Peak Month	504	1,200	1,752	2,616
Design Day	16	39	57	84
Design Hour	5	11	15	20

AIRFIELD CAPACITY

A demand/capacity analysis measures the capacity of the airfield facilities (i.e., runways and taxiways) in order to identify a plan for additional development needs. The capacity of the airfield is affected by several factors, including airfield layout, meteorological conditions, aircraft mix, runway use, aircraft arrivals, aircraft touch-and-go activity, and exit taxiway locations. An airport's airfield capacity is expressed in terms of its annual service volume (ASV). Annual service volume is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year.

Pursuant to FAA guidelines detailed in the FAA Advisory Circular (AC 150/5060-5, *Airport Capacity and Delay*, the annual service volume of a single runway configuration is approximately 230,000 operations at general aviation airports similar to H.A. Clark Memorial Field. Since the forecasts for the airport indicate that activity throughout the planning period will remain well below 230,000 annual operations, the capacity of the existing airfield system will not be reached, and the airfield is expected to accommodate the forecasted operational demands. Therefore, no additional runways or taxiways are needed for capacity reasons.

CRITICAL AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use the airport. The critical design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 itinerant operations per year at the airport. Planning for future aircraft use is of particular importance since design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the long term potential needs of the airport.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This airport reference code (ARC) has two components: the first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities.

According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at that aircraft's maximum certificated weight. The five approach categories used in airport planning 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 greater than 166 knots.

The airplane design group (ADG) is based upon the aircraft's wingspan. The six ADGs used in airport planning are as follows:

Group I: Up to but not including 49 feet.

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

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

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

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

Group VI: 214 feet or greater.

Exhibit 3A summarizes representative aircraft by ARC.

The FAA advises designing airfield facilities to meet the requirements of the airport's most demanding aircraft, or critical aircraft. An aircraft or group of aircraft within a particular Approach Category or ADG must conduct more than 500 operations annually to be considered the critical design aircraft. In order to determine facility requirements, an ARC should first be determined, and then appropriate airport design criteria can be applied. This begins with a review of aircraft currently using the airport and those expected to use the airport through the planning period. H.A. Clark Memorial Field is currently used by a variety of general aviation aircraft. General aviation aircraft using the airport include single and multi-engine aircraft less than 12,500 pounds, which fall within Approach Categories A and B and ADG I. Occasionally, aircraft in ADG II use the airport (such as the Beechcraft King Air 200). Turbojet aircraft use the airport very infrequently. A review of completed instrument flight plans for calendar years 2003, 2004, 2005, and the first quarter of 2006 reveal that turbojet aircraft conducted less than 10 operations annually during this period.

All based aircraft currently fall within ARC A-I and ARC B-I. Representative based aircraft include single-engine Cessna aircraft, although numerous other aircraft makes and models are based at the airport.

The aviation demand forecasts projected the mix of aircraft to use the airport to consist of mainly the single-engine and multi-engine piston-powered aircraft which fall within Approach Categories A and B and ADGs I and II. The turboprop aircraft projected to base at the airport in the future would also fall within similar categories. While two turbojet aircraft are projected to base at the airport by the end of the planning period, business jet aircraft can include a wide range of Approach Categories and ADGs. The newest microjets being developed fall within ARC A-I. The most common business jet in use today, the Cessna Citation, falls within ARC B-II. Some larger business jets fall within ARCs C-I, C-II, D-I, and D-II.

While business jet use of the airport is expected to increase in the future, it is not expected that aircraft in Approach Category C or D will conduct 500 or more annual operations at the airport in the future. Aircraft in these approach categories have conducted less than 10 total operations since 2003 at the airport.

The previous master plan established the ARC B-III design standards for the airport in anticipation of larger aerial tour operator aircraft. The current airfield is designed to ARC B-III standards. This Master Plan recognizes the potential for the establishment of an air tour operation during the period of this Master Plan. There-

04MP12-3A-11/9/07

A-I

- Beech Baron 55
- Beech Bonanza
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- **Eclipse 500**
- Piper Archer
- Piper Seneca

C-I, D-I

- Beech 400
- **Lear** 25, 31, **35**, 45, 55, 60
- Israeli Westwind
- HS 125-400, 700

B-I *less than 12,500 lbs.*

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I

C-II, D-II

- Cessna Citation III, VI, VIII, X
- **Gulfstream** II, III, **IV**
- Canadair 600
- ERJ-135, 140, 145
- CRJ-200, 700, 900
- Embraer Regional Jet
- Lockheed JetStar
- Super King Air 350

B-II *less than 12,500 lbs.*

- **Super King Air 200**
- Cessna 441
- DHC Twin Otter

C-III, D-III

- ERJ-170, 190
- eing Business Jet
- B 7-200
- **B 7-300 Series**
- MD 0, DC-9
- Fo er 70, 100
- A 9, A320
- ulfstream V
- Global Express

B-I, B-II *over 12,500 lbs.*

- Super King Air 300
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- **Citation II**, III, IV, V
- Saab 340
- Embraer 120

C-IV, D-IV

- **-757**
- B 67
- C- 0
- DC -70
- DC 0
- M -11
- 1011

A-III, B-III

- DHC Dash 7
- **DHC Dash 8**
- DC-3
- Convair 580
- Fairchild F-27
- ATR 72
- ATP

D-V

- **B- 7** Series
- B- 7

H. A. CLARK MEMORIAL FIELD

Note: Aircraft pictured is identified in bold type.

Exhibit 3A
AIRPORT REFERENCE CODES

fore, even though the majority of based aircraft are expected to fall within ARC B-II or below in the future, H.A. Clark Memorial Field should maintain the ARC B-III design standards through the planning period.

AIRFIELD REQUIREMENTS

The analyses of the operational capacity and the critical design aircraft are used to determine airfield needs. This includes runway configuration, dimensional standards, and pavement strength, as well as navigational aids and lighting.

RUNWAY CONFIGURATION

Key considerations in the runway configuration of an airport involve the orientation for wind coverage and the operational capacity of the runway system. The airfield capacity analysis indicated that additional airfield capacity will not need to be considered through the long-term planning horizon.

FAA Advisory Circular 150/5300-13, Change 9, *Airport Design*, recommends that a crosswind runway should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for ARC A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; 16 knots (18 mph) for ARC A-III, B-III, and C-I through D-II; and 20 knots (23 mph) for ARC C-III through D-IV.

H.A. Clark Memorial Field does not have ten years of wind data collected from its AWOS; therefore, wind data collected from the Flagstaff Pulliam Airport was used to produce a wind rose for H.A. Clark Memorial Field. The most recent ten years of wind data from the Flagstaff Pulliam Airport at the time of this analysis was 1993-2002. This data is graphically depicted on the wind rose in **Exhibit 3B**. Runway 18-36 provides 96.1 percent coverage for 10.5 knot crosswinds, 98.4 percent coverage for 13 knot crosswinds, 99.7 percent coverage for 16 knot crosswinds, and 99.9 percent coverage for 20 knot crosswinds. Thus, the existing runway configuration has adequate wind coverage for all sizes and speeds of aircraft. For this reason, an additional runway for crosswind purposes is not necessary.

RUNWAY DIMENSIONAL REQUIREMENTS

Runway dimensional standards include the length and width of the runway, as well as the dimensions associated with runway safety areas and other clearances. These requirements are based upon the design aircraft, or group of aircraft. The runway length must consider the performance characteristics of individual aircraft types, while the other dimensional standards are generally based upon the most critical airport reference code expected to use the runway. The dimensional

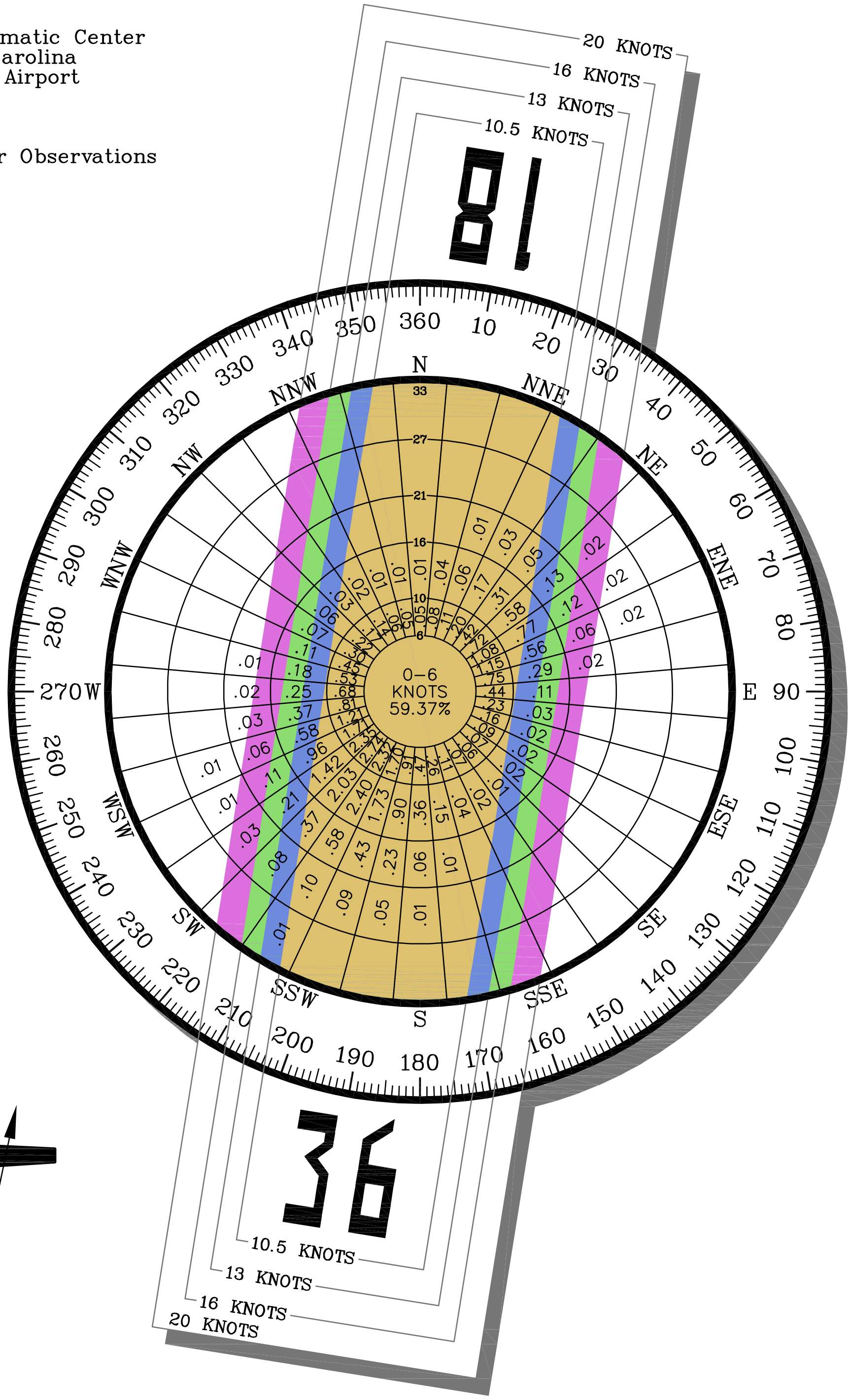
Draft 04MP12-3B-02/12/07

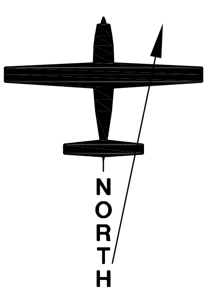
ALL WEATHER WIND COVERAGE

Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18-36	*95.36%*	*98.07%*	*99.65%*	*99.95%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Flagstaff Pulliam Airport
Flagstaff, Arizona

OBSERVATIONS:
77,081 All Weather Observations
1994-2003





Magnetic Variance
11° 52" East (April 2006)
Annual Rate of Change
00° 06' West (April 2006)

Exhibit 3B
WINDROSE

standards are outlined for the planning period for the primary runway.

Runway Length

The aircraft performance capability is a key factor in determining the runway length needed for takeoff and landing. The performance capability and, subsequently, the runway length requirement of a given aircraft type can be affected by the elevation of the airport, the air temperature, the gradient of the runway, and the operating weight of the aircraft.

The airport elevation at H.A. Clark Memorial Field is 6,685 feet above mean sea level (MSL). The mean maximum daily temperature during the hottest month is 83.7 degrees Fahrenheit. The gradient for Runway 18-36 is 1.0 percent.

Table 3C outlines the runway length requirements for various classifications of general aviation aircraft specific to H.A. Clark Memorial Field. These were derived utilizing the FAA Airport Design Computer Program. This program uses performance figures provided in AC 150/5325-4B, *Runway Length Requirements for Airport Design*. These runway lengths are based upon groupings or "families" of aircraft. As discussed earlier, the runway design required should be based upon the most critical family of aircraft with at least 500 annual operations. As noted above, this included general aviation aircraft within ARC B-II.

TABLE 3C
General Aviation Runway Length Requirements
H.A. Clark Memorial Field

AIRPORT AND RUNWAY DATA	
Airport elevation	6,685 feet
Mean daily maximum temperature of the hottest month	83.7 F
Maximum difference in runway centerline elevation	60 feet
Wet runway	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	5,700 feet
95 percent of these small airplanes	**8,000 feet**
100 percent of these small airplanes	8,000 feet
Small airplanes with 10 or more passenger seats	8,000 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	7,900 feet
75 percent of these large airplanes at 90 percent useful load	9,200 feet
100 percent of these large airplanes at 60 percent useful load	11,600 feet
100 percent of these large airplanes at 90 percent useful load	11,600 feet

Chapter Two of AC 150/5325-4B, *Runway Length Requirements for Airport Design*, no changes included.

Small aircraft are defined as aircraft weighing 12,500 pounds or less. Small airplanes make up the vast majority of general aviation activity at H.A. Clark Memorial Field and most other general aviation airports. In particular, piston-powered aircraft make up the majority of the small airplane operations.

According to the table, the present runway length of 6,000 feet is adequate to accommodate 75 percent of these small airplanes. FAA Advisory Circular 150/5325-4B recommends that airports such a H.A. Clark Memorial Field be designed to at least serve 95 percent of small airplanes. The advisory circular further defines the fleet categories as follows:

- **95 Percent of Small Airplane Fleet:** Applies to airports that are primarily intended to serve medium-sized population communities with a diversity of usage and a greater potential for increased aviation activities. This category also includes airports that are primarily intended to serve low-activity locations, small population communities, and remote recreational areas.

- **100 Percent of Small Airplane Fleet:** This type of airport is primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population community remote from a metropolitan area.

Based upon these definitions, H.A. Clark Memorial Field falls within the 95 percent fleet category. At the airport's temperature and elevation, this would require a runway length of 8,000 feet. According to the FAA planning guidance, this is also the same length recommended to accommodate 100 percent of the small airplane fleet. Thus, Runway 18-36 should be planned to be extended to 8,000 feet in the long-term planning horizon.

This length should also be sufficient to accommodate any potential air tour operators. The largest aircraft currently used regularly in Grand Canyon air tour service in the region is the De Havilland Twin Otter (DH6). This aircraft requires less than 5,000 feet for takeoff at the temperature and altitude of H.A. Clark Memorial Field. Other aircraft used in air tour operations are single-engine and multi-engine piston-powered aircraft. Their runway length requirements are included in the runway length defined above.

An extension to Runway 18-36 is included in this Master Plan for planning purposes only. This is to aid in local land use planning to ensure that appropriate land use measures are put into place to allow for this extension in the future if it is needed. By planning for an 8,000-foot runway, the City and County can take appropriate measures to ensure that there are no hazards or obstacle penetrations to the 14 Code of Federal Regulations (CFR) Part 77 airspace in the future that could prevent the extension, and to allow for compatible land use to be planned in the extended runway approach/departure area. The Airport Disclosure Map that will be developed for this Master Plan will assume the potential for this extension at the airport in the future. Separate justification for constructing the runway extension will likely be required outside this Master Plan at the time of implementation. This justification will need to identify those specific users that require a longer runway to operate at the airport. This type of justification is generally built upon letters of support from the specific users requiring the runway extension.

Pavement Strength

An important feature of airfield pavement is the ability to withstand repeated use by aircraft of significant weight. Runway 18-36 is strength-rated at 15,000 pounds single wheel loading (SWL). This is generally adequate for current use. As larger and heavier multi-engine, turboprop and business jet use increases, the pavement should be strengthened up to 30,000 SWL and 60,000 pounds dual wheel loading (DWL) to accommodate these heavier aircraft.

Dimensional Design Standards

Runway dimensional design standards define the widths and clearances required to optimize safe operations in the landing and takeoff area. These dimensional standards vary depending upon the ARC for the runway. **Table 3D** outlines key dimensional standards for the airport reference codes most applicable to H.A. Clark Memorial Field, both now and in the future.

The runway should be planned to maintain critical ARC, which is B-III.

The following considers those areas where standards will need to be met on the existing Runway 18-36:

Runway Width – The current width of Runway 18-36 (100 feet) meets the 100-foot design requirement for ARC B-III.

Runway Safety Area – The runway safety area (RSA) is defined in FAA Advisory Circular 150/5300-13, Change 9, *Airport Design*, as a surface surrounding the runway, prepared or suitable for reducing the risk of damage to airplanes in the event of an overshoot, undershoot, or excursion from the runway. The RSA is centered on the runway and extends beyond either end. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

The RSA standard for Category B-III aircraft is 400 feet wide and extends 800 feet beyond each runway end. The existing airport layout should allow these standards to be met without affecting any existing airport facilities.

TABLE 3D **Airfield Design Standard** **H.A. Clark Memorial Field**	**Runway 18-36**		
Airport Reference Code (ARC)	**Available (ft.)**	**B-II (ft.)**	**B-III (ft.)**
Runway Width	100	75	100
Runway Safety Area			
Width	300	150	**400**
Length Beyond End	300	300	**800**
Runway Object Free Area			
Width	800	500	800
Length Beyond End	300	300	**800**
Runway Blast Pad			
Width	N/A	95	140
Length	N/A	150	200
Runway Centerline to:			
Holding Position	200	200	200
Parallel Taxiway	400	240	400
Taxiway Width	35	35	**50**
Taxiway Centerline to:			
Fixed or Moveable Object	93	65.5	**93**
Parallel Taxilane	N/A	105	**152**
Taxilane Centerline to:			
Fixed or Moveable Object	50	**57.5**	**81**
Parallel Taxilane	140	97	**140**
Runway Protection Zones -			
One mile or greater visibility			
Inner Width	500	500	500
Length	1,000	1,000	1,000
Outer Width	700	700	700
Not Lower than ¾ mile			
Inner Width	500	**1,000**	**1,000**
Length	1,000	**1,700**	**1,700**
Outer Width	700	**1,510**	**1,510**
Lower than ¾ mile			
Inner Width	500	**1,000**	**1,000**
Length	1,000	**2,500**	**2,500**
Outer Width	700	**1,750**	**1,750**

* Boldface indicates standards not met.

Runway Object Free Area – The object free area (OFA) is an area centered on the runway to enhance the safety of aircraft operations by having an area free of objects, except for objects that need to be located in the OFA for air navigation or ground maneuvering purposes. The OFA must provide clearance of all ground-based objects protruding above the runway safety area (RSA) edge elevation, unless the object is fixed by a function serving air or ground navigation.

For ARC B-III, the OFA extends for 800 feet beyond the runway end, and has a width of 800 feet. Runway 18-36 meets the width standard but currently only extends 300 feet beyond the runway ends. This will need to be extended to the full 800 feet to comply with B-III design standards in the future.

Aircraft Holding Positions – The current hold positions for Runway 18-36 are marked 200 feet from the runway centerline. The standard for ARC B-III is 200 feet. These hold positions are adequate for the long term.

Runway Protection Zones – The runway protection zone (RPZ) is an area off the runway end that enhances the protection of people and property on the ground. This is best achieved through airport owner control over the RPZs. Such control includes maintaining RPZ areas clear of incompatible objects and activities.

The RPZ is trapezoidal in shape and is centered on the extended runway centerline. The dimensions of the RPZ are a function of the critical aircraft and the approach visibility minimums associated with the runway. All approaches to the airport now are visual as there are no designated instrument approach procedures for the airport. The establishment of an instrument approach procedure at the airport might not change the size of the RPZ. An instrument approach procedure with visibility minimums as low as one mile could be developed for the airport and the size of the RPZ would not change. **Table 3D** depicts the RPZ requirements for runway ends equipped with low-visibility instrument approach procedures. Based upon the capabilities of any instrument approach procedures developed in the future, the RPZs for each runway end would become larger in the future if instrument approach procedures had visibility minimums less than one mile.

TAXIWAY REQUIREMENTS

Taxiways are constructed primarily to facilitate aircraft movements to and from the runway system. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport to provide safe and efficient use of the airfield.

As detailed in Chapter One, Runway 18-36 is served by a full-length parallel taxiway with a total of five exit taxiways. **Table 3D** outlines the runway to taxiway centerline separation standards for ARC B-II and B-III. Parallel Taxiway A meets separation standards for up to ARC B-III.

Exit taxiways provide a means to enter and exit the runways at various points on the airfield. The type and number of exit taxiways can have a direct impact on the capacity and efficiency of the airport as a whole. Runway 18-36 has a total of five exit taxiways on the east side of the runway. Exit taxiways are most effective when planned at least 800 feet apart. Each of Runway 18-36's exit taxiways are spaced 800 feet or more from each other. Potential locations for new exit taxiways that may improve capacity or efficiency will be examined in Chapter Four.

Dimensional standards for the taxiways are depicted on **Table 3D**.

Taxiway width and clearance standards are based upon the ADG for a particular runway or taxiway. For Runway 18-36, all taxiways must meet ADG II standards. The parallel taxiways and exit taxiways for Runway 18-36 are 35 feet wide. These taxiways will need to be widened to 50 feet to meet the ADG III standard. **Table 3D** summarizes the clearance standards that should be considered in future development.

Holding aprons improve the efficiency of the taxiway system by allowing an area of the taxiway for aircraft to prepare for departure. This allows aircraft ready for departure to by-pass these aircraft. A holding apron should be planned for each runway end.

NAVIGATIONAL AIDS AND INSTRUMENT APPROACH PROCEDURES

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which properly equipped aircraft and pilots translate into point-to-point guidance and position information. The very high frequency omnidirectional range (VOR), Global Positioning System (GPS), and LORAN-C are available for pilots to navigate to and from H.A Clark Memorial Field. These systems are sufficient for navigation to and from the airport; therefore, no other navigational aids are needed at the airport.

Instrument Approach Procedures

Instrument approach procedures consist of a series of predetermined maneuvers established by the FAA for navigation during inclement weather conditions. Currently, there are no established instrument approach procedures for H.A Clark Memorial Field. Therefore, during those times when visibility drops below three miles and/or cloud ceilings are below 1,000 feet MSL, the airport is essentially closed to arrivals.

A GPS modernization effort is underway by the FAA and focuses on augmenting the GPS signal to satisfy requirements for accuracy, coverage, availability, and integrity. For civil aviation use, this includes the continued development of the Wide Area Augmentation System (WAAS), which was initially launched in 2003. The WAAS uses a system of reference stations to correct signals from the GPS satellites for improved navigation and approach capabilities. Where the non-WAAS GPS signal provides for enroute navigation and limited instrument approach (lateral navigation) capabilities, WAAS provides for approaches with both course and vertical navigation. This capability was historically only provided by an instrument landing system (ILS), which requires extensive on-airport facilities. The WAAS upgrades are expected to allow the development of approaches to most airports with cloud ceilings as low as 200 feet above the ground and visibilities restricted to one-half mile, after 2015.

Nearly all new instrument approach procedures developed in the United States are being developed with GPS. GPS approaches are currently categorized as to whether they provide only lateral (course) guidance or a combination of lateral and vertical (descent) guidance. An approach procedure with vertical guidance (APV) GPS approach provides both course and descent guidance. A lateral navigation approach (LNAV) approach only provides course guidance. In the future, as WAAS is upgraded, precision approaches similar in capability to the existing ILS will become available. These approaches are currently categorized as the Global Navigation Satellite System Landing System (GLS). A GLS approach may be able to provide for approaches with one-half-mile visibility and 200-foot cloud ceilings. A GLS would be implemented in lieu of an ILS approach.

Since both course guidance and descent information is desirable for an instrument approach to H.A Clark Memorial Field and GPS does not require the installation of costly navigation equipment at the airport, a GLS should be planned to the Runway 36 end. An APV approach with one-mile visibility minimums is appropriate to Runway 18.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

There are a number of lighting and pavement marking aids serving pilots using the H.A. Clark Memorial Field. These lighting and marking aids assist pilots in locating the airport during night or poor weather conditions, as well as assist in the ground movement of aircraft.

Identification Lighting

The location of an airport at night is universally indicated by a rotating beacon. The rotating beacon at the airport is located on the top of a metal tower east of Runway 18-36. The rotating beacon is sufficient and should be maintained through the planning period.

Runway and Taxiway Lighting

The medium intensity runway edge lighting (MIRL) currently available along Runway 18-36 will be adequate for the planning period. The taxiway system does not currently have a lighting system. In the short term, medium intensity taxiway lights (MITL) should be planned for all taxiways.

Airfield Signs

Airfield signage assists pilots in identifying their location on the airport. Signs located at intersections of taxiways provide crucial information to avoid conflicts between moving aircraft and potential runway incursions. Directional signage also instructs pilots as to the location of taxiways and apron areas. This directional signage is sufficient and should be maintained through the planning period.

Visual Approach Lighting

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. Each end of Runway 18-36 is currently equipped with a precision approach path indicator (PAPI-2). These lighting systems should be upgraded to PAPI-4s to better suit large aircraft operations in the future.

Approach and Runway End Identification Lighting

Runway end identifier lights (REILs) are flashing lights located at each runway end that facilitate identification of the runway end at night and during poor visibility conditions. REILs provide pilots with the ability to identify runway ends and distinguish the runway end lighting from other lighting on the airport and in the approach areas. REILs are installed at each end of Runway 18-36. These lighting aids should be maintained through the planning period. To support a GLS approach to Runway 36, a medium intensity approach lighting system with runway alignment indicator lights (MALSR) will be required.

Distance Remaining Signs

Distance remaining signage should be planned for Runway 18-36. These lighted signs are placed in 1,000-foot increments along the runway to notify pilots of the length of runway remaining.

Pilot-Controlled Lighting

H.A. Clark Memorial Field is equipped with pilot-controlled lighting (PCL). PCL allows pilots to control the intensity of the runway lighting using the radio transmitter in the aircraft. PCL also provides for more efficient use of airfield lighting energy. A PCL system turns the airfield lights off or to a lower intensity when not in use. Similar to changing the intensity of the lights, pilots can turn up the lights using the radio transmitter in the aircraft. This system should be maintained through the planning period. The PAPIs and REILs should be added to the PCL system, along with future taxiway lighting.

Pavement Markings

In order to facilitate the safe movement of aircraft about the field, airports use pavement markings, lighting, and signage to direct pilots to their destinations. Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular 150/5340-1H, *Marking of Paved Areas on Airports*, provides the guidance necessary to design airport markings.

Runway 18-36 currently has nonprecision markings. Nonprecision runway markings identify the runway centerline, threshold, aiming point, and designation. These markings are sufficient for an APV approach to Runway 18. Precision markings would be required for a GLS approach to Runway 36. Precision markings identify the runway designation, centerline, threshold, aiming point, touchdown zone, and provide side strips.

Holdlines need to be marked on all taxiways connecting to the runway. The holdlines are currently required to be placed 200 feet from the runway centerline. These markings assist in reducing runway incursions as aircraft must remain behind the holdline until taking the active runway for departure.

Taxiway and apron areas also require marking to assure that aircraft remain on the pavement and clear of any objects located along the taxiway/taxilane. Yellow centerline stripes are currently painted on all taxiway and apron surfaces at the airport to provide assistance to pilots in taxiing along these surfaces at the airport. Besides routine maintenance, these markings will be sufficient through the planning period.

HELIPADS

The airport does not have a designated helipad on the main apron area. Helicopters utilize the same areas as fixed-wing aircraft. Helicopter and fixed-wing aircraft should be segregated to the extent possible. Facility planning should include establishing a designated transient helipad at the airport, including providing up to two parking positions. Lighting should be provided to allow safe operation to the helipad at night.

WEATHER REPORTING

The airport has a lighted wind cone that provides pilots with information about wind conditions. A segmented circle provides traffic pattern information to pilots. These facilities are sufficient and should be maintained in the future.

The airport is equipped with an AWOS. The AWOS provides automated weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The AWOS reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The AWOS is sufficient and should be maintained through the planning period.

REMOTE COMMUNICATIONS FACILITIES

H.A. Clark Memorial Field is not currently equipped with a remote communications outlet (RCO). It is recommended that an RCO be added to the airport. An RCO would provide pilots with a direct communication link to the Albuquerque Air Route Traffic Control Center. This communication link facilitates the opening and closing of flight plans.

AIRPORT TRAFFIC CONTROL

H.A. Clark Memorial Field does not have an operational airport traffic control tower (ATCT); therefore, no formal terminal air traffic control services are available at the airport. Establishment of an ATCT is governed by Title 14 of the Code of Federal Regulation (CFR) Part 170, *Establishment and Discontinuance Criteria for Air Traffic Control Services and Navigational Facilities.*

14 CFR Part 170.13 *Airport Traffic Control Tower (ATCT) Establishment Criteria*, provides the general criteria along with general facility establishment standards that must be met before an airport can qualify for an ATCT. These are as follows:

1. The airport, whether publicly or privately owned, must be open to and available for use by the public as defined in the Airport and Airway Improvement Act of 1982;

2. The airport must be recognized by and contained within the National Plan of Integrated Airport Systems;

3. The airport owners/authorities must have entered into appropriate assurances and covenants to guarantee that the airport will continue in operation for a long enough period to permit the amortization of the ATCT investment;

4. The FAA must be furnished appropriate land without cost for construction of the ATCT; and;

5. The airport must meet the benefit-cost ratio criteria utilizing three consecutive FAA annual counts and projections of future traffic during the expected life of the tower facility. (An FAA annual count is a fiscal year or a calendar year activity summary. Where actual traffic counts are unavailable or not recorded, adequately documented FAA estimates of the scheduled and nonscheduled activity may be used.)

An airport meets the establishment criteria when it satisfies the criterion above and its benefit-cost ratio equals or exceeds one. The benefit-cost ratio is the ratio of the present value of the ATCT life cycle benefits (BPV) to the present value of ATCT life cycle costs (CPV).

The benefits of establishing an ATCT result from the prevention of aircraft collisions, the prevention of other type of preventable accidents, reduced flying time, emergency response notification, and general security oversight. Benefits from preventable collisions are further broken down into mid-air collisions, airborne-ground collisions, and ground collisions. Data collected for analyzing the establishment of an ATCT include scheduled and non-scheduled commercial service, and non-commercial traffic which includes military operations.

Since the cost data fluctuates each year based on new control tower operational cost estimates, development cost estimates, and aircraft operational costs, the benefit/costs analysis ratios change frequently and cannot be readily determined for the airport in the future The FAA has sole authority over the benefit/cost analysis. Therefore, any analysis must be completed by FAA staff and cannot be developed independently for this Master Plan.

The airport is not expected to reach annual operational levels that support FAA ATCTs at other airports across the country. Therefore, the FAA-funded construction and operation of an ATCT at the airport is unlikely. However, this does not prevent the establishment of an ATCT funded locally or through a federal cost sharing program. Therefore, while the airport is not expected to qualify for an ATCT, for planning purposes, the alternatives analysis will examine alternative locations for the construction of an ATCT at the airport.

LANDSIDE FACILITIES

Landside facilities are those necessary for handling general aviation aircraft and passengers while on the ground. This section is devoted to identifying future landside facility needs during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Aircraft Parking Apron
- General Aviation Terminal Services

HANGARS

The demand for hangar facilities typically depends on the number and type of aircraft expected to be based at the airport. Hangar facilities are generally classified as T-hangars, and conventional hangars. Conventional hangars can include individual hangars or multi-aircraft hangars. These different types of hangars offer varying levels of privacy, security, and protection from the elements.

Demand for hangars varies with the number of aircraft based at the airport. Another important factor is the type of based aircraft. Smaller single-engine aircraft usually prefer T-hangars, while larger business jets will prefer conventional hangars. Rental costs will also be a factor in the choice.

The airport has three T-hangar storage facilities, providing three storage units. T-hangar space available at the airport totals approximately 1,650 square feet for aircraft storage. Analysis of future T-hangar requirements, as depicted on **Table 3E,** indicates that additional T-hangar positions will be needed as the number of based aircraft grows.

