BAGDAD AIRPORT

AIRPORT MASTER PLAN

AIRPORT MASTER PLAN

for

BAGDAD AIRPORT
Yavapai County, Arizona

Prepared for

YAVAPAI COUNTY

by

Coffman Associates, Inc.

In association with

C&S Companies

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Approved by the
Yavapai County Board of Supervisors
On May 19, 2014

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Yavapai County, Arizona

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BAGDAD AIRPORT

AIRPORT MASTER PLAN

INTRODUCTION

The Bagdad Airport 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 Update 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 Yavapai County can coordinate project approvals, design, financing, and construction in a timely manner, prior to experiencing the detrimental effects of deteriorating or inadequate facilities.

An important result of the Master Plan Update 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 on-airport land use concept which outlines specific uses for all areas of airport property, including strategies for revenue enhancement.

The preparation of this Master Plan Update is evidence that Yavapai County recognizes the importance of the airport to the surrounding area 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 local community and County. With a sound and realistic Master Plan Update, Bagdad Airport can maintain its role as an important link to the national air transportation system for the community and maintain the public and private investments in its facilities.

MASTER PLAN GOALS AND OBJECTIVES

The primary objective of the Bagdad Airport Master Plan Update is to develop and maintain a financially feasible, long term development program which will satisfy aviation demand; be compatible with community development, other transportation modes, and the environment; and enhance employment and revenue for the Town and surrounding areas. The most recent planning efforts for the airport were undertaken in June 2000, when the last Airport Master Plan was conducted, and again in December 2008 when the Airport Layout Plan (ALP) was revised.

This Master Plan Update is intended to provide guidance through an updated capital improvement and financial program to demonstrate the future investments required by the County. The new planning study also provides justification for new priorities. The plan will be closely coordinated with other planning studies in the area and with aviation plans developed by the FAA and the State of Arizona. Specific objectives of the study include, but are not limited to the following:

- Examine the projected aviation demand and identify the facilities necessary to accommodate the demand.
- Determine projected needs of airport users over the next 20 years, by which to support airport development alternatives.
- Recommend improvements which enhance the airport's safety and capacity to the maximum extent possible.
- Establish a schedule of development priorities and a program for the proposed improvements.
- Prioritize the Airport Capital Improvement Program (ACIP).
- Prepare a new Airport Layout Plans in accordance with Federal Aviation Administration (FAA) and Arizona Department of Transportation – Multimodal Planning Division - Aeronautics Group (ADOT-MPD – Aeronautics Group) guidelines.
- Develop active and productive public involvement throughout the planning process.

MASTER PLAN TASKS

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

- Determining projected needs of airport users through the year 2032.
- Analyzing socioeconomic factors likely to affect air transportation demand in Yavapai County, including regional factors.
- Identifying potential existing and future land acquisition needs.
- Evaluating future airport facility development alternatives which will optimize undeveloped airport property to promote capacity and aircraft safety.
- Developing a realistic, common sense plan for the use and expansion of the airport.
- Presenting environmental considerations associated with any recommended development alternatives.

- Establishing a schedule of development priorities and a program for improvements.

- Producing current and accurate base maps and ALP drawings.

- Coordinating this Master Plan Update with local, regional, state, and federal agencies.

- Preparing this Master Plan Update under guidelines established by the FAA and ADOT.

BASELINE ASSUMPTIONS

A study such as this typically requires several baseline assumptions that will be used throughout this analysis. The baseline assumptions for the Bagdad Airport Master Plan Update are as follows:

- Bagdad Airport will continue to operate as a general aviation airport through the planning period.

- Bagdad Airport will continue to accommodate general aviation tenants and transient operations.

- 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 – Forecasts.

- The socioeconomic characteristics of the region will remain as forecast (see Chapter One).

- Both a federal program and a state program will be in place through the planning period to assist in funding future capital development needs.

MASTER PLAN ELEMENTS AND PROCESS

The Bagdad Airport Master Plan Update is being prepared in a systematic fashion following FAA guidelines and industry-accepted principles and practices, as shown on **Exhibit IA**. The Master Plan has six chapters and five appendices that are intended to assist in the evaluation of future facility needs and provide the supporting rationale for their implementation.

Chapter One – Inventory summarizes 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 is collected to define the local growth trends. Planning studies which may have relevance to the Master Plan are also collected.

Chapter Two – Forecasts examines the potential aviation demand at the airport. The 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 Bagdad Airport through the year 2032. The results of this effort are used to determine the types and sizes of facilities which will be required to meet the projected aviation demand at the airport through the planning period.

Chapter Three – Facility Requirements comprises the demand capacity and facility requirements analyses. 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 identi-

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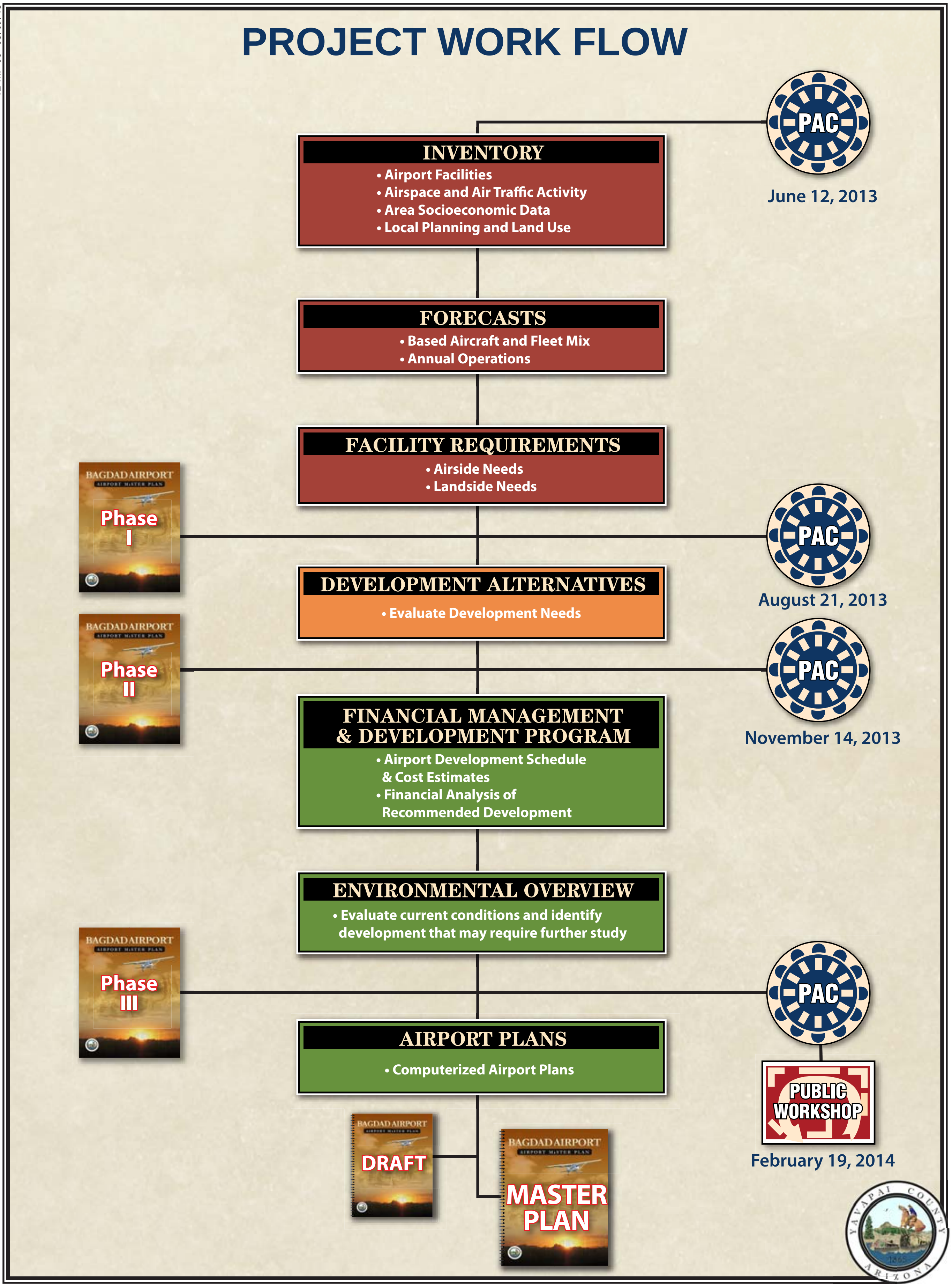

Exhibit IA
PROJECT WORK FLOW

fied, the size and type of new facilities to accommodate the demand are identified. The airfield analysis focuses on improvements needed to safely 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 the general aviation terminal, hangar, apron, and support needs.

Chapter Four – Airport Alternatives considers a variety of solutions to accommodate the projected facility needs. This element proposes various facility and site plan configurations which can meet the projected facility needs. An analysis is completed to identify the strengths and weaknesses of each proposed development alternative, with the intention of determining a single direction for development.

Chapter Five – Recommended Master Plan Concept provides both a graphic and narrative description of the recommended plan for the use, development, and operation of the airport.

Chapter Six – Capital Improvement Program provides a proposed capital needs program which defines the schedules, costs, and funding sources for the recommended development projects.

Appendix A – Glossary of Terms includes definitions and acronyms referenced throughout the Master Plan.

Appendix B – Environmental Overview provides a review of federal environmental requirements applicable to Bagdad Airport based upon the recommended Master Plan Concept.

Appendix C – CIP Cost Estimates includes a detailed breakdown of the costs associated with each CIP project outlined in Chapter Six.

Appendix D – Airport Layout Plan Drawings provides the official ALP drawings that are produced as a result of the recommended Master Plan Concept and used by the FAA and ADOT-MPD – Aeronautics Group in determining grant eligibility and funding.

Appendix E – FAA Forecast Approval Letter includes the letter from the FAA that approves the Master Plan forecasts for airport planning purposes, including ALP development.

COORDINATION

The Bagdad Airport Master Plan Update is of interest to many within the local community and County. This includes local citizens, local businesses, community organizations, County officials, airport users, airport tenants, and aviation organizations. As a component of the regional, state, and national aviation systems, Bagdad Airport is of importance to both state and federal agencies responsible for overseeing air transportation.

To assist in the development of the Master Plan Update, Yavapai County identified a group of government representatives, airport users and tenants, the military, and local community representatives to act in an advisory role in the development of the Master Plan Update. Members of this Planning Advisory Committee (PAC) met at designated times during the study to review phase reports and provide comments to help ensure that a realistic, viable plan is developed.

To assist in the review process, draft phase reports were prepared at various milestones in the planning process. The phase report process allows for timely input and review during each step within the Master Plan to ensure that all issues are fully addressed as the recommended program develops.

Chapter One

INVENTORY

Chapter One

INVENTORY

The purpose of the Bagdad Airport Master Plan Update is to provide Yavapai County, the Arizona Department of Transportation - Multimodal Planning Division - Aeronautics Group (ADOT-MPD - Aeronautics Group), and the Federal Aviation Administration (FAA) with a clear vision of necessary airport improvements over the next 20 years. This document will focus on the facility changes and development direction of the airport that has occurred since the previous Master Plan, which was completed in June 2000. More recently, the Airport Layout Plan (ALP) was updated and approved by the FAA in December 2008.

AIRPORT CHARACTERISTICS

The purpose of this section is to summarize various studies and data collected to provide an understanding of the characteristics of the airport and the regional area. Within this section is a description of the airport's setting, history, climate, system planning role, and funding.

AIRPORT SETTING

Bagdad Airport is located in western Yavapai County in west-central Arizona, approximately 100 miles northwest of Phoenix and 60 miles west of Prescott. The Town of Bagdad is positioned along State Route 96, which connects to other State and U.S. Highways eventually leading to Interstates 10, 17, and 40. The location of the airport in its regional setting is depicted on **Exhibit 1A**.

Bagdad is a copper mining community, with local mining operations ongoing since 1882 when the first claims were staked. The town is owned by the Freeport-McMoRan Copper & Gold Company. It is one of only two remaining company-

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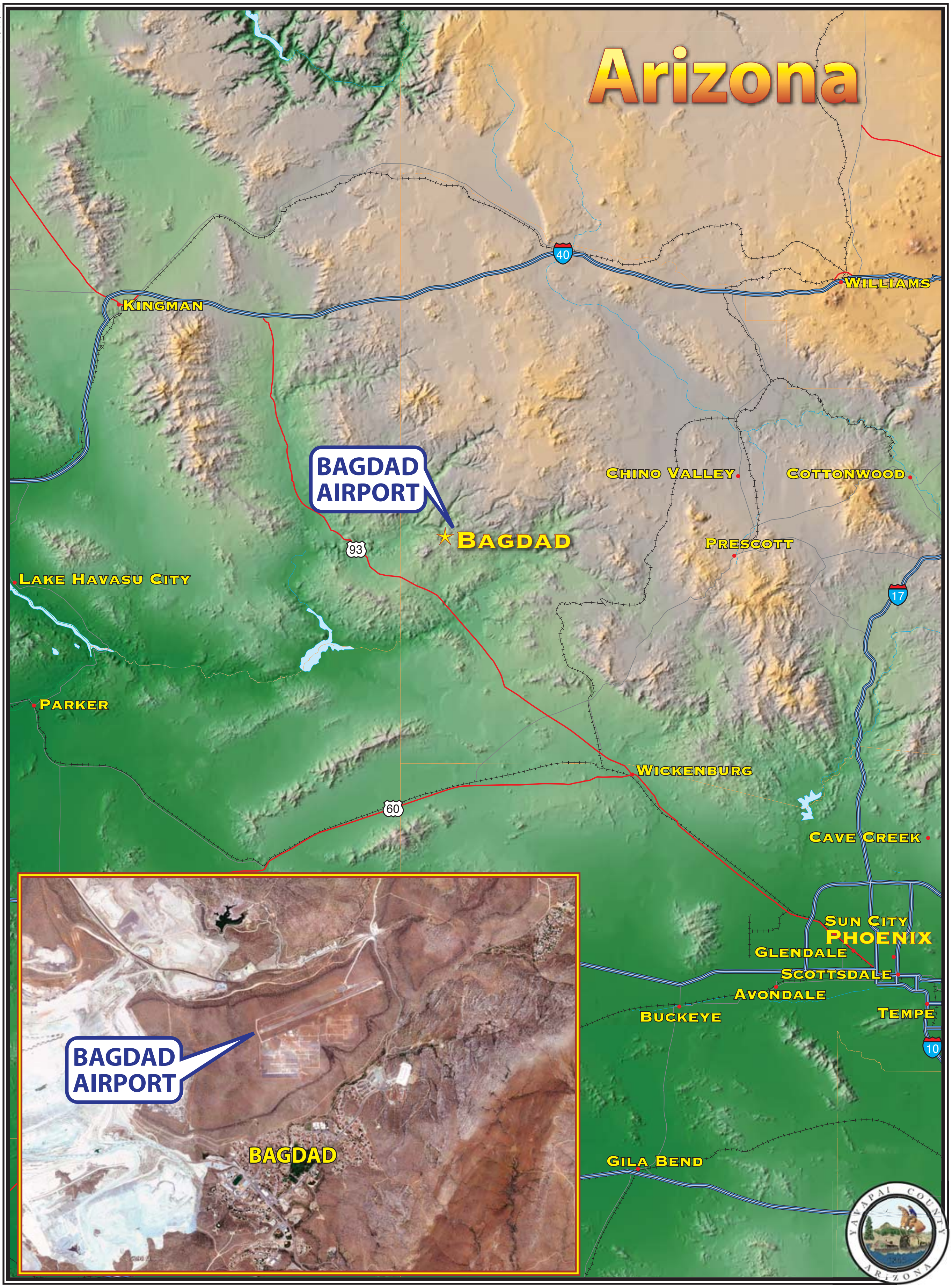


Exhibit 1A
LOCATION/VICINITY MAP

owned towns in Arizona, the other being Morenci.

AIRPORT HISTORY AND OWNERSHIP

On November 15, 1949, an airfield easement was granted to Yavapai County by MTL Cattle Company (L.K. and Mark T. Lindahl) for the purposes of construction and maintenance of a public airfield to provide air access for the mining operations.

On May 9, 1972, a Warranty Deed was issued to Bagdad Copper Corporation, conveying property subject to easement for airfield and rights. A Warranty Deed is a type of deed where the grantor (seller) guarantees the clear title to a piece of real estate and has a right to sell it to the grantee (buyer). The guarantee is not limited to the time the grantor owned the property; it extends back to the property's origins.

Continued growth in area mining and the community has driven the development of Bagdad Airport. A list of major projects over the years includes:

- 1950 – Runway grade and drain; access road
- 1967 – Runway, taxiway, and apron extension and paving
- 1979 – Construction of aircraft parking apron
- 1983 – Runway seal and extension
- 1990 – Runway, taxiway, and apron surfacing/pavement preservation
- 1999 – Runway crack seal
- 2004 – Runway, taxiway, and apron overlay
- 2007 – Installation of perimeter fencing and security gate
- 2011 – Runway safety area improvements

Bagdad Airport is owned by Yavapai County, which also owns the Seligman Airport and the Sedona Airport. While the County fully operates and maintains the Bagdad and Seligman Airports, it leases Sedona Airport to the Sedona-Oak Creek Airport Authority, which in turn, operates and maintains the facility. It is important to note that Bagdad and Sedona Airports are included as general aviation airports in the FAA's *National Plan of Integrated Airport Systems* (NPIAS), to be further detailed later in this chapter. This designation makes them eligible for funding under the Airport Improvement Program (AIP) and under the federal/state/local matching grant program. Seligman Airport is not included in the NPIAS, and is only eligible for state airport grants with a local match.

Quit Claim Deed and Other Recorded Documents

On March 9, 2000, the Yavapai County Board of Supervisors approved a Quit Claim Deed from Phelps Dodge Bagdad, Inc. (now Freeport-McMoRan Copper & Gold Company) conveying all rights, title, and interest of 96.6 acres known as the Bagdad Airport to Yavapai County. A Quit Claim Deed is a legal instrument by which the owner (grantor) of a piece of property transfers interest to a recipient (grantee). The owner/grantor terminates (or "quits") their right and claim to the property, thereby allowing the claim to transfer to the recipient/grantee.

There are other documents related to the airport and adjacent property that include airfield and access road easements dating back to 1949 and avigation "clear zone" easements from 1966. The avigation easements provide protection for the approaches to each runway end.

CLIMATE

Weather conditions are important to the planning and development of an airport. Temperature is an important factor in determining runway length requirements, while wind direction and speed are used to determine optimum runway orientation. The need for navigational aids and lighting is determined by the percentage of time that visibility is impaired due to cloud coverage or other conditions.

Table 1A summarizes monthly climatic data for the Town of Bagdad. This information was gathered from data obtained by the Western Regional Climate Center between 1925 and 2013.

TABLE 1A
Climate Conditions
Bagdad , Arizona

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Avg. High Temp (°F)	58.3	61.2	66.2	73.7	82.7	92.0	96.5	94.3	89.6	79.4	67.8	59.7
Avg. Low Temp (°F)	32.5	34.7	38.5	44.4	52.4	60.9	68.5	67.2	61.1	50.4	39.7	33.8
Avg. Precipitation (in.)	1.64	1.96	1.40	0.73	0.28	0.27	1.31	2.18	1.26	1.03	0.90	1.46
Avg. Snow Fall (in.)	0.7	0.5	0.4	.01	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8

Source: Western Regional Climate Center (05/01/1925 – 03/31/2013).

Located in west-central Arizona at an altitude of 4,163 feet, Bagdad has a four-season, colder variation of a semi-arid climate, with mild to cool winters and warm to hot summers. July is the hottest month, with an average daily maximum temperature of 96.5 degrees Fahrenheit (° F), and January is the coldest month, with an average daily minimum temperature of 32.5°F. Average precipitation in Bagdad is approximately 14 inches per year, with the largest portion of precipitation occurring during the July-August monsoon season. Snowfall is typically light and snow cover usually melts away quickly.

AIRPORT SYSTEM PLANNING ROLE

Airport planning exists on many levels: national, state, and local. Each level has a different emphasis and purpose. On the national level, Bagdad Airport is included in the NPIAS. This federal plan identifies 3,355 airports (3,330 and 25 proposed) which are considered significant to the national air transportation system.

The NPIAS is published and used by the FAA in administering the Airport Improvement Program (AIP), which is the source of federal funds for airport improvement projects across the country. The AIP program is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets. The 2013-2017 NPIAS estimates that over this time period, there will be $42.5 billion of AIP eligible infrastructure projects. This is a decrease of 19 percent ($9.8 billion) from the report issued two years ago.

The NPIAS supports the FAA's strategic goals for safety, system efficiency, and environmental compatibility by identifying specific airport improvements. An airport must be included in the NPIAS to be eligible for federal funding assistance through the AIP. Bagdad Airport is classified as a general aviation airport within the NPIAS. The current issue of the NPIAS identifies nearly $1.4 million in development needs over the next four years for Bagdad Airport. This figure is not a guarantee of federal funding. Rather, this figure represents development needs as presented to the FAA in the annual airport capital improvement program (ACIP) submitted by Yavapai County.

Airports that apply for and accept AIP grants must provide grant assurances. These assurances include maintaining the airport facility safely and efficiently in accordance with specific conditions. The duration of the assurances depends on the type of airport, the useful life of the facility being developed, and other factors. Typically, the useful life for an airport development project is a minimum of 20 years. Therefore, when an airport accepts AIP grants, they are obligated to maintain that facility in accordance with FAA standards for at least that long.

In 2012, the FAA published a document titled *General Aviation Airports: A National Asset*. An outcome of the report was further classification of general aviation airports into four categories: national, regional, local, and basic airports. Of the 2,952 general aviation airports included in the study, 497 were not specifically classified due to types of activity and characteristics that did not provide for clear classification within one of the four groups.

With this report, which has been integrated into the NPIAS, the FAA promotes the important contribution that general aviation airports provide to the national aviation system and economy. General aviation contributed $38.8 billion in economic output in 2009. When factoring in manufacturing and visitor expenditures, general aviation accounted for an economic contribution of $76.5 billion.

The new categories for general aviation airports are intended to help guide policy makers when making decisions regarding airports. The study recognized that categorizing all general aviation airports the same did not properly identify the important role of each airport within a community and the benefits of a large and diverse aviation system.

Bagdad Airport is classified as a basic airport in the General Aviation National Asset Study. As defined by the study, 668 airports were classified within the basic grouping. The FAA describes the basic group as airports that support general aviation activities such as emergency service, charter or critical passenger service, cargo operations, flight training, and personal flying. Basic airports account for approximately seven percent of the total flying at general aviation airports and two percent of flying with flight plans. Most of the flying is self-piloted for business and personal reasons using propeller-driven aircraft. A fair amount of air charter (taxi) services is provided at these airports.

At the state level, the airport is included in the *Arizona State Airports 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 well into the 21st century.

The SASP defines the role of each airport in the state's aviation system. Bagdad Airport is classified as a general aviation – basic airport in the SASP.

ADOT-MPD – Aeronautics Group, through its *Airport Development Guidelines* policy, further identifies funding needs and/or allocations to each airport role in the state's system. According to the *Airport Development Guidelines*, basic airports serve a limited role in the local economy, primarily serving recreational and personal flying. In addition, basic airports may be eligible for up to 95 percent funding on approved airport projects.

The Airport Master Plan is the primary local planning document. The master plan is intended to provide a 20-year vision for airport development based on aviation demand forecasts. Forecasts beyond five years become less reliable. The most recent forecasts were completed in the 2000 Airport Master Plan. As a result, this is an appropriate time to update these forecasts and revisit the development assumptions from that plan.

HISTORICAL GRANTS

To assist in funding capital improvements, the FAA has provided funding assistance at Bagdad Airport through the AIP. The AIP is funded through the Aviation Trust Fund, which was established in 1970 to provide funding for aviation capital investment programs to include aviation development, facilities and equipment, and research and development. The Aviation Trust Fund also finances a portion of the operation of the FAA. A summary of capital improvement projects funded by the FAA at Bagdad Airport since 2002 is presented in **Table 1B**. ADOT-MPD – Aeronautics Group has also provided assistance to Bagdad Airport. **Table 1C** presents a summary of these projects and grant totals since 2002.

TABLE 1B
Historical FAA Grant History
Bagdad Airport

Fiscal Year	Grant Number	FAA Grant Amount	Description of Project
2002	#3-04-0002-02	$140,400	Runway Rehabilitation.
2003	#3-04-0002-03	$313,853	Runway Rehabilitation – Phase II.
2004	#3-04-0002-04	$346,296	Runway/Apron Design and Reconstruction.
2005	#3-04-0002-05	$19,912	Design of Perimeter Fencing.
2007	#3-04-0002-06	$667,364	Install Security Fencing.
2011	#3-04-0002-07	$475,000	Runway Safety Area Improvements.
FAA Grant Total		**$1,962,825**	

Source: FAA

TABLE 1C Historical ADOT Grant History Bagdad Airport			
Fiscal Year	**Grant Number**	**ADOT Grant Amount**	**Description of Project**
2003	#E3F30	$6,892	Runway Rehabilitation.
2004	#E4S24	$18,000	Wind Indicator Upgrade.
2004	#E4F12	$15,407	Runway Rehabilitation – Phase II.
2005	#E5F57	$9,113	Runway/Apron Design and Reconstruction.
2006	#E6F04	$524	Design of Perimeter Fencing.
2007	#E7S62	$25,000	Design Runway Safety Area.
2008	#E8F53	$17,562	Install Security Fencing.
2012	#E2F1K	$12,500	Runway Safety Area Improvements.
2013	#E3S1T	$156,322	Airport Master Plan Update.
ADOT Grant Total		**$261,320**	
Source: ADOT-MPD – Aeronautics Group			

AIRPORT SERVICE AREA

Defining a service area for an airport can be useful in the forecasting process. Once a general service area is identified, various statistical comparisons can be made for projecting aviation demand. For example, in rural areas, where there may be one airport in each county, the service area could reasonably be defined as the entire county. This would facilitate comparisons to county population and employment for forecasting purposes.

In regions where there are many airports, the definition of the service area is not as simple. Aircraft owners in areas with more airports have more choices when it comes to basing their aircraft. The most common reason aircraft owners cite for choosing an airport at which to base their aircraft is convenience to home or work. Other reasons may include the capability of the runway system, availability of hangar space, and the services available. Therefore, the primary limiting factor to defining an airport service area is the proximity of other airports that provide a similar or greater level of service.

The service area generally represents where most, but not all, based aircraft will come from. It is not unusual for some based aircraft to be registered outside the county or even outside the state. In regions with several airports in relatively close proximity, service areas will likely overlap to some extent.

A review of public-use airports within 50 nautical miles of Bagdad Airport has been made to identify and distinguish the type of air service provided in the region. Information pertaining to each airport was obtained from FAA 5010 Master Records. **Table 1D** identifies the major characteristics of each airport.

TABLE 1D Vicinity Airports						
Airport Name	Distance (nm)	NPIAS* Role	Longest Runway	Based Aircraft	Annual Operations[1]	Instrument Approaches
Ernest A. Love Field	37 E	Commercial	7,616’	232	252,500	Yes
Wickenburg Municipal	42 SSE	GA	6,101’	34	36,100	No
Seligman	47 NNE	Non-NPIAS	4,800’	2	1,100	No

Source: FAA 5010 Form.
*National Plan of Integrated Airport Systems.
[1]FAA Tower Reports (2011), except Wickenburg and Seligman, which are estimated.

Ernest A. Love Field Airport (owned by the City of Prescott) is located approximately 37 nautical miles east of Bagdad Airport and is the nearest commercial service airport. The airport is served by three runways, the longest of which is 7,616 feet. Approximately 232 aircraft are based at Ernest A. Love Field Airport. The airport is served by a control tower, which reported 252,500 annual operations in 2012. Several published instrument approaches are approved for use into the airport. Two major fixed base operators (FBOs) are located on the airfield that provide a full array of services.

Wickenburg Municipal Airport (owned by the Town of Wickenburg) is located approximately 42 nautical miles south-southeast of Bagdad Airport. The airport is served by a single 6,101-foot runway. A total of 34 aircraft are based at Wickenburg Municipal Airport and annual operations are estimated at 36,100. There is no control tower at the airport and there are no published instrument approaches available. Services available include aircraft tiedowns, fuel sales (Jet A and 100LL), and minor aircraft maintenance.

Seligman Airport (owned by Yavapai County) is located approximately 47 nautical miles north-northwest of Bagdad Airport. The airport is served by a single 4,800-foot runway. Two aircraft are based at Seligman Airport and annual operations are estimated at 1,100. There is no control tower at the airport and there are no published instrument approaches available. Aircraft tiedowns are available at the airport.

AREA LAND USE

The area land use surrounding an airport can have a significant impact on airport operations and growth. The following section identifies baseline information related to generalized land uses in the vicinity of the airport. By understanding the land use issues surrounding the airport, more appropriate recommendations can be made for the future of the airport. The land in the immediate area is classified as undeveloped, mining production, open-range, or raw natural desert land, with no apparent conflicts with residential dwellings.

BAGDAD MINE

The Bagdad Mine, which is located directly north of the airport, is an open-pit copper and molybdenum mining complex. The first claims were staked in 1882, with property ownership changing numerous times through the first half of the 20th century. The first mill began operation in 1928 to process ore from the underground mine. Transition to open-pit mining began in 1945. A $240 million expansion in 1973 included new haul trucks, shovels, and nearly 400 new housing units.

The mine operation currently operates on an around-the-clock schedule and includes a 75,000 metric ton-per-day concentrator that produces copper and molybdenum concentrates. This concentrate is either then trucked to southern Arizona or taken 20 miles outside of town to a small railroad community named Hillside.

A recent economic study indicated that at the end of 2012, the Bagdad Mine had nearly 900 employees and had a total impact of approximately 3,700 jobs on Arizona's economy. It was estimated that the Mine generated approximately $126.4 million in economic benefits for Yavapai County and approximately $339.1 million for the State of Arizona in 2012.

BAGDAD SOLAR PROJECT

Located directly south of the airport property is the Bagdad Solar Project, which began operating in December 2011. Duke Energy owns and operates the Project, which uses 72,000 solar panels and collectively generates 15 megawatts of electricity. The electricity generated from the project is sold to Arizona Public Service under a 25-year power purchase agreement.

AIRPORT HEIGHT AND HAZARD ZONING

Height and hazard zoning establishes height limitations for new construction near the airport and within the runway approaches. It is based upon an approach plan which describes imaginary surfaces defining the edges of airspace, which are to remain free of obstructions for the purpose of safe air navigation. It requires that anyone who is proposing to construct or alter an object that affects airspace must notify the FAA prior to its construction.

Height restrictions are necessary to ensure that objects will not impair flight safety or decrease the operational capability of the airport. Title 14 of the Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*, defines a series of imaginary surfaces surrounding airports. The imaginary surfaces consist of the approach zones, conical zones, transitional zones, and horizontal zones. Objects such as trees, towers, buildings, or roads which penetrate any of these surfaces are considered by the FAA to be an obstruction to air navigation. Height restrictions can be accomplished through height and hazard zoning, avigation easements, or fee simple acquisition. The Town of Bagdad (Freeport-McMoRan Copper & Gold Company) and Yavapai County should adhere to and support the height restriction guidelines set forth in 14 CFR Part 77.

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 1E** summarizes airside facility data at Bagdad Airport.

TABLE 1E
Airside Facilities Data
Bagdad Airport

	Runway 5-23
Runway Length Runway Width	4,552' 60'
Runway Surface Material Condition	Asphalt Good
Pavement Markings	Basic
Runway Load-Bearing Strength (lbs.) Single Wheel Loading (SWL)	 12,000
Runway Lighting	None
Taxiway Lighting	None
Approach Aids	None
Instrument Approach Procedures	None
Weather or Visual Aids	Wind Socks (3) Tetrahedron

Source: FAA 5010 Report.

Runway/Taxiway System

Bagdad Airport is served by a single asphalt runway. Runway 5-23 is 4,552 feet long, 60 feet wide, and oriented in a northeast-southwest manner. This runway has a pavement strength of 12,000 pounds single wheel loading (SWL), which refers to the design of certain aircraft landing gear which has a single wheel on each main landing gear strut. The difference in runway end elevations for the runway is 11.2 feet, which results in a 0.2 percent runway gradient.

Runway 5-23 has a displaced threshold of 120 feet on both runway ends. The portion of the runway that is displaced may be used for takeoff, but not for landing. However, landing aircraft may use the displaced area on the opposite end for roll out.

Runway 5-23 is not served by a parallel taxiway. The runway has two connecting taxiway exits. Taxiway A1 is 30 feet wide and connects to the main aircraft parking apron. Taxiway A2 is 25 feet wide and leads to a hangar complex farther east.

Pavement Markings

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. The basic markings on Runway

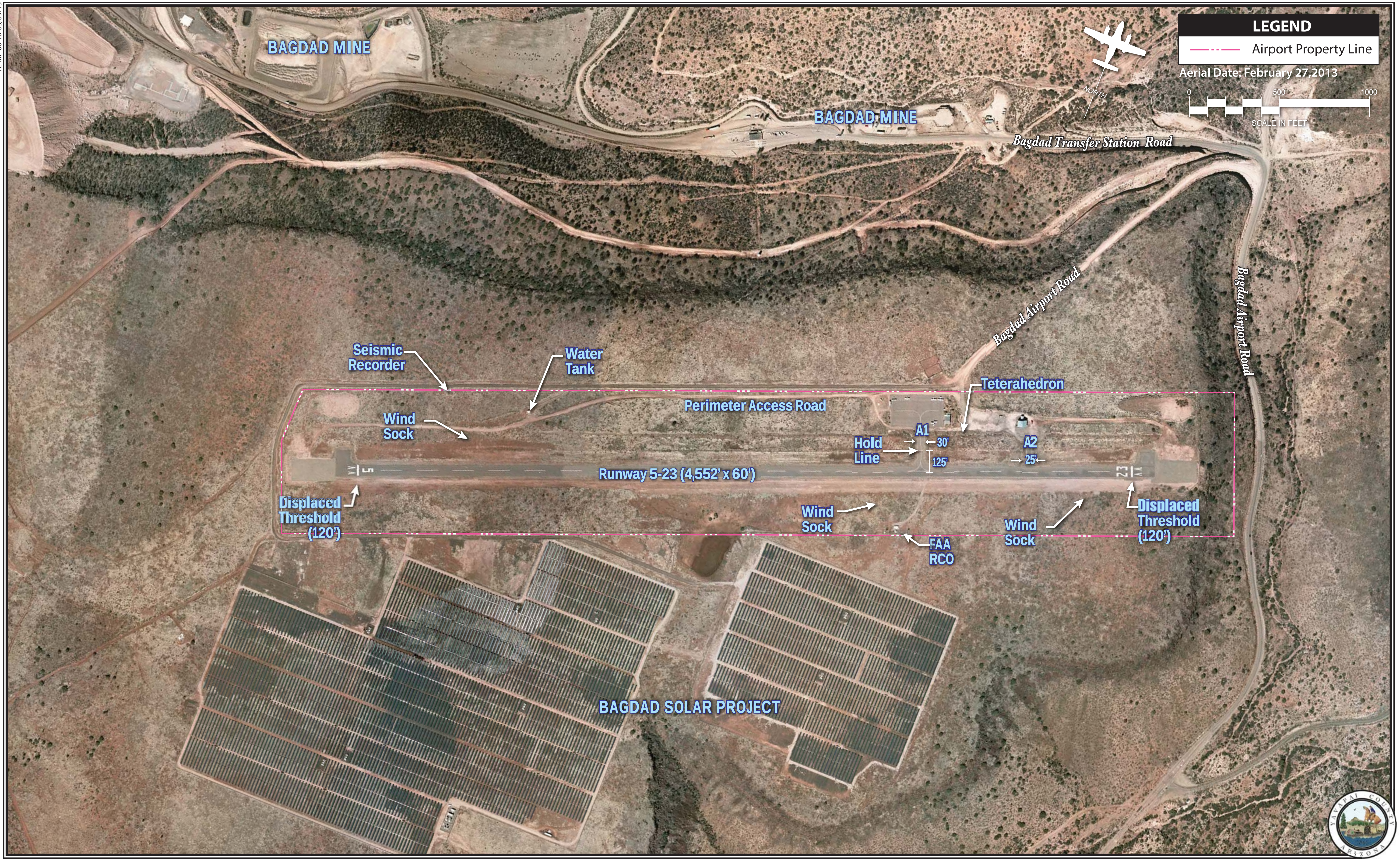


Exhibit 1B
AIRSIDE FACILITIES

5-23 identify the runway centerline and designation.

Taxiway and apron centerline markings are provided to assist pilots in maintaining proper clearance from pavement edges and objects near the taxiway edges. Pavement markings also identify aircraft tiedown positions and aircraft holding positions. A hold line is located on Taxiway A1, 125 feet from the runway centerline.

Airfield Lighting

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. Bagdad Airport is not equipped with any type of identification lighting, runway/taxiway lighting, or visual approach lighting.

Weather Facilities

The airport is equipped with three wind socks, which provide pilots with information about wind conditions. The airport is also equipped with a tetrahedron. A tetrahedron is a device normally installed at airports without control towers. It indicates the direction of landings and takeoffs, with the small end pointing in the direction of landing. Pilots are cautioned against using a tetrahedron for any purpose other than as an indicator of landing direction. The location of the wind socks and the tetrahedron are depicted on **Exhibit 1B**.

LANDSIDE FACILITIES

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

Airport Access Road And Automobile Parking

Access to the airport is off of Bagdad Airport Road, which connects to the north side of the airfield. There is an unpaved area between the main aircraft parking apron and hangar farther east that can be used for vehicle parking.

Airport Fencing

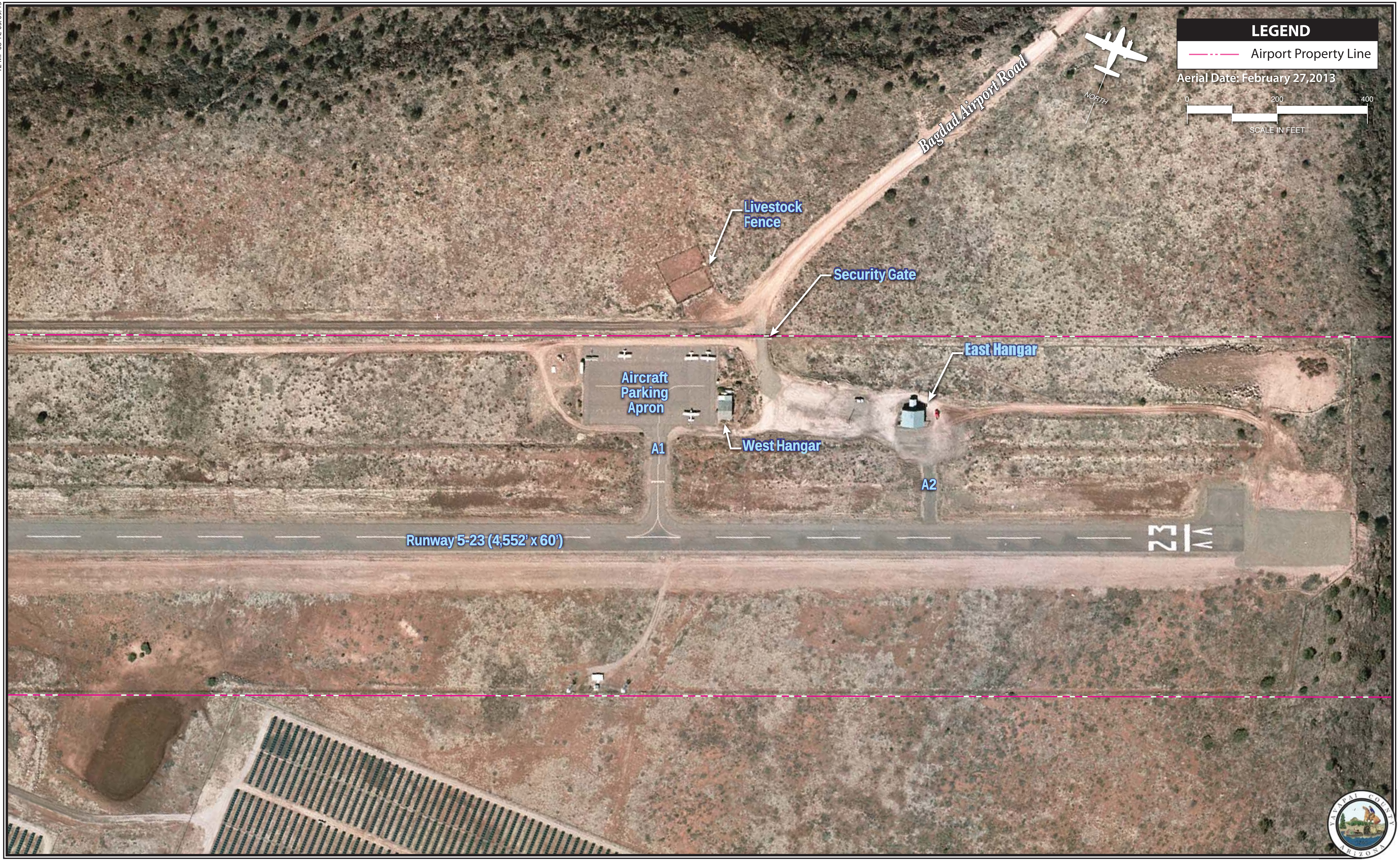
The airport's existing property line is enclosed with an 8-foot chain link fence with steel posts. This fence encompasses airport property except off the approach end of Runway 23. Access to the property is through a secured vehicular gate (with keypad code) off Bagdad Airport Road.

General Aviation Terminal Building

Bagdad Airport does not have a terminal facility or any aircraft and pilot services available to transient aircraft. The airport is unattended and existing hangar facilities are privately owned.

Aircraft Storage Facilities

As depicted on **Exhibit 1C**, there are two aircraft storage hangars at Bagdad Airport. The hangar adjacent to the main



12-MP-08-1C-05/09/13

Exhibit 1C
LANDSIDE FACILITIES

aircraft parking apron totals approximately 1,200 square feet, while the hangar farther east totals approximately 3,000 square feet. Both of these hangars are privately owned.

Aircraft Parking Apron

The aircraft parking apron at Bagdad Airport totals approximately 6,000 square yards. It is constructed of asphalt and has a total of twelve aircraft parking positions.

Fuel Storage Facilities

There are currently no fueling facilities at Bagdad Airport.

Aircraft Rescue and Firefighting

There is no dedicated aircraft rescue and firefighting (ARFF) facility at Bagdad Airport. As a general aviation facility, the airport is not required to have on-airport firefighting capability. Fire support is provided by the Bagdad Fire Department, which is located approximately 1.5 miles south of the airport.

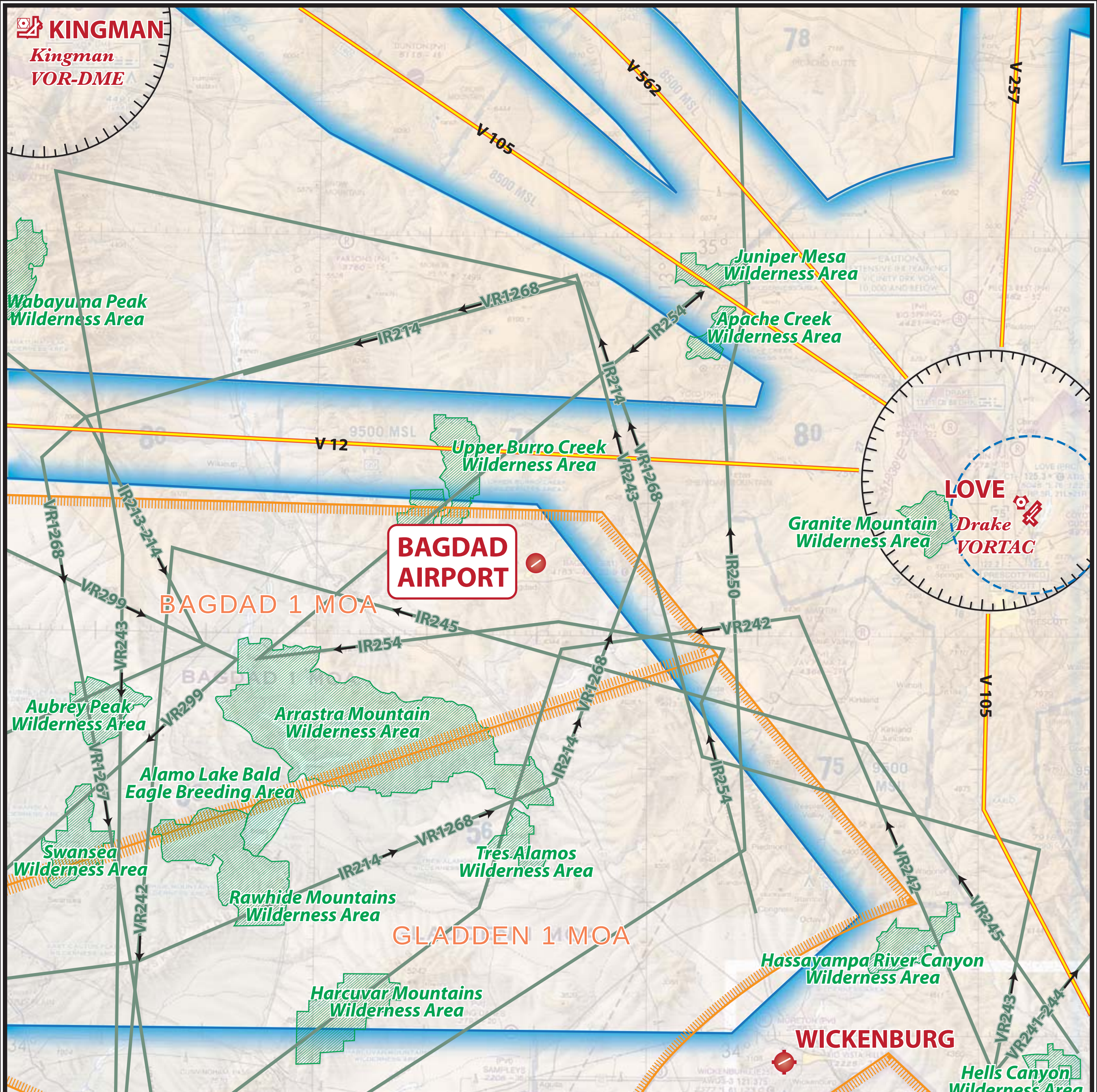
AIRSPACE CHARACTERISTICS

To ensure a safe and efficient airspace environment for all aspects of aviation, the FAA has established an airspace structure that regulates and establishes procedures for aircraft using the National Airspace System. The U.S. airspace structure provides two basic categories of airspace, controlled and uncontrolled, and identifies them as Classes A, B, C, D, E, and G. All aircraft operating within Classes A, B, C, and D airspace must be in contact with the air traffic control facility responsible for that particular airspace. Class E airspace is controlled airspace that encompasses all instrument approach procedures and low-altitude federal airways. Only aircraft conducting instrument flights are required to be in contact with air traffic control when operating in Class E airspace. 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. Class G airspace is uncontrolled airspace that does not require contact with an air traffic control facility. Airspace in the vicinity of Bagdad Airport is depicted on **Exhibit 1D**. Bagdad Airport lies underneath Class G airspace.

SPECIAL USE AIRSPACE

Exhibit 1D depicts two Military Operations Areas (MOAs) in the vicinity of Bagdad Airport; the Bagdad 1 MOA, which the airport is actually located within, and the Gladden 1 MOA, which is located further south. MOAs define airspace where a high level of military activity is conducted and are intended to segregate military and civilian aircraft.