There are currently seven conventional general aviation hangars on the airport totaling approximately 19,750 square feet. This type of hangar is typically used to store multiple aircraft or one or more corporate aircraft.

However, the majority of the conventional hangars at H.A. Clark Memorial Field are used to store a single aircraft. Conventional hangar space will need to be planned to at least accommodate the turbine aircraft forecast to base at H.A. Clark Memorial Field.

Requirements for maintenance and fixed base operator (FBO) hangar area were estimated at 20 percent of the total T-hangar and conventional hangar area. It should be noted that FBO hangars are cross-utilized for storage and aircraft maintenance. They are also sometimes used to store transient aircraft overnight.

Table 3E compares the existing hangar space to the future hangar requirements. It is evident from the table that there is a need for additional enclosed hangar storage space throughout the planning period.

TABLE 3E
Hangar Storage Requirements
H.A. Clark Memorial Field

	Available	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Hangar Positions				
T-Hangars	2	8	12	18
Conventional	7	9	10	14
Total Aircraft to be Hangared	9	17	22	32
Hangar Area Requirements				
T-Hangars (s.f.)	1,650	9,200	13,800	20,700
Conventional (s.f.)	19,750	41,400	46,000	64,400
Service Hangar Area (s.f.)	5,530	10,100	12,000	17,000
Total Hangar Area (s.f.)	21,400	60,700	71,800	102,100

*Available service hangar area is a portion of the available conventional hangar total.

AIRCRAFT PARKING APRON

A parking apron should be provided for at least the number of locally based aircraft that are not stored in hangars, as well as transient aircraft. The airport currently provides approximately 40,700 square yards of total apron adjacent to the airport hangar facilities and the airport terminal building. The number of local tie-downs and apron space for the planning period is presented in **Table 3F.**

TABLE 3F
Aircraft Parking Apron Requirements
H.A. Clark Memorial Field

	Available	Existing Need	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Non-hangared Based Aircraft		4	2	3	2
Busy Day Itinerant Operations		22	50	67	95
Local Ramp Positions		4	2	3	2
Transient Ramp Positions		6	13	17	24
Total Ramp Positions	31	10	15	20	26
Apron Area (s.y.)	40,700	5,600	8,400	11,200	14,600

FAA Advisory Circular 150/5300-13, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At H.A. Clark Memorial Field, the number of transient spaces required was determined to be approximately 25 percent of busy-day itinerant operations. A planning criterion of 560 square yards per parking space was used to determine future apron requirements.

The available parking apron should be adequate through the long term, assuming that adequate hangar space is available for based aircraft.

TERMINAL FACILITIES

Terminal facilities are often the first impression of the community that air travelers or tourists will encounter. Terminal facilities at an airport provide space for passenger waiting, a pilots' lounge and flight planning, concessions, management, storage, and various other needs. At H.A. Clark Memorial Field, this is accommodated in a single facility located east of Runway 18-36.

In the future, the existing terminal building may be needed to accommodate an air tour operation as detailed in Chapter Two. The existing terminal facility is ideally suited for an air tour operation as it contains a large lobby area and ticket counters, and has direct access to the terminal apron.

The methodology used in estimating terminal facility needs was based upon the number of airport users expected to utilize the terminal facilities during the design hour, as well as FAA guidelines. Space requirements for terminal facilities were based on providing 90 square feet per design hour itinerant passenger. **Table 3G** outlines the space requirements for terminal services at H.A. Clark Memorial Field through the long term planning horizon.

TABLE 3G
Terminal Facility Requirements
H.A. Clark Memorial Field

	Available	Current Need	Short Term (± 5 Years)	Intermediate Term (± 10 Years)	Long Term (± 20 Years)
Itinerant Operations					
Annual		3,840	9,200	12,800	18,900
Design Hour		4	10	13	18
Passengers per Operation		1.8	2.0	2.2	2.5
Design Hour Passengers		8	18	23	32
Terminal Space (s.f.)	3,000	700	1,600	2,100	2,900
Auto Parking Spaces	25	23	49	66	96

SUPPORT REQUIREMENTS

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation facilities have been identified for inclusion in this Master Plan. Facility requirements have been identified for these remaining facilities:

- Automobile Parking
- Security
- 14 CFR Part 139 Certification Requirements
- Aircraft Rescue And Firefighting
- Perimeter Fencing
- Airport Maintenance
- Aircraft Wash Facility
- Aviation Fuel Storage
- Utilities
- Off-Airport Vehicular Access
- On-Airport Vehicular Access

Automobile Parking

Vehicle parking requirements were also examined. Space determinations were based on an evaluation of the existing airport use, as well as industry standards. Vehicle parking spaces were calculated at 50 percent of based aircraft plus the product of design hour itinerant passengers and the industry standard of 2.0 increasing to 2.5 by the end of the planning period to account for the higher activity levels associated with an air tour operation. Automobile parking requirements are summarized in **Table 3G**.

Security

In cooperation with representatives of the general aviation community, the TSA published security guidelines for general aviation airports. These guidelines are contained in the publication entitled *Security Guidelines for General Aviation Airports,* published in May 2004. Within this publication, the TSA recognized that general aviation is not a specific threat to national security. However, the TSA does believe that general aviation may be vulnerable to misuse by terrorists as security is enhanced in the commercial portions of aviation and at other transportation links.

To assist in defining which security methods are most appropriate for a general aviation airport, the TSA defined a series of airport characteristics that potentially affect an airport's security posture. These include:

1. **Airport Location** – An airport's proximity to areas with over 100,000 residents or sensitive sites that can affect its security posture. Greater security emphasis should be given to airports within 30 miles of mass population centers (areas with over 100,000 residents) or sensitive areas such as military installations, nuclear and chemical plants, centers of government, national monuments, and/or international ports.

2. **Based Aircraft** – A smaller number of based aircraft increases the likelihood that illegal activities will be identified more quickly. Airports with based aircraft over 12,500 pounds warrant greater security.

3. **Runways** – Airports with longer paved runways are able to serve larger aircraft. Shorter runways are less attractive as they cannot accommodate the larger aircraft which have more potential for damage.

4. **Operations** – The number and type of operations should be considered in the security assessment.

Table 3H summarizes the recommended airport characteristics and ranking criterion. The TSA suggests that an airport rank its security posture according to this scale to determine the types of security enhancements that may be appropriate.

TABLE 3H
Airport Characteristics Measurement Tool

Security Characteristic	Assessment Scale: Public Use Airport	Assessment Scale: H.A. Clark Memorial Field
Location		
Within 20 nm of mass population areas [1]	5	0
Within 30 nm of a sensitive site[2]	4	0
Falls within outer perimeter of Class B airspace	3	0
Falls within boundaries of restricted airspace	3	0
Based Aircraft		
Greater than 101 based aircraft	3	0
26-100 based aircraft	2	0
11-25 based aircraft	1	1
10 or fewer based aircraft	0	0
Based aircraft over 12,500 pounds	3	0
Runways		
Runway length greater than 5,001 feet	5	5
Runway length less than 5,000 feet, greater than 2,001 feet	4	0
Runway length 2,000 feet or less	2	0
Asphalt or concrete runway	1	1
Operations		
Over 50,000 annual operations	4	0
Part 135 operations	3	0
Part 137 operations	3	0
Part 125 operations	3	0
Flight training	3	3
Flight training in aircraft over 12,500 pounds	4	0
Rental aircraft	4	4
Maintenance, repair, and overhaul facilities conducting long-term storage of aircraft over 12,500 pounds	4	4
Totals		**18**

Source: *Security Guidelines for General Aviation Airports*
[1] An area with a total population over 100,000
Sensitive sites include military installations, nuclear and chemical plants, centers of government, national monuments, and/or international ports

Table 3H also ranks H.A. Clark Memorial Field according to this scale. As shown in the table, the H.A. Clark Memorial Field ranking on this scale is 18. Points are assessed for the airport having more than 11 based aircraft, having a runway greater than 5,001 feet in length, having a paved runway surface, for having flight training activities at the airport, having rental aircraft, and for having aircraft maintenance capabilities.

As shown in **Table 3J**, a rating of 18 points places H.A. Clark Memorial Field on the third tier ranking of security measures by the TSA. This rating clearly illustrates the security needs at H.A. Clark Memorial Field. The H.A. Clark Memorial Field ranking could increase to 26 by the Long Term Planning Horizon with based aircraft levels over 26, an air tour (14 CFR Part 139 operation) and based aircraft over 12,500 pounds.

Based upon the results of the security assessment, the TSA recommends nine security enhancements for H.A. Clark Memorial Field. These enhancements are shown in **Table 3J**.

A review of each recommended security procedure is below.

TABLE 3J
Recommended Security Enhancements Based on Airport Characteristics Assessment Results

	Points Determined Through Airport Characteristics Assessment			
Security Enhancements	**> 45**	**25-44**	**15-24**	**0-14**
Fencing	■			
Hangars	■			
Closed-Circuit Television (CCTV)	■			
Intrusion Detection System	■			
Access Controls	■	■		
Lighting System	■	■		
Personal ID System	■	■		
Challenge Procedures	■	■		
Law Enforcement Support	■	■	■	
Security Committee	■	■	■	
Transient Pilot Sign-in/Sign-Out Procedures	■	■	■	
Signs	■	■	■	
Documented Security Procedures	■	■	■	■
Positive/Passenger/Cargo/Baggage ID	■	■	■	■
Aircraft Security	■	■	■	■
Community Watch Program	■	■	■	■
Contact List	■	■	■	■

Source: *Security Guidelines for General Aviation Airports*

Law Enforcement Support: This involves establishing and maintaining a liaison with appropriate law enforcement agencies including local, state, and federal. These organizations can better serve the airport when they are familiar with airport operating procedures, facilities, and normal activities. Procedures may be developed to have local law enforcement personnel regularly or randomly patrol ramps and aircraft hangar areas, with increased patrols during periods of heightened security.

Security Committee: This Committee should be composed of airport tenants and users drawn from all segments of the airport community. The main goal of this group is to involve airport stakeholders in developing effective and reasonable security measures and disseminating timely security information.

Transient Pilot Sign-in/Sign-Out Procedures: This involves establishing procedures to identify non-based pilots and aircraft using their facilities, and implementing sign-in/sign-out procedures for all transient operators and associating them with their parked aircraft. Having assigned spots for transient parking areas can help to easily identify transient aircraft on an apron.

Signs: The use of signs provides a deterrent by warning of facility boundaries as well as notifying of the consequences for violation.

Documented Security Procedures: This refers to having a written security plan. This plan would include documenting the security initiatives already in place at H.A. Clark Memorial Field, as well as any new enhancements. This document could consist of, but not be limited to, airport and local law enforcement contact information, including alternates when available, and utilization of a program to increase airport user awareness of security precautions such as an airport watch program.

Positive/Passenger/Cargo/Baggage ID: A key point to remember regarding general aviation passengers is that the persons on board these flights are generally better known to airport personnel and aircraft operators than the typical passenger on a commercial airliner. Recreational general aviation passengers are typically friends, family, or acquaintances of the pilot in command. Charter/sightseeing passengers typically will meet with the pilot or other flight department personnel well in advance of any flights. Suspicious activities such as use of cash for flights or probing or inappropriate questions are more likely to be quickly noted and authorities could be alerted. For corporate operations, typically all parties onboard the aircraft are known to the pilots. Airport operators should develop methods by which individuals visiting the airport can be escorted into and out of aircraft movement and parking areas.

Aircraft Security: The main goal of this security enhancement is to prevent the intentional misuse of general aviation aircraft for terrorist purposes. Proper securing of aircraft is the most basic method of enhancing general aviation airport security. Pilots should employ multiple methods of securing their aircraft to make it as difficult as possible for an unauthorized person to gain access to it. Some basic methods of securing a GA aircraft include: ensuring that door locks are consistently used to prevent unauthorized access or tampering with the aircraft, using keyed ignitions where appropriate, storing the aircraft in a hangar, if available, and locking hangar doors, using an auxiliary lock to further protect aircraft from unauthorized use (i.e., propeller, throttle, and/or tie-down locks), and ensuring that aircraft ignition keys are not stored inside the aircraft.

Community Watch Program: The vigilance of airport users is one of the most prevalent methods of enhancing security at general aviation airports. Typically, the user population is familiar with those individuals who have a valid purpose for being on the airport property. Consequently, new faces are quickly noticed. A watch program should include elements similar to those listed below. These recommendations are not all-inclusive. Additional measures that are specific to each airport should be added as appropriate, including:

- Coordinate the program with all appropriate stakeholders including airport officials, pilots, businesses and/or other airport users.
- Hold periodic meetings with the airport community.
- Develop and circulate reporting procedures to all who have a regular presence on the airport.
- Encourage proactive participation in aircraft and facility security and heightened awareness measures. This should include encouraging airport and line staff to 'query' unknowns on ramps, near aircraft, etc.
- Post signs promoting the program, warning that the airport is watched. Include appropriate emergency phone numbers on the sign.
- Install a bulletin board for posting security information and meeting notices.
- Provide training to all involved for recognizing suspicious activity and appropriate response tactics.

Contact List: This involves the development of a comprehensive list of responsible personnel/agencies to be contacted in the event of an emergency procedure. The list should be distributed to all appropriate individuals. Additionally, in the event of a security incident, it is essential that first responders and airport management have the capability to communicate. Where possible, coordinate radio communication and establish common frequencies and procedures to establish a radio communications network with local law enforcement.

14 CFR Part 139 Certification Requirements

14 CFR Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers*, as amended, prescribes the rules governing the certification and operation of land airports which serve any scheduled or un-

scheduled passenger operation of an air carrier that is conducted with an aircraft having a seating capacity of more than nine passengers.

Under Part 139 requirements, there are four classes of airports: Classes I, II, III, and IV. Airports serving all types of scheduled operations of large air carrier aircraft, and any other type of air carrier operations, are known as Class I airports. Class II airports are those airports that serve scheduled operations of small air carrier aircraft (10-30 seats) and unscheduled operations of larger air carrier aircraft (more than 30 seats). Class III airports are those airports that serve only scheduled operations of air carrier aircraft with 10-30 seats. Class IV airports would be those airports serving only unscheduled air carrier operations in aircraft with more than 30 seats. These designations are shown in **Table 3K**.

Presently, H.A. Clark Memorial Field is not required to comply with 14 CFR Part 139 as there are currently no scheduled air carrier operations at the airport, nor are there any unscheduled operations by aircraft with more than 30 passengers. Requirements for 14 CFR Part 139 certification in the future will be dependent upon the type of air tour operation established at the airport. Should the air tour operation consist of unscheduled operations by aircraft with 30 or less passenger seats, then the airport will not be required to be certificated under 14 CFR Part 139. However, should aircraft with a larger seating capacity be used, or there are scheduled operations by aircraft with more than nine passenger seats, then the airport would be required to be certificated.

TABLE 3K
Proposed Part 139 Airport Classifications

	Proposed Airport Class			
Type of air carrier operation	**Class I**	**Class II**	**Class III**	**Class IV**
Scheduled Large Air Carrier Aircraft	X			
Unscheduled Large Air Carrier Aircraft	X	X		X
Scheduled Small Air Carrier Aircraft	X	X	X	

Aircraft Rescue and Firefighting (ARFF)

The requirements for Aircraft Rescue and Firefighting (ARFF) equipment and services at an airport are determined by whether the airport is required to be certificated under 14 CFR Part 139 and the size of the aircraft. As discussed above, H.A. Clark Memorial Field is presently not required to be certificated under 14 CFR Part 139; therefore, there is no requirement now for ARFF equipment or facilities. However, the City has acquired an Index A ARFF vehicle and plans to construct an ARFF storage facility in 2006.

The Index A ARFF vehicle will allow the airport to serve scheduled or unscheduled operations by air carrier aircraft less than 90 feet in length. It is not anticipated that aircraft greater than 90 feet in length will be operating at the airport; therefore, the existing ARFF vehicle and facility should be sufficient to meet the future ARFF needs of the airport through the planning period.

Perimeter Fencing

Perimeter fencing is used at airports to primarily secure the aircraft operations area. The physical barrier of perimeter fencing provides the following functions:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area.
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Optimizes the use of security personnel while enhancing the capabilities for detection and apprehension of unauthorized individuals.
- Demonstrates a corporate concern for facility security.
- Provides a cost-effective method of protecting facilities.
- Limits inadvertent access to the aircraft operations area by wildlife.

The airport perimeter at H.A. Clark Memorial Field is equipped with 6-foot chain-link fencing with three-strand barbed wire on top. An automated gate is located southeast of the Aviation Services of Northern Arizona facility. Five manual access gates are located in various locations around the perimeter of the property. The existing perimeter fence is adequate and should be maintained through the planning period.

Airport Maintenance Building

Presently, there is not a dedicated airport maintenance facility. When maintenance needs to be performed on any of the facilities, equipment is brought in from existing City facilities off airport property. A facility for general maintenance activities would assist in the cost-effective and time-efficient maintenance of the airport. Consideration should be given to developing a permanent maintenance facility on the airport. The alternatives analysis will examine optimal locations for the construction of a maintenance building.

Aircraft Wash Facility

Presently, there is not a designated aircraft wash facility on the airport. Consideration should be given to establishing an aircraft wash facility at the airport to collect aircraft cleaning fluids used during the cleaning process.

Aviation Fuel Storage

All fuel storage at the airport is privately-owned and operated. Fuel storage currently totals 8,000 gallons in a single above-ground tank for 100LL Avgas fuel.

Growth in operations and based aircraft will not significantly impact fuel storage requirements. With the existing storage mix, the airport will be able to maintain a two-week supply of 100LL Avgas. A Jet A storage tank should be added in the short term to facilitate future turbine operations.

Utilities

Electrical and water services are available at the airport. Arizona Public Service Company provides electrical service. Water is provided by the City of Williams using the on-airport water tank. Septic systems are in place for sanitary sewer requirements.

Utility extensions to new hangar areas will be needed through the planning period, as well as the availability of sanitary sewer connections to City waste water treatment plants and a connection to City water supply system.

Off-Airport Access

The airport has a single public access point located on the east side of the airport. Aviation Drive currently serves as the airport access road. This should provide adequate access capacity throughout the planning period.

On-Airport Access

Private vehicles regularly use the apron and taxilanes for movement as there is no dedicated interior access road. The segregation of vehicle and aircraft operational areas is supported by FAA guidance established in June 2002. FAA AC 50/5210-20, *Ground Vehicle Operations on Airports*, states, "The control of vehicular activity on the airside of an airport is of the highest importance." The AC further states, "An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport."

Service roads are typically used to segregate vehicles from the aircraft operational areas. The alternatives analysis will examine options for interior access roads to serve hangar facilities as well as a service road extending around the runway and airport perimeter for airport maintenance vehicles.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet aviation demands projected for H.A. Clark Memorial Field through the long term planning horizon. A summary of the airfield, and general aviation facility requirements are presented on **Exhibit 3C and 3D**.

Following the facility requirements determination, the next step is to develop a direction for development to best meet these projected needs. The remainder of the Master Plan will be devoted to outlining this direction, its schedule, and its costs.

04MP12-3C-4/17/06

	EXISTING FACILITY	SHORT TERM NEED	LONG TERM NEED
RUNWAYS 	**Runway 18-36** 6,000' x 100' Airport Reference Code B-II 15,000 # Single Wheel Loading	**Runway 18-36** 6,000' x 100' Airport Reference Code B-II 15,000 # Single Wheel Loading	**Runway 18-36** 8,000' x 100' Airport Reference Code B-III 30,000 # Single Wheel Loading 60,000 # Dual Wheel Loading
TAXIWAYS 	**Taxiway A** 5 Exits 35' Wide	**Taxiway A** 50' wide Exit Taxiways - 50'wide	**Runway 18-36** Add: High Speed Exit Holding Apron
NAVIGATIONAL AIDS 	Automated Weather Observing System	Automated Weather Observing System **Runway 18-36** GLS-RWY 36 APV-RWY 18 **APV** - Approach Procedure with Vertical Guidance **GLS** - Global Navigation Satellite System Landing System	Automated Weather Observing System **Runway 18-36** GLS-RWY 36 APV-RWY 18
LIGHTING AND MARKING 	Airport Beacon Segmented Circle Basic Taxiway Marking **Runway 18-36** Precision Approach Path Indicator-2 Non-Precision Markings Runway End Identifier Lights Medium Intensity Runway Lights	Add Medium Intensity Taxiway Lights **Runway 18-36** Add Distance Remaining Signage Precision Approach Path Indicator-4	Medium Intensity Taxiway Lights **Runway 18-36** Add Precision Markings - RWY 36 **MALSR:** Medium Intensity Approach Lighting Systeym w/ Runway Alignment Lighting

Exhibit 3C
AIRFIELD REQUIREMENTS

04MP12-3D-4/17/06

Aircraft Storage Hangar Requirements

	Available	Short Term Need	Intermediate Term Need	Long Term Need
Aircraft to be Hangared	9	17	22	32
T-Hangars	2	8	12	18
Conventional Hangar Positions	7	9	10	14
T-Hangar Area (s.f.)	1,650	9,200	13,800	20,700
Conventional Hangar Storage Area (s.f.)	19,750	41,400	46,000	64,400
Maintenance Area (s.f.)	5,530	10,100	12,000	17,000
Subtotal Conventional Hangar Area (s.f.)	19,750	51,500	58,000	81,400
Total Hangar Area (s.f.)	***21,400***	***60,700***	***71,800***	***102,100***

Aircraft Parking Apron Requirements

	Available	Short Term Need	Intermediate Term Need	Long Term Need
Single, Multi-Engine Transient Aircraft Positions	16	13	17	24
Apron Area (s.y.)	11,000	7,300	9,500	13,500
Locally-Based Aircraft Positions	15	2	3	2
Apron Area (s.y.)	29,700	1,100	1,700	1,100
Total Positions	31	15	20	26
Total Apron Area (s.y.)	40,700	8,400	11,200	14,600

Transient Passenger Terminal Facilities

	Available	Short Term Need	Intermediate Term Need	Long Term Need
General Aviation Terminal Building Area (s.f.)	3,000	1,600	2,100	2,900

Other Facilities

	Available	Short Term Need	Intermediate Term Need	Long Term Need
	Aircraft Rescue and Firefighting Facility	Aircraft Wash Rack Jet-A storage Maintenance Facilty Helicopter Parking Spaces	Aircraft Wash Rack Jet-A storage Maintenance Facilty Helicopter Parking Spaces	Aircraft Wash Rack Jet-A storage Maintenance Facilty Helicopter Parking Spaces

Exhibit 3D
LANDSIDE FACILITY REQUIREMENTS

Chapter Four

Airport Alternatives

Airport Alternatives

Prior to defining the development program for H.A. Clark Memorial Field, it is important to consider development potential and constraints at the airport. The purpose of this chapter is to consider the actual physical facilities that are needed to accommodate projected demand and meet the program requirements as defined in Chapter Three, Facility Requirements.

In this chapter, a series of airport development scenarios are considered for the airport. In each of these scenarios, different physical facility layouts are presented for the purposes of evaluation. The ultimate goal is to develop the underlying rationale that supports the final master plan recommendations. Through this process, an evaluation of the highest and best uses of airport property is made while considering local goals, physical constraints, and federal and state airport design standards, where appropriate.

Any development proposed by a master plan evolves from an analysis of projected needs. Though the needs were determined by the best methodology available, it cannot be assumed that future events will not change these needs. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands through the planning period.

The alternatives have been developed to meet the overall program objectives for the airport in a balanced manner. Through coordination with the Planning Advisory Committee (PAC) and

the City of Williams, the alternatives (or a combination thereof) will be refined and modified as necessary to produce the recommended development program. Therefore, the alternatives presented in this chapter can be considered a beginning point in the preparation of the recommended master plan development program, and input will be necessary to define the resultant program.

REVIEW OF PREVIOUS MASTER PLAN

The previous master plan for H.A. Clark Memorial Field was completed in 1995. The 1995 *H.A. Clark Memorial Field Master Plan* proposed widening Runway 18-36 to 100 feet and extending it for a total runway length of 8,000 feet. It was also recommended that Runway 2-20 be abandoned due to the poor structural condition of the pavement. Runway 2-20 was also not needed to meet minimum wind coverage requirements.

Landside development recommended in the previous master plan included a proposed airline terminal building, apron, and automobile parking area along Airport Road, segregated south of the general aviation apron area. The general aviation apron area was to be expanded to the north and includes additional aircraft tie-downs, a proposed T-hangar facility, and a fixed base operator (FBO) facility. FBO facilities are used for providing commercial aviation services such as aircraft maintenance, flight training, and/or air charter services. A fuel storage facility was planned to be located between the airline terminal and the general aviation apron areas. An Automated Weather Observing System (AWOS) was proposed to be located west of the existing segmented circle and wind cone.

Since the completion of the 1995 Master Plan, Runway 18-36 has been resurfaced, widened to 100 feet, the line of sight has been enhanced, and Runway 2-20 has been closed. The terminal apron and the airline terminal building were constructed in 2000 on the southeast side of the runway. The general aviation apron area was expanded to the north in the spring of 2006. This expansion provides additional aircraft tie-downs and space for up to two 20-unit T-hangars. Both 100LL and Jet-A fuel storage and dispensing have been developed in the area between the airline terminal apron and the main apron area. Several hangar facilities have also been removed. An AWOS has been installed at the airport on the west side of the runway adjacent to the segmented circle and wind cone.

DO-NOTHING ALTERNATIVE

For planning purposes, and to establish a baseline condition for comparison and evaluation, the "do-nothing" or "no action" alternative is considered. The "do-nothing" alternative essentially considers keeping the airport in its present condition and not providing for any type of improvement to the existing facilities. The primary result of this alternative would be the inability of the airport to satisfy the projected aviation demands of the airport service area.

The Williams area continues to experience socioeconomic growth. Forecasts approved by the Arizona Department of Economic Security indicate that regional area will continue to grow in population and the economy will expand throughout the long range planning horizon for this master plan. This growth, combined with favorable forecasts for the general aviation industry, the potential for an aerial tour operator, as well as the possibility of the construction of an entertainment complex in the City of Williams, indicate a need for improved facilities.

Improvements recommended in the previous chapter include a longer runway, improvements to the taxiway system, improved navigational aids, the construction of additional conventional and T-hangar facilities, the development of an aircraft wash rack, a dedicated maintenance facility, and the construction of a helipad. Without these facilities, regular users of the airport will be constrained from taking maximum advantage of the airport's air transportation potential. More specifically, the airport will not be able to attract new users, in particular, business aircraft activity that may require the longer runway for departure.

If demand continues to grow, it will be critical that H.A. Clark Memorial Field accommodate this growth to ensure Williams' economic growth. An overall impact of this alternative will likely be the inability to attract certain businesses and industries seeking locations with adequate and convenient aviation facilities. H.A. Clark Memorial Field has much to offer in terms of airside and landside facilities. Without regular maintenance and additional improvements, existing and potential users and business for H.A. Clark Memorial Field could be lost.

To propose no further development at H.A. Clark Memorial Field would adversely affect the long term viability of the airport, resulting in negative economic affects to the City of Williams. It would also be contrary to the airport's role in the national and state air transportation systems as envisioned in the *National Plan of Integrated Airports System* (NPIAS) and *Arizona State Aviation System Plan* (SASP). Therefore, the "do-nothing" alternative is not considered as prudent or feasible.

KEY PLANNING ISSUES

A commitment to remain at the existing site and develop facilities sufficient to meet the long range aviation demands entails providing sufficient airside and landside capacity to meet the long range planning horizon level demand of the area, and developing the airport in accordance with the currently established FAA design criteria.

Analyses in the earlier chapters of this master plan indicated that several improvements will be necessary to ensure the airport's capability to serve the needs of the Williams area well into the future. The primary airfield focus will be on providing adequate runway length for general aviation needs, establishing instrument approach procedures, and acquiring land to protect the approach paths to each runway end from incompatible development to preserve the long range viability of the airport. On the landside, primary issues focus on providing facilities to accommodate an air tour operator and providing general aviation support facilities to meet the forecast demand which would serve the needs of general aviation in a manner that is beneficial to overall community development. **Exhibit 4A** outlines key airfield and landside considerations for this alternative analysis.

YAVAPAI RANCH LAND EXCHANGE

The Yavapai Ranch Land Exchange includes the conveyance of 35,000 acres of Yavapai Ranch land to the U.S. Forest Service in exchange for existing U.S. Forest Parcels in various sections of northern Arizona. The City of Williams is a benefactor of the Yavapai Ranch Land Exchange and will receive land for the comprehensive water program and municipal golf course. Additionally, the City of Williams will acquire approximately 194 acres of land adjacent to the airport. This includes land along Airport Road and at each runway end as shown on **Exhibit 4B**. At the end of 2006, the land exchange has not formally been completed and the land had not yet been transferred to the City of Williams. Since the land exchange has been approved by the U.S. Congress, this master plan will assume that this land will eventually become part of airport property.

AIRSIDE CONSIDERATIONS

The facility requirements analysis identified several future airside needs. These include the following:

- 2,000-foot extension to Runway 18-36;
- Improved instrument approach capability;
- Additional exit taxiways; and
- Widen taxiways to 50 feet.

RUNWAY EXTENSION

Exhibit 4B depicts the extension of Runway 18-36 and parallel Taxiway A 2,000 feet to the north for an ultimate length of 8,000 feet. The entire extension is placed to the north, as the runway cannot be extended to the south due to the location of a natural gas pipeline beyond the Runway 36 end. The extension to the north will require approximately 27 acres of land beyond the land provided through the Yavapai Ranch Land Exchange. This land will be required to accommodate the runway protection zone (RPZ), runway safety area (RSA), and object free area (OFA) associated with the extension. The RPZ, RSA, and OFA ensure an obstruction free operating environment for aircraft. The RSA and OFA need to be owned and held in fee simple ownership by the airport. While fee simple ownership of the RPZ is desired, the RPZ can protect from incompatible development through land use zoning, avigation easements, or land leases.