The exhibit also depicts several Military Training Routes (MTRs) within the vicinity of the airport. These routes are used by military aircraft for training activity and commonly operate at speeds in excess of 250 knots, at altitudes above 10,000 feet MSL. While civilian aircraft are not restricted in MOAs or in the vicinity of MTRs, civilian aircraft are cautioned



LEGEND

- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- VORTAC
- VOR-DME
- Class D Airspace
- Class E Airspace with floor 1,200' or greater above surface that abuts Class G airspace
- Military Operations Area (MOA)
- Victor Airways
- Military Training Routes
- Compass Rose

NORTH

NOT TO SCALE

Source: Phoenix Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration, 10/18/2012

Exhibit 1D
AIRSPACE MAP

to remain alert for high speed military jet activity at the specified altitudes. It should be noted that military aircraft associated with Luke Air Force Base regularly utilize the Bagdad 1 and Gladden 1 MOAs and frequent the immediate airspace surrounding Bagdad Airport.

Arizona is also home to numerous national parks, forests, and wilderness areas. Because the government regards these areas as noise-sensitive, many of their boundaries are marked on aeronautical charts. Pilots are requested to maintain a minimum altitude of 2,000 feet AGL when over these areas. Bagdad Airport is located in the vicinity of the Upper Burro Creek and Arrastra Mountain Wilderness Areas.

AIR TRAFFIC CONTROL

There is no airport traffic control tower (ATCT) at Bagdad Airport; therefore, no formal terminal air traffic control services are available for aircraft landing or departing the airport. Aircraft operating in the vicinity of the airport are not required to file any type of flight plan or to contact any air traffic control facility unless they are entering airspace where contact is mandatory.

Air traffic advisories and certain weather information can be obtained using the common traffic advisory frequency (CTAF) channel 122.9 MHz, also known as UNICOM. Enroute air traffic control services are provided by the Albuquerque Air Route Traffic Control Center (ARTCC), which controls aircraft in a large multi-state area. The Prescott Flight Service Station (FSS) provides additional weather data and other pertinent information to pilots on the ground and enroute.

Local Operating Procedures

Bagdad Airport is situated at 4,163 feet mean sea level (MSL). Runway 5-23 utilizes a left-hand traffic pattern. In this manner, aircraft approaching either runway end follow a series of left-hand turns.

Remote Communications Outlet

An FAA remote communications outlet (RCO) is located on the south side of the airfield, just south of Taxiway A1. RCOs are remote aviation band radio transceivers, established to extend the communication capabilities of Flight Service Stations (FSS).

Pilots can find RCO frequencies in charts or publications. The RCO is used to make a radio call to the outlet as if the pilot were making the call directly to the FSS. The outlet will then relay the call (and the briefer's response) automatically.

NAVIGATIONAL AIDS

Navigational aids are electronic devices that transmit radio frequencies, which pilots of properly equipped aircraft can translate into point-to-point guidance and position information. As shown on **Exhibit 1D**, the Drake very high frequency omnidirectional range and tactical air navigation system (VORTAC) is located 14 miles east and is available to pilots in the vicinity of Bagdad Airport. A VORTAC provides distance and direction information to both civil and military pilots.

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 during low visibility and cloud ceiling conditions. Currently, there are no instrument approach procedures published for Bagdad Airport. Therefore, the airport is essentially closed to arrivals when visual flight can no longer be conducted.

SOCIOECONOMIC CHARACTERISTICS

Socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the study area. This information assists in determining aviation service level requirements, as well as forecasting the number of based aircraft and aircraft activity at the airport. Aviation forecasts are typically 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.

POPULATION

Historical population totals, which were obtained from the U.S. Census Bureau, are presented in **Table 1F**. According to the U.S. Census Bureau, the State of Arizona had more than 5.1 million residents in 2000. This is an increase of nearly 1.5 million residents since 1990, which represents an average annual growth rate of 3.4 percent. Between 2000 and 2010, the state's population grew at an annual rate of 2.2 percent, adding an additional 1.2 million residents. Much of Arizona's population is concentrated in limited areas around major cities.

TABLE 1F
Historical Population

Area	1990	2000	2010	Avg. Annual Growth Rate (1990-2000)	Avg. Annual Growth Rate (2000-2010)
Arizona	3,665,200	5,130,600	6,392,000	3.4%	2.2%
Yavapai Co.	107,700	167,500	211,000	4.5%	2.3%
Bagdad	1,860	1,580	1,880	-1.6%	1.7%

Source: U.S. Census Bureau.

The population for Yavapai County was also examined. Between 1990 and 2000, Yavapai County experienced an average growth rate of 4.5 percent, exceeding the statewide growth rate and adding nearly 60,000 new residents. Between 2000 and 2010, the County's growth rate was consistent with the state's (2.3 percent), adding 43,500 new residents during this time.

Historical population for the Town of Bagdad was also examined. In 1990, Bagdad reported 1,860 residents. Between 1990 and 2000, the town experienced a decline in population, falling to 1,580 residents, which equates to a negative annual growth rate of 1.6 percent. Since 2000, the town's population has rebounded, with a reported 1,880 residents in 2010.

Population projections for the forecast period are presented in **Table 1G**. The most recent population projections for the state and the County were obtained from The Arizona Department of Administration's Office of Employment and Population Statistics (December 2012). According to this, Arizona's population is projected to grow at an average annual rate of 1.7 percent between 2012 and 2032, totaling over 9.1 million residents by the end of the planning period. Yavapai County's population is projected to grow at the same rate (1.7 percent) over this 20-year period, totaling approximately 296,800 residents by 2032. Population projections for the Town of Bagdad were not available.

TABLE 1G
Forecast Population

Area	2012	2017	2022	2032	AAGR (2012-2032)
Arizona	6,498,600	7,059,000	7,758,600	9,128,500	1.7%
Yavapai Co.	211,600	232,200	256,900	296,800	1.7%

AAGR – Average Annual Growth Rate

Source: Arizona Department of Administration, Office of Employment & Population Statistics (Dec. 2012).

EMPLOYMENT

Analysis of a community's employment base can provide valuable insight to the overall well-being of the community. In most cases, the community makeup and health is significantly impacted by the availability of jobs, variety of employment opportunities, and types of wages provided by local employers. Civilian labor force data, which was obtained from the U.S. Bureau of Labor Statistics, is presented in **Table 1H**. Unemployment rates for each of these areas are at an all-time high. This can mainly be attributed to the recent economic crisis.

TABLE 1H
Civilian Labor Force Data

	1990	2000	2013*
Yavapai County			
Civilian Labor Force	45,000	75,700	89,800
Employment	43,000	72,600	82,300
Unemployment	2,000	3,100	7,500
Unemployment Rate	4.5%	4.1%	8.3%
State of Arizona			
Civilian Labor Force	1,788,200	2,505,300	3,010,300
Employment	1,694,100	2,404,900	2,776,700
Unemployment	94,100	100,400	233,600
Unemployment Rate	5.3%	4.0%	7.8%
United States			
Civilian Labor Force	125,840,000	142,583,000	154,512,000
Employment	118,793,000	136,891,000	142,698,000
Unemployment	7,047,000	5,692,000	11,815,000
Unemployment Rate	5.6%	4.0%	7.6%

Source: U.S. Department of Labor, Bureau of Labor Statistics (Not Seasonally Adjusted).
*Data as of March 2013.

The government sector accounts for a majority of employment in Yavapai County, with retail trade and services being two other major industries. The largest employers include Yavapai County, Yavapai Regional Medical Center, Northern Arizona VA Health Care system, Prescott Unified School District, State of Arizona, City of Prescott, Embry-Riddle Aeronautical University, Yavapai Community College, Wal-Mart, and West Yavapai Guidance Center.

Similar to population, historical and forecast data is presented for employment in Yavapai County and Arizona in **Table 1J**. Since 2000, the County annual growth rate is 1.19 percent, constituting a slightly less growth rate than what has been experienced in Arizona. Projections through 2032 call for continued growth in employment in the region. If realized, the projected employment growth could provide a strong base for increased aviation demand in the region.

TABLE 1J
Historical and Forecast Employment

	HISTORICAL			PROJECTIONS			
	2000	**2012**	**AAGR 2000-2012**	**2017**	**2022**	**2032**	**AAGR 2012-2032**
Arizona	2,795,777	3,294,203	1.38%	3,617,335	3,966,220	4,752,155	1.85%
Yavapai County	69,759	80,398	1.19%	83,425	88,823	100,648	1.13%

AAGR - Average Annual Growth Rate

Source: Woods & Poole Economics - Complete Economic Demographic Data Source (2013)

PER CAPITA PERSONAL INCOME

Table 1K compares the historical and forecast per capita personal income (PCPI) for Arizona and Yavapai County. PCPI is determined by dividing the total income by population. In order for PCPI to grow, income growth must outpace population growth significantly. As shown in the table, the historical PCPI for Yavapai County from 2000 to 2012 was less than Arizona; however, the average growth rate was slightly higher at 0.76 percent. Over the next 20 years, the County's PCPI is anticipated to grow at the same rate as the State of Arizona.

TABLE 1K
Historical and Forecast Per Capita Income (adjusted to 2005 dollars)

	HISTORICAL			PROJECTIONS			
	2000	**2012**	**AAGR 2000-2012**	**2017**	**2022**	**2032**	**AAGR 2012-2032**
Arizona	$29,287	$32,003	0.74%	$33,686	$36,396	$43,492	1.55%
Yavapai County	$24,359	$26,686	0.76%	$28,194	$30,586	$36,296	1.55%

AAGR - Average Annual Growth Rate

Source: Woods & Poole Economics - Complete Economic Demographic Data Source (2013)

ENVIRONMENTAL INVENTORY

A review of the potential environmental impacts associated with proposed airport projects is an essential consideration in the Airport Master Plan process. The intent of this inventory is to identify potential environmental sensitivities or resources that might affect future improvements at the airport. The information contained in this section was obtained from internet resources, agency maps, and existing literature.

Research was done for each of the 21 environmental impact categories described within the FAA's Order 1050.1E *Environmental Impacts: Policies and Procedures*. It was determined that the following resources are not present with the airport environs or cannot be inventoried:

- Resources not present
  - Coastal Resources (Coastal Barriers and Coastal Zones) – the airport is inland and not subject to any coastal restrictions.
  - Wild and Scenic Rivers – The nearest Wild and Scenic River segment to Bagdad Airport is the Verde River, located approximately 72 miles to the east.
- Resources that were not inventoried
  - Construction Impacts
  - Energy Supply and Natural Resources
  - Noise
  - Social Impacts

The following sections provide a discussion of the remaining resource categories.

AIR QUALITY

The U.S. 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_2), Nitrogen Oxide (NO), Particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb). Various levels of review apply within both NEPA and permitting requirements. Potentially significant air quality impacts, associated with an FAA project or action, would be demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed.

According to the EPA's Greenbook, Yavapai County is an attainment area for all criteria pollutants.[1]

COMPATIBLE LAND USE

The compatibility of existing and planned land uses in the vicinity of an airport is generally associated with the extent of the airport's noise impacts. Typically, significant impacts occur if noise-sensitive land uses are located within the 65 DNL noise contour, based upon the FAA's Integrated Noise Model (INM). Noise contours will be developed later in the master planning process.

Bagdad Airport is located in unincorporated Yavapai County. Based on a review of aerial photography, the land immediately to the north, east, and west of Bagdad Airport is undeveloped. The Bagdad Solar Project, a solar power farm, is located to the south of the airport. Land be-

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1 http://www.epa.gov/oar/oaqps/greenbk/anay_az.html, accessed August 2013

yond the solar farm to the south is developed with residences within the Bagdad town site. Additionally, to the northwest and west of the airport, the primary land use is the Freeport-McMoRan Copper & Gold Company.

DEPARTMENT OF TRANSPORTATION ACT: SECTION 4(f)

Section 4(f) of the DOT Act, which was recodified and renumbered as Section 303(c) of 49 USC, provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a historic site, public parks, recreation areas, or waterfowl and wildlife refuges of national, state, regional, or local importance unless there is no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use.

There are no publicly owned parks within the Bagdad townsite. The nearest wilderness area is the Upper Burrow Creek Wilderness Area, located approximately six miles northwest of the airport. The nearest historic site listed on the National Register of Historic Places is the Hyde Mountain Lookout House, located 22 miles northeast of the airport. The closest wildlife refuge is the Bill Williams National Wildlife Refuge located approximately 50 miles southwest of the airport.

FARMLAND

Under the *Farmland Protection Policy Act* (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland, to consider appropriate alternative actions which could lessen adverse effects, and to assure that such federal programs are, to the extent practicable, compatible with state or local government programs and policies to protect farmland. The FPPA guidelines developed by the U.S. Department of Agriculture (USDA) apply to farmland classified as prime or unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture.

Information obtained from the Natural Resource Conservation Service's (NRCS) Web Soil Survey indicates that no portion of the airport property is classified as prime farmland.[2]

FISH, WILDLIFE, AND PLANTS

A number of regulations have been established to ensure that projects do not negatively impact protected plants, animals, or their designated habitat. Section 7 of the *Endangered Species Act* (ESA), as amended, applies to federal agency actions and sets forth requirements for consultation to determine if the proposed action may affect a federally endangered or threatened species.

According to the USFWS Arizona Ecological Field Services Office, there are 14 federally listed species that have potential habitat in Yavapai County. These species are listed in **Table 1L.** As indicated in the table, habitat to support these species is not present at the airport**.** Additionally, the closest area of designated critical habitat is located 22 miles west of the airport.

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[2] NRCS Web Soil Survey, http://websoilsurvey.nrcs.usda.gov, accessed August 2013

Table 1L
Threatened and Endangered Species
Yavapai County, Arizona

Common Name	Status	Habitat	Habitat Present At Airport
Arizona cliffrose	Endangered	White limestone soils derived from tertiary lakebed deposits.	**No**
Black-footed ferret	Endangered	Grassland plains generally found in association with prairie dogs.	**No**
California condor	Endangered	High desert canyons and plateaus	**No**
Chiricahua leopard frog	Threatened	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs.	**No**
Colorado pikeminnow	Endangered	Warm, swift, turbid mainstream rivers. Prefers eddies and pools.	**No**
Desert pupfish	Endangered	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	**No**
Desert tortoise	Threatened	Primarily rocky (often steep) hillsides and bajadas of Mohave and Sonoran desertscrub but may encroach into desert grassland, juniper woodland, interior chaparral habitats, and even pine communities. Washes and valley bottoms may be used in dispersal.	**No**
Gila chub	Endangered	Pools, springs, cienegas, and streams.	**No**
Gila topminnow	Endangered	Small streams, springs, and cienegas vegetated shallows.	**No**
Loach minnow	Endangered	Flowing waters usually less than three feet deep, often along gravel or sand bars, in calm eddies, or in broad shallow areas of streams and rivers.	**No**
Mexican spotted owl	Threatened	Nests in canyons and dense forests with multi-layered foliage structure.	**No**
Razorback sucker	Endangered	Riverine and lacustrine areas, generally not in fast moving water and may use backwaters.	**No**
Southwestern willow flycatcher	Endangered	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	**No**
Spikedace	Threatened	Medium to large perennial streams with moderate to swift velocity waters over cobble and gravel substrate. Recurrent flooding and natural hydrograph important to withstand invading exotic species.	**No**
Source: Heritage Data Management System, USFWS Arizona Ecological Field Services Office, and http://www.biologicaldiversity.org (Loach Minnow)			

FLOODPLAINS

Executive Order 11988 directs federal agencies 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 the floodplains.

A review of Federal Emergency Management Agency (FEMA) floodplain information indicates that the airport and surrounding land is located above the 500-year floodplain area and is in an area of minimal flood risk.

HAZARDOUS MATERIALS, POLLUTION PREVENTION AND SOLID WASTE

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources.

The EPA's *EJView* online tool was consulted regarding the presence of impaired waters and regulated hazardous sites. According to *EJView*, an unnamed stream segment, located one mile north of the airport is classified as a Clean Water Act Section 303d impaired stream. This segment is located off airport property. Impaired streams have excess pollutants and are not clean enough to support recreational uses under EPA criteria. According to EJView, there are no Superfund sites within 100 miles of the airport.

HISTORICAL, ARCHITECTURAL, AND CULTURAL RESOURCES

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*. In addition, the *Antiquities Act of 1906*, the *Historic Sites Act of 1935*, and the *American Indian Religious Freedom Act of 1978* also protect historical, architectural, archaeological, and cultural resources. Impacts may occur when the proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance. In Texas, the Texas Historical Commission has oversight on Texas laws and regulations regarding historical, architectural, archeological and cultural resource laws and regulations.

As previously discussed, the nearest historic site listed on the National Register of Historic Places is the Hyde Mountain Lookout House, located 22 miles northeast of the airport.

LIGHT EMISSIONS AND VISUAL IMPACTS

Airport lighting is characterized as either airfield lighting (i.e., runway, taxiway, approach and landing lights) or landside lighting (i.e., security lights, building interior lighting, parking lights, and signage). Generally, airport lighting does not result in significant impacts unless a high intensity strobe light, such as a Runway End Identifier Lighting (REIL), would produce glare on any adjoining site, particularly residential uses.

The existing light features of the airport are described in detail previously in this chapter. Similar to noise, impacts associated with light emissions occur within residential areas. A discussion of sensitive receptors is included in the land use compatibility section of this environmental inventory.

ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations,* and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require FAA to provide for meaningful public involvement by minority and low-income populations as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse. The EPA's *EJview* online tool was consulted regarding the presence of environmental justice areas within the airport environs. According to the tool, four percent of the population within the Census tract encompassing the airport is below the poverty level. Additionally, the population of the Census block which encompasses the airport is 27 percent minority.

WATER QUALITY

The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc. Additionally, Congress has mandated (under the *Clean Water Act*) the National Pollutant Discharge Elimination System. This program addresses non-agricultural storm water discharges. Through the use of AZPDES permits, certain procedures are required to prevent contamination of water bodies from storm water runoff. The EPA can delegate this permit authority to individual states. In Arizona, the Arizona Department of Environmental Quality (AZDEQ) administers the AZPDES program.

As previously discussed, an unnamed stream segment, located one mile north of the airport is classified as a *Clean Water Act* Section 303d impaired stream. This segment is located off airport property.

WETLANDS

The U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*. Wetlands are defined in 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 seasonably saturated soil conditions for growth and reproduction." Wetlands can include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: the soil is inundated or saturated to the surface at some time during the growing season (hydrology), has a population of plants able to tolerate various degrees of flooding or frequent saturation (hydrophytes), and soils that are saturated enough to develop anaerobic conditions during the growing season (hydric).

According to the U.S. Fish and Wildlife Service, which manages the National Wetlands Inventory[3] on behalf of all federal agencies, there are no wetlands within the Bagdad Airport boundaries. A 0.52-acre freshwater pond is located immediately south of the airport.

Additionally, a review of NRCS soil survey for the area including the airport indicates that there are no hydric soils present at the airport.

DOCUMENT SOURCES

As previously mentioned, a variety of different sources were utilized in the inventory process. The following listing reflects a partial compilation of these sources. This does not include data provided by the airport management as part of their records, nor does it include airport drawings and photographs which were referenced for information. On-site inventory and interviews with staff tenants also contributed to the inventory effort.

2000 Airport Master Plan Update.

2008 Arizona State Airports System Plan (SASP).

Airport/Facility Directory, Southwest U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, June 27, 2013 Edition.

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration (2013-2017).

Phoenix Sectional Chart, U.S. Department of Transportation, Federal Aviation Administration (Effective October 18, 2012).

A number of Internet sites were also used to collect information for the inventory chapter. These include the following:

AirNav:
www.airnav.com

Arizona Department of Administration (AZDOA):
http://www.azdoa.gov/

Arizona Department of Transportation (ADOT):
www.azdot.gov/

FAA:
www.faa.gov

U.S. Bureau of Labor Statistics:
www.bls.gov/

U.S. Census Bureau:
www.census.gov

Western Regional Climate Center:
http://www.wrcc.dri.edu/

Yavapai County:
http://www.yavapai.us

[3] http://www.fws.gov/wetlands/Wetlands-Mapper.html, accessed August 2013

Chapter Two

FORECASTS

Chapter Two

FORECASTS

An important factor in facility planning involves a definition of demand that may reasonably be expected to occur during the useful life of the facility's key components. For a general aviation airport such as Bagdad Airport, this involves projecting potential aviation demand for a 20-year timeframe. In this Master Plan, forecasts of based aircraft and annual operations (takeoffs and landings) will serve as the basis for facility planning.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. The FAA reviews individual airport forecasts with the objective of comparing them to its Terminal Area Forecast (TAF) and the National Plan of Integrated Airport Systems (NPIAS). In addition, aviation activity forecasts provide important input to the benefit-cost analyses associated with airport development, and FAA reviews these analyses when federal funding requests are submitted.

FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems, dated December 4, 2004, states that forecasts should be:

- Realistic
- Based on the latest available data
- Reflective of current conditions at the airport
- Supported by information in the study
- Able to provide adequate justification for airport planning and development

The forecast process for an Airport Master Plan consists of a series of basic steps that vary in complexity depending upon the issues to be addressed and the type of airport being studied. The steps include a review of previous forecasts, determination of data needs, identification of data

sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results.

The resulting forecasts may be used for several purposes, including facility needs assessments, airfield capacity evaluation, and environmental evaluations. The forecasts will be reviewed and approved by the FAA to ensure that they are reasonable projections of aviation activity. The intent is to permit Yavapai County to make the necessary planning adjustments to ensure the facility meets projected demands in an efficient and cost-effective manner.

Because aviation activity can be affected by many influences at the local, regional, and national levels, 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.

NATIONAL AVIATION TRENDS AND FORECASTS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for passengers, airlines, air cargo, general aviation, and FAA workload measures. The forecasts are prepared to meet the 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 forecasts developed for the airport must consider national, regional, and local aviation trends and use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

The following section describes the trends in aviation. This information is utilized both in statistical analysis and to aid the forecast preparer in making any manual adjustments to the forecasts as necessary. The current edition when this chapter was prepared was *FAA Aerospace Forecast - Fiscal Years 2013-2033*, published in April 2013.

ECONOMIC OUTLOOK

The aviation industry in the United States has experienced an event-filled decade. Since the turn of the century, the industry has faced impacts of the events of September 11, 2001, scares from pandemics such as severe acute respiratory syndrome (SARS), the bankruptcy of five network air carriers, all-time high fuel prices, and a serious economic downturn with global ramifications. The Bureau of Economic Research has determined that the worst economic recession in the post-World War II era began in December 2007 and lasted until mid-2009. Eight of the world's top 10 economies were in recession by January 2009.

As the recession began, unemployment in the United States was at 5.0 percent. While it grew through 2008, unemployment intensified in 2009 until peaking at 10.1 percent in October, although the recession officially ended in June of that year. At the end of 2011, unemployment stood at 8.7 percent and by the end of 2012, the unemployment rate was still high at 7.7 percent.

This recession did not face the high inflationary environment of the recession in the early 1980s or the high-energy costs of the mid-1970s recession. While recessions during the post-war era have averaged 10 months in duration, this one lasted 19 months. Continued levels of high debt, a weak housing market, and tight credit are expected to keep the recovery modest by most standards. The resolution of those factors will determine the future path of the recovery.

The nation's gross domestic product (GDP) is the primary measure of overall economic growth. GDP growth rate in fiscal year 2012 was 2.2 percent, reassuring concerns about the possibility of a double-dip recession. GDP growth did, however, soften in the 4th quarter of 2012 as uncertainty over the "fiscal cliff" reduced demand. The FAA forecasts were based upon a 2.5 percent annual average growth in GDP from federal fiscal year 2012 through 2033.

Economic growth on the global scale is expected to be higher, with emerging markets in Asia/Pacific and Latin America leading the way. The global GDP was projected to grow at an average of 3.2 percent over the 20-year forecast period.

GENERAL AVIATION TRENDS

Following more than a decade of decline, 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 manufacture 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.

General aviation activity trends tend to closely match national economic trends. From 2008 through 2012, total operations by general aviation aircraft have declined annually. The FAA forecasts a return to growth in 2013 with an average annual growth rate of 0.5 percent through 2033.

The FAA forecasts the fleet and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. **Exhibit 2A** presents the historical and forecast U.S. active general aviation aircraft.

After growing rapidly for most of the decade, the demand for business jet aircraft has slowed over the past few years as the industry has been hard hit by the economic recession. However, recent shipment activity indicates a cautiously optimistic outlook. The FAA forecast calls for robust growth in the long-term, driven by higher corporate profits and continued concerns about safety, security, and flight delays. Overall, business aviation is projected to outpace personal/recreational use.

The active general aviation fleet is projected to increase at an average annual rate of 0.5 percent through 2033, growing from a 2012 estimate of 220,670 to 246,375 in 2033. The turbine fleet, including helicopters, is forecast to grow annually at 2.8 percent, with the jet portion increasing at 3.5 percent annually.

U.S. Active General Aviation Aircraft

	2013	2018	2023	2028	2033
FIXED WING					
Piston					
Single Engine	135,005	131,095	128,200	127,115	129,040
Multi-Engine	15,530	15,165	14,605	14,085	13,650
Turbine					
Turboprop	9,830	10,650	11,595	12,665	13,740
Turbojet	12,230	14,420	16,895	20,285	24,620
ROTORCRAFT					
Piston	3,865	4,400	4,885	5,415	5,970
Turbine	7,130	8,415	9,705	11,110	12,585
EXPERIMENTAL					
	24,750	26,250	27,745	29,370	30,980
SPORT AIRCRAFT					
	7,075	7,890	8,680	9,460	10,245
OTHER					
	5,670	5,635	5,605	5,575	5,545
TOTAL	**221,085**	**223,920**	**227,915**	**235,080**	**246,375**

Source: FAA Aerospace Forecasts, Fiscal Years 2013-2033.

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

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

Piston-powered aircraft are projected to decrease from the 2010 total of 159,007 through 2028, with declines in both single and multi-engine fixed wing aircraft, but growth in piston helicopters. Beyond 2028, active piston-powered aircraft are forecast to increase to 148,660 in 2033, still below the current number in the fleet. Fixed-wing single and multi-engine piston aircraft are forecast to decline annually at 0.2 percent and 0.6 percent, respectively.

The FAA began tracking the light sport aircraft segment of the general aviation fleet in 2005. At the end of 2011, a total of 6,645 aircraft were estimated in this category. By 2033, a total of 10,245 light sport aircraft are forecast to be in the fleet.

AIRPORT SERVICE AREA

In determining aviation demand for an airport, it is necessary to identify the role of that airport. Bagdad Airport is classified as a general aviation airport in the NPIAS. As such, the primary role of the airport is to serve the needs of general aviation in the area. General aviation is a term used to describe a diverse range of aviation activities, which includes all segments of the aviation industry except commercial air carriers and the military. General aviation is the largest component of the national aviation system and includes activities such as pilot training, recreational flying, and the use of sophisticated turboprop and jet aircraft for business and corporate use.

The initial step in determining the general aviation demand for an airport is to define its generalized service area. The airport service area is a generalized geographical area where there is a potential market for airport services, particularly based aircraft. Access to general aviation airports and transportation networks enter into the equation to determine the size of a service area, as well as the quality of aviation facilities, distance, and other subjective criteria.

Typically, the service area for a rural general aviation airport can extend up to 30 miles. The proximity and level of general aviation services are largely the defining factors when describing the general aviation service area. A description of nearby airports was previously completed in Chapter One. Three public-use airports are located within 50 nautical miles of Bagdad Airport, including Ernest A. Love Field Airport in Prescott, Wickenburg Municipal Airport, and Seligman Airport. Ernest A. Love Field and Wickenburg Municipal Airports, located 37 nautical miles and 42 nautical miles, respectively, from Bagdad Airport, could impact aviation demand as these facilities provide services such as aircraft fuel, hangar storage, and maintenance which are not currently offered at Bagdad Airport.

When discussing the general aviation service area, two primary demand segments need to be addressed. The first component is the airport's ability to attract based aircraft. Almost universally, aircraft owners choose to base at an airport nearer their home or business. Convenience is the most common reason for basing in close proximity. According to airport records, two Bagdad Airport based aircraft tenants reside in the Town of Bagdad. The remaining tenant is located in Black Canyon City, located in southern Yavapai County. The second segment is itinerant aircraft operations. In most cases, transient aircraft operators will also elect to utilize airports nearer their intended destination. This, however, is highly dependent on the airport's capabilities to accommodate the aircraft operator. As a result, the more attractive the facility, the more likely an airport will be to attract a larger portion of the region's itinerant aircraft operations.

Given these considerations, the primary general aviation service area for Bagdad Airport includes the Town of Bagdad. Since the Town of Bagdad is owned by the Freeport-McMoRan Copper & Gold Company (as detailed in Chapter One), future activity at Bagdad Airport will likely be associated with mining operations associated with the Bagdad Mine. The secondary service area extends into the surrounding areas, especially those with limited general aviation services in western Yavapai County. In the event that aviation services such as aircraft fuel, hangar storage, and terminal facilities (i.e., restrooms and flight planning) are offered on the airfield, the airport's service area could expand to include a wider array of aviation activity.

AVIATION FORECAST METHODOLOGY

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is 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 assessment of the local situation is important in the final determination of the preferred forecast.

Beyond five years, the predictive reliability of the forecasts can diminish. Therefore, it is prudent for the airport to update the forecasts, reassess the assumptions originally made, and revise the forecasts based on the current airport and industry conditions. Facility and financial planning usually require at least a 10-year preview, since it often takes several 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 activity occurring in both the local and national markets. Technological advances in aviation have historically altered and will continue to change the growth rates in aviation demand over time. A recent example is the substantial growth in the production and delivery of business jet aircraft, which resulted in a growth rate that far exceeded expectations. Such changes are difficult to predict, but over time reasonable growth trends can be identified. Using a broad spectrum of demographic, economic, and industry data, forecasts for Bagdad Airport have been developed. Several standard statistical methods have been employed to generate various projections of aviation demand.

Time series/trend line projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical demand data, then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the time series projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of a direct relationship between two separate sets of historic data. Should there be a reasonable correlation between the data, further evaluation using regression analysis may be employed.

Regression analysis measures the statistical relationship between dependent and independent variables, yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures association between the changes in a dependent variable and independent variable(s). If the r-squared (r^2) value (coefficient determination) is greater than 0.90, it indicates good predictive reliability. A value below 0.90 may be used with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections, but can provide a useful check on the validity of other forecasting techniques.

Utilizing these statistical methods, available existing forecasts, and analyst expertise, forecasts of aviation demand for Bagdad Airport have been developed. The remainder of this chapter presents the aviation demand forecasts and includes activity in two broad categories: based aircraft and annual operations.

RISKS TO THE FORECASTS

While the FAA is confident that its forecasts for aviation demand and activity can be achieved, this hinges on a number of factors, including the strength of the global economy, security (including the threat of international terrorism), and the level of oil prices. Higher oil prices could lead to further shifts in consumer spending away from aviation, dampening a recovery in air transport demand. In the long term, the FAA foresees a competitive and profitable industry characterized by increasing demand for air travel and airfares growing more slowly than inflation.

AVIATION FORECASTS

The following forecasts analysis examines each of the aviation demand categories expected at Bagdad Airport over the next 20 years. Each segment will be examined individually, and then collectively, to provide an understanding of the overall aviation activity at the airport through 2032. Forecasts for airport activities include the following:

- Registered Aircraft
- Based Aircraft
- Based Aircraft Fleet Mix
- General Aviation Operations
- Annual Instrument Approaches

The remainder of this chapter will examine historical trends with regard to these areas of general aviation and project future demand for these segments of general aviation activity at the airport. These forecasts, once approved by the FAA, will become the basis for planning future facilities, both airside and landside, at the airport.

FAA AND STATE FORECASTS

In an effort to assist the FAA in developing its programs and budgets, the TAF is updated annually. FAA staffing standards and other resource models also use the TAF to forecast requirements for operating the airspace system. Historical and forecast data for enplanements, airport operations, and based aircraft help the FAA, state aviation authorities, and other aviation entities in planning for future airport improvements.

The Arizona Department of Transportation – Multimodal Planning Division - Aeronautics Group (ADOT-MPD – Aeronautics Group) assists airports in the state in identifying infrastructure needs with a state aviation needs study and other special aviation studies. The most recent study on a statewide basis is the *2008 Arizona State Airports System Plan* (SASP), which includes forecasts of aviation activity in the state and for individual airports. The TAF and SASP are referenced throughout the remainder of this chapter as they relate to forecast aviation demand at Bagdad Airport

REGISTERED AIRCRAFT FORECAST

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of aviation activities at the airport can be projected. Aircraft basing at the airport is somewhat dependent upon the nature and degree of aircraft ownership in the local service area. As a result, aircraft registrations in Yavapai County were reviewed and forecast first.

Table 2A outlines the historic registered aircraft in Yavapai County between 2002 and 2012. This information was obtained from records of the FAA's Aircraft Registry. According to the FAA, there were 628 aircraft registered in Yavapai County in 2002. This number has since decreased, with 575 registered aircraft reported in the County at the end of 2012. This represents an annual average growth rate (AAGR) of -0.9 percent over the ten-year period. In fact, between 2011 and 2012, registered aircraft in the County decreased by 11.1 percent. This is a reflection of what has occurred nationwide, as the total registered aircraft count in the United States decreased from 376,857 in 2011 to 338,783 in 2012, constituting an approximate eight percent decrease.

TABLE 2A
Historical Registered Aircraft
Yavapai County

Year	Registered Aircraft	Annual % Change
2002	628	-
2003	626	-0.3%
2004	657	5.0%
2005	684	4.1%
2006	702	2.6%
2007	713	1.6%
2008	728	2.1%
2009	695	-4.5%
2010	659	-5.2%
2011	647	-1.8%
2012	575	-11.1%

Source: FAA Aircraft Registry Database

There are no recently prepared forecasts of registered aircraft to examine and compare. As a result, a projection of county registrations was developed for this study. Time-series and regression analyses were performed. However, due to the fluctuations in registered aircraft since 2002, they yielded correlation coefficients too low to have any predictive reliability. Therefore, none of the time-series or regression analyses were carried forward in this study, and other methods were used to provide projections of registered aircraft.

The first method considered the County's market share of U.S. active general aviation aircraft. This market share analysis compared the County's aircraft ownership trends versus national aircraft ownership trends since 2002. As evidenced in **Table 2B**, the County's share of U.S. active general aviation aircraft has fluctuated between a high of 0.32 percent in 2008 to a low of 0.26 percent in 2012. From this, a constant market share projection of 0.26 percent was applied to the forecast years and yields 635 registered aircraft in Yavapai County by 2032.

TABLE 2B
Registered Aircraft Forecasts
Yavapai County

Year	Yavapai Co. Registered Aircraft	U.S. Active GA Aircraft	% of U.S. Active GA Aircraft	Yavapai Co. Population[1]	AC Per 1,000 Residents
2002	628	211,500	0.30%	175,400	3.58
2003	626	211,300	0.30%	179,500	3.49
2004	657	209,600	0.31%	183,700	3.58
2005	684	224,300	0.30%	188,000	3.64
2006	702	221,900	0.32%	192,400	3.65
2007	713	231,600	0.31%	196,900	3.62
2008	728	228,700	0.32%	201,500	3.61
2009	695	223,900	0.31%	206,200	3.37
2010	659	223,400	0.29%	211,000	3.12
2011	647	220,800	0.29%	211,300	3.06
2012	575	220,700	0.26%	211,600	2.72
Constant Market Share of U.S. Active GA Aircraft					
2017	582	223,300	0.26%		
2022	591	227,000	0.26%		
2027	608	233,400	0.26%		
2032	635	243,700	0.26%		
Average Market Share (2002-2012) of U.S. Active GA Aircraft					
2017	670	223,300	0.30%		
2022	681	227,000	0.30%		
2027	700	233,400	0.30%		
2032	731	243,700	0.30%		
Constant Ratio Projection Per 1,000 Residents (Yavapai County)					
2017	631			232,200	2.72
2022	698			256,900	2.72
2027	755			277,800	2.72
2032	807			296,800	2.72
Average Ratio Projection (2002-2012) Per 1,000 Residents (Yavapai County)					
2017	789			232,200	3.40
2022	873			256,900	3.40
2027	945			277,800	3.40
2032	1,009			296,800	3.40

Source: Historical Registered Aircraft – FAA; Historical and Forecast U.S. Active GA Aircraft - FAA *Aerospace Forecasts, Fiscal Years 2013-203* (April 2013); Historical Population – U.S. Census Bureau; Forecast Population – Arizona Department of Administration, Office of Employment & Population Statistics (December 2012).
[1]Interpolated

Due to the fluctuation in the County's market share over the past ten years, an average market share projection was also developed. Between 2002 and 2012, the County's market share of U.S. active general aviation aircraft averaged 0.30 percent. This percentage was applied to the forecast years and yields 731 registered aircraft in Yavapai County by 2032.

The population of Yavapai County has also been used as a comparison with registered aircraft in the County. This forecast method examines historical registered aircraft as a ratio of 1,000 residents in the County. As shown in **Table 2B**, this ratio has fluctuated between a high of 3.65 aircraft per 1,000 residents in 2006 to a low of 2.72 aircraft per 1,000 residents in 2012. A constant ratio projection of 2.72 was applied to the forecast years and yields 807 aircraft registered in the County by 2032.

Similar to the previous forecast, an average ratio projection was also developed. Applying the average ratio between 2002 and 2012 (3.40) to the forecast years yields 1,009 registered aircraft in Yavapai County by the end of the planning period.

Table 2C and **Exhibit 2B** summarize the registered aircraft forecasts for Yavapai County. The selected planning forecast is an average of the four newly developed forecasts. With the decrease in registered aircraft over the past few years, this forecast projects a modest increase of registered aircraft in the short term and gradually increases throughout the planning period as a return to positive growth in the economy is forecasted. This selected planning forecast results in 800 registered aircraft by 2032, which represents an average annual growth rate of 1.7 percent.

TABLE 2C
Summary of Registered Aircraft Forecasts
Yavapai County

	2012	2017	2022	2027	2032
Market Share of U.S. Active GA Aircraft					
Constant Market Share		582	591	608	635
Average Market Share (2002-2012)		670	681	700	731
Registered Aircraft Per 1,000 Residents (Yavapai Co.)					
Constant Ratio Projection		631	698	755	807
Average Ratio Projection (2002-2012)		789	873	945	1,009
Selected Planning Forecast (1.5% AAGR)	**575**	**670**	**710**	**750**	**800**

BASED AIRCRAFT FORECAST

According to the previous *2000 Bagdad Airport Master Plan Update*, there were 14 aircraft based at the airport in 1997. Airport records at the end of 2012 indicated three based aircraft. Historical based aircraft totals for the intermediate years were not available for this study; therefore, time-series and regression analyses could not be performed.

The based aircraft forecast is a function of the registered aircraft forecast completed in the previous section. **Table 2D** presents the airport's based aircraft market share of registered aircraft in Yavapai County. As shown in the table, the three based aircraft at Bagdad Airport accounted for 0.5 percent of the aircraft registered in the County in 2012. This is a decrease from the 2.9 percent share the airport accounted for in 1997.

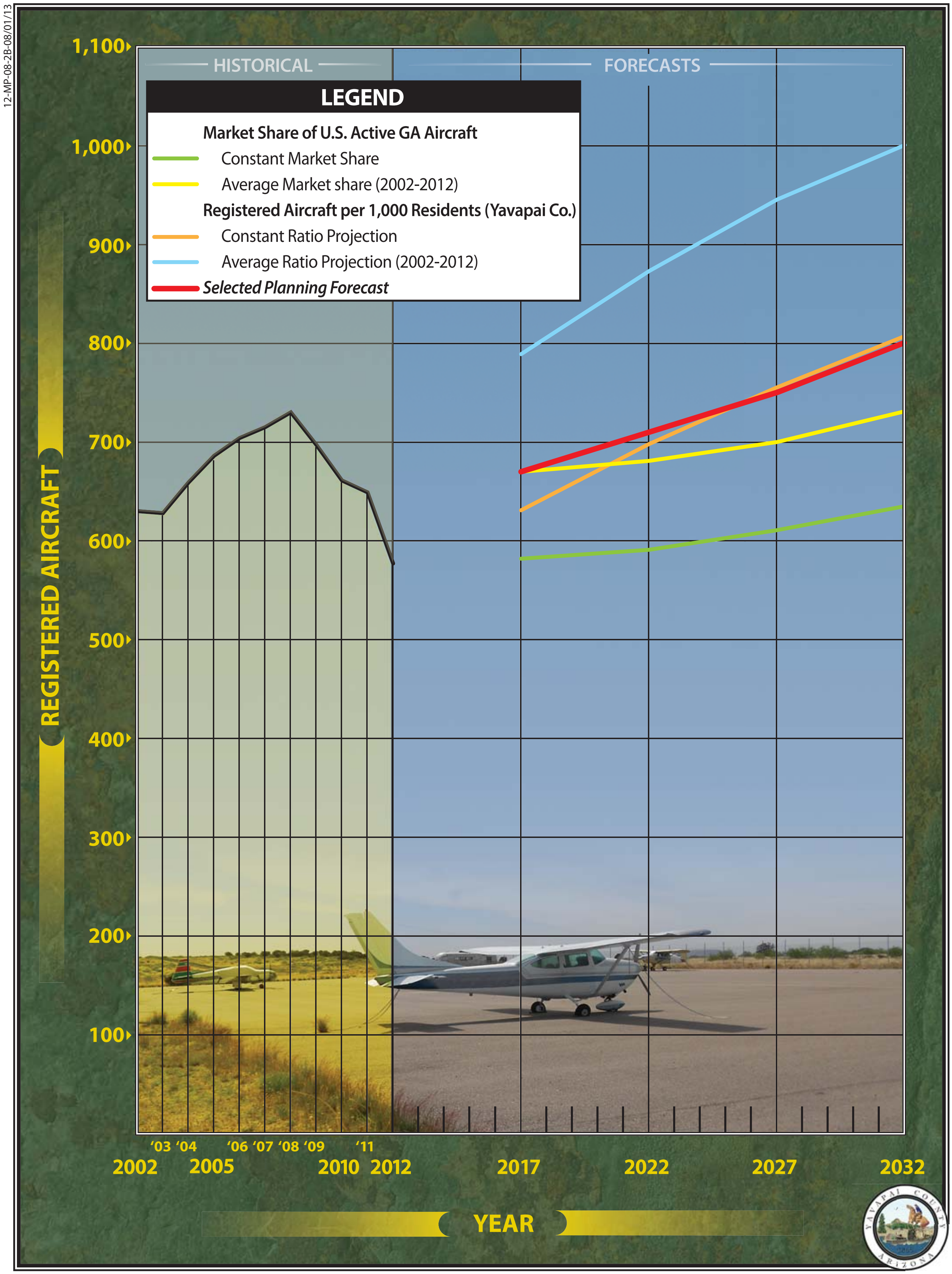

Exhibit 2B
REGISTERED AIRCRAFT
FORECASTS SUMMARY

A constant market share projection was first developed and applies the existing (0.5 percent) market share to the forecast years, yielding four based aircraft at the airport by 2032. An increasing market share forecast was also developed. This assumes the airport would begin to recapture some of the market share it held historically. This increasing market share forecast yields eight based aircraft at the airport by 2032. These two market share forecasts are presented in **Table 2D**.

TABLE 2D
Based Aircraft Market Share Forecasts

Year	Bagdad Based Aircraft	Yavapai County Registered Aircraft	Market Share of Reg. AC
1997	14	486	2.9%
2012	3	575	0.5%
Constant Market Share Projection			
2017	3	670	0.5%
2022	4	710	0.5%
2027	4	750	0.5%
2032	4	800	0.5%
Increasing Market Share Projection			
2017	4	670	0.7%
2022	6	710	0.9%
2027	7	750	1.0%
2032	8	800	1.1%

Source: Historical Based Aircraft – Airport Records; Historical Registered Aircraft – FAA.

Three additional forecasts were also examined, including the *2000 Airport Master Plan Update* and the *2008 Arizona State Airports System Plan* (SASP), and the 2013 FAA *Terminal Area Forecast* (TAF).

The 2000 Master Plan used a base number of 14 based aircraft in 1997and projected 15 based aircraft at the airport by 2017. The 2008 Arizona SASP developed a low, medium, and high forecast based on different projections of population growth and used a base year of 2007 with five based aircraft. The 2013 FAA TAF currently lists three based aircraft at Bagdad Airport and projects no growth in based aircraft through the end of the planning period.

Table 2E and **Exhibit 2C** summarizes the previous based aircraft forecasts for Bagdad Airport, as well as the newly developed forecasts. The selected planning forecast is an average of the two newly developed market share forecasts and yields six based aircraft by 2032, which represents an average annual growth rate of 4.3 percent.

It is important to note that the actual percentage of area-wide aircraft that base at Bagdad Airport in the future will depend primarily on activities related to operations associated with the Bagdad Mine as well as the availability of hangars, rental rates, and services offered on the airport.

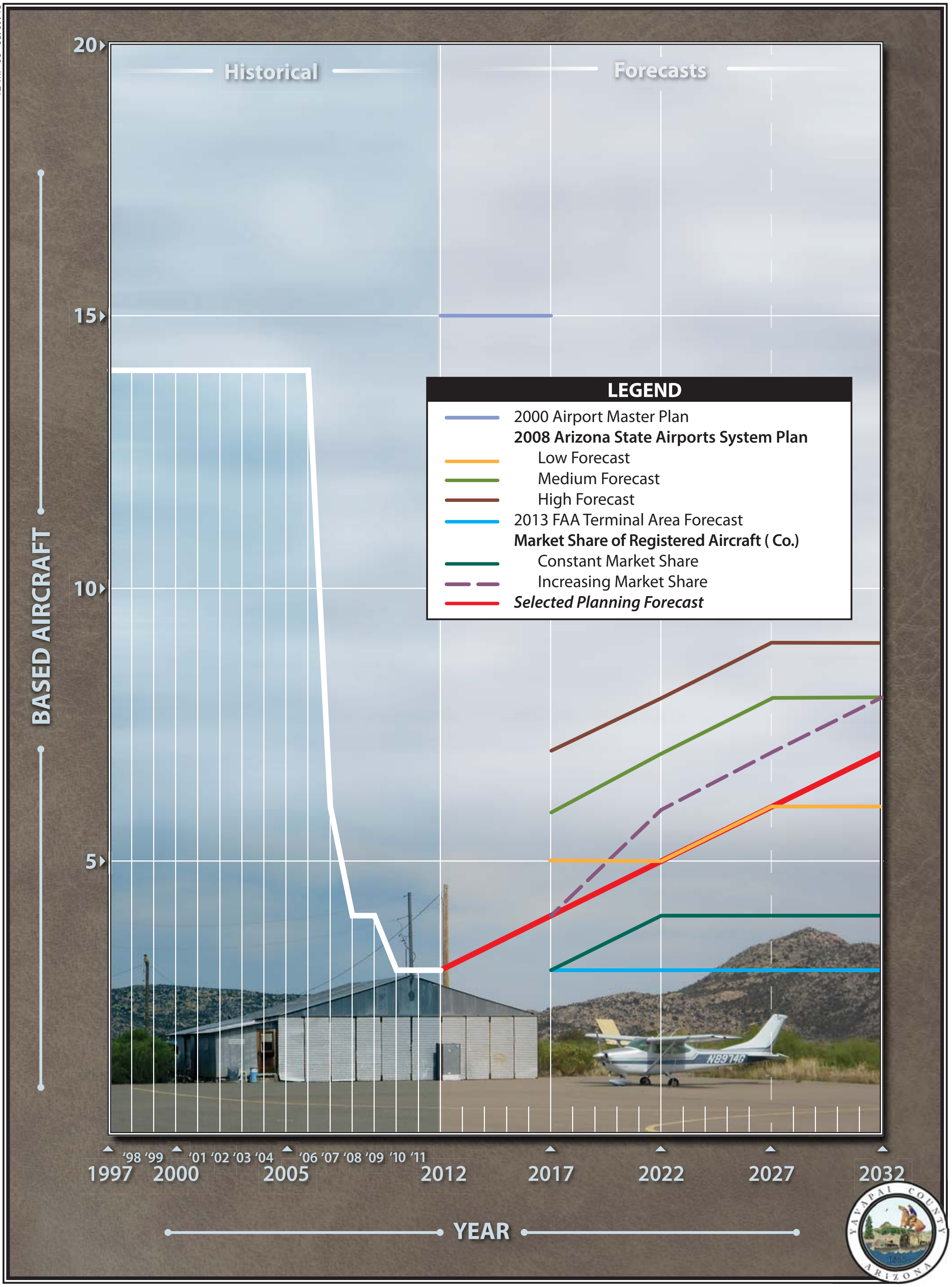

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Exhibit 2C
BASED AIRCRAFT
FORECAST SUMMARY

TABLE 2E Summary of Based Aircraft Forecasts Bagdad Airport	**2012**	**2017**	**2022**	**2027**	**2032**
Market Share of Reg. Aircraft (Yavapai Co.)					
Constant Market Share Projection		3	4	4	4
Increasing Market Share Projection		4	6	7	8
2000 Airport Master Plan		15	N/A	N/A	N/A
2008 Arizona State Airports System Plan					
Low Forecast		5	5[1]	6[2]	6[2]
Medium Forecast		6	7[1]	8[2]	8[2]
High Forecast		7	8[1]	9[2]	9[2]
2013 FAA Terminal Area Forecast		3	3	3	3
Selected Planning Forecast	**3**	**4**	**5**	**6**	**7**
[1]Interpolated/[2]Extrapolated					

Based Aircraft Fleet Mix

While the total number of general aviation aircraft based at Bagdad Airport is projected to increase, it is also important to know the type of aircraft expected to base at the airport. This will ensure the planning of proper facilities in the future. According to airport records, the current mix of aircraft based at the airport consists of three single engine aircraft.

The forecast mix of based aircraft was determined by comparing existing and forecast U.S. general aviation fleet trends to the fleet mix at Bagdad Airport. The national trend in general aviation is toward a greater percentage of larger, more sophisticated aircraft as part of the national fleet.

While an increase in single engine aircraft at the airport can be expected, their percentage of the total fleet mix will likely decrease, with the airport projected to gain one multi-engine aircraft and one turboprop aircraft in the future. It is not expected that Bagdad Airport's based aircraft mix will include any jets throughout the planning period. The fleet mix projections for Bagdad Airport are presented in **Table 2F**.

TABLE 2F Based Aircraft Fleet Mix Bagdad Airport	**2012**		**2017**		**2022**		**2027**		**2032**	
	#	%	#	%	#	%	#	%	#	%
Single Engine	3	100%	4	100%	4	80%	5	83%	5	72%
Multi-Engine	0	0%	0	0%	1	20%	1	25%	1	14%
Turboprop	0	0%	0	0%	0	0%	0	0%	1	14%
Totals	**3**	**100.0%**	**4**	**100.0%**	**5**	**100.0%**	**6**	**100%**	**7**	**100.0%**
Source: Airport Records and Coffman Associates analysis.										

GENERAL AVIATION OPERATIONS

General aviation operations are classified as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Generally, local operations are characterized by training operations. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Typically, itinerant operations increase with business and commercial use, since business aircraft are not typically used for large scale training activities.

When tower reports are not available, the FAA Statistics and Forecast Branch recommends using the *Model for Estimating General Aviation Operations at Non-Towered Airports* (July 2001). This report develops and presents a regression model for estimating general aviation (GA) operations at non-towered airports. Independent variables used in the equation include airport characteristics (i.e., number of based aircraft, number of flight schools, population totals, and geographic location).

As shown in **Table 2G**, the estimated 4,400 annual general aviation operations equates to 1,470 operations per based aircraft. From this base number, a constant ratio projection was developed and yields 10,300 annual general aviation operations by 2032. This represents an average annual growth rate of 4.3 percent. The FAA TAF estimates that the current operational split is 60 percent itinerant and 40 percent local and will continue to remain so through the forecast period. The general aviation operations forecast are presented in **Table 2G**.

TABLE 2G
General Aviation Operations Per Based Aircraft Forecast
Bagdad Airport

Year	Based Aircraft	Itinerant Operations	Local Operations	Total Operations	Operations Per Based Aircraft
2012	3	2,640	1,760	4,400[1]	1,470
Constant Ratio Projection					
2017	4	3,540	2,360	5,900	1,470
2022	5	4,380	2,920	7,300	1,470
2027	6	5,280	3,520	8,800	1,470
2032	7	6,180	4,120	10,300	1,470

[1]2012 Estimate of operations – Derived from *Model for Estimating General Aviation Operations at Non-Towered Airports, Equation #15*, FAA Statistics and Forecast Branch (July 2001).

Previous forecasts were also examined, including those in the *2000 Airport Master Plan Update*, the 2008 SASP, and the 2013 FAA TAF. The 2000 Master Plan used a base number of 2,800 annual operations in 1997 and projected 3,000 annual operations at the airport by 2017. The preferred forecast presented in the 2008 Arizona SASP used a base year of 2007 with 14,000 annual operations and projected 18,900 annual operations by 2030. The 2013 FAA TAF currently estimates 1,000 annual operations at Bagdad Airport and projects no growth through the end of the planning period.

ANNUAL INSTRUMENT APPROACHES

Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities. An instrument approach is defined by the FAA as "an approach to an airport with intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum approach altitude."

Currently, there are no published instrument approaches at Bagdad Airport. This means that the airport is essentially closed to arrivals when flight conditions are below minimums. However, visual flight conditions occur the majority of the time in the region. Therefore, if the airport were to establish an instrument approach procedure, it would likely be utilized a limited amount of time other than for potential flight training activities. For this analysis, it is expected that annual instrument approaches at Bagdad Airport would represent one percent of total itinerant operations. Applying this percentage to the forecast years yields approximately 60 annual instrument approaches by 2032.

COMPARISON TO THE FAA TAF

The FAA will review the forecasts of this Master Plan and compare them to the TAF. The FAA prefers the Master Plan forecasts differ from the TAF by less than 10 percent in the first five-year period and no more than 15 percent in the 10-year period. Where the forecasts do differ, supporting documentation should be provided.

Table 2H presents a direct comparison of the 2013 FAA TAF to the forecasts for this Master Plan. Regarding based aircraft, the forecast for the five-year timeframe is 33.3 percent higher than the TAF, and the forecast for the 10-year timeframe is 66.7 percent higher than the TAF. This is due to the TAF exhibiting a zero growth scenario, while the Master Plan reflects an annual growth rate of 4.3 percent.

TABLE 2H
Forecast Comparison to the Terminal Area Forecast
Bagdad Airport

Year	Airport Activity	2013 FAA TAF	Percent Difference
BASED AIRCRAFT			
2012	3[1]	3	0%
2017	4	3	33.3%
2022	5	3	66.7%
2027	6	3	100%
2032	7	3	133.3%
AAGR 2012-2032	4.3%	0.0%	
ANNUAL OPERATIONS			
2012	4,400[2]	1,000	340%
2017	5,900	1,000	490%
2022	7,300	1,000	630%
2027	8,800	1,000	780%
2032	10,300	1,000	930%
AAGR 2012-2032	4.3%	0.0%	

[1]Airport Records / [2]Derived from *Model for Estimating General Aviation Operations at Non-Towered Airports, Equation #15*, FAA Statistics and Forecast Branch (July 2001)

Source: FAA TAF (2013) Coffman Associates analysis

The total annual operations forecast in the Master Plan is significantly higher than the TAF for the five- and 10-year timeframes. As previously discussed, the Master Plan utilized the *Model for Estimating General Aviation Operations at Non-Towered Airports* (July 2001) to determine an approximate number of base year operations at Bagdad Airport. The 4,400 annual operations that are estimated exceed the 1,000 operations projected in the TAF. Similar to based aircraft, the TAF projects no growth in annual operations at the airport, while the Master Plan calls for a 4.3 percent annual growth rate.

PEAKING CHARACTERISTICS

Many airport facility needs are related to the level of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month –** The calendar month when peak activity occurs.
- **Design Day –** The average day in the peak month. This indicator is derived by dividing the peak month activity by the number of days in the month.
- **Busy Day –** The busy day of a typical week in the peak month.
- **Design Hour –** The peak hour within the design day.

It is important to realize that only the peak month is an absolute peak within the year. Each of the other periods will be exceeded at various times during the year. However, each provides reasonable planning standards that can be applied without overbuilding or being too restrictive.

GENERAL AVIATION PEAKS

Typically, the peak month for general aviation operations represents between 10 and 15 percent of the airport's annual operations. For this analysis, the peak month was estimated at 12 percent of annual operations, which equates to 530 monthly operations for the base year. Forecasts of peak month activity have been developed by applying this percentage to the forecasts of annual operations.

Design day operations were calculated by dividing the total number of operations in the peak month by the number of days in the month. The design hour is projected as 15 percent of the design day operations. Busy day operations were calculated at 15 percent busier than the design day activity. **Table 2J** summarizes the general aviation peak activity forecasts for Bagdad Airport.

TABLE 2J
Peak Period Forecasts
Bagdad Airport

		FORECASTS			
	2012	**2017**	**2022**	**2027**	**2032**
General Aviation Operations					
Annual	4,400	5,900	7,300	8,800	10,300
Peak Month (12.0%)	530	710	880	1,060	1,240
Design Day	18	24	29	35	41
Busy Day	21	28	33	40	47
Design Hour (15.0%)	3	4	4	5	6

SUMMARY

This chapter has provided forecasts for each sector of aviation demand anticipated over the planning period. A summary of the aviation forecasts developed for Bagdad Airport is presented on **Exhibit 2D**.

In the following chapter, existing components of the airport are evaluated so that the capacities of the overall system are identified. Once identified, the existing capacity is compared to the planning horizon milestones to determine where deficiencies currently exist or may be expected to materialize in the future. Once deficiencies in a component are identified, a more specific determination of the appropriate sizing and timing of the new facilities can be made.

12-MP-08--05/09/13

	BASE YEAR	FORECASTS			
CATEGORY	**2012**	**2017**	**2022**	**2027**	**2032**
ANNUAL OPERATIONS					
General Aviation					
Itinerant	2,640	3,540	4,380	5,280	6,180
Local	1,760	2,360	2,920	3,520	4,120
Total Annual Operations	**4,400**	**5,900**	**7,300**	**8,800**	**10,300**
BASED AIRCRAFT FLEET MIX					
Single Engine	3	4	4	5	5
Multi-Engine	0	0	1	1	1
Turboprop	0	0	0	0	1
Total Based Aircraft	**3**	**4**	**5**	**6**	**7**
PEAKING CHARACTERISTICS					
Annual Operations	4,400	5,900	7,300	8,800	10,300
Peak Month	530	710	880	1,060	1,240
Design Day	18	24	29	35	41
Busy Day	21	28	33	40	47
Design Hour	3	4	4	5	6
ANNUAL INSTRUMENT APPROACHES	**N/A**	**35**	**44**	**53**	**60**

OPERATIONS

BASED AIRCRAFT

Exhibit 2D
FORECAST SUMMARY

Chapter Three

FACILITY REQUIREMENTS

Chapter Three

FACILITY REQUIREMENTS

The purpose of this chapter is to convert basic airport needs into types and quantities of actual physical facilities required to meet forecast demands. By identifying the adequacy of the existing airport facilities, a determination can be made as to what new facilities may be needed and when they may be needed to accommodate forecast demands. This chapter uses the results of the forecasts conducted in Chapter Two, as well as established planning criteria, to determine the airside (i.e., runway, taxiways, navigational aids, marking and lighting) and landside (i.e., terminal services, hangars, aircraft parking apron, automobile parking, and support services) facility requirements.

The objective of this effort is to evaluate existing components of the airport so that the capacities of the overall system are identified. Once identified, the existing capacity is compared to the planning horizon milestones to determine where deficiencies currently exist or may be expected to materialize in the future. Once deficiencies in a component are identified, a more specific determination of the appropriate sizing and timing of the new facilities can be made.

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. In order to develop a Master Plan that is “demand-based” rather than time-based, a series of planning horizon milestones has been established for Bagdad Airport that takes into consideration the reasonable range of aviation demand projections prepared in Chapter Two. It is important to consider that the actual activity at any given time at the airport may be higher or lower than projected activity levels. By planning according to activity milestones, the resulting plan can accommodate unexpected shifts or changes in the area's aviation demand.

The most important reason for utilizing milestones is that they allow the airport to develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can either be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport management with a financially responsible and needs-based program. **Table 3A** presents the planning horizon milestones of short, intermediate, and long term for each aircraft activity category. These milestones generally correlate to the five, ten, and 20-year periods used in Chapter Two.

TABLE 3A
Planning Horizon Activity Levels
Bagdad Airport

	Current (2012)	Short Term (1-5 Years)	Intermediate Term (6-10 Years)	Long Term (11-20 Years)
ANNUAL GENERAL AVIATION OPERATIONS				
Itinerant Operations	2,640	3,540	4,380	6,180
Local Operations	1,760	2,360	2,920	4,120
Total Operations	***4,400***	***5,900***	***7,300***	***10,300***
BASED AIRCRAFT	**3**	**4**	**5**	**7**
Single Engine Piston	3	4	4	5
Multi-Engine Piston	0	0	1	1
Turboprop	0	0	0	1
Total Based Aircraft	**3**	**4**	**5**	**7**

AIRFIELD DESIGN STANDARDS

The selection of appropriate Federal Aviation Administration (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. FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, was published on September 28, 2012. It is intended to replace AC 150/5300-13, *Airport Design*, which was dated September 29, 1989. The previous Airport Design AC established the design standards based primarily on the Airport Reference Code (ARC). Paragraph 4 defined the ARC as "*a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.*"

The critical design aircraft is used to define the design parameters for the airport. In most cases, the design aircraft is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). In the case of an airport with multiple runways, a design aircraft is selected for each runway. The first consideration is the safe operation of aircraft likely to use the airport. Any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

RUNWAY DESIGN CODE

The AAC, ADG, and approach visibility minimums are combined to form the Runway Design Code (RDC) of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by runway visual range (RVR) values in feet of 1,200, 1,600, 2,400, and 4,000. The third component should read "NPI-1" for runways with a non-precision instrument approach with visibility minimums between one and three miles and "VIS" for runways designed for visual approach use only. Generally, runway standards are related to aircraft approach speed, aircraft wingspan, and designated for planned approach visibility minimums. **Table 3B** presents the RDC parameters. **Exhibit 3A** provides a listing of typical aircraft and their associated AAC and ADG.

TABLE 3B
Runway Design Code Parameters

Aircraft Approach Category (AAC)		
Category	**Approach Speed**	
A	less than 91 knots	
B	91 knots or more but less than 121 knots	
C	121 knots or more but less than 141 knots	
D	141 knots or more but less than 166 knots	
E	166 knots or more	
Airplane Design Group (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262
Visibility Minimums		
RVR (ft)	**Flight Visibility Category (statute miles)**	
VIS	3-mile or greater visibility minimums	
NPI - 1	Lower than 3 miles but not lower than 1-mile	
4,000	Lower than 1-mile but not lower than ¾-mile (APV ≥ ¾ but < 1-mile)	
2,400	Lower than ¾-mile but not lower than ½-mile (CAT-I PA)	
1,600	Lower than ½-mile but not lower than ¼-mile (CAT-II PA)	
1,200	Lower than ¼-mile (CAT-III PA)	

RVR: Runway Visual Range
APV: Approach Procedure with Vertical Guidance
PA: Precision Approach
Source: FAA AC 150/5300-13A, *Airport Design*

12-MP-08-3A-05/09/13

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- Eclipse 500/550
- Piper Archer
- Piper Seneca

B-I

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I (525)

B-II

- Super King Air 200
- Cessna 441
- DHC Twin Otter
- Super King Air 350
- Beech 1900
- Citation Excel (560), Sovereign (680)
- Falcon 50, 900, 2000
- **Citation Bravo (550)**
- Embraer 120

A-III, B-III

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

C-I, D-I

- Beech 400
- **Lear** 31, **35,** 45, 60
- Israeli Westwind

C-II, D-II

- **Cessna Citation X (750)**
- Gulfstream 100, 200,300
- Challenger 300/600
- ERJ-135, 140, 145
- CRJ-200/700
- Embraer Regional Jet
- Lockheed JetStar
- Hawker 800

C-III, D-III less than 100,000 lbs.

- ERJ-170
- CRJ 705, 900
- Falcon 7X
- **Gulfstream 500**, 550, 650
- Global Express, Global 5000
- Q-400

C-III, D-III over 100,000 lbs.

- ERJ-90
- Boeing Business Jet
- B-727
- **B-737**-300, **700,** 800
- MD-80, DC-9
- A319, A320

C-IV, D-IV

- **B-757**
- B-767
- C-130 Hercules
- DC-8-70
- MD-11

D-V

- **B-747-400**
- B-777
- B-787
- A-330, A-340

Note: Aircraft pictured is identified in bold type.

Exhibit 3A
AIRCRAFT REFERENCE CODES

TAXIWAY DESIGN CODE

The TDG relates to the undercarriage dimensions of the design aircraft. Taxiway/taxilane width and fillet standards, and, in some instances, runway to taxiway and taxiway/taxilane separation requirements are determined by TDG. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

The TDG standards are based on the Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/ taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces.

CRITICAL AIRCRAFT

The FAA recommends designing airfield facilities to meet the requirements of the airport's most demanding aircraft, or critical aircraft. The critical design aircraft is defined as the most demanding category of aircraft which conducts 500 or more annual operations at the airport. In some cases, more than one specific make and model of aircraft comprises the airport's critical design aircraft. One category of aircraft may be the most critical in terms of approach speed, while another is most critical in terms of wingspan and/or tail height, which affects runway/taxiway width and separation design standards.

General aviation aircraft using the airport include single and multi-engine aircraft, which fall within AACs A and B and ADG I. Occasionally, aircraft in ADG II use the airport (such as the Beechcraft King Air 200 and Cessna 441), but only on a very limited basis. Therefore, the current critical aircraft is determined to be in RDC B-I. FAA guidelines make a distinction in the B-I design category for aircraft over 12,500 pounds and those aircraft below 12,500 pounds. For Bagdad Airport, the majority of aircraft within RDC A-I and B-I are less than 12,500 pounds. Therefore, the RDC that best describes the aircraft fleet at the airport is B-I, small aircraft exclusively.

Increased activity by larger business jets would drive the need to meet more stringent design standards associated with the runway system. The forecasts do not point to business jets representing the critical aircraft within the planning period. The based aircraft fleet mix does introduce the potential for a turboprop aircraft being based at Bagdad Airport in the future. It is likely that transient turboprop aircraft associated with the Bagdad Mine will continue to utilize the airfield as well. Although turboprop aircraft are typically larger than single and multi-engine piston-powered aircraft, many still possess the characteristics of AACs A and B and ADG I. Therefore, this Master Plan will consider the long term critical aircraft to remain in RDC B-I. As such, the airport should maintain B-I design standards (serving small aircraft exclusively) now and in the future.

DIMENSIONAL DESIGN STANDARDS

The FAA has established several imaginary surfaces to protect aircraft operational areas and keep them free from obstructions that could affect the safe operation of aircraft. These include the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), and runway protection zone (RPZ).

The RSA is "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 an excursion from the runway." An OFA is an area on the ground centered on the runway, taxiway, or centerline, provided to enhance the safety of aircraft operations, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. An OFZ is a volume of airspace that is required to be clear of objects, except for frangible items required for navigation of aircraft. It is centered along the runway and extended runway centerline.

The FAA has placed a higher significance on maintaining adequate RSAs at all airports. On October 1, 1999, the FAA established Order 5200.8, *Runway Safety Area Program*. The order states that all RSAs at federally obligated airports shall conform to the standards contained in Advisory Circular 150/5300-13A, *Airport Design*, to the extent practicable.

Table 3C summarizes the FAA safety area design standards as they apply to Bagdad Airport. The FAA expects these areas to be under the control of the airport and free from obstructions. In 2011, Yavapai County made significant improvements to runway safety standards associated with Runway 5-23 at Bagdad Airport. As depicted on **Exhibit 3B**, the RSA, OFA, and OFZ are all in compliance.

The RPZ is defined as an area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered about the extended runway centerline.

The dimensions of an RPZ are a function of the RDC and approach visibility minimums. The RPZs on both ends of the runway extend off airport property. Where possible, the airport should have positive control over the RPZ through fee simple acquisition. However, avigation easements (acquiring control of designated airspace within the RPZ) can be pursued if fee simple acquisition is not feasible.

While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13A, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements;
- Irrigation channels as long as they do not attract birds;
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator;
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable; and
- Unstaffed navigational aids (NAVAIDs) and facilities, such as required for airport facilities that are fixed-by-function in regard to the RPZ.

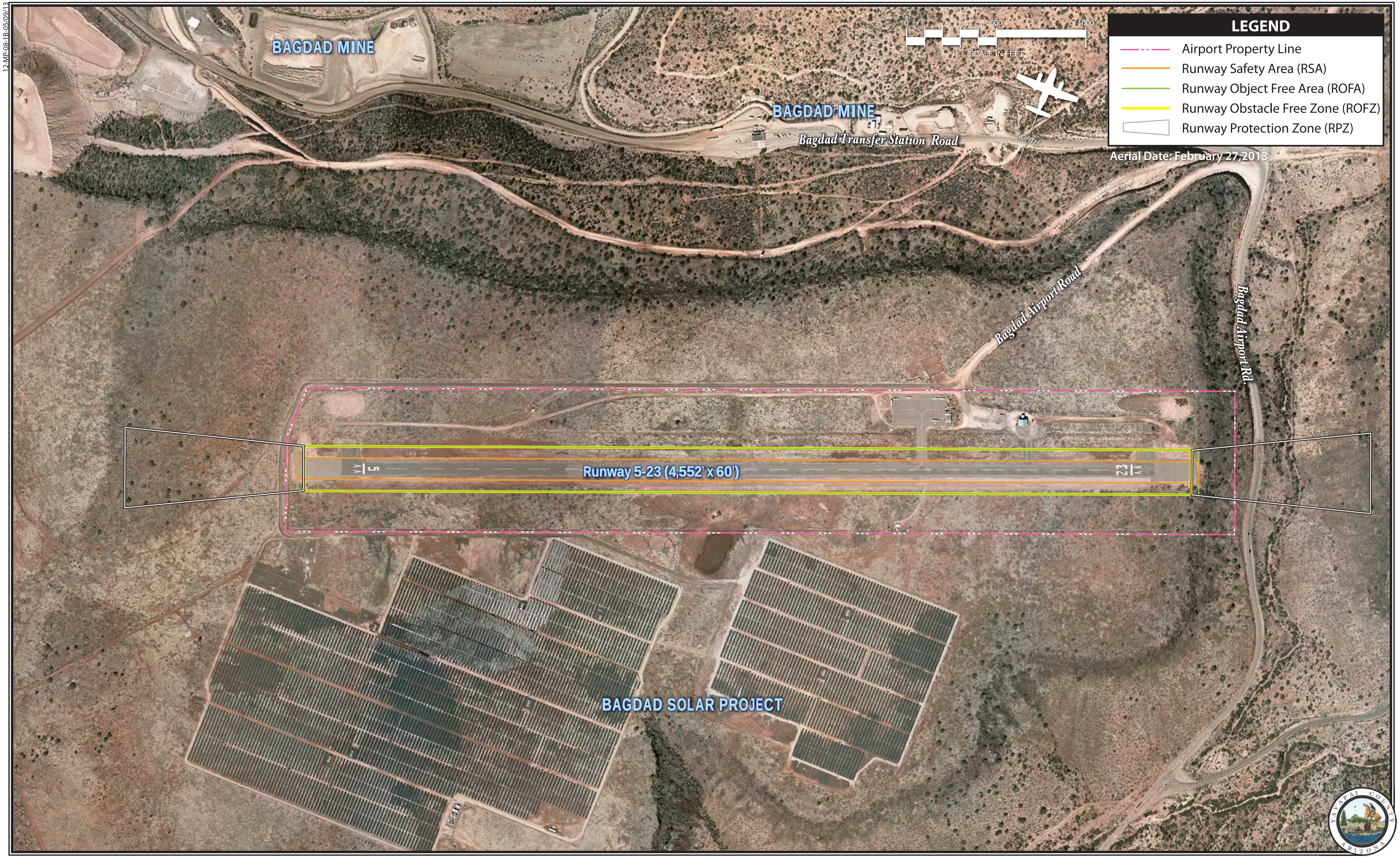


Exhibit 3B
SAFETY AREA DIMENSIONS

TABLE 3C Airfield Safety Area Dimensional Standards Bagdad Airport	
	FAA Design Standards
Airport Reference Code	**B-I (Small Aircraft Exclusively)**
Approach Visibility Minimums	**Visual**
Runway Width	60’
Runway Centerline To: Holding Position Parallel Taxiway Centerline Aircraft Parking Area	 125’ 150’ 125’
Runway Safety Area (RSA) Width Length Prior to Landing Threshold Length Beyond Runway End	 120’ 240’ 240’
Runway Object Free Area (OFA) Width Length Beyond Runway End	 250’ 240’
Runway Obstacle Free Zone (OFZ) Width Length Beyond Runway End	 250’ 200’
Runway Protection Zone (RPZ) Inner Width Outer Width Length	 250’ 450’ 1,000’
Source: FAA AC 150/5300-13A, *Airport Design*.	

Any other land uses considered within RPZ land owned by the airport sponsor must be evaluated and approved by the FAA Office of Airports. The FAA has published, *Interim Guidance on Land Uses within a Runway Protection Zone* (9.27.2012), which identifies several potential land uses that must be evaluated and approved prior to implementation. The specific land uses requiring FAA evaluation and approval include:

- Buildings and structures (Examples include, but are not limited to: residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)
- Recreational land use (Examples include, but are not limited to: golf courses, sports fields, amusement parks, other places of public assembly, etc.)
- Transportation facilities. Examples include, but are not limited to:
  - Rail facilities - light or heavy, passenger or freight
  - Public roads/highways
  - Vehicular parking facilities
- Fuel storage facilities (above and below ground)
- Hazardous material storage (above and below ground)
- Wastewater treatment facilities

- Above-ground utility infrastructure (i.e., electrical substations), including any type of solar panel installations.

The *Interim Guidance on Land within a Runway Protection Zone* states, "RPZ land use compatibility also is often complicated by ownership considerations. Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Currently, the RPZ review standards are applicable to any new or modified RPZ. The following actions or events could alter the size of an RPZ, potentially introducing an incompatibility:

- An airfield project (e.g., runway extension, runway shift);
- A change in the critical design aircraft that increases the RPZ dimensions;
- A new or revised instrument approach procedure that increases the size of the RPZ; or
- A local development proposal in the RPZ (either new or reconfigured).

Since the interim guidance only addresses new or modified RPZs, existing incompatibilities are essentially grandfathered under certain circumstances. While it is still necessary for the airport sponsor to take all reasonable actions to meet the RPZ design standard, FAA funding priority for certain actions, such as relocating existing roads in the RPZ, will be determined on a case by case basis.

As depicted on **Exhibit 3B**, the RPZ associated with the Runway 23 approach extends beyond airport property over Bagdad Airport Road, which is a public roadway serving the airport and the Bagdad Mine. On the opposite end of the runway, the RPZ associated with Runway 5 extends beyond the property line to include a private service road leading to the Bagdad Solar Project located on the south side of the airport.

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). ASV is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year with limited levels of delay.

In accordance with FAA guidelines specified in FAA AC 150/5060-5, *Airport Capacity and Delay*, the ASV of a single runway configuration comparable to Bagdad Airport can provide up to approximately 230,000 annual operations. FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements should be considered when operations reach 60 percent of the airfield's ASV. As the forecasts for the airport indicate that activity through the planning horizon will remain well below 230,000 annual operations, the capacity of the existing airfield (runway) system will not be reached and the existing single runway configuration can meet operational demands. Thus, additional airfield capacity enhancements are not required.

AIRFIELD REQUIREMENTS

As indicated earlier, airfield facilities include those facilities that are related to the arrival, departure, and ground movement of aircraft. These components include:

- Runways
- Taxiways
- Airfield Lighting, Marking, and Signage
- Navigational Approach Aids

RUNWAYS

The adequacy of the existing runway system at Bagdad Airport has been analyzed from a number of perspectives, including runway orientation, runway length, runway width, and pavement strength. From this information, requirements for runway improvements were determined for the airport. Runway 5-23 should be planned to conform to all applicable ARC B-I design standards (serving small aircraft exclusively).

Runway Orientation

Runway use is normally dictated by wind conditions. The direction of takeoffs and landings are generally determined by the speed and direction of the wind. For the operational safety and efficiency of an airport, it is desirable for the principal runway of an airport's runway system to be oriented as close as possible to the direction of the prevailing wind. This reduces the impact of crosswind components during landing or takeoff.

Bagdad Airport is currently served by Runway 5-23, which is oriented in a northeast-southwest manner. FAA design standards specify that additional runway configurations are needed when the primary runway configuration provides less than 95 percent wind coverage at specific crosswind components. The 95 percent wind coverage is computed on the basis of crosswinds not exceeding 10.5 knots for small aircraft weighing less than 12,500 pounds and from 13 to 20 knots for aircraft weighing over 12,500 pounds.

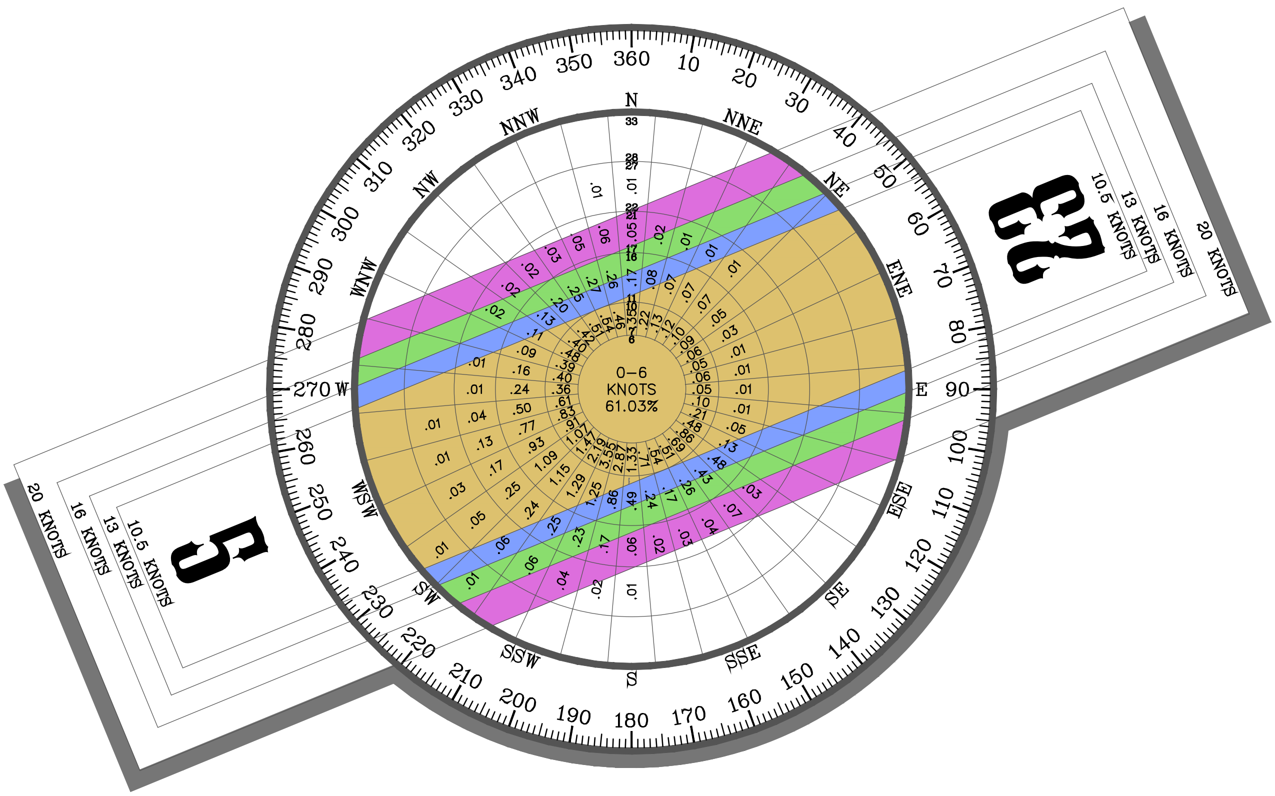
Bagdad Airport is not equipped with any weather reporting device. Therefore, data from the nearest weather station in Prescott, Arizona (located 37 miles east) was used for this analysis. **Exhibit 3C** presents the wind rose for the airport and summarizes wind coverage based on this data.

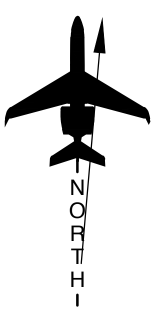
As evidenced on the exhibit, the 94.01 percent coverage associated with 10.5 knots falls just short of the 95 percent threshold. Due to the low level of activity at the airport, constructing a crosswind runway would not be feasible; therefore, the existing runway orientation should be adequate for the planning period.

Runway Length

Runway length requirements for an airport typically are based on factors including airport elevation, mean daily maximum temperature of the hottest month, runway gradient (difference in runway elevation of each runway end), critical

ALL WEATHER WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 5–23	*94.01%*	*96.92%*	*99.18%*	*99.83%*





Magnetic Declination
11° 15' 19.0"East (July 2013)
Annual Rate of Change
00° 06.3' West (July 2013)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Earnest A. Love Field Airport
Prescott, Arizona

OBSERVATIONS:
82,880 All Weather Observations
2003–2012

aircraft type expected to use the airport, and stage length of the longest nonstop trip destination. For aircraft with maximum certificated takeoff weights of less than 12,500 pounds, adjustments for runway gradient are not taken into account.

Aircraft performance declines as each of these factors increase. Summertime temperatures and stage lengths are the primary factors in determining runway length requirements. For calculating runway length requirements at Bagdad Airport, the airport's elevation is 4,163 feet above mean sea level (MSL) and the mean maximum temperature of the hottest month (July) is 96.5 degrees Fahrenheit (F).

Using the site-specific data described above, runway length requirements for the various classifications of aircraft that may operate at the airport were examined using the FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. The program groups general aviation aircraft into several categories, reflecting the percentage of the fleet within each category. The runway design should be based upon the most critical aircraft (or group of aircraft) performing at least 500 annual itinerant operations.

Table 3D summarizes the FAA's generalized recommended runway lengths determined for Bagdad Airport. FAA AC 150/5325-4B recommends that airports 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, Bagdad Airport currently qualifies for the 95 percent fleet category. At the airport's temperature and elevation, this would require a runway length of 5,500 feet.

TABLE 3D
Runway Length Requirements
Bagdad Airport

AIRPORT AND RUNWAY DATA	
Airport elevation	4,163 feet
Mean daily maximum temperature of the hottest month	96.5° F
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
95 percent of these small airplanes	5,500 feet
100 percent of these small airplanes	5,800 feet
Small airplanes with 10 or more passenger seats	5,800 feet

Source: FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design.*

Runway 5-23 at Bagdad Airport is currently 4,552 feet long. Based upon the FAA's AC, the existing runway accommodates less than 95 percent of the fleet during summertime operations. However, only when a specific aircraft is identified as having more than 500 annual itinerant operations that requires greater length will a runway extension be considered. Although no extension to the runway is justified at this time, in the event that a larger multi-engine or turboprop aircraft requiring additional runway length would base at or utilize the airport regularly, justification for additional runway length could be warranted. As a result, analysis in the next chapter will evaluate potential runway extension alternatives for Bagdad Airport.

Runway Width

Runway 5-23 is currently 60 feet wide, which meets the design standards for ADG I, serving small aircraft exclusively.

Runway Pavement Strength

The most important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight on a regular basis. While the pavement strength rating is not the maximum weight limit, aircraft weighing more than the certified strength can only operate on the runway on an infrequent basis. Heavy aircraft operations can shorten the life span of airport pavements.

Runway 5-23 has a current strength rating of 12,000 pounds single wheel loading (SWL). This pavement strength will adequately serve existing and future aircraft operations through the long term planning horizon.

Runway Gradient

Runway gradient describes the effective slope of a runway surface. Runway pavement should be moderately sloped to allow for effective drainage, but not so as to reduce visibility from end to end. Currently, there is a significant difference in runway elevation that encompasses a portion of Runway 5-23 starting approximately 100 feet northeast of the Runway 5 threshold and extending approximately 1,900 feet farther northeast toward the opposite end of the runway. As such, this gradient does not allow for clear line-of-sight from one end of the runway to the other.

The maximum runway gradient change for runways serving AACs A and B is 2.0 percent. According to the recent survey data obtained on the airport, certain portions of the runway described above exceed the standard 2.0 percent gradient change. Further evaluation of the runway gradient and potential recommendations for adhering to FAA standards will be detailed in the next chapter.

TAXIWAYS

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

Runway 5-23 is not served by a parallel taxiway. To improve safety conditions at the airport, a turnaround is constructed at each end of Runway 5-23.

The runway has two connecting taxiway exits. Taxiway A1 is 30 feet wide and Taxiway A2 is 25 feet wide. This meets or exceeds the 25-foot requirement for ADG I design standards, serving small aircraft exclusively.

The design standards associated with taxiways are determined by the TDG or the ADG of the critical design aircraft. As determined previously, the applicable ADG for Runway 5-23 now and into the future is ADG I. **Table 3E** presents the various taxiway design standards related to ADG I in the event that a more extensive taxiway system is offered at Bagdad Airport in the future.

TABLE 3E
Taxiway Dimensions and Standards
Bagdad Airport

STANDARDS BASED ON WINGSPAN	ADG I
Taxiway Protection	
Taxiway Safety Area (TSA) width	49'
Taxiway Object Free Area (TOFA) width	89'
Taxilane Object Free Area width	79'
Taxiway Separation	
Taxiway Centerline to:	
Fixed or Movable Object	69’
Taxilane Centerline to:	
Fixed or Movable Object	39.5'
Parallel Taxiway Centerline to:	
Runway 5-23 Centerline	150'
STANDARDS BASED ON TDG	**TDG 1**
Taxiway Width Standard	25'
Taxiway Edge Safety Margin	5'
Taxiway Shoulder Width	10'
ADG: Airplane Design Group	
TDG: Taxiway Design Group	
Source: FAA AC 150/5300-13A, *Airport Design*	

The table also shows those taxiway design standards related to TDG. The TDG standards are based on the Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiway/taxilane pavements can and should be designed to the most appropriate TDG design standards.

Parallel taxiways provide a standard routing of aircraft to and from the runway recognizable to pilots. Parallel taxiways additionally limit direct inadvertent access onto runways for departing aircraft and reduce runway crossings by providing access to the runway ends on each side of the runway (where necessary). Furthermore, if an instrument approach procedure is offered on Runway 5-23 in the future, it is recommended that a parallel taxiway serve the runway system. Alternative analysis in the next chapter will evaluate a potential parallel taxiway serving Runway 5-23.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

These lighting systems and marking aids assist pilots in locating the airport at night or during poor weather conditions, as well as enhancing the effective ground movement of aircraft.

Identification Lighting

Bagdad Airport is not presently equipped with a rotating beacon. The airport should consider the installation of a rotating beacon to assists pilots in locating the airport at night.

Runway and Taxiway Lighting

Airport lighting systems provide critical guidance to pilots during nighttime and low-visibility operations, as well as enhancing the effective ground movement of aircraft. Runway 5-23 is not presently equipped with any type of lighting system. In the future, the airport should consider the installation of medium intensity runway lighting (MIRL) to allow for aircraft operations during nighttime conditions. Elevated taxiway edge reflectors should be considered on all existing and future taxiways on the airfield.

In the event that the airport pursues airfield lighting in the future, light emitting diode (LED) technology should be considered. LEDs have many advantages, including lower energy consumption, longer lifetime, tougher construction, reduced size, greater reliability, and faster switching. While an initial investment is required upfront, the energy savings and reduced maintenance costs will outweigh any costs in the long run.

Visual Approach Lighting

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual descent information during landings, visual glide slope indicators are commonly provided at airports. Presently, Runway 5-23 is not equipped with any type of visual approach lighting. The airport should consider the installation of two-box precision approach path indicators (PAPI-2s) serving each end of Runway 5-23.

Runway End Identification Lighting

Runway end identification lights (REILs) provide pilots with a rapid and positive identification of the approach ends of a runway. The airport is not currently equipped with REILs, but should consider the installation of REILs on both ends of Runway 5-23.

Pavement Markings

Runway markings are designed according to the type of instrument approach available on the runway. FAA AC 150/5340-1J, *Marking of Paved Areas on Airports*, provides the guidance necessary to design an airport's markings. Basic markings currently exist on Runway 5-23. These markings are currently sufficient and should remain so through the planning period, unless the airport upgrades to an instrument approach, in which non-precision markings would be warranted that consist of threshold bars and aiming points.

As previously discussed, a 120-foot displaced threshold serves each end of Runway 5-23. Analysis in the next chapter will determine the need for the displaced thresholds.

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 during low visibility and cloud ceiling conditions. There are currently no published instrument approaches at Bagdad Airport. The installation of a global positioning system (GPS) approach is recommended at the airport in the future. Analysis in the next chapter will evaluate improvements necessary for enhanced instrument approaches to Runway 5-23 at Bagdad Airport.

WEATHER REPORTING FACILITIES

The airport is equipped with a three wind socks, which provide pilots with information about wind conditions. These facilities are required when the airport is not served by a 24-hour airport traffic control tower (ATCT). The airport is also equipped with a tetrahedron, which is used to indicate the direction of landings and takeoffs.

The airport should consider the installation of an Automated Weather Observation System (AWOS). An AWOS automatically records weather conditions such as wind speed, gusts, wind direction, temperature, dew point, altimeter setting, and density altitude. A summary of the airside needs at Bagdad Airport is presented on **Exhibit 3D**.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for the handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs. This includes:

- Terminal Building
- Aircraft Storage Hangars
- Aircraft Parking Apron
- Vehicle Parking
- Airport Support Facilities

TERMINAL BUILDING

Bagdad Airport does not have a terminal facility or any aircraft and pilot services available to transient aircraft. The airport is unattended and existing hangar facilities are privately owned.

The methodology used in estimating general aviation terminal facility needs is based on the number of airport users expected to utilize general aviation facilities during the design hour. General aviation space requirements were based upon providing 120 square feet per design hour itinerant passenger. Design hour itinerant passengers are determined by multiplying design hour itinerant operations by the number of passengers on the air-

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	AVAILABLE	FUTURE
	**Runway 5-23** RDC B-I (small AC exclusively) 4,552' x 60' 12,000 lbs. SWL	**Runway 5-23** RDC B-I (small AC exclusively) Examine potential to extend to 5,500' Adhere to Runway Gradient Requirements
	**Runway 5-23** Turnaround serving each runway end Connecting Taxiways ≥ 25' wide	**Runway 5-23** Examine potential parallel taxiway Connecting Taxiways ≥ 25' wide
	Wind Socks, Tetrahedron **Runway 5-23** No Approach Lighting	Wind Socks, Tetrahedron AWOS **Runway 5-23** PAPI-2s REILs GPS Approach
	No Identification Lighting **Runway 5-23** No Runway Lighting No Taxiway lighting Basic Marking	Rotating Beacon **Runway 5-23** MIRL (LED) Elevated Taxiway Edge Reflectors Non-Precision Marking

AC - Aircraft
RDC - Runway Design Code
AWOS - Automated Weather Observation System
LED - Light Emitting Diode
MIRL - Medium Intensity Runway Lighting
PAPI - Precision Approach Path Indicator
REIL - Runway End Identifier Lighting
SWL - Single Wheel Loading

Note: Items in red represent future recommendation.

Exhibit 3D
AIRSIDE FACILITIES SUMMARY

craft (multiplier). An increasing passenger count is used to account for the likely increase in larger, more sophisticated aircraft using the airport. Terminal building requirements are presented on **Exhibit 3E**. The airport should consider the construction of a small terminal facility that provides basic pilot and passenger amenities such as a lounge, flight planning, and restrooms.

AIRCRAFT STORAGE HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is towards more sophisticated aircraft (and, consequently, more expensive aircraft); therefore, many aircraft owners prefer enclosed hangar space to outside tie-downs.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at the airport in the future. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, hangar development should be based upon actual demand trends and financial investment conditions. While a majority of aircraft owners prefer enclosed aircraft storage, a number of based aircraft will still tie-down outside (due to the lack of hangar availability, hangar rental rates, and/or operational needs). Therefore, enclosed hangar facilities should not be planned for each based aircraft. At Bagdad Airport, one aircraft is currently stored in an enclosed hangar space.

Hangars are typically classified as conventional/executive hangars, box hangars, T-hangars, and Port-a-Port hangars. Conventional/executive hangars provide open space, free from roof support structures, and have the capability to store multiple aircraft simultaneously, depending on their size. Box hangars are similar to conventional/executive hangars, but smaller in size and typically providing storage for only one or two aircraft. T-hangars provide for separate storage facilities within a larger hangar complex. These hangars typically provide space for only one aircraft and are used for private storage only. Port-a-Port hangars are similar to T-hangars in that they are enclosed hangars for individual aircraft storage. However, each Port-a-Port hangar can be disconnected and transported to a different location.

There are currently two conventional/executive hangars at Bagdad Airport, totaling approximately 4,200 square feet.

A planning standard of 1,200 square feet per based aircraft has been used to determine future requirements for T-hangars. As the trend towards more sophisticated aircraft continues throughout the planning period, it is important to determine the need for more conventional/executive hangar space. For conventional/executive hangars, a planning standard of 1,200 square feet was used for single engine aircraft, while a planning standard of 3,000 square feet was used for multi-engine and turboprop aircraft.

In addition, since portions of conventional/executive hangars are also used for aircraft maintenance and servicing, requirements for a maintenance/service hangar area were estimated using a planning standard of approximately 15 percent of the total hangar space needs.

AIRCRAFT STORAGE HANGAR REQUIREMENTS

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
Aircraft to be Hangared		3	4	6
T-Hangar Area (s.f.)		3,600	3,600	4,800
Conventional / Executive Hangar Area (s.f.)		0	3,000	6,000
Maintenance Area		500	1,000	1,600
Total Hangar Area (s.f.)	**4,200**	**4,100**	**7,600**	**12,400**

AIRCRAFT PARKING APRON REQUIREMENTS

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
Transient Aircraft Positions		7	8	9
Apron Area (s.y.)		6,400	8,000	8,800
Locally Based Aircraft Positions		1	1	1
Apron Area (s.y.)		700	700	700
Total Positions	**12**	**8**	**9**	**10**
Total Apron Area (s.y.)	**6,000**	**7,100**	**8,700**	**9,500**

GENERAL AVIATION TERMINAL AREA FACILITIES

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
General Aviation Building Space (s.f.)	N/A	1,100	1,500	2,000

VEHICLE PARKING REQUIREMENTS

	AVAILABLE	SHORT TERM NEED	INTERMEDIATE TERM NEED	LONG TERM NEED
Design Hour Passengers		4	5	8
Terminal Vehicle Spaces		8	11	20
Parking Area (s.f.)		3,200	4,400	8,000
General Aviation Parking Spaces		2	3	3
General Aviation Parking Area (s.f.)		800	1,200	1,200
Total Parking Spaces		**10**	**14**	**23**
Total Parking Area (s.f.)	**N/A**	**4,000**	**5,600**	**9,200**

Exhibit 3E
LANDSIDE FACILITIES SUMMARY

Future hangar requirements for the airport are summarized on **Exhibit 3E**. The exhibit indicates that additional hangar space could be needed in the intermediate term. It should be noted that these hangar requirements are general in nature based on the aviation demand forecasts. Actual need for hangar space will depend on the actual usage within hangars, as well as the need to replace and/or relocate existing hangars.

AIRCRAFT PARKING APRON

A parking apron should provide for the number of locally based aircraft that are not stored in hangars, as well as for those aircraft used for air taxi and training activity. Parking should be provided for itinerant aircraft as well.

For planning purposes, 20 percent of the based aircraft total will be used to determine the parking apron requirements of local aircraft, due to some aircraft requiring both hangar storage and parking apron space. Since the majority of locally based aircraft are stored in hangars, the area requirement for parking of locally based aircraft is smaller than for transient aircraft. Therefore, a planning criterion of 650 square yards per aircraft was used to determine the apron requirements for local aircraft. Transient aircraft parking needs must also be considered when determining apron requirements. A planning criterion of 800 square yards was used for single and multi-engine itinerant aircraft and 1,600 square yards for turboprops and jet aircraft.