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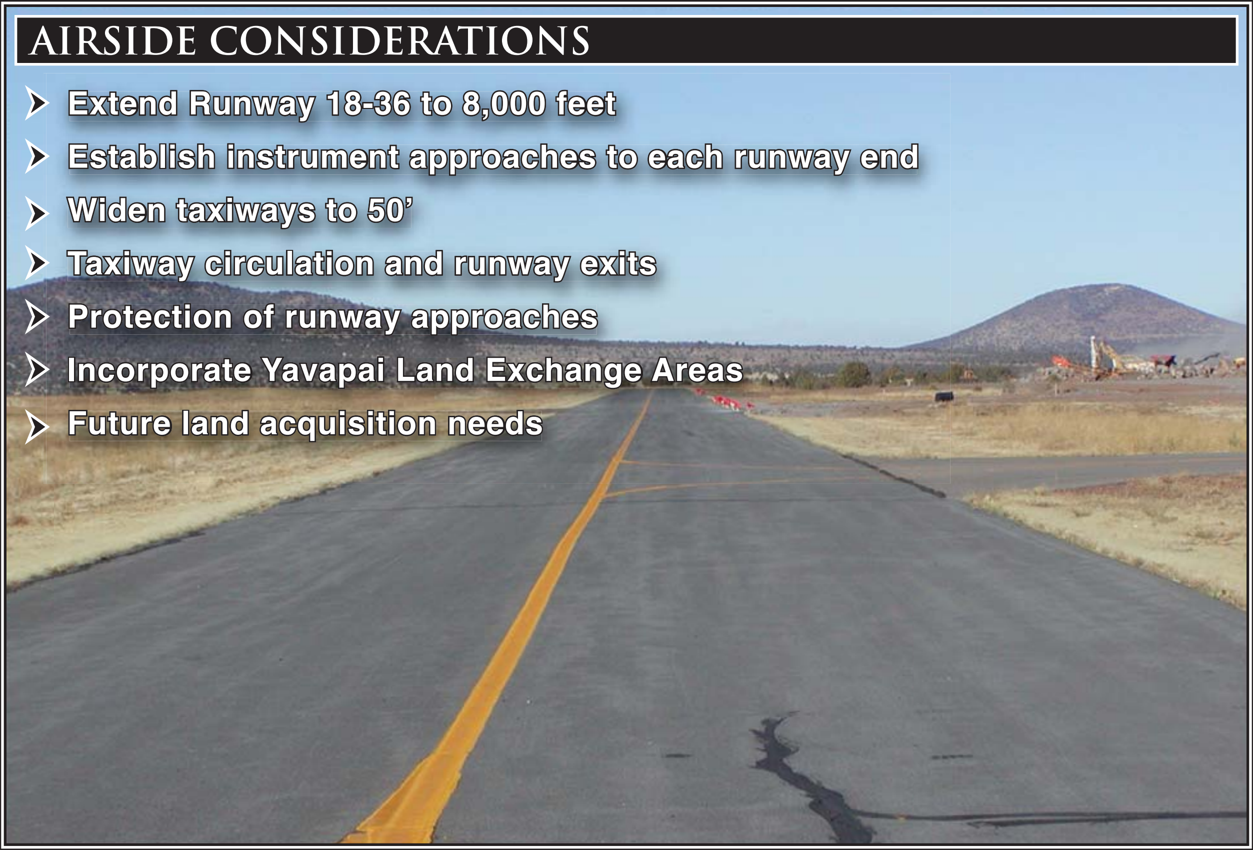
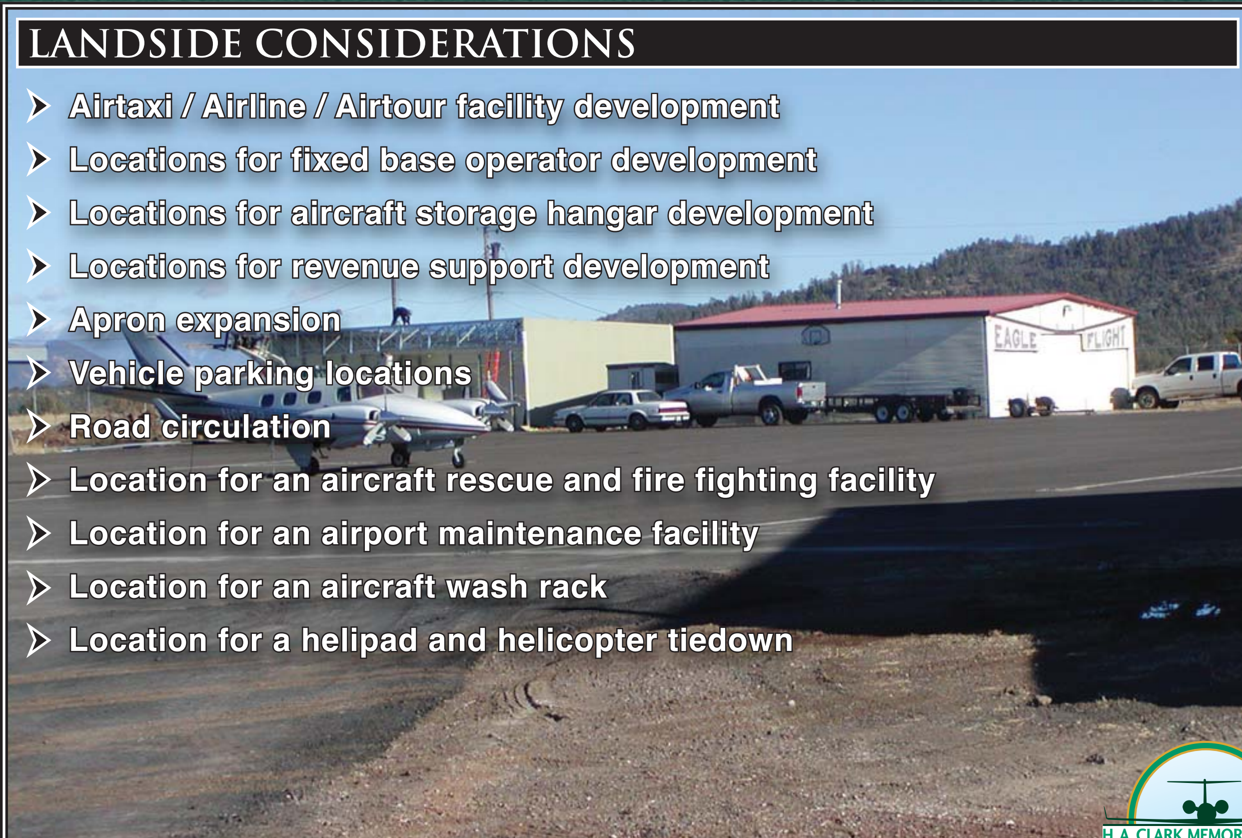


AIRSIDE CONSIDERATIONS

- Extend Runway 18-36 to 8,000 feet
- Establish instrument approaches to each runway end
- Widen taxiways to 50'
- Taxiway circulation and runway exits
- Protection of runway approaches
- Incorporate Yavapai Land Exchange Areas
- Future land acquisition needs



LANDSIDE CONSIDERATIONS

- Airtaxi / Airline / Airtour facility development
- Locations for fixed base operator development
- Locations for aircraft storage hangar development
- Locations for revenue support development
- Apron expansion
- Vehicle parking locations
- Road circulation
- Location for an aircraft rescue and fire fighting facility
- Location for an airport maintenance facility
- Location for an aircraft wash rack
- Location for a helipad and helicopter tiedown

H. A. CLARK MEMORIAL FIELD

Exhibit 4A
KEY PLANNING ISSUES

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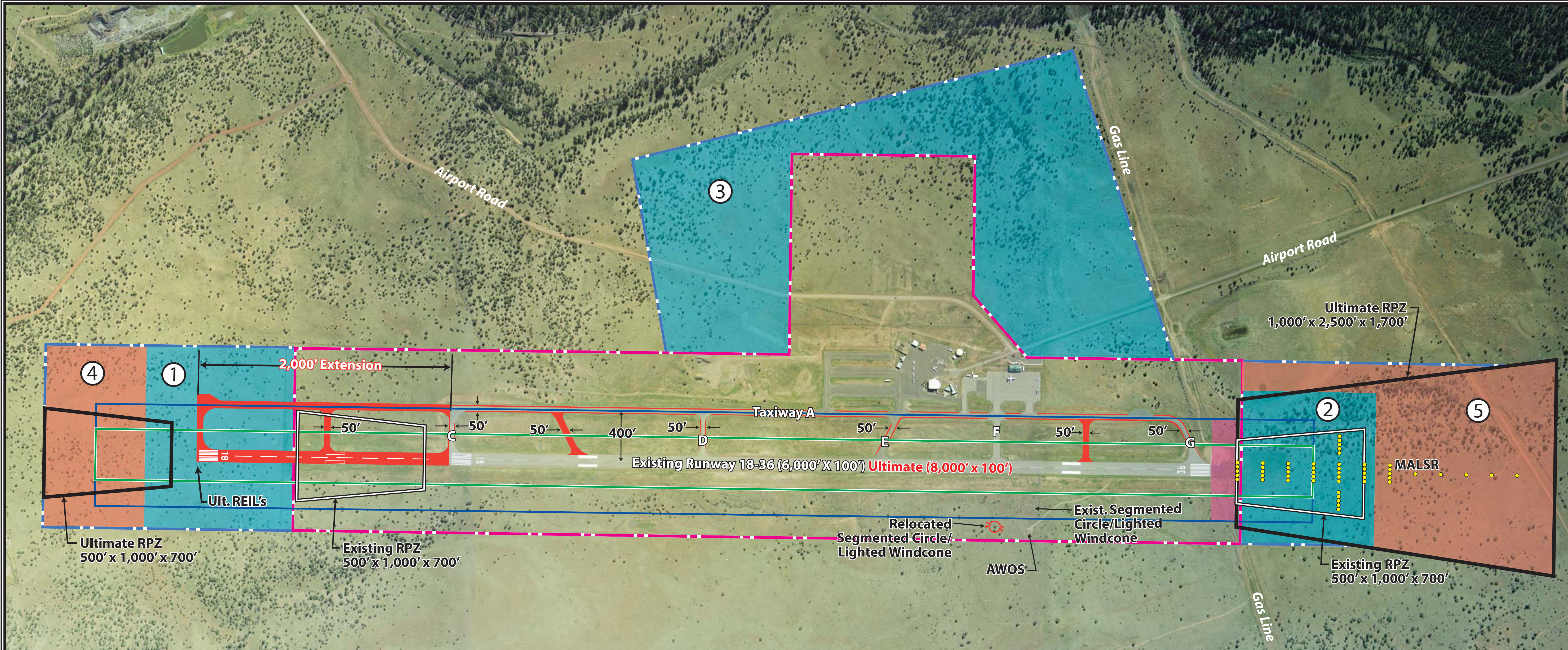
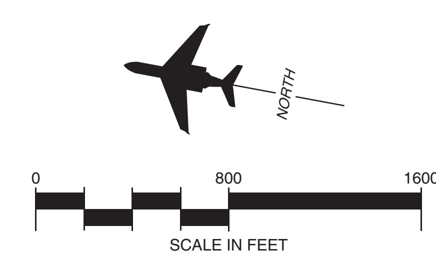


LEGEND

- Existing Property Line
- Ultimate Property Line
- Ultimate Runway Safety Area (RSA)
- Ultimate Object Free Area (OFA)
- Ultimate Pavement
- XXX Buildings to be Removed
- Yavapai Ranch Land Exchange Areas
- Land for Approach Protection
- Precision Obstacle Free Zone
- Existing Runway Protection Zone (RPZ)
- Ultimate Runway Protection Zone (RPZ)

KEY

1 - 40 Acres
2 - 30 Acres
3 - 124 Acres
4 - 27 Acres
5 - 56 Acres
RPZ - Runway Protection Zone
MALSR - Medium Intensity Approach Lighting System with Runway Alignment Lighting
AWOS - Automated Weather Observing System
ARFF - Aircraft Rescue and Firefighting



H.A. CLARK MEMORIAL FIELD

Exhibit 4B
AIRSIDE CONSIDERATIONS

An extension to Runway 18-36 is included in this master plan for planning purposes only. This is to aid in local land use planning to ensure that appropriate land use measures are put into place to allow for this extension in the future if it is needed. By planning for an 8,000-foot runway, the City and County can take appropriate measures to ensure that there are no hazards or obstacle penetrations to the 14 Code of Federal Regulations (CFR) Part 77 airspace in the future that could prevent the extension, and to allow for compatible land use to be planned in the extended runway approach/ departure area. The Airport Disclosure Map that will be developed for this master plan will assume the potential for this extension at the airport in the future. Separate justification for constructing the runway extension will be required outside this master plan at the time of implementation. This justification will need to identify those specific users that require a longer runway to operate at the airport. This type of justification is generally built upon letters of support from the specific users requiring the runway extension.

INSTRUMENT APPROACH CAPABILITY

Instrument approach capability is planned for each runway end. Presently, the airport does not have an instrument approach. Therefore, it is essentially closed when cloud ceilings fall below 1,000 feet and/or visibility is less than three miles. While an instrument approach is required to access the airport when weather conditions deteriorate, an instrument approach is often used during visual conditions to provide navigational assistance to the airport. Many business aircraft users desire an instrument approach for these reasons. The primary benefit of an instrument approach is that it limits the amount of time that the airport is closed. This makes the airport more reliable for users as the amount of time the airport is accessible increases. An instrument approach is needed to ensure continuous scheduled services such as an airline or air tour operator.

Runway 36 is planned for a precision instrument approach with visibility minimums as low as one-half mile and cloud ceiling minimums of 200 feet above the ground. To achieve these minimums, the addition of a medium intensity approach lighting system with runway alignment lights (MALSR) will be required at the Runway 36 end. As shown on **Exhibit 4B**, a precision approach requires a larger RPZ. Approximately 56 acres of land, in addition to the land provided through the Yavapai Ranch Land Exchange, will be required to protect the Runway 36 RPZ and provide for the installation of the MALSR. The precision approach to Runway 36 could either be a traditional instrument landing system (ILS) or Global Navigation Satellite System Landing System (GLS) after 2015.

Runway 18 is planned to be equipped for an approach procedure with vertical guidance (APV) with visibility minimums as low as one mile. This instrument approach is expected to utilize the Global Positioning System (GPS).

TAXIWAYS

The facility requirements analysis indicated that Taxiway A and associated exit taxiways need to be widened to 50 feet to meet ARC B-III design standards. Also, additional runway exits could enhance airfield capacity by allowing aircraft more opportunities to exit the runway, which reduces the amount of time the aircraft will occupy the runway. As shown on **Exhibit 4B**, an additional three exit taxiways are proposed to be constructed including one high-speed exit taxiway. Two 90-degree exit taxiways would be constructed 1,000 feet from each runway end. These exits are designed to serve larger turboprop and business jet aircraft. According to FAA data, 100 percent of business jets can exit the runway at this point. A high-speed exit taxiway is also proposed 5,000 feet from the Runway 36 end. The design of the high-speed exit allows aircraft to exit the runway at higher speeds than a traditional 90-degree exit. According to FAA data, 100 percent of small aircraft and 75 percent of larger aircraft can exit at this point on the runway. Taxiway E serves as the high-speed exit for landings on Runway 18.

LANDSIDE ALTERNATIVES

The orderly development of the landside area is a critical element of an airport's capabilities. General aviation hangar space is needed at H.A. Clark Memorial Field to accommodate the maintenance and enclosed storage of existing and future based aircraft. Therefore, this master plan must consider places to locate FBO and aircraft storage hangars. The addition of a helipad, aircraft wash rack, airport maintenance building, and the long-range vision of a business airpark should also be considered.

DEVELOPMENT CONSIDERATIONS

Landside development issues were summarized previously on **Exhibit 4A**. The following briefly describes proposed landside facility improvements.

FBO Activities

This essentially relates to providing areas for the development of facilities associated with aviation businesses that require airfield access. This includes businesses involved with (but not limited to) aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. High levels of activity characterize businesses such as these with a need for apron space for the storage and circulation of aircraft. These facilities are best placed along ample apron frontage with good visibility from the runway system for transient aircraft. The facilities commonly associated with businesses such as these include large conventional type hangars that hold several aircraft. Utility services are needed for these types of facilities, as well as automobile parking areas.

Planning for commercial general aviation activities is important for this master plan. The mix of aircraft using H.A Clark Memorial Field is expected to change to include some business class aircraft which have larger wingspans than the mix of aircraft using the airport in the past. These larger aircraft, which have wingspans approaching 100 feet, require greater separation distance between facilities, larger apron areas for parking and circulation, and larger hangar facilities.

Small Aircraft Storage Hangars

The facility requirements analysis indicated a need for the development of small general aviation aircraft storage hangars. This primarily involves additional T-hangars, but may also include some clearspan hangars for accommodating several aircraft simultaneously. Since storage hangars often have lower levels of activity, these types of facilities should be located away from the primary apron areas, which should be reserved for commercial general aviation activity and can be located in more remote locations of the airport. Limited utility services are needed for these areas. Typically, this involves electricity, but may also include water and sanitary sewer.

Other Aircraft Storage Hangars

This includes areas for larger conventional hangar development. Typically, these types of hangars are used by corporations with company-owned aircraft or by an individual or group of individuals with several aircraft. These hangar areas require all utilities and segregated roadway access.

Transient Helicopters

A helipad and helicopter parking area should be considered. There is currently no designated helipad, and helicopters must use apron areas typically designed for use by fixed-wing aircraft. Fixed-wing aircraft and rotary aircraft should be segregated to the extent practical.

Airport Maintenance

There are no dedicated airport maintenance facilities on the airport. Consideration is being given to establishing a permanent location for the development of an airport maintenance facility for the storage of City-owned equipment and supplies to maintain the facilities at the airport.

Aircraft Wash Rack

Consideration is given to developing an aircraft wash/maintenance facility to provide a suitable area for the washing of aircraft. This provides for the proper disposal of aircraft cleaning fluids. There is no such facility currently available at the airport.

Revenue Support Land Uses

The landside alternatives to follow consider options for the City of Williams to utilize portions of the airport for non-aeronautical purposes such as commercial, industrial, or office park development. It should be noted that the City does not have the approval to use airport property for non-aeronautical purposes at this time. This requires specific approval from Congress. The master plan does not gain approval for non-aeronautical uses, even if these uses are ultimately shown in the master plan. A separate request justifying the use of airport property for non-aeronautical uses will be required once the master plan is complete.

Federal law obligates an airport sponsor to use all property shown on an Airport Layout Plan (ALP) and/or Property Map for public airport purposes. A distinction is generally not made between property acquired locally and property acquired with federal assistance. However, property acquired with federal assistance or transferred as surplus property from the federal government may have specific covenants or restrictions on its use different from property acquired locally.

These obligations will require that the City formally request from Congress a release from the terms, conditions, reservations, and restrictions contained in any conveyance deeds (some portions of H.A. Clark Memorial Field were conveyed through this method) and assurances in previous grant agreements. A release is required even if the airport desires to continue to own the land and only lease the land for development. The obligations relate to the use of the land just as much as they do to the ownership of the land.

Ultimately, the ability of the City to use airport property for non-aeronautical revenue production will rest upon a determination by Congress that portions of the airport property are no longer needed for airport-related or aeronautical uses. To prove that land is not needed for aeronautical purposes, an assessment and determination of the area that will be required for aeronautical purposes will be required.

An environmental determination will also be required. While FAA Order 1050.1E, *Environmental Policies and Procedures*, states that a release of an airport sponsor from federal obligations is normally categorically excluded and would not normally require an Environmental Assessment (EA), the issuance of a categorical exclusion is not automatic and the FAA must determine that no extraordinary circumstances exist at the airport. Extraordinary circumstances would include a significant environmental impact to any of the environmental resources governed by federal law. An Environmental Assessment may be required if there are extraordinary circumstances.

Segregated Vehicular Access and Fencing

A planning consideration for any master plan is the segregation of vehicles and aircraft operational areas. This is both a safety and security consideration for the airport. Aircraft safety is reduced and accident potential increased when vehicles and aircraft share the same pavement surfaces. Vehicles contribute to the accumulation of debris on aircraft operational surfaces, which increases the potential for Foreign Object Damage (FOD), especially for turbine-powered aircraft. The potential for runway incursions is increased, as vehicles may inadvertently access active runway or taxiway areas if they become disoriented once on the aircraft operational area (AOA). Finally, there is loss of control over the vehicles as they enter the secure AOA. The greatest concern is for public vehicles, such as delivery vehicles and visitors, which may not fully understand the operational characteristics of aircraft and the markings in place to control vehicle access. The best solution is to provide dedicated vehicle access roads to each landside facility that is separated from the aircraft operational areas with perimeter fencing.

The segregation of vehicle and aircraft operational areas is supported by FAA guidance established in June 2002. FAA AC 150/5210-20, *Ground Vehicle Operations on Airports*, states, "The control of vehicular activity on the airside of an airport is of the highest importance." The AC further states, "An airport operator should limit vehicle operations on the movement areas of the airport to only those vehicles necessary to support the operational activity of the airport."

The landside alternatives for H.A. Clark Memorial Field have been developed to reduce the need for vehicles to cross an apron or taxiway area. Special attention is given within the alternatives to ensure public access routes to fixed base operator (FBO) facilities. FBO facilities are focal points for users who are not familiar with aircraft operations (i.e., delivery vehicles, charter passengers, etc.).

Air Tour Facilities

The requirements for commercial air taxi/airline/air tour operations at the airport need to be considered concurrently as well. H.A. Clark Memorial Field has been considered for the establishment of an air tour operation serving the Grand Canyon and other regional sites in the past. The City of Williams has constructed a terminal building, apron, and automobile parking area to serve an air tour operator or even an airline. An aircraft rescue and firefighting (ARFF) building will be constructed in 2007 to house ARFF equipment needed to accommodate an airline or air tour operator as part of the airport's Code of Federal Regulations (CFR) Title 14, Part 139, certification requirements. This master plan considers future air tour/air carrier operational needs in the planning and design of landside facilities.

The following alternatives discuss options for development of the airport.

Landside Alternative A

As presented on **Exhibit 4C, Landside Alternative A** allows for the development of up to three T-hangar facilities to be constructed on the central general aviation apron. These T-hangar facilities would be able to house up to 20 smaller single-engine and multi-engine aircraft each, providing enclosed space for up to 60 aircraft. Taxiway access for the first unit closest to the runway was constructed in 2006.

A 25-foot wide taxiway joining the central general aviation apron to the terminal apron is depicted to provide easy access to the terminal and fueling facilities for aircraft on the general aviation apron. To ensure proper wing-tip clearance for small aircraft, two buildings will need to be removed as shown on the exhibit.

Five 10,000-square-foot commercial general aviation hangars are shown adjacent to the commercial terminal building. These hangars would meet the needs of numerous larger multi-engine piston and turbine aircraft. As businesses continue to develop in the City of Williams, corporate aviation activity is expected to become more prevalent at the airport. These hangars and adjoining apron area could serve as a business aviation center for the airport in the future. As demand arises for an additional FBO, these hangars may be utilized for this purpose. This location provides good visibility from the airside system for FBO activities, plenty of space for aircraft parking and movement, and easy access from Airport Road. In the future, depending upon the type of airline/air tour service at the airport, greater segregation between general aviation and commercial airline/air tour operations may be desirable for security purposes.

A helipad is proposed to be located south of the commercial general aviation hangar apron. The helipad would be accessible via a ground vehicle access road connecting the helipad to the apron area. While this location segregates the helipad from fixed-wing operations, its location is based upon the ultimate development of the apron to the south. This prevents the helipad from being readily accessible in the near term from existing facilities. A helipad is needed in the short-term.

An aircraft rescue and firefighting (ARFF) facility is planned to be located north of the terminal facility. Should an aerial tour operator or any other 14 CFR, Part 139, operator conduct operations at H.A. Clark Memorial field, ARFF equipment will need to be acquired to meet the safety requirements of Part 139. This facility would house this equipment. The ARFF facility is depicted in the same location on each proposed alternative as the City plans to develop this facility in 2006 with an existing FAA grant.

A maintenance building is planned along Airport Road near the water storage tank. This facility would house various airport maintenance equipment, materials, and offices for airport workers.

An aircraft wash rack is planned to be located adjacent to the fueling facilities. This location would provide easy

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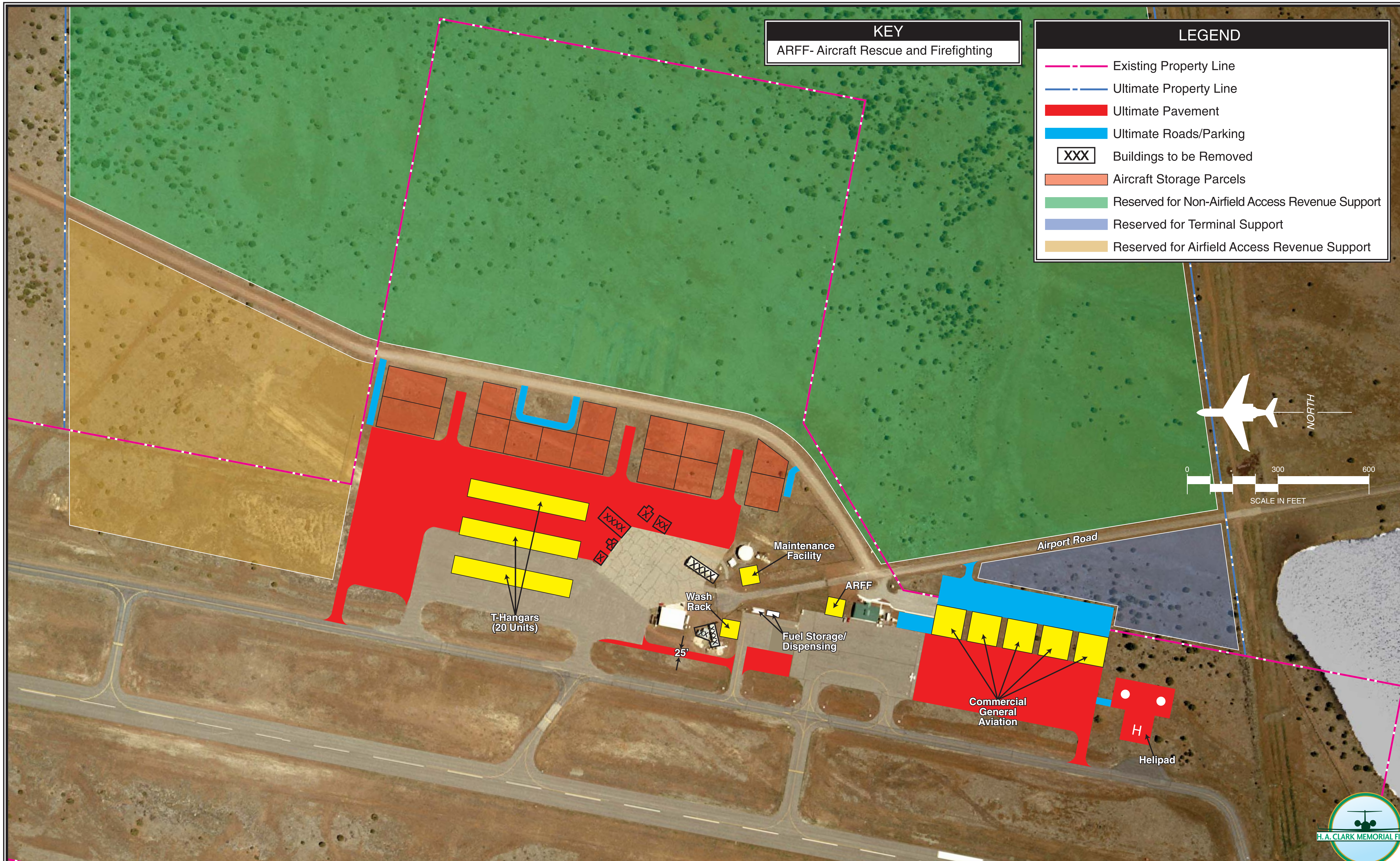

Exhibit 4C
LANDSIDE ALTERNATIVE A

access for aircraft owners and also is within close proximity to existing utilities.

Several aircraft storage parcels ranging in size from 0.3 acres to 0.4 acres are located to the east of the T-hangar development areas. Each of these parcels may be privately developed with hangar facilities generating revenue support for the airport. Airside access is available via taxilanes, stemming from the T-hangar apron, while ground access will be provided by newly constructed access roads from Airport Road.

The remaining land that is to be acquired in the Yavapai Ranch Land Exchange, depicted on **Exhibit 4C** with green shading, is to be reserved for future non-airfield access revenue support development. A smaller section to the north, shown with yellow shading, will be reserved for airfield access revenue support, while the remaining area south of the terminal, shown with blue shading, will be reserved for future terminal support. The terminal support area may be utilized in the future for expanded automobile parking or other facilities needed to support airline or air tour operations. These reserved lands are depicted on each alternative with varying sizes and locations.

Expanded terminal area parking is also shown to the south of the terminal facility. A supplemental parking lot will be located east of the commercial general aviation hangar facilities.

Several of the existing hangar facilities are shown on this alternative and each subsequent alternative as being removed to allow for the development of T-hangars or apron areas. Many of these hangar facilities are in poor structural condition and are in need of renovation. If the hangar owners wish to keep their facilities, considerations may be made to relocate the hangar facilities to another location on the airport.

Landside Alternative B

Landside Alternative B is depicted on **Exhibit 4D.** In contrast with Landside Alternative A, this alternative segregates all future general aviation hangar and apron areas away from the existing terminal building and apron. The intent is to present a development concept that provides distance between commercial and general aviation facilities. As described above, security regulations in the future may dictate that these facilities be segregated for unrestricted access.

The alternative proposed provides for more T-hangar development than Landside Alternative A, with seven total facilities planned for the general aviation apron. A group of six 6,400-square-foot commercial general aviation hangars are proposed to be located east of the T-hangar development areas. Apron area will be available to the west of these hangars by only allowing for two T-hangars to be developed on the central apron. Two larger 10,000-square-foot commercial general aviation hangars are depicted to the south of the six smaller commercial general aviation hangars. These hangars could be utilized by future FBOs or specialty operators. Automobile parking lots are shown to

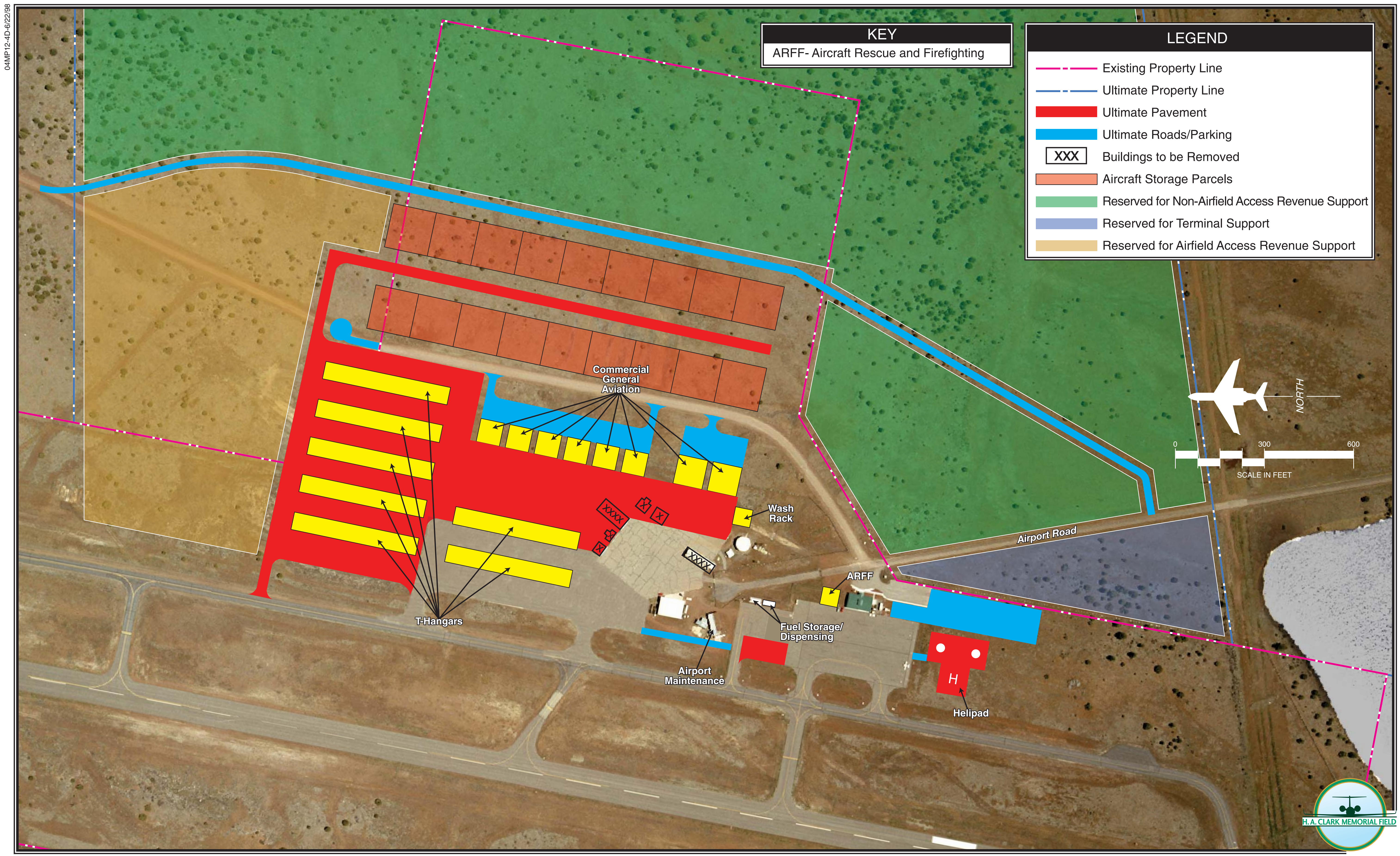

Exhibit 4D
LANDSIDE ALTERNATIVE B

the east of each of these hangar facilities.

An aircraft wash rack is shown at the southern edge of the general aviation apron adjacent to the water tank. At this location, it would be easily accessible to most airport users and water utilities are readily available.

An existing hangar facility to the south of the Aviation Services of Northern Arizona facility is depicted as the future maintenance facility. This is a central location on the landside of the airport that allows maintenance workers to quickly access all landside facilities and utilizes an existing facility to reduce initial development costs to the City. An interior service access road is shown to connect the aprons for airport maintenance vehicles. This would allow ground vehicles to move about the landside facilities without driving on Taxiway A.

The helipad on this alternative is shown to the south of the existing terminal apron. A ground vehicle access road would connect the helipad to the apron providing quick access and egress from the airport. In contrast with Alternative A, this location allows for the helipad to be developed in close proximity to the terminal in the short term. However, it would limit the expansion of the terminal apron to the south in the future if needed for commercial airline/air tour operations.

The terminal parking lot is planned to be expanded to the south. A terminal support area is depicted to the southeast of the existing terminal facility.

Several half-acre aircraft storage parcels are depicted east of the existing Airport Road. Airfield access will be provided via a taxilane constructed from the T-hangar apron. These parcels will be accessible on the landside via an existing segment of Airport Road on the west and the relocated Airport Road to the east. While this taxiway supports a number of development parcels, the design of this taxiway can create potential taxi conflicts as aircraft may not be able to see other aircraft on the taxiway until turning south on this interior taxiway. A perpendicular taxiway extending to the east only would eliminate the potential for conflict and also allow for incremental development. The perpendicular taxiway alignment is shown in **Landside Alternative C**.