Current apron area at Bagdad Airport totals approximately 6,000 square yards with twelve aircraft tie-down positions. Future aircraft parking apron requirements are presented on **Exhibit 3E**. This analysis indicates that additional apron area could be supported through the long term planning period. Additional apron area may also be needed as new hangar areas are developed on the airport which are not contiguous with the existing apron areas.

VEHICLE PARKING

A limited area for vehicle parking is located between the main aircraft parking apron and hangar farther east. Future vehicle parking requirements have been determined based on industry standards and are presented on **Exhibit 3E**. The airport should consider the development of a dedicated vehicle parking area to better segregate aircraft and vehicle movements.

AIRPORT SUPPORT FACILITIES

Various facilities that do not logically fall within classifications of airfield, terminal building, or general aviation areas have also been identified. These other areas provide certain functions related to the overall operation of the airport and include the following:

- Aircraft Rescue and Firefighting
- Fuel Storage
- Maintenance/Storage Facilities
- Security Fencing/Gates
- Utilities
- Security Recommendations

Aircraft Rescue and Firefighting

Presently, there is no dedicated airport rescue and firefighting (ARFF) facility at Bagdad Airport. Requirements for ARFF services at an airport are established under Title 14 Code of Federal Regulations (CFR) Part 139, which applies to the certification and operation of airports served by any scheduled or unscheduled passenger operation of an air carrier using an aircraft with more than nine seats. Since the airport is not a Part 139 facility, an on-site ARFF facility is neither required nor justified.

Fuel Storage

Public fueling facilities are not currently available at Bagdad Airport. The costs of developing fuel facilities, combined with the level of activity at the airport, make it difficult to economically justify it at the present time. This does not preclude the potential for fueling services in the future.

Future fueling requirements would likely be dictated by transient aircraft use associated with the Bagdad Mine. In the event that fueling capabilities were provided on the airfield, one 12,000-gallon fuel storage tank with two separate compartments, one storing 100LL and the other storing Jet A fuel, would be adequate at the facility.

Maintenance/Storage Facilities

A dedicated maintenance facility is not currently available at Bagdad Airport. Consideration should be given to a dedicated facility for airport maintenance and storage.

Security Fencing / Gates

Perimeter fencing is used at airports primarily to secure the aircraft operational 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 facilities.

- Limits inadvertent access to the aircraft operations area by wildlife.

Bagdad Airport's operations areas are completely enclosed with chain link fence topped by three-strand barbed-wire. One controlled-access gate associated with the fencing leads to landside facilities on the airport.

Utilities

The availability and capacity of the utilities serving the airport are factors in determining the development potential of the airport. Currently, utility service is limited at the airport. A water tank and connecting pipeline are located on the northwest side of the airport and extend east toward existing landside development. Further evaluation of these facilities will be made to determine the likelihood of utilizing such for future development on the airfield.

Security Recommendations

In cooperation with representatives of the general aviation community, the Transportation Security Administration (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 weighing more than 12,500 pounds warrant greater security measures.

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 3F 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. As shown in the table, the Bagdad Airport's ranking on this scale is 8. Points are assessed for the airport having a runway between 2,001 and 5,000 feet long constructed of asphalt. Furthermore, additional transient flight training is also conducted at the facility.

TABLE 3F
General Aviation Airport Security Measurement Tool
Transportation Security Administration

	Assessment Scale	
Security Characteristic	**Public Use Airport**	**Bagdad Airport**
Airport 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	0
10 or fewer based aircraft	0	0
Based aircraft over 12,500 pounds	3	0
Runways		
Runway length greater than 5,001 feet	5	0
Runways less than 5,000 feet and greater than 2,001 feet	4	4
Runway length less than 2,000 feet	2	0
Asphalt or concrete runway	1	1
Operations		
Over 50,000 annual operations	4	0
Part 135 operations (Air taxi and fractionals)	3	0
Part 137 operations (Agricultural aircraft)	3	0
Part 125 operations (20 or more passenger seats)	3	0
Flight training	3	3
Flight training in aircraft over 12,500 pounds	4	0
Rental aircraft	4	0
Maintenance, repair, and overhaul facilities conducting long-term storage of aircraft over 12,500 pounds	4	0
Totals	**64**	**8**

[1] An area with a population over 100,000

[2] Sensitive sites include military installations, nuclear and chemical plants, centers of government, national monuments, and/or international ports

Source: *Security Guidelines for General Aviation Airports* (TSA 2004)

As shown in **Table 3G**, a rating of 8 points places Bagdad Airport in the fourth tier ranking of security measures by the TSA. Based upon the results of the security assessment, the TSA recommends five potential security enhancements for Bagdad Airport. These enhancements are discussed in detail as follows:

TABLE 3G
Recommended Security Enhancements

	Points Determined Through Airport Security Characteristics Assessment			
Security Enhancements	**Tier 1 > 45**	**Tier 2 25-44**	**Tier 3 15-24**	**Tier 4 0-14**
Fencing	■			
Hangars	■			
Closed-Circuit Television (CCTV)	■			
Intrusion Detection System	■			
Access Controls	■	■		
Lighting System	■	■		
Personal ID/Vehicle 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*

Documented Security Procedures: This refers to having a written security plan. This plan would include documenting the security initiatives already in place at Bagdad Airport, as well as any new enhancements. This document should consist of airport and local law enforcement contact information, and include 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 boarding 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 criminal 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 general aviation 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.

Other security measures may be considered by the airport as the local need demands. It should be noted that Yavapai County has been proactive in dealing with security enhancements with the recent construction of airport perimeter fencing and a controlled-access gate at Bagdad Airport.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for Bagdad Airport through the long term planning horizon. By utilizing planning horizons, Yavapai County can focus on demand indicators for initiating projects and grant requests rather than on specific dates in the future.

In Chapter Four, potential improvements to the airside and landside systems will be examined through a series of airport development alternatives. Most of the alternatives discussion will focus on those capital improvements that would be eligible for federal and state grant funds. Other projects of local concern will also be presented. Ultimately, an overall airport development plan that presents a vision beyond the 20-year scope of this Master Plan will be developed.

Chapter Four

AIRPORT ALTERNATIVES

Chapter Four

AIRPORT ALTERNATIVES

Prior to defining the recommended development program for Bagdad Airport, it is important to first consider development potential as well as constraints to future development at the airport. The previous chapters have focused on the airport's available facilities, existing and potential future demand levels, and the types of facilities that are needed to meet the demand. Specific attention was also given to defining Federal Aviation Administration (FAA) design standards that are applicable to the airport.

In some cases, development needs are straightforward, while for other items, alternative methods for meeting projected aviation demand should be considered. In this chapter, airport development alternatives are considered for the airport, where applicable. For each alternative, different physical layouts are presented for the purpose of evaluation. The ultimate goal is to develop the underlying rationale which supports the recommended development concept. Through this process, an evaluation of the most realistic and best uses of airport property is made while considering local development goals, physical and environmental constraints, and appropriate airport design standards.

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 for the next 20 years. However, no plan of action should be developed which may be in-consistent with the future goals and objectives of Yavapai County and the Town

of Bagdad, who have a vested interest in the development and operation of the airport.

The development alternatives for Bagdad Airport can be categorized into two functional areas: airside (runways, taxiways, navigational aids, marking and lighting) and landside (aircraft storage hangars, terminal area, aircraft parking aprons, automobile parking, and support services). Each functional area interrelates and affects the development potential of the others. Therefore, all areas must be examined individually, and then coordinated as a whole, to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the existing airport must be evaluated to determine if the investment in Bagdad Airport will meet the needs of the region, both during and beyond the planning period.

The alternatives presented in this chapter 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 Yavapai County officials, the alternatives (or combination thereof), will be refined and modified as necessary to develop the recommended development concept. Therefore, the alternatives presented in this chapter can be considered a beginning point in the development of the recommended concept for the future development of Bagdad Airport.

In conjunction with the alternatives, an environmental overview has been completed and included as an appendix to the Master Plan. The purpose of the overview is to obtain information regarding environmental sensitivities on or near airport property and to identify any potential environmental concerns that must be addressed prior to program implementation. Only informal consultation with various federal and state agencies occurs (if needed) at this time to document environmental sensitivities.

CONSIDERATION OF NON-DEVELOPMENT ALTERNATIVES

In analyzing and comparing the advantages and disadvantages of various development alternatives, it is important to consider the consequences of no future development at Bagdad Airport, transferring services to another airport, and the development of a new airport.

NO ACTION ALTERNATIVE

In analyzing and comparing costs and benefits of various development alternatives, it is important to consider the consequences of no further development. The "no action" alternative essentially considers keeping the airfield in its present condition and not providing for any improvements to existing facilities. The primary result of this alternative, as in any changing air transportation market, would be the eventual inability of the airport to satisfy the demands of the local service area.

The airport's aviation demand forecasts and facility requirements call for the potential implementation of aircraft storage hangars, terminal facility space, fueling services, and additional runway length. A policy of "no action" would be considered an irresponsible approach, ignoring not only the long term viability of the airport and the investment that has been made in it, but also the economic well-being of the region. If facilities are not maintained and improved so that the airport can provide a pleasant experience to the flying public, then pilots and passengers may consider alternate airport locations. Therefore, the "no action" alternative is not considered as prudent or feasible.

TRANSFER SERVICES TO ANOTHER AIRPORT

Limiting development at Bagdad Airport and relying on other airports to serve aviation demand for the local area is an alternative for consideration. As discussed in Chapter One, there are three public-use airports located within 50 nautical miles (nm) of Bagdad Airport. Ernest A. Love Field in Prescott is located approximately 37 nm east of Bagdad Airport and has a primary runway length of 7,616 feet. Wickenburg Airport, located 42 nm to the southeast, has a runway length of 6,101 feet. Both airports provide longer runway lengths and aviation services which Bagdad Airport currently does not offer; however, general aviation users desiring to utilize these airports would have to drive considerable distances in order to reach these public-use airports. The commute may be considered a substantial supplementary expense, especially when Bagdad Airport already exists.

Seligman Airport is the third public-use airport within 50 nm of Bagdad Airport, located 47 nm to the northeast. Also owned and operated by Yavapai County, this facility is comparable to Bagdad Airport in terms of runway length and limited aviation services being offered.

Shifting aviation services away from and closing the airport could hinder the services provided to the Town of Bagdad, the Bagdad Mine, and surrounding area given their remote location. Furthermore, relocating aviation activities and closing the airport would not be a viable option given the amount of federal and state grant funding that Yavapai County has accepted, in addition to matching funds the County has invested to complete recent improvements on the airfield.

DEVELOPMENT OF A NEW AIRPORT

The alternative of developing an entirely new airport facility to meet the aviation needs of the local area can also be considered. The development of a new airport is generally considered when an airport reaches capacity and it is cost-prohibitive to expand the existing facility. Development of a new airport is not considered necessary from a capacity perspective, as Bagdad Airport can continue to develop its airfield system to meet the demands of aviation activity.

As detailed earlier in this study, the Bagdad Mine is located directly north of the airport. In March 2000, Yavapai County approved a Quit Claim Deed from Phelps Dodge Bagdad, Inc. (now Freeport-McMoRan Copper & Gold Company) conveying all rights, title, and interest of the Bagdad Airport to Yavapai County. Over the past several years, the open-pit mining operation has expanded and has reached the edge of the mesa that encompasses the airport. Certain terms of the Quit Claim Deed, pending further legal review, could allow for expansion of the mine to the south which could negatively impact operations at the airport. While this issue is beyond the scope of this Master Plan, Yavapai County should continue to coordinate with the mine operators regarding the future growth and development of the Bagdad Mine.

From the social, political, and environmental standpoints, the commitment of a new large land area must also be considered when developing a new airport. Also, a new airport would likely take a minimum of ten years to become a reality. The potential exists for significant environmental impacts associated with disturbing a large land area when developing a new airport site.

Overall, transferring service to an existing airport in the region or to an entirely new airport facility are unreasonable alternatives that will not be further pursued at this time. Bagdad Airport is capable of accommodating its share of the long range aviation demands of the area and should be developed in response to those demands. The airport has the potential to continue to develop as a general aviation facility that could serve the needs of Yavapai County, the Town of Bagdad, the Bagdad Mine, and the surrounding area, and enhance the economic development of the region.

REVIEW OF PREVIOUS MASTER PLAN AND AIRPORT LAYOUT PLAN

The previous Master Plan for Bagdad Airport was completed in 2000. More recently, the Airport Layout Plan (ALP) has been updated and approved by the FAA in 2008.

The 2000 Master Plan recommended several airside and landside improvements, including maintenance and lighting upgrades on Runway 5-23, installation of 8-foot perimeter fencing, implementation of a terminal facility, apron overlays, and construction of additional hangar facilities. Since the time of these recommendations, significant investments have been made for improvements to the airfield, including the rehabilitation of runway, taxiway, and apron pavements. In addition, focus has been given to enhancing safety and security of the airport by adhering to FAA safety design standards and installing perimeter fencing around airport property.

The 2008 ALP, shown on **Exhibit 4A**, depicts improvements at Bagdad Airport along with other proposed projects, including:

- Runway lighting on Runway 5-23;
- Reconstruction of a portion of the runway to meet proper FAA standards for runway gradient; and
- Landside development in the form of a terminal facility and increased aircraft parking apron space.

The analysis to follow in this alternatives chapter will revisit the recommendations presented in the previous Master Plan and on the current ALP. Some elements may be carried over to this Master Plan and others may be removed from further consideration.

AIRPORT DEVELOPMENT OBJECTIVES

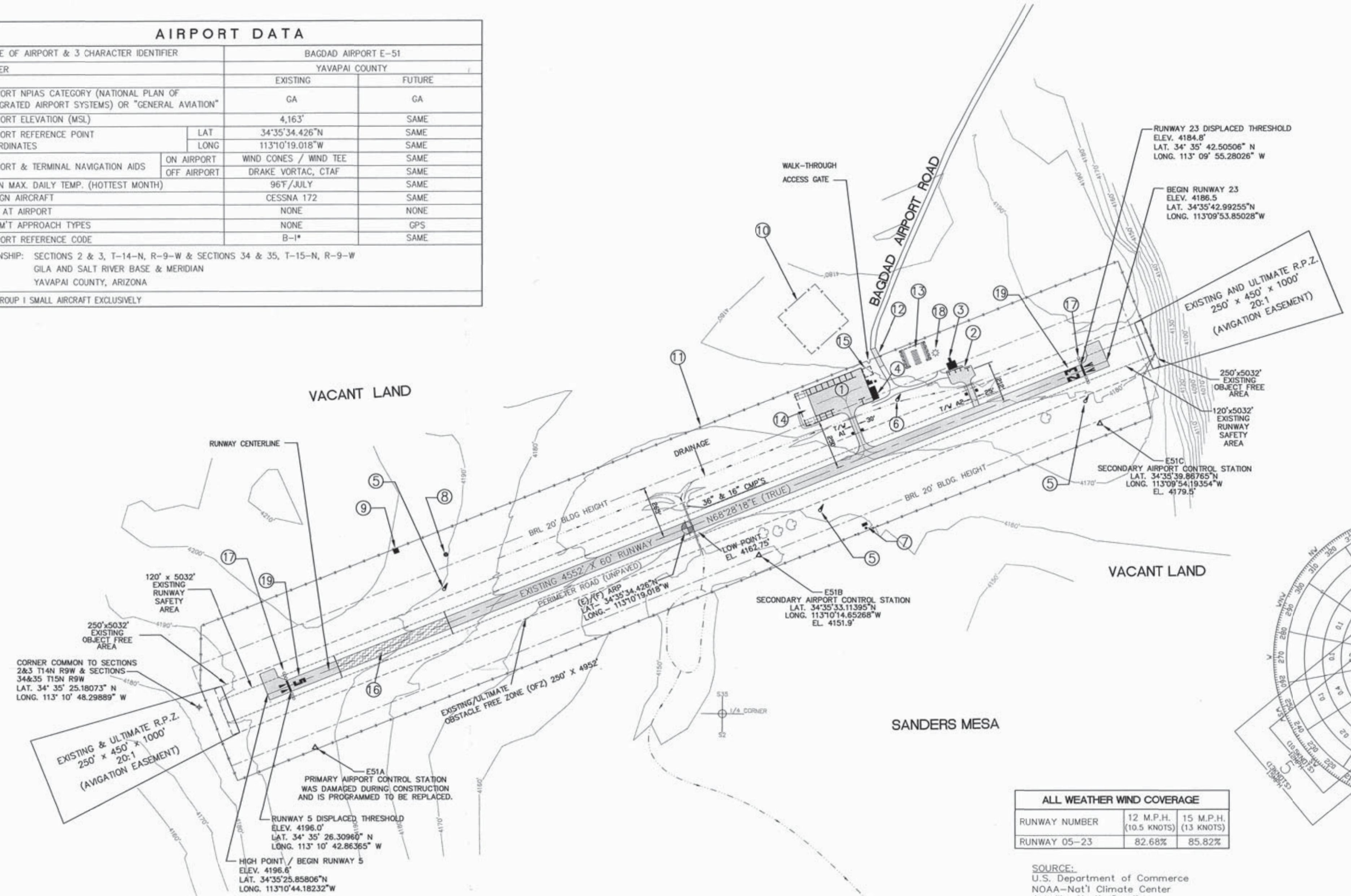
It is the overall objective of this effort to produce a balanced airport complex to serve forecast aviation demands. Before defining and evaluating specific alternatives, airport development objectives should be established. The primary goal

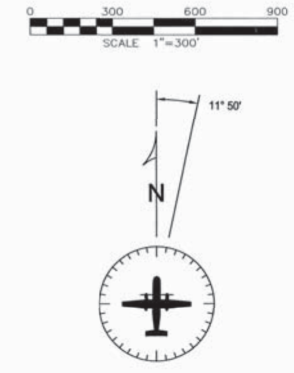
AIRPORT DATA

			EXISTING	FUTURE
NAME OF AIRPORT & 3 CHARACTER IDENTIFIER			BAGDAD AIRPORT E-51	
OWNER			YAVAPAI COUNTY	
AIRPORT NPIAS CATEGORY (NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS) OR "GENERAL AVIATION"			GA	GA
AIRPORT ELEVATION (MSL)			4,163'	SAME
AIRPORT REFERENCE POINT COORDINATES		LAT	34°35'34.426"N	SAME
		LONG	113°10'19.018"W	SAME
AIRPORT & TERMINAL NAVIGATION AIDS	ON AIRPORT		WIND CONES / WIND TEE	SAME
	OFF AIRPORT		DRAKE VORTAC, CTAF	SAME
MEAN MAX. DAILY TEMP. (HOTTEST MONTH)			96°F/JULY	SAME
DESIGN AIRCRAFT			CESSNA 172	SAME
GPS AT AIRPORT			NONE	NONE
INSTM'T APPROACH TYPES			NONE	GPS
AIRPORT REFERENCE CODE			B-I*	SAME

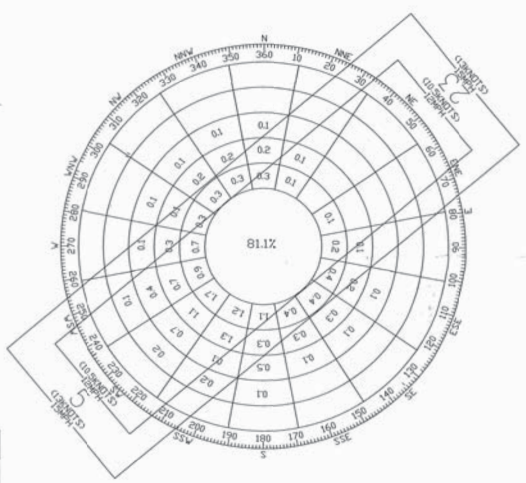
TOWNSHIP: SECTIONS 2 & 3, T-14-N, R-9-W & SECTIONS 34 & 35, T-15-N, R-9-W
GILA AND SALT RIVER BASE & MERIDIAN
YAVAPAI COUNTY, ARIZONA

*GROUP I SMALL AIRCRAFT EXCLUSIVELY





Magnetic Declination=11° 50'E
2008 Annual Average Rate of Change
is 0.103' West (NGDC/NOAA, March 2008)



ALL WEATHER WIND COVERAGE

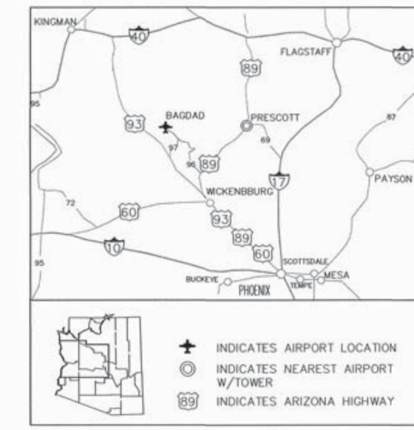
RUNWAY NUMBER	12 M.P.H. (10.5 KNOTS)	15 M.P.H. (13 KNOTS)
RUNWAY 05-23	82.68%	85.82%

SOURCE:
U.S. Department of Commerce
NOAA–Nat'l Climate Center
Ashville, North Carolina

Note: Prescott Airport wind data from 1978–1998 used for Bagdad Airport's windrose.

LEGEND

	EXISTING	FUTURE
ROADS AND FACILITIES		SAME
BUILDINGS		
OBSTACLE FREE ZONE (OFZ)		SAME
RUNWAY SAFETY AREA (RSA)		SAME
BUILDING RESTRICTION LINE (BRL)		SAME
PROPERTY BOUNDARY / FENCE		SAME
WALK THROUGH ACCESS GATE		SAME
TOPOGRAPHIC CONTOUR	4170'	SAME
AIRPORT REFERENCE POINT (ARP)		SAME
ASPHALTIC CONCRETE PAVEMENT		SAME
DRAINAGE		SAME
SURVEY CONTROL POINTS		SAME
TAXIWAY CONNECTOR REFLECTORS	NONE	
BUSHES		SAME
UNDERGROUND DRAIN PIPE		SAME
WIND INDICATOR		SAME
SECTION CORNER		SAME
RUNWAY THRESHOLD LIGHTING	NONE	
AIRPORT ROTATING BEACON	NONE	



AIRPORT LOCATION MAP

NOT TO SCALE

AIRPORT VICINITY MAP

NOT TO SCALE

DEVIATIONS FROM DESIGN STANDARDS

DEVIATION DESCRIPTION	AFFECTED DESIGN STD	STANDARD	EXISTING	PROPOSED DISPOSITION
RUNWAY 5 END USABLE RSA WIDTH TOO NARROW	AC 150/5300-13-305	120'	105'	WIDEN USABLE RSA WIDTH TO 120' ON THE RUNWAY 05 END
RUNWAY 5 END USABLE RSA LENGTH TOO SHORT	AC 150/5300-13-305	240'	210'	EXTEND USABLE RSA LENGTH TO 240' ON THE RUNWAY 05 END
RUNWAY 23 END USABLE RSA LENGTH TOO SHORT	AC 150/5300-13-305	240'	170	EXTEND USABLE RSA LENGTH TO 240' ON THE RUNWAY 23 END

AIRPORT BUILDINGS/FACILITIES

EXISTING	FUTURE	DESCRIPTION
1		MAIN TIEDOWN APRON (WEST)
2		SECONDARY TIEDOWN APRON (EAST) POOR PAVEMENT CONDITION
3		EAST PRIVATE HANGAR
4		WEST PRIVATE HANGAR
5		WINDSOCK
6		WINDTEE
7		FAA RCO (122.5 MHZ)
8		WATER TANK
9		SEISMIC RECORDER, FENCED
10		LIVESTOCK FENCE
11		SECURITY FENCE
12		SECURITY GATE-CARDKEY ACCESS
	13	FUTURE AUTO PARKING
	14	FUTURE AIRCRAFT PARKING
	15	FUTURE TERMINAL BUILDING
	16	FUTURE RUNWAY RECONSTRUCTION TO FAA STDS. (APPR. 1200 S.Y.)
	17	FUTURE THRESHOLD LIGHTS
	18	FUTURE ROTATING BEACON
	19	FUTURE RUNWAY NUMBER CHANGE FROM 5/23 TO 6/24 DUE TO MAGNETIC DECLINATION

RUNWAY DATA TABLE

		RWY 05-23	
DATA ELEMENTS		EXISTING	FUTURE
AIRPLANE DESIGN GROUP		GROUP I *	SAME
AIRCRAFT APPROACH CATEGORY		B	SAME
RUNWAY AZIMUTH	RWY 05	291°31'42"	SAME
	RWY 23	68°28'18"	SAME
RUNWAY BEARING (TRUE)		N68°28'18"E	SAME
MAXIMUM ELEVATION ABOVE MSL		4,195.75'	SAME
INSTRUMENT RUNWAY (TYPE)		VISUAL	GPS(SEE NOTE 5)
APPROACH SLOPE (BOTH ENDS)		20:1	SAME
APPROACH VISIBILITY MINIMUMS (BOTH ENDS)		+3 MILE	SAME
THRESHOLD DISPLACEMENT	RWY 05	110'	NONE
	RWY 23	125'	NONE
RUNWAY (WIDTH)		60'	SAME
RUNWAY (LENGTH)		4,552'	SAME
WIDTH & LENGTH (W & L) BEYOND RUNWAY END	RWY END 05	105'W X 210'L	120'W X 240'L
	RWY END 23	120'W X 170'L	120'W X 240'L
RUNWAY SAFETY AREA	RWY 05-240'	120' x 5,032'	SAME
	RWY 23-240'		
OBJECT FREE AREA		250' x 5,032'	SAME
OBSTACLE FREE ZONE		250' x 4,952'	SAME
PAVEMENT STRENGTH (IN POUNDS)		4,000 SWL	12,500 SWL

*GROUP I SMALL AIRCRAFT EXCLUSIVELY

RUNWAY DATA TABLE (CONT)

		RWY 05-23	
DATA ELEMENTS		EXISTING	FUTURE
RUNWAY INSTRUMENTATION(BOTH ENDS) (PER ADOT 1999 CHECKLIST)		VISUAL/VISUAL	NONPRECISION/VISUAL (SEE NOTE 5)
RUNWAY LIGHTING (LIRL, MIRL, HIRL)		NONE	MIRL
RUNWAY APPROACH LIGHTING		NONE	SAME
RUNWAY MARKING		BASIC/BASIC	SAME
RUNWAY SURFACE TYPE		ASPHALT	SAME
TAXIWAY LIGHTING (REFLECTORS, MITL)		NONE	REFLECTORS
TAXIWAY MARKING		NONE	EDGE/CENTERLINE
TAXIWAY SURFACE TYPE		ASPHALT	SAME
NAVIGATIONAL AIDS		NONE	GPS(SEE NOTE 5)
VISUAL AIDS (GVGI, REIL, ETC.)		WIND CONES & WIND TEE	SAME PLUS REILS 23 END
RUNWAY EFFECTIVE GRADIENT (%)		1.4%	SAME
PAVEMENT SURFACE TREATMENT		ASPHALT OVERLAY	SAME
RUNWAY APPROACH LIGHTING (ODALS, MALSAR, ETC.)		NONE	SAME
FAR PART 77 CATEGORY (BOTH ENDS)		VISUAL/VISUAL	SAME
WIND COVERAGE %	12 M.P.H.	82.68%	SAME
	15 M.P.H.	85.82%	SAME

RUNWAY END DATA (NAD 83)

RUNWAY			EXISTING	FUTURE
RUNWAY 5	ELEV.	LAT	34° 35' 25.85806" N	SAME
	4196.6'	LONG	113° 10' 44.18232" W	SAME
RUNWAY 5 – DISPLACED THRESHOLD	ELEV.	LAT	34° 35' 26.30960" N	SAME
	4196.0'	LONG	113° 10' 42.86365" W	SAME
RUNWAY 23	ELEV.	LAT	34° 35' 42.99255" N	SAME
	4186.5'	LONG	113° 09' 53.85028" W	SAME
RUNWAY 23 – DISPLACED THRESHOLD	ELEV.	LAT	34° 35' 42.50506" N	SAME
	4184.8'	LONG	113° 09' 55.28026" W	SAME

GENERAL NOTES:

1. LAT/LONG BASED ON NORTH AMERICAN DATUM 1983. (NAD 83). ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).
2. AIRPORT SURVEY CONTROL STATIONS ARE PER F.A.A. No.405 – STANDARDS FOR AERONAUTICAL SURVEYS AND RELATED PRODUCTS, FOURTH EDITION 1996.
3. AIRPORT DATA (Including Spot Elevations) BASED ON NGS/YAVAPAI COUNTY SURVEY, AUGUST 2003. TOPOGRAPHICAL CONTOURS BASED ON COUNTY SURVEY 2008.
4. YAVAPAI COUNTY OWNS AIRPORT PROPERTY PER QUIT CLAIM DEED, MARCH 20, 2000.
5. FUTURE GPS APPROACH PROPOSED IS SUBJECT TO FURTHER EVALUATION. THE AZ NAVIGATIONAL AIDS AND AVIATION SERVICES SPECIAL STUDY (NOV 1998) STATES THAT A POTENTIAL IAP FOR BAGDAD DOES NOT MEET THE 1-MILE TARGET VISIBILITY, BUT THAT FACILITY DESIGN STANDARDS ARE MET. HOWEVER, THE BAGDAD AIRPORT MASTER PLAN 2000 NOTES THAT ANNUAL OPERATIONS AT BAGDAD ARE MINIMAL AND SUGGEST THAT A BENEFIT/COST ASSESSMENT BE CONDUCTED TO DETERMINE WHETHER SUCH AN INVESTMENT IS JUSTIFIED.

FAA STATEMENT:
THE CONTENTS OF THIS PLAN DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF ADOT AERONAUTICS DIVISION AND THE FAA. ACCEPTANCE OF THIS DOCUMENT BY ADOT AND THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE STATE OF ARIZONA AND 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.

~~Approved conditionally~~ ____
Subject to comments contained in our letter dated: 12/23/2008
Revalidated 12/23/2008
FEDERAL AVIATION ADMINISTRATION
Western-Pacific Region
By Robert C Cabalbag
Asst. Manager - LAX/ADO

FOR APPROVAL BY
YAVAPAI COUNTY, ARIZONA

Phil Bourdon — 11/25/08
APPROVED BY — DATE
PUBLIC WORKS DIRECTOR
TITLE

NO.	DESCRIPTION OF WORK	DATE	BY	APPROVED
2	ALP UPDATE	4/08	TTS	
1	PREVIOUS APPROVED ALP	8/00	RC	FAA

YAVAPAI COUNTY
PUBLIC WORKS DEPARTMENT
1100 COMMERCE DR. PRESCOTT, ARIZONA 86305
(928) 771-3183
PHIL BOURDON, PUBLIC WORKS DIRECTOR

PROJECT NAME:
BAGDAD AIRPORT
BAGDAD, ARIZONA
SERVICE REQUEST (PROJ.) #28-18116
SHEET NAME:
AIRPORT LAYOUT PLAN

DESIGN BY: A.M.S.
DRAWN BY: A.M.S.
CHECKED BY: T.T.S.
DATE: November 25, 2008
DWG. NAME: Bagdad ALP 2008.dwg
SHEET: 2 OF 8

Exhibit 4A
2008 AIRPORT LAYOUT PLAN

of the Master Plan is to define a development concept which allows for the airport to be marketed, developed, and safely operated for the betterment of the surrounding region and its users. With this in mind, the following development objectives have been defined for this planning effort.

- Conform to FAA and Arizona Department of Transportation – Multimodal Planning Division – Aeronautics Group (ADOT-MPD – Aeronautics Group) design and safety standards for the mix of aircraft that could potentially use the airport during the 20-year planning period of the Master Plan;
- Develop facilities to safely and efficiently serve aviation users and support the potential for future growth;
- Reflect and support, wherever applicable, the long term planning efforts currently applicable to the region;
- Identify any future land acquisition needs;
- Develop a facility with a focus on self-sufficiency and cost recovery; and
- Ensure that any recommended future development is environmentally compatible.

AIRPORT PLANNING CONSIDERATIONS

The development alternatives are categorized into two functional areas: airside and landside. Airside considerations relate to runways, taxiways, navigational aids, etc. and require the greatest commitment of land area to meet the physical layout of the airport, as well as the required airfield safety standards. The design of the airfield also defines the minimum set-back distances from the runway and object clearance standards. These criteria are defined first to ensure that the fundamental needs of the airport are met. Landside considerations include hangars, aircraft parking aprons, terminal facilities and services, as well as the utilization of remaining airport property to provide revenue support for the airport and to benefit the economic development and well-being of the regional area.

Each functional area interrelates and affects the development potential of the others. Therefore, all areas must be examined individually, and then coordinated as a whole, to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the existing airport must be evaluated to determine if the investment in Bagdad Airport will meet the needs of the surrounding area, both during and beyond the planning period of this study.

Exhibit 4B presents both the airside and landside planning considerations that will be specifically addressed in this analysis. These issues are the result of the findings of the aviation demand forecasts and airport facility requirements evaluations, as well as input from the PAC.

The remainder of this chapter will describe various development alternatives for airside and landside facilities. Although each area is treated separately, ultimate planning will integrate the individual requirements so that they can complement one another.

12MP08-4B-09/09/13

AIRSIDE CONSIDERATIONS

- Plan for Runway Design Code (RDC) B-I (small aircraft) standards on Runway 5-23.
- Improve runway gradient and line-of-sight to meet Aircraft Approach Category (AAC) B design standards.
- Consider the potential for a runway extension providing up to 5,500 feet of operational length and associated land acquisition needs.
- Install medium intensity runway lighting (MIRL) and taxiway edge reflectors.
- Analyze the displaced thresholds serving each runway end.
- Evaluate the taxiway system to include constructing taxiway turnarounds and a potential parallel taxiway serving Runway 5-23.
- Enhance visual approaches to the runway system through the installation of precision approach path indicators (PAPIs) and runway end identification lights (REILs).
- Consider instrument approach procedures for Runway 5-23.
- Install a rotating beacon and an Automated Weather Observation System (AWOS).

LANDSIDE CONSIDERATIONS

- Evaluate the development of a small terminal facility at the airport.
- Identify locations for future hangar development.
- Consider additional aircraft parking apron area to meet future aircraft demands.
- Provide a designated vehicle parking area.
- Analyze a separate facility for airport maintenance and storage.
- Designate an area to accommodate aircraft fuel storage capabilities.

Exhibit 4B
PLANNING CONSIDERATIONS

AIRSIDE DEVELOPMENT CONSIDERATIONS

This section identifies and evaluates various airside development factors at Bagdad Airport. Airside facilities are, by nature, the focal point of an airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development options.

AIRPORT DESIGN CRITERIA

Applicable standards for airport design are outlined in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*. The design of airfield facilities is primarily based on the physical and operational characteristics of aircraft using the airport. As discussed in Chapter Three, the Runway Design Code (RDC) is applied to an airport's runway in order to identify the appropriate design standards for the runway and associated taxiway system. The RDC is made up of the Aircraft Approach Category (AAC), the Airplane Design Group (ADG), and the approach visibility minimums expressed in runway visual range (RVR) values. It relates to the largest and fastest aircraft which conducts 500 or more annual operations at the airport. While this can, at times, be represented by one specific make and model of aircraft, a runway's RDC can also be representative of several different aircraft, which collectively operate frequently at the airport.

The existing RDC for Runway 5-23 is B-I-VIS (serving small aircraft exclusively). Analysis in Chapter Three indicated that the RDC at Bagdad Airport is planned to remain in B-I (small aircraft exclusively), which accommodates a large majority of general aviation propeller aircraft, as well as some small business jets, all weighing less than 12,500 pounds. In the event that the runway were to obtain a non-precision instrument approach with visibility minimums not lower than one-mile, the RDC would be B-I – NPI-1 (small aircraft exclusively).

SAFETY AREAS

The design of airfield facilities includes both the pavement areas to accommodate landing and ground operations of aircraft, as well as the required safety areas to protect aircraft operational areas and keep them free of obstructions that could affect the safe operation of aircraft at the airport. The safety areas include the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), and runway protection zone (RPZ). As depicted on **Exhibit 4C**, the RSA, OFA, and OFZ standards are currently met on Runway 5-23 at Bagdad Airport, while portions of the RPZ do not conform to FAA standards.

Runway Protection Zone

The goal of the RPZ standard is to increase safety for both pilots and people on the ground by maintaining the RPZ free of items that attract groupings of people or property. FAA AC 150/5300-13A defines the RPZ as *"An area at ground level off the runway end to enhance the safety and protection of people and property on the ground."*

The disposition of RPZs for each runway end should be considered individually. The FAA recommends that the airport

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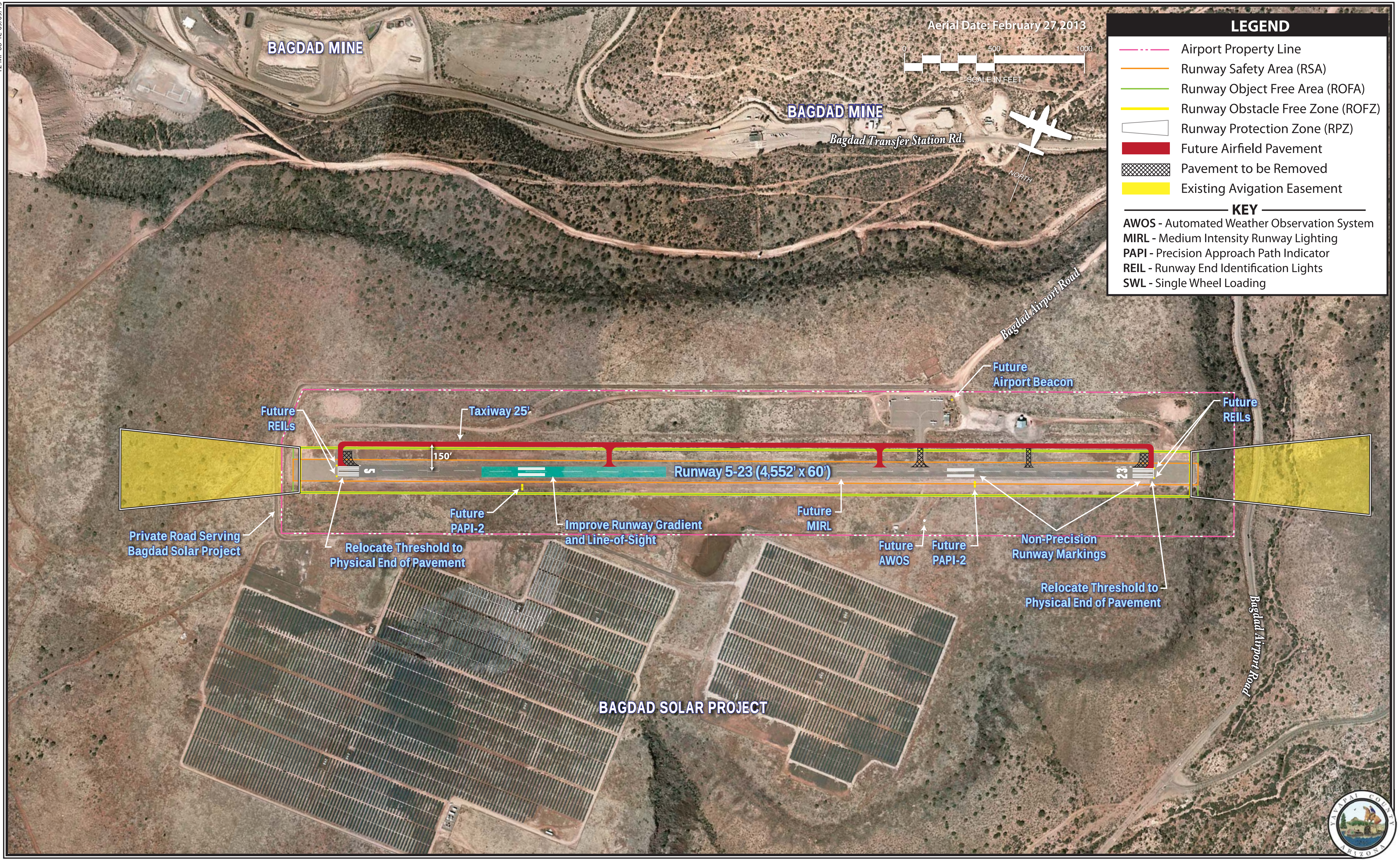

Exhibit 4C
AIRSIDE ALTERNATIVES

have ownership of the RPZ lands where feasible. If outright ownership is not feasible, then easements can be acceptable. Easements in the RPZ should allow the airport to positively limit the height of structures. A third option for protection of the RPZs that extend beyond airport property is implementation of strict land use zoning that, at a minimum, prohibits residential development that could serve as a congregating point for people and restricts structure heights.

Avigation easements are currently in place within the RPZs serving each end of Runway 5-23 that help control the height of certain structures to be built within these areas. Given that there is no development located within the RPZs, other than roadways which are detailed in the next paragraph, the avigation easements are sufficient for controlling any future development within these areas.

As detailed on **Exhibit 4C**, the RPZs serving each end of Runway 5-23 currently contain incompatibilities. A private service road leading to the Bagdad Solar Project is located within the Runway 5 RPZ. The road would likely be acceptable since it handles a low volume of vehicles and is accessible only through a controlled-access gate.

On the opposite end of the airfield, the Runway 23 RPZ extends over portions of Bagdad Airport Road, which is a public roadway serving the airport and the Bagdad Mine. Given the physical land constraints within this area, there is no feasible alternative to relocating the road outside of the RPZ.

As previously discussed in Chapter Three, since the new RPZ guidance addresses new or modified RPZs, existing incompatibilities such as those discussed can be grandfathered under certain conditions. Any change to the RPZ would likely require full compliance. Alternatives discussed later in this chapter will evaluate the effects of the RPZs when considering a potential extension to Runway 5-23.

RUNWAY THRESHOLDS

According to AC 150/5300-13A, a runway's threshold is located to provide proper clearance for landing aircraft over existing obstacles while on approach to landing. Runway thresholds can be displaced to provide:

1) A means for obtaining RSA prior to the threshold;
2) A means for obtaining additional OFA prior to the threshold;
3) A means for locating the RPZ to mitigate unacceptable incompatible land uses; and
4) Mitigation of environmental impacts.

A 120-foot displaced threshold currently serves each end of Runway 5-23 at Bagdad Airport. As detailed in Chapter Three, improvements have been made to the RSA and OFA which now meet the full safety standard prior to each end of the runway. Although the RPZs serving each runway end have incompatibilities in the form of roadways, the private service road located within the Runway 5 RPZ is rarely utilized and can only be accessed by personnel associated with the Bagdad Solar Project. Within the Runway 23 RPZ, Bagdad Airport Road is situated approximately 150 feet below the elevation of the airport. Furthermore, a preliminary obstruction analysis was conducted which did not identify any approach surface penetrations to either runway end based upon the landing threshold being located at the physical end of runway pavement.

As a result, **Exhibit 4C** considers situating the runway thresholds at the physical end of pavement on each end of Runway 5-23. In doing so, an additional 120 feet of runway pavement would be made available for landing aircraft.

RUNWAY GRADIENT AND LINE-OF-SIGHT

As discussed in the previous chapter, there is a significant difference in runway elevation that encompasses a portion of Runway 5-23, starting approximately 100 feet northeast of the Runway 5 threshold and extending approximately 1,900 feet farther northeast toward the opposite end of the runway. As detailed on **Exhibit 4D**, the gradient change over this portion of the runway is 2.1 percent, which exceeds the standard 2.0 percent gradient change for runways serving AACs A and B.

A runway's gradient should also be moderately sloped to allow for clear line-of-sight across the runway system. Runway line-of-sight requirements facilitate coordination among aircraft, and between aircraft and vehicles that are operating on active runways. This allows departing and arriving aircraft to verify the location and actions of other aircraft and vehicles on the ground that could create a conflict.

For runways without a full parallel taxiway, which is currently the case on Runway 5-23 at Bagdad Airport, any point five feet above the runway centerline must be visible with any other point five feet above the runway centerline. For runways with a full parallel taxiway, any point five feet above the runway centerline must be mutually visible with any other point five feet above the runway centerline that is located at a distance that is less than one-half the length of the runway. As detailed at the bottom of **Exhibit 4D**, due to the runway gradient issue described above, clear line-of-sight standards are not met when at the physical end of pavement on Runway 5 looking northeast.

It is recommended that Yavapai County coordinate with the FAA and ADOT-MPD – Aeronautics Group to improve portions of Runway 5-23 in order to meet runway gradient and line-of-sight standards in the future. Further details related to the proper programming of these projects will be outlined later in the Master Plan.

RUNWAY LIGHTING AND APPROACH AIDS

Previous analysis determined that Runway 5-23 should consider providing medium intensity runway lighting (MIRL). MIRL would provide pilots with positive identification of the runway and its alignment during nighttime and/or poor visibility conditions.

In the event MIRL is implemented on Runway 5-23, it is recommended that an airport rotating beacon be installed at the airport to assist pilots in locating the airport at night. **Exhibit 4C** depicts a potential location for the airport beacon adjacent to the aircraft parking apron.

Certain approach aids provide information to pilots to indicate if they are on the correct glide path to the runway for landing. A precision approach path indicator (PAPI) system is commonly installed to enhance safety by providing pi-

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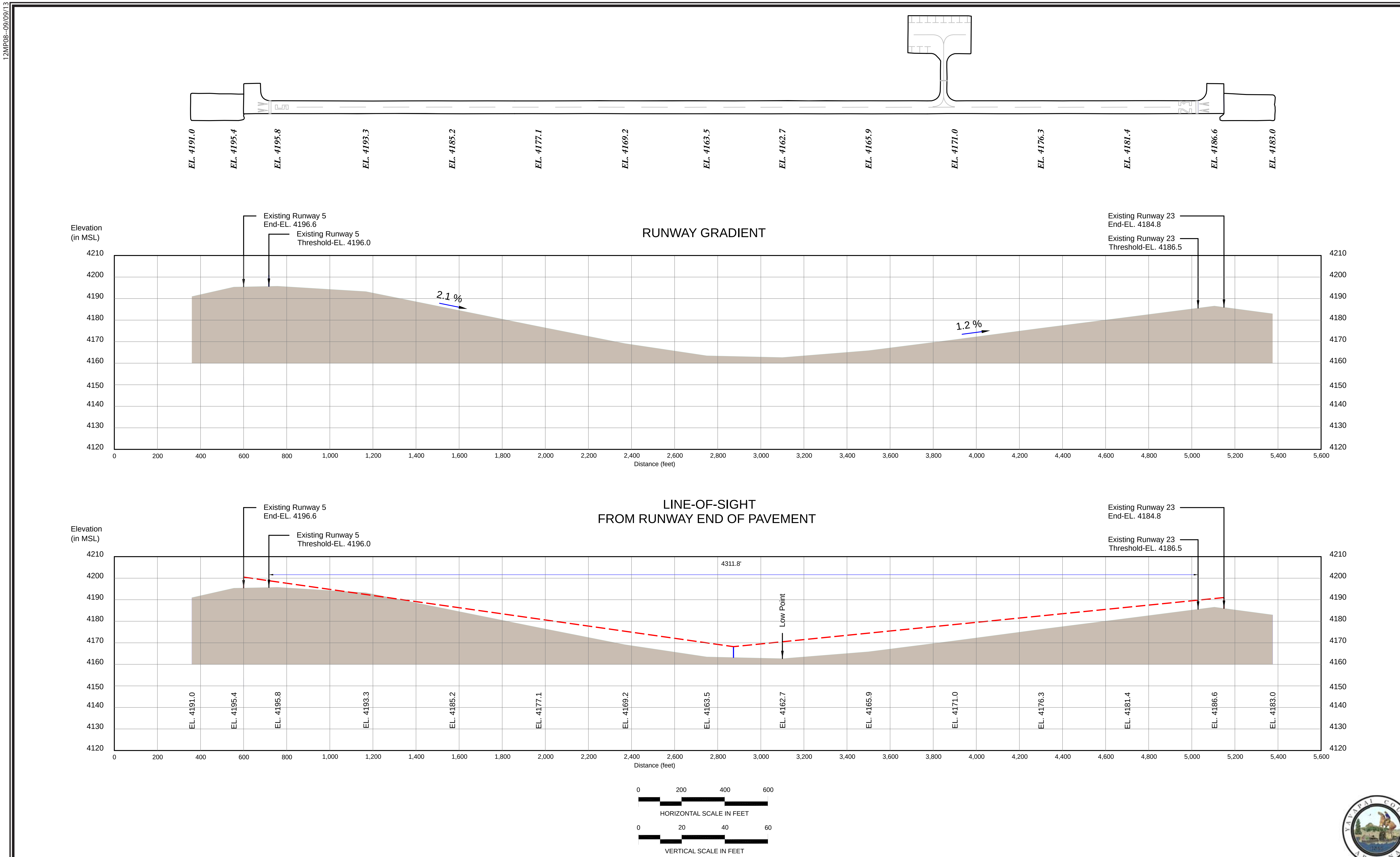

Exhibit 4D
RUNWAY GRADIENT
AND LINE-OF-SIGHT

lots with visual guidance information during landings to the runway. As shown on **Exhibit 4C**, future planning considers the implementation of a two-box PAPI system serving each end of Runway 5-23. The PAPI must be sited and aimed so it defines an approach path with sufficient clearance over obstacle and minimum threshold crossing heights. The two-box PAPI system is normally installed on a runway that generally serves smaller general aviation aircraft. The PAPI can be expanded to a four-box system when jet operations occur regularly.

Runway end identification lights (REILs) should be considered for all lighted runway ends not planned for a more sophisticated approach lighting system. Facility planning considers the implementation of REILs on each end of Runway 5-23 in the event that MIRL is also implemented on the runway system. It should be noted that the location of the PAPIs and REILs would be dependent on the location of the runway threshold since both are visual approach aids to landing aircraft.

TAXIWAYS

Taxiways are the primary transport surface linked with the runway and its operations. Such surfaces include parallel taxiways, entrance/exit taxiways, and connecting taxiways. Currently, there are two taxiways at Bagdad Airport that connect Runway 5-23 and landside development.

Currently, aircraft must "back-taxi" to either runway end in order to utilize the full runway length for takeoff. Providing a full-length parallel taxiway as proposed on **Exhibit 4C** is recommended to improve operational safety and efficiency. In addition, if Runway 5-23 were to accommodate an instrument approach procedure (to be detailed later in this chapter), it is recommended that a parallel taxiway serve the runway system. This taxiway should be located 150 feet from the Runway 5-23 centerline, which meets the separation requirements for RDC B-I (small aircraft exclusively).

AC 150/5300-13A instituted new design standards for taxiways, most of which were enacted to mitigate the potential for runway incursion events. Changes were also aimed at improving pilot situational awareness. One of these standards put into place is the prohibition of direct aircraft access between a parking apron and a runway. In the event that a parallel taxiway is implemented on the airfield, the two existing connecting taxiways should be removed and replaced by entrance and exit taxiways as depicted on **Exhibit 4C**.

As discussed in Chapter Three, future taxiway development should meet Taxiway Design Group (TDG) I standards, which call for a width of 25 feet. Elevated taxiway edge reflectors should be implemented on all existing and future taxiways on the airfield.

Taxiway Turnarounds

Taxiway turnarounds may be considered at general aviation airports that experience lower levels of aircraft activity. Currently, hold aprons are provided adjacent to each end of Runway 5-23. In the event that the runway thresholds are relocated as previously discussed and the implementation of a parallel taxiway serving the runway system is not pursued, the construction of taxiway turnarounds as depicted on **Exhibit 4E** should be planned.

The taxiway turnarounds must be consistent with ADG and TDG I design standards. The layout of the proposed turnarounds would allow for the connection of a future parallel taxiway.

INSTRUMENT APPROACH CONSIDERATIONS

Currently, Bagdad Airport is not served with an instrument approach procedure. Aircraft that utilize the airport must do so in visual meteorological conditions. With recent advances in global positioning system (GPS) technologies, it is possible for an instrument approach procedure to serve the airport without the implementation of ground-based navigational facilities on the airfield.

A key priority that would need to be considered in order to implement an instrument approach is protecting the airport from flight obstructions. The FAA has established criteria aimed at protecting the airport from these flight obstructions. First, FAA criterion stipulates that obstructions not be placed too near the runway ends or parallel to the runway. The obstruction clearance requirements are based on the RDC and/or the weight of the design aircraft, as well as the type of approaches established or planned for the runway. For visual approaches and/or approaches providing not lower than one-mile visibility minimums, minimum obstruction clearance is required.

The two primary resources for determining airspace obstructions are Part 77, *Objects Affecting Navigable Airspace* and *Terminal Instrument Procedures* (TERPS). Part 77 is more of a filter which identifies potential obstructions, whereas TERPS is the critical tool in determining actual flight obstructions, as its analysis is used to evaluate and develop instrument approach procedures, including visibility minimums and cloud heights associated with approved approaches.

The safety design standards related to RDC B-I (small aircraft exclusively) detailed earlier in this study would apply to an instrument approach providing not lower than one-mile visibility minimums. It should be noted that the Part 77 primary surface, centered on the runway, would expand from its current width of 250 feet to a width of 500 feet with the onset of a non-precision instrument approach. This could limit future landside development, mainly in the form of hangar structures and their heights, on the north side of the airport. In the event that an instrument approach procedure is introduced at Bagdad Airport, the runway markings should be upgraded to include threshold bars and aiming points as depicted on **Exhibit 4C**.

AUTOMATED WEATHER OBSERVATION SYSTEM

Presently, the airport is without any form of automated or actual weather observation which provides important weather details to pilots, such as visibility, cloud ceilings, and altimeter settings. Wind speed and direction can be estimated by pilots using the wind cones located at various locations on the airfield.

The unavailability of current weather observation and reporting primarily affects itinerant aircraft operations to the airport as pilots cannot readily determine weath-

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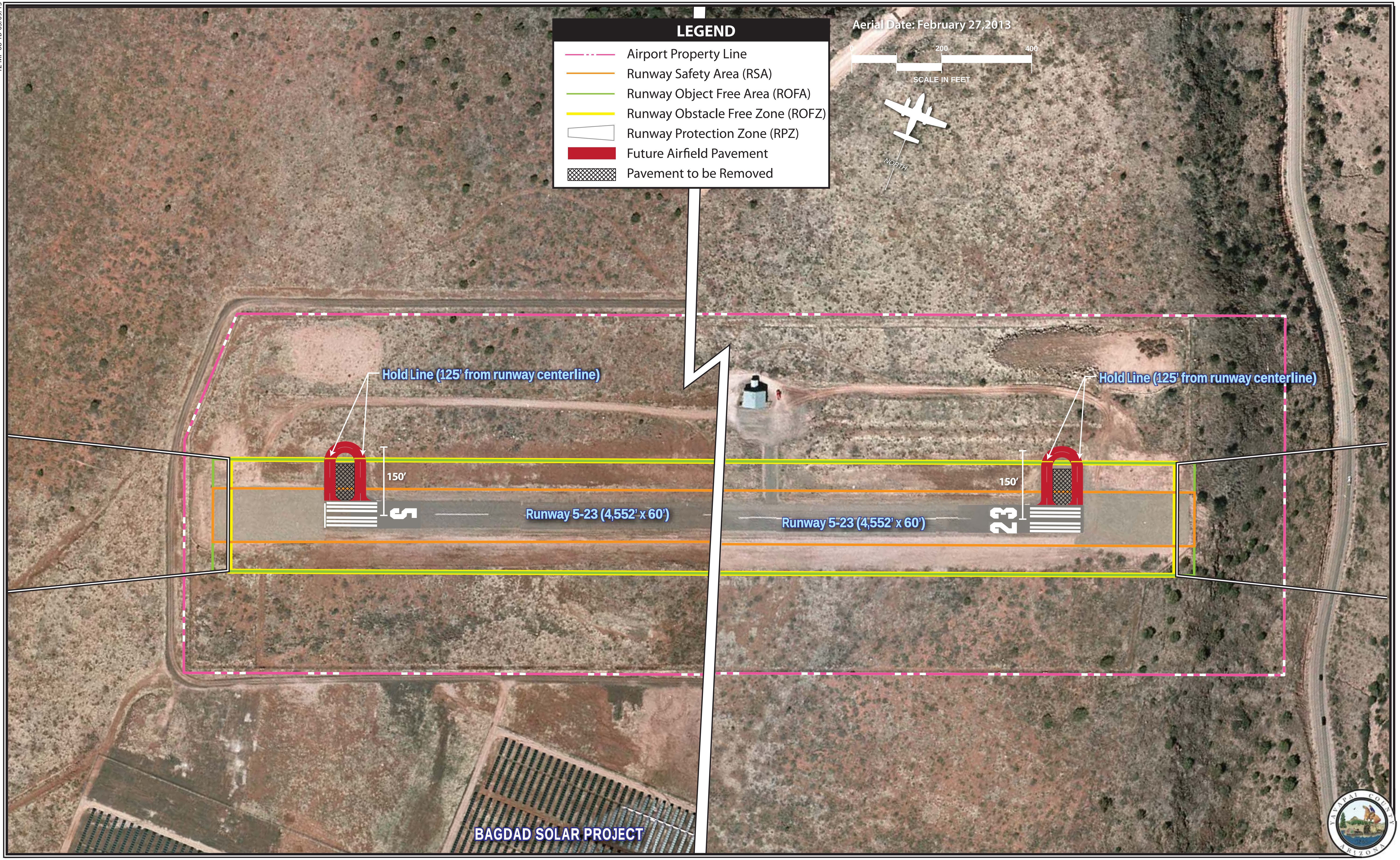

Exhibit 4E
TAXIWAY TURNAROUNDS

er conditions at the airport from a distant location. The nearest weather reporting station is located at Ernest A. Love Field in Prescott, approximately 37 nm to the east.

FAA Order 6560.20B, *Siting Criteria for Automated Weather Observing Systems (AWOS)* provides AWOS siting requirements. While each AWOS sensor has specific siting requirements, all AWOS sensors should be located together and outside the runway and taxiway OFAs. Generally, AWOS sensors are best placed between 1,000 and 3,000 feet from the primary runway threshold and between 500 and 1,000 feet from the runway centerline. However, this criterion can be relaxed to meet site requirements or reduce impacts to landside development. **Exhibit 4C** calls for the AWOS to be located approximately 250 feet south of the runway centerline and 1,300 feet from the proposed Runway 23 threshold.

RUNWAY LENGTH

Analysis in the previous chapter recommended that the Master Plan consider a potential runway extension in order to meet 95 percent of the small aircraft fleet. This includes airports that are primarily intended to serve low-activity locations with a small population community, such as Bagdad Airport. In order to meet aircraft needs within the 95 percent category, a runway length of 5,500 feet is recommended when factoring the airport's elevation (4,163 feet) and mean daily maximum temperature of the hottest month (96.5 degrees Fahrenheit).

Exhibit 4F depicts an extension on Runway 5-23 that provides 5,500 feet of runway length. As presented, the southwest end of the runway would be extended 948 feet. The RSA, OFA, OFZ, and RPZ associated with the southwesterly extension would extend beyond the current airport property boundary. The proposed extension would also necessitate the relocation of a portion of the private service road leading to the Bagdad Solar Project outside the safety areas including the RPZ. Approximately 21 acres of land is highlighted for recommended property acquisition by Yavapai County in order to satisfy the safety design standards and potential parallel taxiway related to the runway extension. Due to the physical terrain constraints beyond the northeast end of Runway 5-23, a runway extension in this direction is considered impracticable.

This alternative provides additional runway length should future demand dictate, while also attempting to meet FAA airport safety design criteria. Any capital expenditures required to meet the needs of general aviation aircraft will require specific justification. The FAA typically stipulates that if a runway extension is planned, documentation of 500 annual itinerant operations of the design aircraft requiring the additional runway length will be required.

Implementing a runway extension will also result in environmental impacts. Biological and cultural surveys would be needed beyond the runway end when considering the extension and associated safety areas.

LANDSIDE DEVELOPMENT CONSIDERATIONS

Generally, landside issues are related to those airport facilities necessary, or de-

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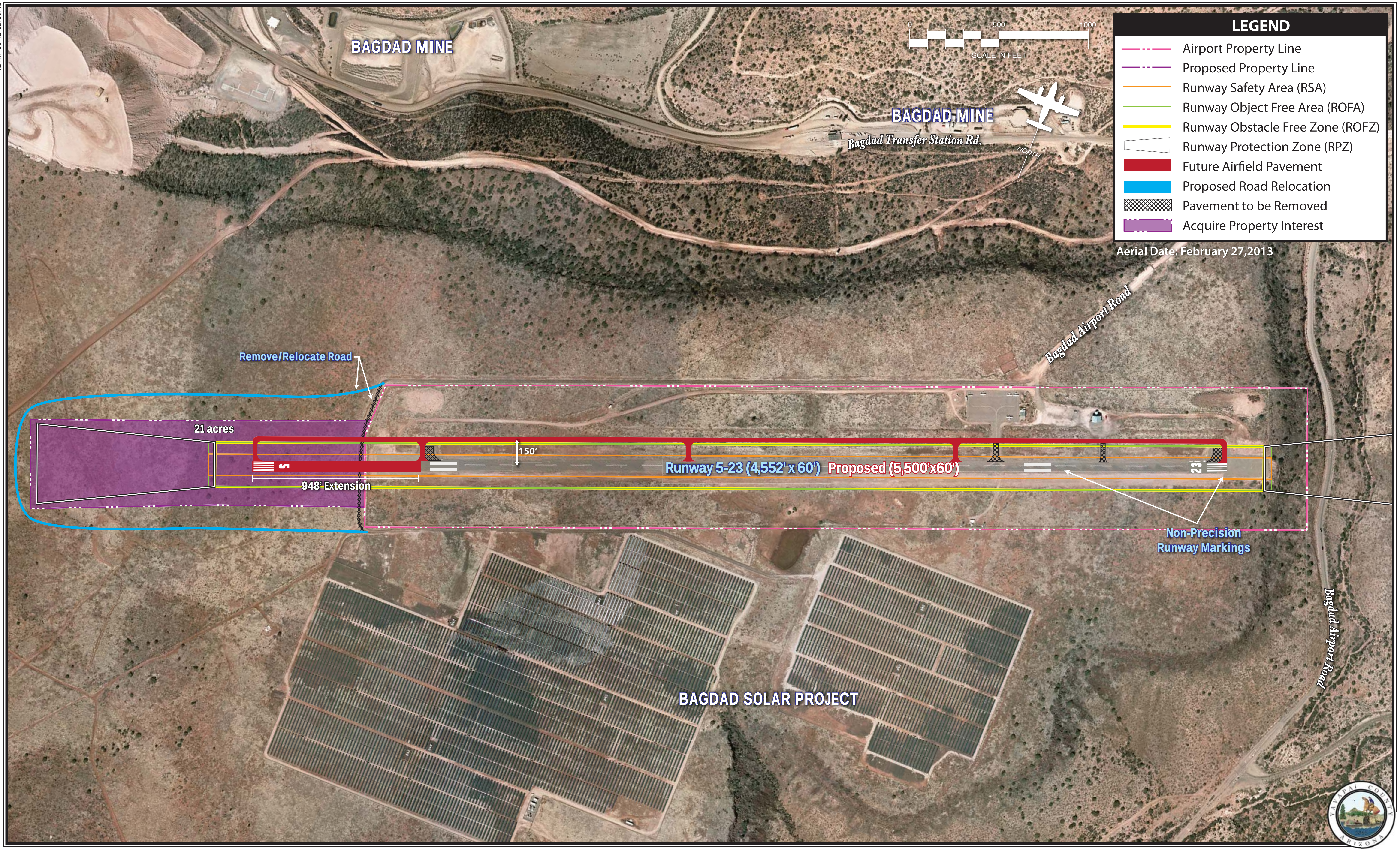

Exhibit 4F
PROPOSED RUNWAY 5-23 EXTENSION

sired, for the safe and efficient parking and storage of aircraft, movement of passengers and pilots to and from aircraft, and overall revenue support functions. Landside planning considerations are summarized on **Exhibit 4B**.

AIRCRAFT HANGAR DEVELOPMENT

Landside alternatives to follow will consider the construction of additional aircraft hangars at Bagdad Airport. Hangar development takes on a variety of sizes corresponding with several different uses.

The facilities associated with general aviation businesses and corporations with company-owned aircraft include conventional and executive type hangars which are capable of storing multiple aircraft. High levels of activity often characterize these operations, 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. Utility services are needed for these types of facilities, as well as automobile parking areas.

Aircraft hangars used for the storage of smaller aircraft primarily involve T-hangars or linear box hangars. Since storage hangars often have lower levels of activity, these types of facilities can be located away from the primary apron areas in more remote locations of the airport. Limited utility services are needed for these areas.

AIRPORT TERMINAL FACILITY

A terminal facility is often the first impression air travelers have of the area. A functional and attractive terminal facility can be needed to secure and build air travelers' favorable opinion of the surrounding area, particularly business leaders who may be investing in communities adjacent to the airport. Currently, Bagdad Airport does not have a terminal facility. At a minimum, a terminal facility should be considered to meet the needs of general aviation users to include flight planning and restrooms.

Terminal Building Location

FAA AC 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*, identifies a number of basic considerations that affect the location of a terminal building. The primary considerations include the following:

1. **Runway configuration:** The terminal should be located to minimize aircraft taxiing distances, time, and the number of runway crossings;

2. **Access to transportation network:** The terminal should be located to provide the most direct/shortest routing to the regional roadway network;

3. **Expansion potential:** The long term viability of the terminal is dependent upon the ability of the site to accommodate expansion of the terminal beyond forecast requirements; and

4. **FAA Geometric Design Standards:** The terminal location needs to assure adequate distance from present and future aircraft operational areas.

Consideration in the alternatives analysis will be given to potential terminal locations that best meet the criteria listed above, while taking into account future development potential on the airport.

BUILDING RESTRICTION LINE

The building restriction line (BRL) identifies suitable building area locations on the airport. The BRL encompasses the RPZs, the OFA, navigational aid critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight criteria.

Two primary factors contribute to the determination of the BRL: type of runway (utility or other-than-utility) and the capability of the instrument approaches. Runway 5-23 is considered a "utility" runway with visual approaches only.

The BRL is the product of CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object be located in the primary surface, defined as being no closer than 125 feet from a visual runway centerline and not closer than 250 feet to a runway served by a non-precision instrument approach (visibility minimums not lower than ¾-mile). From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet. For Runway 5-23, the 20-foot BRL is set at 265 feet from the runway centerline.

LANDSIDE ALTERNATIVES

Two landside alternatives have been developed and are presented in the following section. These alternatives are not the only options for development. In some cases, a portion of one alternative could be intermixed with another. Also, some development concepts could be replaced with others. The final recommended plan only serves as a guide for the airport. Many times, airport operators change their plan to meet the need of specific users. The goal in analyzing landside alternatives is to focus future development so that airport property can be maximized.

Landside Alternative 1

Landside Alternative 1, as depicted on **Exhibit 4G**, proposes the construction of a terminal facility adjacent to the east side of the existing aircraft parking apron. A dedicated vehicle parking area located to the east would accommodate the terminal area. This alternative recommends relocating portions of the airport perimeter fencing and controlled-access gate. As depicted, the existing gate could be replaced by two separate controlled-access points leading to future hangar development on the airfield. In doing so, the terminal facility parking area would be provided public access, while the remaining portions of the airfield would be limited to private access in order to maintain a high level of safety and security.

Alternative 1 also depicts hangar development in the form of two conventional/executive hangars located south of the proposed vehicle parking area. A private road accessed from the terminal parking lot would lead to these proposed hangars, as well as the existing hangar farther east. As depicted, these hangars could share a common aircraft parking apron with access provided by a taxiway leading to either the proposed parallel taxiway or directly from Runway 5-23. West of these hangars, a dedicated airport maintenance/storage facility is proposed that

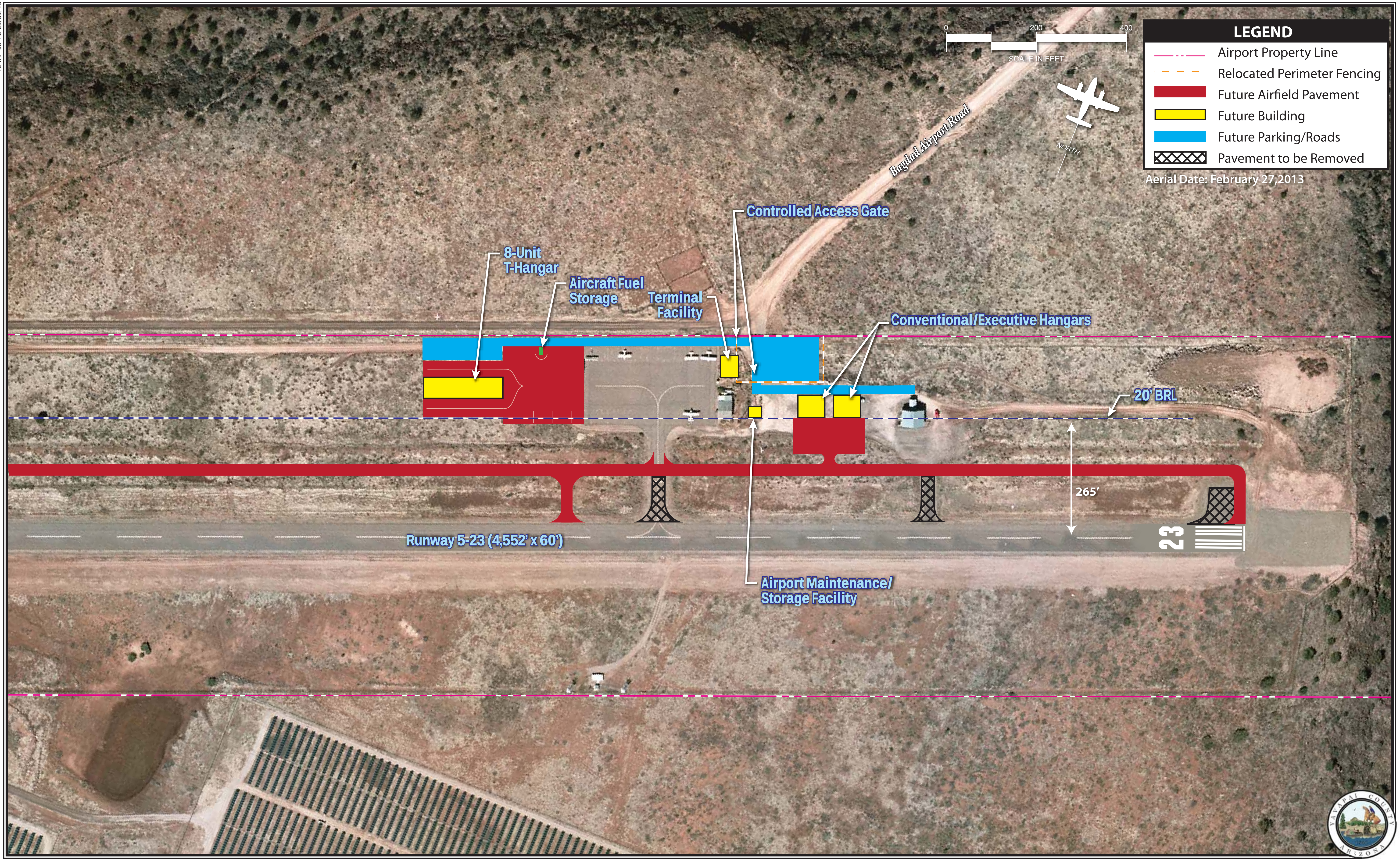

Exhibit 4G
LANDSIDE ALTERNATIVE 1

would provide storage space for airport equipment.

Analysis in Chapter Three indicated a future need for additional aircraft parking apron space at Bagdad Airport. Alternative 1 would help address this need by increasing the size of the existing aircraft parking apron. The apron expansion would serve not only additional aircraft parking needs, but could also accommodate a self-service fuel storage facility. Immediately west of the apron expansion, this alternative calls for an 8-unit T-hangar facility. Vehicle access to the T-hangars is proposed via a secured road extending along the north side of airport property.

Landside Alternative 2

Exhibit 4H depicts Landside Alternative 2, which calls for the construction of a dedicated aircraft parking apron east of the existing apron to accommodate a proposed terminal facility. A vehicle parking area adjacent to the north side of the terminal would provide adequate public parking space to accommodate terminal area needs. As presented on this alternative, the terminal apron could accommodate aircraft parking, as well as self-service fueling capabilities.

Similar to the previous alternative, portions of the perimeter fencing would be relocated to properly secure and segregate the airfield operating areas. A controlled-access gate is proposed immediately east of the terminal facility that would provide access to the existing hangar facility at the airport.

A second controlled-access gate is proposed directly west of the airport entrance leading to landside facilities farther west. These landside facilities consist of two conventional/ executive hangars and one 6-unit T-hangar complex, each served by a taxiway and apron extending from the proposed parallel taxiway. In the event the parallel taxiway is not constructed, a taxiway directly connecting the hangars to Runway 5-23 would be needed. This alternative depicts the construction of a maintenance/ storage facility adjacent to the east side of the existing aircraft parking apron.

SUMMARY

The development alternatives considered in this chapter provide a vision for future development at Bagdad Airport through the long term planning period of this Master Plan. A detailed analysis of facility requirements was utilized in assessing the airside and landside alternatives.

After review and input from the PAC and Yavapai County officials, a recommended development concept will be put forth by the consultant. The resultant plan will represent an airside facility that fulfills safety design standards and a landside complex that can be developed as demand dictates.

The development plan for Bagdad Airport must represent a means by which the airport can evolve in a balanced manner to accommodate the forecast demand. In addition, the plan must provide flexibility to meet activity growth beyond the long range planning horizon.

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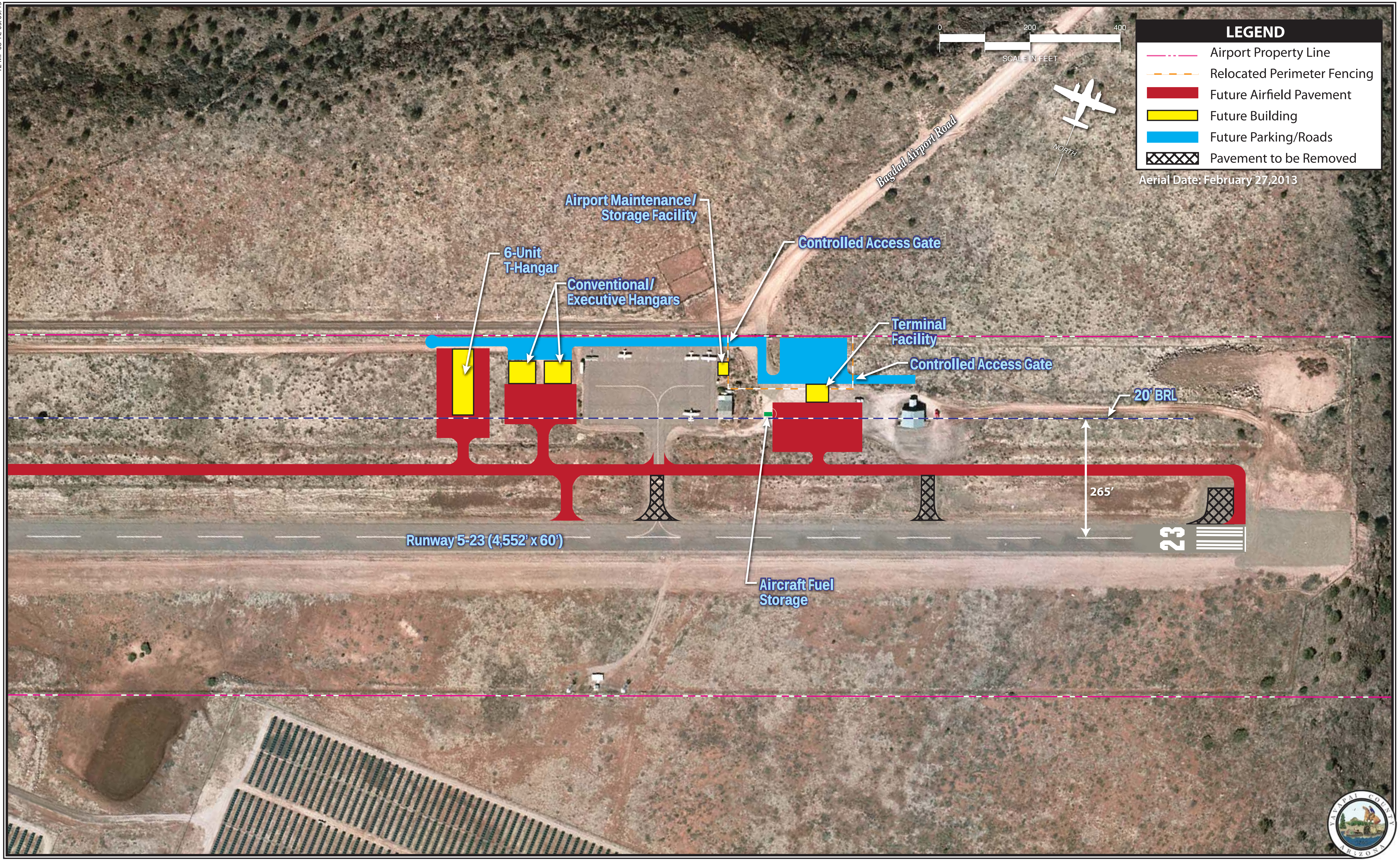

Exhibit 4H
LANDSIDE ALTERNATIVE 2

Chapter Five

RECOMMENDED MASTER PLAN CONCEPT

Chapter Five

RECOMMENDED MASTER PLAN CONCEPT

The planning process for Bagdad Airport has included several analytical 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 facility needs. The planning process has included the development of draft phase reports. These have been presented to the Planning Advisory Committee (PAC), which is comprised of constituents with an investment or interest in the airport and surrounding area.

Several alternatives were analyzed in the previous chapter to explore different options for the future growth and development of the airport. Each alternative provided a different approach to facility development. Since then, the airport alternatives have been refined into a single development concept for the Master Plan, which is included for presentation in this chapter.

An objective of this planning effort is to equip decision-makers with the ability to either accelerate or slow development goals based on actual demand. If there is little demand, the obvious result would be minimized development of the airport beyond routine airport safety and maintenance. If, however, aviation demand accelerates, development could need to be expedited.

Any plan can account for limited development, but the lack of a plan for accelerated growth can be challenging. Therefore, to ensure flexibility in planning and development in order to respond to unforeseen needs, the recommended Master Plan Concept considers the balanced development potential of Bagdad Airport.

The recommended development plan preserves the current nature of the airport by maintaining the focus of supporting general aviation activities that the facility is capable of accommodating. Overall, the plan presents an ultimate configuration for the airport that meets Federal Aviation Administration (FAA) and Arizona Department of Transportation – Multimodal Planning Division – Aeronautics Group (ADOT-MPD – Aeronautics Group) design and safety standards. Furthermore, the plan provides landside development options to meet increasing demands on the airport by different aviation activities.

The Master Plan Concept is a consolidation of airside and landside functions detailed in previous chapters. A phased program to implement this development concept will be presented in Chapter Six. The following sections will describe, in narrative and graphic form, the Master Plan Concept for Bagdad Airport. When assessing development needs, this study has separated the airport system into airside and landside functional areas.

AIRSIDE CONCEPT

Airside components relate to the runway, taxiways, navigational aids, etc., and require the greatest commitment of land area to meet the physical layout of the airport. **Exhibit 5A** depicts the airside development plan for Bagdad Airport. The major airside issues addressed in the Master Plan Concept include the following:

- Adhere to ultimate Runway Design Code (RDC) B-I (small aircraft) standards on Runway 5-23.
- Extend Runway 5-23 to 5,500 feet (948' southwest) to better accommodate the mix of general aviation aircraft operations utilizing the airport should justification be warranted.
- Acquire land to accommodate a potential runway extension.
- Implement taxiway improvements to include taxiway turnarounds serving each runway end in the short term and a potential full-length parallel taxiway in the long term.
- Remove the displaced threshold serving Runway 5.
- Enhance lighting, marking, visual approach, and weather aids on the runway and taxiway system.

DESIGN STANDARDS

The FAA has established design criteria to define physical dimensions of runways and taxiways, as well as the imaginary surfaces surrounding them which protect the safe operation of aircraft at the airport. These design standards also define the separation criteria for the placement of landside facilities.

As discussed previously, the design criteria primarily center on the airport's critical design aircraft. The critical aircraft is the most demanding aircraft or family of aircraft which currently, or are projected to, conduct 500 or more operations (takeoffs and landings) per year at the airport. Factors included in airport design are an aircraft's wingspan, approach speed, tail height and, in some cases, the instrument approach visibility minimums

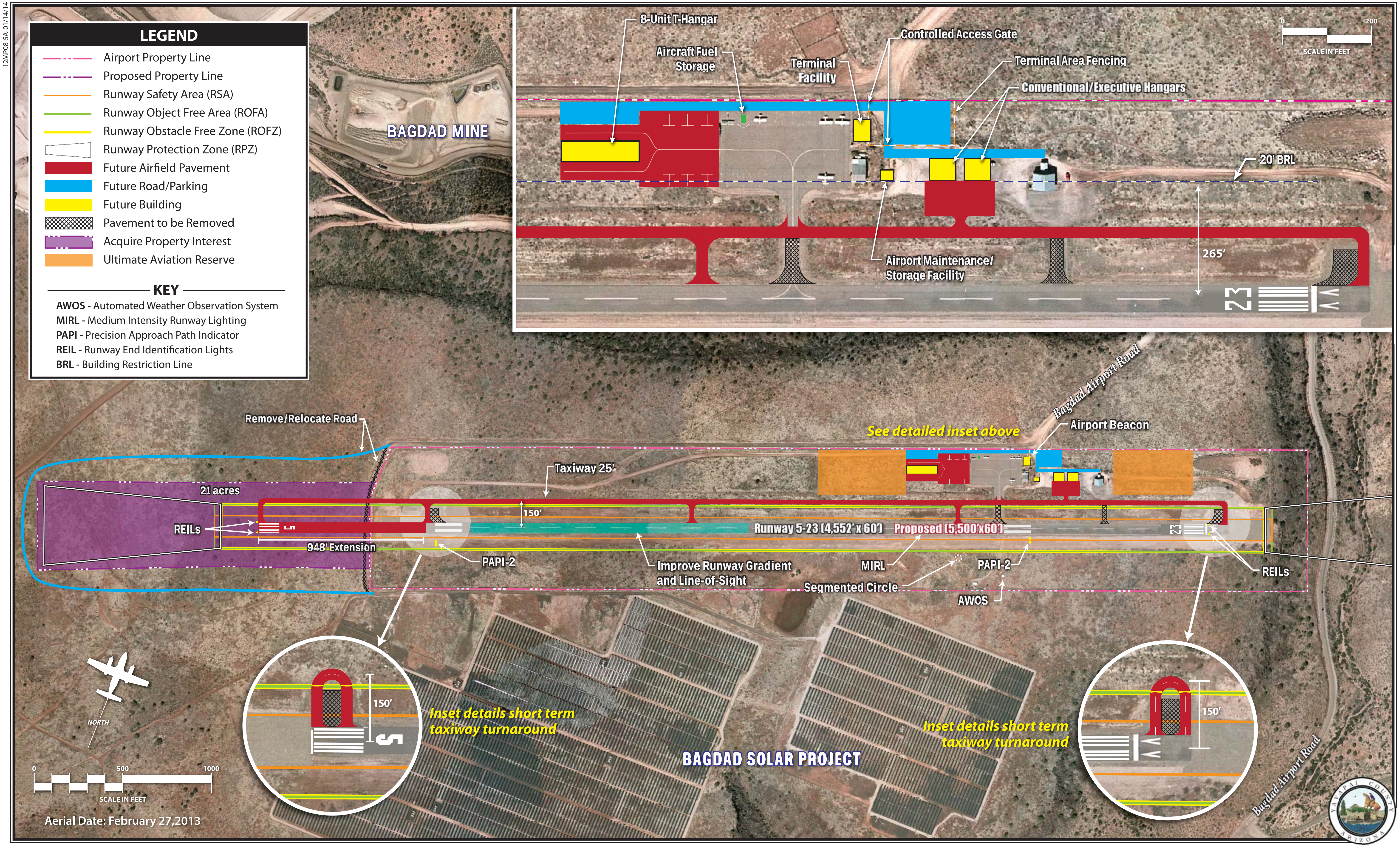

Exhibit 5A
RECOMMENDED MASTER PLAN CONCEPT

for the runway. The FAA has established the RDC to relate these design aircraft factors to airfield design standards. The highest RDC is also considered for the overall Airport Reference Code (ARC). Since Bagdad Airport has only one runway, the RDC for Runway 5-23 will also serve as the ARC for the airport.

Analysis in Chapter Three concluded that the current and future RDC for Runway 5-23 is B-I (serving small aircraft exclusively). As a result, those airfield elements associated with the runway should be planned to meet the B-I (small aircraft) design standards to the greatest extent feasible.

Table 5A presents the primary design standards to be applied to the airport based on the RDC for Runway 5-23. Those elements in **BOLD** indicated a planned change based on the recommended Master Plan Concept. It should be noted that, in some instances, the physical layout of existing facilities exceeds design standards on the airfield. This is the case for aircraft parking apron separation from Runway 5-23. For RDC B-I (small aircraft), the separation standard between a runway and aircraft parking apron with not lower than ¾-mile visibility minimums is 125 feet. The existing aircraft parking apron is located 250 feet from the runway centerline. As such, the Master Plan Concept does not depict the relocation of this facility since it meets and exceeds the standards.

Runway Design Code

The RDC is an FAA code signifying the design standard to which the runway is to be built. This code includes the Aircraft Approach Category (AAC), Airplane Design Group (ADG), and the lowest instrument approach visibility planned. An RDC is applied to each runway.

Currently, there are no instrument approaches serving the runway; therefore, the RDC is B-I-VIS (small aircraft). In the event that an instrument approach is implemented at the airport in the future, planning will consider an ultimate RDC of B-I – NP-1 (small aircraft). This code indicates that an instrument approach with not lower than one-mile visibility minimums would be implemented on Runway 5-23.

Runway Reference Code

The Runway Reference Code (RRC) is an FAA code signifying the current operational capabilities of a runway and associated parallel taxiway. The RRC is comprised of the AAC, ADG, and the lowest visibility minimum permissible based on the existing runway/taxiway separation. The RRC is not a design standard; instead, it indicates the potential capabilities of the existing runway and parallel taxiway.

Since there is currently no parallel taxiway serving Runway 5-23, an RRC does not apply to Bagdad Airport. Future planning does include the implementation of a full-length parallel taxiway located 150 feet (centerline to centerline) from the runway. An ultimate RRC of B-IS-4000 would apply in the event the parallel taxiway is constructed. This indicates that the runway will be able to support a design aircraft in B-I (small aircraft) and can support an instrument approach with not lower than ¾-mile visibility minimums based on the runway to parallel taxiway separation. The RRC is only an indication that the existing airport geometry can support this classification, not an indication that there are no obstructions or other factors that may restrict the capability of the runway.

TABLE 5A Current and Future Runway Design Standards Bagdad Airport	Current on Runway 5-23	Future on Runway 5-23
RUNWAY		
Runway Design Code	B-I-VIS (small aircraft)	B-I – NP-1 (small aircraft)
Runway Reference Code	N/A	B-IS-4000
Visibility Minimums	N/A	≥1-mile
RUNWAY DESIGN		
Runway Length	4,552	**5,500**
Runway Width	60	60
RUNWAY PROTECTION		
Runway Safety Area (RSA)		
Width	120	120
Length Beyond Departure End	240	240
Length Prior to Threshold	240	240
Runway Object Free Area (ROFA)		
Width	250	250
Length Beyond Departure End	240	240
Length Prior to Threshold	240	240
Runway Obstacle Free Zone (ROFZ)		
Width	250	250
Length Beyond End	200	200
Approach/Departure Runway Protection Zones (RPZ)		
Length	1,000	1,000
Inner Width	250	250
Outer Width	450	450
RUNWAY SEPARATION		
Runway Centerline to:		
Holding Position	125	125
Parallel Taxiway	N/A	**150**
Aircraft Parking Apron	250	250
Note: All dimensions in feet		
Source: FAA Advisory Circular 150/5300-13A, *Airport Design*		

RUNWAY 5-23 LENGTH

FAA Advisory Circular (AC) 150/5325-4B, *Runway Length Requirements for Airport Design* is utilized in Chapter Three to aid in calculating a recommended runway length for Bagdad Airport. The FAA provides several categories of runway length calculations based primarily on documented activity by a group of similar aircraft. To accommodate 95 percent of the small aircraft fleet, a runway length of

5,500 feet is recommended when factoring the airport's elevation (4,163 feet) and mean daily maximum temperature of the hottest month (96.5 degrees Fahrenheit).

As a result of the runway length calculations, Runway 5-23 is planned for a 948-foot extension, bringing the total runway length to 5,500 feet. It is important to note that any capital expenditure (FAA or ADOT-MPD – Aeronautics Group grant) utilized to meet the needs of general aviation aircraft will require specific justification. The FAA typically stipulates that if a runway extension is planned, documentation of 500 annual itinerant operations of the design aircraft will be required prior to actual implementation. Currently, the airport does not have justification to extend Runway 5-23 given the number and type of aircraft utilizing the facility. In the event that a larger multi-engine or turboprop aircraft requiring additional runway length would base at or utilize the airport regularly, justification for additional runway length could be warranted. As a result, the Master Plan Concept carries forward the potential for a runway extension in its ultimate planning.

There are several methods to track aircraft activity, including an online subscription service, *Airport IQ*. The FAA also has available a comprehensive database called *Traffic Flow Management Systems Counts* (TFMSC), which documents flight plans that are filed in the national airspace system. This is a public database accessible at: http://aspm.faa.gov/tfms/sys. The airport can also track individual aircraft activity. This would be recommended as some aircraft operating under visual flight rules (VFR) may not be documented in databases that track flight plans, such as those mentioned above. Finally, letters from specific aircraft operators addressing their runway needs can provide supporting documentation for justification of FAA participation.

Consideration was given to which end of the runway could best support the extension. Due to the physical land constraints beyond the northeast end of Runway 5-23, an extension in this direction is impracticable. As a result, the development plan considers a 948-foot extension to the southwest. In order to accommodate the proposed extension, associated safety design standards, and a potential parallel taxiway, 21 acres of land outside the existing airport property line are highlighted for acquisition.

RUNWAY STRENGTH

Runway 5-23 has a published strength rating of 4,000 pounds single wheel loading (SWL). Further evaluation has been undertaken during this study process and it is determined that the current pavement strength is approximately 12,000 pounds SWL. This strength meets the requirements of the critical aircraft family in ARC B-I (small aircraft exclusively). The existing pavement strength is planned to be maintained. Routine maintenance and overlay of the runway in the future will likely have the effect of increasing the strength of the pavement over time.

SAFETY AREAS

Chapter Three discussed the requirements for the runway safety area (RSA), object free area (OFA), and obstacle free zone (OFZ). Of particular concern is the RSA, which must meet FAA design standards to the greatest extent possible. The

RSA is an area surrounding the runway that must be cleared of all penetrating obstructions, graded, drained, and capable of supporting an aircraft veer-off or emergency vehicles.

The RSA for Runway 5-23 is 120 feet wide and extends 240 feet off each runway end. Only those navigational aids with frangible bases, such as runway edge lights and approach lights necessary for the safe operation of aircraft, are allowable within the RSA. The OFA must also be clear of penetrating obstructions, but it does not have to be capable of supporting an aircraft or emergency vehicle, like the RSA. The OFA for Runway 5-23 is 250 feet wide and extends 240 feet beyond the runway end. The ROFZ is 250 feet wide and extends 200 feet beyond the runway ends. Like the RSA, the OFZ precludes penetrating obstructions except for frangible navigational aids necessary for safe operation of aircraft.

The RSA, OFA, and OFZ currently meet FAA standards. A proposed 948-foot extension on the southwest side of Runway 5-23 would place the private service road leading to the Bagdad Solar Project within the RSA, OFA, and OFZ. As such, a portion of the road would need to be closed and relocated farther southwest as shown on the development concept.

RUNWAY PROTECTION ZONES

The runway protection zone (RPZ) is a trapezoidal area beginning 200 feet beyond the runway ends. The function of the RPZ is to protect people and property on the ground. Typically, this is achieved through airport ownership of the RPZs, although proper land use control measures, such as easements, are acceptable. The RPZs should be cleared of any incompatible objects or activities. Prohibited land uses include residences and places of public assembly such as churches, schools, hospitals, office buildings, and shopping centers.

The FAA recommends that the airport sponsor own in fee simple the RPZ property. When fee simple ownership is not feasible, positive land use measures should be implemented in order to protect the airport from encroachment by incompatible land uses or obstructions.

In September 2012, the FAA published *Interim Guidance on Land Uses within a Runway Protection Zone*. The guidance addresses action necessary for new or modified RPZs. Any action that would introduce new land use incompatibilities into the RPZ will have to be specifically reviewed and approved by the FAA. Airport sponsors should follow existing guidance for meeting RPZ design standards for existing incompatibilities.

The current compatibility status of the RPZs for each runway end was presented in Chapters Three and Four. **Table 5B** presents information related to the current and future compatibility status of RPZs based on the Master Plan Concept.

TABLE 5B
RPZ Status and Mitigation Recommendations
Bagdad Airport

RPZ	Current Status	Current Recommendation	Future Status	Future Recommendation
Runway 5	Private service road leading to the Bagdad Solar Project	Maintain since it is a low volume and control-accessed road	Remove private service road to accommodate a potential runway extension	Relocate private service road outside the RPZ
	Other than airport property in RPZ (7.5 acres)	Maintain existing avigation easement	Other than airport property in RPZ (8.0 acres)	Acquire easement or in fee
Runway 23	Bagdad Airport Road	Maintain since there is no feasible alternative to relocating the road	Bagdad Airport Road	Maintain since there is no feasible alternative to relocating the road
	Other than airport property in RPZ (6.5 acres)	Maintain existing avigation easement	Other than airport property in RPZ (6.5 acres)	Maintain existing avigation easement

Source: Coffman Associates analysis

Currently, the RPZ serving the Runway 5 approach contains a private service road leading to the Bagdad Solar Project adjacent to the south side of the airport. This road is essentially grandfathered under current conditions. If the runway is extended in the future, then the RPZ will shift accordingly. The extension of the runway would impact the road, at which time it would need to removed and relocated outside the shifted RPZ.

Currently, there are approximately 7.5 acres of private property within the RPZ. The proposed runway extension would introduce additional uncontrolled property within the RPZ totaling approximately 8.0 acres. This property is recommended for fee simple acquisition; however, an avigation easement could apply.

The existing RPZ serving Runway 23 encompasses portions of the Bagdad Airport Road which provides access to the airport and the Bagdad Mine. A total of 6.5 acres of uncontrolled property exists within the RPZ. There are no changes planned to the runway environment and RPZ on this runway end. As a result, it is recommended to maintain the existing avigation easement serving the Runway 23 RPZ.

INSTRUMENT APPROACHES

The development concept considers the implementation of non-precision instrument approaches on each end of Runway 5-23 utilizing global positioning system (GPS) technology. The safety design standards previously discussed would apply to an instrument approach providing not lower than one-mile visibility minimums. As detailed in Chapter Four, an obstruction analysis would be needed to determine any potential airspace penetrations related to Part 77, *Objects Affecting Navigable Airspace* and *Terminal Instru-*

ment Procedures (TERPS). The Master Plan Concept depicts upgraded runway markings to include threshold bars and aiming points that would be needed in the event that an instrument approach is introduced at Bagdad Airport.