Landside Alternative C

Landside Alternative C is presented in **Exhibit 4E.** Similar to Landside Alternative B, this alternative segregates all future general aviation hangar and apron areas away from the existing terminal building and apron. This alternative proposes six T-hangar facilities to be located north and east of the existing general aviation apron. Six 8,000-square-foot commercial general aviation hangar facilities are depicted to the north of the T-hangar facilities adjacent to a large apron area. These facilities are intended to be utilized by FBOs, specialty operators, or aviation-related businesses.

The helipad is depicted to the north of the commercial general aviation

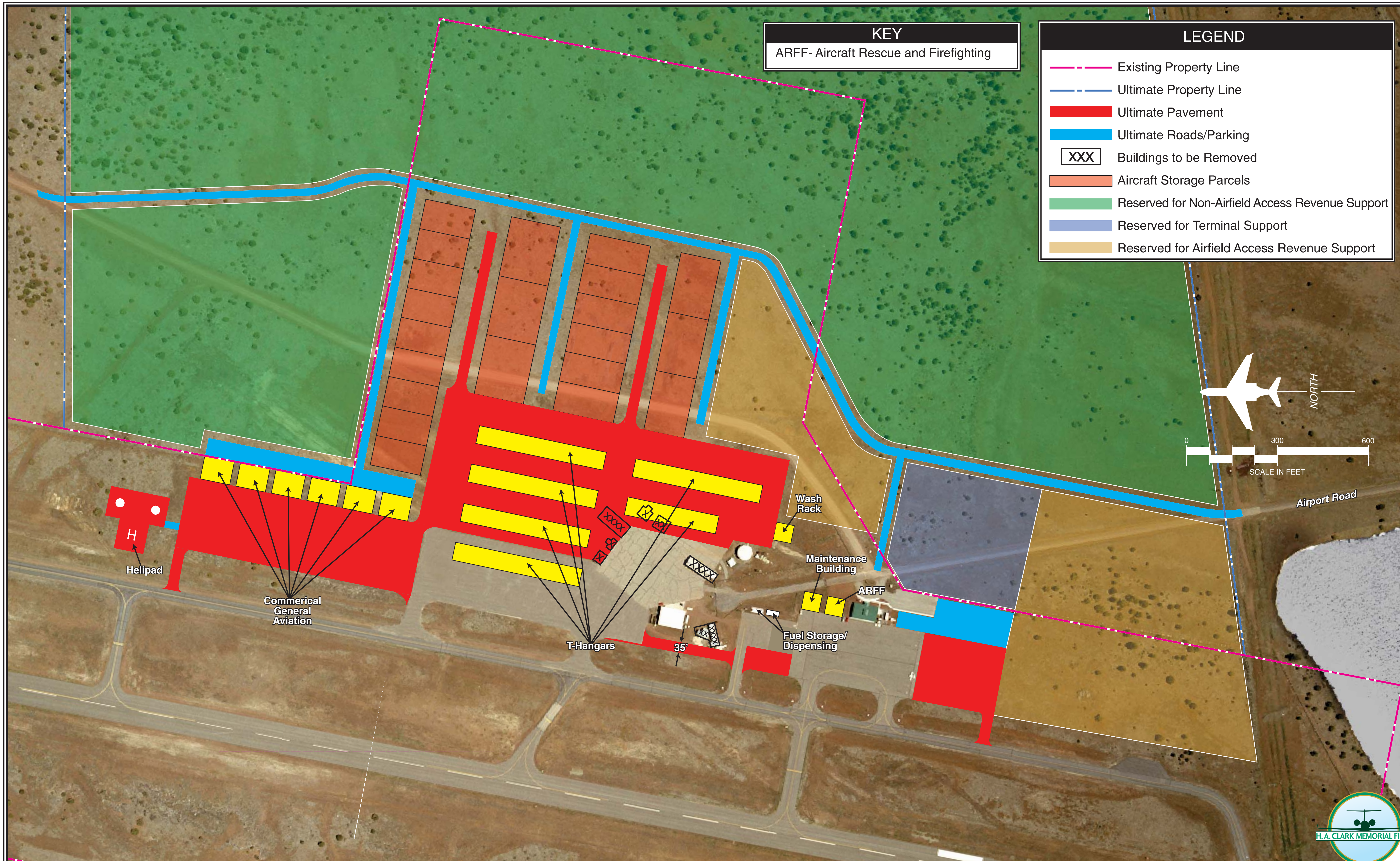

Exhibit 4E
LANDSIDE ALTERNATIVE C

apron. It is accessible via a ground access road which connects to the southerly apron. While this location may be used by a based helicopter, it may be less desirable for transient users due to the distance from the existing terminal and fueling facilities.

Aircraft storage parcels ranging in size from 0.3 to 0.7 acres are shown to the north and east of the existing general aviation apron. Airside access will be provided by taxilanes from the general aviation apron and ground access will be provided by access roads from the Airport Road realignment. In contrast with Landside Alternative B, the perpendicular design of the access taxiways allows for incremental development and reduction in potential taxi conflicts as the entire length of the taxiway is visible from the apron.

The terminal apron and adjacent automobile parking lot would be expanded to the south providing increased capacity for aircraft parking locations and automobile parking locations. Ground access to the terminal facilities would be from a newly constructed access road intersecting with the realigned Airport Road to the east.

A new airport maintenance facility is depicted north of the proposed ARFF facility and the existing terminal facility. This location is easily accessible from the terminal where airport management offices are located.

The aircraft wash rack is located at the south end of the proposed general aviation apron near the water tank. With the close proximity to the water tank, as in Landside Alternative B, utilities may be more readily accessible.

A 35-foot taxiway is shown connecting the general aviation apron to the terminal apron west of the Aviation Services of Northern Arizona building. This taxiway would provide easier access to the fueling facilities for aircraft on the north side of the airport and would allow ground vehicles to avoid driving on Taxiway A when moving from one side of the airport to the other. Similar to Landside Alternative A, this taxiway would require the removal of two existing buildings.

SUMMARY

The process utilized in assessing the airfield and landside development alternatives involved consideration of short and long term needs as well as future growth potential. Current airport design standards were considered in every scenario. Safety, both in the air and on the ground, was given high priority in the analyses.

The recommended development concept for H.A. Clark Memorial Field must represent a means by which the airport can grow in a balanced manner to accommodate future aviation demands. In addition, the plan must provide the flexibility to meet activity growth beyond the long range planning horizon. Each of the landside alternatives presented has the capability to accommodate demand well beyond the activity levels forecast in Chapter Two and development needs presented in Chapter Three.

Through further meetings and discussions with the Planning Advisory Committee (PAC) and the City of Williams, a development concept will evolve. The plan will represent a means by which the airport can continue to effectively serve general aviation and potential air carrier/air tour needs within the overall operation and development of the airport. This will then be developed into a single recommended plan for operating, maintaining, and improving H.A. Clark Memorial Field.

Chapter Five

Airport Plans

Airport Plans

The planning process for the H.A. Clark Memorial Field Master Plan has included several analytic efforts in the previous chapters, intended to project potential aviation demand, establish airside and landside facility needs, and evaluate options for improving the airport to meet those airside and landside facility needs. The process, thus far, has included the presentation of two draft phase reports (representing the first four chapters of the Master Plan) to the Planning Advisory Committee (PAC) and the City of Williams. A plan for the use of H.A. Clark Memorial Field has evolved considering their input. The purpose of this chapter is to describe, in narrative and graphic form, the plan for the future use of H.A. Clark Memorial Field.

AIRFIELD PLAN

The airfield plan for H.A. Clark Memorial Field focuses on meeting Federal Aviation Administration (FAA) design and safety standards, widening all taxiways to 50 feet, constructing additional exit taxiways along Runways 18-36, and establishing a precision instrument approach to Runway 36 and a new approach to Runway 18. It also preserves the ability to lengthen primary Runway 18-36 2,000 feet to the north to achieve an ultimate length of 8,000 feet. **Exhibit 5A** graphically depicts the proposed airfield improvements. The following text summarizes the elements of the airfield plan.

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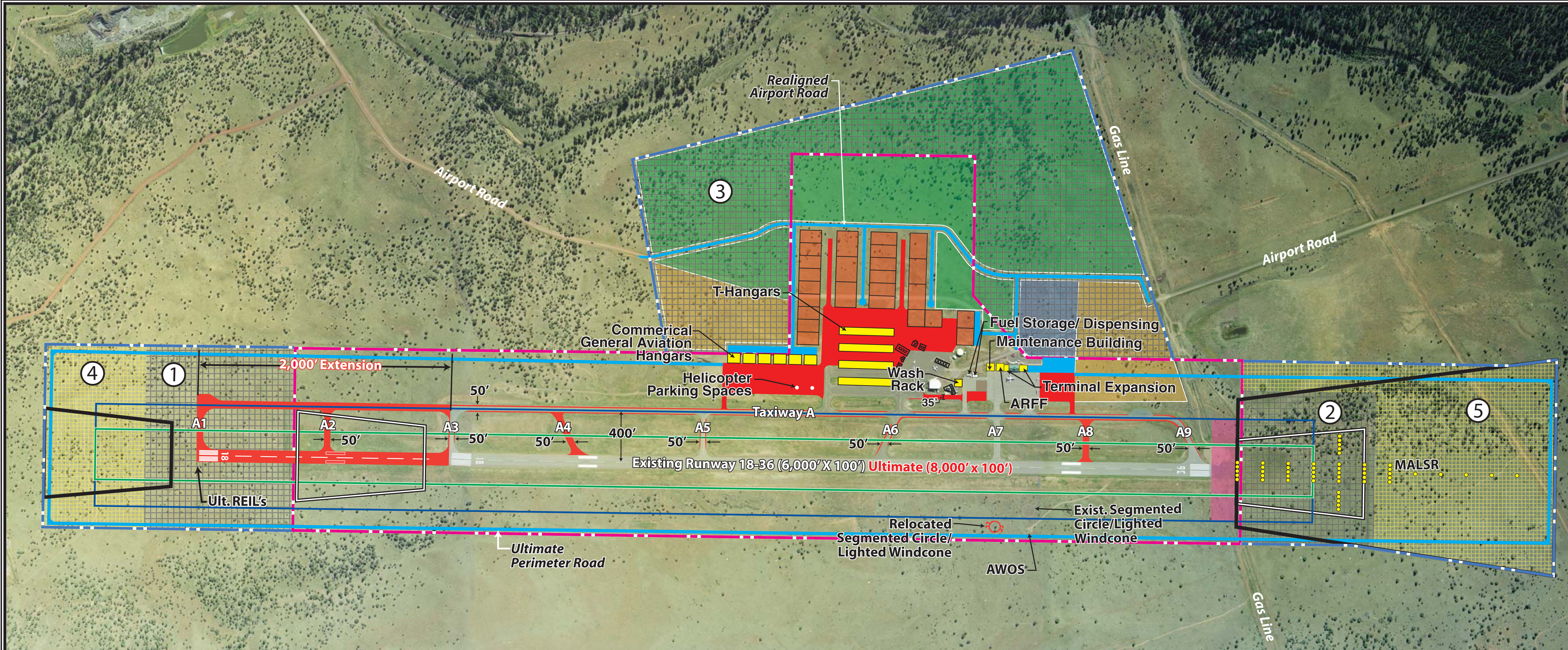

LEGEND

- Existing Property Line
- Ultimate Property Line
- Ultimate Runway Safety Area (RSA)
- Ultimate Object Free Area (OFA)
- Ultimate Pavement
- Ultimate Roads/Parking
- XXX Buildings to be Removed
- Aircraft Storage Parcels
- Reserved for Non-Airfield Access Revenue Support
- Reserved for Terminal Support
- Reserved for Airfield Access Revenue Support
- Yavapai Ranch Land Exchange Areas
- Land for Approach Protection
- Precision Obstacle Free Zone
- Existing Runway Protection Zone (RPZ)
- Ultimate Runway Protection Zone (RPZ)

KEY

1 - 40 Acres
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5 - 56 Acres
RPZ - Runway Protection Zone
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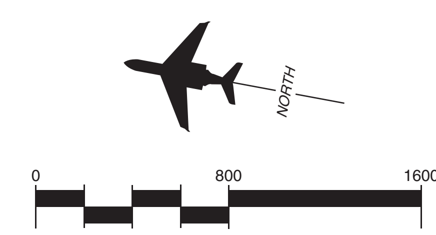
AWOS - Automated Weather Observing System
ARFF - Aircraft Rescue and Firefighting



H.A. CLARK MEMORIAL FIELD

Exhibit 5A
AIRSIDE DEVELOPMENT PLAN

AIRFIELD DESIGN STANDARDS

The FAA has established a variety of design criterion to define the physical dimensions of runways and taxiways and the surrounding imaginary surfaces that protect the safe operation of aircraft at the airport. FAA design standards also define the separation criteria for the placement of landside facilities. As discussed previously in Chapter Three, FAA design criteria are a function of the critical design aircraft's (the most demanding aircraft or "family" of aircraft which will conduct 500 or more operations [take-offs and landings] per year at the airport) wingspan and approach speed, and in some cases, the runway approach visibility minimums. The FAA has established the Airport Reference Code (ARC) to relate these factors to airfield design standards.

H.A. Clark Memorial Field is currently used by a wide variety of general aviation aircraft, ranging from general aviation turboprop and occasional business jet aircraft to general aviation recreational aircraft. Aircraft within ARC A-I to ARC B-II are the primary users of the airport, with aircraft within ARC B-II conducting more than 500 annual operations. Corporate aircraft in ARC C-I and C-II conduct limited operations at the airport (less than 10 annual operations). The airfield is presently designed to ARC B-III design standards to accommodate a wide range of potential aircraft that could be used by general aviation or an air tour operator/air carrier. This Master Plan reflects the potential for larger aircraft to use the airport in the future as part of an air tour operation or as part of the general aviation fleet. Therefore, ARC B-III design standards should be maintained through the planning period.

Assigning ARC B-III to the ultimate design of airfield facilities at H.A. Clark Memorial Field provides for the full range of corporate aircraft, including the Raytheon Beechcraft King Air 300, Falcon 900, and the Cessna Citation III. Potential air tour aircraft that could be accommodated include the Bombardier Dash-8 or Q series of aircraft or the ATR family of aircraft.

As the primary runway, Runway 18-36 and its associated taxiways should continue to be planned and developed to ARC B-III standards. **Table 5A** summarizes the ARC B-III airfield safety and facility dimensions to be applied to H.A. Clark Memorial Field planning and design.

AIRFIELD DEVELOPMENT

The components of the planned airfield development are summarized below.

- **Acquire lands involved in the Yavapai Land Exchange.**

The Yavapai Land Exchange involves the exchange of Yavapai Ranch land to the U.S. Forest Service in exchange for existing U.S. Forest Parcels in various sections of northern Arizona. Three of these sections expected to become the property of the City of Williams are located adjacent the existing airport property line and are depicted by black crosshatching on **Exhibit 5A**. Two sections of land expected to be included in the exchange are located beyond each runway end and encompass a combined 70 acres. This land will facilitate the runway extension to the north, an approach lighting system, and a larger runway protection zone (RPZ) for the Runway 36 end. A larger section of land encompassing approximately 124 acres is located to the east of the runway and will facilitate landside facility expansions in the future.

TABLE 5A
Planned Airfield Safety and Facility Dimensions (in feet)

	Existing Runway 18-36	Ultimate Runway 18-36	
Airport Reference Code (ARC)	**B-II**	**B-III**	
Approach Visibility Minimums	**Visual**	**½ -Mile (Rwy 36) One-Mile (Rwy 18)**	
Runway			
Width	100	100	
Length	6,000	8,000	
Runway Safety Area (RSA)			
Width	300	400	
Length Beyond Runway End	300	800	
Object Free Area (OFA)			
Width	800	800	
Length Beyond Runway End	300	800	
Obstacle Free Zone (OFZ)			
Width	400	400	
Length Beyond Runway End	200	300	
Runway Centerline To:			
Hold Line	200	200	
Parallel Taxiway Centerline	400	400	
Edge of Aircraft Parking	400	400	
Runway Protection Zone (RPZ)		**18**	**36**
Inner Width	500	500	1,000
Outer Width	700	700	1,700
Length	1,000	1,000	2,500
Approach Obstacle Clearance	20:1	34:1	50:1
Departure Surface Clearance	40:1	62:1	62:1
Taxiways			
Width	35	50	
Safety Area Width	79	118	
Object Free Area Width	131	186	
Taxiway Centerline To:			
Parallel Taxiway/Taxilane	140	152	
Fixed or Moveable Object	50	93	
Taxilanes			
Taxilane Centerline To:			
Parallel Taxilane Centerline	140	140	
Fixed or Moveable Object	50	81	
Taxilane Object Free Area	115	162	

Source: FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, Change 10, Title 14 of the Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*, FAA AC 150/5340-1F, *Marking Of Paved Areas On Airports*

- **Maintain Airport Reference Code (ARC) B-III design standards on Runway 18-36.**

The potential exists in the future for an aerial tour operator or aircraft to conduct operations at H.A. Clark Memorial Field. This would result in increased use of the airport by commercial turboprop aircraft. Common turboprop aircraft used by aerial tour operators have wider wingspans than the existing critical aircraft operating at the airport. Ultimately, the airfield plan for H.A. Clark Memorial Field provides for the airport to fully comply with ARC B-III design standards on Runway 18-36. As shown in **Table 5A**, this will require creating a longer and wider runway safety area (RSA), a longer object free area (OFA), and a longer obstacle free zone (OFZ). The ARC B-III RSA and OFA extend beyond the existing airport property line to the south; however, the City is acquiring property through the Yavapai Land Exchange which will secure the area needed to protect the RSA and OFA. The runway centerline to the parallel taxiway centerline is already located at the standard separation distance for ARC B-III.

- **The extension of Runway 18-36 to 8,000 feet.**

The Master Plan Development Concept includes extending Runway 18-36 2,000 feet to the north from 6,000 feet to 8,000 feet. This extension requires the acquisition of approximately 67 acres of land to secure the RSA, OFA, and runway protection zone (RPZ). Approximately 86 acres of land is required to secure the RSA, precision obstacle free zone (POFZ), OFA, RPZ, and the installation of a medium intensity approach lighting system with runway alignment lighting (MALSR) to the south of Runway 18-36. These acquisition areas as well as the Yavapai Land Exchange areas, which will be discussed in detail later, are depicted on **Exhibit 5A**.

The proposed extension to Runway 18-36 is included in this Master Plan for planning purposes only. This is to aid in local land use planning to ensure that appropriate land use measures are put into place to allow for this extension in the future if it is needed. By planning for a runway extension, the City and County can take appropriate measures to ensure that there are no hazards or obstacle penetrations to the 14 Code of Federal Regulations (CFR) Part 77 airspace in the future that could prevent the extension, and to allow for compatible land use to be planned in the extended runway approach/departure area. Separate justification for constructing the runway extension will likely be required outside this Master Plan at the time of implementation. This justification will require letters of support from users detailing 500 annual operations by the critical aircraft requiring the additional runway length.

- **The strengthening of Runway 18-36 to 60,000 pounds dual wheel loading (DWL).**

The current strength rating on runway 18-36 is 15,000 pounds single wheel loading (SWL). This current strength rating is adequate for the mix of aircraft currently using the airport. The Master Plan Concept includes the overlay of Runway 18-36 to obtain an ultimate dual wheel loading (DWL) strength of up to 60,000 pounds. The strength rating would accommodate most business aircraft and any turboprop aircraft used for future aerial tour operations on a regular basis.

- **A precision instrument approach to Runway 36.**

The airfield plan reserves the potential for the FAA to establish a precision instrument approach to Runway 36. This is planned to involve the installation of the traditional instrument landing system (ILS) or utilize the Global Positioning System (GPS). A precision instrument approach provides both descent and lateral guidance to the pilot. This approach is planned for visibility minimums as low as one-half mile and cloud ceilings as low as 200 feet. The Master Plan Concept also includes the installation of a medium intensity approach lighting system with runway alignment indicator lights (MALSR) to the Runway 36 end. The MALSR is required to achieve the visibility and cloud ceiling minimums described above. Improving the instrument approach capability to Runway 36 will be at the sole discretion of the FAA. While instrument approaches are designed for use by pilots during inclement weather conditions, instrument approaches are commonly used during good visibility conditions by transient pilots to navigate to the airport.

A precision obstacle free zone (POFZ) will be in effect with the installation of a precision instrument approach. The POFZ surface is only in effect when all of the following conditions are met: there is a vertically guided approach, the reported ceiling is below 250 feet and/or visibility is less than ¾ statute miles, and an aircraft is on final approach within two miles of the runway threshold. When the POFZ is in effect, an aircraft, while holding on a taxiway, may not allow the aircraft's fuselage or tail to penetrate the POFZ. The POFZ begins at the runway threshold and extends beyond the runway end 200 feet with a width of 800 feet centered on the extended runway centerline

- **Exit taxiways, holding apron construction, and taxiway lighting.**

Three additional exit taxiways for Runway 18-36 are included in the plan to reduce runway occupancy time. Two 90-degree exit taxiways are planned to be located 1,000 feet from each ultimate runway threshold. These exit taxiways will allow for 100 percent utilization of aircraft in categories A, B, and C, and 98 percent of category D aircraft. A single high-speed exit taxiway is planned 5,000 feet from the Runway 36 threshold. This high-speed exit taxiway will allow for 100 percent utilization for aircraft in categories A and B, 76 percent for category C, and 55 percent for category D aircraft. With the addition of new exit taxiways, it will be necessary to develop a new taxiway designation system according to the FAA Advisory Circular 15/5340-18D *Standards for Airport Sign Systems*. Since the long term plan includes only a single parallel taxiway, the ultimate associated exit taxiways should be re-designated "A1," "A2," "A3," etc., starting with the northernmost exit taxiway and ending at "A9" with the most southerly exit taxiway.

Taxiway A is currently equipped with taxiway delineators. Taxiway A and each new taxiway should be planned to be equipped with medium intensity taxiway lights (MITL).

Piston-powered aircraft must complete a series of engine run-up tests before departure. Holding aprons at the runway ends allow these activities to take place off the active taxiway surface, allowing ready-for-departure aircraft to bypass those aircraft holding or completing engine run-up tests. Holding aprons are planned on the north end of the ultimate Taxiway A extension.

LANDSIDE PLAN

Examples of landside facilities include aircraft storage hangars, terminal buildings, aircraft parking aprons, hangar and apron access taxilanes, and vehicle parking lots. The landside plan for H.A. Clark Memorial Field has been devised to efficiently accommodate potential aviation demand and provide revenue enhancement possibilities by designating the use of certain portions of airport property for aviation-related and non-aviation-related commercial uses.

The development of landside facilities will be demand-based. In this manner, the facilities will only be constructed if required by verifiable demand. For example, T-hangars will only be constructed if new based aircraft owners desire enclosed aircraft storage. The landside plan is based on projected needs that can change over time. The landside plan is developed with flexibility in mind to ensure the orderly development of the airport should this demand materialize.

The overall philosophy of the H.A. Clark Memorial Field landside plan is to safely and securely segregate general aviation activities from commercial activities on the airport. This segregation is needed to meet air carrier and 14 CFR Part 139 operational security requirements. This segregation also helps to mitigate potential safety and security issues that can arise when larger commercial aircraft come in close proximity to smaller general aviation aircraft. In this plan, the general aviation facilities will be planned to the north of Taxiway A7 as shown on **Exhibit 5A**, while commercial activity facilities will be planned south of Taxiway A7 adjacent to the terminal building.

The landside plan provides for the expansion of the existing terminal building, the construction of a new airport maintenance building, an aircraft rescue and firefighting (ARFF) facility, development of aircraft storage facilities and parcels, non-airfield access revenue support development parcels, construction of an aircraft wash rack, and helicopter parking spaces. Landside improvements are shown in detail on **Exhibit 5A**.

TERMINAL AREA

The terminal building is planned to be expanded both to the north and to the south. This expansion is based on the potential future needs of an aerial tour operator or other Part 139 operator that chooses to conduct operations at H.A. Clark Memorial Field.

The terminal parking lot is to be expanded to the south to increase capacity. A large parcel to the southeast of the terminal building is reserved for future terminal support needs which could include additional automobile parking spaces or other facilities needed to support airline or air tour operations. The terminal apron will also be expanded to the south, which will provide additional aircraft parking spaces.

A new 3,600 square-foot airport maintenance building is planned to the north of the existing terminal building. This location would provide direct and timely access to all airport facilities for maintenance personnel whose offices are located within the terminal building.

An ARFF facility which is currently under construction is planned for completion in 2007 north of the existing terminal building. This location provides direct access to the runway system so that airport emergency response can meet minimum response times specified in 14 CFR Part 139.

An aircraft wash rack facility is planned to be constructed adjacent the fuel storage facilities on the existing apron. The aircraft wash rack would provide an area for aircraft cleaning and the proper collection of the aircraft cleaning solvents and contaminants removed from the aircraft hull during cleaning.

Two helicopter parking spaces are planned to be temporarily located to the west of the terminal building on the expanded terminal apron. These parking spaces are planned to be relocated to the commercial general aviation hangar apron once it is constructed. These helicopter parking spaces will provide a location for transient helicopters to park while enplaning and deplaning passengers or cargo.

A 35-foot wide taxiway is planned to extend from the general aviation apron to the apron adjacent to the fueling facilities. This taxiway will provide a quicker access route for general aviation aircraft to the fueling facilities. It will also eliminate the need of general aviation aircraft to utilize Taxiway A to access the commercial apron and the fueling facilities, which reduces taxiway occupancy and congestion potential.

As shown on **Exhibit 5A**, several existing hangar facilities will need to be removed to facilitate the construction of the taxiway and the expanded general aviation apron. These existing hangars are in poor structural condition and are in need of removal. These facilities could either be demolished or relocated to another location on the airport per the desire of the hangar owner.

AIRCRAFT STORAGE HANGARS

T-hangar development is located to the north of the existing general aviation apron. The four proposed T-hangar facilities should be able to accommodate approximately 20 aircraft in each facility. Six 8,000 square-foot commercial general aviation hangars and an associated aircraft parking apron, including two helicopter parking spaces, are planned to the north of the T-hangar/condominium hangars. These hangars could be utilized for larger multi-engine piston and turbine aircraft storage. This hangar area is planned to be a potential business aviation center for the airport in the future. As demand arises for an additional fixed base operator (FBO), these hangars may be utilized for this purpose. This location provides good visibility from the airside system for FBO activities such as aircraft maintenance, and provides ample area for aircraft parking and movement and easy access from the relocated Airport Road.

REVENUE GENERATING PARCELS

Several 0.39 to 0.75-acre aircraft storage parcels are located to the east of the proposed T-hangars and commercial general aviation hangar development areas. These parcels should be reserved for the private development of hangar facilities. The aircraft storage parcels are depicted on **Exhibit 5A** with orange shading. Ground access roads would be constructed from the relocated Airport Road.

Airfield access and non-airfield access revenue development parcels are located on the east side of the airport adjacent to the terminal and general aviation areas. These parcels would be available for larger conventional hangar construction for businesses wishing to have airport access capabilities. Areas reserved for airfield access revenue support are depicted on **Exhibit 5A** by yellow shading, while areas reserved for non-airfield access revenue support are depicted with green shading. The use of airport property for non-aviation purposes such as commercial, industrial, or office park development will need to be approved by Congress. The master plan does not gain approval for the non-aeronautical uses, even if these uses are ultimately shown in the master plan. A separate request justifying the use of airport property for non-aeronautical uses will be required once the master plan is complete. Approval for non-aviation uses will also require an environmental determination by the FAA.

AIRPORT ACCESS/ CIRCULATION

The existing airport access road, Airport Road, is planned to be relocated to the east to allow for the proposed landside facility expansions. In addition to the easterly relocation, the new airport access road will need to extend to all hangar and development parcel areas.

An airport perimeter road is planned to be constructed to provide vehicle access to the perimeter of the airport. This allows maintenance and emergency vehicles access around the airport without utilizing aircraft operational area such as the runway and taxiways. This increases safety by reducing the potential for runway incursions. When new property is acquired in the future or when the runway is extended, the perimeter road will need to be realigned and expanded to ensure that the road remains clear of the runway safety areas and extends to all new areas of the airport. **Exhibit 5A** depicts the ultimate alignment for the airport perimeter road.

UTILITIES

The planned expansion of the terminal area and general aviation facilities will require utility improvements. Presently, the airport is not served by a public water or sewer system. A water and sewer connection to the City of Williams municipal system is needed. A water connection will also aid in fire protection. A utility study should be conducted to identify the costs and preferred method for connecting the airport to the municipal water and sewer system. This plan should also identity the on-airport utility structure to support the planned landside development.

PART 139 CERTIFICATION

Title 14 of the Code of Federal Regulation (CFR) Part 139 prescribes rules governing the certification and operation of land airports that serve any scheduled or unscheduled passenger operation of an air carrier that is conducted with an aircraft having a seating capacity of more than nine passengers. In the future if a certificated scheduled or non-scheduled aerial tour operator/air carrier conducts operations at H.A. Clark Memorial Field, the airport will need to acquire a Part 139 certificate.

Under this certification process, airports are classified into four classes, based on the type of air carrier operations served:

- **Class I Airport** – an airport certificated to serve scheduled operations of large air carrier aircraft (more than 30 passenger seats) that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft (30 or less passenger seats).

- **Class II Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.

- **Class III Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.

- **Class IV Airport** – an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled large or small air carrier aircraft.

Depending upon the type of service, H.A. Clark Memorial Field will likely fall within Class II or Class III.

Aircraft Rescue and Firefighting Facilities (ARFF)

Part 139 airports are required to provide aircraft rescue and fire fighting (ARFF) services during air carrier operations that require a Part 139 certificate. Each certificated airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, A through E, with A applicable to the smallest aircraft and E the largest (based on wingspan). H.A. Clark Memorial Field would most likely fall within ARFF Index A. As such, the airport would be required to maintain a fleet of equipment and properly trained personnel consistent with this standard.

The H.A. Clark Memorial Field ARFF facility is currently under construction north of the terminal building. The facility should be adequate to house the required ARFF equipment under ARFF Index A.

ENVIRONMENTAL EVALUATION

Analysis of the potential environmental impacts of proposed airport development projects is an important component of the Airport Master Plan process. The primary purpose of this section is to evaluate the proposed development program for the H.A. Clark Memorial Field to determine whether proposed development actions could individually or collectively affect the quality of the environment.

Construction of the improvements depicted on the Airport Layout Plan will require compliance with the *National Environmental Policy Act* (NEPA) *of 1969*, as amended, to receive federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). In instances in which significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. While this portion of the Master Plan is not designed to satisfy the NEPA requirements for a categorical exclusion, EA, or EIS, it is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the NEPA process. This evaluation considers all environmental categories required for the NEPA process as outlined in FAA Order 1050.1E and Order 5050.4B, *National Environmental Policy Act (NEPA) Implementation Instructions for Airport Actions.*

During the inventory process for this master plan, the existing environmental condition was researched and documented within Chapter One. This evaluation will determine if any potential identified resources could be impacted by the proposed airport development projects.

ENVIRONMENTAL ANALYSIS

FAA Orders 1050.1E and 5050.4B contain a list of the environmental categories to be evaluated for airport projects. Of the 18 plus environmental categories, the following resources are not found within the airport environs:

- Coastal Resources
- Department of Transportation Act Section 4(f) Properties
- Environmental Justice Areas and Children's Environmental Health Risks
- Prime or Unique Farmland
- Floodplains
- Wild and Scenic Rivers
- Lighting or Visual Impacts

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

As discussed within Chapter One, previous coordination with the State Historic Preservation Officer (SHPO) and the Hopi Tribe indicated that the potential presence of cultural resources within the airport environs is highly likely. Previous surveys conducted at the airport have identified numerous sites; however, none of the sites uncovered thus far are eligible for listing on the National Register of Historic Places (NRHP). Because of the potential for discovering important historic or cultural resources, surveys should be conducted prior to development within those areas which have not previously been surveyed. Specific projects which may trigger field surveys include the runway extension project, development of the additional hangar facilities, the realignment of Airport Road, the installation of the MALSR, runway safety area improvements, and the development of the proposed aircraft storage parcels. Areas proposed for acquisition may need to be surveyed prior to acquisition to assist the FAA with Section 106 consultation with the SHPO.

WETLANDS

As discussed within Chapter One, Threemile Lake is the only known naturally occurring wetland within the project area. Further coordination with the U.S. Army Corps of Engineers and possible field surveys may be required prior to construction of the proposed projects to verify no additional wetland resources will be impacted prior to project development.