RUNWAY GRADIENT AND LINE-OF-SIGHT IMPROVEMENTS

Chapters Three and Four detail Runway 5-23 currently not meeting gradient and line-of-sight standards for runways serving AACs A and B. The runway's gradient should be sloped in such a manner not to exceed 2.0 percent gradient change while allowing for clear line-of-sight across the runway system. This is especially important at Bagdad Airport since there is no parallel taxiway serving Runway 5-23.

The portion of the runway that creates these deficiencies begins approximately 100 feet northeast of the Runway 5 threshold and extends 1,900 feet northeast toward the Runway 23 threshold, as highlighted on the Master Plan Concept. Projects related to improving the gradient and line-of-sight will most likely require the runway to be closed for the period of time while the enhancements are being made. As such, it is important for Yavapai County to coordinate with the FAA and ADOT-MPD – Aeronautics Group for the proper programming of these projects. Chapter Six provides a recommended capital program that addresses the timing of projects related to these improvements.

RUNWAY 5 THRESHOLD

In recent years, improvements have been made to the RSA and OFA which meet the full 240-foot safety standard prior to each runway end. The Master Plan proposes the removal of the 120-foot displaced threshold serving Runway 5 and situating the threshold at the physical end of pavement. In doing so, an additional 120 feet of runway length would be made available for landing aircraft. In the event of a runway extension as detailed earlier, the Runway 5 threshold would be situated at the physical end of pavement, allowing for full use of the extension for departing and landing aircraft.

It should be noted that the 120-foot displaced threshold serving Runway 23 was also evaluated. Due to factors related to approaching this runway end over steep terrain, it is recommended that the existing displaced threshold remain so as to provide a safety buffer for aircraft utilizing the runway.

TAXIWAYS

In order to enhance airfield safety, several taxiway improvements are included in the Master Plan Concept. Currently, hold aprons are located adjacent to each end of Runway 5-23. FAA AC 150-5300-13A, *Airport Design* recommends the implementation of taxiway turnarounds at general aviation airports that experience lower levels of aircraft activity, such as Bagdad Airport.

The short term development plan proposes the construction of taxiway turnarounds serving each end of Runway 5-23. As depicted, the taxiway turnarounds would be consistent with ADG and Taxiway Design Group (TDG) I design standards and include hold lines located 125 feet from the runway centerline.

In the long term planning horizon, a full-length parallel taxiway is proposed serving Runway 5-23. A parallel taxiway is recommended to improve operational safety and efficiency on the airfield and would better position the facility to accommodate an instrument approach procedure. The layout of the proposed taxiway turnarounds would allow for the connection of an ultimate parallel taxiway. The taxiway should be located 150 feet from the runway centerline, which would meet the separation requirements for RDC B-I (small aircraft).

The implementation of a parallel taxiway at Bagdad Airport would necessitate additional taxiway enhancements. These include removing the existing taxiways on the airfield that provide direct access from the runway to landside development (i.e., aircraft parking apron and private hangar) and replacing them with taxiway exits farther west along the runway system. In doing so, situational awareness on the airfield would be improved by not allowing direct access from an aircraft parking apron to the runway system.

AIRFIELD LIGHTING, WEATHER, AND APPROACH AIDS

Future planning considers medium intensity runway lighting (MIRL) on Runway 5-23. Furthermore, in the event that MIRL is implemented, an airport rotating beacon should be constructed to assist pilots in locating the airport at night. Elevated taxiway edge reflectors should accommodate all existing and future taxiways on the airfield.

An Automated Weather Observation System (AWOS) is planned approximately 250 feet south of the runway centerline and 1,200 feet from the Runway 23 displaced threshold. Electric utility service can be extended to this location from the FAA Remote Communications Outlet (RCO), located approximately 175 feet to the southwest. The AWOS will provide important weather information to pilots such as wind conditions, visibility, cloud ceilings, and altimeter settings.

Future planning also considers two-box precision approach path indicator (PAPI-2) systems and runway end identification lights (REILs) on each runway end. The Master Plan Concept depicts the location of the visual approach aids in relationship to the ultimate extension on Runway 5. The PAPI-2s and REILs could be implemented on the existing runway system and relocated in the event the runway is extended.

Finally, the Master Plan calls for the implementation of a segmented circle. A segmented circle performs functions related to aiding pilots in locating the airport and providing a centralized location for other indicators and signal devices as may be required on a particular airport. A segmented circle should be installed in a position that affords maximum visibility to pilots and is oftentimes co-located with a wind sock.

LANDSIDE CONCEPT

Landside components include hangars, aircraft parking aprons, terminal services, as well as the utilization of remaining airport property to provide revenue support and to benefit the economic development and well-being of the regional area. The primary goal of landside facility planning is to provide adequate aircraft storage space to meet forecast needs, while also maximizing operational efficiencies and land uses. Also important is identifying the overall land use classification of airport property in order to preserve the aviation purpose of the airport well into the future. Achieving these goals yields a development scheme which segregates aircraft activity levels while maximizing the airport's revenue potential. **Exhibit 5A** presents a view of the planned landside development for the airport that includes an inset at the top of the exhibit providing a detailed layout.

There are numerous potential facility layout concepts that could be considered. Potential layouts were presented in the previous chapter. The future layout depicted is a compilation of the alternatives presented, as well as further refinement based upon discussions with the PAC and Yavapai County officials.

The major landside issues addressed in the Master Plan Concept include the following:

- Construct a terminal facility that can meet future general aviation demands.
- Construct additional aircraft storage hangars.
- Provide additional apron space for aircraft parking and to support future aviation-related development.
- Implement aircraft fueling capabilities to help attract aviation demand and enhance airport revenues.
- Construct aviation support facilities to include an airport maintenance building.

TERMINAL FACILITY

Sponsors of business-oriented general aviation airports see benefit in providing terminal building facilities. A terminal building can provide many necessary services, such as flight planning, pilot lounge, and restrooms. Terminal buildings are often the first impression of a community a visitor will experience. Currently, there is no terminal facility or services offered at Bagdad Airport.

The development plan proposes the construction of a terminal facility. Aircraft would be provided ideal access to the facility by way of the existing aircraft parking apron. Bagdad Airport Road would lead directly to a dedicated vehicle parking area located to the east of the terminal. In order to allow public access to the facility, the Master Plan Concept calls for the removal of the controlled-access gate and portions of airport perimeter fencing. The gate and fencing could be relocated in order to maintain proper airfield safety and security. In fact, the development plan calls for two controlled-access gates, one leading to aviation facilities to the west of the terminal and another farther south leading to proposed hangar and support (maintenance) facilities.

AIRCRAFT PARKING APRON

Additional aircraft parking apron space is planned adjacent to the west side of the existing apron. This parking apron combined with the existing space provided would satisfy general aviation demand through the long term planning period. It could also accommodate other aviation activities to include fueling capabilities, which will be detailed later in this chapter.

AIRCRAFT HANGARS

The Master Plan Concept establishes the location of certain hangar types primarily following the philosophy of separation of activity levels. An 8-unit T-hangar facility is called for adjacent to the west side of the aircraft parking apron expansion. As depicted, this facility would be provided access to the runway system via the aircraft parking apron. If a parallel taxiway is constructed, access to the T-hangar facility could be provided via a taxiway extending directly from the parallel taxiway. A secured road extending along the north side of airport property would provide vehicle access to the T-hangars.

Two conventional/executive hangars are proposed east of the aircraft parking apron, in the vicinity of an existing hangar facility that is utilized for aircraft storage. In order to allow aircraft access to these facilities, a taxiway extending from either the runway or proposed parallel taxiway would be constructed leading to an apron area adjacent to the hangars. A private road extending from the terminal parking lot would provide access to this development area.

The hangar facilities identified on the Master Plan Concept provide more than 14,000 square feet of additional hangar space that could accommodate aircraft storage and maintenance activities. The proposed layout plan exceeds the amount of hangar space needed over the next 20 years; however, if an increase in aviation demand is experienced at the airport through the long term planning horizon that warrants additional facilities, development areas to the east and west of existing landside infrastructure are identified on the Master Plan Concept to accommodate these demands.

FUEL FACILITIES

The location for a fuel storage facility has been identified on the aircraft parking apron. This location could provide self-service fueling capabilities, as it is planned on apron space that would allow for efficient movement of aircraft. The road proposed immediately to the north would provide access for refueling tanker trucks needing to off-load fuel into the storage tank.

MAINTENANCE FACILITY

The development plan calls for the construction of a dedicated maintenance facility to store and maintain airport equipment. The building would be granted access via the private road extending from the terminal parking lot.

SUMMARY

The Master Plan Concept is designed to assist Yavapai County in making decisions on the future growth and development of Bagdad Airport. The plan represents an airfield facility that fulfills aviation needs for the airport, while conforming to safety and design standards. It also provides a landside complex that can be developed as demand dictates.

Flexibility will be very important to future development at the airport, as activity may not occur as predicted. The development plan provides airport stakeholders with a general guide that, if followed, can maintain the airport's long term viability and allow the airport to continue to provide air transportation service to the region. The next chapter of this Master Plan will consider strategies for funding the recommended improvements and will provide a reasonable schedule for undertaking the projects based on demand over the course of the next 20 years.

Chapter Six

CAPITAL IMPROVEMENT PROGRAM

Chapter Six

CAPITAL IMPROVEMENT PROGRAM

The previous analyses outlined airport development needs on both the airside and landside to meet projected aviation demand for the next 20 years based on forecast activity, facility needs, and operational safety and efficiency. In this chapter, basic economic, financial, and management rationale is applied to the development items so that the feasibility of each item contained in the plan can be assessed.

The capital improvement program (CIP) has been organized into three sections. First, the airport's capital program needs are categorically recognized. Second, the CIP projects and their allocated cost estimates are itemized into planning horizons that extend through the planning period of the Master Plan. Third, funding sources on the federal, state, and local levels are identified and discussed. The vision of the Master Plan is based on the airport achieving specific demand-based triggers such as growth in based aircraft and an increase in aviation and potential non-aviation business development.

The Bagdad Airport Master Plan Update has been developed according to a demand-based schedule. This type of planning establishes guidelines for capital investments at the airport based upon airport activity levels instead of subjective factors such as dates in time. By doing so, the levels of activity derived from the demand forecasts can be related to the actual capital investments needed to safely and efficiently accommodate the level of demand being experienced at the airport. More specifically, the intention of the Master Plan is that facility improvements needed to serve new levels of demand should only be undertaken when the levels of demand experienced at the airport justify their implementation. Obviously, some projects related to maintenance efforts will follow more closely to a timeline

schedule due to general wear and tear requiring routine upkeep. Airport maintenance projects have been factored into the CIP and should be closely monitored by Yavapai County officials.

As discussed, many development items included in the Master Plan Concept will need to follow demand indicators. For example, the plan includes the construction of new taxiways leading to potential aviation infrastructure development. An increasing number of based aircraft will be the indicator for these needs. If based aircraft growth occurs as projected, additional hangars will need to be constructed to meet the demand; thus, taxiway development would be necessary to access hangar construction. If growth slows or does not occur as projected, these projects can be delayed.

Other projects, especially those related to the continued development of airside facilities, such as a runway extension, will also be demand-driven and tied directly to the number of annual aircraft operations and types of aircraft that may utilize Bagdad Airport. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets.

A demand-based Master Plan does not specifically require the implementation of demand-driven improvements. Instead, it is envisioned that the need for these improvements would be examined against the demand levels prior to implementation. The Master Plan establishes a plan for the use of airport facilities consistent with the potential aviation needs and capital needs required to support that specific use. However, individual projects in the plan are not implemented until the need is demonstrated and the project is approved for funding. **Table 6A** summarizes the key demand milestones for each of the three planning horizons.

TABLE 6A
Planning Horizon Activity Summary
Bagdad Airport

	Base Year (2012)	Short Term (1-5 Years)	Intermediate Term (6-10 Years)	Long Term (11-20 Years)
BASED AIRCRAFT				
Single Engine Piston	3	4	4	5
Multi-Engine Piston	--	--	1	1
Turboprop	--	--	--	1
Total Based Aircraft	***3***	***4***	***5***	***7***
ANNUAL OPERATIONS				
Itinerant	2,640	3,540	4,380	6,180
Local	1,760	2,360	2,920	4,120
Total Annual Operations	***4,400***	***5,900***	***7,300***	***10,300***

Source: Coffman Associates analysis

AIRPORT DEVELOPMENT NEEDS

In an effort to identify capital needs at the airport, this section provides analysis regarding the associated development needs of those projects included in the CIP. While some projects will be demand-based, others will be dictated by design standards, safety, or rehabilitation needs. Each development need is categorized according to this schedule. The applicable category (or categories) included are presented on **Exhibit 6A**. The proposed projects can be categorized as follows:

1) **Safety/Security (SS)** – these are capital needs considered necessary for operational safety and protection of aircraft and/or people and property on the ground near the airport.

2) **Environmental (EN)** – these are capital needs which are identified to enable the airport to operate in an environmentally acceptable manner or meet needs identified in the Environmental Overview outlined in Appendix B.

3) **Maintenance (MN)** – these are capital needs required to maintain the existing infrastructure at the airport.

4) **Efficiency (EF)** – these are capital needs intended to optimize aircraft ground operations or passengers' use of the terminal building.

5) **Demand (DM)** – these are capital needs required to accommodate levels of aviation demand. The implementation of these projects should only occur when demand for these needs is verified.

6) **Opportunities (OP)** – these are capital needs intended to take advantage of opportunities afforded by the airport setting. Typically, this will involve improvements to property intended for lease to aviation or non-aviation related development.

CAPITAL IMPROVEMENT SCHEDULE AND COST SUMMARIES

Now that the specific needs for the airport have been established, the next step is to determine a realistic capital improvement schedule and associated costs for implementing the plan. This section will identify these projects and the overall costs of each item in the development plan. The program outlined in the following pages has been evaluated from a variety of perspectives and represents the culmination of a comparative analysis of basic budget factors, demand, and priority assignments.

The recommended improvements are grouped by the planning horizons: short term, intermediate term, and long term. It is important to note that the CIP provided here presents current and projected needs at this point in time. The very nature of the aviation industry is always changing, and as such, so too could the needs of the airport. As a result, Yavapai County officials should re-examine the priorities each year for funding, adding or removing projects to the capital programming lists based on needs/demands at that point in time.

Once the list of necessary projects was identified and refined, project-specific cost estimates were developed. The cost estimates include design, engineering, construction administration, and contingencies that may arise on the project. Capital costs presented in the Master Plan should be viewed only as estimates sub-

	PROJECT DESCRIPTION	DEVELOP-MENT CATEGORY	TOTAL PROJECT COST	FAA ELIGIBLE	ADOT ELIGIBLE	LOCAL SHARE
	SHORT TERM PROGRAM (1-5 Years)					
	Current Year (2014)					
1	Design and Construct Terminal Facility (Pilots' Lounge and Restrooms)	DM/OP	$400,000	-	$380,000	$20,000
	2014 Total		***$400,000***	-	***$380,000***	***$20,000***
	2015					
2	Improve Utility Infrastructure Leading to Landside Development	DM/OP	$251,000	-	$238,450	$12,550
3	Environmental and Design - Partial Runway Reconstruction to Meet Gradient / Line-of-Sight Requirements and Construct Taxiway Turnarounds	SS/EN	$187,000	$170,282	$8,359	$8,359
	2015 Total		***$438,000***	***$170,282***	***$246,809***	***$20,909***
	2016					
4	Construct Runway Gradient / Line-of-Sight Improvements	SS	$810,000	$737,586	$36,207	$36,207
5	Construct Taxiway Turnarounds Serving Each End of Runway 5-23	SS/EF	$255,000	$232,203	$11,399	$11,399
6	Pavement Rehabilitation and Marking Improvements - Runway, Taxiway, and Aircraft Parking Apron; Remove Runway 5 Displaced Threshold and Implement Non-Precision Markings	MN/SS	$582,000	$529,969	$26,015	$26,015
	2016 Total		***$1,647,000***	***$1,499,758***	***$73,621***	***$73,621***
	2017					
7	Implement Terminal Area Improvements (Vehicle Parking, Controlled-Access Gates, and Terminal Fencing)	SS	$370,000	-	$351,500	$18,500
	2017 Total		***$370,000***	-	***$351,500***	***$18,500***
	2018					
8	Install AWOS and Segmented Circle	SS	$277,000	$252,236	$12,382	$12,382
	2018 Total		***$277,000***	***$252,236***	***$12,382***	***$12,382***
	2019					
9	Construct Airport Maintenance/Storage Facility	MN	$196,000	-	$186,200	$9,800
	2019 Total		***$196,000***	-	***$186,200***	***$9,800***
	TOTAL SHORT TERM PROGRAM		***$3,328,000***	***$1,922,277***	***$1,250,512***	***$155,212***
	INTERMEDIATE TERM PROGRAM (6-10 Years)					
1	Implement MIRL, PAPI-2s, and REILs on Runway 5-23 and Construct Airport Rotating Beacon	SS/EF	$594,000	$540,896	$26,552	$26,552
2	Construct Roadway Improvements to Support Landside Development	DM/OP	$359,200	-	$341,240	$17,960
3	Install Fuel Farm and Self-Service Fueling Capability	DM/OP	$377,000	$343,296	$16,852	$16,852
4	Expand Aircraft Parking Apron and Hangar Access Taxilanes to Accommodate Aviation Demand	DM/OP	$609,000	$554,555	$27,222	$27,222
5	Construct 8-Unit T-Hangar Complex	DM	$859,000	$782,205	$38,397	$38,397
6	General Pavement Maintenance	MN	$240,500	$218,999	$10,750	$10,750
	TOTAL INTERMEDIATE TERM PROGRAM		***$3,038,700***	***$2,439,953***	***$461,013***	***$137,734***
	LONG TERM PROGRAM (11-20 Years)					
1	Construct Parallel Taxiway and Entrance/Exit Taxiways Serving Runway 5-23 (Include Elevated Edge Reflectors)	SS/EF	$3,237,500	$2,948,068	$144,716	$144,716
2	Acquire Property Interests Associated with Runway 5-23 Extension (21 acres)	EN/DM	$154,400	$140,597	$6,902	$6,902
3	Relocate Road Leading to Bagdad Solar Project	SS	$248,000	$225,829	$11,086	$11,086
4	Extend Runway 5-23 and Parallel Taxiway 948' Southwest (Relocate PAPI-2 and REILs)	DM	$1,742,800	$1,586,994	$77,903	$77,903
5	General Pavement Maintenance	MN	$1,106,000	$1,007,124	$49,438	$49,438
	TOTAL LONG TERM PROGRAM		***$6,488,700***	***$5,908,610***	***$290,045***	***$290,045***
	TOTAL PROGRAM COSTS		***$12,855,400***	***$10,270,840***	***$2,001,570***	***$582,990***

MIRL - Medium Intensity Runway Lights
PAPI - Precision Approach Path Indicator
REIL - Runway End Identification Light
AWOS - Automated Weather Observation System
SS - Safety/Security
EF - Efficiency
MN - Maintenance
EN - Environmental
DM - Demand
OP - Opportunity

Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

ject to further refinement during the design phase; however, they are considered sufficient for planning purposes. Cost estimates for projects included in the CIP were provided by C&S Companies, the airport's current engineering firm. The detail on these estimates is provided in **Appendix C**. Cost estimates for each of the development projects listed are in current (2014) dollars. Adjustments will need to be applied over time as construction costs or capital equipment costs change.

Exhibit 6A presents the proposed CIP for Bagdad Airport. An estimate of Federal Aviation Administration (FAA) and Arizona Department of Transportation – Multi-Modal Planning Division – Aeronautics Group (ADOT-MPD – Aeronautics Group) funding eligibility has been included, although actual funding is not guaranteed. For those projects that would be eligible for federal funding, Airport Improvement Program (AIP) reauthorization (to be discussed later in this chapter) allocates 91.06 percent of the total project cost to Arizona airports. The remaining amount would be equally shared between the state and local sponsor, at 4.47 percent each. For projects that are funded through the state, the CIP allocates 95 percent of the total project cost as being eligible for ADOT-MPD – Aeronautics Group funding. The remaining five percent would be the responsibility of the airport sponsor. This eligibility breakdown is based upon the state's general aviation basic airport classification given to Bagdad Airport.

As detailed in the CIP, the majority of projects listed are eligible for federal and state funding. Obviously, demand and justification for these projects must be provided prior to a grant being administered by the FAA and/or ADOT-MPD – Aeronautics Group. **Exhibit 6B** graphically depicts the development staging by overlaying each project onto the aerial photography of the airport.

The FAA and ADOT-MPD – Aeronautics Group utilize a national priority ranking system to help objectively evaluate potential airport projects. Projects are weighted toward safety, infrastructure preservation, standards, and capacity enhancement. These entities will participate in the highest priority projects before considering lower priority projects, even if a lower priority project is considered a more urgent need by the local sponsor. Nonetheless, the project should remain a priority for the airport and funding support should continue to be requested in subsequent years.

Some projects identified in the CIP will require environmental documentation. The level of documentation necessary for each project must be determined in consultation with the FAA and ADOT-MPD – Aeronautics Group. There are three major levels of environmental review to be considered under the *National Environmental Policy Act* (NEPA) that include categorical exclusions (CATEX), environmental assessments (EA), and environmental impact statements (EIS). Each level requires more time to complete and more detailed information. Guidance on what level of documentation is required for a specific project is provided in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*. The Environmental Overview presented in **Appendix B** addresses NEPA and provides an evaluation of potential environmental impacts for Bagdad Airport.

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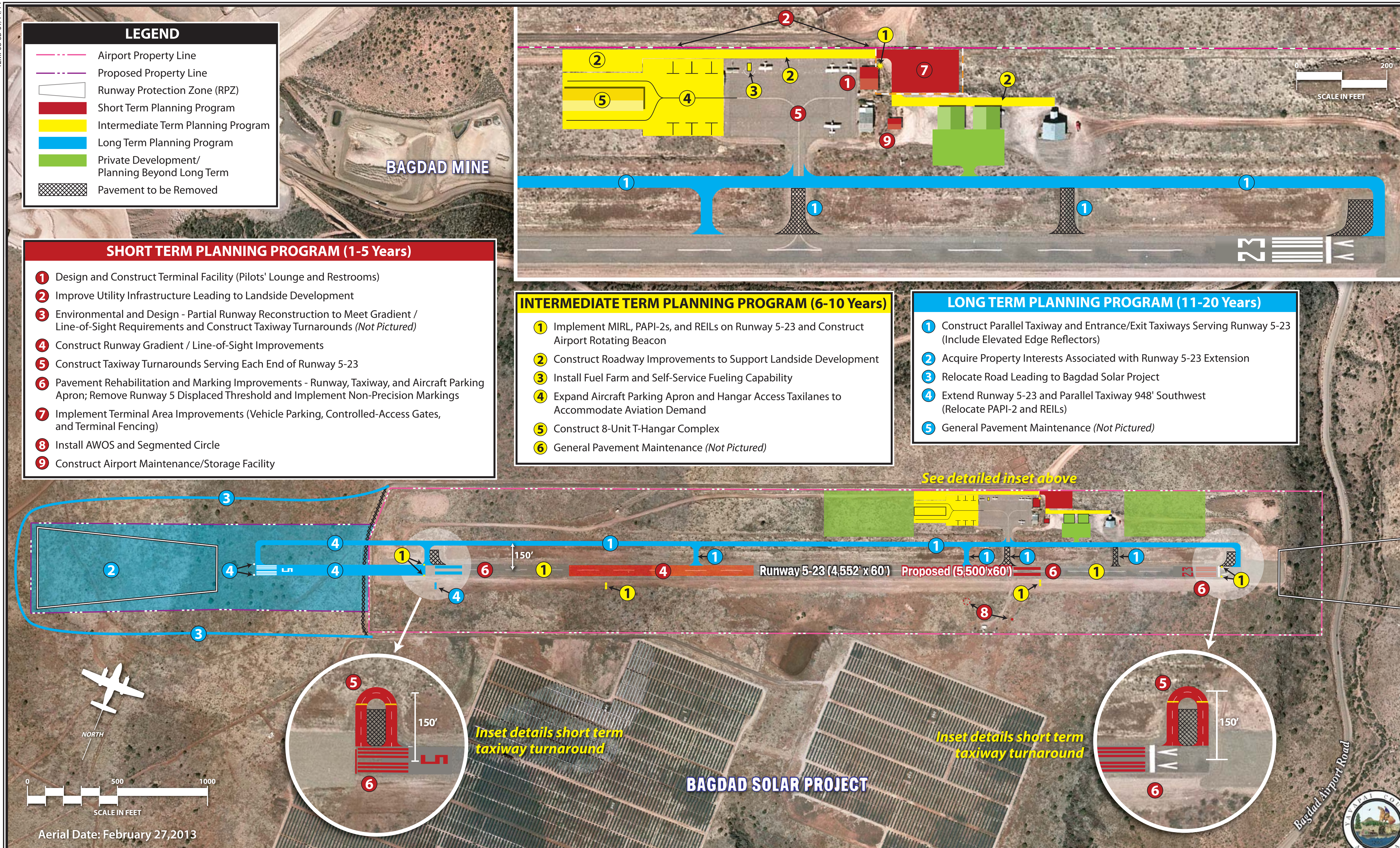


Exhibit 6B
DEVELOPMENT STAGING

SHORT TERM PROGRAM

The short term program considers nine projects for the five-year planning period as presented on **Exhibit 6A** and illustrated on **Exhibit 6B**. The short term planning period is the only planning horizon separated into single years. This is to allow the CIP to be coordinated with the five-year planning cycle of the FAA and ADOT-MPD – Aeronautics Group programs.

Projects called out during this timeframe are very specific in terms of actual design and construction. Several projects in the short term may also need to be addressed in a CATEX or an EA. As such, some projects are initially put through an environmental and/or design phase and then followed up with actual construction.

2014

The first year of the CIP considers projects that may be accomplished in the 2014 federal funding cycle (October 2013 through September 2014). The only project identified in the 2014 CIP is the design and construction of an airport terminal facility. Yavapai County officials were notified by ADOT-MPD – Aeronautics Group that Bagdad Airport may be eligible for a state grant during this fiscal year (FY) for the implementation of a terminal facility, pending approval by the State's Transportation Board in May or June. The terminal facility will be located adjacent to the east side of the aircraft parking apron and provide services such as a pilot lounge, flight planning, and restrooms.

2015

Two projects are identified in 2015, one related to enhancing landside opportunities and the other related to airside improvements. The first calls for the extension of utility infrastructure on the north side of the airport in order to complement and attract landside development. These utilities could include water and electric enhancements, among other services.

As detailed in previous chapters, improvements are recommended on Runway 5-23 in order for the runway to meet gradient and line-of-sight standards associated with Runway Design Code (RDC) B-I for small aircraft. During this time, the environmental analysis and design needed to accomplish this project is programmed. This environmental and design phase also includes taxiway turnarounds to be constructed at each end of the runway. The environmental analysis would likely require a CATEX for these projects.

2016

Once the environmental and design work proposed in FY 2015 is complete for the runway gradient and line-of-sight improvements and taxiway turnarounds, actual construction is proposed in 2016. In addition, the CIP calls for rehabilitating pavements on the airfield to include portions of Runway 5-23, existing taxiways, and the aircraft parking apron as well as removing the displaced threshold on Runway 5 and implementing non-precision markings on the runway pavement.

The pavement rehabilitation and marking project would be timely given that the runway system would likely be closed for a period of time while the gradient and line-of-sight improvements and taxiway turnarounds are being constructed. It is important that Yavapai County officials properly plan and coordinate these projects with the FAA and ADOT-MPD – Aeronautics Group in order to minimize the amount of time the airport would be closed to administer these improvements.

2017

The one project in FY 2017 calls for implementing terminal area improvements in the form of dedicated vehicle parking in the vicinity of the terminal facility. In order to provide public access to this parking area, the plan calls for relocating portions of the airport's perimeter fencing and controlled-access gate in order to provide public access to the parking lot while maintaining airfield safety and security.

2018

The construction of an Automated Weather Observation System (AWOS) is planned for 2018. The AWOS will provide accurate weather reporting for the airport and is planned approximately 650 feet south of the proposed terminal facility.

Also included at this same time is the implementation of a segmented circle. The segmented circle would be co-located with an existing wind sock adjacent to the south side of Runway 5-23.

2019

The final project in the short term planning horizon involves the design and construction of the airport maintenance/storage facility. As the airport plans for improvements to the airfield system in the form of lighting and approach aids, this facility will provide adequate storage for necessary equipment related to these enhancements.

Short Term CIP Summary

The short term CIP includes projects that enhance the overall safety, efficiency, and maintenance of the airfield. It also positions Bagdad Airport to readily accept an increase in aviation demand by providing terminal services and improved utility infrastructure. The total investment necessary for the short term CIP is approximately $3.33 million. Of this total, approximately $3.17 million is eligible for FAA/ADOT-MPD – Aeronautics Group funding. At a minimum, the remaining $155,212 would need to be provided through local funding outlets.

INTERMEDIATE TERM PROGRAM

The intermediate term covers the period six through ten years. Planning new projects beyond a five-year timeframe can be challenging. Project need is heavily dependent upon local demand and the economic outlook of the aviation industry and area in which the airport serves. Since many of the projects in the intermediate term are demand-based, the use of planning horizons to group potential airport projects provides Yavapai County the flexibility to accelerate those projects that are needed immediately and delay those projects that no longer have a high priority. Due to the fluid nature of 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 list and not prioritized by year.

This planning horizon considers six projects for the five-year timeframe as listed on **Exhibit 6A** and depicted on **Exhibit 6B**. The first project included in the intermediate term addresses airfield lighting and visual approach aids. Medium intensity runway lighting (MIRL) is planned on the runway system. This airfield lighting enhancement also warrants the construction of an airport rotating beacon, bringing positive identification to the airport at night. An ideal location for the rotating beacon would be adjacent to the proposed terminal facility. The installation of two-box precision approach path indicator (PAPI-2) systems and runway end identification lights (REILs) on each end of Runway 5-23 is also planned that would bring an element of improved safety to aircraft utilizing the airport.

The next four projects involve enhancements to landside facilities on the north side of the runway in proximity to the existing aircraft parking apron. They include the implementation of dedicated access roads, installation of a fuel storage tank with self-service fueling capabilities, expanded aircraft parking apron space, and construction of an 8-unit T-hangar complex. Demand will dictate the magnitude and degree to which this infrastructure is developed.

Miscellaneous pavement maintenance projects are also included as the final project. A substantial amount of funding is programmed for this line item to account for the runway, taxiways, and aircraft parking apron at Bagdad Airport. Although listed as one project at the end of the intermediate term, it is conceivable that multiple pavement preservation projects could occur during this timeframe, utilizing portions of the funding set aside in this particular CIP item.

The total costs associated with the intermediate term program are estimated at $3.04 million. Of this total, approximately $2.90 million could be eligible for federal/state grant funding, and the local share is projected to be $137,734.

LONG TERM PROGRAM

The long term planning horizon considers five projects for the ten-year period. The improvements are presented on **Exhibit 6A** and depicted on **Exhibit 6B.**

The most significant projects planned during this timeframe involve the construction of a parallel taxiway serving the existing layout of Runway 5-23 and the extension of the runway to the southwest. These projects would bring the total runway length up to 5,500 feet and provide a full-length parallel taxiway to the runway system. Ancillary projects would include removing existing entrance/exit taxiways, acquiring property to accommodate the runway extension and associated safety areas, removing and relocating a portion of the service road leading to the Bagdad Solar Project, and relocating visual approach aids.

As with the intermediate term program, general pavement maintenance is also included in the long term to account for ongoing and preventative maintenance repairs during the ten-year period. Total long term program costs are estimated at $6.49 million with approximately $6.20 million eligible for FAA/ADOT-MPD – Aeronautics Group funding assistance. The remaining $290,045 would be the responsibility of the airport sponsor.

CAPITAL IMPROVEMENTS SUMMARY

The CIP is intended as a road map of airport improvements to help guide Yavapai County, the FAA, and ADOT-MPD – Aeronautics Group on needed projects. The plan as presented will meet the forecast demand at Bagdad Airport over the next 20 years and, in many respects, beyond. It should be noted that the sequence of projects will likely change due to availability of funds or changing priorities. Nonetheless, this is a comprehensive list of capital projects the airport should consider in the next 20 years.

The total 20-year CIP proposes approximately $12.86 million in airport development. Of this total, approximately $12.27 million could be eligible for federal/state funding. The local funding requirement for the proposed 20-year CIP is $582,990.

CAPITAL IMPROVEMENT FUNDING SOURCES

There are generally four sources of funds used to finance airport development which include:

- Airport cash flow
- Revenue and general obligation bonds
- Federal/state/local grants
- Passenger facility charges (PFCs), which are reserved for commercial service airports

Access to these sources of financing varies widely among airports, with some large airports maintaining substantial cash reserves and the smaller general aviation airports often requiring subsidies from local governments to fund operating expenses and finance modest improvements.

Financing capital improvements at the airport will not rely solely on the financial resources of the airport or the County. Capital improvement funding is available through various grant-in-aid programs on both the federal and state levels. Historically, Bagdad Airport has received federal and state grants. While some years more funds could be available, the CIP was developed with project phasing in order to remain realistic and within the range of anticipated grant assistance. The following discussion outlines key sources of funding potentially available for capital improvements at Bagdad Airport.

FEDERAL GRANTS

Through federal legislation over the years, various grant-in-aid programs have been established to develop and maintain a system of public use airports across the United States. The purpose of this system and its federally based funding is to maintain national defense and to promote interstate commerce. The most recent legislation affecting federal funding was enacted on February 17, 2012 and is titled the *FAA Modernization and Reform Act of 2012*.

The law authorizes the FAA's AIP at $3.35 billion for FYs 2012 through 2015. Eligible airports, which included those in the *National Plan of Integrated Airports Systems* (NPIAS), such as Bagdad Airport, can apply for airport improvement grants. **Table 6B** presents the approximate distribution of the AIP funds. Bagdad Airport is eligible to apply for grants which may be funded through state apportionments, the small airport fund, and/or discretionary categories.

TABLE 6B **Federal AIP Funding Distribution**		
Funding Category	**Percent of Total**	**Funds***
Apportionment/Entitlement		
Passenger Entitlements	29.19%	$977,865,000
Cargo Entitlements	3.00%	$100,500,000
Alaska Supplemental	0.65%	$21,775,000
State Apportionment for Non-Primary Entitlements	10.35%	$346,725,000
State Apportionment Based on Area and Population	9.65%	$323,275,000
Carryover	10.77%	$360,795,000
Small Airport Fund		
Small Hubs	1.67%	$55,945,000
Non-Hubs	6.68%	$223,780,000
Non-Primary (GA and Reliever)	3.34%	$111,890,000
Discretionary		
Capacity/Safety/Security/Noise	11.36%	$380,560,000
Pure Discretionary	3.79%	$126,965,000
Set Asides		
Noise	8.40%	$281,400,000
Military Airports Program	0.99%	$33,165,000
Reliever	0.16%	$5,360,000
Totals	100.00%	$3,350,000,000
**FAA Modernization and Reform Act of 2012* AIP: Airport Improvement Program		
Source: FAA Order 5100.38C, *Airport Improvement Program Handbook*		

Funding for AIP-eligible projects is undertaken through a cost-sharing arrangement in which the FAA provides up to 90 percent of the cost and the airport sponsor invests the remaining 10 percent. In exchange for this level of funding, the airport sponsor is required to meet various grant assurances, including maintaining the improvement for its useful life, usually 20 years. As discussed earlier in this chapter, the FAA provides up to 91.06 percent of the cost of eligible projects for Arizona airports.

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 Aviation Trust Fund also finances the operation of the FAA. It is funded by user fees, including taxes on airline tickets, aviation fuel, and various aircraft parts.

Apportionment (Entitlement) Funds

Federal AIP 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 minimum enplanement levels of at least 10,000 passengers annually. Other entitlement funds are distributed to cargo service airports, states and insular areas (state apportionment), and Alaska airports.

General aviation airports included in the NPIAS can receive up to $150,000 each year in Non-Primary Entitlement (NPE) funds. These funds can be carried over and combined for up to four years, thereby allowing for completion of a more expensive project. In the past, Bagdad Airport has received NPE funding.

The states also receive a direct apportionment based on a federal formula that takes into account area and population. The states can then distribute these funds for projects at various airports throughout the state.

Small Airport Fund

If a large or medium hub commercial service airport chooses to institute a PFC, which is a fee of up to $4.50 on each airline ticket for funding of capital improvement projects, then their apportionment is reduced. A portion of the reduced apportionment goes to the small airport fund. The small airport fund is reserved for small-hub primary commercial service airports, non-hub commercial service airports, and general aviation airports.

Discretionary Funds

The remaining AIP funds are distributed by the FAA based on the priority of the project for which they have requested federal assistance through discretionary apportionments. A national priority ranking system is used to evaluate and rank each airport project. Those projects with the highest priority from airports across the country are given preference in funding. High priority projects include those related to meeting design standards, capacity improvements, and other safety enhancements.

Under the AIP program, examples of eligible development projects include the airfield, public aprons, and access roads. Additional buildings and structures may be eligible if the function of the structure is to serve airport operations in a non-revenue generating capacity, such as maintenance facilities. Some revenue-enhancing structures, such as T-hangars and fuel farms, may be eligible if all airfield improvements have been made; however, the priority ranking of these facilities is very low.

Whereas entitlement monies are guaranteed on an annual basis, discretionary funds are not assured. If the combination of entitlement, discretionary, and airport sponsor match does not provide enough capital for planned development, projects may be delayed.

Set-Aside Funds

Portions of AIP funds are set-asides designed to achieve specific funding minimums for noise compatibility planning and implementation, select former military airfields (Military Airport Program), and select reliever airports. Bagdad Airport does not qualify for set-aside funding since it is not a reliever airport.

FAA Facilities and Equipment (F&E) Program

The Airway Facilities Division of the FAA administers the Facilities and Equipment (F&E) Program. This program provides funding for the installation and maintenance of various navigational aids and equipment of the national airspace system. Under the F&E program, funding is provided for FAA Airport Traffic Control Towers (ATCTs), enroute navigational aids, on-airport navigational aids, and approach lighting systems.

While F&E still installs and maintains some navigational aids, on-airport facilities at general aviation airports have not been a priority. Therefore, airports often request funding assistance for navigational aids through AIP and then maintain the equipment on their own. Proposed installation of the PAPI-2 systems on Runway 5-23 could qualify for F&E funds, but would likely not be a high priority.

STATE FUNDING PROGRAMS

The ADOT-MPD – Aeronautics Group recognizes the valuable contribution to the state's transportation economy that airports make. Therefore, it administers several programs to aid in maintaining airports in the state. 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 State Transportation Board establishes the policies for distribution of these state funds.

Under the State of Arizona's grant program, an airport can receive funding for one-half (currently 4.47 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. As previously discussed, Bagdad Airport is eligible for up to 95 percent funding from the state for projects which are not eligible or have not received federal funding.

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 the maximum useful life of the airport system's pavement. The Arizona Pavement Management System (APMS) has been established to assist in the preservation of Arizona airports' system infrastructure.

Public Law 103-305 requires that airports requesting federal AIP funding for pavement rehabilitation or reconstruction have an effective pavement maintenance program system. To this end, ADOT-MPD – Aeronautics Group maintains the APMS. This system requires monthly airport inspections which are conducted by airport management and supplied to ADOT.

The Arizona APMS uses the Army Corps of Engineers' "Micropaver" program as a basis for generating a Five-Year 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 conditions in accordance with the most recent FAA Advisory Circular 150/5380-7, *Pavement Management System*, 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. ADOT-MPD – Aeronautics Group ensures that the APMS database is kept current, in compliance with FAA requirements.

Every year, ADOT-MPD – Aeronautics Group, 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 APPP, or the airport sponsor may sign an Inter-Government Agreement (IGA) with ADOT-MPD – Aeronautics Group to participate in the APPP.

State Airport Loan Program

The ADOT Airport Loan Program was established to enhance the utilization of state funds and provide a flexible funding mechanism to assist airports in funding revenue-generating projects, 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.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. Bagdad Airport is owned and operated by Yavapai County and receives assistance from the County for both operational and capital expenditures. A goal for the airport is to generate enough revenue to cover all operating and capital expenditures. As with many general aviation airports, however, this is not always possible and other financial methods are needed.

There are several alternatives for local financing options for future development at the airport, including airport revenues, direct funding (subsidizing) from the county, 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.

There are several municipal bonding options available, 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 secured by the full faith and credit of the county, and future 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 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 government agency, produces a unique set of concerns.

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.

In addition to leasehold financing, it is acceptable for the airport to enter into some form of public/private partnership for various airport projects. Typically, this would be limited to hangar construction, but there are some examples where a private developer constructs, for example, a taxilane, then deeds it to the airport for ongoing maintenance. When entering any such arrangement, the airport must be sure that the private developer does not gain an economic advantage over other airport tenants.

MASTER PLAN IMPLEMENTATION

There is a continuous debate in communities across the country about the mission of local airports. Many communities view the local airports as assets and treat them as another department within the local government structure. Under this structure, like parks, the airport is not expected to be a profit center. Other communities view the airport as a business center where profit is the goal. Most communities settle on some combination where revenue generation is maximized and any additional funds needed come from the general operating budget of the sponsoring community.

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 airport should implement measures that allow them to track various demand indicators, such as based aircraft, hangar demand, and operations. 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 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 how long 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 of project implementation. Updating can be done by the manager, thereby improving the plan's effectiveness.

In summary, the planning process requires Yavapai County to consistently monitor the progress of Bagdad 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 delayed.

Appendix A

GLOSSARY OF TERMS

Glossary of Terms

A

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

AIRCRAFT OPERATIONS AREA (AOA): 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 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 IMPROVEMENT PROGRAM: A program authorized by the Airport and Airway

Improvement Act of 1982 that provides funding for airport planning and development.

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRPORT LAYOUT PLAN (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

AIRPORT LAYOUT PLAN DRAWING SET: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

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 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 en route 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 en route phase of flight.

AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

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.

AUTOMATIC WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, 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).

B

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.

C

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.

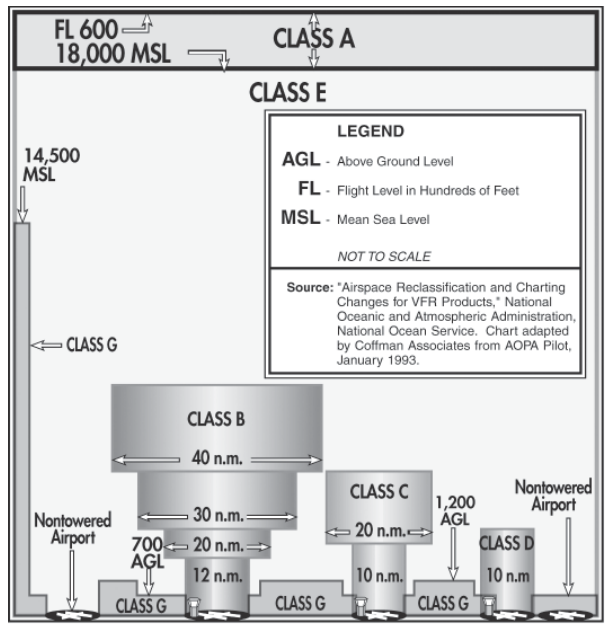
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 200 feet above the horizontal plane containing the runway threshold.

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 100 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.

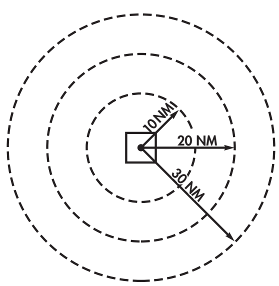
CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

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 procedure . 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."

D

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT/DECISION ALTITUDE: 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.

- **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.

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 Aweighted 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."

E

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 nonscheduled 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 are 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.

F

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.

FEDERAL INSPECTION SERVICES: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

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."

FINAL APPROACH AND TAKEOFF AREA (FATO). A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

FINAL APPROACH FIX: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

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 measure of altitude used by aircraft flying above 18,000 feet. Flight levels are indicated by three digits representing the pressure altitude in hundreds of feet. An airplane flying at flight level 360 is flying at a pressure altitude of 36,000 feet. This is expressed as FL 360.

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.

G

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.

GENERAL AVIATION AIRPORT: An airport that provides air service to only general aviation.

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 48 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.

H

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.

I

INITIAL APPROACH FIX: The designated point at which the initial approach segment begins for an instrument approach to a 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.

K

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

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 en route 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.

M

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.

N

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.)

NAVIGATIONAL AID: A facility used as, available for use as, or designed for use as an aid to air navigation.

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.

O

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.

ONE-ENGINE INOPERABLE SURFACE: A surface emanating from the runway end at a slope ratio of 62.5:1. Air carrier airports are required to maintain a technical drawing of this surface depicting any object penetrations by January 1, 2010.

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

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.

P

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 Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

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 en route 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 en route 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 DESIGN CODE: A code signifiying the design standards to which the runway is to be built.

RUNWAY END IDENTIFICATION LIGHTING (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 REFERENCE CODE: A code signifying the current operational capabilities of a runway and associated taxiway.

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.

S

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 AIRCRAFT: An aircraft 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 INSTRUMENT DEPARTURE PROCEDURES: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or en route airspace.

STANDARD TERMINAL ARRIVAL ROUTE (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.

T

TACTICAL AIR NAVIGATION (TACAN): An ultrahigh 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 DESIGN GROUP: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

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.

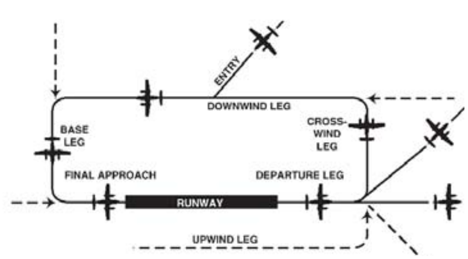
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

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.



U

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.

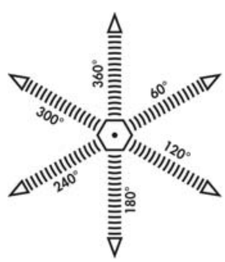
UNIVERSAL COMMUNICATION (UNICOM): A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

V

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE (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/ 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."

W

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.

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)

AOA: Aircraft Operation Area

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire fighting

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: automatic weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of 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

LOM: compass locator at outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system with 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 rule making

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

RRC: Runway Reference Code

RDC: Runway Design Code

REIL: runway end identification 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 runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TDG: Taxiway Design Group

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

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

Appendix B

ENVIRONMENTAL OVERVIEW

Appendix B
ENVIRONMENTAL OVERVIEW

A review of the potential environmental impacts associated with proposed airport projects is an essential consideration in the Airport Master Plan process. The primary purpose of this section is to review the development alternatives at Bagdad Airport to determine whether the actions could, individually or collectively, have the potential to significantly affect the quality of the environment. The information contained in this section was obtained from previous studies, various internet websites, and analysis by the consultant.

Construction of any and all improvements depicted on the Airport Layout Plan (ALP) will require compliance with the *National Environmental Policy Act* (NEPA) *of 1969*, as amended. This includes privately funded projects in addition to those projects receiving federal funding. Projects that do not qualify for a categorical exclusion (CATEX) under Federal Aviation Administration (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 where 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, it is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the environmental review processes. This evaluation considers all environmental categories required as outlined within FAA Order 1050.1E, *Environmental Impacts, Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act* (NEPA) *Implementation Instructions for Airport Actions.*

The following sections provide a description of the environmental resources which could be impacted by the airport development alternatives discussed in Chapter Four. Through a review of previous environmental studies and resource agency websites, it was determined that the following resources are not present within the Bagdad Airport environs or cannot be inventoried:

- Coastal Resources (Coastal Barriers and Coastal Zones) – the airport is inland and not subject to any coastal restrictions.
- Farmland – Information obtained from the Natural Resource Conservation Service's (NRCS) Web Soil Survey indicates that no portion of the existing or proposed airport property is classified as prime farmland.[1]
- A review of Federal Emergency Management Agency (FEMA) floodplain information indicates that the airport and surrounding land is located above the 500-year floodplain area and is in an area of minimal flood risk.
- Wild and Scenic Rivers – The nearest Wild and Scenic River segment to Bagdad Airport is the Verde River, located approximately 72 miles to the east.

AIR QUALITY AND CLIMATE

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. The significance of a pollution concentration is determined by comparing it to state and federal air quality standards. In 1971, the U.S. Environmental Protection Agency (EPA) established 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_2), Nitrogen Oxide (NO), Particulate matter (PM_{10} and $PM_{2.5}$), and Lead (Pb).

Based on both federal and state air quality standards, a specific geographic area can be classified as either an "attainment," "maintenance," or "non-attainment" area for each pollutant. The threshold for non-attainment designation varies by pollutant. Bagdad Airport is located in Yavapai County, which is an attainment area for all criteria pollutants.

Airfield projects, including the parallel taxiway or turnaround taxiway projects, runway gradient improvements, Automated Weather Observation System (AWOS), airport beacon, precision approach path indicator (PAPI), and associated landside facilities could result in impacts to air quality. These air quality impacts would be temporary as they are related to construction activities. Exhaust emissions from the operation of construction vehicles and fugitive dust from ground disturbance and pavement removal are common air pollutants during construction. These impacts could be reduced through the use of standard Best Management Practices (BMPs), including those outlined within FAA Advisory Circular 150/5371-10, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control*.

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[1] NRCS Web Soil Survey, http://websoilsurvey.nrcs.usda.gov, accessed October 2013

More permanent operational air quality impacts will result from the forecast increase in operations at the airport. These potential impacts may need to be evaluated as part of any required environmental documentation for planned projects.

An increase in operational greenhouse gas (GHG) emissions would also occur over the 20-year planning horizon of the Master Plan. However, there are no federal GHG emissions standards that can be applied to this growth at this time. The FAA is involved in several studies aimed at quantifying aviation contributions to GHG emissions and climate changes.

COMPATIBLE LAND USE

The compatibility of existing and planned land uses in the vicinity of an airport is typically associated with the extent of the airport's noise impacts, although attention is also given to wildlife attractants and community disruption.

Noise impacts are generally evaluated by comparing the extent of an airport's noise exposure contours to the land uses within the immediate vicinity of the airport. Based on a review of aerial photography, the land immediately to the north, east, and west of Bagdad Airport is undeveloped.

As discussed in the Noise section of this appendix, the ultimate (2032) 65 DNL noise contour remains entirely on airport property and does not encompass noise-sensitive land uses.

Property interest acquisition to protect the Runway 5 and 23 runway protection zones (RPZs) is identified as a component of the Master Plan. No existing residences or businesses will be displaced as a result of the proposed property acquisition.

Wildlife attractants include those land uses that bring wildlife into areas where they could prove hazardous to aircraft operations. Wildlife attractants include landfills, wastewater treatment facilities, wetlands, wildlife refuges, or any other land use that attracts wildlife. FAA AC 150/5200-33B states that the aforementioned land uses prove hazardous if they are located within:

- 5,000 feet of an airport serving piston-powered aircraft;
- 10,000 feet of an airport serving turbine-powered aircraft; and/or
- For all airports, the FAA recommends a distance of five miles between the farthest ends of the airport's operating area and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the airport approach or departure airspace.

Potential wildlife attractants within the vicinity of the airport include the various ponds and water reservoirs located within the mine west of the airport.

CONSTRUCTION IMPACTS

Construction impacts typically relate to the effects on specific impact categories, such as air quality, water quality, or noise during construction. The use of BMPs, including those outlined within FAA Advisory Circular 150/5371-10, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control*, during construction is typically a requirement of construction-related permits such as an Arizona Pollution Discharge Elimination System (AZPDES) permit. Use of these measures typically alleviates potential resource impacts.

Short term construction-related noise impacts could occur associated with the taxiway improvements and landside developments, including the development of a hotel, and construction of hangar, apron, access road, and parking lot facilities. However, these impacts typically do not arise unless construction is being undertaken during early morning, evening, or nighttime hours.

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 emissions inventory, as necessary, for NEPA documentation efforts.

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

FLOODPLAINS

As defined in FAA Order 1050.1E, 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 1050.1E (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 (FIRMs) prepared by the Federal Emergency Management Agency (FEMA).

A review of FEMA FIRMs and Yavapai County Flood Control District indicates that floodplain information for the airport and surrounding area is not available. As there are no washes or streams near the project areas, it is unlikely that any of the development identified within the alternatives would occur within a 100-year floodplain. However, coordination with the Yavapai County Flood Control District may be required.

FISH, WILDLIFE, AND PLANTS

Biotic resources include the various types of plants and animals that are present in a particular area. The term also applies to rivers, lakes, wetlands, forests, and other habitat types that support plants, birds, and/or fish. Typically, development in areas such as previously disturbed airport property, populated places, or farmland would result in minimal impacts to 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. Along with the FAA, the FWS and the NMFS 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.

As described in Chapter One, there are 14 federal and/or state listed species that have the potential to occur in Yavapai County. Based on a review of the habitat required to support these species presented in Chapter One, it is unlikely that these species would occur within the project area as the required habitat is not present.

Additionally, most of the planned projects at the airport will be undertaken in areas that are regularly maintained for airport uses and may not require field investigation. The areas of land identified for acquisition may require field investigation prior to acquisition or development due to their relatively undisturbed nature to determine the potential occurrence of protected species. Coordination with the U.S. Fish and Wildlife Service and/or the Arizona Game and Fish Department may be necessary to determine the extent, if any, of field investigations prior to undertaking any of the planned improvements.

HAZARDOUS MATERIALS, POLLUTION PREVENTION, AND SOLID WASTE

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminates may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources.

As discussed in Chapter One, an unnamed stream segment, located one mile north of the airport is classified as a *Clean Water Act* Section 303d impaired stream. Impaired streams have excess pollutants and are not clean enough to support recreational uses under EPA criteria. This segment is located off airport property and would not be altered as a result of the potential alternatives. Additionally, according to the EPA's online *EJView*[2], there are no Superfund sites within 100 miles of the airport.

The proposed property acquisition area at the approach end of Runway 5 may require the preparation of an environmental due diligence audit to determine the presence of any recognized environmental conditions (RECs). An REC is defined by the American Society for Testing and Materials as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances, or petroleum products into the ground, groundwater, or surface water of a property.

A construction-related AZPDES permit may be required prior to on-airport construction projects. The permit requires a Notice of Intent for all construction activities disturbing one or more acre of land. In conjunction with the AZPDES, a Stormwater Pollution Prevention Plan (SWPPP) may be required to outline the BMPs to be used to minimize impacts to stormwater conveyance systems.

HISTORICAL AND CULTURAL RESOURCES

Determination of a project's impact to historical and cultural resources is made in compliance with the *National Historic Preservation Act* (NHPA) *of 1966*, as amended for federal undertakings. A historic property is defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). Properties or sites having traditional religious or cultural importance to Native American Tribes may also qualify.

As previously discussed, the nearest historic site listed on the National Register of Historic Places is the Hyde Mountain Lookout House, located 22 miles northeast of the airport. Following coordination with the State Historic Preservation Office, archaeological field surveys may be required to determine the presence of previously unidentified historic properties or archaeological resources on the airport prior to undertaking the proposed property acquisition. The remaining projects would be undertaken in areas that are regularly maintained for airport uses and may not require field investigation.

LIGHT EMISSIONS AND VISUAL IMPACTS

Airport lighting is characterized as either airfield lighting (i.e., runway, taxiway, approach and landing lights) or landside lighting (i.e., security lights, building interior lighting, parking lights, and signage). Generally, airport lighting does not result in significant impacts unless a high intensity strobe light, such as a runway end identification light (REIL), would produce glare on any adjoining site, particularly residential uses.

[2] http://epamap14.epa.gov/ejmap/ejmap.aspx accessed October 2013

Visual impacts relate to the extent that the proposed development contrasts with the existing environment and whether a jurisdictional agency considers this contrast objectionable. The visual sight of aircraft, aircraft contrails, or aircraft lights at night, particularly at a distance that is not normally intrusive, should not be assumed to constitute an adverse impact.

The majority of the land surrounding the airport is undeveloped. The closest sensitive receptors to the airport are the residences located approximately 0.6 miles to the south. Construction of the lighting improvements (MIRL, PAPI, REIL, airport beacon) would introduce new light sources at the airport. However, due to their proximity from the sensitive receptors, it is unlikely that lighting or visual impacts would result.

If the potential for lighting or visual impacts is determined to be associated with the planned development, consultation with local residents and the owners of light-sensitive sites may be needed to determine possible alternatives to minimize these effects without risking aviation safety or efficiency. Measures such as shielding guidance lighting so that they are only visible to pilots or using vegetative buffers could be used to reduce the effects of airport-related light emissions. Additional coordination with state, regional, or local art or architecture councils, tribes, or other organizations having an interest in airport-associated visual effects may be necessary.

NOISE

Per federal regulation, the Yearly Day-Night Average Sound Level (DNL) is used in this study to assess aircraft noise. DNL is the metric currently accepted by the FAA, EPA, and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three agencies have each identified the 65 DNL noise contour as the threshold of incompatibility. Noise exposure contours are overlaid on maps of existing and planned land uses to determine areas that may be affected by aircraft noise at or above 65 DNL. The noise exposure contours are developed using the FAA-approved Integrated Noise Model which accepts inputs for several airport characteristics including: aircraft type, operations, flight tracks, time of day, and topography.

Exhibit B1 depicts the existing (2012) condition noise exposure contours for Bagdad Airport. As shown on the left side of the exhibit, the 65 DNL noise contour does not extend off airport property and does not affect any noise-sensitive land uses.

Exhibit B2 depicts the ultimate condition noise contours, based on 2032 forecast operations outlined in Chapter Two. As shown on the exhibit, the noise exposure contours do not extend off airport property and do not affect any noise-sensitive land uses. It should be noted that the ultimate condition noise contours consider a potential extension on Runway 5-23 as detailed in Chapter Four.

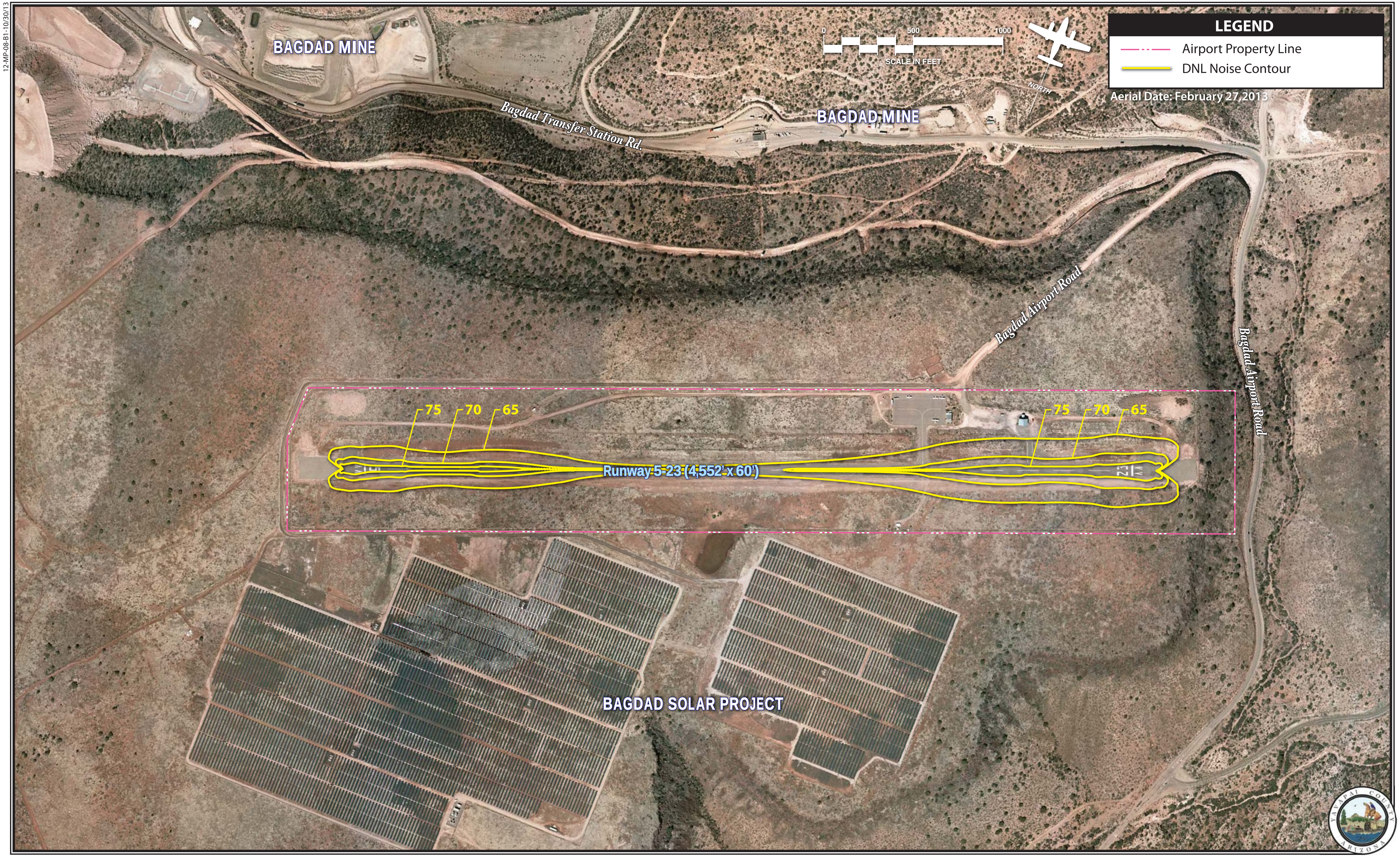


Exhibit B1
EXISTING NOISE EXPOSURE CONTOURS

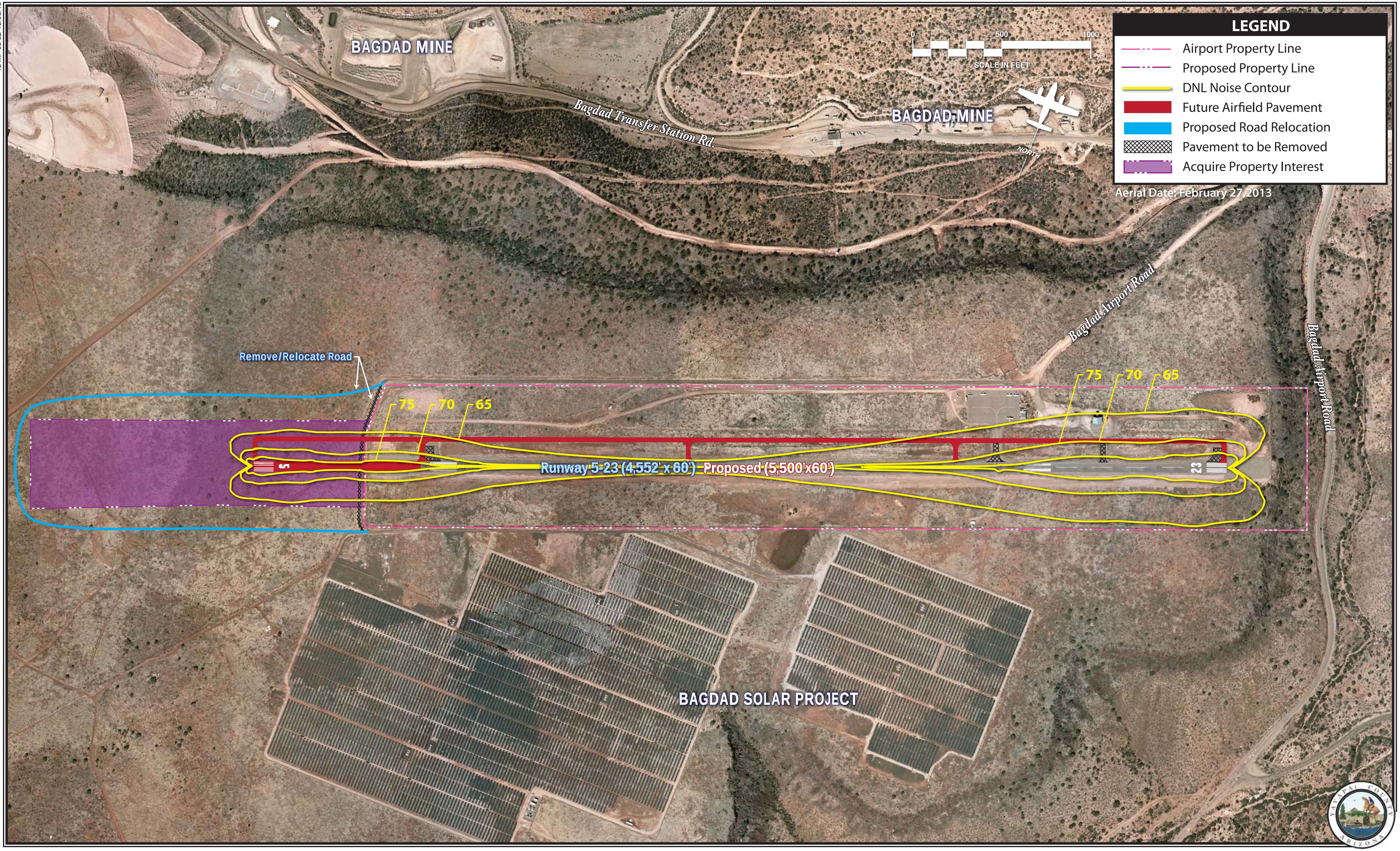


Exhibit B2
ULTIMATE NOISE EXPOSURE CONTOUR

NATURAL RESOURCES AND ENERGY SUPPLY

In instances of proposed actions, such as the expansion of utilities, power companies or other suppliers of energy will need to be contacted to determine if the proposed project demands can be met by existing or planned utility/power production facilities.

Increased uses of energy and natural resources are anticipated as the operations at the airport grow. Temporary increases in resource consumption can be anticipated during construction. None of the planned development projects are anticipated to result in significant increases in energy consumption.

SECONDARY (INDUCED) IMPACTS

Secondary impacts address potential changes to surrounding communities resulting from the proposed development, including shifts in patterns of population growth, public service demands, and changes in business and economic activity to the extent influenced by airport development.

Significant shifts in patterns of population movement or growth or public service demands are not anticipated as a result of the proposed development. It could be expected, however, that the proposed 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 also expected to encourage industry and trade and to enhance the future growth and expansion of the community's economic base. Additionally, the proposed development projects will likely create construction jobs supporting local employment. Future socioeconomic impacts resulting from the proposed development are anticipated to be primarily positive in nature.

SECTION 4(f) RESOURCES

Section 4(f) properties include publicly owned land from a public park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance; or any land from a historic site of national, state, or local significance.

As discussed in Chapter One, there are no publically owned parks within the Bagdad town site. The nearest wilderness area is the Upper Burrow Creek Wilderness Area, located approximately six miles northwest of the airport. The nearest historic site listed on the National Register of Historic Places is the Hyde Mountain Lookout House, located 22 miles northeast of the airport. The closest wildlife refuge is the Bill Williams National Wildlife Refuge, located approximately 50 miles southwest of the airport. The developments evaluated in this Master Plan will not impact this or any potential Section 4(f) properties.

SOCIOECONOMIC IMPACTS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

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.

The acquisition of real property or displacing people or businesses is required to conform to the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (URARPAPA). These regulations mandate that certain relocation assistance services be made available to owners/tenants of the properties. None of the proposed land acquisition would require the relocation of residences or businesses. However, all proposed property acquisition may require coordination with the FAA and the property owner and additional environmental documentation.

Executive Order 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations,* and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require FAA to provide for meaningful public involvement by minority and low-income populations, as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse.

According to the *EJView* tool, four percent of the population within the Census tract encompassing the airport is below the poverty level. Additionally, the population of the Census block which encompasses the airport is 27 percent minority.

Pursuant to Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks,* federal agencies are directed to identify and assess environmental health and safety risks that may disproportionately affect children. These risks include those that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products to which they may be exposed.

During construction of the projects outlined within the Master Plan, appropriate measures should be taken to prevent access by unauthorized persons to construction project areas. Additionally, BMPs should be implemented to decrease environmental health risks to children.

WATER QUALITY

The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc.

As previously discussed, an unnamed stream segment, located one mile north of the airport, is classified as a *Clean Water Act*, Section 303d impaired stream. This segment is located off airport property and will not be disturbed as a result of any of the development alternatives.

During construction of any of the planned improvements at the airport, it is suggested that mitigation measures from FAA Advisory Circular 150/5370-10A, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control*, be incorporated into project design specifications to further mitigate potential water quality impacts. These standards include temporary measures to control water pollution, soil erosion, and siltation through the use of berms, fiber mats, gravels, mulches, slope drains, and other erosion control methods. Implementation of these measures will help to protect local water bodies and streams.

Additionally, construction activities would need to comply with an AZPDES general permit for discharge to surface waters. Yavapai County would also need to update its AZPDES Multi-Sector General Permit to account for additional impervious surfaces. A SWPPP must also be established or updated for the airport. All future construction of the planned improvements at the airport will require subsequent updates of the facility's SWPPP and AZPDES.

WETLANDS AND WATERS OF THE U.S.

The U.S. Army Corps of Engineers (USACE) 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 include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine areas, 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.

According to the U.S. Fish and Wildlife Service, which manages the National Wetlands Inventory[3] on behalf of all federal agencies, there are no wetlands within the Bagdad Airport boundaries. A 0.52-acre freshwater pond is located immediately south of the airport. The area where this wetland is identified will not be affected by any of the

[3] http://www.fws.gov/wetlands/Wetlands-Mapper.html, accessed October 2013

proposed development alternatives. Additionally, a review of NRCS soil survey for the area, including the airport, indicates that there are no hydric soils present at the airport.

None of these potential wetland areas will be impacted by projects proposed in the Master Plan; however, field studies and coordination with USACE may be required prior to undertaking future development projects to determine the presence of Wetlands or Waters of the U.S.

Appendix C

CIP COST ESTIMATES

Bagdad Airport
Capital Improvement Program

PROJECT DESCRIPTION

SHORT TERM PROGRAM (1-5 Years)

2014

Item	Description	Qty.	Unit	Unit Cost	Total Cost
1	**Design and Construct Terminal Facility (Pilots' Lounge and Restrooms)**				
1	Design and Construct Terminal Facility (Pilots' Lounge and Restrooms)	1	LS	$375,000.00	$375,000.00
2	Contingency (15%)	1	LS	$56,000.00	$56,000.00
				Subtotal	**$431,000.00**
				Design	**$65,000.00**
				CM	**$86,000.00**
				Total	**$582,000.00**

2015

Item	Description	Qty.	Unit	Unit Cost	Total Cost
2	**Improve Utility Infrastructure Leading to Landside Development**				
1	Improve Utility Infrastructure Leading to Landside Development	1	LS	$150,000.00	$150,000.00
2	Contingency (15%)	1	LS	$23,000.00	$23,000.00
				Subtotal	**$173,000.00**
				Design	**$35,000.00**
				CM	**$43,000.00**
				Total	**$251,000.00**

Item	Description	Qty.	Unit	Unit Cost	Total Cost
3	**Environmental and Design - Partial Runway Reconstruction to Meet Gradient / Line-of-Sight Requirements and Construct Taxiway Turnarounds**				
1	Catex	1	LS	$6,000.00	$6,000.00
2	Design	1	LS	$157,000.00	$157,000.00
3	Contingency (15%)	1	LS	$24,000.00	$24,000.00
				Subtotal	**$187,000.00**
				Total	**$187,000.00**

2016

Item	Description	Qty.	Unit	Unit Cost	Total Cost
4	**Construct Runway Gradient / Line-of-Sight Improvements**				
1	Mobilization	1	LS	$65,000.00	$65,000.00
2	Traffic Control & Barricading	1	LS	$20,000.00	$20,000.00
3	Miscellaneous Removals & Other Work	1	LS	$30,000.00	$30,000.00
4	Stormwater Pollution Prevention	1	LS	$10,000.00	$10,000.00
5	Subgrade Preparation	8,000	SY	$10.00	$80,000.00
6	Asphaltic Concrete Surface Course	7,000	SY	$30.00	$210,000.00
7	Aggregate Base Course	7,000	SY	$25.00	$175,000.00
8	Bituminous Tack Coat	7,000	SY	$1.00	$7,000.00
9	Drainage	1	LS	$25,000.00	$25,000.00
10	Pavement Marking	2,000	SF	$5.00	$10,000.00
11	Contingency (15%)	1	LS	$85,000.00	$85,000.00
				Subtotal	**$717,000.00**
				CM	**$93,000.00**
				Total	**$810,000.00**

Cost Estimates Prepared by C&S Companies

5	Construct Taxiway Turnarounds Serving Each End of Runway 5-23				
1	Mobilization	1	LS	$21,000.00	$21,000.00
2	Traffic Control & Barricading	1	LS	$20,000.00	$20,000.00
3	Miscellaneous Removals & Other Work	1	LS	$30,000.00	$30,000.00
4	Stormwater Pollution Prevention	1	LS	$10,000.00	$10,000.00
5	Subgrade Preparation	1,300	SY	$10.00	$13,000.00
6	Asphaltic Concrete Surface Course	1,250	SY	$30.00	$37,500.00
7	Aggregate Base Course	1,250	SY	$25.00	$31,250.00
8	Bituminous Tack Coat	1,250	SY	$1.00	$1,250.00
9	Drainage	1	LS	$25,000.00	$25,000.00
10	Pavement Marking	2,000	SF	$5.00	$10,000.00
11	Contingency (15%)	1	LS	$27,000.00	$27,000.00
				Subtotal	**$226,000.00**
				CM	**$29,000.00**
				Total	**$255,000.00**

6	Pavement Rehabilitation and Marking Improvements - Runway, Taxiway, and Aircraft Parking Apron; Remove Runway 5 Displaced Threshold and Implement Non-Precision Markings				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$44,000.00	$44,000.00
2	Traffic Control & Barricading	1	LS	$10,000.00	$10,000.00
3	Crack Seal	15,000	LF	$2.00	$30,000.00
4	1" Rubberized Asphalt Overlay	40,000	SY	$7.00	$280,000.00
5	Bituminous Tack Coat	40,000	SY	$1.00	$40,000.00
6	Pavement Marking	10,000	SF	$2.00	$20,000.00
7	Contingency (15%)	1	LS	$57,000.00	$57,000.00
				Subtotal	**$481,000.00**
				Design	**$48,000.00**
				CM	**$53,000.00**
				Total	**$582,000.00**

2017

7	Implement Terminal Area Improvements (Vehicle Parking and Controlled-Access Gate)				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$27,000.00	$27,000.00
2	Traffic Control & Barricading	1	LS	$20,000.00	$20,000.00
3	Miscellaneous Removals & Other Work	1	LS	$30,000.00	$30,000.00
4	Stormwater Pollution Prevention	1	LS	$10,000.00	$10,000.00
5	Subgrade Preparation	2,000	SY	$10.00	$20,000.00
6	Asphaltic Concrete Surface Course	2,000	SY	$30.00	$60,000.00
7	Aggregate Base Course	2,000	SY	$25.00	$50,000.00
8	Bituminous Tack Coat	2,000	SY	$1.00	$2,000.00
9	Drainage	1	LS	$10,000.00	$10,000.00
10	Pavement Marking	2,000	SF	$5.00	$10,000.00
11	Automated Vehicle Access Gate	1	LS	$30,000.00	$30,000.00
12	Contingency (15%)	1	LS	$32,000.00	$32,000.00
				Subtotal	**$301,000.00**
				Design	**$30,000.00**
				CM	**$39,000.00**
				Total	**$370,000.00**

Cost Estimates Prepared by C&S Companies

	2018				
8	**Install AWOS**				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$17,000.00	$17,000.00
2	Traffic Control & Barricading	1	LS	$5,000.00	$5,000.00
3	Clearing and Grubbing	1.0	AC	$2,000.00	$2,000.00
4	Cable Trenching and Backfill	3,600	LF	$5.00	$18,000.00
5	No.8 AWG, 5KV, 1/C Airport Lighting Cable	7,500	LF	$1.50	$11,250.00
6	2" PVC Duct	3,600	LF	$3.00	$10,800.00
7	Counterpoise Cable	4,000	LF	$2.00	$8,000.00
8	Electric Junction Can	10	EA	$1,000.00	$10,000.00
9	Furnish & Install AWOS - AV System	1	LS	$75,000.00	$75,000.00
10	Miscellaneous Vault Modifications	1	LS	$10,000.00	$10,000.00
11	Contingency (15%)	1	LS	$23,000.00	$23,000.00
				Subtotal	**$190,050.00**
				Design	**$29,000.00**
				CM	**$38,000.00**
				Total	**$257,050.00**
	2019				
9	**Construct Airport Maintenance/Storage Facility**				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Construct Airport Maintenance/Storage Facility	1	LS	$100,000.00	$100,000.00
2	Infrastructure Improvements (20%)	1	LS	$20,000.00	$20,000.00
3	Contingency (15%)	1	LS	$15,000.00	$15,000.00
				Subtotal	**$135,000.00**
				Design	**$27,000.00**
				CM	**$34,000.00**
				Total	**$196,000.00**
	INTERMEDIATE TERM PROGRAM (6-10 Years)				
1	**Implement MIRL, PAPI-2s, and REILs on Runway 5-23 and Construct Airport Rotating Beacon**				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$37,000.00	$37,000.00
2	Traffic Control & Barricading	1	LS	$30,000.00	$30,000.00
3	Trenching	15,000	LF	$5.00	$75,000.00
4	No.8 AWG, 5KV, 1/C Airport Lighting Cable	20,000	LF	$1.50	$30,000.00
5	2" PVC Duct	14,000	LF	$3.00	$42,000.00
6	Counterpoise Cable	20,000	LF	$2.00	$40,000.00
7	Medium Intensity Runway Lights, Base Mounted	80	EA	$800.00	$64,000.00
8	Airport Rotating Beacon, In Place	1	LS	$40,000.00	$40,000.00
9	Electric Junction Can	20	EA	$1,000.00	$20,000.00
10	Furnish & Install PAPI System	1	LS	$20,000.00	$20,000.00
11	Furnish & Install REIL System	1	LS	$12,000.00	$12,000.00
12	Miscellaneous Vault Modifications	1	LS	$30,000.00	$30,000.00
13	Contingency (15%)	1	LS	$60,000.00	$60,000.00
				Subtotal	**$440,000.00**
				Design	**$66,000.00**
				CM	**$88,000.00**
				Total	**$594,000.00**

Cost Estimates Prepared by C&S Companies

2	Construct Roadway Improvments to Support Landside Development (Include Controlled-Access Gate)				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$27,000.00	$27,000.00
2	Traffic Control & Barricading	1	LS	$10,000.00	$10,000.00
3	Miscellaneous Removals & Other Work	1	LS	$25,000.00	$25,000.00
4	Stormwater Pollution Prevention	1	LS	$10,000.00	$10,000.00
5	Subgrade Preparation	2,200	SY	$10.00	$22,000.00
6	Asphaltic Concrete Surface Course	2,200	SY	$30.00	$66,000.00
7	Aggregate Base Course	2,200	SY	$25.00	$55,000.00
8	Bituminous Tack Coat	2,200	SY	$1.00	$2,200.00
9	Drainage	1	LS	$10,000.00	$10,000.00
10	Controlled Access Gate	1	LS	$30,000.00	$30,000.00
11	Contingency (15%)	1	LS	$35,000.00	$35,000.00
				Subtotal	**$292,200.00**
				Design	**$29,000.00**
				CM	**$38,000.00**
				Total	**$359,200.00**

3	Install Fuel Farm and Self-Service Fueling Capability				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$25,000.00	$25,000.00
2	Traffic Control & Barricading	1	LS	$10,000.00	$10,000.00
3	Miscellaneous Removals & Other Work	1	LS	$20,000.00	$20,000.00
4	Fuel Station	1	LS	$150,000.00	$150,000.00
5	Infrastructure Improvements (20%)	1	LS	$41,000.00	$41,000.00
6	Contingency (15%)	1	LS	$33,000.00	$33,000.00
				Subtotal	**$279,000.00**
				Design	**$42,000.00**
				CM	**$56,000.00**
				Total	**$377,000.00**

4	Expand Aircraft Parking Apron and Hangar Access Taxilanes to Accommodate Aviation Demand				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$45,000.00	$45,000.00
2	Traffic Control & Barricading	1	LS	$5,000.00	$5,000.00
3	Miscellaneous Removals & Other Work	1	LS	$10,000.00	$10,000.00
4	Clearing and Grubbing	1	AC	$1,000.00	$1,000.00
6	Subgrade Preparation	5,000	SY	$10.00	$50,000.00
7	Asphaltic Concrete Surface Course	5,000	SY	$30.00	$150,000.00
8	Aggregate Base Course	5,000	SY	$25.00	$125,000.00
9	Bituminous Tack Coat	5,000	SY	$1.00	$5,000.00
10	Drainage	1	LS	$15,000.00	$15,000.00
11	Pavement Marking	1,000	SF	$10.00	$10,000.00
12	Miscellaneous Utilitites Infrastructure	1	LS	$20,000.00	$20,000.00
13	Contingency (15%)	1	LS	$59,000.00	$59,000.00
				Subtotal	**$495,000.00**
				Design	**$50,000.00**
				CM	**$64,000.00**
				Total	**$609,000.00**

Cost Estimates Prepared by C&S Companies

5	Construct 8-Unit T-Hangar Complex				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$61,000.00	$61,000.00
2	Traffic Control & Barricading	1	LS	$10,000.00	$10,000.00
3	Miscellaneous Removals & Other Work	1	LS	$20,000.00	$20,000.00
4	8-Unit T-Hangar Complex	1	LS	$500,000.00	$500,000.00
5	Contingency (15%)	1	LS	$80,000.00	$80,000.00
				Subtotal	**$671,000.00**
				Design	**$101,000.00**
				CM	**$87,000.00**
				Total	**$859,000.00**
6	**General Pavement Maintenance**				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$16,000.00	$16,000.00
2	Traffic Control & Barricading	1	LS	$15,000.00	$15,000.00
3	Crack Seal	10,000	LF	$2.00	$20,000.00
4	Rubberized Seal Coat	37,000	SY	$1.50	$55,500.00
5	Pavement Marking	50,000	SF	$1.00	$50,000.00
6	Contingency (15%)	1	LS	$21,000.00	$21,000.00
				Subtotal	**$177,500.00**
				Design	**$27,000.00**
				CM	**$36,000.00**
				Total	**$240,500.00**
	LONG TERM PROGRAM (11-20 Years)				
1	**Construct Parallel Taxiway and Entrance/Exit Taxiways Serving Runway 5-23 (Include Elevated Edge Reflectors)**				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$245,000.00	$245,000.00
2	Traffic Control & Barricading	1	LS	$30,000.00	$30,000.00
3	Miscellaneous Removals & Other Work	1	LS	$50,000.00	$50,000.00
4	Clearing and Grubbing	9	AC	$1,500.00	$13,500.00
5	Stormwater Pollution Prevention	1	LS	$25,000.00	$25,000.00
6	Subgrade Preparation	36,000	SY	$8.00	$288,000.00
7	Asphaltic Concrete Surface Course	36,000	SY	$30.00	$1,080,000.00
8	Aggregate Base Course	36,000	SY	$15.00	$540,000.00
9	Bituminous Tack Coat	36,000	SY	$1.00	$36,000.00
10	Drainage	1	LS	$40,000.00	$40,000.00
11	Pavement Marking	10,000	SF	$2.00	$20,000.00
12	Taxiway Edge Reflectors	100	EA	$100.00	$10,000.00
13	Contingency (15%)	1	LS	$320,000.00	$320,000.00
				Subtotal	**$2,697,500.00**
				Design	**$189,000.00**
				CM	**$351,000.00**
				Total	**$3,237,500.00**
2	**Acquire Property Interests Associated with Runway 5-23 Extension**				
***	*****Requires Coffman Assoc. Assistance*** (Above Line Item #2)**				
Cost Estimates Prepared by C&S Companies					

3	Relocate Road Leading to Bagdad Solar Project				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$18,000.00	$18,000.00
2	Traffic Control & Barricading	1	LS	$5,000.00	$5,000.00
3	Miscellaneous Removals & Other Work	1	LS	$10,000.00	$10,000.00
4	Clearing and Grubbing	3	AC	$1,000.00	$3,000.00
5	Stormwater Pollution Prevention	1	LS	$7,000.00	$7,000.00
6	Subgrade Preparation	8,000	SY	$5.00	$40,000.00
7	Aggregate Surface Course	8,000	SY	$10.00	$80,000.00
8	Drainage	1	LS	$15,000.00	$15,000.00
9	Contingency (15%)	1	LS	$24,000.00	$24,000.00
				Subtotal	**$202,000.00**
				Design	**$20,000.00**
				CM	**$26,000.00**
				Total	**$248,000.00**

4	Extend Runway 5-23 and Parallel Taxiway 948' Southwest (Relocate PAPI-2 and REILs)				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$106,000.00	$106,000.00
2	Traffic Control & Barricading	1	LS	$30,000.00	$30,000.00
3	Miscellaneous Removals & Other Work	1	LS	$30,000.00	$30,000.00
4	Clearing and Grubbing	4	AC	$1,000.00	$4,000.00
5	Stormwater Pollution Prevention	1	LS	$10,000.00	$10,000.00
6	Subgrade Preparation	11,000	SY	$10.00	$110,000.00
7	Asphaltic Concrete Surface Course	11,000	SY	$30.00	$330,000.00
8	Aggregate Base Course	11,000	SY	$25.00	$275,000.00
9	Bituminous Tack Coat	11,000	SY	$1.00	$11,000.00
10	Drainage	1	LS	$25,000.00	$25,000.00
11	Paint Removal	1	LS	$50,000.00	$50,000.00
12	Seal Coat	30,500	SY	$2.00	$61,000.00
13	Pavement Marking	75,000	SF	$1.50	$112,500.00
14	Trenching	2,500	LF	$5.00	$12,500.00
15	No.8 AWG, 5KV, 1/C Airport Lighting Cable	2,500	LF	$1.50	$3,750.00
16	2" PVC Duct	2,500	LF	$3.00	$7,500.00
17	Counterpoise Cable	2,500	LF	$2.00	$5,000.00
18	Medium Intensity Runway Lights, Base Mounted	20	EA	$800.00	$16,000.00
19	Taxiway Edge Reflectors	15	EA	$100.00	$1,500.00
20	Electric Junction Can	10	EA	$1,000.00	$10,000.00
21	Relocate PAPI System	1	LS	$15,000.00	$15,000.00
22	Relocate REIL System	1	LS	$10,000.00	$10,000.00
23	Miscellaneous Vault Modifications	1	LS	$10,000.00	$10,000.00
24	Contingency (15%)	1	LS	$171,000.00	$171,000.00
				Subtotal	**$1,416,750.00**
				Design	**$142,000.00**
				CM	**$184,000.00**
				Total	**$1,742,750.00**

Cost Estimates Prepared by C&S Companies

5	General Pavement Maintenance				
Item	**Description**	**Qty.**	**Unit**	**Unit Cost**	**Total Cost**
1	Mobilization	1	LS	$82,000.00	$82,000.00
2	Traffic Control & Barricading	1	LS	$10,000.00	$10,000.00
3	Crack Seal	20,000	LF	$2.00	$40,000.00
4	1" Rubberized Asphalt Overlay	80,000	SY	$6.00	$480,000.00
5	Bituminous Tack Coat	80,000	SY	$1.00	$80,000.00
6	Pavement Marking	100,000	SF	$1.00	$100,000.00
7	Contingency (15%)	1	LS	$107,000.00	$107,000.00
				Subtotal	**$899,000.00**
				Design	**$90,000.00**
				CM	**$117,000.00**
				Total	**$1,106,000.00**

Cost Estimates Prepared by C&S Companies

Appendix D

AIRPORT LAYOUT PLAN DRAWINGS

Appendix D
AIRPORT LAYOUT PLAN DRAWINGS

Per Federal Aviation Administration (FAA) and Arizona Department of Transportation – Multimodal Planning Division – Aeronautics Group (ADOT-MPD – Aeronautics Group) requirements, an official Airport Layout Plan (ALP) has been developed for Bagdad Airport. The ALP is used in part by the FAA and ADOT-MPD – Aeronautics Group to determine funding eligibility for future development projects.

These drawings were created on a computer-aided drafting system (CAD) and serve as the official depiction of the current and planned condition of the airport. These drawings will be delivered to the FAA and ADOT-MPD – Aeronautics Group for their review and inspection. The drawings will be critiqued from a technical perspective to be sure all applicable regulations are met.

The following is a description of the ALP drawings included with this Master Plan.

Title Sheet (Sheet 1 of 9) – The Title Sheet details the index of drawings included in the ALP drawing set.

Airport Layout Drawing (Sheet 2 of 9) – The Airport Layout Drawing (ALD) graphically presents the existing and ultimate layout plan of the airport. The ALD includes such elements as the physical airport features, location of airfield facilities (i.e., runway, taxiways, navigational aids), and existing general aviation development. Also presented on the ALD are the runway safety areas, airport property boundary, and revenue support areas. Existing and ultimate conditions for the airport as they relate to the runway, taxiways, navigational aids, and wind data tabulations are also presented in various data tables.

Terminal Area Plan (Sheet 3 of 9) – The Terminal Area Plan provides greater detail concerning landside improvements at a larger scale than on the ALD.

Airport Airspace Drawing (Sheet 4 of 9) – 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. This 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. These plans should be coordinated with local land use planners.

Outer Approach Surface for Runway 5-23 (Sheet 5 of 9) – The Outer Approach Surface Drawing provides both plan and profile views of Title 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 are shown as appropriate.

Inner Approach Surface Plan and Profile for Runway 5-23 (Sheet 6 of 9) – The Inner Portion of the Approach Surface Drawing provides scaled drawings of the safety areas associated with each runway end. A plan and profile view of the safety areas are 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 7 of 9) – The On-Airport Land Use Drawing is a geographic depiction of the land use recommendations. The objective of this drawing is to coordinate uses of the airport property in a manner compatible with the functional design of the airport facility. When development is proposed, it should be directed to the appropriate land use area depicted on this plan.

Airport Property Map (Sheet 8 of 9) – 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 Property Map.

Departure Surface Drawing (Sheet 9 of 9) – The Departure Surface Drawing provides detailed analysis of the ultimate departure surface for each corresponding runway end. A composite profile of the extended ground line is depicted. Obstructions are shown as appropriate. The departure surface is only applicable to a runway with instrument departure procedures in place.

DRAFT ALP DISCLAIMER

The ALP drawing set has been developed in accordance with accepted FAA and Arizona Department of Transportation – Multimodal Planning Division – Aeronautics Group (ADOT - MPD – Aeronautics Group) standards. The ALP set has not been approved by the FAA and is subject to FAA airspace review. Land use and other changes may result.

AIRPORT MASTER PLAN BAGDAD, ARIZONA

BAGDAD AIRPORT

AIRPORT LAYOUT PLAN SET

INDEX OF DRAWINGS

PREPARED FOR
YAVAPAI COUNTY

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6/14	--	--
2	ALP UPDATE	11/08	PB	FAA
1	PREVIOUS APPROVED ALP	8/00	RC	FAA

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 OF 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 THE APPROPRIATE PUBLIC LAWS.

BAGDAD AIRPORT

TITLE SHEET

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

Coffman Associates
Airport Consultants
www.coffmanassociates.com

RUNWAY DATA	RUNWAY 5-23	
	EXISTING	ULTIMATE
RUNWAY DESIGN CODE	B-I (SMALL AIRCRAFT)-VIS	B-I (SMALL AIRCRAFT)-5000
RUNWAY REFERANCE CODE	N/A	B/I(S)/5000
CRITICAL DESIGN AIRCRAFT	CESSNA 172	KING AIR B100
WINGSPAN OF DESIGN AIRCRAFT	33'6"	45.92
APPROACH SPEED OF DESIGN AIRCRAFT (KNOTS)	72	111
MAXIMUM TAKE OFF WEIGHT (lbs)	3,650	11,800
RUNWAY AZIMUTH	353.768	SAME
RUNWAY BEARING (TRUE)	N68°28'18"E	SAME
RUNWAY DIMENSIONS	4552'x60'	5500'x60'
ELEVATION OF RWY. TOUCH DOWN ZONE (MSL)	4195.73'/4186.78'	SAME
ELEVATION OF RUNWAY HIGH POINT (above MSL)	4195.7'	SAME
ELEVATION OF RUNWAY LOW POINT (above MSL)	4162.8'	SAME
RUNWAY PROTECTION ZONE (RPZ) DIMENSIONS	250' x1000'x450'	SAME
WIND COVERAGE IN KNOTS	10.5-97.12%/13-98.83%	SAME
APPROACH VISIBILITY MINIMUMS	VISUAL/VISUAL	≥1 MILE
FAR PART 77 CATEGORY	20:1/20:1	SAME
RUNWAY APPROACH TYPE	VISUAL/VISUAL	NON-PREC/NON-PREC
RUNWAY APPROACH SURFACES	20:1/20:1	34:1/34:1
RUNWAY DEPARTURE SURFACE	N/A	40:1/40:1
RUNWAY THRESHOLD DISPLACEMENT	120'/120'	NONE/SAME
RUNWAY STOPWAY	NONE	NONE
RUNWAY SAFETY AREA WIDTH (RSA)	120'	SAME
RSA DISTANCE BEYOND EACH RUNWAY END	240'/240'	SAME
RUNWAY OBJECT FREE AREA WIDTH (OFA)	250'	SAME
OFA DISTANCE BEYOND EACH RUNWAY END	240'/240'	SAME
RUNWAY OBSTACLE FREE ZONE WIDTH (OFZ)	250'	SAME
OFZ DISTANCE BEYOND EACH RUNWAY END	200'/200'	SAME
LINE OF SITE REQUIREMENT	NO	YES
RUNWAY PAVEMENT MATERIAL	ASPHALT	SAME
RUNWAY PAVEMENT SURFACE TREATMENT	NONE	SAME
PAVEMENT STRENGTH (in thousand lbs.)[1]	12.0(S)	SAME
RUNWAY EFFECTIVE GRADIENT (in %)	2.1%	≤ 2.0%
MAXIMUM GRADIENT (in %)	2%	SAME
RUNWAY LIGHTING	NONE	MIRL
RUNWAY MARKINGS	VISUAL/VISUAL	NON-PREC/NON-PREC
RUNWAY APPROACH LIGHTING	NONE	SAME
THRESHOLD SITING SURFACE	20:1	SAME
AERONAUTICAL SURVEY REQUIRED	NONE	NVGS
TAXIWAY DESIGN GROUP	1	SAME
TAXIWAY MARKING	CENTERLINE/HOLDBAR	SAME
DISTANCE FROM RWY. CL TO HOLD BARS	125'	SAME
TAXIWAY PAVEMENT MATERIAL	ASPHALT	SAME
TAXIWAY LIGHTING	NONE	REFLECTORS
TAXIWAY WIDTH	30'	25'
TAXIWAY SAFETY AREA	49'	SAME
TAXIWAY OFA	89'	SAME
TAXIWAY CENTERLINE TO FIXED OR MOVABLE OBJECT	44.5'	SAME
VISUAL AND NAVIGATIONAL AIDS	NONE	PAPI-2/PAPI-2 GPS BEACON REILs

[1] Pavement strengths are expressed in Single(S),wheel loading capacities.