WATER QUALITY

The airport will need to continue to comply with an AZPDES operations permit. With regard to construction activities, the airport and all applicable contractors will need to obtain and comply with the requirements and procedures of the construction-related AZPDES General Permit number AZG2003-001, including the preparation of a *Notice of Intent* and a *Stormwater Pollution Prevention Plan,* prior to the initiation of product construction activities.

As discussed within Chapter One, The Arizona Department of Environmental Quality (ADEQ) has indicated concerns regarding the existing surface hydraulic connection between the airport and the Colorado River via Havasu Creek, Cataract Creek, and other unnamed washes. Coordination with ADEQ should be undertaken prior to development projects to obtain recommendations which could lessen the project's potential impact on the Colorado River.

BIOTIC RESOURCES

The Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are charged with overseeing the requirements contained within Section 7 of the *Endangered Species Act*. This Act was put into place to protect animal or plant species whose populations are threatened by human activities. In coordination with the FAA, the FWS and the NMFS will need to review projects to determine if a significant impact to these protected species will result with implementation of a proposed project. Significant impacts occur when the proposed action could jeopardize the continued existence of a protected species or would result in the destruction or adverse modification of federally designated critical habitat in the area.

In a similar manner, states are allowed to prepare statewide wildlife conservation plans through authorizations contained within the *Sikes Act*. Airport improvement projects should be checked for consistency with the State Wildlife Conservation Plan where such a plan exists.

Biotic resources were discussed in detail in Chapter One. According to the Arizona Game and Fish Department's On-Line Environmental Review Tool, four special status species have been documented within three miles of the project. These species include the bald eagle (federally listed as threatened and state listed as a species of special concern), the northern goshawk (federally and state listed as a species of special concern), and the osprey (state listed as a species of special concern). Biologic surveys may be needed to determine whether any of the proposed improvements would potentially impact any of these species. Projects which could impact listed species include the development of the realigned Airport Road, the construction of the runway extension, installation of the MALSR, construction of the perimeter road, and development of the aircraft storage parcels. Further coordination with the U.S. Fish and Wildlife Service and the Arizona Fish and Game Department is recommended.

AIR QUALITY

According to the most recent update contained on the EPA's Greenbook website, Coconino County is currently in attainment for all criteria pollutants. To determine the significance of potential air quality impacts resulting from the implementation of various projects, an emissions inventory is needed.

CONSTRUCTION IMPACTS

Construction impacts typically relate to the effects on specific impact categories, such as air quality or noise, during construction. The use of BMPs during construction is typically a requirement of construction-related permits such as an NPDES (AZDES) permit. Use of these measures typically alleviates potential resource impacts.

Construction-related noise impacts are not anticipated as the airport is surrounded by undeveloped land. Construction related air quality impacts can be expected. Air emissions related to construction activities will be short term in nature and will be included in the air emission inventory, if one is requested.

SOCIOECONOMIC IMPACTS

Socioeconomic impacts known to result from airport improvements are often associated with relocation activities or other community disruptions, including alterations to surface transportation patterns, division or disruption of existing communities, interferences with orderly planned development, or an appreciable change in employment related to the project. Social impacts are generally evaluated based on areas of acquisition and/or areas of significant project impact, such as areas encompassed by noise levels in excess of 65 DNL.

Development of the proposed extension to Runway 18-36, installation of the MALSR, and development of the aviation facilities on the east side of the airport will require the acquisition of property from the U.S. Forest Service. This property acquisition will not require the relocation of residences or businesses.

INDUCED SOCIOECONOMIC IMPACTS

Induced socioeconomic impacts address those secondary impacts to surrounding communities resulting from the proposed development, including shifts in patterns of population movement and growth, public service demands, and changes in business and economic activity to the extent influenced by the airport development. According to FAA Order 1050.1E, "Induced impacts will normally not be significant except where there are also significant impacts in other categories, especially noise, land use or direct social impacts."

Significant shifts in patterns of population movement or growth or increased public service demands are not anticipated as a result of the proposed development. It is expected, however, that the proposed new airport development would potentially induce positive socioeconomic impacts for the community over a period of years. The airport, with expanded facilities and services, would be expected to attract additional users. It is expected to encourage tourism, industry, and trade to enhance the future growth and expansion of the community's economic base. Future socioeconomic impacts resulting from the proposed development would be expected to be primarily positive in nature.

NOISE AND COMPATIBLE LAND USE

To determine the noise-related impacts that the proposed development could have on the environment surrounding H.A. Clark Memorial Field, noise exposure patterns were analyzed for both existing airport activity conditions and projected long term activity conditions.

The basic methodology employed to define aircraft noise levels involves the use of a mathematical model for aircraft noise predication. The Day-Night Average Sound Level (DNL) was used in this study to assess aircraft noise. DNL is defined as the average A-weighted sound level as measured in decibels (dB) during a 24-hour period. A 10 dB penalty applies to noise events occurring at night (10:00 p.m. to 7:00 a.m.). DNL is a summation metric which allows objective analysis and can describe noise exposure comprehensively over a large area. The 65 DNL contour has been established as the threshold of incompatibility, meaning that noise levels below 65 DNL are considered compatible with underlying land uses.

Since noise decreases at a constant rate in all directions from a source, points of equal DNL noise levels are routinely indicated by means of a contour line. The various contour lines are then superimposed on a map of the airport and its environs. It is important to recognize that a line drawn on a map does not imply that a particular noise condition exists on one side of the line and not on the other. DNL calculations do not precisely define noise impacts. Nevertheless, DNL contours can be used to: (1) highlight existing or potential incompatibilities between an airport and any surrounding development; (2) assess relative exposure levels; (3) assist in the preparation of airport environs land use plans; and (4) provide guidance in the development of land use control devices such as zoning ordinances, subdivision regulations, and building codes.

The noise contours for H.A. Clark Memorial Field have been developed from the Integrated Noise Model (INM), Version 6.1. The INM was developed by the Transportation Systems Center of the U.S. Department of Transportation at Cambridge, Massachusetts, and has been specified by the FAA as one of the two models acceptable for federally funded noise analysis.

The INM is a computer model which accounts for each aircraft along flight tracks during an average 24-hour period. The flight tracks assume straight-out departures, as well as east and west departures from each runway end. A left traffic pattern was assumed for both Runway 18 and 36. These flight tracks are coupled with separate tables contained in the database of the INM, which relate to noise, distances, and engine thrust for each make and model of aircraft type selected. The input files contain operational data, runway utilization, aircraft flight tracks, and fleet mix as projected in the plan. The operational data and aircraft fleet mix are summarized in **Table 5B**. These estimates were derived from a review of registered flight plans and examining the based aircraft mix. For this analysis, Runway 36 was assumed to be used 60 percent of the time, whereas Runway 18 was assumed to be used 40 percent of the time.

TABLE 5B
Noise Model Input: Aircraft Operations

Operations By Type	Single Engine	Multi-Engine	Turbo-prop	Turbojet	Helicopter	Totals
Existing Conditions						
Local	306	36	4	4	10	360
Itinerant	3,264	384	38	38	116	3,840
Total	3,570	420	42	42	126	4,200
Long Term						
Local	2,407	290	58	58	87	2,900
Itinerant	13,230	1,890	2,835	378	567	18,900
Total	15,637	2,180	2,893	436	654	21,800

Source: Coffman Associates Analysis

The aircraft noise contours generated using the aforementioned data for H.A. Clark Memorial Field are depicted on **Exhibit 5B**. For existing activity levels, the 65, 70, and 75 DNL contours remain entirely on airport property. When considering long term forecast activity at the airport, the 65, 70, and 75 DNL contours also remain entirely on airport property.

AIRPORT LAYOUT PLAN DRAWINGS

Per FAA and Arizona Department of Transportation (ADOT) requirements, an official Airport Layout Plan (ALP) has been developed for H.A. Clark Memorial Field. The full ALP drawing set (Sheets 1 through 12) can be found at the end of this chapter. The ALP **(Sheet 1 of 12)** graphically presents the existing and ultimate airport layout. The ALP is used, in part by the FAA and ADOT, to determine funding eligibility for future development projects.

The ALP was prepared on a computer-aided drafting system for future ease of use. The computerized plan set provides detailed information of existing and future facility layout on multiple layers that permits the user to focus in on any section of the airport at a desirable scale. The plan can be used as base information for design, and can be easily updated in the future to reflect new development and more detail concerning existing conditions as made available through design surveys.

A number of related drawings, which depict the ultimate airspace and landside development, are included with the ALP. The following provides a brief discussion of the additional drawings included with the ALP:

Airport Landside Facilities Drawing (Sheet 2 of 12) – The terminal area drawings provide greater detail concerning landside improvements on the east side of the runway and at a larger scale than on the ALP.

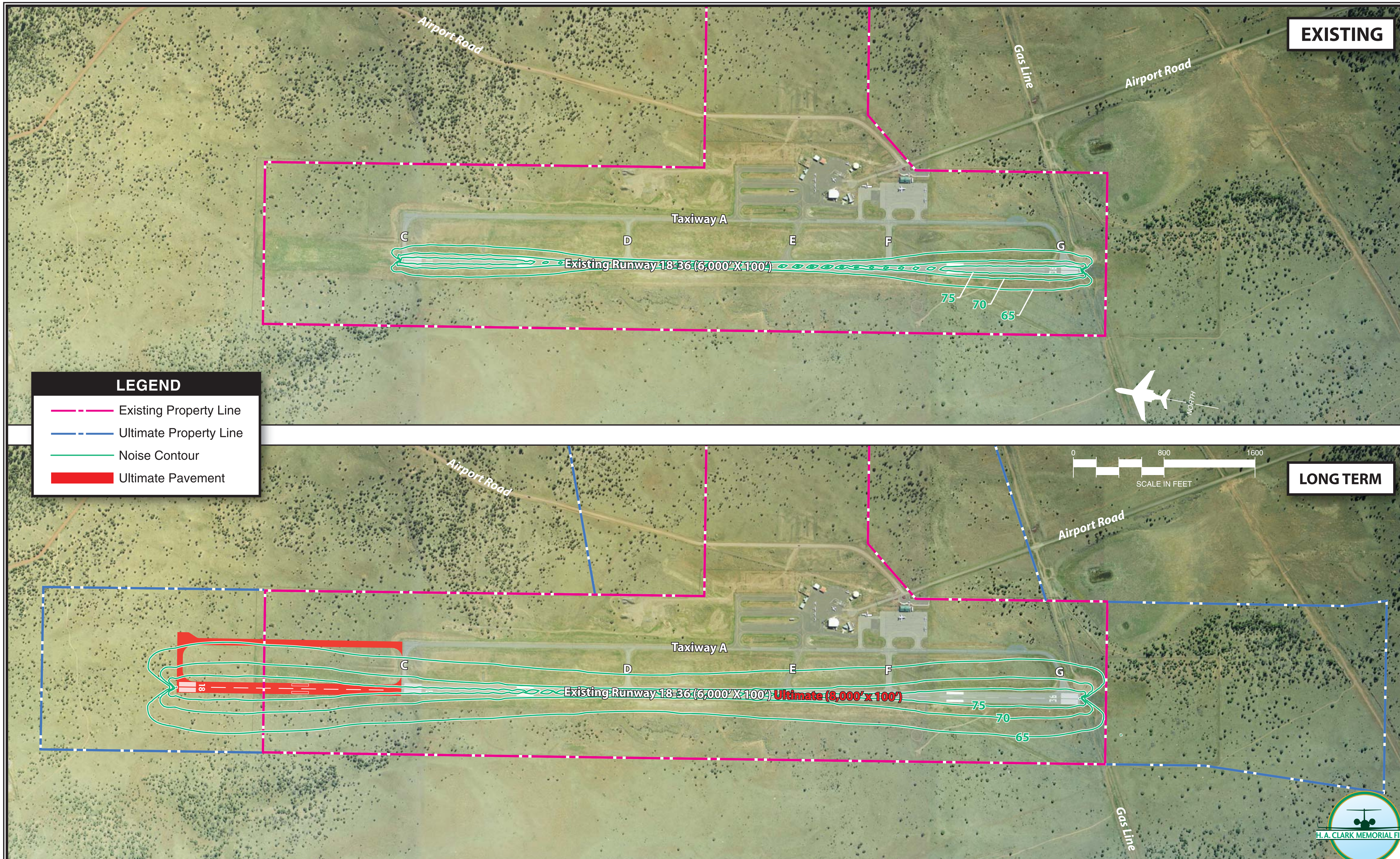


Exhibit 5B
EXISTING & PROJECTED LONG TERM
NOISE CONTOURS

Airport Airspace Drawing (Sheets 3, and 4 of 12) – The Airport Airspace Drawing is a graphic depiction of the Title 14 Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*, regulatory criterion. The Airport Airspace Drawing is intended to aid local authorities in determining if proposed development could present a hazard to the airport and obstruct the approach path to a runway end. This plan should be coordinated with local land use planners.

Approach Surface Profile Drawings (Sheets 5 and 6 of 12) – These drawings provide both plan and profile views of the 14 CFR Part 77 approach surfaces for each runway end. A composite profile of the extended ground line is depicted. Obstructions and clearances over roads and railroads are shown as appropriate. The ultimate 40:1 precision approach surface is shown to be obstructed by terrain.

Inner Portion of the Approach Surface Drawings (Sheets 7, 8, 9, and 12 of 12) – The Inner Portion of the Approach Surface Drawings are scaled drawings of the runway protection zone (RPZ) for each runway end. A plan and profile view of each RPZ is provided to facilitate identification of obstructions that lie within these safety areas. Detailed obstruction and facility data is provided to identify planned improvements and the disposition of obstructions (as appropriate).

On-Airport Land Use Drawing (Sheet 10 of 12) – The On-Airport Land Use Drawing is a graphic depiction of the land use recommendations. When development is proposed, it should be directed to the appropriate land use area depicted on this plan.

Airport Property Map (Sheet 11 of 12) – The Airport Property Map provides information on the acquisition and identification of all land tracts under the control of the airport. Both existing and future property holdings are identified on the "Exhibit A" Property Map.

Inner Approach OFZ Drawing (Sheet 12 of 12) – The Inner-Approach and Inner-Transitional obstacle free zone (OFZ) Drawing depicts the volume of airspace along the sides of the runway OFZ and inner-approach OFZ as it applies to the planned precision instrument approach standards.

SUMMARY

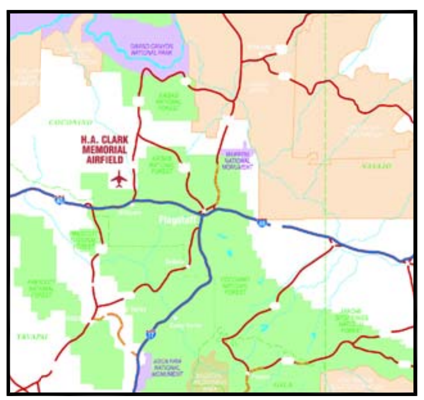
The Master Plan for H.A. Clark Memorial Field has been developed in cooperation with the PAC, interested citizens, and the City of Williams. It is designed to assist the City in making decisions relative to the future use of H.A. Clark Memorial Field as it is maintained and developed to meet its role as defined in Chapter Two.

Flexibility will be a key to the plan, since activity may not occur exactly as forecast. The Master Plan provides the City with options to pursue in marketing the assets of the airport for community development. Following the general recommendations of the plan, the airport can maintain its viability and continue to provide air transportation services to the region.

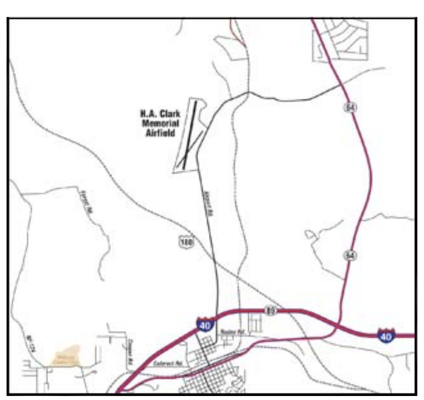
H. A. CLARK

MEMORIAL FIELD

AIRPORT LAYOUT PLAN SET
PREPARED FOR THE CITY OF WILLIAMS, ARIZONA



LOCATION MAP



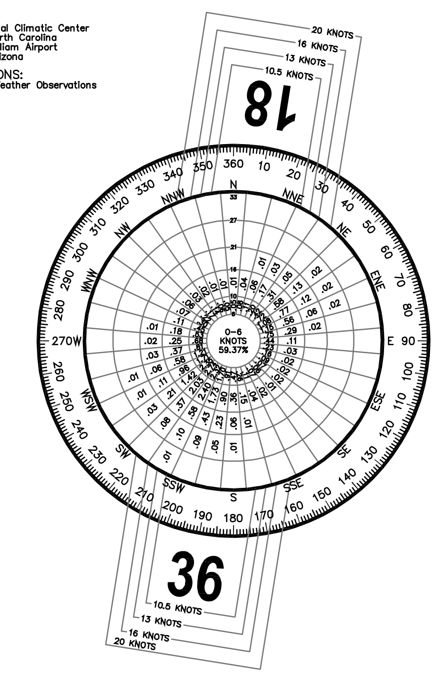
VICINITY MAP

DRAWING INDEX

ALL WEATHER WIND COVERAGE				
Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18–36	95.36%	98.07%	99.65%	99.95%

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Flagstaff Pulliam Airport
Flagstaff, Arizona

OBSERVATIONS:
77,081 All Weather Observations
1994–2003



Coffman Associates
Airport Consultants

February 2008

AIRPORT BUILDING TABLE

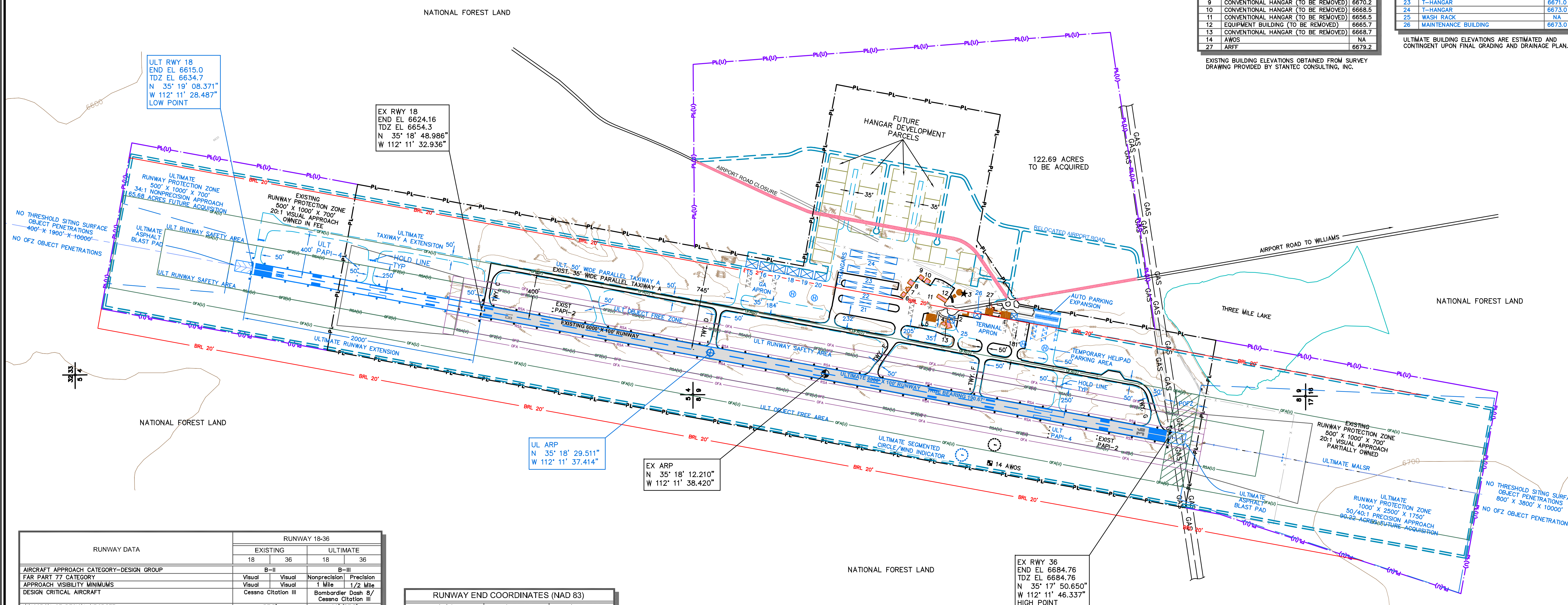
EXIST	DESCRIPTION	TOP ELEV
1	TERMINAL	6670.3
2	FUEL STORAGE	6663.5
3	ROTATING BEACON	6664.6
4	T-HANGAR (TO BE REMOVED)	6665.8
5	AVIATION SVCS. OF NORTHERN ARIZONA	6676.6
6	CONVENTIONAL HANGAR (TO BE REMOVED)	6664.3
7	T-HANGAR (TO BE REMOVED)	6668.7
8	CONVENTIONAL HANGAR (TO BE REMOVED)	6667.1
9	CONVENTIONAL HANGAR (TO BE REMOVED)	6670.2
10	CONVENTIONAL HANGAR (TO BE REMOVED)	6668.5
11	CONVENTIONAL HANGAR (TO BE REMOVED)	6656.5
12	EQUIPMENT BUILDING (TO BE REMOVED)	6665.7
13	CONVENTIONAL HANGAR (TO BE REMOVED)	6668.7
14	AWOS	NA
27	ARFF	6679.2

EXISTNG BUILDING ELEVATIONS OBTAINED FROM SURVEY DRAWING PROVIDED BY STANTEC CONSULTING, INC.

AIRPORT BUILDING TABLE

ULT	DESCRIPTION	TOP ELEV
15	CONVENTIONAL HANGAR	6665.0
16	CONVENTIONAL HANGAR	6665.0
17	CONVENTIONAL HANGAR	6666.0
18	CONVENTIONAL HANGAR	6667.0
19	CONVENTIONAL HANGAR	6668.0
20	CONVENTIONAL HANGAR	6669.0
21	T-HANGAR	6669.0
22	T-HANGAR	6669.0
23	T-HANGAR	6671.0
24	T-HANGAR	6673.0
25	WASH RACK	NA
26	MAINTENANCE BUILDING	6673.0

ULTIMATE BUILDING ELEVATIONS ARE ESTIMATED AND CONTINGENT UPON FINAL GRADING AND DRAINAGE PLAN.



RUNWAY DATA	RUNWAY 18-36			
	EXISTING		ULTIMATE	
	18	36	18	36
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	B-II		B-III	
FAR PART 77 CATEGORY	Visual	Visual	Nonprecision	Precision
APPROACH VISIBILITY MINIMUMS	Visual	Visual	1 Mile	1/2 Mile
DESIGN CRITICAL AIRCRAFT	Cessna Citation III		Bombardier Dash 8/ Cessna Citation III	
WINGSPAN OF DESIGN AIRCRAFT	53.5'		90'/53.5'	
UNDERCARRIAGE WIDTH OF DESIGN AIRCRAFT	9.04'		25.83'/9.04'	
APPROACH SPEED (KNOTS) OF DESIGN AIRCRAFT	114		90'/114	
MAXIMUM CERTIFIED TAKEOFF WEIGHT (LBS) OF DESIGN AIRCRAFT	22,000		43,000/22,000	
RUNWAY EFFECTIVE GRADIENT	1.0%		0.9%	
RUNWAY MAXIMUM GRADIENT	1.0%		0.9%	
PAVEMENT DESIGN STRENGTH (in thousand lbs.)[1]	15(S)		30(S), 60(D)	
RUNWAY APPROACH SLOPE	20:1	20:1	34:1	50:1
RUNWAY END ELEVATION (MSL)	6624.5'	6684.7'	6615.0'	6684.7'
RUNWAY TOUCHDOWN ZONE ELEVATION (MSL)	6654.3'	6684.7'	6634.7'	6684.7'
RUNWAY HIGH POINT ELEVATION (MSL)	6684.7'		6684.7'	
RUNWAY LOW POINT ELEVATION (MSL)	6624.5'		6615.0'	
LINE OF SIGHT REQUIREMENT MET	YES		YES	
RUNWAY LENGTH	5992'		8000'	
RUNWAY WIDTH	100'		100'	
RUNWAY BEARING (TRUE)	10.66°	190.67°	10.66°	190.67°
RUNWAY SAFETY AREA LENGTH BEYOND RUNWAY END	300'	300'	800'	800'
RUNWAY SAFETY AREA WIDTH	150'		400'	
RUNWAY OBJECT FREE AREA LENGTH BEYOND RUNWAY END	300'	300'	800'	800'
RUNWAY OBJECT FREE AREA WIDTH	500'		800'	
RUNWAY OBSTACLE FREE ZONE LENGTH BEYOND RUNWAY END	200'	200'	200'	200'
RUNWAY OBSTACLE FREE ZONE WIDTH	400'		400'	
DISTANCE FROM RUNWAY CENTERLINE TO HOLD BARS AND SIGNS	250'		250'	
RUNWAY MARKING	NP	NP	NP	P
STANDARD SEPARATION - RUNWAY CL TO PARALLEL TAXIWAY CL	400'		400'	
STANDARD SEPARATION - TAXIWAY CL TO FIXED OR MOVABLE OBJECT	65.5'		65.5'	
RUNWAY THRESHOLD DISPLACEMENT	0'	0'	0'	0'
RUNWAY SURFACE/PAVEMENT MATERIAL	Asphalt		Asphalt	
RUNWAY PAVEMENT SURFACE TREATMENT	None		None	
RUNWAY LIGHTING	MIRL		MIRL	
TAXIWAY WIDTH	35'		50'	
TAXIWAY SURFACE MATERIAL	Asphalt		Asphalt	
TAXIWAY OBJECT FREE AREA WIDTH	131'		186'	
TAXIWAY SAFETY AREA WIDTH	79'		118'	
TAXIWAY WING TIP CLEARANCE	26'		34'	
TAXIWAY MARKING	Centerline		Centerline	
TAXIWAY LIGHTING	NONE		MITL	
RUNWAY NAVIGATIONAL AIDS	NONE		GPS	
RUNWAY VISUAL AIDS	Rotating Beacon PAPI-2 (18,36) REIL (18,36)		Rotating Beacon MALSR PAPI-4 (18,36) REIL (18,36)	

[1]Pavement strengths are expressed in Single(S), Dual(D), and Dual Tandem (DT) wheel loading capacities.

RUNWAY END COORDINATES (NAD 83)

RUNWAY	LATITUDE	LONGITUDE
EXISTING RUNWAY 18	35° 18' 48.986" N	112° 11' 32.936" W
ULTIMATE RUNWAY 18	35° 19' 08.371" N	112° 11' 28.487" W
EXISTING RUNWAY 36	35° 17' 50.650" N	112° 11' 46.337" W

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
PL	PL(U)	AIRPORT PROPERTY LINE
32|33 5|4	32|33 5|4	SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (IF APPLICABLE)
		BUILDING ON AIRPORT
		ABANDON BUILDING
		BUILDING OFF AIRPORT
BRL 20'	BRL 20'	BUILDING RESTRICTION LINE (BRL)
x	x	FENCE
		AIRPORT PAVEMENT
H		HELICOPTER PARKING SPACE
		HOLD MARKING
OFA	OFA(U)	OBJECT FREE AREA
RSA	RSA(U)	RUNWAY SAFETY AREA
OFZ	OFZ(U)	OBSTACLE FREE ZONE
		PRECISION OBSTACLE FREE ZONE
		RUNWAY PROTECTION ZONE
		MALSR
PAPI-4	PAPI-4	PAPI
		RUNWAY THRESHOLD LIGHTS & REIL
		SEGMENTED CIRCLE/WIND INDICATOR
		TIEDOWNS
6650	6650	TOPOGRAPHY

GENERAL NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 – NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 – NAVD88.
2. EXISTING AND ULTIMATE RUNWAY COORDINATES AND ELEVATIONS PROVIDED BY STANTEC CONSULTING, INC 12/03/07.
3. THERE ARE NO PRIMARY OR SECONDARY AIRPORT CONTROL STATIONS AT H. A. CLARK MEMORIAL FIELD.
4. NO OFZ PENETRATIONS
5. FENCE LINE EXTENDS ALONG PROPERTY LINE AND WHERE SHOWN.
6. SEE SHEET 2 OF FOR AIRPORT FACILITY IMPROVEMENT DETAILS.

AIRPORT DATA

OWNER: City of Williams	AIRPORT NPIAS CODE: GA
CITY: Williams, Arizona	COUNTY: Coconino, Arizona
RANGE: R 2 E	TOWNSHIP: T22N

H. A. CLARK MEMORIAL FIELD (CMR)		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		GA	Commercial Service
AIRPORT REFERENCE CODE		B-II	B-III
AIRPORT ELEVATION		6684.7' MSL	6684.7' MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		83.7° July	83.7° July
AIRPORT REFERENCE POINT (NAD 83)	Latitude	35° 18' 12.210" N	35° 18' 29.511" N
	Longitude	112° 11' 38.420" W	112° 11' 37.414" W
AIRPORT INSTRUMENT APPROACH		NONE	GPS
NAVAIDS		Airport Beacon AWOS PAPI-4 (18,36) REIL (18, 36)	Airport Beacon GPS, AWOS MALSR (36) PAPI-4 (18,36) REIL (18, 36)
GPS AT AIRPORT		No	Yes

All coordinates are horizontal NAD83 and vertical NAVD88

FOR APPROVAL BY
City of Williams

Mr. Dennis Wells
City Manager

DATE:

FAA APPROVAL STAMP

MAGNETIC NORTH

Magnetic Declination
11° 40 East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)

0 400 800
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	NEW FENCE LINE: CONNECTOR T/W-WIDEN R/W TO 100'	12/7/01	GJG	RJZ
1	TO REFELCT TERMINAL AREA AND AWOS AS BUILT	4/19/00	BTM	GM

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF 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."

H. A. CLARK MEMORIAL FIELD

AIRPORT LAYOUT DRAWING

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008 | **SHEET** 1 **OF** 12

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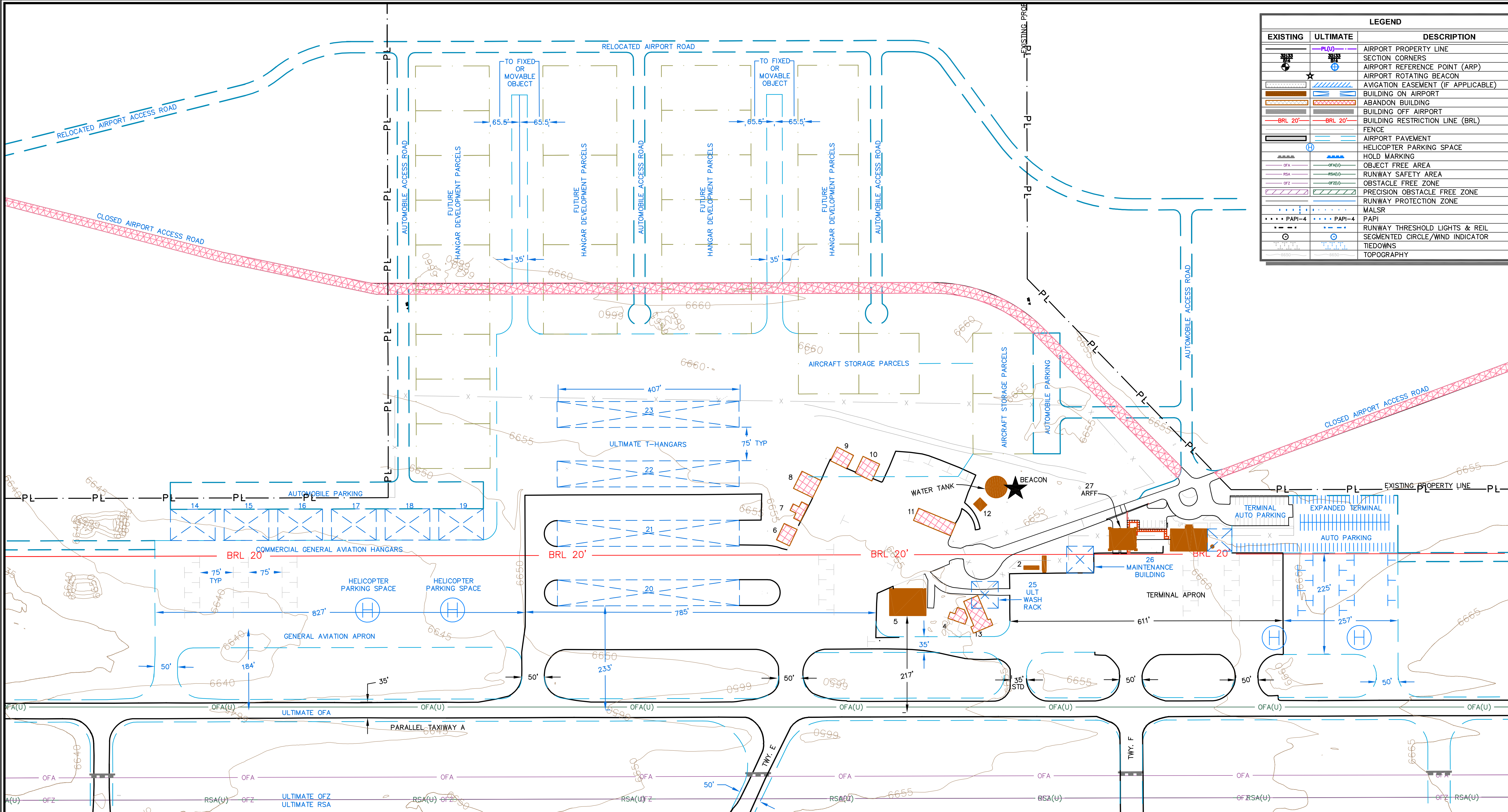
Airport Consultants
www.coffmanassociates.com



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
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		AVIGATION EASEMENT (IF APPLICABLE)
		BUILDING ON AIRPORT
		ABANDON BUILDING
		BUILDING OFF AIRPORT
BRL 20'	BRL 20'	BUILDING RESTRICTION LINE (BRL)
		FENCE
		AIRPORT PAVEMENT
		HELICOPTER PARKING SPACE
		HOLD MARKING
OFA	OFA(U)	OBJECT FREE AREA
RSA	RSA(U)	RUNWAY SAFETY AREA
OFZ	OFZ(U)	OBSTACLE FREE ZONE
		PRECISION OBSTACLE FREE ZONE
		RUNWAY PROTECTION ZONE
		MALSR
PAPI-4	PAPI-4	PAPI
		RUNWAY THRESHOLD LIGHTS & REIL
		SEGMENTED CIRCLE/WIND INDICATOR
		TIEDOWNS
		TOPOGRAPHY

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19	CONVENTIONAL HANGAR	6668.0
20	CONVENTIONAL HANGAR	6669.0
21	T-HANGAR	6669.0
22	T-HANGAR	6669.0
23	T-HANGAR	6671.0
24	T-HANGAR	6673.0
25	WASH RACK	NA
26	MAINTENANCE BUILDING	6673.0

ULTIMATE BUILDING ELEVATIONS ARE ESTIMATED AND CONTINGENT UPON FINAL GRADING AND DRAINAGE PLAN.