RUNWAY END COORDINATES (NAD 83)

		EXISTING	ULTIMATE
RUNWAY 5	Latitude	34°35'25.8580"N	34°35'22.2880"N
	Longitude	113°10'44.1820"W	113°10'54.6660"W
DISPLACED 5	Latitude	34°35'26.3100"N	NA
	Longitude	113°10'42.8550"W	NA
RUNWAY 23	Latitude	34°35'42.9930"N	SAME
	Longitude	113°09'53.8500"W	SAME
DISPLACED 23	Latitude	34°35'42.5410"N	SAME
	Longitude	113°09'55.1770"W	SAME

AIRPORT DATA

BAGDAD AIRPORT (E51)

CITY: BAGDAD, ARIZONA		COUNTY: YAVAPAI COUNTY, ARIZONA	
RANGE: R-9-W TOWNSHIP: T-14-N		CIVIL TOWNSHIP: N/A	
		EXISTING	ULTIMATE
NPIAS SERVICE LEVEL		GENERAL AVIATION	SAME
STATE SERVICE ROLE		GENERAL AVIATION BASIC AIPRORT	SAME
CRITICAL DESIGN AIRCRAFT		CESSNA 172	KINGAIR B100
AIRPORT REFERENCE CODE (ARC)		B-I (SMALL AIRCRAFT)	SAME
AIRPORT ELEVATION (ABOVE MEAN SEA LEVEL)		4183'	SAME
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		96.5.°F (July)	SAME
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	Latitude	34°35'34.426"N	34°35'32.640"N
	Longitude	113°10'19.018"W	113°10'24.260"W
AIRPORT NAVIGATIONAL AIDS		NONE NONE NONE NONE	GPS BEACON PAPI-2 REILs
MISCELLANEOUS FACILITIES		LIGHTED WIND CONE --	SAME AWOS

DECLARED DISTANCES	RUNWAY			
	EXISTING		ULTIMATE	
	5	23	5	23
TAKEOFF RUN AVAILABLE (TORA)	4,552'	4,552'	5,500'	5,500'
TAKEOFF DISTANCE AVAILABLE (TODA)	4,552'	4,552'	5,500'	5,500'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	4,552'	4,552'	5,500'	5,500'
LANDING DISTANCE AVAILABLE (LDA)	4,432'	4,432'	5,500'	5,380'

EXISTING AIRPORT FACILITIES

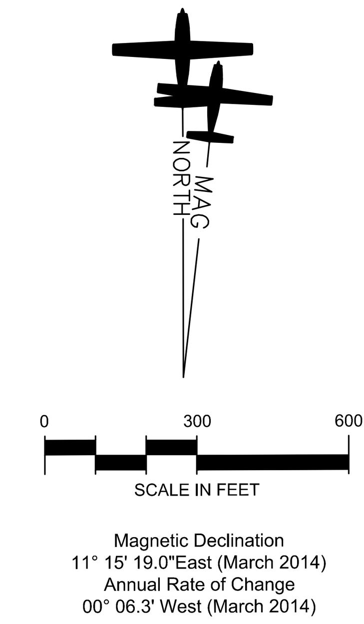
NO.	DESCRIPTION	ELEV. (MSL)
1	HANGAR	4193.4'
2	HANGAR	4205.1'
3	TETRAHEDRON	4178.0'
4	FAA RCO	4170.6'
5	WATER TANK	--
6	--	--
7	--	--
8	--	--
9	--	--
10	--	--

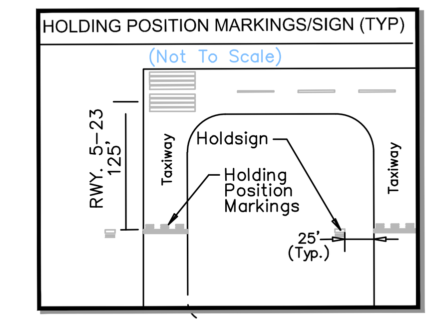
ULTIMATE AIRPORT FACILITIES

NO.	DESCRIPTION	Est. ELEV. (MSL)
20	TERMINAL	--
21	MAINTENANCE/STORAGE FACILITY	--
22	EXECUTIVE HANGAR	--
23	EXECUTIVE HANGAR	--
24	8-UNIT T-HANGAR	--
25	AWOS	--
26	AUTO PARKING	--
27	AIRCRAFT FUEL STORAGE (SELF-SERVE)	
29	--	--

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
32 33 / 5 4		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
	SAME	AIRPORT ROTATING BEACON
	ESMT(U)	AVIGATION EASEMENT
		BUILDING RESTRICTION LINE
		STRUCTURES ON AIRPORT
N/A		ABANDON/REMOVE BUILDING
		STRUCTURE OFF AIRPORT
		CRITICAL AREA
		AIRPORT PAVEMENT
N/A		ABANDON/REMOVE PAVEMENT
X	X	FENCE LINE
		HOLD MARKING
		SURVEY MONUMENT WITH IDENTIFIER
OFA	OFA	OBJECT FREE AREA
RSA	SAME	RUNWAY SAFETY AREA
OFZ	SAME	OBSTACLE FREE ZONE
RPZ	SAME	RPZ CENTER PORTION
RPZ	SAME	RUNWAY PROTECTION ZONE
	SAME	TAXIWAY OBJECT FREE AREA
AS	AS(U)	RUNWAY APPROACH SURFACE
	SAME	TIE-DOWNS
		PAPI-2
		RUNWAY END IDENTIFIER LIGHTS (REILS)
		WINDCONE
3660	3660	TOPOGRAPHIC CONTOURS





ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 5-23	94.01%	96.92%	99.18%	99.83%

Magnetic Declination
11° 15' 19.0" East (March 2014)
Annual Rate of Change
00° 06.3' West (March 2014)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Ernest A. Love Field Airport
Prescott, Arizona

OBSERVATIONS:
82,880 All Weather Observations
2003–2012

SUBMITTED BY:
Coffman Associates
FOR APPROVAL BY:

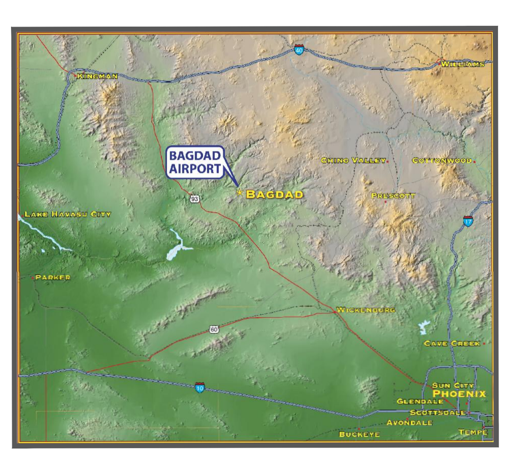
APPROVED BY:

Public Works Director

FAA APPROVAL STAMP

GENERAL NOTES:

1. EXISTING RUNWAY END ELEVATIONS, END COORDINATES, BEARINGS AND LENGTHS NOTED IN THIS ALP ARE FROM AERIAL SURVEY DONE APRIL 2013
2. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 - NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 - NAVD88.
3. THERE ARE "NO OFZ OBJECT PENETRATIONS" AND "NO THRESHOLD SITING SURFACE PENETRATIONS"
4. SEE AIRPORT PROPERTY MAP, SHEET 6 OF 6 FOR PROPERTY OWNERSHIP DETAILS.
5. BAGDAD AIRPORT WAS CONVEYED TO YAVAPAI COUNTY THROUGH A QUIT CLAIM DEED DATED MARCH 9, 2000.
6. AN ULTIMATE NON-PRECISION GPS APPROACH BEING PROPOSED ON RUNWAY 5-23 IS SUBJECT TO FURTHER EVALUATION. THE ARIZONA NAVIGATIONAL AIDS AND AVIATION SERVICES SPECIAL STUDY (NOVEMBER 1998) STATES THAT A POTENTIAL INSTRUMENTAPPROACH PROCEDURE FOR BAGDAD AIRPORT DOES NOT MEET THE ONE-MILE TARGET VISIBILITY, BUT THAT FACILITY DESIGN STANDARDS ARE MET. FURTHER ANALYSIS RELATED TO APPROACH OBSTRUCTIONS, LANDSIDE DEVELOPMENT IN RELATION TO THE BRL, AND OTHER FACTORS WILL BE NECESSARY PRIOR TO THE POTENTIAL IMPLEMENTATION OF AN INSTRUMENT APPROACH PROCEDURE.
7. THE BRL IS PLACED ON THE ALP FOR IDENTIFYING SUITABLE BUILDING AREA LOCATIONS ON THE AIRPORT. THE BRL LOCATION IS DEPENDENT UPON THE SELECTED ALLOWABLE STRUCTURE HEIGHT AND IS BASED UPON THE EXISTING PART 77 PRIMARY SURFACE ASSOCIATED WITH RUNWAY 5-23 FOR VISUAL APPROACH ONLY. THE IMPLEMENTATION OF AN INSTRUMENT APPROACH PROCEDURE AT THE AIRPORT COULD RESULT IN THE RELOCATION OF THE BRL, MINIMIZING THE POSSIBILITY FOR FUTURE LANDSIDE DEVELOPMENT. FURTHER ANALYSIS WILL BE NEEDED PRIOR TO THE POTENTIAL IMPLEMENTATION OF AN INSTRUMENT APPROACH PROCEDURE.
8. FUTURE RUNWAY RECONSTRUCTION TO FAA STANDARDS FOR GRADIENT AND LINE-OF-SIGHT.



LOCATION MAP

VICINITY MAP

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6/14	--	--
2	ALP UPDATE	11/08	PB	FAA
1	PREVIOUS APPROVED ALP	8/00	RC	FAA

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BAGDAD AIRPORT

AIRPORT LAYOUT DRAWING

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

SHEET 2 OF 9

Coffman Associates
Airport Consultants
www.coffmanassociates.com

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
32 33 5 4		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
	SAME	AIRPORT ROTATING BEACON
ESMT	ESMT(U)	AVIGATION EASEMENT
		BUILDING RESTRICTION LINE
		STRUCTURES ON AIRPORT
N/A		ABANDON/REMOVE BUILDING
		STRUCTURE OFF AIRPORT
		CRITICAL AREA
		AIRPORT PAVEMENT
N/A		ABANDON/REMOVE PAVEMENT
x	x x	FENCE LINE
		HOLD MARKING
		SURVEY MONUMENT WITH IDENTIFIER
OFA	OFA	OBJECT FREE AREA
RSA	SAME	RUNWAY SAFETY AREA
OFZ	SAME	OBSTACLE FREE ZONE
RPZ	SAME	RPZ CENTER PORTION
RPZ	SAME	RUNWAY PROTECTION ZONE
	SAME	TAXIWAY OBJECT FREE AREA
AS	AS(U)	RUNWAY APPROACH SURFACE
	SAME	TIE-DOWNS
		PAPI-2
		RUNWAY END IDENTIFIER LIGHTS (REILS)
		WINDSOCK
3660	3660	TOPOGRAPHIC CONTOURS

EXISTING AIRPORT FACILITIES

NO.	DESCRIPTION	ELEV. (MSL)
1	HANGAR	4193.4'
2	HANGAR	4205.1'
3	TETRAHEDRON	4178.0'
4	FAA RCO	4170.6'
5	--	--
6	--	--
7	--	--
8	--	--
9	--	--
10	--	--

ULTIMATE AIRPORT FACILITIES

NO.	DESCRIPTION	Est. ELEV. (MSL)
20	TERMINAL	--
21	MAINTENANCE/STORAGE FACILITY	--
22	EXECUTIVE HANGAR	--
23	EXECUTIVE HANGAR	--
24	8-UNIT T-HANGAR	--
25	AWOS	--
26	AUTO PARKING	--
27	AIRCRAFT FUEL STORAGE (SELF-SERVE)	
29	--	--

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6/14	--	--
2	ALP UPDATE	11/08	PB	FAA
1	PREVIOUS APPROVED ALP	8/00	RC	FAA

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BAGDAD AIRPORT

TERMINAL AREA PLAN

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick

DETAILED BY: Maggie Beaver

APPROVED BY: Jim Harris P.E.

June 5, 2014

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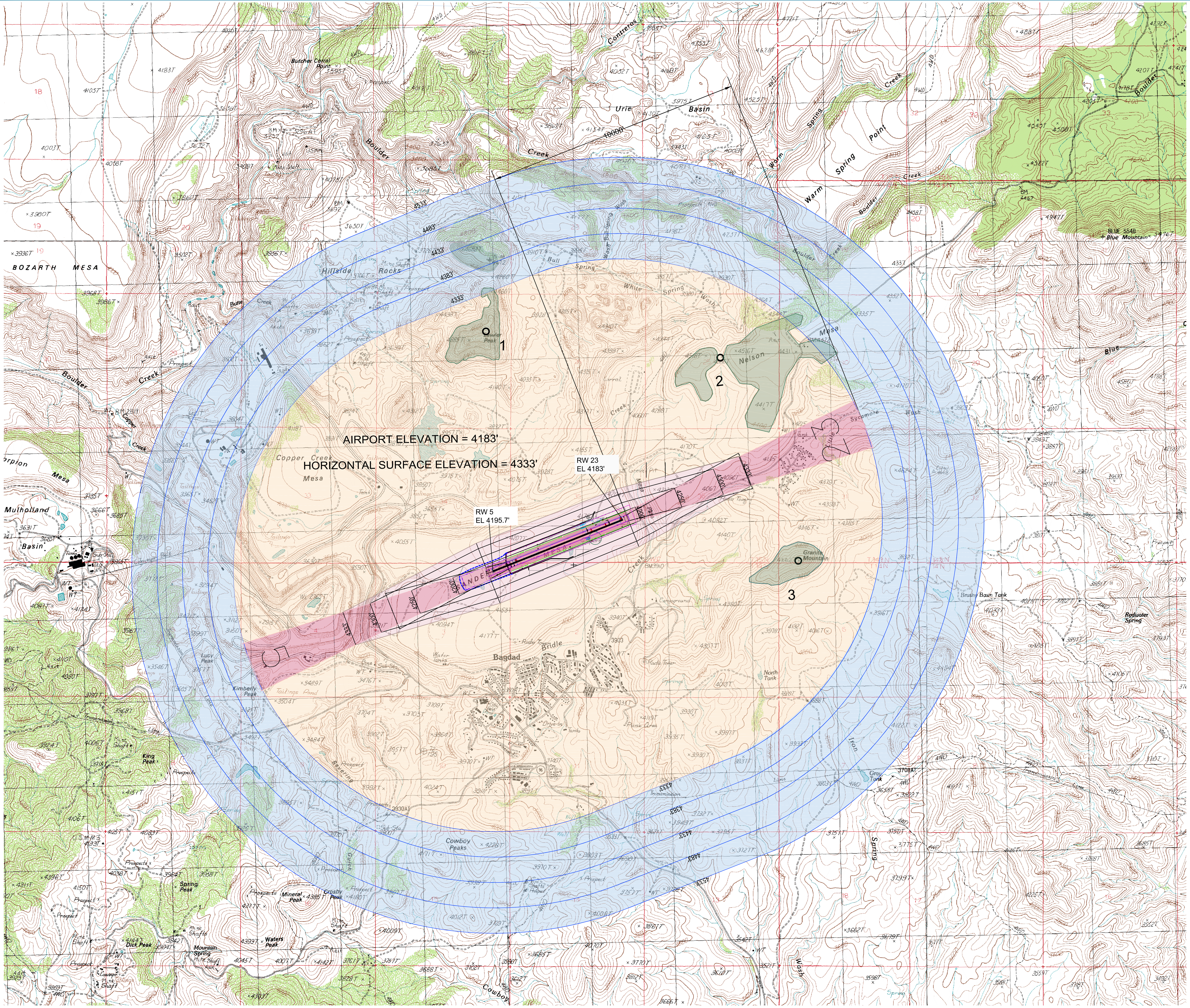
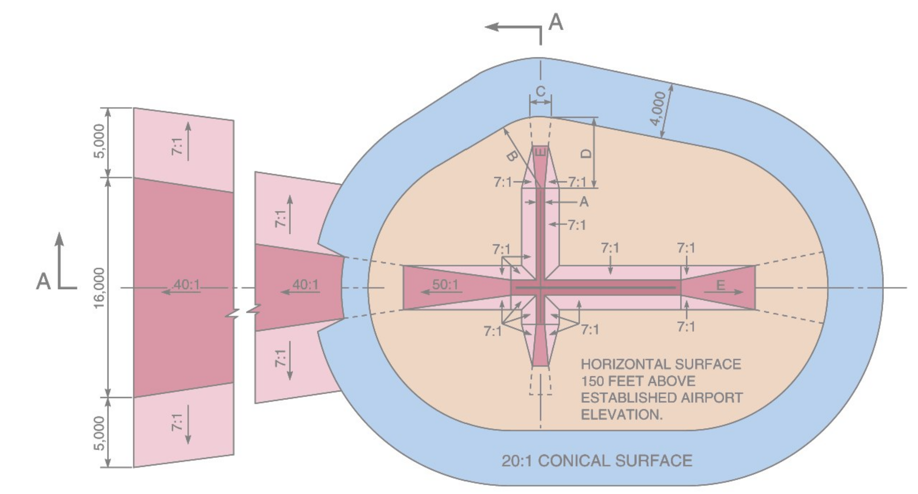
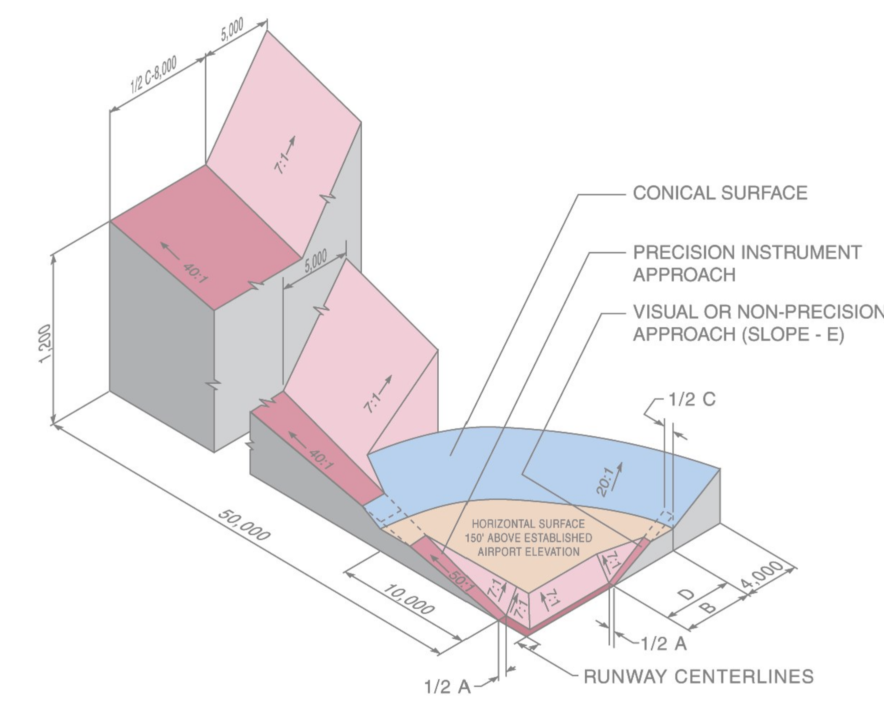
Airport Consultants
www.coffmanassociates.com





DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

GENERAL NOTES:

1. Horizontal Datum: North American Datum 1983–NAD83; Vertical Datum: North American Datum 1988–NAVD88.
3. The following USGS 7.5 Quad Maps were Applied as background: Bagdad, AZ, Big Shipp Mountain, AZ, Behm Mesa, AZ, and Bozarth Mesa, AZ.

Magnetic Declination
11° 15' 19.0"East (March 2014)
Annual Rate of Change
00° 06.3' West (March 2014)

MAG NORTH

0 2000 4000
SCALE IN FEET

OBSTRUCTION TABLE

	Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1	Lawler Peak	4,885'	Horizontal/Conical	4,333'	550'	Request Aeronautical Study
2	Nelson Mesa	4,518'	Horizontal	4,333'	185'	Request Aeronautical Study
3	Granite Mountain	4,662'	Horizontal	4,333'	329'	Request Aeronautical Study
-	--	--	--	--	--	--
-	--	--	--	--	--	--

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6/14	--	--
2	ALP UPDATE	11/08	PB	FAA
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BAGDAD AIRPORT

AIRPORT AIRSPACE DRAWING

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

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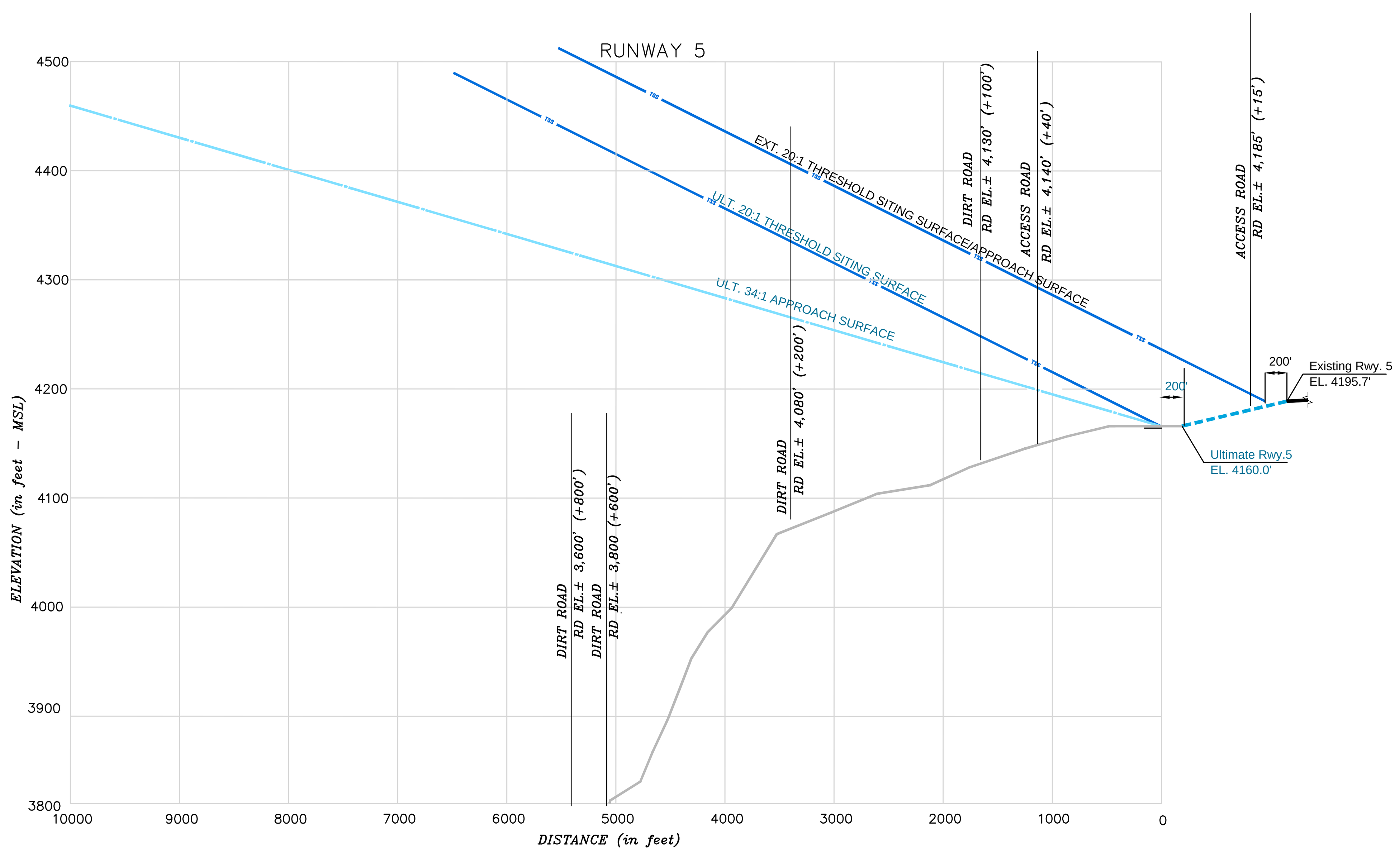
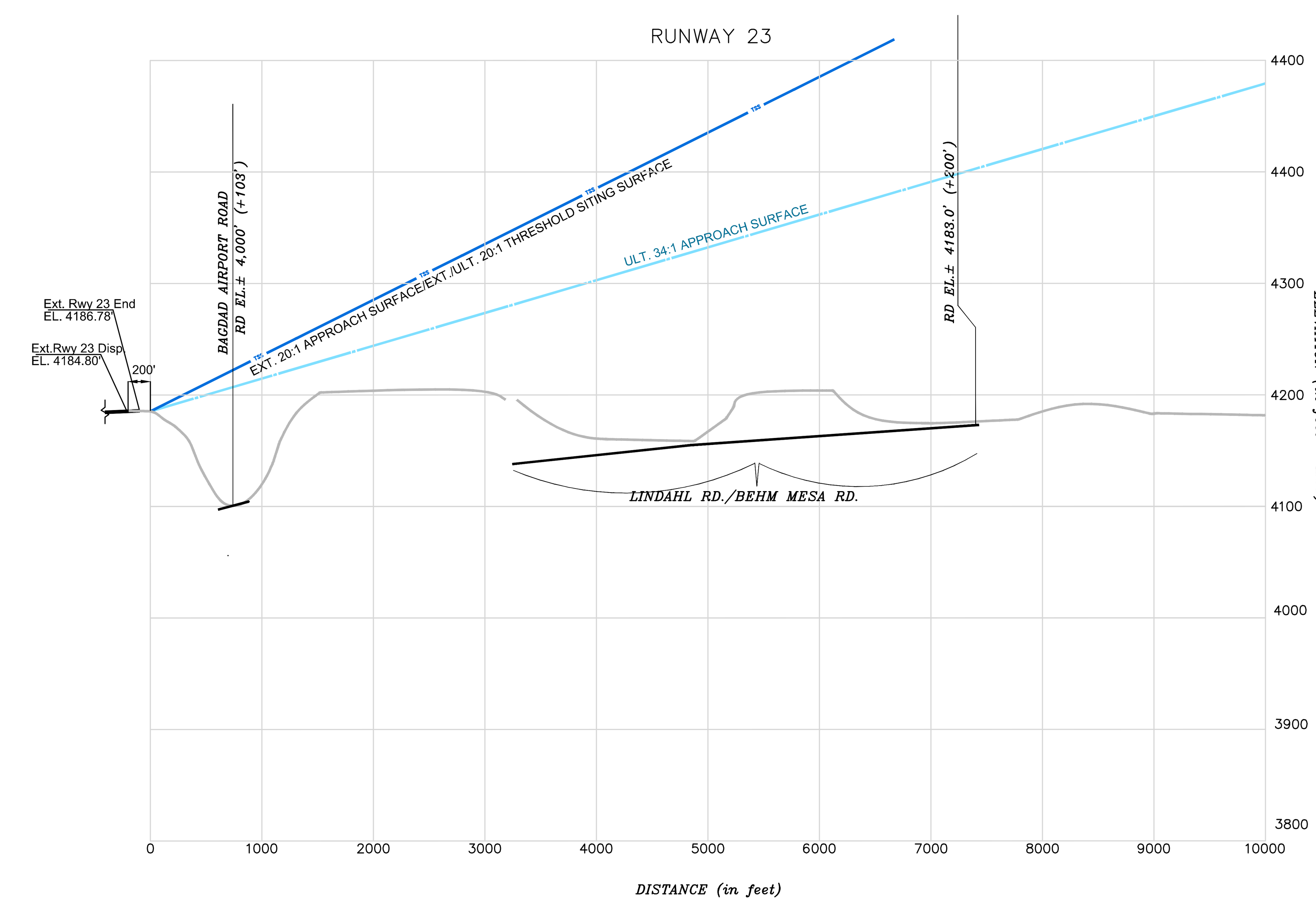
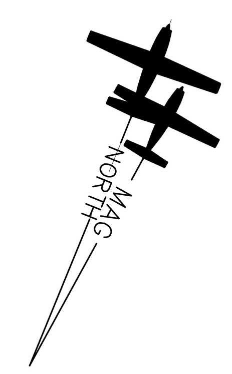
www.coffmanassociates.com







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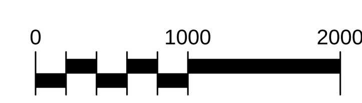
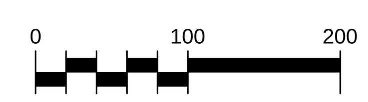


HORIZONTAL SCALE IN FEET



VERTICAL SCALE IN FEET

OBSTRUCTION TABLE

	Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1	Lawler Peak	4,885'	Horizontal/Conical	4,333'	550'	Request Aeronautical Study
2	Nelson Mesa	4,518'	Horizontal	4,333'	185'	Request Aeronautical Study
3	Granite Mountain	4,662'	Horizontal	4,333'	329'	Request Aeronautical Study
-	--	--	--	--	--	--
-	--	--	--	--	--	--

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6/14	--	--
2	ALP UPDATE	11/08	PB	FAA
1	PREVIOUS APPROVED ALP	8/00	RC	FAA

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BAGDAD AIRPORT

OUTER APPROACH SURFACE FOR RUNWAY 5-23

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

SHEET 5 OF 9

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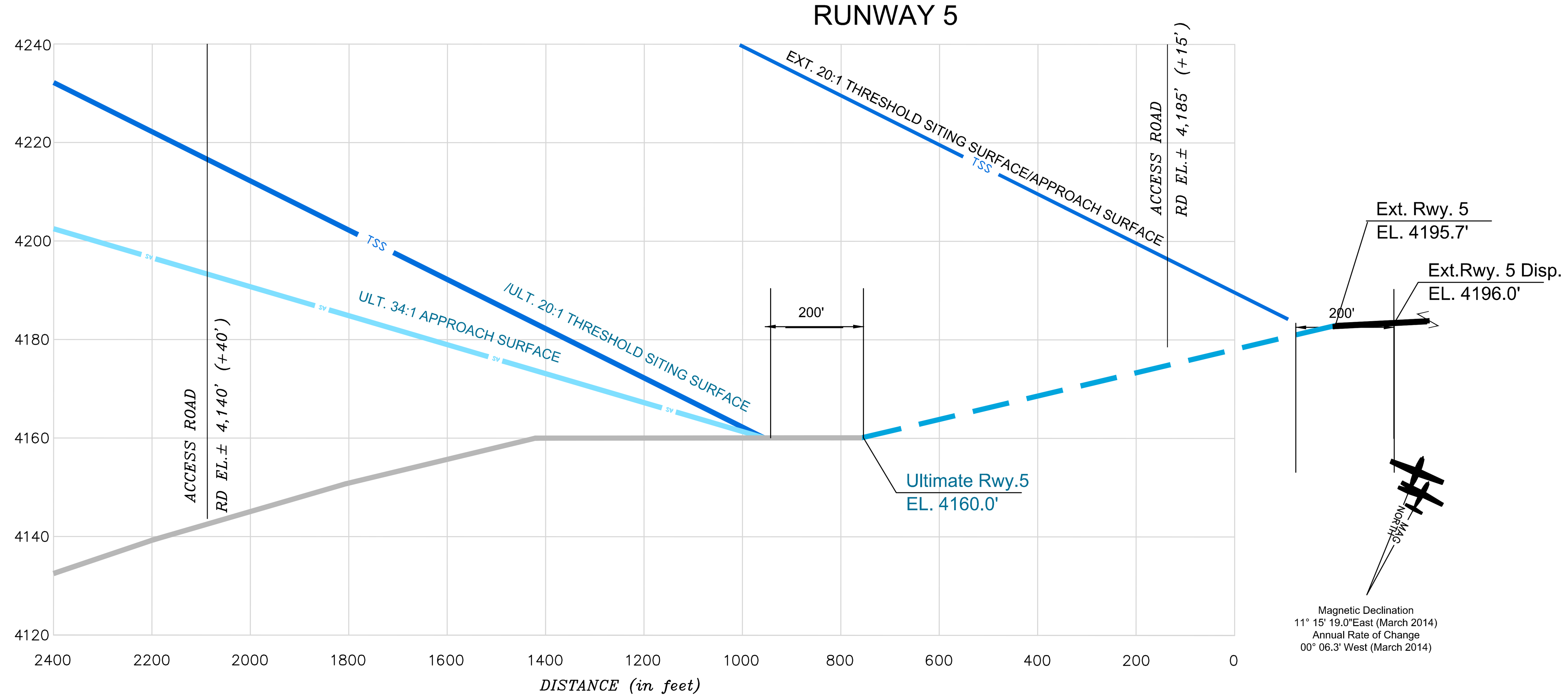
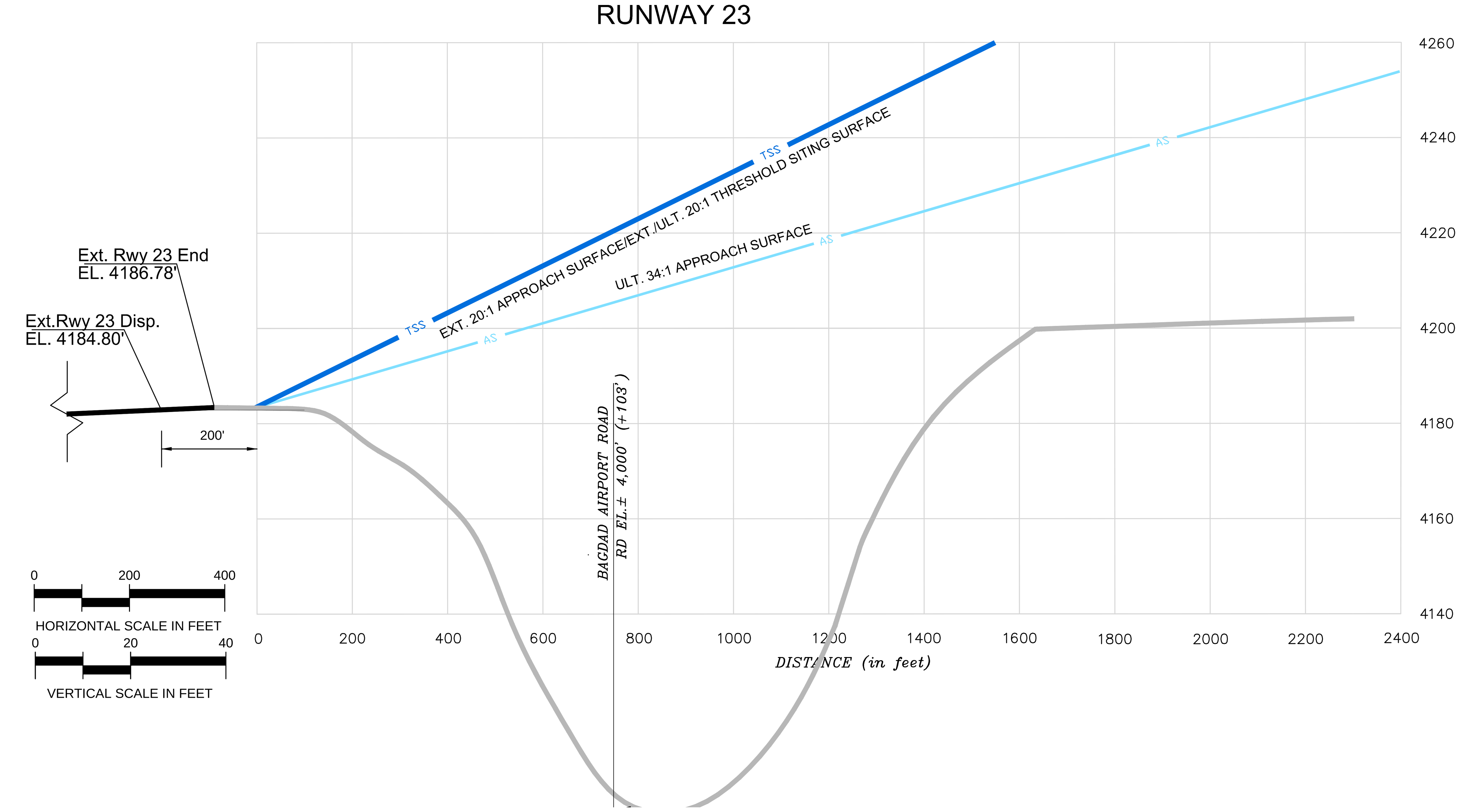
RUNWAY 5



RUNWAY 23



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-	--	--	--	--	--	--
-	--	--	--	--	--	--

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6z/14	--	--
2	ALP UPDATE	11/08	PB	FAA
1	PREVIOUS APPROVED ALP	8/00	RC	FAA

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BAGDAD AIRPORT

INNER APPROACH SURFACE PLAN AND PROFILE FOR RUNWAY 5-23

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

SHEET 6 OF 9

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No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6/14	--	--
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BAGDAD AIRPORT

ON AIRPORT LAND-USE DRAWING

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

SHEET 7 OF 9

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EXISTING PROPERTY DATA

DESIGNATION	ACREAGE	ACQUISITION	UPC #	DATE ACQUIRED	BOOK, PAGE	REMARKS
1	96.2	QUIT CLAIM DEED	NA	3-20-2000	BK 3740 / P 648	YAVAPAI COUNTY IS AIRPORT OWNER
2	96.2	CLEAR ZONE EASMENT	NA	1966	BK 407 / P 488	YAVAPAI COUNTY IS AIRPORT OWNER
3	96.2	CLEAR ZONE EASMENT	NA	1966	BK 407 / P 488	YAVAPAI COUNTY IS AIRPORT OWNER

PROPERTY LEGEND

- Ultimate Property Line
- Ultimate Airport Property
- Existing Property Line
- Existing Airport Property
- Parcel Boundary Line
- Existing Airport Easement

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
3	MASTER PLAN	6z/14	--	--
2	ALP UPDATE	11/08	PB	FAA
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BAGDAD AIRPORT

AIRPORT PROPERTY MAP

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

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Airport Consultants
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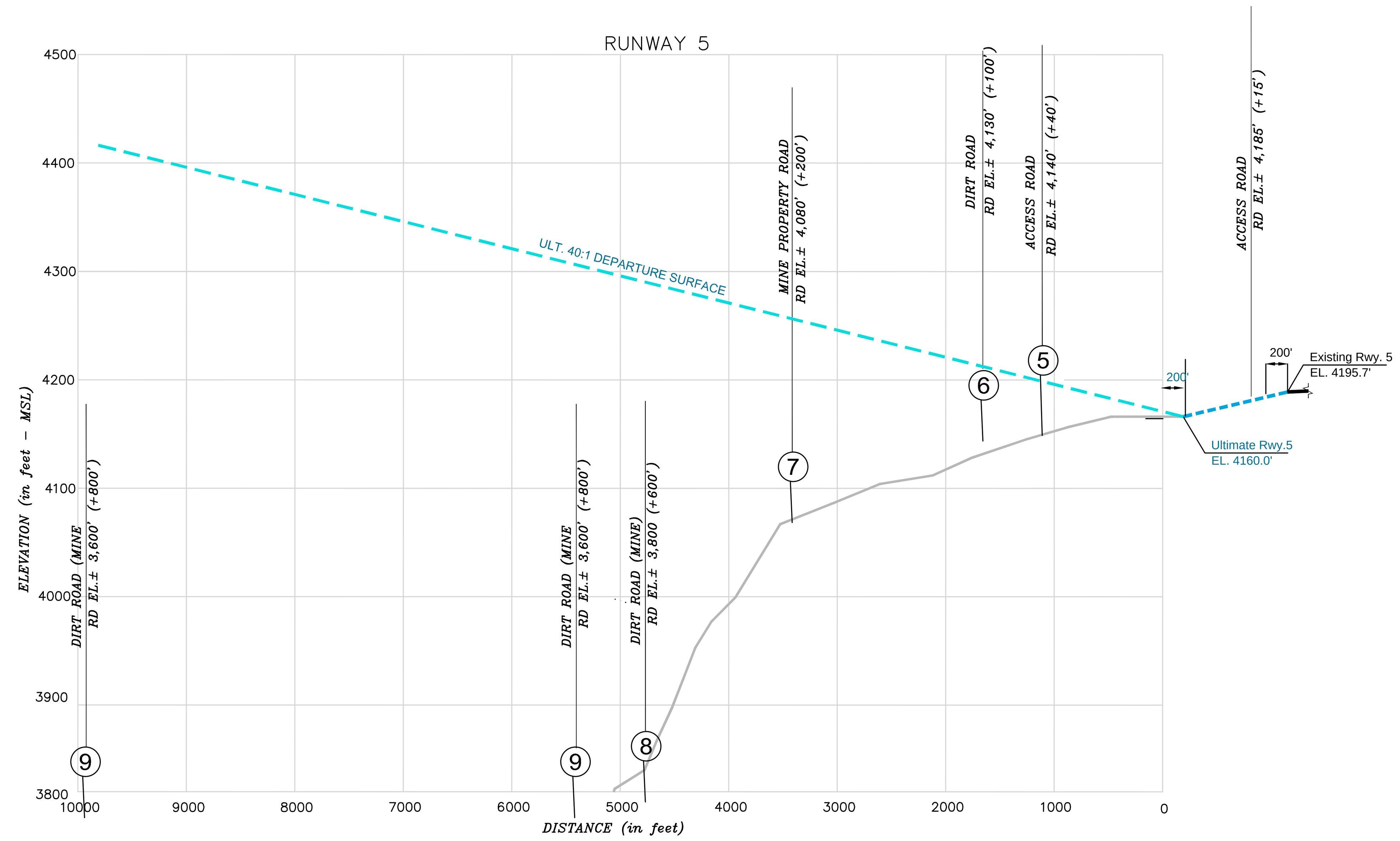

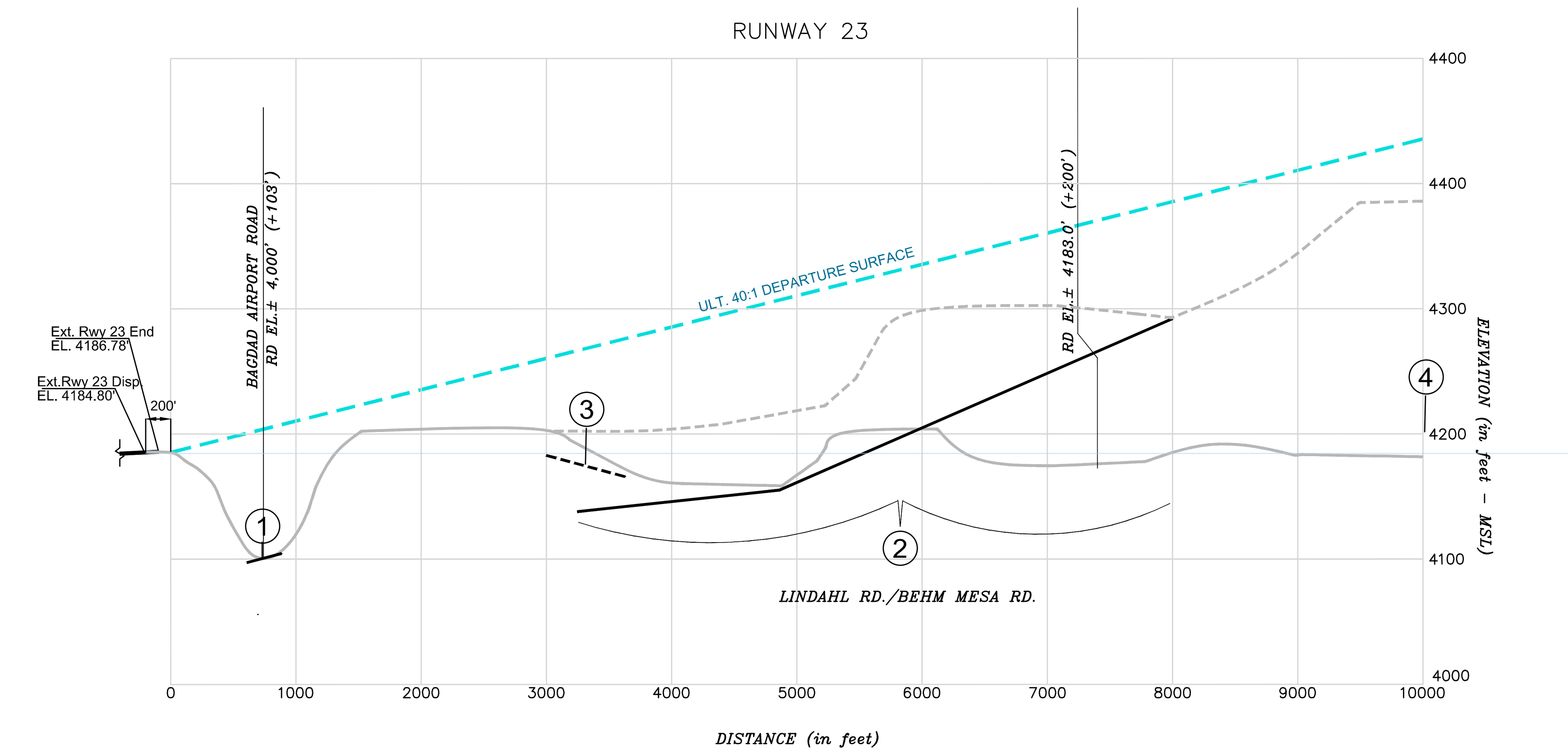

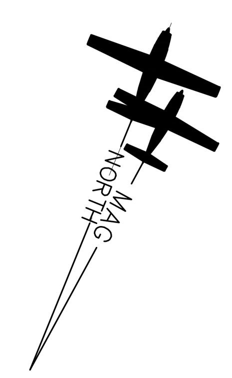

0 1000 2000
HORIZONTAL SCALE IN FEET

0 100 200
VERTICAL SCALE IN FEET

Magnetic Declination
11° 15' 19.0"East (March 2014)
Annual Rate of Change
00° 06.3' West (March 2014)

OBSTACLE IDENTIFICATION SURFACE (OIS)

Object Description/Elevation	40:1 Departure Surface		Obstacle Clearance Requirements (Remove, Relocate, or Lower Object)
	Elevation	Penetrations	
1. BAGDAD AIPORT ROAD	4,000'	-103'	NONE
2. LINDAHL ROAD/BEHM MESA ROAD	4,150'-4,300	-93'-101'	NONE
3. DIRT ROAD	4, 172'	-35'	NONE
4. DIRT ROAD	4,200'	-240'	NONE
5. ACCESS ROAD	4,145'	-15'	NONE
6. MESA DRIVE	4,,140'	-25'	NONE
7. MINE PROPERTY ROAD	4,105'	-100'	NONE
8. DIRT ROAD (MINE)	3,800'	-580'	NONE
9. DIRT ROAD (MINE)	3,600'	-800'	NONE

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted. Road obstructions reflect a safety clearance of 10' for dirt roads or private roads, 15' for noninterstate roads, 17' for interstate roads, and 23' for railroad.

2. Roads and Buildings Clearance of more than 50 feet AGL are not detail in Departure Surface Profiles.

No.	REVISIONS	DATE	BY	APP'D.
5				
4				
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BAGDAD AIRPORT

DEPARTURE SURFACE DRAWING

DRAFT

BAGDAD, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris P.E.

June 5, 2014

Appendix E

FAA FORECAST APPROVAL LETTER

U.S. Department
of Transportation
Federal Aviation Administration

Federal Aviation Administration
Phoenix Airports Field Office

2800 N 44th Street
Suite 510
Phoenix, AZ 85008

October 9, 2013

Ms. Gay Hendin
Airport Grant Administrator
Yavapai County
1100 Commerce Drive
Prescott, Arizona 86305

Dear Ms. Hendin:

Bagdad Airport (E51), Bagdad, Arizona
Aviation Activity Forecast Approval

The Federal Aviation Administration (FAA) has reviewed the aviation forecast for the airport master plan for Bagdad Airport dated September 30, 2013. The FAA approves these forecasts for airport planning purposes, including Airport Layout Plan development.

In summary, while the difference between the FAA TAF and Bagdad's forecast update regarding total operations isn't within the 10 percent and 15 percent allowance for 5 and 10 year planning horizons, the airport forecast update appropriately explains these differences due to the expansion of the copper mine, an increase in based aircraft, and expanded aviation services at the airport over the next few years. Therefore, approval of this forecast doesn't need to be sent to FAA Headquarters for review because the 5 and 10 year forecasts do not exceed benchmarks established in the FAA's Guidance on Review & Approval of Local Aviation Forecasts published in 2008.

The forecast was formulated using current data and appropriate methodologies; therefore the FAA locally approves this forecast for planning purposes at the Bagdad Airport. It is important to note that the approval of this forecast doesn't guarantee future funding for large scale capital improvements as future projects will need to be justified by current activity levels reached at the time the projects are proposed for implementation.

If you have any questions about this forecast approval, please call me at 602-379-3022

Sincerely,

Jared M. Raymond
Airport Planner

cc: Kenn Potts, ADOT, Airport Grant Manager

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