MAGNETIC NORTH

Magnetic Declination
11° 40' East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)

0 100 200
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	-	-	-	-
1	-	-	-	-

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H. A. CLARK MEMORIAL FIELD

LANDSIDE FACILITY DRAWING

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008 | SHEET 2 OF 12

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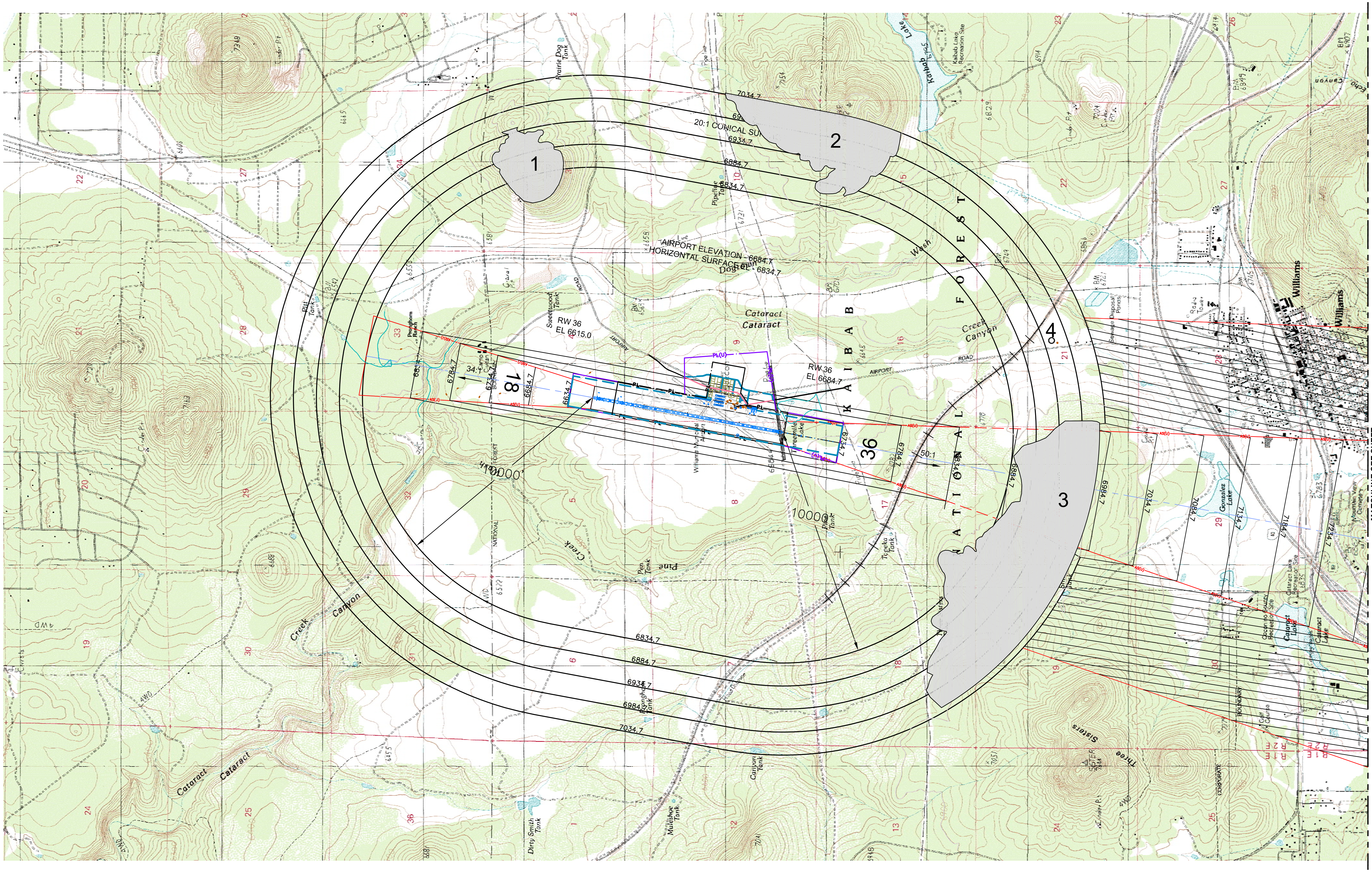

OBSTRUCTION TABLE						
Area No.	Description	Top Elevation	Surface Penetrated	Surface Elevation	Penetration	Remediation
1	TERRAIN	6840.0–7013.0	HORIZONTAL	6834.7	5.3–178.3	REQUEST AERONAUTICAL STUDY
2	TERRAIN	6835.0–7100.0	CONICAL	6834.7	0.3–265.3	REQUEST AERONAUTICAL STUDY
3	TERRAIN	6860.0–7280.0	CONICAL	6834.7–7034.7	25.3–245.3	REQUEST AERONAUTICAL STUDY
4	TOWER	6939	CONICAL	6912	27	ADD OBSTRUCTION LIGHT

GENERAL NOTES:

1. THE FOLLOWING USGS QUAD MAPS APPLY AS BACKGROUND: McLELLAN RESERVOIR, WILLIAMS NORTH, AND WILLIAMS SOUTH.
2. FEATURES AND OBJECTS DERIVED FROM USGS QUAD MAPS AND FAA DIGITAL OBSTACLE FILE.
3. OBSTRUCTION CLEARANCES ARE CALCULATED FROM ULTIMATE RUNWAY END ELEVATIONS.
4. SEE THE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR CLOSE-IN OBSTRUCTIONS.

MAGNETIC
NORTH

Magnetic Declination
11° 40 East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)

0 2000 4000
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

AIRPORT AIRSPACE
DRAWING I

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008

SHEET 3 OF 12

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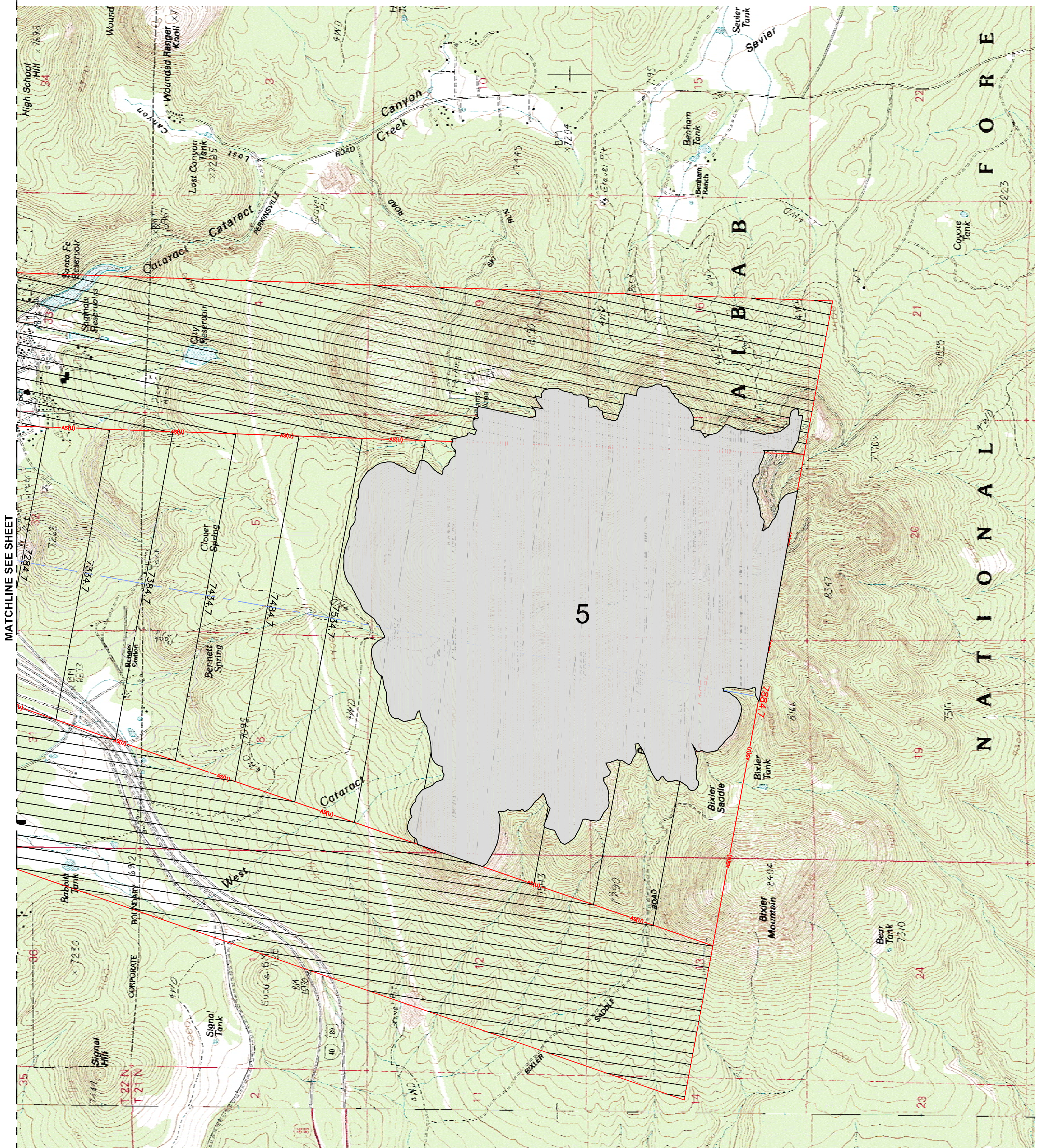
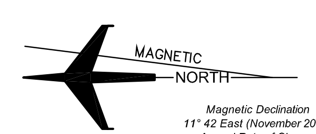
www.coffmanassociates.com



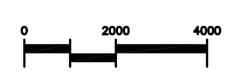
OBSTRUCTION TABLE						
Area No.	Description	Top Elevation	Surface Penetrated	Surface Elevation	Penetration	Remediation
5	TERRAIN	7551–9256	APPROACH	7550–9256	1–1446	REQUEST AERONAUTICAL STUDY

GENERAL NOTES:

1. THE FOLLOWING USGS QUAD MAPS APPLY AS BACKGROUND: McLELLAN RESERVOIR, WILLIAMS NORTH, AND WILLIAMS SOUTH.
2. FEATURES AND OBJECTS DERIVED FROM USGS QUAD MAPS AND FAA DIGITAL OBSTACLE FILE.
3. OBSTRUCTION CLEARANCES ARE CALCULATED FROM ULTIMATE RUNWAY END ELEVATIONS.
4. SEE THE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR CLOSE–IN OBSTRUCTIONS.



Magnetic Declination
11° 42' East (November 2007)
Annual Rate of Change
0° 6' West (November 2007)



No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

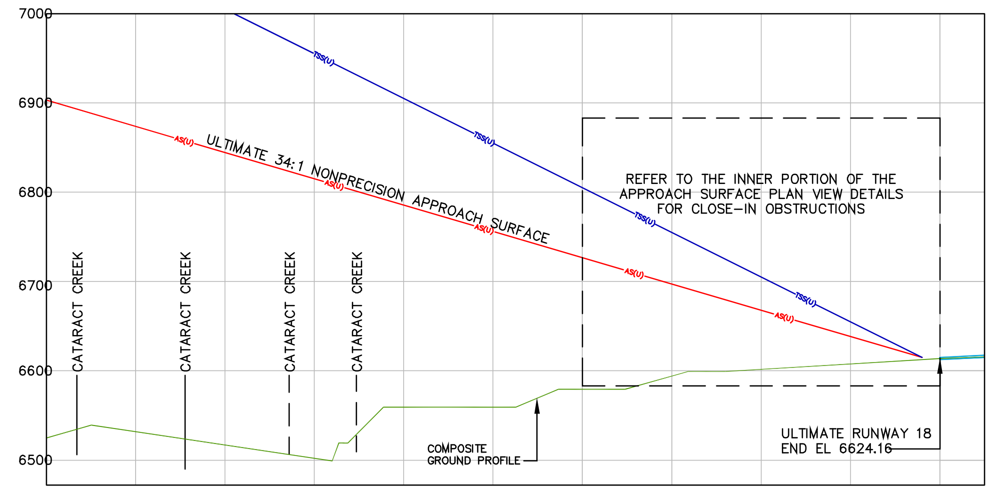
AIRPORT AIRSPACE DRAWING II

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008 SHEET 4 OF 12

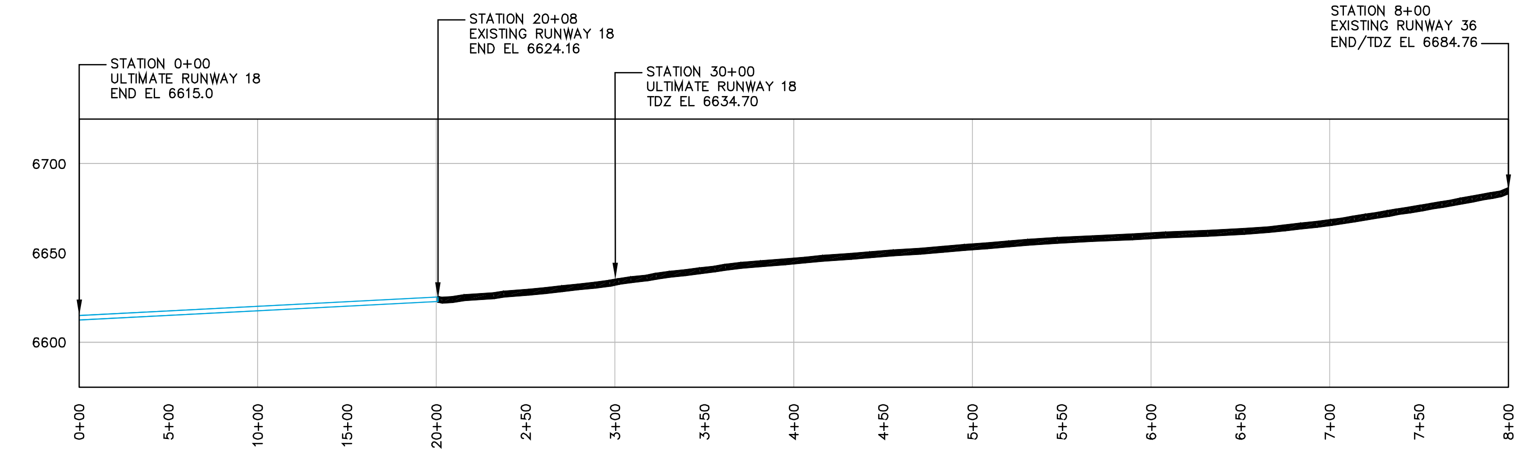
Coffman Associates Airport Consultants www.coffmanassociates.com



RUNWAY 18

0 1000 2000
HORIZONTAL SCALE IN FEET

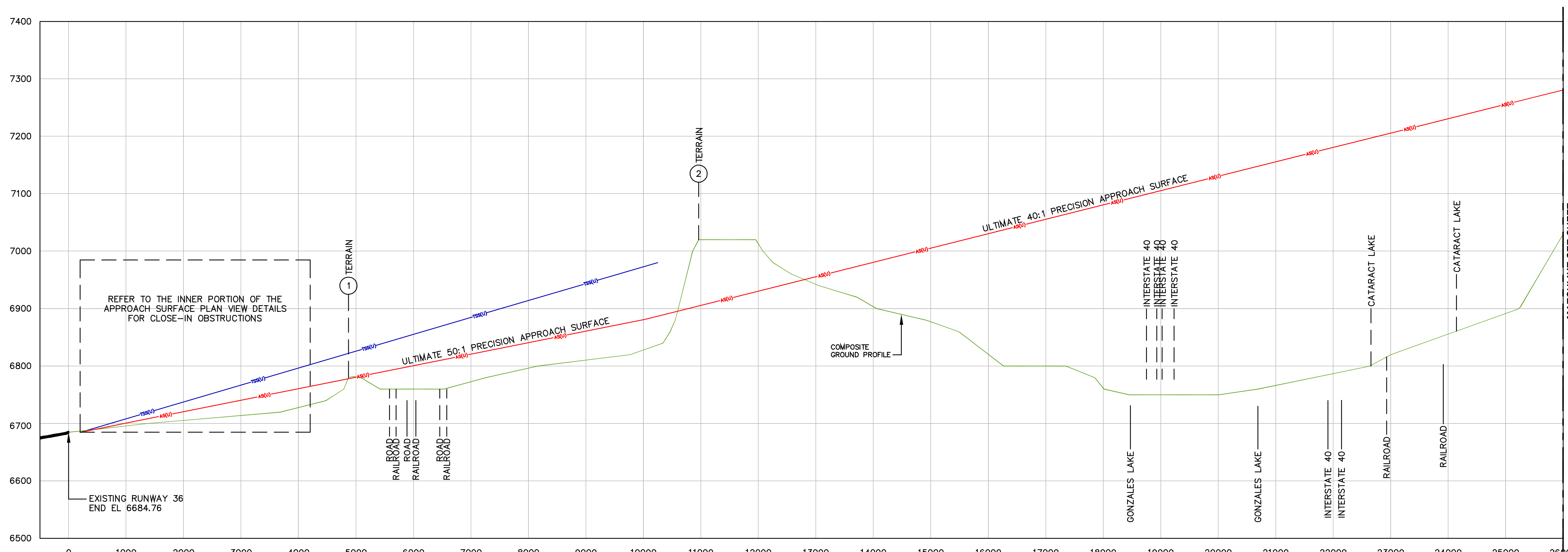
0 100 200
VERTICAL SCALE IN FEET



EXISTING/ULTIMATE RUNWAY 18-36

0 500 1000
HORIZONTAL SCALE IN FEET

0 50 100
VERTICAL SCALE IN FEET



RUNWAY 36

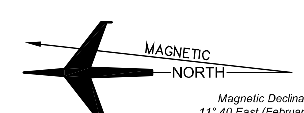
0 1000 2000
HORIZONTAL SCALE IN FEET

0 100 200
VERTICAL SCALE IN FEET

OBSTRUCTION TABLE						
Area No.	Description	Top Elevation	Distance from RW End	Offset from Centerline	Penetration	Remediation
1	TERRAIN	6780–6782	4869	777 L	1–25	REQUEST AERONAUTICAL STUDY
2	TERRAIN	6894–7200	10593	2150 L	1–115	REQUEST AERONAUTICAL STUDY
3	TERRAIN	6860–7280	36709	3404 R	1–1448	REQUEST AERONAUTICAL STUDY

GENERAL NOTES:

1. OBSTRUCTION CLEARANCES ARE CALCULATED FROM ULTIMATE RUNWAY END ELEVATIONS.
2. SEE THE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR CLOSE-IN OBSTRUCTIONS.



Magnetic Declination
11° 40' East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)

No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

PART 77 APPROACH PROFILE
DRAWING I

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008

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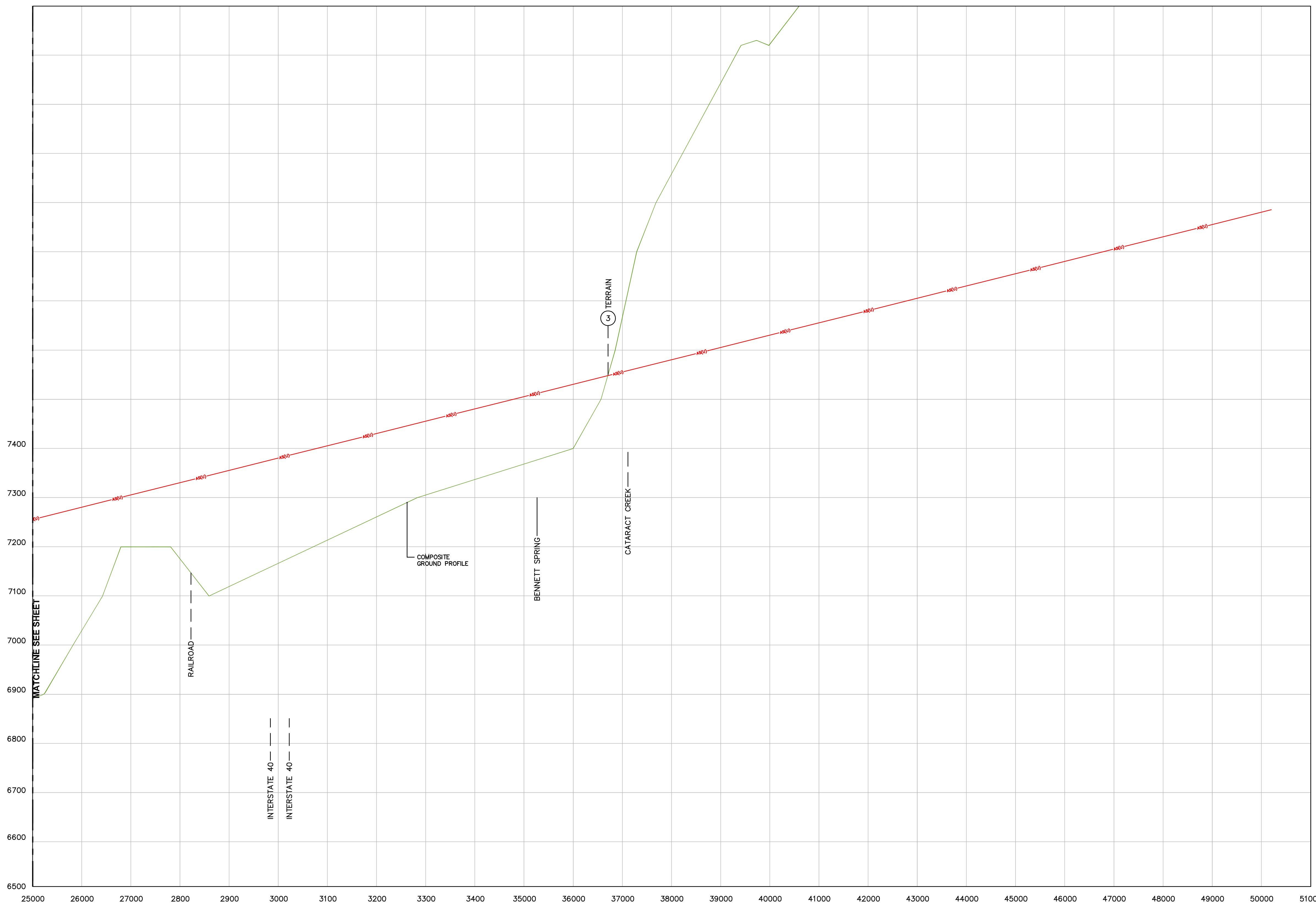
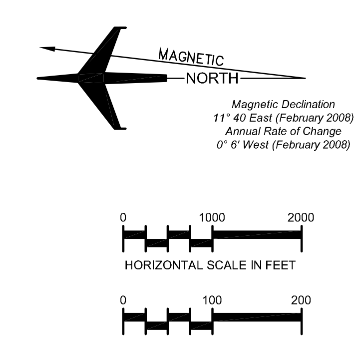


RUNWAY 36



OBSTRUCTION TABLE						
Area No.	Description	Top Elevation	Distance from RW End	Offset from Centerline	Penetration	Remediation
3	TERRAIN	6860–7280	36709	3404 R	1–1448	REQUEST AERONAUTICAL STUDY

GENERAL NOTES:

1. OBSTRUCTION CLEARANCES ARE CALCULATED FROM ULTIMATE RUNWAY END ELEVATIONS.
2. SEE THE INNER PORTION OF THE APPROACH SURFACE DRAWINGS FOR CLOSE–IN OBSTRUCTIONS.

No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

PART 77 APPROACH PROFILE DRAWING II

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008 | SHEET 6 OF 12

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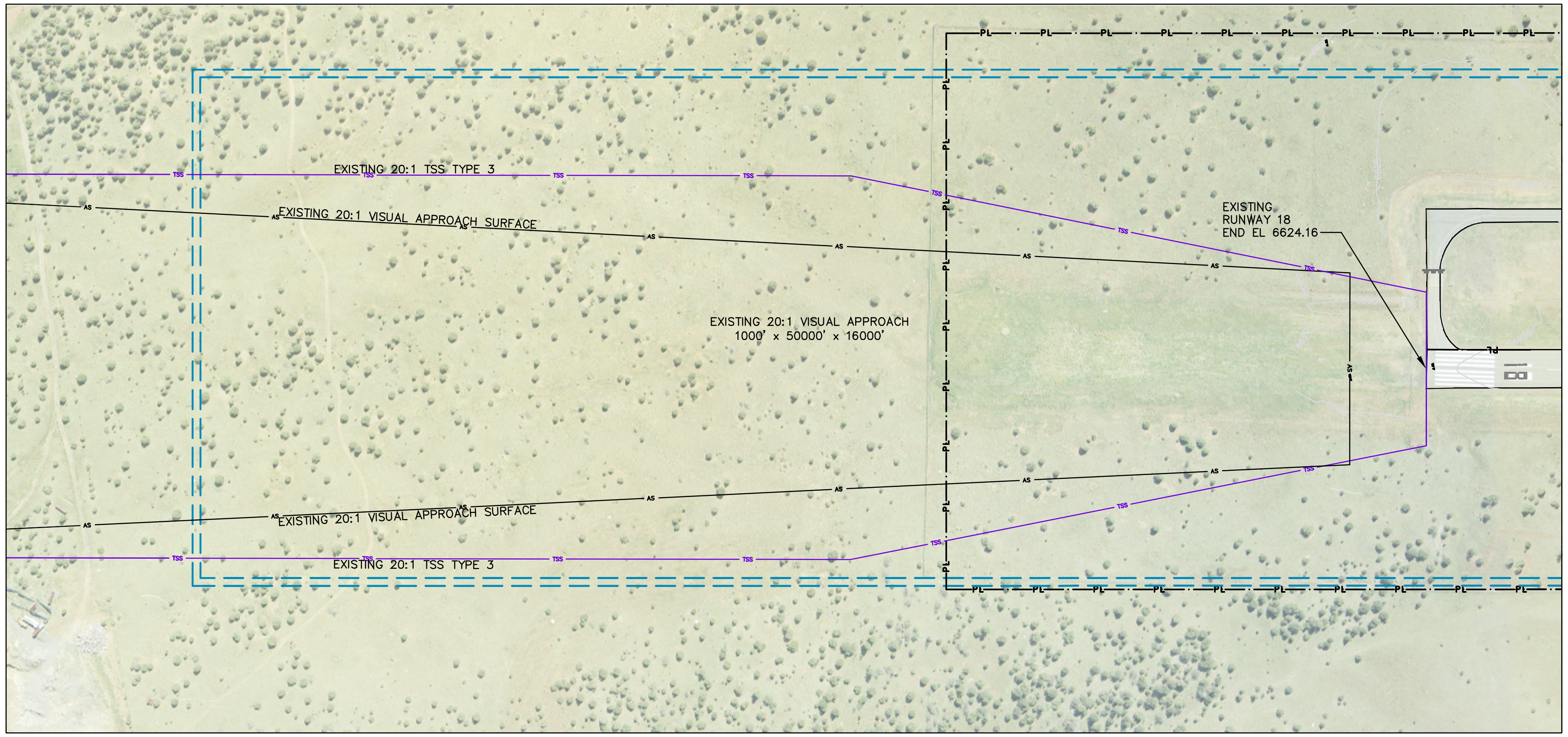
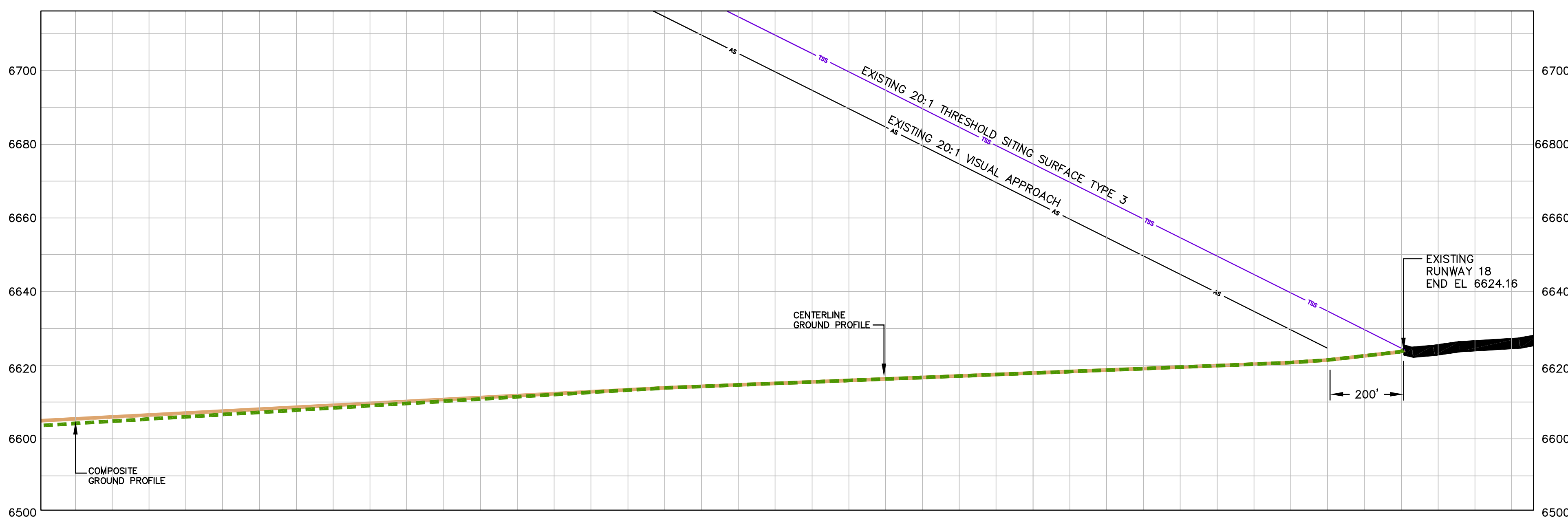
ULTIMATE RUNWAY 18 OBSTRUCTION TABLE						
No.	Description	Top Elevation	Distance from RW End	Offset from Centerline	Penetration	Remediation
–	NONE FOUND	–	–	–	–	–

GENERAL NOTES:

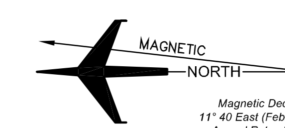
1. FEATURES AND OBJECTS DERIVED FROM USGS QUAD MAPS AND FAA DIGITAL OBSTACLE FILE.
2. OBSTRUCTION ANALYSIS CALCULATED FROM EXISTING RUNWAY END ELEVATION.



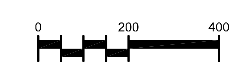
RUNWAY 18 PLAN



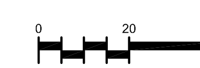
RUNWAY 18 PROFILE



Magnetic Declination
11° 40 East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)



HORIZONTAL SCALE IN FEET



VERTICAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD
INNER PORTION
OF THE APPROACH SURFACE
EXISTING RUNWAY 18
WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008 — **SHEET** 7 **OF** 12

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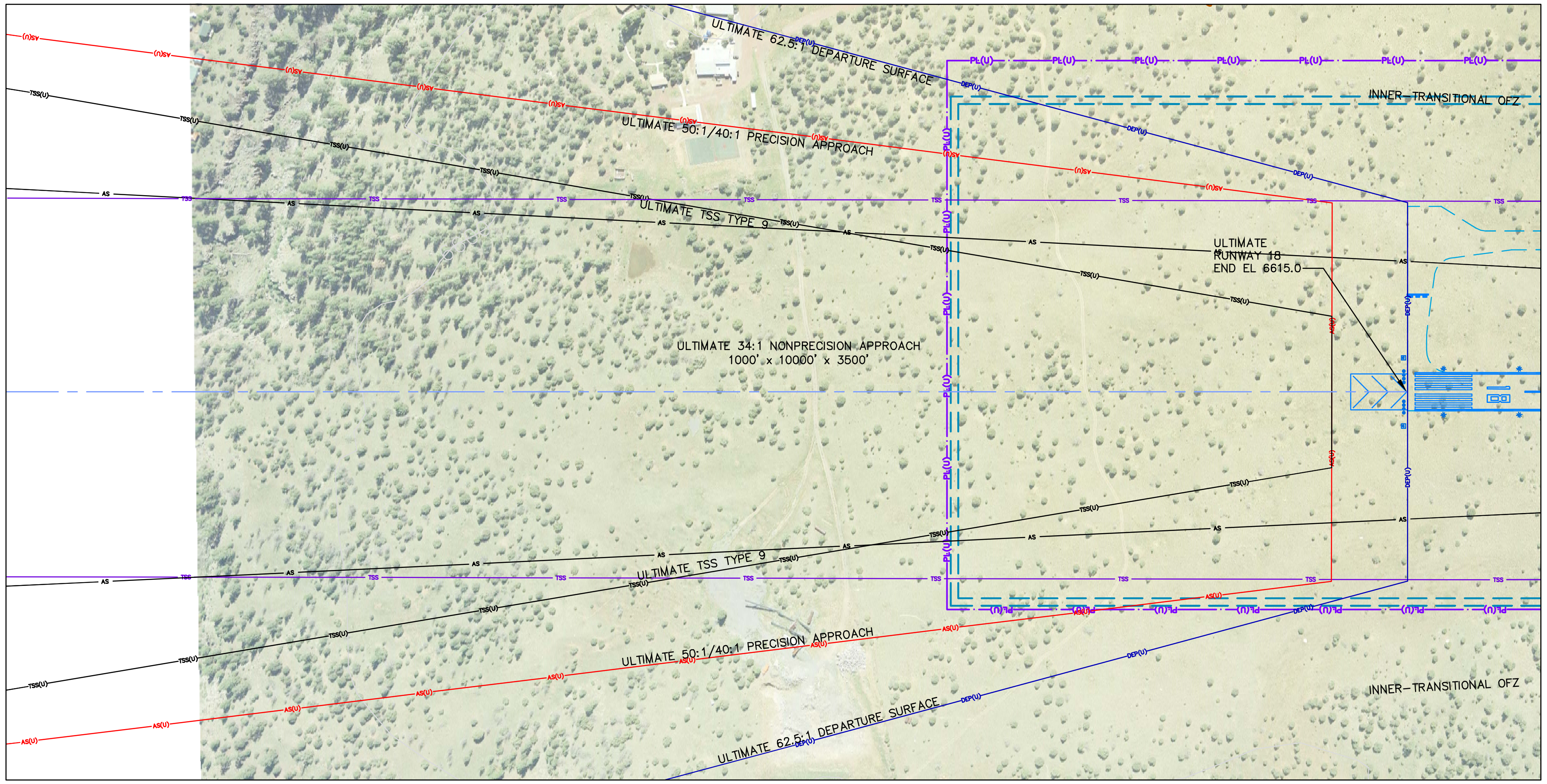
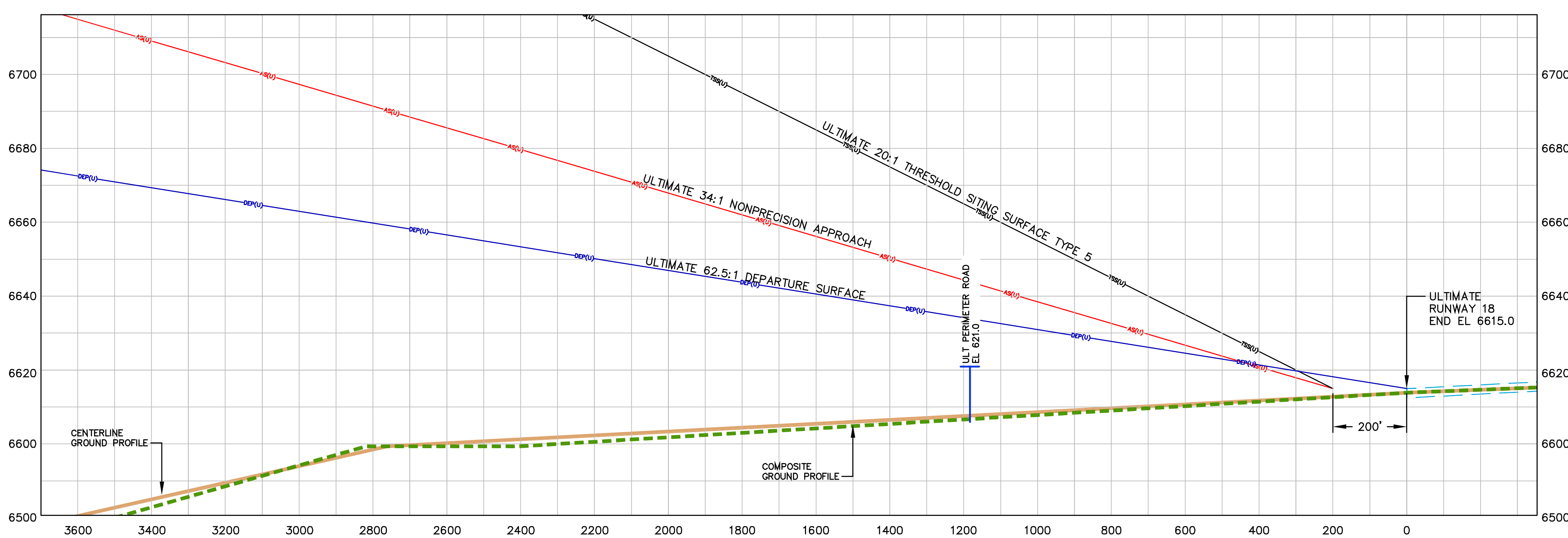


RUNWAY 18 PLAN



RUNWAY 18 PROFILE

ULTIMATE RUNWAY 18 OBSTRUCTION TABLE						
No.	Description	Top Elevation	Distance from RW End	Offset from Centerline	Penetration	Remediation
–	NONE FOUND	–	–	–	–	–

GENERAL NOTES:

1. OBSTRUCTION ANALYSIS CALCULATED FROM ULTIMATE RUNWAY END ELEVATION.

MAGNETIC
NORTH

Magnetic Declination
11° 40 East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD
INNER PORTION
OF THE APPROACH SURFACE
ULTIMATE RUNWAY 18
WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Huqunin

February 2008

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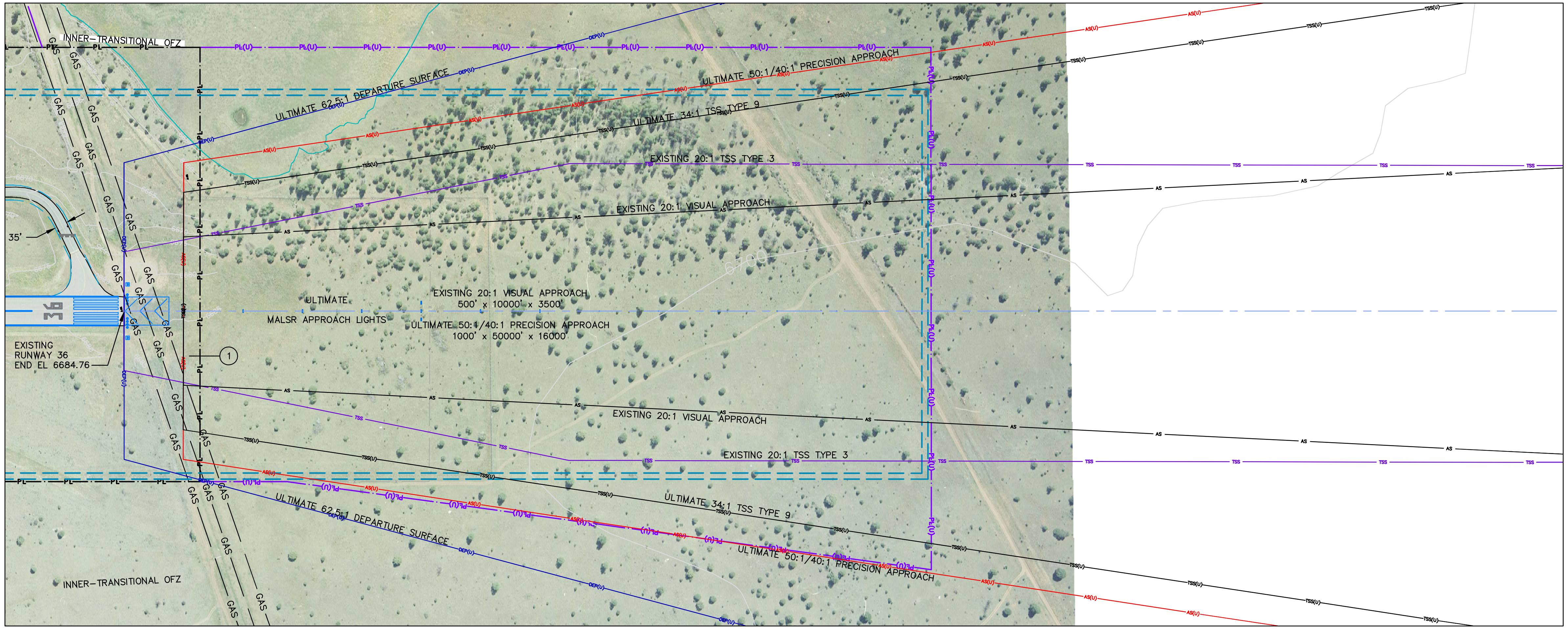
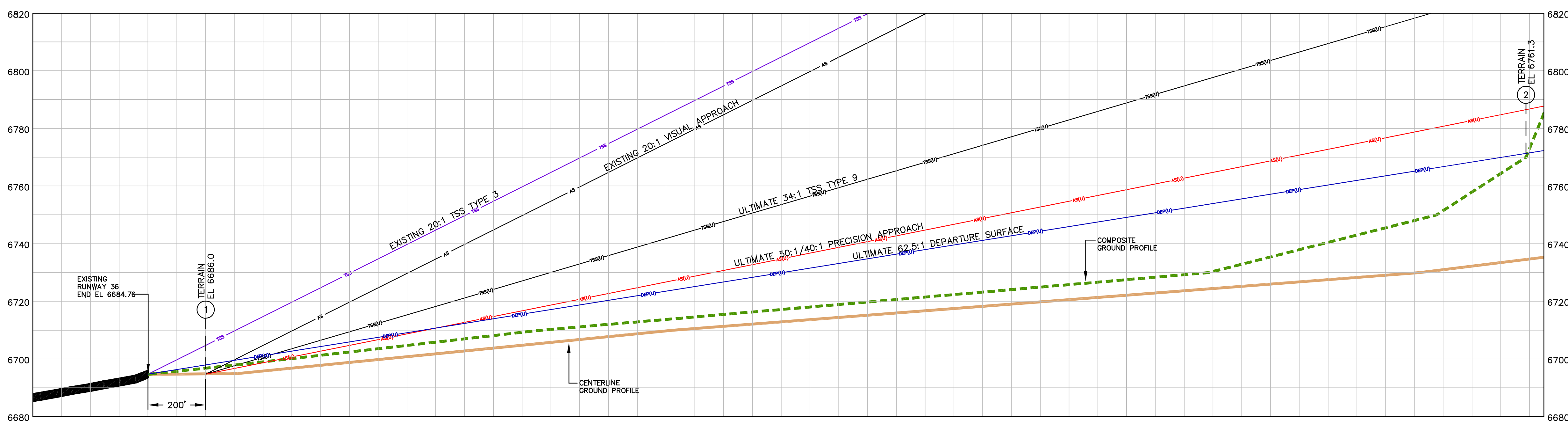
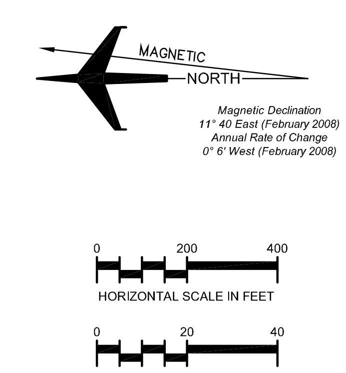


RUNWAY 36 PLAN



RUNWAY 36 PROFILE



ULTIMATE RUNWAY 18 OBSTRUCTION TABLE						
No.	Description	Top Elevation	Distance from RW End	Offset from Centerline	Penetration	Remediation
1	TERRAIN	6686.0	200	150 L	1.3	GRADE TERRAIN TO COMPLY WITH AC 150/5300-13
2	TERRAIN	6761.3	4787	874 L	1-18.3	REQUEST AERONAUTICAL STUDY

ALL MEASUREMENTS IN FEET

GENERAL NOTES:

1. FEATURES AND OBJECTS DERIVED FROM USGS QUAD MAPS AND FAA DIGITAL OBSTACLE FILE.
2. OBSTRUCTION ANALYSIS CALCULATED FROM ULTIMATE RUNWAY END ELEVATION.

No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

INNER PORTION OF THE APPROACH RUNWAY 36

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Huqunin

February 2008

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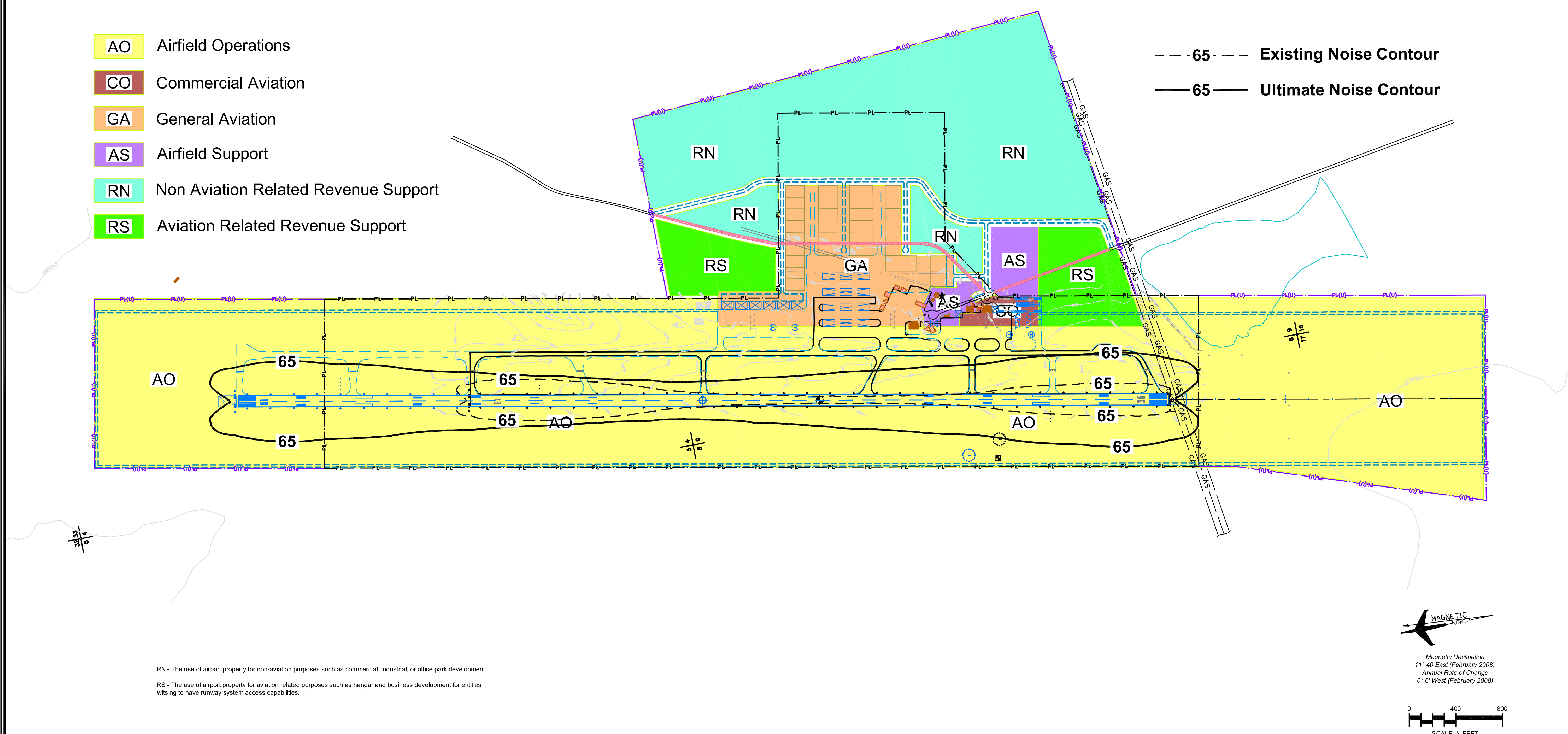

RN - The use of airport property for non-aviation purposes such as commercial, industrial, or office park development.

RS - The use of airport property for aviation related purposes such as hangar and business development for entities witsing to have runway system access capabilities.

No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

ON AIRPORT LAND USE DRAWING

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008

SHEET 10 **OF** 12

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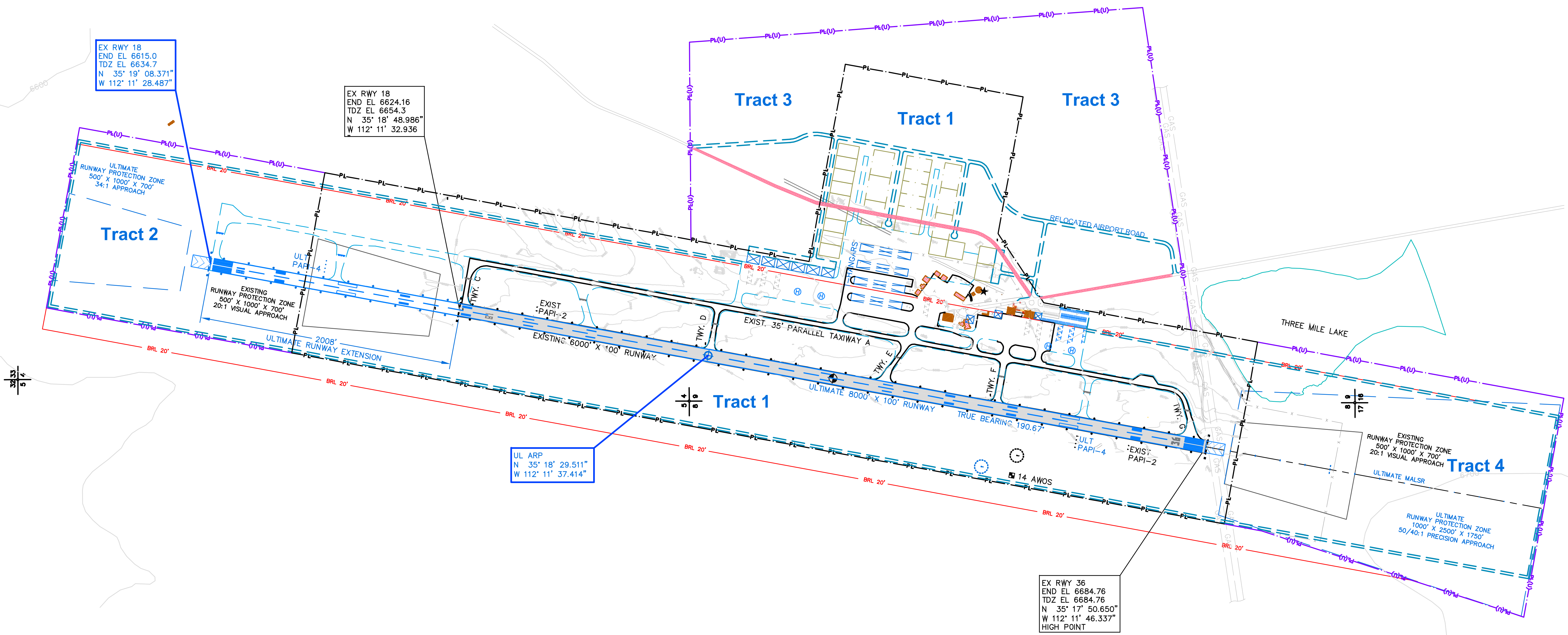
PROPERTY DATA

TRACT	ACRES	TITLE	GRANTOR	VOL & PAGE	DATE	REMARKS
1	304.8	DEED	USA	7/182-187	11/17/1948	COCONINO COUNTY RECORDS
2	65.7	–	–	–	–	–
3	122.7	–	–	–	–	–
4	90.2	–	–	–	–	–



MAGNETIC NORTH

Magnetic Declination
11° 40 East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)

0 400 800
SCALE IN FEET

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
—PL—	—PL(U)—	AIRPORT PROPERTY LINE
		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
★		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (IF APPLICABLE)
		BUILDING ON AIRPORT
		ABANDON BUILDING
—BRL 20'—	—BRL 20'—	BUILDING RESTRICTION LINE (BRL)
		AIRPORT PAVEMENT
		RUNWAY PROTECTION ZONE
		MALSR
PAPI-2	PAPI-4	PAPI
		RUNWAY THRESHOLD LIGHTS & REIL

GENERAL NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 – NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 – NAVD88. DERIVED FROM STANTEC CONSULTING, INC. SURVEY FILE.
2. THERE ARE NO PRIMARY OR SECONDARY AIRPORT CONTROL STATIONS AT H. A. CLARK MEMORIAL FIELD.

No.	REVISIONS	DATE	BY	APP'D.
2	NEW FENCE LINE: CONNECTOR T/W-WIDEN R/W TO 100'	12/7/01	GJG	RJZ
1	TO REFELCT TERMINAL AREA AND AWOS AS BUILT	4/19/00	BTM	GM

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H. A. CLARK MEMORIAL FIELD

AIRPORT PROPERTY MAP

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008

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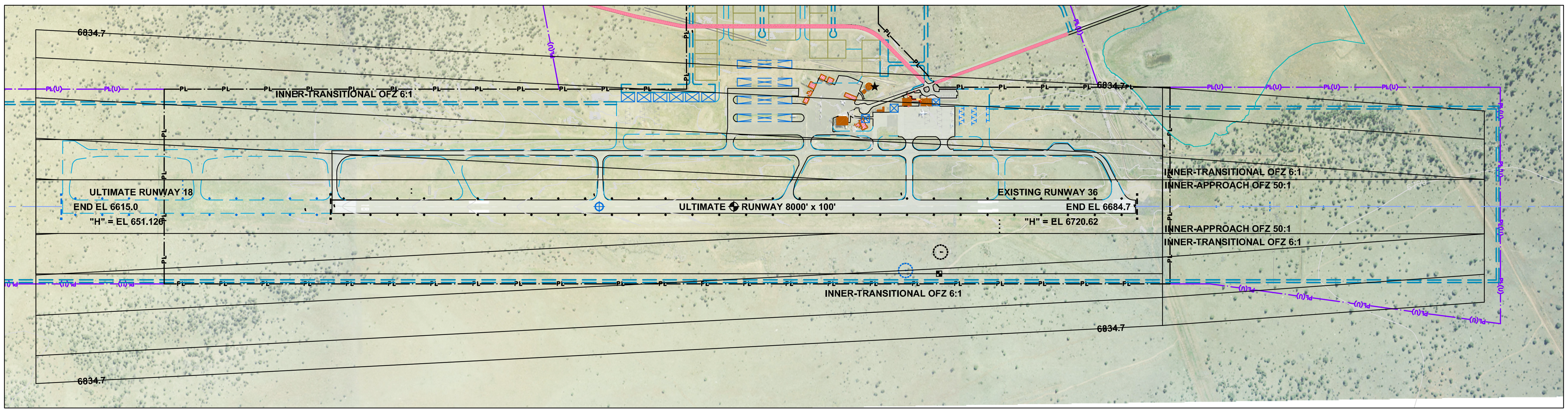
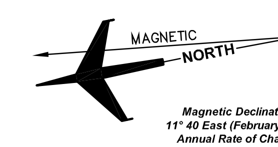
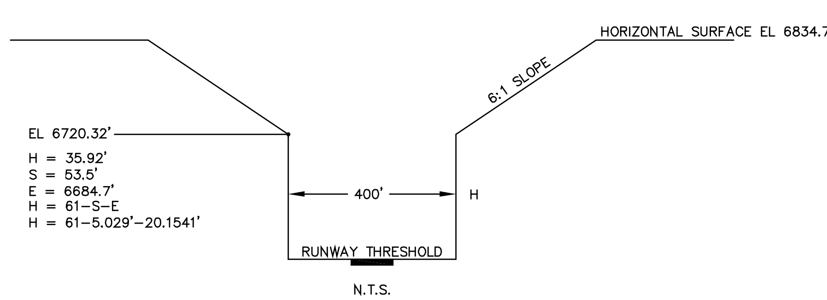
AIRPORT EL 6684.7' / HORIZONTAL SURFACE EL 6834.7'

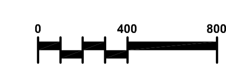






OBSTACLE FREE ZONE (OFZ) OBJECT PENETRATIONS

Object	Penetration	Disposition
NONE FOUND	–	–



No.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

INNER-APPROACH & INNER-TRANSITIONAL OFZ DRAWING ULTIMATE RUNWAY 18-36

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008

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Chapter Six

Capital Improvement Program

Capital Improvement Program

The implementation of the H.A. Clark Memorial Field Master Plan will require sound judgment on the part of airport management. Among the more important factors influencing decisions to carry out a recommendation is timing and airport activity. Both of these factors should be used as references in plan implementation.

Experience has indicated that major problems can materialize from the standard time-based format of traditional planning documents. The problems typically center on inflexibility and an inability to deal with unforeseen changes that may occur.

While it is necessary for scheduling and budgeting purposes to consider timing of airport development, the actual need for facilities is established by airport activity. Proper master planning implementation suggests the use of airport activity levels, rather than time, as guidance for development.

This section of the Master Plan is intended to become one of the primary references for decision-makers responsible for implementing master plan recommendations. Consequently, the narrative and graphic presentations must provide understanding of each recommended development item. This understanding will be critical in maintaining a realistic and cost-effective program that provides maximum benefit to the community.

AIRPORT DEVELOPMENT SCHEDULES AND COST SUMMARIES

Once the specific needs and improvements for the airport have been established, the next step is to determine the cost of development and a realistic schedule for implementing the plan. This section will examine the overall cost of each item in the development plan and present a development schedule.

The recommended improvements are grouped by planning horizon: short term, intermediate term, and long term. **Table 6A** summarizes the key milestones for each of the three planning horizons.

TABLE 6A
Planning Horizon Summary
H.A. Clark Memorial Field

	Current	Short Term	Intermediate Term	Long Range
Based Aircraft	13	19	25	34
Annual Operations				
General Aviation Itinerant	3,840	4,700	5,300	6,900
Air Tour Itinerant	--	4,500	7,500	12,000
General Aviation Local	360	800	1,800	2,900
Total Operations	4,200	10,000	14,600	21,800

A key aspect of this planning document is the use of demand-based planning milestones. The short term planning horizon contains items of highest priority. These items should be considered for development based on actual demand levels within the next five years. As short term horizon activity levels are reached, it will then be time to program for the intermediate term based upon the next activity milestones. Similarly, when the intermediate term milestones are reached, it will be time to program for the long term activity milestones.

Many development items included in the recommended concept will need to follow demand indicators. For example, the plan includes construction of new hangar facilities. Based aircraft will be the indicator for additional hangar needs. If based aircraft growth occurs as projected, additional hangars will need to be constructed to meet the demand.

If growth slows or does not occur as projected, hangar pavement projects can be delayed. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets. Some development items do not depend on demand, such as pavement maintenance. These types of projects typically are associated with day-to-day operations and should be monitored and identified by airport management.

As a master plan is a conceptual document, implementation of these capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Moreover, some projects, such as the runway extension, will require further study at the time of implementation.

The cost estimates presented in this chapter have been increased to allow for contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficiently accurate for planning purposes. Cost estimates for each of the development projects listed in the capital improvement plan are listed in current (2007) dollars. **Exhibit 6A** presents the proposed capital improvement program for H.A. Clark Memorial Field.

SHORT TERM IMPROVEMENTS

As indicated above, the short term planning horizon is the only development stage that is correlated to time. This is because development within this initial period is concentrated first on the most immediate needs of the airfield and landside areas. Therefore, the program is presented year-by-year for the first five years (2007-2012) to assist in capital improvement.

Prior to considering these planned projects, an understanding of existing design and construction grants is necessary. In 2007, the City of Williams held grants to rehabilitate Taxiway A, replace the airport's rotating beacon, and construct helipads. The Taxiway A project involves widening Taxiway A and its associated exit taxiways to 50 feet to meet ARC B-III design standards.

The primary focus of the short term planning horizon is to provide the airport with essential facilities and the land that will be needed for intermediate and long term projects. Some of the essential facilities and projects to be undertaken include: the design and construction of an airport perimeter road, the expansion of the terminal building, automobile parking expansion, aircraft apron expansion, the construction of an aircraft wash rack, the construction of helipads, and the installation of medium intensity taxiway lighting (MITL) on all taxiways.

An airport perimeter road is planned in the short term. This perimeter road will allow vehicle access around the airside facilities for maintenance and emergency situations. This increases safety by reducing the potential incursions as a result of vehicles operating on aircraft runways and taxiways.

The expansion of the terminal building is planned to accommodate the needs of a potential air tour operator or scheduled air carrier. Automobile parking and terminal apron expansions closely correlate to the addition of this type of service at the airport. Both will need to be expanded to meet increased traffic at the airport.

The construction of an aircraft wash rack and helipads is also included in the short term horizon. The aircraft wash rack will provide an area for aircraft cleaning and the proper collection of the aircraft cleaning solvents and contaminants. Helipads are nec-

04MP12-6A-6/22/98

	Total Cost	Federally Eligible	ADOT Eligible	Local Share
Short Term Planning Horizon (First 5 Years)				
2007				
Rehabilitate Taxiway A (Widen to 50 feet)	$862,500	$819,375	$21,563	$21,563
Replace Rotating Beacon	172,500	--	155,250	17,250
SUBTOTAL 2007	**$1,035,000**	**$819,375**	**$176,813**	**$38,813**
2008				
Acquire Land for Approach Protection	$330,625	$314,094	$8,266	$8,266
Prepare Airport Certification Manual	86,250	81,938	2,156	2,156
Acquire Snow Removal Equipment	316,250	300,438	7,906	7,906
Acquire Sweeper	230,000	218,500	5,750	5,750
Slurry Seal Runway and Apron	280,000	266,000	7,000	7,000
Obstruction Survey	230,000	--	207,000	23,000
Utilities Master Plan	57,500	--	51,750	5,750
Design Apron Reconstruction	86,250	--	77,625	8,625
Design Perimeter Road	86,250	81,938	2,156	2,156
Design Auto Parking Expansion	57,500	--	51,750	5,750
SUBTOTAL 2008	**$1,760,625**	**$1,262,906**	**$421,359**	**$76,359**
2009				
Reconstruct Apron	$862,500	$819,375	$21,563	$21,563
Construct Perimeter Road	575,000	546,250	14,375	14,375
Expand Auto Parking	257,600	244,720	6,440	6,440
Expand Terminal	862,500	--	776,250	86,250
Design Access Road Reconstruction	86,250	--	77,625	8,625
Design Wash Rack	57,500	--	51,750	5,750
Design PAPI Upgrade - (Precision Approach Path Indicator)	28,750	--	25,875	2,875
Design Apron Expansion	86,250	--	77,625	8,625
SUBTOTAL 2009	**$2,816,350**	**$1,610,345**	**$1,051,503**	**$154,503**
2010				
Rehabilitate Access Road	$86,250	$81,938	$2,156	$2,156
Construct Wash Rack	151,800	--	136,620	15,180
Upgrade PAPI - (Precision Approach Path Indicator)	115,000	109,250	2,875	2,875
Expand Terminal Apron	862,500	819,375	21,563	21,563
Design Helipad	57,500	--	51,750	5,750
Design Terminal Apron Expansion	172,500	163,875	4,313	4,313
Design Taxilanes	172,500	163,875	4,313	4,313
SUBTOTAL 2010	**$1,618,050**	**$1,338,313**	**$223,589**	**$56,149**
2011				
Construct Helipad	$287,500	$273,125	$7,188	$7,188
Apron Expansion	1,017,750	966,863	25,444	25,444
Construct Taxiway	549,700	522,215	13,743	13,743
Design Auto Parking Expansion	172,500	--	155,250	17,250
Design Maintenance Facility	115,000	--	103,500	11,500
SUBTOTAL 2011	**$2,142,450**	**$1,762,203**	**$305,124**	**$75,124**
2012				
Auto Parking Expansion	$392,150	$372,543	$9,804	$9,804
Construct Maintenance Facility	506,000	480,700	12,650	12,650
Install Medium Intensity Taxiway Lighting	345,000	327,750	8,625	8,625
Drainage / Erosion Control	345,000	327,750	8,625	8,625
Fire Protection	575,000	546,250	14,375	14,375
SUBTOTAL 2012	**$2,163,150**	**$2,054,993**	**$54,079**	**$54,079**
Subtotal Short Term Planning Horizon	**$11,535,625**	**$8,848,134**	**$2,232,466**	**$455,026**

	Total Cost	Federally Eligible	ADOT Eligible	Local Share
Intermediate Term Planning Horizon (6-10 years)				
Install ILS (Instrument Landing System) Runway 36	$2,300,000	$2,185,000	$57,500	$57,500
Construct Taxiway (GA Apron to Fuel Facilities)	195,500	185,725	4,888	4,888
Expand Fuel Apron	287,500	273,125	7,188	7,188
Expand Terminal Automobile Parking	392,150	372,543	9,804	9,804
Commercial Hangar Apron Construction	785,450	746,178	19,636	19,636
Airport Road Realignment	1,150,000	1,092,500	28,750	28,750
Construct General Aviation Access Road	394,450	374,728	9,861	9,861
Construct General Aviation Access Road	608,350	577,933	15,209	15,209
Construct Commercial Hangar Automobile Parking Lot	309,350	293,883	7,734	7,734
Construct T-Hangar Taxilane	549,700	522,215	13,743	13,743
Construct General Aviation Apron	785,450	746,178	19,636	19,636
Pavement Preservation	5,000,000	4,750,000	125,000	125,000
Subtotal Intermediate Term Planning Horizon	**$12,757,900**	**$12,120,005**	**$318,948**	**$318,948**
Long Term Planning Horizon (11-20 years)				
Construct High-Speed Exit Taxiway	$300,150	$285,143	$7,504	$7,504
Construct Two 90-Degree Exit Taxiways	526,700	500,365	13,168	13,168
Construct T-Hangar Taxilane	999,350	949,383	24,984	24,984
Construct General Aviation Apron	577,300	548,435	14,433	14,433
Construct General Aviation Apron	993,600	943,920	24,840	24,840
Construct Parcel Taxilanes	127,650	121,268	3,191	3,191
Construct Access Road	394,450	374,728	9,861	9,861
Construct Commercial Hangar Automobile Parking Lot	778,550	739,623	19,464	19,464
Design & Construct 2,000' Runway and Taxiway Extension	2,190,750	--	1,971,675	219,075
Pavement Preservation	10,000,000	9,500,000	250,000	250,000
Subtotal Long Term Planning Horizon	**$16,888,500**	**$13,962,863**	**$2,339,119**	**$586,519**
TOTAL PROGRAMS COST	**$41,182,025**	**$34,931,001**	**$4,890,532**	**$1,360,492**

Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

essary to provide a segregated operational area for rotorcraft. These are planned to be constructed adjacent to the terminal building. In the future, the helipads will be relocated into the general aviation apron area to segregate these activities from the potential commercial air service activities.

The general aviation apron is planned to be reconstructed in the short term horizon. This project will occur once all existing hangar facilities that are planned to be removed are demolished or relocated.

MITL is planned to be installed on all taxiways in the short term horizon. This lighting system is necessary to provide pilots with a proper lighting system while taxiing during night time operations or periods of low visibility. Precision approach path indicator (PAPI-4s) are planned to replace the PAPI-2s currently installed at both ends of Runway 18-36. The PAPI-4 is better suited for large aircraft operations than the PAPI-2s.

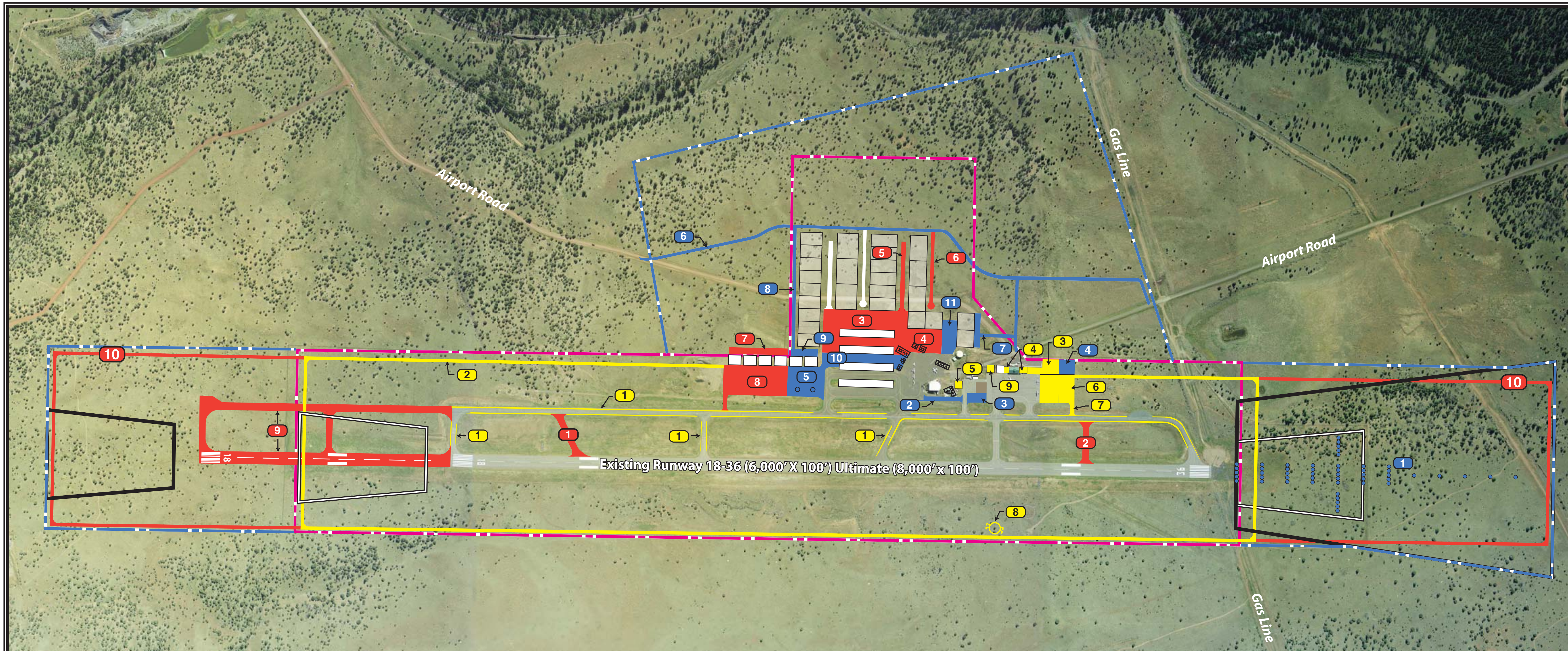
The acquisition of a combined 277 acres of land should occur in the short term horizon to provide runway protection and to allow for future airside and landside development. Of the 277 acres to be acquired, 194 of that is planned to be included in the Yavapai Land Exchange. The remaining 83 acres should be acquired by a subsequent land transfer with the U.S. Forest Service. The Yavapai Land Exchange areas and future land transfer areas are depicted on **Exhibit 6B** by black and yellow crosshatch markings, respectively.

Hangar development is also expected to occur in each of the planning periods, however, since hangars will be developed using private funding, hangar development costs are not included in the capital improvement program.

Other projects slated for the short term horizon include the preparation of an airport certification manual, the acquisition of snow removal equipment and foreign object debris (FOD) sweeper, which are all requirements under Part 139 certification regulations. A utilities master plan will also need to be undertaken with consideration to the ultimate facility layout depicted in this master plan to determine the water, wastewater, communications, and stormwater needs and structure. A drainage and erosion control project will also be performed to identify and improve areas of the airport that experience drainage and erosion issues. A fire protection project at the airport is planned to provide fire protection for all airport structures. An obstruction survey is also planned to be performed which will be used to implement future instrument approach procedures at the airport.

The total investment necessary for the short term CIP is approximately $11.5 million. Of this total, $8.8 million is eligible for FAA grant funding, $2.2 million is eligible for state funds, with the airport sponsor responsible for $455,000.

04MP12-6B-6/22/98



LEGEND

- Existing Property Line
- Ultimate Property Line
- Short Term Project
- Intermediate Term Project
- Long Term Project
- Ultimate Runway Protection Zone
- Existing Runway Protection Zone
- XXXXX Buildings to be Removed

SHORT TERM

1. Widen Taxiway A & Exit Taxiways to 50'
2. Construct Perimeter Road
3. Expand Auto Parking
4. Expand Terminal
5. Construct Aircraft Wash Rack
6. Expand Terminal Apron
7. Construct Taxiway
8. Relocate Segmented Circle
9. Construct Maintenance Facility

INTERMEDIATE TERM

1. Install Instrument Landing System Runway 36
2. Construct Taxiway
3. Expand Apron
4. Expand Terminal Parking Lot
5. Construct Commercial Hangar Apron
6. Airport Road Realignment
7. Construct Access Road
8. Construct Access Road
9. Construct Commercial Hangar Parking Lot
10. Construct T-Hangar Taxilane
11. Construct General Aviation Apron

LONG TERM

1. Construct High Speed Exit Taxiway
2. Construct One 90-Degree Exit Taxiway
3. Construct T-Hangar Taxilane
4. Construct General Aviation Apron
5. Construct Parcel Taxiway
6. Construct Access Road
7. Construct Commercial Hangar Parking Lot
8. Construct Commercial Hangar Apron
9. Construct 2,000' Runway and Taxiway Extension
10. Airport Perimeter Road Realignment

NORTH

0 800 1600

SCALE IN FEET

H.A. CLARK MEMORIAL FIELD

Exhibit 6B

DEVELOPMENT STAGING

INTERMEDIATE PLANNING HORIZON

The intermediate term planning horizon focuses on the airport's development needs during the six- to ten-year time frame. Due to the fluid nature of general aviation growth, and the uncertainty of infrastructure and development needs more than five years into the future, the projects in the intermediate term were combined into a single project listing and not prioritized by year. However, the project listing is intended to depict a prioritization of projects as now anticipated to meet future demand.

The implementation of many of the items in the intermediate term should be based upon actual demand. Those projects, such as the construction of T-hangars and associated taxilanes, should not be undertaken unless there is an existing demand for such facilities.

The first project in the intermediate term planning horizon is the installation of an instrument landing system (ILS) for Runway 36. This approach will increase the accessibility and reliability of the airport as users will be able to land at the airport during virtually any weather condition.

Other projects included in this planning horizon include the construction of a taxiway from the general aviation apron to the fuel and terminal apron, and the expansion of the terminal apron near the fueling facilities. These improvements are intended to make the fueling facilities more accessible to additional circulation for aircraft fueling. The terminal automobile parking lot is also planned to be expanded further to meet potential demand created by an air tour operator or scheduled air carrier.

The construction of the north commercial apron area is planned in the intermediate horizon. This area of the airport is planned to be developed with larger conventional hangars that could be used for larger aircraft storage or for a future fixed base operator (FBO). It is also anticipated that T-hangar development will be needed at this time. A taxilane is programmed to be constructed on the general aviation apron to accommodate an additional T-hangar unit. A taxilane has already been constructed on the western side of the proposed T-hangar facility. The T-hangar itself will be developed using private funds; however, the taxilane would be eligible for FAA funding. There is potential in the intermediate term for two aircraft storage parcels to be developed. If this development should take place, the general aviation apron will need to be expanded to the east to accommodate the parcel developments.

The realignment of Airport Road is also planned for the intermediate term horizon. This project will also include the construction of access roads to the terminal building and to the north commercial area. An access road and associated parking lots should also be planned for two aircraft storage parcels if development of those parcels is undertaken.

A total of $5.0 million is included in this planning period for on-going pavement maintenance needs such as crack sealing, rejuvenating seal coats, and slab replacements as necessary.

The total investment necessary for the intermediate term CIP is approximately $12.8 million. Of this total, $12.1 million is eligible for FAA grant funding, $319,000 is eligible for state funds, with the airport sponsor responsible for $319,000.

LONG TERM PLANNING HORIZON

Long term improvements, as presented on **Exhibit 6B**, continue the expansion of landside facilities and aircraft aprons to accommodate growth. Landside improvements include expansion of the general aviation apron, taxilanes, and access roads to support T-hangar development, and the development of the aircraft storage parcels. The expansion of the commercial hangar apron and automobile parking areas is also planned in association with the construction of conventional hangars and FBO facilities. Airside improvements to be made in the long term horizon include the construction of a high-speed exit taxiway and a 90-degree exit taxiway. These taxiways will reduce runway occupancy time.

The extension of Runway 18-36 and Taxiway A 2,000 feet to the north is also included in the long term planning horizon. This project will require the relocation of the airport perimeter road that is scheduled to be constructed in the short term horizon. As stated previously in Chapter Five, this runway extension project is included for planning purposes only. Separate justification for constructing the runway extension will likely be required outside this Master Plan at the time of implementation. The extension of both Runway 18-36 and Taxiway A includes the construction of an additional 90-degree exit taxiway and an aircraft holding apron at the north end of Taxiway A.

A total of $10.0 million is included in this planning period for on-going pavement maintenance needs such as crack sealing, rejuvenating seal coats, and slab replacements as necessary.

The total investment necessary for the long term CIP is approximately $16.9 million. Of this total, $14.0 million is eligible for FAA grant funding, $2.3 million is eligible for state funds, with the airport sponsor responsible for $586,500.

CAPITAL IMPROVEMENTS FUNDING

Financing capital improvements at the airport will not rely exclusively upon the financial resources of the City of Williams. Capital improvement funding is available through various grants-in-aid programs at both the federal and state levels. The following discussion outlines the key sources for capital improvement funding.

FEDERAL GRANTS

The United States Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for the purpose of national defense and promotion of interstate commerce. Various grants-in-aid programs to public airports have been established over the years for this purpose. The most recent legislation is the *Airport Improvement Program* (AIP) of 1982. The AIP has been reauthorized several times, with the most recent legislation enacted in late 2003 and entitled the *Vision 100 – Century of Aviation Reauthorization Act.*

The remaining FAA fiscal years covered by the four-year program are 2006 and 2007. This bill presented similar funding levels to the previous reauthorization – *AIR-21*. Funding was authorized at $3.6 billion in 2006 and $3.7 billion in 2007.

The source for AIP funds is the Aviation Trust Fund. The Aviation Trust Fund was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances the operation of the FAA. It is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts. Funds are distributed each year by the FAA from appropriations by Congress. A portion of the annual distribution is to primary commercial service airports based upon enplanement levels. General aviation airports, however, also received entitlements under the last reauthorization. After all specific-funding mechanisms are distributed, the remaining AIP funds are disbursed by the FAA, based upon the priority of the project for which they have requested federal assistance through discretionary apportionments. A national priority system is used to evaluate and rank each airport project. Those projects with the highest priority are given preference in funding.

Under the AIP program, examples of eligible development projects include the airfield, aprons, and access roads. Passenger terminal building improvements (such as bag claim and public waiting lobbies) may also be eligible for FAA funding. Under the newest version of AIP, *Vision 100*, automobile parking at small hub airports can also be eligible. Improvements such as fueling facilities, utilities (with the exception of water supply for fire prevention), hangar buildings, airline ticketing, and airline operations areas are not typically eligible for AIP funds.

Under *Vision 100*, H.A. Clark Memorial Field has been eligible for 95 percent funding assistance from AIP grants, as opposed to the previous *AIR-21* level of 90 percent. The current AIP is set to expire in September 2007. While similar programs have been in place for over 50 years, it will be up to Congress to either extend or draft new legislation authorizing and appropriating future federal funding.

STATE AID TO AIRPORTS

In support of the state airport system, the State of Arizona also participates in airport improvement projects. The source for state airport improvement funds is the Arizona Aviation Fund. Taxes levied by the state on aviation fuel, flight property, aircraft registration tax, and registration fees (as well as interest on these funds), are deposited in the Arizona Aviation Fund. The transportation board establishes the policies for distribution of these state funds.

Under the State of Arizona grant program, an airport can receive funding for one-half (2.5 percent) of the local share of projects receiving federal AIP funding. The state also provides 90 percent funding for projects which are typically not eligible for federal AIP funding or have not received federal funding.

State Airport Loan Program

The Arizona Department of Transportation - Aeronautics Division (ADOT) Airport Loan Program was established to enhance the utilization of state funds and provide a flexible funding mechanism to assist airports in funding improvement projects. Eligible projects include runway, taxiway, and apron improvements; land acquisition; planning studies; and the preparation of plans and specifications for airport construction projects; as well as revenue-generating improvements such as hangars and fuel storage facilities. Projects which are not currently eligible for the State Airport Loan Program are considered if the project would enhance the airport's ability to be financially self-sufficient.

There are two ways in which the loan funds can be used: Matching Funds, or Revenue Generating Projects. The Matching Funds are provided to meet the local matching fund requirement for securing federal airport improvement grants or other federal or state grants. The Revenue Generating Projects' funds are provided for airport-related construction projects that are not eligible for funding under another program.

Pavement Maintenance Program

The airport system in Arizona is a multi-million dollar investment of public and private funds that must be protected and preserved. State aviation fund dollars are limited and the State Transportation Board recognizes the need to protect and extend to the maximum amount the useful life of the airport system's pavement. This program, Arizona Pavement Preservation Program (APPP), is established to assist in the preservation of the Arizona airport system infrastructure. H.A. Clark Memorial Field participates in this program.

Public Law 103-305 requires that airports requesting federal AIP funding for pavement rehabilitation or reconstruction have an effective pavement maintenance management system. To this end, ADOT-Aeronautics has completed and is maintaining an Airport Pavement Management System (APMS) which, coupled with monthly pavement evaluations by the airport sponsors, fulfills this requirement.

The Arizona Airport Pavement Management System uses the Army Corps of Engineers' "Micropaver" program as a basis for generating a Five-Year Airport Pavement Preservation Program (APPP). The APMS consists of visual inspections of all airport pavements. Evaluations are made of the types and severities observed, and entered into a computer program database. Pavement Condition Index (PCI) values are determined through the visual assessment of pavement condition in accordance with the most recent FAA Advisory Circular 150/5380-6, and range from 0 (failed) to 100 (excellent). Every three years, a complete database update with new visual observations is conducted. Individual airport reports from the update are shared with all participating system airports. The Aeronautics Division ensures that the APMS database is kept current, in compliance with FAA requirements.

Every year, the Aeronautics Division, utilizing the APMS, will identify airport pavement maintenance projects eligible for funding for the upcoming five years. These projects will appear in the State's Five-Year Airport Development Program. Once a project has been identified and approved for funding by the State Transportation Board, the airport sponsor may elect to accept a state grant for the project and not participate in the Airport Pavement Preservation Program (APPP), or the airport sponsor may sign an Inter-Government Agreement (IGA) with the Aeronautics Division to participate in the APPP.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. Assuming federal funding, this essentially equates to 2.5 percent of the project costs if all eligible FAA and state funds are available. If only ADOT grants are available, the local share would be 10 percent of the project.

According to **Exhibit 6A**, local funding will be needed in each planning horizon. This includes $455,026 in the short term, $318,948 in the intermediate term, and $586,519 in the long range.

There are several alternatives for local finance options for future development at the airport, including airport revenues, direct funding from the City, issuing bonds, and leasehold financing. These strategies could be used to fund the local matching share or complete the project if grant funding cannot be arranged.

The capital improvement program has assumed that some landside facility development (conventional hangars, T-hangars, and public auto parking) would be completed privately.

There are several municipal bonding options available to the City of Williams, including general obligation bonds, limited obligation bonds, and revenue bonds. General obligation bonds are a common form of municipal bond which is issued by voter approval and is secured by the full faith and credit of the County. County tax revenues are pledged to retire the debt. As instruments of credit, and because the community secures the bonds, general obligation bonds reduce the available debt level of the community. Due to the community pledge to secure and pay general obligation bonds, they are the most secure type of municipal bond and are generally issued at lower interest rates and carry lower costs of issuance. The primary disadvantage of general obligation bonds is that they require voter approval and are subject to statutory debt limits. This requires that they be used for projects that have broad support among the voters, and that they are reserved for projects that have the highest public priorities.

In contrast to general obligation bonds, limited obligation bonds (sometimes referred to as Self-Liquidating Bonds) are secured by revenues from a local source. While neither general fund revenues nor the taxing power of the local community is pledged to pay the debt service, these sources may be required to retire the debt if pledged revenues are insufficient to make interest and principal payments on the bonds. These bonds still carry the full faith and credit pledge of the local community and, therefore, are considered, for the purpose of financial analysis, as part of the debt burden of the local community. The overall debt burden of the local community is a factor in determining interest rates on municipal bonds.

There are several types of revenue bonds, but in general, they are a form of municipal bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a Lease Revenue Bond is secured with the income from a lease assigned to the repayment of the bonds. Revenue bonds have become a common form of financing airport improvements. Revenue bonds present the opportunity to provide those improvements without direct burden to the taxpayer. Revenue bonds normally carry a higher interest rate because they lack the guarantees of general and limited obligation bonds.

Leasehold financing refers to a developer or tenant financing improvements under a long term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a municipal agency, produces a unique set of problems. In particular, it is more difficult to obtain private financing as only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases normally provide for the reversion of improvements to the lessor at the end of the lease term, which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease.

To ensure that the airport maximizes revenue potential in the future, the City of Williams should also periodically review aviation services rates and charges (i.e., fuel flowage fees, hangar and tiedown rental) at other regional airports to ensure that rates and charges at the airport are competitive and similar to aviation services at other airports. Additionally, all new leases at the airport should have inflation clauses allowing for periodic rate increases in-line with inflationary factors.

While it is desirable for the airport to directly pay for itself, the indirect and intangible benefits of the airport to the community's economy and growth must be considered in implementing future capital improvements.

PLAN IMPLEMENTATION

The best means to begin implementation of the recommendations in this master plan is to first recognize that planning is a continuous process that does not end with completion and approval of this document. Rather, the ability to continuously monitor the existing and forecast status of airport activity must be provided and maintained. The issues upon which this master plan is based will remain valid for a number of years. The primary goal is for the airport to best serve the air transportation needs of the region, while continuing to be economically self-sufficient.

The actual need for facilities is most appropriately established by airport activity levels rather than a specified date. For example, projections have been made as to when additional hangars may be needed at the airport. In reality, however, the timeframe in which the development is needed may be substantially different. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate the development. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, aviation demand will dictate when facility improvements need to be delayed or accelerated.

The real value of a usable master plan is in keeping the issues and objectives in the minds of the managers and decision-makers so that they are better able to recognize change and its effect. In addition to adjustments in aviation demand, decisions made as to when to undertake the improvements recommended in this master plan will impact the period that the plan remains valid. The format used in this plan is intended to reduce the need for formal and costly updates by simply adjusting the timing. Updating can be done by the manager, thereby improving the plan's effectiveness.

In summary, the planning process requires that airport management consistently monitor the progress of the airport in terms of aircraft operations and based aircraft. Analysis of aircraft demand is critical to the timing and need for new airport facilities. The information obtained from continually monitoring airport activity will provide the data necessary to determine if the development schedule should be accelerated or decelerated.

Appendix A

Glossary of Terms

Glossary of Terms

ABOVE GROUND LEVEL: The elevation of a point or surface above the ground.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.

ADVISORY CIRCULAR: External publications issued by the FAA consisting of non-regulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

AIR CARRIER: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRCRAFT: A transportation vehicle that is used or intended for use for flight.

AIRCRAFT APPROACH CATEGORY: An alphabetic classification of aircraft based upon 1.3 times the stall speed in a landing configuration at their maximum certified landing weight.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA: A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT APPROACH CATEGORY: A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. 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 greater than 166 knots.

AIRCRAFT RESCUE AND FIRE FIGHTING: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- *Group I:* Up to but not including 49 feet.
- *Group II:* 49 feet up to but not including 79 feet.
- *Group III:* 79 feet up to but not including 118 feet.
- *Group IV:* 118 feet up to but not including 171 feet.
- *Group V:* 171 feet up to but not including 214 feet.
- *Group VI:* 214 feet or greater.

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.

AIRPORT CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRPORT MASTER PLAN: The planner's concept of the long-term development of an airport.

AIRPORT MOVEMENT AREA SAFETY SYSTEM: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER: A facility which provides enroute air traffic control service to aircraft operating on an IFR flight plan within controlled airspace over a large, multi-state region.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIR TRAFFIC CONTROL: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

AIR TRAFFIC HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIR TRANSPORT ASSOCIATION OF AMERICA: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level.

ANNUAL INSTRUMENT APPROACH (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dewpoint, etc.)

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

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. See "traffic pattern."

BASED AIRCRAFT: The general aviation aircraft that use a specific airport as a home base.

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 50 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

CLASS A AIRSPACE: See Controlled Airspace.

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- *CLASS A:* Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

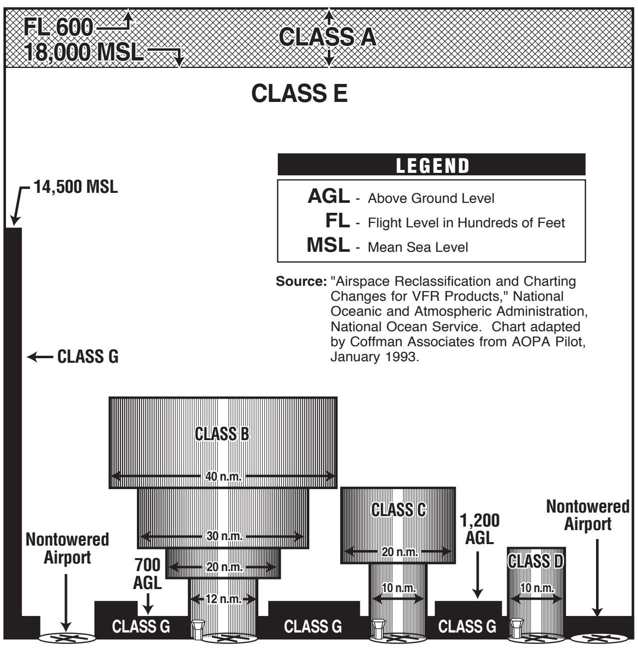
- *CLASS B:* Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

- *CLASS C:* Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- *CLASS D:* Generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach proce dures. Unless otherwise authorized, all persons must establish two-way radio communication.

- *CLASS E:* Generally, controlled airspace that is not classified as Class A, B, C, or D. 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. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- *CLASS G:* Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.



CONTROLLED FIRING AREA: See special-use airspace.

CROSSWIND: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- *TAKEOFF RUNWAY AVAILABLE (TORA):* The runway length declared available and suitable for the ground run of an airplane taking off;

- *TAKEOFF DISTANCE AVAILABLE (TODA):* The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA;

- *ACCELERATE-STOP DISTANCE AVAILABLE (ASDA):* The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff; and

- *LANDING DISTANCE AVAILABLE (LDA):* The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

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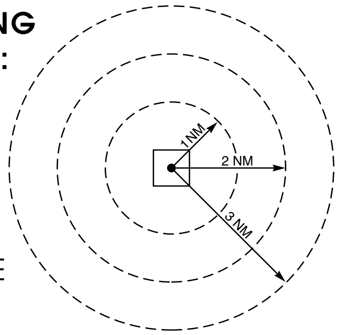
DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.



DNL: The 24-hour average sound level, in A-weighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

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. Also see "traffic pattern."

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ELEVATION: The vertical distance measured in feet above mean sea level.

ENPLANED PASSENGERS: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects ar legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

FEDERAL AVIATION REGULATIONS: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

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. See "traffic pattern."

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FLIGHT LEVEL: A designation for altitude within controlled airspace.

FLIGHT SERVICE STATION: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.

HIGH INTENSITY RUNWAY LIGHTS: The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

INSTRUMENT APPROACH PROCEDURE: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

INSTRUMENT METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

ITINERANT OPERATIONS: Operations by aircraft that are not based at a specified airport.

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM: A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy, integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch-and-go training operations.

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

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LONG RANGE NAVIGATION SYSTEM (LORAN): Long range navigation is an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for enroute navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MEDIUM INTENSITY RUNWAY LIGHTS: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace.

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

NATIONAL AIRSPACE SYSTEM: The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS: The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVAID: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc.)

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NON-DIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN: A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function,
in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

OPERATION: A take-off or a landing.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- *CATEGORY I (CAT I):* A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.

- *CATEGORY II (CAT II):* A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.

- *CATEGORY III (CAT III):* A precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Sevice Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used enroute and for approaches to an airport.

RUNWAY: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT: A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

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.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

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.

RUNWAY VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SMALL AIRPLANE: An airplane that has a maximum certified takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area 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. Special-use airspace classifications include:

- *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.

- *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 or property on the ground.

- *MILITARY OPERATIONS AREA (MOA):* Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- *PROHIBITED AREA:* Designated airspace within which the flight of aircraft is prohibited.

- *RESTRICTED AREA:* Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- *WARNING AREA:* Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD TERMINAL ARRIVAL (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

TACTICAL AIR NAVIGATION (TACAN): An ultra-high frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA): See declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA): See declared distances.

TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: A defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

TERMINAL RADAR APPROACH CONTROL: An element of the air traffic control system responsible for monitoring the en-route and terminal segment of air traffic in the airspace surrounding airports with moderate to high-levels of air traffic.

TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

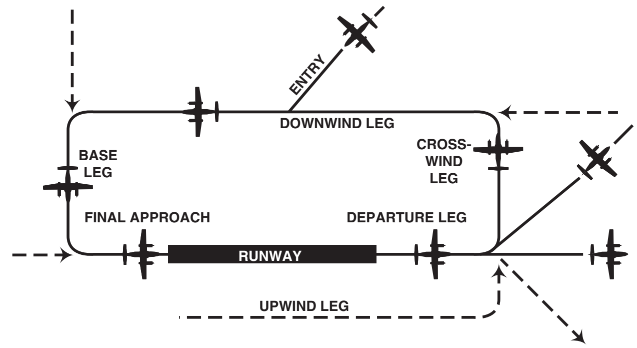
TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) 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.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.

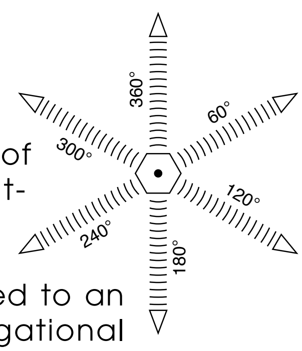


UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM): A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."



VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE STATION (VOR): 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.

VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE STATION/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan,
operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

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. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Abbreviations

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and firefighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automated weather observation station

BRL: building restriction line

CFR: Code of Federal Regulations

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity for aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity fo aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator
FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOC: ILS localizer

LOM: compass locator at ILS outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system

MALSR: medium intensity approach lighting system with runway alignment indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076 .1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rulemaking

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW: public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

PVC: Poor visibility and ceiling.

RCO: remote communications outlet

REIL: runway end identifier lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: Runway Safety Area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with sequenced flashers

SSALR: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel type landing gear

STWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TDZ: touchdown zone

TDZE: touchdown zone elevation

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

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